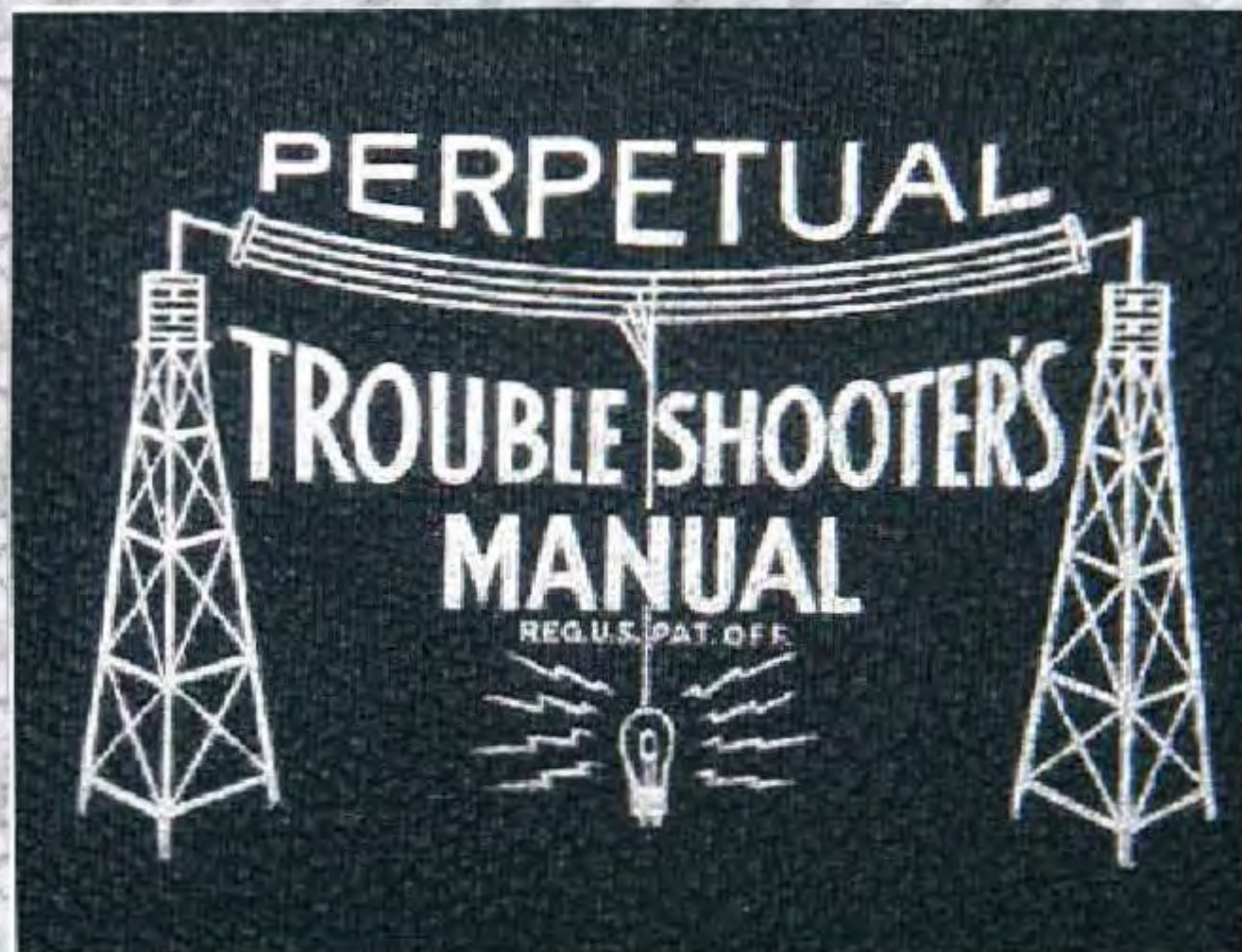
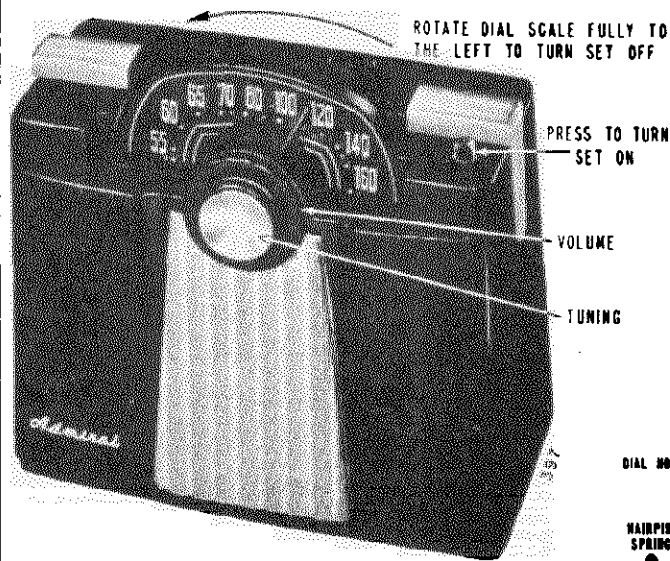


RIDER'S **VOLUME - XXI**



COVERING 1950
PART 2

MODELS 4R11, 4R12,
Ch. 4R1

WEAK RECEPTION DUE TO SLIPPING VOLUME DRIVE CORD.

Weak reception can be caused by the slipping of the volume drive cord. If the set is still weak after the batteries and tubes have been checked, it is a good idea to check the volume drive for slipping. To make this check, first remove the "A" battery from the cabinet and connect outside of the set. Turn the set on and fully rotate the volume knob to the right (clockwise). Then reach into the cabinet and rotate the volume pulley on the volume control as far to the right (clockwise) as it will go. If the volume increases, it will be necessary to remove the chassis from the cabinet and check the stringing of the volume drive cord. See paragraph "Stringing Volume Control Drive".

"HIDE-A-WAY" DIAL

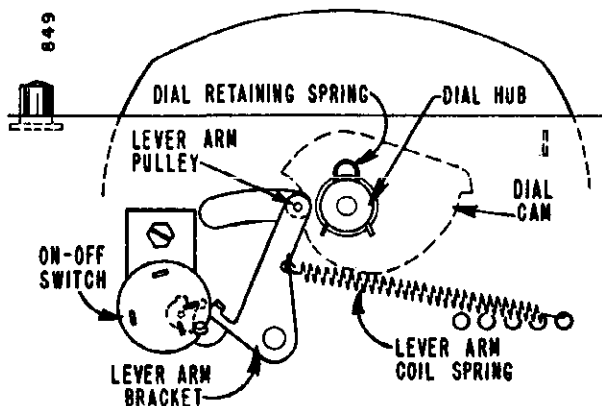
Illustrations below show front, rear and exploded views of dial mechanism. Follow the sequence shown in exploded view for disassembly or reassembly of the knobs, pointer or dial.

The "Hide-A-Way" dial mechanism is operated by the push button which works the trigger release bracket. The trigger bracket releases the dial assembly.

Thrust of the lever arm roller against the cam on back of the dial causes the dial to pop-up while a protruding edge on the lever arm simultaneously trips (turns on) the on-off switch.

Lever arm thrust is adjustable by attaching the far end of the lever arm spring to any of the holes spaced at different distances from the lever arm.

Rotating the dial fully to the left locks the dial into the cabinet and also trips (shuts-off) the on-off switch.



"Hide-A-Way" Dial, Rear View

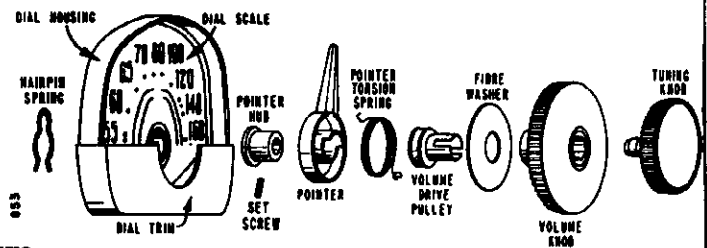
REMOVING AND INSTALLING CHASSIS

To remove the chassis from the cabinet, remove the tuning knobs, cabinet bottom (base) and metal speaker grille. The speaker grille is removed by pulling it down away from the cabinet.

Release the chassis by removing the two mounting screws located in the top inside of the cabinet just below the handle brackets.

Install the chassis in cabinet in the same manner, being sure that the 1 5/16" diameter fibre washer (sleeve retainer) is placed over the volume tuning sleeve just before sliding the chassis into the cabinet.

Also, before tightening the two chassis mounting screws adjust the chassis for even spacing between all sides of the dial and the cut-out in the cabinet, otherwise binding may result. In some early sets, the bottom of the dial can be leveled with the top surface of the cabinet (when dial is fully concealed) by adjusting the bracket adjustment screw called out in the front view illustration of the "Hide-A-Way" dial.

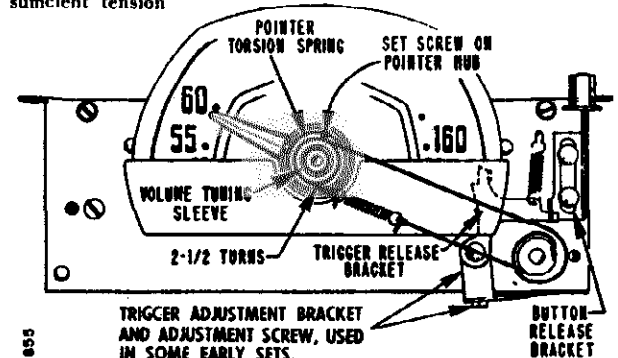


Dial and Tuning Knob Assembly, Exploded View

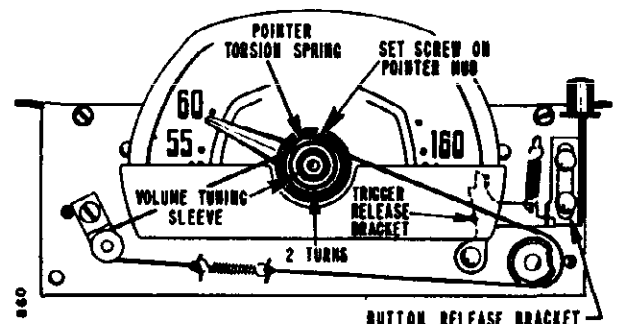
STRINGING VOLUME CONTROL DRIVE

Illustrations below show volume cord stringing used in early and in late production sets.

Before restringing the volume cord, rotate volume control fully clockwise and, using a #6 Allen wrench, tighten the set screw on the volume control pulley, first being sure the cut-out slots on the pulley are in the position shown in the illustration. Loop the cord in the cut-out slots, winding 1 1/2 turns around the volume control pulley, and then winding 2 turns around the volume tuning sleeve. In late sets loop the cord around the fibre pulley to the left of the set. To prevent slipping, be sure that the volume control turns freely and that the dial cord tension spring has sufficient tension.



"Hide-A-Way" Dial, Front View (early set)



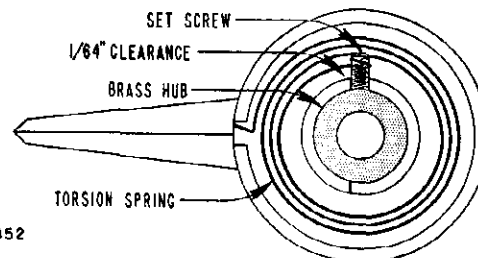
"Hide-A-Way" Dial, Front View (late set)

MODELS 4R11,
4R12, Ch. 4R1

DIAL POINTER

The illustration shows an exploded view of the dial assembly and the sequence in which the pointer hub and torsion spring are to be assembled. When assembling the pointer torsion spring to the pointer, insert the rectangular end into the base of the pointer; compress the spring from about one-half to one turn in a clock-wise direction. Insert the rounded or looped end of the spring over the top end of the pointer set screw. Allow about 1/64" clearance between the inner turn of the pointer spring and pointer hub, or the pointer may bind or stick.

To adjust pointer, fully close the gang condenser. Set the end of the pointer over the two dots below 55 on the dial and tighten the pointer screw with a #4 Allen wrench. Important: Allow approximately 1/32" clearance between the hub on the pointer and the dial scale.



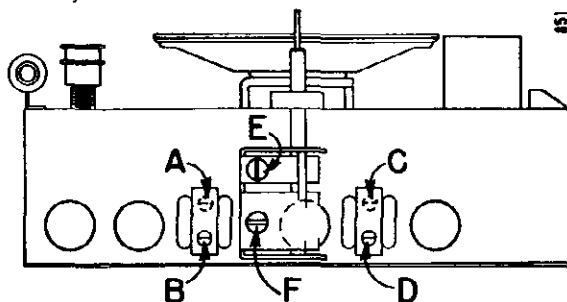
Dial Pointer and Hub Assembly

ALIGNMENT PROCEDURE

- Use battery power for alignment if fresh batteries are available.
- When using AC power, an isolation transformer should be used if available. If not using an isolating transformer, connect a .1 mfd. condenser in series with the signal generator low side to B minus (Pin 7 of 1U5 tube).
- Batteries should be held in chassis during alignment.
- Set volume control full on.
- Connect output meter across speaker voice coil.
- Use lowest setting of signal generator capable of producing adequate output meter indication and then proceed as outlined below.
- Use a non-metallic alignment tool for IF transformers.
- Repeat adjustments to insure good results.

Step	Dummy Antenna in Series with Signal Generator	Connection of Signal Generator (High Side)	Signal Generator Frequency	Receiver Gang Setting	Trimmer Description	Trimmer Designation	Type of Adjustment
1	.001 mfd. when using A. C. .1 mfd. when using Battery	Tuning condenser, antenna stator	455 KC	Gang fully open	2nd IF 1st IF	*A, B *C, D	Maximum output
2	"	"	1620 KC	"	Oscillator (on gang)	E	"
Install metal chassis cover.							
3	Loop of several turns of wire, or place generator lead close to receiver loop for adequate signal.	No physical connection (signal by radiation)	1400 KC	Tune in generator signal	Antenna (on gang)	F	"

*Adjustments A and C are made from other side of chassis.



Trimmer Location, Underside of Chassis

REPLACEMENT OF BATTERIES

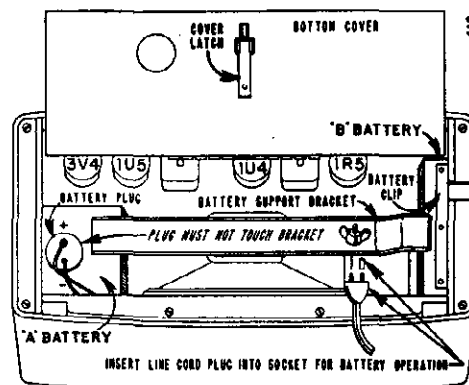
Use replacement "A" and "B" batteries of the following types:

A Battery (7½ Volts): General 31, Eveready 717, Burgess C5, Ray-o-Vac 751C or equivalent.

B Battery (67½ Volts): General 108, Eveready 467, Burgess XX45, Ray-o-Vac 4367 or equivalent.

Electrical characteristics of recommended batteries for these models provide for equal life for both the "A" and "B" batteries. "A" batteries may give satisfactory performance as low as 5.5 volts; "B" batteries as low as 49.5 volts. Replace batteries when reception is weak and voltage has dropped below values given above.

To install replacement batteries, slide the cover latch and open the hinged bottom cover. Then remove the wing nut which holds the battery support bracket in place.

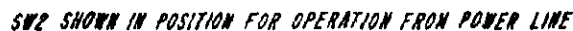


Tube and Battery Location

Disconnect battery connectors from old batteries. Batteries can easily be removed from the set by grasping them with long nose pliers or if necessary removing the cabinet bottom. Install new batteries so battery connectors are farthest away from the ends of the battery bracket. Batteries may become shorted if bracket touches connectors.

REPLACING TUBES

Tubes can most conveniently be removed or replaced by first removing the batteries and cabinet bottom. A miniature tube puller or extractor will be of help in facilitating tube replacement.



- All voltages taken between tube socket terminals and B minus (pin 7 of 1U5 tube).
- Dial turned to low frequency end; volume control at minimum.
- Voltages measured with Vacuum Tube Voltmeter from 117 Volts AC line.

MODELS 4R11,
4R12, Ch. 4R1

MODELS 4R11,
4R12, Ch. 4R1

RESISTORS

Symbol	Description	Part No.
R1	270 ohms, 1/2 watt (was 180 ohms in early sets)	60B 8-271
R2	100,000 ohms, 1/2 watt	60B 8-104
R3	10 Megohms, 1/2 watt	60B 8-106
R4	390 ohms, 1/2 watt	60B 8-391
R5	3.3 megohms, 1/2 watt	60B 8-335
R6	1 megohm, Vol. Control	75B 1-37
R7	120 ohms, 1/2 watt	60B 8-121
R8	10 megohms, 1/2 watt	60B 8-106
*R9	4.7 megohms, 1/2 watt	
*R10	1 megohm, 1/2 watt	
*R11	2.2 megohms, 1/2 watt	
R12	2,200 ohms, 1/2 watt	60B 8-222
R13	47 ohms, 1 watt	60B 14-470
R14	2,700 ohm, 1 watt	60B 14-272
R15A	1380 ohms	Tapped Candohm 61A 5-7
R15B	1380 ohms	

CONDENSERS

C1A	272.3 mmfd. max., Ant.	Gang 68B 34
C1B	107.2 mmfd. max., Osc.	
C2	.25 mfd, 200 volts, paper	64B 1-28
C3	100 mmfd. ceramic	65B 6-3
C4	.01 mfd, 400 volts, paper	64B 1-25
C5	.001 mfd, min. ceramic	65B 6-41
C6	100 mfd, 25 volts, Electrolytic	67A 4-6
C7	100 mmfd. ceramic	65B 6-3
C8	.001 mfd, min. ceramic	65B 6-41
*C9	.005 mfd, min. ceramic	
*C10	100 mmfd, ceramic	
*C11	.005 mfd, ceramic	

*Part of couplet (part #63A4-3). Replace with exact duplicate or individual components. Note that numbers 1, 2, 3, 4, 5, 6, on schematic correspond to lead numbers printed on face of couplet.

C12	.001 mfd, min. ceramic	65B 6-41
C13	.05 mfd, 400 volts, paper	64B 8-28
C14A	30 mfd, 150 volts	
C14B	20 mfd, 150 volts	Electrolytic 67C 7-41
C14C	20 mfd, 150 volts	
C15	.1 mfd, 200 volts, paper	64B 1-30

COILS, TRANSFORMERS, ETC.

L1	Antenna, Rod (Ferro-Scope)	69C 120
L2	Coil, Oscillator	69A 39-4
T1	Transformer, 1st IF	72B 28-1
T2	Transformer, 2nd IF	72B 28-61
T3	Transformer, Output	98A 21
M1	Speaker (3 1/2" PM) and Output Trans.	78B 58-1
M2	Rectifier, Selenium	93A 1-8
SW1	Switch, On-Off, DPST, (less bracket)	77A 23
SW2	Switch, Power Change	77A 19-1

*Couplet (includes R9, R10, R11, C9, C10, C11) 63A 4-3

PARTS FOR "HIDE-A-WAY" DIAL

Description	Part No.
Dial Cord (for volume control)	50A 1-3
Dial Scale	
Ebony for 4R11	22C 25-4
Maroon for 4R12	22C 25-1
Housing Assembly, Metal (for dial scale, includes hub and cam)	
Ebony for 4R11	A3264
Maroon for 4R12	A3256
Hub, Brass (for dial pointer)	27A 151
Pointer, Dial	25A 40
Pulley, Brass (volume tuning sleeve)	27A 149
Screw (#6x5/8 S.T.B.H.—for mtg. dial trim)	1A 71-9-71
Screw, Set (#4-40x5/16—for dial pointer hub)	1A 43-4
Spring, Hairpin (for mtg. dial assembly)	19A 2-8
Spring, Pointer Torsion	19A 63
Trim, Plastic (front bottom of dial housing)	
Ebony for 4R11	33B 60-1
Maroon for 4R12	33B 60-2

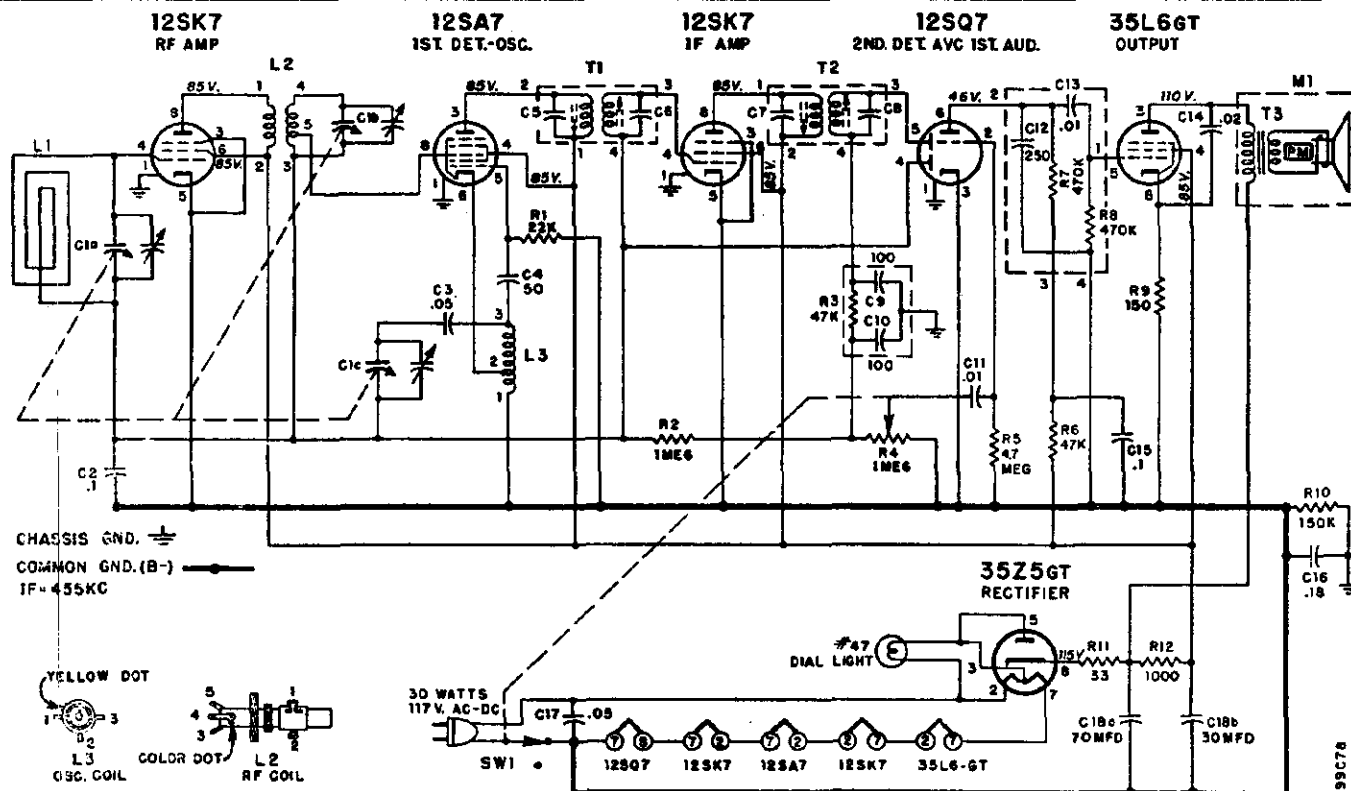
CABINET PARTS

Bottom, Cabinet (Base)	
Ebony for 4R11	
complete with metal door	A3270
plastic frame only	34D 35-2
Maroon for 4R12	
complete with metal door	A3260
plastic frame only	34D 35-1
Bracket, Handle Support (metal ends)	20B 14
Button, Push	
Ebony for 4R11	33A 61-1
Maroon for 4R12	33A 61-2

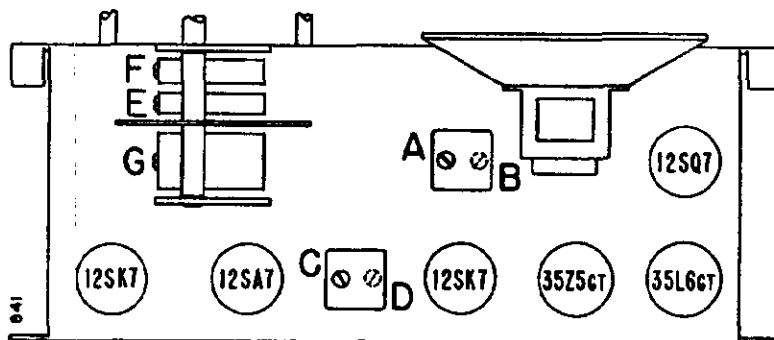
Description	Part No.
Cabinet (less bottom)	
Ebony for 4R11	A3271
Maroon for 4R12	A3273
Catch, Slide (for bottom door)	15A 291
Grille, Speaker (metal)	
Ebony for 4R11	36B 14-1
Gold for 4R12	36B 14
Handle, Carrying (plastic covering only)	
Ebony for 4R11	33A 58-1
Maroon for 4R12	33A 58-2
Hinge, Bottom Cover	37A 33
Knob	
Volume, Ebony	33C 56-2
Volume, Maroon	33C 56-4
Tuning, Ebony (includes compression ring)	A3272
Tuning, Maroon (includes compression ring)	A3274
Monogram ("Admiral")	26A 36
Ring, Compression (for tuning knob)	18A 5-5
Rivet, Shoulder	
with 5/64 shoulder	6A 4-2-2
with 7/64 shoulder	6A 4-12-71
with 15/64 shoulder	6A 4-11-2
with 3/32 shoulder	6A 4-7-71
Washer, Felt (for volume knob)	5A 4-17
Washer, Fibre (1 5/16" ODx 7/16" ID; for retaining volume pulley)	5A 1-17
Rubber Strap (for carrying handle)	12A 38
Screw	
#4x1/8 self tapping; for mtg. plastic base to cabinet	1A 69-6-71
#8-32x7/16; for mtg. handle and chassis	280-437-C2-71
Slide Arm (for bottom door)	15A 291
Spacer, Brass (for mtg. carrying handle)	29A 1-54
Spring, Support (for carrying handle)	18A 42

MISCELLANEOUS PARTS

Baffle, Speaker	43A 111
Bracket	
on-off switch mounting	15A 602
battery support	15A 603
button release	15A 599
trigger release and adjustment bracket assembly	A3253
(used in early sets only)	
trigger release bracket only	15A 600
volume pulley and bracket assy.	A3316
(used in late sets only)	
shield for gang	15A 618
cover for AC switch	15A 595
lever arm assembly	A3254
Carton and Fillers	44B 165
Clip, IF Transformer mounting	72B 28-10
Clip "B" Battery Connector	90A 5-3
Cover, Metal	
for chassis	14C 70
for AC switch	15A 595
Dial Cord (24" length needed)	50A 1-3
Insulator, Fibre (for mtg. rectifier)	32A 137
Manual	
Customers Instruction	41A 18-16
Service Manual	S322
Nut, Wing (#6/32 for battery support bracket)	2A 5-4-71
Plate, Electrolytic Mounting	67A 2-1
Plug, "A" Battery Connector	88A 4-6
Pulley, Brass	
mounts on volume control shaft	27A 150
drive for volume control cord	27A 149
riveted to lever arm	27A 146
Screw, Set	
for volume control pulley (#6-32x3/16)	1A 43-8
for pointer hub (#4-40x5/16)	1A 43-4
Snap Button (for mtg. AC switch cover)	13A 1-1-71
Socket, Tube	87A 3-4
Speed Nut, #5/32 (for trigger adjustment bracket)	2B 10-12
Spring, Coil	
for dial release bracket (1/2"x3/16" dia.)	19B 1-18
for lever arm (1 3/4" long)	19A 64
for dial cord (volume control) (7/16"x1/8" dia.)	19B 1-16
Spring, Hairpin (for retaining dial housing)	19A 2-6
Washer, Spring (5/16"ODx3/16"ID)	4A 6-13

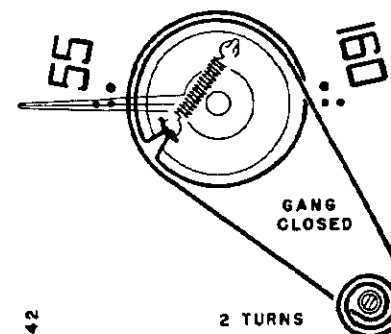


TUBE AND TRIMMER LOCATION



Adjustments B and D are made from underside of chassis.

POINTER SETTING AND DIAL CORD STRINGING



With gang fully closed, set
pointer in horizontal position.

MODELS 6A21, 6A22,
6A23, Ch. 6A2

ALIGNMENT PROCEDURE

- Turn receiver volume control full on.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator, and connect to B minus (terminal of On-Off switch).
- Caution: Do not connect a ground wire directly to chassis.
- Connect output meter across speaker voice coil.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and then proceed as outlined in chart below.
- Repeat adjustments to insure good results.
- Use a non-metallic alignment tool for IF transformers.

Step	Dummy Antenna in Series with Signal Generator	Connection of Signal Generator (High Side)	Signal Generator Frequency	Receiver Gang Setting	Trimmer Description	Trimmer Designation	Type of Adjustment
1	250 mmfd. condenser	Pin 8 of 12SA7 tube	455 KC	Gang fully open	2nd IF 1st IF	A, *B C, *D	Maximum Output
2	250 mmfd. condenser	Tuning condenser Antenna stator	1620 KC	"	Oscillator (on gang)	E	"
3	Loop of several turns of wire (or place generator lead close to receiver loop for adequate signal)	No physical connection (signal by radiation)	1400 KC	Tune in Generator signal	RF (on gang)	F	"
4	"	"	"	"	Antenna (on gang)	G	"

*Adjustments B and D are made from underside of chassis.

VOLTAGE DATA

- All voltages taken between tube socket terminals and B minus (terminal of On-Off switch).
- Dial turned to low frequency end; volume control at minimum.
- Voltages measured with Vacuum Tube Voltmeter from 117 Volts AC line.

RESISTORS

Symbol	Description	Part No.	Symbol	Description	Part No.	Symbol	Description	Part No.
R1	22,000 Ohms, ½ Watt	60B 8-223	†C12	.01 mfd., 400 Volts, Paper	64B 1-25	Cabinet, Plastic		
R2	1 Megohm, ½ Watt	60B 8-105	†C13	.01 mfd., Ceramic		Ebony (6A21)		34D 25-1
†R3	47,000 Ohms, ½ Watt		C14	.02 mfd., 400 Volts, Paper	64B 1-24	Mahogany (6A22)		34D 25-2
R4	1 Megohm Volume Control		C15	.1 mfd., 200 Volts, Paper	64B 1-30	Ivory (6A23)		34D 25-3
	and On-Off switch SW1	75B 1-36	C16	.18 mfd., 200 Volts, Paper	64A 2-2	Clip, Tinnerman (for mtg. escutcheon)		2B 10-6-69
R5	4.7 Megohms, ½ Watt	60B 8-475	C17	.05 mfd., 400 Volts, Paper	64B 1-22	Escutcheon, Dial, (Plastic)		23D 46-3
R6	47,000 Ohms, ½ Watt	60B 8-473	C18a	70 mfd., 150 Volts	Elect	Knob, Tuning		
†R7	470,000 Ohms, ½ Watt		C18b	30 mfd., 150 Volts		Ebony (6A21)		33A 21-11
†R8	470,000 Ohms, ½ Watt					Mahogany (6A22)		33A 21-12
R9	150 Ohms, ½ Watt	60B 8-151				Ivory (6A23)		33A 21-13
R10	150,000 Ohms, ½ Watt	60B 8-154				Shield, Fibre (for pilot light)		32A 138
R11	33 Ohms, 1 Watt	60B 28-3				Washer, Felt (for tuning knobs)		5A 4-4
R12	1,000 Ohms, 1 Watt	60B 28-2						

CONDENSERS

C1a	420 mmfd. (max) Ant.				
C1b	193.8 mmfd. (max) RF	Gang, 68B 33-2			
C1c	90 mmfd. (max) Osc.				
	(Dial drum spot welded to gang)				
C2	.1 mfd., 200 Volts, Paper	64B 1-30			
C3	.05 mfd., 400 Volts, Paper	64B 1-22			
C4	50 mmfd., Mica	65B 6-4			
C5	85 mmfd., part of T1				
C6	107 mmfd., part of T1				
C7	85 mmfd., part of T2				
C8	107 mmfd., part of T2				
††C9	100 mmfd., Ceramic				
††C10	100 mmfd., Ceramic				

COILS, TRANSFORMERS, Etc.

L1	Antenna, Loop	69C 19-1			
	(mounted on cardboard back)				
L2	Coil, RF	69A 115-1			
L3	Coil, Oscillator	69A 52-2			
T1	Transformer, 1st I.F.	72B 28-7			
T2	Transformer, 2nd I.F.	72B 28-7			
T3	Transformer, Output	98A 4			
M1	Speaker (5" PM) and				
	Output Transformer	78B 57-2			
SW1	Switch, On-Off	Part of R4			
	†Couplate	63A 5-1			
	(Includes R7, R8, C12, C13,				
	††Diode Filter	63A 3-1			
	(Includes R3, C9, C10)				

CABINET PARTS

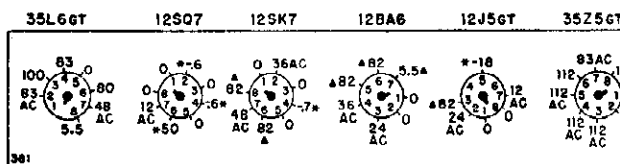
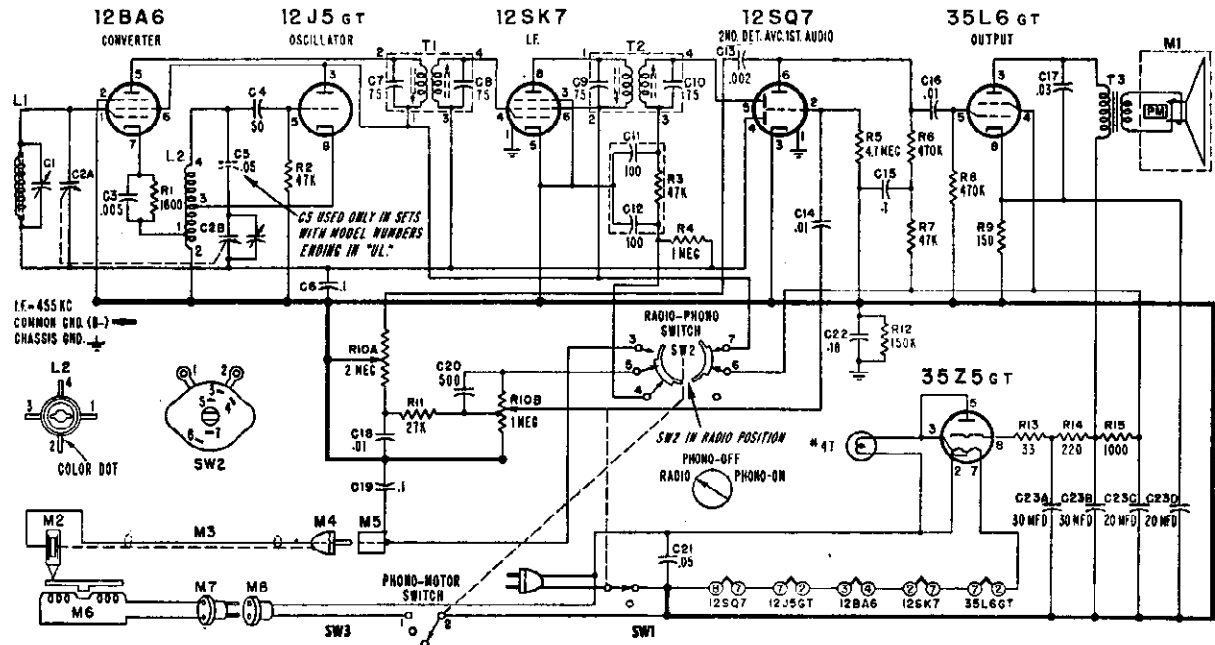
Back Assembly (includes L1 loop antenna)	69C 19-1
--	----------

MISCELLANEOUS

Baffle, Speaker	43B 74
Carton and Fillers	44B 150
Clip, IF Transformer Mounting	72B 28-10
Dial Background	22B 24
Dial Cord	50A 1-3
Fastener (for mtg. speaker baffle)	8A 8-4
Grommet, Rubber (for mtg. gang)	12A 1-2
Pilot Light #47	81A 1-8
Pointer, Dial	25A 39
Ring, Pointer Compression	19A 31-1
Service Manual	S320
Shaft, Tuning	28A 11-3
Snap Button, Dial Background Mtg.	13A 1-3-47
Socket, Pilot Light	82A 3-4
Socket, Tube	87A 10-2
Spacer, Metal "T" (for mtg. gang)	29A 2-1-71
Spacer, Speaker Mounting	23A 1-17
Sponge Rubber, (for dial background)	12A 5-17
Spring, Dial Cord Tension	19B 1-2
Washer, "C" (tuning shaft)	4A 4-5
Washer, Spring (tuning shaft)	4A 6-3-0

†Part of couplate (part 63A 5-1). Replace with exact duplicate or individual components. Note that numbers 1, 2, 3, 4, on schematic correspond to couplate lead numbers printed on face of couplate 63A 5-1.

††Part of diode filter (part 63A 3-1). Replace with exact duplicate or individual components.

MODELS 6S11,
6S12, Ch. 6S1

VOLTAGE DATA

- All readings made between tube socket terminals and B minus (terminal of On-Off switch).
- Range Switch in "Radio" position.
- Measured on 117 Volt AC line.
- Volume control minimum; dial turned to low end.
- Voltages measured with Vacuum Tube Voltmeter.

* If taken with a 1000 ohm-per-volt meter, readings will be either lower or practically zero.
 * On "Phono" these voltages will be zero. All other DC readings may be slightly higher.

RESISTORS

Symbol	Description	Part No.
R1	1,600 Ohms, 1/2 Watt, 5%	60B 7-162
R2	47,000 Ohms, 1/2 Watt	60B 8-473
R3	47,000 Ohms, 1/2 Watt	60B 8-473
R4	1 Megohm, 1/2 Watt	60B 8-105
R5	4.7 Megohms, 1/2 Watt	60B 8-475
R6	470,000 Ohms, 1/2 Watt	60B 8-474
R7	47,000 Ohms, 1/2 Watt	60B 8-473
R8	470,000 Ohms, 1/2 Watt	60B 8-474
R9	150 Ohms, 1 Watt	60B 14-151
R10A	2 Megohms, Tone	75B 11-8
R10B	1 Megohm, Volume	75B 11-8
R11	27,000 Ohms, 1/2 Watt	60B 8-273
R12	150,000 Ohms, 1/2 Watt	60B 8-154
R13	33 Ohms, 1 Watt	60B 28-3
R14	220 Ohms, 1 Watt	60B 28-7
R15	1,000 Ohms, 1 Watt	60B 28-2

CONDENSERS

C1	Trimmer, 3 to 30 mmfd.....	Part of L1
C2a	Gang-0 to 420 mmfd.	} 68B 30
C2b	Gang-0 to 108 mmfd.	
Note—Dial drum spot welded to Gang.		
C3	.005 mfd., min., Ceramic	65A 10-1
C4	50 mmfd., Ceramic	65B 6-4
C5	.05 mfd., 400 Volts, Paper	64B 1-22
C6	.1 mfd., 200 volts, Paper	64B 1-30
C7	75 mmfd., 3%, Ceramic	Part of T1
C8	75 mmfd., 3%, Ceramic	Part of T1
C9	75 mmfd., 3%, Ceramic	Part of T2
C10	75 mmfd., 3%, Ceramic	Part of T2
†C11	100 mmfd., Ceramic	} 64B 1-30
†C12	100 mmfd., Ceramic	
C13	.002 mfd., 600 Volts, Paper	64B 1-14
C14	.01 mfd., 400 Volts, Paper	64B 1-25
C15	.1 mfd., 200 Volts, Paper	64B 1-30
C16	.01 mfd., 400 Volts, Paper	64B 1-25
C17	.03 mfd., 400 Volts, Paper	64B 1-23
C18	.01 mfd., 400 Volts, Paper	64B 1-25
C19	.1 mfd., 200 Volts, Paper	64B 1-30
C20	500 mmfd., Ceramic	65B 6-6
C21	.75 mfd., 400 Volts, Paper	64B 1-22
C22	.18 mfd., 200 Volts, Paper	64A 2-2
C23a	30 mfd., 150 Volts	} Elect. 67A 14-1
C23b	30 mfd., 150 Volts	
C23c	20 mfd., 150 Volts	
C23d	20 mfd., 25 Volts	

COILS, TRANSFORMERS, ETC.

Symbol	Description	Part No.
L1	Antenna and Trimmer	69C 118
L2	Coil, Oscillator	69A 113-1
T1	Transformer, 1st IF	72B 50
T2	Transformer, 2nd IF	72B 51
T3	Transformer, Output	79A 11-4
M1	Speaker (5" pm)	78B 39-1
M5	Socket, Phono Input	88A 1
M8	Socket & Leads, Motor	89A 6-3
SW1	Switch, On-Off	Part of R10
SW2	Switch, Radio-Phono	77A 28-1
SW3	Switch, Phono Motor	Part of SW2
†	Diode Filter	63A 3-1

MISCELLANEOUS

Carton and Fillers	44B 145
Clip, Electrolytic Mounting	18A 10-6
Cover, Plastic Shaft	45C 11-3
Dial Cord	50A 1-3
Drum, Pointer	17A 27
Gasket, Sponge Rubber (mounts on Speaker)	12A 5-16
Grommet, Rubber (Gang mtg.)	12A 1-2
Insulator, Phono Receptacle	32A 46
Manual	41A 17-45
Service, for 6S1 Chassis	3298
Service, for RC500 Changer	3298
Pilot Light, #47	81A1-6
Pilot Light Socket and Leads	82A2-2
Plate, Pointer Support	65A 498
Pointer, Dial	25A 35-1
Shaft, Pointer	28A 42
Shield, Pilot Light	82A 15-1
Sleeve, Pointer Shaft	27A 124
Sleeve, Tuning (Brass)	27A 123
Spacer, "T" (Gang condenser mtg.)	29A 2-1-71
Spring, Dial Cord Tension	18B 1-5
Socket, Tube (12BA6)	87A 32
Washer, "C" (for pointer drum)	4A 4-6
Washer, Spring	4A 6-10-0

CABINET PARTS

Cabinet, Plastic	34D 28-3
Bottom, less lid (Ebony 6S11)	34D 28-5
Bottom, less lid (Mahogany 6S12)	34D 28-4
Lid only (Ebony 6S11)	34D 28-6
Lid only (Mahogany 6S12)	34D 28-5
Clamp, Cable	11A2-3
Escutcheon, Dial	23C 51-1
Escutcheon Ring (Gold trim)	23A 53
Hinge	37A 8-1

Description	Part No.
Hinge Screw (6/32x1/4 BH MS)	365-250-C2-58
Hinge Stud	27A 17-1
Jewel, Pilot Light	82A 14-1
Knobs, Radio, for Ebony 6S11	33C 55-11
"Tuning" (outer knob)	33C 55-12
"Radio-Phono" (inner knob)	33C 55-14
"Off-On Volume" (inner knob)	33C 55-13
"Tone" (outer knob)	33C 55-13
Knobs, Radio, for Mahogany 6S12	33C 55-11
Two types of knobs were used. Early 6S12 sets used dual knobs having an inner knob with a recessed bar. Later 6S12 sets used dual knobs having an inner knob with a raised bar.	
"Tuning"	33C 48-26
"Radio-Phono"	33C 48-23
"Off-On Volume"	33C 48-24
"Tone"	33C 48-25
"Tuning"	33C 55-7
"Radio-Phono"	33C 55-8
"Off-On Volume"	33C 55-10
"Tone"	33C 55-9
Rubber Bumper for cabinet bottom	12A 3-4
Rubber Bumper for cabinet top	12A 9-9
Speed Nut (for mtg. pilot light jewel)	2B 10-28-59
Spring, Escutcheon Mtg. (2 req.)	19A 60
Stay Arm and Plate	37A 9-1
Washer, Felt (for tuning knobs)	5A 4-9

PHONOGRAPH PARTS

M2	Cartridge, Pickup (includes needle)	409A 13
M3	Cable, Shielded Pickup (includes plug)	412A 11-2
M4	Plug, Pickup Cable	88A 2-3
M5	Motor, Phono (3 speed)	407B 19
M7	Plug, Motor (Male)	88A 8-1
	Adapter, 45 RPM (envelope of 12)	48A 8-1
	Button, Snap-in Plug	13A 2-8-57
	Centerpost, Record	G400B 505
	Idle Wheel (includes tire)	G400A 279
	Needle, Pickup for 409A13 cartridge	98A 15-19
	Needle, Pickup for 409A13-1 cartridge	98A 15-18
	Needle Retaining Nut (for 409A13 cartridge)	98A 54-2
	Service Manual, RC500	S298
	Screw and Washer Changer Mounting (10-32x1¼ RHMS)	AA210
	Spring, Changer Float	19A 10-3

† Part of Diode Filter 63A3-1. This unit, consisting of C11, C12 and R3 may be replaced with individual components.

MODELS 6S11,
6S12, Ch. 6S1

ALIGNMENT PROCEDURE

- Turn receiver volume and tone controls full on.
- Antenna must be connected and placed in the same relative position to the chassis as when in cabinet.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and attach to B minus of chassis (terminal of On-Off Switch). Caution: Do not connect a ground wire directly to chassis.
- Connect output meter across speaker voice coil.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and proceed in the following sequence.
- Repeat adjustments to insure good results.
- Use a non-metallic alignment tool for IF transformers.

Step	Dummy Antenna in Series with Signal Generator	Connection of Signal Generator (High Side)	Signal Generator Frequency	Receiver Gang Setting	Trimmer Description	Trimmer Designation	Type of Adjustment
1	250 mmfd. condenser	Tuning condenser, antenna stator	455 KC	Gang fully open	2nd IF 1st IF	*A, B *C, D	Maximum output
2	250 mmfd. condenser	Tuning condenser, antenna stator	1620 KC	Gang fully open	Oscillator	E	Maximum output

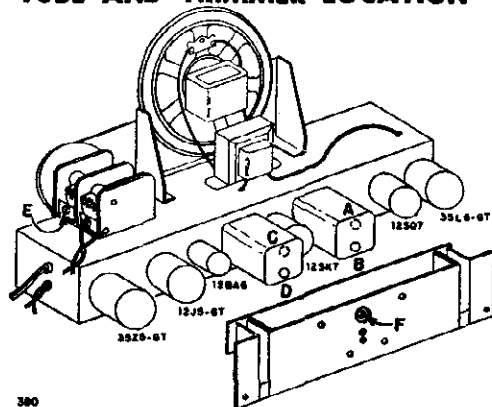
Mount dial pointer. Set pointer to horizontal position with tuning condenser tuned to 1400 KC generator signal (see illustration below). Rotate the tuning condenser until the pointer is in a vertical position (900 KC), then slip chassis in cabinet, carefully guiding the pointer so that it locates between the dial escutcheon and the cabinet. Install antenna and chassis mounting bolts. The pointer and escutcheon may be mounted after installing the chassis in cabinet as follows: Set pointer to horizontal position with gang tuned to 1400 KC signal. Place escutcheon on cabinet. With long nose pliers slip the hairpin ends of the escutcheon mounting springs in holes of escutcheon tabs.

3	Loop of several turns of wire, or place generator lead close to receiver antenna for adequate signal.	No actual connection (signal by radiation)	1400 KC	Tune in generator signal	Antenna	†F	Maximum output
---	---	--	---------	--------------------------	---------	----	----------------

*Adjustments A and C made from the underside of the chassis. If IF transformers have hollow core slugs, these adjustments may all be made from the top of chassis, if you use alignment tool #98A30-7 obtainable from your Admiral distributor. The bottom IF slug adjustment may be reached through the hollow core in the upper slug.

†Antenna Trimmer "F" should be aligned after chassis and antenna are mounted in cabinet.

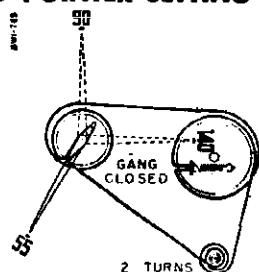
TUBE AND TRIMMER LOCATION



Adjustments A and C made from underside of chassis.

DIAL STRINGING AND POINTER SETTING

Dial stringing and pointer with solid lines shown with gang closed. Dashed line pointer positions (1400 KC and 900 KC) shown when tuning condenser is tuned to generator signal.

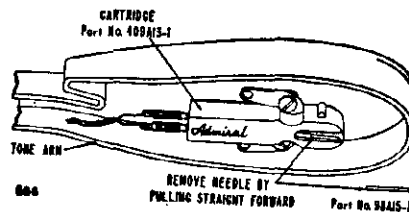
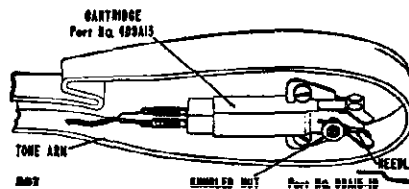


RECORD CHANGER SERVICE DATA

The changer model number will be found stamped at the top rear of the changer base. Complete service information and parts list for the RC500 record changer is contained in Record Changer Service Manual (form number S298).

Cartridge and Needle

As shown in the illustrations, alternate cartridges may be used. Cartridges are interchangeable when complete with needle.



RECORD CHANGER: Model RC500, see page RCD.CH.21-1.

MODELS AR-250MU, AR-251BU, AR-252MU
AR-253BU, AR-254MU, AR-255BU



Models AR-250MU, AR-252MU, AR-254MU
(Mahogany)



Models AR-251BU, AR-253BU, AR-255BU
(Blond)

DESCRIPTION

TYPE: Eight-tube, two-band, superheterodyne.

FREQUENCY RANGE: Standard Broadcast Band; 540 to 1620 kc. (Selector Switch at middle position).

Frequency Modulation Band; 88 to 108 megacycles (Selector Switch to right).

INTERMEDIATE FREQUENCY: Standard Broadcast Band; 455 kc.

Frequency Modulation Band; 10.7 mc.

FM ANTENNA INPUT IMPEDANCE: 75 ohms balanced.

POWER SUPPLY: a. c. only.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 60 watts at 117 volt power supply; 20 watts additional for record changer.

POWER OUTPUT: 3.2 watts maximum.

TUBE COMPLEMENT:

Type	Function
6BA6	R. F. Amplifier (AM & FM)
12AT7	Oscillator & Mixer (FM)
6BA6	1. F. Amplifier (AM & FM)
6BA6	2nd I. F. Amplifier (FM)
6T8	Ratio Detector (FM) Diode Det. & AVC (AM) Audio Amp. (AM & FM)
6BE6	Converter (AM)
7A5	Audio Output
5Y3GT	Rectifier

DIAL BULB: Type 47, 6.3 volts, .15 amp.

ALIGNMENT PROCEDURE

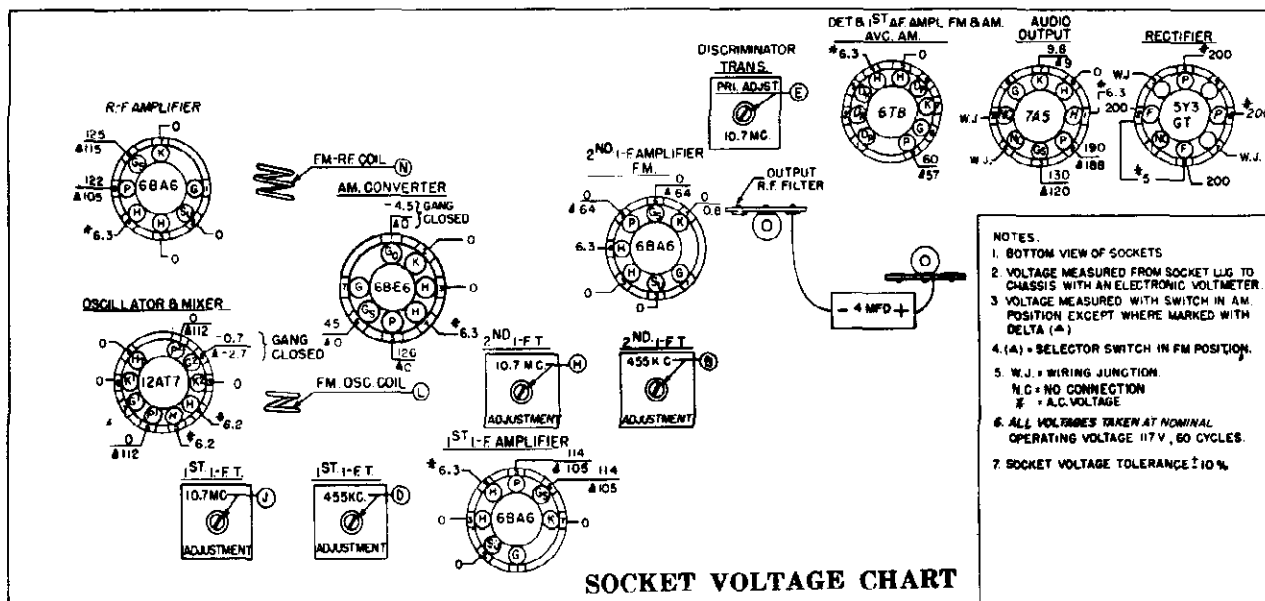
This receiver has been aligned at the factory for best performance and no attempt should be made to realign it unless the proper test equipment is available.

1. Turn the tuning condenser to full mesh, against stop, and set the dial pointer to line up with the right hand vertical portion of the "M" in "AM" and "FM", located to the left of 55 on the dial.
2. Set the tone control knob to the full treble position (extreme right).
3. For Amplitude Modulated signal readings, connect output meter across voice coil (3.2 ohms).
4. All Amplitude Modulated input signals are modulated 30% at 400 cycles with the High side of the signal generator connected to receiver as indicated in the alignment chart. Connect the low side of signal generator to the receiver chassis.
5. All Frequency Modulated signals are modulated 30% at 400 cycles. 30% modulation is equal to a deviation of 22.5 kilocycles. Connect the Frequency Modulated signal generator as indicated in the align-

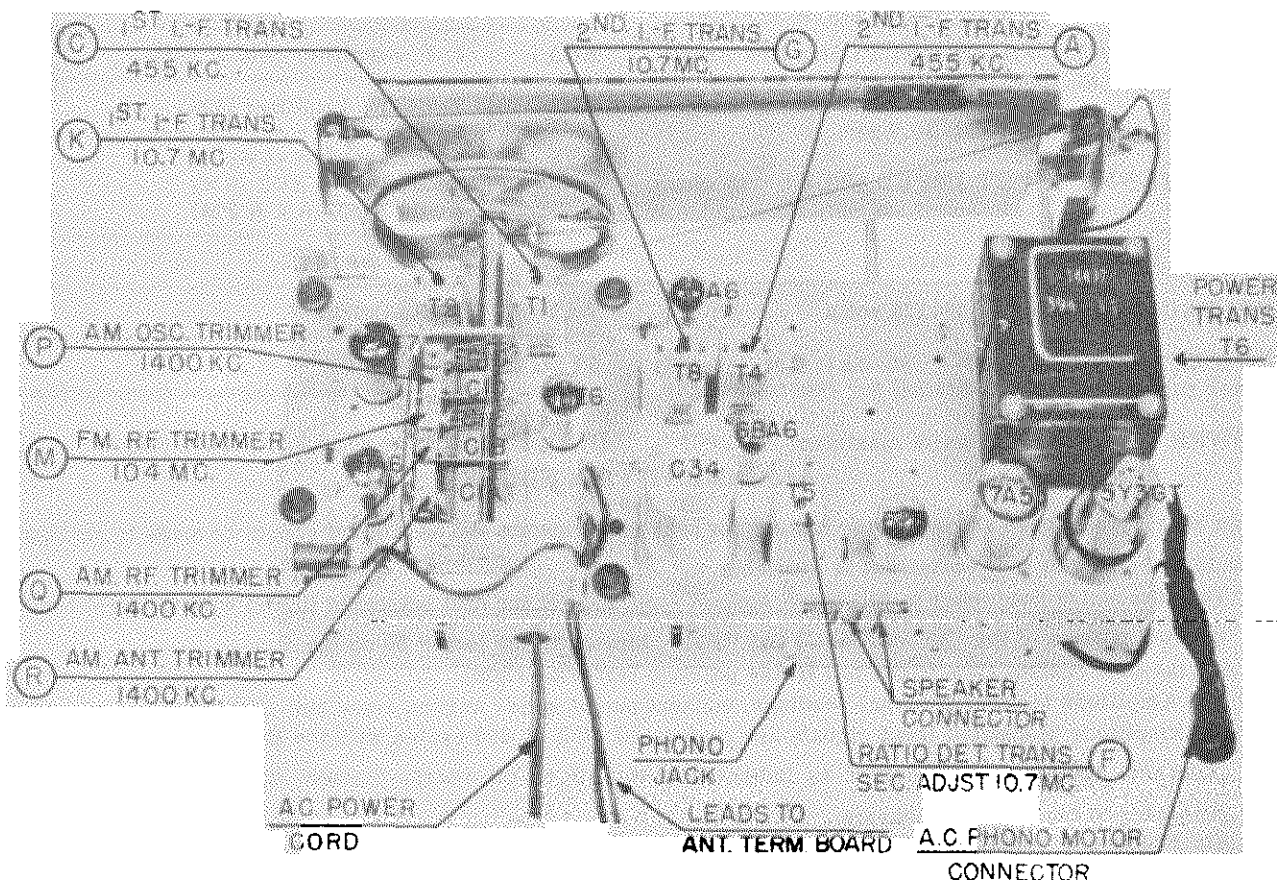
PAGE 21-2 AFFILIATED RETAILERS

MODELS AR-250MU, AR-251BU,
AR-252MU, AR-253BU,
AR-254MU, AR-255BU

6. Turn the volume control to maximum clockwise position and adjust signal generator output to produce a noticeable output meter reading. Keep signal generator output as low as possible to prevent AVC action in the receiver.
7. For F. M. alignment, the loop antenna must remain connected, or a suitable dummy antenna must be connected in its place (See F.M. Dummy Antenna diagram).



SOCKET VOLTAGE CHART

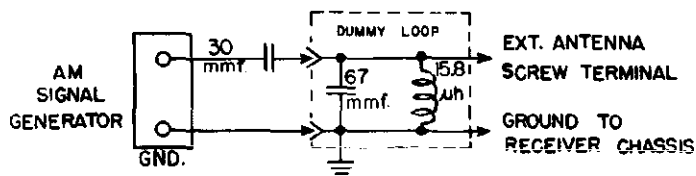


CHASSIS TOP VIEW SHOWING ALIGNMENT ADJUSTMENTS

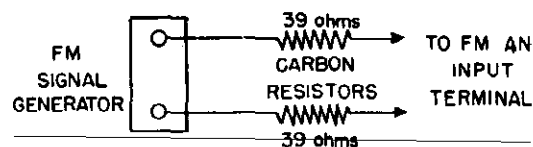
MODELS AR-250MU, AR-251BU,
AR-252MU, AR-253BU,
AR-254MU, AR-255BU

ALIGNMENT CHART

Align- ment Se- quence	Signal Generator Output			Position of		Adjust	Type of Selectivity Curve	Remarks
	Frequency	In Series With	To	Range Sw.	Tuning Dial or Tun. Cap.			
1	455 kc.	.01 mfd.	Stator plates of C1B	AM	Open	A & B	Single Peak	
2	455 kc.	.01 mfd.	Stator plates of C1B	AM	Open	C & D	Single Peak	
3	10.7 mc.	.01 mfd.	2nd I-F Grid pin 1 V4	FM	Open	E		See note 1
4	10.7 mc.	.01 mfd.	2nd I-F Grid pin 1 V4	FM	Open	F		See note 2
5	Repeat steps 3 and 4							Remove the two 100K ohm re- sistors after alignment.
6	10.7 mc.	.01 mfd.	1st I-F Grid pin 1 V3	FM	Open	G & H retouch E		See note 3
7	10.7 mc.	.01 mfd.	Stator plates of C1E	FM	Open	J & K		See note 4
8	Readjust G & H and J & K for maximum gain							See note 4
9	98 mc.	F.M. Dummy Ant.	Dipole Ant. Terminals	FM	98 mc.	L		See note 5
10	104 mc.	F.M. Dummy Ant.	Dipole Ant. Terminals	FM	104 mc.	M		See note 6
11	92 mc.	F.M. Dummy Ant.	Dipole Ant. Terminals	FM	92 mc.	N		See note 7
12	Repeat steps 10 and 11 until no further improvement in sensitivity is noted.							
13	1400 kc.	30 mmf.	Ext. Ant. Term. or A.M. Dummy Ant.	AM	1400 kc.	P		See note 8
14	1400 kc.	30 mmf.	Ext. Ant. Term. or A.M. Dummy Ant.	AM	1400 kc.	Q & R		See note 8



A. M. DUMMY ANTENNA



F. M. DUMMY ANTENNA

PAGE 21-4 AFFILIATED RETAILERS

MODELS AR-250MU, AR-251BU,
AR-252MU, AR-253BU,
AR-254MU, AR-255BU

ALIGNMENT NOTES

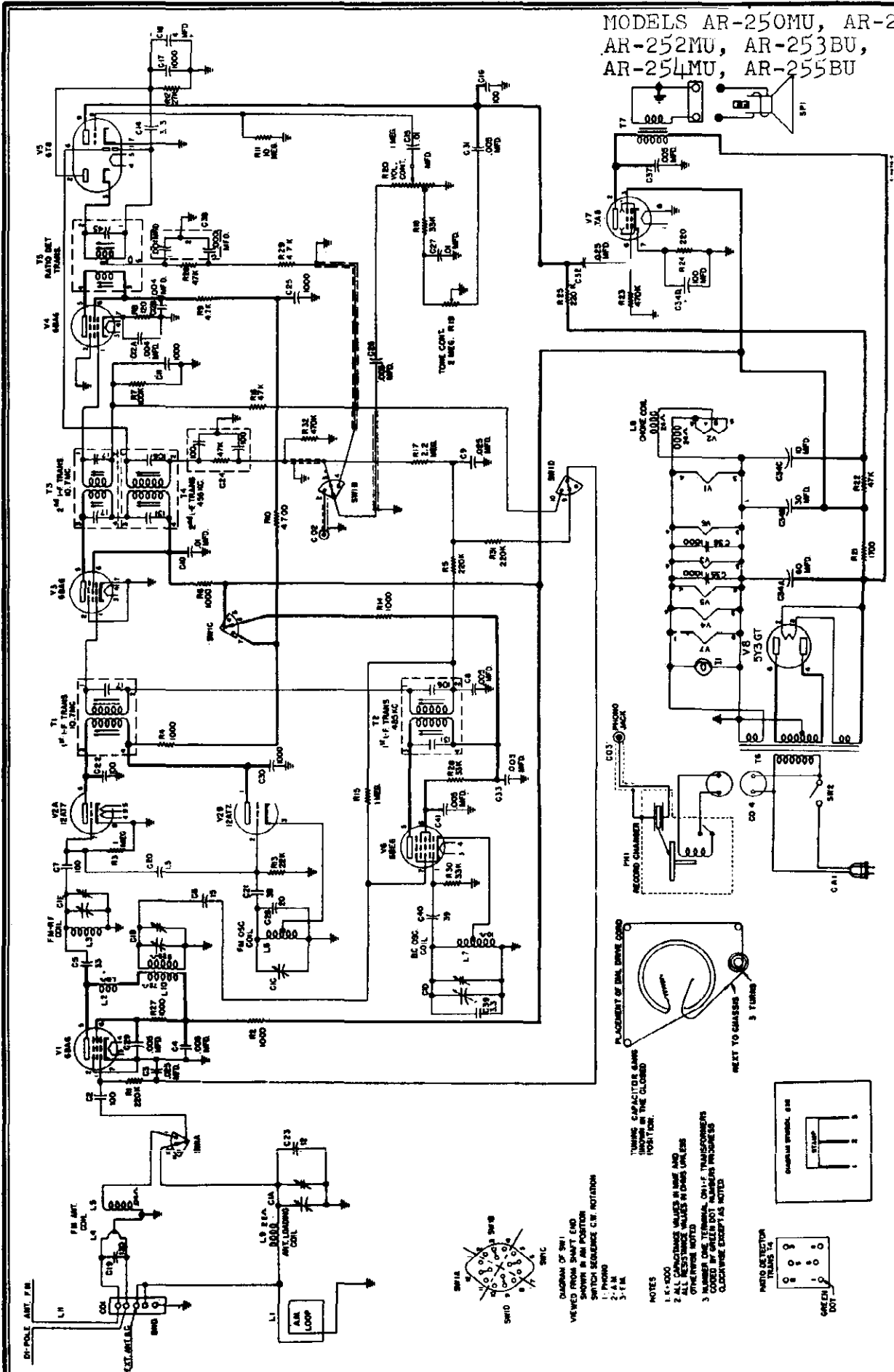
1. Connect two 100,000 ohm, 5%, carbon resistors (part no. 39375-97) in series, from pin 2 of V5 to ground. Then, connect an electronic voltmeter (negative polarity) across these resistors. Adjust "E" of T5 for maximum meter reading.
2. With the two 100,000 ohm resistors still connected as explained in note 1, connect the electronic voltmeter from the center junction of the resistors to the junction of R26 and R29. Adjust "F" of T5 for zero volts, first using a high scale on the voltmeter and then the lowest scale to obtain close balance.
3. Connect the electronic voltmeter from pin 2 of V5 to ground. Then adjust "G" and "H" of T3 for maximum meter reading. Retouch "E" of T5 for maximum meter reading.
4. With the voltmeter connected as for note 3, adjust "J" and "K" of T1 for maximum meter reading.
5. Adjust turns on F.M. oscillator coil by spreading apart or squeezing together, as required to make the 98 megacycle signal fall on 98 megacycles on the dial. See F.M. Dummy Antenna diagram.
6. Rotate variable capacitor rotor plates slightly back and forth while adjusting "M" to obtain maximum meter reading. See F.M. Dummy Antenna diagram.
7. Adjust turns on R.F. coil until maximum meter reading is obtained. See F.M. Dummy Antenna diagram.
8. Adjust for maximum output. See A.M. Dummy Antenna diagram.

MEGACYCLES TO CHANNEL NUMBERS "FM" BAND

Frequency in Megacycles	Channel No.	Frequency in Megacycles	Channel No.
87.9	200	98.9	255
88.9	205	99.9	260
89.9	210	100.9	265
90.9	215	101.9	270
91.9	220	102.9	275
92.9	225	103.9	280
93.9	230	104.9	285
94.9	235	105.9	290
95.9	240	106.9	295
96.9	245	107.9	300
97.9	250		

To find the frequency in megacycles for CHANNEL NUMBERS between those given above, add .2 megacycles for every whole number added to the CHANNEL NUMBER; for example Channel 204 would be 88.7 megacycles and 251 would be 98.1 megacycles.

MODELS AR-250MU, AR-251BU,
AR-252MU, AR-253BU,
AR-254MU, AR-255BU



SCHEMATIC DIAGRAM

PAGE 21-6 AFFILIATED RETAILERS

MODELS AR-250MU, AR-251BU,
AR-252MU, AR-253BU,
AR-254MU, AR-255BU

REPLACEMENT PARTS LIST

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
C1A	C-144962-3	Capacitor, Variable	CO2	W-136998	Connector (Female), Phono
C1B		Capacitor, Variable	CO3	AW-143496	Shielded Wire Assy., Phono
C1C		Capacitor, Variable	CO4	B-139727-3	Connector & Wire Assy., Phono Motor
C1D		Capacitor, Variable	SP1	138762-5	Speaker, 10" P.M.
C1E		Capacitor, Variable	T1	C-145025-3	Transformer, 1st I.F. (10.7 mc)
C2	C-137727-1	Capacitor, 100 mmf., 300 v., ceramic	T2	AC-139919-3	Transformer, 1st I.F. (455 kc)
C3	39001-81	Capacitor, .025 mfd., 600 v., paper	T3	D-145025-1	Transformer, 2nd I.F. (10.7 mc)
C4	C-144675-2	Capacitor, .005 mfd., 500 v., disc ceramic	T4	AC-139919-3	Transformer, 2nd I.F. (455 kc)
C5	C-137727-87	Capacitor, 33 mmf., 500 v., ceramic	T5	C-145193	Transformer, Ratio Detector
C6	C-137727-43	Capacitor, 15 mmf., 500 v., ceramic	T6	B-144970	Transformer, Power
C7	C-137727-1	Capacitor, 100 mmf., 300 v., ceramic	T7	B-145088	Transformer, Output
C8	C-144675-2	Capacitor, 5000 mmf., 500 v., disc ceramic	L1	Not Stocked	Loop Antenna (270" - No. 22 Wire)
C9	39001-81	Capacitor, .025 mfd., 600 v., paper	L2	AW-143837	Coil, Choke
C10	39001-13	Capacitor, .01 mfd., 600 v., paper	L3	AW-145112	Coil, F.M., R.F.
C11	C-137727-8	Capacitor, 1000 mmf., 300 v., ceramic	L4	B-143322	Coil, Antenna Primary (F.M.)
C12A	C-144675-8	Capacitor, .004 mfd., 500 v. } Two Section.	L5	AW-145104	Coil, Antenna Secondary (F.M.)
C12B		Capacitor, .004 mfd., 500 v. } Disc Ceramic	L6	AW-146004	Coil, Oscillator (F.M.)
C14	W-137398-5	Capacitor, 3.3 mmf., 500 v.	L7	AW-145372	Coil, Oscillator (A.M.)
C15	39001-13	Capacitor, .01 mfd., 600 v., paper	L8	AW-144987	Coil, Choke
C16	B-143686-3	Capacitor, 100 mmf., 500 v., molded disc ceramic	L9	AW-148565	Coil, Antenna Loading
C17	C-137727-8	Capacitor, 1000 mmf., 300 v., ceramic	L10	AW-145993	Transformer, R.F.
C18	B-142958	Capacitor, 4 mfd., 50 v., Electrolytic	SW1	W-148480	Switch, Band Selector
C19	W-145913-1	Capacitor, 120 mmf., 5%, 500 v. ceramic	SW2	39369-1	Switch, Power
C20	W-137398-3	Capacitor, 1.5 mmf., 500 v.	PH1	D-148278-1	Record Changer (V950)
C21	C-137727-100	Capacitor, 39 mmf., 10%, 200 v., ceramic	AB-148507		Background Assy., Dial
C22	C-137727-90	Capacitor, 100 mmf., 5%, 500 v., ceramic	148583		Baffle, Speaker
C23	B-143686-8	Capacitor, 12 mmf., 500 v., molded disc ceramic	143485		Bumper (Rubber), Doors
C24	C-142951-2	Capacitor - Resistor	R-148577		Cabinet (11-250MU, 11-252MU, 11-254MU)
C25	C-137727-8	Capacitor, 1000 mmf., 300 v., ceramic	R-148603		Cabinet (11-251BU, 11-253BU, 11-255BU)
C26	39001-11	Capacitor, .005 mfd., 600 v., paper	W-138201		Clip, Dial Glass
C27	39001-13	Capacitor, .01 mfd., 600 v., paper	W-145510		Clip, Sub Chassis Mtg.
C28	C-137727-99	Capacitor, 20 mmf., 2%, 500 v., ceramic	W-136999-1		Connector (Male), Shielded Phono Wire
C29	C-144675-2	Capacitor, .005 mfd., 500 v., disc ceramic	W-138853		Cushion (Rubber), Dial Glass
C30	C-137727-8	Capacitor, 1000 mmf., 300 v., ceramic	148561		Decal, Off-On-Vol-Tone
C31	39001-11	Capacitor, .005 mfd., 600 v., paper	148560		Decal, Tuning-Ph-AM-FM
C32	39001-81	Capacitor, .025 mfd., 600 v., paper	C-148587		Dial Glass (11-250MU, 11-251BU)
C33	C-144675-2	Capacitor, .005 mfd., 500 v., disc ceramic	C-148701		Dial Glass (11-252MU, 11-253BU, 11-254MU, 11-255BU)
C34A	B-144990	Capacitor, 60 mfd., 300 v.	148605		Door, Radio
C34B		Capacitor, 30 mfd., 300 v.			Front, Drawer } 1 Pair(11-251BU, 11-253BU, 11-255BU)
C34C		Capacitor, 10 mfd., 300 v.			Door, Radio
C34D		Capacitor, 100 mfd., 25 v.			Front, Drawer } 1 Pair(11-250MU, 11-252MU, 11-254MU)
C35	C-137727-8	Capacitor, 1000 mmf., 300 v., ceramic	148608		Doors (1 pair), Record Compartment (11-251BU, 11-253BU, 11-255BU)
C36	C-137727-8	Capacitor, 1000 mmf., 300 v., ceramic	148582		Doors (1 pair), Record Compartment (11-250MU, 11-252MU, 11-254MU)
C37	39001-11	Capacitor, .005 mfd., 600 v., paper	C-145773-1		Escutcheon
C38	C-144675-12	Capacitor, .001 mfd., 500 v. } Two Section.	148609		Grille Cloth (11-251BU, 11-253BU, 11-255BU)
C38		Capacitor, .0001 mfd., 500 v. } disc ceramic	148584		Grille Cloth (11-250MU, 11-252MU, 11-254MU)
C39	W-137398-5	Capacitor, 3.3 mmf., 500 v.	148611-1		Hinge (Upper Left - Lower Right), Door (11-251BU, 11-253BU, 11-255BU)
C40	C-137727-100	Capacitor, 39 mmf., 10%, 200 v., ceramic	146786		Hinge (Upper Left - Lower Right), Door (11-250MU, 11-252MU, 11-254MU)
C41	C-144675-2	Capacitor, .005 mfd., 500 v., disc ceramic	148611-2		Hinge (Lower Left - Upper Right), Door (11-251BU, 11-253BU, 11-255BU)
R1	39373-80	Resistor, 220,000 ohm, 1/2 w.	146787		Hinge (Lower Left - Upper Right), Door (11-250MU, 11-252MU, 11-254MU)
R2	39373-33	Resistor, 1000 ohm, 1/2 w.	B-148643-1		Knob, Band Selector
R3	39373-82	Resistor, 1 megohm, 1/2 w.	B-139540-7		Knob, Off-On-Vol., Tone, Tuning
R4	39373-33	Resistor, 1000 ohm, 1/2 w.	W-45580		Mounting (Rubber), Band Selector Switch; Speaker
R5	39373-80	Resistor, 220,000 ohm, 1/2 w.	148610		Panel, Radio Dial (11-251BU, 11-253BU, 11-255BU)
R6	39373-33	Resistor, 1000 ohm, 1/2 w.	148586		Panel, Radio Dial (11-250MU, 11-252MU, 11-254MU)
R7	39373-74	Resistor, 100,000 ohm, 1/2 w.	W-130078CL		Pin, Speaker Cable
R8	39374-14	Resistor, 120 ohm, 10%, 1/2 w.	W-143769		Pointer, Dial
R9	39374-33	Resistor, 4700 ohm, 10%, 1/2 w.	148606		Pull, Handle (11-251BU, 11-253BU, 11-255BU)
R10	39373-47	Resistor, 4700 ohm, 1/2 w.	148505		Pull, Handle (11-250MU, 11-252MU, 11-254MU)
R11	39373-107	Resistor, 10 megohm, 1/2 w.	148607		Pull, Knob (11-251BU, 11-253BU, 11-255BU)
R12	39374-42	Resistor, 27,000 ohm, 10%, 1/2 w.	148581		Pull, Knob (11-250MU, 11-252MU, 11-254MU)
R13	39374-41	Resistor, 22,000 ohm, 10%, 1/2 w.	W-137939-2		Pulley (Idler), Dial Drive Cord
R14	39373-33	Resistor, 1000 ohm, 1/2 w.	W-137170		Retainer, Record Changer Mtg. Screw
R15	39373-82	Resistor, 1 megohm, 1/2 w.	W-137940-1		Rivet, Dial Drive Idler Pulley
R16	39373-87	Resistor, 47,000 ohm, 1/2 w.	W-144498-1		Screw, Escutcheon
R17	39373-97	Resistor, 2.2 megohm, 1/2 w.	W-148501		Shaft, Dial Drive
R18	39373-64	Resistor, 33,000 ohm, 1/2 w.	148604		Shelf Assy., Drawer (11-251BU, 11-253BU, 11-255BU)
R19	39368-11	Control, Tone (2 megohm)	148578		Shelf Assy., Drawer (11-250MU, 11-252MU, 11-254MU)
R20	39368-18	Control, Volume (1 megohm, Tap 275,000 ohm)	W-139040		Shock Mount, Sub Chassis Mtg.
	39369-1	Switch, Power	143478		Slide, Drawer
	39370-2	Shaft, Volume Control	D-136565-18		Socket, Dial Light
R21	B-144857-3	Resistor, 1700 ohm, 10%, 7 w., W.W.	W-142781		Socket, Tube (V1, V3, V4, V6)
R22	39373-87	Resistor, 47,000 ohm, 1/2 w.	W-144732		Socket, Tube (V2)
R23	39373-87	Resistor, 470,000 ohm, 1/2 w.	W-145607		Socket, Tube (V5)
R24	39374-17	Resistor, 230 ohm, 10%, 1/2 w.	39232-1		Socket, Tube (V8)
R25	39373-80	Resistor, 220,000 ohm, 1/2 w.	39441		Socket, Tube (V7)
R26	39373-87	Resistor, 47,000 ohm, 1/2 w.	W-145757		Spring, Dial Drive Cord
R27	39373-33	Resistor, 1000 ohm, 1/2 w.	W-49829		Spring (Lock), Dial Drive Shaft
R28	39373-64	Resistor, 33,000 ohm, 1/2 w.	W-143552		Strip, Dial Pointer
R29	39373-47	Resistor, 4700 ohm, 1/2 w.			
R30	39374-43	Resistor, 33,000 ohm, 10%, 1/2 w.			
R31	39373-80	Resistor, 220,000 ohm, 1/2 w.			
R32	39373-87	Resistor, 470,000 ohm, 1/2 w.			
CA1	C-132300-2	Cable & Plug Assy., Power			
I1	138437-1	Bulb (Dial), Type 47, 6.3 v., .15 amp.			
CO1	AW-148639	Terminal Board, Antenna			

Operating Instructions

POWER SOURCES: This combination will operate on an alternating (AC) current only, of 110 to 125 volts at 60 cycles.

CAUTION: Always predetermine voltage of power source. Never try to plug this combination into a 220 volt line, as this will cause serious damage.

Never try to operate this combination on 50 cycle current, as this will cause the motor to rotate at an incorrect speed. The normal speed is 78 R.P.M., (revolutions per minute) and to insure proper reproduction of recordings 60 cycle current must be used.

This receiver is equipped with a sensitive hank antenna and under ordinary conditions no external antenna would be required. However, in steel constructed buildings or in distant isolated locations, the reception may be improved by using an outside antenna. This should be a single wire not more than 50 feet long and should be connected to the antenna lead that projects from the back of the receiver. No ground wire is required at any time.

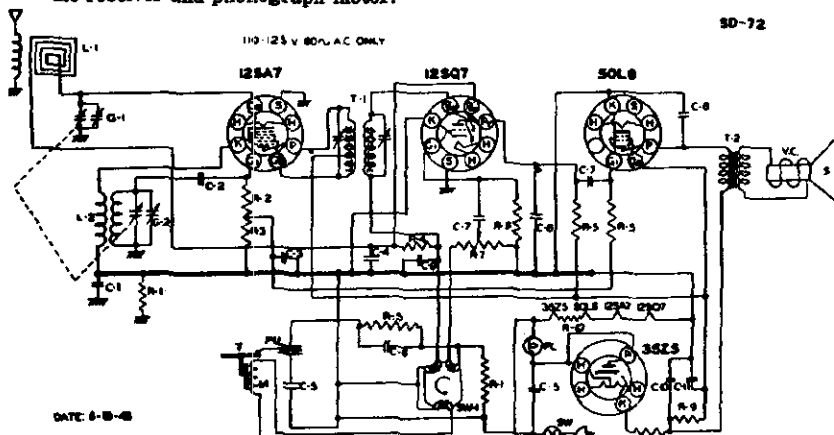
INSTALLATION: Unwind power cord and plug into a convenient power outlet. Follow instructions under "Controls" to operate receiver.

CONTROLS: Three controls are provided on the front panel for operation of this combination. The right hand control is the station selector which is used only in "Radio" operation. The left hand control is a switch which selects operation of either "Radio" or "Phonograph". The center control is used to adjust volume on either "Radio" or "Phonograph" and is also used as a power switch to turn the combination "On" or "Off."

RADIO RECEPTION: After the power cord plug has been connected to your power outlet, turn the center control to the right in a clockwise direction and a click will be heard. This indicates that the power is turned on, and the pilot light in the dial should begin to glow. After about 30 seconds, the set will be ready for operation.

Make sure that the left hand control is turned to the left, in "Radio" position. Turn the center control about halfway on, in a clockwise direction to increase volume. Rotate the right hand control to the right or left to select the desired station. By mentally adding a zero to the figures on the upper half of the dial, the result will be read directly in kilocycles (i.e., 60 plus 0 equals 600KC or 140 plus 0 equals 1400KC). After a station has been tuned in, adjust the center control to your desired volume.

PHONOGRAPH REPRODUCTION: To operate the phonograph, be sure that the left hand control is turned to the right. This puts the circuit in "Phonograph" position and also turns on the power for the motor. The center control must also be turned on (as in Radio instructions) as it is the master control for power to the radio receiver and phonograph motor.



ALIGNMENT AND SERVICE DATA

Remove chassis from cabinet for alignment.

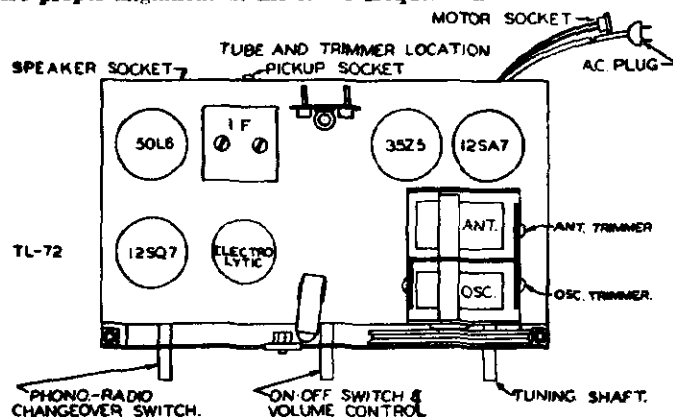
A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the floating ground bus under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

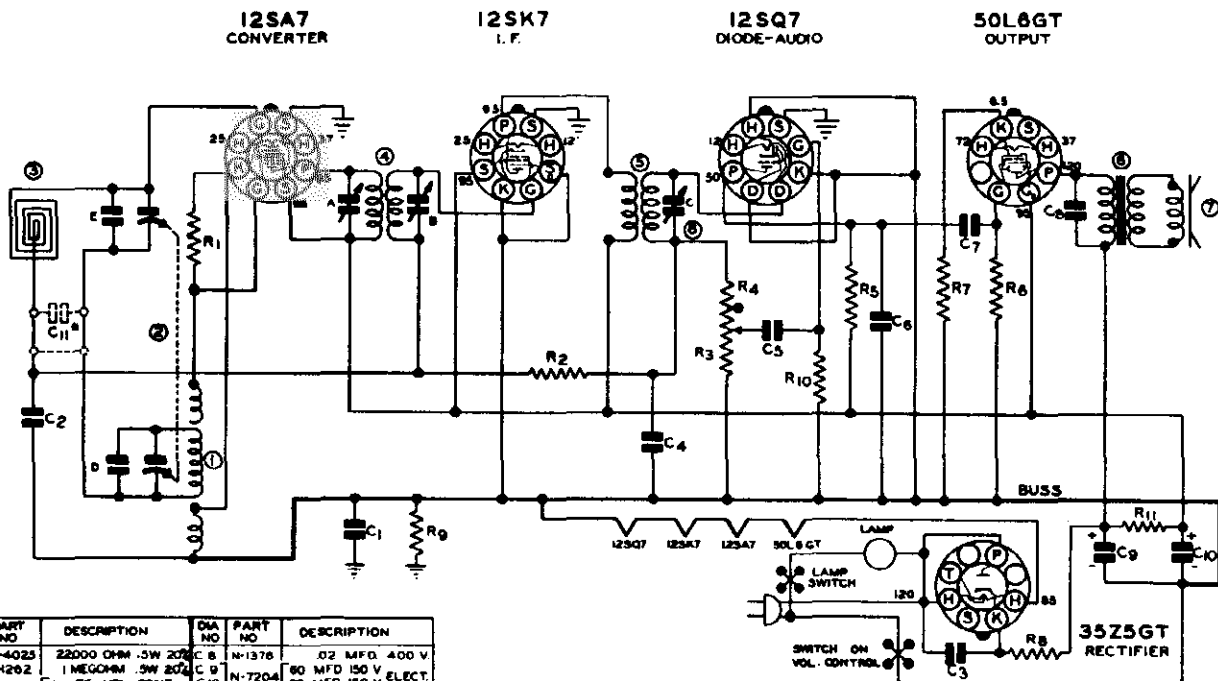
SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the primary of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the top of the ANT. section of the gang condenser. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

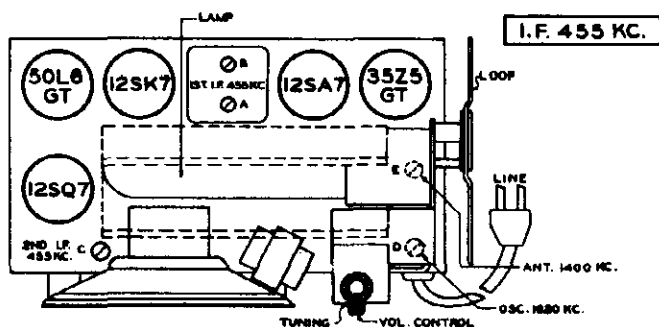


PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
1R-20	R-1 220M RESISTOR 1/2W 20K	SW-1	SW SWITCH ON VOLUME CONTROL
1R-21	R-2 22M RESISTOR 1/2W 20K	SW-2	RADIO-PHONO SWITCH
1R-22	R-3 47M RESISTOR 1/2W 20K	T-1	1:1 TRANSFORMER
1R-23	R-4 3M RESISTOR 1/2W 20K	T-2	OUTPUT TRANSFORMER
1R-24	R-5 470M RESISTOR 1/2W 20K	V-1	VOICE COIL
1R-25	R-6 10M RESISTOR 1/2W 20K	V-2	47PM SPEAKER
1R-26	R-7 10M RESISTOR 1/2W 20K	L-1	LOOP ANT
1R-27	R-8 1M RESISTOR 1/2W 20K	L-2	OSC COIL
1R-28	R-9 33K RESISTOR 1/2W 20K	L-3	10V 80 CYCLES MOTOR
1R-29	R-10 220K RESISTOR 1/2W 20K	M-2	TONE ARM WITH L-75 CARTRIDGE
1R-30	R-11 47K RESISTOR 1/2W 20K	PS-1	47P PULS. BLUB
1R-31	R-12 10M RESISTOR 1/2W 20K	CO-1A	LINE COND
1R-32	R-13 10M RESISTOR 1/2W 20K	T-1	8' TUNABLE
1R-33	R-14 1M RESISTOR 1/2W 20K	G-1	GANG CONDENSER
1R-34	R-15 33K RESISTOR 1/2W 20K	G-2	GANG CONDENSER
1R-35	R-16 220K RESISTOR 1/2W 20K		
1R-36	R-17 47K RESISTOR 1/2W 20K		
1R-37	R-18 10M RESISTOR 1/2W 20K		
1R-38	R-19 10M RESISTOR 1/2W 20K		
1R-39	R-20 1M RESISTOR 1/2W 20K		
1R-40	R-21 33K RESISTOR 1/2W 20K		
1R-41	R-22 220K RESISTOR 1/2W 20K		
1R-42	R-23 47K RESISTOR 1/2W 20K		
1R-43	R-24 10M RESISTOR 1/2W 20K		
1R-44	R-25 10M RESISTOR 1/2W 20K		
1R-45	R-26 1M RESISTOR 1/2W 20K		
1R-46	R-27 33K RESISTOR 1/2W 20K		
1R-47	R-28 220K RESISTOR 1/2W 20K		
1R-48	R-29 47K RESISTOR 1/2W 20K		
1R-49	R-30 10M RESISTOR 1/2W 20K		
1R-50	R-31 10M RESISTOR 1/2W 20K		
1R-51	R-32 1M RESISTOR 1/2W 20K		
1R-52	R-33 33K RESISTOR 1/2W 20K		
1R-53	R-34 220K RESISTOR 1/2W 20K		
1R-54	R-35 47K RESISTOR 1/2W 20K		
1R-55	R-36 10M RESISTOR 1/2W 20K		
1R-56	R-37 10M RESISTOR 1/2W 20K		
1R-57	R-38 1M RESISTOR 1/2W 20K		
1R-58	R-39 33K RESISTOR 1/2W 20K		
1R-59	R-40 220K RESISTOR 1/2W 20K		
1R-60	R-41 47K RESISTOR 1/2W 20K		
1R-61	R-42 10M RESISTOR 1/2W 20K		
1R-62	R-43 10M RESISTOR 1/2W 20K		
1R-63	R-44 1M RESISTOR 1/2W 20K		
1R-64	R-45 33K RESISTOR 1/2W 20K		
1R-65	R-46 220K RESISTOR 1/2W 20K		
1R-66	R-47 47K RESISTOR 1/2W 20K		
1R-67	R-48 10M RESISTOR 1/2W 20K		
1R-68	R-49 10M RESISTOR 1/2W 20K		
1R-69	R-50 1M RESISTOR 1/2W 20K		
1R-70	R-51 33K RESISTOR 1/2W 20K		
1R-71	R-52 220K RESISTOR 1/2W 20K		
1R-72	R-53 47K RESISTOR 1/2W 20K		
1R-73	R-54 10M RESISTOR 1/2W 20K		
1R-74	R-55 10M RESISTOR 1/2W 20K		
1R-75	R-56 1M RESISTOR 1/2W 20K		
1R-76	R-57 33K RESISTOR 1/2W 20K		
1R-77	R-58 220K RESISTOR 1/2W 20K		
1R-78	R-59 47K RESISTOR 1/2W 20K		
1R-79	R-60 10M RESISTOR 1/2W 20K		
1R-80	R-61 10M RESISTOR 1/2W 20K		
1R-81	R-62 1M RESISTOR 1/2W 20K		
1R-82	R-63 33K RESISTOR 1/2W 20K		
1R-83	R-64 220K RESISTOR 1/2W 20K		
1R-84	R-65 47K RESISTOR 1/2W 20K		
1R-85	R-66 10M RESISTOR 1/2W 20K		
1R-86	R-67 10M RESISTOR 1/2W 20K		
1R-87	R-68 1M RESISTOR 1/2W 20K		
1R-88	R-69 33K RESISTOR 1/2W 20K		
1R-89	R-70 220K RESISTOR 1/2W 20K		
1R-90	R-71 47K RESISTOR 1/2W 20K		
1R-91	R-72 10M RESISTOR 1/2W 20K		
1R-92	R-73 10M RESISTOR 1/2W 20K		
1R-93	R-74 1M RESISTOR 1/2W 20K		
1R-94	R-75 33K RESISTOR 1/2W 20K		
1R-95	R-76 220K RESISTOR 1/2W 20K		
1R-96	R-77 47K RESISTOR 1/2W 20K		
1R-97	R-78 10M RESISTOR 1/2W 20K		
1R-98	R-79 10M RESISTOR 1/2W 20K		
1R-99	R-80 1M RESISTOR 1/2W 20K		
1R-100	R-81 33K RESISTOR 1/2W 20K		

MODELS 5F-600,
5F-601



DIA. NO.	PART NO.	DESCRIPTION	DIA. NO.	PART NO.	DESCRIPTION
R1	N-4025	22000 OHM .5W 20%	C8	N-1376	.02 MFD. 400 V.
R2	N-1262	1 MEGOHM .5W 20%	C9	N-7204	80 MFD 150 V. ELECT.
R3	N-7205	.5 MEG. VOL. CONT.	C10		20 MFD 150 V. ELECT.
R4	N-4026	IN. VOLUME CONTROL	C11	N-1345	.05 MFD. 200 V.
R5	N-4026	22000 OHM .5W 20%			USED IN SOME MODELS
R6	N-4027	470,000 OHM .5W 20%			
R7	N-6244	OR 220 OHM .5W 10%			
R8	N-4024	OR 220 OHM .5W 10%			
R9	N-6258	47 OHM LOW 10%			
R10	N-4026	220,000 OHM .5W 20%	N-2084		LAMP SWITCH
R11	N-4028	6.8 MEGOHM .5W 20%	N-2565		25W. T-10 110V. LAMP
	N-4800	(200 OHM LOW 10%)			
C1	N-1345	.05 MFD. 200 V.	1	N-7138	OSCILLATOR COIL
C2	N-1345	.05 MFD. 200 V.	2	N-7203	2 GANG CONDENSER
C3	N-1346	.05 MFD. 400 V.	3	N-7109	ANT. LOOP COIL
C4	N-8015	100 MMFD CERAMIC	4	N-4813	1ST. I.F.
C5	N-4864	.005 MFD. 500 V.	5	N-4848	2ND. I.F.
C6	N-8135	250 MMFD CERAMIC	6	N-7187	SPKR. & OUTPUT XFMR.
C7	N-1344	.01 MFD. 400 V.	7	N-7188	
			8	N-4885	2ND I.F. TRIMMER



This receiver is designed to operate over the standard broadcast band which extends from 535 to 1620 Kilocycles (KC) (185 to 560 Meters.)

ALIGNMENT PROCEDURE

GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

I.F. ALIGNMENT. Remove the chassis and loop antenna from the cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near

the loop. Do not make this set-up on a metal bench. With the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the converter tube (12SA7) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the ground buss, indicated on the circuit diagram. Align all three I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. Connect the test oscillator to a dummy loop which can be made by coiling 2 turns of hookup wire about 6" in diameter. Place this dummy loop about a foot from the loop on the receiver and in the same plane as the receiver loop. With the gang condenser set at minimum capacity, set the test oscillator at 1620 KC, and adjust the oscillator (or 1620 KC trimmer) on the gang condenser. Next—set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

CONNECTING THE SET

POWER SUPPLY. This receiver is designed to operate on an alternating current supply (AC) ranging from 110 to 120 volts, 60 Cycles only. *Do Not Operate on Direct Current.*

Before connecting the set be sure that your house is wired for the voltage and current for which the set is designed. If in doubt, call your local power company for the necessary information. Connecting the set to a supply outlet furnishing the wrong type of current will result in improper operation or damage.

ANTENNA. This receiver has a built-in "loop" aerial. Its excellent design is such as to increase pick-up from stations having wide variations in signal strength. The efficiency and selectivity of the loop provide outstanding reception without the use of an external aerial.

TUBES. Five tubes (including rectifier) are used. Type numbers and locations are shown in the tube location diagram on the bottom of the cabinet.

GROUND. No ground connection should be used when operating this receiver. The receiver gets its ground connection through the power line and any external connection to the chassis may cause a short circuit and consequent damage.

CAUTION. Do not place receiver on hot objects such as stoves, radiators, etc. Heat will damage the cabinet and the internal components of the receiver.

RADIO OPERATION

AUTO-OFF-ON SWITCH KNOB (Bottom of Clock Face). Turn this knob to the right (clockwise), so that the indicator points to "ON", to turn on the radio. To turn off the radio, turn this knob so that the indicator points straight up to "OFF".

VOLUME CONTROL KNOB (Bottom Knob on Front of Cabinet) This knob controls the volume of the signal received. To reduce the volume, rotate this knob to the left (counter-clockwise). When this knob is rotated to the right it will increase the volume.

STATION SELECTOR KNOB. (Large Knob on Front of Cabinet) Rotate this knob over a narrow range of the dial where the desired station is located, until the station is received with maximum volume and clarity. Then readjust the volume control to the proper level. NEVER use the station selector knob to adjust the volume as this will result in the signal being received with distorted tone quality.

The station selector knob is calibrated in Kilocycles with the last zero of the actual frequency omitted. For instance, the numeral 55 on the knob indicates 550 Kilocycles and 160 indicates 1600 Kilocycles.

OPERATION OF CLOCK

This clock-radio is equipped with a self-starting clock. As soon as the power plug is inserted into the wall outlet, the sweep second hand will begin to operate.

To set the time hands, rotate the knob located at the rear of the receiver so that the hands will rotate in a clockwise rotation. Once the clock is set, it needs no further attention unless you remove the plug or there is a power interruption.

The clock of this clock-radio is equipped to automatically turn on the radio at any time during the course of approximately 10-1/2 hours after the controls are properly set. The controls may be properly set by following the instructions itemized below:

1. **SET TURN-ON TIME.** Pull out and turn the knob at the top of clock face to the left (counter-clockwise) until the selected TURN-ON time is indicated on the small center dial by the small pointer on the opposite end of the hour hand.

Leave this knob out if you wish the conventional alarm to turn on in addition to the radio. The conventional alarm will sound approximately seven minutes after the radio is turned on.

If you prefer to have the radio turned on without the conventional alarm, push the knob in after the TURN-ON time is set.

2. **SELECT PROGRAM TO BE TURNED ON.** Tune in the station that will carry the desired program at the selected time, and adjust the volume to the proper level.

3. **SET AUTO-OFF-ON SWITCH KNOB.** Turn this knob to the left until the indicator points to "AUTO". This will turn off the radio and set the switch so that it automatically comes on again at the selected time.

To turn the radio on before the "TONE-ALARM" time, turn the AUTO-OFF-ON knob to the "ON" position. It will then be necessary to repeat the steps listed above to again use the alarm feature.

PAGE 21-4 ALLIED RADIO

MODELS 5H-605,
5H-606

USE OF "CONVENTIONAL ALARM"

The clock may be set to turn on the conventional buzzer alarm without turning on the radio. To accomplish this set the TURN-ON time as explained under "USE OF TONE-ALARM" and leave the knob out from the cabinet. Set "AUTO-OFF-ON" switch knob to the "OFF" position. At the selected time, the buzzer will sound and will continue to sound until you turn it off by pushing knob all the way in.

USE OF TURN-ON FEATURE WITH EXTERNAL APPLIANCES

An electrical outlet is provided at the rear of the receiver to use the TURN-ON feature on any electrical appliance which operates on a 110-120 volt, 60 cycle power supply.

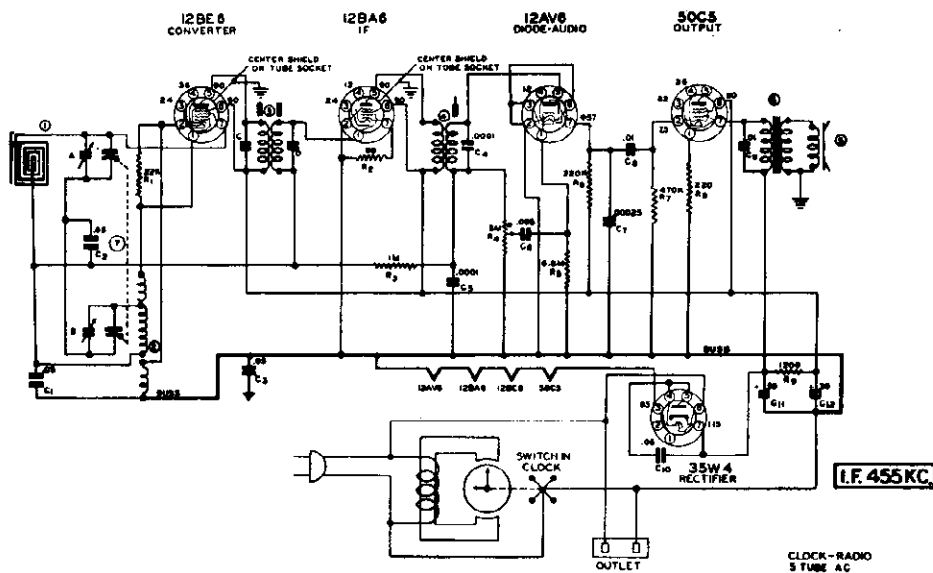
To use this outlet, simply plug in the appliance and set the controls on the clock the same as explained in the paragraph "USE OF TONE-ALARM". This will automatically start the appliance AND the radio at the selected time.

CAUTION: THE RATING OF THE EXTERNAL ELECTRICAL APPLIANCE MUST NOT EXCEED 660 WATTS.

Current is available at this outlet whenever the radio is turned on.

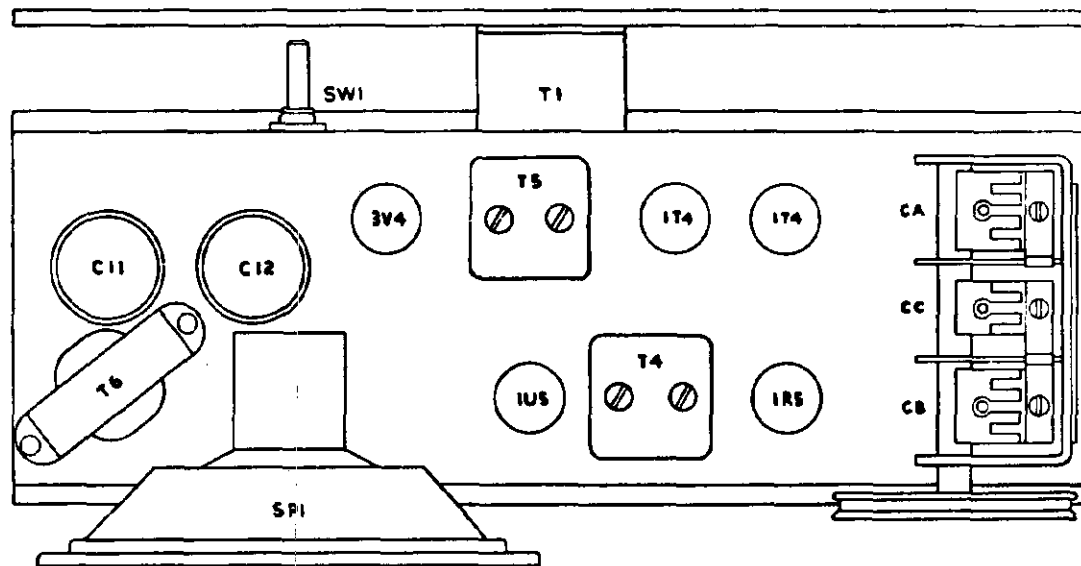
ALIGNMENT

Step No.	Position of Gang	Signal Generator Frequency	Generator Connection	Dummy Antenna	Adjustment	Type of Adjustment
1.	Open	455 KC.	Rear Gang Terminal	.1 Mfd.	I.F. Slugs	Adjust for Maximum Output
2.	Open	1620 KC.	Dummy Antenna	2 Turns of Hookup Wire 6" in Dia. (Place Approx. a Foot from & parallel to loop.)	Front Gang Trimmer	Adjust for Maximum Output
3.	1400 KC	1400 KC.			Rear Gang Trimmer	Adjust for Maximum Output
4.	600 KC	600 KC.				Check Gang Alignment

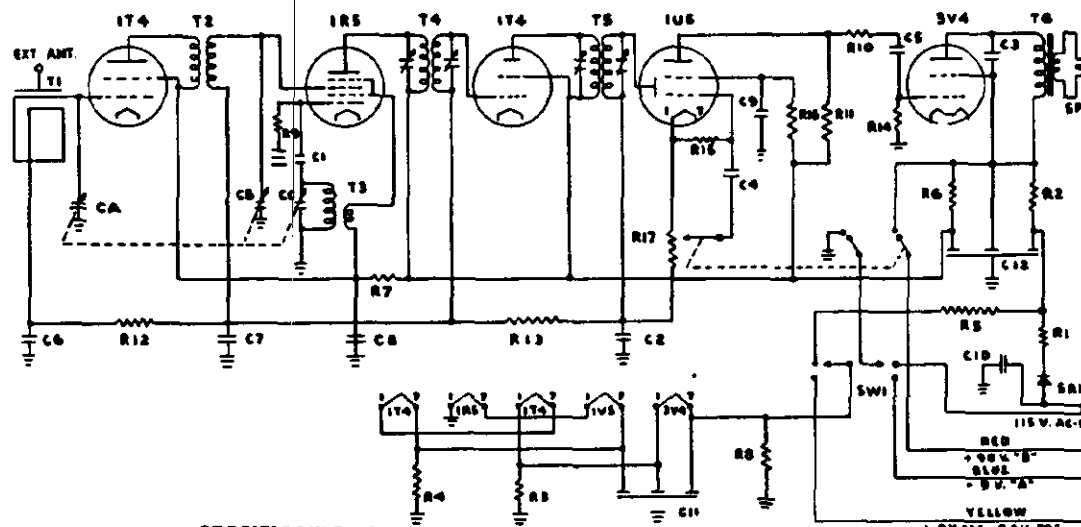


PARTS LIST

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
C1, C2, C3	N-1345	Capacitor-Paper .05 MFD. 200 V.	R1	N-4025 Resistor - 22,000 Ohm - 1/2W. - 20%
C4	N-7549	Capacitor-Ceramic 100 MMFD 500 V. 10%	R2	N-6485 Resistor - 68 Ohm - 1/2W. - 10%
C5	N-6015	Capacitor-Ceramic 100 MMFD 500 V. 20%	R3	N-1262 Resistor - 1.0 Megohm - 1/2 W. - 20%
C6	N-4894	Capacitor-Paper .005 MFD. 600 V.	R4	N-7957 Control - On-Off & Volume
C7	N-8458	Capacitor-Ceramic 250 MMFD. 500 V. 20%	R5	N-4028 Resistor - 6.8 Megohm - 1/2 W. - 20%
C8, C9	N-1344	Capacitor-Paper .01 MFD. 400 V.	R6	N-4026 Resistor - 220,000 Ohm - 1/2W. - 20%
C10	N-1346	Capacitor-Paper .05 MFD. 400 V.	R7	N-4027 Resistor - 470,000 Ohm - 1/2W. - 20%
C11	N-7889	Capacitor-Electrolytic 50 MFD. 150 V.	R8	N-4024 Resistor - 220 Ohm - 1/2W. - 10%
C12		30 MFD. 150 V.	R9	N-4800 Resistor - 1,200 Ohm - 1.0W. - 10%
			N-7824	Speaker - 4" P.M. with Output Transformer
			N-7956	Coil - Loop Antenna
			N-7888	Coil - 1st. I.F.
			N-7542	Coil - 2nd. I.F.
			N-7139	Coil - Oscillator



TOP VIEW

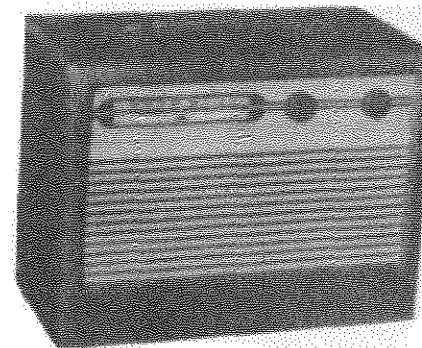


SPECIFICATIONS

CIRCUIT DIAGRAM

- Super-het circuit—455 KC I. F.
- Band coverage: 540 KC to 1700 KC.
- Five miniature tubes—plus selenium rectifier
1—1T4 R. F., 1—1R5 Mixer, 1—1T4 I. F., 1—1U5 Det.
and 1st audio, 1—3V4 Pr. output (6-tube performance).

- Battery life—approximately 170 hours.
Surgess No. F6A60, Eveready No. 753, Ray-O-Vac No. AB994.
- Five-inch P. M. dynamic speaker—1.47 oz. Alnico 5.

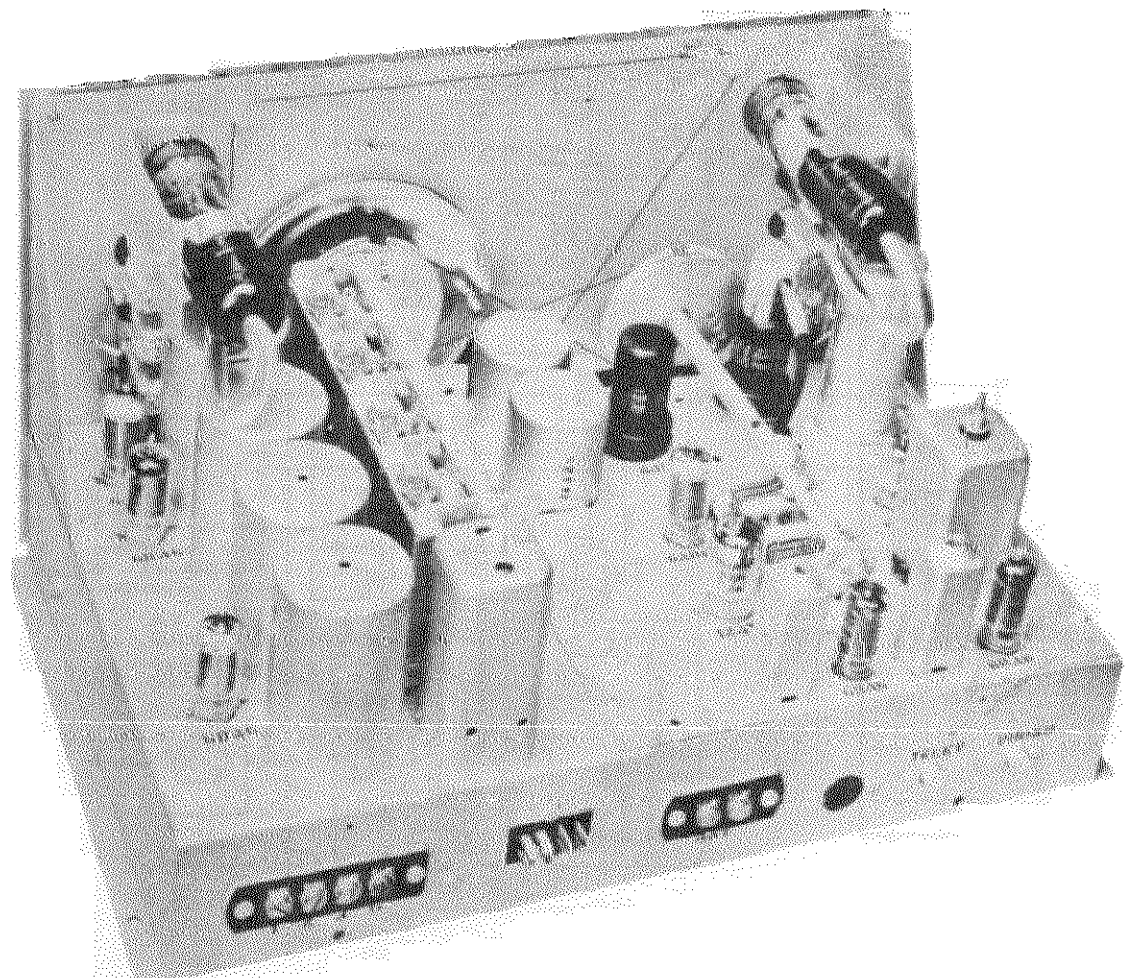
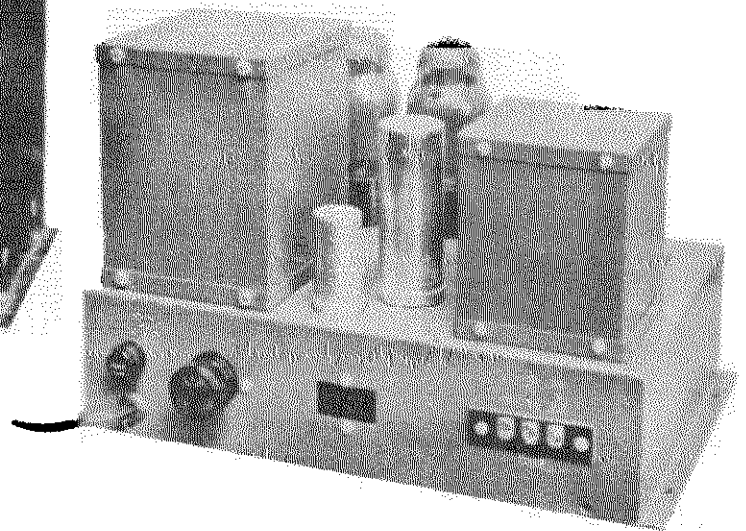
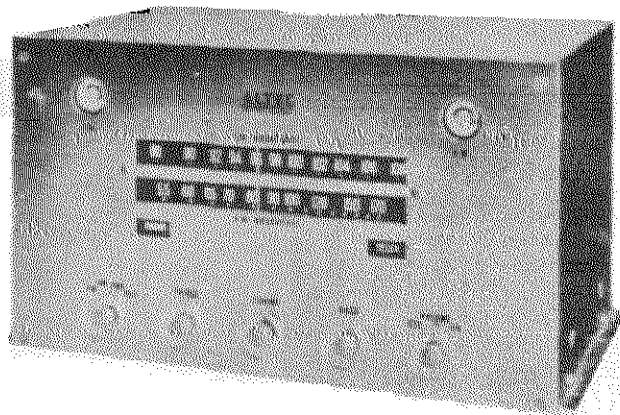


- C1—.0001 MFD. 400 V. CONDENSER
- C2—.0001 MFD. 400 V. CONDENSER
- C3—.004 MFD. 400 V. CONDENSER
- C4—.01 MFD. 400 V. CONDENSER
- C5—.01 MFD. 400 V. CONDENSER
- C6—.05 MFD. 200 V. CONDENSER
- C7—.05 MFD. 200 V. CONDENSER
- C8—.05 MFD. 200 V. CONDENSER
- C9—.05 MFD. 200 V. CONDENSER
- C10—.1 MFD. 400 V. CONDENSER
- C11—50+50+50 MFD. 150V. COND.
- C12—50+50+50 MFD. 150 V. COND.
- C A-B-C—3-GANG. CONDENSER

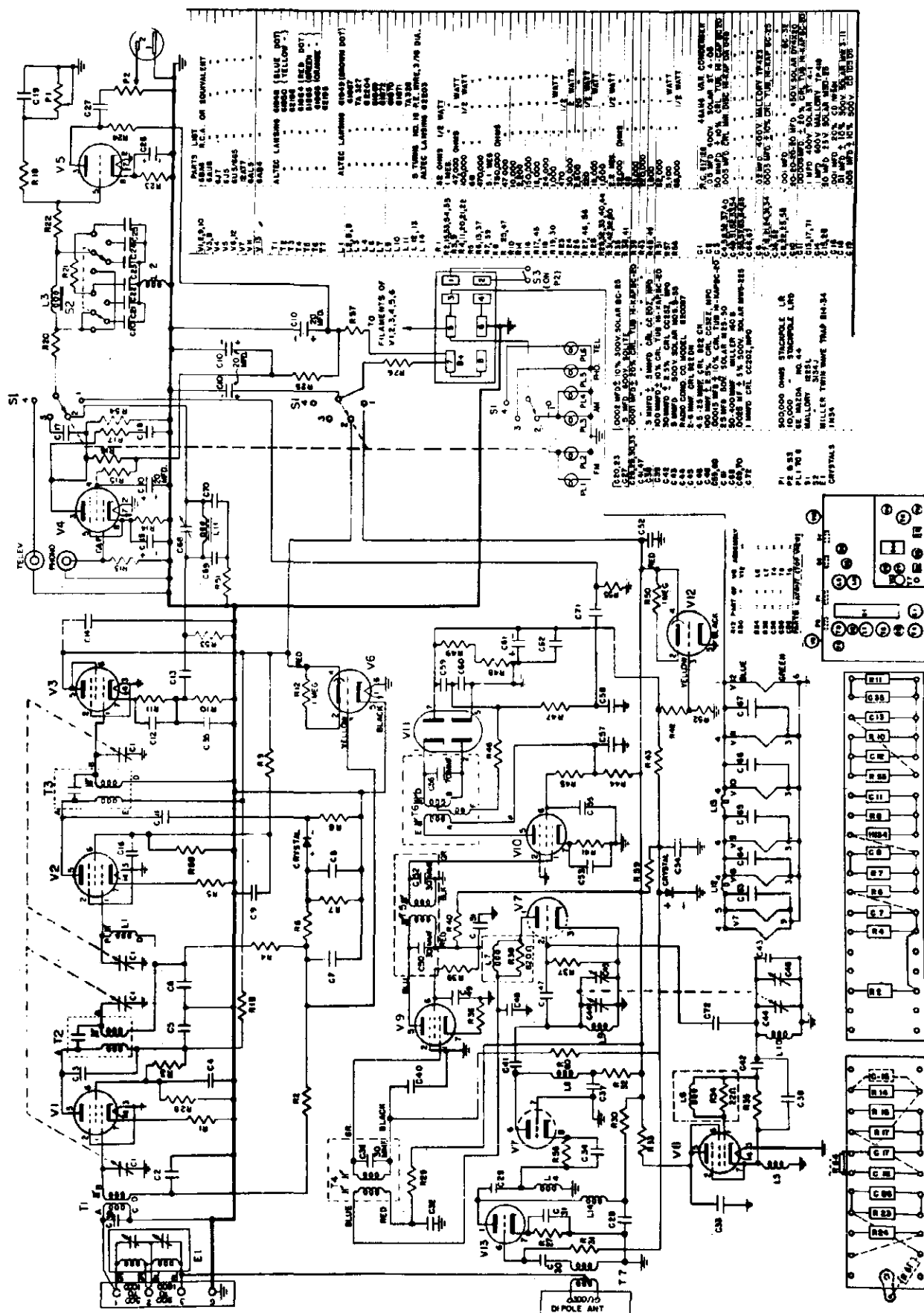
- R1—100 OHM—5 W. RESISTOR
- R2—150 OHM—1/2 W. RESISTOR
- R3—500 OHM—1/3 W. RESISTOR
- R4—1200 OHM—1/3 W. RESISTOR
- R5—2000 OHM—10 W. RESISTOR
- R6—3000 OHM—1/3 W. RESISTOR
- R7—5000 OHM—1/3 W. RESISTOR
- R8—25M OHM—1/3 W. RESISTOR
- R9—100M OHM—1/3 W. RESISTOR
- R10—100M OHM—1/3 W. RESISTOR
- R11—1Meg. OHM—1/3 W. RESISTOR
- R12—2Meg. OHM—1/3 W. RESISTOR
- R13—2Meg. OHM—1/3 W. RESISTOR
- R14—2Meg. OHM—1/3 W. RESISTOR
- R15—5Meg. OHM—1/3 W. RESISTOR
- R16—5Meg. OHM—1/3 W. RESISTOR
- R17—500M OHM POT.—1/3 WITH SWITCH

- T1—LOOP ANT.
- T2—RF COIL
- T3—OSC. COIL
- T4—455 KC INPUT I.F. COIL
- T5—455 KC OUTPUT I.F. COIL
- T6—OUTPUT TRANSFORMER
- SW1—2 POLE 2 POS. SWITCH
- SPl—5" PM. SPEAKER
- SRI—SELENIUM RECTIFIER

ALIGNMENT PROCEDURE
I. F. Alignment 455 KC (Connect to 1R5 Grid) Loop and R. F. Alignment—1400, 1000 and 600 KC. Dial Pointer Setting—535 KC with fully closed condenser.



MODEL 101B,
Tuner



(1) The FM Tuner employs six miniature tubes. The antenna is coupled to the RF stage through a broad band transformer having a high degree of balance. The RF stage consists of a 6AB4 tube and one half of a 12AT7 tube connected in "cascode". A 6AU6 tube is employed as a separate oscillator, the voltage being injected into the grid circuit of the second half of the 12AT7 tube, which operates as a mixer. Two stages of IF amplification, having a frequency of 10.7 megacycles, use 6BA6 tubes. The output of the second IF stage feeds the ratio detector which incorporates a 6AL5 tube. Delayed AVC gives good small signal sensitivity and is applied to the RF and first IF stages. The modified cascode circuit, a wartime "radar" development which is used as the RF amplifier, produces high signal gain with very low noise. The balanced antenna transformer, used as the coupling medium into this stage, gives a high degree of rejection to unwanted interference signals picked up by the antenna lead-in. The triode mixer is used since it has high gain and low noise compared to a pentagrid converter. Accurate tuning is aided by the use of a 6U5/6G5 electron tuning indicator. A half wave dipole antenna, having an impedance of 300 ohms is supplied with a sixty foot transmission cable. Maximum sensitivity of this unit is 5.5 microvolts with a quieting sensitivity of 12 microvolts.

(2) The AM Tuner covers the band of 514-1740 kilocycles. It is of the tuned radio frequency type, employing two 6AU6 type tubes in two stages. Complex coupling networks are used between the various networks to provide nearly constant gain and band width. The detector is of the infinite impedance type and the audio output is obtained across a portion of the cathode resistance. A.V.C. is obtained by means of a 1N34 Crystal and is applied to both RF stages. A separate 6U5/6G5 Electron Tuning Indicator is used as an AM tuning indicator. A dual wave trap is provided at the input of the AM section, and is inserted by means of a link on the antenna terminal strip. One section of the trap covers the range from 500-1000 kilocycles. The second section covers the range from 900-1800 kilocycles. This trap provides optional attenuation at any portion of the band so that the signal from a strong interfering local station may be reduced to a point where other weaker stations may be received without interference.

(3) A single stage audio amplifier is provided with the necessary equalization for using a variable reluctance or similar type phonograph pickup. A four position selector switch is supplied to switch between AM-FM, phonograph, and an external connection which is labeled television. This high impedance, low gain input is intended for the audio portion of television, magnetic reproducer, or similar use. After the selector switch there is a bass tone control which gives a range of 15 db variation at 100 cycles. Immediately following the bass boost circuit is a treble tone control having four positions:

- Position 1 provides flat response.
- Position 2 inserts an 8 KC low pass filter.
- Position 3 changes the low pass filter to 6000 cycle cut-off.
- Position 4 provides 4000 cycle cut-off.

A sharp 10 KC dip filter is provided on the AM audio output so as to remove the heterodyne whistle of interfering stations. Immediately following the tone controls is a single-stage 6J5 audio output stage.

Model 101B Tuner dimensions: 15 inches wide
 9½ inches high
 11½ inches deep (Chassis 10 inches deep;
 plus protrude 1½ inches out of rear)

(4) The A-323C amplifier is a separate unit and consists of a pentode connected input stage, a phase inverter, and push-pull 6L6 stages with an output transformer having taps covering the range from 2.5-24 ohms. The output of the A-323C amplifier provides 15 watts with less than 8% intermodulation, and approximately 2% total harmonics at 60 cycles. This amplifier supplies the plate, filament, and pilot lamp power for the tuner chassis. Two inter-connecting cables are provided for the power and speech circuits between the amplifier and tuner.

Model A-323C Amplifier
 dimensions: 13 inches wide
 8½ inches high
 9 inches deep

(5) Where average to strong signals are available, the FM dipole antenna can be used for both FM and AM by proper strapping on the terminal board. Where weak AM signals are available, it is recommended that a separate 10-30 foot antenna be used on AM.



MODELS 350-PB, 351-PB,
Ch. RE-267-1; 350-PL, 351-PL,
352-PL, 353-PL, Ch. RE-267-2

MODELS 350PB, 351PB, 350PL, 351PL, 352PL
& 353PL, CHASSIS RE-267-1 & RE-267-2
5 TUBE AC-DC, BATTERY PORTABLE

Changes covered in this supplement -

1. 350-PB and 351-PB, Chassis RE-267-1, a modified version of the 350-P and 351-P made especially for areas where strong local signals caused overloading.
2. 350-PL, 351-PL, 352-PL and 353-PL, Chassis RE-267-2, a revised version of the 350-P and 351-P to improve it for all locations and relieve crowding of parts. These four models are identical except for color of cabinet and cabinet back assembly.

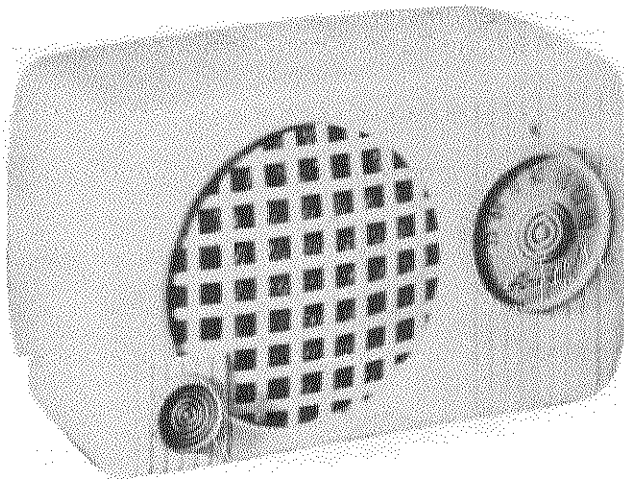
The only parts in the Parts List which are different from those on 350-P and 351-P are electrical chassis components and colored cabinet parts. The portions of the list which are changed are printed below.

PARTS LIST FOR 350-PL, 351-PL, 352-PL and 353-PL,
CHASSIS RE-267-2

SCHEMATIC LOCATION	PART NO.	DESCRIPTION
R1, R2	C20060-682	Resistor, 6.8K, 1/4 W. 20%
R3	C20060-332	Resistor, 3300 ohms, 1/4 W. 20%
R4	A21816	Resistor, 1850 ohms, 10 W. 10%
R5, R6	C20060-102	Resistor, 1000 ohms, 1/4 W. 20%
R7	A19177	Resistor, 47 wire, 1 W. 10%
R8	A22777	Resistor, 250 wire, 2 W.
R9	C20070-681	Resistor, 680 ohms, 1 W. 10%
R10	C20060-106	Resistor, 10 meg., 1/4 W. 20%
R11, R13		
R14	C20245-335	Resistor, 3.3 meg., 1/4 W. 5%
R12	C20245-106	Resistor, 10 meg., 1/4 W. 5%
R15	C20060-104	Resistor, 100K, 1/4 W. 20%
C1	AC22277	Variable Condenser Assembly
C2	A20275	Trimmer, 8-75 mmf.
C3	C20273-104	Condenser, P. T., .1 mg. 400 V.
C4, C5, C7	C20272-503	Condenser, P. T., .05 mf., 200 V.
C6	C20272-103	Condenser, P. T., .01 mf., 200 V.
C8	C20067-503	Condenser, P. T., .05 mf., 200 V.
C9A, B, C, D	A22879	Condenser, Electrolytic, 40-20-30 mfd., 150 V., 100 mfd., 10 V.
C10	C20273-602	Condenser, P. T., .006 mfd., 400 V.
C12, C13	A21674	Disc Ceramic Capacitor, .005 mfd.
C14	A22295	Disc Ceramic Capacitor, .01 mfd.
C15, C11	C20065-500	Condenser, Mica, 50 mmf., 500 V.
L2, L3	AC22912-1	RF Trans. Assy.
T1	C21797-5	First IF Transformer
T2	C21797-2	Second IF Transformer
CP1	A22257	Couplate
CP2	A22902	Couplate
L1	AD22258-3	Antenna Loop & Cabinet Back Assy. Sandelwood
L1	AD22258-4	Antenna Loop & Cabinet Back Assy. Burgundy
	AA22380-3	Cabinet Assy. Sandelwood
	AA22380-4	Cabinet Assy. Burgundy

PARTS LIST FOR 350-PB and 351-PB CHASSIS RE-267-1

SCHEMATIC LOCATION	PART NO.	DESCRIPTION
R1	C20271-153	Resistor, 15,000 ohm, 1/3 W. 20%
R2	C20271-104	Resistor, 100K, 1/3 W. 20%
R3	C20271-223	Resistor, 22K ohms, 1/3 W. 20%
R4	C20271-106	Resistor, 10 meg., 1/3 W. 20%
R5, R6, R10		
R11, R13	C20271-475	Resistor, 4.7 meg., 1/3 W. 20%
R7	C20271-473	Resistor, 47K, 1/3 W. 20%
R8	C20060-332	Resistor, 3300 ohms, 1/4 W. 20%
R9	A21816	Resistor, 1850 ohms, 10 W. 10%
R14, R15, R16, C14		
C15, C16	A22257	Audio Coupling Unit
R17	C20271-102	Resistor, 1000 ohms, 1/3 W. 20%
R18	A19177	Resistor, 47 Wire, 1 W. 10%
R19	A22777	Resistor, 250 Wire, 2 W.
R20	C20070-681	Resistor, 680 ohms, 1 W. 10%
R21	C20271-106	Resistor, 10 meg., 1/3 W. 20%
VC	C22253	Volume Control & Switch, 2 meg.
C1	AC22277-1	Variable Condenser Assembly
C2	A20275	Trimmer, 8-75 uuf.
C3	C20273-104	Condenser, P. T., .1 uf., 400 V.
C4, C12	C20065-500	Condenser, Mica, 50 uuf., 500 V.
C5, C7, C13, C17	C20272-503	Condenser, P. T., .05 uf., 200 V.
C6, C9	A21674	Condenser, P. T., .005 uf.,
C8	A22295	Disc Ceramic Capacitor, .01 uf.
C10	C20065-330	Condenser, Mica 33 uuf., 500 V.
C11	C20272-103	Condenser, P. T., .01 uf., 200 V.
C18A, B, C	A21815	Condenser, Electrolytic, 40-20 mfd., 150 V., 100 mfd., 10 V.
C19	C20273-602	Condenser, P. T., .006 uf., 400 V.
C20	A21675	Condenser, Electrolytic 30 mfd., 150 V.
L1	AD22258-1	Antenna Loop & Cabinet Back Assy. Blue-Green
L1	AD22258-2	Antenna Loop & Cabinet Back Assy. Jade-Green
L2, L3	AC22256-1	R. F. Transformer Assembly
L4, L5	AC22255-1	Oscillator Coil Assembly

MODEL 440T,
Ch. RE-278

MODELS 440T
CHASSIS RE-278 — 4 TUBE AC — DC

ELECTRICAL AND MECHANICAL SPECIFICATIONS

FREQUENCY RANGE

Broadcast ----- 540-1600 kc
IF ----- 455 kc

TUBES AND FUNCTIONS

12SA7 ----- Mixer-oscillator
12SQ7 ----- Detector — AVC-AF.
50L6GT ----- Output
35Z5GT ----- Rectifier

POWER SUPPLY

105-125 Volts, AC-DC, 30 Watts

POWER OUTPUT

Type: Beam tube
Undistorted ----- 1 Watt
Maximum ----- 1.85 Watts
Plate Load ----- 2000 Ohms

LOUD SPEAKER

Type: Permanent magnet
Size: 4 inch
Voice coil impedance ----- 3.2 Ohms

CHASSIS FEATURES

Automatic Volume Control
Underwriter's Listed

OPERATING CONTROLS

1. Upper knob ----- Tuning
Tuning ratio ----- 1.1
2. Lower knob ----- ON-OFF & Volume

GENERAL INFORMATION & SERVICE HINTS

POSITION OF POWER CORD PLUG.

On AC the power cord plug should be tried in both its possible positions in the receptacle, and left in the position that gives least hum. On DC the receiver will work in only one position of the plug in its receptacle.

THE ANTENNA

A 20 ft. antenna hank is attached to the receiver. In metropolitan areas it may be necessary to uncoil only a portion of the antenna to obtain satisfactory reception. For maximum pickup uncoil the antenna hank the full length. Do not attach it to a water pipe, radiator or other grounded object. So doing may result in hum and possibly a burned out antenna coil. If you are located some distance from a broadcasting station, or if local noise from electrical equipment is high, reception will be greatly improved by the addition of an outside antenna which may be connected to the end of the hank.

This receiver is designed to operate without a ground connection and no attempt should be made to use one.

CAUTION:

If any part of the antenna hank is located near the 12SA7 tube, the set is likely to oscillate, especially when the hank is not uncoiled.

ALIGNMENT PROCEDURE

PRELIMINARY.

Output meter connection ----- Across loudspeaker voice coil
Output meter reading to indicate 500 milliwatts (standard output) ----- 1.26 volts
Dummy antenna to be in series with signal generator output ----- See chart below
Connection of generator ground lead ----- Floating ground
Generator modulation ----- 30% 400 cycles
Position of Volume Control ----- Fully clockwise

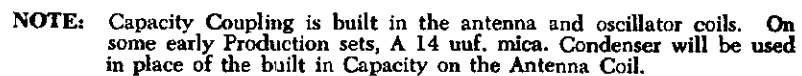
Position of Variable	Generator Frequency	Dummy Antenna	Generator Output Connection	Trimmers Adjusted	Trimmer Function	Approximate Sensitivity
Open	455 Kc	.05 uf.	12SA7 Grid (Stator of C-1)	A1 A2	IF	4000 uv.
1400 Kc	1400 Kc	.00005 uf.	Antenna Lug with Hank Removed	** A3	Oscillator	450 uv.

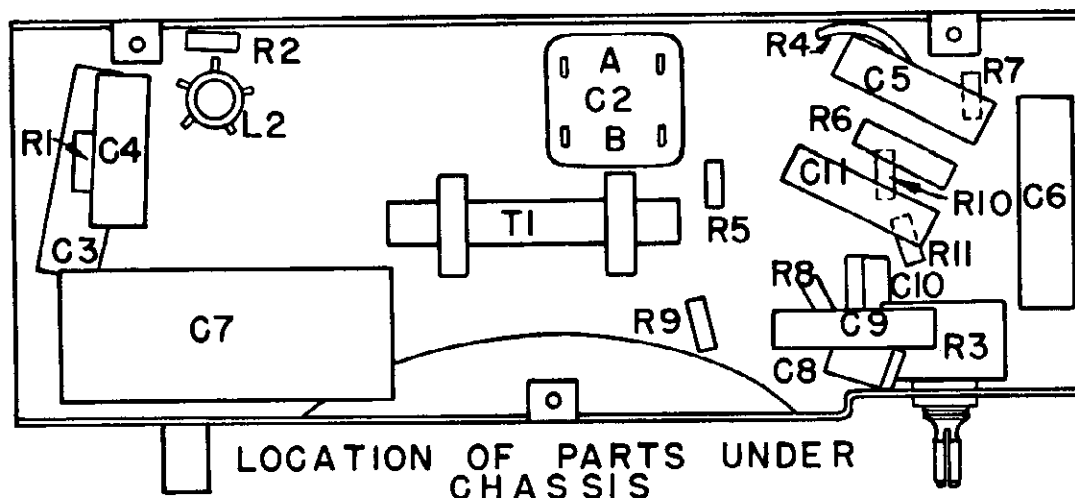
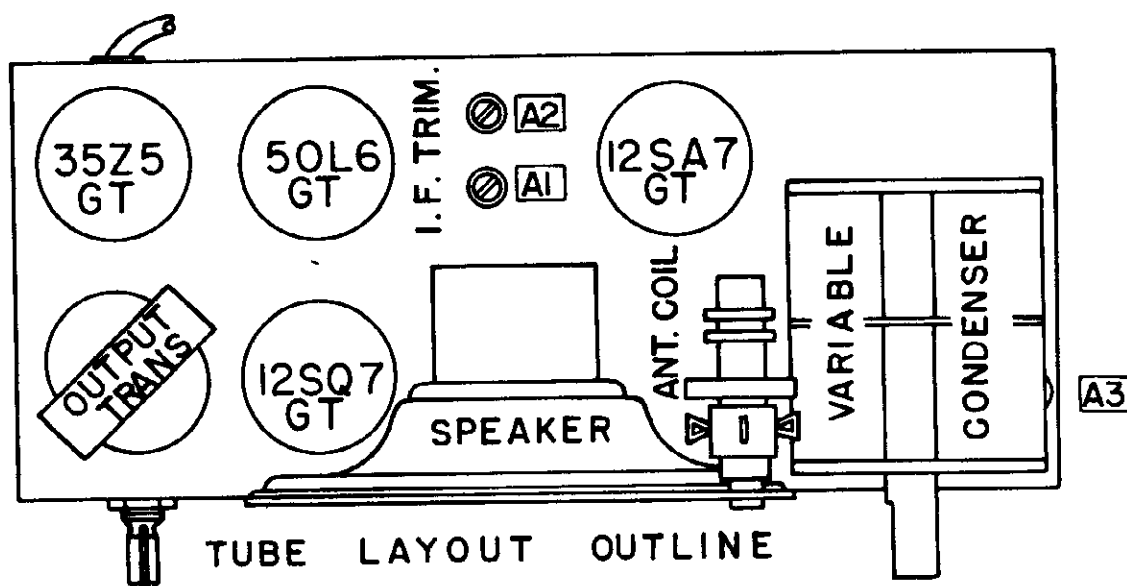
**Since the antenna section of the variable has no trimmer, the rotor of the variable should be rocked back and forth on both sides of 1400 Kc while adjusting the oscillator trimmer for maximum output. This is to obtain the combination of rotor and trimmer setting to give perfect tracking of the two sections of the variable condenser and consequently give maximum output.

Check sensitivity at 600 Kc. If weak, adjust antenna section plates for maximum output at 600 Kc. Tracking of the condenser at points other than 1400 Kc is accomplished by bending the outside plates on the variable condenser rotor, which are cut for this purpose. When bending plates to track the condenser at any given frequency, keep in mind the fact that this will effect the tracking at all frequencies below that point. A tuning wand is very helpful in checking the tracking of this condenser, to indicate whether more or less capacity is needed.

The alignment procedure should be repeated stage by stage in the original order for greatest accuracy.

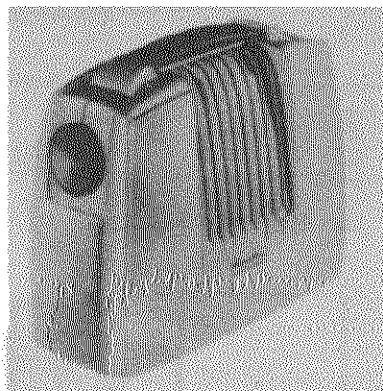
Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.



MODEL 440T,
Ch. RE-278

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
R1	C20060-334	Resistor, ¼ W., 330 K.	C9	C20069-202	Condenser, .002 uf, 600 V.
R2	C20060-223	Resistor, ¼ W., 22 K.	C10	C20065-101	Condenser, 100 uf, 500 V.
R3	C21630	Resistor, Volume Control, 2meg.	C11	C20069-202	Condenser, .002 uf, 600 V.
R4	A19177	Resistor, 1 W., 47 ohms	SPK	C22875	4" P. M. Speaker
R5	C20120-121	Resistor, ¼ W., 120 ohms	T2	C22878	Output Transformer
R6	C20070-222	Resistor, 1 W., 2200 ohms	T1	C22863	I. F. Transformer
R7	C20060-150	Resistor, ¼ W., 15 ohms	L1	C22864	Antenna Coil
R8	C20060-475	Resistor, ¼ W., 4.7 meg.	L2	C22865	Oscillator Coil
R9	C20060-156	Resistor, ¼ W., 15 meg.	P	B20257-1	Line Cord & Plug Assy.
R10	C20060-474	Resistor, ¼ W., 470 K.	AA23438-1	Cabinet with Grille Cloth, Ivory	
R11	C20060-105	Resistor, ¼ W., 1 meg.	AA23438-2	Cabinet with Grille Cloth, Red	
C1A, C1B	C22919	Condenser, Tuning	AA23438-3	Cabinet with Grille Cloth, Yellow	
C2A, C2B	A21042	Condenser, I. F. Trans. Trimmers	AA23438-4	Cabinet with Grille Cloth, Bronze	
C3	C20068-503	Condenser, .05 uf., 400 V.	AA23438-5	Cabinet with Grille Cloth, Willow Green	
C4	C20067-503	Condenser, .05 uf, 200 V.	AA23438-6	Cabinet with Grille Cloth, Burgundy	
C5	C20068-103	Condenser, .01 uf, 400 V.	C22923-1	Tuning Knob	
C6	C20068-503	Condenser, .05 uf., 400 V.	A22924-1	Volume Knob	
C7	A22878	Condenser, 40-20, uf, 150 V., 20 uf, 25 V.	A21992	Compression Spring	
C8	C20065-101	Condenser, 100 uf, 500 V.			

MODEL 446P,
Ch. RE-280



SPECIFICATIONS

FREQUENCY RANGE

Broadcast 540-1600 kc
IF 455 kc

TUBES AND FUNCTIONS

1R5 Mixer-oscillator
1T4 IF Amp.
1U5 DET-AVC AF Amp.
3S4 Output

POWER SUPPLY

1 6 $\frac{1}{2}$ V. B. Battery, Eveready Minimax, No. 467 or Equal.
2 1 $\frac{1}{2}$ V. D. Size Flashlight Cells, Connected in Parallel.

POWER OUTPUT

Undistorted06 Watts
Maximum15 Watts
Plate Load 10,000 Ohms

LOUD SPEAKER

Type: Permanent magnet 68 Oz.
Size: 4 Inch
Voice: Coil Impedance 3.2 Ohms

CHASSIS FEATURES

Automatic Volume Control
Built-in Loop

OPERATING CONTROLS

1 Left Knob On-Off Switch and Volume
2 Right Knob Tuning

PHYSICAL DIMENSIONS

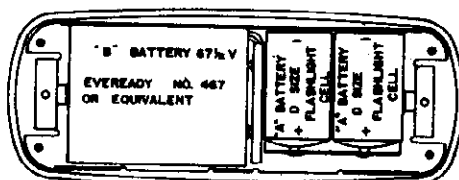
Length 9 Inches
Height 6 $\frac{1}{2}$ Inches
Depth 3 $\frac{1}{2}$ Inches

PARTS LIST

REF. No.	PART NO.	DESCRIPTION
R1	C20060-104	Resistor, 100,000 ohm, $\frac{1}{4}$ watt, 20%
R2	C20060-225	Resistor, 2.2 megohm, $\frac{1}{4}$ watt, 20%
R3	C20060-106	Resistor, 10 megohm, $\frac{1}{4}$ watt, 20%
R4	C20060-475	Resistor, 4.7 megohm, $\frac{1}{4}$ watt, 20%
R5	C20060-105	Resistor, 1 megohm, $\frac{1}{4}$ watt, 20%
R6	C20060-225	Resistor, 2.2 megohm, $\frac{1}{4}$ watt, 20%
R7	C20120-391	Resistor, 390 ohm, $\frac{1}{4}$ watt, 10%
R8	C23138	Volume Control and Switch, 2 megohm
C1	A21811	Condenser, Electrolytic, 10 uf, 150 volts
C2, C11	C20067-503	Condenser, .05 uf, P.T., 200 volts
C3, C10	C20065-500	Condenser, 50 uf, Mica, 500 volts
C4	C20069-202	Condenser, .002 uf, P.T., 600 volts
C5	C20065-101	Condenser, 100 uf, Mica, 500 volts
C6	C20067-103	Condenser, .01 uf, P.T., 200 volts
C7	C20069-602	Condenser, .006 uf, P.T., 600 volts
C8	C20069-102	Condenser, .001 uf, P.T., 600 volts
C9 (A-B)	C22966	Condenser, Variable
L1	C23141	Antenna, Loop
L2	AC23139	Oscillator Coil Assembly
T1, T2	C21797-1	I.F. Transformer

REF. No.	PART NO.	DESCRIPTION
	A21792	Spring Clip, I.F. Coil Mounting.
T3	AC23140	Output Transformer
SPK	C22972	Speaker, 4" P.M.
	A21842	"B" Battery Cable and Terminal Strip
	A23136	"A" Battery Clip (Brass)
	A19180	"A" Battery Insulating Washers, 10 for
	A23137	"A" Battery Clip Insulator, 10 for
	C23133	Volume Control Mounting Bracket
	C23134	Variable Condenser, Mounting Bracket
	C23132	Chassis Bottom Cover
	A20243-3	Socket, Miniature, Shielded
	A20243-1	Socket, Miniature, Unshielded
	C23167	Knob, Volume Control
	C23166	Knob, Tuning
	A22572	Tube, Shield (145)
	A22573	Shield Base Clip
	A23172	Carton
	*AA23759-1	Cabinet Assembly, Maroon
	*AA23759-2	Cabinet Assembly, Sandalwood

* Cabinet assembly includes grill cloth, handle, and chassis mounting brackets.



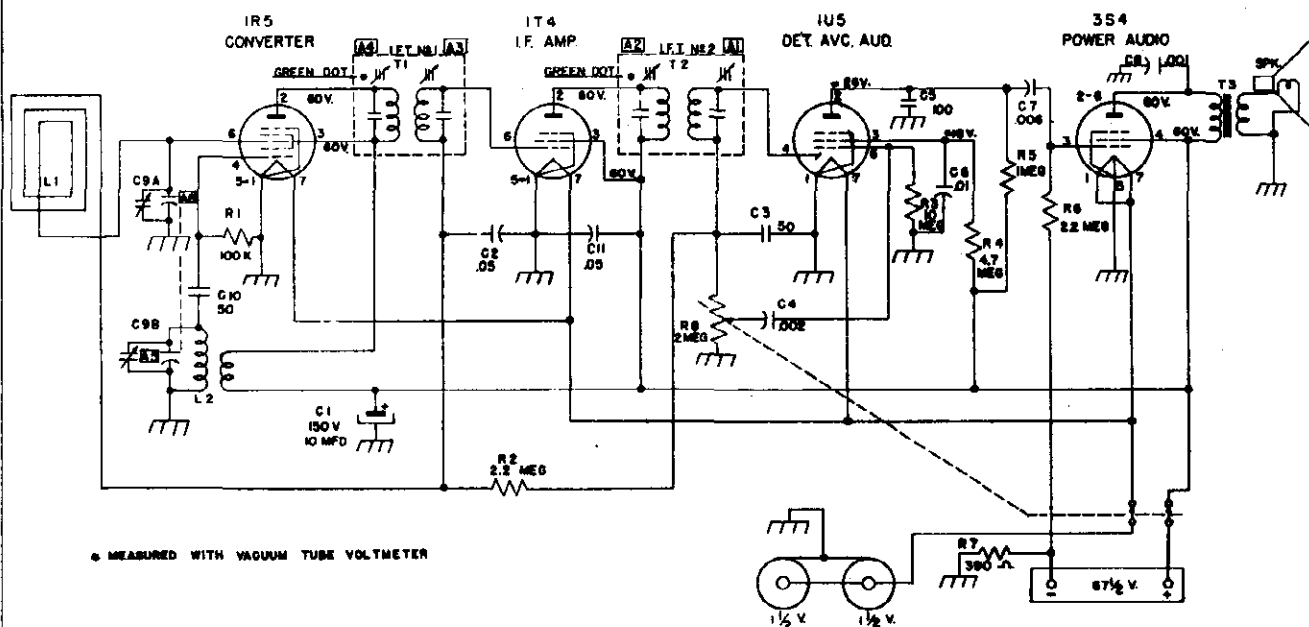
BATTERY INSTALLATION

ALIGNMENT DATA

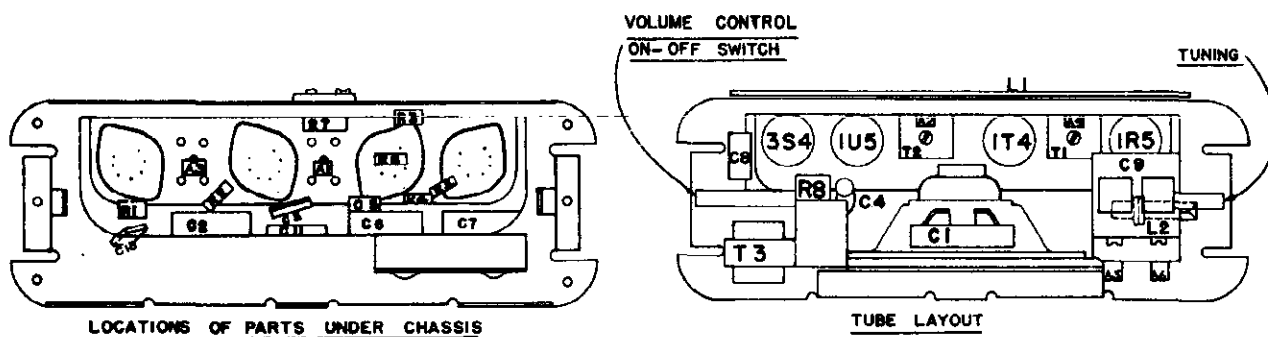
Preliminary

Output meter reading to indicate .05 watt across voice coil _____ 0.4 V.
 Generator ground lead connected _____ to metal chassis.
 Generator modulation _____ 30%, 400 cycles.
 Position of Volume control _____ fully on.

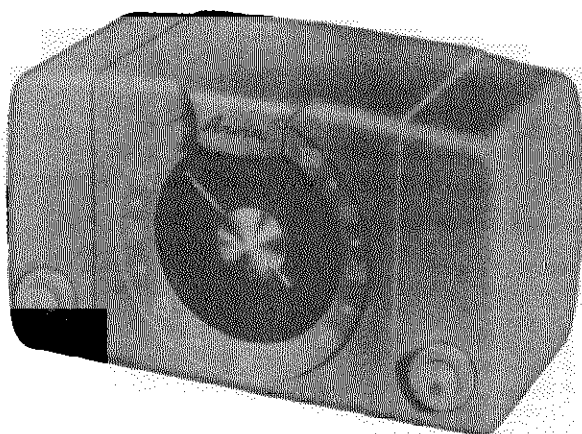
Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Adjust Trimmers (in order shown)	Trimmer Function
Open	455 KC	.05 MFD	Mixer Grid	A1, A2, A3, A4	I.F.
Open	1650 KC		Test Loop	A5	Osc.
1400 KC	1400 KC		Test Loop	A6	Ant.
600 KC	600 KC		Test Loop	Check Point	



SCHEMATIC DIAGRAM



MODELS 450T,
451T, Ch. RE-281



SPECIFICATIONS

FREQUENCY RANGE

Broadcast 540-1600 kc
IF 455 kc

TUBES AND FUNCTIONS

12BE6 Mixer-oscillator
12BA6 IF Amp.
12AT6 DET-AVC AF Amp.
50C5 Output
35W4 Rectifier

LOUD SPEAKER

Type: Permanent magnet
Size: 5 Inch
Voice coil impedance 3.2 Ohms

POWER SUPPLY

105-125 Volts, AC-DC, 35 Watts

POWER OUTPUT

Undistorted 1 Watt
Maximum 1.5 Watts
Plate load 2000 Ohms

PHYSICAL DIMENSIONS

Length 11 inches
Height 6 $\frac{3}{4}$ inches
Depth 5 $\frac{1}{2}$ inches

The same chassis is used in models 450T and 451T. 451T has additional cabinet trim and deluxe knobs, which are not used on Model 450T. 450T is made in Ivory and Walnut. 451T is made in the following colors: Ivory, Willow Green, Sandalwood, and Ebony.

CHASSIS FEATURES

Automatic Volume Control
Built-in Loop
Underwriters' Listed

OPERATING CONTROLS

1. Left knob ON-OFF Sw and Volume
2. Right knob Tuning

THE ANTENNA

This receiver has a built-in loop which gives satisfactory reception in most locations. If the receiver is located some distance from a broadcasting station, or where the electrical interference is high, an outside antenna connected to the pickup lead on the loop, will improve reception.

This receiver is designed to operate without a ground connection and no attempt should be made to use one.

PRELIMINARY:

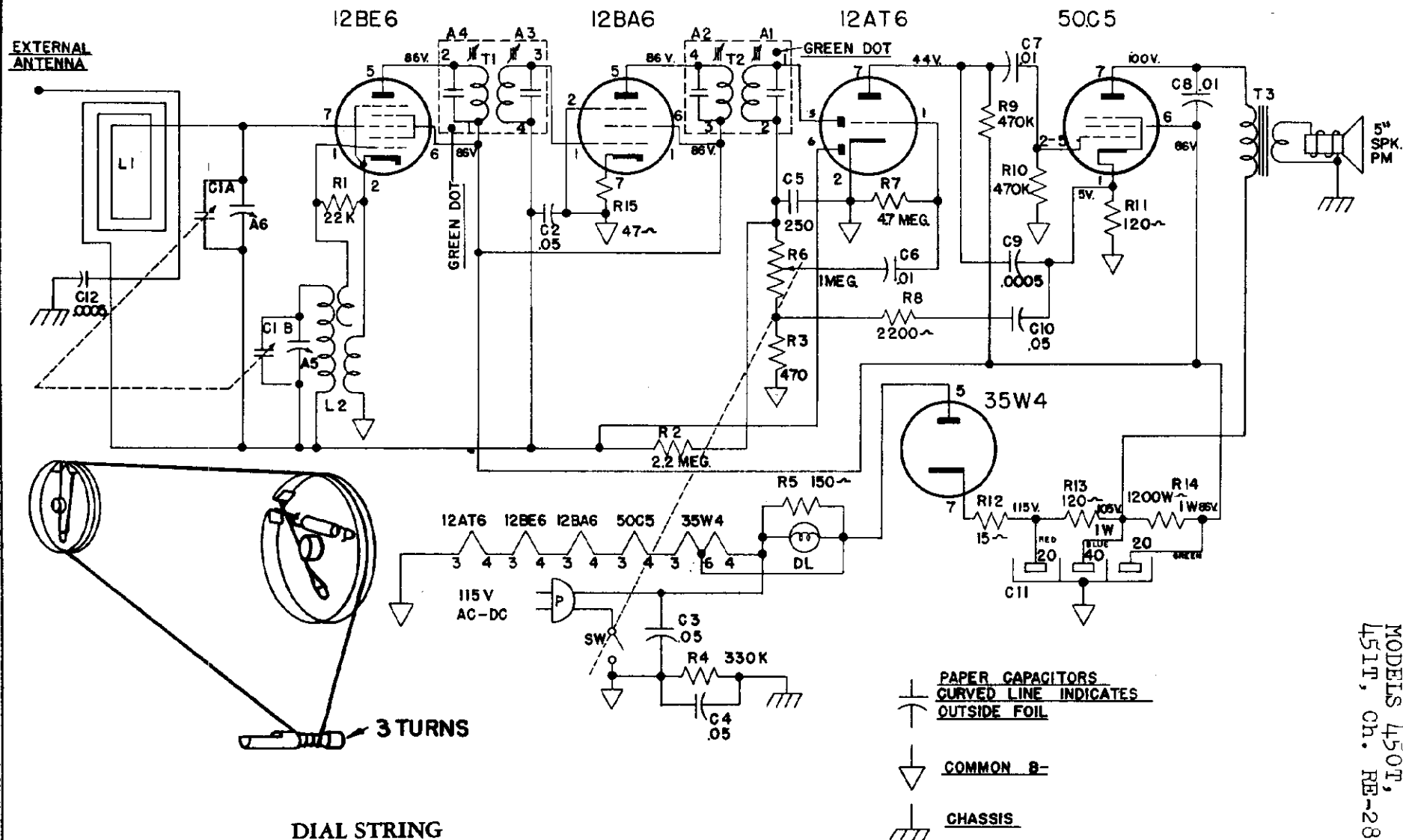
ALIGNMENT PROCEDURE

Output meter connection Across loudspeaker voice coil
Output meter reading to indicate 500 milliwatts (standard output) 8 volts
Dummy antenna value to be used in series with generator output See chart below
Connection of generator output lead See chart below
Connection of generator ground lead Floating ground
Generator modulation 30% 400 cycles
Position of volume control Fully clockwise
Position of dial pointer with variable fully closed Last mark at left end of dial

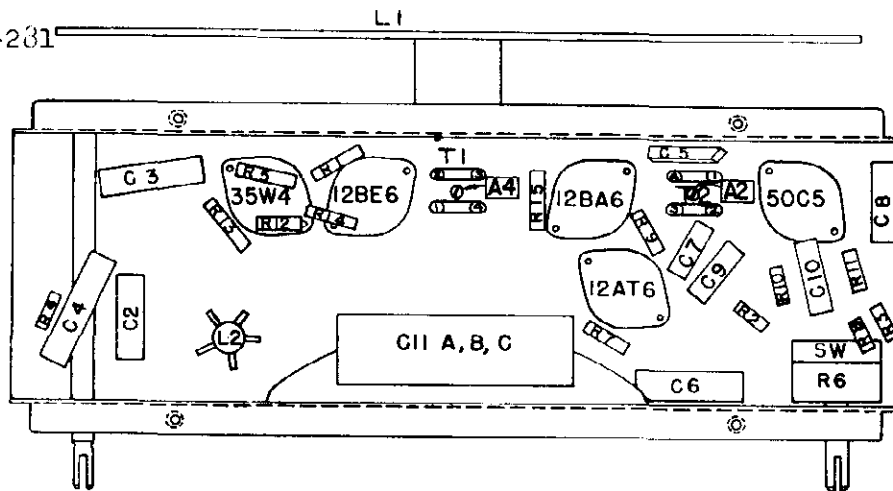
Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers Adjusted in Order Shown for Maximum Output	Function of Trimmer
Open	455	.05 mfd.	12BE6 Grid (Stator of CIA)	A1, A2, A3, A4,	IF
1400	1400		*Test Loop	A5, A6 on Variable Condenser	Osc. Ant.
600	600		*Test Loop	Check Point	

*Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter, placed about one foot from the set loop.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.

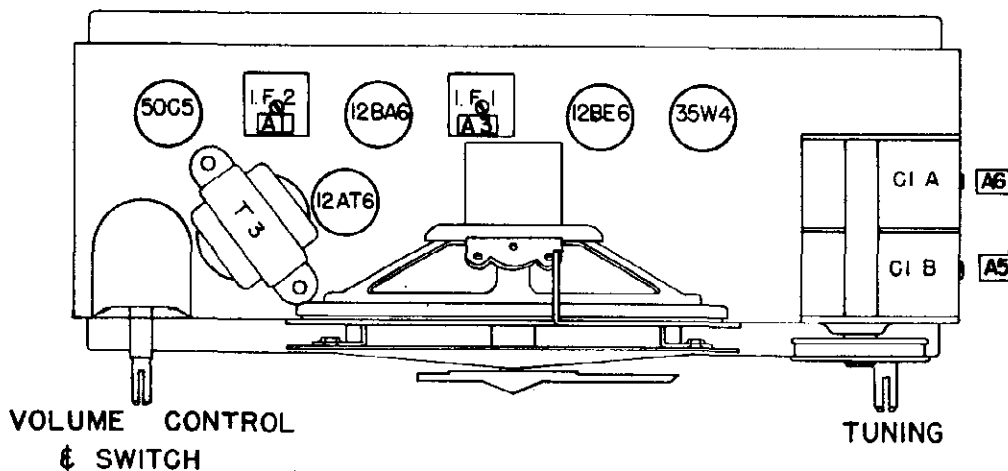


MODELS 450T,
451T, Ch. RE-231



LOCATION OF PARTS UNDER CHASSIS

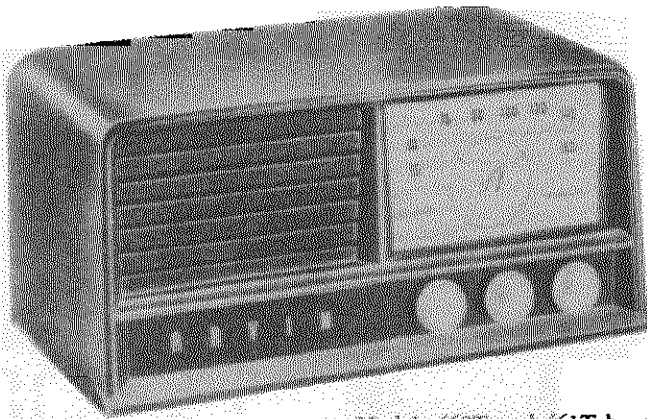
TUBE LAYOUT



LOCATION OF TUBES AND TRIMMERS
PARTS LIST — 450T-451T

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
L1	D23465	Antenna Loop and Rear Cover	B20138-16	Line Cord	
	B23456	Antenna Loop Mounting Bracket	C23461	Pointer	
	AE23499-1	Cabinet Assy., 450T Ivory	R1	C20060-223	Resistor, 22k 1/4 watt 20%
	AE23499-2	Cabinet Assy., 450T Walnut	R2	C20060-225	Resistor, 2.2 Meg. 1/4 watt 20%
	AE23499-3	Cabinet Assy., 451T Deluxe Ivory	R3	C20060-471	Resistor, 470 1/4 watt 20%
	AE23499-4	Cabinet Assy., 451T Deluxe Willow Green	R4	C20060-334	Resistor, 330K 1/4 watt 20%
	AE23499-5	Cabinet Assy., 451T Deluxe Sandalwood	R5	C20060-151	Resistor, 150 1/4 watt 20%
	AE23499-6	Cabinet Assy., 451T Deluxe Ebony	R6	C23468	Volume Control, 1 Meg. 1/4 watt 20%
	A23474	Carton with fillers	R7	C20060-475	Resistor, 4.7 Meg. 1/4 watt 20%
L2	AC22865-1	Coil, Oscillator	R8	C20060-222	Resistor, 2200 1/4 watt 20%
C1 A, B	C23469	Variable Condenser	R9, R10	C20060-474	Resistor, 470K 1/4 watt 20%
C2, C10	C20067-503	Condenser, Paper Tubular .05 mf. 200 V	R11	C20120-121	Resistor, 120 1/4 watt 10%
C3, C4	C20068-503	Condenser, Paper Tubular .05 mf. 400 V	R12	C20060-150	Resistor, 15 1/4 watt 20%
C5	C20065-251	Condenser, Mica 250 mmf. 500 V	R13	C20070-121	Resistor, 120 1 watt 10%
C6, C7, C8	C20068-103	Condenser, Paper Tubular .01 mf. 400 V	R14	C20070-122	Resistor, 1200 1 watt 10%
C9, C12	C20069-501	Condenser, Paper Tubular .0005 mf. 600 V	R15	C20060-470	Resistor, 47 1/4 watt 20%
CL1	C23470	Condenser, Electrolytic 20-40-20 150 V	A20243-1	Socket, Wafer, Plain	
	A19351	Dial Light Bulb Mazda No. 47	A20243-3	Socket, Wafer, Center Pin Shielded	
	A19628-3	Dial Light Socket	SPK	C23467	Speaker, 5" PM
	A23453-1	Knob, Clear		C23462-1	Speaker, Grill
	A23453-2	Knob, Ivory		A23982	Speaker Brkt & Pointer Shaft
			T1, T2	C21797-16	Transformer, I. F.
				A21792	Transformer, I. F. Spring Clips 5 for
			T3	AC23464-1	Transformer, Output
				A23475	Tuning Shaft
				A19361	Tuning Shaft hair pin Clip

MODELS 460T,
461T, Ch. RE-284



Colors are as follows:

460T — Ivory, Willow Green, and Sandalwood.

461T — Mahogany.

POWER OUTPUT

Undistorted8 Watts
Maximum 1.5 Watts
Plate load 2000 Ohms

Models 460T and 461T have the same Chassis, they differ only in cabinet trim and knobs.

SPECIFICATIONS

FREQUENCY RANGE

Broadcast 540-1600 kc
IF 455 kc

TUBES AND FUNCTIONS

12SK7GT RF Amp.
12SA7GT Mixer-oscillator
12SK7GT IF Amp.
12SQ7GT DET-AVC AF Amp.
35L6GT Output
35Z5GT Rectifier

LOUD SPEAKER

Type: Permanent magnet, 1.47 oz. Alnico 5
Size: 5 Inch
Voice coil impedance 3.2 Ohms

CHASSIS FEATURES

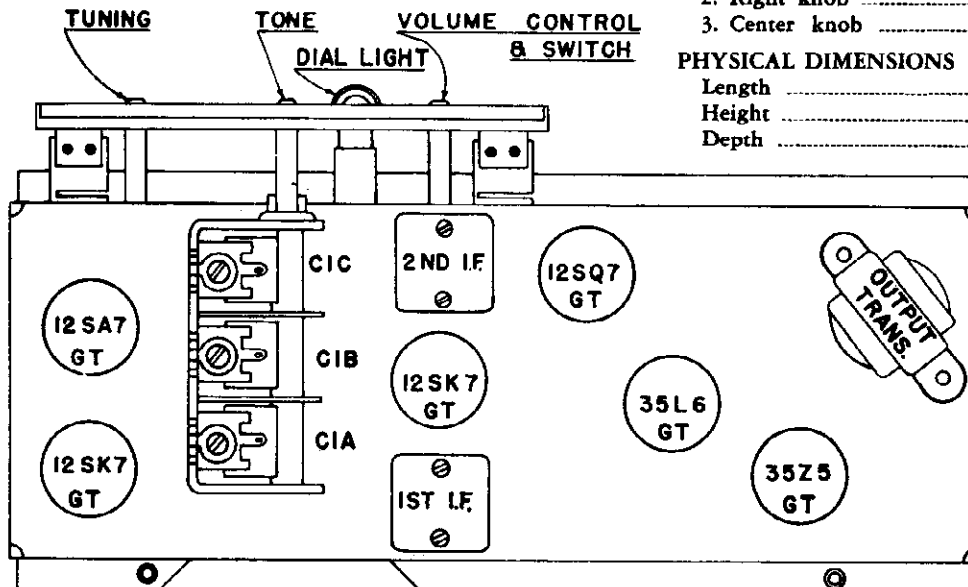
Automatic Volume Control
Built-in Loop
Underwriters' Listed
Tuned RF Stage

OPERATING CONTROLS

1. Left knob ON-OFF Sw and Volume
2. Right knob Tuning
3. Center knob Tone

PHYSICAL DIMENSIONS

Length 13 $\frac{1}{8}$ inches
Height 6 $\frac{3}{8}$ inches
Depth 7 $\frac{1}{2}$ inches



TUBE LAYOUT

ALIGNMENT PROCEDURE

PRELIMINARY:

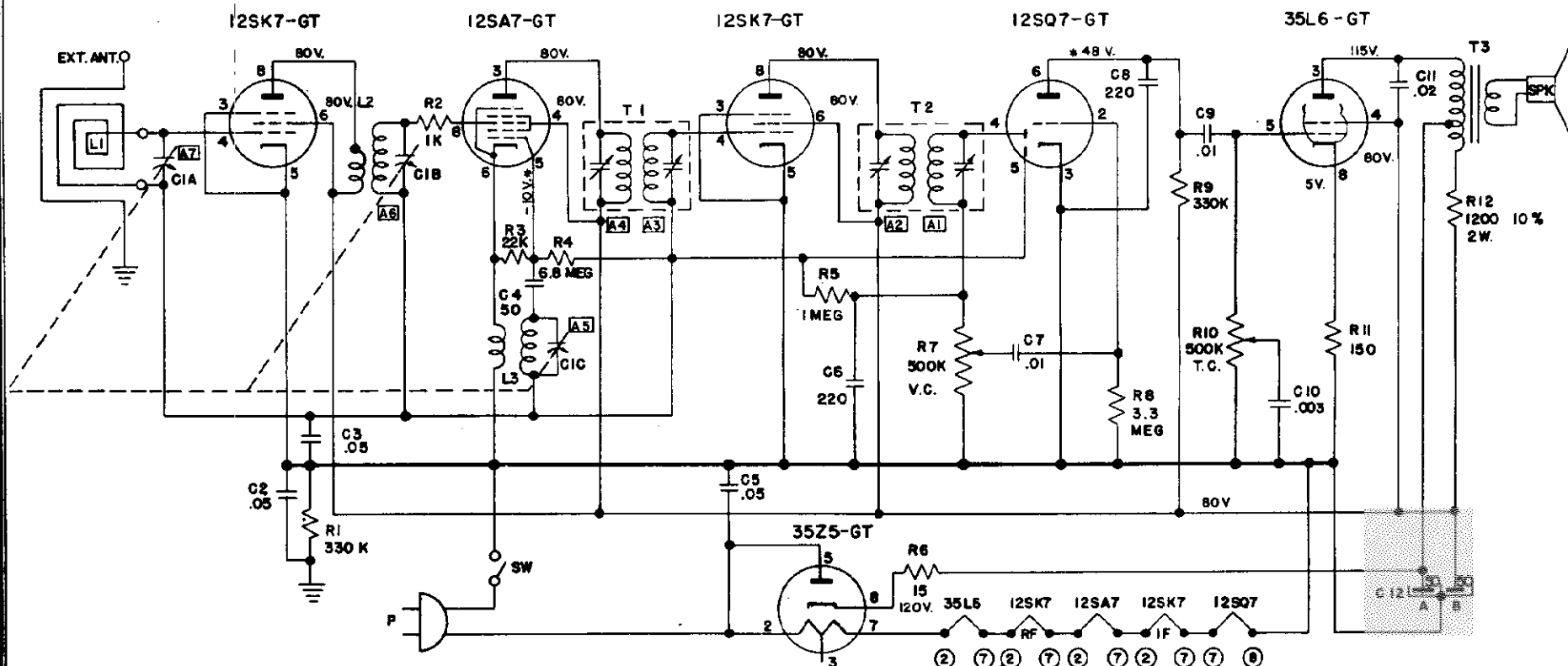
Output meter connection Across loudspeaker voice coil
Output meter reading to indicate .5 W (standard output) 1.26 volts
Connection of generator ground lead Floating ground
Generator modulation 30% 400 cycles
Position of volume control Fully clockwise
Position of dial pointer with variable fully closed Horizontally to left

MODELS 460T,
461T, Ch. RE-284

1. Connect signal generator lead through a .05 uf. condenser to converter grid. Open tuning condenser. Set signal generator to 455 Kc. Tune I. F. Trimmers A1, A2, A3, and A4 for maximum output.
2. Close tuning condenser and set pointer horizontally to left. Open tuning condenser. Connect signal generator to test loop or to blue lead on set loop. Set signal generator to 1650 Kc. Tune A5 trimmer on oscillator section of tuning condenser for maximum output.
3. Set signal generator to 1400 Kc. Adjust tuning shaft until maximum output is obtained. Tune R. F. trimmer A6 and antenna trimmer A7 on tuning condenser for greatest output. Reset tuning shaft until output is again maximum. Retune R. F. and antenna trimmers. Repeat this cycle of operations at 1400 Kc. until no further increase of output can be obtained. Keep generator output at a low value to prevent detuning by A. V. C. action.
4. Set signal generator to 600 Kc. Adjust tuning shaft for maximum output. Adjust tuning condenser plates for maximum output if necessary.

Approximate sensitivities with 117 V. AC line voltage and .5 W output across voice coil, should be: Mixer grid, 455 Kc—200 uv; Antenna lead 600 Kc.—250 uv., 1000 Kc—200 uv., 1400 Kc.—200 uv.

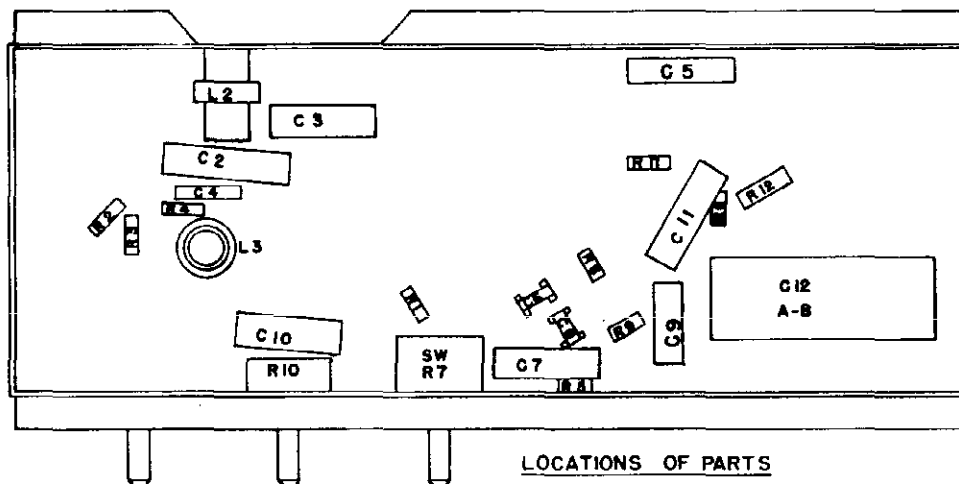
VOLTAGE READINGS TAKEN WITH 117V. A.C. LINE VOLTAGE
*THESE READINGS TAKEN WITH VACUUM TUBE VOLTMETER



MODELS 460T,
461T, Ch. RE-284

PARTS LIST — 460T-461T

Schematic Location	Part No.	Description	Schematic Location	Part No.	Description
L1	D23159	Antenna Loop		AC23302-3	Dial Plate Assy. (Wil. Green)
	B22953	Antenna Loop Mtg. Brkt.		AC23302-4	Dial Plate Assy. (San'wood)
	A23830-1	Cabinet (461) Mahogany with carton		C23229-1	Knob — on-off Volume (460)
	A23829-2	Cabinet (460) Ivory with decorative rail & Carton		C23229-3	Knob — Tuning (460)
	A23829-3	Cabinet (460) Willow Green with decorative Rail & Carton		C23229-4	Knob — Tone (460)
	A23829-4	Cabinet (460) Sandalwood with decorative Rail & Carton		C23229-5	Knob — on-off volume (461)
	C23299	Cabinet - Rear Cover		C23229-7	Knob — Tuning (461)
	C23300	Cabinet decorative Rail with Palnuts & washers.		C23229-8	Knob — Tone (461)
	A23237	Carton		B20138-15	Line Cord and Plug
L2	AC23163	Coil, R. F.		D23242	Pointer
L3	C23751	Coil, Oscillator		A20040-17	Pointer felt washer 10 for
C1A,B,C	C23743	Condenser, Variable	R1, R9	C20060-334	Resistor, 330,000 ohm ¼ W
C2, C5	C20068-503	Condenser, P. T. .05 uf., 400 V	R2	C20060-102	Resistor, 1000 ohm ¼ W
C3	C20067-503	Condenser, P. T. .05 uf., 200 V	R3	C20060-223	Resistor, 22,000 ohm ¼ W
C4	C20065-500	Condenser, Mica 50 uuf., 500 V	R4	C20060-685	Resistor, 6.8 Megohm ¼ W
C6, C8	C20203-221	Condenser, Ceramic, 220 uuf., 350 V	R5	C20060-105	Resistor, 1 megohm ¼ W
C7, C9	C20068-103	Condenser, P. T. .01 uf., 400 V	R6	C20060-150	Resistor, ¼ W
C10	C20069-302	Condenser, P. T. .003 uf., 600 V	R7	C22963	Resistor, Volume control & switch 500,000 ohm
C11	C20068-203	Condenser, P. T. .02 uf., 400 V	R8	C20060-335	Resistor, 3.3 megohm ¼ W
C12 A, B	A22111	Condenser, Electrolytic 50-50 uf., at 150 V	R10	C23156	Resistor, Tone control 500,000 ohm
	A19133	Dial Cord Spring 10 for	R11, R13	C20060-151	Resistor, 150 ¼ W
	D23235	Dial Crystal	R12	C20223-122	Resistor, 1200 2 W ± 10%
	A19124	Dial Crystal Snap Fasteners 10 for	SPK	C22760-1	Speaker, 5" P. M.
	A19351	Dial, Lamp Bulb Mazda No. 47		A19138-8	Speaker, spacer eyelet 10 for
	A22849-1	Dial, Lamp Socket	T1	AC23161	Transformer, 1st I. F.
	AC23302-1	Dial Plate Assy. (Brown)	T2	AC23162	Transformer, 2nd I. F.
	AC23302-2	Dial Plate Assy. (Ivory)	T3	AC23164	Transformer, Output
				A19233-1	Tube socket, center pin shielded
				A18254-1	Tube Socket Plain
				A22957-1	Tuning shaft
				A19361	Tuning shaft hair pin clip

LOCATIONS OF PARTS
UNDER CHASSIS

SPECIFICATIONS

FREQUENCY RANGE

Broadcast 540-1600 kc
IF 455 kc

TUBES AND FUNCTIONS

12SK7GT RF Amp.
12SA7GT Mixer-oscillator
12SK7GT IF Amp.
12SQ7GT DET-AVC AF Amp.
35L6GT Output
35Z5GT Rectifier

POWER OUTPUT

Undistorted 8 Watts
Maximum 15 Watts
Plate load 2000 Ohms

LOUD SPEAKER

Type: Permanent magnet, 1.47 oz. Alnico 5
Size: 8 Inch
Voice coil impedance 3.2 Ohms

CHASSIS FEATURES

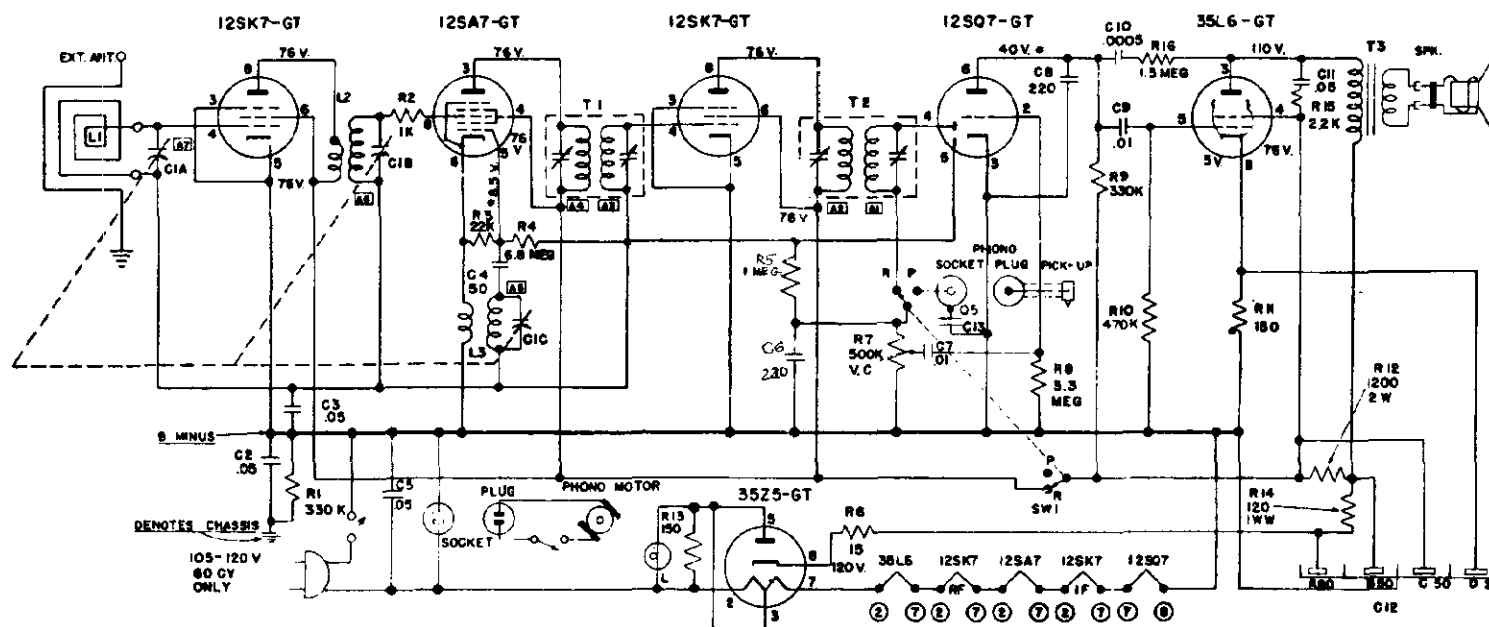
Automatic Volume Control
Built-in Loop
Underwriters' Listed
Tuned RF Stage

OPERATING CONTROLS

1. Left knob ON-OFF Sw and Volume
2. Right knob Tuning
3. Center knob Tone

PHYSICAL DIMENSIONS

Length 22 inches
Height 34 inches
Depth 16 inches



MODELS 462-CB, 462-
CM, Ch. RE-287-1

ALIGNMENT PROCEDURE

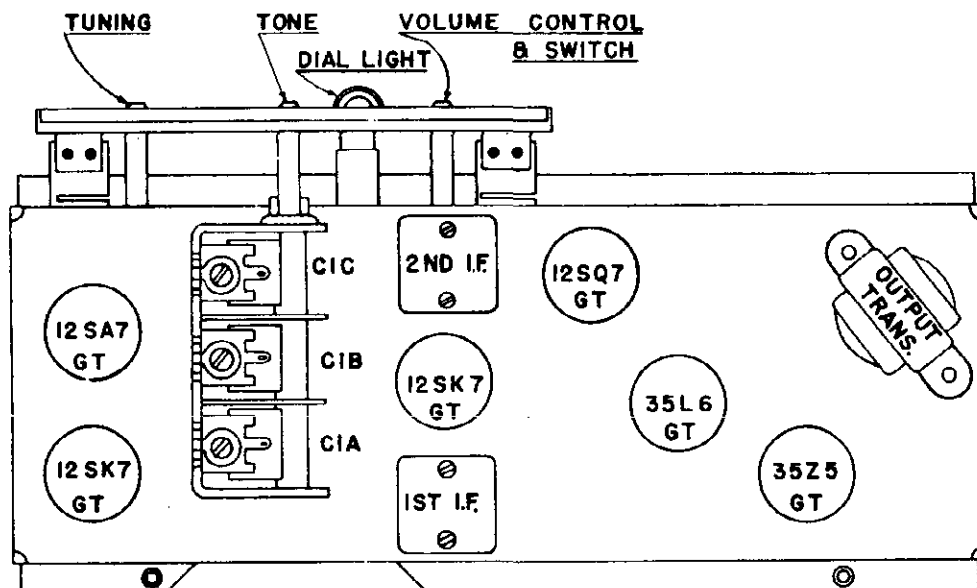
PRELIMINARY:

Output meter connection Across loudspeaker voice coil
 Output meter reading to indicate .5 W (standard output) 1.26 volts
 Connection of generator ground lead Floating ground
 Generator modulation 30% 400 cycles
 Position of volume control Fully clockwise
 Position of dial pointer with variable fully closed Horizontally to left

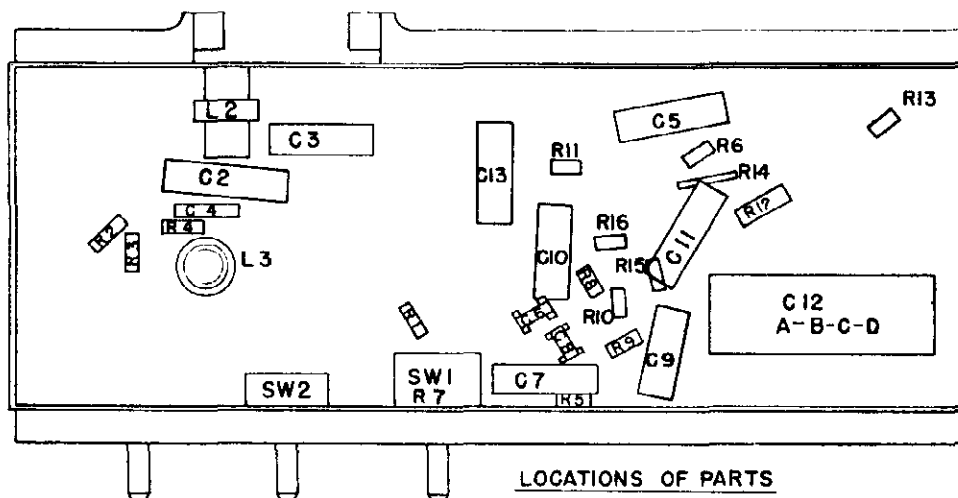
1. Connect signal generator lead through a .05 uf. condenser to converter grid. Open tuning condenser. Set signal generator to 455 Kc. Tune I. F. Trimmers A1, A2, A3, and A4 for maximum output.
2. Close tuning condenser and set pointer horizontally to left. Open tuning condenser. Connect signal generator to test loop or to blue lead on set loop. Set signal generator to 1650 Kc. Tune A5 trimmer on oscillator section of tuning condenser for maximum output.
3. Set signal generator to 1400 Kc. Adjust tuning shaft until maximum output is obtained. Tune R. F. trimmer A6 and antenna trimmer A7 on tuning condenser for greatest output. Reset tuning shaft until output is again maximum. Retune R. F. and antenna trimmers. Repeat this cycle of operations at 1400 Kc. until no further increase of output can be obtained. Keep generator output at a low value to prevent detuning by A. V. C. action.
4. Set signal generator to 600 Kc. Adjust tuning shaft for maximum output. Adjust tuning condenser plates for maximum output if necessary.

Approximate sensitivities with 117 V. AC line voltage and .5 W output across voice coil, should be: Mixer grid, 455 Kc — 200 uv; Antenna lead 600 Kc. — 250 uv., 1000 Kc — 200 uv., 1400 Kc. — 200 uv.

TUBE LAYOUT



MODELS 462-CB, 462-CM, Ch. RE-287-1

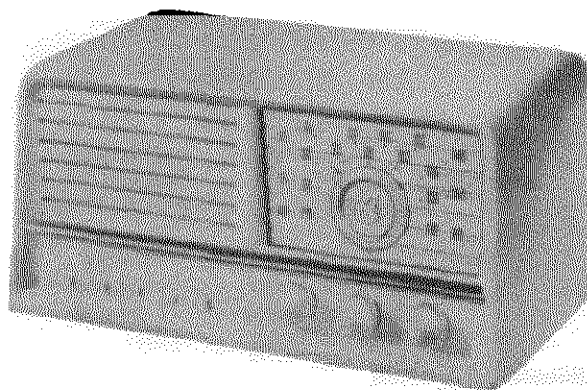


LOCATIONS OF PARTS
UNDER CHASSIS

PARTS LIST FOR NO. 462-CM AND NO. 462-CB, RE-287-1

Schematic Location	Part No.	Description	Schematic Location	Part No.	Description
L1	D23159	Antenna Loop Assy.	D23706-3	Knob, Tuning (Mahogany)	
	B22953	Bracket, Antenna Loop Mtg.	D23706-11	Knob, Tuning (Blonde)	
	C23427	Bracket, Dial (2 Used)	D23706-1	Knob, Volume, On-Off (Mahogany)	
	R23689	Cabinet, Mahogany (With Carton)	D23706-9	Knob, Volume, On-Off (Blonde)	
	R23689-1	Cabinet, Blonde (With Carton)	A19351	Lamp, Dial, Mazda No. 47	
C1A, B, C	C23743	Capacitor, Variable, 3-Gang	B20138-15	Line Cord & Plug	
C4	C20065-500	Capacitor, 50 uuf, 500 V, Mica	R6	C20060-150 Resistor, 15 Ohms, 20%, 1/2 W	
C6, C8	C20203-221	Capacitor, 220 uuf, 350 V, Ceramic	R14	A23933 Resistor, 120 Ohms 10%, 1 W	
C10	C20069-501	Capacitor, .0005 MFD, 600 V, Paper	R11, R13	C20060-151 Resistor, 150 Ohms 20%, 1/2 W	
C7, C9	C20068-103	Capacitor, .01 MFD, 400 V, Paper	R2	C20060-102 Resistor, 1000 Ohms 20%, 1/2 W	
C3	C20067-503	Capacitor, .05 MFD, 200 V, Paper	R12	C20223-122 Resistor, 1200 Ohms 10%, 2 W	
C2, C5, C11, C13	C20068-503	Capacitor, .05 MFD, 400 V, Paper	R16	C20060-222 Resistor, 2200 Ohms 20%, 1/2 W	
C12A, B, C, D	C23930	Capacitor, 80-50-50/150, 25/25, Electrolytic	R3	C20060-223 Resistor, 22K Ohms 20%, 1/2 W	
	E23593	Record Changer Assy. (See V-M Model 950)	R1, R9	C20060-334 Resistor, 330K Ohms 20%, 1/2 W	
L3	AC23751-1	Coil, Oscillator	R10	C20060-474 Resistor, 470K Ohms 20%, 1/2 W	
L2	AC23163-1	Coil, R.F.	R5	C20060-105 Resistor, 1 Megohm 20%, 1/2 W	
R7	C22963	Control, Vol. & Switch, 500K Ohms	R16	C20060-155 Resistor, 1.5 Megohms 20%, 1/2 W	
	C23707	Cover, Cabinet Rear	R8	C20060-335 Resistor, 3.3 Megohms 20%, 1/2 W	
	C23578	Cover, Record Changer Bottom	R4	C20060-685 Resistor, 6.8 Megohms 20%, 1/2 W	
	A23594	Dial Pointer (Mahogany)	A19551	Socket, A.C., Phono. Motor	
	A23594-1	Dial Pointer (Blonde)	A23537-2	Socket, Dial Lamp	
	D23695	Dial Scale (Mahogany)	A19552	Socket, Phono. Pick-up	
	D23695-1	Dial Scale (Blonde)	A19579	Socket, Speaker	
	C23402	Escutcheon & Crystal	AD23693-1	Speaker Assy. 8" With Leads & Plug	
	D23706-2	Knob, Radio-Phono (Mahogany)	A19133	Spring, Dial Cord	
	D23706-10	Knob, Radio-Phono (Blonde)	C23486	Switch, Band	
			T1	AC23161-1 1st I.F. Transformer	
			T2	AC23162-1 2nd I.F. Transformer	
			T3	AC23931-1 Transformer, Output	
				A22957-1 Tuning Shaft	
				A19361 Tuning Shaft, Hair Pin Clip	
				A22763 Weight, Cabinet	

MODELS 480TFM, 481TFM
Ch. RE-277, RE-277-1



SPECIFICATIONS

FREQUENCY RANGE

Broadcast (AM)	540-1600 kc
IF	455 kc
FM	88-108 mc
IF	10.7 mc

TUBES AND FUNCTIONS

6BA6	FM R. F. Amp.
12AT7	FM Converter
6BE6	AM Converter
6BA6	AM-FM-IF Amp.
6BA6	FM, IF Amp.
6T8	FM-AM DET, 1ST Audio AVC
6V6GT	Output
6X4	Rectifier

POWER OUTPUT

Undistorted	1.5 Watts
Maximum	2.5 Watts
Plate load	2000 Ohms

LOUD SPEAKER

Type: Permanent magnet, 1.47 oz. Alnico 5	
Size: 5 Inch	
Voice coil impedance	3.2 Ohms

CHASSIS FEATURES

Automatic Volume Control
Built-in Loop
Underwriters' Listed

OPERATING CONTROLS

1. Left knob	ON-OFF Sw and Volume
2. Right knob	Tuning
3. Center knob	Band Sw

PHYSICAL DIMENSIONS

Length	13 $\frac{3}{8}$ inches
Height	6 $\frac{3}{8}$ inches
Depth	7 $\frac{3}{8}$ inches

Models 480TFM and 481TFM have the same Chassis, they differ only in Cabinet trim and knobs.

Colors are as follows:

480TFM — Ivory, Willow Green, Sandalwood and Rosewood.

481TFM — Mahogany.

Chassis RE-277-1 has a Bass boost and Hum Reduction Circuit which is not incorporated in Chassis RE-277. See note on Schematic Diagram.

THE ANTENNA

AM - This receiver has a built-in loop which gives satisfactory reception in most locations. If the receiver is located some distance from a broadcasting station, or where the electrical interference is high, an outside antenna connected to the terminal marked AM on the antenna terminal strip will improve reception.

FM - An 8' length of wire is connected to the FM antenna terminal for an indoor FM antenna. Terminals are provided on the antenna terminal strip to connect an outside FM antenna, they are labeled FM & G.

TECHNICAL INFORMATION

AM Tuning range — 540 Kc. to 1600 Kc. Immediate Frequency — 455 Kc. I. F. and R. F. measurements made at 500 milliwatts output — approximately 1.27 volts on a receiver type voltmeter connected across speaker voice coil. Approximate input for 500 MW output: I. F. 300 uv; R. F. with standard loop: at 600 Kc. 1200 uv/m; at 1000 Kc. 900 uv/m; at 1400 Kc. 800 uv/m.

FM Tuning range — 88 megacycles to 108 megacycles. Intermediate frequency 10.7 megacycles. I.F. and R.F. measurements made at 500 milliwatts output — approximately 1.27 volts on a rectifier type voltmeter connected across speaker voice coil. Approximate input for 500 MW output: I. F. 300 uv; R. F. "Absolute Measurements": 91 megacycles 100 uv; 105 megacycles, 100 uv.

ALIGNMENT PROCEDURE

Output meter connection Across speaker voice coil
Output meter reading to indicate 500 MW 1.27 volts
Generator Modulation 30%, 400 cycles
Position of volume control Fully clockwise

Set dial pointer Horizontal, variable condenser closed
Set hand switch To left for AM alignment, right for FM alignment

MODELS 480TFM, 481TFM,
Ch. RE-277, RE-277-1

AM ALIGNMENT

Position of Variable	Generator Frequency	Dummy Ant.	Generator Connection (high)	Generator Connection Ground Lead	Adjust Trimmers In Order Shown For Max. Output	Trimmer Function
Open	455 Kc	.05 mfd.	Mixer Grid	Chassis	A1, A2, A3, A4,	I. F.
Open	1650 Kc		*Test Loop	Test Loop	A5	Oscillator
1400 Kc	1400 Kc		*Test Loop	Test Loop	A6	Antenna
**600 Kc	600 Kc		*Test Loop	Test Loop	Check Point	Antenna

* Connect generator lead to Standard Hazeltine Test Loop, Model 1150, placed two feet from the set loop, or three turns of wire about six inches in diameter, placed about one foot from the set loop. Or the generator can be connected with the high side lead to the AM antenna screw terminal and the ground lead to the chassis.

**With a generator signal of 600 Kc, tune the set to the point where maximum output is obtained, which should be approximately 600 Kc on the dial. Adjust antenna section plates of variable for maximum output. The alignment procedure should be repeated in the original order for greatest accuracy.

Always keep the output from the signal generator at its lowest possible value to make the A. V. C. action of the receiver ineffective.

FM ALIGNMENT

1. Turn band switch to FM, (right).
2. Connect (FM) I. F. generator to the second 6BA6 I. F. amp. grid, (lug No. 1) through a .01 uf mica dummy. Connect oscilloscope across volume control. With the I. F. generator tuned to 10.7 mc with 150 Kc deviation, and the same audio voltage used as horizontal sweep on the scope that is used to modulate the generator, adjust the ratio detector transformer slugs A7-A8 for the characteristic "S" curve (See Fig. 1), with maximum vertical height on the scope. After this adjustment the top slug of the ratio detector should not be moved during the rest of the alignment.
3. Connect I. F. generator to mixer grid through .01 mica dummy. Using 23 Kc deviation at 10.7 Mc, adjust for maximum output. Maximum output may be indicated by maximum vertical height on the scope or maximum voltage on a standard output meter across the voice coil of the receiver. After the two I. F. transformers have been aligned the bottom slug A8 of the ratio detector should also be peaked.

The characteristic "S" curve of the complete I. F. channel should be checked by applying a 10.7 Mc signal with 150 Kc deviation to the mixer grid and observing the "S" curve on the scope. It should not be very much different from that observed in step 2.
4. Connect R. F. (FM) generator (88 to 108Mc) to the antenna terminals through the standard 300 ohm dummy (150 ohm in each side of generator leads).
5. Use R. F. generator with 23 Kc deviation. With the variable condenser completely open and Signal Generator tuned to 108.5 Mc adjust oscillator trimmer A12 (small ceramic trimmer) for maximum reading on output meter.

Then tune receiver to low end of band (variable completely closed) and Signal Generator to 87.5 Mc. If the receiver does not tune to this frequency the FM oscillator coil L4 will either have to be squeezed together or lengthened to cover the band, (squeezing lowers and lengthening raises the frequency). Any change in the coil will have to be completed by the trimmer at the high end of the band.

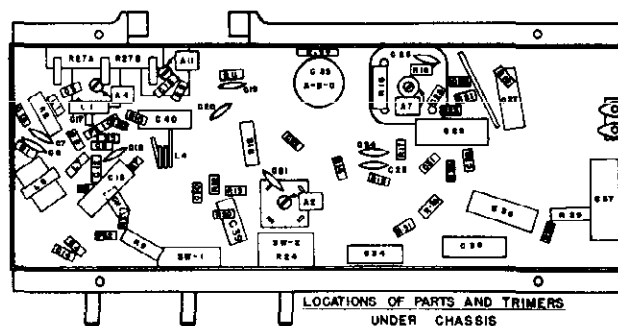
With the same Signal Generator connections as per paragraph 4 tune Signal Generator and set to 105 Mc. Tune R. F. trimmer A13 for maximum output at the same time rock variable back and forth through the frequency. (Rocking is necessary because slight oscillator pulling causes erroneous maximum readings).

Tune Signal Generator and set to 90 Mc. Adjust R. F. coil L3 length for maximum output by squeezing or lengthening. Any change in the coil will have to be compensated at 105 Mc by the R. F. trimmer A13.
6. After Steps 4 and 5 are finished check calibration and band coverage. Steps 4 and 5 may have to be repeated if set is off calibration. Band coverage should be 87.5 Mc to 108.5 Mc. Sensitivity should be approximately 100 uv at 105 Mc, 98 Mc and 90 Mc.

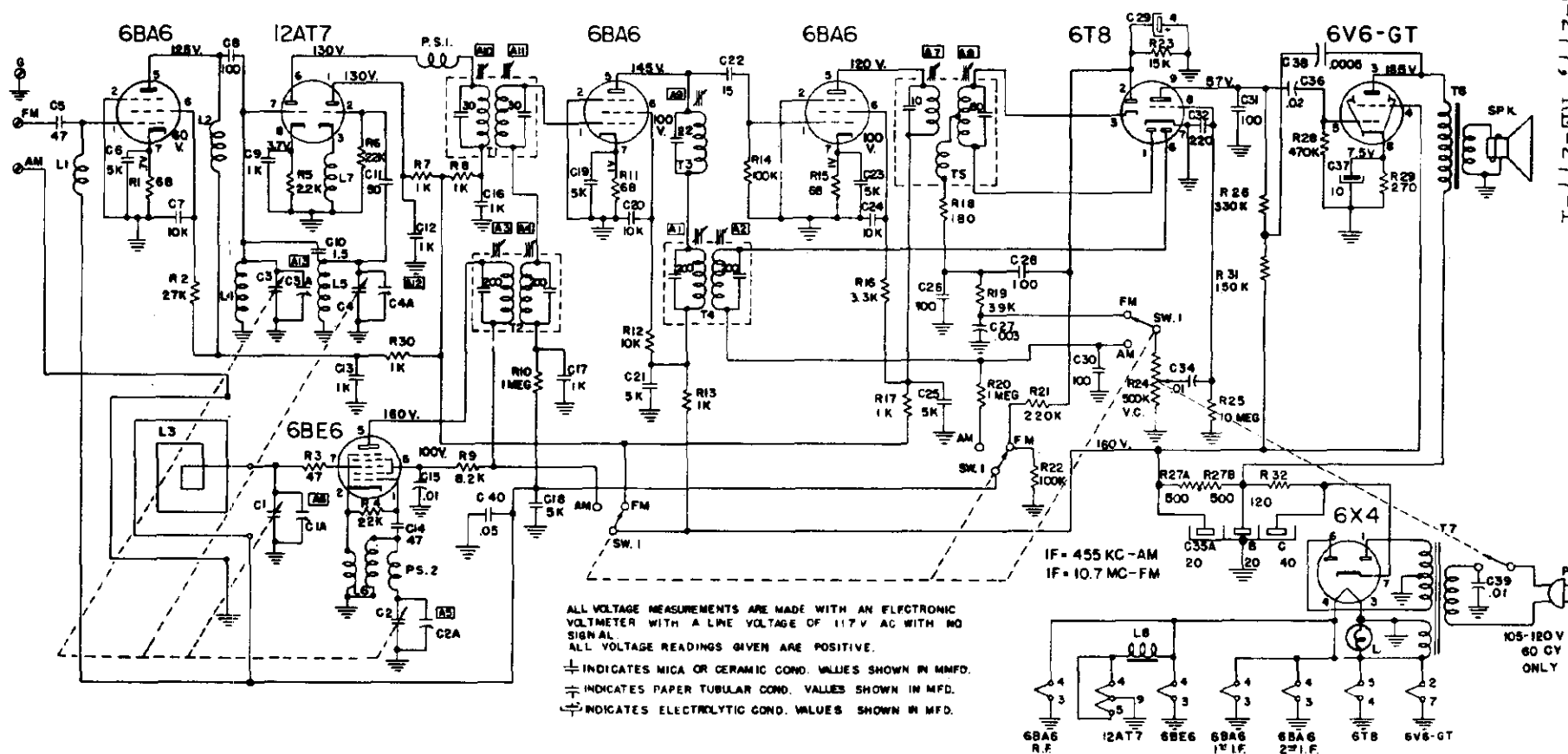


FIG. 1.

Schematic Location	Part No.	Description	Schematic Location	Part No.	Description
L3	D22586	Antenna Loop Assembly		AC23302-3	Dial Plate Assembly (Willow Green)
	B22953	Antenna Loop Mounting Bracket		AC23302-4	Dial Plate Assembly (Sandalwood)
	A22960	Antenna Terminal Strip		C23229-1	Knob, On Off Volume (480)
	AA23830-1	Cabinet (480) Mahogany with carton		C23229-2	Knob, Band Switch (480)
	AA23829-2	Cabinet (480) Ivory with decorative rail & Carton		C23229-2	Knob, Tuning (480)
	AA23829-3	Cabinet (480) Willow Green with decorative rail and carton		C23229-5	Knob, On-Off Volume
	AA23829-4	Cabinet (480) Sandalwood with decorative rail and carton		C23229-6	Knob, Band Switch
	AA23829-1	Cabinet (480) Rosewood with decorative rail and carton		C23229-7	Knob, Tuning
	C23299	Cabinet rear cover		B20138-14	Line Cord and Plug
	C23300	Cabinet Decorative Rail with Walnut and Washer		D23242	Pointer
	A23237	Carton		A20040-17	Pointer felt washer 10 for
L1	AA22648-1	Choke High Frequency 1.5 uh	PS-1	AA22345-1	Parasitic Suppressor
L2	AA21445-1	Choke High Frequency 7.5 uh	PS-2	AA22334-1	Parasitic Suppressor
L7	AA22597-1	Choke High Frequency 3 uh.	R1, R11	C20060-680	Resistor, 68 ohm 1/4 W 20%
L8	A21673	Choke, RF, Iron Core, 14 uh.	R15		
L4	A22593	Coil, R. F. FM	R2	C20070-273	Resistor, 27K ohm 1 W 10%
L5	A22594	Coil, Oscillator, FM	R3	C20060-470	Resistor, 47 ohm 1/4 W 20%
L6	AC22587-1	Coil, Oscillator, AM	R4, R6	C20060-223	Resistor, 22K ohm 1/4 W 20%
C1, C2, C3, C4	R22962	Condenser, Variable, 4 Gang AM-FM	R5	C20060-222	Resistor, 2.2K ohm 1/4 W 20%
C4A	A22724	Condenser, Oscillator Temperature Cor. 5-25 uf.	R7, R8	C20060-102	Resistor, 1K ohm 1/4 W 20%
C5, C14	C20203-470	Condenser, Ceramic 47 uuf., 350 V	R13, R17		
C6, C18, C19, C21, C23, C25	A21674	Condenser, Disc. 5000 uuf., 350 V	R30		
C7, C20, C24	A22295	Condenser, Disc Ceramic, .01 uf., 350 V	R9	C20070-822	Resistor, 8.2K ohm 1 W 10%
C8, C26, C30, C31, C20	C20203-101	Condenser, Ceramic 100 uuf., 350 V	R10, R20	C20060-105	Resistor, 1 megohm 1/4 W 20%
C9, C12, C13, C16, C17	C20203-102	Condenser, Ceramic .001 uf., 350 V	R12	C20070-103	Resistor, 10K ohm 1 W 10%
C10	A20238-3	Condenser, Ceramic 1.5 uuf., 350 V Gimmick	R14, R22	C20060-104	Resistor, 100K ohm 1/4 W 20%
C11	C20205-3	Condenser, Ceramic 50 uuf., 500 V	R16	C20070-332	Resistor, 3.3K ohm 1 W 10%
C15, C34	C20068-103	Condenser, P. T. .01 uf., 400 V	R18	C20060-181	Resistor, 180 ohm 1/4 W 20%
C22	C20203-150	Condenser, Ceramic 15 uuf., 350 V	R19	C20120-393	Resistor, 39K ohm 1/4 W 20%
C27	C20069-302	Condenser, P. T. .003 uf., 600 V	R21	C20060-224	Resistor, 220K ohm 1/4 W 20%
C29	A22659	Condenset, Electrolytic, 4 uf., 25 V	R23	C22381-153	Resistor, 15K ohm 1/4 W 10%
C32	C20203-221	Condenser, Ceramic, 220 uuf., 350 V	R24, SW-2	B22963	Resistor, Volume Control & Switch 500K ohm
C35 A,B,C	A22806	Condenser, Electrolytic, 20-20-40 at 250 V	R25	C20060-106	Resistor, 10 megohm 1/4 W 20%
C36, C38	C20068-203	Condenser, P. T. .02 uf., 400 V	R26	C20060-474	Resistor, 330K ohm 1/4 W 20%
*C38	C20069-501	Condenser, P. T. .0005 uf., 600 V	R27 A, B	A22624	Resistor, 2 x 500 ohm 5 Watts
C37	A22602	Condenser, Electrolytic 10 uf., 25 V	R28	C20060-474	Resistor, 470K ohm 1/4 W 20%
C39	C20249-103	Condenser, Phenolic, .01 uf., 400 V	R29	C20070-271	Resistor, 270 ohm 1 W 10%
C40	C20067-503	Condenser, P. T. .05, 200 V	R30	C20060-102	Resistor, 1K ohm 1/4 W 20%
	A19133	Dial, Cord Spring 10 for	*R31	C20060-154	Resistor, 150K ohm 1/4 W 20%
	E23241-1	Dial Crystal	*R32	A23933	Resistor, 120 ohm 1 W 10%
	A19124	Dial, Crystal Snap Fasteners 10 for	SPK	C22760	Speaker 5" FM
	A19351	Dial, Lamp bulb Mazda No. 47	Sw-1	C22961	Switch, Band
	A23298	Dial, Lamp bracket 10 for	T1	C22590	Transformer, 1. F. 1st F.M. 10.7 Mc
	A22849-1	Dial, Lamp Socket	T2, T4	C22352	Transformer, 1. F. AM 455 Kc
	AC23302-1	Dial Plate Assembly (Brown)	T3	AC22967-1	Transformer, 1. F. 2nd F. M. 10.7 Mc
	AC23302-2	Dial Plate Assembly (Ivory)	T5	AD22592-1	Transformer, Ratio Detector
			T6	AC22995-1	Transformer output
			T7	D22959	Transformer Power
				A20243-1	Tube socket Min Wafer 1" 7 prong plain
				A20243-2	Tube socket Min Wafer 1" 7 prong center shield
				A20274	Tube socket min. wafer 1 1/8" 8 prong, center shield
				A21677	Tube socket min. moulded low loss 8 prong center shield
				A18254-1	Tube socket wafer plain
				A22957	Tuning Shaft
				A19361	Tuning shaft hair pin clip



MODELS 480T FM, 481T FM,
Ch. RE-277, RE-277-1

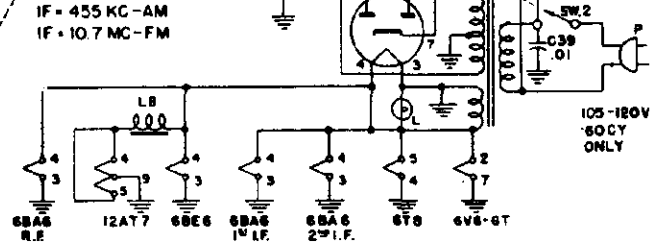


NOTE:

The Schematic Diagram printed in this bulletin is for Chassis RE-277-1 which includes a bass boost & hum reduction circuit. Chassis RE-277 differs from Chassis RE-277-1 in the following respects:

1. C38 was .02 uf. 400 V., and was connected from plate to screen of the 6V6GT tube.
2. R31, 150 K ohm 1/4 watt Resistor, was not included in the circuit and R26 connected directly to B+ 140 V.
3. R32, 120 ohm 1 watt resistor, was not included in the circuit and C35B electrolytic condenser section connected to the center tap of R27.

The two chassis are identified by the proper RE numbers on the Model Number label on the bottom of the cabinet.



MODELS 482CFB, 482CFM,
Ch. RE-288-1

TECHNICAL INFORMATION

AM Tuning range — 540 Kc. to 1600 Kc. Immediate Frequency — 455 Kc. I. F. and R. F. measurements made at 500 milliwatts output — approximately 1.27 volts on a rectifier type voltmeter connected across speaker voice coil. Approximate input for 500 MW output: I. F. 300 uv; R. F. with standard loop: at 600 Kc. 1200 uv/m; at 1000 Kc. 900 uv/m; at 1400 Kc. 800 uv/m.

FM Tuning range — 88 megacycles to 108 megacycles. Intermediate frequency 10.7 megacycles I.F. and R.F. measurements made at 500 milliwatts output — approximately 1.27 volts on a rectifier type voltmeter connected across speaker voice coil. Approximate input for 500 MW output: I. F. 300 uv; R. F. "Absolute Measurements": 91 megacycles 100 uv; 105 megacycles, 100 uv.

ALIGNMENT PROCEDURE

Output meter connection Across speaker voice coil
Output meter reading to indicate 500 MW 1.27 volts
Generator Modulation 30%, 400 cycles
Position of volume control Fully clockwise

Set dial pointer Horizontal, variable condenser closed
Set band switch To left for AM alignment, right for FM alignment

AM ALIGNMENT

Position of Variable	Generator Frequency	Dummy An.	Generator Connection (high)	Generator Connection Ground Lead	Adjust Trimmers In Order Shown For Max. Output	Trimmer Function
Open	455 Kc	.05 mfd.	Mixer Grid	Chassis	A1, A2, A3, A4,	I. F.
Open	1650 Kc		*Test Loop	Test Loop	A5	Oscillator
1400 Kc	1400 Kc		*Test Loop	Test Loop	A6	Antenna
**600 Kc	600 Kc		*Test Loop	Test Loop	Check Point	Antenna

* Connect generator lead to Standard Hazeltine Test Loop, Model 1150, placed two feet from the set loop, or three turns of wire about six inches in diameter, placed about one foot from the set loop. Or the generator can be connected with the high side lead to the AM antenna screw terminal and the ground lead to the chassis.

**With a generator signal of 600 Kc, tune the set to the point where maximum output is obtained, which should be approximately 600 Kc on the dial. Adjust antenna section plates of variable for maximum output.

The alignment procedure should be repeated in the original order for greatest accuracy.

Always keep the output from the signal generator at its lowest possible value to make the A. V. C. action of the receiver ineffective.

FM ALIGNMENT

1. Turn band switch to FM, (right).

2. Connect (FM) I. F. generator to the second 6BA6 I. F. amp. grid, (lug No. 1) through a .01 uf mica dummy. Connect oscilloscope across volume control. With the I. F. generator tuned to 10.7 mc with 150 Kc deviation, and the same audio voltage used as horizontal sweep on the scope that is used to modulate the generator, adjust the ratio detector transformer slugs A7-A8 for the characteristic "S" curve (See Fig. 1), with maximum vertical height on the scope. After this adjustment the top slug of the ratio detector should not be moved during the rest of the alignment.

3. Connect I. F. generator to mixer grid through .01 mica dummy. Using 23 Kc deviation at 10.7 Mc, adjust for maximum output. Maximum output may be indicated by maximum vertical height on the scope or maximum voltage on a standard output meter across the voice coil of the receiver. After the two I. F. transformers have been aligned the bottom slug A8 of the ratio detector should also be peaked.

The characteristic "S" curve of the complete I. F. channel should be checked by applying a 10.7 Mc signal with 150 Kc deviation to the mixer grid and observing the "S" curve on the scope. It should not be very much different from that observed in step 2.

4. Connect R. F. (FM) generator (88 to 108Mc) to the antenna terminals through the standard 300 ohm dummy (150 ohm in each side of generator leads).

Use R. F. generator with 23 Kc deviation. With the variable condenser completely open and Signal Generator tuned to 108.5 Mc adjust oscillator trimmer A12 (small ceramic trimmer) for maximum reading on output meter.

Then tune receiver to low end of band (variable completely closed) and Signal Generator to 87.5 Mc. If the receiver does not tune to this frequency the FM oscillator coil L4 will either have to be squeezed together or lengthened to cover the band, (squeezing lowers and lengthening raises the frequency). Any change in the coil will have to be completed by the trimmer at the high end of the band.

5. With the same Signal Generator connections as per paragraph 4 tune Signal Generator and set to 105 Mc. Tune R. F. trimmer A13 for maximum output at the same time rock variable back and forth through the frequency. (Rocking is necessary because slight oscillator pulling causes erroneous maximum readings).

Tune Signal Generator and set to 90 Mc. Adjust R. F. coil L3 length for maximum output by squeezing or lengthening. Any change in the coil will have to be compensated at 105 Mc by the R. F. trimmer A13.

6. After Steps 4 and 5 are finished check calibration and band coverage. Steps 4 and 5 may have to be repeated if set is off calibration. Band coverage should be 87.5 Mc to 108.5 Mc. Sensitivity should be approximately 100 uv at 105 Mc, 98 Mc and 90 Mc.

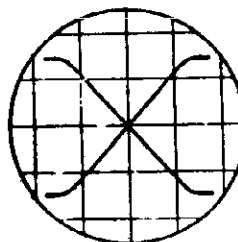
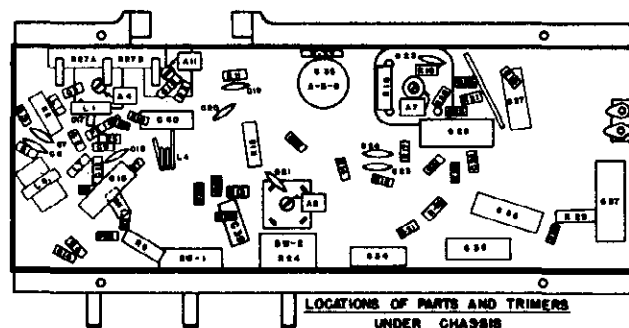
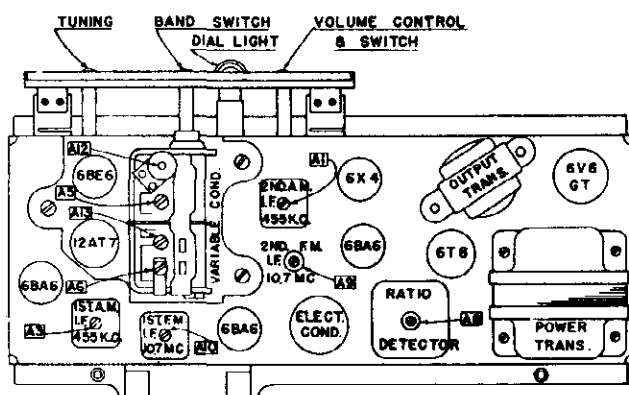


FIG 1

MODELS 482CFB, 482CFM,
Ch. RE-288-1



PARTS LIST FOR 482 CFM, CFB

Schematic Location	Part No.	Description	Schematic Location	Part No.	Description
	D22586	Antenna Loop Assembly		D23706-12	Knob, Ph-AM-FM [Blonde]
	B22953	Bracket, Antenna Loop Mounting		D23706-3	Knob, Tuning [Mahogany]
	C23427	Bracket, Dial [2 used]		D23706-11	Knob, Tuning [Blonde]
	R23689	Cabinet, Mahogany [with Carton]		D23706-1	Knob, Volume, On-Off [Mahogany]
	R23689-1	Cabinet, Blonde [with Carton]		D23706-9	Knob, Volume, On-Off [Blonde]
C1, C2, C3, C4	R22962	Capacitor, Variable, 4-gang		A19351	Lamp, Dial, Mazda No. 47
				B20138-14	Line Cord & Plug
C4A	A22724	Capacitor, FM Oscillator Trimmer, 5-25 uuf	PS-1	AA22345-1	Parasitic Suppressor
			PS-2	AA22334-1	Parasitic Suppressor
C10	A20238-3	Capacitor, 1.5 uuf, 350 V, Gimmick	R-3	C20060-470	Resistor, 47 ohms 20%, 1/2 W
C22	C20203-150	Capacitor, 15 uuf, 350V, Ceramic	R1, R11, R15	C20060-680	Resistor, 68 ohms 20%, 1/2 W
C5, C14	C20203-470	Capacitor, 47 uuf, 350V, Ceramic	R32	A23933	Resistor, 120 ohms, 10%, 1W
C11	C20205-5	Capacitor, 50 uuf, 500V, Ceramic	R18	C22381-181	Resistor, 180 ohms 10%, 1/2 W
C20, C8, C26	C20203-101	Capacitor, 100 uuf, 350V, Ceramic	R29	C20070-271	Resistor, 270 ohms 10%, 1W
C30, C31			R27	A22624	Resistor, 2x500 ohms, 5 Watts
C32	C20203-221	Capacitor, 220 uuf, 350V, Ceramic	R7, R8, R13, R17, R30	C20060-102	Resistor, 1K ohms 20%, 1/2 W
C38	C20069-501	Capacitor, .0005 mfd., 600V, Paper			
C9, C12, C13	C20203-102	Capacitor, 1000 uuf, 350V, Ceramic	R5	C20060-222	Resistor, 2.2K ohms 20%, 1/2 W
C16, C17			R16	C20070-332	Resistor, 3.3K ohms 10%, 1W
C27	C20069	Capacitor, .003 mfd., 600V, Paper	R9	C20070-822	Resistor, 8.2K ohms 10%, 1W
C6, C18, C19, C21, C23, C25	A21674	Capacitor, 5000 uuf, 350V, Disc Ceramic	R12	C20070-103	Resistor, 10K ohms 10%, 1W
			R23	C22381-153	Resistor, 15K ohms 10%, 1/2 W
C7, C20, C24	A22295	Capacitor, 10,000 uuf, 350V, Disc Ceramic	R4, R6	C20060-223	Resistor, 22K ohms 20%, 1/2 W
			R2	C20070-273	Resistor, 27K ohms 10%, 1W
C15, C34	C20068-103	Capacitor, .01 mfd., 400V, Paper	R19	C20120-393	Resistor, 39K ohms 20%, 1/2 W
C39	C20249-103	Capacitor, .01 mfd., 400V, Phenolic	R14, R22	C20060-104	Resistor, 100K ohms 20%, 1/2 W
C36	C20068-203	Capacitor, .02 mfd., 400V, Paper	R31	C20060-154	Resistor, 150K ohms 20%, 1/2 W
C40	C20067-503	Capacitor, .05 mfd., 200V, Paper	R21	C20060-224	Resistor, 220K ohms 20%, 1/2 W
C29	A22659	Capacitor, 4 mfd., 25V, Electrolytic	R26	C20060-334	Resistor, 330K ohms 20%, 1/2 W
C37	A22602	Capacitor, 10 mfd., 25V, Electrolytic	R28	C20060-474	Resistor, 470K ohms 20%, 1/2 W
C35	A22806	Capacitor, 20-20-40 mfd., 250V, Electrolytic	R10, R20	C20060-105	Resistor, 1 megohm 20%, 1/2 W
		Changer, 3-speed Record [See V-M Model 950]	R25	C20060-106	Resistor, 10 megohms 20%, 1/2 W
				A19551	Socket, AC, Phono Motor
L1	AA22648-1	Choke, 1.5 uh		A23537-1	Socket, Dial Lamp
L7	AA22597-1	Choke, 3 uh		A19552	Socket, Phono Pickup
L2	AA21445-1	Choke, 7.5 uh		A19579	Socket, Speaker
L8	A21673	Choke, 14 uh, Iron Core		AD23693-1	Speaker Assy. 8" PM with Cable And Plug
L6	AC22587-1	Coil, Oscillator, AM			
L5	A22594	Coil, Oscillator, FM		A19133	Spring, Dial Cord
L4	A22593	Coil, R F, FM		C23485	Switch, Band
R24-SW2	C22963	Control, Volume, & Switch, 500K ohms		A22960	Terminal Strip, Antenna
	C23707	Cover, Cabinet Rear	T1	C22590	Transformer, I.F., 1st F.M. [10.7 Mc]
	C23578	Cover, Record Changer Bottom	T2, T4	C22352	Transformer, I.F. AM [455 Kc]
	A23594	Dial Pointer [Mahogany]	T3	AC22967-1	Transformer, I.F., 2nd F.M. [10.7 Mc]
	A23594-1	Dial Pointer [Blonde]	T6	AC23669-1	Transformer, Output
	D23700	Dial Scale [Mahogany]	T7	D22959	Transformer, Power
	D23700-1	Dial Scale [Blonde]	T5	AD22592-1	Transformer, Ratio Detector
	C23402	Escutcheon & Crystal		A22957	Tuning Shaft
	D23706-4	Knobs, Ph-AM-FM [Mahogany]		A19361	Tuning Shaft Hair Pin Clip

HUDSON, 1948-
1949-1950

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superheterodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. Any standard two or three section whip or "fish pole" antenna will provide good reception of distant or weak stations. The unit is simple to install and requires no electrical adjustment after installation.

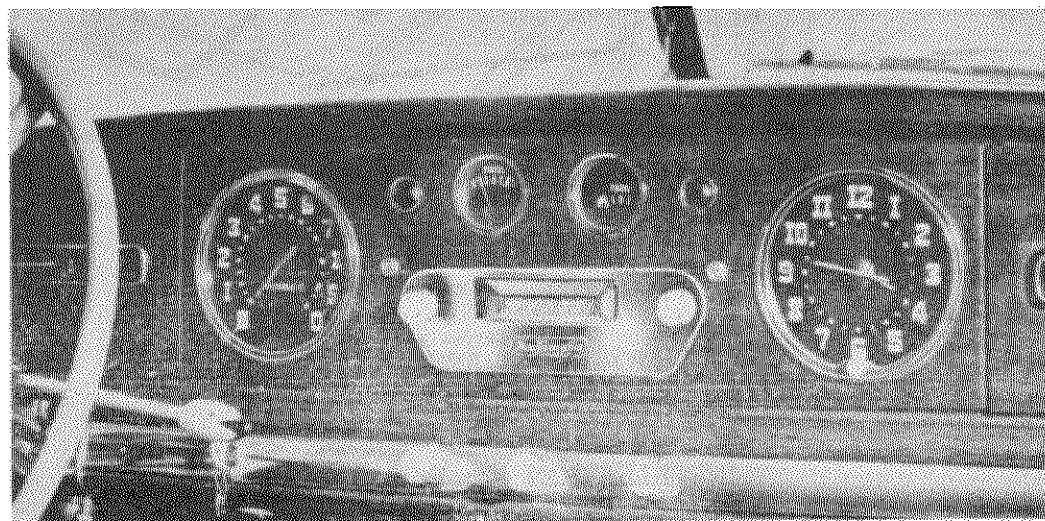


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

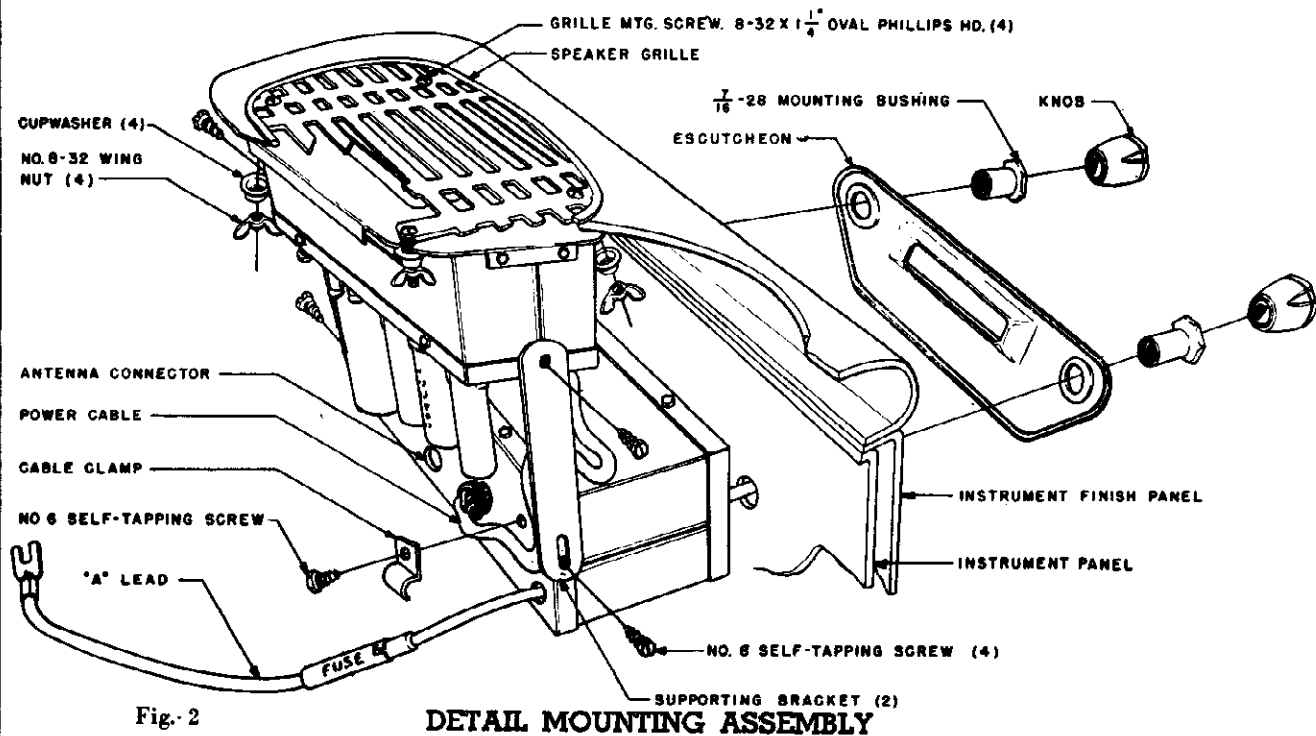
INSTALLATION

1. Remove screws securing radio speaker grille and cardboard speaker opening cover plate.
2. Discard cardboard cover plate and speaker mounting screws.
3. Replace radio speaker grille in original position on the instrument panel and secure with 1 1/4" long No. 8-32 oval head Phillips screws. (4 supplied in kit of hardware.)

NOTE: Some automobile models are not equipped with a Radio speaker grille. A Radio speaker grille must be obtained from an authorized Hudson dealer before an installation can be made.

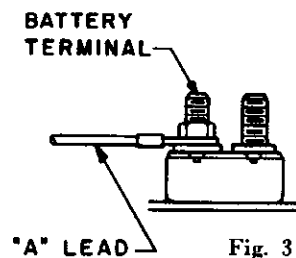
4. Insert power supply unit under instrument panel and position so that slots on cover of power supply unit line up with speaker grille mounting screws and power cable is located on left hand side.
5. Secure in place with cupwashers and 8-32 wing nuts.
6. Remove speed nuts attaching radio opening dummy cover plate.
7. Remove dummy cover plate and discard.

HUDSON, 1948-
1949-1950



INSTALLATION (Continued)

8. Remove knobs, mounting bushings and escutcheon from RF Tuning Unit.
9. Position RF Tuning Unit behind instrument panel so that control shafts protrude through the instrument panel.
10. Place escutcheon over control shafts on instrument panel front.
11. Attach RF Tuning Unit and escutcheon to instrument panel with two mounting bushings previously removed.
12. Replace knobs on control shafts.
13. Secure a supporting bracket (2 supplied in kit of hardware) to each side of power pack with two No. 8 self-tapping screws. Use end of supporting bracket with round hole.
14. Swing supporting brackets so that slotted holes are in line with holes on each side of tuning unit.
15. Secure to RF tuning unit with two No. 8 self-tapping screws.
16. Connect cable from Power Supply Unit to RF Tuning Unit.
17. Secure Power Supply cable under clamp on RF Tuning Unit.
18. Connect "A" lead to battery terminal on circuit breaker mounted over the steering column behind the instrument panel. (See fig. 3.)
19. Plug antenna cable into tuning unit.



ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver.
(See detail assembly drawing FIG. 2)

- 2 7/16-28 mounting bushings
- 2 Knobs
- 1 Cable clamp

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 2 Supporting brackets
- 4 No. 8 self-tapping screws
- 4 8-32 wing nuts
- 4 cup washers
- 4 8-32 x 1 1/4 oval head Phillips screws.

HUDSON, 1948-
1949-1950

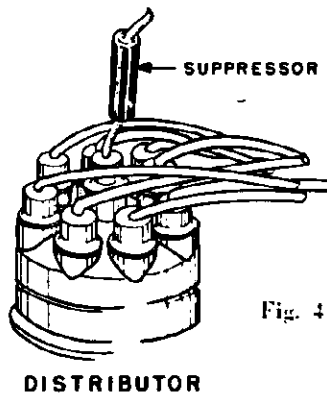
MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

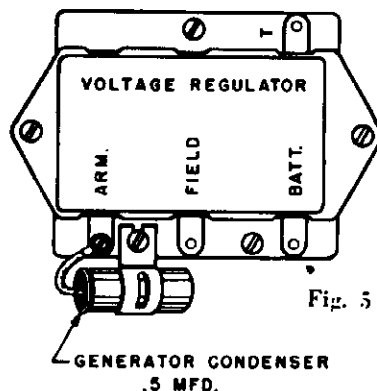
- 1 Generator Condenser.
- 1 Distributor suppressor.

DISTRIBUTOR SUPPRESSOR



Disconnect the high tension wire that runs from the ignition coil to the center hole of the distributor cap. Cut lead one inch back from the metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor back into distributor cap.

GENERATOR CONDENSER



Loosen voltage regulator mounting screw. Insert slotted end of generator condenser mounting bracket under this screw and tighten screw. Connect condenser lead to armature terminal marked "ARM."

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

Power Supply.....	6.3 Volts DC
Current.....	5.5 Amp. average
Frequency Range.....	538-1600 KC
Speaker.....	5 1/4" PM
Power Output.....	2 watts, undistorted 3 watts, maximum
Sensitivity.....	2-3 microvolts average for 1 watt output
Selectivity.....	40 KC broad at 1000 times signal, at 1000 KC

1-6BA6—RF Amplifier
1-6BE6—Converter
1-6BA6—I. F. Amplifier
1-6AT6—Detector—AVC—1st Audio
1-6AQ5—Power Output
1-6X4—Rectifier

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart. (Fig. 7 and 7A).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

Fig. 6

Fig. 6

Volume control—Maximum, all adjustments.
No signal applied to antenna.
Power input—6.3 volts.
Connect dummy antenna in series with output lead of signal generator.
Connect ground lead of signal generator to chassis.
Repeat alignment procedure as a final check.

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Output meter. (1.8 volt for 1 watt output.)

For alignment points refer to Schematic Diagram.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connection	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						

CONDENSERS

PARTS LIST

Schematic Diagram
Reference

Part No

Description

C2, C3, C5	C207	.05 MFD 200 volt condenser
C4, C12	C209	.5 MFD 100 volt condenser
C5	CC200	100 MMFD ceramic condenser
C7, C9	CC201	200 MMFD ceramic condenser
C8	C203	.002 MFD 400 volt condenser
C10, C13	C206	.01 MFD 400 volt condenser
C11	C205	.008 MFD 1600 volt condenser
CE85	CE-86	20 MFD 350 volt electrolytic condenser
CV1-CV2-CV3	CV-100	20 MFD 350 volt electrolytic condenser 3 section variable

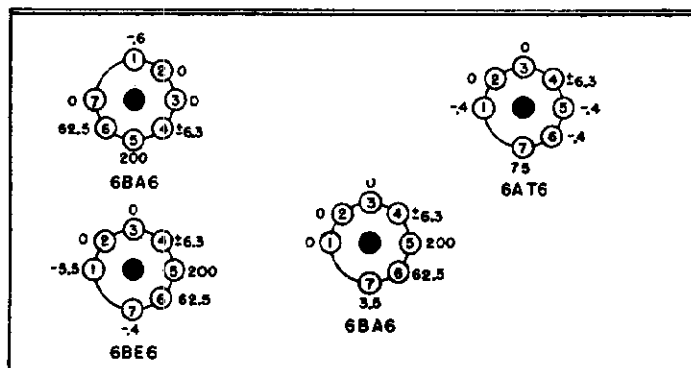
RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor
R2, R14	R303	330 ohm 1/2 watt 20% resistor
R3	R306	20K ohm 1/2 watt 20% resistor
R4	R314	1.5K ohm 1/2 watt 20% resistor
R5	RV-100	Volume control 1/4 megohm with switch
R6	R310	2 megohm 1/2 watt 20% resistor
R7	R311	10 megohm 1/2 watt 20% resistor
R8	R313	20K ohm 2 watt 20% resistor
R9	R307	250K ohm 1/2 watt 20% resistor
R10, R11	R301	100 ohm 1/2 watt 20% resistor
R12	R312	1K ohm 1 watt 20% resistor
R13	R308	500K ohm 1/2 watt 20% resistor

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit
L2	57FB-3	Antenna coil
L3	57FB-4	R.F. coil
L4	L201	R. F. oscillator coil
L5	L203	Choke, "A" line
L6	L202	Choke, vibrator hash
T2	1655-16	2nd IF transformer
T1	1655-16	1st IF transformer
T3	TV-100 or 318V-2	Vibrator transformer
T4		Output transformer (Part of speaker not furnished separately)

BOTTOM VIEW OF CHASSIS



FRONT OF CHASSIS

Fig. 7

SOCKET VOLTAGES

DIAL PARTS

H401	Dial Scale Assembly
D400	Dial Scale Escutcheon
PS100	Dial Pointer
H201	Grommet, rubber drive
T47	Pilot Light
H114	Pilot Light Socket
H203	Pulley, idler
H204	Spring, Dial drive String Tension
H115	String, dial drive

MISCELLANEOUS

A300	"A" lead assembly
H301	Case, less covers for Power Supply Unit
H100	Case, complete with covers for R.F. tuning unit
H207	Clip, Anti-rattle
H208	Clip, coil mounting
H102	Cover, power supply unit mounting (with speaker louvers)
A201	Fuse 15 Amp.
504PC-300	Power Cable Assembly (complete with plug)
H212	Receptacle, Antenna cable
504-FC	Socket, power cable
PM-705	Speaker, 5 1/4" PM (includes output transformer)
V-83	Vibrator
H310	Knob
H311	Cup washer
H113	7 16-28 Hex nut
C100	.5 MFD generator condenser
R100	Distributor suppressor
H402	7 16-28 Mounting bushing

BOTTOM VIEW OF POWER PACK

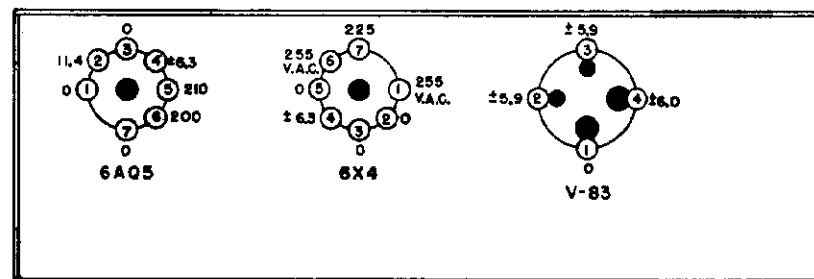


Fig. 7A

HUDSON, 1943-
1949-1950

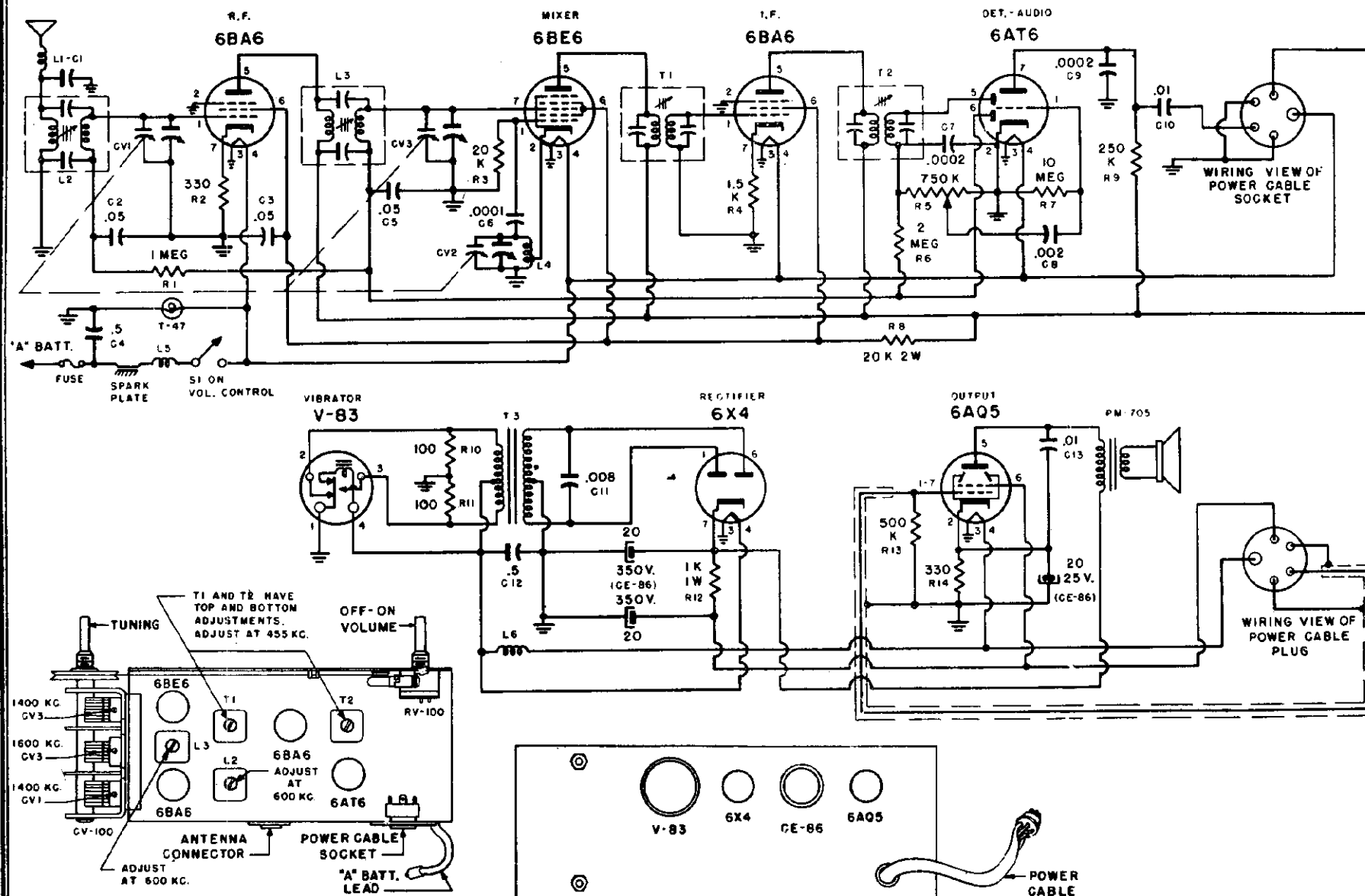


Fig. 8

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. Any standard two or three section whip or "fish pole" antenna will provide good reception of distant or weak stations. The unit is simple to install and requires no electrical adjustment after installation.

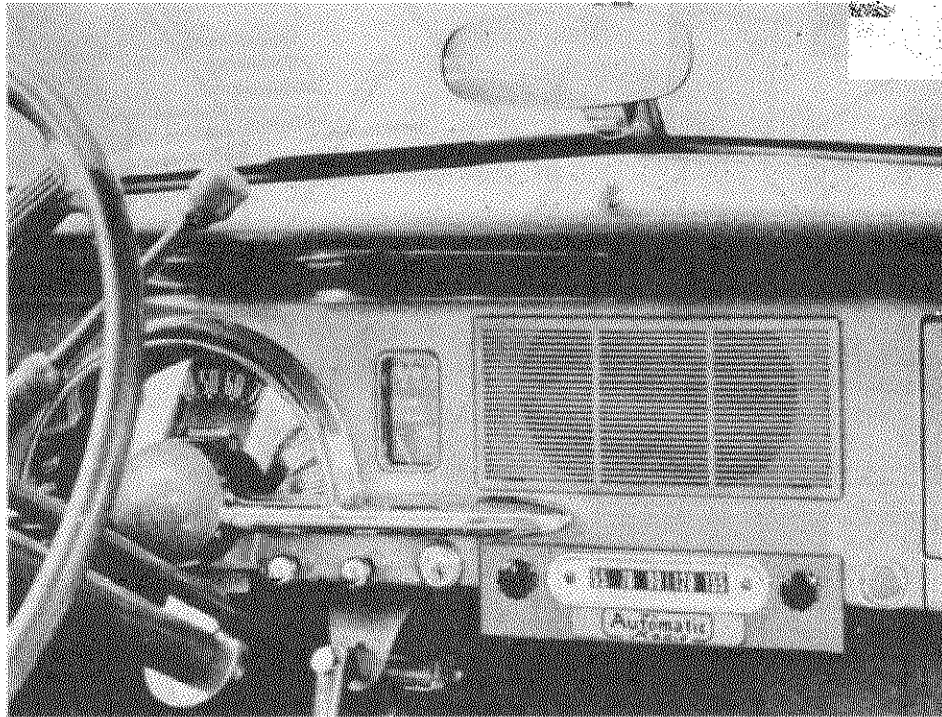


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION (See Fig. 2)

1. Attach rubber gasket baffle assembly to speaker grille on radio with 4 snap fasteners supplied in kit of mounting hardware.
2. Remove two screws securing radio opening cover plate to instrument panel.
3. Discard cover plate.
4. *Important:* Some car models have a cover over the speaker opening at the back of the instrument panel. Remove and discard this cover.
5. Lift hood of car and locate the two 5/16" holes which are in the Fire Wall just below the windshield wiper motor. Insert hook bolt through the right hand hole on the engine side.
6. Place a 1/4-20 hex nut approximately one inch up on threaded end of hook bolt.
7. Position radio with attached rubber gasket baffle behind instrument panel and insert threaded end of hook bolt through hole on bracket attached to back of radio.
8. Screw 1/4-20 hex nut on hook bolt. Adjust position of the two 1/4-20 hex nuts so that the radio is mounted parallel to instrument panel. Tighten bottom hex nut.
9. Insert two 1/4-20 Flat head bolts supplied in mounting kit through bottom edge of radio and screw into edge of instrument panel.
10. Connect "A" lead to terminal on ignition switch.
11. Plug antenna cable into receiver.

STUDEBAKER, 1950

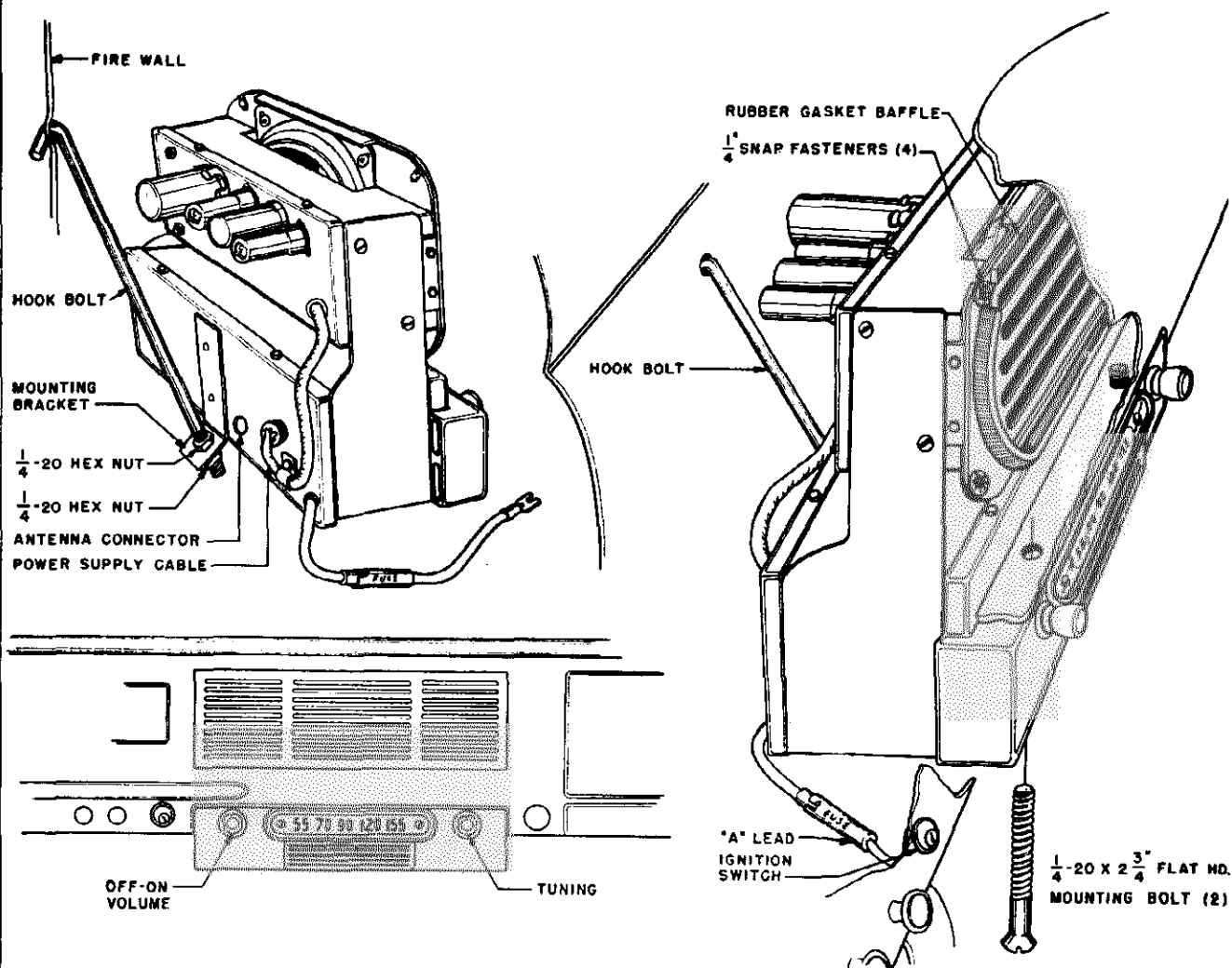


Fig. 2
MOUNTING PARTS KIT

DETAIL MOUNTING ASSEMBLY

ACCESSORIES FURNISHED FOR INSTALLATION

- 1 Rubber Gasket baffle assembly
- 4 1/4" snap fasteners
- 1 Hook bolt
- 2 1/4-20 hex nuts
- 2 1/4-20 x 2 3/4" flat head mounting bolts

MOTOR NOISE ELIMINATION

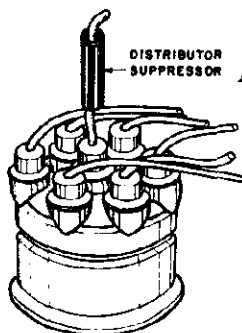
SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser.
- 1 Distributor suppressor.

DISTRIBUTOR SUPPRESSOR

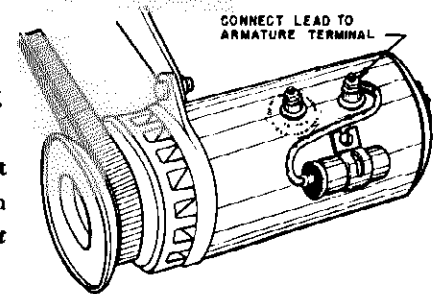
Disconnect the high tension wire that runs from the ignition coil to the center hole of the distributor cap. Cut lead one inch back from the metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor back into distributor cap.



DISTRIBUTOR
Fig. 3

GENERATOR CONDENSER

Loosen screw on top surface of generator near terminals. Insert slotted generator condenser bracket under screw head and tighten screw. Connect generator condenser lead to armature terminal. *Do not connect to field terminal.*



GENERATOR CONDENSER

Fig. 4

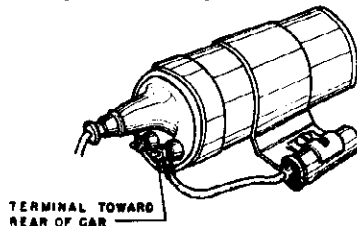
The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.



IGNITION COIL CONDENSER

Fig. 5

COIL CONDENSER

In some extreme cases it may be necessary to connect a .5 MFD by-pass condenser from the rear terminal of the spark coil to ground.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

ELECTRICAL SPECIFICATIONS

Power Supply.....	6.3 Volts DC
Current.....	5.5 Amp. average
Frequency Range.....	538-1600 KC
Speaker.....	5 1/4" PM
Power Output.....	2 watts, undistorted
	3 watts, maximum
Sensitivity.....	2-3 microvolts average for 1 watt output
Selectivity.....	40 KC broad at 1000 times signal, at 1000 KC

This receiver contains the following:

- 1—6BA6—RF Amplifier
- 1—6BE6—Converter
- 1—6BA6—I. F. Amplifier
- 1—6AT6—Detector—AVC—1st Audio
- 1—6AQ5—Power Output
- 1—6X4—Rectifier

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 7 and 7A).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.
No signal applied to antenna.
Power input—6.3 volts.
Connect dummy antenna in series with output lead of signal generator.
Connect ground lead of signal generator to chassis.
Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:
Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
Non-metallic screwdriver.
Output meter. (1.8 volt for 1 watt output.)
Dummy antennas—.1 MFD., 100 MMFD.
For alignment points refer to Schematic Diagram.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connection	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						

BOTTOM VIEW OF CHASSIS

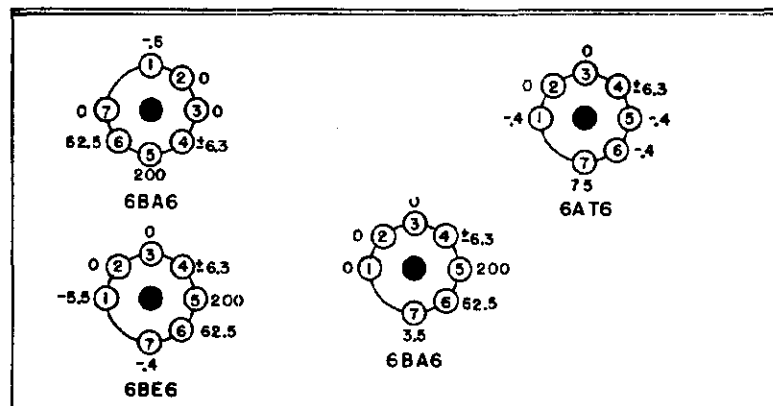
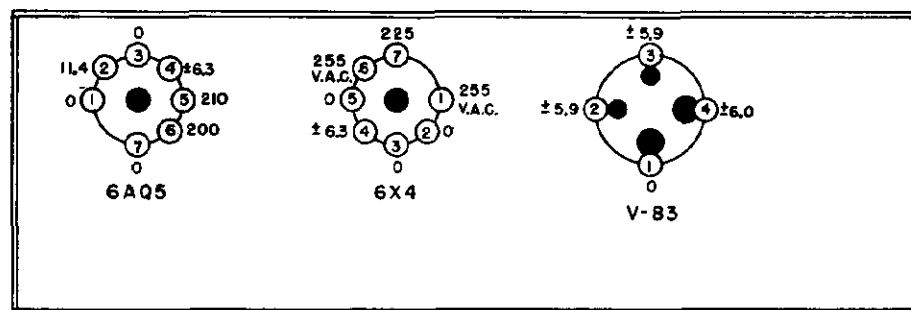


Fig. 7

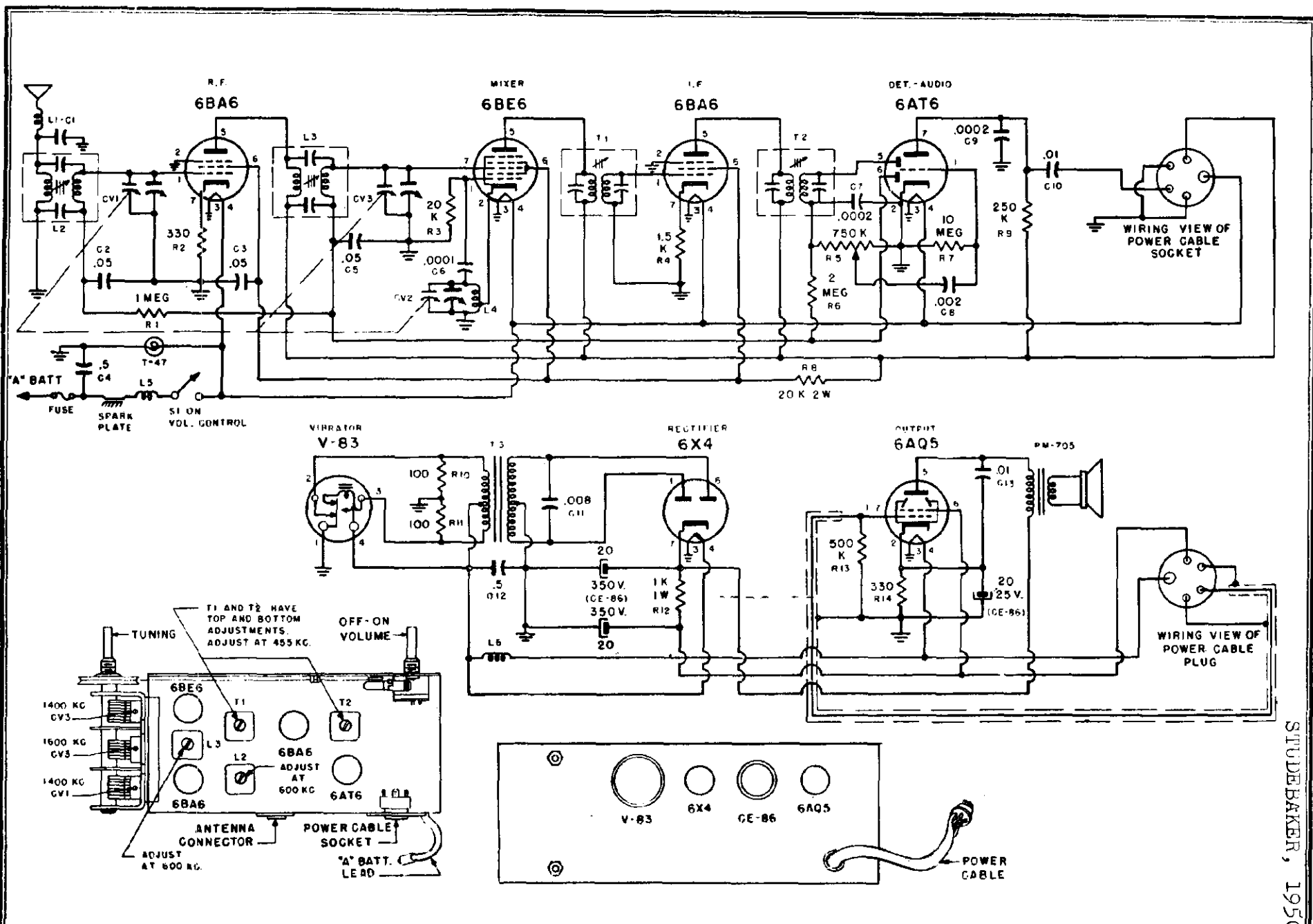
FRONT OF CHASSIS

BOTTOM VIEW OF POWER PACK

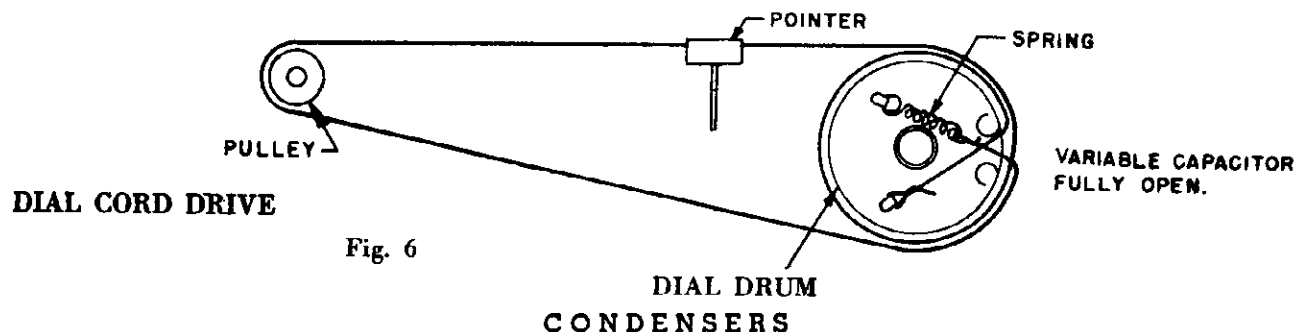


SOCKET VOLTAGES

Fig. 7A



STUDEBAKER, 1950



Schematic Diagram
Reference

Part No.

Description

C2, C3, C5	C207	.05 MFD 200 volt condenser
C4, C12	C209	.5 MFD 100 volt condenser
C6	CC200	100 MMFD ceramic condenser
C7, C9	CC201	200 MMFD ceramic condenser
C8	C203	.002 MFD 400 volt condenser
C10, C13	C206	.01 MFD 400 volt condenser
C11	C205	.008 MFD 1600 volt condenser
CE86	CE-86	20 MFD 350 volt electrolytic condenser
		20 MFD 350 volt electrolytic condenser
		20 MFD 25 volt electrolytic condenser
CV1-CV2-CV3	CV-400	3 section variable

RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor
R2, R14	R303	330 ohm 1/2 watt 20% resistor
R3	R306	20K ohm 1/2 watt 20% resistor
R4	R314	1.5 K ohm 1/2 watt 20% resistor
R5	RV-570	Volume control 3/4 megohm with switch
R6	R310	2 megohm 1/2 watt 20% resistor
R7	R311	10 megohm 1/2 watt 20% resistor
R8	R313	20K ohm 2 watt 20% resistor
R9	R307	250K ohm 1/2 watt 20% resistor
R10, R11	R301	100 ohm 1/2 watt 20% resistor
R12	R312	1K ohm 1 watt 20% resistor
R13	R308	500K ohm 1/2 watt 20% resistor

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit
L2	15053 or 57FB-3	Antenna coil
L3	15054 or 57FB-4	R.F. coil
L4	L201	R.F. oscillator coil
L5	L203	Choke "A" line
L6	L202	Choke, vibrator hash
T2	14977 or 1655-16	2nd IF transformer
T1	14977 or 1655-16	1st IF transformer
T3	TV-100 or 318V-2	Vibrator transformer
T4		Output transformer (Part of speaker not furnished separately)

MISCELLANEOUS

A300	"A" lead assembly
H521	Case, less covers for Power Supply Unit
H520	Case, complete with covers for R.F. tuning unit
H207	Clip, Anti-rattle
H208	Clip, coil mounting
H102	Cover, power supply unit mounting (with speaker louvers)
H522	Cover, RF tuning unit, front (complete with plas- tic escutcheon)
A201	Fuse 15 Amp.
H524	Hook bolt
504PC-300	Power Cable Assembly (complete with plug)
H212	Receptacle, Antenna cable
504-FC	Socket, power cable
PM-705	Speaker, 5 1/4" PM (includes output transformer)
V-83	Vibrator
H310	Knob
H311	Cup washer
C100	.5 MFD generator condenser
R100	Distributor suppressor

DIAL PARTS

H523	Dial Scale Escutcheon, Plastic
PS100	Dial Pointer
T47	Pilot Light
H114	Pilot Light Socket
H203	Pulley, idler
H204	Spring, Dial drive String Tension
H115	String, dial drive

MODEL D-200, Dodge,
Plymouth, 1949-1950

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM oval speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. Any standard two or three section whip or "fish pole" antenna will provide good reception of distant or weak stations. The unit is simple to install and requires no electrical adjustment after installation.

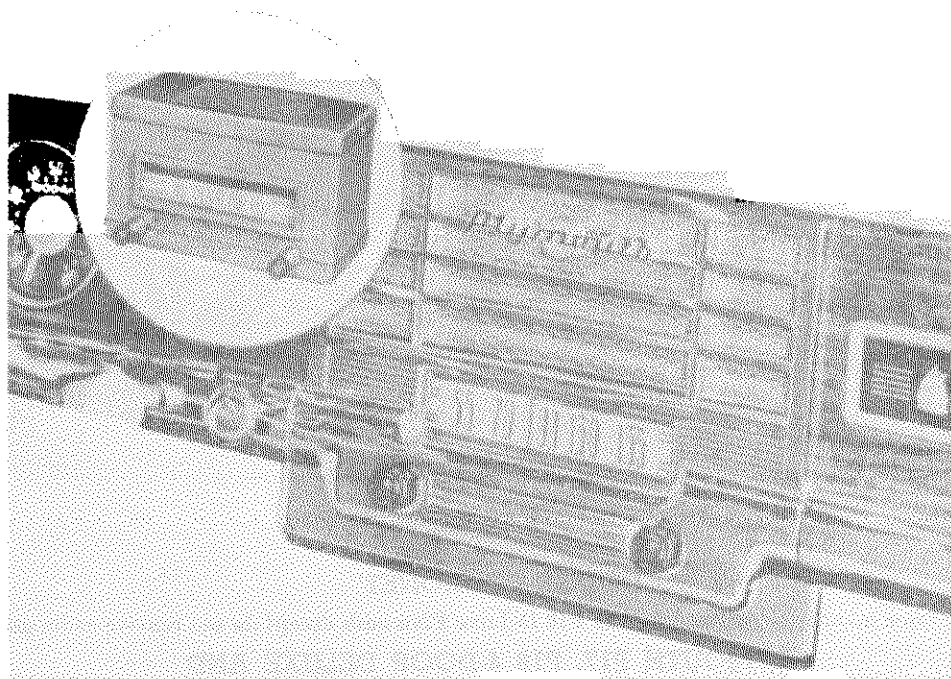


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the required loudness. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

PLYMOUTH P18 SPECIAL DELUXE

1. Remove four screws securing Radio Grille in place and remove Radio Grille.
2. Remove dummy plates covering radio dial and control openings.
3. Enlarge holes in radio control cover plate to fit over mounting bushings.
4. Remove knobs, cup washers, hex nuts and washers from control shafts and mounting bushings.
5. Secure two mounting brackets to Radio Grille with $\frac{3}{8}$ inch long 10-32 self-tapping screws and cup washers as shown in detail assembly drawing, Fig. 2.
6. Place radio control cover plate over mounting bushings.
7. Position receiver behind Radio Grille so that mounting bushings and shafts protrude through the grille.
8. Attach receiver by replacing washers and hex nuts on mounting bushings.
9. Replace cup washers and knobs over shafts.
10. Secure receiver to mounting brackets with two No. 8 self-tapping wing nut screws.
11. Insert radio with attached grille through front opening on instrument panel.
12. Replace grille mounting screws.
13. Connect battery lead to terminal marked "ACC" on ignition switch.
14. Plug antenna cable into receiver.

MODEL D-200, Dodge,
Plymouth, 1949-1950

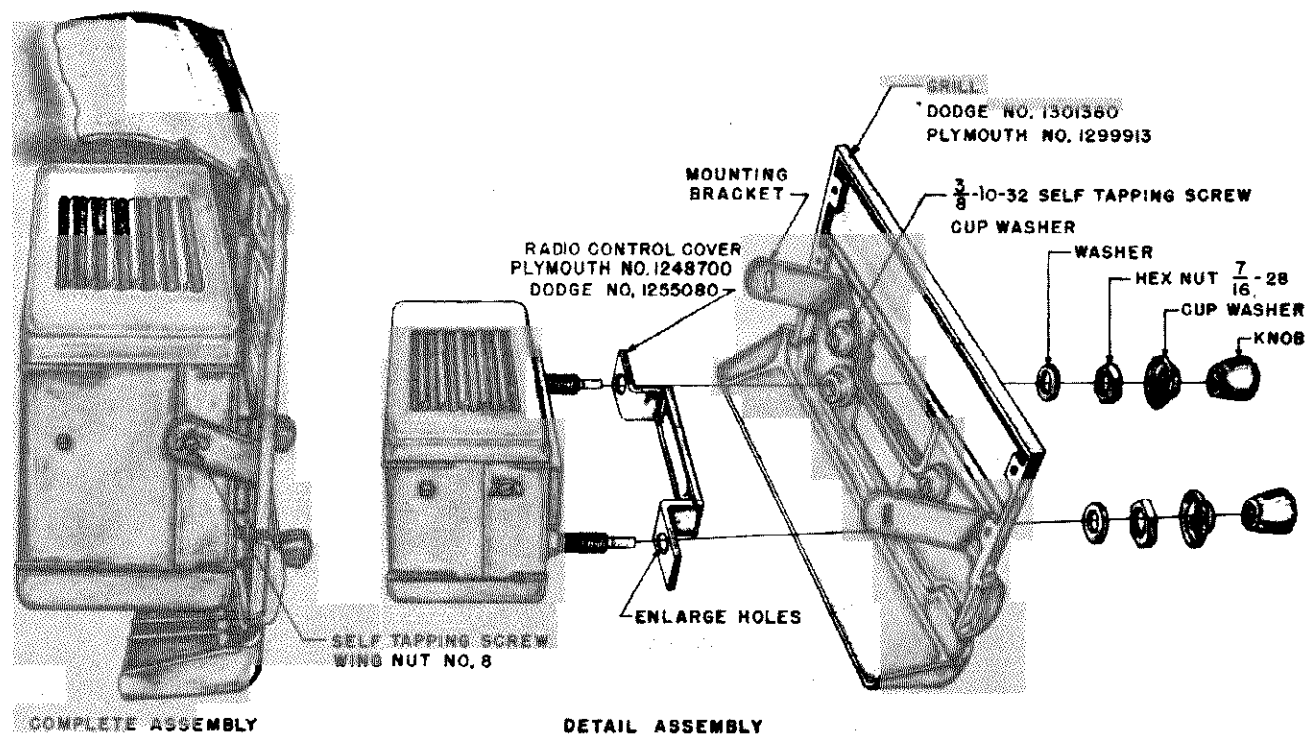


Fig. 2

DODGE "CORONET"

Install in the same manner as outlined for the P18 DeLuxe Plymouth except do not remove radio grille.

PLYMOUTH P17, P18 4-DOOR DELUXE AND

P18 CLUB COUPE DELUXE

DODGE "WAYFARER" AND "MEADOWBROOK"

These models are not equipped by the car manufacturers with a radio grille or a radio control cover plate.

The following parts must be obtained from any authorized Plymouth or Dodge dealer before an installation can be made in any of these cars.

Plymouth P17, P18 4-Door DeLuxe, P18 Club Coupe DeLuxe

Radio Grille No. 1299913

Radio control cover No. 1248700

Dodge "Meadowbrook" or "Wayfarer"

Radio Grille No. 1301360

Radio control cover No. 1255080

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver.

(See detail assembly drawing FIG. 2)

- 2 Washers
- 2 7/16-28 hex nuts
- 2 Cup washers
- 2 Knobs
- 2 Mounting Brackets
- 2 No. 8 self-tapping wing nut screws

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 2 3/8 10-32 self-tapping screws
- 2 Cup washers

SUPPRESSION KIT

- 1 Distributor Suppressor
- 1 .5 MFD Generator Condenser

MOTOR NOISE ELIMINATION

GENERATOR CONDENSER

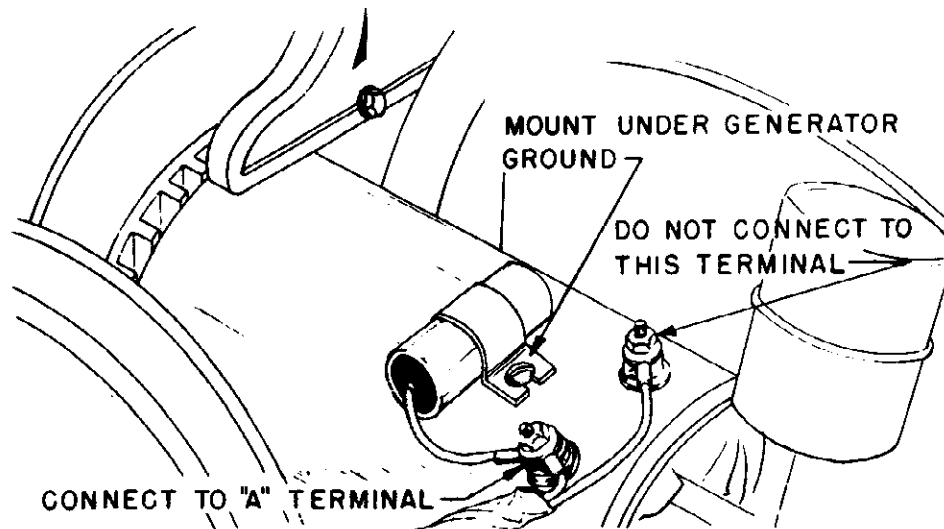


Fig. 3

DISTRIBUTOR SUPPRESSOR

NOTE: 1950 Dodge and Plymouth automobiles do *not* require distributor suppressors.

1949 DODGE AND PLYMOUTH

Remove metal tip from the distributor center tower lead and screw lead into the suppressor. Plug suppressor with attached lead back into distributor head.

The generator condenser and distributor suppressor should eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

ELECTRICAL SPECIFICATIONS

This receiver contains the following:

- 1—6BA6—RF Amplifier
- 1—6BE6—Converter
- 1—6BA6—I. F. Amplifier
- 1—6AT6—Detector—AVC—1st Audio
- 1—6AQ5—Power Output
- 1—6X4—Rectifier

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure". After realignment has been completed repeat the procedure as final check.

Removing the bottom cover makes it possible to service tubes, vibrator, and volume control.

For alignment points refer to Schematic Diagram.

© John F. Rider

PARTS LIST

CONDENSERS

Schematic Diagram Reference	Part No.	Description
C2, C3, C4	C207	.05 MFD 200 volt condenser
C5	CC200	100 MMFD ceramic condenser
C6, C13, C14	CC201	200 MMFD ceramic condenser
C7	C203	.002 MFD 400 volt condenser
C8, C9	C206	.01 MFD 500 volt condenser
C10, C11	C209	.5 MFD 100 volt condenser
C12	C205	.008 MFD 1600 volt condenser
CE-86	CE-86	20 MFD 350 volt electrolytic condenser
		20 MFD 350 volt electrolytic condenser
		20 MFD 25 volt electrolytic condenser
CV-200	CV-200	3 section variable tuning condenser

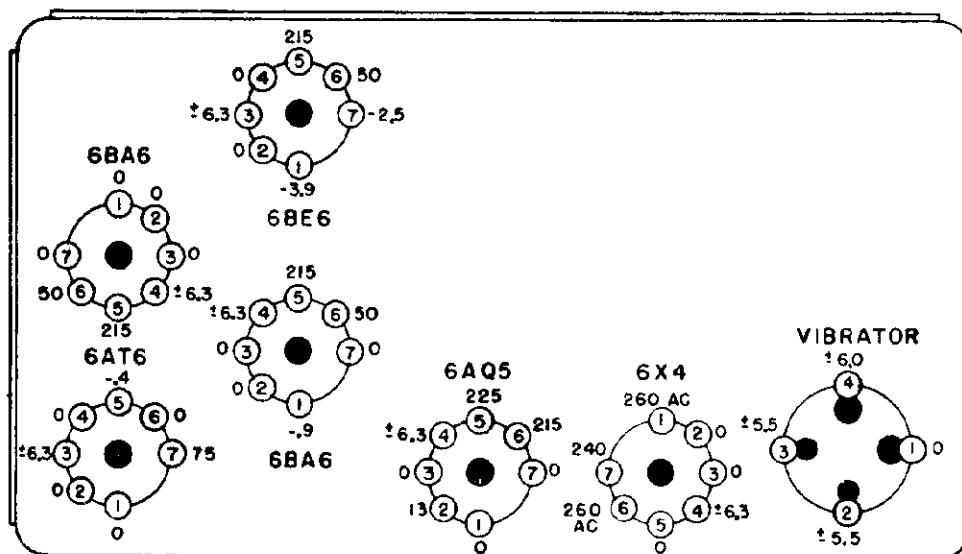
RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor
R2	R306	20K ohm 1/2 watt 20% resistor
R3	R305	2K ohm 1/2 watt 20% resistor
R4	R310	2 megohm 1/2 watt 20% resistor
R5	R311	10 megohm 1/2 watt 20% resistor
R6	R307	250K ohm 1/2 watt 20% resistor
R7	R308	500K ohm 1/2 watt 20% resistor
R8	R303	330 ohm 1/2 watt 20% resistor
R9	R313	20K ohm 2 watt 20% resistor
R10, R11	R301	100 ohm 1/2 watt 20% resistor
R12	R312	1K ohm 1 watt 20% resistor
RV-200	RV-200	Volume control 3/4 megohm with switch

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit
L2	57FB-3	Antenna Coil
L3	57FB-4	RF coil
L4	L201	RF Oscillator coil
L5	L202	Choke, vibrator hash
L6	L203	Choke, "A" line
T1	1655-16	1st IF transformer
T2	1655-16	2nd IF transformer
T3		Output transformer (Part of speaker not furnished separately)
T4	TV-86 or TV-86A	Vibrator transformer

BOTTOM VIEW OF CHASSIS



FRONT OF CHASSIS

SOCKET VOLTAGES

Fig. 4

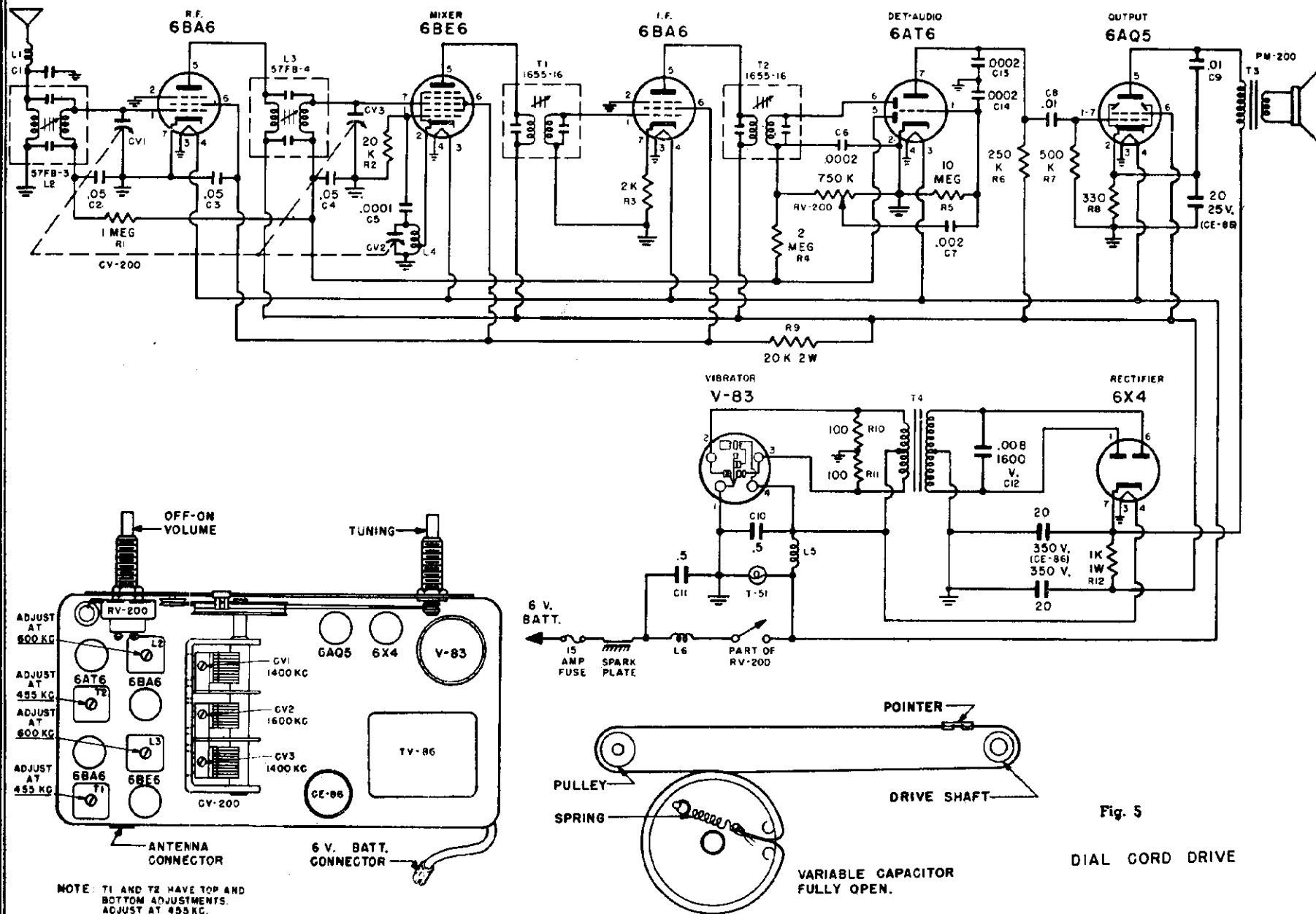
DIAL PARTS

D200	Dial Scale
PS200	Dial Pointer
DS200	Drive shaft assembly
H201	Grommet, rubber drive
T51	Pilot light
H202	Pilot light socket
H203	Pulley, idler
H204	Spring, Dial Drive String Tension
H205	String, Dial Drive

MISCELLANEOUS

A200	"A" lead assembly
H206	Case (less covers)
H207	Clip, anti-rattle
H208	Clip, coil mounting
H209	Cover, bottom case
H210	Cover, top case (with speaker louvers)
A201	Fuse, 15 Amp.
H211	Grommet, rubber, gang mounting
H212	Receptacle, antenna cable
PM-200	Speaker 4" x 6" PM (includes output transformer)
V-83	Vibrator

MODEL D-200, Dodge,
Plymouth, 1949-1950



DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It features a novel two-piece construction and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver.

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. Any standard two or three section whip or "fish pole" antenna will provide good reception of distant or weak stations. The unit is simple to install and requires no electrical adjustment after installation.

INSTALLATION

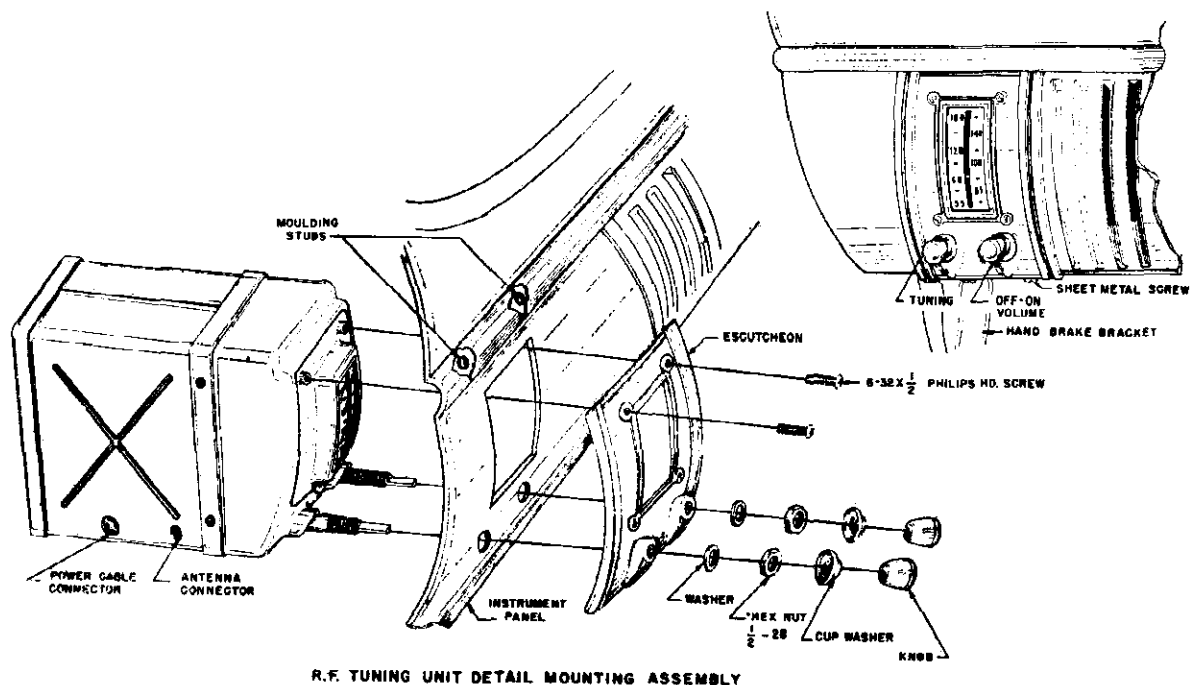


Fig. 1

R.F. TUNING UNIT DETAIL MOUNTING ASSEMBLY

R. F. TUNING UNIT

1. Loosen nuts on the two moulding studs located behind the instrument panel cover plate.
2. Remove sheet metal screw from the lower edge of the instrument panel cover plate and the two screws and washers attaching the hand brake to the instrument panel. Keep these parts.
3. Remove instrument panel cover plate and discard.
4. Tighten nuts on the two moulding studs located behind the instrument panel cover plate.
5. Drop vent controls by removing screws, lockwashers, and flat washers securing these controls to the instrument panel. This will facilitate installation of both receiver units. Save parts removed.
6. Install R.F. Tuning Unit behind instrument panel so that mounting bushings and tuningshafts protrude through the instrument panel.
7. Slide plastic escutcheon over mounting bushings and secure with flat washers, nuts, cup washers, and knobs as shown in Fig. 1
8. Secure top part of plastic escutcheon to R.F. Tuning Unit with two No. 6-32 x 1/2" long Philips Head screws.

MODEL C-300,
Chevrolet, 1949-1950

POWER SUPPLY UNIT

1. Insert a thin blade screwdriver or a flat strip of metal through the Radio Grille and slit fiberboard Radio Grille screen. Reach in back of Radio Grille and remove screen by grasping slit edge. Discard fiberboard screen.
2. Remove 10-32 nuts and washers from the moulding studs behind the Radio Grille.
3. Remove 10-32 nuts, screws, and washers securing the lower tabs of the Radio Grille to the instrument panel.
4. Install Power Supply Unit behind Radio Grille and position into place so that holes in top of unit slide over moulding studs as shown in Fig. 2.

NOTE: It may be more convenient, in car models with air conditioner heaters, to remove the vibrator before installing this unit. The vibrator can be replaced after the power unit is mounted.

5. Replace 10-32 nuts and washers on moulding studs.
6. Replace lower grille tab 10-32 mounting screws, nuts, and washers so that screws secure the lower grille tabs and Power Supply Unit to the instrument panel.
7. Connect cable from Power Supply Unit to R.F. Tuning Unit.
8. Replace vent controls.
9. Replace screws and washers securing hand brake.

Connect battery lead to terminal on Ignition Switch.

Plug Antenna cable into receiver.

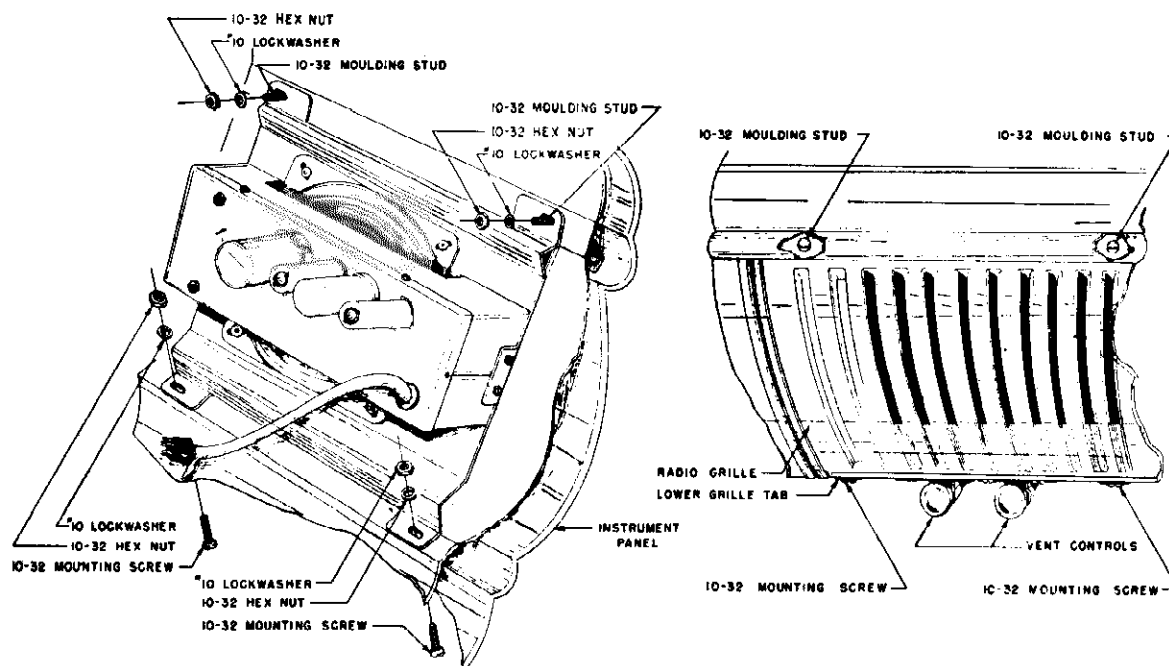


Fig. 2

POWER SUPPLY UNIT DETAIL MOUNTING ASSEMBLY

OPERATION

VOLUME CONTROL KNOB

This knob is located on the right side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the required loudness. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the left side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser.
- 1 Distributor Suppressor.

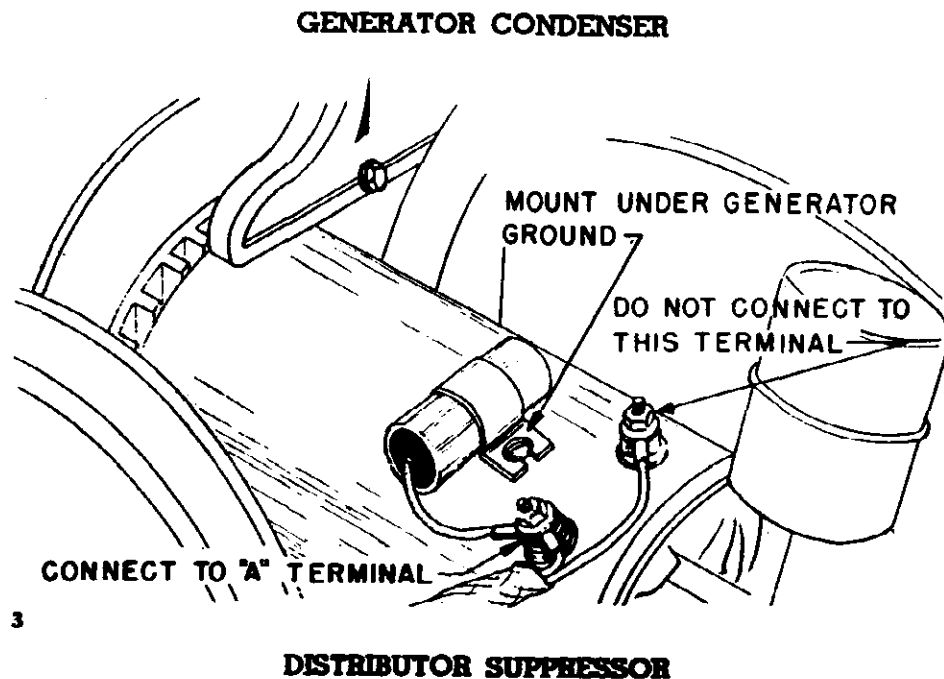


Fig. 3

Disconnect the center lead in the distributor head of the motor. Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

MODEL C-300,
Chevrolet, 1949-1950

SERVICE DATA ELECTRICAL SPECIFICATIONS

Power Supply	6.3 Volts DC
Current	5.5 Amp. average
Frequency Range	538-1600 KC
Speaker	5 1/4" PM
Power Output	2 watts, undistorted 3 watts, maximum
Sensitivity	2-3 microvolts average for 1 watt output
Selectivity	40 KC broad at 1000 times signal, at 1000 KC

This receiver contains the following:
 1—6BA6—RF Amplifier
 1—6BE6—Converter
 1—6BA6—I. F. Amplifier
 1—6AT6—Detector—AVC—1st Audio
 1—6AQ5—Power Output
 1—6X4—Rectifier

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 4).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components such as tubes, condensers, resistors, etc. are normal before proceeding with re-alignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure". After realignment has been completed repeat the procedure as final check.

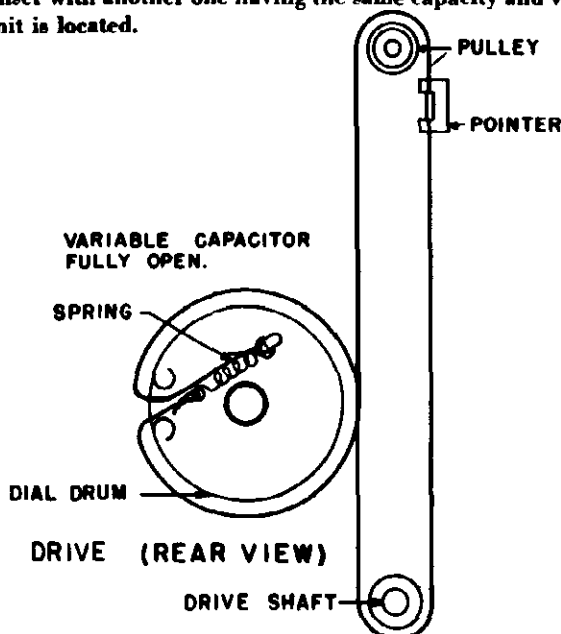


Fig. 4 DIAL CORD DRIVE (REAR VIEW)

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.
 No signal applied to antenna.
 Power input—6.3 volts.
 Connect dummy antenna in series with output lead of signal generator.
 Connect ground lead of signal generator to chassis.
 Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:
 Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
 Non-metallic screwdriver.
 Output meter. (1.8 volt for 1 watt output.)
 Dummy antennas—.1 MFD., 100 MMFD.
 For alignment points refer to Schematic Diagram.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connector	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in Signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						

PARTS LIST

CONDENSERS

Schematic Diagram Reference	Part No.	Description
C2, C3, C6, C9	C207	.05 MFD 200 volt condenser
C4, C15	C209	.5 MFD 100 volt condenser
C7	CC200	100 MMFD ceramic condenser
C8	C210	.1 MFD 400 volt condenser
C10, C12	CC201	200 MMFD ceramic condenser
C13, C16	C206	.01 MFD 600 volt condenser
C14	C205	.008 MFD 1600 volt condenser
C11	C211	.002 MFD 400 volt condenser
CE-86	CE-86	20 MFD 350 volt electrolytic condenser
		20 MFD 350 volt electrolytic condenser
CV1-CV2-CV3	CV-300	20 MFD 25 volt electrolytic condenser
		3 section variable tuning

RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor
R2	R306	20K ohm 1/2 watt 20% resistor
R3	R314	1.5K ohm 1/2 watt 20% resistor
R4	RV-300	Volume control 1/4 megohm with switch
R5	R310	2 megohm 1/2 watt 20% resistor
R6	R311	10 megohm 1/2 watt 20% resistor
R7	R307	250K ohm 1/2 watt 20% resistor
R8	R313	20K ohm 2 watt 20% resistor
R9, R10	R301	100 ohm 1/2 watt 20% resistor
R11	R312	1K ohm 1 watt 20% resistor
R12	R308	500K ohm 1/2 watt 20% resistor
R13	R303	330 ohm 1/2 watt 20% resistor

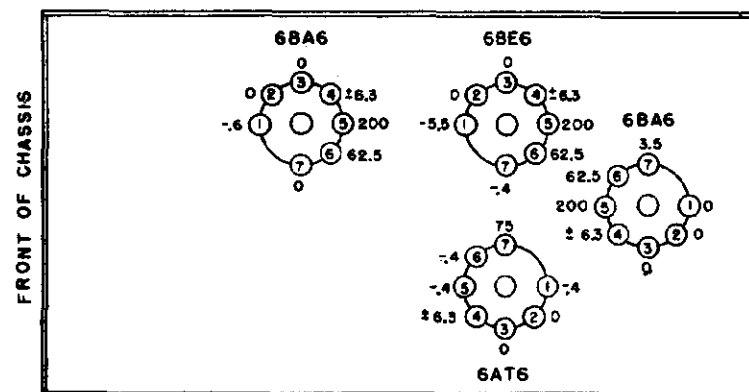
COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit
L2	57FB-3	Antenna coil
L3	57FB-4	R.F. coil
L4	L201	R.F. oscillator coil
L5	L203	Choke, "A" line
L6	L202	Choke, vibrator hash
T1	1655-16	2nd IF transformer
T2	1655-16	1st IF transformer
T3		Vibrator transformer
T4	TV-100 or 318V-2	Output transformer (Part of speaker not furnished separately)

DIAL PARTS

D300	Dial Scale
PS300	Dial Pointer
DS300	Drive Shaft Assembly
H201	Grommet, rubber drive
T51	Pilot Light
H214	Pilot Light Socket
H203	Pulley, idler
H204	Spring, Dial drive String Tension
H215	String, dial drive

BOTTOM VIEW OF CHASSIS



BOTTOM VIEW OF POWER PACK

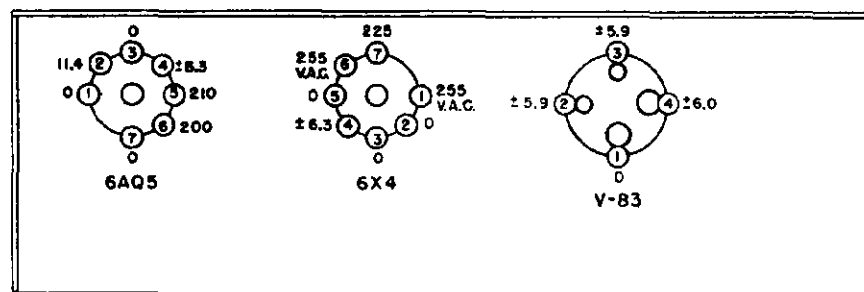


Fig. 5

SOCKET VOLTAGES

MISCELLANEOUS

A300	"A" lead assembly
H301	Case, lens covers for Power Supply Unit
H300	Case, complete with covers for R.F. tuning unit
H207	Clip, Anti-rattle
H208	Clip, coil mounting
H302	Cover, power supply unit mounting (with speaker louvers)
A201	Fuse 15 Amp.
504PC-300	Power Cable Assembly (complete with plug)
H212	Receptacle, Antenna cable
504-FC	Socket, power cable
PM-735	Speaker, 5 1/4" PM (includes output transformer)
V-83	Vibrator
H310	Knob
H311	Cup washer
H312	Plastic Escutcheon

MODEL C-300,
Chevrolet, 1949-1950

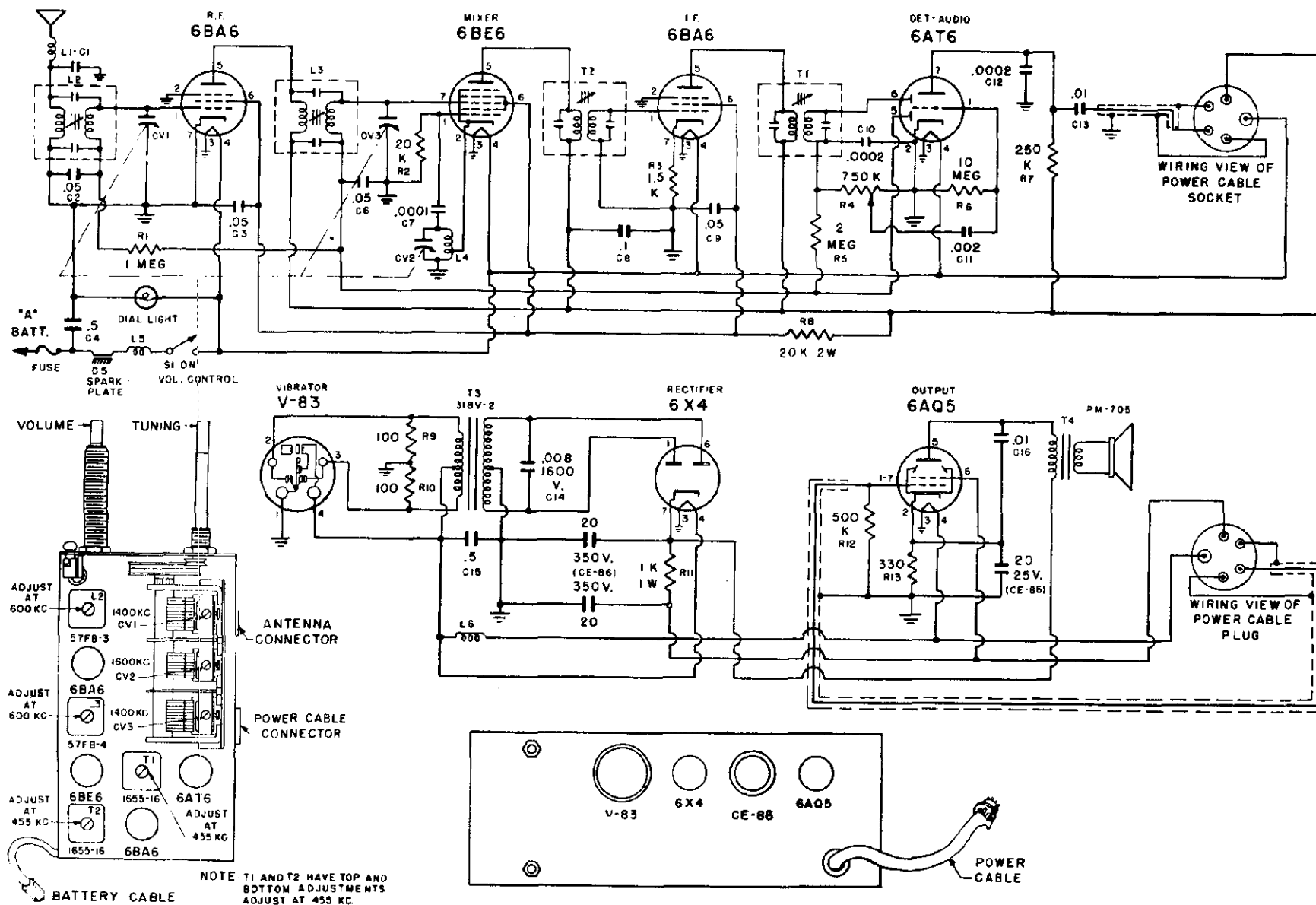
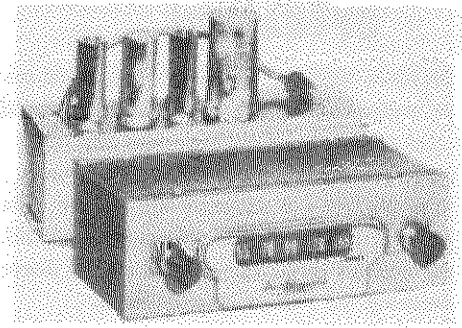


Fig. 6

MODEL F-100,
Ford, 1949-1950

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superheterodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC.

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. Any standard two or three section whip or "fish pole" antenna will provide good reception. The unit is simple to install and requires no electrical adjustment after installation.

SCHEMATIC DIAGRAM REF. NO.	PART NO.	DESCRIPTION
CONDENSERS		
C2, C3, C5	C207	.05 MFD 200 volt condenser.
C4, C12	C209	.5 MFD 100 volt condenser.
C6	CC200	100 MMFD ceramic condenser. ...
C7, C9	CC201	200 MMFD ceramic condenser. ...
C8	C203	.002 MFD 400 volt condenser.
C10, C13	C206	.01 MFD 400 volt condenser.
C11	C205	.008 MFD 1600 volt condenser. ...
		20 MFD 350 volt electrolytic condenser.
CE-86	CE-86	20 MFD 350 volt electrolytic condenser.
		20 MFD 25 volt electrolytic condenser.
CV1-CV2- CV3	CV-100A	3 section variable.
RESISTORS		
R1	R309	1 megohm ½ watt 20% resistor. .
R2, R14	R303	330 ohm ½ watt 20% resistor.
R3	R306	20K ohm ½ watt 20% resistor.
R4	R314	1.5K ohm ½ watt 20% resistor. ...
R5	RV-100	Volume control ¾ megohm with switch.
R6	R310	2 megohm ½ watt 20% resistor. .
R7	R311	10 megohm ½ watt 20% resistor. .
R8	R313	20K ohm 2 watt 20% resistor.
R9	R307	250K ohm ½ watt 20% resistor. ...
R10, R11	R301	100 ohm ½ watt 20% resistor.
R12	R312	1K ohm 1 watt 20% resistor.
R13	R308	500K ohm ½ watt 20% resistor. ..
COILS AND TRANSFORMERS		
L1-C1	L200	Motor noise elimination unit.
L2	15053 or 57FB-3	Antenna coil.
L3	13054 or 57FB-4	R.F. coil.
L4	L201	R. F. oscillator coil.
L5	L203	Choke "A" line.
L6	L202	Choke, vibrator hash.
T2	14977 or 1655-16	2nd IF transformer.
T1	14977 or 1655-16	1st IF transformer.
T3	TV-100 or 318V-2	Vibrator transformer.
T4		Output transformer (Part of speak- er not furnished separately).

DIAL PARTS

D100	Dial Scale Escutcheon, Plastic.
PS100	Dial Pointer.
T47	Pilot Light.
H114	Pilot Light Socket.
H203	Pulley, idler.
H204	Spring, Dial drive String Tension.
H115	String, dial drive.

MISCELLANEOUS

A300	"A" lead assembly.
H301	Case, less covers for Power Supply Unit. .
H100	Case, complete with covers for R.F. tuning unit.
H207	Clip, Anti-rattle.
H208	Clip, coil mounting.
H102	Cover, power supply unit mounting (with speaker louvres).
A201	Fuse 15 Amp.
504PC-300	Power Cable Assembly (complete with plug).
H212	Receptacle, Antenna cable.
504-FC	Socket, power cable.
PM-705	Speaker, 5¼" PM (includes output trans- former).
V-83	Vibrator.
H310	Knob.
H311	Cup washer.
H113	⅜—28 Hex nut.
C100	.5 MFD generator condenser.
R100	Distributor suppressor.

MODEL F-100,
Ford, 1949-1950

OPERATION

VOLUME CONTROL KNOB — This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB — This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone. Add a zero to the dial readings to obtain the frequency in kilocycles.

INSTALLATION

1. Remove two speed nuts securing radio opening cover plate to instrument panel.
2. Remove cover plate.
3. Place speaker and power pack unit over four threaded stud bolts located on the underside of the instrument panel. (Position power pack unit so that power cable is located on the left hand side.) See Fig. 1.
4. Secure power pack into position with four 8-32 nuts and washers supplied in kit of mounting hardware.
5. Remove knobs, cup washers and hex mounting nuts from tuning units. Do not remove escutcheon.
6. Place tuning unit behind instrument panel so that mounting bushings and shafts protrude through the front panel.
7. Attach tuning unit with a hex nut on each mounting bushing.

8. Replace cup washers, grommets and knobs over shafts.
9. Secure a supporting bracket (2 supplied in kit of hardware) to each side of the power pack unit by means of two No. 8 self-tapping screws. Use end of supporting bracket with round hole. If more convenient, these brackets may be attached before power pack unit is positioned in place.
10. Swing supporting brackets so that slotted holes are in line with the holes on each side of the tuning unit.
11. Secure to tuning unit with two No. 8 self-tapping screws.
12. Insert power cable plug into socket on rear of tuning unit.
13. Plug antenna cable into tuning unit.
14. Secure power cable under cable clamp and tighten clamp screw.
15. Connect "A" lead to accessory terminal marked RAD. GA, on the ignition switch.

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver. (See detail assembly drawing Fig. 1).

- 2 1/4-28 hex nuts
- 2 Cup washers
- 2 Grommets
- 2 Knobs
- 1 Cable clamp

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 2 Supporting brackets
- 4 No. 8 self-tapping screws
- 4 8-32 nuts
- 4 No. 8 washers

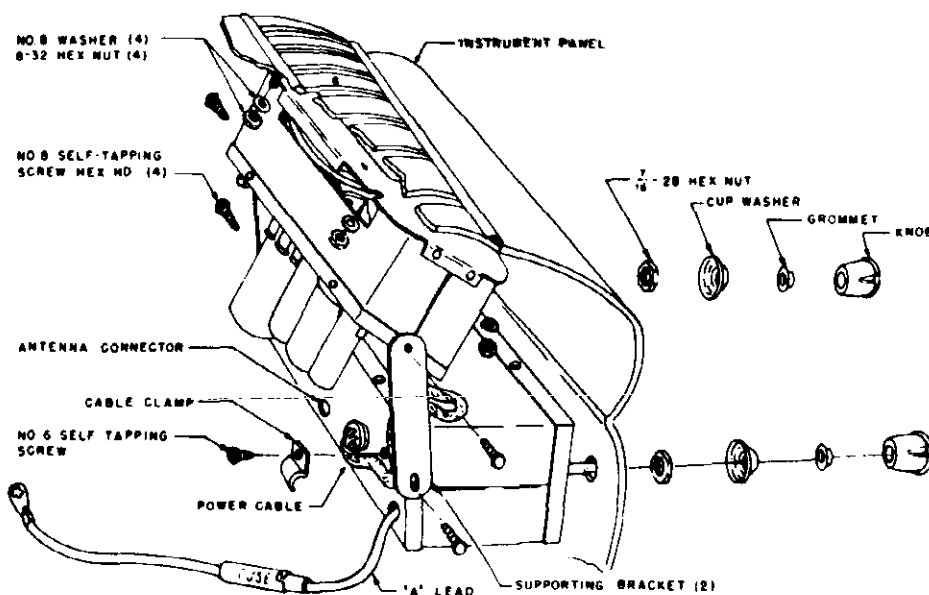
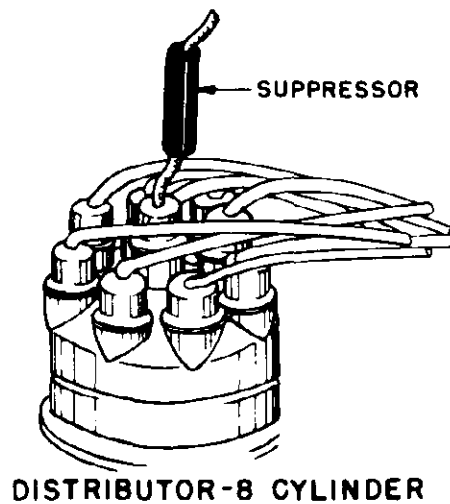


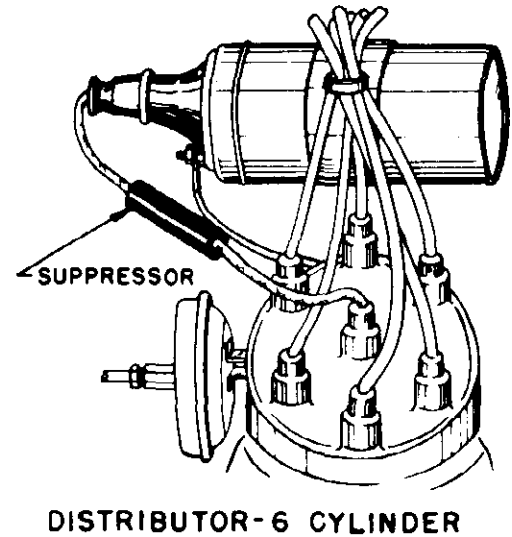
FIG. 1 DETAIL MOUNTING ASSEMBLY

MOTOR NOISE ELIMINATION

MODEL F-100,
Ford, 1949-1950



DISTRIBUTOR-8 CYLINDER



DISTRIBUTOR-6 CYLINDER

FIG. 2 DISTRIBUTOR SUPPRESSOR

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser
- 1 Distributor suppressor

DISTRIBUTOR SUPPRESSOR

Disconnect high tension wire that runs from the ignition coil to the center hole of the distributor head. Cut lead one and one-half inches back from metal tip end for 8 cylinder Ford or two and one-half inches back for 6 cylinder Ford. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor, back into distributor head.

GENERATOR CONDENSER

Loosen the top assembly bolt from the rear end plate of the generator. DO NOT REMOVE. Mount .5MFD generator condenser under this bolt. Tighten bolt and connect condenser lead to the armature terminal of the generator.

The generator condenser and distributor suppressor should eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

GENERATOR
CONDENSER
.5 MFD.

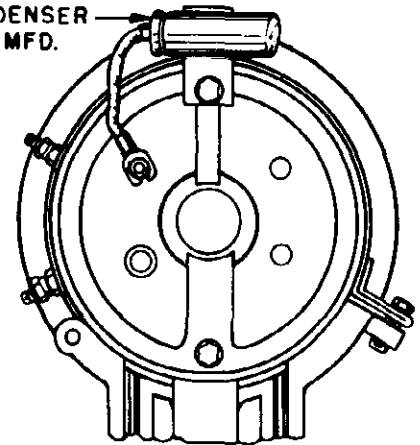


FIG. 3 GENERATOR CONDENSER

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

MODEL F-100,
Ford, 1949-1950

ELECTRICAL SPECIFICATIONS

Power Supply 6.3 Volts DC
Current 5.5 Amp. average
Frequency Range 538-1600 KC
Speaker 5 1/4" PM 3.2 Ohm V.C.
Power Output 2 watts, undistorted
3 watts, maximum

Sensitivity 2-3 microvolts average for 1 watt output
Selectivity .. 40 KC broad at 1000 times signal, at 1000 KC

This receiver contains the following:

- 1 - 6BA6 - RF Amplifier
- 1 - 6BE6 - Converter
- 1 - 6BA6 - I. F. Amplifier
- 1 - 6AT6 - Detector - AVC - 1st Audio
- 1 - 6AQ5 - Power Output
- 1 - 6X4 - Rectifier

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart.

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

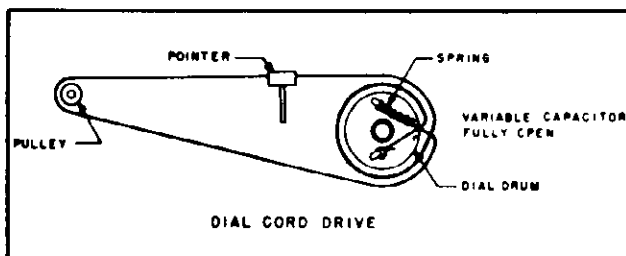


FIG. 4 DIAL CORD DRIVE

ALIGNMENT PROCEDURE

Volume control - Maximum all adjustments.

No signal applied to antenna.

Power input - 6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

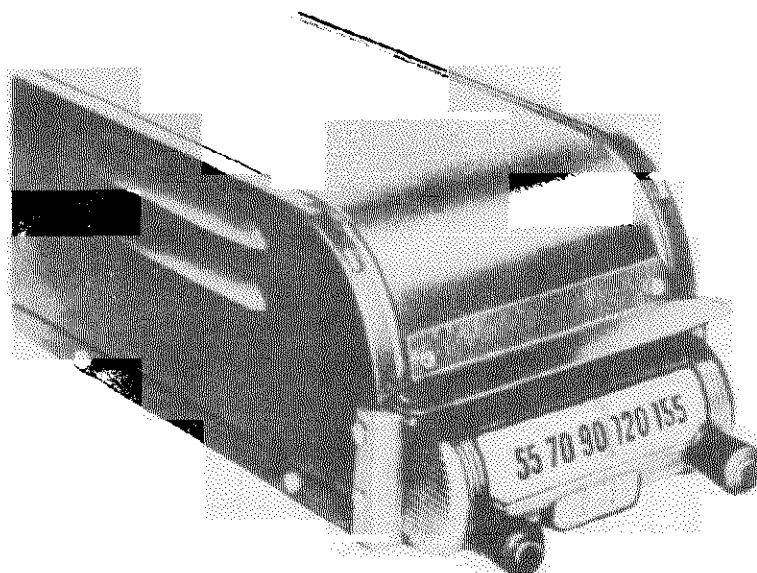
Dummy antennas - .1 MFD., 100 MMFD.

For alignment points refer to Schematic Diagram.

DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANT.	GENERATOR CONNECTION	TRIMMER REFERENCE	TRIMMER ADJUSTMENT	TRIMMER FUNCTION
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						



MODEL M-90



SCHEMATIC DIAGRAM REFERENCE	PART NO.	DESCRIPTION
CONDENSERS		
C2, C3, C5	C207	.05 MFD 200 volt condenser.....
C4, C12	C209	.5 MFD 100 volt condenser.....
C6	CC200	100 MMFD ceramic condenser...
C7, C9	CC201	200 MMFD ceramic condenser...
C8	C203	.002 MFD 400 volt condenser....
C10, C13	C206	.01 MFD 600 volt condenser.....
C11	C205	.008 MFD 1600 volt condenser...
		20 MFD 350 volt electrolytic condenser.....
CE-86	CE-86	20 MFD 350 volt electrolytic condenser.....
		20 MFD 25 volt electrolytic condenser.....
CV1, CV2, CV3	CV-148	3 section variable condenser.....
RESISTORS		
R1	R-309	1 megohm ½ watt 20% resistor..
R2, R14	R-303	330 ohm ½ watt 20% resistor....
R3	R-306	20K ohm ½ watt 20% resistor....
R4	R-314	1.5K ohm ½ watt 20% resistor...
R5	RV-57	Volume control ¾ megohm with switch.....
R6	R-310	2 megohm ½ watt 20% resistor..
R7	R-311	10 megohm ½ watt 20% resistor..
R8	R-313	20K ohm 2 watt 20% resistor....
R9	R-307	250K ohm ½ watt 20% resistor...
R10, R11	R-301	100 ohm ½ watt 20% resistor....
R12	R-312	1k ohm 1 watt 20% resistor.....
COILS AND TRANSFORMERS		
L1-C1	L-200	Motor Noise elimination unit.....
L2	57FB-3	Antenna Coil.....
L3	57FB-4	R.F. Coil.....
L4	L-201	R.F. Oscillator Coil.....

SCHEMATIC DIAGRAM REFERENCE	PART NO.	DESCRIPTION
L5	L-203	Choke "A" Line.....
L6	L-202	Choke, vibrator hash.....
T1	1655-16	1st I.F. Transformer.....
T2	1655-16	2nd I.F. Transformer.....
T3	TV86 or TV86A	Vibrator Transformer.....
T4		Output transformer (Part of speak- er not furnished separately)....

PART NO.	DESCRIPTION
DIAL PARTS	
H201	Grommet, rubber drive.....
T51	Pilot light.....
H202	Pilot light socket.....
H203	Pulley, idler.....
H204	Spring, Dial drive string tension.....
H503	String, Dial drive.....
DP505	Dial Pan.....
PS 1024	Dial Pointer.....
DS -500	Drive shaft assembly.....
	Plastic Dial Scale front.....
H508	Knob.....

MISCELLANEOUS	
A300	"A" lead assembly.....
A201	Fuse 15 Amp.....
V-83	Vibrator.....
H-207	Clip, case anti-rattle.....
H-208	Clip, coil mounting.....
H-501	Case bottom.....
H-502	Case cover.....
PM-702-A	Speaker 5" (includes output transformer)..
H-212	Receptacle, Antenna Cable.....
GC-507	Speaker Grill Cloth and cardboard baffle..

INSTALLATION

Due to the compact size of this receiver, many mounting positions are possible. However, the most convenient is directly below the instrument panel as illustrated in figure 1. The following step by step procedure will facilitate the installation of the receiver.

1. With the receiver itself as a model, select the desired position.
2. Using the front mounting bracket as a template locate the two front mounting holes and a $\frac{1}{4}$ " hole at each point.
3. Attach front mounting bracket to the receiver by two No. 6 self-tapping screws.
4. Locate the position for the rear mounting stud in the bulkhead and drill a $\frac{1}{2}$ " hole.
5. With the stud mounted on the receiver and the inside nut and washer in place, insert the stud through the bulkhead hole and attach the front end of the receiver to the instrument panel with two 8-32 machine screws contained in kit of mounting hardware.
6. Open the engine compartment and remove the paint on the bulkhead around the stud. Assemble the washer and nut on this side and adjust both this nut and the inside nut for

perfect alignment of the receiver and for good contact with the brightened surface of the bulkhead.

Caution: Do not screw stud in case beyond point necessary to insure support, otherwise, it may penetrate rear wall of case and cause damage to the instrument.

7. Attach the terminal of the "A" battery cable to one of the posts on the ammeter, preferably on the battery side. This may be ascertained by switching the receiver on. If no deflection of the ammeter occurs, the receiver is properly connected.
8. Insert plug on the end of the antenna lead into socket connector located on the left side of the radio.

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

1 mounting stud	2 8-32 hex nuts
2 $\frac{3}{8}$ -16 hex nuts	2 No. 8 washers
2 $\frac{3}{8}$ " I.D. washers	2 No. 8 lock washers
2 8-32 machine screws	

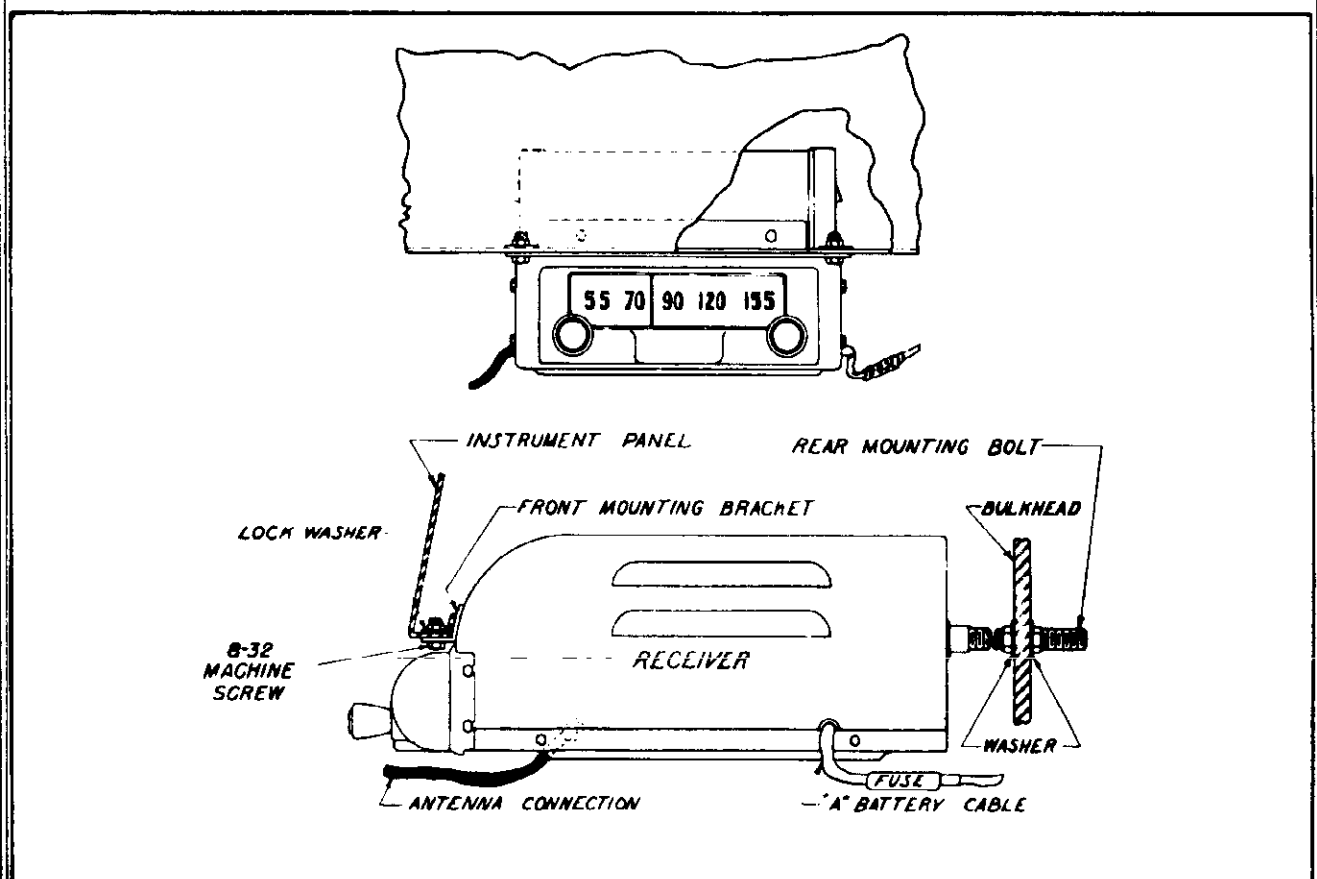


FIG. 1 DETAIL MOUNTING ASSEMBLY

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

1 .5 MFD Generator Condenser 1 Distributor Suppressor

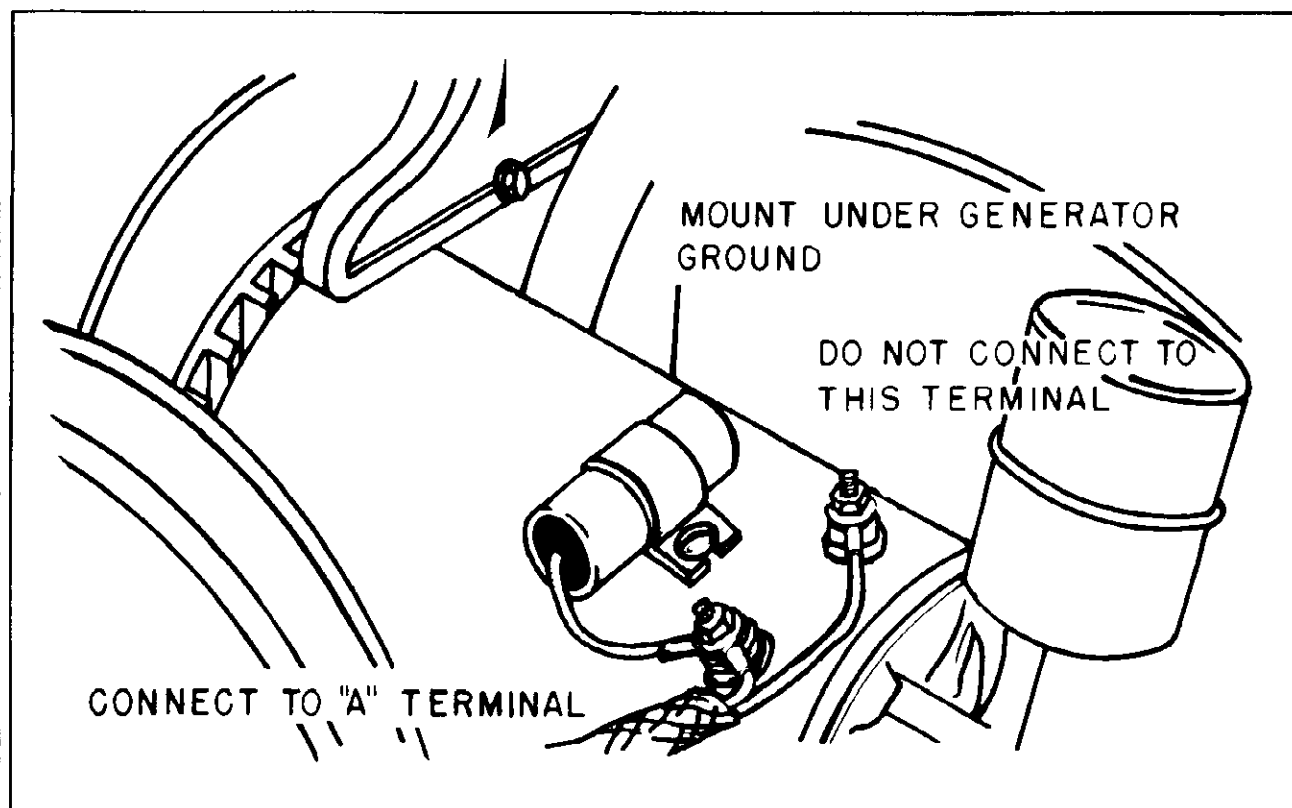


FIG. 2 GENERATOR CONDENSER

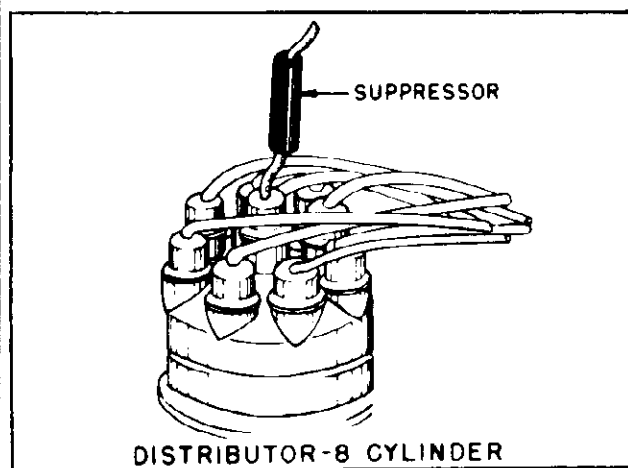


FIG. 3 DISTRIBUTOR SUPPRESSOR

GENERATOR CONDENSER

The generator condenser (Installed as shown in Figure 2) and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

DISTRIBUTOR SUPPRESSOR

Disconnect the center lead in the distributor head of the motor (see Fig. 3). Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

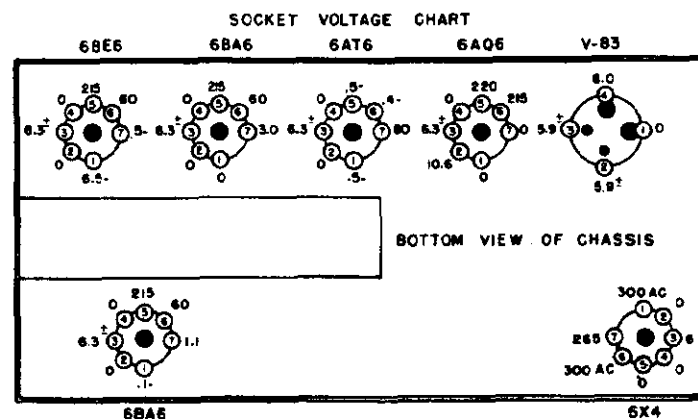
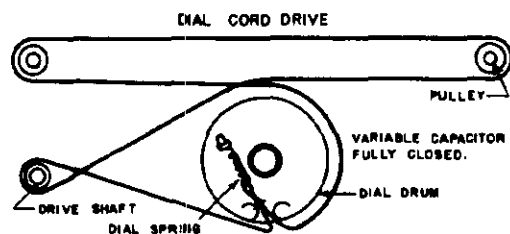
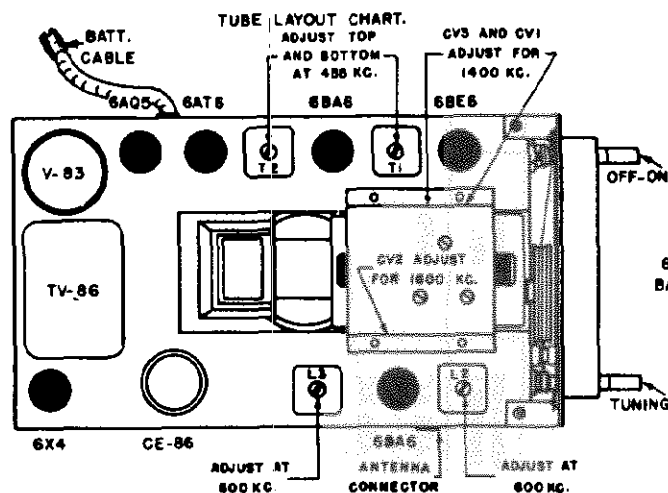
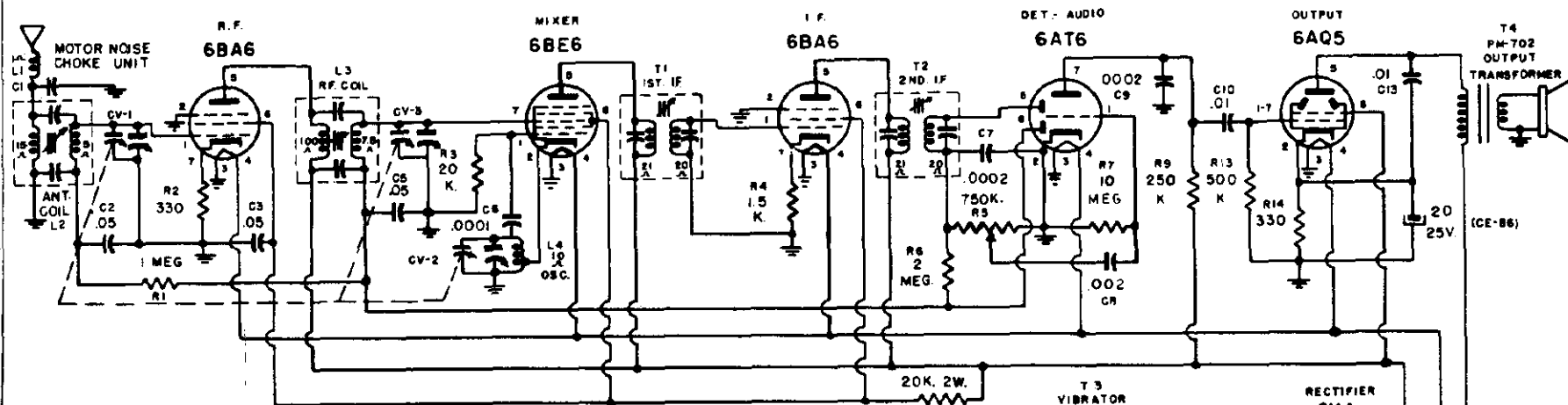
WHEEL STATIC

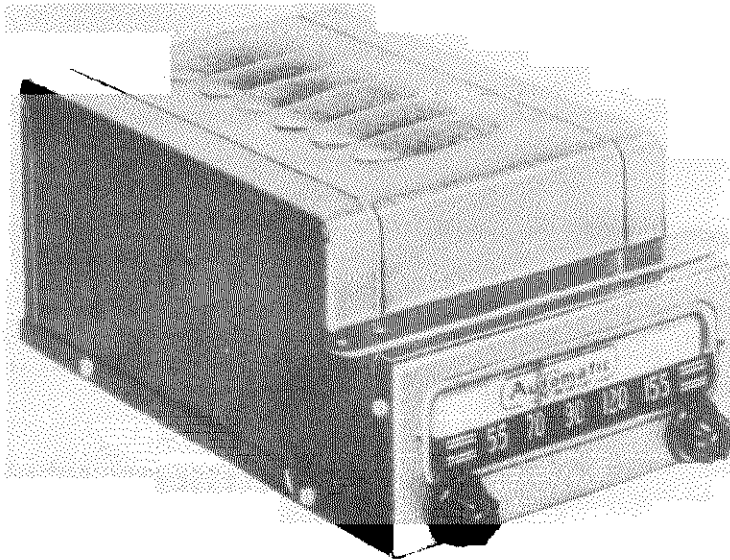
Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANT.	GENERATOR CONNECTION	TRIMMER REFERENCE	TRIMMER ADJUSTMENT	TRIMMER FUNCTION
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						





REPLACEMENT PARTS LIST

SCHEMATIC DIAGRAM REF. NO.	PART NO.	DESCRIPTION	
CONDENSERS			
C3, C5	C207	.05 MFD 200 volt condenser. . . .	
C4, C12	C209	.5 MFD 100 volt condenser.	
C6	CC200	100 MMFD ceramic condenser. . .	
C7, C9	CC201	200 MMFD ceramic condenser. . .	
C8	C203	.002 MFD 400 volt condenser. . .	
C10, C13	C206	.01 MFD 600 volt condenser. . . .	
C11	C220	.0125 MFD 1200 volt condenser. .	
C15	CE-X50	20 MFD 150 volt electrolytic condenser.	
		20 MFD 150 volt electrolytic condenser.	
		20 MFD 25 volt electrolytic condenser.	
		RESISTORS	
R3	R306	20K ohm 1/2 watt 20% resistor. . .	
R4, R10, R11	R301	100 ohm 1/2 watt 20% resistor. . .	
R5	RV-X50	Volume control 3/4 megohm with switch.	
R6	R310	2 megohm 1/2 watt 20% resistor. .	
R8	R326	2K ohm 1 watt 20% resistor.	
R9	R307	250K ohm 1/2 watt 20% resistor. .	
R12	R308	500K ohm 1/2 watt 20% resistor. .	
R13	R327	150 ohm 1/2 watt 20% resistor. . .	
R14	R312	1K ohm 1 watt 20% resistor.	
COILS AND TRANSFORMERS			
L1-C1	L200	Motor noise elimination Unit. . . .	
L2	57FB-3	Antenna Coil.	
L4	L201	R.F. Oscillator coil.	
L5	L203	Choke "A" line.	
L6	L202	Choke, vibrator hash.	

SCHEMATIC DIAGRAM REF. NO.	PART NO.	DESCRIPTION
T1	1655-16	1st IF transformer
T2	1655-16	2nd IF transformer
T3	TV-X50	Vibrator transformer
T4		Output transformer (Part of speak- er, not furnished separately) . . .

PART NO.	DESCRIPTION
DIAL PARTS	
H201	Grommet, rubber drive
T51	Pilot light
H202	Pilot light socket
H203	Pulley, idler
H204	Spring, Dial drive string tension
H531	String, Dial drive
DP 530	Dial Pan
PS 800	Dial Pointer
DS 540	Drive shaft assembly
S556	Dial scale window
H508	Knob
F555	Felt washers (for knobs)
MISCELLANEOUS	
A300	"A" lead assembly
A201	Fuse 15 Amp
V83	Vibrator
H207	Clip, case anti-rattle
H208	Clip, coil mounting
PM611	Speaker 5" (includes output transformer) . . .
H212	Receptacle, Antenna cable
GC607	Speaker Grill cloth
H601	Case bottom
H602	Case cover

MODEL X-50

INSTALLATION

Due to the compact size of this receiver, many mounting positions are possible. However, the most convenient is directly below the instrument panel as illustrated in figure 1. The following step by step procedure will facilitate the installation of the receiver.

1. With the receiver itself as a model, select the desired position.
2. Using the mounting bracket as a template locate the two front mounting holes and drill a $\frac{1}{4}$ " hole at each point.
3. Locate the position for the rear mounting stud in the bulkhead and drill a $\frac{1}{2}$ " hole.
4. With the stud mounted on the receiver and the inside nut and washer in place, insert the stud through the bulkhead hole and attach the front end of the receiver to the instrument panel with the two 8-32 machine screws contained in kit of mounting hardware.
5. Open the engine compartment and remove the paint on the bulkhead around the stud. Assemble the washer and nut on this side and adjust both this nut and the inside nut for perfect alignment of the receiver and for good contact with the brightened surface of the bulkhead.

Caution: Do not screw stud in case beyond point necessary to insure support, otherwise, it may penetrate rear wall of case and cause damage to the instrument.

6. Attach the terminal of the "A" battery cable to one of the posts on the ammeter, preferably on the battery side. This may be ascertained by switching the receiver on. If no deflection of the ammeter occurs, the receiver is properly connected.
7. Insert plug on the end of the antenna lead into socket connector located on the left side of the radio.

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

1 mounting stud	2 8-32 machine screws
2 $\frac{3}{8}$ -16 hex nuts	2 8-32 hex nuts
2 $\frac{3}{8}$ " I.D. washers	2 No. 8 washers
	2 No. 8 lock washers

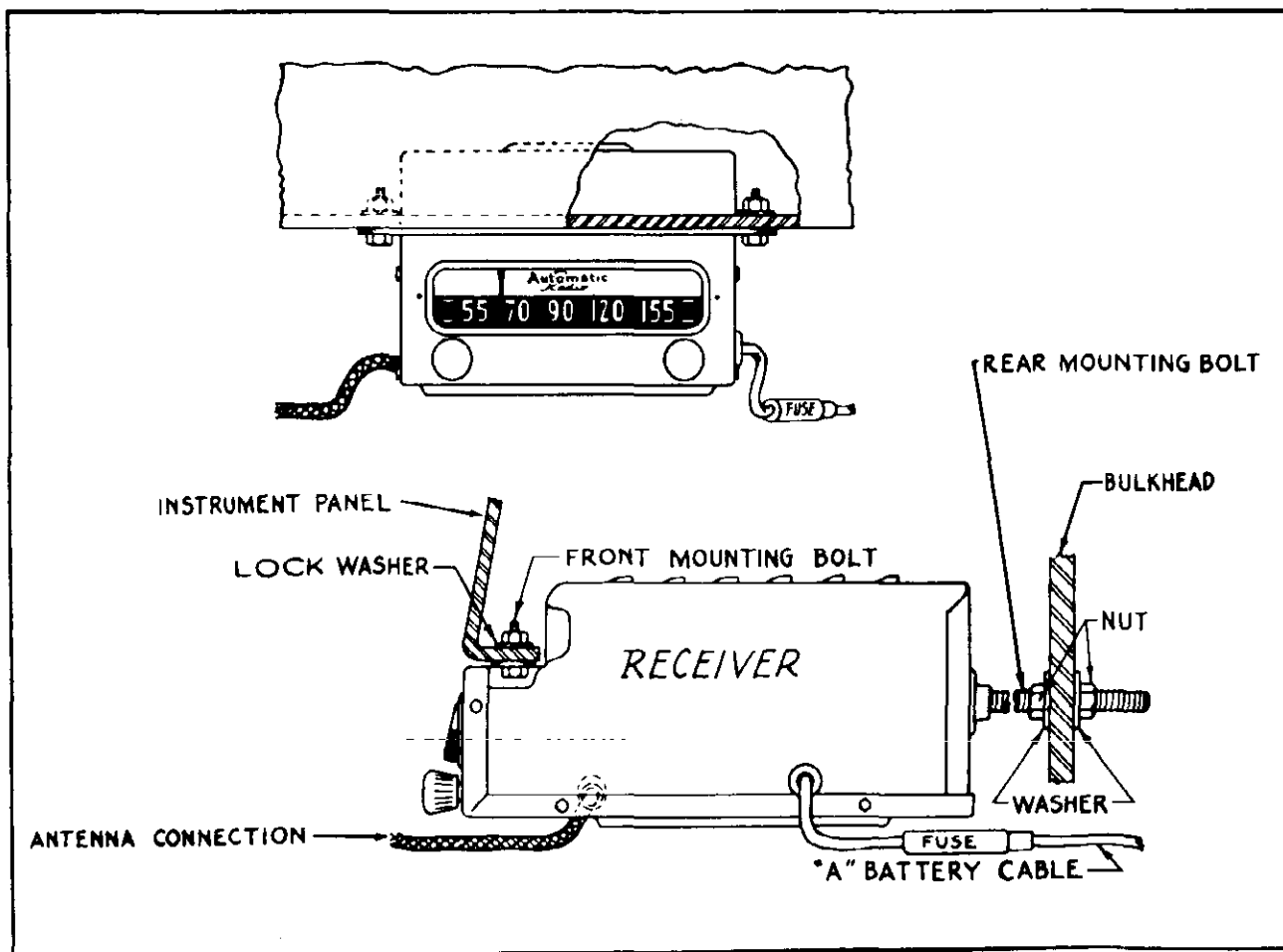


FIG. 1 RECEIVER MOUNTING DIAGRAM

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

1 Generator Condenser. 1 Distributor Suppressor.

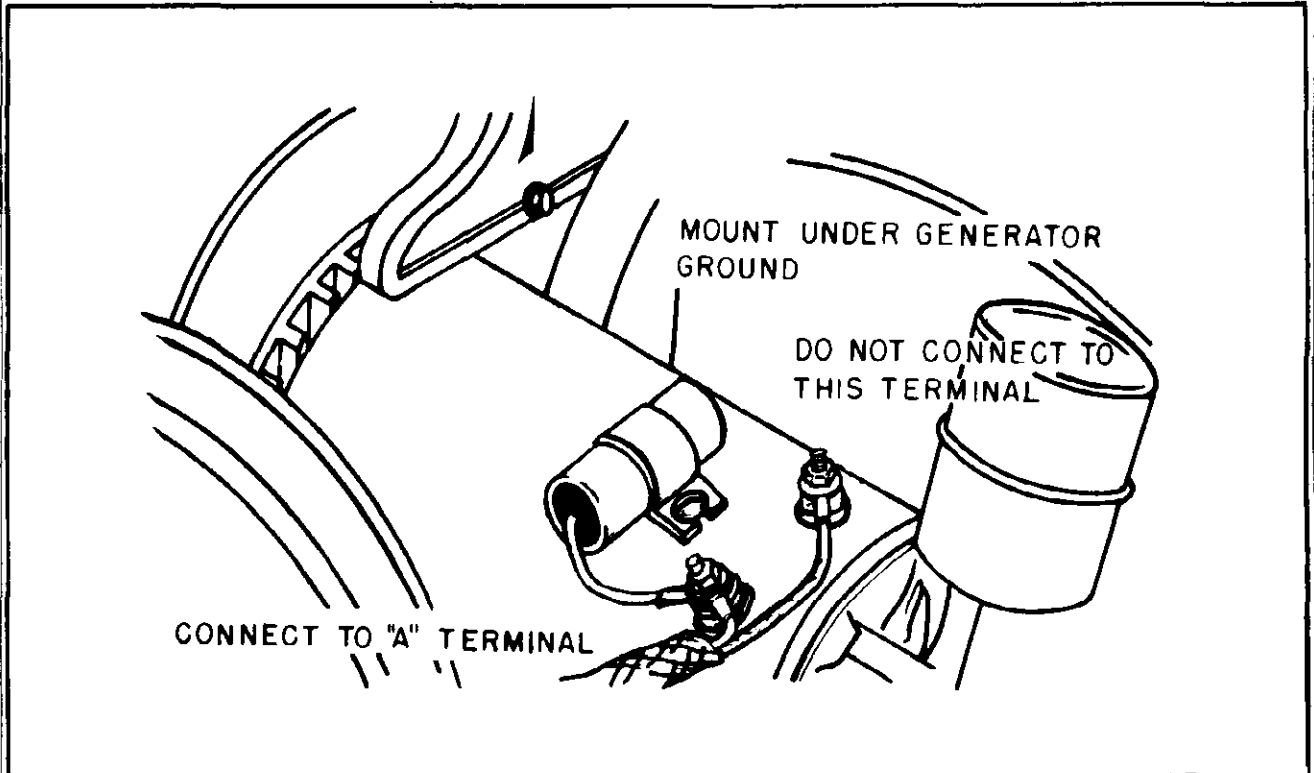


FIG. 2 GENERATOR CONDENSER

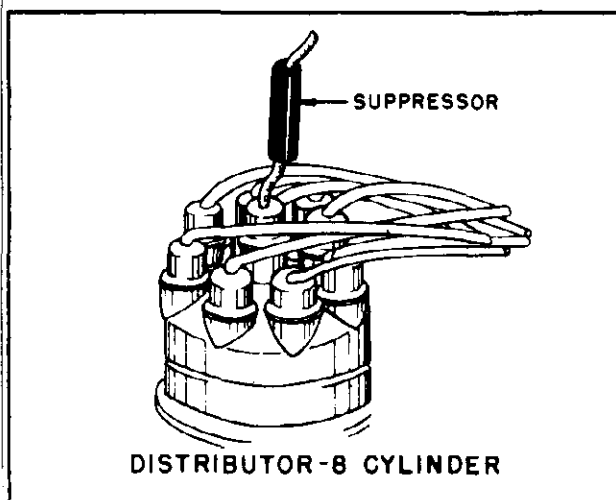


FIG. 3 DISTRIBUTOR SUPPRESSOR

GENERATOR CONDENSER

The generator condenser (Installed as shown in Figure 2) and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

DISTRIBUTOR SUPPRESSOR

Disconnect the center lead in the distributor head of the motor (see Fig. 3). Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

Power Supply	6.3 Volts DC.
Current	5.5 Amp. Average
Frequency Range	538-1600 KC.
Speaker	5" PM 3.2 Ohm V. C.
Power Output	1.5 watts, undistorted
	2 watts, maximum

- 1 — 6BE6 — Converter
- 1 — 6BA6 — I. F. Amplifier
- 1 — 6AT6 — Detector — AVC — 1st Audio
- 1 — 6AS5 — Power Output
- 1 — 6X4 — Rectifier

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum posi-

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

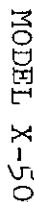
Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

Repeat alignment procedure as a final check.

For alignment points refer to Schematic Diagram.

DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANT.	GENERATOR CONNECTION	TRIMMER REFERENCE	TRIMMER ADJUSTMENT	TRIMMER FUNCTION
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
5) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
6) Repeat steps 4 and 5						



MODELS M-1,
M-1A, FordBENDIX CAR RADIOS M-1 & M-1A
1949 and Early 1950General

Bendix Car Radios M-1 and M-1A are six tube superheterodyne receivers with vibrator power supplies and full wave rectifiers. The antenna, radio frequency, and oscillator circuits are inductively tuned, by means of push buttons or the manual tuning control, over a frequency range of 540 to 1610 kilocycles, by means of iron cores.

The On-Off, Volume and Tone Controls are on concentric shafts at the left of the receiver. The Manual Tuning Control is at the right. The Speaker is a separate unit.

TUBE COMPLIMENT

6SK7/GT	R.F. Amplifier	6SQ7/GT	Det., AVC & AF Ampl.
6SA7/GT	Converter	6V6/GT	AF Amplifier
6SK7/GT	I.F. Amplifier	6X5/GT	Rectifier

POWER SUPPLY

The power supply uses a 6X5/GT full wave rectifier tube in conjunction with a four prong full wave primary type vibrator.

ALIGNMENTRecommended Test Equipment:

Signal Generator - 260 to 1700 KC range. Output from 1 to 100,000 microvolts. Modulation 30% to 400 cycles.

Output meter - 2 watt capability or, P.M. Speaker, for alignment by ear as an alternate.

Dummy Antenna - Constructional circuit included in the rear section of this manual.

General:

Make all alignment adjustments to the receiver with "A" lead connected to a 7.2 volt negative source, and ground the chassis to the positive side of this source. Rotate the volume, tone and sensitivity controls to their maximum clockwise position. Connect the output meter across the speaker voice coil. Use an insulated screw driver for making all adjustments. Use shielded cables for connections between signal generator, dummy antenna, and receiver. For each adjustment, the signal level should be kept as low as possible while still obtaining a reasonable output indication. The signal level should be controlled at the signal generator, and not with the receiver controls. With the sensitivity control turned fully clockwise as instructed above, some of the older type M-1 receivers will have I.F. oscillation during alignment. In these receivers, capacitor C-5 is .1 mfd. Changing the value of this capacitor to .5 mfd will correct this trouble.

1. I.F. Alignment

- (a) Set the signal generator frequency to 262.5 K.C. Connect the signal lead thru a .1 mfd condenser to the receiver antenna connection.
- (b) Turn the receiver manual tuning control for the high frequency end of the dial.
- (c) Adjust the I.F. trimmers "C18B", "C18A", "C15B", and "C15A" for maximum output. Repeat this operation to assure accurate alignment.
- (d) Adjust the I.F. wave trap trimmer, C32, for minimum output.

MODELS M-1,
M-1A, Ford

2. R.F. Alignment

- (a) Check to see that the dial pointer stops just off of the left edge of the calibration marker, under the 55, when the manual tuning control has been rotated clockwise to where this pointer stops. If incorrect, the pointer should be bent slightly to correspond to the above instructions.
- (b) Set the signal generator to 1610 KC, and connect the signal lead thru the dummy antenna to the receiver antenna socket.
- (c) Turn the receiver tuning control until the dial pointer is at the right hand edge of the 16 calibration mark.
- (d) Adjust the oscillator trimmer C9 for maximum output.
- (e) Set the signal generator to 1400 KC; tune in the signal on the receiver.
- (f) Adjust the R.F. trimmer C12 for maximum output.
- (g) Adjust the antenna trimmer C1 for maximum output.
- (h) Set signal generator to 600 KC and tune in the signal carefully.
- (j) Observe the output meter reading.
- (k) Turn L6 adjusting screw one turn clockwise. Retune the signal with the tuning control and observe the new output meter reading carefully.
- (l) If operation (k) shows an increase in output over (j) continue to turn L6 in single turn clockwise steps, retuning the signal after each turn, and observing the output reading each time. See (n) below.
- (m) If operation (k) shows a decrease in output over (j) the direction for turning L6 adjustment must be reversed to counter-clockwise.
- (n) Continue the process of adjusting L6 for one turn at a time, retuning the receiver for the greatest output each turn of L6. A peak setting will be reached, at which point the signal can be tuned in for a greater output than at any other setting of L6 adjustment.
- (o) Repeat operations (b), (c), (d), (e), (f), and (g).

3. Sensitivity Control Adjustment

- (a) Using the dummy antenna, the signal generator should be connected to the receiver as in the R.F. alignment procedure. Make sure the receiver volume control is fully clockwise.
- (b) Apply a signal, 30 per cent modulated at 400 cycles, of sufficient strength to produce one watt output, when tuned in on the receiver.
- (c) Remove modulation and adjust the sensitivity control R2 for 100 milliwatts of noise, maximum, at the worst point in the band. This will usually be found at the low frequency end of the dial.

4. Alignment With Car Antenna

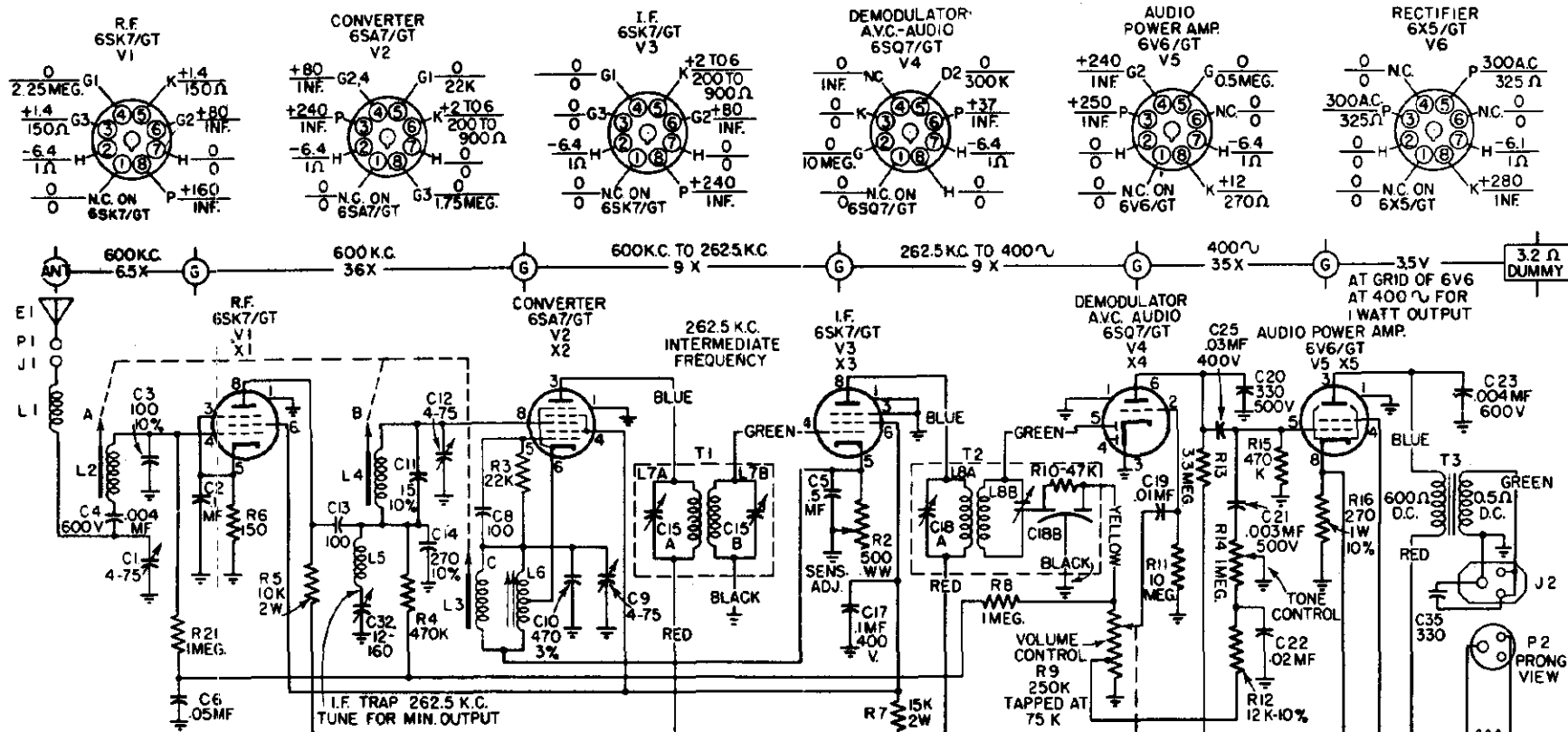
With the antenna fully extended, tune in a weak station near 1400 kilocycles and adjust the antenna trimmer C1 for maximum volume.

MODEL M-1 SCHEMATIC CIRCUIT

Use the Schematic Circuit for the Model M-1A, which is included in this manual, except that the following differences should be noted:

- 1) The tube socket showing voltage and resistance measurements for the 6SQ7GT tube should read zero voltage and 300K ohms on Pin #4, for the M-1 model.
- 2) Sensitivity control, R-2 is 900 ohms in the M-1 model.
- 3) In the 6SQ7GT tube circuit, pin 4 of this socket connects to pin 5 in the M-1 model.

With the exception of the above differences, the Schematic Circuits for Models M-1 and M-1A are identical to each other.



NOTES:

ALL RESISTOR VALUES IN OHMS, 1/4 W. AND 20% TOLERANCE UNLESS OTHERWISE STATED. K=1000. ALL CAPACITOR VALUES IN MICROMICROFARADS, 200 VOLTS, AND 25% TOLERANCE UNLESS OTHERWISE STATED. TUNING RANGE 540 K.C. TO 1610 K.C.

TEST CONDITIONS:

SOCKETS AT TOP OF PAGE ARE BOTTOM VIEWS. VOLTAGES TO GROUND ARE SHOWN ABOVE LINES AND RESISTANCES TO GROUND BELOW LINES.

RESISTANCE MEASUREMENTS

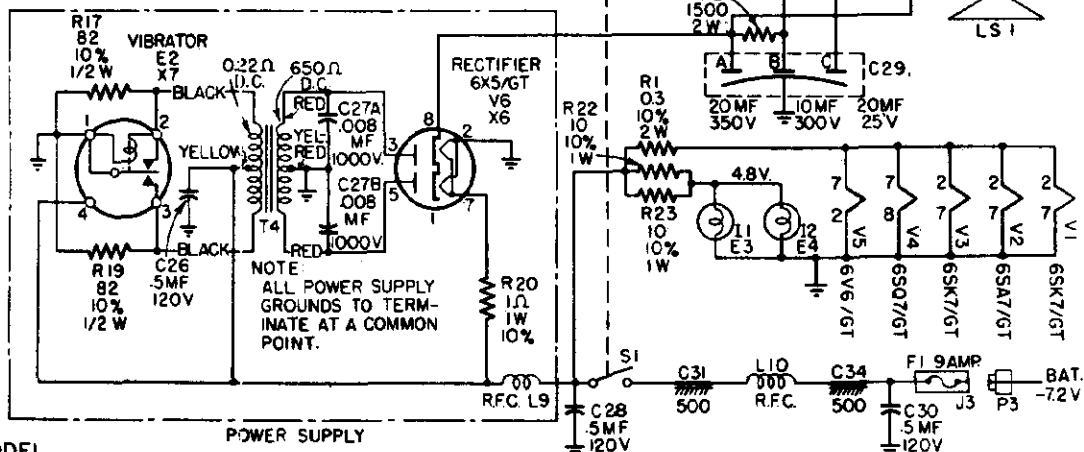
- 1-BATTERY LEAD REMOVED FROM SET.
- 2-NEGATIVE OHMMETER LEAD ON CHASSIS GROUND.
- 3-VALUES SHOULD NOT VARY MORE THAN 20%.

VOLTAGE MEASUREMENTS

- 1-20,000 OHMS/VOLT METER, POSITIVE OR NEGATIVE CHASSIS GROUND AS APPLICABLE FOR D.C., FOR A.C. 1000 OHMS/VOLT METER.
- 2-7.2 VOLT INPUT WITH POSITIVE GROUND.
- 3-VOLUME AND TONE CONTROL FULL ON; NO INCOMING SIGNAL.
- 4-VALUES SHOULD NOT VARY MORE THAN 20%.

DUMMY ANTENNA

- 30 MMF SERIES AND 30 MMF SHUNT AT ANTENNA SOCKET.
- 0.1 MF SERIES TO CONTROL GRIDS FOR GAIN MEASUREMENTS.



MODEL
M-1A

MODELS M-1,
M-1A, Ford

LOCATION PLAN
ALIGNMENT TRIMMERS & TUBES

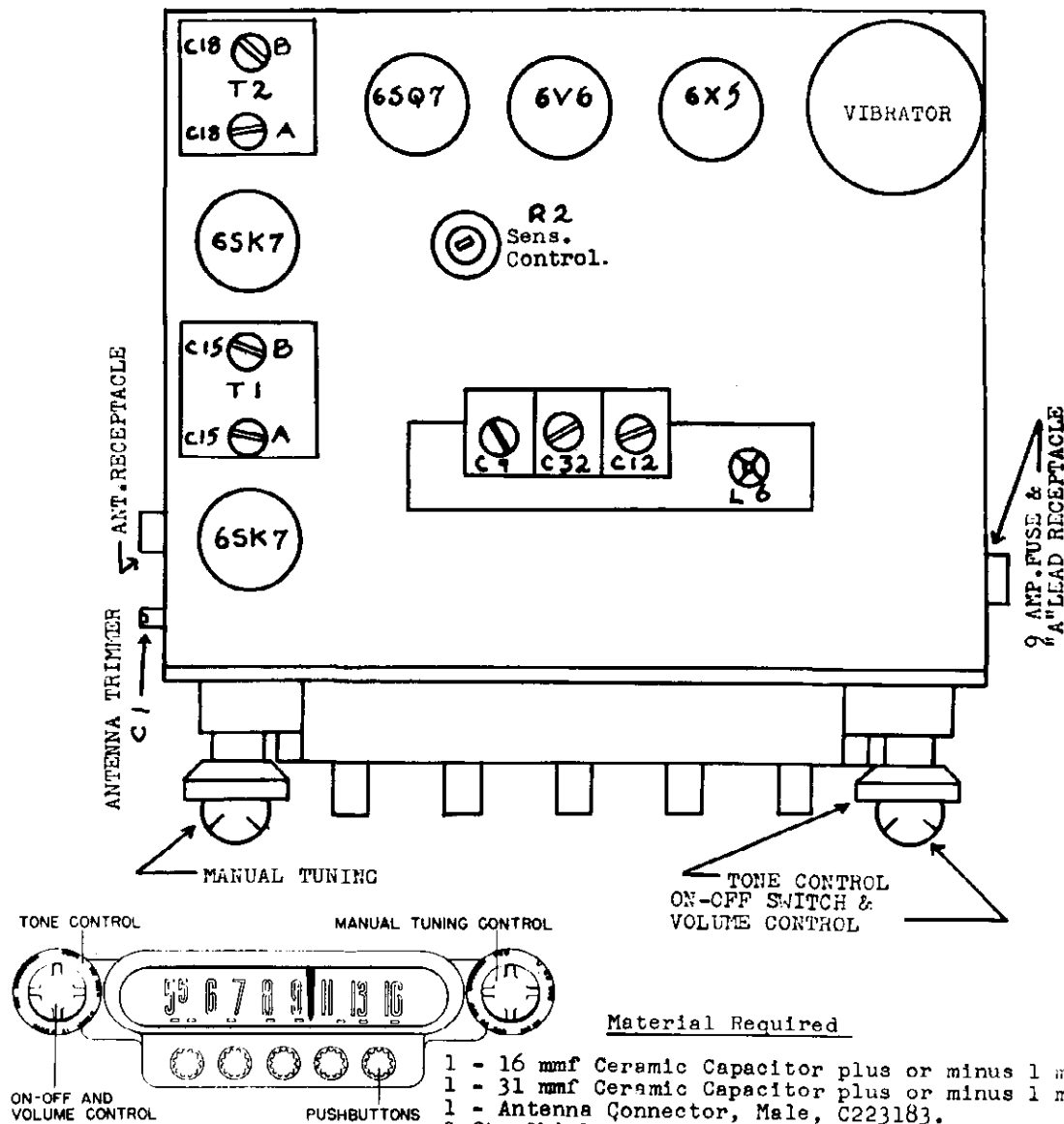


Figure 1—Operating Controls

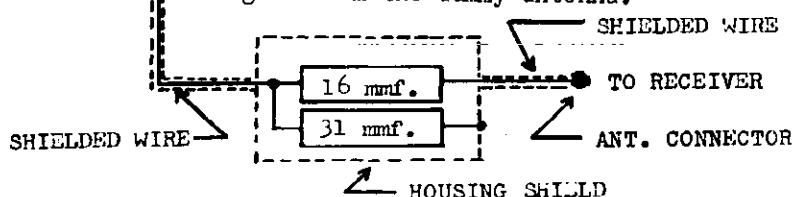
Material Required

- 1 - 16 mmf Ceramic Capacitor plus or minus 1 mmf.
- 1 - 31 mmf Ceramic Capacitor plus or minus 1 mmf.
- 1 - Antenna Connector, Male, C223183.
- 3 ft. Shielded Wire.
- A shield can, or other material for a shielded housing.

DETAILS FOR CONSTRUCTING
DUMMY ANTENNA

TO SIGNAL
GENERATOR

Gnd.



The purpose of the dummy antenna is to properly match the output of the signal generator to the receiver input. It should be remembered, however, that the dummy antenna described below attenuates, or reduces, the signal by two. Thus, if the signal generator is feeding 10 microvolts of signal to the dummy antenna, the receiver will be receiving only 5 microvolts of signal from the dummy antenna.

MODELS 50151,
5015W**ALIGNMENT AND SERVICE DATA**

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

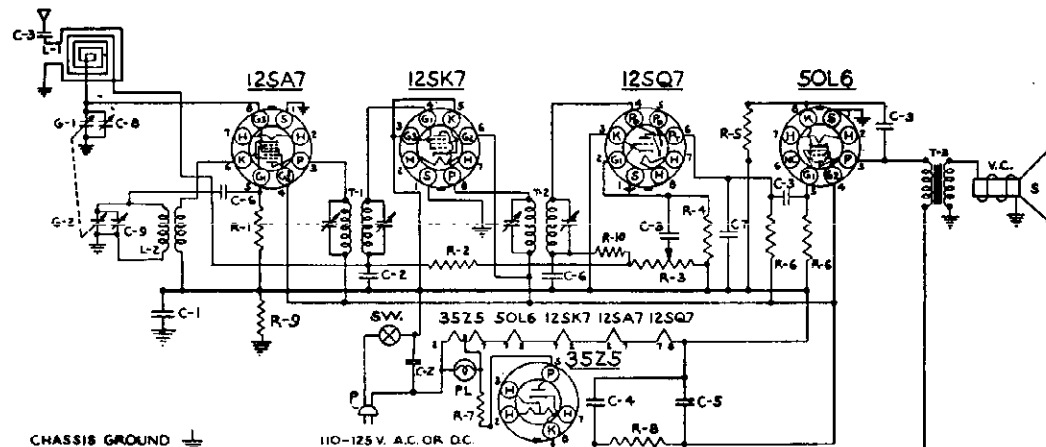
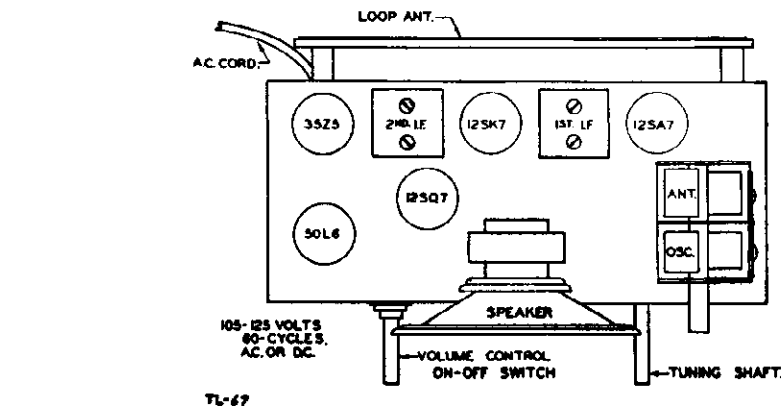
The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the primary of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the top of the ANT. section of the gang condenser. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

PART NO.	DESCRIPTION
IR-9	R-1 22000 Ω RESISTOR $\frac{1}{2}$ W 20%
IR-23	R-2 3.3 MEG. RESISTOR $\frac{1}{2}$ W 20%
VC-4	R-3 1 MEG. VOL. CONTROL & SW
IR-13	R-4 2.2 MEG. RESISTOR $\frac{1}{2}$ W 20%
IR-14	R-5 150 Ω RESISTOR $\frac{1}{2}$ W 20%
IR-11	R-6 470M Ω RESISTOR $\frac{1}{2}$ W 20%
IR-17	R-7 33 Ω RESISTOR $\frac{1}{2}$ W 20%
IR-25	R-8 2200 Ω RESISTOR $\frac{1}{2}$ W 10%
PC-8	C-1 .1MFD. COND. 400V.
PC-5	C-2 .05 MFD. COND. 400V.
PC-7	C-3 .01 MFD. COND. 400V.
EC-12	C-4 40 MFD. 60V. ELECTROLYTIC
MC-2	C-5 20 MFD.
MC-3	C-6 100 MMFD. MICA COND.
IR-10	C-7 500MMFD. MICA COND.
	C-8 ANTENNA TRIMMER COND.
	C-9 OSC. TRIMMER COND.
IR-20	R-9 220M Ω RESISTOR $\frac{1}{2}$ W 20%
GC-6	G-1 GANG CONDENSER
LL-12	L-1 LOOP ANTENNA
LO-13	L-2 OSC. COIL
LI-1	T-1 INPUT I.F. TRANSFORMER
LI-2	T-2 OUTPUT I.F. TRANSFORMER
SPK-6	T-3 OUTPUT SPKR. TRANSFORMER
PB-1	V.C. VOICE COIL
	P.M. SPEAKER
	N \circ 47 PILOT BULB
	SW. AC. SW. ON VOL. CONTROL
CO-1	P LINE CORD
TU-3	125A7 GT. 12SK7 GT.
	12SQ7 GT. 50L6 GT. 35Z5GT



MODELS 5066I,
5055W

ALIGNMENT AND SERVICE DATA

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

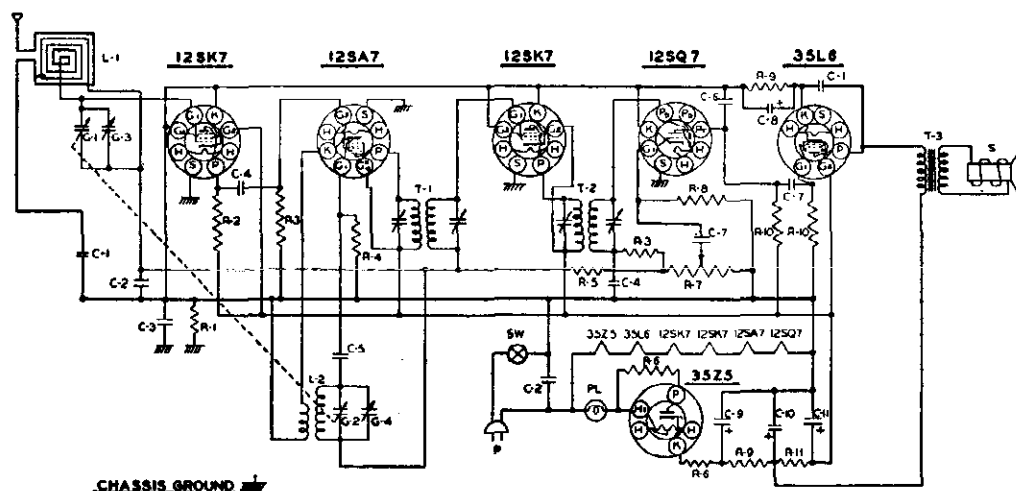
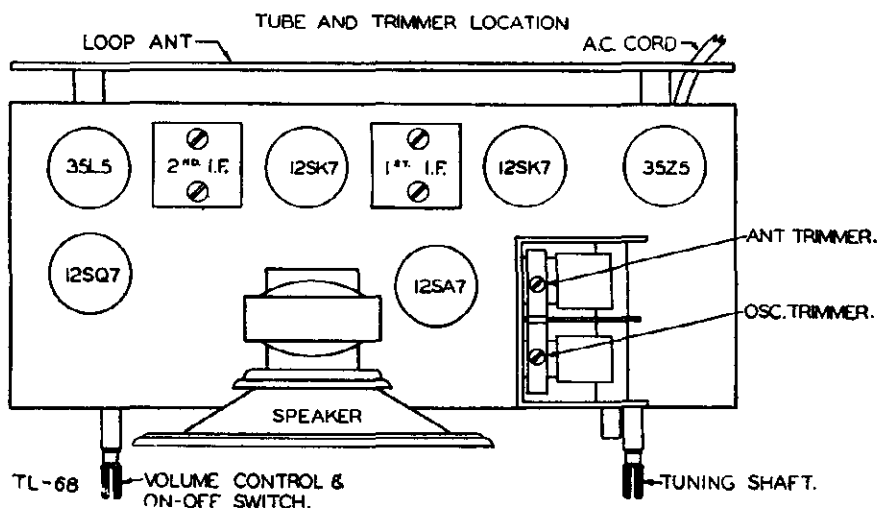
The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 455KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the primary of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the back of the loop antenna. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

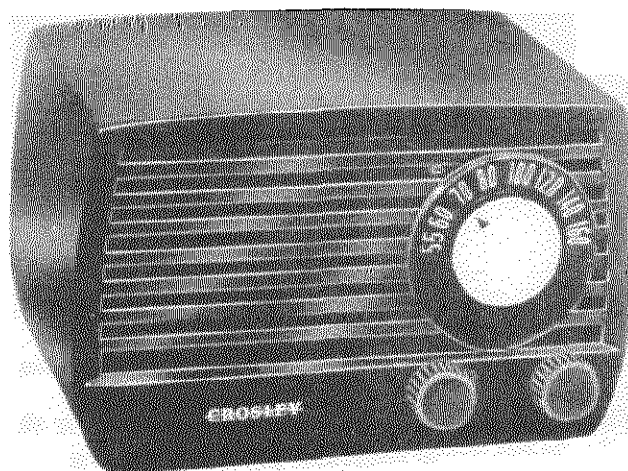
PART NO.	DESCRIPTION
PC-7	C-1 0.01MFD. CONDENSER 400 V
PC-5	C-2 0.05MFD. CONDENSER 400 V
PC-8	C-3 0.01MFD. CONDENSER 400 V
MC-2	C-4 0.001 MICA CONDENSER
MC-4	C-5 0.0005 MICA CONDENSER
MC-5	C-6 0.0005 MICA CONDENSER
PC-6	C-7 0.005MFD. CONDENSER 600 V
EC-2	C-8 10MFD. 25WV ELECTROLYTIC
	C-9 40MFD.
CC-14	C-10 40MFD. ELECTROLYTIC 150 WV
	C-11 20MFD.
IR-20	R-1 220M Ω RESISTOR 1/2W 20%
IR-22	R-2 3900 Ω RESISTOR 1/2W 10%
IR-10	R-3 47M Ω RESISTOR 1/2W 20%
IR-9	R-4 22M Ω RESISTOR 1/2W 20%
IR-23	R-5 33MEG Ω RESISTOR 1/2W 20%
IR-17	R-6 33 Ω RESISTOR 1/2W 20%
VC-13	R-7 1MEG. VOLUME CONTROL
IR-13	R-8 2.2MEG Ω RESISTOR 1/2W 20%
IR-5	R-9 220 Ω RESISTOR 1/2W 10%
IR-11	R-10 470M Ω RESISTOR 1/2W 20%
IR-21	R-11 330 Ω RESISTOR 1/2W 10%
GC-5	G-1 GANG CONDENSER
	G-2
	G-3 ANT. TRIMMER
	G-4 OSC. TRIMMER
LL-16	L-1 LOOP ANT.
LO-10	L-2 OSC. COIL
LI-6	T-1 INPUT I.F. TRANSFORMER
LI-7	T-2 OUTPUT I.F. TRANSFORMER
	SW SWITCH ON VOLUME CONTROL
SPK-12	T-3 OUTPUT TRANSFORMER
	S 5" P.M. SPEAKER
PS-1	PL #47 PILOT BULB
CO-1	P LINE CORD



Model 10-102E (Ebony)

Model 10-103 (Brown)

Model 10-104W (Ivory)

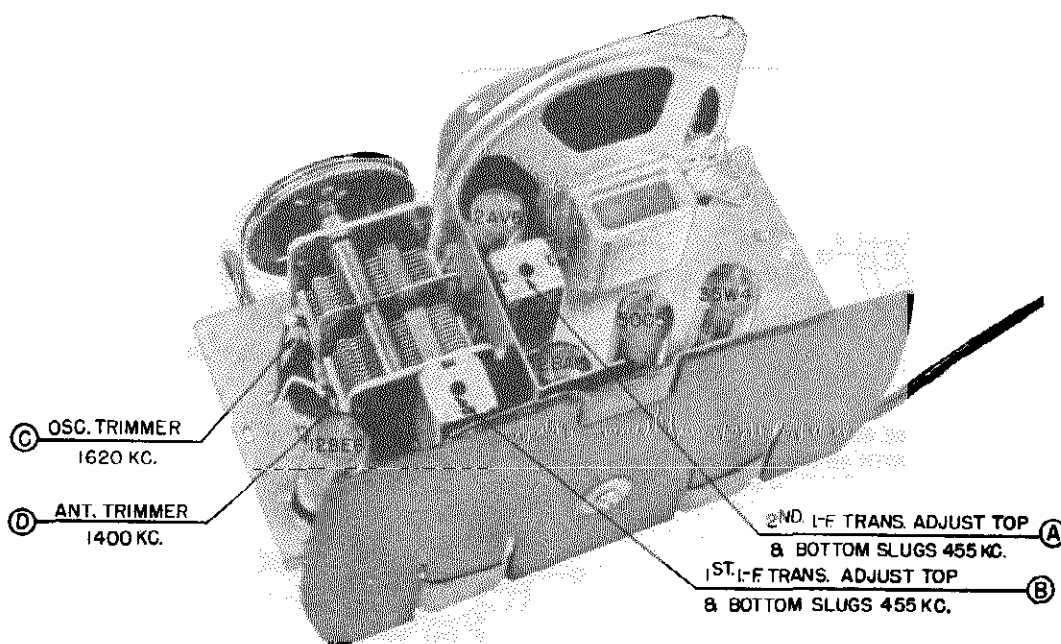


DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.**FREQUENCY RANGE:** 540 to 1600 kc.**INTERMEDIATE FREQUENCY:** 455 kc.**POWER SUPPLY:** a.c.-d.c.**VOLTAGE RATING:** 105-125 volts.**POWER CONSUMPTION:** 30 watts.**POWER OUTPUT:** 1.5 watts maximum.

TUBE COMPLEMENT

Type	Function
12BE6	Converter
12BA6	I. F. Amplifier
12AV6	Detector, AVC, 1st A.F. Amplifier
50C5	A.F. Power Output
35W4	Rectifier



CHASSIS, TOP VIEW

PAGE 21-2 CROSLEY

MODELS 10-102E,
10-103, 10-104W

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce hum.

Under no circumstances should a ground be connected to this receiver.

ALIGNMENT PROCEDURE

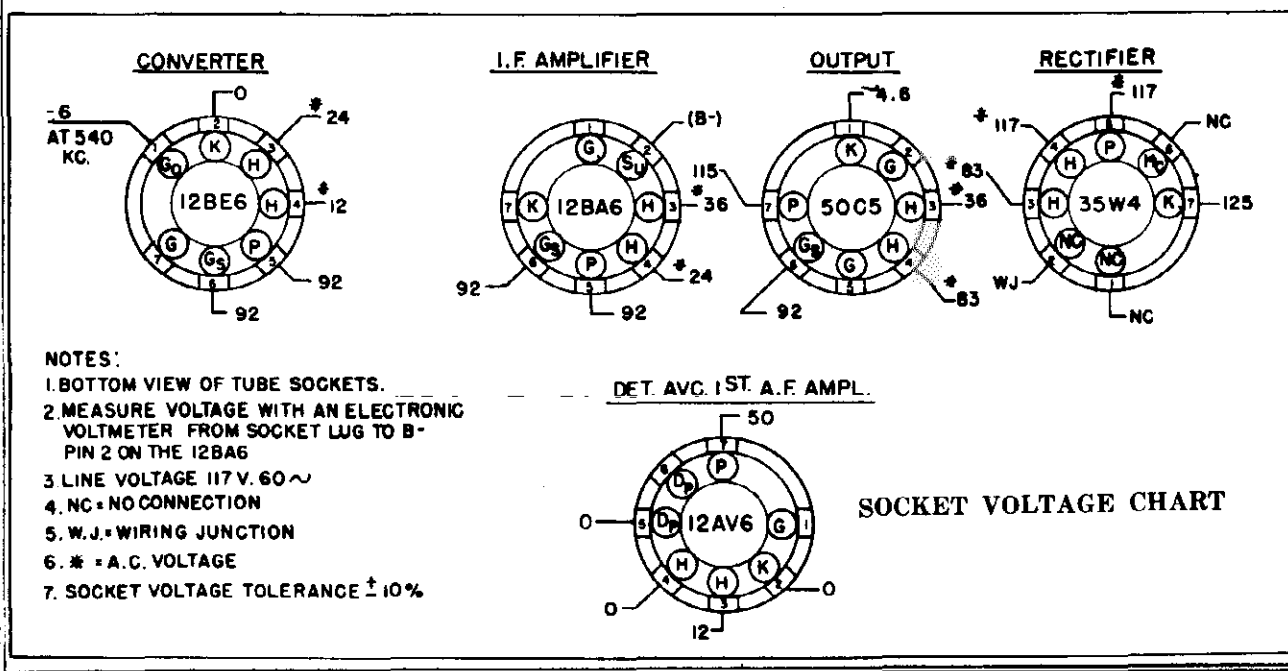
1. Connect an output meter across the speaker voice coil.
2. The r.f. signal input from the signal generator should be connected to the high side of loop antenna. Connect the signal generator ground through a 0.1 mfd. condenser to B— (pin 2 on 12BA6 tube socket).
3. Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

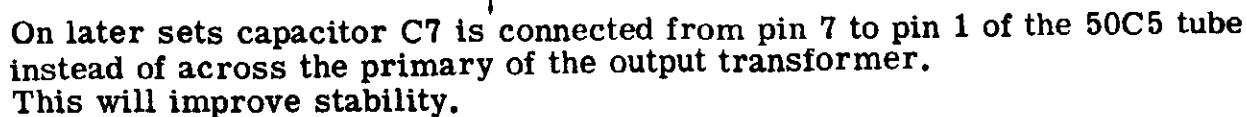
ALIGNMENT CHART

Alignment adjustment locations are shown on page 1, "CHASSIS, TOP VIEW."

Alignment Sequence	Signal Generator Output			Position of Dial Pointer	Adjust for Maximum Output
	Frequency in kc.	In Series with	To		
1	455	200 mmf.	High Side of Loop	1620	A & B
2	1620	*Radiated to Loop		1620	C
3	1400	*Radiated to Loop		1400	D

* Place signal generator output lead near the loop antenna.





Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
C1A	B-138292-3	Capacitor, Variable)	R12	39373-84	Resistor, 330,000 ohm, 1/2w.
C1B		Capacitor, Variable)	CA1	C-142769	Cable & Plug Assy., Power
C3A	B-144675-1	Capacitor, .002 mfd.	L1	AB-145437	Antenna Loop & Back Assy.
C3B		Capacitor, .00022 mfd. Four	L2	AW-144325	Coil, Oscillator
C3C		Capacitor, .00022 mfd. Section	SW1	39369-1	Switch, Power
C3D		Capacitor, .005 mfd.	SP1	139631	Speaker
C4	C-137727-21	Capacitor, 50 mmf., 500 v., ceramic	T1	AC-139919-4	Transformer, 1st I.F.
C5	39477-45	Capacitor, .047 mfd., 600v., molded paper	T2	AC-139919-5	Transformer, 2nd I.F.
C7	39477-43	Capacitor, .022 mfd., 600v., molded paper	T3	B-138131-1	Transformer, Output
C8	39477-45	Capacitor, .047 mfd., 600v., molded paper		R-145356-3	Cabinet (10-102E)
C9	39477-46	Capacitor, .068 mfd., 600v., molded paper		R-145356-1	Cabinet (10-103)
C10A	B-136770	Capacitor, 50 mfd., 150v.) Two Section		R-145514	Cabinet (10-104W)
C10B		Capacitor, 30 mfd., 150v. (Electrolytic		W-145887	Clip, Spring
C11	Part of T1	Capacitor, 330 mmf.		W-131154-1	Cotter (External), Drive Shaft
C12	Part of T1	Capacitor, 330 mmf.		B-145121-4	Knob (10-102E)
C13	Part of T2	Capacitor, 107 mmf.		B-145121-5	Knob (10-103)
C14	Part of T2	Capacitor, 86 mmf.		B-145121-6	Knob (10-104W)
R1	39373-80	Resistor, 22,000 ohm, 1/2w.		AB-145431-1	Pointer, Dial (10-102E)
R3	39373-67	Resistor, 47,000 ohm, 1/2w.		AB-145431-2	Pointer, Dial (10-103)
R4	39373-107	Resistor, 10 megohm, 1/2w.		AB-145431-3	Pointer, Dial (10-104W)
R5	39373-80	Resistor, 220,000 ohm, 1/2w.		W-145391	Ring (Compression), Dial Pointer
R6	39373-87	Resistor, 470,000 ohm, 1/2w.		B-135075-11	Shaft, Dial Drive
R7	39374-13	Resistor, 100 ohm, 1/2w.		39462-1	Socket, Tube
R8	39373-100	Resistor, 3.3 megohm, 1/2w.		W-51752	Spring, Dial Drive Cord
R9	39368-14	Control, Volume (1 megohm)		W-134916	Washer (Spring) Drive Shaft
R11	39374-114	Resistor, 1200 ohm, 1w.			

PAGE 21-4 CROSLEY

MODELS 10-135, 10-136E, 10-137,
10-138, 10-139, 10-140

Model No.	Color
10-135	Dulux White and Chrome
10-136E	Ebony and Gold
10-137	Chartreuse and Gold
10-138	Maroon and Gold
10-139	Aqua and Chrome
10-140	Metallic Green and Chrome

DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

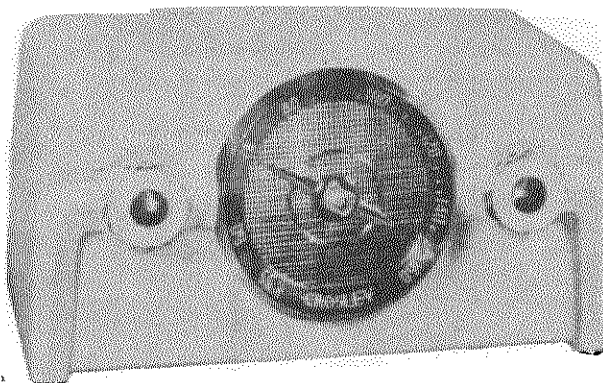
INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a.c.-d.c.

VOLTAGE RATING: 105-125 volts.

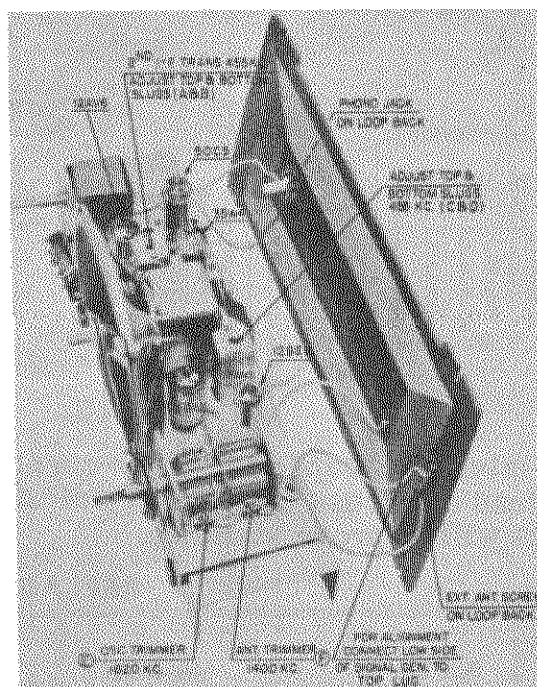
POWER CONSUMPTION: 30 watts.

POWER OUTPUT: 1 watt maximum.



TUBE COMPLEMENT

Type	Function
12BE6	Converter
12BA6 or 6BJ6	I. F. Amplifier
12AV6 or 12AT6	Detector, AVC, 1st A. F. Amplifier
50C5	A. F. Power Output
35W4	Rectifier



CHASSIS, TOP VIEW

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce hum.

Under no circumstances should a ground be connected to this receiver.

Phonograph connection—To use a record player with this receiver insert the pickup plug of the record player into the Phono jack on back of receiver (this automatically switches the receiver from radio to phonograph operation). Connect the power cord of the record player to a convenient electric outlet of the correct voltage and frequency. Operate the record player in the normal manner. The controls of the receiver operate the same as for radio programs.

To again use the receiver for radio operation it is necessary to remove the pickup plug of the record player from the Phono jack.

MODELS 10-135, 10-136, 10-137,
10-138, 10-139, 10-140

ALIGNMENT PROCEDURE

Connect an output meter across the speaker voice coil.

The r.f. signal input from the signal generator should be connected, through a 200 mmf. capacitor, to the external antenna screw. Connect the signal generator ground to the top lug on loop antenna (see Chassis Top View, page 1).

Position loop antenna to simulate its position when chassis and antenna are in cabinet.

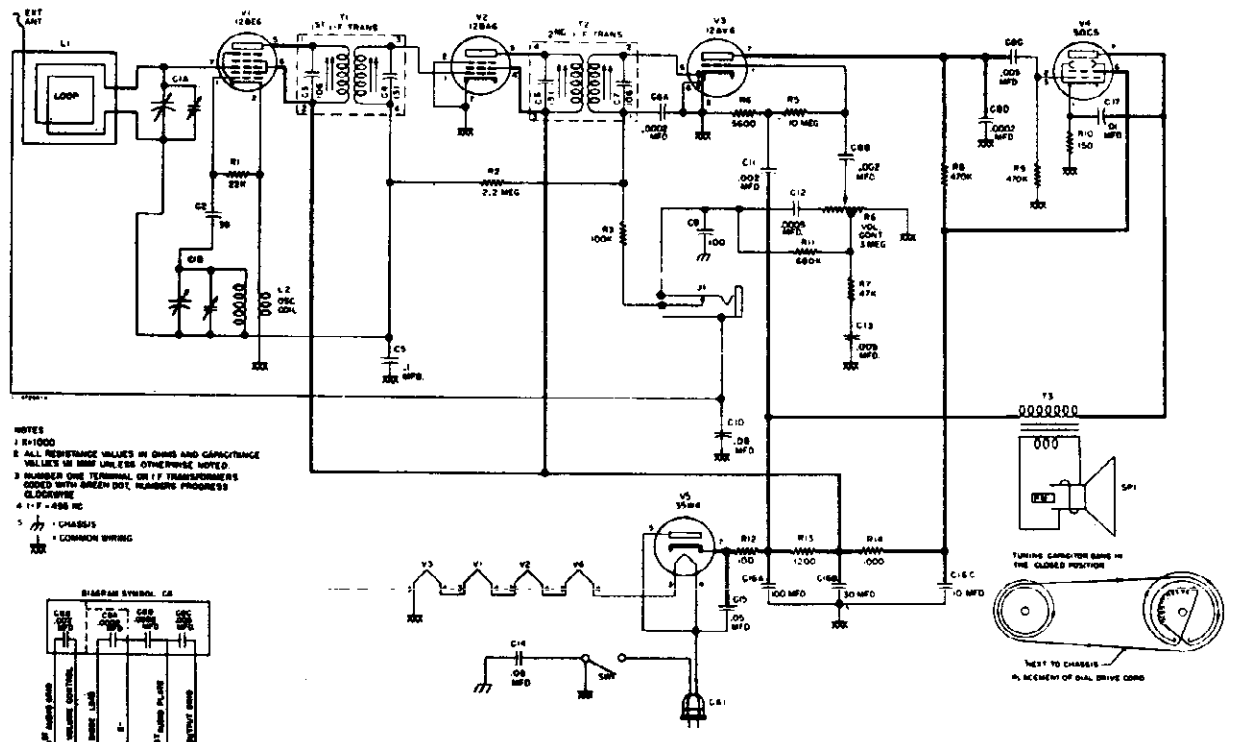
Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

Alignment adjustment locations are shown on page 1, "CHASSIS, TOP VIEW."

Alignment Sequence	Signal Generator Output			Position of Dial Pointer	Adjust for Maximum Output
	Frequency in kc.	In Series with	To		
1	455	200 mmf.	External Ant. Screw	1620	* A, B, C & D
2	1620	200 mmf.	External Ant. Screw	1620	E
3	1400	200 mmf.	External Ant. Screw	1400	F

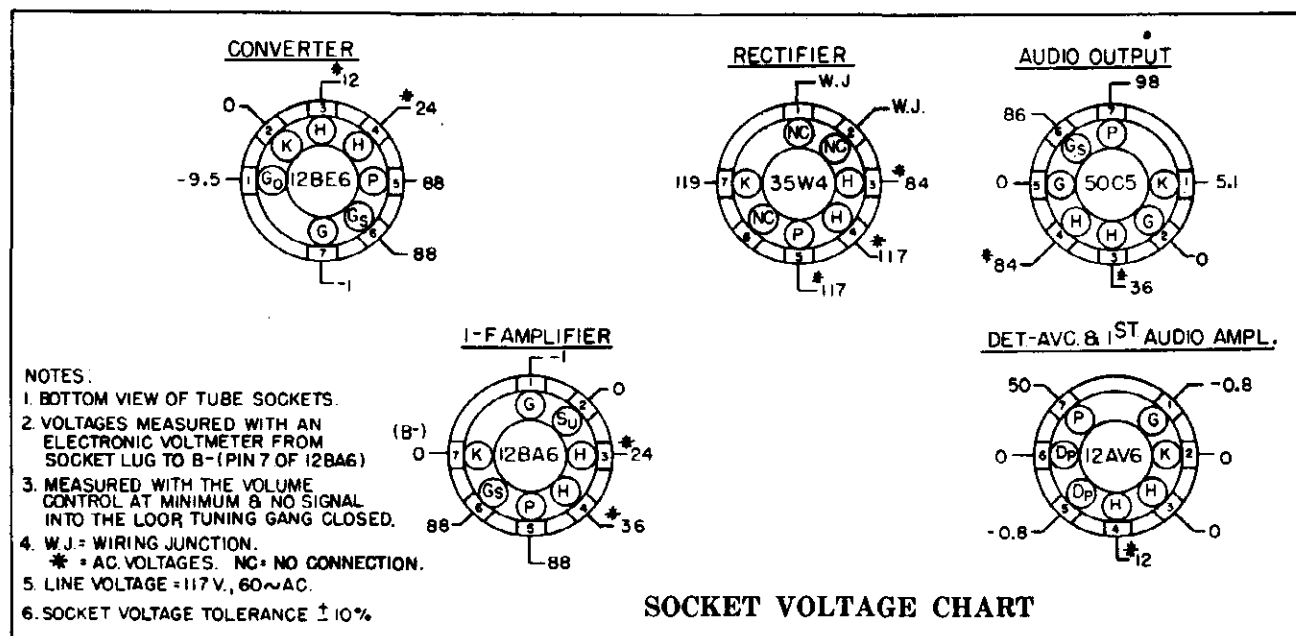
* Repeat adjustments until maximum output is obtained.



On some sets of models 10-135 to 10-140, R2 is a 3.3 megohm, 10%, 1/2 watt resistor instead of a 2.2 megohm resistor; and because of this C5 is an .05 mfd., 600 volt paper capacitor (Part No. 39001-17).

PAGE 21-6 CROSLEY

MODELS 10-135, 10-136,
10-137, 10-138, 10-139, 10-140



REPLACEMENT PARTS LIST

Sym- bol No.	Part No.	Description	Sym- bol No.	Part No.	Description
C1A	B-147180	Capacitor, Variable } Two Section	T1	AC-139919-3	Transformer, 1st I.F.
C1B		Capacitor, Variable }	T2	AC-139919-3	Transformer, 2nd I.F.
C2	C-137727-109	Capacitor, 39mmf., 10%, 200v., ceramic	T3	B-147171	Transformer, Output
C3	Part of T1	Capacitor, 106 mmf.		AW-147289	Cabinet (10-135)
C4	Part of T1	Capacitor, 131 mmf.		AW-147779	Cabinet (10-136E)
C5	39001-19	Capacitor, .1 mfd., 600 v., paper		AW-147806	Cabinet (10-137)
C6	Part of T2	Capacitor, 131 mmf.		AW-147807	Cabinet (10-138)
C7	Part of T2	Capacitor, 106 mmf.		AW-147805	Cabinet (10-139)
C8A	C-144675-1	Capacitor, .0002 mfd., 500v.		AW-147848	Cabinet (10-140)
C8B		Capacitor, .002 mfd., 500v.		W-139921	Clip (Mtg.), I.F. Transformer
C8C		Capacitor, .005 mfd., 500v.		W-131154-1	Cotter (External), Pointer Pulley
C8D		Capacitor, .0002 mfd., 500v.		W-147216	Cup (Suction) Cabinet Feet
C9	B-143686-3	Capacitor, 100 mmf., 500v., disc ceramic		C-147164-1	Escutcheon, Dial (10-135)
C10	39001-19	Capacitor, .1 mfd., 600v., paper		D-147164-2	Escutcheon, Dial (10-136E, 10-137)
C11	39001-74	Capacitor, .002 mfd., 600v., paper		D-147164-4	Escutcheon, Dial (10-138)
C12	39001-5	Capacitor, .0005 mfd., 600v., paper		D-147164-5	Escutcheon, Dial (10-139)
C13	39001-11	Capacitor, .005 mfd., 600., paper		D-147164-6	Escutcheon, Dial (10-140)
C14	39001-19	Capacitor, .1 mfd., 600v., paper		B-147192	Gasket (Rubber), Escutcheon
C15	39001-17	Capacitor, .05 mfd., 600v., paper		B-147160	Gasket (Rubber), Speaker
C16A	B-147174	Capacitor, 100 mfd., 150v.		B-147161-1	Grille, Dial (10-135)
C16B		Capacitor, 30 mfd., 150v.		AB-147878-1	Grille, Dial (10-136E)
C16C		Capacitor, 10 mfd., 150v.		C-147161-3	Grille, Dial (10-137)
C17	39001-13	Capacitor, .01 mfd., 600v., paper		C-147161-4	Grille, Dial (10-138)
R1	39373-60	Resistor, 22,000 ohm, $\frac{1}{2}$ w.		C-147161-5	Grille, Dial (10-139)
R2	39373-97	Resistor, 2.2 megohm, $\frac{1}{2}$ w.		C-147161-6	Grille, Dial (10-140)
R3	39373-74	Resistor, 100,000 ohm, $\frac{1}{2}$ w.		W-147245	Hanger, Wall Mtg.
R4	39374-34	Resistor, 5600 ohm, 10%, $\frac{1}{2}$ w.		AB-147159-1	Knob (10-135)
R5	39373-107	Resistor, 10 megohm, $\frac{1}{2}$ w.		AB-147159-2	Knob (10-136E)
R6	B-147179	Control, Volume (3 megohm, Tap 300,000 ohm)		AC-147159-3	Knob (10-137)
R7	39373-67	Resistor, 47,000 ohm, $\frac{1}{2}$ w.		AC-147159-4	Knob (10-138)
R8	39373-87	Resistor, 470,000 ohm, $\frac{1}{2}$ w.		AC-147159-5	Knob (10-139)
R9	39373-87	Resistor, 470,000 ohm, $\frac{1}{2}$ w.		AC-147159-6	Knob (10-140)
R10	39373-16	Resistor, 150 ohm, $\frac{1}{2}$ w.		W-147275	Mounting (Rubber), Speaker
R11	39373-90	Resistor, 680,000 ohm, $\frac{1}{2}$ w.		W-45580-2	Mounting (Rubber), Var. Capacitor
R12	39374-189	Resistor, 100 ohm, 10%, 2w.		B-94704-22	Nut (Speed), Escutcheon
R13	39374-114	Resistor, 1200 ohm, 10%, 1w.		C-147149-1	Pointer, Dial (10-135, 10-139, 10-140)
R14	39373-33	Resistor, 1000 ohm, $\frac{1}{2}$ w.		D-147149-2	Pointer, Dial (10-136E, 10-137)
CA1	C-132300-9	Cable & Plug Assy., Power		D-147149-3	Pointer, Dial (10-138)
J1	W-147213	Connector, Phone		W-147181	Pulley, Dial Pointer
L1	AC-147239	Loop Antenna & Back Assy.		W-142732	Shield, Tube
L2	AW-146323	Coil, Oscillator		39462-2	Socket, Tube
SP1	AD-145956-2	Speaker (5 $\frac{1}{4}$ " P.M.)		W-51752	Spring, Drive Cord
SW1	Part of R6	Switch, Power		B-147170	Support, Pointer Pulley
				W-134916	Washer (Spring), Pointer Pulley

MODELS 10-310,
10-311, 10-313

DESCRIPTION

TYPE: Four-tube, combination, battery Portable and a.c.-d.c. Superheterodyne with Selenium Rectifier.

FREQUENCY RANGE: 540 to 1600 kilocycles.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a.c.—d.c. or Battery.

VOLTAGE RATING: a.c.—d.c., 110 to 120 volts.

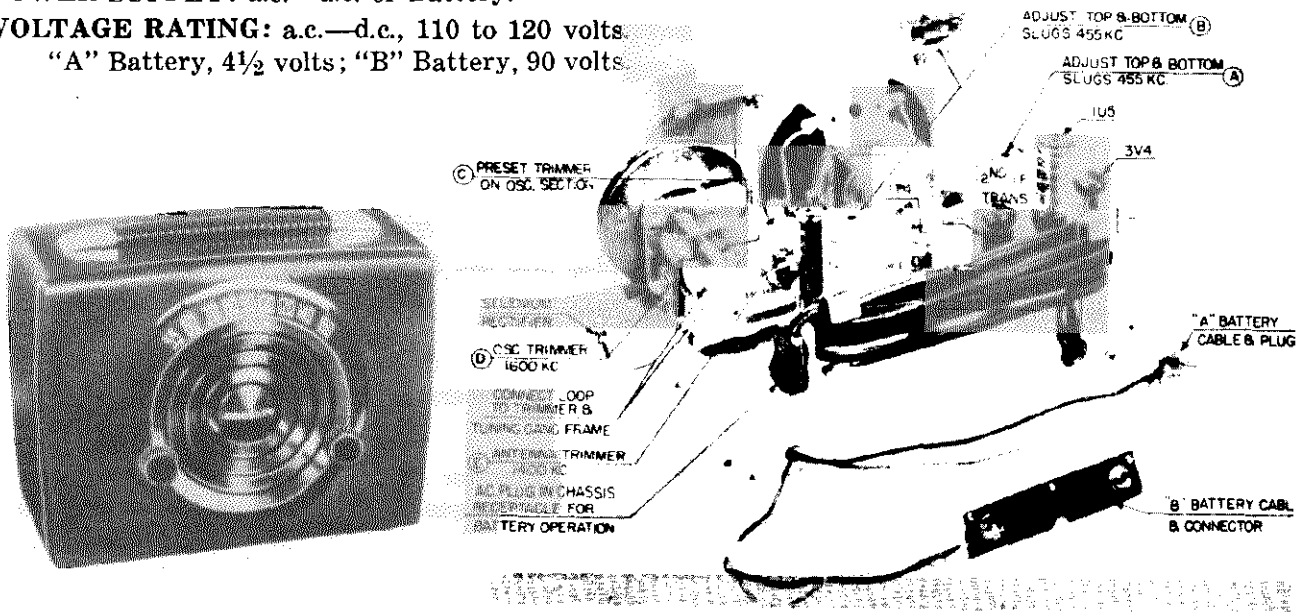
"A" Battery, 4½ volts; "B" Battery, 90 volts

POWER OUTPUT: 200 M.W. maximum.

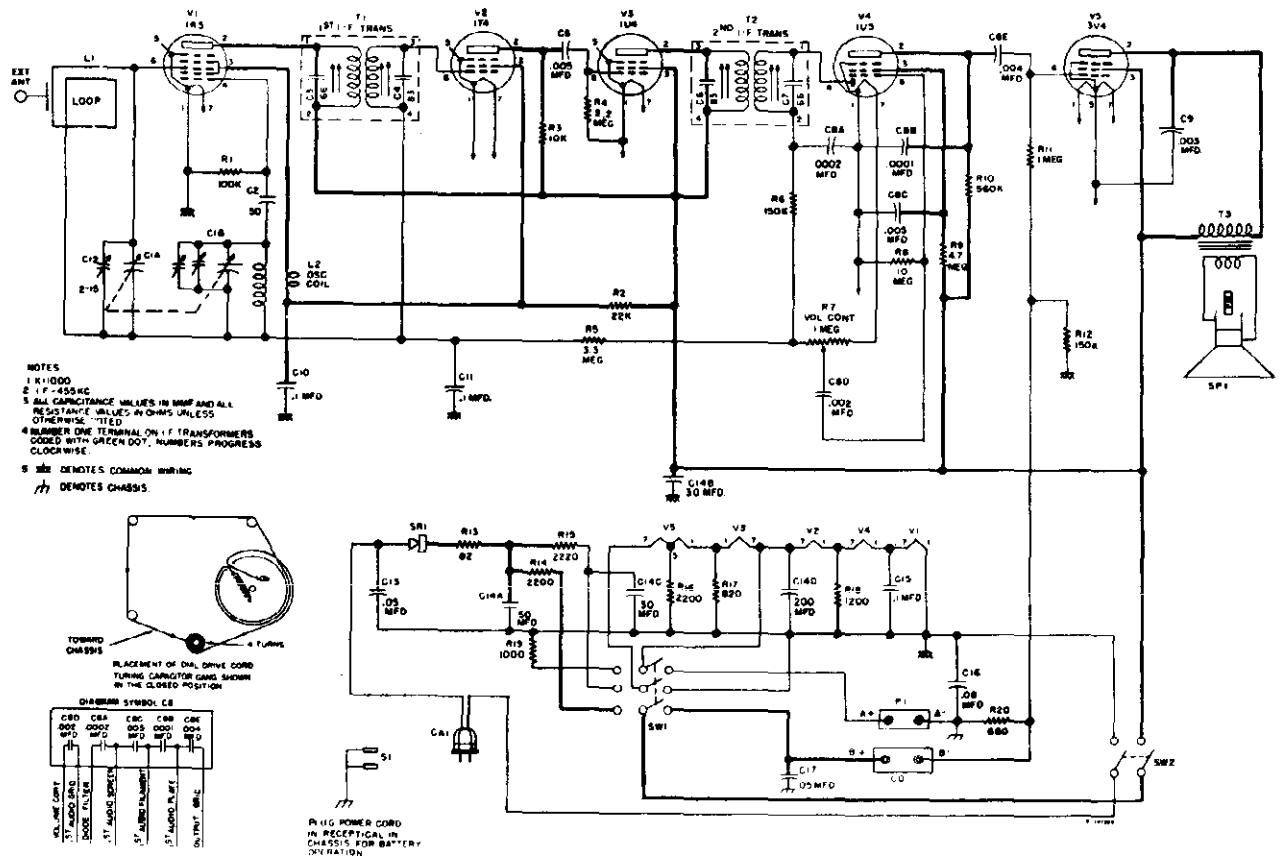
POWER CONSUMPTION: 15 watts at 125 volts, 60 cycle.

"A" BATTERY: one Crosley CR-72.

"B" BATTERY: one Crosley CR-96.



CHASSIS TOP VIEW



PAGE 21-8 CROSLEY

MODELS 10-310,
10-311, 10-313
TUBE COMPLEMENT:

Type	Function	1U4	2nd I. F. Amplifier
1R5	Converter	1U5	Detector, AVC, 1st A.F. Amplifier
1T4	1st I.F. Amplifier	3V4	A.F. Power Output
			Selenium Rectifier

ALIGNMENT PROCEDURE

ALIGNMENT SHOULD ALWAYS BE MADE ON BATTERY OPERATION.

1. Unsolder the two loop antenna leads from the rear of the tuning capacitor and remove the chassis from the cabinet.
2. Remove the chassis bottom cover and connect a 33,000 ohm resistor from the grid of the 1R5 converter tube to B— (pin 6 to pin 1 of V1 tube socket).
3. Connect the battery cable plug to the receptacle on the battery. Wrap the power cord around the metal cord supports and insert the prongs of the plug into the receptacle on the chassis.
4. Connect the output meter across the speaker voice coil.
5. Connect the high side of the signal generator through a 200 mmf. capacitor to the converter grid terminal (pin 6 of V1 tube socket). Connect the signal generator ground through a .05 mfd. capacitor to B— (pin 1 of V1 tube socket).
6. Turn the volume control on full and adjust the signal generator output to produce approximately mid-scale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

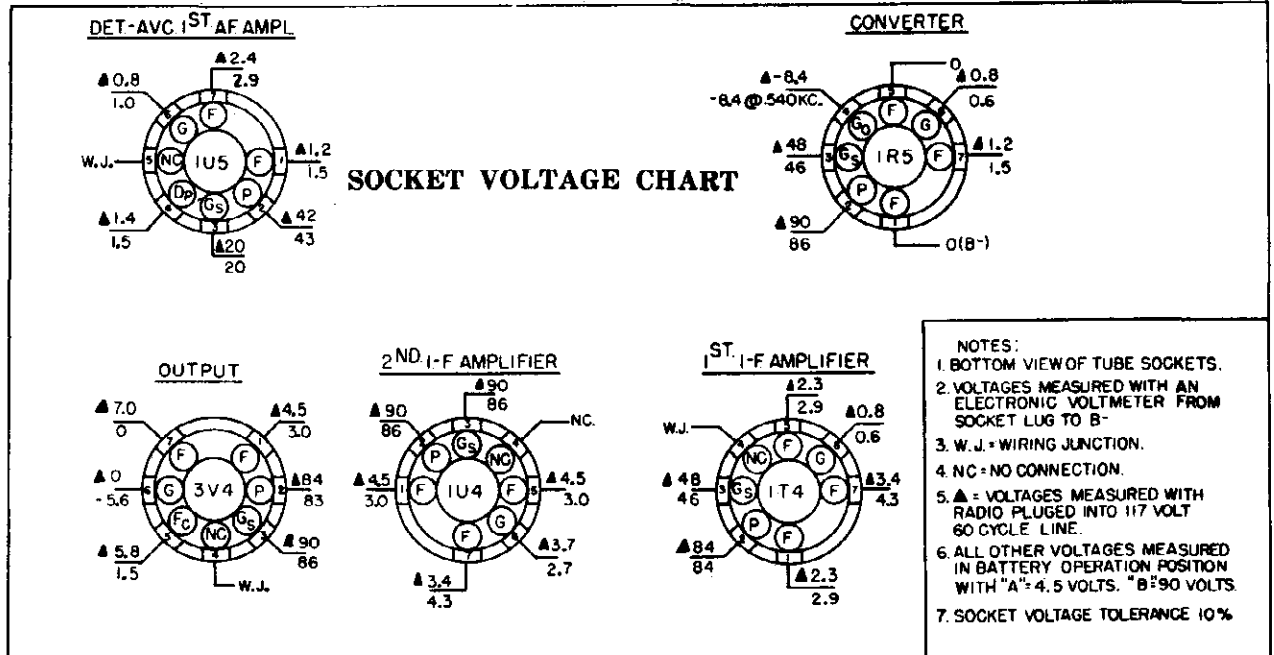
ALIGNMENT CHART

Alignment adjustment locations are shown on page 1, Chassis Top View

Alignment Sequence	Signal Generator Output			Position of Dial pointer or Var. Cond.	Adjust for Maximum Output	Remarks
	Frequency in KC	In Series with	To			
1	455	200 mmf.	V1 Grid	Open	A & B	See steps 2 & 5 of Alignment procedure
2	1620	200 mmf.	V1 Grid	Open	D	See notes 1 & 2 of Alignment notes
3	1400	Radiated to Loop		1400 kc	E	See notes 3 & 4 of Alignment notes

ALIGNMENT NOTES

1. After adjusting A and B, replace the chassis bottom.
2. Preset C to $\frac{1}{4}$ turn from its closed position before adjusting D.
3. Before adjusting E remove the 33,000 ohm resistor from pins 6 and 1 of the V1 tube socket. Replace the chassis in the cabinet and connect the antenna loop (see Chassis Top View). Make certain that the battery cable and the power cord are connected for battery operation (see step 3, Alignment Procedure), and that the batteries are in place in the cabinet.
4. To obtain a radiated signal for this alignment, place the signal generator output lead near the loop antenna.



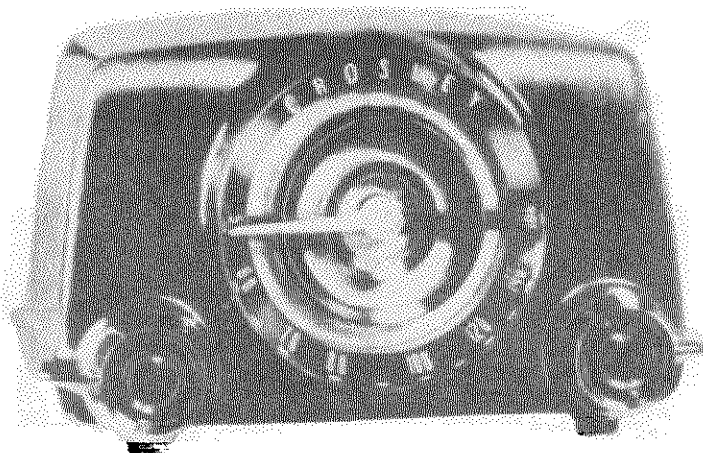
REPLACEMENT PARTS LIST

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
C1A	AG-137073-38	Capacitor, Variable	L1	AC-146069	Loop Assembly, Antenna
C1B		Capacitor, Variable	L2	AW-145006	Coil Assembly, Oscillator
C2	C-137727-21	Capacitor, 50 mmf., 500 v., ceramic	S1	Part of SW1	Socket, Power Cable Plug
C3	Part of T1	Capacitor, 66 mmf.	SR1	W-145429	Rectifier, Selenium
C4	Part of T1	Capacitor, 83 mmf.	SW1	W-145922	Switch (T. P. D. T.)
C5	39001-11	Capacitor, .005 mfd., 600 v., paper	SW2	39369-2	Switch, Power
C6	Part of T2	Capacitor, 83 mmf.	SP1	139631	Speaker
C7	Part of T2	Capacitor, 66 mmf.	T1	AC-139919-2	Transformer, 1st I. F.
C8A	C-144675-10	Capacitor, 200 mmf., 500 v.	T2	AC-139919-2	Transformer, 2nd I. F.
C8B		Capacitor, 100 mmf., 500 v.	T3	138131-3	Transformer, Output
C8C		Capacitor, .005 mfd., 500 v.	P1	W-136863	Plug, Battery
C8D		Capacitor, .002 mfd., 500 v.	D-145984-1	Back, Cabinet (10-310)	
C8E		Capacitor, .004 mfd., 500 v.	D-145984-2	Back, Cabinet (10-311)	
C9	39001-76	Capacitor, .003 mfd., 600 v., paper	D-145984-3	Back, Cabinet (10-313)	
C10	39001-19	Capacitor, .1 mfd., 600 v., paper	AB-145981-2	Background Assembly, Dial	
C11	39001-19	Capacitor, .1 mfd., 600 v., paper	CR72	Battery, "A" Pack	
C12	C-136327-45	Capacitor, 2-15 mmf., Trimmer	CR96	Battery "B" Pack	
C13	39001-17	Capacitor, .05 mfd., 600 v., paper	AW-145444	Bracket & Terminal Assy., Antenna	
C14A	B-145261	Capacitor, 50 mfd., 150 v.	AC-146034-1	Cabinet Assy., Complete (10-310)	
C14B		Capacitor, 30 mfd., 100 v.	AC-146034-2	Cabinet Assy., Complete (10-311)	
C14C		Capacitor, 30 mfd., 25 v. (Electrolytic)	AC-146034-3	Cabinet Assy., Complete (10-313)	
C14D		Capacitor, 200 mfd., 10 v.	W-139921	Clip, I. F. Transformer	
C15	39001-19	Capacitor, .1 mfd., 600 v., paper	W-146608	Clip (Tinnerman), Cabinet Back	
C16	39001-17	Capacitor, .05 mfd., 600 v., paper	W-145420	Clip (Fuse Type), Cabinet Back	
C17	39001-17	Capacitor, .05 mfd., 600 v., paper	W-131154-1	Cotter, External	
R1	39373-74	Resistor, 100,000 ohm, ½ w.	AW-146075	Grille Cloth & Baffle	
R2	39373-60	Resistor, 22,000 ohm, ½ w.	W-145996-2	Handle (10-313)	
R3	39373-64	Resistor, 10,000 ohm, ½ w.	W-145996-3	Handle (10-310, 10-311)	
R4	39373-97	Resistor, 2.2 megohm, ½ w.	W-145232	Hinge, Cabinet Back	
R5	39373-100	Resistor, 3.3 megohm, ½ w.	W-145933	Holder, Cabinet Handle	
R6	39373-77	Resistor, 150,000 ohm, ½ w.	B-145121-2	Knob (10-310, 10-311)	
R7	39368-14	Control, Volume (1 megohm)	B-145121-3	Knob (10-313)	
R8	39373-107	Resistor, 10 megohm, ½ w.	B-145960	Pointer, Dial	
R9	39373-102	Resistor, 4.7 megohm, ½ w.	B-135075-2	Shaft, Dial Drive	
R10	39374-58	Resistor, 560,000 ohm, ½ w., 10%-----	W-142732	Shield, Tube	
R11	39373-92	Resistor, 1 megohm, ½ w.	W-46065	Shock Mount, Var. Cond. Mtg.	
R12	39373-77	Resistor, 150,000 ohm, ½ w.	W-145379-2	Shock Mount, Chassis Mtg.	
R13	39374-188	Resistor, 82 ohm, 2 w., 10%	W-145379-3	Shock Mount, Chassis Mtg.	
R14	39373-40	Resistor, 2200 ohm, ½ w.	39462-2	Socket, Tube	
R15	B-144857-4	Resistor, 2220 ohm, 7 w.	W-145757	Spring, Dial Drive Cord	
R16	39373-40	Resistor, 2200 ohm, ½ w.	W-145918	Spring, Cabinet Handle	
R17	39374-24	Resistor, 820 ohm, ½ w., 10%	W-138136	Strip, Dial Pointer	
R18	39374-26	Resistor, 1200 ohm, ½ w., 10%	C-135038-78	Strip, Terminal (2 ¼" long; 6 Lugs)	
R19	39373-33	Resistor, 1000 ohm, ½ w.	C-135038-18	Strip, Terminal (¾" long; 2 Lugs)	
R20	39373-30	Resistor, 680 ohm, ½ w.	W-136630	Stud Trimount (Chassis Bottom)	
CA1	C-132300-8	Cable & Plug Assy., A.C.-D.C. Power	W-134916	Washer, Spring (Dial Drive Shaft)	
CO1	W-146009	Connector Battery			

PAGE 21-10 CROSLEY

MODELS 11-100U, 11-101U, 11-102U,
11-103U, 11-104U, 11-105U, Ch. 301

Model No.	Color
11-100U	White
11-101U	Blue
11-102U	Green
11-103U	Red
11-104U	Ebony
11-105U	Chartreuse



DESCRIPTION

TYPE: Five-tube, single band, Superheterodyne.

FREQUENCY RANGE: 540 to 1600 kc.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a.c.-d.c.

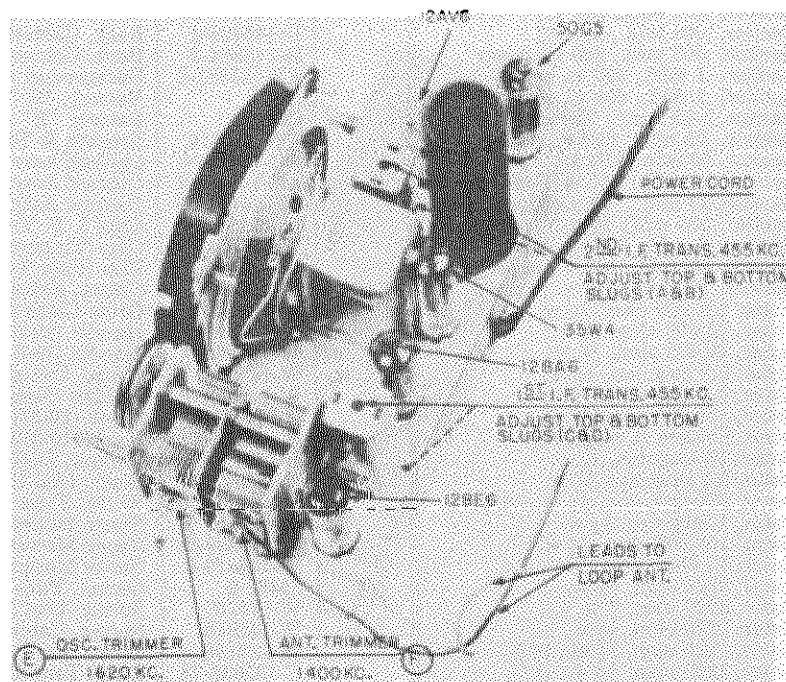
VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

POWER OUTPUT: 1.5 watts maximum.

TUBE COMPLEMENT

Type	Function
12BE6	Converter
12BA6	I. F. Amplifier
12AV6	Detector, AVC, 1st A.F. Amplifier
50C5	A.F. Power Output
35W4	Rectifier



CHASSIS, TOP VIEW

MODELS 11-100U, 11-101U, 11-102U,
11-103U, 11-104U, 11-105U, Ch. 301

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce hum.

Under no circumstances should a ground be connected to this receiver.

ALIGNMENT PROCEDURE

1. Connect an output meter across the speaker voice coil.
2. The r.f. signal input from the signal generator should be connected as indicated in the alignment chart. Connect the signal generator ground through a 0.1 mfd. condenser to B - (pin 2 on 12BA6 tube socket).
3. Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

ALIGNMENT CHART

Alignment adjustment locations are shown on page 1, "CHASSIS, TOP VIEW."

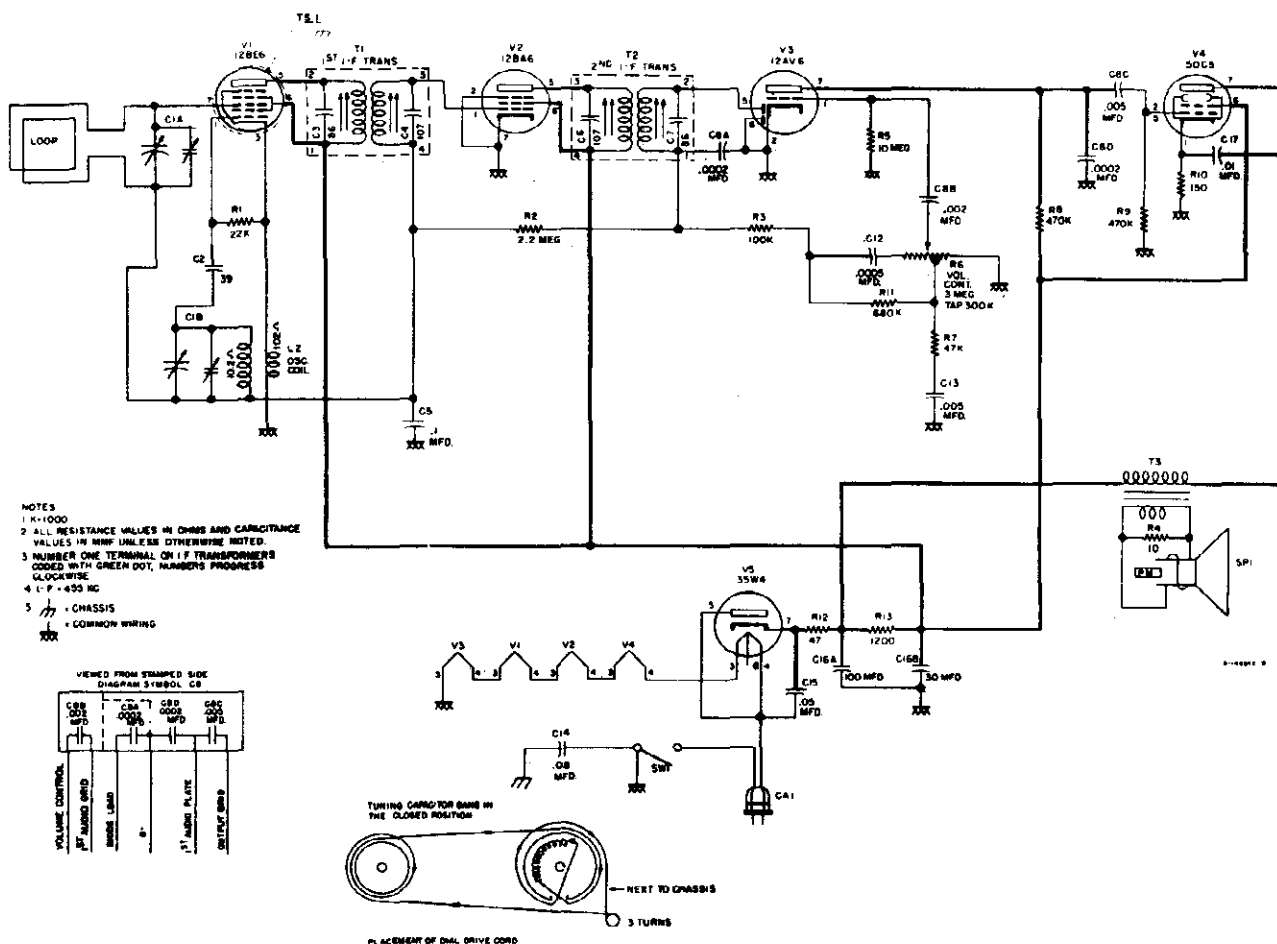
Alignment Sequence	Signal Generator Output			Position of Dial pointer	Adjust for Maximum Output
	Frequency in KC	In Series with	To		
1	455	200 mmf.	High Side of Loop	1620	A, B, C & D (See Note 1.)
2	1620	Radiated to Loop		1620	E (See Note 2.)
3	1400	Radiated to Loop		Tune to Signal	F (See Note 2.)

ALIGNMENT NOTES

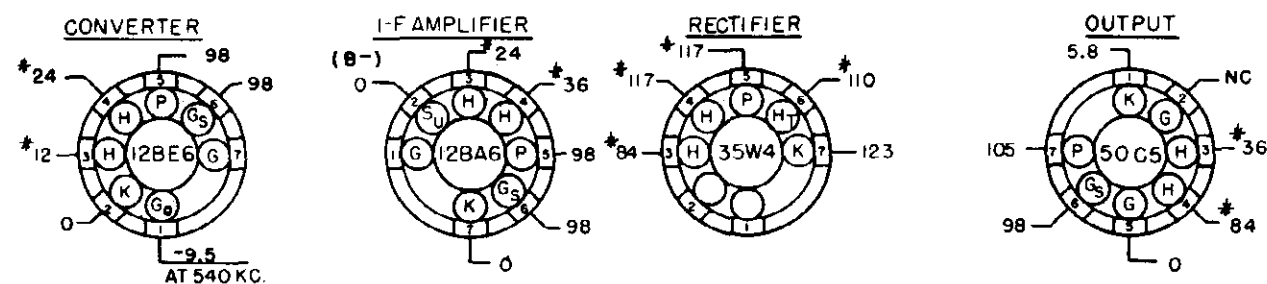
1. Repeat adjustments (A, B, C & D) in sequence, until maximum output is obtained.
2. Place signal generator output lead near the loop antenna. The loop antenna must be positioned with respect to the chassis to simulate its position when chassis and loop are fastened in cabinet.

PAGE 21-12 CROSLEY

MODELS 11-100U, 11-101U, 11-102U,
11-103U, 11-104U, 11-105U, Ch. 301



SCHEMATIC DIAGRAM



SOCKET VOLTAGE CHART

MODELS 11-100U, 11-101U, 11-102U,
11-103U, 11-104U, 11-105U, Ch. 301

REPLACEMENT PARTS LIST

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
C1A	B-148350	Capacitor, Variable Two Section	L2	AW-148259	Coil, Oscillator
C1B		Capacitor, Variable	SP1	AD-148400	Speaker
C2	C-137727-109	Capacitor, 39 mmf., 10%, 200 v., ceramic	SW1	Part of R6	Switch, Power
C3	Part of T1	Capacitor, 86 mmf.	TS1	W-147784	Shield, Tube (V1)
C4	Part of T1	Capacitor, 107 mmf.	T1	C-139919-5	Transformer, 1st I.F.
C5	39001-19	Capacitor, .1 mfd., 600 v., paper	T2	C-139919-5	Transformer, 2nd I.F.
C6	Part of T2	Capacitor, 107 mmf.	T3	138131-1	Transformer, Output
C7	Part of T2	Capacitor, 86 mmf.	AB-148406-1		Baffle & Grille Cloth Assy.
C8A	C-144675-1	Capacitor, .0002 mfd., 500 v.	AB-148465-1		Cabinet (11-100U)
C8B		Capacitor, .002 mfd., 500 v.	AB-148465-2		Cabinet (11-101U)
C8C		Capacitor, .005 mfd., 500 v.	AB-148465-3		Cabinet (11-102U)
C8D		Capacitor, .0002 mfd., 500 v. ceramic	AB-148465-4		Cabinet (11-103U)
C12	39001-5	Capacitor, .0005 mfd., 600 v., paper	R-148273-3		Cabinet (11-104U)
C13	39001-11	Capacitor, .005 mfd., 600 v., paper	AB-148465-6		Cabinet (11-105U)
C14	39001-85	Capacitor, .08 mfd., 600 v., paper	W-148434		Clip, I.F. Transformer Mtg.
C15	39001-17	Capacitor, .05 mfd., 600 v., paper	W-131154-1		Cotter (External), Tuning Shaft
C16A	B-148357	Capacitor, 100 mfd., 150 v. Two Section	B-148364		Gasket, Speaker
C16B		Capacitor, 30 mfd., 150 v. Electrolytic	W-148390		Grommet (3 used), chassis
C17	39001-13	Capacitor, .01 mfd., 600 v., paper	B-148318-1		Knob (11-100U)
R1	39373-60	Resistor, 22,000 ohm, $\frac{1}{2}$ w.	B-148318-2		Knob (11-101U)
R2	39373-97	Resistor, 2.2 megohm, $\frac{1}{2}$ w.	B-148318-3		Knob (11-102U)
R3	39373-74	Resistor, 100,000 ohm, $\frac{1}{2}$ w.	B-148318-4		Knob (11-103U)
R4	39373-1	Resistor, 10 ohm, $\frac{1}{2}$ w.	B-147318-5		Knob (11-104U)
R5	39373-107	Resistor, 10 megohm, $\frac{1}{2}$ w.	B-148318-6		Knob (11-105U)
R6	B-148327	Control, Volume (3 megohm, Tap 300,000 ohm)	B-94704-7		Nut (Push On), Grille Cloth Mtg.
R7	39373-87	Resistor, 47,000 ohm, $\frac{1}{2}$ w.	B-148320		Pointer, Dial
R8	39373-87	Resistor, 470,000 ohm, $\frac{1}{2}$ w.	39176-59		Screw, Chassis Mtg.
R9	39373-87	Resistor, 470,000 ohm, $\frac{1}{2}$ w.	W-148379		Shaft, Tuning
R10	39373-16	Resistor, 150 ohm, $\frac{1}{2}$ w.	AW-148806		Shaft & Pulley Assy., Pointer
R11	39373-90	Resistor, 680,000 ohm, $\frac{1}{2}$ w.	39462-2		Socket, Tube
R12	39374-97	Resistor, 47 ohm, 10%, 1 w.	W-148469		Spring (Retainer), Pointer Pulley
R13	39374-114	Resistor, 1200 ohm, 10%, 1 w.	W-51752		Spring, Drive Cord
CA1	C142769-1	Cable & Plug Assy., Power	AB-148362		Support & Bushing Assy., Pointer Pulley
L1	C-148399	Loop & Back Assy.	W-134916		Washer (Spring), Tuning Shaft

Slipping of dial drive cords on these models can be corrected by replacing the drive cord with a cord long enough to permit it to be wrapped around the drive shaft four turns instead of three turns.

If necessary, place a 1/16" thick #6 flat washer on each screw that mounts the tuning capacitor. The washer should be placed between the rubber grommet eyelet and the capacitor frame. When the mounting screws are drawn tight, the eyelet will then flatten enough to reduce the flexibility of the grommet. This will hold the capacitor rigid and prevent the cord from becoming loose when the drive shaft is rotated.

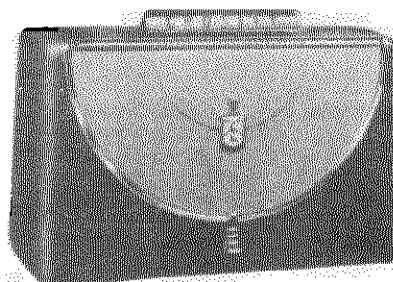
In addition to the recommendations in the original service instruction it is sometimes necessary to replace the drive shaft with new shaft (part Number 148379). This new shaft does not have a groove for the drive cord.

On some sets of models 11-100U to 11-109U, R2 is a 3.3 megohm, 10%, 1/2 watt resistor instead of a 2.2 megohm resistor; and because of this C5 is an .05 mfd., 600 volt paper capacitor (Part No. 39001-17).

PAGE 21-14 CROSLEY

MODELS 11-301U, 11-302U,
11-303U, 11-304U, 11-305U,
Ch. 303

Model No.	Cabinet	Lid
11-301U	New Brunswick Blue	Salvador Blue
11-302U	Meadow Green	Sea
11-303U	Fez Red	Sport Beige
11-304U	Brown	Tan
11-305U	Ebony	Ebony



DESCRIPTION

TYPE: Four-tube, combination, battery Portable and a.c.-d.c. Superheterodyne with Selenium Rectifier.

FREQUENCY RANGE: 540 to 1600 kilocycles.

INTERMEDIATE FREQUENCY: 455 kc.

POWER SUPPLY: a.c.-d.c. or Battery.

VOLTAGE RATING: a.c.-d.c., 110 to 120 volts. "A" Battery, $1\frac{1}{2}$ volts; "B" Battery, $67\frac{1}{2}$ volts.

POWER OUTPUT: 200 M.W. maximum.

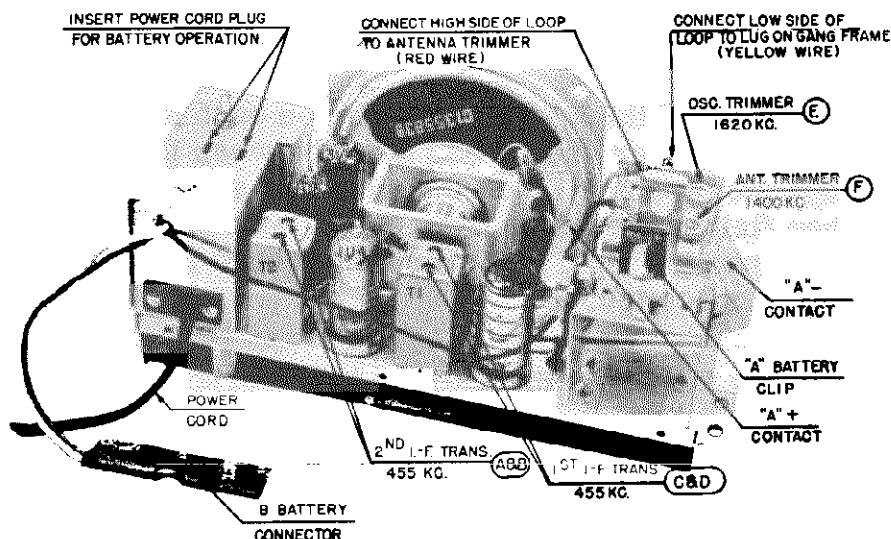
POWER CONSUMPTION: 15 watts at 125 volts, 60 cycle.

"A" BATTERY: One leak resistant "D" cell.

"B" BATTERY: One Crosley CR-88.

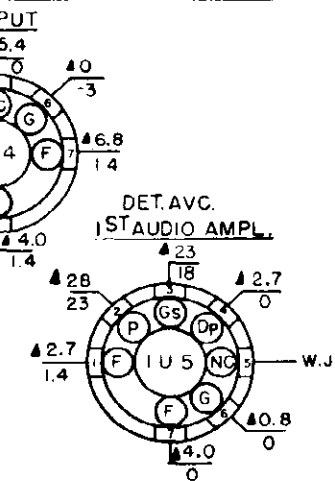
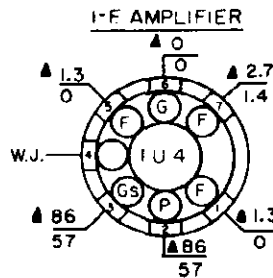
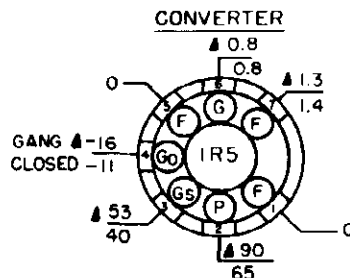
TUBE COMPLEMENT:

Type	Function
1R5	Converter
1U4	1st I.F. Amplifier
1U5	Detector, AVC, 1st A.F. Amplifier
3V4	A.F. Power Output
Selenium Rectifier	



CHASSIS TOP VIEW

1. BOTTOM VIEW OF TUBE SOCKETS.
2. VOLTAGES MEASURED WITH AN ELECTRONIC VOLT-METER FROM SOCKET LUG TO (B-)
3. W. J. = WIRING JUNCTION
4. N.C. = NO CONNECTION
5. ▲ = VOLTAGES MEASURED WITH RADIO PLUGGED INTO 117V 60 CYCLE LINE.
6. ALL OTHER VOLTAGES MEASURED IN BATTERY OPERATION POSITION WITH "A" = 1.45 VOLTS, "B" = 67 1/2 VOLTS.
7. SOCKET VOLTAGE TOLERANCE $\pm 10\%$.



(For sets built as shown by solid lines in Schematic Wiring Diagram)

Reversing the position of the power plug when alternating current is used may reduce hum.

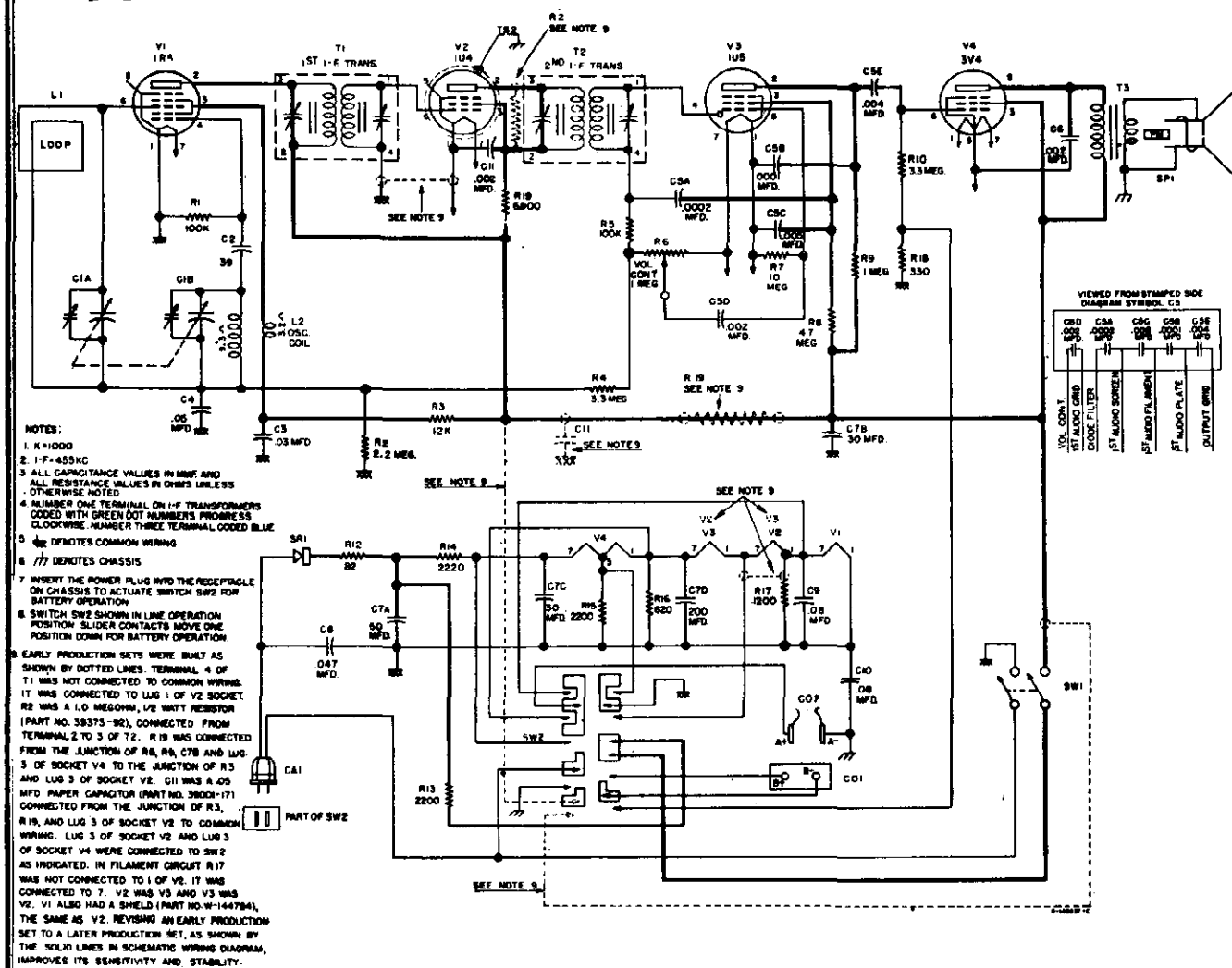
Under no circumstances should a ground be connected to this receiver.

1. Alignment should be made with the receiver connected to the power line (not in battery operation position).
2. Connect output meter across speaker voice coil (3.2 ohms).
3. With the cabinet front lid open all the way, radiate an R-F signal modulated 30% at 400 cycles to the receiver by placing the output lead from the high side of the signal generator close to the loop antenna in the lid.
4. Turn the volume control to maximum and adjust the signal generator to produce mid-scale deflection of the output meter, but maintain generator output as low as possible to prevent AVC action.

Alignment Sequence	Signal Generator		Position of Tuning Gang or Dial pointer	Adjust for Max. Output	Remarks
	Freq in KC	Output			
1	455	Radiated to Loop	Open	A, B, C & D	See Note
2	1620	Radiated to Loop	Open	E	
3	1400	Radiated to Loop	Tune in Signal	F	

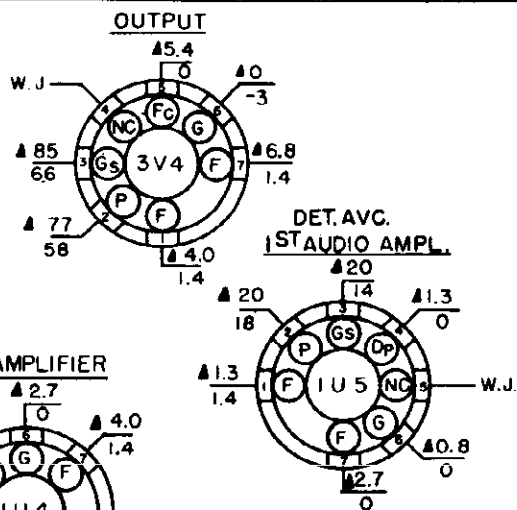
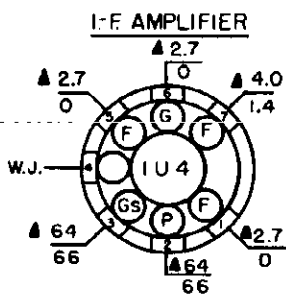
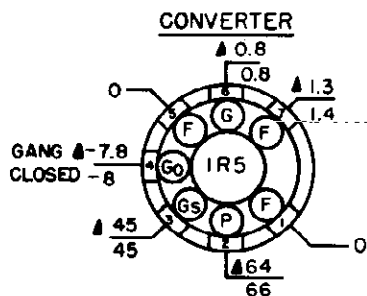
Repeat adjustment of A, B, C, & D until maximum output is obtained.

MODELS 11-301U, 11-302U, 11-303U, 11-304U, 11-305U, Ch. 303 **SCHEMATIC DIAGRAM**



NOTES:

1. BOTTOM VIEW OF TUBE SOCKETS.
2. VOLTAGES MEASURED WITH AN ELECTRONIC VOLTMETER FROM SOCKET LUG TO (B-)
3. W. J. = WIRING JUNCTION.
4. N.C. = NO CONNECTION.
5. * VOLTAGES MEASURED WITH RADIO PLUGED INTO 117V 60 CYCLE LINE.
6. ALL OTHER VOLTAGES MEASURED IN BATTERY OPERATION POSITION WITH "A" = 1.45 VOLTS, "B" = 67 1/2 VOLTS.
7. SOCKET VOLTAGE TOLERANCE $\pm 10\%$.



SOCKET VOLTAGE CHART

(For sets built as shown by dotted lines in Schematic Wiring Diagram)

MODELS 11-301U, 11-302U,
11-303U, 11-304U, 11-305U,
Ch. 303

REPLACEMENT PARTS LIST

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
C1A	B-148204	Capacitor, Variable	TS2	W-144784	Shield, Tube (V2)
C1B		Capacitor, Variable		148875	Antenna & Lid Assy. (11-301U)
C2	C-137727-109	Capacitor, 39 mmf., 10%, 200 v., ceramic		148876	Antenna & Lid Assy. (11-302U)
C3	39001-82	Capacitor, .03 mfd., 600 v., paper		148877	Antenna & Lid Assy. (11-303U)
C4	39001-17	Capacitor, .05 mfd., 600 v., paper		148878	Antenna & Lid Assy. (11-304U)
C5A	C-144675-10	Capacitor, .0002 mfd., 500 v.		148879	Antenna & Lid Assy. (11-305U)
C5B		Capacitor, .0001 mfd., 500 v.		AW-149752-1	Bracket (R.H.) Handle
C5C		Capacitor, .0005 mfd., 500 v.		AW-149752-2	Bracket (L.H.) Handle
C5D		Capacitor, .002 mfd., 500 v.		B-148034	Bottom, Chassis
C5E		Capacitor, .004 mfd., 500 v.		AD-148370	Bottom Assy., Cabinet
C6	C-144675-16	Capacitor, .002 mfd., + 100%—0%, 500 v., disc ceramic		D-148192-1	Cabinet & Lid Assy. (11-301U)
C7A	B-148246	Capacitor, 50 mfd., 150 v.		D-148192-2	Cabinet & Lid Assy. (11-302U)
C7B		Capacitor, 80 mfd., 100 v.		D-148192-3	Cabinet & Lid Assy. (11-303U)
C7C		Capacitor, 80 mfd., 25 v.		D-148192-4	Cabinet & Lid Assy. (11-304U)
C7D		Capacitor, 200 mfd., 10 v.		D-148192-5	Cabinet & Lid Assy. (11-305U)
C8	39477-45	Capacitor, .047 mfd., 600 v., paper		W-148103	Catch, Cabinet Lid
C9	39001-85	Capacitor, .08 mfd., 600 v., paper		AC-148443	Grille & Baffle Assy.
C10	39001-85	Capacitor, .08 mfd., 600 v., paper		W-148390	Grommet (3 used), Chassis
C11	C-144675-16	Capacitor, .002 mfd., 500 v., disc ceramic		W-148107	Guide, Cabinet Lid Catch
R1	39373-74	Resistor, 100,000 ohm, $\frac{1}{2}$ w.		B-147997	Handle
R2	39373-97	Resistor, 2.2 megohm, $\frac{1}{2}$ w.		B-148232-1	Knob, Volume (11-301U)
R3	39374-38	Resistor, 12,000 ohm, 10%, $\frac{1}{2}$ w.		B-148233-1	Knob, Tuning (11-301U)
R4	39373-100	Resistor, 3.3 megohm, $\frac{1}{2}$ w.		B-148232-2	Knob, Volume (11-302U)
R5	39373-74	Resistor, 100,000 ohm, $\frac{1}{2}$ w.		B-148233-2	Knob Tuning (11-302U)
R6	B-148240	Control, Volume (1 megohm)		B-148232-3	Knob, Volume (11-303U)
R7	39373-107	Resistor, 10 megohm, $\frac{1}{2}$ w.		B-148233-3	Knob, Tuning (11-303U)
R8	39374-77	Resistor, 4.7 megohm, 10%, $\frac{1}{2}$ w.		B-148232-4	Knob, Volume (11-304U, 11-305U)
R9	39374-61	Resistor, 1 megohm, 10%, $\frac{1}{2}$ w.		B-148233-4	Knob, Tuning (11-304U, 11-305U)
R10	39373-100	Resistor, 3.3 megohm, $\frac{1}{2}$ w.		W-148218	Nut (Elastic Stop), Lid Catch Slide
R12	39374-188	Resistor, 82 ohm, 10%, 2 w.		W-94701-4	Nut (Push-On), Cabinet Trim
R13	39373-40	Resistor, 2200 ohm, $\frac{1}{2}$ w.		AW-148424	Pointer, Dial
R14	B-144857-4	Resistor, 2220 ohm, 5%, 7 w.		W-148366-1	Push Button, Off-On (11-301U)
R15	39373-40	Resistor, 2200 ohm, $\frac{1}{2}$ w.		W-148366-2	Push Button, Off-On (11-302U)
R16	39374-24	Resistor, 820 ohm, 10%, $\frac{1}{2}$ w.		W-148366-3	Push Button, Off-On (11-303U)
R17	39374-26	Resistor, 1200 ohm, 10%, $\frac{1}{2}$ w.		W-148366-4	Push Button, Off-On (11-304U, 11-305U)
R18	39374-19	Resistor, 330 ohm, 10%, $\frac{1}{2}$ w.		39178-55	Screw, Chassis Mtg.
R19	39373-51	Resistor, 6800 ohm, $\frac{1}{2}$ w.		39178-28	Screw, Handle
L1		Loop (Part of Lid Assy.)		39178-28	Screw, Cabinet Bottom
L2	AW-148420	Coil, Oscillator		39178-28	Screw, Grille & Baffle Assy.
T1	C-148449	Transformer, 1st I.F.		W-147784	Shield, Tube
T2	C-148449	Transformer, 2nd I.F.		W-148108	Slide, Cabinet Lid Catch
T3	B-148328	Transformer, Output		W-148346	Socket, Tube
SW1	B-148392	Switch, Off-On (Power)		W-148054	Spacer, Speaker
SW2	B-148330	Switch, Battery A.C.		W-148523	Spring, Push Button
SP1	C-148852	Speaker		W-148111	Spring, Cabinet Lid Catch
SR1	W-145429	Rectifier, Selenium		W-148042	Support, Speaker
CA1	C-132300-8	Cable & Plug Assy., Power		B-148082	Trim, Cabinet Lid
CO1	W-148414	Connector, "B" Battery		C-148110	Trim, Cabinet
CO2	AB-148062	Support Assembly, Battery		W-148248	Trimount Stud, Handle
				W-148206-2	Washer (Spring), Lid Catch Slide

Handles pulling off may be prevented by replacing the original equipment handle

brackets with the new type that has a rivet brazed to the bracket. The R. H.

Bracket part number is AW-149752-1 and the L. H. Bracket number is AW-149752-2.

On some sets of models 11-301U to 11-305U, R2 is a 3.3 megohm resistor instead of 2.2 megohm resistor. In these sets the .05 mfd. capacitor is identified by symbol No. C4. Since this was already a .05 mfd. capacitor, no change was necessary when R2 was substituted.

MODELS 11-106U, 11-107U,
11-108U, 11-109U, Ch. 302

2ND I-F TRANS. 455 KC.
ADJUST TOP & BOTTOM
SLUGS (C&D)

12AV6

500

35W4

RADIO PHONO
SWITCH

PHONO JACK
LOOP BACK

LOW SIDE
OF SIG. GEN.
TO TOP LUG
EXT. ANT.
CONNECTION
LOOP BACK

1ST I-F TRANS.
ADJUST
TOP & BOTTOM
SLUGS (A&B)

ANT. TRIMMER
1400 KC. (F)

OSC. TRIMMER
1620 KC. (E)

CHASSIS, TOP VIEW (Sets equipped with 12SQ7GT Tube) REPLACEMENT PARTS LIST

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
C1A	B-148745	Capacitor, Variable	L1	AC-148752	Loop & Back Assy.
C1B		Capacitor, Variable } Two Section	L2	AW-148259	Coil, Oscillator
C2	C-137727-109	Capacitor, 39 mmf., 10%, 200 v., ceramic	SP1	AD-145956-2	Speaker (5-1/4" P.M.)
C3	Part of T1	Capacitor, 106 mmf.	SW1	Part of R6	Switch, Power
C4	Part of T1	Capacitor, 131 mmf.	SW2	W-148260	Switch, Phono
C5	39001-19	Capacitor, .1 mfd., 600 v., paper	T1	AC-139919-3	Transformer, 1st I.F.
C6	Part of T2	Capacitor, 131 mmf.	T2	AC-139919-3	Transformer, 2nd I.F.
C7	Part of T2	Capacitor, 106 mmf.	T3	B-147171	Transformer, Output
C8A	C-144675-1	Capacitor, .0002 mfd., 500 v.	C-147934	Bottom, Chassis	
C8B		Capacitor, .001 mfd., 500 v.	R-148672	Cabinet (11-106U)	
C8C		Capacitor, .005 mfd., 500 v.	AB-148962-1	Cabinet (11-107U)	
C8D		Capacitor, .0002 mfd., 500 v.	AB-148962-2	Cabinet (11-108U)	
C9	B-143686-3	Capacitor, 100 mmf., 500 v., Molded disc ceramic	AB-148962-3	Cabinet (11-109U)	
C10	39001-85	Capacitor, .08 mfd., 600 v., paper	B-94962-5	Clip, Dial Pointer	
C11	39001-74	Capacitor, .002 mfd., 600 v., paper	W-148434	Clip, I.F. Transformer Mtg.	
C12	39001-5	Capacitor, .0005 mfd., 600 v., paper	W-131154-1	Cotter (External), Dial Pointer Shaft	
C13	39001-11	Capacitor, .005 mfd., 600 v., paper	C-148674	Escutcheon, Dial	
C14	39001-85	Capacitor, .08 mfd., 600 v., paper	AB-148743	Grille Cloth & Baffle Assy.	
C15	39001-17	Capacitor, .05 mfd., 600 v., paper	AW-148774	Grille & Medallion Assy. (11-106U)	
C16A	B-147174	Capacitor, 100 mfd., 150 v.	AW-148956	Grille & Medallion Assy. (11-107U)	
C16B		Capacitor, 30 mfd., 150 v.	AW-148957	Grille & Medallion Assy. (11-108U)	
C16C		Capacitor, 10 mfd., 150 v.	AW-148955	Grille & Medallion Assy. (11-109U)	
C17	39001-13	Capacitor, .01 mfd., 600 v., paper	C-148708	Knob	
R1	39373-60	Resistor, 22,000 ohm, 1/2 w.	W-147275	Mounting, Rubber (2 used)	
R2	39373-97	Resistor, 2.2 megohm, 1/2 w.	W-45580-2	Mounting, Rubber (4 used)	
R3	39373-74	Resistor, 100,000 ohm, 1/2 w.	W-148788	Name (CROSLEY)	
R4	39374-34	Resistor, 5600 ohm, 10%, 1/2 w.	AW-148773	Pointer & Clip Assy., Dial	
R5	39373-107	Resistor, 10 megohm, 1/2 w.	AW-148779	Pulley & Shaft Assy., Dial Pointer	
R6	B-148327	Control, Volume (3 megohm)	39178-57CL	Screw, Grille Mtg.	
R7	39373-67	Resistor, 47,000 ohm, 1/2 w.	39176-61CL	Screw, Chassis Mtg.	
R8	39373-87	Resistor, 470,000 ohm, 1/2 w.	W-147784	Shield, Tube (V2, V3)	
R9	39373-87	Resistor, 470,000 ohm, 1/2 w.	W-46447-1	Shield, Tube (V3), sets equipped with 12SQ7GT Tube	
R10	39373-16	Resistor, 150 ohm, 1/2 w.	39462-2	Socket, Tube	
R11	39373-90	Resistor, 680,000 ohm, 1/2 w.	W-149987	Socket, Tube (V3), sets equipped with 12SQ7GT Tube	
R12	39374-189	Resistor, 100 ohm, 10%, 1 w.	W-51752	Spring, Drive Cord	
R13	39374-114	Resistor, 1200 ohm, 10%, 1 w.	W-136630	Stud, Trimount	
R14	39373-33	Resistor, 1000 ohm, 1/2 w.	AB-148775	Support Assy. Pointer Pulley	
CA1	C-132300-2	Cable & Plug Assy., Power	W-147168	Support, Speaker	
CO1	W-136998	Connector, Phono			

MODELS 11-106U, 11-107U,
11-108U, 11-109U, Ch. 302

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce hum.

Under no circumstances should a ground be connected to this receiver.

Photograph connection —To use a record player with this receiver insert the pickup plug of the record player into the Phono jack on back of receiver. Then slide the Radio-Phono Switch on the back of the receiver to the "Phono" position. Connect the power cord of the record player to a convenient electric outlet of the correct voltage and frequency. Operate the record player in the normal manner. The controls of the receiver operate the same as for radio programs.

ALIGNMENT PROCEDURE

Note: Before removing the chassis from the cabinet, turn the tuning control completely counter-clockwise and push the dial pointer down so as to clear opening in grille.

1. Connect an output meter across the speaker voice coil.
2. The r.f. signal input from the signal generator should be connected as indicated in the alignment chart. Connect the signal generator ground to the top lug on loop antenna back.
3. Turn the volume control on full and adjust the signal generator output to produce approximately midscale deflection of the output meter, but maintain signal generator output as low as possible to prevent AVC action in the receiver.

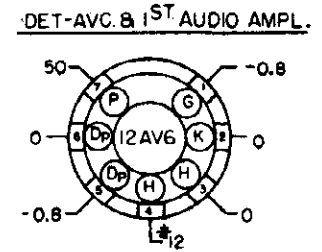
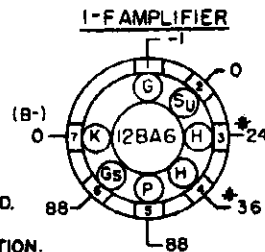
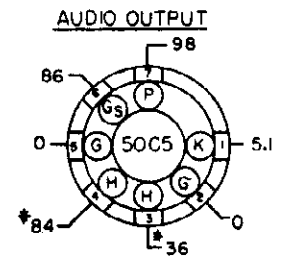
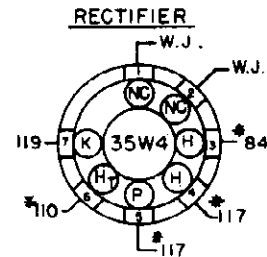
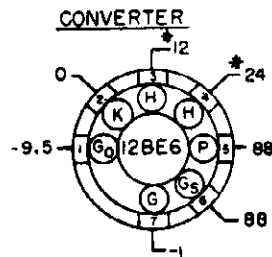
ALIGNMENT CHART

Alignment adjustment locations are shown on page 1, "CHASSIS, TOP VIEW."

Alignment Sequence	Signal Generator Output			Position of Dial pointer	Adjust for Maximum Output
	Frequency in KC	In Series with	To		
1	455	200 mmf.	External Ant. Screw	1620	A, B, C & D (See Note 1.)
2	1620	200 mmf.	External Ant. Screw	1620	E (See Note 2.)
3	1400	200 mmf.	External Ant. Screw	Tune to Signal	F (See Note 2.)

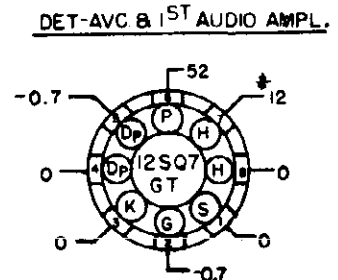
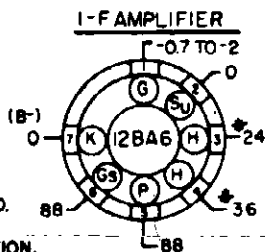
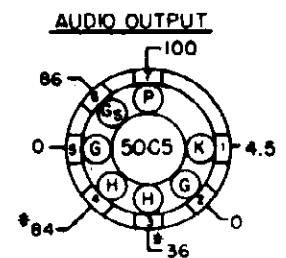
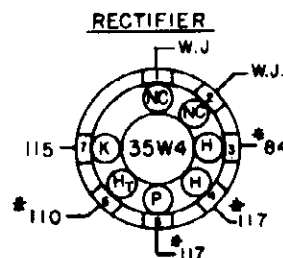
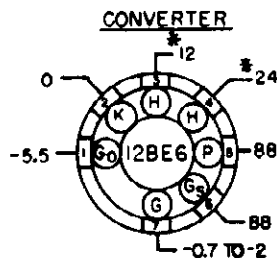
ALIGNMENT NOTES

1. Repeat adjustments (A, B, C & D) in sequence, until maximum output is obtained.
2. The loop antenna must be positioned with respect to the chassis to simulate its position when chassis and loop are fastened in cabinet.



- NOTES:
1. BOTTOM VIEW OF TUBE SOCKETS.
 2. VOLTAGES MEASURED WITH AN ELECTRONIC VOLTMETER FROM SOCKET LUG TO B- (PIN 7 OF 12BA6) (B- 0)
 3. MEASURED WITH THE VOLUME CONTROL AT MINIMUM & NO SIGNAL INTO THE LOOP TUNING GANG CLOSED.
 4. W.J. = WIRING JUNCTION.
* = AC. VOLTAGES. NC = NO CONNECTION.
 5. LINE VOLTAGE = 117 V., 60 ~ AC.
 6. SOCKET VOLTAGE TOLERANCE $\pm 10\%$

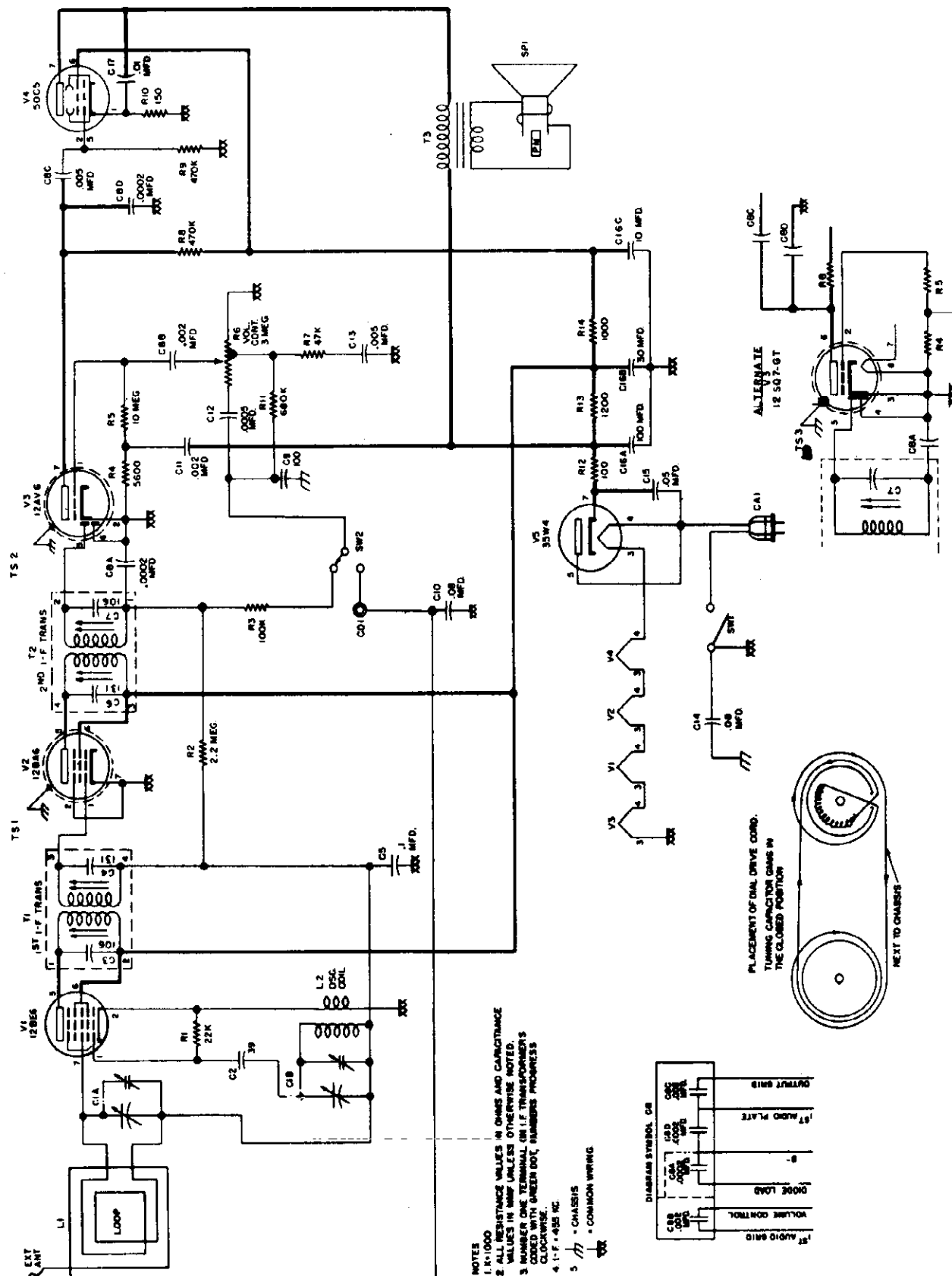
SOCKET VOLTAGE CHART (Sets equipped with 12AV6 Tube)



- NOTES:
1. BOTTOM VIEW OF TUBE SOCKETS.
 2. VOLTAGES MEASURED WITH AN ELECTRONIC VOLTMETER FROM SOCKET LUG TO B- (PIN 7 OF 12BA6) (B- 0)
 3. MEASURED WITH THE VOLUME CONTROL AT MINIMUM & NO SIGNAL INTO THE LOOR TUNING GANG CLOSED.
 4. W.J. = WIRING JUNCTION.
* = AC. VOLTAGES. NC = NO CONNECTION.
 5. LINE VOLTAGE = 117 V., 60~AC.
 6. SOCKET VOLTAGE TOLERANCE $\pm 10\%$

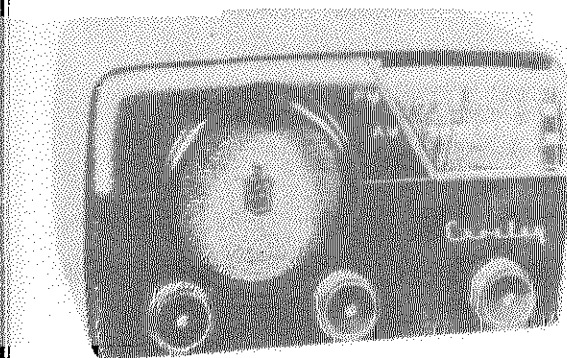
SOCKET VOLTAGE CHART (Sets equipped with 12SQ7GT Tube)

MODELS 11-106U, 11-107U,
11-108U, 11-109U, Ch. 302



SCHEMATIC DIAGRAM

MODELS 11-126U,
11-128U, 11-129U, Ch. 312



Model No.	Cabinet	Front
11-126U	Simulated Saddle Leather	Brown
11-127U	Simulated Green Morocco Leather	Green
11-128U	Simulated Light Rawhide	Ebony
11-129U	Simulated Red Morocco Leather	Maroon

DESCRIPTION

TYPE: Seven-tube, two-band, superheterodyne.

FREQUENCY RANGE: Standard Broadcast Band; 540 to 1620 kc.

Frequency Modulation Band; 88 to 108 megacycles.

INTERMEDIATE FREQUENCY: Standard Broadcast Band; 455 kc.

Frequency Modulation Band; 10.7 mc.

FM ANTENNA INPUT IMPEDANCE: 75 ohms balanced.

POWER SUPPLY: a.c.—d.c.

VOLTAGE RATING: 105-125 volts.

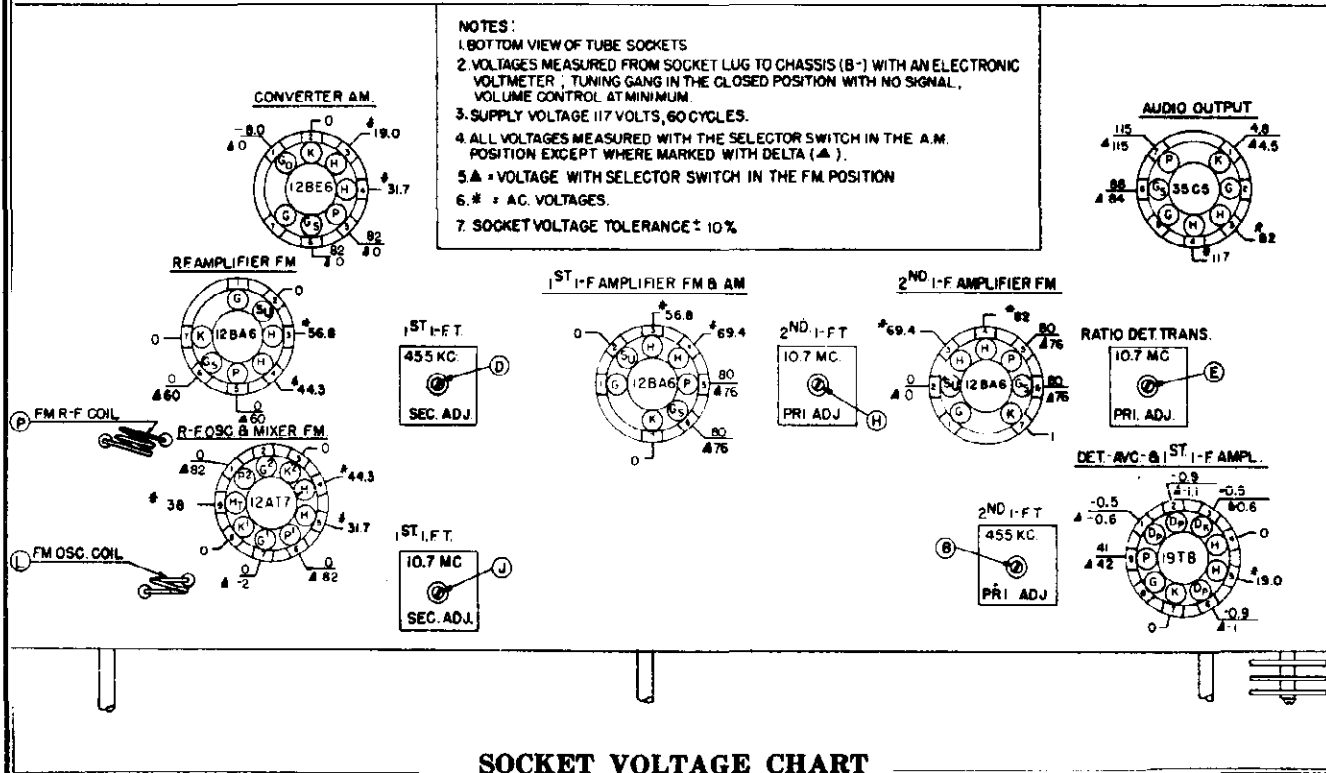
POWER CONSUMPTION: 40 watts at normal power supply voltage (117 volts).

POWER OUTPUT: 1 watt maximum.

TUBE COMPLEMENT:

Type	Function
12BA6	R. F. Amplifier (FM)
12AT7	Oscillator & Mixer (FM)
12BA6	I. F. Amplifier (AM & FM)
12BA6	2nd I. F. Amplifier & AVC (FM)
19T8	Detector & 1st A.F. Ampl. (AM & FM; AVC (AM))
12BE6	Converter (AM)
35C5	Audio Output
	Selenium Rectifier

DIAL BULB: 7 w., 120 v., Candelabra Base



PAGE 21-24 CROSLEY

MODELS 11-126U, 11-128U,
11-129U, Ch. 312

When using direct current it may be necessary to reverse the position of the power plug in the electric outlet for correct polarity.

Reversing the position of the power plug when alternating current is used may reduce power hum.

Under no circumstances should a ground be connected to this receiver.

Never place the receiver chassis on a metal bench or grounded object when the power plug is connected to the electric outlet. To avoid shock when making repairs or adjustments, do not permit any part of the body to contact grounded metal objects.

ALIGNMENT PROCEDURE

This receiver has been aligned at the factory for best performance and no attempt should be made to realign it unless the proper test equipment is available.

1. Turn the tuning condenser to full mesh, against stop, and set the dial pointer to the reference point at the "88" end of the dial.
2. Set the tone control knob to the full treble position (extreme right).
3. For Amplitude Modulated signal readings, connect output meter across voice coil (3.2 ohms).
4. All Amplitude Modulated input signals are modulated 30% at 400 cycles with the High side of the signal generator connected to receiver as indicated in the alignment chart. Connect the low side of signal generator through a 0.1 mfd. condenser to the receiver chassis. If hum is encountered, use a 1 to 1 isolating transformer between the power line outlet and the receiver power line cord. Then connect the low side of the signal generator directly to the receiver chassis.
5. All Frequency Modulated signals are modulated 30% at 400 cycles. 30% modulation is equal to a deviation of 22.5 kilocycles.
6. Turn the volume control to maximum clockwise position and adjust signal generator output to produce a noticeable output meter reading. Keep signal generator output as low as possible to prevent AVC action in the receiver.
7. Disconnect short wire, with spade lug, from F.M. Antenna Terminal.

ALIGNMENT NOTES

1. Use an unmodulated signal generator with approximately 100,000 mv. output.
2. Connect the electronic voltmeter across the 27,000 ohm diode load resistor (R6).
3. Connect two 100,000 ohm 5% carbon resistors in series, connect these resistors across the 4 mfd. stabilizing capacitor (C17) in the diode circuit, connect the electronic voltmeter between the output of the RF filter network (C22) and the midpoint of the two 100,000 ohm resistors. Align secondary core (F) of T5 for zero volts, first using a high scale on the electronic voltmeter and then switching to the lowest scale for close balance.
4. Use an unmodulated signal. Electronic voltmeter connected across 27,000 ohm load resistor (R6). Limit output of signal generator so that the reading on the electronic voltmeter will not exceed 5 volts.

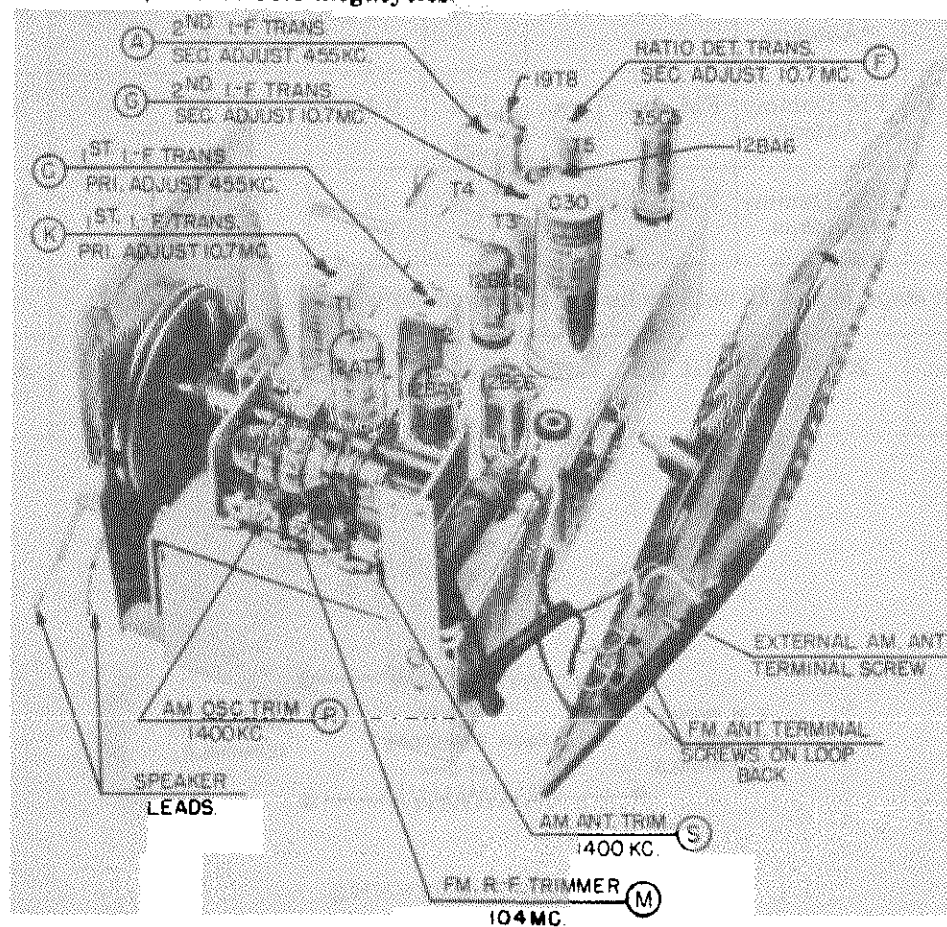
MODELS 11-126U, 11-128U,
11-129U, Ch. 312

5. Remove the two 100,000 ohm resistors and electronic voltmeter after alignment.
6. Adjust turns on FM oscillator coil by spreading or squeezing together, so that 98 megacycle signal falls on 98 megacycles on the dial.
7. Rock gang while adjusting FM. RF trimmer until maximum output meter reading is obtained, or align for maximum noise level at zero signal.
8. Adjust turns on FM. RF coil until maximum output meter reading is obtained.

MEGACYCLES TO CHANNEL NUMBERS "FM" BAND

Frequency in Megacycles	Channel No.	Frequency in Megacycles	Channel No.
87.9	200	98.9	255
88.9	205	99.9	260
89.9	210	100.9	265
90.9	215	101.9	270
91.9	220	102.9	275
92.9	225	103.9	280
93.9	230	104.9	285
94.9	235	105.9	290
95.9	240	106.9	295
96.9	245	107.9	300
97.9	250		

To find the frequency in megacycles for CHANNEL NUMBERS between those given above, add .2 megacycles for every whole number added to the CHANNEL NUMBER; for example Channel 204 would be 88.7 megacycles and 251 would be 98.1 megacycles.



CHASSIS TOP VIEW SHOWING ALIGNMENT ADJUSTMENTS

MODELS 11-126U, 11-128U,
11-129U, Ch. 312

ALIGNMENT CHART

Align- ment Se- quence	Signal Generator Output			Position of		Adjust	Type of Selectivity Curve	Remarks
	Frequency	In Series With	To	Range Switch	Tuning Dial or Tun. Cap.			
1	455 kc.	.05 mfd.	V3 grid pin 1	AM	Open	A & B	Single peak	
2	455 kc.	.05 mfd.	V6 grid pin 7	AM	Open	C & D	Single peak	Retouch A & B
3	10.7 mc.	.05 mfd.	V4 grid pin 1	FM	Closed	E	Single peak	See note 1 & 2
4	10.7 mc.	.05 mfd.	V4 grid pin 1	FM	Closed	F	—	Balance to zero volts. Note 3
5	10.7 mc.	.05 mfd.	V3 plate pin 5	FM	Closed	E & G	Single peak	See note 4 repeat adj. of E & G for max. alignment
6	10.7 mc.	.05 mfd.	V3 grid pin 1	FM	Closed	H	Single peak	Note 4
7	10.7 mc.	.05 mfd.	Stator center gang section	FM	Closed	J, K & H	Single peak	Note 4 & 5
8	98 mc.	FM Dummy *Antenna	FM Ant. Term.	FM	98 mc.	L	—	Note 6
19	104 mc.	FM Dummy *Antenna	FM Ant. Term.	FM	104 mc.	M	—	Note 7
10	92 mc.	FM Dummy *Antenna	FM Ant. Term.	FM	92 mc.	P	—	Note 8
11	Repeat steps 9 and 10 until no further improvement is noted.							
12	1400 kc.	200 mmf.	Ext. Ant. Term.	AM	1400 kc.	R & S	—	Adjust S for max output



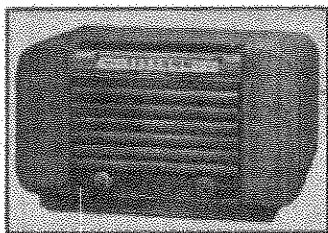
* DUMMY ANTENNA



MODELS 11-126U, 11-128U,
11-129U, Ch. 312

REPLACEMENT PARTS LIST

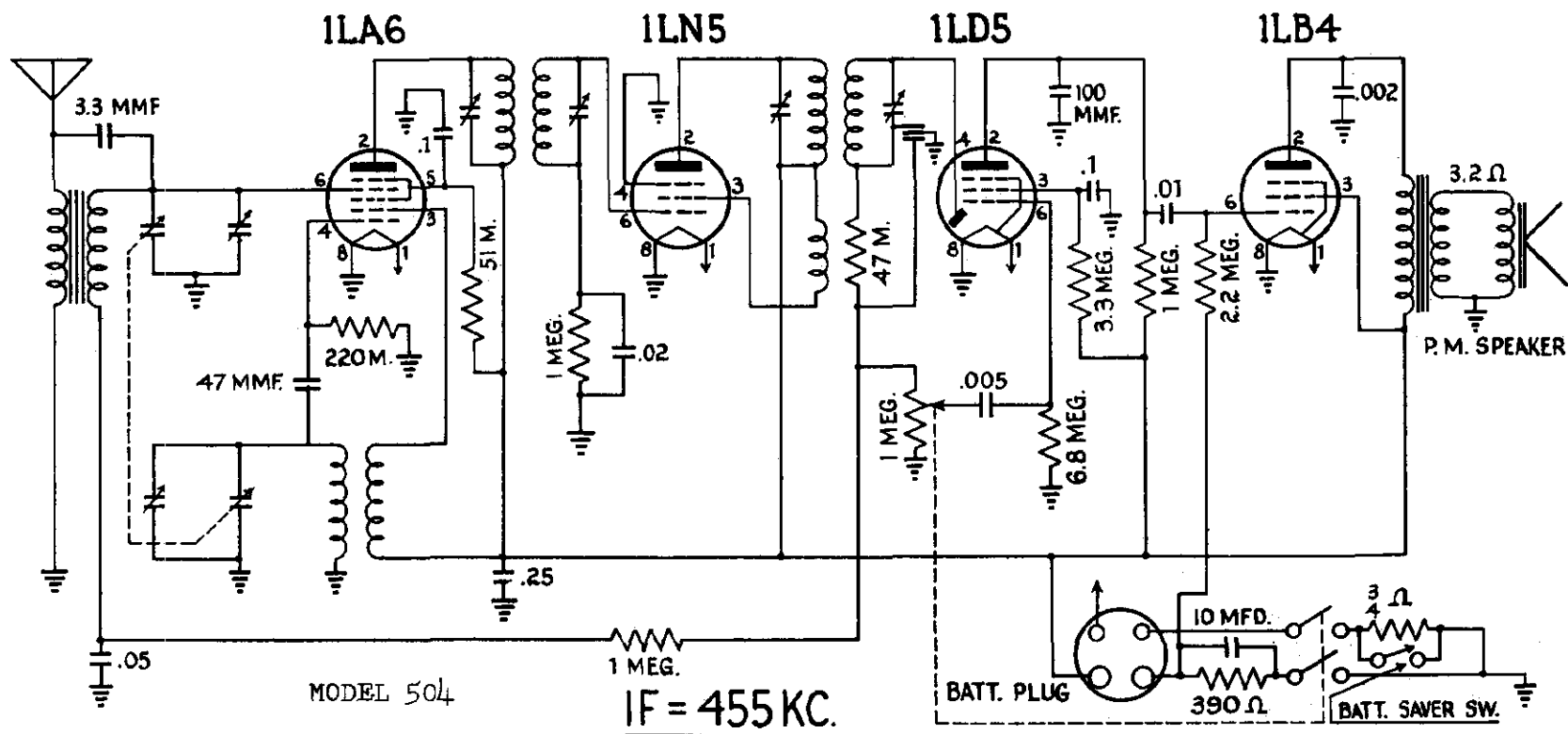
Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
C1	W-145913-2	Capacitor, 110 mmf., 5%, 500 v., ceramic	R14	39373-33	Resistor, 1000 ohm, 1/2 w.
C2	B-143686-3	Capacitor, 100 mmf., 500 v., molded disc ceramic	R15	39373-92	Resistor, 1 megohm, 1/2 w.
C3	B-143223-7	Capacitor, 100 mmf., 500 v., mica	R16	39373-80	Resistor, 22,000 ohm, 1/2 w.
C4	C-144675-2	Capacitor, .005 mfd., 500 v., disc ceramic	R17	39373-33	Resistor, 1000 ohm, 1/2 w.
C5A	C-149125	Capacitor, Variable	R18	B-149184	Control, Volume (3 megohm-Tap 300,000 ohm)
C5B		Capacitor, Variable	R19	39373-87	Resistor, 47,000 ohm, 1/2 w.
C5C		Capacitor, Variable	R20	39373-87	Resistor, 470,000 ohm, 1/2 w.
C5D		Capacitor, Variable	R21	39374-15	Resistor, 150 ohm, 10%, 1/2 w.
C6A	C-144675-7	Capacitor, .001 mfd., 500 v. } Two section	R22	39373-87	Resistor, 470,000 ohm, 1/2 w.
C6B		Capacitor, .001 mfd., 500 v. } disc ceramic	R23	39373-107	Resistor, 10 megohm, 1/2 w.
C8	B-143686-5	Capacitor, 2.2 mmf., 500 v., molded disc ceramic	R24	39374-185	Resistor, 47 ohm, 10%, 2 w.
C9	C-137727-48	Capacitor, 5000 mmf., 500 v., ceramic	R25	39374-202	Resistor, 1200 ohm, 10%, 2 w.
C10	B-143223-12	Capacitor, 100 mmf., 5%, 500 v., mica	R26	39374-25	Resistor, 1000 ohm, 10%, 1/2 w.
C11	39001-17	Capacitor, .05 mfd., 600 v., paper	R27	39374-33	Resistor, 4700 ohm, 10%, 1/2 w.
C12	39001-17	Capacitor, .05 mfd., 600 v., paper	R28	39373-80	Resistor, 680,000 ohm, 1/2 w.
C13A	C-144675-7	Capacitor, .001 mfd., 500 v. } Two section	CA1	C-132300-8	Cable & Plug Assy., Power
C13B		Capacitor, .001 mfd., 500 v. } disc ceramic	I1	W-145851	Bulb (Dial), 7 w., 120 v., Candelabra Base
C14	C-137727-48	Capacitor, 5000 mmf., 500 v., ceramic	SP1	C-145768	Speaker
C15	39008-91	Capacitor, 3.3 mmf., Spiral Shield Wire	SR1	B-145370	Rectifier, Selenium
C16A	C-144675-7	Capacitor, .001 mfd., 500 v. } Two section	SW1	W-145300-2	Switch, Band Change
C16B		Capacitor, .001 mfd., 500 v. } disc ceramic	SW2		Part of R18
C17	B-142958	Capacitor, 4 mfd., 50 v., Electrolytic	T1	D-145025-3	Transformer, 1st I.F. (10.7 mc.)
C18	C-137727-48	Capacitor, 5000 mmf., 500 v., ceramic	T2	AC-139919-3	Transformer, 1st I.F. (455 kc.)
C19	C-137727-98	Capacitor, 22 mmf., 2%, 500 v., ceramic	T3	D-145025-1	Transformer, 2nd I.F. (10.7 mc.)
C20	C-137727-97	Capacitor, 39 mmf., 10%, 500 v., ceramic	T4	AC-139919-3	Transformer, 2nd I.F. (455 kc.)
C22A	C-144675-12	Capacitor, .001 mfd., 500 v. } Two section	T5	C-145193-1	Transformer, Ratio Detector
C22B		Capacitor, .0001 mfd., 500 v. } disc ceramic	T6	138131-1	Transformer, Output
C24	C-137727-109	Capacitor, 39 mmf., 10%, 200 v., ceramic	L1	AW-145695	Coil Assy., F.M. Antenna Primary
C25A	C-144675-18	Capacitor, .0001 mfd., 500 v. } Three sec-	L2	AW-145724	Coil Assy., F.M. Antenna Secondary
C25B		Capacitor, .004 mfd., 500 v. } tion disc	L3	AW-143837	Choke Assy., R.F. (F.M.)
C25C		Capacitor, .004 mfd., 500 v. } ceramic	L4	AW-145678	Coil Assy., R.F. (F.M.)
C26	39001-13	Capacitor, .01 mfd., 600 v., paper	L5	AW-145677	Coil Assy., Oscillator (F.M.)
C27A	C-144675-1	Capacitor, .0002 mfd., 500 v. } Four sec-	L6	AW-145372	Coil Assy., Oscillator (A.M.)
C27B		Capacitor, .002 mfd., 500 v. } tion disc	L7	AW-143934	Choke Assy., R.F.
C27C		Capacitor, .005 mfd., 500 v. } ceramic	L8	AW-143934	Choke Assy., R.F.
C27D		Capacitor, .0002 mfd., 500 v. } ceramic	L9	AC-145876	Loop Antenna, Back & Power Cable Assy.
C28	39001-13	Capacitor, .01 mfd., 600 v., paper	L10	AW-149187	Choke Assy.
C29	39001-17	Capacitor, .05 mfd., 600 v., paper	L11	AW-149187	Choke Assy.
C30A	B-149183	Capacitor, 100 mfd., 150 v. } Three sec-	P1	W-139900	Plug, Interlock
C30B		Capacitor, 30 mfd., 150 v. } tion elec-	AB-149176		Background & Cloth Assy., Dial
C30C		Capacitor, 10 mfd., 150 v. } trolytic	AB-149145		Baffle Assembly, Speaker
C31	B-143686-1	Capacitor, 50 mmf., 500 v., molded disc ceramic	AW-149073		Bracket Assembly, Dial Pointer
C32	39001-18	Capacitor, .075 mfd., 600 v., paper	AW-145897		Bushing & Insulator, Drive Shaft
C33	B-143686-3	Capacitor, 100 mmf., 500 v., molded disc ceramic	AC-149317-1		Cabinet (11-126U)
C34	39001-20	Capacitor, .15 mfd., 600 v., paper	AC-149317-2		Cabinet (11-127U)
C35	W-137398-5	Capacitor, 3.3 mmf., 500 v.	AC-139317-3		Cabinet (11-128U)
C36	39001-74	Capacitor, .002 mfd., 600 v., paper	AC-149317-4		Cabinet (11-129U)
C37	39001-5	Capacitor, .0005 mfd., 600 v., paper	AW-145103		Connector, F.M. Line Antenna
C38	Part of T1	Capacitor, 17 mmf., 3%	W-131154-1		Cotter (External), Drive Shaft
C39	Part of T2	Capacitor, 106 mmf., 5%	C-149154		Dial
C40	Part of T2	Capacitor, 131 mmf., 5%	W-138853		Insulator, Volume Control
C41	Part of T3	Capacitor, 17 mmf., 3%	B-149065-1		Knob (11-126U)
C42	Part of T3	Capacitor, 17 mmf., 3%	B-149065-2		Knob (11-127U)
C43	Part of T4	Capacitor, 131 mmf., 5%	B-149065-3		Knob (11-128U)
C44	Part of T4	Capacitor, 106 mmf., 5%	B-149065-4		Knob (11-129U)
C45	Part of T5	Capacitor, 43 mmf., 5%	B-148080-4		Medallion
R1	39373-92	Resistor, 1 megohm, 1/2 w.	W-149104		Pointer, Dial
R2	39373-92	Resistor, 1 megohm, 1/2 w.	W-143208-3		Shaft, Dial Drive
R3	39373-44	Resistor, 3300 ohm, 1/2 w.	AB-149113		Shaft & Gear Assy., Dial Pointer
R4	39373-92	Resistor, 1 megohm, 1/2 w.	W-139040		Shock Mount, Sub-Chassis
R5	39373-14	Resistor, 100 ohm, 1/2 w.	AB-145818		Socket & Bracket Assy., Dial Light
R6	39374-42	Resistor, 27,000 ohm, 10%, 1/2 w.	W-144732		Socket, Tube (V2)
R7	39374-41	Resistor, 22,000 ohm, 10%, 1/2 w.	W-145607		Socket, Tube (V5)
R8	39373-26	Resistor, 470 ohm, 1/2 w.	W-142761		Socket, Tube (V6, V1)
R9	39373-97	Resistor, 2.2 megohm, 1/2 w.	39462-1		Socket, Tube (V7)
R10	39373-100	Resistor, 3.3 megohm, 1/2 w.	39462-2		Socket, Tube (V3, V4)
R11	39373-33	Resistor, 1000 ohm, 1/2 w.	W-149096		Spring, Gear
R12	39373-87	Resistor, 47,000 ohm, 1/2 w.	W-145757		Spring, Drive Cord
R13	39373-74	Resistor, 100,000 ohm, 1/2 w.	W-139121		Stud (Insulated), Chassis Mtg.
			W-138976		Washer (Shouldered), Volume Control



ANT. COIL 3D30
 OSC. COIL 3D29
 GANG COND. 7D6
 FIRST I.F. 3031
 SECOND I.F. 3032
 OUTPUT TRANS. 12D10
 SPEAKER 18D11

MODELS 504, 504Q
 ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIG. GENERATOR TO	SET SIG. GENERATOR TO	TUNE RECEIVER TO	ADJUST THE FOLLOWING FOR MAX. OUTPUT (KEEP SIG FROM GEN AS LOW AS POSSIBLE AT ALL TIMES.)
1.	RF SECTION OF TUNING COND. IN SERIES WITH .1 CONDENSER	455KC	FULL CLOCKWISE POSITION (COND PLATES ALL WAY OPEN)	PRIMARY & SECONDARY OF 2nd I.F. TRANSFORMER
2.	" "	" "	" "	PRIMARY & SECONDARY OF 1st I.F. TRANSFORMER

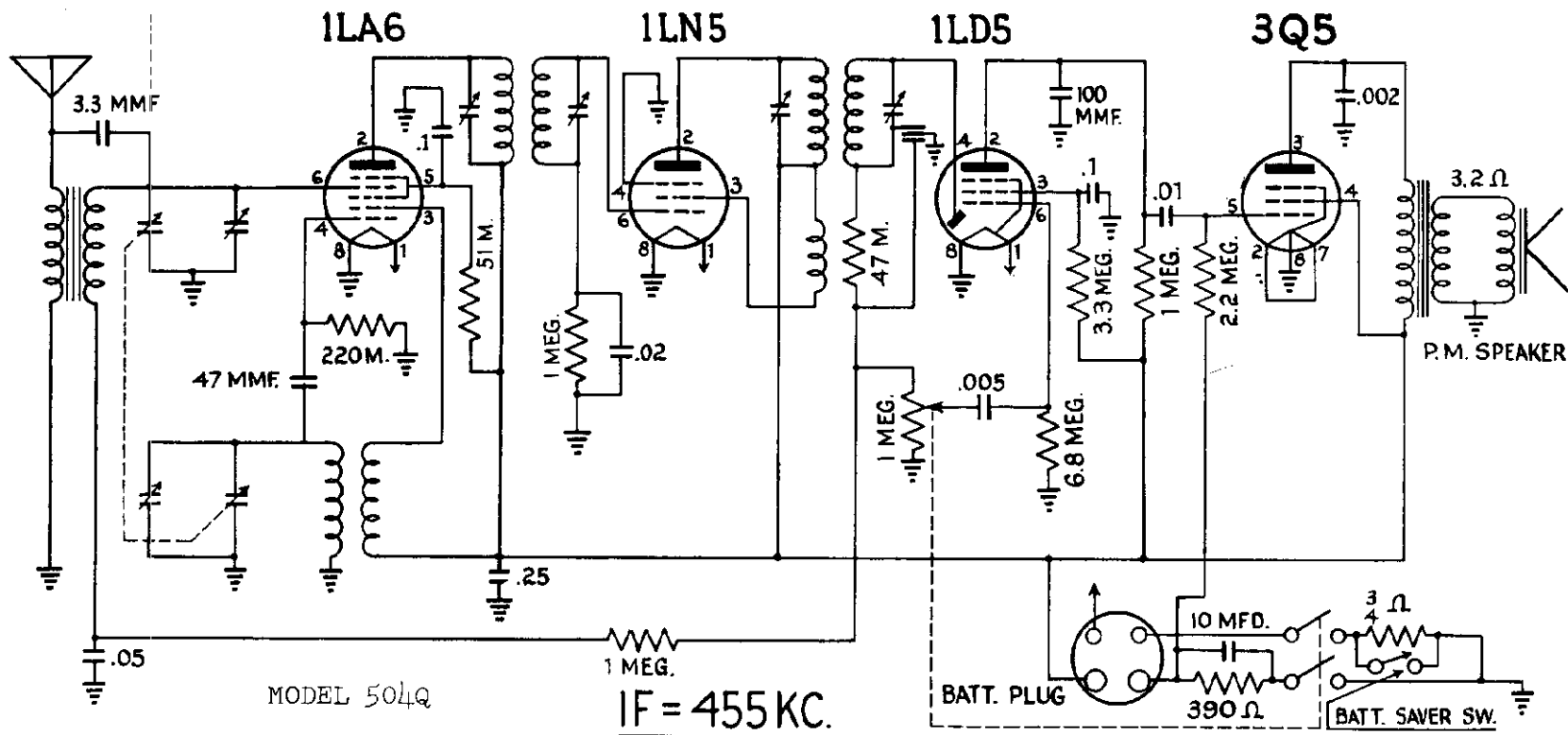


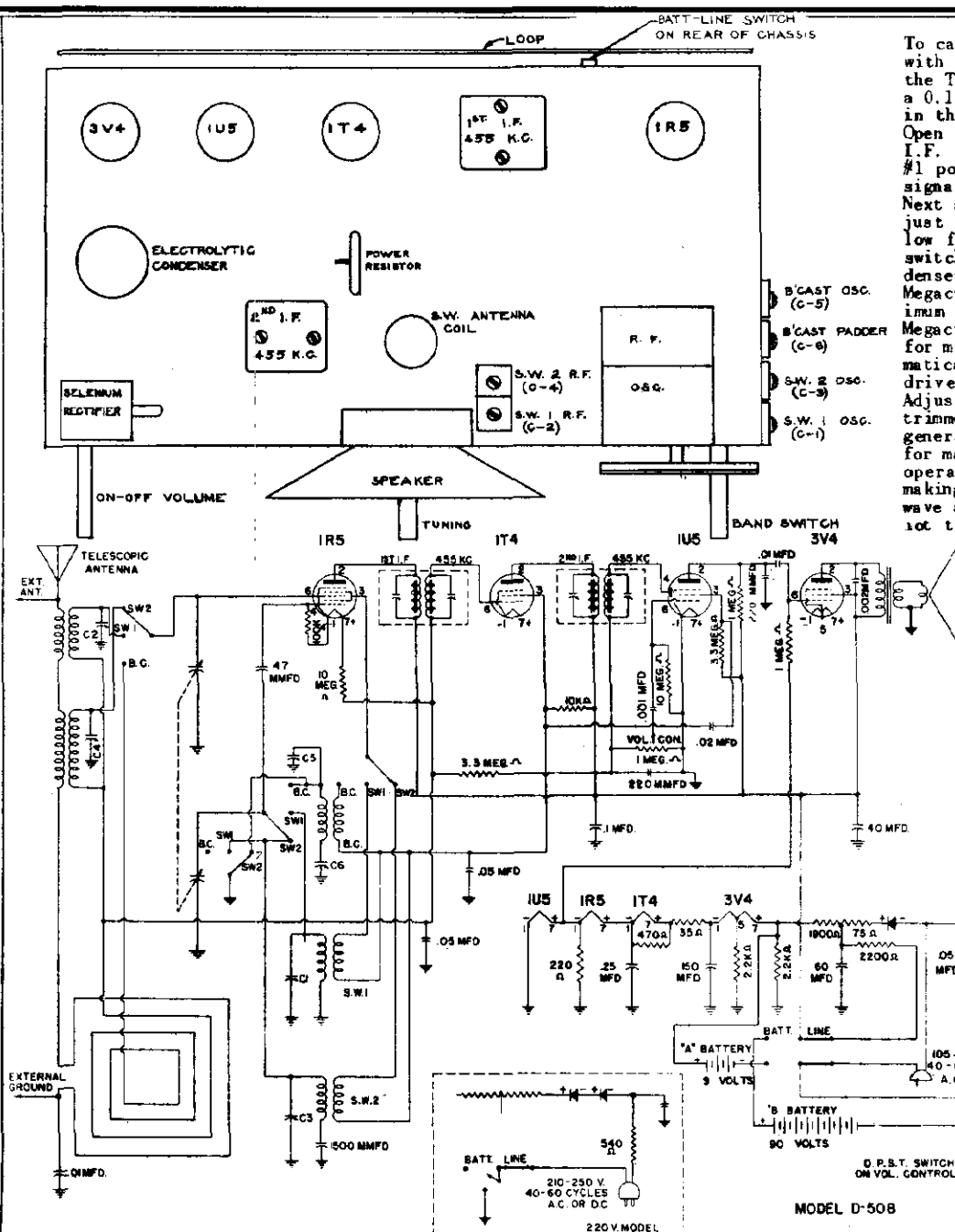
ALIGNMENT PROCEDURE (CONT'D)

3.	REPEAT STEPS #1 & #2.			
4.	ANTENNA WIRE IN SERIES WITH .00025 MICA COND.	1600 KC	1600 KC (160 ON DIAL)	OSC. TRIMMER LOCATED ON VARIABLE COND. ACCESSIBLE THRU HOLE IN DIAL BRACKET
5.	" "	1400 KC	MAX. SIG. APPROX. 140 ON DIAL	ANT. TRIMMER LOCATED ON VARIABLE CONDENSER

ANT. COIL 3D30
OSC. COIL 3D29
GANG COND. 7D6
FIRST I.F. 3D31
SECOND I.F. 3D32
OUTPUT TRANS. 12D2
SPEAKER 18D11

NOTE: BE SURE THAT THE BLACK GROUND LEAD OF RECEIVER IS ATTACHED TO GROUND OF SIGNAL GENERATOR DURING ALL THE ABOVE OPERATIONS.





To calibrate receiver connect the output of signal generator in series with a 200 MMFD fixed condenser to the external antenna lead (coming from the Telescopic Antenna). Connect the low side of signal generator through a 0.1 MFD condenser to receiver chassis. The wave band switch should be in the broadcast position. Adjust signal generator to 455 Kilocycles. Open the receiver variable condenser for minimum capacity. Adjust both I.F. transformers for maximum signal. Turn the bandswitch to Short Wave #1 position. Set signal generator at 16.7 Megacycles. Tune in this signal. Peak Short Wave #1 oscillator trimmer (C1) for maximum signal. Next set signal generator at 15.7 Megacycles. Tune in this signal. Adjust Short Wave #1 R.F. trimmer (C2) for maximum signal strength. The low frequency end of the dial is automatically adjusted. Next turn band switch to Short Wave #2 position. Rotate drive shaft until variable condenser is in minimum capacity position. Adjust signal generator to 5.5 Megacycles. Adjust the Short Wave #2 oscillator trimmer (C3) until maximum signal from generator is heard. Next set signal generator at 5.0 Megacycles. Tune in this signal. Adjust Short Wave #2 R.F. trimmer (C4) for maximum signal strength. The low frequency end of the dial is automatically adjusted. Next turn bandswitch to broadcast position. Rotate drive shaft until variable condenser is in minimum capacity position. Adjust signal generator to 1700 Kilocycles. Adjust broadcast oscillator trimmer (C5) until maximum signal from generator is heard. Set the signal generator and receiver to 600 Kilocycles. Peak the broadcast padder (C6) for maximum output. The variable condenser should be rocked during this operation. Keep the signal generator output as low as possible when making all of these adjustments. Care should be taken in making the Short wave adjustments, that the fundamental oscillator signal be tuned in and not the image frequency, which will fall below the fundamental.

"A" battery (two required) "B" battery (two required)

Eveready	#746	Eveready	#482
Bright Star	#361	Bright Star	#30-33
Ray-O-Vac	#P83A	Ray-O-Vac	#P7830
Burgess	#G3	Burgess	#M30
Winchester Olin	#4918	Winchester Olin	#6210

The life of the batteries is from 225-275 hours when the receiver is used about two to four hours per day.

RANGE:

B.C. Band	540-1700 Kilocycles	555-175 meters
S.W., Band 1	16.7 to 5.3 Mc.	18-57 meters
S.W., Band 2	5.5 to 1.9 Mc.	54.5-158 meters

TUBES AND FUNCTION:

1-1R5	Converter
1-1T4	I.F. Amplifier
1-1U5	Second Detector and Audio Amplifier
1-3V4	Power Output

REPLACEMENT PARTS LIST

3005-2	35 Ohm, 2 Watt Pigtail	1021-3	Loop Antenna
3007-2	1975 Ohm Metal-Clad	1020-2	B.C. Osc. Coil
	Resistor, 10 Watt	1124	S.W. Osc. Coil
3006C-3	Volume Ctrl with	1125	S.W. Ant. Coil
	Switch	1123	2nd I.F.
4134	Cabinet	1122	1st I.F.
4057A-4	Pointer Knobs	2005-4	Electrolytic
4145-1	Station Selector Knob	2014-5	Variable Condenser
4137	Name Plate	2058	Dual Trimmer
6042	Dial Scale	2057	Quadruple Trimmer
7001D-4	Speaker	8067-1	Telescopic Antenna
8017B-6	Bandswitch	5000	Line Cord for 110V
8019	Battery-Line Switch	5015	Operation
8018B	Selenium Rectifier	9069-3	Resistance Line Cord
			for 220 V Operation
			Drive Spring

MODEL D-508

MODEL D-517

The receiver uses an "A" supply of $4\frac{1}{2}$ volts and a "B" supply of $67\frac{1}{2}$ volts.

For good reception the life of the batteries is from 70 to 80 hours when the receiver is used about two hours per day.

The following or similar batteries may be used with this receiver:

"A" BATTERY $4\frac{1}{2}$ V

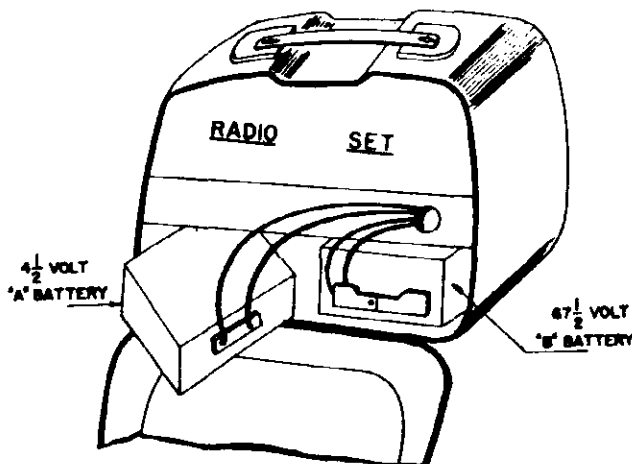
Eveready #746
General #3H3
Ray O Vac #P83A
Burgess #G3

"B" BATTERY $67\frac{1}{2}$ V

#467
#W45A
#P4367
#XX45

To install the batteries in the receiver, proceed as follows:

1. Open back by inserting fingers in slots provided on top of cabinet and pull back open.
 2. Connect battery clips to batteries.
 3. Put batteries in set as shown in sketch.
- BE CAREFUL NOT TO BREAK WIRES CONNECTED TO LOOP ANTENNA.



OPERATION

Battery and Electric Power

When the back of the cabinet is opened a lever switch will be seen. To operate the receiver on batteries move switch to the side marked BATT. Fold up line cord, place in set and close back. For operation of the receiver on electric power, move the lever switch to LINE, bring the line cord out of the cabinet so that when the back is closed, the cord is in the cut out provided, in the corner of the cabinet. The back of the cabinet should always be kept closed when operating the receiver.

NOTE:

If the receiver is operated on direct current and no signals are heard, reverse the line plug in the electric outlet.

If slight hum is heard when operating the receiver on alternating current, reverse the line plug in the electric outlet.

OPERATION

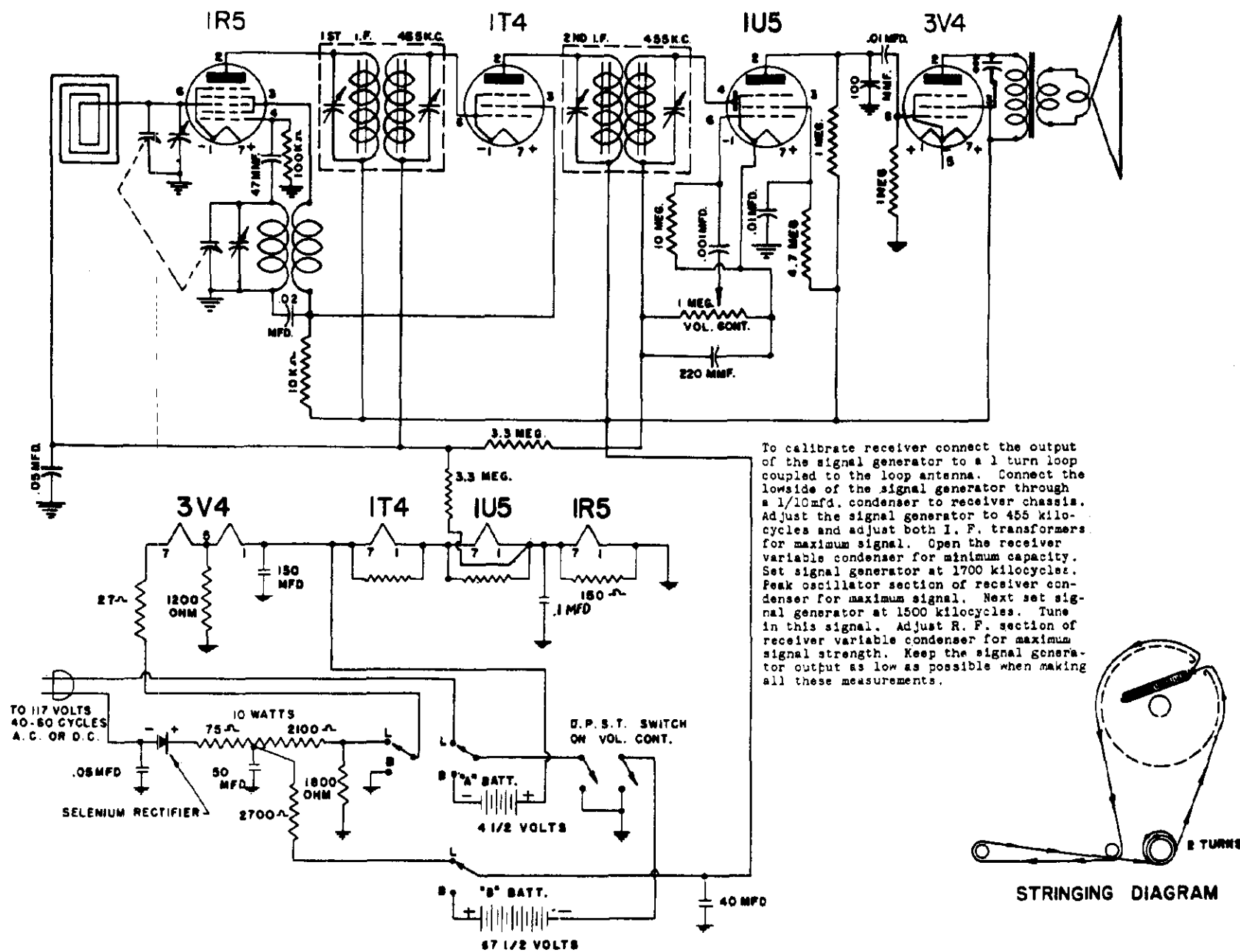
The knob on the left is a combination on off switch and volume control. When the knob is turned fully counter clockwise, the receiver is off and the white dot on the knob will give the relative position. To turn the receiver on, rotate this knob in a clockwise direction; further rotation in this direction increases the volume of the receiver. The control on the right is the station selector or tuning knob.

IMPORTANT

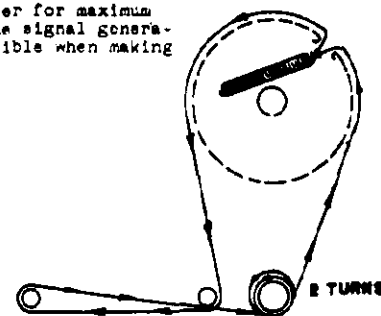
BE SURE THE RECEIVER IS TURNED OFF WHEN NOT IN USE. SINCE THE LOOP ANTENNA USED IN THIS RECEIVER HAS A DIRECTIONAL EFFECT IT MAY BE FOUND NECESSARY AT TIMES TO TURN THE RECEIVER TO OBTAIN BEST RECEPTION AND A MINIMUM OF INTERFERENCE.

LIST OF REPLACEMENT PARTS

1st I.F.	1027C-4	Variable Cond.	2017B
2nd I.F.	1027-1	Electrolytic Cond.	2020B
Osc. Coil	1034	Volume Control	3012
Ant. Loop	1037	Cabinet	4064
Batt. Cable	5005	Speaker	7003B3
Knobs	4055A	Sel. Rect.	8018A



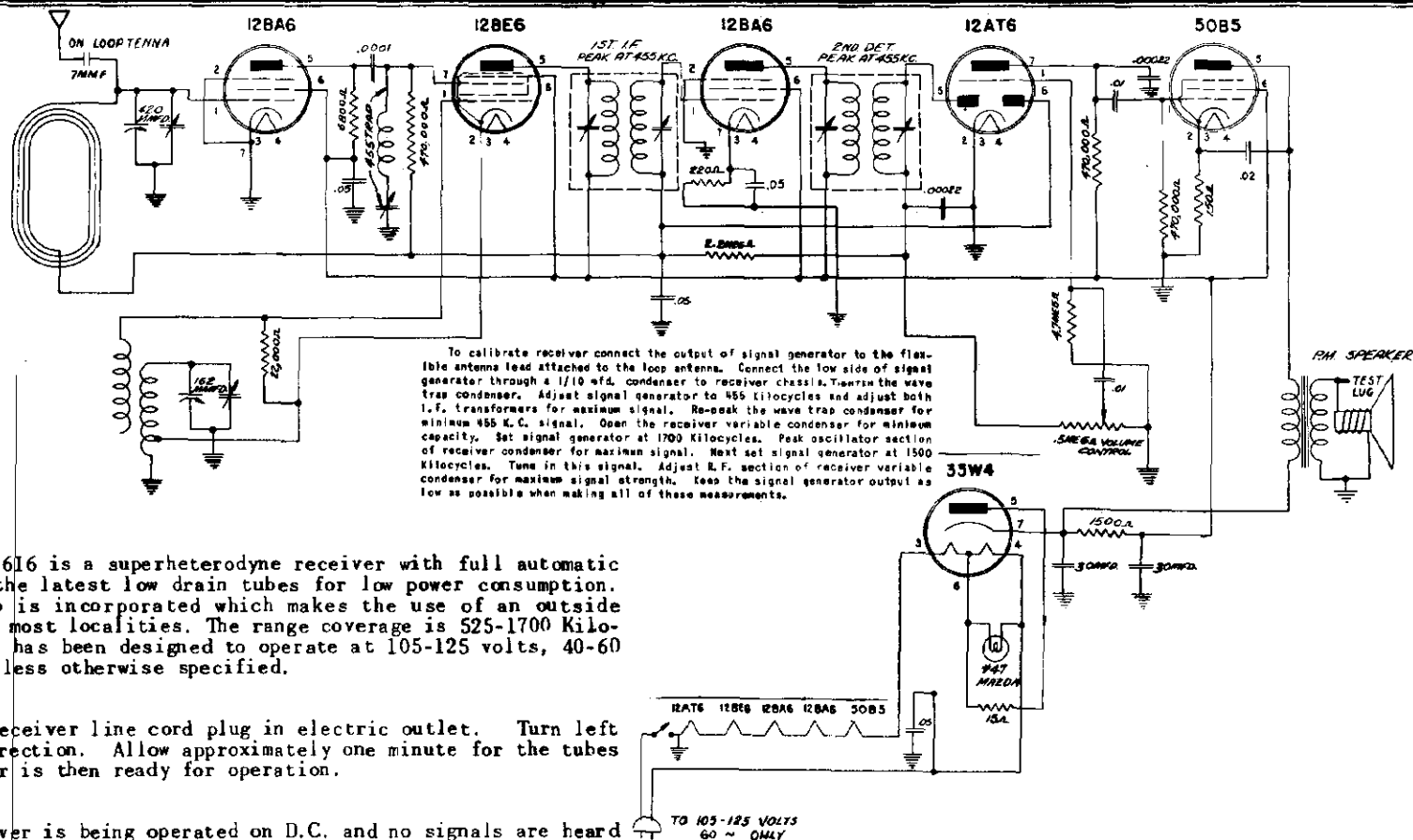
To calibrate receiver connect the output of the signal generator to a 1 turn loop coupled to the loop antenna. Connect the lowside of the signal generator through a 1/10mfd. condenser to receiver chassis. Adjust the signal generator to 455 kilocycles and adjust both I. F. transformers for maximum signal. Open the receiver variable condenser for minimum capacity. Set signal generator at 1700 kilocycles. Peak oscillator section of receiver condenser for maximum signal. Next set signal generator at 1500 kilocycles. Tune in this signal. Adjust R. F. section of receiver variable condenser for maximum signal strength. Keep the signal generator output as low as possible when making all these measurements.



STRINGING DIAGRAM

TUBES

12BA6
12BE6
12BA6
12AT6
50B5
35W4



The model D-616 is a superheterodyne receiver with full automatic volume control using the latest low drain tubes for low power consumption. A self contained loop is incorporated which makes the use of an outside antenna unnecessary in most localities. The range coverage is 525-1700 Kilocycles. This receiver has been designed to operate at 105-125 volts, 40-60 cycles A.C. or D.C. unless otherwise specified.

OPERATION:

Insert the receiver line cord plug in electric outlet. Turn left knob in a clockwise direction. Allow approximately one minute for the tubes to heat up and receiver is then ready for operation.

NOTE:

If the receiver is being operated on D.C. and no signals are heard after it has been turned "on" for one minute, reverse the line plug.

ANTENNA:

The receiver operates satisfactorily without an antenna. If additional pick-up is desired, an antenna may be connected to the lead extending from the rear of chassis.

VOLUME CONTROL:

The left knob of the receiver is used as the power switch and volume control. Rotation of this knob in a clockwise direction turns the receiver "on". Further rotation in this direction increases the volume.

STATION SELECTOR:

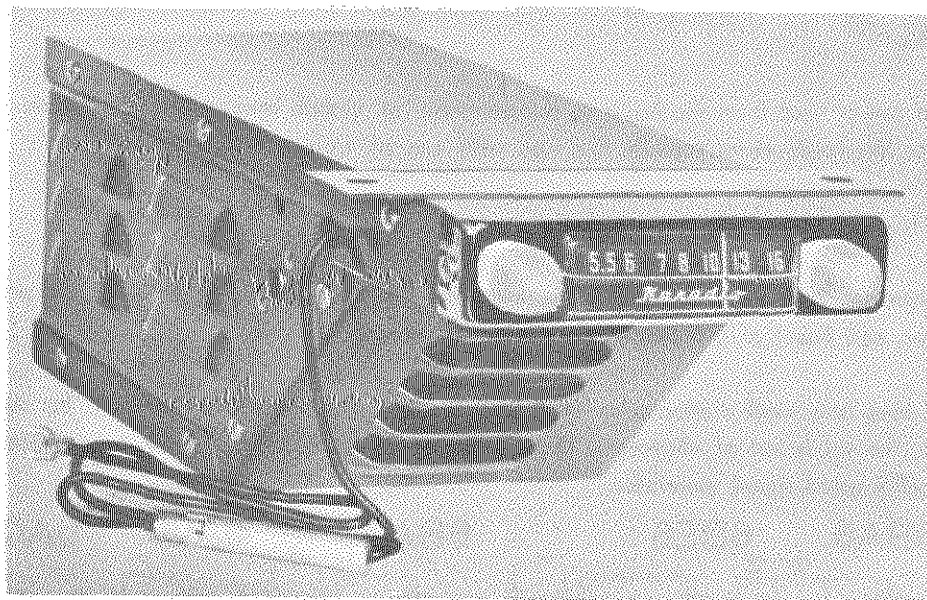
The right hand knob operates the tuning in of stations and pointer. Ease and accuracy in tuning is provided because of a reduction drive.

IMPORTANT:

Since the loop has a directional effect, it may be found necessary to change the angle of the receiver.

REPLACEMENT PARTS

Loop Antenna	1073A	Volume Control and Switch	3013-3
Oscillator coil	1011	Line Cord	5000
1st I.F. coil	1000-3	Dial Scale (Glass)	6000G-3
2nd Detector I.F.	1002B-3	Speaker	7000C-3
Paper Condensers	2000A	Pilot Lamp Socket	8001-1
Ceramic Condensers	2012B	Shaft	9109A-2
Combination Electrolytic	2005-1	Bushing	9818C
Variable Condenser	2003C	Drive Spring	9069-3
1/2 Watt Resistors	3029	Dial Cord	
1 Watt Resistors	3001A	#47 Pilot Lamp	
2 Watt Resistors	3036	Wave Trap Coil	1005
Trimmer Condenser	2056	Dial Pointer	9113A-1
Cabinet, Molded, Mahogany	4077C-2	Knob, Mahogany	4080-4
Cabinet Back	4079-3		



SPECIFICATIONS

Power Supply	6.3 volts DC
Frequency Range	540 KC to 1600 KC
Intermediate Frequency	257.5 KC
Antenna	Whip type
Tuning	Permeability
Speaker	4", P.M. voice coil impedance 3.2 ohms
Power Output	2.5 watts undistorted, 3.5 watts maximum
Sensitivity	1 uv for 500 milliwatts output
Selectivity	40 KC broad at 1000 times, signal at 1000 KC
Signal to Noise Ratio	10 to 1

Tubes used are as follows:

- 6BA6 R.F. Amplifier
- 6BE6 Oscillator-Converter
- 6BA6 I.F. Amplifier
- 6AV6 A.V.C., Detector, and Audio Amplifier
- 6AQ5 Power Output
- 6X4 Power Rectifier

UNPACK CAREFULLY, YOU WILL FIND:

- Radio
- 1 Mounting bracket
- 1 Bag mounting parts:
- Hardware, generator condenser, and distributor resistor.

MOUNTING

The chassis contains the complete radio, power supply, and speaker. This unit may be mounted to, and directly below, the instrument panel at any convenient location. Two holes must be drilled in the stiffening lip of the instrument panel about $\frac{3}{4}$ inch back from the front of the panel and spaced approximately 6 inches apart. These holes must be large enough to pass the two No. 8 machine screws provided in the bag of mounting parts for fastening the radio in place. After the holes are drilled, insert the mounting screws through the holes in the mounting plate of the radio and in the instrument panel lip, and place lock washers and nuts on screws. These nuts must be securely fastened. It is also very important that the paint be removed from the instrument panel lip directly under the nut so that a good ground connection is made.

Drill a hole to pass a No. 10 machine screw in the fire wall or some other convenient place, and bolt one end of the metal strap with series of holes to this place. Insert the $\frac{1}{4}$ -20 stud in tapped hole in the back of the radio, and fasten the mounting strap to the back of the radio by means of this stud, lock washer, and nut. This is the back support for the radio, and good ground connections must also be considered in this assembly.

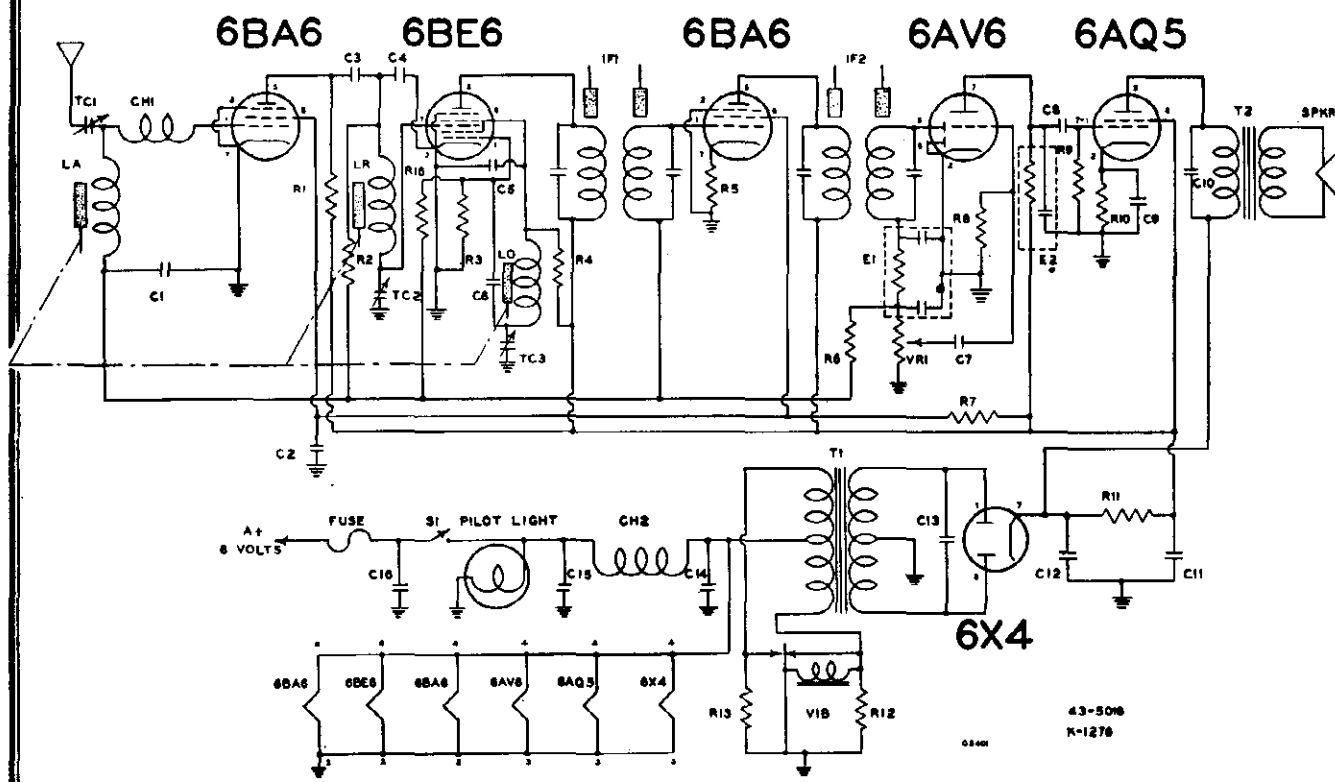
CONNECTIONS

Connect the fused power lead from the radio to the ammeter or circuit breaker of the vehicle. A 10 ampere fuse is provided in this lead; never replace this fuse with one of another value.

The antenna lead is plugged into the antenna jack.

If a second, or external, speaker is desired, a speaker socket is provided. Just connect the proper plug onto this second speaker, and insert plug in the external speaker socket.

After installation, tune in a weak station near 1600 KC, and adjust antenna trimmer, TC1, for maximum volume. If, for any reason, the set is out of alignment, these adjustments must be made by a competent service man and with the use of a good signal generator.



ALIGNMENT PROCEDURE

The following is for use only by competent service men having the proper equipment:

The alignment should be made with volume control fully on and the output voltage from the signal generator as low as possible to prevent A.V.C. action from interfering with the proper alignment. With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is 0.4 volts using a signal which is modulated at 400 c.p.s.

Adjust all trimmers for maximum output. After adjusting IF1 and IF2, "rock" the tuner to make sure that the I.F. coils are not tuned to an image. Repeat the alignment procedure given below as a final check.

SIGNAL GENERATOR

Frequency	Dummy Antenna	Connection To Radio	Position Of Tuner	Adjust for Max. Output
257.5 KC	100 MMFD	6BE6 Grid Pin No. 7	Slugs Out	IF1 & IF2
1610 KC	100 MMFD	Ant. Jack	Slugs Out	TC3
1610 KC	100 MMFD	Ant. Jack	Slugs Out	TC2
1610 KC	100 MMFD	Ant. Jack	Slugs Out	TC1
1400 KC	100 MMFD	Ant. Jack	Tune in Signal Gen.	LA Slug & LR Slug

PARTS NUMBERS

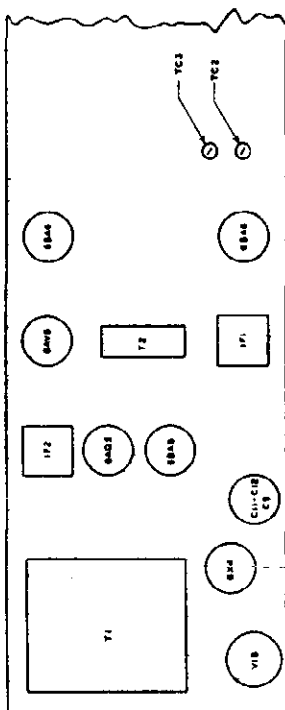
CIRCUIT COMPONENTS

SYMBOL	PART NO.	DESCRIPTION	VALUE	RATING
TC2-TC3	VC1276-2	Dual Trimmer		
TC1	VC1276-1	Trimmer		
C9, C11, C12	C-15-15-25-3.5-.25	Electrolytic	15-15-25 MFD	350-350-25 volts
	C5G	Generator, capacitor	.5 MFD	
C14, C15	C52	Capacitor, paper	.5 MFD	200 volts
C1	CO472	Capacitor, paper	.047 MFD	200 volts
C2	CO474	Capacitor, paper	.047 MFD	400 volts
C8	CO156	Capacitor, paper	.015 MFD	600 volts
C7, C10	CO16	Capacitor, paper	.01 MFD	600 volts
C13	COO5616	Capacitor, buffer	.0056 MFD	1600 volts
C5	C14205M	Capacitor, mica	1420 MMFD	500 volts
C4	C3005M	Capacitor, mica	300 MMFD	500 volts
C6	C505M	Capacitor, mica	50 MMFD	500 volts
C3	C105M	Capacitor, mica	10 MMFD	500 volts
C16	C20020M	Capacitor, spark	200 MMFD	2000 volts
LA	1276LA	Antenna coil		
LR	1276LR	R.F. coil		
LO	1276LO	Oscillator coil		
	LV-1276	Permeability tuner, complete		
CH2	L16	A choke		
CHI	L47	Spark choke	4.7 MH	
T1	PT1276	Vibrator transformer		
T2	OT1276	Output transformer		
IF1, IF2	IF1276	I.F. transformer		
R12, R13	R680.5	Resistor	68 ohms	1/2 watt
R5	R122.5	Resistor	1200 ohms	1/2 watt
R1, R3	R223.5	Resistor	22K ohms	1/2 watt
R4	R333.5	Resistor	33K ohms	1/2 watt
R9	R474.5	Resistor	470K ohms	1/2 watt
R2	R185.5	Resistor	1.8 megohm	1/2 watt
R6	R225.5	Resistor	2.2 megohm	1/2 watt
R8	R106.5	Resistor	10 megohm	1/2 watt
R10	R4511	Resistor	450 ohms	1 watt
R11	R1021	Resistor	1000 ohms	1 watt
R7	R2731	Resistor	27K ohms	1 watt
	R1035	Resistor, suppressor	10K ohms	
VR1	VR1276	Volume control	1 megohm	
S1	VR1276	Switch SP.S.T. on volume control		
E2	CR2	Capristor	270K ohm/100 MMFD	
E1	CR1	Diode filter unit	100-100 MFD/47K ohm	
SPKR	SPK1276	Speaker		
VIB	E659	Vibrator		
Fuse		Fuse 10 ampere		
		Pilot light No. 47		

MECHANICAL PARTS

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
M-1801	Chassis and wrapper	H-81651	Dial rivet
M-1802	Top cover	P-1802	Knob
M-1803	Speaker cover	GR14	Rubber grommet
M-1804	Panel	H-81644-5	Vibrator socket
M-1805	Dial plate	H-81644-6	Miniature tube socket
H-1801	I.F. Mounting clip	H-81644-9	Pilot light socket
H-1802	Speed nut	H-81644-6	Antenna jack
H-1803	Eyelet	H-81644-7	Speaker socket
H-1804	Spade lug No. 10	H-81644-8	Fuse holder
P-1801	Dial scale	H-81641-8	Terminal board No. 8
A-1801	Dial cord assembly	H-81641-3	Terminal board No. 3
M-1806	Dial pointer	H-81641-27	Terminal board No. 27
		H12754	Vibrator clamp

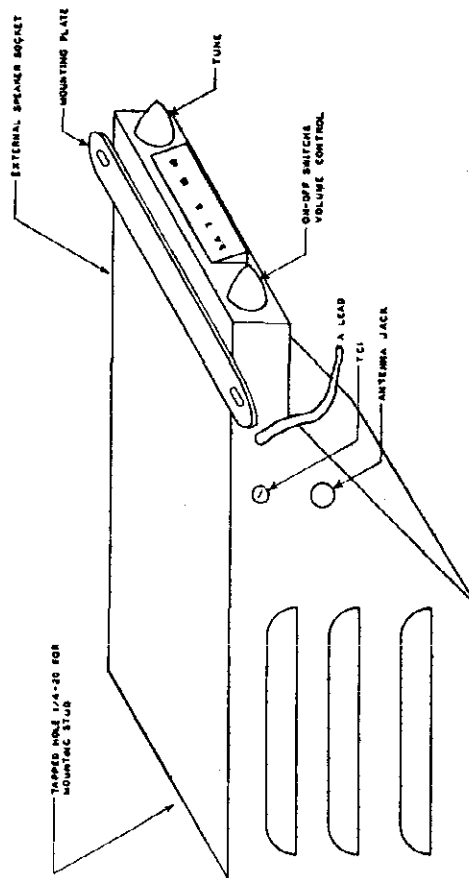
MODEL 1276



43-5046
K-1276

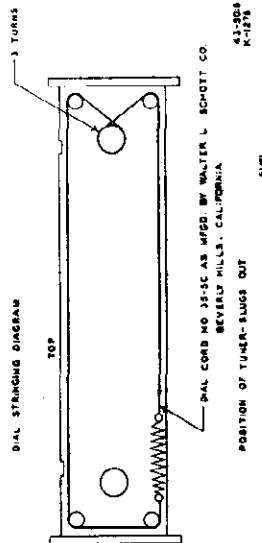
CHASSIS LAYOUT TOP VIEW

(Cut GS402, Chassis layout)



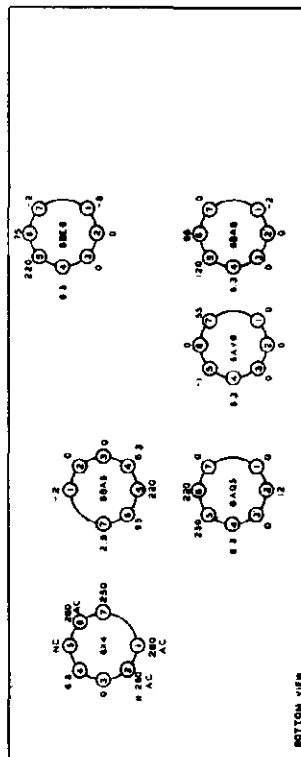
43-5046
K-1276

(Cut GS404, Pictorial view)



43-5046
K-1276

(Cut GS403, Dial stringing diagram)



43-5046
K-1276

(Cut GS405, Voltage chart)

ELIMINATION OF INTERFERENCE

Remove the coil-to-distributor high-tension lead from the distributor. Cut the lead two inches from the end, and screw the distributor resistor onto the coil lead. Then screw the short length onto the resistor, and plug the cable into the distributor cap.

One noise-filter condenser is furnished. Condenser must be connected to the output terminal of the generator (never to the field terminal). The generator-condenser bracket should be fastened to the generator housing, under the screw that holds the field. In some particularly stubborn cases of motor interference, one or more of the following procedures may be necessary:

A condenser can often be used to advantage on the electrically operated oil gauge or gas gauge. Connect the condenser lead to the terminal of the gauge, and bolt the condenser case securely to the frame or some other grounded part of the car.

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw.

In some cases it may be necessary to connect an additional condenser to the ammeter or to the ignition switch.

It may be necessary to use a condenser on the voltage regulator. The condenser case should be mounted under one of the voltage-regulator mounting screws, or at some other convenient location, and the lead connected to the battery terminal of the voltage regulator.

Interference from electric clocks can be eliminated by connecting a condenser to the ammeter terminal. The case of the condenser must be securely grounded.

If tire-static interference is noted in a particular installation, static collector springs should be obtained and installed in the front wheels of the car.

MODEL 634B
Ch. 120097

DESCRIPTION

TYPE: Model 634B is a Single band superheterodyne receiver with a 3-speed automatic record changer.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

Models 634B—chassis 120097B

1—12BE6, converter 1—12AT6, detector, a.v.c., a-f amplifier

1—12BA6, i-f amplifier 1—50B5, power output

1—35W4, rectifier

POWER SUPPLY: 105-125 volts, 60 cycles a.c. only

POWER CONSUMPTION—50 watts.

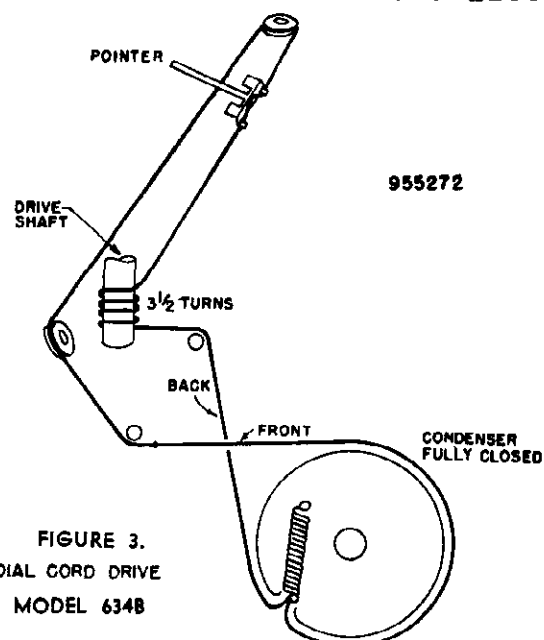


FIGURE 3.
DIAL CORD DRIVE
MODEL 634B

CABINET PARTS LIST (MODEL 634B)

Part No.	DESCRIPTION
140339	Cabinet Assembly (Automatic Changer)
819050-1	Record Changer (3-Speed)
505015	Pickup Plug
580108	Shielded Lead
450041S	Knob—Station Selector—On-Off
450064	Knob—Tone Control
450063	Knob—Radio Phono.
520115-1	Glass Dial
445008	Cork Gasket
410863	Dial Holder
700052	Loop Antenna

CHASSIS PARTS LIST (CHASSIS 120097B)

Symbol	Part No.	DESCRIPTION	Symbol	Part No.	DESCRIPTION
C-1}	900066	Variable Condenser—Tuning	R-3	340270	120 Ohm. Carbon $\frac{1}{2}W \pm 10\%$
C-2}		Variable Condenser—Oscillator	R-4	351330	3.3 Meg. Carbon $\frac{1}{2}W \pm 20\%$
C-3		Trimmer	R-5	510069-1	500,000 Ohm. Volume Control and Switch
C-4	Pt. of C-1	Trimmer	R-6	351490	15 Meg. Carbon $\frac{1}{2}W \pm 20\%$
C-5	Pt. of T-1		R-7	351130	470,000 Ohm. Carbon $\frac{1}{2}W \pm 20\%$
C-6	Pt. of T-1		R-8	351130	470,000 Ohm. Carbon $\frac{1}{2}W \pm 20\%$
C-7	Pt. of T-2		R-9	340290	150 Ohm. Carbon $\frac{1}{2}W \pm 10\%$
C-8	Pt. of T-2		R-10	370490	1,000 Ohm. Carbon $1W \pm 20\%$
C-9A}	470310	220 MMF	R-11	370150	39 Ohm. Carbon $1W \pm 20\%$
C-9B}		2000 MMF			
C-9C}		220 MMF			
C-9D}		5000 MMF	SP-1	180052	PM Speaker—5"
C-10	923104	.01 MF Paper 400V	SW-1	Pt. of R-5	On-Off Switch
C-11	920030	.05 MF Paper 400V	SW-2	Pt. of R-5	Radio-Phono Switch
C-12}	925163	50 MF Electrolytic 150V	SW-3	510068	Tone Control Switch
C-13}		50 MF Electrolytic 150V			
C-14	923105	.05 MF Paper 400V	T-1	720055	1st I.F. Transformer
C-15	920030	.05 MF Paper 400V	T-2	720055	2nd I.F. Transformer
C-16	920030	.05 MF Paper 400V	T-3	734055	Output Transformer
C-17	920040	.1 MF Paper 200V			
C-18	Pt. of L-2	2.2 MMF Ceramic	V-1	800525	Vacuum Tube—12BE6
L-1	716044	Oscillator Coil	V-2	800524	Vacuum Tube—12BA6
L-2	700047	Loop	V-3	800523	Vacuum Tube—12AT6
P-1	583028P	Line Cord & Plug	V-4	800527	Vacuum Tube—50B5
P-2	505015	Pickup Plug	V-5	800526	Vacuum Tube—35W4
R-1	351490	15 Meg. Carbon $\frac{1}{2}W \pm 20\%$	V-6	807000	Dial Light
R-2	340810	22,000 Ohm. Carbon $\frac{1}{2}W \pm 10\%$	X-1	585051	Cable & Socket Assy.—Motor
			X-2	508003	Pickup Socket

MODEL 634B.
Ch. 120097B

ALIGNMENT INSTRUCTIONS — MODEL 634B

1. To position pointer, turn variable condenser fully closed and set pointer to reference mark at low-frequency end of dial backplate.
2. Use isolation transformer if available. If not, connect a .1 mfd. condenser in series with low side of signal generator and B—.
3. Volume control should be at maximum position; radio-phono switch in radio position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated screw driver for adjusting.

STEP	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 mfd.	High side to grid (pin 7) of V1 (12BE6). Low side to chassis.	455 KC	Variable condenser fully open.	Across voice coil.	T2, T1	Adjust for maximum output. If isolation transformer is not used, reduce dummy ant. to .001 mfd. to reduce hum modulation.
2	200 mmf.	Form loop of several turns and radiate signal into receiver.	1620 KC	"	Across voice coil.	Trimmer C-4. (Osc.)	Adjust for maximum output.
3	200 mmf.	"	1400 KC	Tune for maximum output.	Across voice coil.	Trimmer C-3. (Ant.)	Adjust for maximum output.

950137

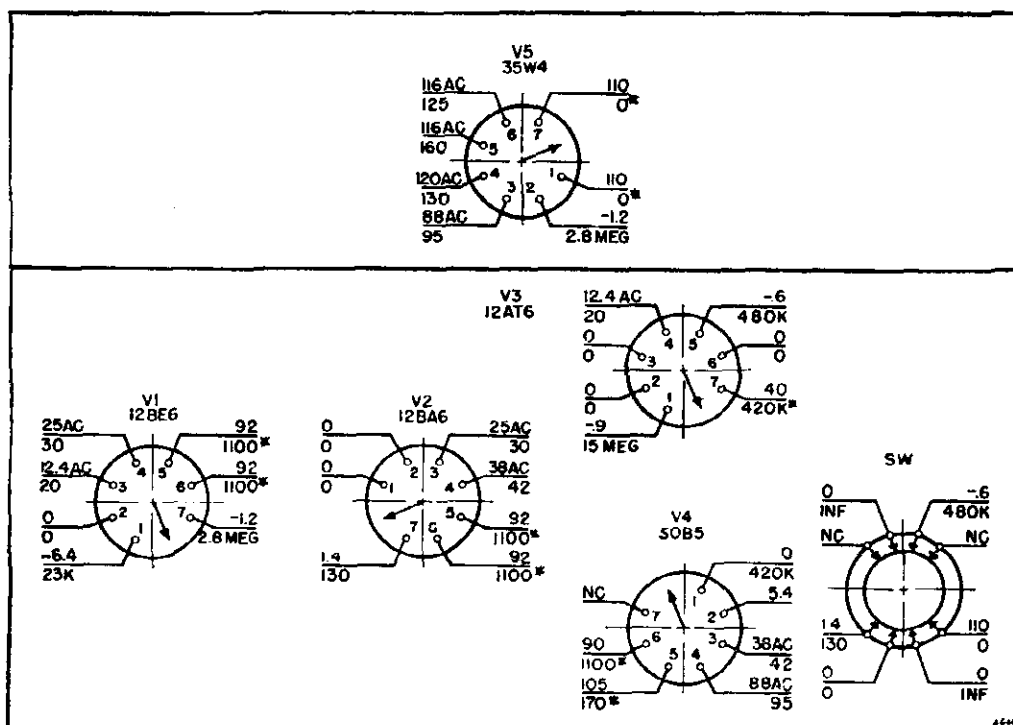
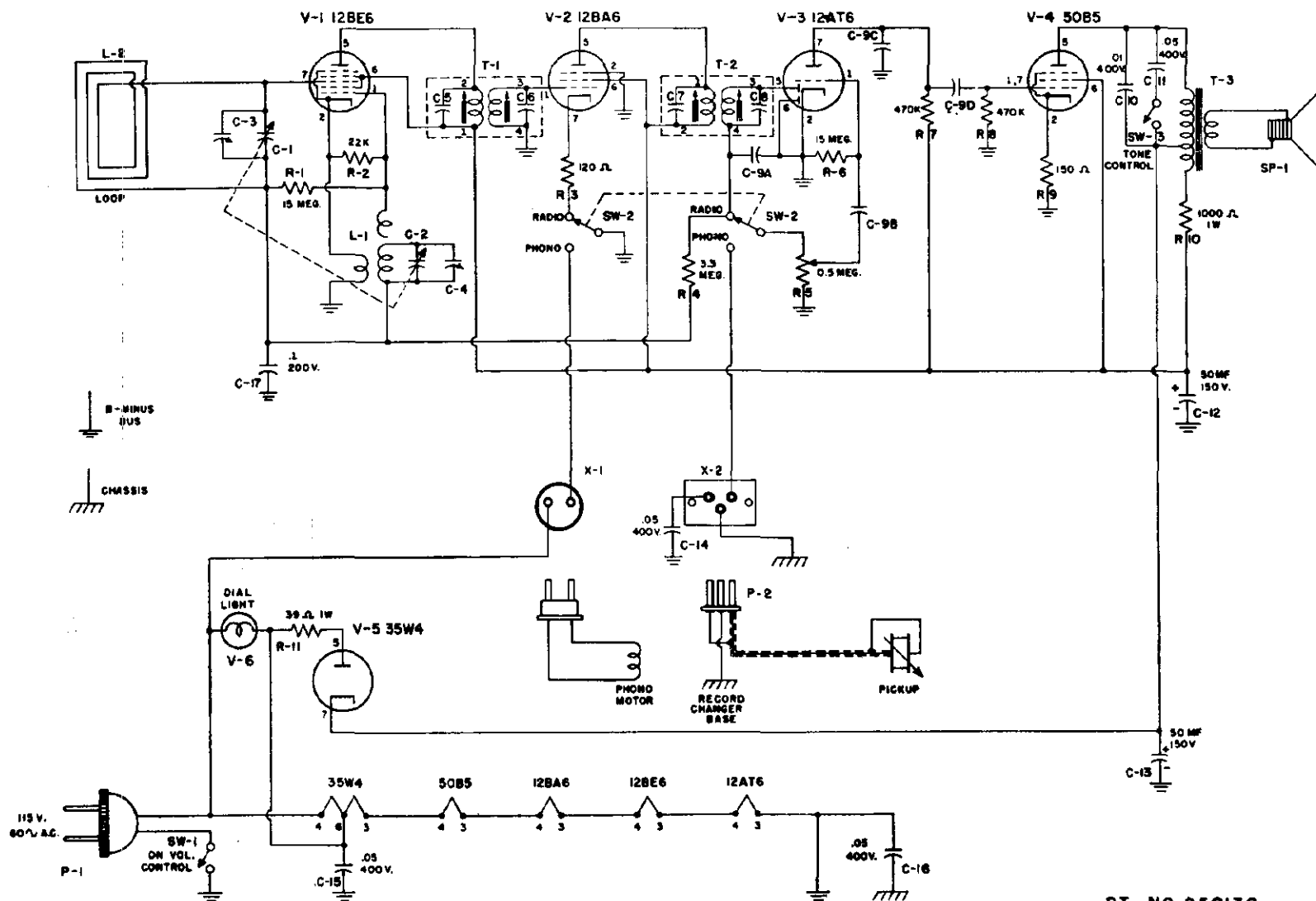


FIG. 2—VOLTAGE AND RESISTANCE CHECK CHART (CHASSIS 120097B)

CONDITIONS FOR VOLTAGE AND RESISTANCE READINGS

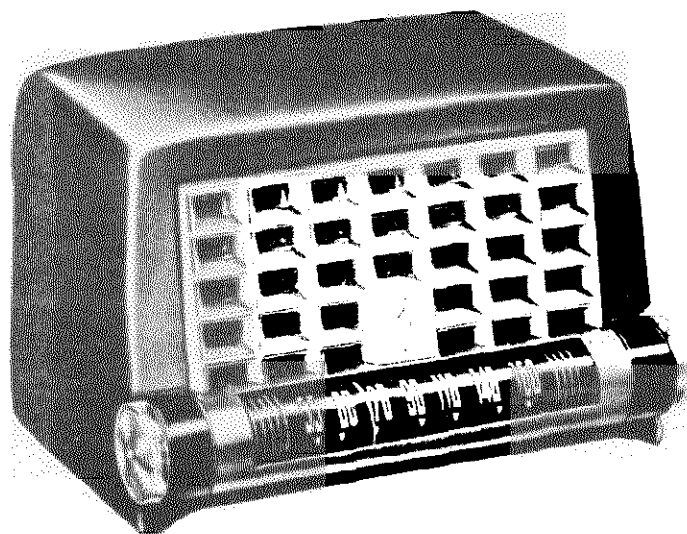
1. Voltages indicated are positive d.c., resistances are in ohms, unless otherwise indicated.
2. Measurements made with voltohmmyst or equivalent.
3. Line voltage maintained at 120 volts a.c. for voltage measurements.
4. Socket connections are shown as bottom views, with measurements from pin to common negative.
5. Volume control at maximum; radio-phono switch in radio position; no signal applied for Model 634B measurements.
6. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
7. On the diagrams, upper values are voltage; lower values are resistance. NC denotes no connection, K is kilohms, MEG is megohms, INF. is infinity. Resistances marked * are measured to pin 7 of rectifier (B+).

DWG. NO. 956019



PT. NO. 950130

MODEL 636,
Ch. 120106A



DESCRIPTION

TYPE: Single-band (AM) superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

- 1—12BE6, converter
- 1—12BA6, i-f amplifier
- 1—12AT6, detector, a.v.c., a-f amplifier
- 1—50B5, power output
- 1—35W4, rectifier

POWER SUPPLY: a.c. or d.c.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. All models have self-contained antennas and do not require additional antenna connections. For permanent home installation, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out at the rear, near the line cord. Use no ground connection.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

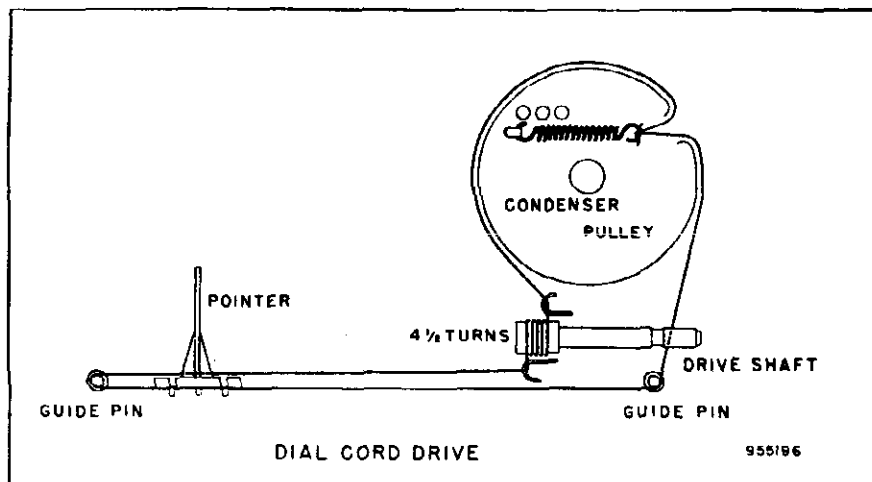
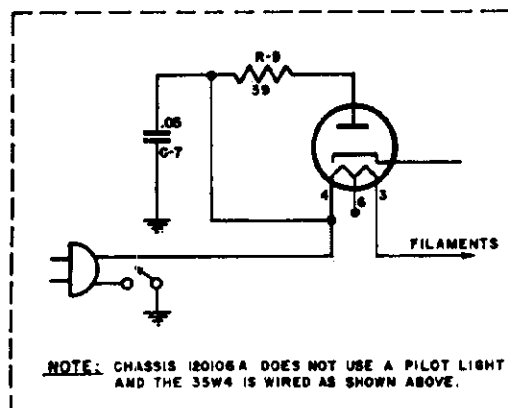
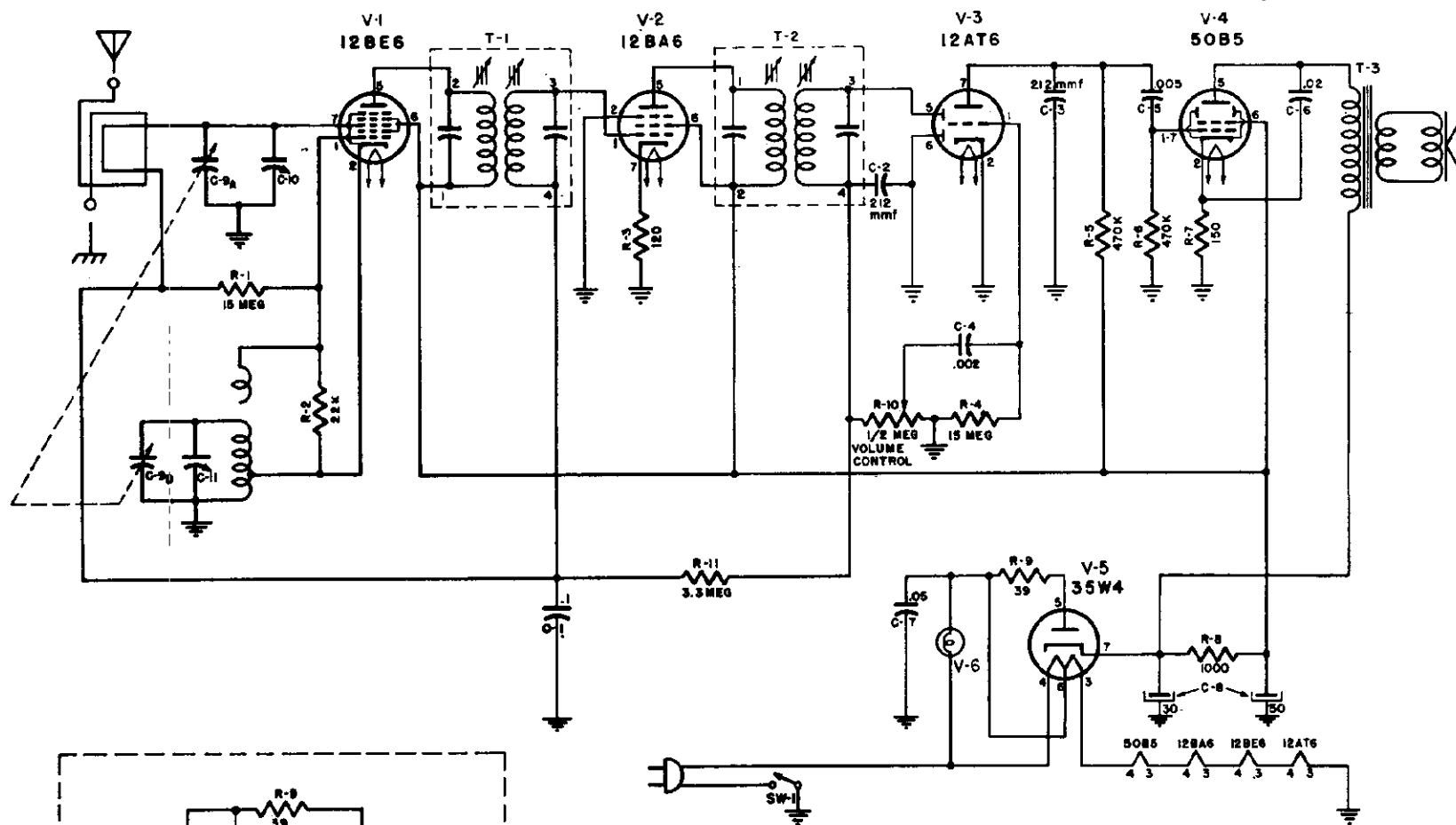


Fig. 2—Dial Cord Stringing, Model 636

DWG. NO. 956008



NOTE: CHASSIS 120106A DOES NOT USE A PILOT LIGHT AND THE 35W4 IS WIRED AS SHOWN ABOVE.

Fig. 1—Schematic Diagram, Chassis 120106A

MODEL 036,
Ch. 120106A

CONDITIONS FOR VOLTAGE AND RESISTANCE READINGS

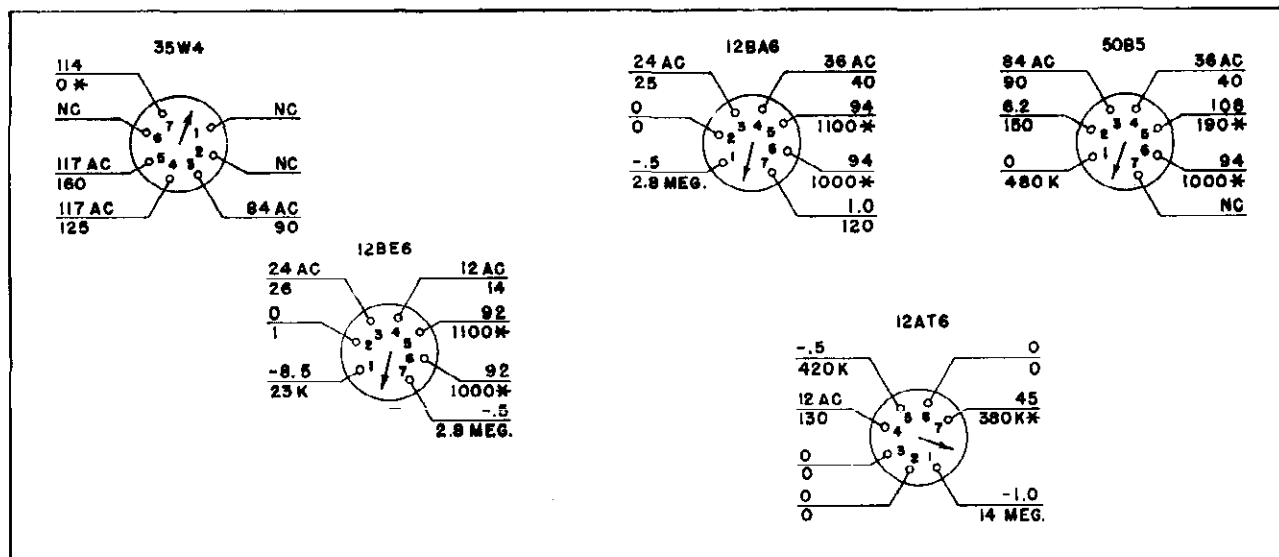
1. Voltages indicated are positive d.c., resistances are in ohms, unless otherwise indicated.
2. Measurements made with voltohmmyst or equivalent.
3. Line voltage maintained at 117 volts a.c. for voltage measurements.
4. Socket connections are shown as bottom views, with measurements from pin to common negative.
5. Volume control at maximum; no signal applied for voltage measurements.
6. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
7. On the diagram, upper values are voltage; lower values are resistance. NC denotes no connection. K is kilohms, MEG is megohms. Resistances marked * are measured to pin 7 of rectifier (B+).

ALIGNMENT INSTRUCTIONS

1. To position pointer, turn variable condenser fully closed and set pointer to reference mark at low-frequency end of dial backplate.
2. Use isolation transformer if available. If not, connect a .1 mfd. condenser in series with low side of signal generator and B—.
3. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated screw driver for adjusting.

STEP	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	1. mfd.	High side to grid (pin 7) of V1 (12BE6). Low side to chassis.	455 KC	Variable condenser fully open.	Across voice coil.	T2, T1 (A1, A2, A3, A4)	Adjust for maximum output. If isolation transformer is not used, reduce dummy ant. to .001 mfd. to reduce hum modulation.
2		Form loop of several turns and radiate signal into receiver.	1620 KC	"	Across voice coil.	Trimmer A5 (Osc.)	Adjust for maximum output.
3		"	1400 KC	Tune for maximum output.	Across voice coil.	Trimmer A6 (Ant.)	Adjust for maximum output.

955312



BOTTOM VIEW OF CHASSIS 120106A

Fig. 3—Voltage and Resistance Diagram, Chassis 120106A

MODEL 636,
Ch. 120106A

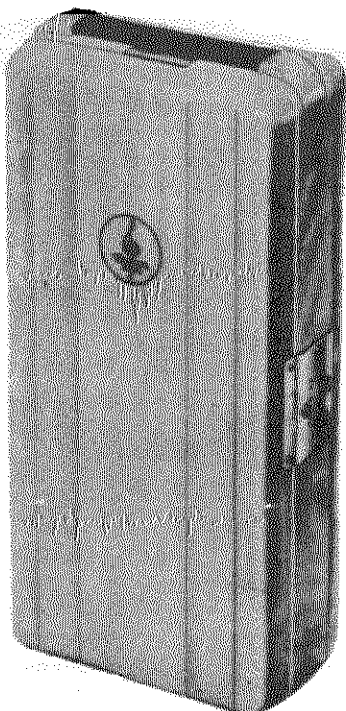
REPLACEMENT PARTS LIST

SYMBOL	PART NO.	DESCRIPTION	SYMBOL	PART NO.	DESCRIPTION
R-1	351490	15 meg, $\frac{1}{2}$ watt, $\pm 20\%$	C-7	920030	.05 mfd., 400 v.
R-2	Pt. of 716018	22,000 ohms, $\frac{1}{2}$ w., $\pm 10\%$	C-8	925061	Electrolytic, 30-50 mfd., 150 v.
R-3	340270	120 ohms, $\frac{1}{2}$ w., $\pm 10\%$	C-9 A & B	900023	Variable capacitor
R-4	351490	15 meg ohms, $\frac{1}{2}$ w., $\pm 20\%$	C-10 & C-11	Pt. of 900023	Trimmers
R-5	351130	470,000 ohms, $\frac{1}{2}$ w., $\pm 20\%$	L-1	700045	Ant. loop and back
R-6	351130	470,000 ohms, $\frac{1}{2}$ w., $\pm 20\%$	L-2	716018	Oscillator coil
R-7	340290	150 ohms, $\frac{1}{2}$ w., $\pm 10\%$			
R-8	370490	1,000 ohms, 1 w., $\pm 10\%$	T-1	720021	1st I.F. transformer
R-9	370150	39 ohms, 1 w., $\pm 10\%$	T-2	720021	2nd I.F. transformer
R-10	390062	$\frac{1}{2}$ meg ohms, volume control	T-3	734023	Output transformer
R-11	351330	3.3 meg ohms, $\frac{1}{2}$ w., $\pm 20\%$			
			SW-1	Pt. of 390062	On-off switch
C-1	920040	.1 mfd., 200 v.	V-1	800528	12BE6 tube
C-2	Pt. of 470310	212 mmf., $\pm 20\%$, ceramic.	V-2	800528	12BA6 tube
C-3	Pt. of 470310	212 mmf., $\pm 20\%$, ceramic.	V-3	800523	12AT6 tube
C-4	Pt. of 470310	.002 mfd., 400 v.	V-4	800527	50B5 tube
C-5	Pt. of 470310	.005 mfd., 400 v.	V-5	800526	35W4 tube
C-6	920020	.02 mfd., 400 v.			

CABINET AND DIAL PARTS

PART NO.	DESCRIPTION
140329	Cabinet, walnut
460078	Grille
575448	Baffle
460088	Knob
520104	Dial backplate
530002	Dial drive cord (31")
280055	Dial drive shaft
587040	Dial drive spring
525033	Pointer

MODEL 640,
Ch. 120112



DESCRIPTION

TYPE: Pocket portable (battery operated) superheterodyne.

FREQUENCY RANGE: 540-1600 kc.

TYPE OF TUBES:

- 1—1R5, converter
- 1—1T4, i-f amplifier
- 1—1U5, detector, a.v.c., a-f amplifier
- 1—3S4, power output

POWER SUPPLY: "A" and "B" batteries.

VOLTAGE RATING:

- "A" Battery—1.5 volts
- "B" Battery—67.5 volts

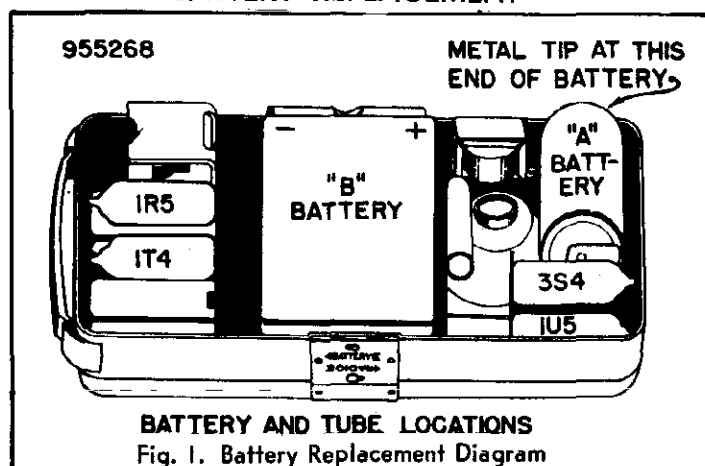
CURRENT DRAIN:

- "A" Battery—0.25 amp.
- "B" Battery—0.0075 amp.

GENERAL NOTES

1. If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.
2. The receiver has a self-contained antenna and does not require additional antenna or ground connections.
3. The self-contained loop antenna has directional properties. It is important, therefore, once the station is tuned in, to rotate the cabinet back and fourth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
4. The receiver is turned on when the lid is open and turned off when the lid is closed. Always close the lid when the set is not in use.
5. Remove batteries as soon as they are exhausted. The "A" battery will require more frequent replacement than the "B" battery.
6. Replace the 1.5 volt "A" battery with standard D-size flashlight cell (1—5/16" dia.). Replace 67.5 volt "B" battery with Eveready Minimax No. 467 or equivalent.

BATTERY REPLACEMENT



1. Slide the button on the release catch marked "Battery" in the direction of the arrow. This loosens the bottom shell and permits it to be swung open on the hinge, making the batteries accessible.
2. Insert the batteries as shown in the above diagram.
3. To reassemble, hold the chassis face down with the batteries in place. Close the bottom shelf over the chassis and press the rear shell so that it snaps into place.

MODEL 640,
Ch. 120112

ALIGNMENT INSTRUCTIONS

1. To position pointer, turn variable condenser fully closed and set pointer to reference mark at low-frequency end of dial back-plate.
2. Volume control should be at maximum; output of signal generator should be no higher than necessary to obtain an output reading.
3. Maintain loop in same position relative to chassis, if chassis is removed from cabinet.

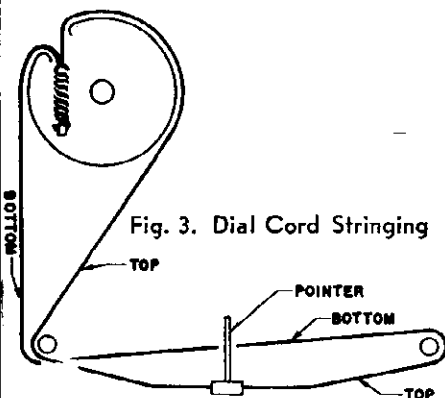
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 mfd.	High side to pin 6 (grid) of 1R5. Low side to chassis.	455 KC.	Tuning condenser fully open.	Across voice coil.	T2 and T1	Adjust for maximum output.
2		Loop	1620 KC.	"	"	C4 (osc. trimmer)	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1400 KC.	Tune for maximum output.	"	C3 (Ant. trimmer)	Adjust for maximum output.

REPLACEMENT PARTS LIST

Symbol	†Part No.	DESCRIPTION	Symbol	†Part No.	DESCRIPTION
C1) C2)	900068	Two gang variable condenser	R2	340470	820 ohms, ½ watt, ±10%
C3)	Part of C1	Trimmer, antenna	R3	390117	1 megohm, volume control
C4)	Part of C2	Trimmer, oscillator	R4	351450	10 megohms, ½ watt, ±20%
C5) C6)	Part of T1	Trimmers	R5	351330	3.3 megohms, ½ watt, ±20%
C7) C8)	Part of T2	Trimmers	R6	351130	470,000 ohms, ½ watt, ±20%
C9	928013	100 mmf., ceramic	R7	351330	3.3 megohms, ½ watt, ±20%
C10	920495	.001 mfd., 200 volt	R8	340730	10,000 ohms, ½ watt, ±10%
C11	920496	.005 mfd., 200 volt	R9	351330	3.3 megohms, ½ watt, ±20%
C12	928104	212 mmf., ceramic	SP1	180064	PM speaker
C13	920495	.001 mfd., 200 volt	T1	720111	I-F transformer
C14	928013	100 mmf., ceramic	T2	720111	I-F transformer
C15	920494	.05 mfd., 200 volt	T3	734056	Output transformer
C16	920120	.02 mfd., 100 volt	T4	716047	Oscillator coil
C17	925164	16 mfd., 100 volt elect.	V1	800110	1R5, converter
C18	920485	.01 mfd., 100 volt	V2	800130	1T4, i-f amplifier
L1	700048	Loop antenna	V3	800019	1U5, det., a.v.c., a-f amp.
R1	350970	100,000 ohms, ½ watt, ±20%	V4	800170	3S4, power output

CABINET AND DIAL PARTS

955309



†PART No.	DESCRIPTION	†PART No.	DESCRIPTION
140312	Case shell—saddle tan	460148	Handle
140313	Top cover—sand	410845	Snap latch—male
460144	Knob—sand	410850	Dual snap latch assembly
140314	Bottom cover—sand	587008	Spring
460147	Handle catch—saddle tan	700048	Loop
140336	Case shell—sand	630110	Loop cover
140337	Top cover—saddle tan	575528	Grille and baffle assembly
460145	Knob—saddle tan	520121	Dial crystal
140338	Bottom cover—saddle tan		
460149	Handle catch—sand		

†Specify part number when ordering.

MODEL 640,
Ch. 120112

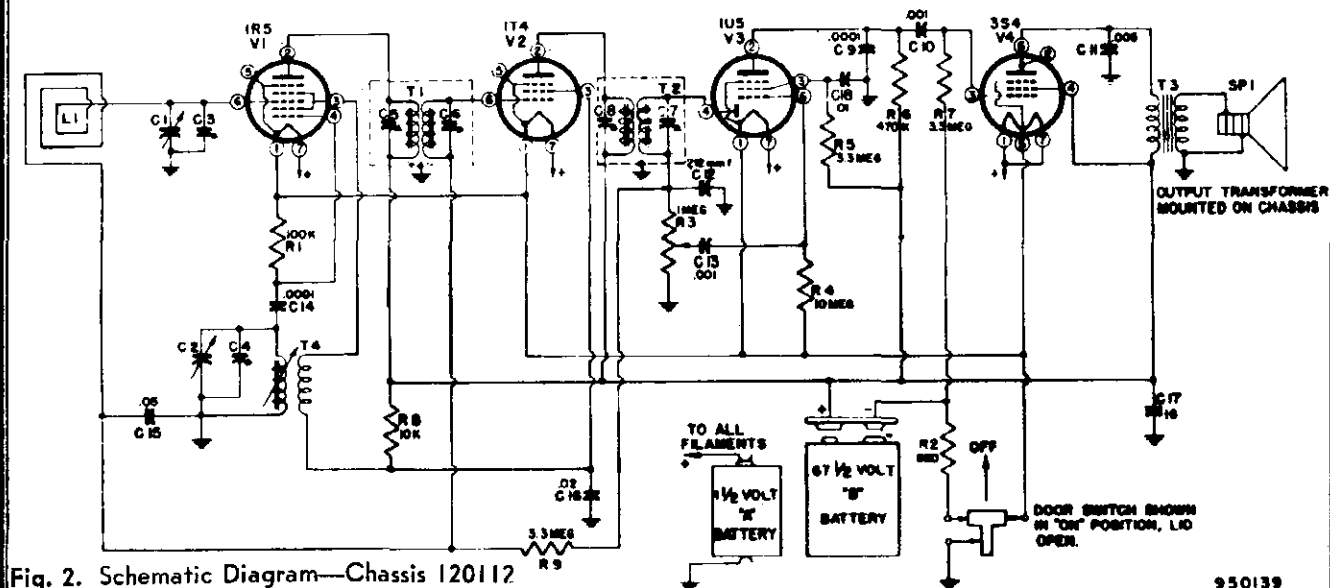


Fig. 2. Schematic Diagram—Chassis 120112

950139

CONDITIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltages indicated are positive d.c., resistances in ohms, unless otherwise noted.
2. Measurements made with voltohmmyst or equivalent.
3. Socket connections are shown as bottom views, with measurements from pin to chassis.
4. Volume control at maximum, no signal applied, for voltage measurements.
5. Nominal tolerance in component valves makes possible a variation of $\pm 15\%$ in readings.
6. On the diagram, upper valves are voltage, lower valves are resistance; K is Kilohms, MEG is megohms. Resistance marked * are measured to B+.

FRONT



955311

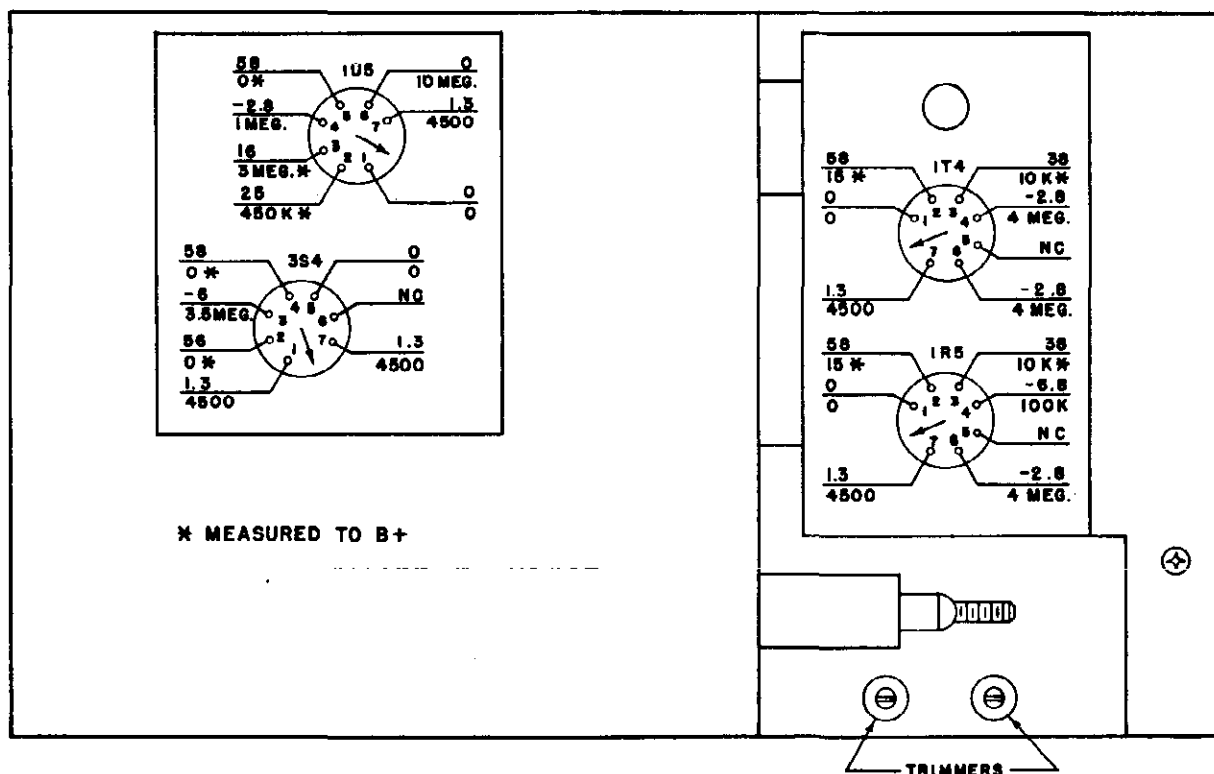
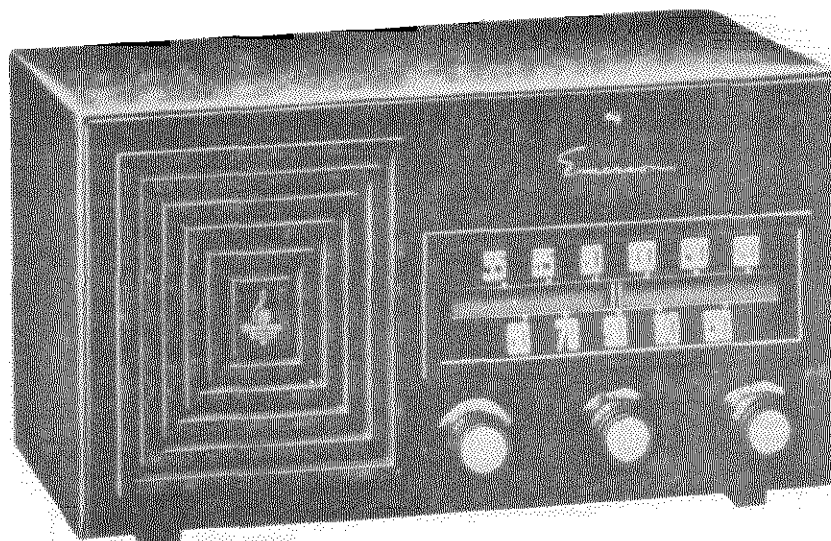


Fig. 4. Voltage and Resistance Diagrams, Chassis 120112

MODEL 641B,
Ch. 120125B



Model—641B
Chassis—120125B

DESCRIPTION

TYPE: Single band (AM) superheterodyne

FREQUENCY RANGE: 540-1620 KC.

TYPES OF TUBES:

- V-1-6BJ6 converter
- V-2-6BJ6 oscillator
- V-3-6BJ6 1st i.f. amplifier
- V-4-6BJ6 2nd i.f. amplifier
- V-5-12AT6 Detector, a.v.c., a-f amplifier
- V-6-50C5 Power output
- V-7-35W4 Rectifier

POWER SUPPLY: A.c. or d.c.

VOLTAGE RATING: 115 volts

POWER CONSUMPTION: 30 watts

CURRENT DRAIN: 0.26 amp. at 117 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The receiver has a self-contained antenna, and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear. Use no ground connection.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltage readings are in d.c. volts and resistance readings in ohms unless otherwise specified.
2. A.C. and D.C. measurements are taken with a V.T.V.M.
3. Measured values are from socket pin to common negative (B—).
4. Line voltage maintained at 115V A.C. for voltage readings.
5. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
6. Volume control at maximum with no signal applied, for voltage measurements.

VOLTAGE READINGS FOR CHASSIS 120125-B

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	6BJ6	-1.2 DC	1 DC	18 AC	12 AC	85 DC	35 DC	0
V-2	6BJ6	-9.2 DC	0	24 AC	18 AC	85 DC	85 DC	0
V-3	6BJ6	0	1.4 DC	30 AC	36 AC	68 DC	85 DC	0
V-4	6BJ6	-1.3 DC	.65 DC	30 AC	24 AC	85 DC	85 DC	0
V-5	12AT6	-.8 DC	0	0	12 AC	0	.65 DC	42 DC
V-6	50C5	5.4 DC	0	36 AC	80 AC	0	85 DC	100 DC
V-7	35W4	85 DC	NC	80 AC	115 AC	110 AC	110 AC	110 DC

RESISTANCE READINGS FOR CHASSIS 120125-B

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	6BJ6	4.2 meg.	1100	22	16	500,000	1 meg.	0
V-2	6BJ6	24,000	1	30	22	500,000	500,000	0
V-3	6BJ6	20	220	38	46	500,000	500,000	0
V-4	6BJ6	4.3 meg	120	38	30	500,000	500,000	0
V-5	12AT6	10 meg	0	0	16	0	550,000	1 meg.
V-6	50C5	150	400,000	46	100	400,000	500,000	500,000
V-7	35W4	500,000	NC	100	135	175	130	500,000

1. To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate.
2. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and B minus bus.
3. Volume control should be at maximum position; output of signal generator should be not higher than necessary to obtain an output reading.
4. Use an insulated alignment screwdriver for adjusting.

STEPS	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 1 (grid) of 6B16 (V1). Low side to B minus Bus.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2 (2nd i-f trans. T2) A3, A4 (1st i-f trans. T1)	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to B minus Bus.	1620 kc	Variable condenser fully open.	Across voice coil.	A5 (Trimmer cond. C5).	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to B minus Bus.	1400 kc	Tune for maximum output.	Across voice coil.	A6 (Trimmer cond. C2).	Adjust for maximum output.

Symbol	PART NO.	DESCRIPTION	Symbol	PART NO.	DESCRIPTION	
C-1	PT. OF L-1	2.2 mmf.	R-6	350970	100,000 ohm carbon $\frac{1}{2}w \pm 20\%$	
C-2	PT. OF 900077	Trimer - r.f.	R-7	340272	120 ohm carbon $\frac{1}{2}w \pm 10\%$	
C-3	PT. OF 900077	Variable capacitor - r.f. section	R-8	351330	3.3 megohm carbon $\frac{1}{2}w \pm 20\%$	
C-4	920030	.05 mf paper 400v	R-9	340890	47,000 ohm carbon $\frac{1}{2}w \pm 10\%$	
C-5	PT. OF 900077	Trimmer - osc.	R-10	390152	500,000 ohm volume control	
C-6	PT. OF 900077	Variable capacitor - osc. section	R-11	351450	10 megohm carbon $\frac{1}{2}w \pm 20\%$	
C-7	920020	.02 mf paper 400v	R-12	351130	470,000 ohm carbon $\frac{1}{2}w \pm 20\%$	
C-8	920020	.02 mf paper 400v	R-13	390157	400,000 ohm tone control	
C-9	928104	212 mmf ceramic	R-14	340292	150 ohm carbon $\frac{1}{2}w \pm 10\%$	
C-10	PT. OF T-2	100 mmf	R-15	370150	39 ohm carbon $1w \pm 10\%$	
C-11	PT. OF 470310	220 mmf	R-16	370490	1,000 ohm carbon $1w \pm 10\%$	
C-12	PT. OF 470310	.002 mf	Multiple Capacitor	SP-1	180074	Speaker - pm - 6"
C-13	PT. OF 470310	220 mmf		SW-1	PT. of R-10	On-off switch
C-14	PT. OF 470310	.005 mf		T-1	720033	1st i.f. transformer
C-15	920545	.002 mf paper 400v	T-2	720125	2nd i.f. transformer	
C-16	920020	.02 mf paper 400v	T-3	734061	Output transformer	
C-17	920020	.05 mf paper 400v	V-1	800023	Vacuum tube - 6BJ6	
C-18	PT. OF 925187	80 mf electrolytic 150v	V-2	800023	Vacuum tube - 6BJ6	
C-19	PT. OF 925187	40 mf electrolytic 150v	V-3	800023	Vacuum tube - 6BJ6	
C-20	920040	.1 mf paper 200v	V-4	800023	Vacuum tube - 6BJ6	
L-1	700054	LOOP ANTENNA OSCILLATOR - COIL		V-5	800523	Vacuum tube - 12AT6
L-2	716055			V-6	800032	Vacuum tube - 50C5
R-1	340492	1,000 ohm carbon $\frac{1}{2}w$	-10%	V-7	800526	Vacuum tube - 35W4
R-2	PT. OF L-2	22,000 ohm		V-8	807000	Pilot light
R-3	341050	220,000 ohm carbon $\frac{1}{2}w$	-10%			
R-4	340332	220 ohm carbon $\frac{1}{2}w$	-10%			
R-5	340632	3,900 ohm carbon $\frac{1}{2}w$	-10%			

Part No.	DESCRIPTION
140359	Cabinet
520133	Crystal
575649	Baffle and grill cloth
450068a	Knob
587011	Knob spring insert — 1/4"

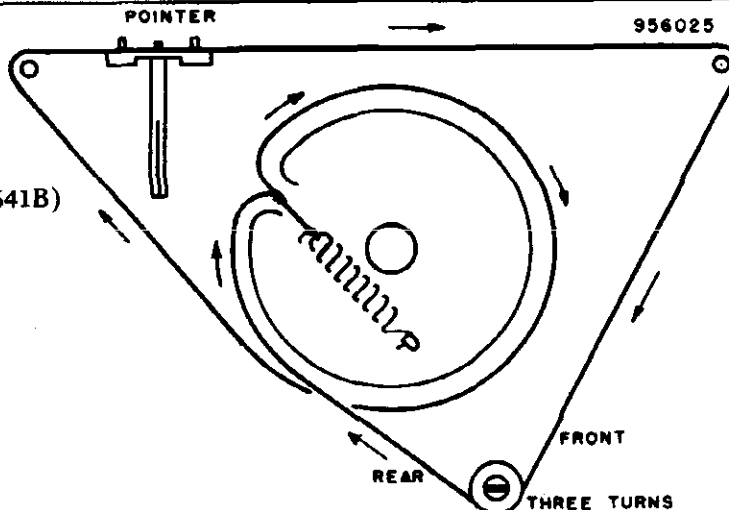
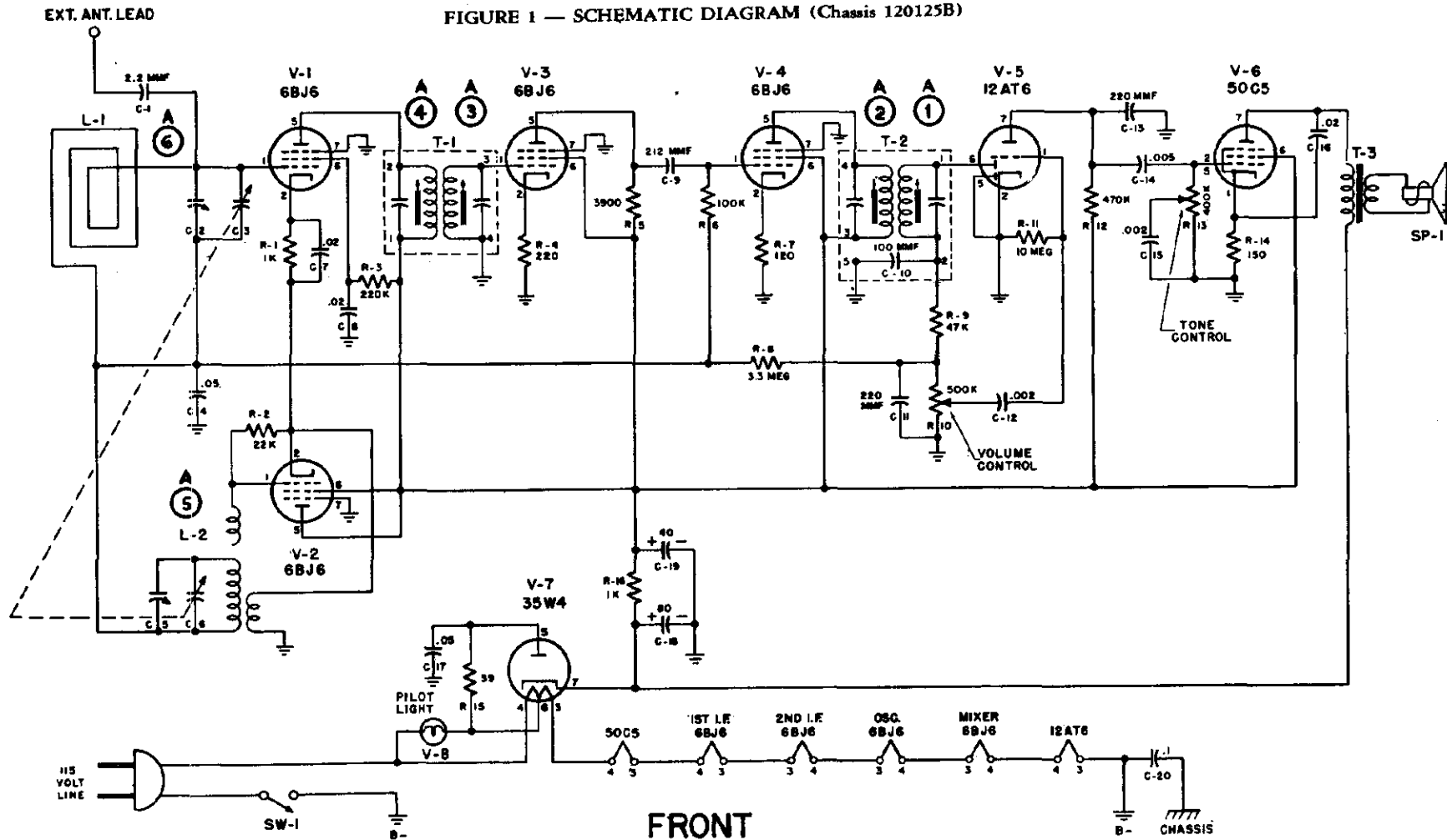
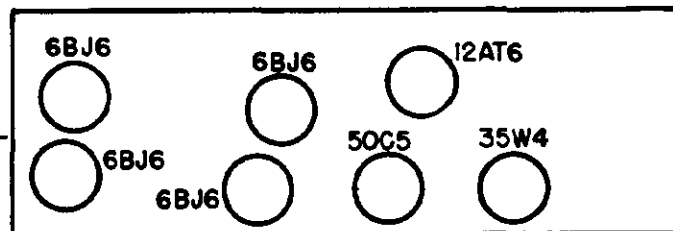


FIGURE 1 — SCHEMATIC DIAGRAM (Chassis 120125B)



CHASSIS 120125-B

FRONT

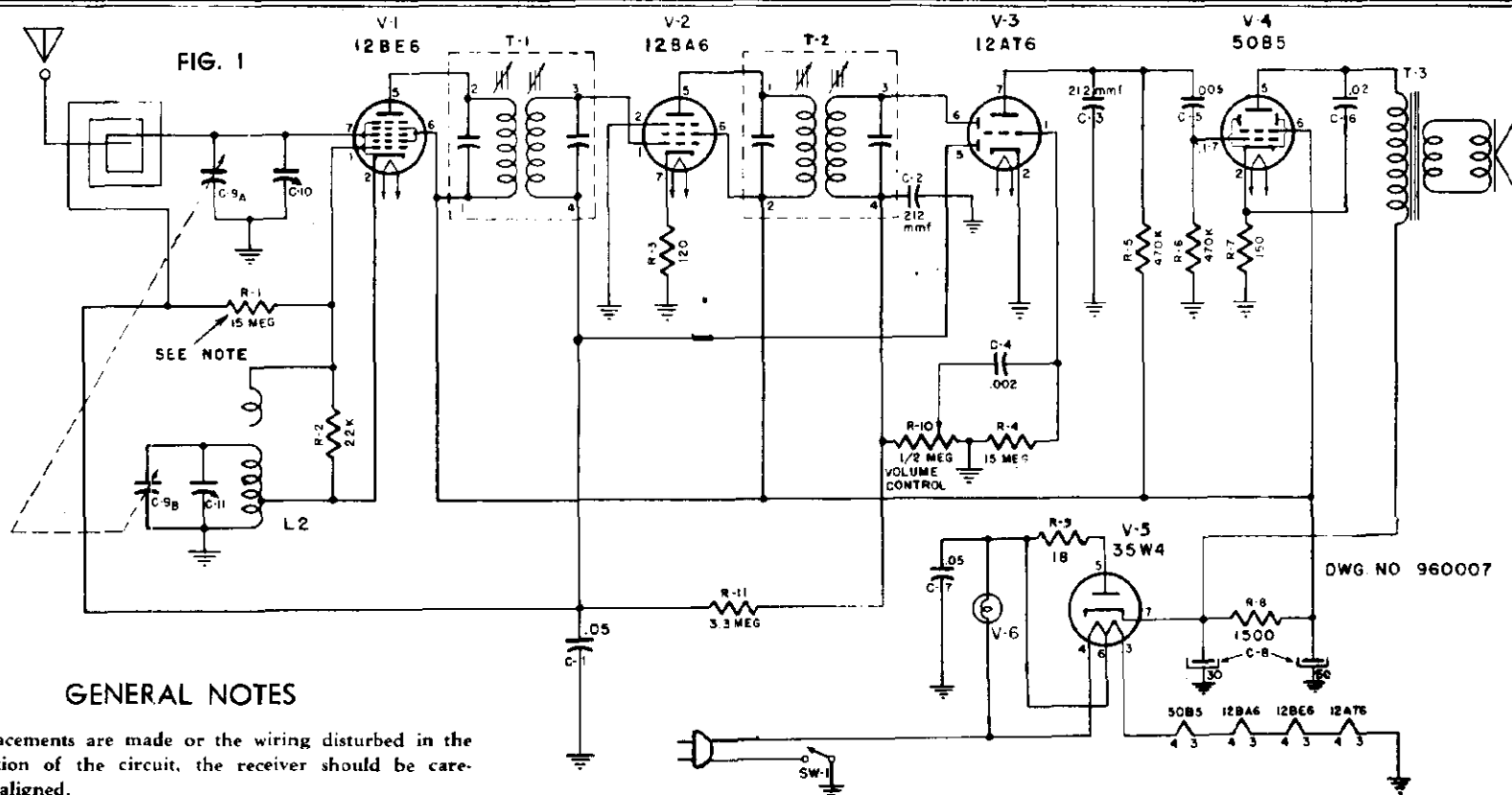


955323

PART NO. 950157

MODEL 641B
Ch. 120125B

MODELS 642, Ch. 120117A;
652, Ch. 120032B;
653, Ch. 120080B

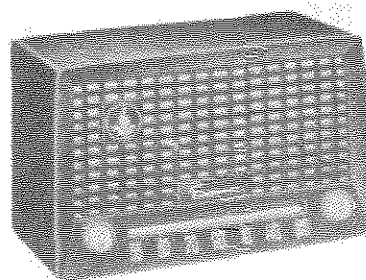


GENERAL NOTES

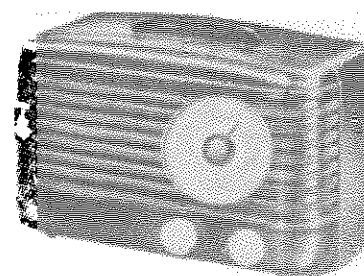
1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. All models have self-contained antennas and do not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

SCHEMATIC FOR MODEL 642 USING CHASSIS 120117A.

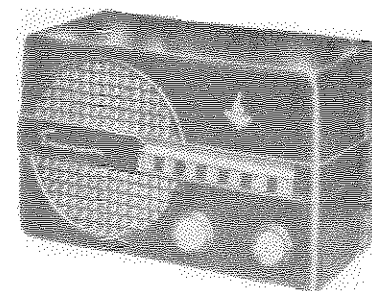
NOTE: R-1 NOT IN LATER SETS.



MODEL 653
Chassis 120080B



MODEL 642
Chassis 120117A



MODEL 652
Chassis 120032B

DWG. NO. 956009



DESCRIPTION

FREQUENCY RANGE: 540-1620 kc.

1—12BE6, pentagrid oscillator-modulator
1—12BA6, first i-f amplifier
1—12AT6, diode detector, a-f amplifier, a.v.c.
1—50B5, beam power output
1—35W4, half-wave rectifier

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.



PT. NO. 950042B

MODELS 642, Ch. 120117A; 652,
Ch. 120032B; 653, Ch. 120080B

CABINET AND DIAL PARTS LIST

DESCRIPTION	†PART NUMBER					
	Model 642			Model 652		Model 653
Cabinet (Bakelite)	140326			140346—Ebony 140353—Ivory		140345
Knobs	460151			460162S		460162S
Baffle and Grill Cloth	—			470609		470608
Back	575059			—		—
Baffle	—			575646		—
Handle (Black)	450000			—		—
Crystal	520034			—		—
Drive Pulley	531009			Pt. of 900072		Pt. of 900071
Drive Shaft	280024			280127		280126
Spring (Drive Cord)	587000			587040		587040
Dial Support Bracket (Right)	—			410907		—
Dial Support Bracket (Left)	—			410908		—
Dial Back Plate	520113			410909		410904
Pointer	525048			525054		525022-2
Loop and Back	—			700023 FH		700051
Loop	700033			—		—
Clip (Pointer)	541169			—		—
Bracket (Loop)	412481			410123		412481

†When Ordering Always Specify Part No.
*Prices Subject to Change Without Notice.

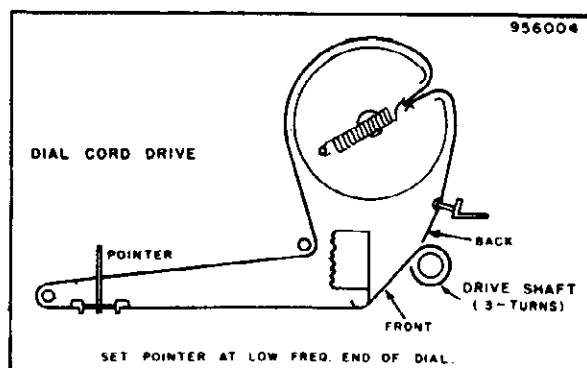
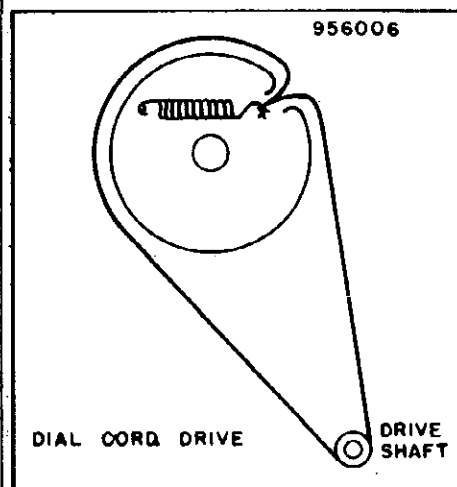
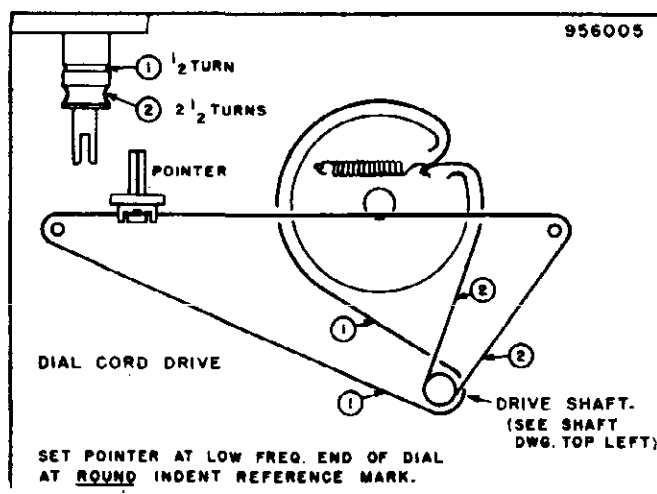


FIG. 5 — DIAL CORD DRIVE FOR CHASSIS 120080B



DIAL CORD DRIVE
FIG. 3 — FOR CHASSIS 120017B



DIAL CORD DRIVE
FIG. 4 — FOR CHASSIS 120032B

MODELS 642, Ch. 120117A; 652,
Ch. 120032B; 653, Ch. 120080B

ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to stator of rear section of tuning condenser. Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6	Adjust for maximum output.

VOLTAGE READINGS FOR CHASSIS 120117A

Symbol	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V1	12BE6	—5.3 DC	0	11.2 AC	25 AC	90 DC	85 DC	—45 DC
V2	12BA6	—45 DC	0	25 AC	38 AC	90 DC	87 DC	1. DC
V3	12AT6	—0.6 DC	0	0	12 AC	—0.45 DC	—0.45 DC	45 DC
V4	50B5	0	5.5 DC	38 AC	85 AC	110 DC	85 DC	0
V5	35W4	0	0	85 AC	117 AC	110 AC	112 AC	120 DC

RESISTANCE READINGS FOR CHASSIS 120117A

Symbol	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V1	12BE6	2400	0.6	18	32	300,000	300,000	3 meg.
V2	12BA6	3 meg.	0	32	48	300,000	300,000	120
V3	12AT6	15 meg.	0	0	18	3 meg.	500,000	500,000
V4	50B5	400,000	150	48	80	300,000	300,000	400,000
V5	35W4	0	0	80	100	110	100	300,000

VOLTAGE READINGS FOR CHASSIS 120032B AND 120080B

Symbol	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V1	12BE6	—6.2 DC	0	24 AC	11.5 AC	85 DC	85 DC	—0.5 DC
V2	12BA6	0	0	24 AC	37 AC	85 DC	85 DC	1.4 DC
V3	12AT6	—4 DC	0	0	11.5 AC	*—0.02 DC	*—0.05 DC	50 DC
V4	50B5	0	5 DC	86 AC	37 AC	115 DC	85 DC	0
V5	35W4	0	0	86 AC	117 AC	110 AC	112 AC	120 DC

*12AT6, Pin 5 is —0.05 in Chassis 120080B

12AT6, Pin 6 is —0.02 in Chassis 120080B

RESISTANCE READINGS FOR CHASSIS 120032B AND 120080B

Symbol	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V1	12BE6	2400	0.6	25	13	300,000	300,000	3 meg.
V2	12BA6	20	0	25	38	300,000	300,000	120
V3	12AT6	15	0	0	13	*500,000	*3.5	700,000
V4	50B5	400,000	150	75	38	300,000	300,000	400,000
V5	35W4	Inf.	Inf.	75	100	110	95	300,000

*12AT6, Pin 5 is 3.5 in Chassis 120080B

12AT6, Pin 6 is 500,000 in Chassis 120080B

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltage measured at 1,000 ohms per volt.
3. Socket connections are shown as bottom views.
4. Measured values are from socket pin to common negative.
5. Line voltage maintained at 117 volts for voltage readings.
6. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
7. Volume control at maximum, no signal applied for voltage measurements.

MODELS 642, Ch. 120117A; 652,
Ch. 120032B; 653, Ch. 120080B

REPLACEMENT PARTS LIST FOR CHASSIS 120117A

Schematic Symbol	†Part No.		DESCRIPTION	Schematic Symbol	†Part No.		DESCRIPTION
	Model 642	Chassis 120117A			Model 642	Chassis 120117A	
R1, 4	351490		Resistor—15 meg., ½ w., 20%	T1, T2	720021		1st and 2nd I. F. transformer
R2	Part of 716051		Resistor—22,000 ohms, ½ w., ±10%	T3	734057		Output transformer
R3	340270		Resistor—120 ohm, ½ w., ±10%	L2	716051		Oscillator coil
R5, 6	351130		Resistor—470 k ohm, ½ w., ±20%	V1	800525		12BE6—Converter
R7	340290		Resistor—150 ohm, ½ w., ±10%	V2	800524		12BA6—I. F. amplifier
R8	380530		Resistor—1500 ohm, 1 w., ±20%	V3	800523		12AT6—Detector—A. V. C. and A. F. amplifier
R9	340070		Resistor—18 ohm, ½ w., ±10%	V4	800527		50B5—Audio output
R10	390015		Volume control	V5	800526		35W4—Rectifier
R11	351330		Resistor—3.3 meg., ½ w., 20%	V6	807000		Pilot light
C1	920060		Capacitor—paper—.05 mfd., 200 v.		530050		Drive cord (12") approx.
C2, 3, 4, 5	470310		Capacitor assembly		583029		Line Cord
C6	920020		Capacitor—.02 mfd., 400 v.		507090		Dial light socket
C7	920030		Capacitor—.05 mfd., 400 v.		180045		Speaker
C8	925000		Capacitor—electrolytic—30-50 mfd., 150 v.				
C9A, C9B	900052		Variable capacitor				

†When Ordering Always Specify Part No.

REPLACEMENT PARTS LIST FOR CHASSIS 120032B AND 120080B

Schematic Symbol	†Part No.		DESCRIPTION
	Model 652 Chassis 120032B	Model 653 Chassis 120080B	
R1	351330	351330	Resistor—3.3 meg., ½ w., ±20%
R2	Part of L2	Part of L2	Resistor—22,000 ohms, ½ w., 10%
R3	340270	340270	Resistor—120 ohms, ½ w., ±10%
R4	351490	351490	Resistor—15 meg., ½ w., 20%
R5, 6	351130	351130	Resistor—470 k ohm, ½ w., ±20%
R7	340290	340290	Resistor—150 ohm, ½ w., ±10%
R8	380530	380530	Resistor—1500 ohm, 1 w., ±20%
R9	340070	340070	Resistor—18 ohm, ½ w., ±10%
R10	390146	390145	.5 meg volume control
C1	920060	920040	.05 mfd., 200 v.
C2	910000		220 mmf., mica, type "O"
C3	910000		220 mmf., mica, type "O"
C4	920515		.002 mfd., 400 v., paper
C5	920180		.005 mfd., 400 v., paper
C2, 3, 4, 5	470310	470310	Herlac coupling assembly
C6	920020	920540	.02 mfd., 400 v., paper
C7	920030	920539	.05 mfd., 400 v., paper
C8	925175	925000	30-50 mfd., 150 v., electrolytic
C9A, B	900072	900071	Variable capacitor
C10, 11	Pt. of C9A, B	Pt. of C9A, B	Trimmers
C12	920040	920040	.1 mfd., 200 v.
T1, T2	720021	720021	1st and 2nd I. F. transformer
T3		734057	Output transformer
L1	700023FH	700051	Ant. loop and back
L2	716026-1	716026-2	Oscillator coil
SP-1	180071	180045	Speaker
SW-1	Pt. of R10	Pt. of R10	On-off switch
V1	800525	800525	12BE6—Mixer
V2	800524	800524	12BA6—I. F. amplifier
V3	800523	800523	12AT6—Detector—1st A. F. amplifier
V4	800527	800527	50B5—Audio output
V5	800526	800526	35W4—Rectifier
V6	807000	807000	Pilot light—15 amp., # 47
	530002	530002	Drive cord (30") approx.
	507005	507220	Drive cord (27") approx.
	583030	583032	Dial light socket
			Line cord

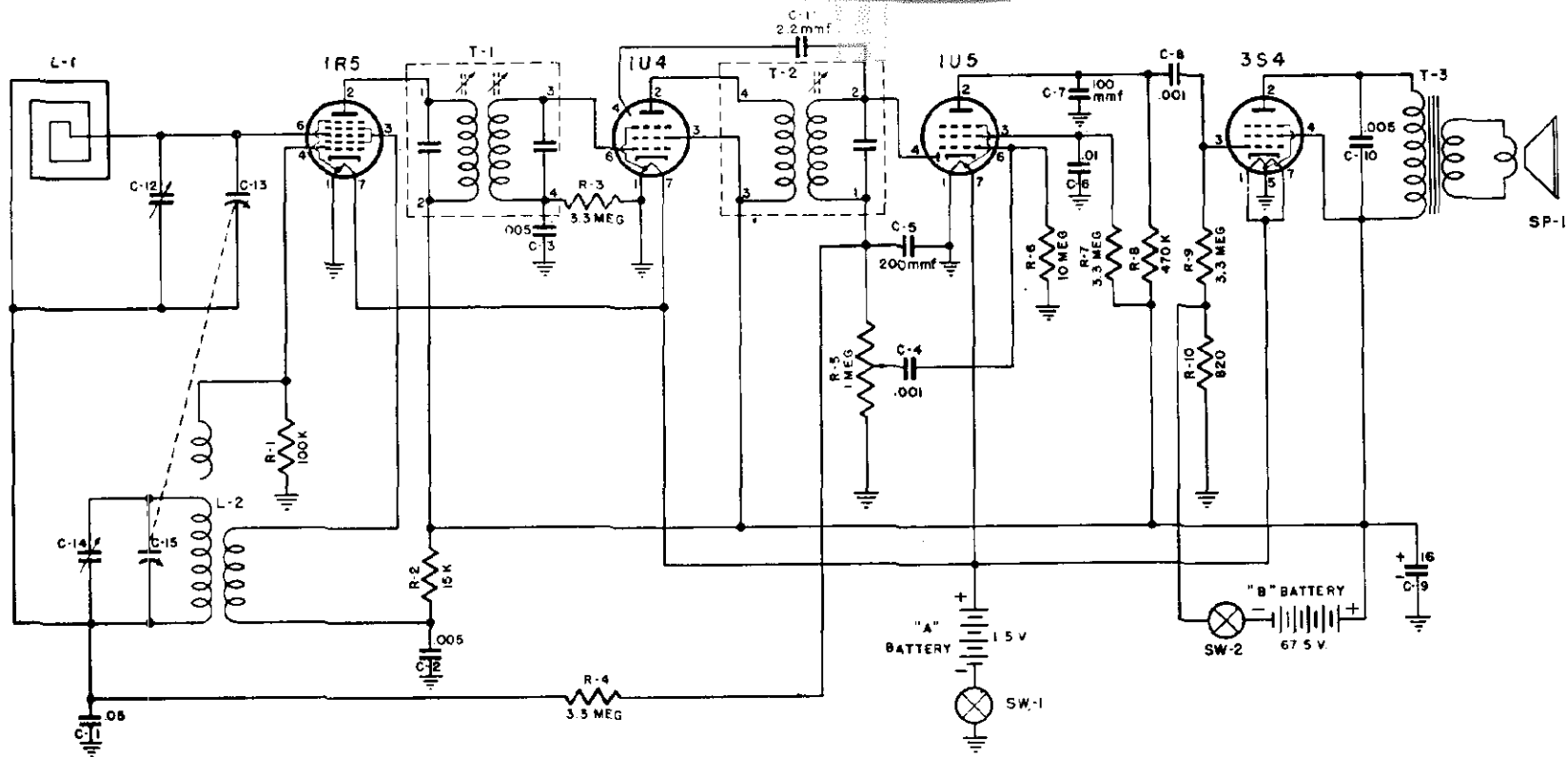
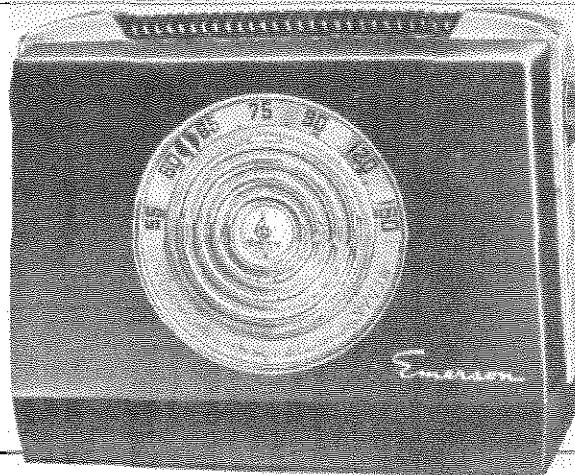


FIG. 1 — SCHEMATIC DIAGRAM — CHASSIS 120115

950141

MODEL 645,
Ch. 120115

DESCRIPTION

GENERAL NOTES

TYPE: Battery operated portable superheterodyne.

FREQUENCY RANGE: 540-1620 KC.

TYPE OF TUBES:

- 1—1R5, pentagrid converter
- 1—1U4, i-f amplifier
- 1—1U5, detector, a.v.c., a-f amplifier
- 1—3S4, power output

POWER SUPPLY: "A" and "B" batteries

VOLTAGE RATING:

- Battery operation—1½ volts "A" supply
- 67½ volts "B" supply

CURRENT CONSUMPTION:

- "A" battery—.250 amp.
- "B" battery—.009 amp.

1. Battery Complement: Replace "A" battery with Eveready 1½ volt No. 720 or equivalent. Replace "B" battery with 67½ volt Eveready No. 467 or equivalent.

2. The color coding of the battery is as follows:

- Red— B+
- White— B—
- Yellow— A+
- Black— A—

3. If replacements are made in the r-f section of the circuit, carefully realign the receiver.

4. The receiver has a self-contained antenna and normally does not require an additional antenna connection. For installations in a location where reception is weak, connect an outside antenna to the colored lead at the rear of the cabinet. Do not use a ground connection.

5. The self-contained loop antenna has directional properties. After a station is tuned in, it is important that the set be rotated through a quarter turn to obtain the position which results in the greatest volume.

REPLACEMENT PARTS LIST

SYMBOL	†Part No.	DESCRIPTION	SYMBOL	†Part No.	DESCRIPTION
C-1	920060	.05 mfd., 200 v., paper	R-3	351330	3.3 megohms, ½ w., ± 20%
C-2	920180	.005 mfd., 400 v., paper	R-4	351330	3.3 megohms, ½ w., ± 20%
C-3	920180	.005 mfd., 400 v., paper	R-5	390066	1 megohm, Volume control
C-4	Pt. of 928034	.001 mfd., +100 —0%	R-6	351450	10 megohm, ½ w., ± 20%
C-5	Pt. of 928034	200 mmf., ± 50%	R-7	351330	3.3 megohms, ½ w., ± 20%
C-6	Pt. of 928034	.01 mfd., +200 —20%	R-8	351130	470,000 ohms, ½ w., ± 20%
C-7	Pt. of 928034	100 mmf., +100 —0%	R-9	351330	3.3 megohms, ½ w., ± 20%
C-8	Pt. of 928034	.001 mfd., +100 —0%	R-10	340470	820 ohms, ½ w., ± 10%
C-9	925066	16 mfd., 100 v., electrolytic	SP-1	180068	Speaker
C-10	920180	.005 mfd., 400 v., paper	SW-1	Pt. of 390066	On-off switch
C-11	915005	2.2 mfd., 400 v., ceramic	SW-2	Pt. of 390066	On-off switch
C-12	Pt. of 900057 or of 900047	R.f. trimmer	T-1	720062	1st i.f. transformer
C-13	Pt. of 900057 or of 900047	Variable cap.—R.f. section	T-2	720066A	2nd i.f. transformer
C-14	Pt. of 900057 or of 900047	Osc. trimmer	T-3	734053	Output transformer
C-15	Pt. of 900057 or of 900047	Variable cap.—Osc. section	V-1	1R5	Converter
L-1 or	700044	Loop ant.—Use with pt. 900057	V-2	1U4	I-F amplifier
L-1	700041	Loop ant.—Use with pt. 900047	V-3	1U5	Detector, a.v.c., a-f amplifier
L-2	716048A	Oscillator coil	V-4	354	Power output
R-1	350970	100,000 ohms, ½ w., ± 20%	—	—	1½ volt "A" battery, Eveready No. 720
R-2	340770	15,000 ohms, ½ w., ± 10%	—	—	67½ volt "B" battery, Eveready No. 467

†Specify part numbers when ordering.

CABINET AND DIAL PARTS

†Part No.	DESCRIPTION	†Part No.	DESCRIPTION
140236	Cabinet	530002	Drive cord (28")
140237	Cabinet back	587023	Drive cord spring
460091	Knob	410514	Dial backplate
520096	Dial and grille	525043	Pointer
460123	Handle	280084	Pointer shaft
280083	Drive shaft	531319	Pointer pulley

MODEL 645,
Ch. 120115

955275

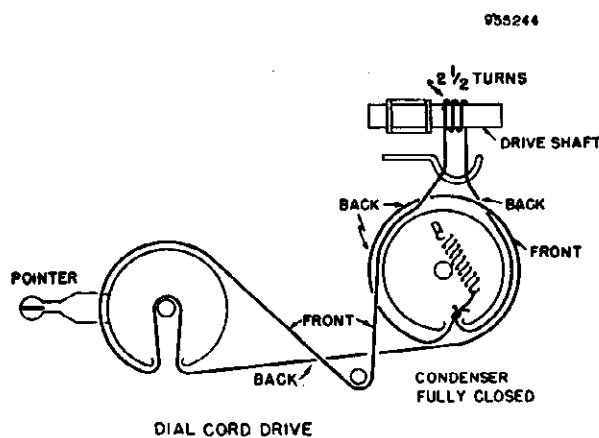


FIG. 2 — DIAL CORD STRINGING

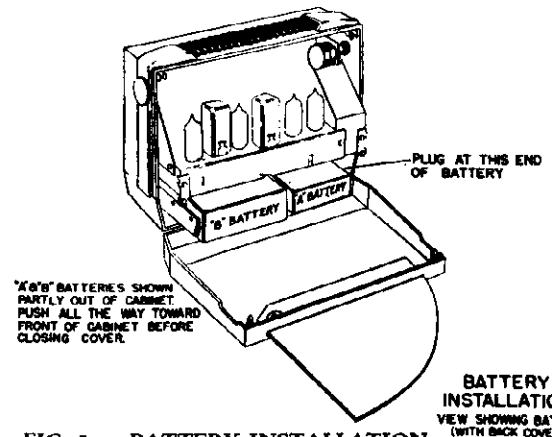


FIG. 3 — BATTERY INSTALLATION

ALIGNMENT PROCEDURE

1. To position pointer, turn variable condenser fully closed and set pointer to reference mark near low-frequency end of dial.
2. Set the volume control at maximum. The output of the signal generator should be no higher than that necessary to obtain an output reading. Attenuate the signal input as alignment proceeds. Use an insulated alignment tool.
3. Maintain the loop in the same position relative to the chassis as when the receiver is in the cabinet.
4. Oscillator and antenna trimmers, and oscillator slugs are reached from bottom of chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to grid (pin 6) of V1 (1R5). Low side to chassis.	455 KC.	Variable condenser fully open.	Across voice coil.	Primary and secondary of T2 and T1.	Adjust for maximum output.
2	200 mmf.	High side to external antenna lead. Low side to chassis.	540 KC.	Variable condenser fully closed.	Across voice coil.	Oscillator slug in L-2.	Adjust for maximum output.
3	200 mmf.	"	1620 KC.	Variable condenser fully open.	Across voice coil.	Oscillator trimmer C-14.	Adjust for maximum output.
4	200 mmf.	"	1400 KC.	Tune for maximum output.	Across voice coil.	Antenna trimmer C-12.	Adjust for maximum output.

CONDITIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltage readings are + dc. volts, resistance readings are ohms unless otherwise noted.
2. All measurements made with voltohmmyst or equivalent.
3. Socket connections are shown as bottom views, with valves measured from socket pin to chassis.
4. No signal applied for voltage measurements.
5. Nominal tolerance on component valves makes possible a variation of $\pm 15\%$ in readings.
6. On the voltage and resistance diagram, readings above line are voltage, valves below line indicate resistance. K= kilohms, MEG=megohms.
7. Valves marked * measured to pin 4 of V-4 (B+).

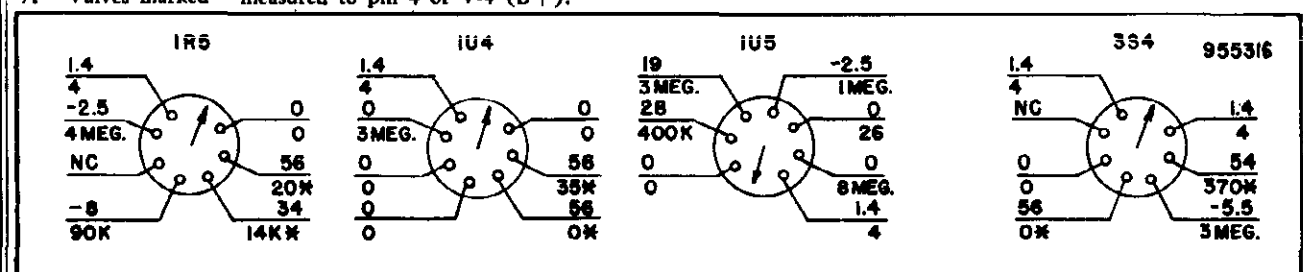


FIG. 4. — VOLTAGE AND RESISTANCE DIAGRAM

PAGE 21-22 EMERSON

MODELS 646A, Ch. 120121A;
646B, Ch. 120121B



MODEL 646A, 646B
CHASSIS 120121A, 120121B

DESCRIPTION

TYPE: Three way (battery, a.c., d.c.) portable superheterodyne

FREQUENCY RANGE: 540-1620 kc.

TYPE TUBES:

- 1—1R5, converter
- 1—1U4, i-f amplifier
- 1—1U5, detector, a.v.c., a-f amplifier
- 1—3V4, power output
- 1—117Z3, rectifier

POWER SUPPLY: "A" and "B" batteries, or a.c., or d.c.

VOLTAGE RATING:

- Line operation—115 volts, a.c. or d.c.
- Battery operation—"A" battery—4.5 volts
- "B" battery—90 volts

POWER CONSUMPTION: 20 watts (line operation).

CURRENT DRAIN: "A" battery—.105 amp. at 4.5 volts
"B" battery—.012 amp. at 90.0 volts

Line operation—.170 amp. at 117 volts a.c.

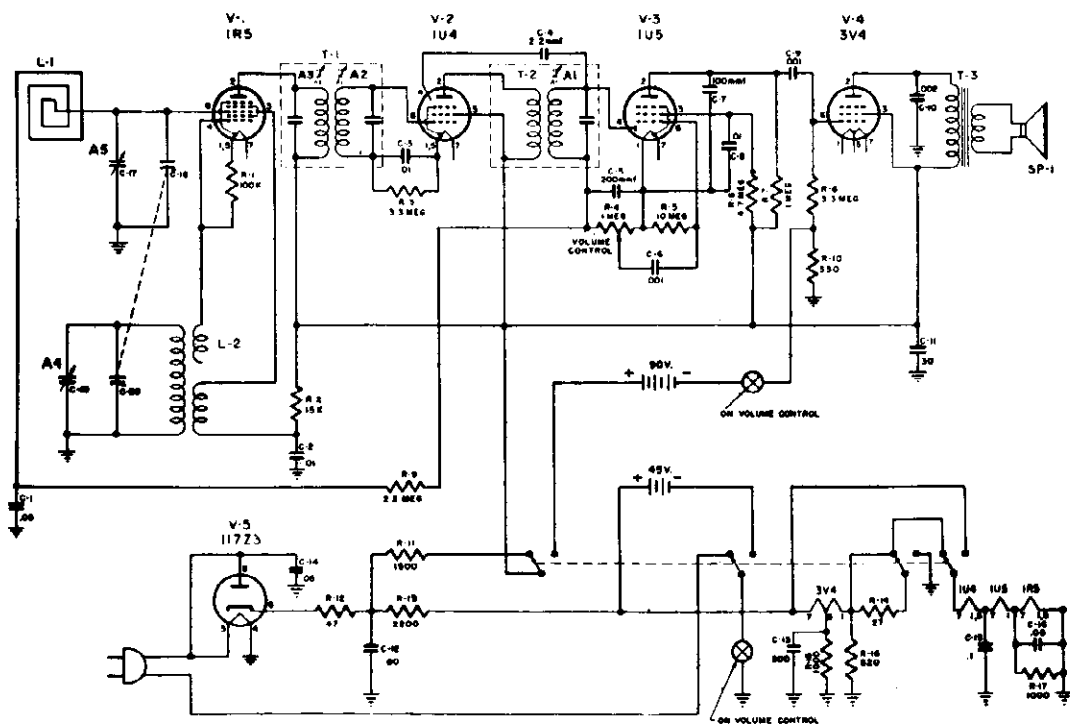
GENERAL NOTES

1. Line Operation: Open the rear cover which is held closed by the catch studs. Remove the line cord plug from its receptacle at the rear of the chassis. Remove the line cord and insert the plug into a suitable outlet. When the power supply is d.c. and the receiver remains inoperative, remove the plug, turn it half-way around and reinsert in the outlet to obtain proper polarity.
2. Battery Operation: Remove the line plug from the outlet and insert in the receptacle at the rear of the chassis. The receiver will not operate from batteries if the plug is out of the chassis receptacle. Coil the loose portion of the line cord and store it carefully alongside the "A" battery underneath the chassis. (See Fig. 5)
3. The color coding of the battery cables is as follows:

Red— A+	Yellow— A+
White— B—	Black— A—
4. If replacements are made in the r-f section of the circuit, carefully realign the receiver.
5. The receiver has a self contained antenna and normally does not require an additional antenna connection. For installations in a location where reception is weak, connect an outside antenna to the colored lead at the rear of the cabinet. Do not use a ground connection.
6. The self-contained loop antenna has directional properties. After a station is tuned in, it is important that the set be rotated through a quarter turn to obtain the position which results in the greatest volume.

MODELS 646A, Ch. 120121A,
646B, Ch. 120121B

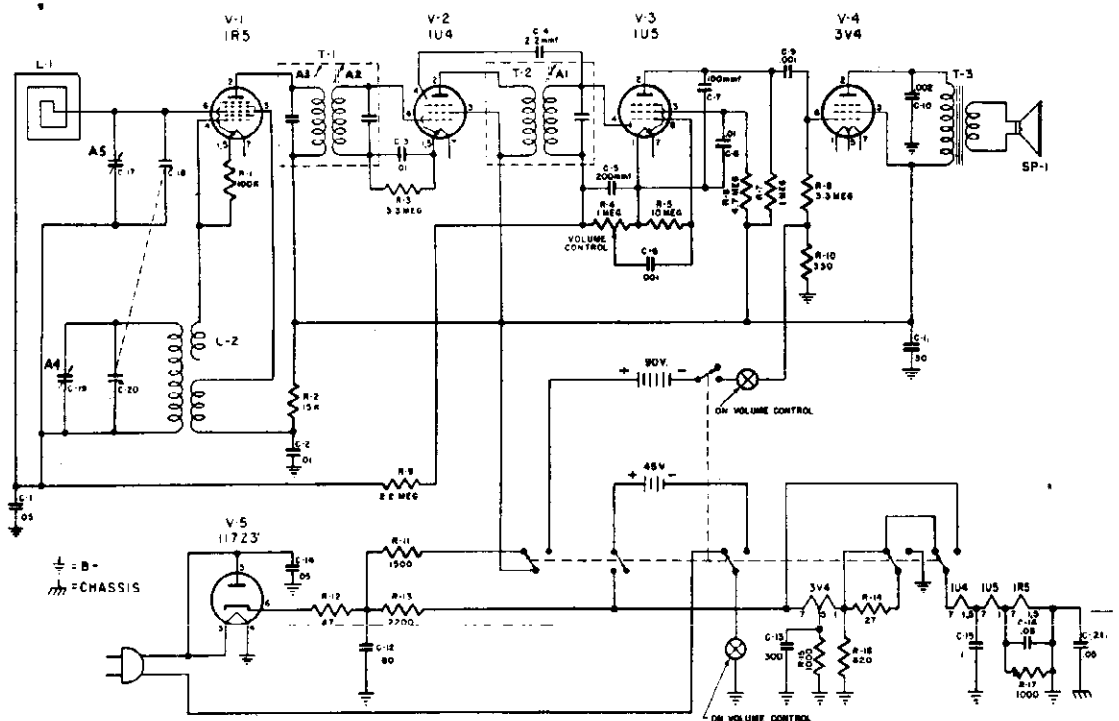
DWG. NO. 956021



CHASSIS NO. 120121A

PT. NO. 950149

Figure 1—Schematic Circuit Diagram—Chassis 120121-A



CHASSIS NO. 120121B

PT. NO. 950155

Figure 2—Schematic Circuit Diagram—Chassis 120121-B

MODELS 646A, Ch. 120121A;
646B, Ch. 120121B

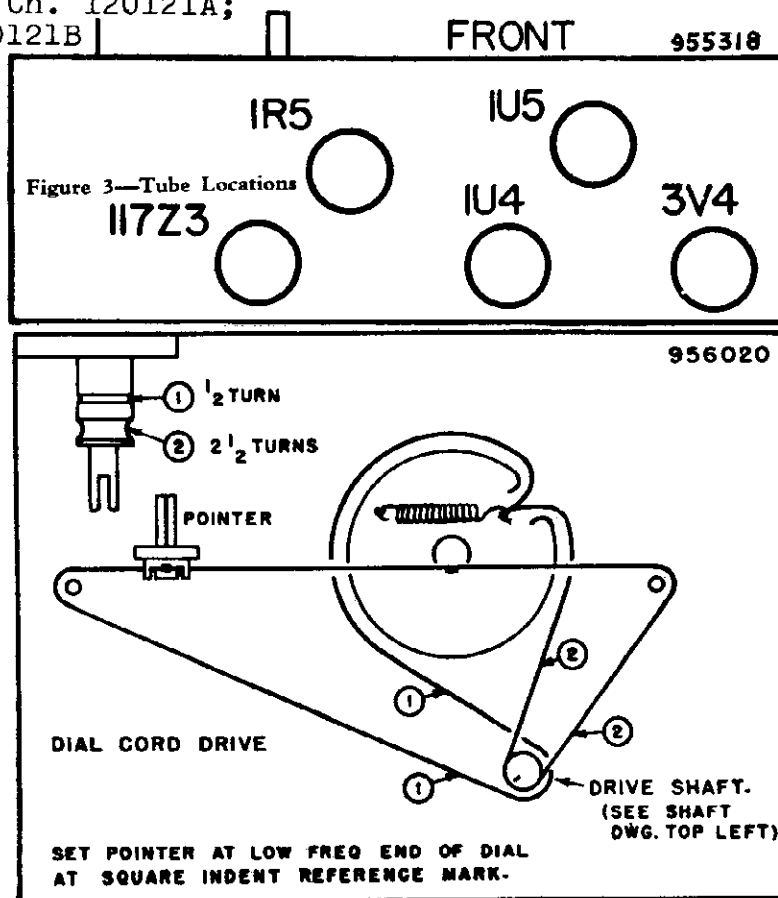


Figure 4—Dial Cord Drive

BATTERY REPLACEMENT TABLE

MODEL	CHASSIS	"A" BATTERY	"B" BATTERY
646A 646B	120121A 120121B	4½ volt. Eveready No. 726 or equivalent. (See Fig. 5)	90 volt. Eveready No. 490 Mini- max or equivalent. (See Fig. 5)

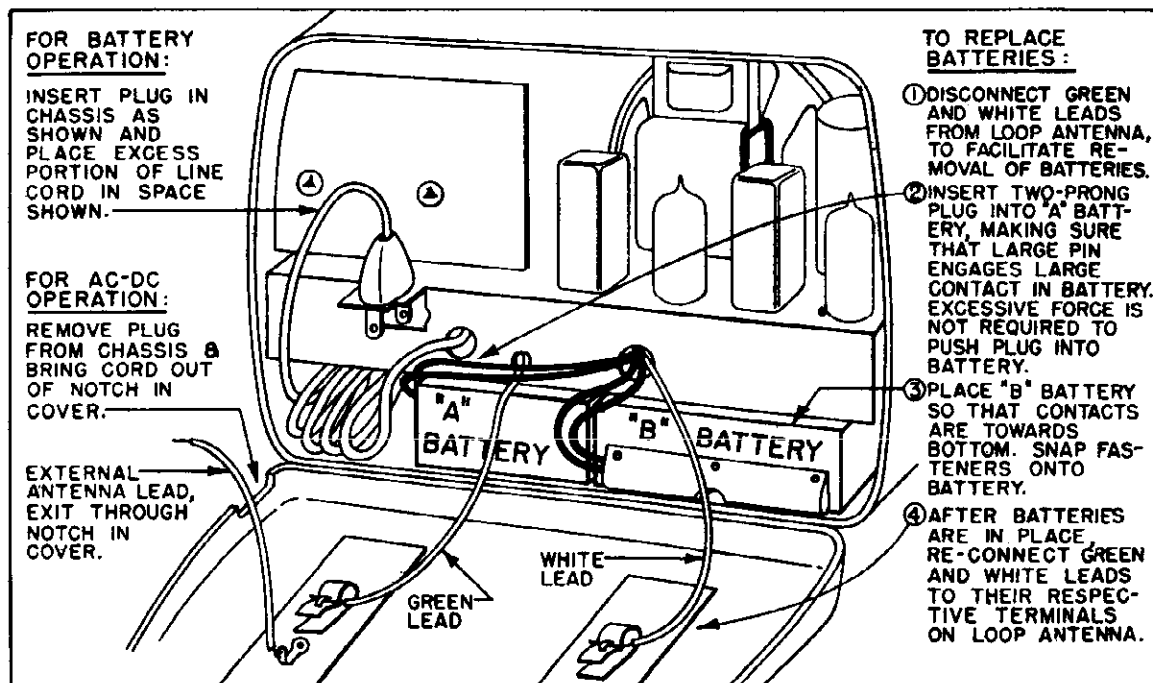


Figure 5—Battery Installation

955317

MODELS 646A, Ch. 120121A;
646B, Ch. 120121B

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltage and resistance readings are measured for 117 volt a.c. line operation.
2. Socket connections are shown as bottom views. Measurements are taken from socket pin to chassis.
3. Voltage readings are in d.c. volts and resistance readings in ohms, unless otherwise specified.
4. All measurements made with voltohmmyst.
5. For voltage measurements, set volume control at maximum; no signal applied.
6. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.

VOLTAGE READINGS

CHASSIS	SYMBOL	TUBE TYPE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
120121A	V1	1R5	0	95	60	-6.2	0	0	1.3
120121B	V2	1U4	2.8	95	95	0	2.8	.05	4.0
	V3	1U5	1.3	16	15	.05	.01	.01	2.5
	V4	3V4	4	95	95	0	5.2	0	6.5
	V5	117Z3	N.C.	115	115 AC	0	115 AC	116	115

RESISTANCE READINGS

CHASSIS	SYMBOL	TUBE TYPE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
120121A	V1	1R5	0	3800	20K	100K	0	3 Meg.	17
120121B	V2	1U4	30	3800	3800	Inf.	34	3.3 Meg.	38
	V3	1U5	17	1 Meg.	3 Meg.	1 Meg.	3 Meg.	10 Meg.	30
	V4	3V4	38	4000	3800	330	42	3.3 Meg.	54
	V5	117Z3	N.C.	2000	480	0	480	2000	2000

NC=no connection;

Inf.=infinity;

K=kilohms;

Meg.=megohms

ALIGNMENT PROCEDURE

1. Use battery power when available. When a.c. power is used, connect the line cord through an isolation transformer if available. Otherwise connect a 0.1 mfd. condenser in series with the low side of the signal generator and B—.
2. Set the volume control at maximum. The output of the signal generator should be no higher than that necessary to obtain an output reading. Attenuate the signal input as alignment proceeds. Use an insulated alignment tool.
3. Maintain the loop in the same position relative to the chassis as when the receiver is in the cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST*	REMARKS
1	0.1 mfd.	High side to pin 6 (grid) of V1 (1R5). Low side to chassis	455 kc	Variable condenser fully open.	Across voice coil.	A1, (2nd i-f trans), A2, A3 (1st i-f trans.)	Adjust for maximum output. If a.c. is used without an isolation transformer, reduce dummy antenna to 200 mmf. to reduce hum modulation.
2	200 mmf.	High side to external ant. lead. Low side to chassis	1620 kc	Variable condenser fully open.	Across voice coil.	A4 (trimmer cond. C4.)	Adjust for maximum output.
3	200 mmf.	"	1400 kc	Tune for maximum output.	Across voice coil.	A5 (trimmer cond. C2.)	Adjust for maximum output.

MODEL 646A,
Ch. 120121A

CHASSIS PARTS LIST—(CHASSIS 120121-A)

Symbol	Part No.	DESCRIPTION
R-1	Pt. of 716017-1	100,000 ohm, $\frac{1}{2}$ w., $\pm 20\%$
R-2	340770	15,000 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-3	351330	3.3 meg., $\frac{1}{2}$ w., $\pm 20\%$
R-4	390051-1	1 meg., volume control
R-5	351450	10 meg., $\frac{1}{2}$ w., $\pm 20\%$
R-6	351370	4.7 meg., $\frac{1}{2}$ w., $\pm 20\%$
R-7	341210	1 meg., $\frac{1}{2}$ w., $\pm 10\%$
R-8	351330	3.3 meg., $\frac{1}{2}$ w., $\pm 20\%$
R-9	351290	2.2 meg., $\frac{1}{2}$ w., $\pm 20\%$
R-10	340370	330 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-11	340530	1,500 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-12	370170	47 ohm, 1 w., $\pm 10\%$
R-13	394095	2,200 ohm, 10 w.
R-14	340110	27 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-15	340490	1,000 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-16	340470	820 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-17	340490	1,000 ohm, $\frac{1}{2}$ w., $\pm 10\%$
C-1	920060	.05 mfd., 200v.
C-2	920092	.01 mfd., 200v.
C-3	920092	.01 mfd., 200v.
C-4	915005	2.2 mmf.
C-5	Pt. of 928034	200 mmf., coupling plate
C-6	Pt. of 928034	.001 mfd., coupling plate
C-7	Pt. of 928034	100 mmf., coupling plate
C-8	Pt. of 928034	.01 mfd., coupling plate
C-9	Pt. of 928034	.001 mfd., coupling plate
C-10	920515	.002 mfd., 400v.
C-11	Pt. of 925167-1	30 mfd., 150v. electrolytic
C-12	Pt. of 925167-1	80 mfd., 150v. electrolytic
C-13	Pt. of 925167-1	300 mfd., 10v. electrolytic
C-14	920539	.05 mfd., 400v.
C-15	920040	.1 mfd., 200v.
C-16	920060	.05 mfd., 200v.
C-17	Pt. of 900160-1	R.F. trimmer
C-18	Pt. of 900160-1	Variable cap. — R.F. section
C-19	Pt. of 900160-1	Oscillator trimmer
C-20	Pt. of 900160-1	Variable cap. — Oscillator section
L-1	700027	Loop antenna
L-2	716017-1	Oscillator coil
T-1	720062	1st I.F. transformer
T-2	720066A	2nd I.F. transformer
T-3	734053	Output transformer
SW-1	510075	Transfer switch
SP-1	180068	Speaker
V-1	800110	1R5 tube
V-2	800017	1U4 tube
V-3	800019	1U5 tube
V-4	800018	3V4 tube
V-5	800013	117Z3 tube

CABINET PARTS LIST—(MODEL 646-A)

Part No.	DESCRIPTION
140352	Cabinet—maroon
140352-1	Cabinet back—maroon
140366	Cabinet—saddle tan
140366-A	Cabinet back—saddle tan
140364	Cabinet—green
140364-A	Cabinet back—green
140365	Cabinet—ivory
140365-A	Cabinet back—ivory
587007	Hinge spring—(for all above backs)
460162-S	Knob—black—gold center
525054	Pointer
808202	Fuse clip
541009	Tubular clip
530002	Drive cord (27")
410909	Dial back plate
583012P	Line cord
587040	Spring—drive cord
585008	Battery cable "A"
585029	Battery cable "B"

CHASSIS PARTS LIST—(CHASSIS 120121-B)

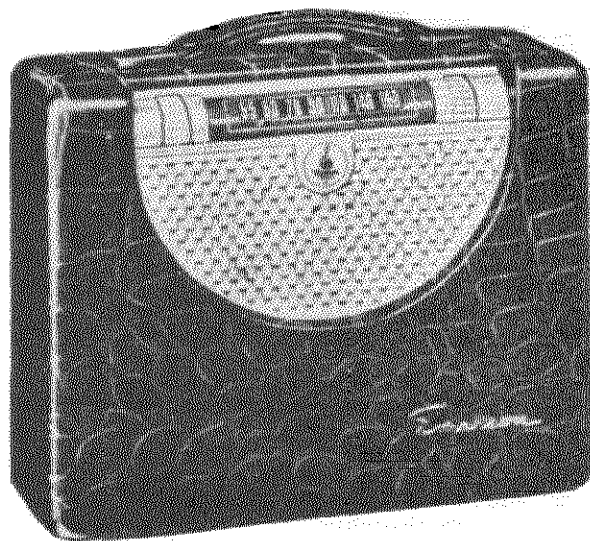
MODEL 646B,
Ch. 1201211

Symbol	Part No.	DESCRIPTION
R-1	350970	100,000 ohm, $\frac{1}{2}$ w., $\pm 20\%$
R-2	340770	15,000 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-3	351330	3.3 meg., $\frac{1}{2}$ w., $\pm 20\%$
R-4	390051-1	1 meg., volume control
R-5	351450	10 meg., $\frac{1}{2}$ w., $\pm 20\%$
R-6	351370	4.7 meg., $\frac{1}{2}$ w., $\pm 20\%$
R-7	341210	1 meg., $\frac{1}{2}$ w., $\pm 10\%$
R-8	351330	3.3 meg., $\frac{1}{2}$ w., $\pm 20\%$
R-9	351290	2.2 meg., $\frac{1}{2}$ w., $\pm 20\%$
R-10	340372	330 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-11	340532	1,500 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-12	370172	47 ohm, 1 w., $\pm 10\%$
R-13	394095	2,200 ohm, 10 w.
R-14	340112	27 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-15	340492	1,000 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-16	340472	820 ohm, $\frac{1}{2}$ w., $\pm 10\%$
R-17	340492	1,000 ohm, $\frac{1}{2}$ w., $\pm 10\%$
C-1	920060	.05 mfd., 200v.
C-2	920092	.01 mfd., 200v.
C-3	920092	.01 mfd., 200v.
C-4	915005	2.2 mmf.
C-5	Pt. of 928034	200 mmf., coupling plate
C-6	Pt. of 928034	.001 mfd., coupling plate
C-7	Pt. of 928034	100 mmf., coupling plate
C-8	Pt. of 928034	.01 mfd., coupling plate
C-9	Pt. of 928034	.001 mfd., coupling plate
C-10	920515	.002 mfd., 400v.
C-11	Pt. of 925186	30 mfd., 150v. electrolytic
C-12	Pt. of 925186	80 mfd., 150v. electrolytic
C-13	Pt. of 925186	300 mfd., 10v. electrolytic
C-14	920539	.05 mfd., 400v.
C-15	920040	.1 mfd., 200v.
C-16	920060	.05 mfd., 200v.
C-17	Pt. of 900160-1	R.F. trimmer
C-18	Pt. of 900160-1	Variable cap. — R.F. section
C-19	Pt. of 900160-1	Oscillator trimmer
C-20	Pt. of 900160-1	Variable cap. — Oscillator section
C-21	920539	.05 mfd., 400v.
L-1	700027	Loop antenna
L-2	716057	Oscillator coil
T-1	720062	1st I.F. transformer
T-2	720066A	2nd I.F. transformer
T-3	734053B	Output transformer
SW-1	510073	Transfer switch
SP-1	180068	Speaker
V-1	800110	1R5 tube
V-2	800017	1U4 tube
V-3	800019	1U5 tube
V-4	800018	3V4 tube
V-5	800013	117Z3 tube

CABINET PARTS LIST—(MODEL 646B)

Part No.	DESCRIPTION
140352	Cabinet—maroon
140352-1	Cabinet back—maroon
140366	Cabinet—saddle tan
140366-A	Cabinet back—saddle tan
140364	Cabinet—green
140364-A	Cabinet back—green
140365	Cabinet—ivory
140365-A	Cabinet back—ivory
587007	Hinge spring (for all above backs)
460162-S	Knob—black—gold center
700027	Loop antenna
525054	Pointer
808202	Fuse clip
541009	Tubular clip
530002	Drive cord (27")
410909	Dial back plate
583018	Line cord
587040	Spring—drive cord
585008	Battery cable "A"
585029	Battery cable "B"

MODELS 656B, 657B,
Ch. 120122B



MODEL 657B
CHASSIS 120122B



MODEL 656B
CHASSIS 120122B

DESCRIPTION

TYPE: Three way (battery, a.c., d.c.) portable superheterodyne.

FREQUENCY RANGE: 540-1620 KC.

TYPE OF TUBES:

- 1—IU4, tuned r-f amplifier
- 1—IR5, pentagrid converter
- 1—IU4, i-f amplifier
- 1—IU5, detector, a.v.c., a-f amplifier
- 1—3V4, power output
- 1—117Z3, rectifier

POWER SUPPLY: Battery powerpack, or a.c., or d.c.

VOLTAGE RATING:

- Line operation—105-125 volts, a.c. or d.c.
- Battery operation— 9 volts "A" supply
- 90 volts "B" supply

POWER CONSUMPTION: Line operation 20 watts

CURRENT CONSUMPTION:

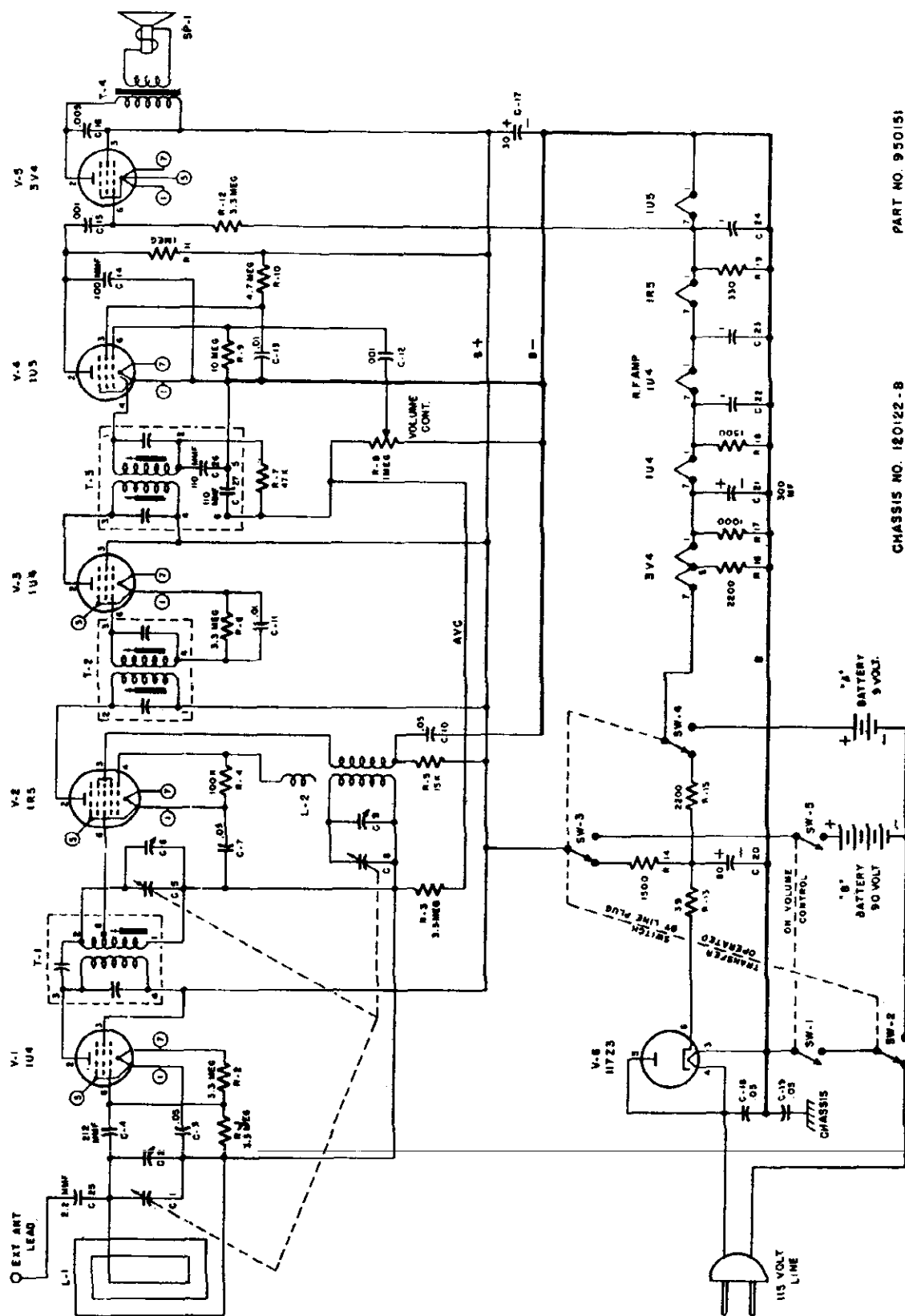
- "A" battery—.055 amp.
- "B" battery—.014 amp.
- 117 volts a.c.—.170 amp.

GENERAL NOTES

1. Line Operation: Open the rear cover which is held closed by the catch studs. Remove the line cord plug from its receptacle at the right side of the chassis (looking from the rear). Remove the line cord and insert the plug into

a suitable outlet. When the power supply is d.c. and the receiver remains inoperative, remove the plug, turn it half-way around and reinsert in the outlet to obtain proper polarity.

2. Battery Operation: Remove the line plug from the outlet and insert in the receptacle at the right side of the chassis. The receiver will not operate from batteries if the plug is out of the chassis receptacle. Coil the loose portion of the line cord and store it carefully in the compartment formed by the insulating paper.
3. Battery Complement: Replace the power pack unit with Eveready No. 753 or Rayovac No. AB994 batteries. These units supply both "A" and "B" voltages for battery operation.
4. The color coding of the battery cable is as follows:
Red— B+, 90 volts Yellow— A+, 9 volts
White— B— Black— A—
5. If replacements are made in the r-f section of the circuit, carefully realign the receiver.
6. The receiver has a self contained antenna and normally does not require an additional antenna connection. For installations in a location where reception is weak, connect an outside antenna to the colored lead connected to the loop at the left side of the cabinet (looking from the rear). Do not use a ground connection.
7. The self-contained loop antenna has directional properties. After a station is tuned in, it is important that the set be rotated through a quarter turn to obtain the position which results in the greatest volume.



PART NO. 950151

CHASSIS NO. 120122-B

FIGURE 1 — SCHEMATIC DIAGRAM, CHASSIS 120122B

MODELS 656B, 657B,
Ch. 120122B

ALIGNMENT PROCEDURE

1. Use battery power when available. When a.c. power is used, connect the line cord through an isolation transformer if available. Otherwise connect a 0.1 mfd. condenser in series with the low side of the signal generator and B—.
2. Set the volume control at maximum. The output of the signal generator should be no higher than that necessary to obtain an output reading. Attenuate the signal input as alignment proceeds. Use an insulated alignment tool.
3. Maintain the loop in the same position relative to the chassis as when the receiver is in the cabinet.

STEP	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 Mfd.	High side to grid (pin 6) of V2. Low side to B—	455 KC	Variable condenser fully open	Across voice coil	T2, T3 top and bottom	Adjust for maximum output
2	Receiver Loop	Form loop of several turns and radiate signal into receiver	1620 KC	"	"	Trimmer condenser (C-9 osc.)	Bottom cover on chassis
3	"	"	1400 KC	Tunt for maximum output	"	Trimmer condenser (C-6 RF) and trimmer condenser (C-2 ant.)	"
4	"	"	600 KC	"	"	T1 top	"
5	Repeat steps 3 and 4						

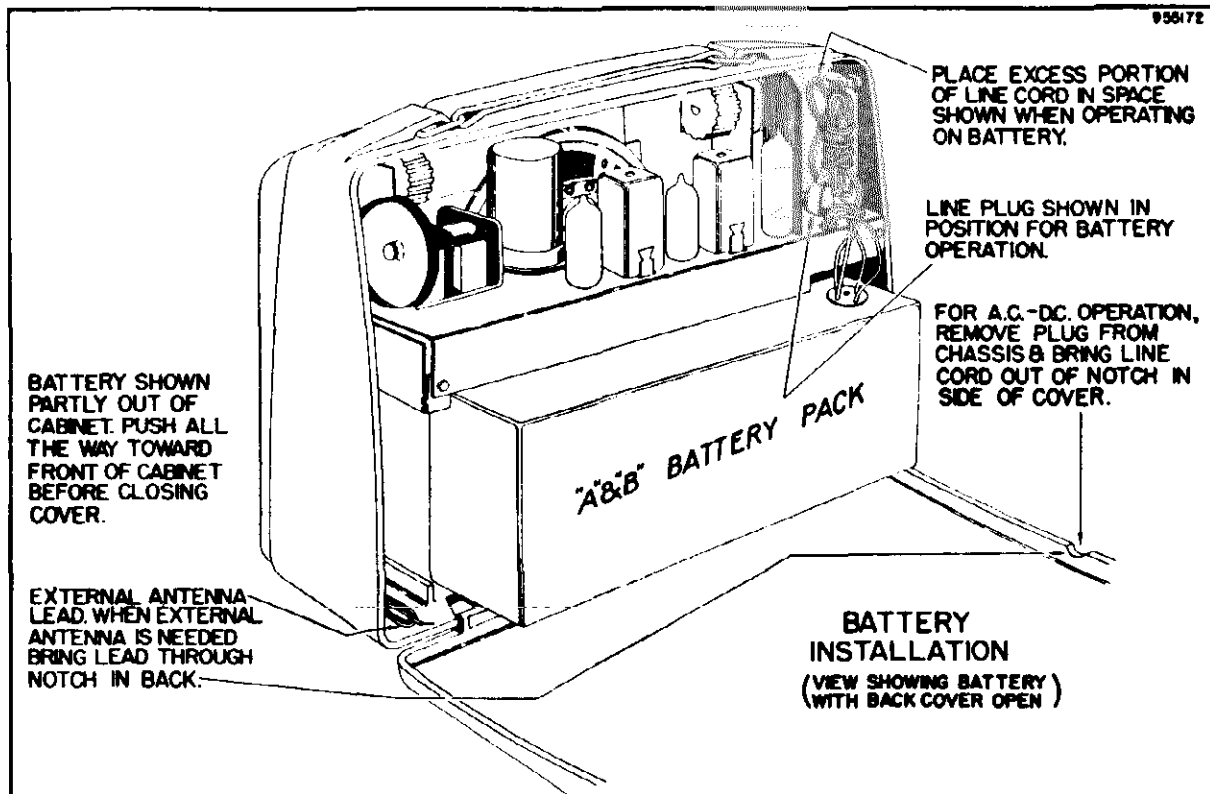


FIGURE 2 — BATTERY REPLACEMENT

CONDITIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltages indicated are positive d.c., resistances are in ohms, unless otherwise indicated.
2. Measurements made with volt ohmmyst or equivalent.
3. Line voltage maintained at 120 volts a.c. for voltage measurements.
4. Socket connections are shown as bottom views, with measurements from pin to common negative.
5. Volume control at maximum; no signal applied for voltage measurements.
6. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.

SYMBOL	TUBE	PIN NUMBER						
		Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	1U4	2.8 d.c.	92 d.c.	92 d.c.	N. C.	2.8 d.c.	1.8 d.c.	4.2 d.c.
V2	1R5	1.4 d.c.	92 d.c.	60 d.c.	-10 d.c.	1.4 d.c.	.2 d.c.	2.8 d.c.
V3	1U4	4.2 d.c.	92 d.c.	92 d.c.	N. C.	4.2 d.c.	3.1 d.c.	5.8 d.c.
V4	1U5	0	26 d.c.	21 d.c.	-5V d.c.	-5V d.c.	0	1.4 V d.c.
V5	3V4	5.7 d.c.	88 d.c.	92 d.c.	0	7 d.c.	1.2 d.c.	8.5 d.c.
V6	117Z3	N. C.	120 d.c.	0	120 a.c.	120 a.c.	120 d.c.	0

VOLTAGE READINGS (MODELS 656B, 657B)

SYMBOL	TUBE	PIN NUMBER						
		Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	1U4	34	4.2 K	4.2 K	N. C.	36	2.2 meg.	48
V2	1R5	18	4.2 K	20 K	100 K	18	2.6 meg.	34
V3	1U4	48	4.2 K	4.2 K	N. C.	48	3.3 meg.	60
V4	1U5	0	1 meg.	4.7 meg.	1 meg.	1 meg.	10 meg.	18
V5	3V4	62	4.6 K	4.1 K	0	74	3.3 meg.	85
V6	117Z3	N. C.	2.4 K	0	500	500	2.4 K	Inf.

RESISTANCE READINGS (MODELS 656B, 657B)

PAGE 21-32 EMERSON

MODELS 656B, 657B,
Ch. 120122B

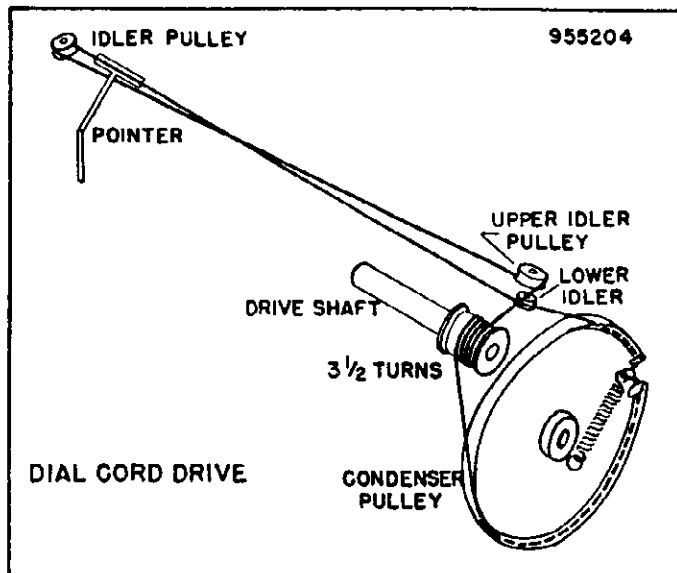


FIGURE 3 — DIAL CORD DRIVE

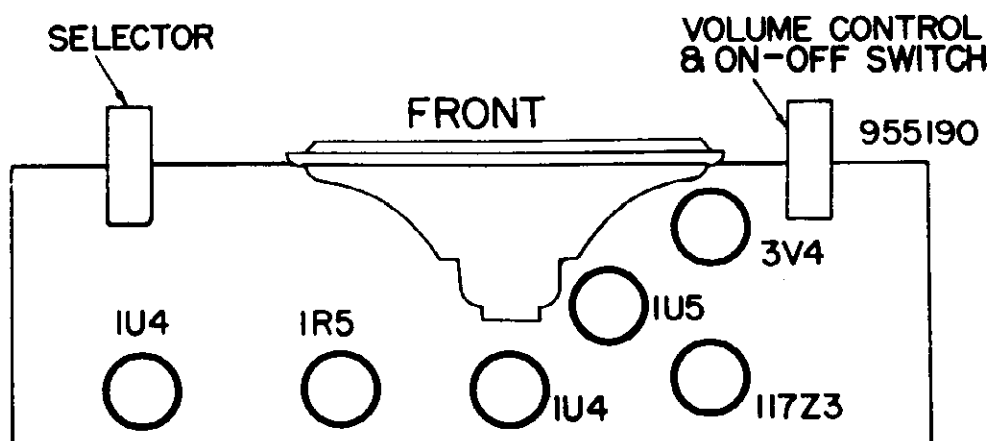


FIGURE 4 — TUBE LOCATIONS, CHASSIS 120122B

Part No.		DESCRIPTION
656B	657B	
140182-A		(Maroon) Cabinet with Grille
140183-S		Cabinet Back with Hinge (Maroon)
460082		Knobs
595006		Handle with Rings (Black)
140253-A		(Sand) Cabinet with Grille
140254		(Sand) Cabinet Back
460104		Knobs (Sand)
595007		Handle with Rings (Pigskin)
	140351	Cabinet and Back (Fabric Covered)
	460102	Grille (Sand)
	460104	Knobs (Sand)
	520126	Dial Crystal
520126		Fuse Clip
808205		Loop Antenna
700042	700042	Pointer
525041-1	525041-1	Speaker
180052	180052	Battery Cable
585033	585033	Line Cord
583017-P	583017-P	Drive Cord
530002	530002	Spring — Drive Cord
587040	587040	Dial Back Plate
520085	520085	

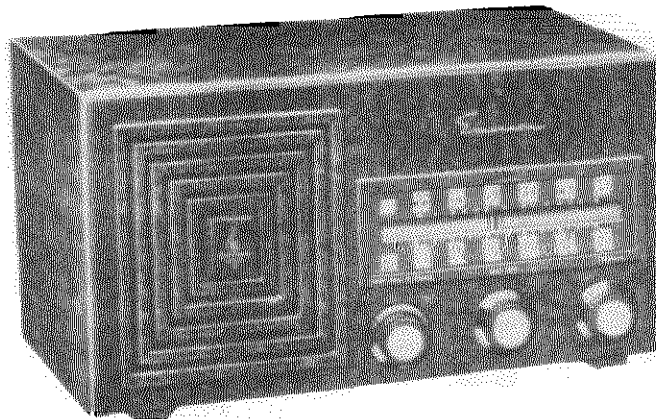
CABINET PARTS LIST (656B, 657B)

MODELS 656B, 657B
Ch. 120122B

CHASSIS PARTS LIST (CHASSIS 120122B)

Symbol	Part No.	DESCRIPTION			
C-1	Pt. of 900076	Variable Capacitor — Antenna Section			
C-2	Pt. of 900076	Trimmer — Antenna			
C-3	920060	.05 MF	Paper		200V
C-4	928104	212 MMF	Ceramic	±20%	300V
C-5	Pt. of 900076	Variable Capacitor — R.F. Section			
C-6	Pt. of 900076	Trimmer — R.F.			
C-7	920060	.05 MF	Paper		200V
C-8	Pt. of 900076	Variable Capacitor — Oscillator Section			
C-9	Pt. of 900076	Trimmer — Oscillator			
C-10	920060	.05 MF	Paper		200V
C-11	920092	.01 MF	Paper		200V
C-12	Pt. of 923022	.001 MF	Multiple Condenser		
C-13	Pt. of 923022	.01 MF			
C-14	Pt. of 923022	100 MMF			
C-15	Pt. of 923022	.001 MF			
C-16	920180	.005 MF	Paper		400V
C-17	Pt. of 925183	30 MF	Electrolytic		150V
C-18	920539	.05 MF	Paper		400V
C-19	920539	.05 MF	Paper		400V
C-20	Pt. of 925183	80 MF	Electrolytic		150V
C-21	Pt. of 925183	300 MF	Electrolytic		15V
C-22	920040	.1 MF	Paper		200V
C-23	920040	.1 MF	Paper		200V
C-24	920040	.1 MF	Paper		200V
C-25	Pt. of L-1	2.2 MMF			
L-1	700042	Loop Antenna			
L-2	716056	Oscillator Coil			
R-1	351330	3.3 Megohm	Carbon	1/2 W	±20%
R-2	351330	3.3 Megohm	Carbon	1/2 W	±20%
R-3	351330	3.3 Megohm	Carbon	1/2 W	±20%
R-4	350970	100,000 Ohm	Carbon	1/2 W	±20%
R-5	340770	15,000 Ohm	Carbon	1/2 W	±10%
R-6	351330	3.3 Megohm	Carbon	1/2 W	±20%
R-7	340890	47,000 Ohm	Carbon	1/2 W	±10%
R-8	390063	1 Megohm	Volume Control		
R-9	351450	10 Megohm	Carbon	1/2 W	±20%
R-10	351370	4.7 Megohm	Carbon	1/2 W	±20%
R-11	341210	1 Megohm	Carbon	1/2 W	±10%
R-12	351330	3.3 Megohm	Carbon	1/2 W	±20%
R-13	370152	39 Ohm	Carbon	1W	±10%
R-14	340532	1,500 Ohm	Carbon	1/2 W	±10%
R-15	394099	2,200 Ohm	W.W.		± 5%
R-16	340572	2,200 Ohm	Carbon	1/2 W	±10%
R-17	340492	1,000 Ohm	Carbon	1/2 W	±10%
R-18	340532	1,000 Ohm	Carbon	1/2 W	±10%
R-19	340372	330 Ohm	Carbon	1/2 W	±10%
SP-1	180052	Speaker — PM			
SW-1	Pt. of R-8	On-Off Switch			
SW-2	Pt. of 510043	Transfer Switch			
SW-3	Pt. of 510043				
SW-4	Pt. of 510043				
SW-5	Pt. of R-8	On-Off Switch			
T-1	720122	R.F. Interstage Transformer			
T-2	720121	1st I.F. Transformer			
T-3	720123	2nd I.F. Transformer			
T-4	734039A	Output Transformer			
V-1	800017	Vacuum Tube — 1U4			
V-2	800110	Vacuum Tube — 1R5			
V-3	800017	Vacuum Tube — 1U4			
V-4	800019	Vacuum Tube — 1U5			
V-5	800018	Vacuum Tube — 3V4			
V-6	800013	Vacuum Tube — 117Z3			

MODEL 659B,
Ch. 120126-B



MODEL 659B
CHASSIS 120126-B

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. A self-contained loop antenna is provided for broadcast band reception. For permanent home installation, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. Connect the outdoor antenna to the screw on the loop terminal strip marked "AM".
3. An internal power line antenna is provided for FM operation in relatively strong signal areas. An external dipole antenna is recommended for maximum FM operation. To connect the dipole, first remove the wire from the screw on the loop terminal strip marked "FM" and connect the dipole leads to the "FM" terminal and "G".
4. A ground connection is not required for AM and FM operation.

DESCRIPTION

TYPE: Amplitude modulation (AM) and frequency modulation (FM) superheterodyne.

FREQUENCY RANGE:

Broadcast band (AM)—540-1620 kilocycles

Frequency modulation band (FM)—88-108 megacycles

TYPE OF TUBES:

1—6BJ6 FM r-f amplifier

1—12AT7 FM converter

1—12BE6 AM converter

1—6BJ6 FM and AM i-f amplifier

1—6BJ6 2nd i-f FM amplifier

1—6BH6 FM limiter

1—19T8 FM discriminator, AM det., AVC and audio ampl.

1—50L6 power output

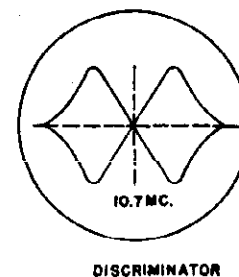
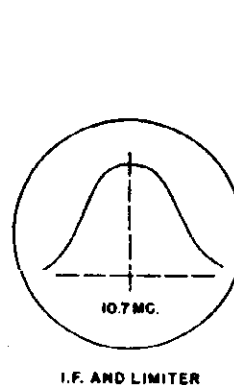
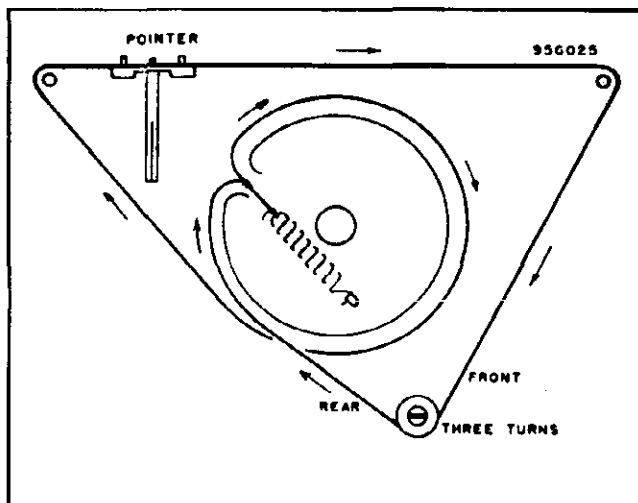
1—Selenium rectifier

POWER SUPPLY: 60 cycles

VOLTAGE RATING: 115v. a.c. and d.c.

POWER CONSUMPTION: 35 watts

CURRENT DRAIN: 0.30 amps. at 115 volts a.c.



ALIGNMENT CURVES (FM)

ALIGNMENT INSTRUCTIONS

1. To position pointer, turn variable condenser fully closed and set pointer to reference mark on dial backplate at the low frequency end of the dial.
2. Volume control should be set at maximum position. The output of the signal generator should be no higher than necessary to obtain an output reading. terminate the signal input as alignment proceeds. Use an insulated alignment tool for all adjustments.
3. Use isolation transformer if available; otherwise connect a .1 mfd. condenser in series with low side of signal generator to chassis.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 mfd.	High side to Pin 7 (grid) of 12BE6. Low side to chassis.	455 KC.	Broadcast	Tuning condenser fully open.	Across voice coil.	A1, A2, (Trans. T4), A3, A4, (Trans. T2).	Adjust for maximum output. Reduce dummy antenna to .001 mfd. Isolation trans. is not used.
2		Loop	1620 KC.	Broadcast	Tuning condenser fully open.	Across voice coil.	A5, (Trimmer cond. C6).	Form loop of several turns of wire. Radiate signal in receiver loop. Adjust for maximum output.
3		Loop	1400 KC.	Broadcast	Tune for max. output.	Across voice coil.	A6, (Trimmer cond. C5).	Adjust for maximum output.

FM I-F and Disc. Alignment Using AM Signal Generator and VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1	.01 mfd.	High side to Pin 1 (grid) of 6BJ6 2nd i-f (V5). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "A". Common to chassis.	A7, (Trans. T5).	Adjust for maximum output.
2	.01 mfd.	High side to Pin 1 (grid) of 6BJ6 1st i-f (V3). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "A". Common to chassis.	A8, A9, (Trans. T3).	Adjust for maximum output.
3	.01 mfd.	High side to Pin 7 of 12AT7 conv. (V2). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "A". Common to chassis.	A10, A11, (Trans. T1).	Adjust for maximum output.
4	.01 mfd.	High side to Pin 1 (grid) of 6BJ6 2nd i-f (V5). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "B". Common to chassis.	A12, (Trans. T6).	Adjust for maximum output.
5	.01 mfd.	"	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "C". Common to chassis.	A13, (Trans. T6).	Adjust for zero output. Continue with FM r-f alignment.

FM I-F AND DISC. ALIGNMENT USING SWEEP SIGNAL GENERATOR AND OSCILLOSCOPE. Use frequency modulated signal, with 40 cycle modulation and 45 sweep. Use 120 cycle sawtooth sweep voltage in oscilloscope for horizontal deflection.

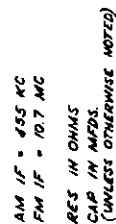
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	CONNECT OSCILLOSCOPE	ADJUST	REMARKS
1	.01 mfd.	High side to Pin 1 (grid) of 6BJ6 1st i-f (V3). Low side to chassis.	10.7 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open.	Vertical input to Point "A". Ground to chassis.	A7, A8, A9, (Trans. T5 and T3).	Adjust for maximum output (height) and symmetry as per i-f alignment curve shown (page 3).
2	.01 mfd.	High side to Pin 7 of 12AT7 of conv. (V2). Low side to chassis.	10.7 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open.	Vertical input to Point "A". Ground to chassis.	A10, A11, (Trans. T1).	Adjust for maximum output (height) and symmetry as per i-f alignment curve shown (page 3).
3	.01 mfd.	High side to Pin 1 (grid) of 6BJ6 2nd i-f (V5). Low side to chassis.	10.7 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open.	Vertical input to Point "C". Ground to chassis.	A12, A13, (Trans. T6).	Alternately adjust A12 & maximum amplitude and A13 for maximum straightness of cross-over lines, with cross-over occurring at center of pattern as per discriminator alignment curve (page 3). Continue with FM r-f alignment.

FM R-F ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1	300 ohm resistor in series with gen. lead.	High side to FM ant. term. Low side to chassis.	109.0 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "A". Common to chassis.	A14 (Iron Core)	Adjust for maximum output.
2	"	"	106.0 mc.	Frequency modulation	Tune for maximum output.	"	A15 (Iron Core)	Adjust for maximum output.

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltages readings are in d.c. volts and resistance reading in ohms, unless otherwise specified.
2. D.c. voltage measurements are made at 20,000 ohms-per-volt and a.c. voltages are measured at 1000 ohms-per-volt.
3. Socket connections are shown as bottom views. Values are measured from socket pin to common negative.
4. Line voltage maintained at 115 volts a.c. for voltage readings.
5. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in readings.
6. Volume control at maximum, with no signal applied and bandswitch in broadcast position (unless otherwise noted), for voltage measurements.



MODEL 659B,
Ch. 120126-

VOLTAGE READINGS (CHASSIS 120126-B)

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V-1	6BJ6	0	.6*	35 AC	41 AC	78*	78*	0	—	—
V-2	12AT7	86*	-2.8*	0	53 AC	41 AC	80*	0	1.7*	NC
V-3	6BJ6	-.4	.8	35 AC	30 AC	100	100	0	—	—
V-4	12BE6	-7.6	0	53 AC	64 AC	100	100	-.4	—	—
V-5	6BJ6	0	.7*	30 AC	24 AC	86*	86*	0	—	—
V-6	6BH6	-.3	0	24 AC	18 AC	50*	50*	0	—	—
V-7	19T8	-.5*	-.6*	-.1*	0	18 AC	-.5	0	-.5	40
V-8	50L6	NC	115 AC	110	105	0	NC	64 AC	7.2	—

RESISTANCE READINGS (CHASSIS 120126-B)

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V-1	6BJ6	0	68	42	50	200K*	200K*	0	—	—
V-2	12AT7	200K*	10K	0	62	50	200K*	0	2200	NC
V-3	6BJ6	3.2 meg.	82	42	35	200K*	200K*	0	—	—
V-4	12BE6	22K	.5	62	75	200K	200K	2.7 meg.	—	—
V-5	6BJ6	.6	82	35	28	200K*	200K*	0	—	—
V-6	6BH6	100K	0	28	20	200K*	200K*	0	—	—
V-7	19T8	100K	100K	175K*	0	20	500K	0	4.7 meg.	500K
V-8	50L6	NC	130	200K	200K	470K	NC	75	150	—

N.C. Denotes "No Connection."

*Denotes Bandswitch in FM Position Only.

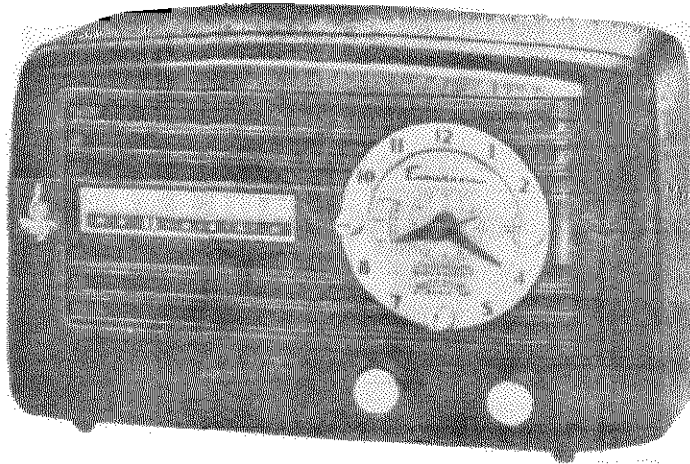
CHASSIS PARTS LIST (CHASSIS 120126-B)

Symbol	Part No.	DESCRIPTION	Symbol	Part No.	DESCRIPTION
C1	928006	1,500 MMF Ceramic	R11	340970	100,000 Ohms $\frac{1}{2}W \pm 10\%$
C2	928006	1,500 MMF Ceramic	R12	340770	15,000 Ohms $\frac{1}{2}W \pm 10\%$
C3	928053	.001 MF Ceramic, Circular	R13	340970	100,000 Ohms $\frac{1}{2}W \pm 10\%$
C4	928027	.01 MF Ceramic, Circular	R14	340970	100,000 Ohms $\frac{1}{2}W \pm 10\%$
C5	915029	.5 MMF (Sim. Stackpole Type GA) 500V $\pm 10\%$	R15	340930	68,000 Ohms $\frac{1}{2}W \pm 10\%$
C6	928053	.001 MF Ceramic, Circular	R16	(Pt.of L5)	22,000 Ohms
C7	928102	.50 MMF Ceramic	R17	351290	2.2 Megohms $\frac{1}{2}W \pm 20\%$
C8	928027	.01 MF Ceramic, Circular	R18	340332	220 Ohms $\frac{1}{2}W \pm 10\%$
C9	928027	.01 MF Ceramic, Circular	R19	340890	47,000 Ohms $\frac{1}{2}W \pm 10\%$
C10	928027	.01 MF Ceramic, Circular	R20	341210	1 Megohm $\frac{1}{2}W \pm 10\%$
C11	928055	.01 MF Dual, Ceramic, Shilded	R21	351370	4.7 Meg. $\frac{1}{2}W \pm 20\%$
C12	928027	.01 MF Ceramic, Circular	R22	390161	1.0 Meg. Vol. Control } Dual Pot.
C13	928110	.25 MMF Ceramic	R23	(Pt.of R22)	480,000 Ohms Tone Control } with Switch
C14	928109	.005 MF Ceramic, Circular	R24	340890	47,000 Ohms $\frac{1}{2}W \pm 10\%$
C15	928006	1,500 MMF Ceramic	R25	351130	470,000 Ohms $\frac{1}{2}W \pm 20\%$
C16	928013	100 MMF Ceramic $\pm 20\%$	R26	351130	470,000 Ohms $\frac{1}{2}W \pm 20\%$
C17	928053	.001 MF Ceramic, Circular	R27	340292	150 Ohms $\frac{1}{2}W \pm 10\%$
C18	(Part of Loop)	2.2 MMF Ceramic	R28	394042	1000 Ohms $3W \pm 10\%$
C19	920060	.05 MF Paper 200V $\pm 25\%$	R29	394027	22 Ohms $2W \pm 10\%$
C20	Pt. of T6	100 MMF	R30	340930	68,000 Ohms
C21		100 MMF	L1	713026	FM Ant. Coil
C22	920180	.005 MF Paper 400V $\pm 25\%$	L2	713027	FM R.F. Coil
C23	928013	100 MMF Ceramic $\pm 20\%$	L3	716059	FM Osc. Coil
C24	920545	.002 MF Paper 400V $\pm 25\%$	L4	700055	AM Loop Ant.
C25	920180	.005 MF Paper 400V $\pm 25\%$	L5	716058	AM Osc. Coil
C26	920090	.01 MF Paper 400V $\pm 25\%$	L6	705002	Filament Choke
C27	928104	212 MMF Ceramic	L7	705002	Filament Choke
C28	920020	.02 MF Paper 400V $\pm 25\%$	P1	505014	Safety Interlock Plug
C29	925187	40 MF Electrolytic	SP1	180074	PM Speaker
C30	925187	80 MF Electrolytic	SW1	(Pt.of R22)	On-Off Switch
C31	928013	100 MMF Ceramic $\pm 20\%$	SW2	510076	Band Switch
C32	920030	.05 MF Paper 400V $\pm 25\%$	T1	720126	1st FM I.F. Transformer
C33	928006	1,500 MMF Ceramic	T2	720067	2nd FM I.F. Transformer
C34	928006	1,500 MMF Ceramic	T3	720077	3rd FM I.F.
C35	928006	1,500 MMF Ceramic	T4	708062	FM Discriminator Transformer
C36	900078	AM Variable Cond. FM Tuning Assembly	T5	720075	1st AM I.F. Transformer
C37	(Pt.of C36)	AM RF Trimmer	T6	720076	2nd AM I.F. Transformer
C38	(Pt.of C36)	AM Osc. Trimmer	T7	734062	Output Transformer
C39	(Pt.of T4)		V1	800023	6BJ6, FM RF Amplifier
R1	340212	68 Ohms $\frac{1}{2}W \pm 10\%$	V2	800047	12AT7, FM Osc.-Mixer
R2	340332	220 Ohms $\frac{1}{2}W \pm 10\%$	V3	800023	6BJ6, FM-AM 1st I.F. Amplifier
R3	340572	2,200 Ohms $\frac{1}{2}W \pm 10\%$	V4	800525	12BE6, AM Osc.-Mixer
R4	340732	18,000 Ohms $\frac{1}{2}W \pm 10\%$	V5	800023	6BJ6, FM 2nd IF Amplifier
R5	340332	220 Ohms $\frac{1}{2}W \pm 10\%$	V6	800054	6BH6, FM Limiter
R6	340212	68 Ohms $\frac{1}{2}W \pm 10\%$	V7	800029	19T8, FM Discriminator, AM Det., Int A.F. Ampl.
R7	340232	82 Ohms $\frac{1}{2}W \pm 10\%$	V8	800070	50L6, Power Output
R8	340492	1,000 Ohms $\frac{1}{2}W \pm 10\%$	V9	817102	Selenium Rectifier, 100 MA.
R9	340232	82 Ohms $\frac{1}{2}W \pm 10\%$		817101	
R10	340332	220 Ohms $\frac{1}{2}W \pm 10\%$	V10	807030	Pilot Bulb—Neon NES1

CABINET PARTS LIST FOR MODEL 659B

Part No.	DESCRIPTION	Part No.	DESCRIPTION
140358	Cabinet	450064	Knob—Bass-Treble
520133	Dial Crystal	587011	Spring Insert ($\frac{1}{4}$ " Knobs)
575649	Baffle and Grill Cloth	560153	Masonite Back
450068S	Knob—Tuning and AM-FM	583206	Line Cord
450099S	Knob—Volume		

MODEL 671B,
Ch. 120137-B



MODEL: 671B
CHASSIS: 120137-B

DESCRIPTION

TYPE: Single-band superheterodyne, with clock-timer.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

V-1—12BE6, pentagrid oscillator-modulator

V-2—12BA6, first i-f amplifier

V-3—12AT6, diode detector, a-f amplifier, a.v.c.

V-4—50C5, beam power output

V-5—35W4, half-wave rectifier

POWER SUPPLY: A.C. 60 cycles only

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 32 watts.

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

CHASSIS PARTS LIST (Chassis 120137-B)

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
C1	920030	.05 mfd. Paper 400V	R2	Pt. of L2	22,000 ohm. Carbon $\frac{1}{2}W \pm 10\%$
C2	470310	220 mmf. } Coupling Assy.	R3	340272	120 ohm. Carbon $\frac{1}{2}W \pm 10\%$
C3		220 mmf. }	R4	351450	10 megohm. Carbon $\frac{1}{2}W \pm 20\%$
C4		.002 mf. }	R5	351130	470,000 ohm. Carbon $\frac{1}{2}W \pm 20\%$
C5		.005 mf. }	R6	351130	470,000 ohm. Carbon $\frac{1}{2}W \pm 20\%$
C6	920540	.02 mf. Paper 400V	R7	340292	150 ohm. Carbon $\frac{1}{2}W \pm 10\%$
C7	922101	.05 mf. Paper Molded 400V	R8	380532	1,500 ohm. Carbon $1W \pm 20\%$
C8	925061	30. & 50 mf. Electrolytic 150V	R9	340072	18 ohm. Carbon $\frac{1}{2}W \pm 10\%$
C9A	900082	Var. Cap.-Ant. Sect.	R10	390177	500,000 ohm. Volume Control
C9B		Var. Cap.-Osc. Sect.	SP1	180079	Loudspeaker—PM—5"
C10	Pt. of C9A	Trimmer-Ant. Section	T1	720033	1st I.F. Transformer
C11	Pt. of C9B	Trimmer-Osc. Section	T2	720033	2nd I.F. Transformer
C12	920040	.1 mf. Paper 200V	T3	734065	Output Transformer
L1	700057	Ant. Loop & Back	VI	800525	12BE6, Osc.—Mixer
L2	716064	Oscillator Coil	V2	800524	12BA6, I.F. Amplifier
M1	470653	Clock Movement	V3	800523	12AT6, Det., 1st A.F. Amp
P1	585082	Plug—3 Prong—and Cable Ass'y.	V4	800032	50C5, Power Output
P2	583014	Plug and Line Cord Ass'y.	V5	800526	35W4, Rectifier
R1	351330	3.3 megohm. Carbon $\frac{1}{2}W \pm 20\%$	X1	500027	Socket—3 Prong—Clock

CABINET PARTS LIST (Model 671B)

PART NO.	DESCRIPTION
140387	Cabinet (Bakelite)
520141	Crystal
470653	Clock Movement
411108	Housing (Clock)
585080	3-Prong Plug and Cable Assemb.
460162S	Knob

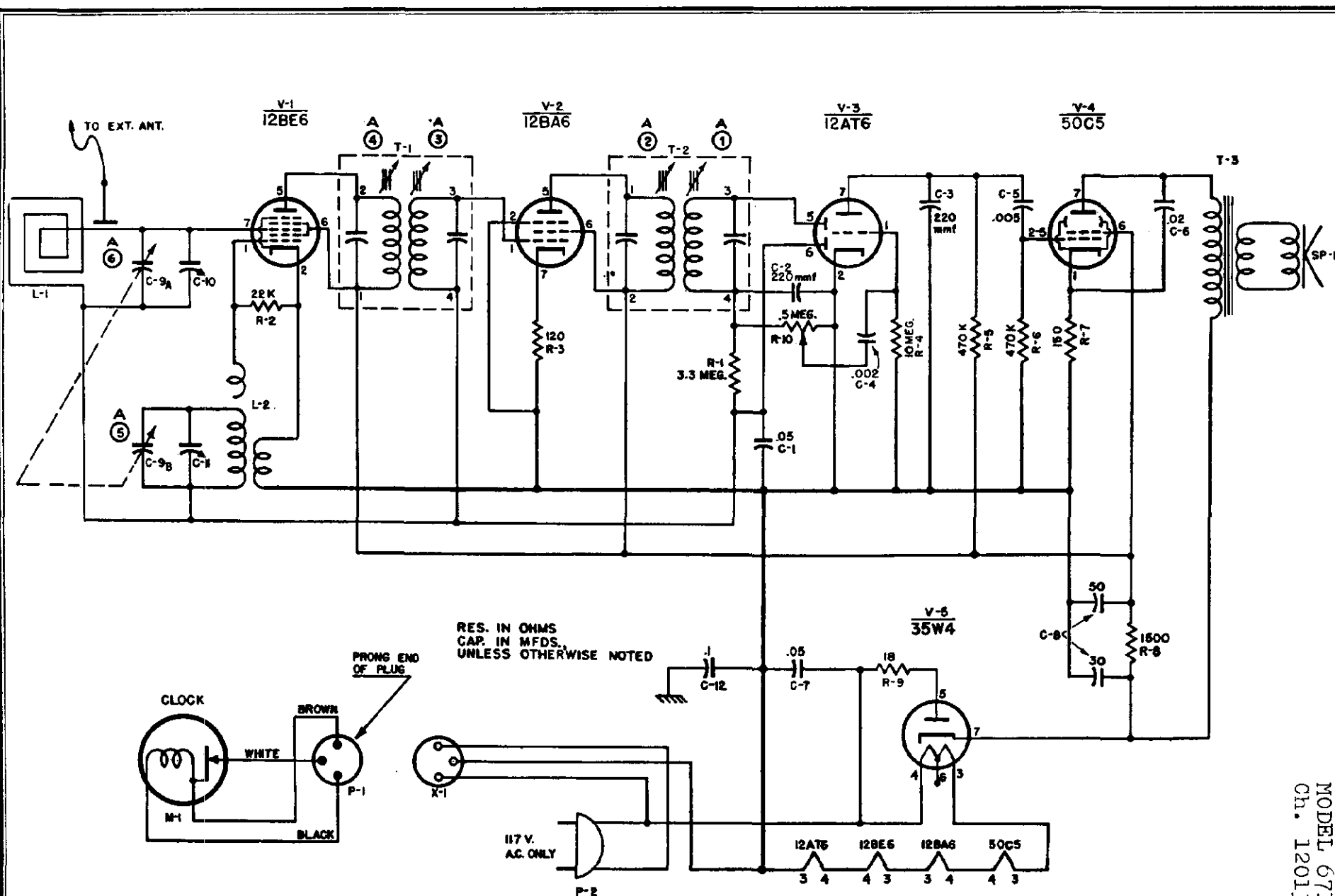
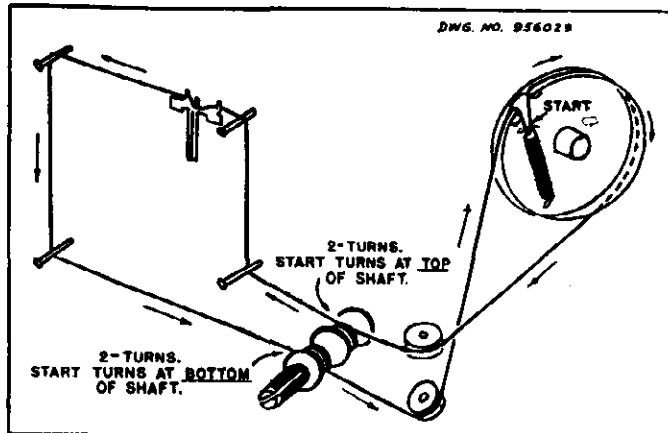


Fig. 1—Schematic Diagram, Chassis 120137-B

MODEL 671B,
Ch. 120137-B

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. This model has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear. Use no ground connection.
3. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.



ALIGNMENT Fig. 2—Dial Cord Stringing, Model 671B

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.001 mfd.	High side to stator of rear section of tuning condenser. Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6	Adjust for maximum output.

VOLTAGE READING FOR CHASSIS 120137B

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	12BE6	—6.3 DC	0	24 AC	12 AC	90 DC	90 DC	—8 DC
V-2	12BA6	—8 DC	0	24 AC	36 AC	90 DC	90 DC	1. DC
V-3	12AT6	—9 DC	0	0	12 AC	—7 DC	—8 DC	38 DC
V-4	50C5	5.5 DC	0	80 AC	36 AC	0	90 DC	110 DC
V-5	35W4	0	0	80 AC	117 AC	115 AC	110 AC	120 DC

RESISTANCE READINGS FOR CHASSIS 120137B

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	12BE6	2,400	0.4	26	14	300,000	300,000	4 meg.
V-2	12BA6	4 meg.	0	26	38	300,000	300,000	120
V-3	12AT6	10 meg.	0	0	14	500,000	4 meg.	800,000
V-4	50C5	150	470,000	90	38	470,000	300,000	350,000
V-5	35W4	N.C.	N.C.	90	125	150	120	350,000

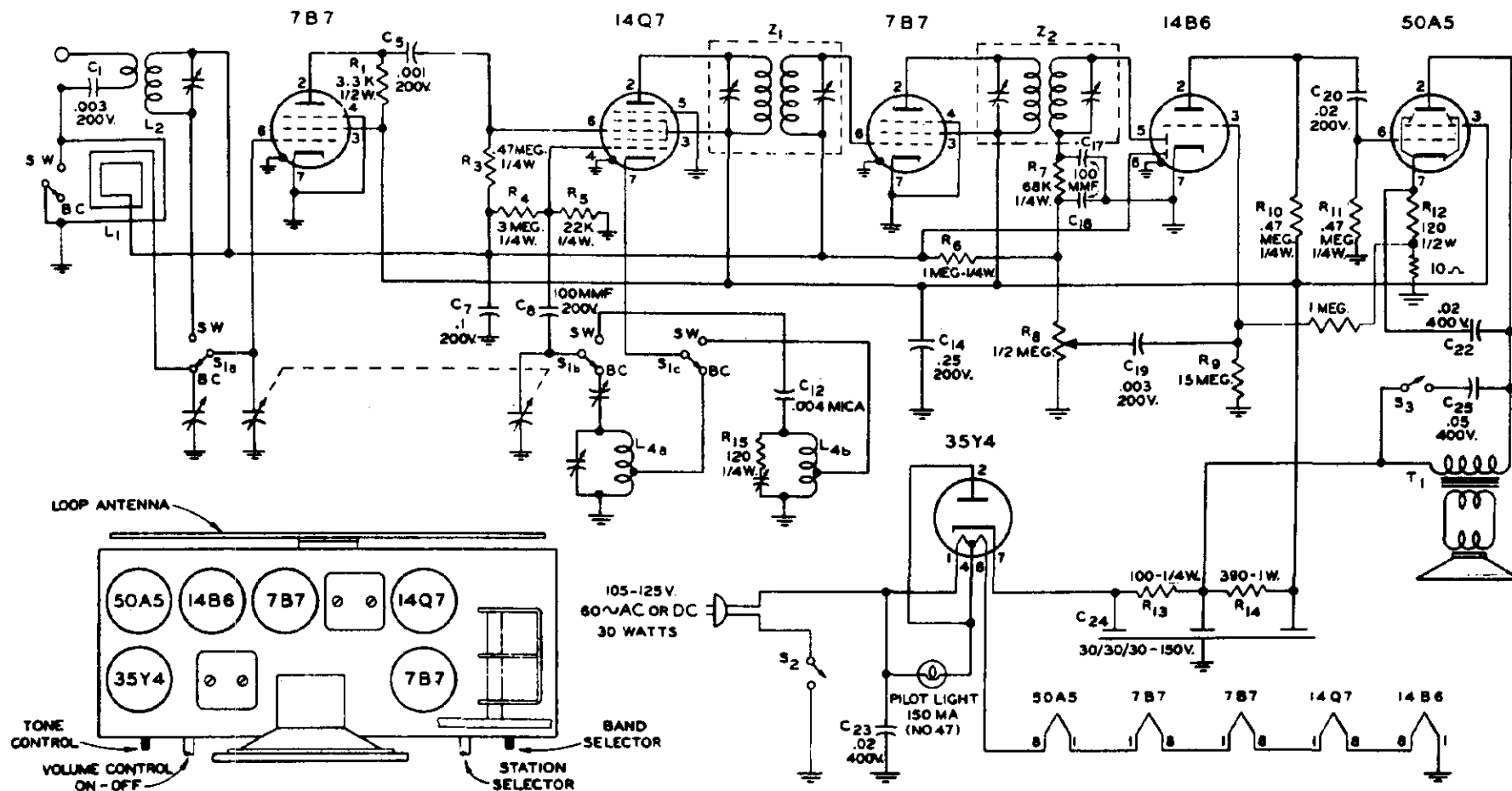
VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltage measured at 1,000 ohms per volt.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts 60 cycle for voltage readings.
5. Normal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

NOTE: The radio and clock mechanism of Model 671B are covered by the Emerson warranty. If it should be necessary to have the clock mechanism repaired after the warranty has expired, it should be sent to the nearest authorized Telechron service station.

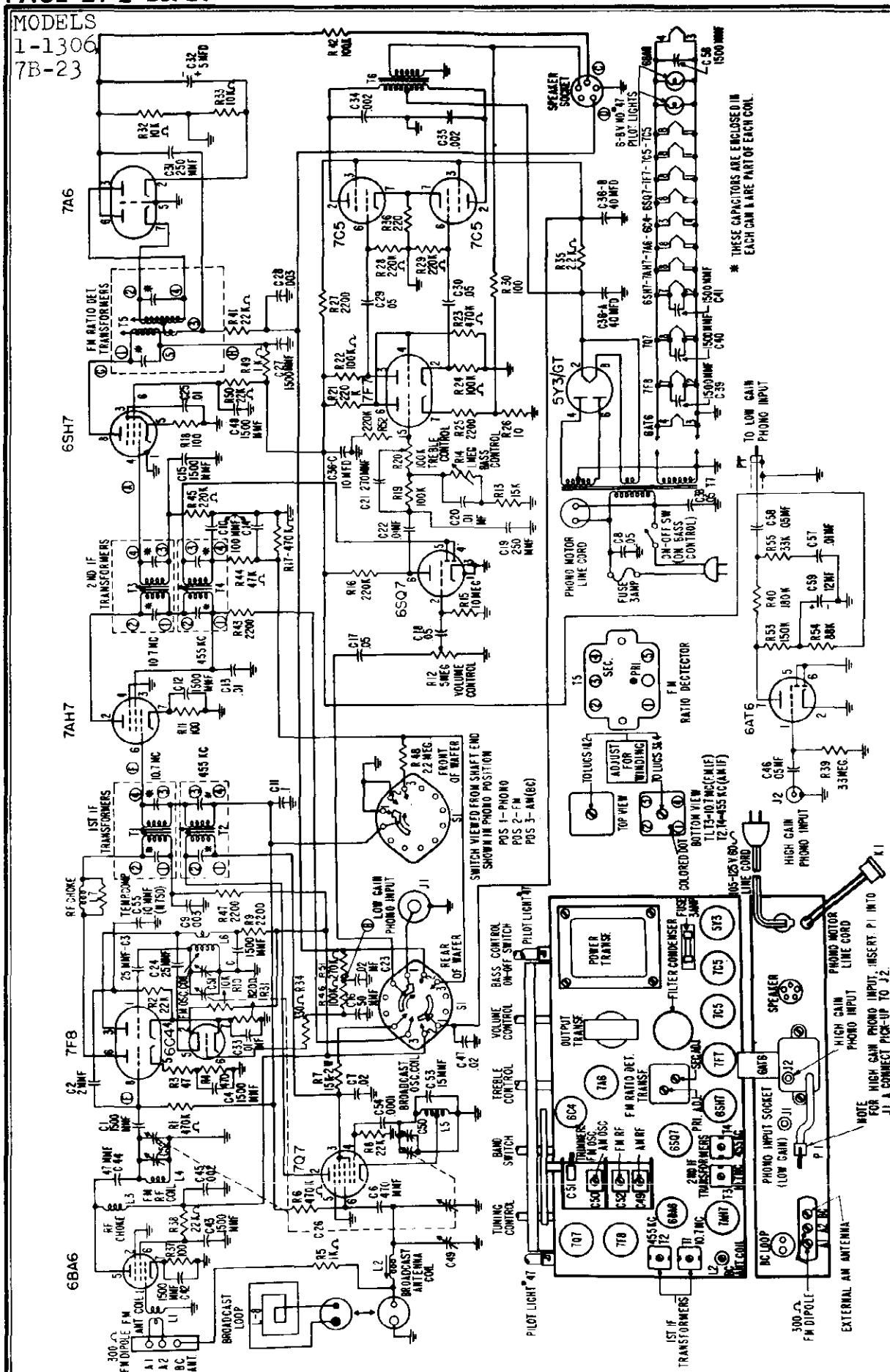
TO REMOVE THE CLOCK MECHANISM FROM THE CABINET THE FOLLOWING STEPS SHOULD BE TAKEN:

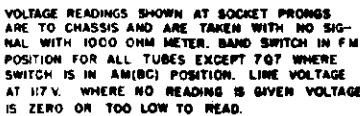
1. Remove radio chassis from cabinet.
2. Remove clock plug from chassis.
3. Remove three nuts located on back of clock and remove clock cover.
4. Carefully remove clock from front of cabinet.

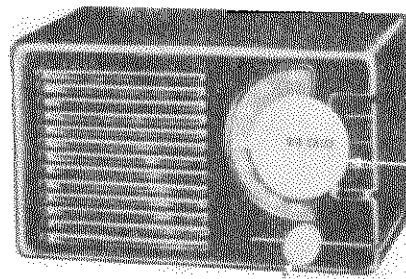


NOTICE IF SET IS INOPERATIVE ON DC REVERSE LINE PLUG

CAUTION: TO REPLACE TUBES, REMOVE SCREW & WASHER AT CENTER OF LOOP ANTENNA, AFTER FIRST REMOVING PLUG FROM CURRENT OUTLET





STATION
SELECTORON-OFF SWITCH
AND
VOLUME CONTROL

CABINET DIMENSIONS	8" X 4-3/4" X 4-7/8"	LOUD SPEAKER	4 Inch P.M.
WEIGHT	2 Lbs. 10 Ozs.	VOICE COIL IMPEDANCE	3.2 Ohm at 400 Cycles
POWER SUPPLY	110 to 120 Volt AC-DC	POWER OUTPUT	Undistorted - 0.9Watts Maximum - 1.8Watts
TUNING RANGE	535 to 1620 KC	TUBE COMPLEMENT	12AU6 - Converter 12AV6 - Diode Audio 50C5 - Output 35W4 - Rectifier
INTERMEDIATE FREQ.	455 KC		

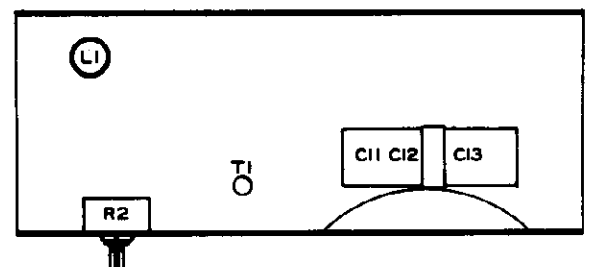
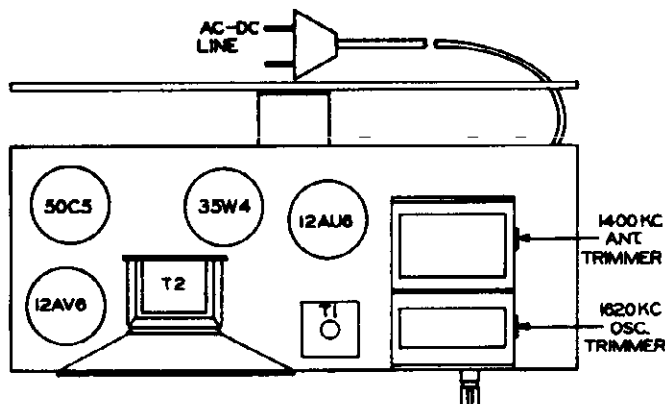
ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right, and make the adjustments marked (1) first, (2) next, (3) Third.

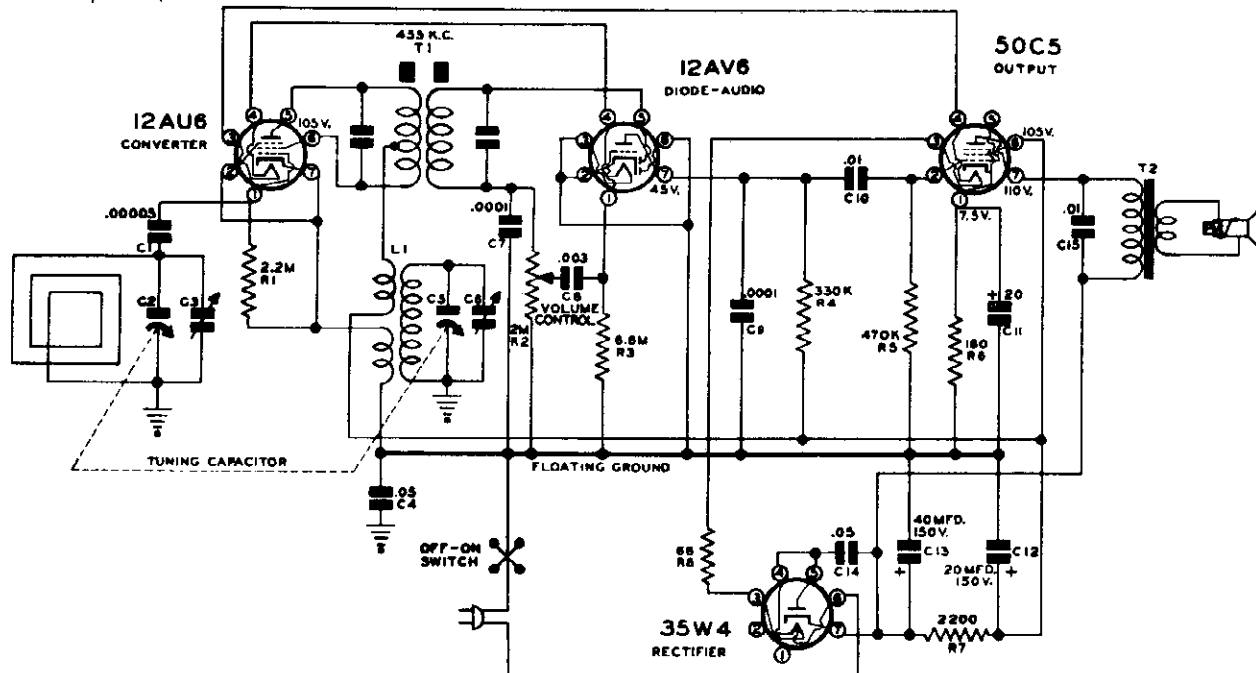
Before starting alignment

- Remove chassis and loop from cabinet. Leave loop in position on its mounting bracket. Turn tuning capacitor until plates are completely in mesh and replace tuning knob with indicator directly down.
- Use an accurately calibrated test oscillator with some type of output measuring device.
- When aligning the 1400 KC Antenna Trimmer and the 1620 KC Oscillator Trimmer, couple test oscillator to receiver loop by; (1) make loop consisting of two turns of #22 size wire wound on a form of 6" in dia. (2) connect this loop across output of test oscillator; (3) place test oscillator loop approximately a foot from and in the same plane as the receiver loop.
BE SURE THAT NEITHER LOOP MOVES WHILE ALIGNING.

Steps	Set Receiver dial to:	TEST OSCILLATOR		Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Attach output of test oscillator to:	
1	ANY POINT WHERE NO INTERFERING SIGNAL IS RECEIVED, WITH TUNING CONDENSER NEAR CENTER	455 K.C.	HIGH SIDE TO REAR STATOR PLATES OF TUNING CONDENSER. LOW SIDE TO COMMON NEGATIVE THROUGH A .05 MFD BLOCKING CONDENSER	ADJUST SLUGS AT TOP AND BOTTOM OF I.F. CAN FOR MAXIMUM OUTPUT.
2	EXACTLY 1620 K.C.	EXACTLY 1620 K.C.	SEE PARAGRAPH "C" ABOVE	ADJUST 1620 K.C. OSCILLATOR TRIMMER FOR MAXIMUM OUTPUT.
3	APPROX. 1400 K.C.	APPROX. 1400 K.C.	SEE PARAGRAPH "C" ABOVE	ADJUST 1400 K.C. ANTENNA TRIMMER FOR MAXIMUM OUTPUT.

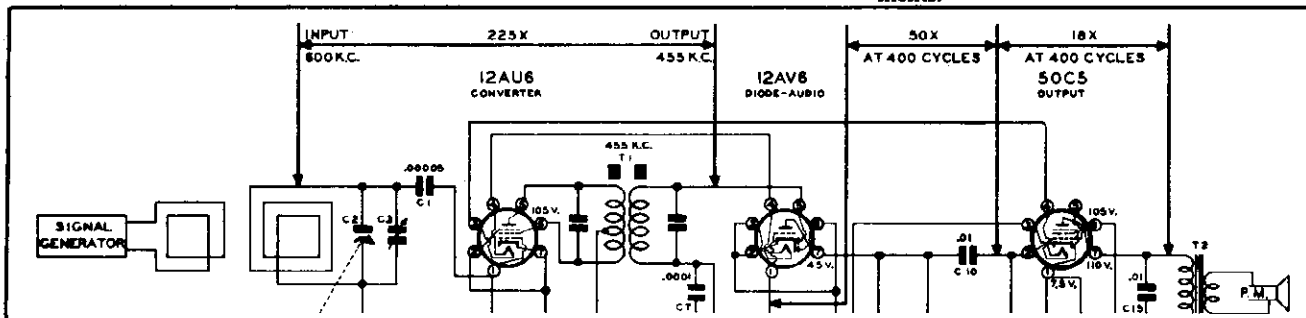


MODEL 4-A-70



Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.



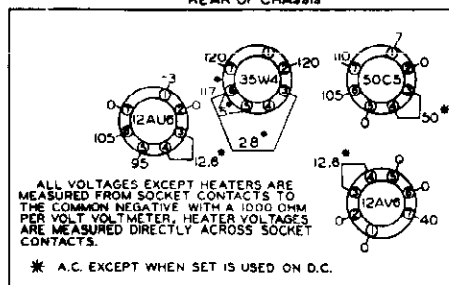
Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

PARTS LIST

ILLUS. NO.	PART NUMBER	PART NAME	DESCRIPTION
C1	N-6385	Condenser	Ceramic 50 MMFD. 500 V.
C7,C9	N-6015	Condenser	Ceramic 100 MMFD. 500 V.
C4	N-1345	Condenser	Tubular .05 MFD. 200 V.
C8	N-2063	Condenser	Tubular .003 MFD. 600 V.
C10,C15	N-1344	Condenser	Tubular .01 MFD. 400 V.
C11)			(20 MFD. 15 V.)
C12)	N-7153	Condenser	Dry Electrolytic (20 MFD. 150 V.)
C13)			(40 MFD. 150 V.)
C14	N-1346	Condenser	Tubular .05 MFD. 400 V.
R1	N-4277	Resistor	Carbon 2.2 Megohm 1/2 W. 20%
R2	N-7142	Volume Control	2.0 Megohm with Switch
R3	N-4028	Resistor	Carbon 6.8 Megohm 1/2 W. 20%
R4	N-4423	Resistor	Carbon 330,000 Ohm 1/2 W. 20%
R5	N-4027	Resistor	Carbon 470,000 Ohm 1/2 W. 20%
R6	N-4067	Resistor	Carbon 180 Ohm 1/2 W. 10%
R7	N-4896	Resistor	Carbon 2,200 Ohm 1/2 W. 10%
R8	N-6014	Resistor	Carbon 68 Ohm 2.0 W. 10%
T1	N-7694	Coil	I.F. Transformer
L1	N-7725	Coil	Oscillator
	N-7670	Antenna	Loop and Cabinet Back

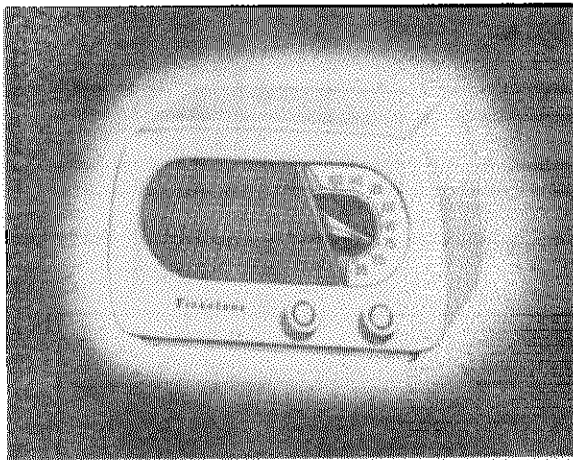
N-7141	Condenser	Two Gang, Tuning
N-7824	Speaker	4" PM with Output Transformer
#299	Cabinet	Walnut Plastic (with Dial Scale and Carton)
N-1090	Cord	6 Foot Rubber Line Cord
N-1270	Knob	Station Selector
N-7826	Knob	Volume

REAR OF CHASSIS

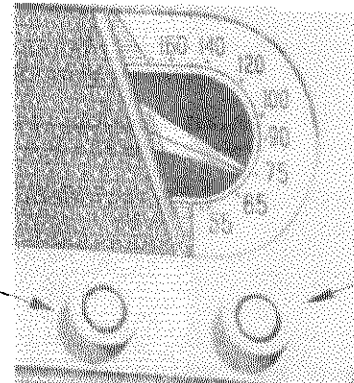


VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

MODELS 4-A-78,
4-A-79



ON-OFF SWITCH
AND
VOLUME CONTROL



STATION
SELECTOR

CABINET DIMENSIONS 8 3/4" x 5" x 5 1/2"

WEIGHT 3 1/2 lbs.

POWER SUPPLY 110 to 120 Volt AC-DC

TUNING RANGE 1650 to 530 KC

INTERMEDIATE FREQ. 455 KC

LOUD SPEAKER

VOICE COIL IMPEDANCE

POWER OUTPUT

TUBE COMPLEMENT

3 Inch P.M.

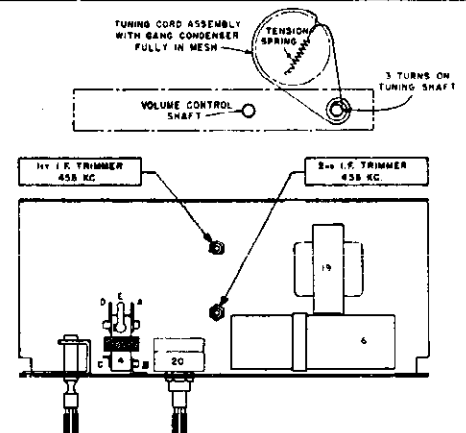
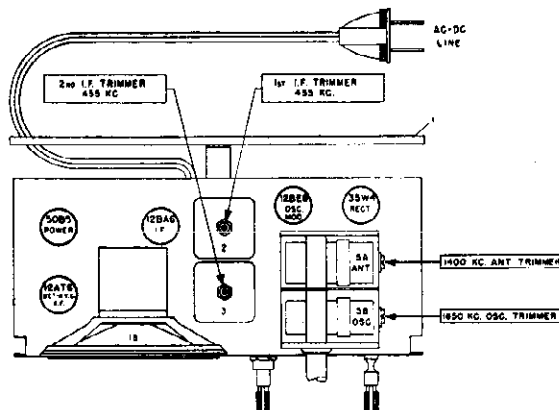
3.2 OHM at 400 Cycles

Undistorted—0.9 Watts

Maximum—1.5 Watts

12BE6 Oscillator Modulator,
12BA6 IF, 12AT6 Det. AVC.,
50B5 Power Output. 35W4
Rectifier

Steps	Set receiver dial to:	TEST OSCILLATOR		Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Attach output of test oscillator to:	
1	Any point where no interfering signal is received.	455 K. C.	High side to rear stator plates of tuning condenser. Low side to common negative through a .02 Mfd. blocking condenser.	Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.
2	Exactly 1650 K. C.	Exactly 1650 K. C.	See paragraph (c) above	Adjust 1650 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	See paragraph (d) above	Adjust 1400 K. C. antenna trimmer for maximum output.

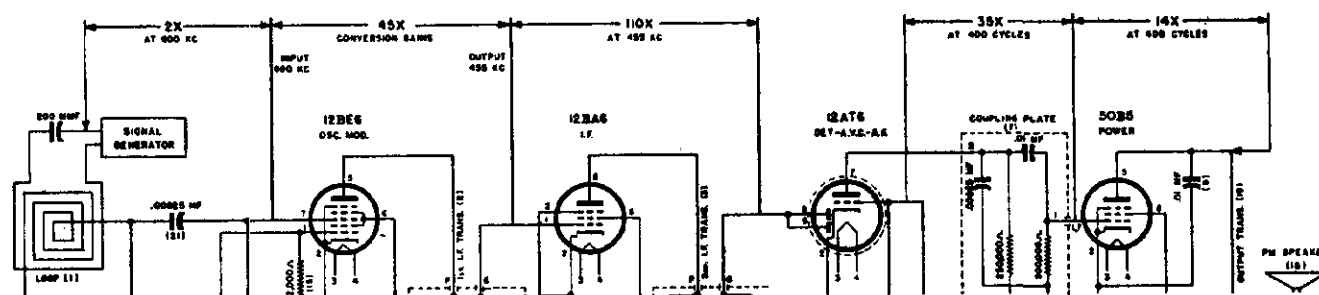


ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

- (A) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.
- (B) Use an accurately calibrated test oscillator with some type of output measuring device.
- (C) **WHEN ADJUSTING THE 1650 KC OSCILLATOR TRIMMER**, remove chassis from cabinet and disconnect the loop connection wires from the loop. Attach a 1 megohm resistor across these connections and feed output of test oscillator across the 1 megohm resistor.
- (D) **THE 1400 KC LOOP ANTENNA TRIMMER** should be adjusted only after all other adjustments have been made. **PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET—APPROXIMATELY $\frac{5}{8}$ " SPACE BETWEEN LOOP AND CHASSIS.**
When aligning the 1400 KC Antenna Trimmer, couple test oscillator to receiver loop by: (1) make loop consisting of five to ten turns of No. 20 to No. 30 size wire, wound on a 2" or 3" form; (2) connect this loop across output of test oscillator; (3) place test oscillator loop near radio loop. **BE SURE THAT NEITHER LOOP MOVES WHILE ALIGNING.**



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

ORDERING PARTS

Order parts from your nearest Firestone Tire and Auto Supply Warehouse. When ordering parts, it is important that the correct code number, stock number, and serial number be given with the correct part name and part number as shown in the parts list. You will find the stock number and code number stamped on the chassis pan.

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum-tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

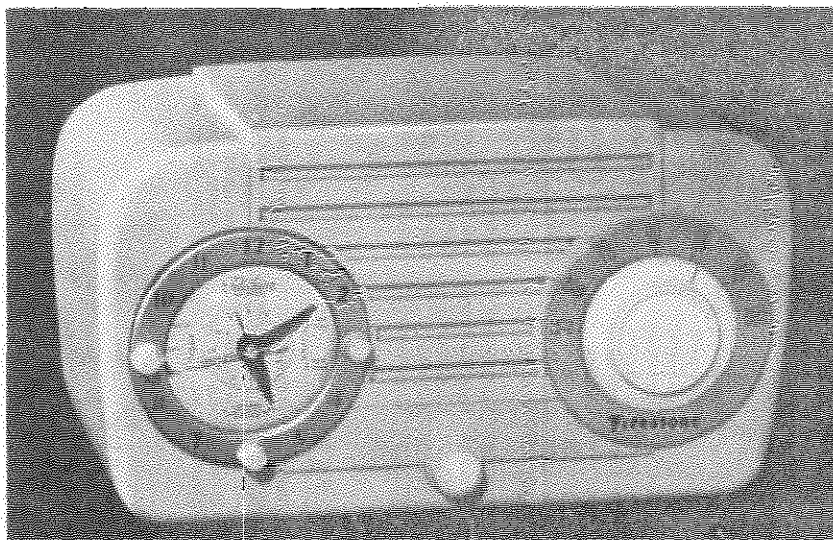


Illus. No.	Part No.	Part Name	Description
9	23E411	Condenser	Tubular, .01 Mfd. 400 V.....
10	23E211	Condenser	Tubular, .01 Mfd. 200 V.....
11	23E216	Condenser	Tubular, .05 Mfd. 200 V.....
12	23E416	Condenser	Tubular, .05 Mfd. 400 V.....
13	27E151	Resistor	Carbon, 150 Ohm, 1/3 W.....
14	27E222-3	Resistor	Carbon, 2200 Ohm, 1 W.....
15	27E223	Resistor	Carbon, 22,000 Ohm, 1/3 W.....
16	27E335	Resistor	Carbon, 3.3 Megohm, 1/3 W.....
17	27E335	Resistor	Carbon, 3.3 Megohm, 1/3 W.....
18	1E32	Speaker	3" P.M.....
19	22E49	Transformer	Output.....
20	28E27	Vol. Control	500,000 Ohm, with Switch....
21	23E2027	Condenser	Ceramic, .00025 Mfd. 500 V....
22	27E105	Resistor	Carbon, 1 Megohm 1/3 W.....
23	23E2021	Condenser	Tubular, .2 Mfd. 400 V.....

Part No.	Part Name	Description
20E348-3	Dial Shaft Assy.	Dial Drive Shaft with Bracket.....
35E27-2	Dial Pointer	Dial Indicator
65E2	Dial Spring	Tension Spring for Dial Cord.....
37E52-12	Knob	For Walnut Cabinet 4A78.....
37E52-14	Knob	For Ivory Cabinet 4A79.....

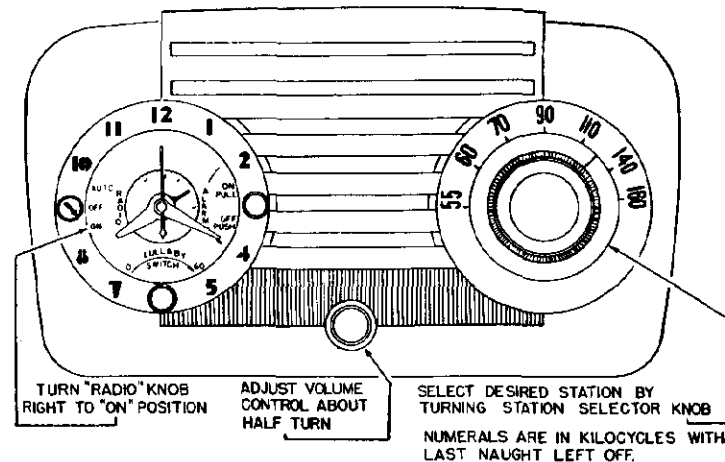
Part No.	Part Name	Description
10E43	Stud	Trimount Stud for baffle and dial scale.
10E41	Stud	Trimount stud for dial scale.....

MODEL 4-A-83,
Slumber-tone



(2)

TO TURN RADIO ON MANUALLY



Instructions for Using Your RADIO-ALARM CLOCK

This skillfully designed and carefully constructed combination will give you long and enjoyable service. This Receiver can perform the following services for the user:

1. Provide accurate time.
2. Receive broadcast programs being transmitted and within range—at any time.
3. Turn off radio program at will of user up to 60-minute interval or less.
4. Turn on radio program for awakening.
5. Turn buzzer alarm on 10 minutes after radio starts playing.
6. Turn on buzzer alarm for awakening — with radio silenced.

INSTALLATION—Check the voltage and cycles of the electric power supplied to your home. This combination will operate **ONLY** on 60 cycle alternating current (ac), from 105 to 125 volts. **THIS SET WILL NOT OPERATE ON ANY OTHER TYPE OF CURRENT OR CYCLES.** Your electric company will help you make certain that you have the correct kind of power.

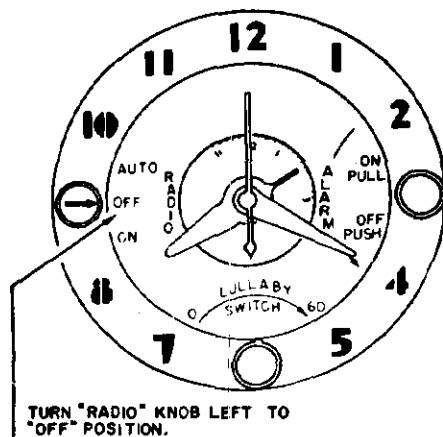
This combination includes a sensitive five multi-purpose tube super-heterodyne radio including a rectifier tube. Your radio has a self contained duro-loop antenna capable of supplying sufficient volume in areas of normal reception. If you live in an area where radio reception is poor, you can improve the performance by connecting an outside antenna to the screw marked EXT. ANT. which you will find on the right hand side of the rear of the cabinet.

(1)

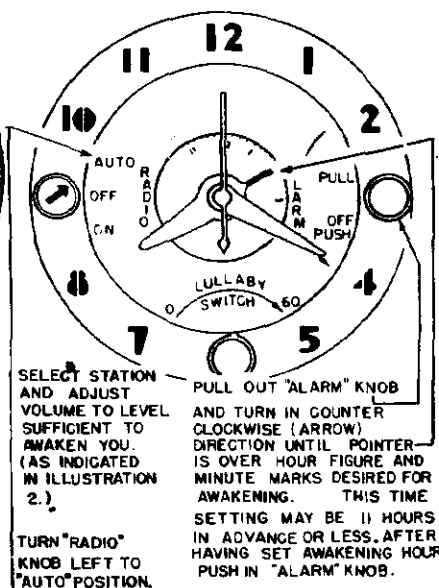
TO SET THE CLOCK

Your self-starting TELECHRON movement will begin operating when the set is plugged into the proper outlet and your sweep second hand begins to rotate. Set the correct time by means of the small knob at the right REAR of the cabinet. Turn **ONLY** in the direction shown on the back cover.

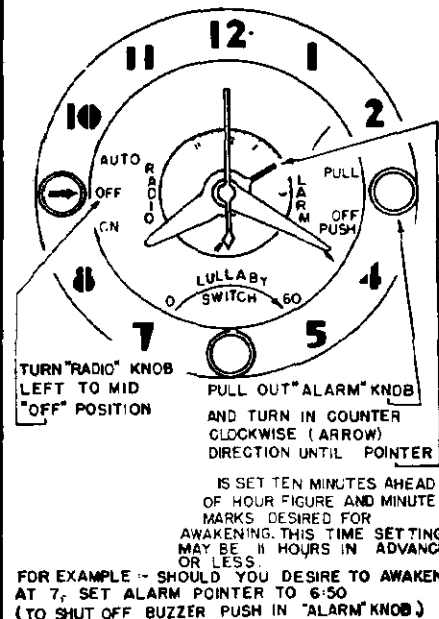
(3) TO TURN OFF RADIO MANUALLY



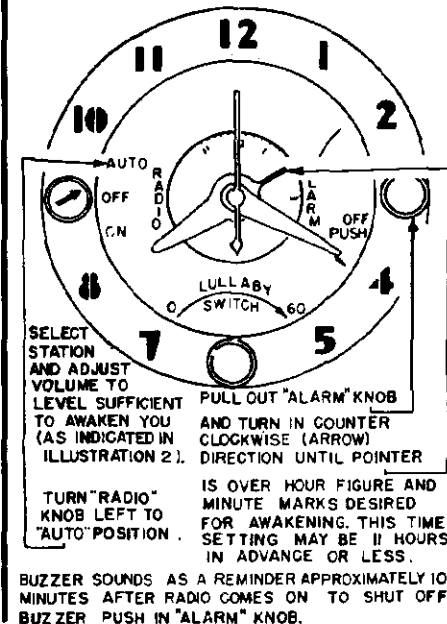
(4) TO AWAKEN TO MUSIC



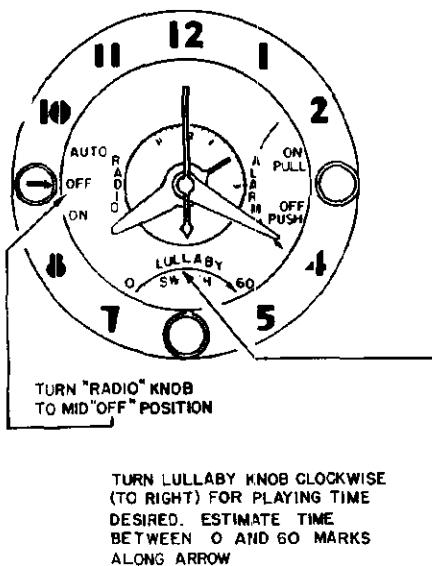
(5) TO AWAKEN TO BUZZER ALARM



(6) TO AWAKEN TO MUSIC AND BUZZER ALARM



(7) TO TURN RADIO OFF AUTOMATICALLY WHEN RETIRING



(8) - To Turn Radio Off Automatically When Retiring and Awaken to Music

Set Controls as in Illustration 4.
Set "Lullaby" Knob as in Illustration 7.

(9) - To Turn Radio Off Automatically When Retiring and Awaken to Buzzer Alarm

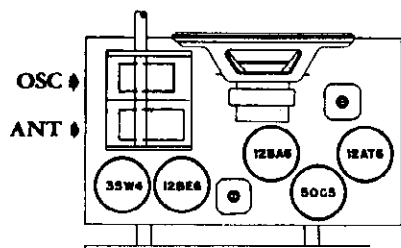
Set Controls as in Illustration 5.
Set "Lullaby" Knob as in Illustration 7.

(10) - To Turn Radio Off Automatically When Retiring, Awaken to Music and Buzzer Alarm

Set Controls as in Illustration 6.
Set "Lullaby" Knob as in Illustration 7.

PAGE 21-8 FIRESTONE

MODEL 4-A-83,
Slumbertone



TUBE COMPLEMENT

12BE6 Converter
12BA6 I.F. Amplifier
12AT6 Det. AVC-AUDIO

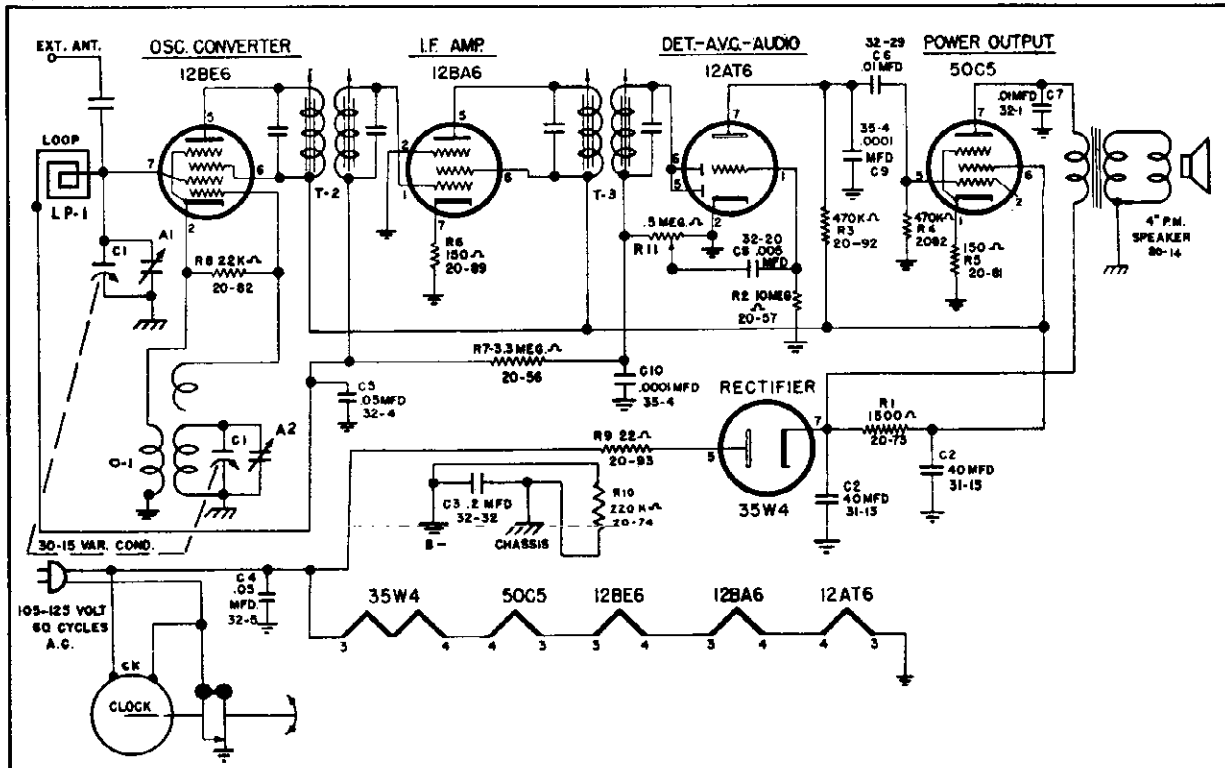
50C5 Power Output
35W4 Rectifier

SERVICE DATA

ALIGNMENT PROCEDURE

- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

SIGNAL GENERATOR				TUNER SETTING	ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown)
Frequency	Coupling Capacitor	Connections to Receiver	Ground Connection		
455 kc	0.1 mfd.	12BE6 grid	B—	Rotor full open (Plates out of mesh)	Input and output slugs of IF cans
1650 kc	0.1 mfd.	12BE6 grid	B—	Rotor full open (Plates out of mesh)	Oscillator trimmer A2
1500 kc		Radiating Loop		1500 kc	Antenna trimmer A1



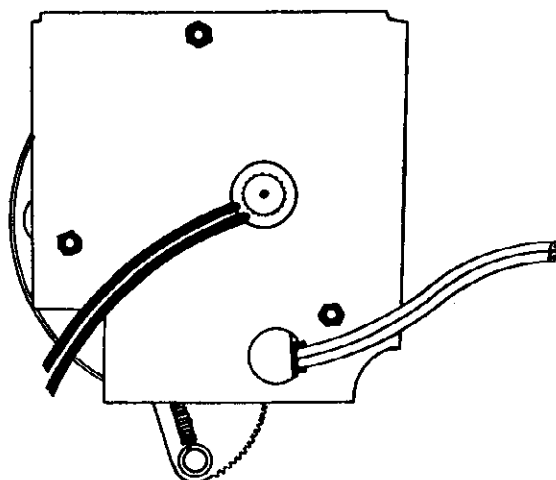
MODEL 4-A-83,
Slumbertone

FIGURE A

To take clock movement out of cabinet proceed as follows:
Remove the following:

A—Line cord from power line.

B—Tuning knob, volume control knob, and chassis from cabinet.

C—3 nuts holding clock clamping shield shown in Figure A above.

D—As this shield is sufficiently pulled back unsolder red and blue wires and power cord shown in Figure B above.

E—Before movement can be withdrawn from cabinet, it is necessary to have the lullaby time switch in the full 60-minute position. With this switch in this position, the clock can be withdrawn by turning the rim clockwise approximately 5 to 10 degrees so that movement parts can pass openings in cabinet.

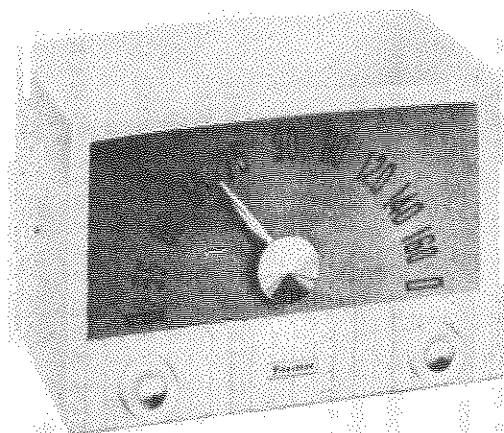
F—In shipping a movement to a service station, be certain that it is suitably packed to withstand transportation. Care should be taken with the glass crystal so that it is not subject to strain during shipment.

REPLACEMENT PARTS LIST

Ref. No.	Part No.	DESCRIPTION
CAPACITORS		
C1	30-15	Variable Condenser, 2 gang
C2	31-13	40 mfd.—40 mfd., 150 volt dual electrolytic condenser
C3	32-32	.2 mfd., 200 volt, paper
C4	32-5	.05 mfd., 400 volt, paper
C5	32-4	.05 mfd., 200 volt, paper
C6	32-1	.01 mfd., 400 volt, paper
C7	32-1	.01 mfd., 400 volt, paper
C8	32-20	.005 mfd., 600 volt, paper
C9	35-4	.0001 mfd., 500 volt, mica
C10	35-4	.0001 mfd., 500 volt, mica
RESISTORS		
R1	20-73	1500 ohm, 1 watt 20%
R2	20-57	10 megohm, 1/4 watt 20%
R3	20-92	470,000 ohm, 1/4 watt 20%
R4	20-92	470,000 ohm, 1/4 watt 20%
R5	20-81	150 ohm, 1/2 watt 20%
R6	20-89	150 ohm, 1/4 watt 20%
R7	20-56	3.3 megohm, 1/4 watt 20%

Ref. No.	Part No.	DESCRIPTION
RESISTORS— (Continued)		
R8	20-82	22,000 ohm, 1/4 watt 20%
R9	20-93	22 ohm, 1/2 watt 20%
R10	20-74	220,000 ohm, 1/4 watt 20%
R11	50-15B	1/2 meg. volume control
COILS AND TRANSFORMERS		
O-1	60-9	Oscillator coil
T-2	61-11	Input IF transformer
T-3	61-11	Output IF transformer
LP-1	A125-32	Loop antenna
MISCELLANEOUS		
80-14	80-14	4 inch P.M. speaker with output transformer
	122-19	Selector knob
	122-15	Volume knob
	120-33Y	Cabinet—ivory (in carton)
CK	140-6	Clock

MODELS 4-A-85,
4-A-89



ON-OFF SWITCH
AND
VOLUME CONTROL

STATION
SELECTOR

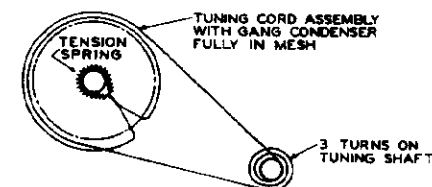
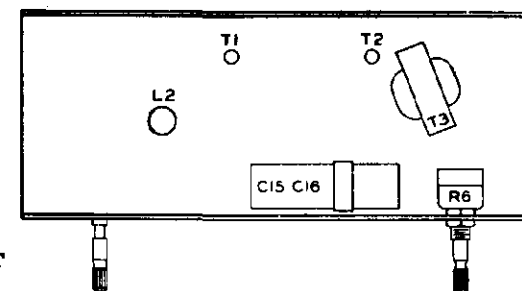
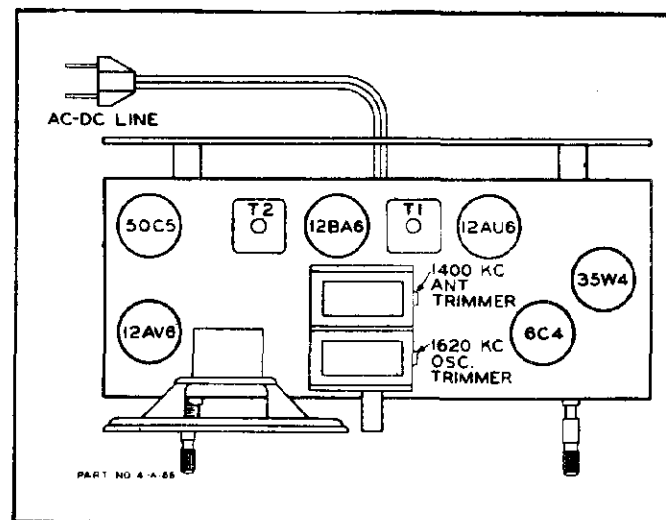
Cabinet Dimensions	-10-5/8"x5-3/4"x7-3/32"	Power Output	- Undistorted- 1.0 Watts
Weight	-7-1/2 Lbs.	Maximum	- 1.9 Watts
Power Supply	-110 to 120 Volt AC-DC	Tube Complement-	12AU6 - Converter
Tuning Range	-535 to 1620 KC		12BA6 - I.F. Amplifier
Intermediate Freq.	-455 KC		12AV6 - Diode-Audio
Loud Speaker	-5 Inch P.M.		6C4 - Oscillator
Voice Coil Impedance	-3.2 Ohm at 400 Cycles		50C5 - Output
			35W4 - Rectifier

ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right and make the adjustments marked (1) first, (2) next, (3) third.

Before starting alignment:

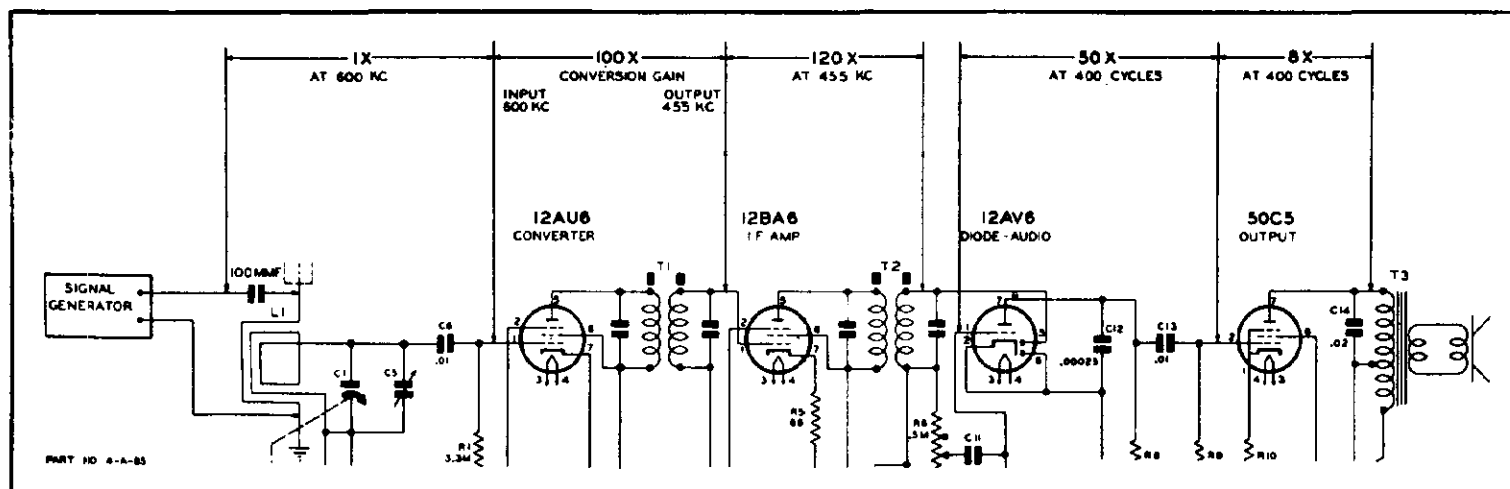
- Remove the chassis and loop antenna from the cabinet at the same time. To accomplish this, remove the two fasteners holding the top of the back to the cabinet and remove the two screws on the rear apron of the chassis which fasten the chassis to the cabinet.
- Use an accurately calibrated test oscillator with some type of output measuring device.



Steps	Set Receiver dial to:	TEST OSCILLATOR		DUMMY ANTENNA	Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Attach output of test oscillator to:		
1	Any point where no interfering signal is received.	EXACTLY 455 KC	High side to grid of 12AU6 Tube. Low side to common negative.	.05 MFD. CONDENSER.	Adjust slugs at top and bottom of 2nd I.F. (T2) and then each of the slugs of the 1st I.F. (T1) for max. output.
2	Exactly 1620 KC	Exactly 1620 KC	External Antenna blue lead on loop.	100 MMFD CONDENSER	Adjust 1620 KC oscillator trimmer for maximum output.
3	Approx. 1400 KC	Approx. 1400 KC	External Antenna blue lead on loop.	100 MMFD CONDENSER	Adjust 1400 KC antenna trimmer for maximum output.

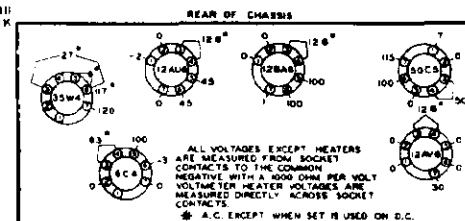
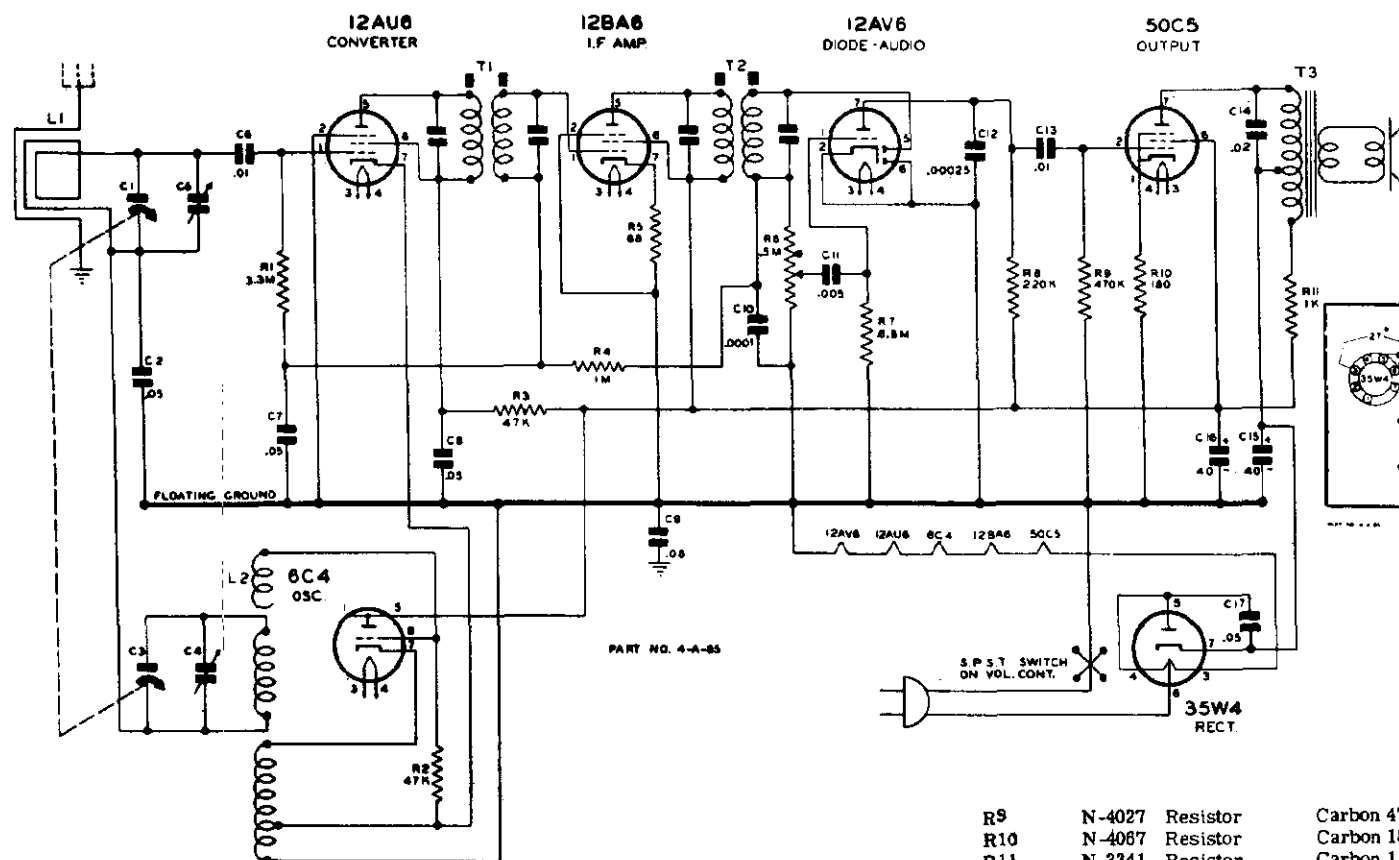
Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in your test equipment. These factors may create considerable variation in gain measurements.

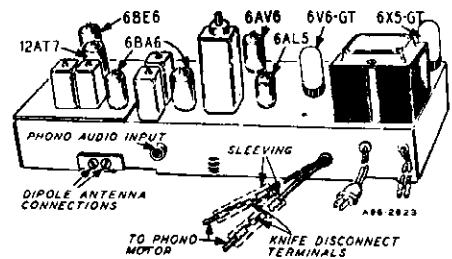
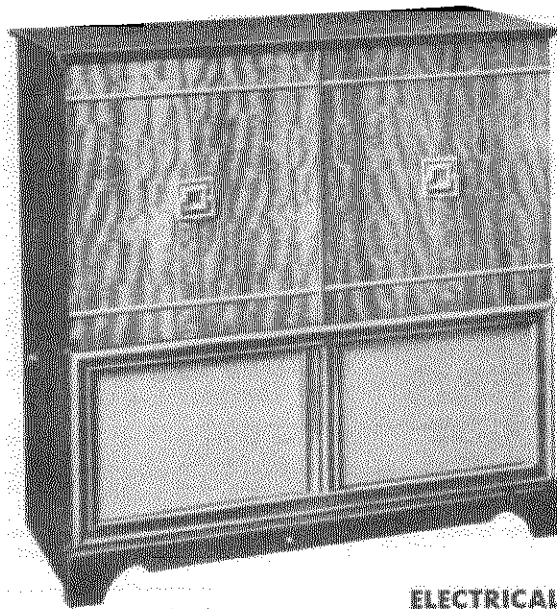
MODELS 4-A-85,
4-A-89



VOLTAGE TABLE
(Bottom View of Chassis)

ILLUS. NO.	PART NUMBER	PART NAME	DESCRIPTION
C2, C7, C8	N-1345	Condenser	Paper .05 MFD. 200 V.
C6, C13	N-1344	Condenser	Paper .01 MFD. 400 V
C9	N-1351	Condenser	Paper .1 MFD. 200 V
C10	N-6015	Condenser	Ceramic 100 MMFD. 500 V. 20%
C11	N-4394	Condenser	Paper .005 MFD. 600 V.
C12	N-6488	Condenser	Ceramic 250 MMFD. 500 V. 20%
C14	N-1376	Condenser	Paper .02 MFD. 400V.
C15			(40 MFD. 150 V.
C16)	N-5051	Condenser	Dry Electrolytic (40 MFD. 150 V.
C17	N-1346	Condenser	Paper .05 MFD. 400 V.
R1	N-4062	Resistor	Carbon 3.3 Megohm 1/2 W. 20%
R2, R3	N-4063	Resistor	Carbon 47,000 Ohm 1/2 W. 20%
R4	N-1262	Resistor	Carbon 1.0 Megohm 1/2 W. 20%
R5	N-6485	Resistor	Carbon 68 Ohm 1/2 W. 10%
R6	N-7984	Volume Control	500,000 Ohm with Switch
R7	N-4028	Resistor	Carbon 6.8 Megohm 1/2 W. 20%
R8	N-4026	Resistor	Carbon 220,000 Ohm 1/2 W. 20%

R9	N-4027	Resistor	Carbon 470,000 Ohm 1/2 W. 20%
R10	N-4067	Resistor	Carbon 180 Ohm 1/2 W. 10%
R11	N-3341	Resistor	Carbon 1,000 Ohm 1/2 W. 10%
L1	N-7964	Coil	Loop Antenna and Cabinet Back
L2	N-7982	Coil	Oscillator
T1, T2	N-7981	Coil	1st and 2nd I.F. Transformer
T3	N-8001	Transformer	Output
	N-7980	Speaker	5 inch P.M.
	N-8045	Assembly	Variable Gang Condenser & Pulley
	N-7992	Screen	Flocked Dial) For Stock No.
	N-7990	Knobs	Walnut Plastic) 4-A-85 Only
	# 313	Cabinet	Walnut Plastic)
	N-7991	Screen	Flocked Dial) For Stock No.
	N-7989	Knobs	White Plastic) 4-A-89
	# 312	Cabinet	White Plastic)
	N-7994	Pointer	Dial Indicator
	N-1090	Line Cord	6 Ft. Rubber



TUBE LAYOUT

ELECTRICAL SPECIFICATIONS

Power Supply 105-125 volts AC 60 cycles, 40 watts. 60 watts with record changer.

Frequency Ranges Broadcast 540-1600 KC
Frequency Modulation 88-108 MC

Intermediate Frequency AM—455 KC
FM—10.7 MC

Selectivity AM—45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—950 KC broad at 200 times down

AM Sensitivity (For .5 watt output with external antenna) 25 microvolts average

FM Sensitivity (For .5 watt output) 25 microvolts average

Power Output 1.9 watts maximum
0.8 watts 10% distortion

Loud Speaker 10" PM Dynamic

Voice Coil Impedance... 3.2 ohms 400 cycles

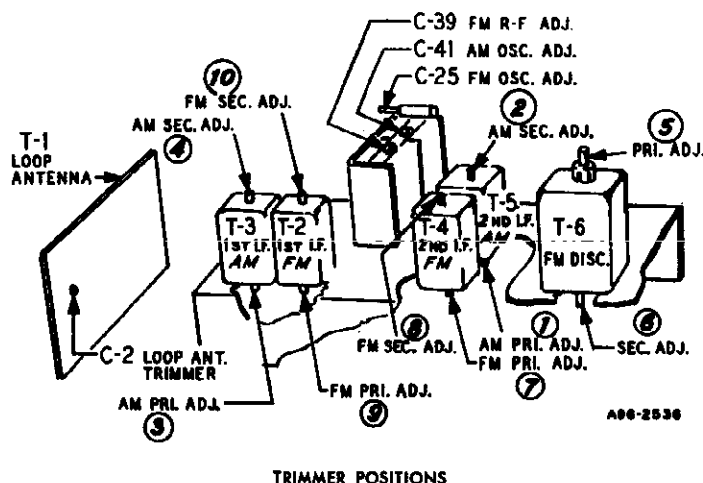
Record Changer See Manual No. 199

Tube and Dial Lamp Complement

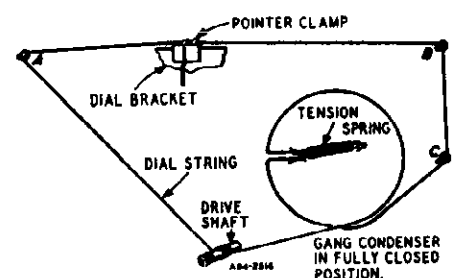
1 6BE6 AM Converter & FM Osc.
1 6BA6 1st I-F Amplifier
1 6BA6 2nd I-F Amplifier
1 6AL5 FM Discriminator
1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
1 6V6GT Audio Output
1 6X5GT Rectifier
1 12AT7 R-F Amplifier & Mixer
2 No. 47 Dial Lamps

DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



TRIMMER POSITIONS



MODEL 4-A-80,
Westmoreland

ALIGNMENT PROCEDURES AM STAGES

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I-F Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Terminal	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

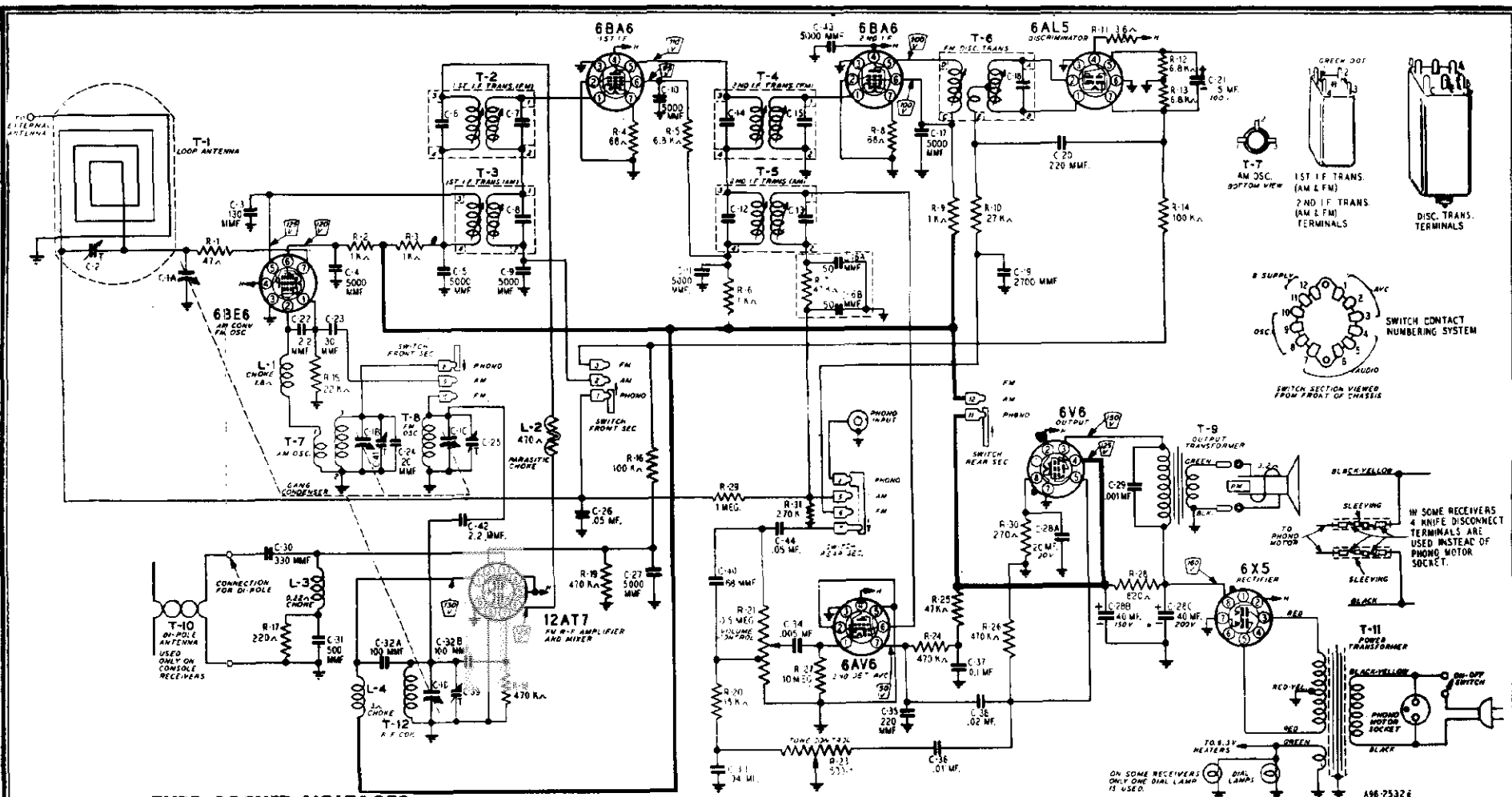
NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

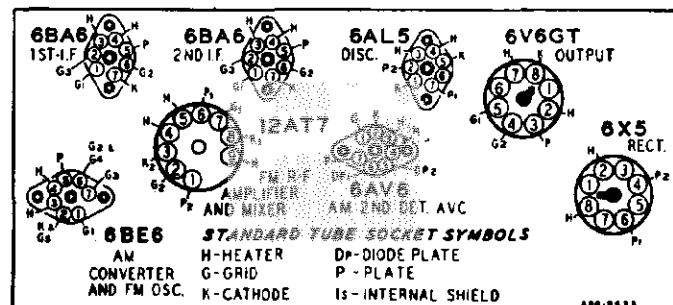
NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage 117 Volts AC
 Signal Input None
 A Variation of $\pm 10\%$ is usually permissible.



MODEL 4-A-86,
Westmoreland

REPLACEMENT PARTS LIST

MISCELLANEOUS

12A480	10" P.M. Speaker	
4X1082	Escutcheon	
10A759	Knob	
13X546	Line Cord & Plug Assembly	
2A393	Band Change Switch	
3A435	Molded Octal Tube Socket	
3A305	Phono Socket	
3A426	Tube Socket (1st 6BA6)	
3A443	Tube Socket (12AT7)	
3A427	Tube Socket (6BE6)	
3A439	Tube Socket (Miniature)	

CAPACITORS

C-1	14A209	Gang Condenser Assembly	
C-2	17A256	2-24 mmf	Trimmer
C-3	47X559	130 mmf	Ceramic
C-4			
C-5			
C-9			
C-10			
C-11	47X507	5000 mmf	Ceramic
C-17			
C-27			
C-43			
C-6		Part of T-2 (1st I-F Trans. FM)	
C-7		Part of T-3 (1st I-F Trans. AM)	
C-8		Part of T-3 (2nd I-F Trans. AM)	
C-12		Part of T-4 (2nd I-F Trans. FM)	
C-13			
C-14			
C-15			
C-16A	47X112	50-50 mmf	Dual Mica
C-16B			
C-18		Part of T-6 (Discriminator Trans.)	
C-19	47X492	2700 mmf	Molded Mica
C-20	47X468	220 mmf	Ceramic
C-35			
C-21	45X361	5 mf	100 V Dry Electrolytic
C-22	47X557	2.2 mmf	Ceramic
C-42			
C-23	47X558	30 mmf	Ceramic
C-24	47X516	20 mmf	Ceramic
C-25	17A255	1.8 mmf	Trimmer
C-26			
C-44	B66503	.05 mf	200 V Tubular
C-28A		20 mf	20 V
C-28B	45X360	40 mf	150 V Dry Electrolytic
C-28C		40 mf	200 V
C-29	H66102	.001 mf	800 V Tubular
C-30	47X470	330 mmf	Molded Mica
C-31	47X508	500 mmf	Ceramic
C-32A			
C-32B	76X4	100 mmf	Dual Ceramic
C-33	B66403	.04 mf	200 V Tubular
C-34	D66502	.005 mf	400 V Tubular
C-36	B66103	.01 mf	200 V Tubular
C-37	D66104	.1 mf	400 V Tubular
C-38	D66203	.02 mf	400 V Tubular
C-39			
C-41		Part of C-1 (Gang Condenser)	
C-40	47X471	68 mmf	Ceramic

RESISTORS

		Ohms	Watts	
R-1	B85470	47	0.5	Carbon
R-2				
R-3	B85102	1000	0.5	Carbon
R-6				
R-9				
R-4	B84680	68	0.5	Carbon
R-8				

R-5				
R-12	B84682	6800	0.5	Carbon
R-13				
R-7	B85473	47 K	0.5	Carbon
R-25	B85273	27 K	0.5	Carbon
R-10	43X233	3.6	0.5	Wirewound
R-11				
R-14	B85104	100 K	0.5	Carbon
R-16				
R-15	B85223	22 K	0.5	Carbon
R-17	B84221	220	0.5	Carbon
R-18				
R-19				
R-24	B85474	470 K	0.5	Carbon
R-26				
R-20	B85153	15 K	0.5	Carbon
R-21	36X372	.5 meg.		Volume Control
R-23	40X310	.5 meg.		Tone Control
R-27	B85106	10 meg.	0.5	Carbon
R-28	D84821	820	2.0	Carbon
R-29	B85105	1 meg.	0.5	Carbon
R-30	B84271	270	0.5	Carbon
R-31	B84274	270 K	0.5	Carbon

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke
L-2	9A2103	Parasitic Choke
L-3	35A9	Insulated Choke
L-4	35A8	Insulated Choke
T-1	9A2146	"B" Range Loop Antenna
T-2	9A2060	1st I-F Trans. (FM)
T-3	9A2062	1st I-F Trans. (AM)
T-4	9A2061	2nd I-F Trans. (FM)
T-5	9A2063	2nd I-F Trans. (AM)
T-6	9A2064	Discriminator Transformer
T-7	9A2065	Oscillator Coil (AM)
T-8	9A2067	Oscillator Coil (FM)
T-9	51X134	Output Transformer
T-10	9A2004	Dipole Antenna
T-11	53X291	Power Transformer
T-12	9A2066	Antenna Coil (FM)

DIAL AND DRIVE ASSEMBLY

58X739	Dial Glass
15X251	Pointer
19X192	"C" Washer (Mtg. Drive Shaft)
6X66	Rubber Grommet
25X1616	Dial Bracket
28X113	Drive Cord Tension Spring
7A103	No. 47 Pilot Light
7A199	Pilot Light Socket Assembly
10X38	Drive Cord Assembly
26X486	Drive Shaft

VM No. 950 RECORD CHANGER PARTS

P-81	Crystal Cartridge with Unipoint Needle
85-35	Unipoint Needle
P-77	Crystal Cartridge with Needles
85-18	Needle, Microgroove (Red)
85-16	Needle, Regular



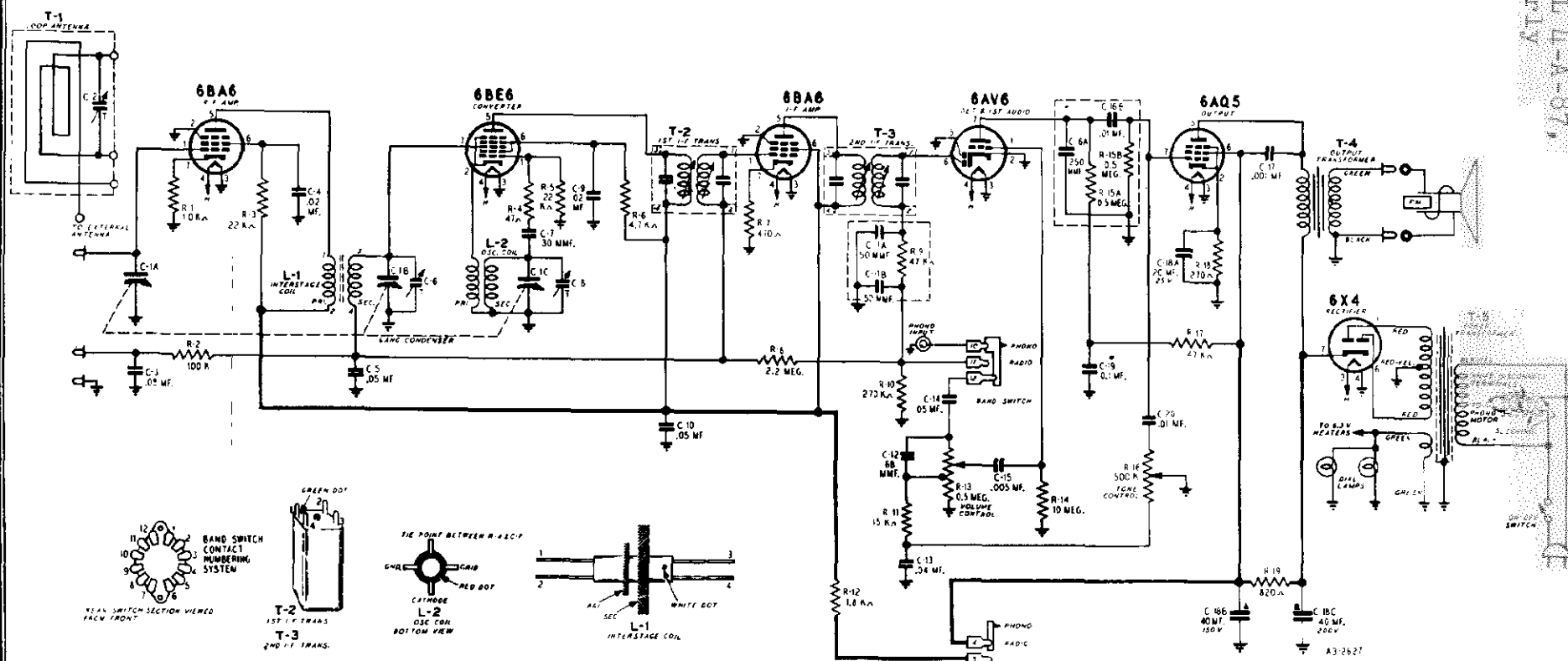
Use a new S-10X77 drive cord assembly or a new length of cord 48 inches long for the installation. Install the cord as shown in the illustration, winding three turns counterclockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



Tube and Dial Lamp Complement	1 6BA6 R-F Amplifier
	1 6BE6 Converter
	1 6BA6 I-F Amplifier
	1 6AV6 Det. & 1st Audio
	1 6AQ5 Output
	1 6X4 Rectifier
	1 No. 47 Dial Lamp

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

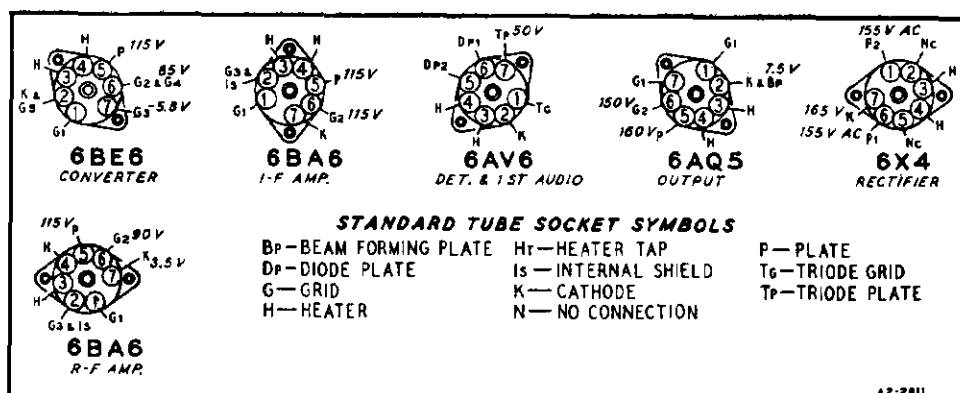
NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.
NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

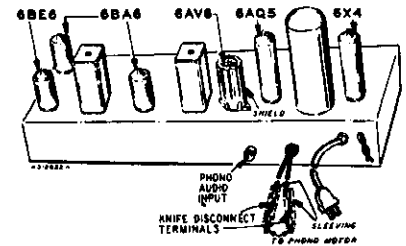
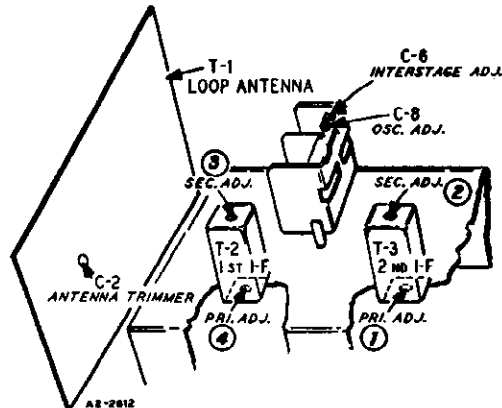


TUBE SOCKET VOLTAGES

Socket voltages are shown on the Bottom Socket diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage117 Volts AC
Signal InputNone
A Variation of $\pm 10\%$ is usually permissible.



MODEL 4-A-87
Waverly

REPLACEMENT PARTS LIST

MISCELLANEOUS

12A477	8" P.M. Speaker	.....
10A759	Knobs	.....
4X1082	Escutcheon	.....
2A405	Radio-Phono Switch	.....
13X546	Line Cord & Plug Assembly	.....
3A458	Tube Socket (6AV6)	.....
3A426	Tube Socket (miniature)	.....
30X560	Line Cord Clamp	.....
3A305	Phono Socket	.....
32X403	Tube Shield (6AV6)	.....
76X1	Capacitor-Resistor Combination	.....
76X5	Capacitor-Resistor Combination	.....

CAPACITORS

C-1A } C-1B } C-1C }	14A213	Gang Condenser Assembly	.....
C-2	17A235	2-24 mmf	Trimmer.....
C-3 } C-5 } C-10 }	B66503	.05 mf	200 V Tubular.....
C-4 } C-9 }	B66203	.02 mf	200 V Tubular.....
C-6 } C-8 }	Part of Gang Condenser Assembly		
C-7	47X558	30 mmf	Ceramic.....
C-11A } C-11B }	Part of 76X1 Assembly (See Miscellaneous)		
C-12	47X471	68 mmf	Ceramic.....
C-13	B66403	.04 mf	200 V Tubular.....
C-14	B65303	.05 mf	200 V Tubular.....
C-15	D66502	.005 mf	400 V Tubular.....
C-16A } C-16B }	Part of 76X5 Assembly (See Miscellaneous)		
C-17	F66102	.001 mf	600 V Tubular.....
C-18A } C-18B } C-18C }	45X381	20 mf	25 V Dry Electrolytic
		40 mf	150 V
		40 mf	200 V
C-19	B66104	.1 mf	200 V Tubular.....
C-20	B66103	.01 mf	200 V Tubular.....

RESISTORS

		Ohms	Watts	
R-1	B84102	1K	0.5	Carbon.....
R-2	B85104	100K	0.5	Carbon.....
R-3 } R-5 }	B85223	22K	0.5	Carbon.....
R-4	B85470	47	0.5	Carbon.....
R-6	B84472	4.7K	0.5	Carbon.....
R-7	B84471	470	0.5	Carbon.....
R-8	B85225	2.2 meg.	0.5	Carbon.....
R-9	Part of 76X1 Assembly (See Miscellaneous)			
R-10	B84274	270K	0.5	Carbon.....
R-11	B84153	15K	0.5	Carbon.....
R-12	C84182	1.8K	1.0	Carbon.....
R-13	36X372	.5 meg.		Volume Control
R-14	B85106	10 meg.	0.5	Carbon.....
R-15A } R-15B }	Part of 76X5 Assembly (See Miscellaneous)			
R-16	40X310	.5 meg.		Tone Control..
R-17	B85473	47K	0.5	Carbon.....
R-18	B84271	270	0.5	Carbon.....
R-19	D84821	820	2.0	Carbon.....

TRANSFORMERS AND COILS

L-1	9A2117	Interstage Coil	.....
L-2	9A2113	Oscillator Coil	.....
T-1	9A2152	Loop Antenna	.....
T-2	9A2112	1st I-F Trans.	.....
T-3	9A2063	2nd I-F Trans.	.....
T-4	51X134	Output Trans.	.....
T-5	53X291	Power Trans.	.....

DIAL AND DRIVE ASSEMBLY

S-10X77	Drive Cord Assembly	.....
15X251	Pointer	.....
25X1616	Dial Bracket	.....
58X740	Dial Glass	.....
26X515	Drive Shaft	.....
7A199	Pilot Light Socket Assembly	.....
28X113	Drive Cord Tension Spring	.....
41X88	Dial Light Reflector	.....
7A103	No. 47 Dial Light	.....
19X192	"C" Washer (Mtg. Drive Shaft)	.....

VM No. 950 RECORD CHANGER PARTS

P-81	Crystal Cartridge with Unipoint Needle	.....
85-35	Unipoint Needle	.....
P-77	Crystal Cartridge with Needles	.....
85-18	Needle, Microgroove (Red)	.....
85-16	Needle, Regular	.....

MODEL 4-B-57,
Chevrolet, 1949-1950

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It features a novel two-piece construction and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver.

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. For best results we recommend Firestone Disappearing Fenderwell Aerial Stock No. 4-B-21. The unit is simple to install and requires no electrical adjustment after installation.

INSTALLATION

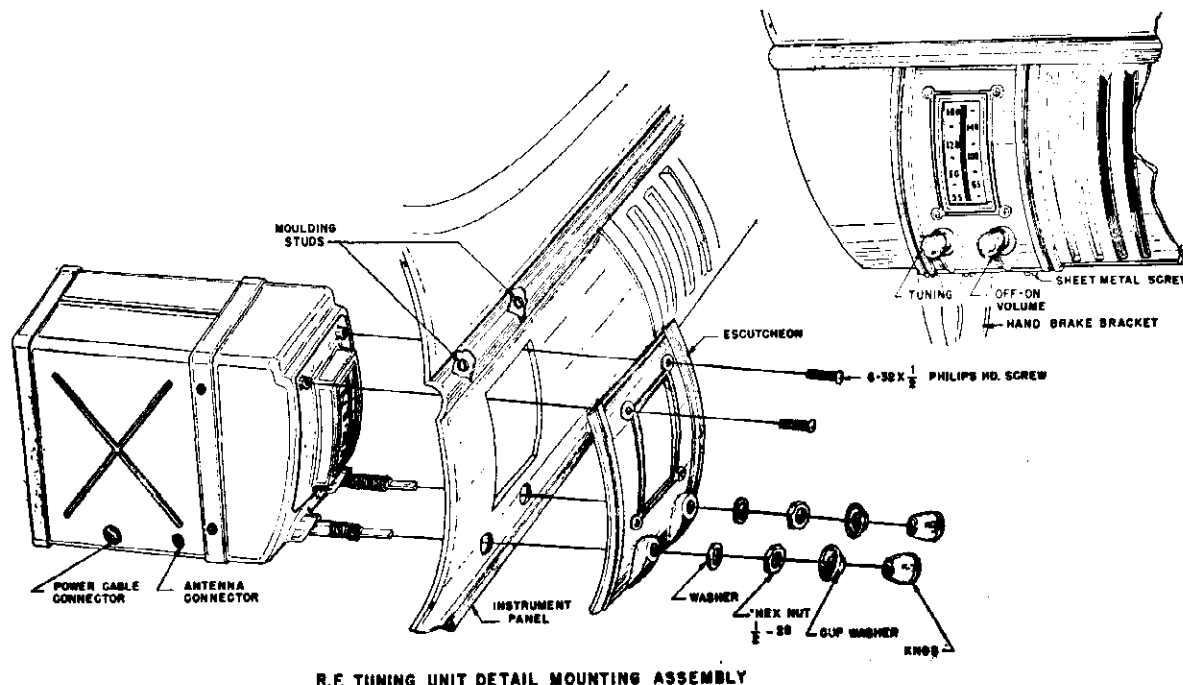


Fig. 1

R. F. TUNING UNIT

1. Loosen nuts on the two moulding studs located behind the instrument panel cover plate.
2. Remove sheet metal screw from the lower edge of the instrument panel cover plate and the two screws and washers attaching the hand brake to the instrument panel. Keep these parts.
3. Remove instrument panel cover plate and discard.
4. Tighten nuts on the two moulding studs located behind the instrument panel cover plate.
5. Drop vent controls by removing screws, lockwashers, and flat washers securing these controls to the instrument panel. This will facilitate installation of both receiver units. Save parts removed.
6. Install R.F. Tuning Unit behind instrument panel so that mounting bushings and tuningshafts protrude through the instrument panel.
7. Slide plastic escutcheon over mounting bushings and secure with flat washers, nuts, cup washers, and knobs as shown in Fig. 1
8. Secure top part of plastic escutcheon to R.F. Tuning Unit with two No. 6-32 x 1/2" long Philips Head screws.

POWER SUPPLY UNIT

1. Insert a thin blade screwdriver or a flat strip of metal through the Radio Grille and slit fiberboard Radio Grille screen. Reach in back of Radio Grille and remove screen by grasping slit edge. Discard fiberboard screen.
2. Remove 10-32 nuts and washers from the moulding studs behind the Radio Grille.
3. Remove 10-32 nuts, screws, and washers securing the lower tabs of the Radio Grille to the instrument panel.
4. Install Power Supply Unit behind Radio Grille and position into place so that holes in top of unit slide over moulding studs as shown in Fig. 2.

NOTE: It may be more convenient, in car models with air conditioner heaters, to remove the vibrator Before installing this unit. The vibrator can be replaced after the power unit is mounted.

MODEL 4-B-57,
Chevrolet, 1949-195

5. Replace 10-32 nuts and washers on moulding studs.
6. Replace lower grille tab 10-32 mounting screws, nuts, and washers so that screws secure the lower grille tabs and Power Supply Unit to the instrument panel.
7. Connect cable from Power Supply Unit to R.F. Tuning Unit.
8. Secure Power Supply Cable under clamp on R.F. Tuning Unit.
9. Replace vent controls.
10. Replace screws and washers securing hand brake.

Connect battery lead to terminal on Ignition Switch.

Plug Antenna cable into receiver.

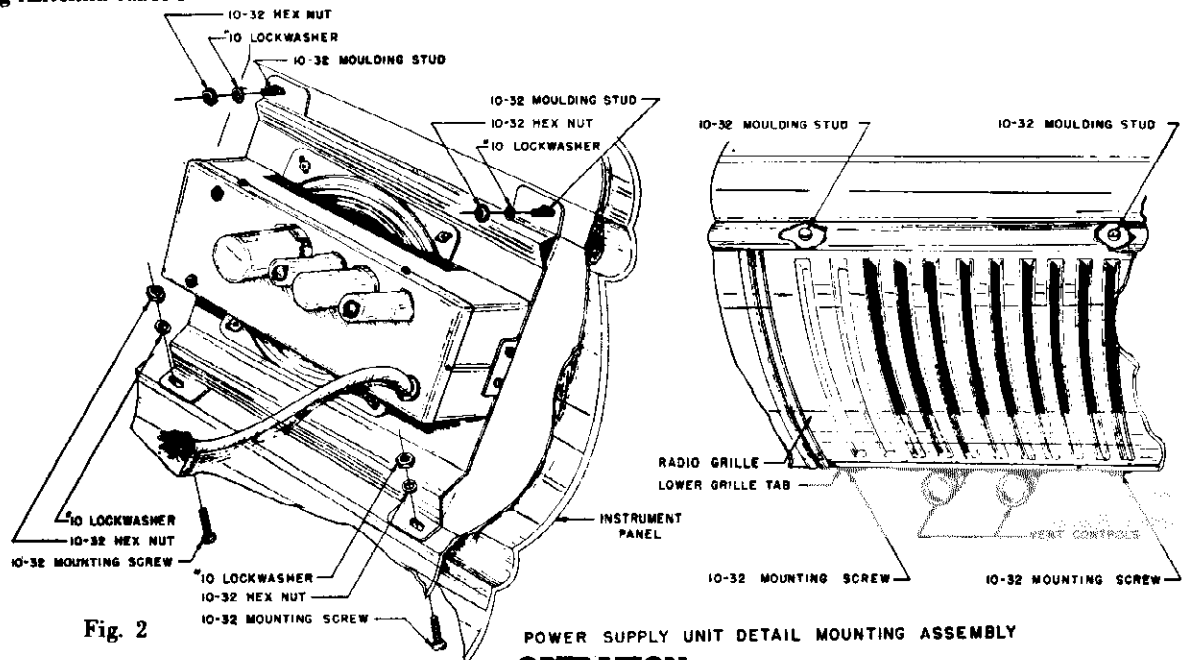


Fig. 2

POWER SUPPLY UNIT DETAIL MOUNTING ASSEMBLY OPERATION

VOLUME CONTROL KNOB

This knob is located on the right side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to the desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the left side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

SUPPRESSION KIT MOTOR NOISE ELIMINATION

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser.
- 1 Distributor Suppressor.

GENERATOR CONDENSER

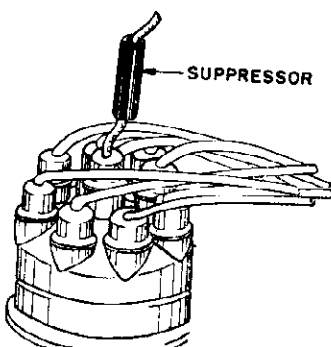
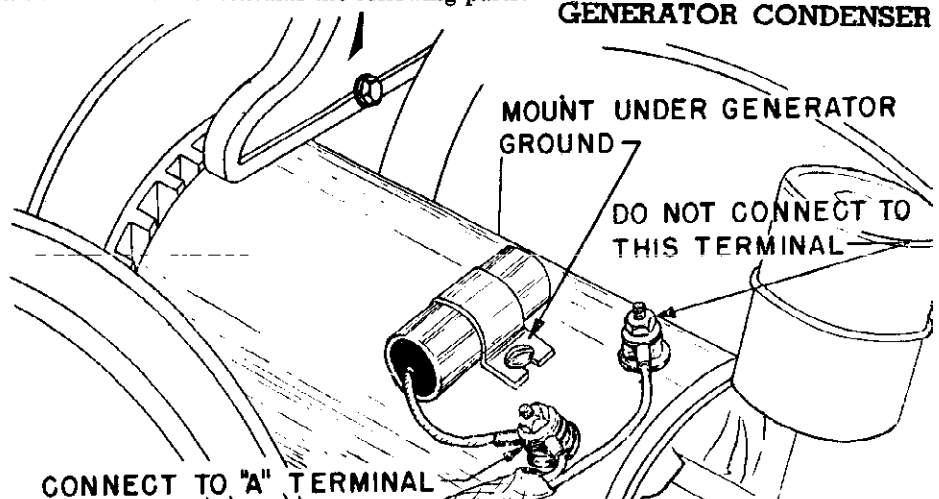


Fig. 3



MODEL 4-B-57,
Chevrolet, 1949-1950

DISTRIBUTOR SUPPRESSOR

Disconnect the center lead in the distributor head of the motor. Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

SERVICE DATA ELECTRICAL SPECIFICATIONS

Power Supply.....	6.3 Volts DC
Current.....	5.5 Amp. average
Frequency Range.....	538-1600 KC
Speaker.....	5 1/4" PM
Power Output.....	2 watts, undistorted
	3 watts, maximum
Sensitivity.....	2-3 microvolts average for 1 watt output
Selectivity.....	40 KC broad at 1000 times signal, at 1000 KC

This receiver contains the following:

- 1—6BA6—RF Amplifier
- 1—6BE6—Converter
- 1—6BA6—I. F. Amplifier
- 1—6AT6—Detector—AVC—1st Audio
- 1—6AQ5—Power Output
- 1—6X4—Rectifier

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 5).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components such as tubes, condensers, resistors, etc. are normal before proceeding with re-alignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure". After realignment has been completed repeat the procedure as final check.

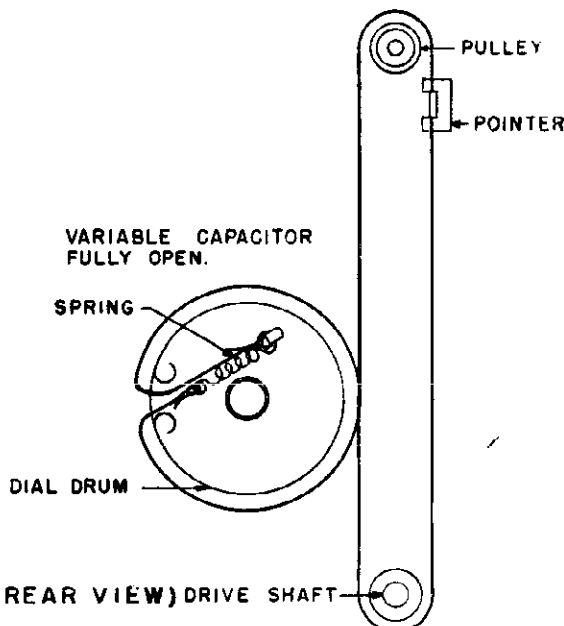


Fig. 4 DIAL CORD DRIVE (REAR VIEW) DRIVE SHAFT

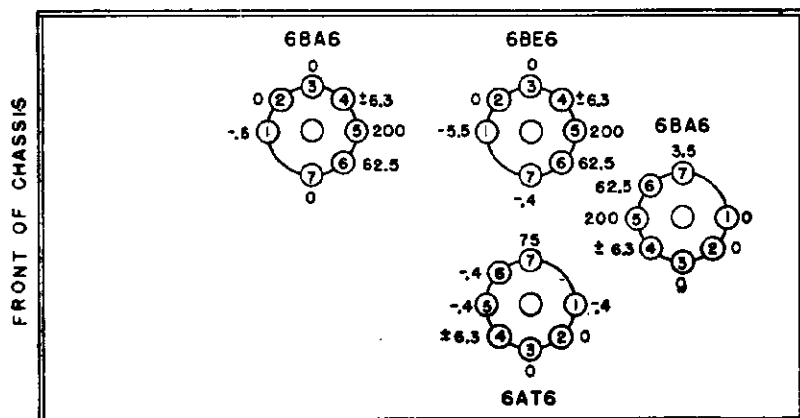
ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.
 No signal applied to antenna.
 Power input—6.3 volts.
 Connect dummy antenna in series with output lead of signal generator.
 Connect ground lead of signal generator to chassis.
 Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:
 Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
 Non-metallic screwdriver.
 Output meter. (1.8 volt for 1 watt output.)
 Dummy antennas—.1 MFD., 100 MMFD.
 For alignment points refer to Schematic Diagram.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connection	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in Signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						

BOTTOM VIEW OF CHASSIS



BOTTOM VIEW OF POWER PACK

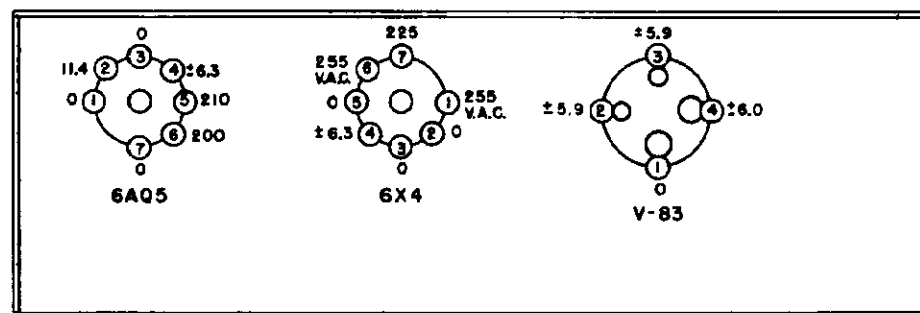
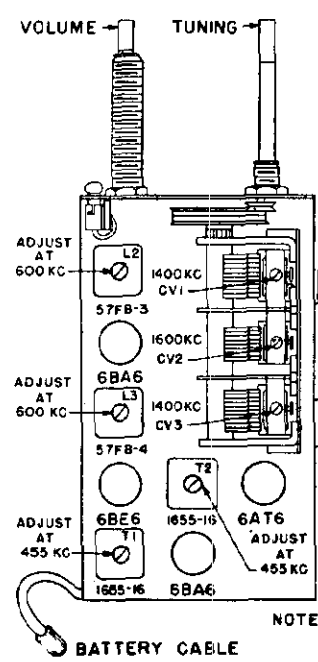
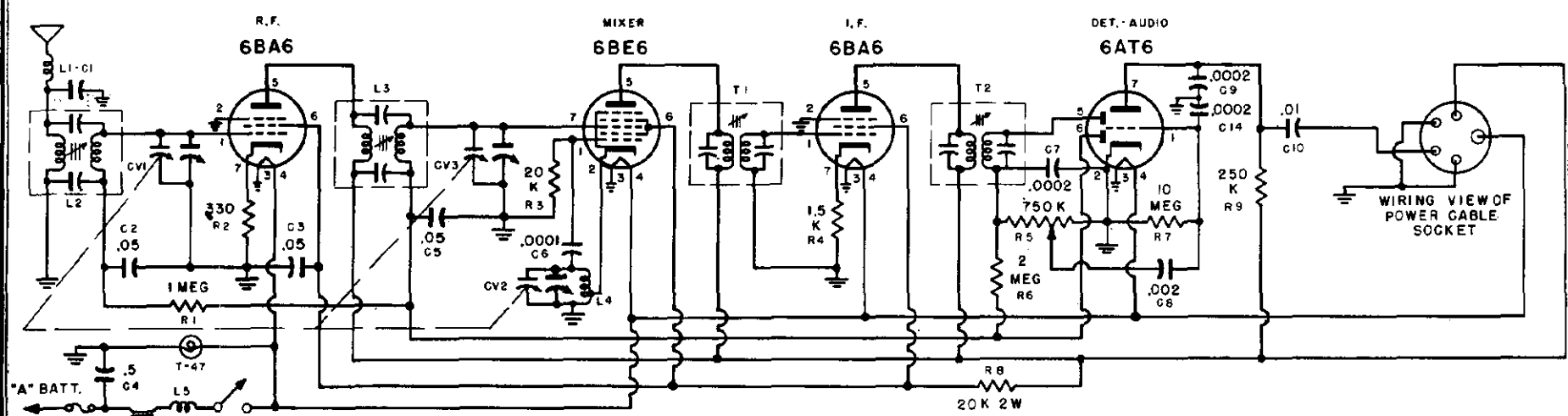


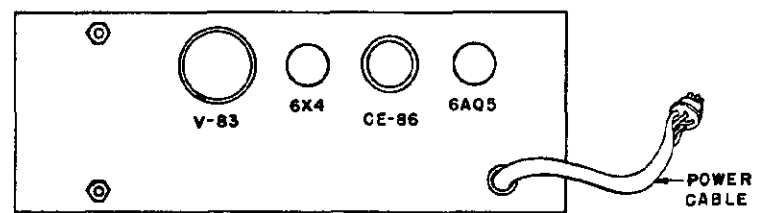
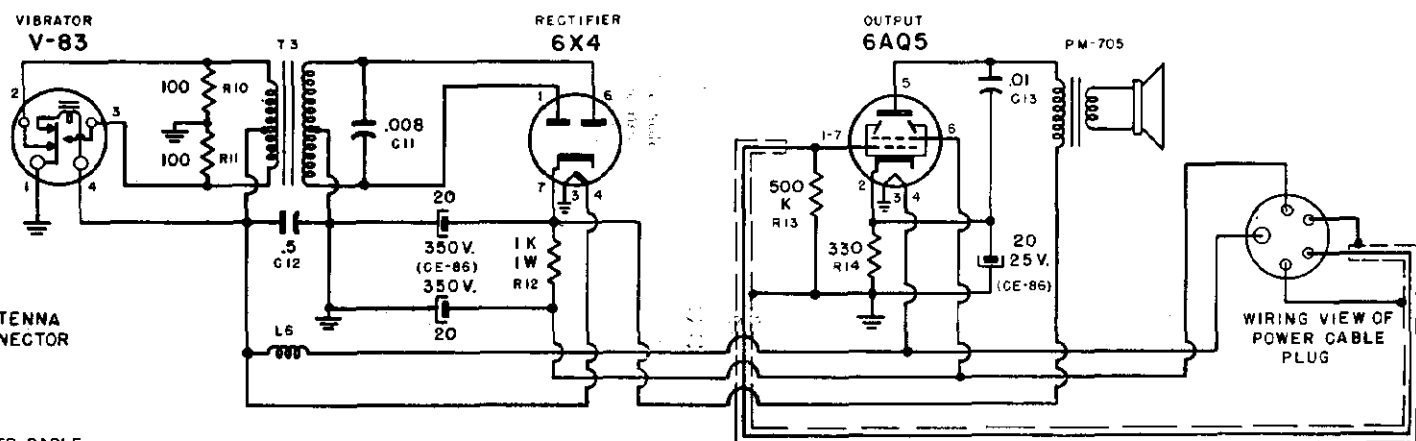
Fig. 5

SOCKET VOLTAGES

MODEL 4-B-57



NOTE: T1 AND T2 HAVE TOP AND BOTTOM ADJUSTMENTS. ADJUST AT 455 KC.



MODEL 4-B-57,
Chevrolet, 1949-1950

PARTS AND PRICE LIST

CONDENSERS

Schematic Diagram Reference	Part No.	Description
C2, C3, C5	C207	.05 MFD 200 Volt Condenser
C4, C12	C209	.5 MFD 100 Volt Condenser
C6	CC200	100 MMFD Ceramic Condenser
C7, C9, C14	CC201	200 MMFD Ceramic Condenser
C8	C203	.002 MFD 400 Volt Condenser
C10, C13	C206	.01 MFD 600 Volt Condenser
C11	C205	.008 MFD 1600 Volt Condenser
CE-86	CE-86	20 MFD 350 Volt Electrolytic Condenser
		20 MFD 350 Volt Electrolytic Condenser
		20 MFD 25 Volt Electrolytic Condenser
CV1-CV2-CV3	CV-300	3 Section Variable Tuning

RESISTORS

R1	R309	1 megohm 1/2 Watt 20% Resistor
R2, R14	R303	330 Ohm 1/2 Watt 20% Resistor
R3	R306	20K Ohm 1/2 Watt 20% Resistor
R4	R314	1.5K Ohm 1/2 Watt 20% Resistor
R5	RV300	Volume Control 3/4 megohm with switch
R6	R310	2 megohm 1/2 Watt 20% Resistor
R7	R311	10 megohm 1/2 Watt 20% Resistor
R8	R313	20K Ohm 2 Watt 20% Resistor
R9	R307	250K Ohm 1/2 Watt 20% Resistor
R10, R11	R301	100 Ohm 1/2 Watt 20% Resistor
R12	R312	1K Ohm 1 Watt 20% Resistor
R13	R308	500K Ohm 1/2 Watt 20% Resistor

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit
L2	15053 or 57FB-3	Antenna coil
L3	15054 or 57FB-4	R.F. coil
L4	L201	R.F. oscillator coil
L5	L203	Choke, "A" line
L6	L202	Choke, vibrator hash
T1	14977 or 1655-16	1st IF transformer
T2	14977 or 1655-16	2nd IF transformer
T3	TV-100	Vibrator transformer
T4		Output transformer (Part of speaker not furnished separately)

MISCELLANEOUS

A300	"A" lead assembly
H301	Case, less covers for Power Supply Unit
H300	Case, complete with covers for R.F. tuning unit
H207	Clip, Anti-rattle
H208	Clip, coil mounting
H302	Cover, power supply unit mounting
	(with speaker louvers)
A201	Fuse 15 Amp.
504PC-300	Power Cable Assembly (complete with plug)
H212	Receptacle, Antenna cable
504-FC	Socket, power cable
PM-705	Speaker, 5 1/4" PM (includes output transformer)
V-83	Vibrator
H310	Knob
H311	Cup washer
H312	Plastic Escutcheon
H313	1/2 x 28 hex nut
C100	.5 MFD Generator Condenser
R100	Distributor Suppressor

DIAL PARTS

D300	Dial Scale
PS300	Dial Pointer
DS300	Drive Shaft Assembly
H201	Grommet, rubber drive
T51	Pilot Light
H214	Pilot Light Socket
H203	Pulley, idler
H204	Spring, Dial drive String
	Tension
H215	String, dial drive

MODEL 4-B-58, Dodge,
Plymouth, 1949-1950

DESCRIPTION

Your new Automobile Receiver is a 6-tube (including rectifier) superhetrodyne, designed to operate from the 6-volt storage battery in your car. It is custom-built to mount behind the instrument panel in the place provided for a radio by the automobile manufacturer. It has a self-contained PM speaker and covers the frequency range 538 to 1600 KC. Two simple controls are provided for operating the receiver. (See Fig. 1.)

This receiver has been designed with a tuned RF stage and a 3-gang tuning condenser thereby insuring the finest in sensitivity and selectivity. For best results we recommend Firestone disappearing fender-well aerial stock No. 4-B-21. The unit is simple to install and requires no electrical adjustment after installation.

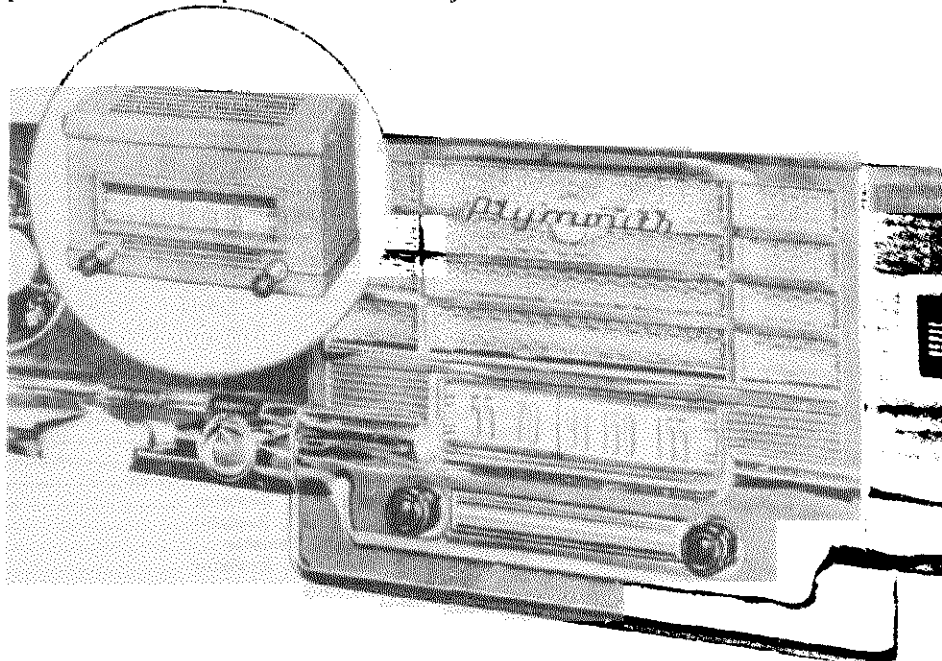


Fig. 1

OPERATION

VOLUME CONTROL KNOB

This knob is located on the left side of the radio. Turning this knob slightly to the right until a slight click is heard will put the radio into operation. Turning this knob further to the right will increase the volume and turning it to the left will decrease the volume. After a station has been selected, the volume control should be adjusted to desired level. The volume should never be reduced by detuning the station selector knob.

STATION SELECTOR KNOB

This knob is located on the right side of the radio. This knob should be turned until a desired station has been selected. Adjust this knob very carefully until the station comes in with the most natural tone.

INSTALLATION

PLYMOUTH P18 SPECIAL DELUXE

1. Remove six screws securing Radio Grille in place and remove Radio Grille.
2. Remove dummy plates covering radio dial and control openings.
3. Remove knobs, cup washers, hex nuts and washers from control shafts and mounting bushings.
4. Secure two mounting brackets to Radio Grille with $\frac{3}{8}$ inch long 10-32 self-tapping screws, lockwashers, and cup washers as shown in detail assembly drawing, Fig. 2.
5. Place radio control cover plate over mounting bushings.
6. Position receiver behind Radio Grille so that mounting bushings and shafts protrude through the grille.
7. Attach receiver by replacing washers and hex nuts on mounting bushings.
8. Replace cup washers and knobs over shafts.
9. Secure receiver to mounting brackets with two No. 8 self-tapping thumb screws.
10. Insert radio with attached grille through front opening on instrument panel.
11. Replace grille mounting screws.
12. Connect battery lead to terminal marked "ACC" on ignition switch.
13. Plug antenna cable into receiver.

PLYMOUTH P17, P18 4-DOOR DELUXE AND P18 CLUB COUPE DELUXE DODGE "WAYFARER" AND "MEADOWBROOK"

These models are not equipped by the car manufacturers with a radio grille.

The following parts must be obtained from any authorized Plymouth or Dodge dealer before an installation can be made in any of these cars.

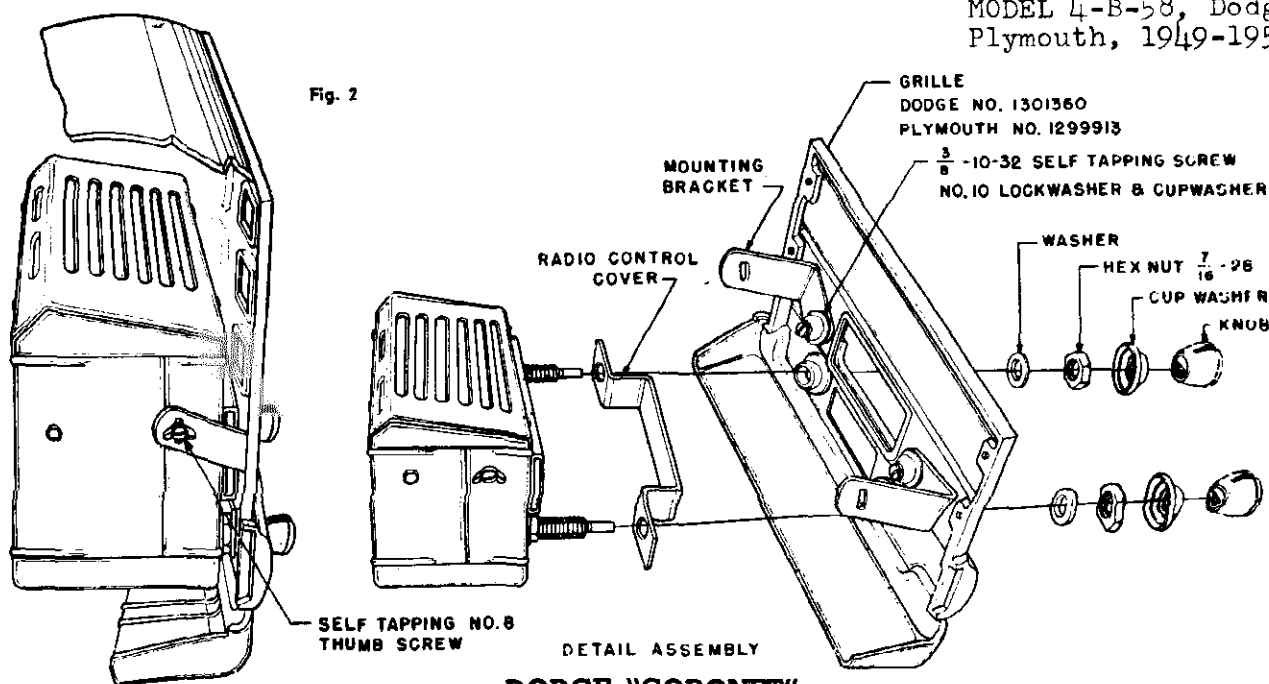
Plymouth P17, P18 4-Door DeLuxe, P18 Club Coupe DeLuxe

Radio Grille No. 1299913

Dodge "Meadowbrook" or "Wayfarer"

Radio Grille No. 1301360

MODEL 4-B-58, Dodge
Plymouth, 1949-1950



COMPLETE ASSEMBLY

Install in the same manner as outlined for the P18 DeLuxe Plymouth except do not remove radio grille.

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver.
(See detail assembly drawing FIG. 2)

- 2 Washers
- 2 7/16-28 hex nuts
- 2 Cup washers
- 2 Knobs
- 2 Mounting Brackets
- 2 No. 8 self-tapping thumb screws
- 1 Radio control cover

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 2 3/8 10-32 self-tapping screws
- 2 Cup washers
- 2 No. 10 lockwashers

SUPPRESSION KIT

- 1 Distributor Suppressor
- 1 .5 MFD Generator Condenser

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser.
- 1 Distributor Suppressor.

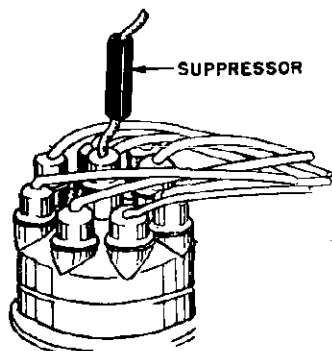
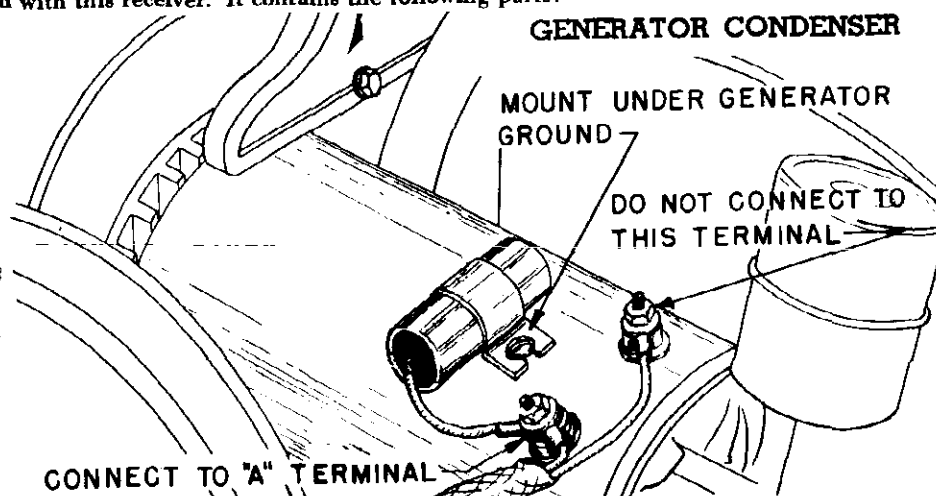


Fig. 3



MODEL 4-B-58, Dodge,
Plymouth, 1949-1950

DISTRIBUTOR SUPPRESSOR

Disconnect the center lead in the distributor head of the motor. Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

SERVICE DATA

ELECTRICAL SPECIFICATIONS

Power Supply.....	6.3 Volts DC
Current.....	5.5 Amp. average
Frequency Range.....	538-1600 KC
Speaker.....	5" PM
Power Output.....	2 watts, undistorted
	3 watts, maximum
Sensitivity.....	2-3 microvolts average for 1 watt output
Selectivity.....	40 KC broad at 1000 times signal, at 1000 KC

This receiver contains the following:

- 1—6BA6—RF Amplifier
- 1—6BE6 Converter
- 1—6BA6—I. F. Amplifier
- 1—6AT6—Detector—AVC—1st Audio
- 1—6AQ5—Power Output
- 1—6X4 Rectifier

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 4).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure". After realignment has been completed repeat the procedure as final check.

INSTRUCTIONS FOR SERVICING RECEIVER COMPONENTS

The novel design of this receiver permits servicing all components without removing the chassis from the case. The top cover (the one with the speaker louvers) can be removed by removing the four (4) screws securing it to the case. This exposes all tube sockets, connections, resistors and condensers for observation and service.

Removing the bottom cover makes it possible to service tubes, vibrator, and volume control.

Table 1

Repeat alignment procedure as a final check.

For alignment points refer to Schematic Diagram.



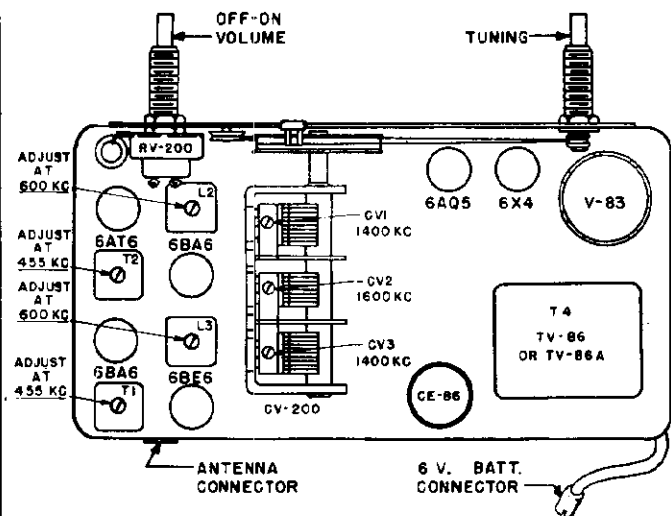
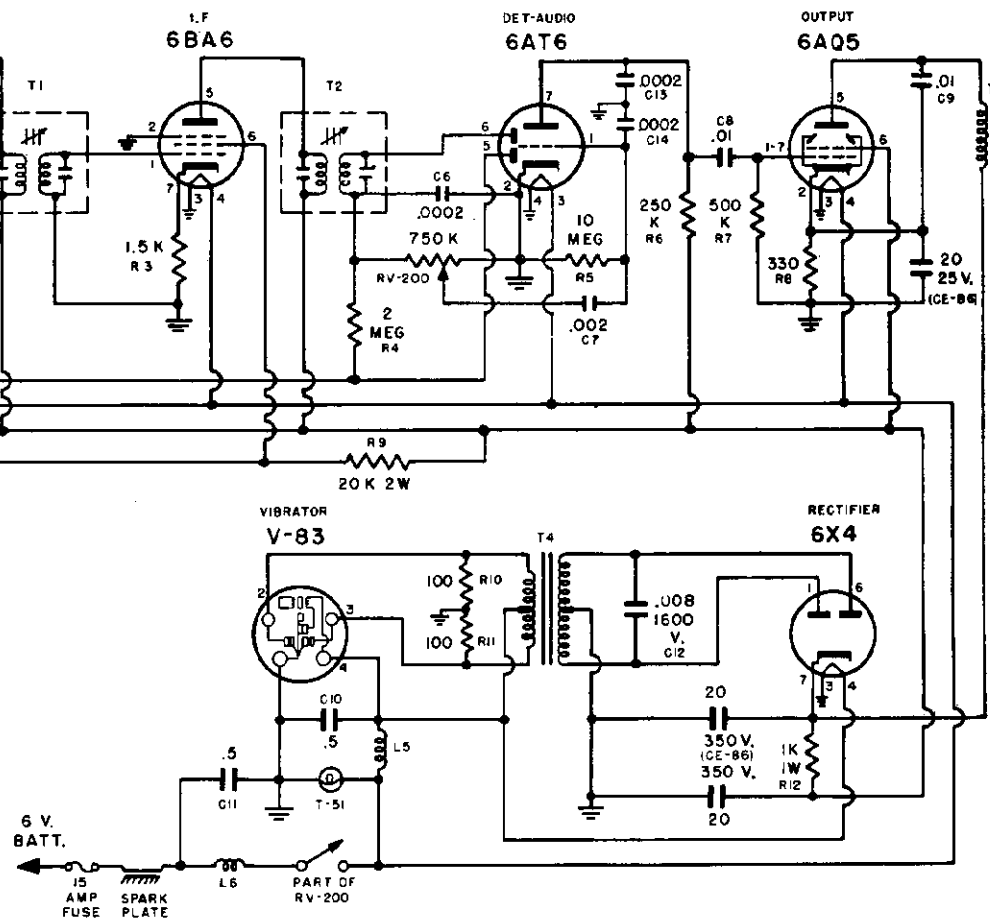
BOTTOM VIEW OF CHASSIS



FRONT OF CHASSIS

FIRESTONE PAGE 21-2
MODEL 4-B-58, Dodge,
Plymouth, 1949-1950

MODEL 4-B-58, Dodge,
Plymouth,
1949-1950



NOTE: T1 AND T2 HAVE TOP AND
BOTTOM ADJUSTMENTS.
ADJUST AT 455 KC.

Fig. 6

MODEL 4-B-58, Dodge,
Plymouth, 1949-1950

PARTS AND PRICE LIST

CONDENSERS

Schematic Diagram Reference	Part No.	Description
C2, C3, C4	C207	.05 MFD 200 volt condenser
C5	CC200	100 MMFD ceramic condenser
C6, C13, C14	CC201	200 MMFD ceramic condenser
C7	C203	.002 MFD 400 volt condenser
C8, C9	C206	.01 MFD 600 volt condenser
C10, C11	C209	.5 MFD 100 volt condenser
C12	C205	.008 MFD 1600 volt condenser
CE-86	CE-86	20 MFD 350 volt electrolytic condenser
		20 MFD 350 volt electrolytic condenser
		20 MFD 25 volt electrolytic condenser
CV-200	CV-200	3 section variable tuning condenser

RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor
R2	R306	20K ohm 1/2 watt 20% resistor
R3	R314	1.5K ohm 1/2 watt 20% resistor
R4	R310	2 megohm 1/2 watt 20% resistor
R5	R311	10 megohm 1/2 watt 20% resistor
R6	R307	250K ohm 1/2 watt 20% resistor
R7	R308	500K ohm 1/2 watt 20% resistor
R8, R13	R303	330 ohm 1/2 watt 20% resistor
R9	R313	20K ohm 2 watt 20% resistor
R10, R11	R301	100 ohm 1/2 watt 20% resistor
R12	R312	1K ohm 1 watt 20% resistor
RV-200	RV-200	Volume control 3/4 megohm with switch

COILS AND TRANSFORMERS

LI-CI	L200	Motor noise elimination unit
L2	57FB-3	Antenna Coil
L3	57FB-4	RF coil
L4	L201	RF Oscillator coil
L5	L202	Choke, vibrator hash
L6	L203	Choke, "A" line
T1	1655-16	1st IF transformer
T2	1655-16	2nd IF transformer
T3		Output transformer (Part of speaker not furnished separately)
T4	TV-86 or TV-86A	Vibrator transformer

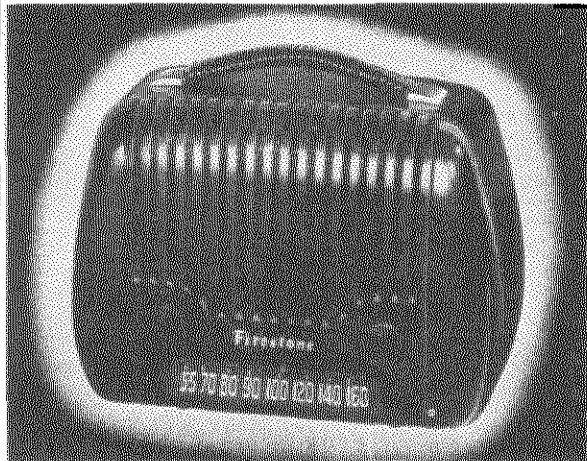
MISCELLANEOUS

A200	"A" lead assembly
H216	Bracket, mounting
H206	Case, (less covers)
H207	Clip, anti-rattle
H208	Clip, coil mounting
H209	Cover, bottom case
H218	Cover, radio control
H210	Cover, top case (with speaker louvers)
H311	Cup washers, shaft
A201	Fuse, 15 amp
H211	Grommet, rubber, gang mounting
H310	Knob
H217	Nuts, mounting
H212	Receptacle, antenna cable
PM-250	Speaker, 5" PM includes output transformer
V-83 or V-94	Vibrator
H113	1/2-28 Hex nut
C100	.5 MFD Generator condenser
R100	Distributor suppressor

DIAL PARTS

D200	Dial Scale
PS200	Dial Pointer
DS200	Drive shaft assembly
H201	Grommet, rubber drive
T81	Pilot light
H202	Pilot light socket
H203	Pulley, idler
H204	Spring, Dial Drive String Tension
H205	String, Dial Drive

MODELS 4-C-16, 4-C-17

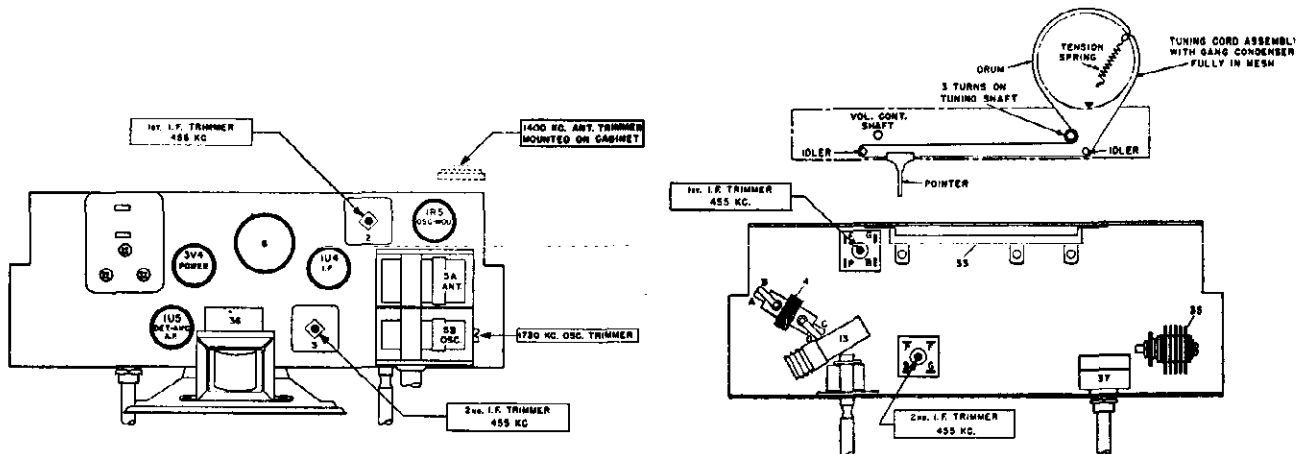


TUNING RANGE 535 to 1730 KC
INTERMEDIATE FREQUENCY 455 KC
LOUD SPEAKER 4 Inch P.M.
VOICE COIL IMPEDANCE 3.2 OHM at 400 Cycles
POWER OUTPUT Undistorted—110 Milliwatts
Maximum—240 Milliwatts
TUBE COMPLEMENT 1R5 Modulator-Oscillator
1U4 I.F. Amplifier
1U5 Det., AVC, 1st Audio
3V4 Power Output

CABINET DIMENSIONS 9-9/16" x 5" x 7"
WEIGHT 4 1/4 lbs. less batteries
POWER SUPPLY 110-120 Volt AC-DC and battery
BATTERY SPECIFICATIONS One 4 1/2 Volt "A", Firestone Stock No. 4-D-86
One 90 Volt "B" Firestone Stock No. 4-D-88
Or
One 67 1/2 Volt "B" Firestone Stock No. 4-D-84



Steps	Set receiver dial to:	TEST OSCILLATOR		Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Attach output of test oscillator to	
1	Any point where no interfering signal is received	Exactly 455 K. C.	High side to grid of 1R5 tube. Low side to common negative through a .02 Mfd. Blocking Condenser.	Adjust each of the 2nd I.F. transformer trimmer adjustment screws for maximum output, then adjust each of the 1st I.F. transformer trimmer adjustment screws for maximum output.
2	Rotate gang condenser to minimum capacity	Exactly 1730 K. C.	See paragraph (C) above	Adjust 1730 K. C. oscillator trimmer for maximum output.
3	Approximately 1400 K. C.	Approx. 1400 K. C.	See paragraph (D) above	Adjust 1400 K. C. antenna trimmer for maximum output.



ALIGNMENT PROCEDURE

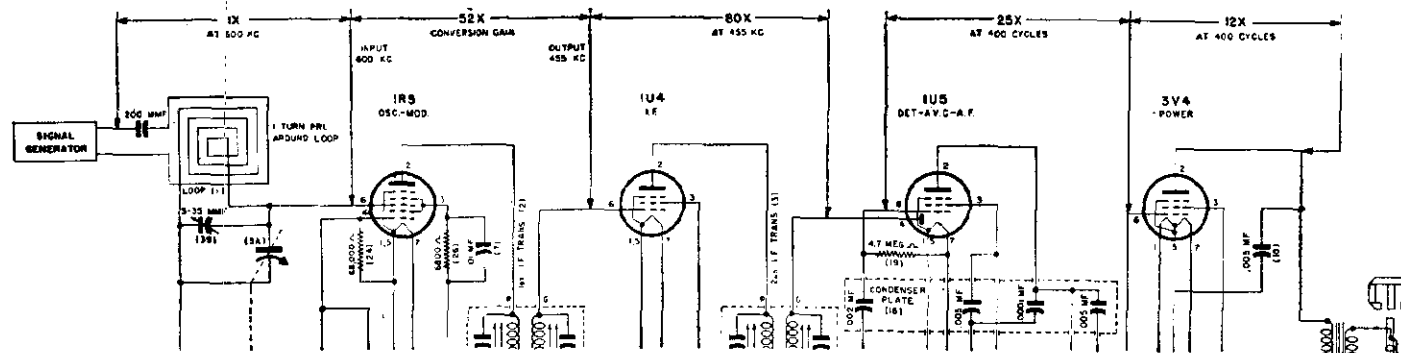
Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure, read tabulations from left to right. Make the adjustment marked (1) first, (2) next, (3) third.

BE SURE TO HAVE METAL BASE PLATE MOUNTED ON CHASSIS DURING ALIGNMENT AT 1730 KC AND 1400 KC STEPS 2 AND 3 OF ALIGNMENT TABLE.

Before starting alignment:

- Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial indicator must be exactly even with the outside edge of the first 5 in the 55 calibration number at the low frequency end of the dial scale. If dial indicator does not point exactly to the outside edge, move pointer to correct position.
- Use an accurately calibrated test oscillator with some type of output measuring device.
- WHEN ADJUSTING THE 1730 KC OSCILLATOR TRIMMER**, remove chassis from cabinet and disconnect the loop connection wires from the loop terminal strip. Attach a 1 megohm resistor across these connections and feed output of test oscillator across the 1 megohm resistor.
- THE 1400 KC LOOP ANTENNA TRIMMER** should be adjusted only after all other adjustments have been made and with the set mounted in the cabinet. When aligning the 1400 KC Antenna Trimmer, couple test oscillator to receiver loop by: (1) make loop consisting of five to ten turns of No. 20 to No. 30 size wire, wound on a 2" or 3" form; (2) connect this loop across output of test oscillator; (3) place test oscillator loop near radio loop. **BE SURE THAT NEITHER LOOP MOVES WHILE ALIGNING.**

- For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

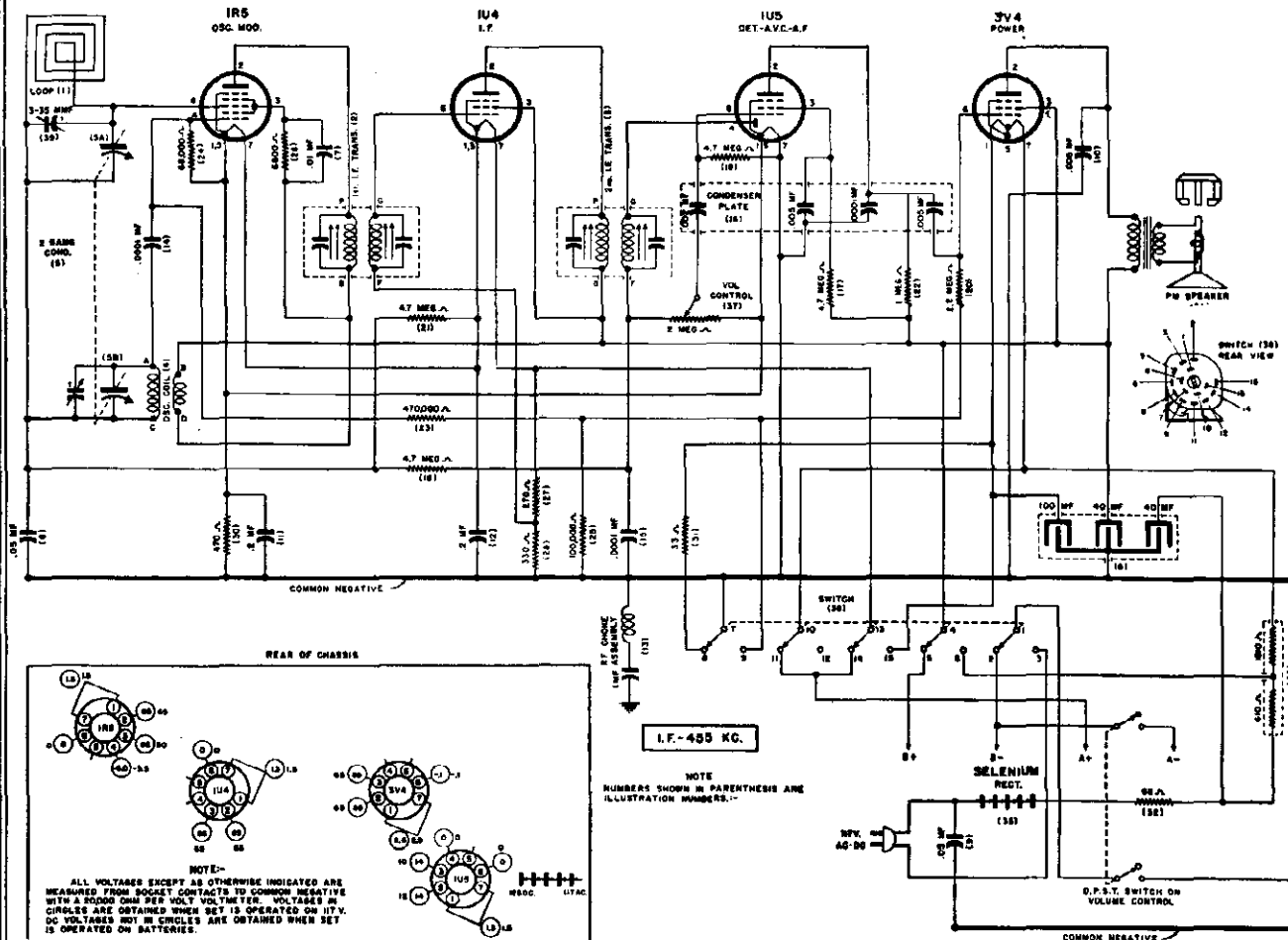
ORDERING PARTS

Order parts from your nearest Firestone Tire and Auto Supply Warehouse. When ordering parts, it is important that the correct code number, and stock number be given with the correct part name and part number as shown in the parts list. You will find the stock number and code number stamped on the chassis pan.

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

- Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
- When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

MODELS 4-C-16, 4-C-17



PARTS LIST

Illus. No.	Part No.	Part Name	Description	Illus. No.	Part No.	Part Name	Description
1	64E18	Antenna	Loop	20	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.
2	20E463	Coil	1st I.F. Transformer	21	27E475	Resistor	Carbon, 4.7 Megohm, 1/3 W.
3	20E463	Coil	2nd I.F. Transformer	22	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.
4	20E338	Coil	Oscillator	23	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.
5	24E40	Condenser	Tuning, Two Gang	24	27E683	Resistor	Carbon, 68,000 Ohm, 1/3 W.
6	25E29	Condenser	Dry Electrolytic, 40-40 Mfd. 150 V. & 100 Mfd. 10 V.	25	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 W.
7	23E211	Condenser	Tubular, .01 Mfd. 200 V.	26	27E682	Resistor	Carbon, 68,000 Ohm, 1/3 W.
8	23E216	Condenser	Tubular, .05 Mfd. 200 V.	27	27E271	Resistor	Carbon, 270 Ohm, 1/3 W.
9	23E416	Condenser	Tubular, .05 Mfd. 400 V.	28	27E331	Resistor	Carbon, 330 Ohm, 1/3 W.
10	23E408	Condenser	Tubular, .005 Mfd. 400 V.	30	27E3471	Resistor	Carbon, 470 Ohm, 1/3 W.
11	23E220	Condenser	Tubular, .2 Mfd. 200 V.	31	27E330-2	Resistor	Carbon, 33 Ohm, 1/2 W.
12	23E220	Condenser	Tubular, .2 Mfd. 200 V.	32	27E680-3	Resistor	Carbon, 68 Ohm, 1 W.
13	20E407	Choke	R. F.	33	27E1005	Resistor	Wire Wound, 1810 and 610 Ohms, 8 W.
14	23E24	Condenser	Ceramic, .0001 Mfd.	*35	57E1-4	Rectifier	Selenium
15	23E24	Condenser	Ceramic, .0001 Mfd.	*35	57E1-5	Rectifier	Selenium
16	23E2024	Condenser	Ceramic Condenser Plate	36	1E29	Speaker	4" P.M.
17	27E475	Resistor	Carbon, 4.7 Megohm, 1/3 W.	*37	28E30	Volume Control	With D.P.S.T. Switch, 2 Megohm
18	27E475	Resistor	Carbon, 4.7 Megohm, 1/3 W.	38	29E20	Switch	Spring Return Type
19	27E475	Resistor	Carbon, 4.7 Megohm, 1/3 W.	39	24E33	Condenser	Trimmer 3-35 MMF. Working Range

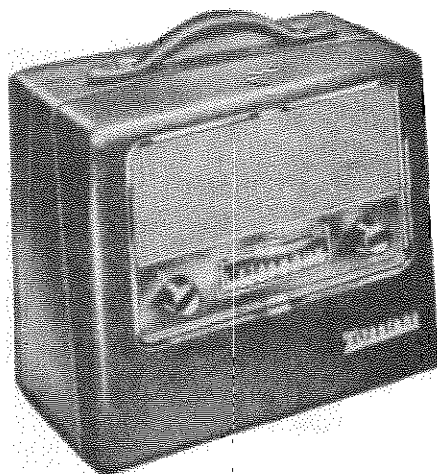
IMPORTANT: When ordering complete cabinet, or cabinet parts, BE SURE TO MENTION REQUIRED COLOR in addition to proper part number.

MISCELLANEOUS PARTS

Part No.	Part Name	Description	Part No.	Part Name	Description
*20E343-8	Cabinet	Complete Cabt. Assembly with Handle, Baffle, Loop and Cabt. Back, Ivory	35E8-8	Dial Pointer	Dial Indicator
*20E343-7	Cabinet	Complete Cabt. Assembly with Handle, Baffle, Loop and Cabt. Back, Tan	20E249	Batt. Connector	B— Battery Connector Assembly
20E344-8	Cabinet, less Back	Cabinet Assembly, less Back, but with Handle, Baffle and Loop, Ivory	20E249-2	Batt. Connector	B+ Battery Connector Assembly
20E344-7	Cabinet, less Back	Cabinet Assembly, less Back, but with Handle, Baffle and Loop, Tan	20E340	"A" Batt. Cable	"A" Battery Cable with Plug
*7E165-9	Cabinet Back	Back for Cabinet with 65E27 Spring Hinge, Maroon	55E21-1	Handle Bracket	Bracket for Mounting Handle
*7E165-8	Cabinet Back	Back for Cabinet with 65E27 Spring Hinge, Tan	52E31-5	Handle Cover	Plastic Cover, Ivory
20E253-19	Dial Cord	Dial Drive Cord	52E31-2	Handle Cover	Plastic Cover, Tan
65E2	Dial Spring	Dial Cord Tension Spring	55E39	Handle Strap	Clock Spring Steel
20E348	Dial Shaft	Drive Shaft Assembly	65E27	Hinge	Spring Hinge for Cabinet Back
5E32	Backplate	Dial Backplate	37E17-9	Knob	Ivory
			37E17-6	Knob	Tan
			41E14	Line Cord	Line Cord and Plug
			17E3-2	Plug	"A" Battery Plug
			20E345	Speaker Baffle	Baffle Assembly with Grille Cloth, Tan
			20E345-2	Speaker Baffle	Baffle Assembly with Grille Cloth, Ivory

MOUNTING HARDWARE

Part No.	Part Name	Description	Part No.	Part Name	Description
13E103-9	Clip	Holds Back to Cabinet	82E37-F10	Screw	6-20x3/8—For Mounting Chassis
82E37-F10	Screw	6-20x3/8—Holds 13E103-9 Clip to Cabt.	10E43	Stud	Trimount, for Mounting Speaker Baffle to Cabinet

**STOCK NO. 4-C-18**

Cabinet Dimensions
 $11\frac{5}{8}'' \times 9\frac{1}{4}'' \times 6\frac{5}{16}''$

Weight
 7 lbs. 4 oz., less battery

Power Supply
 105-125 volt 60 cycle AC-DC or
 Self-Contained battery

Tuning Range
 545 to 1610 KC

SPECIFICATIONS

I. F. Frequency
 455 KC

Loud Speaker
 5 inch P.M.

Voice Coil Impedance
 3.2 ohms at 400 cycles

Power Output
 Maximum 300 milliwatts

CODE NO. 332-0-186193

Tube Complement
 1L4—R. F. Amplifier
 1R5—Oscillator Converter
 1L4—I. F. Amplifier
 1U5—AVC, Detector, 1st Audio
 3V4—Power Output

Battery
 1 combination A-B battery pack,
 9 volt "A", 90 volt "B",
 Firestone Stock No. 4-D-130

ALIGNMENT PROCEDURE

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third, (4) fourth.

Before starting alignment:

- (a) Check position of dial pointer. With variable condenser set for maximum capacity (plates completely in mesh) the pointer should be aligned with the extreme left dot on dial backing plate. Adjust pointer to correct position, if necessary.
- (b) Use an accurately calibrated test oscillator with some type of output measuring device.

Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Minimum capacity (fully open)	455 K.C.	.1 MFD. condenser	High side to grid of 1R5 tube. Low side to common negative. (through .25 MFD. Cond.)	Adjust each trimmer on the second I. F. transformer for maximum output—then adjust each trimmer on the first I. F. transformer for maximum output.
2	Minimum capacity (fully open)	Exactly 1610 K.C.	.1 MFD. condenser	High side to grid of 1R5 tube. Low side to common negative.	Adjust C6 oscillator trimmer for maximum output.
3	Approx. 1400 K.C.	Approx. 1400 K.C.	.1 MFD. condenser	High side to grid of 1L4, RF Low side to common negative.	Adjust C5, R.F. trimmer for maximum output.
4	Approx. 1400 K.C.	Approx. 1400 K.C.		Loosely coupled to Loop Antenna	Adjust C4 antenna trimmer for maximum output.

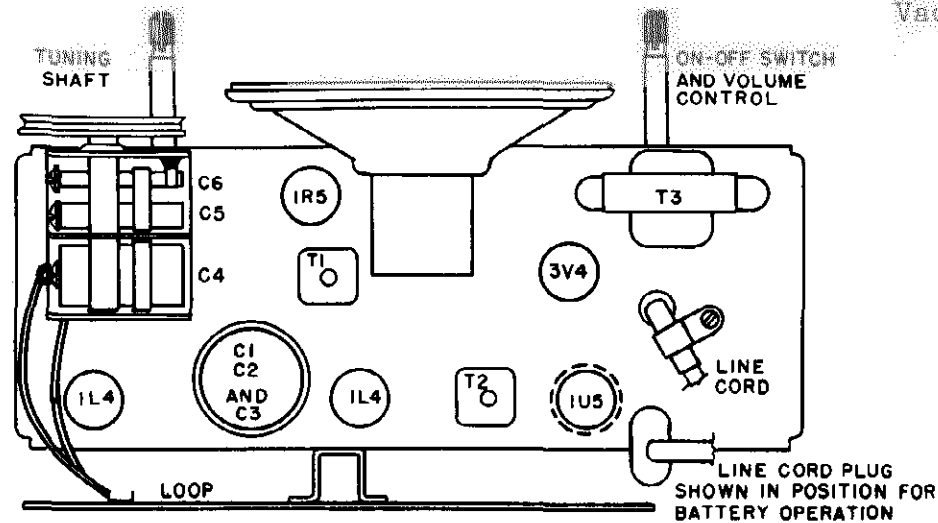
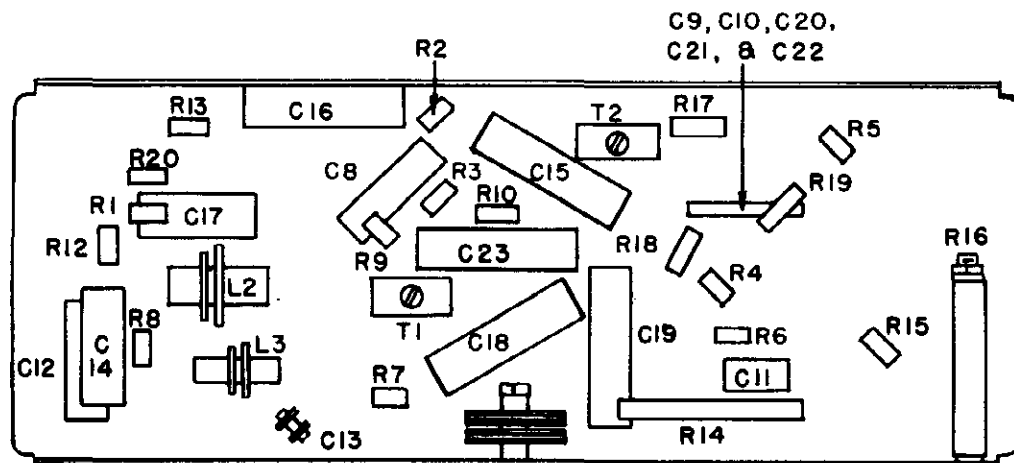
MODEL L-C-18,
Vacationer

Fig. 2. Chassis—top view



SELENIUM RECTIFIER

Fig. 3. Chassis—bottom view

PARTS LIST

Circuit Diagram Reference	Part Number	Description			
CONDENSERS					
C1, C2, C3	18-296	Capacitor, electrolytic	L3	10-553	Oscillator coil
C4, C5, C6	19-208	Capacitor, variable (3 gang)	T1, T2	10-508	Transformer, 1st and 2nd I.F.
C8, C11	16-153	Capacitor, .005 mfd. 600 volt	T3	80-228	Transformer, output
C9, C10, C20, C21, C22	17-103	Capacitor, ceramic unit			MISCELLANEOUS
C12, C17	16-152	Capacitor, .05 mfd. 200 volt		84-391	Cable, assembly, battery
C13	15-186	Capacitor, 10 minfd. mica		83-421	Clip, I.F. transformer mounting
C14	16-150	Capacitor, .02 mfd. 400 volt		24-186	Control, volume with switch
C15, C16, C23	16-157	Capacitor, .1 mfd. 200 volt		23-151	Cord, power, AC/DC
C18, C19	16-179	Capacitor, .05 mfd. 400 volt		51-105	Cord, pointer travel, 29"
				47-108	Grommet, variable condenser
RESISTORS					
R1, R20	60-744	Resistor, 22,000 ohm, 1/2 watt, 10%		76-13	Insulator, electrolytic
R2, R17	60-669	Resistor, 4.7 megohm, 1/2 watt		11-416	Pointer rail bracket
R3, R5	60-728	Resistor, 10 megohm, 1/2 watt		58-82	Pointer
R4	60-730	Resistor, 47,000 ohm, 1/2 watt		83-642	Rectifier, selenium
R6	60-704	Resistor, 330 ohm, 1/2 watt, 10%		75-69	Shaft, tuning
R7	60-727	Resistor, 100,000 ohm, 1/2 watt		68-39	Socket, miniature, wafer
R8	60-745	Resistor, 27,000 ohm, 1/2 watt		79-384	Speaker, 5" P.M.
R9	60-770	Resistor, 470 ohm, 1/2 watt, 10%		70-122	Spring, dial cord
R10, R19	60-725	Resistor, 2.2 megohm, 1/2 watt		69-186	Switch, AC/DC/Battery
R12, R15	60-729	Resistor, 1500 ohm, 1/2 watt, 10%		86-51	Washer, "C", tuning shaft
R13	60-708	Resistor, 680 ohm, 1/2 watt, 10%		86-80	Washer, compression, tuning shaft
R14	60-796	Resistor, 110 ohm, 3 watt, 10%			CABINET
R16	60-757	Resistor, 2000 ohm, 10 watt, 5%		44-14	Baffle
R18	60-668	Resistor, 1 megohm, 1/2 watt		42-469	Cabinet
COILS AND TRANSFORMERS					
L1	82-66	Loop, antenna		31-162	Dial plate
L2	10-535	R.F. coil		67-557	Dial scale
				40-162	Escutcheon
				22-161	Fastener, Escutcheon
				98-16	Grille cloth
				52-310	Knob

MODELS 24, 37,
46, Ch. 100, 110

MODEL	37		
INPUT	105-125 Volts, 60 Cycle	BASS SPEAKER	QSD-A6
		TREBLE SPEAKER	QSD-A4
TUNER CHASSIS	CH-110	RECORD CHANGER	RC-60
POWER SUPPLY & AMPLIFIER CHASSIS	PS #4		

POWER CONSUMPTION SPECIFICATIONS 250 Watts

TUNING RANGES (Frequency Modulation.....88 to 108 Megacycles
(Short Wave Band #2.....6.2 to 9.9 Megacycles
(Short Wave Band #1.....12 to 17.5 Megacycles
(Standard Broadcast Band.540 to 1600 Kilocycles

POWER OUTPUT 20 Watts Undistorted

Quantity	TUBE COMPLEMENT	
	Type	Description
1	6SK7	R. F. Amplifier (AM)
1	6SA7	Oscillator & Converter (AM)
1	6SK7	I. F. Amplifier (AM)
1	6SL7-GT	2nd Det. (AM) First Audio
1	6J5	Bass Boost Amplifier
1	6J5	Audio Amplifier & Phase Inverter
2	6L6-G	Push Pull Power Output
2	5U4-G	Rectifier
1	6AG5	R. F. Amplifier (FM)
1	6AG5	First Detector (FM)
1	6AG5	H. F. Oscillator (FM)
1	6SA7	6.4 Mc. Osc. & 2nd Conv. (FM)
2	6SG7	I. F. Amplifiers (FM)
2	6SH7	Limiters (FM)
1	6H6	Discriminator (FM)
1	6J5-GT	Interstation Noise Suppressor (FM)
1	6U5	Tuning Indicator (FM-AM)

MODELS 24, 37,
46, Ch. 100, 110

Speaker Field Resistance..... 350 Ohms (Bass)

Voice Coil Impedance at 400 cycles..... 8 Ohms (Bass)
3.3 Ohms (Treble)

Intermediate Frequencies..... 455 KC (AM)
10.7 MC (FM)
4.3 MC (FM)

SENSITIVITY

Frequency Modulation..... 10 Microvolts (approximately) to
produce complete limiting.

Standard Broadcast Band..... 10 Microvolts (approximately)

Short Wave Band #1..... 10 Microvolts (approximately)

Short Wave Band #2..... 10 Microvolts (approximately)

NOTE: By definition, the sensitivity is equal to the smallest signal input that will produce a standard test output of 0.5 watt in a matched load resistor across the secondary of the output transformer.

SPECIAL FEATURES

FREQUENCY MODULATION

1. A separate gang condenser and completely independent F.M. section is incorporated. Its advantages are extremely good stability and ease in servicing, both electrically and mechanically.
2. A special type of double conversion circuit is used which makes possible the exceptionally good sensitivity and stability of this receiver.
3. Temperature-compensated capacitors are used to insure stability in tuning.
4. Dual limiters are incorporated to insure adequate limiting action and freedom from impulse noises.
5. A special interstation noise silencer circuit is incorporated, which serves to eliminate tube "hiss" or "rush" ordinarily heard on F.M. receivers when there is no F.M. signal present.
6. Provision is made for an indoor or outdoor Dipole antenna. The receiver is furnished with an indoor Dipole antenna fastened to the back of the cabinet.

AMPLITUDE MODULATION

1. Adjustable iron cores are used in the broadcast tuning coils to provide greater accuracy of alignment.
2. Ceramic trimming capacitors are used with the short wave tuning coils for accuracy and stability.

3. Provision is made for 3 types of AM antennae. A loop is mounted in the cabinet for local broadcast reception and binding posts are provided for either a short or long outside antenna.
4. A special bass boost amplifier is incorporated to insure adequate bass compensation.
5. Inverse feedback is used to reduce total harmonic distortion to an extremely low value and to provide high fidelity response.
6. A special high fidelity dual speaker combination is used.
7. The power transformer has been designed to operate at a maximum rise of 50°C above ambient temperature. This feature permits the transformer to run at an appreciably lower temperature than the average commercial transformer.

RECORD CHANGER

Detailed service information will be found in the special record changer instruction book, which is supplied to Freed-Eisemann dealers.

ALIGNMENT INSTRUCTIONS

CAUTION:

This receiver has been carefully aligned at the factory with special equipment designed for aligning frequency modulation receivers operating in the new band, 88 to 108 megacycles. Due to the fact that the proper equipment, such as a wide band frequency modulated signal generator and a wide band oscilloscope, etc., is not yet generally available, it is advisable not to attempt realigning this receiver unless it is absolutely necessary.

If it is necessary to align this receiver in the field, it is imperative that the following instructions be followed exactly.

IMPORTANT

The following equipment must be available before alignment is attempted:

1. Accurately Calibrated SIGNAL GENERATORS, one of which must cover the new FM band 88 to 108 megacycles.
2. ACCURATE Vacuum Tube Voltmeter which has an extremely high input resistance (approximately 10 megohms).
3. A zero center microammeter (100 microampere range each side of center).

MODELS 24, 37,
46, Ch. 100, 110

4. An insulated low loss high frequency alignment screw driver.

DIAL POINTER ADJUSTMENT

Rotate both gang condensers to the fully closed position and set the dial pointers to the index mark at the low ends of the scales. If adjustment is necessary, make sure to cement the pointer carriage to the dial cord.

ALIGNMENT OF FREQUENCY MODULATED SECTION

CAUTION: Make certain that the signal generator is accurately calibrated and is warmed up for at least a half hour before alignment is attempted.

INTERMEDIATE FREQUENCY (FM)

1. Set the Band Switch to the FM Position.
2. Rotate the gang condenser to its fully open position.
3. Remove 6J5 squelch tube.
4. Connect an extremely high input resistance VTVM across R22 in the grid return circuit of the 1st Limiter Tube (see Schematic Diagram Fig. 1). An alternative method would be to connect the VTVM to the test socket on the back of the chassis. (See test socket on Schematic Diagram, Fig. 1) Use a DC range of approximately 30 volts.
5. Connect the ground terminal on the signal generator output cable to the ground lug on the 6SG7 2nd I.F. tube socket. (See location diagram, Fig. 6)
6. Connect the high side of the signal generator output cable to the grid terminal (Pin #4) of the 6SG7 2nd I.F. tube socket using a 0.1 microfarad capacitor in series with it.
7. Feed in an unmodulated signal at 4.3 megacycles and align the primary and secondary trimmers of the 3rd I.F. transformer for peak reading on VTVM.

NOTE: In the following steps, keep the reading on the VTVM below 10 volts by adjusting the signal generator output attenuator.

8. Move the signal generator output lead and the 0.1 microfarad capacitor in series with it to the grid terminal (pin No. 4) of the 6SG7 1st I.F. tube socket. Move the ground terminal on the output cable to this tube socket.
9. Align the primary and secondary trimmers of the 2nd I.F. transformer for peak reading on the VTVM.

NOTE: DO NOT REPEAK ANY OF THE I.F. TRANSFORMERS ALREADY ALIGNED.

10. Move the signal generator output lead and the 0.1 microfarad capacitor in series with it to input grid (Pin No. 8) of the 6SA7 2nd converter tube socket.
11. Align the primary and secondary trimmers of the 1st I.F. transformer in the same manner.
12. Connect a zero center microammeter (100 microampere range each side of center) with a 0.5 megohm resistor in series with it across R30 in the discriminator load (from the junction of R28, R30 to ground).
13. Align the primary of the discriminator transformer by adjusting the primary trimmer for maximum reading on the zero center microammeter. (See location diagram, Fig. 7).
14. Remove the zero center microammeter from R30 and connect it across the entire discriminator load (Pin No. 4) of the 6H6 discriminator tube socket to ground. Use a 0.5 megohm resistor in series with high side of microammeter.
15. Align the secondary of the discriminator (See location diagram, Fig. 7) for zero reading on the zero center microammeter.
16. Vary the frequency of the signal generator by an equal amount on each side of resonance (approximately 75 KC) and make sure that the zero center microammeter reads the same value each side of center. If the same readings are not obtained on each side of center, it indicates that the discriminator transformer is not in perfect alignment and the primary and secondary should be realigned.
17. Move the signal generator output lead and the 0.1 microfarad capacitor in series with it to input grid (Pin No. 1) of the 6AG5 first converter tube. This can be accomplished by connecting the signal generator across C-7 (See location diagram, Fig. 7).
18. Introduce an unmodulated signal at 10.7 megacycles.
19. Adjust the iron core of the 6.4 mc. oscillator for peak reading (See location diagram, Fig. 6).
20. Align the primary and secondary iron cores of the 10.7 megacycle I.F. transformer for peak reading on the VTVM. (See location diagram, Fig. 6 and Fig. 7).

NOTE: Make certain that the peak reading on the VTVM occurs when the zero center microammeter reads zero.

RADIO FREQUENCY (FM)

1. Leave the high input resistance VTVM across R22 and the zero center microammeter across the discriminator load. Connect the high frequency signal generator to the FM antenna binding posts using a 150 ohm resistor in series with the high side of the signal generator output cable.

MODELS 24, 37,
46, Ch. 100, 110

2. Set the receiver tuning dial to 92 megacycles.
3. Introduce an unmodulated signal at 92 megacycles.

CAUTION: The high frequency signal generator must be accurately calibrated and warmed up for at least a half hour.

4. Align the high frequency oscillator coil adjustable iron core for maximum reading on the VTVM. (See location diagram, Fig. 7).

NOTE: Make certain that the peak reading on the VTVM occurs when the zero center microammeter reads zero. This can be done by rocking the receiver tuning control slightly until zero is obtained on the microammeter. Keep the reading on the VTVM below 10 volts by reducing the signal generator input.

5. Introduce an unmodulated signal at 106 megacycles and set the FM dial pointer to 106 megacycles.
6. Align the high frequency oscillator trimmer capacitor C13 for peak reading on the VTVM. (See location diagram, Fig. 7). Make certain that the zero center microammeter reads zero when the receiver is tuned to the signal generator frequency.
7. Repeat steps 3 to 7, inclusive.
8. Align the R.F. trimmer capacitor C7 for peak reading on the VTVM in the same manner.
9. Align the antenna trimmer capacitor C1 for peak reading on the VTVM in the same manner. The peak reading on the VTVM should coincide with zero reading on the microammeter.
10. Replace 6J5 squelch tube.

ALIGNMENT OF AMPLITUDE MODULATED SECTION

INTERMEDIATE FREQUENCY (AM)

1. Set the band switch to the STANDARD BROADCAST POSITION.
2. Connect an output meter across the voice coil.
3. Rotate the gang condenser to its fully open position.
4. Rotate the volume control to its maximum clockwise position.
5. Rotate the bass control to its minimum position.
6. Connect the ground terminal on the standard signal generator to the ground lug on the 6SK7 I.F. tube socket.
7. Connect the high side of the signal generator output cable to the grid terminal (Pin No. 4) of the 6SK7 I.F. tube socket. Use a 0.1 microfarad capacitor in series.

MODELS 24, 37,
46, Ch. 100, 110

8. Introduce a 455 KC signal modulated 30% at 400 cycles.
9. Align the secondary and primary trimmers of the output I.F. transformer for peak reading on the output meter.

NOTE: IN THE FOLLOWING STEPS KEEP THE OUTPUT METER READING BELOW 3 VOLTS BY ADJUSTING SIGNAL GENERATOR OUTPUT ATTENUATOR.

10. Move the signal generator output cable and the 0.1 microfarad capacitor in series with the high side to Pin No. 8 of the 6SA7 converter tube socket. This can be accomplished by connecting the signal generator output cable to the stator of the center section on the tuning condenser.
11. Align secondary and primary trimmers of the input I.F. transformer for peak reading on the output meter.

CAUTION: DO NOT REPEAK ANY OF THE I.F. TRANSFORMERS ALREADY ALIGNED.

RADIO FREQUENCY (STANDARD BROADCAST)

1. Set the ANT-LOOP Switch to the OUTSIDE ANT. position. (See location drawing).
2. Set the dial pointer to 1000 KC.
3. Connect the signal generator output cable to the AM antenna binding posts using a 200 mmfd. capacitor in series with the high side.
4. Introduce a 1000 KC signal modulated 30% at 400 cycles.
5. Align the oscillator coil adjustable iron core (See location diagram, Fig. 7) for peak reading on the output meter.
6. Set the dial pointer to 600 KC.
7. Introduce a 600 KC signal modulated 30% at 400 cycles.
8. Align the low end of the oscillator range by adjusting the padding capacitor, C54, for peak reading on output meter. (See location diagram, Fig. 7).
9. Align the ANTENNA and R.F. coils by adjusting the iron cores for peak reading.
10. Now rotate the gang condenser until the dial pointer reads "1500 KC".
11. Introduce a 1500 KC signal modulated 30% at 400 cycles.
12. Align the high end of the broadcast oscillator range by adjusting the oscillator trimmer C53 for peak reading on the output meter. (C53 is mounted on the gang condenser, see Fig. 7).
13. Align the ANTENNA and R.F. trimmer capacitors for peak reading. The R.F. trimmer capacitor C47 is mounted on the gang condenser. The antenna trimmer capacitor C38 is mounted under the chassis. (See location diagram, Fig. 6).

PAGE 21-8 FREED

MODELS 24, 37,
46, Ch. 100, 110

NOTE: It may be necessary, if the receiver is far out of alignment, to repeat steps 2 to 13 inclusive, since each of the adjustments is affected by the others.

14. Set the ANT-LOOP switch to LOOP position and align loop trimmer for peak reading on output meter. Use a broadcast station at approximately 1400 KC as a signal source.

SHORT WAVE (BAND #2)

1. Set the band switch to Short Wave Band #2.
2. Set the ANT-LOOP switch to the OUTSIDE ANTENNA position.
3. Set the dial pointer to 9.9 megacycles.
4. Turn chassis bottom side up.
5. Introduce a 9.9 megacycle signal modulated 30% at 400 cycles using a 400 ohm resistor in series with the signal generator output lead.
6. Align the S.W. #2 oscillator trimmer C51 for peak reading on the output meter. (See location diagram, Fig. 8).
7. Align the S.W. #2 antenna and R.F. trimmers for peak reading on the output meter.

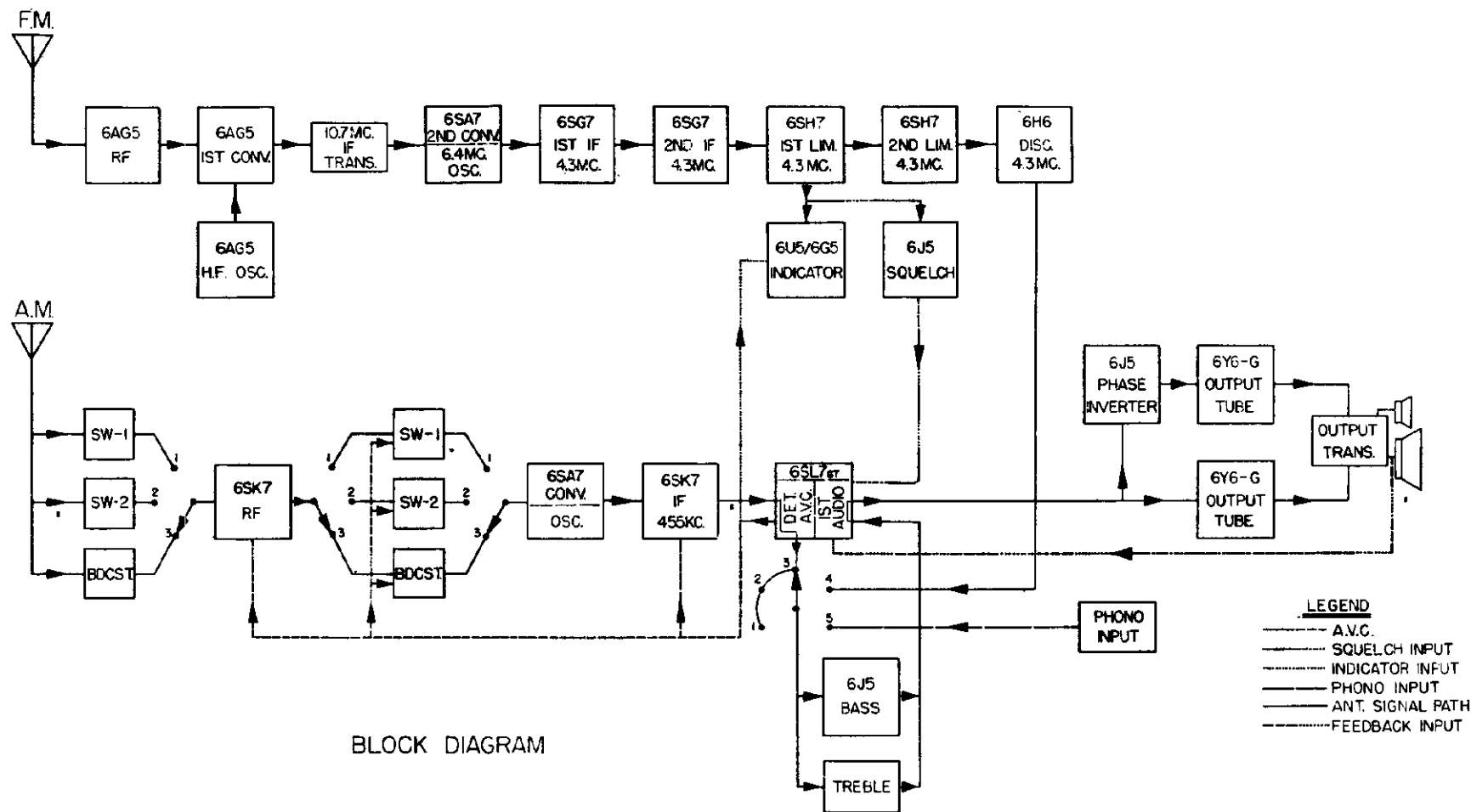
SHORT WAVE (BAND #1)

1. Set the band switch to short wave band #1.
2. Set the dial pointer to 17.5 megacycles.
3. Introduce a 17.5 megacycle signal modulated 30% at 400 cycles.
4. Align the S.W. #1 oscillator trimmer C50 for peak reading on the output meter.
5. Align the S.W. #1 antenna and R.F. trimmers for peak reading on the output meter. (See location diagram, Fig. 8).

WAVE TRAP ALIGNMENT

1. Set the band switch to the standard broadcast position.
2. Set the dial pointer to 1000 kilocycles.
3. Introduce a strong 455 KC signal modulated 30% at 400 cycles into the antenna binding posts.
4. Adjust the wave trap trimmer C42 for MINIMUM reading on the output meter. (See location diagram, Fig. 8).
5. Set the ANT-LOOP switch back to LOOP position. Remove signal generator and output meter leads.

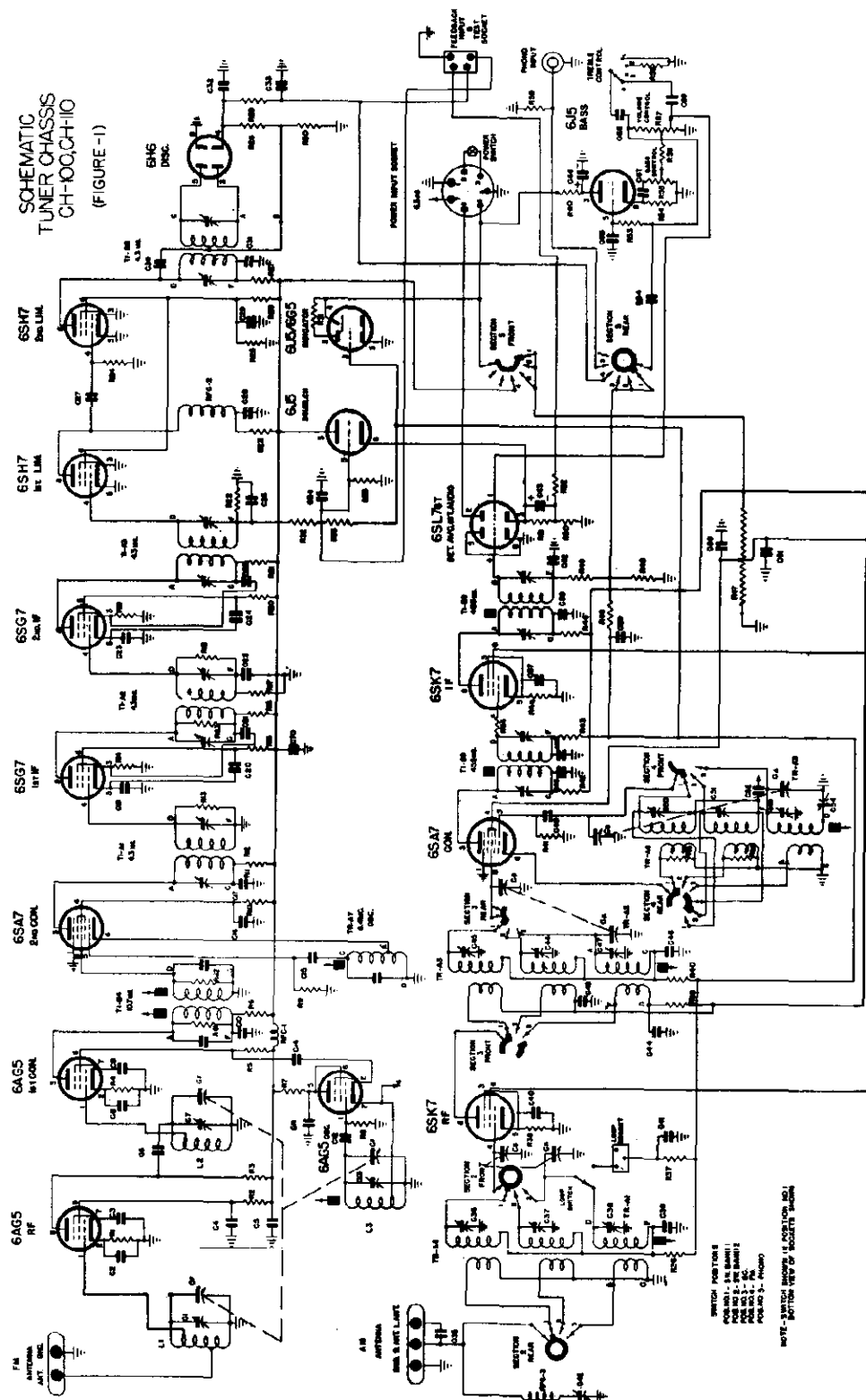
NOTE: The ANT-LOOP switch should be set in that position required for either OUTSIDE ANTENNA or LOOP depending upon which the customer is using.



BLOCK DIAGRAM

MODELS 24, 37,
46, Ch. 100, 110

SCHEMATIC
TUNER CHASSIS
CH-100, CH-110
(FIGURE -1)



MODELS 24, 37,
46, Ch. 100, 11.RESISTANCE VALUES
FOR
CH-100-110 SCHEMATIC

SYMBOL	VALUE	SYMBOL	VALUE	SYMBOL	VALUE
R-1	200 OHM	R-22	51 K	R-43	100 K
R-2	68 K	R-23	100 K	R-44	1000 OHM
R-3	10 K	R-24	24 K	R-45	3600 OHM
R-4	1000 OHM	R-25	22 K	R-46	1 Meg.
R-5	270 K	R-26	39 K, 1 W.	R-47	10 K, W.W.TAP. 5 K
R-6	1000 OHM	R-27	100 K	R-48	270 K
R-7	30 K	R-28	100 K	R-49	51 K
R-8	39 K	R-29	75 K	R-50	20 OHM
R-9	22 K	R-30	100 K	R-51	3600 OHM
R-10	15 K, 2 W.	R-31	1 Meg.	R-52	1500 OHM
R-11	3600 OHM	R-32	510 K	R-53	220 K
R-13	50 K	R-33	2.2 meg.	R-54	5100 OHM
R-14	200 OHM	R-35	1 Meg.	R-55	10 K, BASS
R-15	39 K	R-36	100 K	R-56	51 K
R-16	3600 OHM	R-37	100 K	R-57	500 K, VOL.
R-17	100 K	R-38	390 OHM	R-58	68 K
R-18	50 K	R-39	5100 OHM	R-59	1 Meg.
R-19	390 OHM	R-40	100 K	R-60	10 K
R-20	39 K	R-41	22 K	R-61	51 K
R-21	3600 OHM	R-42	3600 OHM	R-62	51 K
				R-63	51 K
				R-64	1000 OHM
				R-65	510 OHM
				R-66	200 OHM

NOTE:- ALL 1/2 WATT UNLESS OTHERWISE NOTED.

FIG. 2

MODELS 24, 37,
46, Ch. 100, 110

CAPACITOR VALUES
FOR
CH-100-110 SCHEMATIC

SYMBOL	VALUE	SYMBOL	VALUE	SYMBOL	VALUE
C-1	1.5 to 7 mmfd Ceramic	C-24	.01 mfd Mica	C-47	4 - 30 mmfd Ceramic
C-2	510 mmfd Mica	C-25	.01 mfd Mica	C-48	.05 mfd, 400 V.
C-3	510 mmfd Mica	C-26	51 mmfd Ceramic	C-49	62 mmfd, Ceramic
C-4	.001 mfd Mica	C-27	51 mmfd Ceramic	C-50	4 - 30 mmfd Ceramic
C-5	.001 mfd Mica	C-28	.01 mfd Mica	C-51	4 - 30 mmfd Ceramic
C-6	51 mmfd Ceramic	C-29	.01 mfd Mica	C-52	.001 mfd Mica
C-7	1.5 to 7 mmfd Ceramic	C-30	100 mmfd Mica	C-53	4 - 30 mmfd Ceramic
C-8	.001 mfd Mica	C-31	.01 mfd Mica	C-54	200-600 mmfd Padder
C-9	.001 mfd Mica	C-32	100 mmfd Mica	C-55	.05 mfd, 400 V.
C-10	.01 mfd Mica	C-33	.001 mfd Mica	C-56	.05 mfd, 400 V.
C-11	.001 mfd Mica	C-34	.01 mfd Mica	C-57	.05 mfd, 400 V.
C-12	24 mmfd Ceramic	C-35	24 mmfd Ceramic	C-58	.05 mfd, 400 V.
C-13	1.5 to 7 mmfd Ceramic	C-36	4 - 30 mmfd Ceramic	C-59	.05 mfd, 400 V.
C-14	.001 mfd Mica	C-37	4 - 30 mmfd Ceramic	C-60	.05 mfd, 400 V.
C-15	51 mmfd Ceramic	C-38	4 - 30 mmfd Ceramic	C-61	.05 mfd, 400 V.
C-16	.01 mfd Mica	C-39	.05 mfd, 400 V.	C-62	100 mmfd Mica
C-17	.01 mfd Mica	C-40	.05 mfd, 400 V.	C-63	25 mfd, 50 Volt
C-19	.01 mfd Mica	C-41	.05 mfd, 400 V.	C-64	.05 mfd, 400 V.
C-20	.01 mfd Mica	C-42	10 - 80 mmfd, Trimmer	C-65	.005 mfd, 400 V.
C-21	.01 mfd Mica	C-43	.01 mfd, 400 V.	C-66	8 mfd, 450 V.
C-22	.01 mfd Mica	C-44	.05 mfd, 400 V.	C-67	.5 mfd, 400 V.
C-23	.01 mfd Mica	C-45	4 - 30 mmfd, Ceramic	C-68	.005 mfd, 400 V.
		C-46	4 - 30 mmfd, Ceramic	C-69	62 mmfd Ceramic
				C-70	.01 mfd Mica

FIG. 3



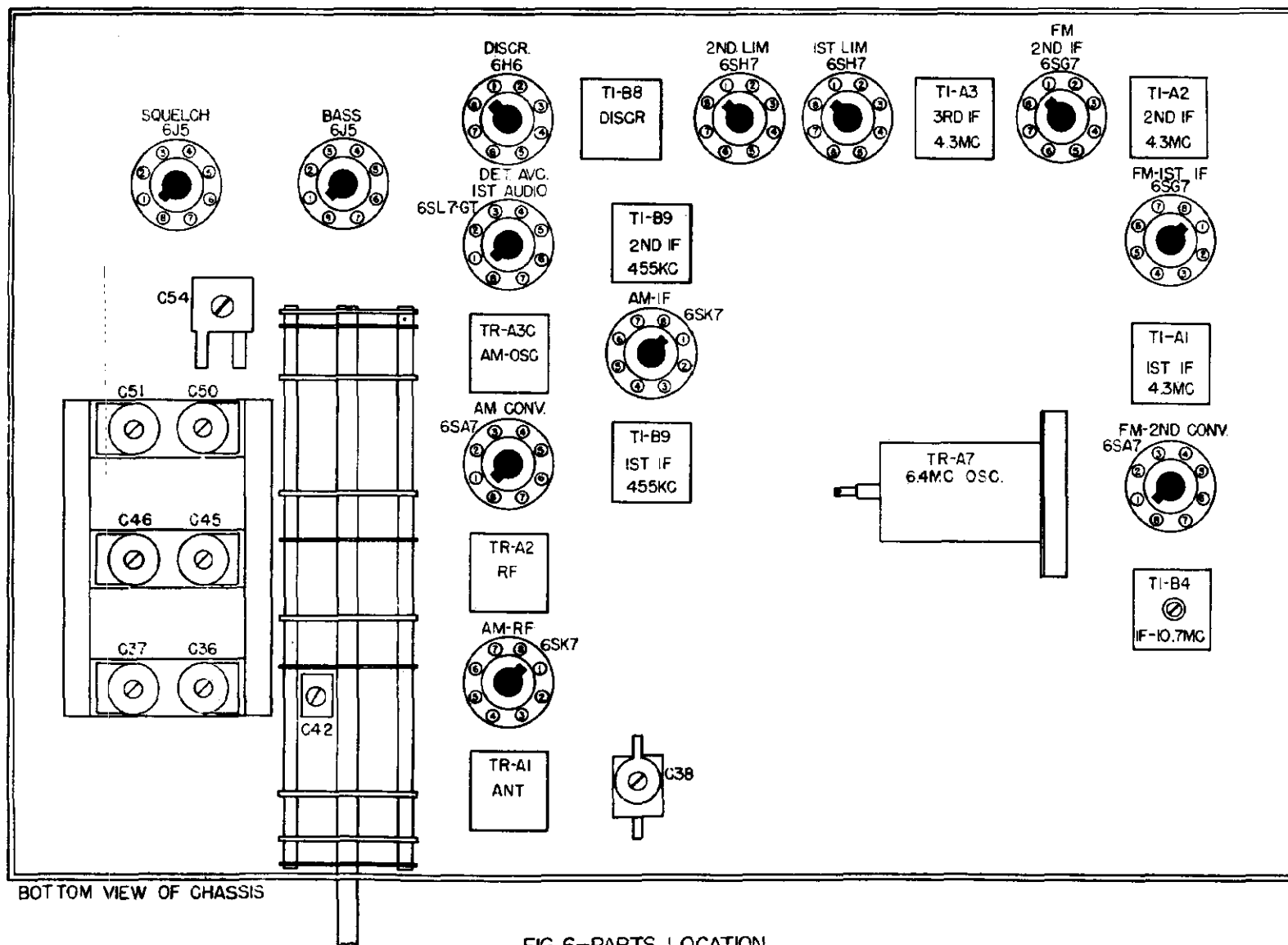
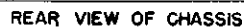
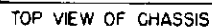


FIG. 6-PARTS LOCATION



©John F. Rider

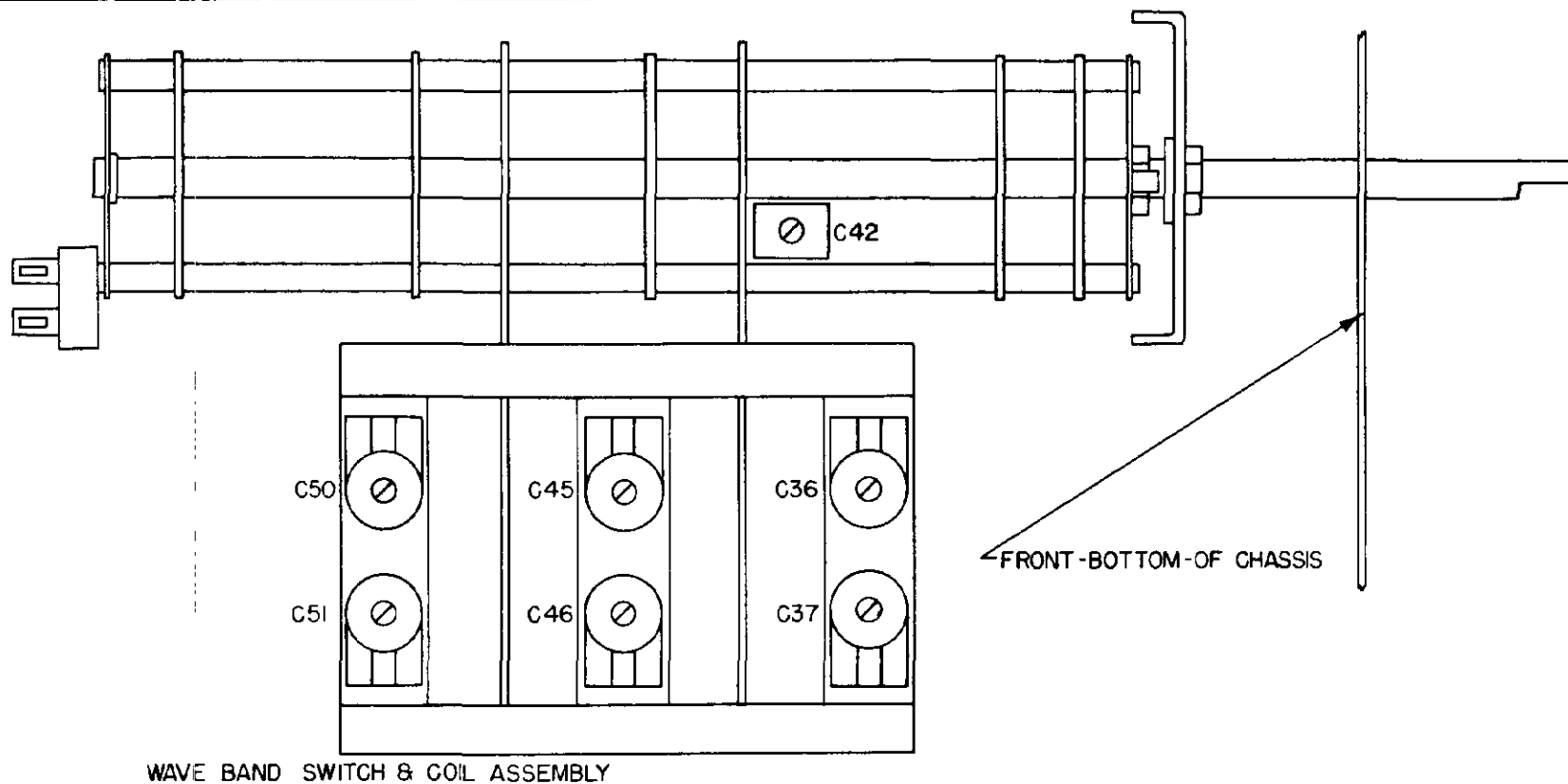


FIG. 8-PARTS LOCATION

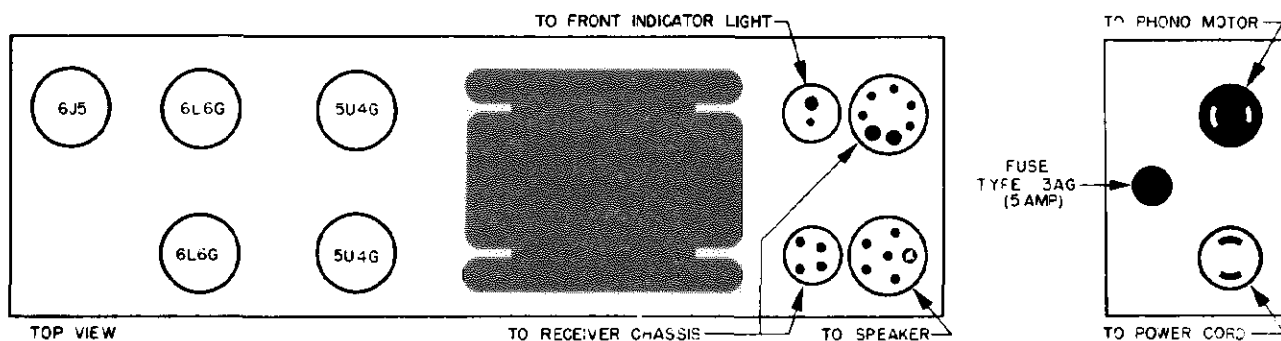


FIG. 9 -PARTS LOCATION PS-4

MODELS 24, 37,
46, Ch. 100, 110

TO FRONT INDICATOR LIGHT

FIGURE 10-PARTS LOCATION P.S.-4

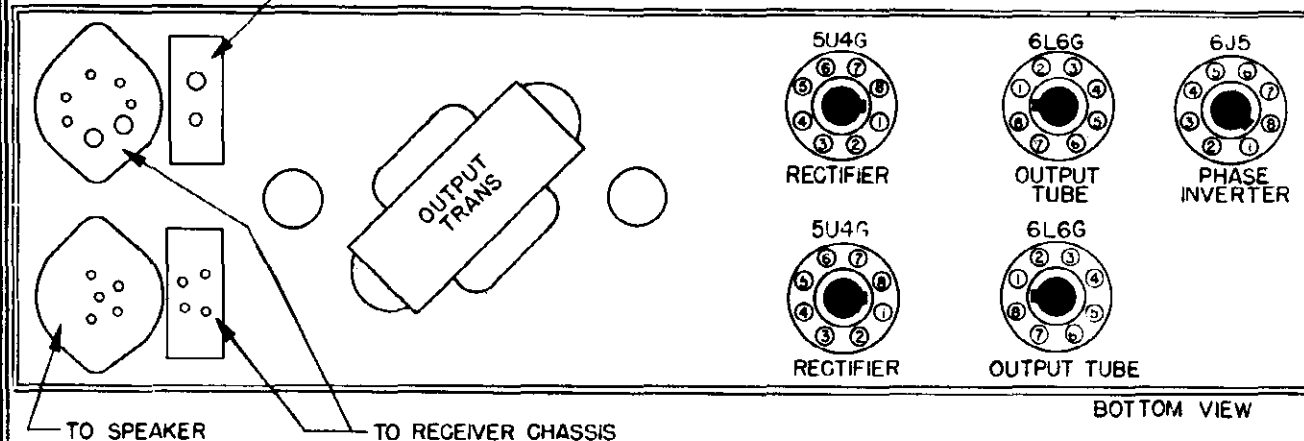


TABLE OF RESISTANCE MEASUREMENTS-TUNER CHASSIS CH-110

FIGURE 11

TUBE	FUNCTION	PLATE TO GROUND	SCREEN TO GROUND	CONTROL GRID TO GROUND	CATHODE TO GROUND
6SK7	AM-R.F.	9,000	4,000	1 MEG.	400
6SA7	AM-CONV.	9,000	4,000	1 MEG.	0
6SK7	AM-I.F.	9,000	4,000	1 MEG.	1,000
6SL7-GT	AM-DET. 1st AUDIO	0 250,000	--- ---	300,000 370,000	0 3,600
6J5	BASS AMP.	15,000	---	550,000	5,100
6AG5	FM-R.F.	20,000	75,000	0	200
6AG5	FM-1st CONV:	10,000	270,000	0	1,000
6AG5	FM-H.F.O.	40,000	---	40,000	0
6SA7	FM-2nd CONV.	12,000	22,000	0	0
6SG7	FM-1st I.F.	13,500	49,000	100,000	200
6SG7	FM-2nd I.F.	13,500	49,000	100,000	390
6SH7	1st LIMITER	110,000	15,000	51,000	0
6SH7	2nd LIMITER	110,000	15,000	24,000	0
6H6	DISCRIMINATOR	100,000	100,000	---	200,000
6J5-GT	INTERSTATION NOISE SUPPR.	10,000	---	300,000	3,600
6U5	TUNING INDICATOR	1 meg.	---	1 MEG.	0

MODELS 24, 37,
46, Ch. 100, 110

TABLE OF RESISTANCE MEASUREMENTS - P.S. #4

FIGURE 12

TUBE	FUNCTION	PLATE TO GROUND	SCREEN TO GROUND	CONTROL GRID TO GROUND	CATHODE TO GROUND
6J5-GT	PHASE INV.	120,000	----	17,000	5,100
6L6-G	OUTPUT	7,000	7,000	220,000	130
6L6-G	OUTPUT	7,000	7,000	220,000	130
5U4-G	RECTIFIER	300	----	----	7,500
5U4-G	RECTIFIER	300	----	----	7,500

TABLE OF VOLTAGE MEASUREMENTS-TUNER CHASSIS CH-110

FIGURE 13

TUBE	FUNCTION	PLATE TO GROUND	SCREEN TO GROUND	CONTROL GRID TO GROUND	CATHODE TO GROUND
6SK7	AM-R.F.	190	80	---	2.0
6SA7	AM-CONV.	190	80	6.0 *	---
6SK7	AM-I.F.	190	80	---	3.5
6SL7-GT	1st AUDIO	100	---	---	1.4
6J5	BASS AMP.	180	---	---	8.5
6AG5	FM-R.F.	150	100	---	1.0
6AG5	FM-1st CONV.	190	85	---	2.0
6AG5	FM-H.F.O.	90	---	4.0 *	---
6SA7	FM-2nd CONV.	180	85	12.0 *	---
6SG7	FM-1st I.F.	170	105	---	1.75
6SG7	FM-2nd I.F.	170	115	---	3.0
6SH7	1st LIMITER	13	45	---	---
6SH7	2nd LIMITER	45	45	---	---
6H6	DISCRIMINATOR	---	---	---	---
6J5-GT	INTERSTATION NOISE SUPPR.	190	---	---	6.5
6U5	TUNING IND.	SUPPLY 190	---	---	---

BAND SWITCH
IN
BROADCAST
POSITIONBAND SWITCH
IN
F. M.
POSITION

NOTE: Above values are measured with a 20,000 ohm per voltmeter and with no signal applied.

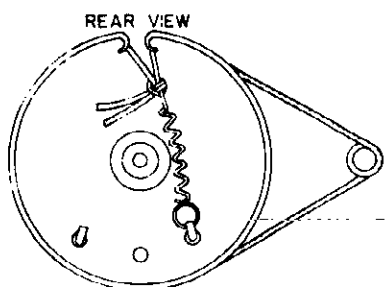
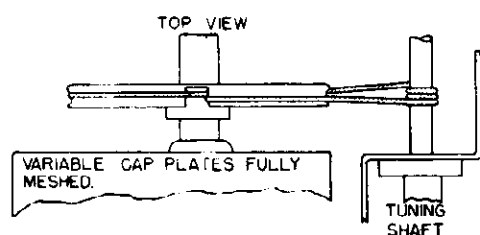
Measured with vacuum tube voltmeter and 1 megohm resistor in series with test prod.

MODELS 24, 37,
46, Ch. 100, 110

FIGURE 14

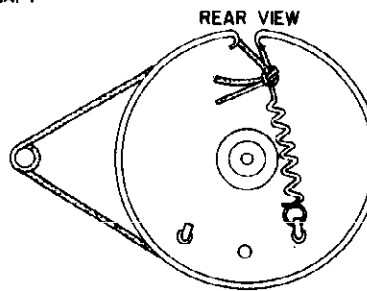
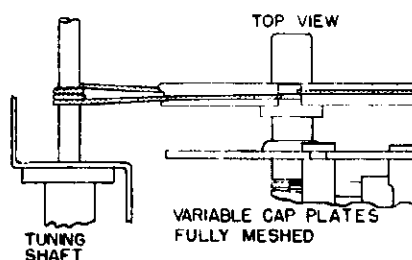
TABLE OF VOLTAGE MEASUREMENTS - P.S. #4

TUBE	FUNCTION	PLATE TO GROUND	SCREEN TO GROUND	CONTROL GRID TO GROUND	CATHODE TO GROUND
6J5-GT	PHASE INV.	160	----	----	6.5
6L6-G	OUTPUT	300	300	----	20
6L6-G	OUTPUT	300	300	----	20
5U4-G	RECTIFIER	360 AC	----	----	400
5U4-G	RECTIFIER	360 AC	----	----	400



ASSEMBLY NO. 1-DRIVE DRUM-F.M. TUNING

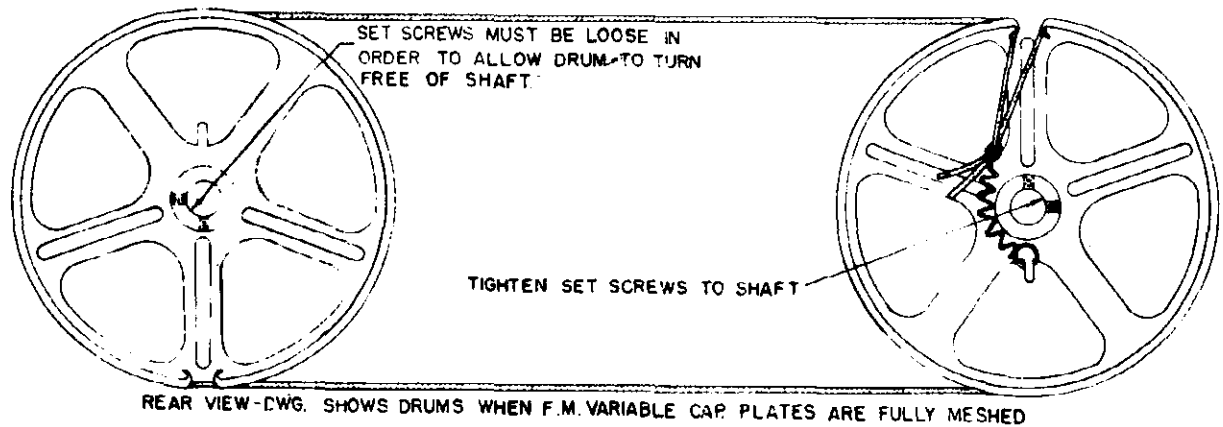
FIGURE 15A



ASSEMBLY NO. 2-DRIVE DRUM-A.M. TUNING

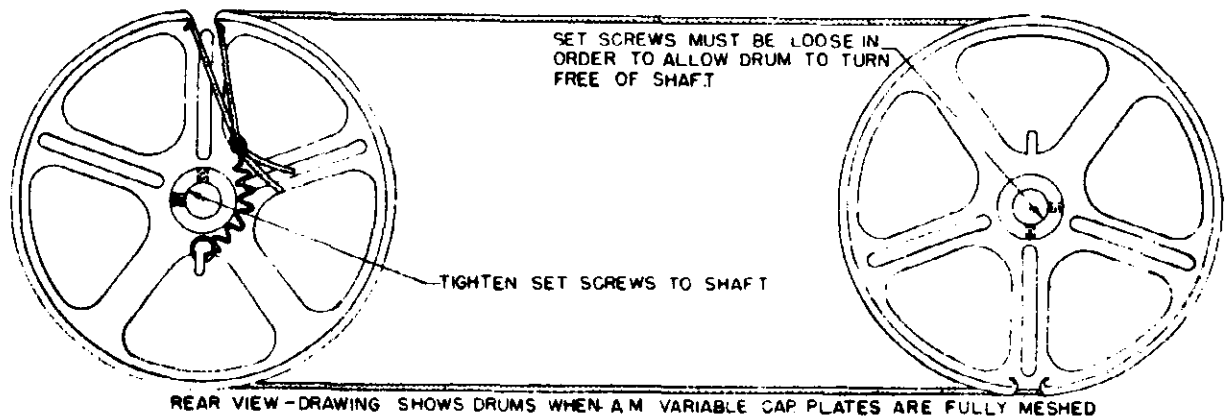
FIGURE 15B

MODELS 24, 37,
46, Ch. 100, 110



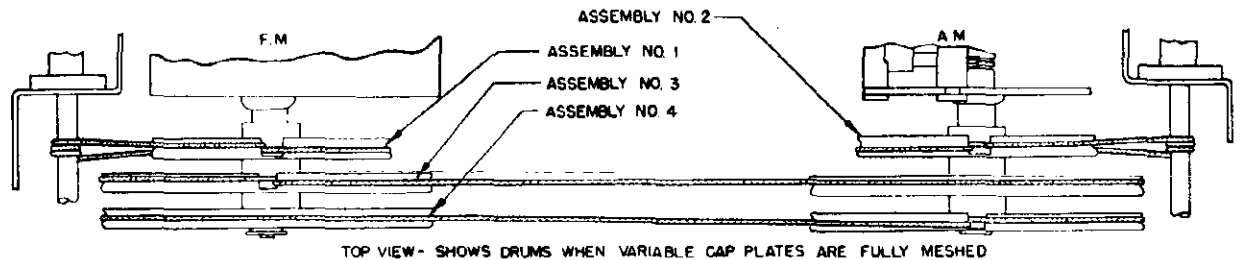
ASSEMBLY NO. 3- DIAL DRUM-F.M. TUNING

FIGURE 15C



ASSEMBLY NO. 4- DIAL DRUM-A.M. TUNING

FIGURE 15D



NOTE
SEE ASSEMBLY DETAIL DRAWINGS
FOR PROPER ASSEMBLY SEQUENCE

DIAL CABLE ASSEMBLY

FIGURE 15E

MODELS 24, 37,
46, Ch. 100, 110

FIGURE 16

REPLACEMENT PARTS LIST
CH-110 Tuner

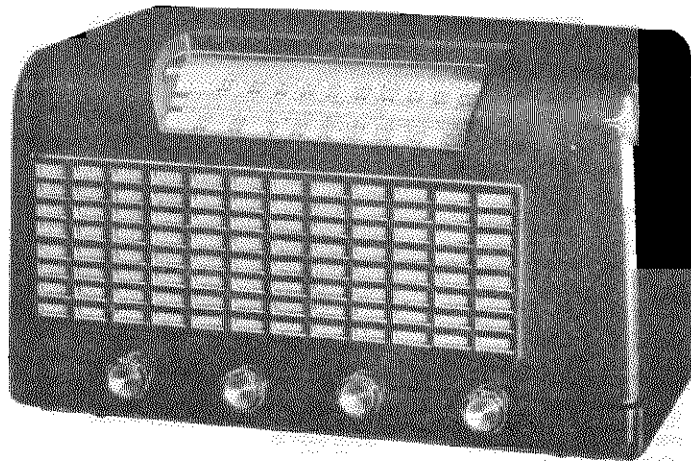
<u>PART NO.</u>	<u>DESCRIPTION</u>
A-A11	Pointer, AM
A-A45	Pointer, FM
LC-B1	Loop, AM
LC-A2	Choke, R.F., 1 Mh.
ND-D4	Dial, Glass
OK-A1	Knob
PL-A1	Plug for Phono Motor
PL-A2	Plug for Line Cord
HVC-A1	Volume Control
HVC-A2	Bass Control
RW-A1	Resistor, Wire Wound
SR-B1	Switch, Wave Band
SR-A2	Switch, Treble Control
SR-A3	Switch, Ant-Loop
TI-A1	Transformer, I.F., 4.3 Mc., Input
TI-A2	Transformer, I.F., 4.3 Mc., Interstage
TI-A3	Transformer, I.F., 4.3 Mc., Output
TI-B4	Transformer, I.F., 10.7 Mc.
TI-B8	Discriminator, FM, 4.3 mc.
TI-B9	Transformer, I.F., 455 KC.
TR-A1	Coil, Antenna, AM
TR-A2	Coil, R.F., AM
TR-A3	Coil, Oscillator, AM
TR-A4	Coil, Antenna, Short Wave
TR-A5	Coil, R.F., Short Wave
TR-A6	Coil, Oscillator, Short Wave
TR-A7	Coil, Oscillator, FM
W-A6	Cable, 7-wire Power Supply

Power Supply #4

<u>PART NO.</u>	<u>DESCRIPTION</u>
CE-A2	Capacitor, Electrolytic
QSD-A6	Speaker, 12"
QSD-A4	Speaker, 5"
RW-A2	Resistor, Wire Wound, 2200 Ohms
RW-A3	Resistor, Wire Wound, Bleeder
RW-A4	Resistor, Wire Wound, 130 Ohms
TP-C1	Transformer, Power

NOTE: SPECIAL REPLACEMENT ITEMS LISTED. PARTS NOT LISTED MAY
BE OBTAINED FROM FREED RADIO CORPORATION.

MODEL 94RA1-43-8510B,
94RA1-43-8511B



GENERAL DESCRIPTION

This radio is a 7 tube (including rectifier tube) AC receiver designed for reception of stations in the standard broadcast band between 540 and 1600 kilocycles and FM (Frequency Modulation) stations in the newly allocated FM Band of 88-108 megacycles. Controls are provided on the front panel for tuning, tone, volume and band or phono selection. Special features include a built-in loop antenna for broadcast reception, a hank antenna for the reception of FM stations, automatic volume control, compensator circuits to prevent oscillator drift, beam power output stage, permanent magnet dynamic speaker and an electrostatic shield in the power transformer to reduce power line noise. A socket labeled PHONO is provided on the back of the chassis to which an external record player may be connected.

ELECTRICAL SPECIFICATIONS

Power Consumption —
117 volts AC—35 Watts

Power Output —
1.5 watts maximum
.9 watts 10% distortion

Speaker—5" PM dynamic

Frequency Ranges —
Broadcast 540-1600 KC
Frequency modulation 88-108 MC

Intermediate Frequency —
AM 455 KC — FM 10.7 MC

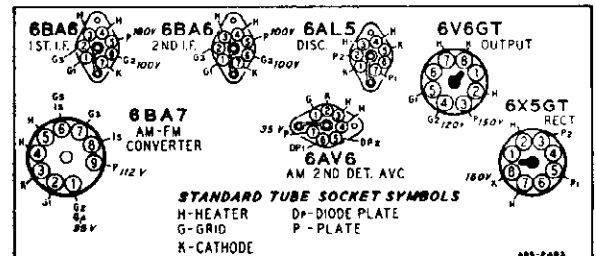
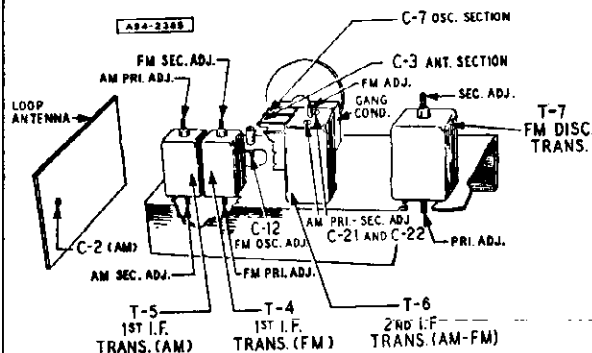
Selectivity — AM — 60 KC broad
at 1000 times signal, measured
at 1000 KC

I.F. FM—200 KC broad at 2 times
down

I.F. FM — 700 KC broad at 200
times down

AM Sensitivity—(For .5 watt output
with external antenna)
10 microvolts average

FM Sensitivity—(For .5 watt output)
100 microvolts average



TUBE SOCKET VOLTAGES

Socket voltages are shown on the Bottom Socket diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage117 Volts AC
Signal InputNone
A Variation of $\pm 10\%$ is usually permissible.

MODEL 94RA1-43-8510B,
94RA1-43-8511B

SERVICE DATA

ALIGNMENT PROCEDURES

AM STAGES

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50 mmf.

SIGNAL GENERATOR					ADJUST TUNING SLUGS AND TRIMMERS
FREQUENCY SETTING	CONNECTION AT RADIO	GROUND CONNECTION	DUMMY ANTENNA	GANG CONDENSER SETTING	
455 KC	Control Grid 1st 6BA6 Pin No. 1	Chassis Base	.1 mf	Turn Rotor to Full Open	2nd I.F. C-21 & C-22
455 KC	Control Grid 6BA7 Pin No. 7 1st Det.	Same as above	.1 mf	Turn Rotor to Full Open	1st I.F. Pri. & Sec.
1620 KC	Control Grid 6BA7 Pin No. 7	Same as above	.1 mf	Turn Rotor to Full Open	Oscillator C-7
1400 KC	External Antenna Clip	Same as above	50 mmf	Turn Dial to 1400 KC. See Note A	Antenna C-2

NOTE A—Set pointer at the 1400 KC mark on the dial scale. Attach pointer to drive cord.

FM STAGES

Allow chassis and signal generator to warm up for several minutes.

The following equipment is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms and a 3300 ohm .5 watt resistor with short leads.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings.)

	SIGNAL GENERATOR				CONDENSER SETTING	ADJUSTMENT FOR MAX. METER DEFLECTION
	FREQUENCY SETTING	CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING		
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 & Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. Note A
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. Note B
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Pri. Note A
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. Note B
I-F	10.7 MC Note E	6BA6 1st I-F Pin 1 & Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Note C
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 & Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. Note A
I-F	10.7 MC	Antenna and Chassis	2500 mmf	FM	Rotor Fully Open	1st. I-F Pri. and Sec. and Note C
	10.7 MC	Antenna and Chassis Solder a 3300 ohm resistor across terminals 3 and 4 of 1st. I-F trans.	2500 mmf	FM	Rotor Fully Open	1st. I-F Pri. Note C
	10.7 MC	Antenna and Chassis Note D	2500 mmf	FM	Rotor Fully Open	1st. I-F Sec. Note C
RECHECK I-F ADJUSTMENTS IN ORDER GIVEN						
Oscillator	108.4 Note F	Disconnect hank antenna and connect generator to dipole terminals with resistor in series	300 ohms	FM	Rotor Fully Open	Osc. C-12
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-3

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it to the audio takeoff point at the 27 K ohm resistor (R-11) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

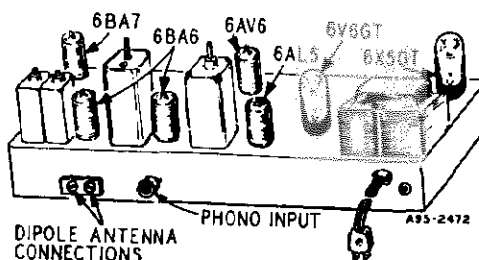
NOTE D—Unsolder 3300 ohm resistor from terminals 3 and 4 of 1st I-F transformer and resolder across terminals 1 and 2.

NOTE E—2nd I-F Trimmers (AM) must be aligned before attempting to adjust 2nd I-F (FM) tuning slug.

NOTE F—Remove the 3300 ohm load resistor before attempting to check the antenna and oscillator adjustments.

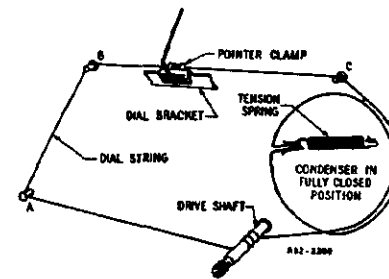
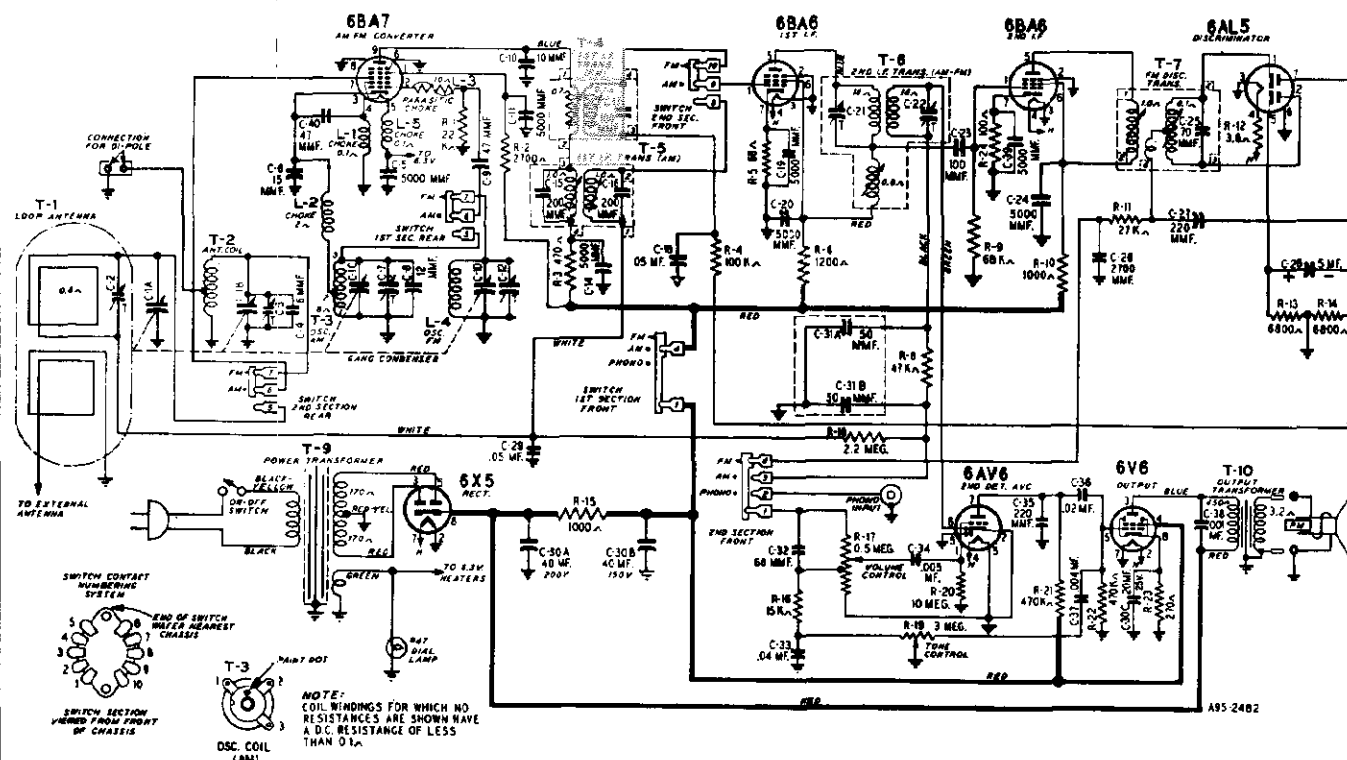
Tube and Dial Lamp Complement

- 1 6BA7 FM-AM Converter
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 No. 47 Dial Lamp



DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



MODEL 94RA1-43-8510B,
94RA1-43-8511B

REPLACEMENT PARTS LIST

Ref. No.	DESCRIPTION	Part No.
----------	-------------	----------

CAPACITORS

C-1	Gang Condenser & Pulley	14A204
C-2	Capacitor, Trimmer; 2-24 mmf	17A256
C-3 }	Part of C-1 (Gang Condenser)	
C-7 }		
C-4	Capacitor, Ceramic; 6 mmf	47X521
C-5		
C-11		
C-14		
C-19	Capacitor, Ceramic; 5000 mmf	47X507
C-20		
C-24		
C-39		
C-6	Capacitor, Ceramic; 15 mmf	47X552
C-8	Capacitor, Ceramic; 12 mmf	47X522
C-9	Capacitor, Ceramic; 47 mmf \pm 10%	47X517
C-10	Capacitor, Ceramic; 10 mmf	47X512
C-12	Capacitor, Trimmer; 1-8 mmf	17A255
C-15 }	Part of T-5 (1st I-F Trans. AM)	
C-16 }		
C-17	Part of T-4 (1st I-F Trans. FM)	
C-18 }	Capacitor, Tubular; .05 mf 200 V	B66503
C-29 }		
C-21 }	Part of T-6 (2nd I-F Trans. AM-FM)	
C-22 }		
C-23	Capacitor, Ceramic; 100 mmf	47X476
C-25	Part of T-7 (FM Disc. Trans.)	
C-26	Capacitor, Molded Mica; 2700 mmf	47X492
C-27 }	Capacitor, Ceramic; 220 mmf	47X468
C-35 }		
C-28	Capacitor, Dry Electrolytic; 5 mf 100 V	45X361
C-30A	40 mf 200 V	
C-30B	Capacitor, Dry Electrolytic; 40 mf 150 V	45X360
C-30C	20 mf 25 V	
C-31A }	Capacitor, Dual Mica; 50-50 mmf	47X112
C-31B }		
C-32	Capacitor, Molded Mica; 68 mmf	47X471
C-33	Capacitor, Tubular; .04 mf 200 V	B66403
C-34	Capacitor, Tubular; .005 mf 400 V	D66502
C-36	Capacitor, Tubular; .02 mf 400 V	D66203
C-37	Capacitor, Tubular; .004 mf 200 V	B66402
C-38	Capacitor, Tubular; .001 mf 800 V	H66102
C-40	Capacitor, Ceramic; 47 mmf \pm 20%	47X509

RESISTORS

R-1	Resistor, Carbon; 22K ohms 0.5 W	B84223
R-2	Resistor, Carbon; 2700 ohms 0.5 W	B84272
R-3	Resistor, Carbon; 470 ohms 0.5 W	B84471
R-4	Resistor, Carbon; 100K ohms 0.5 W	B85104
R-5	Resistor, Carbon; 68 ohms 0.5 W	B83680
R-6	Resistor, Carbon; 1200 ohms 0.5 W	B85122
R-8	Resistor, Carbon; 47K ohms 0.5 W	B85473
R-9	Resistor, Carbon; 68K ohms 0.5 W	B84683
R-10	Resistor, Carbon; 1000 ohms 0.5 W	B85102
R-11	Resistor, Carbon; 27K ohms 0.5 W	B85273
R-12	Resistor, Wirewound; 3.6 ohms 0.5 W	43X233
R-13 }	Resistor, Carbon; 6800 ohms 0.5 W	B84682
R-14 }		
R-15	Resistor, Carbon; 1000 ohms 2.0 W	D84102
R-16	Resistor, Carbon; 15K ohms 0.5 W	B85153
R-17	Volume Control & Switch; .5 megohm	36X372
R-18	Resistor, Carbon; 2.2 megohms 0.5 W	B85225
R-19	Tone Control; 3 megohms	40X285
R-20	Resistor, Carbon; 10 megohms 0.5 W	B85106
R-21 }	Resistor, Carbon; 470K ohms 0.5 W	B85474
R-22 }		
R-23	Resistor, Carbon; 270 ohms 0.5 W	B84271
R-24	Resistor, Carbon; 100 ohms 0.5 W	B84101

Ref. No.	DESCRIPTION	Part No.
----------	-------------	----------

TRANSFORMERS AND COILS

L-1 }	Choke, Filament	9A2044
L-5 }		
L-2	Choke, Insulated 2 uh.	35A5
L-3	Choke, Parasitic	9A1940
L-4	Coil, Oscillator (FM)	9A2021
T-1	"B" Range Loop Antenna Assembly	9A2040
T-2	Coil, Antenna	9A1956
T-3	Coil, Oscillator (AM)	9A1997
T-4	1st I-F Trans. (FM)	9A2037
T-5	1st I-F Trans. (AM)	9A2038
T-6	2nd I-F Trans. (AM-FM)	9A1999
T-7	Discriminator Coil Assembly	9A2036
T-9	Power Transformer	53X291
T-10	Output Transformer	
	(See Miscellaneous)	

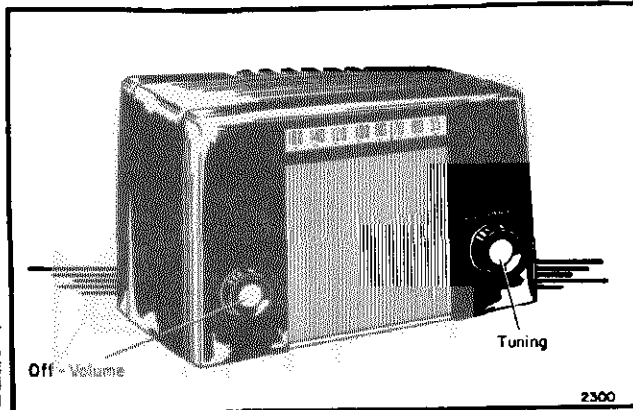
DIAL AND TUNING PARTS

Diffuser & Clamp Assembly	25A1044
consisting of:	
Diffuser Clamp	30X541
Diffuser	41X82
Rubber Grommets (mtg. Gang Cond.)	6X67
Pointer	15X236
Crystal	17X100
"C" Washer (Drive Shaft)	19X192
Condenser Cushion Stud	20X260
Drive Shaft	26X486
Drive Cord Tension Spring	28X113
Dial Clamp	30X532
Dial Glass (Brown Cabinet)	58X712
Dial Glass (Ivory Cabinet)	58X713
Dial Bracket Assembly	S-25X28
consisting of:	
Rivet	20X1580
Dial Bracket	25X1606

MISCELLANEOUS

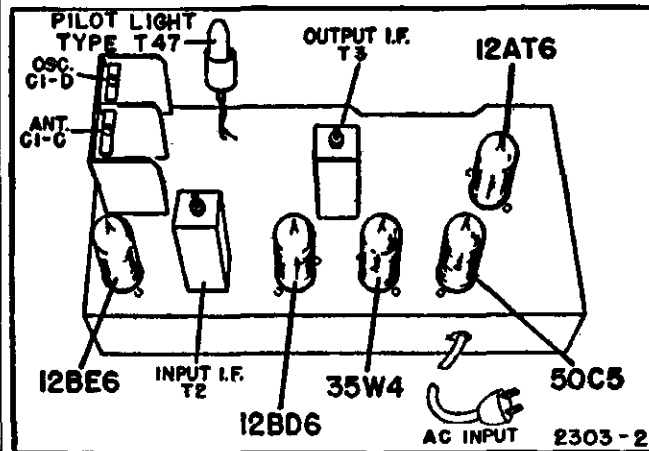
Band Change Switch	2A375
Tube Socket, Molded (Octal)	3A303
Phono Socket (Single Pin)	3A305
Tube Socket (Miniature)	3A426
Tube Socket (AM-FM Converter)	3A443
No. 47 Pilot Light	7A103
Pilot Light Socket Assembly	7A216
Knob (Tuning)	10A699
Knob (Off-Volume)	10A700
Knob (Tone)	10A701
Knob (FM-BC-PH)	10A702
Knob (Tuning)	10A703
Knob (Off-Volume)	10A704
Knob (Tone)	10A705
Knob (FM-BC-PH)	10A706
Speaker, 5" P.M. with Output Transformer	12A493
Drive Cord Assembly	10X68
Line Cord & Plug Assembly	13X546
Line Cord Clamp	30X547
Grille Cloth (Ivory Cabinet)	14X444
Grille Cloth (Brown Cabinet)	14X445
Speaker Baffle	14X463
Cabinet (Ivory)	55X338
Cabinet (Brown)	55X339

MODEL 94RA2-43-8230A

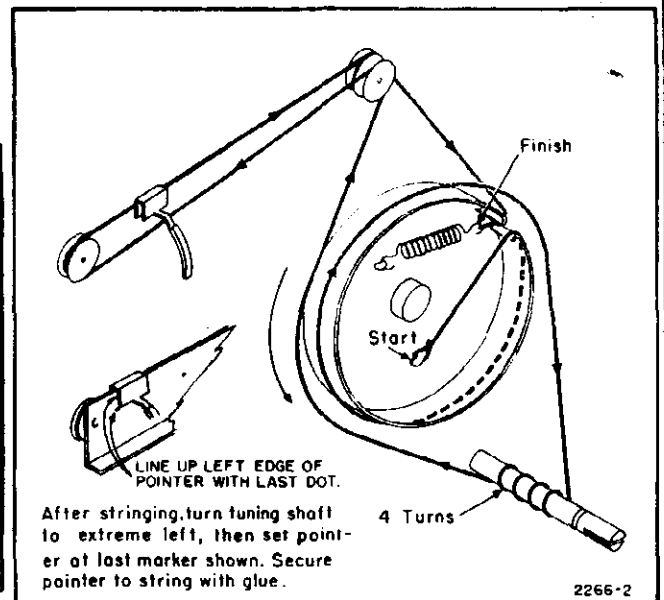


SERVICE DATA

POWER SUPPLY.....105 to 125 volts, DC or 50-60 cycle AC, 24 watts.
 FREQUENCY RANGE.....535 to 1620 Kc.
 INTERMEDIATE FREQ.....455 Kc.
 SELECTIVITY.....At 1000 Kc., 60 Kc. at 1000 x signal.
 SENSITIVITY.....150 u. v. per meter.
 POWER OUTPUT.....0.8 watt undistorted, 1.0 watt max.
 LOUD SPEAKER.....4" round PM., v. c. impedance 3.2 ohms.
 TUBE COMPLEMENT.....
 12BE6, Converter.
 12BD6, IF Amplifier.
 12AT6, Detector, AVC, Audio.
 50C5, Output Amplifier.
 35W4, Rectifier.



Chassis View



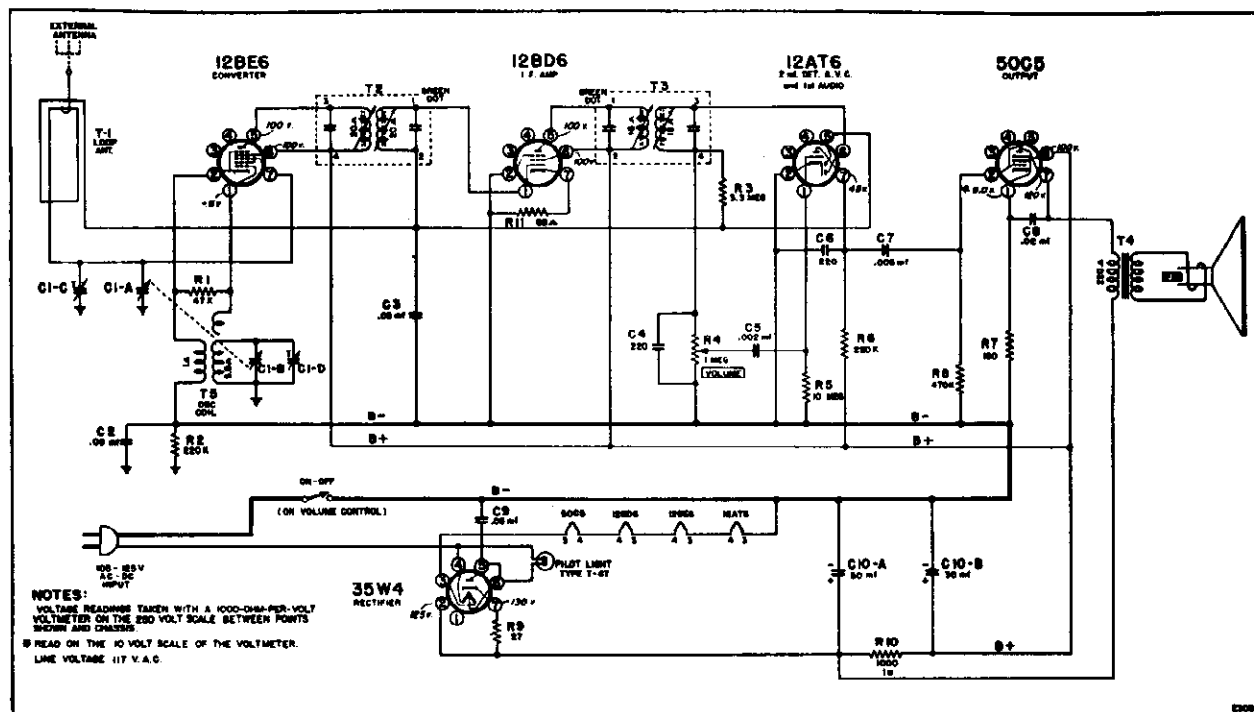
Dial Stringing Diagram

ALIGNMENT PROCEDURE

SIGNAL GENERATOR				TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT	INPUT FOR 50 MILLIWATT OUTPUT
Frequency	Coupling Capacitor	Connection to Radio	Ground Connection			
455 kc.	.1 mf.	12BE6, Pin 7	HEAVY BUSS LEAD ACROSS CENTER OF CHASSIS	Capacitor full open (plates out of mesh)	Top and bottom Cores in output and input I.F. cans	65 microvolts
1620 kc.	.1 mf.	12BE6, Pin 7		Capacitor full open (plates out of mesh)	Oscillator trimmer CI-D on gang	70 microvolts
535 kc.	.1 mf.	12BE6, Pin 7		Capacitor fully closed	Check for adequate range	70 microvolts
1400 kc.	—	Lay Generator lead near back of cabinet		Tune in 1400 kc. signal	Antenna trimmer CI-C on gang	200 to 400 microvolts
400 cycles	.1 mf.	12AT6, Pin 1		—	—	.06 volts

MODEL 94RA2-43-8230A

SCHEMATIC DIAGRAM WITH VOLTAGES

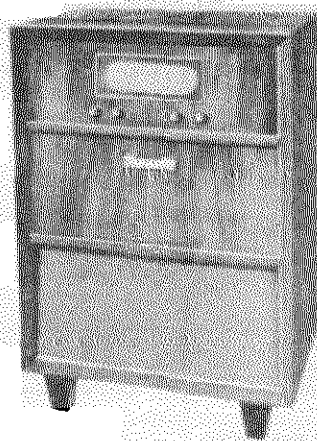


NOTE: In some sets capacitor C-2 is .18 mfd

REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Qty. Used In Set	Ref. No.	Part No.	Description	Qty. Used In Set
Condensers				Dial Parts			
C1A, B	B-8A-17377	Gang tuning condenser	1	A-3A-18612	Tuning shaft	1	
C1C, D		Trimmers on gang	2	A-40A-17591	Bushing	1	
C2	C-8D-11251	.09 mf, 400 volts, paper	1	B-29E-17592	Spring washer	1	
C3	C-8D-10770	.05 mmf, 200 volts, paper	1	A-43D-16401	Spring clip	1	
C4, C6	A-201-14397	{ .002 mf, } audio coupling strip	1	B-29C-10630	"C" washer	1	
C5				A-2M-18612	Dial cross bar	1	
C7		{ .005 mf }		A-2D-17584	Support bracket	1	
C8	C-8D-10774	.02 mf, 400 volts, paper	1	B-27A-11039	Shoulder rivet	2	
C9	C-8-J-16081	.047 mf, molded, paper, 400 v.	1	A-6E-11492	Pulley	3	
C10A, B	A-8C-17391	50-30 mf x 150 volts, lytic	1	A-53A-10989	Dial string (approx. 40" req.)	yd.	1
Resistors				A-49A-10078	Tension spring	1	
R1	C-9B1-82	47K ohms, 1/2 watt, 10%	1	A-2G-18615	Dial pointer	1	
R2, 6	C-9B1-27	220K ohms, 1/2 watt, 20%	2	B-6D-16383	Dial scale	1	
R3	C-9B1-34	3.3 megohms, 1/2 watt, 20%	1	A-43D-17611	Dial mounting clip	2	
R4	A-10A-18650	1 megohm, volume control and switch	1	A-47A-18613	Pilot light assembly	1	
R5	C-9B1-37	10 megohms, 1/2 watt, 20%	1	A-46A-10793	Pilot light bulb	1	
R7	C-9B1-52	150 ohms, 1/2 watt, 10%	1	Miscellaneous			
R8	C-9B1-29	470K ohms, 1/2 watt, 20%	1	A-2M-17580	I.F. mounting clip	2	
R9	C-9B1-43	27 ohms, 1/2 watt, 10%	1	A-15C-16007	7-pin, miniature socket	5	
R10	C-9B2-62	1000 ohms, 1 watt, 10%	1	B-14M-11088-1	AC line cord	1	
R11	C-9B1-48	68 ohms, 1/2 watt, 20%	1	R-5C-16147-75	Cabinet, bakelite	1	
Transformers and Coils				B-29A-2164	Steel chassis mounting washer	2	
T1	C-13E-18653	Loop antenna	1	134-103	Rubber chassis mtg. washer	2	
T2	B-13B-17397	Input I.F. transformer	1	42A-10097	Chassis mounting screw	2	
T3	B-13B-17399	Output I.F. transformer	1	B-5B-18657-58	Knob	2	
T4	B-12C-17595	Audio output transformer	1	B-23J-18651	Cardboard speaker baffle	1	

MODELS 05RA1-437755A,
05RA1-43-7755B



GENERAL DESCRIPTION

This radio is an 8 tube (including rectifier tube) AC receiver with automatic record changer, designed for reception of stations in the standard broadcast band between 540 and 1600 kilocycles and FM (Frequency Modulation) stations in the FM Band of 88-108 megacycles. Controls are provided on the front panel for tuning, tone, volume and band or phono selection. Special features include two built-in antennas, a grounded grid R-F amplifier stage on the FM Band, automatic volume control, compensator circuits to prevent oscillator drift, beam power output stage, permanent magnet dynamic speaker and an electrostatic shield in the power transformer to reduce power line noise.

Tube and Dial Lamp Complement

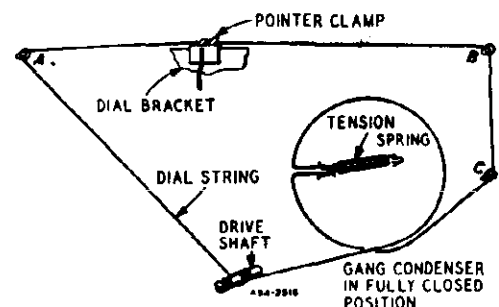
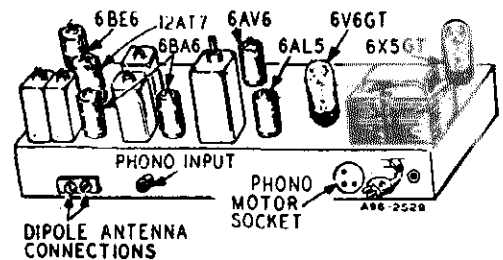
- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps

DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.

ELECTRICAL SPECIFICATIONS

- Power Consumption
 - 117 volts AC—60 cycles 40 Watts
 - 60 watts phono operating
- Power Output —
 - 1.5 watts maximum
 - .8 watts 10% distortion
- Speaker—8" PM dynamic
- Frequency Ranges —
 - Broadcast 540-1600 KC
 - Frequency modulation 88-108 MC
- Intermediate Frequency —
 - AM 455 KC — FM 10.7 MC
- Selectivity — AM — 45 KC broad at 1000 times signal, measured at 1000 KC
- I.F. FM—200 KC broad at 2 times down
- I.F. FM — 950 KC broad at 200 times down
- AM Sensitivity—(For .5 watt output with external antenna)
 - 25 microvolts average
- FM Sensitivity—(For .5 watt output)
 - 25 microvolts average



MODELS 05RA1-43-7755A,
05RA1-43-7755B

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I-F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I-F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I-F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Lead	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	Maximum Deflection

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.

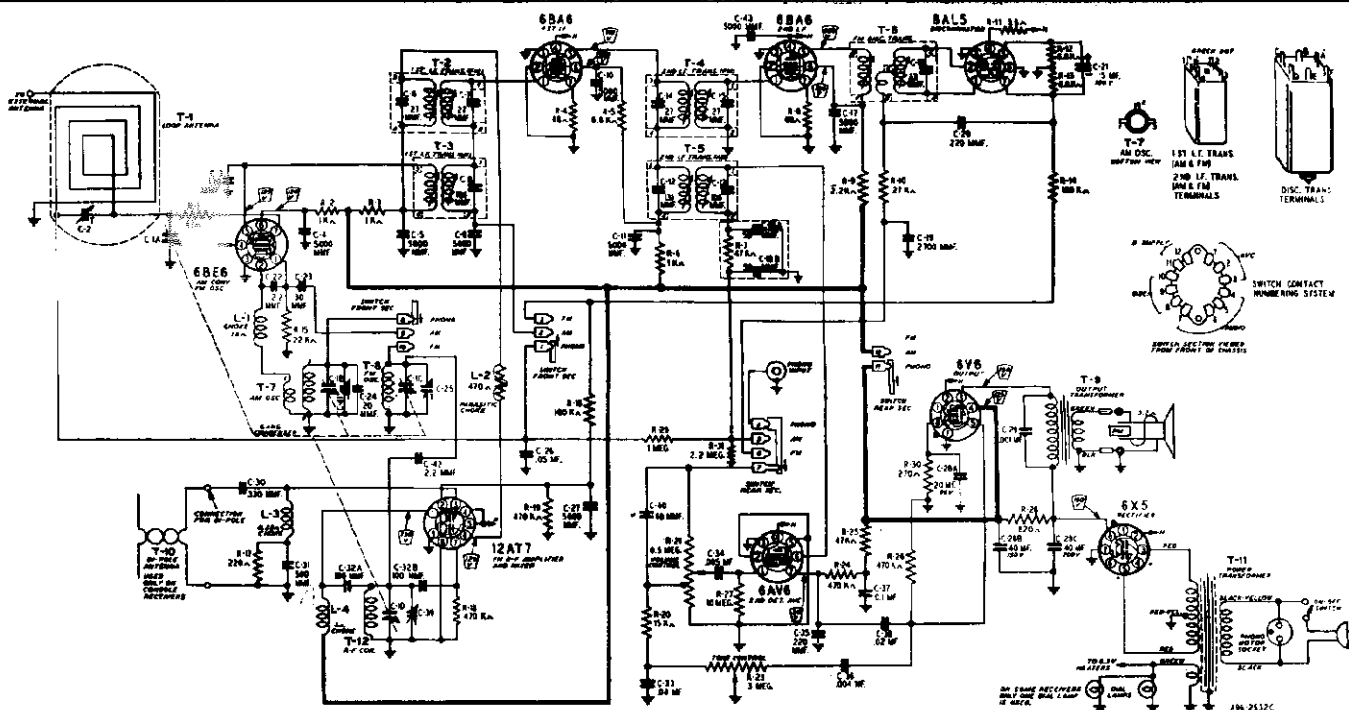
Note output voltage on the zero center DC vacuum tube voltmeter

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

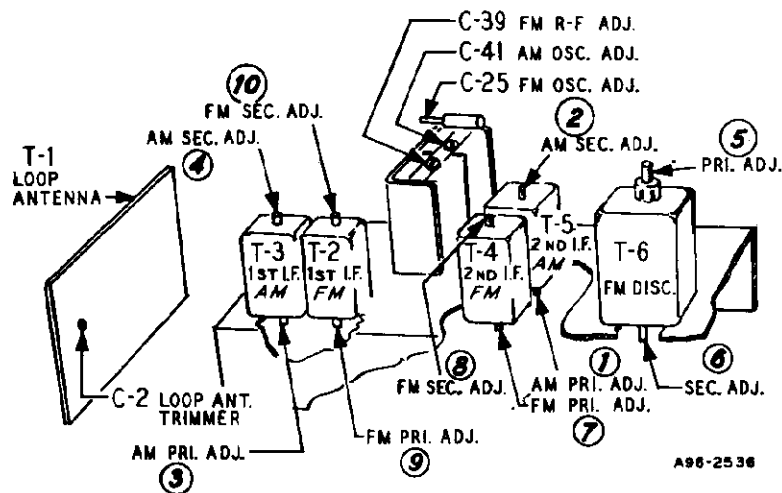
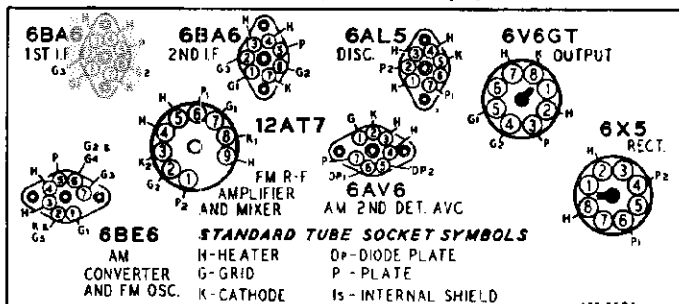
NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust Input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage117 Volts AC
Signal InputNone
A Variation of $\pm 10\%$ is usually permissible.



A98-2538

MODELS 05RA1-43-7755A,
05RA1-43-7755B**REPLACEMENT PARTS LIST**

Ref. No.	DESCRIPTION	Part No.
----------	-------------	----------

CAPACITORS

C-1	Gang Condenser Assembly	14A209
C-2	Capacitor, Trimmer; 2-24 mmf	17A256
C-3	Capacitor, Ceramic; 130 mmf	47X559
C-4		
C-5		
C-9		
C-10		
C-11	Capacitor, Ceramic; 5000 mmf	47X507
C-17		
C-27		
C-43		
C-6	Part of T-2 (1st I-F Trans. F.M.)	
C-7		
C-8	Part of T-3 (1st I-F Trans. AM)	
C-12		
C-13	Part of T-5 (2nd I-F Trans. AM)	
C-14		
C-15	Part of T-4 (2nd I-F Trans. FM)	
C-16A		
C-16B	Capacitor, Dual Mica; 50-50 mmf	47X112
C-18	Part of T-6 (Discriminator Trans.)	
C-19	Capacitor, Molded Mica; 2700 mmf	47X492
C-20		
C-35	Capacitor, Ceramic; 220 mmf	47X468
C-21	Capacitor, Dry Electrolytic; 5 mf 100 V	45X361
C-22		
C-42	Capacitor, Ceramic; 2.2 mmf	47X557
C-23	Capacitor, Ceramic; 30 mmf	47X558
C-24	Capacitor, Ceramic; 20 mmf	47X516
C-25	Capacitor, Trimmer; 1-8 mmf	17A255
C-26	Capacitor, Tubular; .05 mf 200 V	B66503
C-28A	20 mf 20 V	
C-28B	Capacitor; Dry Electrolytic; 40 mf 150 V	45X360
C-28C	40 mf 200 V	
C-29	Capacitor, Tubular; .001 mf 800 V	H66102
C-30	Capacitor, Molded Mica; 330 mmf	47X470
C-31	Capacitor, Ceramic; 500 mmf	47X508
C-32A		
C-32B	Capacitor, Dual Ceramic; 100 mmf	76X4
C-33	Capacitor, Tubular; .04 mf 200 V	B66403
C-34	Capacitor, Tubular; .005 mf 400 V	D66502
C-36	Capacitor, Tubular; .004 mf 200 V	B66402
C-37	Capacitor, Tubular; .1 mf 400 V	D66104
C-38	Capacitor, Tubular; .02 mf 400 V	D66203
C-39		
C-41	Part of C-1 (Gang Condenser)	
C-40	Capacitor, Ceramic; 68 mmf	47X471

RESISTORS

R-1	Resistor, Carbon; 47 ohms 0.5 W	B85470
R-2		
R-3	Resistor, Carbon; 1000 ohms 0.5 W	B85102
R-6		
R-4		
R-8	Resistor, Carbon; 68 ohms 0.5 W	B84680
R-5		
R-12	Resistor, Carbon; 6800 ohms 0.5 W	B84682
R-13		
R-7		
R-25	Resistor, Carbon; 47 K ohms 0.5 W	B85473
R-9	Resistor, Carbon; 2200 ohms 0.5 W	B85222
R-10	Resistor, Carbon; 27 K ohms 0.5 W	B85273
R-11	Resistor, Wirewound; 3.6 ohms 0.5 W	43X233
R-14		
R-16	Resistor, Carbon; 100 K ohms 0.5 W	B85104
R-15	Resistor, Carbon; 22 K ohms 0.5 W	B85223
R-17	Resistor, Carbon; 220 ohms 0.5 W	B84221

Ref. No.	DESCRIPTION	Part No.
----------	-------------	----------

R-18		
R-19	Resistor, Carbon; 470 K ohms 0.5 W	B85474
R-24		
R-26		
R-20	Resistor, Carbon; 15 K ohms 0.5 W	B85153
R-21	Volume Control & Switch; .5 megohm	36X372
R-23	Tone Control; 3 megohms	40X285
R-27	Resistor, Carbon; 10 megohms 0.5 W	B85106
R-28	Resistor, Carbon; 820 ohms 2.0 W	D84821
R-29	Resistor, Carbon; 1 megohm 0.5 W	B85105
R-30	Resistor, Carbon; 270 ohms 0.5 W	B84271
R-31	Resistor, Carbon; 2.2 megohms 0.5 W	B85225

TRANSFORMERS AND COILS

L-1	Choke, Insulated	35A5
L-2	Choke, Parasitic	9A2103
L-3	Choke, Insulated	35A9
L-4	Choke, Insulated	35A8
T-1	"B" Range Loop Antenna	9A2099
T-2	1st I-F Trans. (FM)	9A2060
T-3	1st I-F Trans. (AM)	9A2062
T-4	2nd I-F Trans. (FM)	9A2061
T-5	2nd I-F Trans. (AM)	9A2063
T-6	Discriminator Transformer	9A2064
T-7	Oscillator Coil (AM)	9A2065
T-8	Oscillator Coil (FM)	9A2067
T-9	Output Transformer	51X134
T-10	Dipole Antenna	9A2003
T-11	Power Transformer	53X291
T-12	Antenna Coil (FM)	9A2066

DIAL AND TUNING PARTS

No. 47 Pilot Light	7A103
Pilot Light Socket Assembly	7A199
Escutcheon	4X1060
Rubber Grammets (mtg. Gang Cond.)	6X66
Drive Card Assembly	10X72
Pointer	15X251
"C" Washer (Drive Shaft)	19X192
Condenser Cushion Stud	20X260
Drive Shaft	26X486
Drive Card Tension Spring	28X113
Spring (Dial Glass)	28X564
Dial Glass	58X732

MISCELLANEOUS

Band Change Switch	2A393
Phono Motor Socket	3A304
Phono Socket (Single Pin)	3A305
Tube Socket (1st 6BA6)	3A426
Tube Socket (6BE6)	3A427
Tube Socket, Molded (Octal)	3A435
Tube Socket (Miniature)	3A439
Tube Socket (12AT7)	3A443
Knob (Tuning)	10A699
Knob (Off-Volume)	10A700
Knob (Tone)	10A701
Knob (FM-BC-PH)	10A702
Speaker, 8" P.M.	12A477
Record changer—3 speed	28A166
Line Cord & Plug Assembly	13X546
Line Cord Clamp	30X560

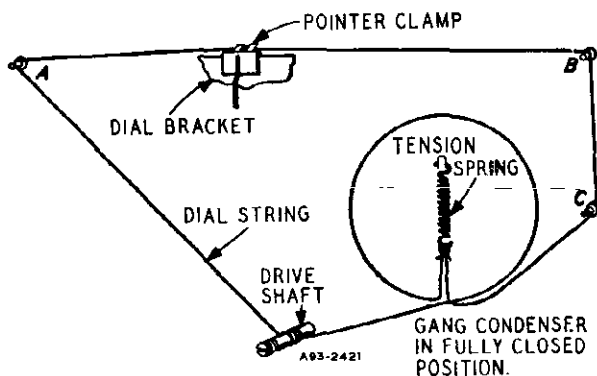


ELECTRICAL SPECIFICATIONS

Power Supply	105-125 volts AC 60 cycles, 80 watts, 100 watts with record changer
Frequency Ranges	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency	AM-455 KC FM-10.7 MC
Selectivity	AM-43 KC broad at 1000 times signal, measured at 1000 KC I.F. FM-200 KC broad at 2 times down I.F. FM-760 KC broad at 200 times down
AM Sensitivity	(For .5 watt output with external antenna) 10 microvolts average
FM Sensitivity	(For .5 watt output) 30 microvolts average
Power Output	8.5 watts maximum 6.0 watts 10% distortion
Loud Speaker	12" PM Dynamic
Voice Coil Impedance	3.2 ohms 400 cycles

DRIVE CORD REPLACEMENT

Use a new 10X38 drive cord assembly or a new length of cord 46 inches long for the installation, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation, rotate the drive shaft a few turns to take up the slack in the cord.



Tube and Dial Lamp Complement	1 6BA6 AM-FM R-F Amplifier
	1 12AT7 FM & AM Osc. & Mixer
	1 6BA6 FM-AM 1st I-F Amplifier
	1 6BA6 FM 2nd I-F Amplifier
	1 6AL5 FM Detector
	1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
	2 6K6-GT Audio Output
	1 5Y3-GT Rectifier
	1 6AV6 Phase Inverter
	2 No. 47 Dial Lamps

MODEL 05RA1-43-7901A

ALIGNMENT PROCEDURE

AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately
Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
—.1 mf, 200 mmf.

Volume Control—Maximum all Adjustments
Connect Radio Chassis to Ground Post of Signal Generator with a
Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several
Minutes.

SIGNAL GENERATOR		CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
I-F	455 kc	12AT7 Pin 7 and Chassis	.1 mf	Broadcast	Rotor Fully Open	2nd I-F Pri. & Sec. ① & ② 1st I-F Pri. & Sec. ③ & ④	Maximum Output
Broadcast	1620 kc	External ant. term.	200 mmf	Broadcast	Rotor Fully Open	Broadcast Oscillator C-33	
	1400 kc	External ant. term.	200 mmf	Broadcast	Turn Rotor to Max. Output Set pointer to	Broadcast Interstage C-29	
	1400 kc	External ant. term.	200 mmf	Broadcast	1400 kc See Note A	Loop Antenna C-48	

Note A—If the pointer is not at 1400 KC on dial, reset pointer at the 1400 KC mark on the dial scale.

FM STAGES

The following equipment is required for aligning:
An accurately calibrated signal generator providing unmodulated
signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor—.01 mf, 300 ohms
and 1000 ohms.

Zero center scale DC vacuum tube voltmeter having a range of
approximately 3 volts.
(If a zero center scale meter is not available, a standard scale
vacuum tube voltmeter may be used by reversing the meter connec-
tions for negative readings.)
Allow chassis and signal generator to warm up for several minutes.

SIGNAL GENERATOR		CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
Discrim- inator	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. ⑤ Note A	Maximum Deflection
	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. ⑥ Note C	Zero Center
I-F	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	2nd I-F Pri. Note A and D ⑦ 2nd I-F Sec. Note A and E ⑧	Maximum Deflection
Discrim- inator	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. ⑤ Note A	Maximum Deflection
	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. ⑥ Note C	Zero Center
	10.7 MC Note F	FM-RF Gang Condenser terminal	.01 mf	FM	Rotor Fully Open	1st I-F Pri. ⑨ 1st I-F Sec. ⑩ Notes A, D & E	Maximum Deflection

Recheck I-F Adjustments in order given

R-F & Osc.	108.4 Note H	Disconnect dipole and connect generator to di- pole terminals with re- sistor in series	300 ohms	FM	Rotor Fully Open	Oscillator C-35 Note G	Maximum Deflection
	104.5	Disconnect dipole and connect generator to di- pole terminals with re- sistor in series	300 ohms	FM	Tune Rotor for Max. AVC voltage	FM Interstage C-32	Maximum Deflection
	104.5	Disconnect dipole and connect generator to di- pole terminals with re- sistor in series	300 ohms	FM	Tune Rotor for Max. AVC voltage	Ant. C-47	Maximum Deflection

Recheck R-F and Osc. Adjustments in order given

NOTE A—Test Equipment connections are as given in the table. The
zero center scale DC vacuum tube voltmeter is to be
connected between chassis ground and the AVC line at the
junction of resistor R-22 and condenser C-18 for all ad-
justments except the discriminator secondary adjustment, for
which See Note C.

NOTE B—A signal of .1 volt must be fed into the receiver for this
adjustment.

NOTE C—Disconnect zero center DC vacuum tube voltmeter from
AVC and connect to junction of R-18 and C-62. Adjust
for zero voltage indication.

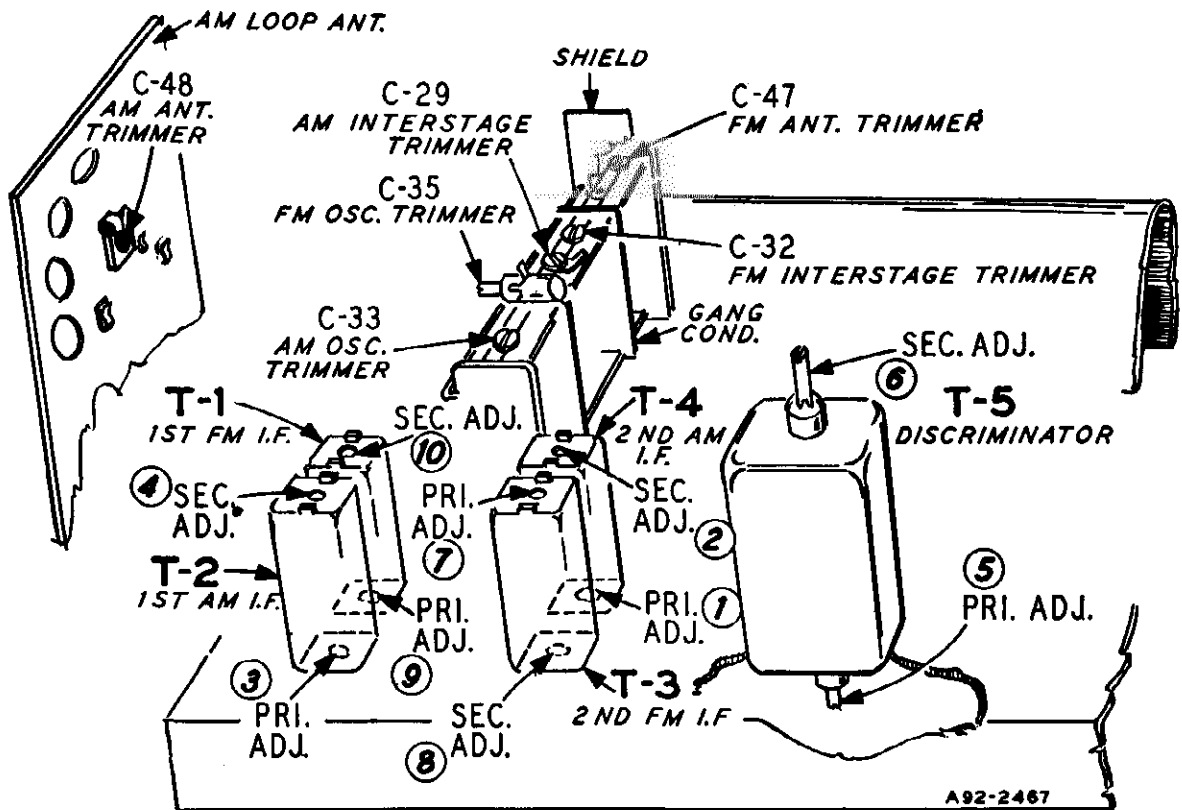
NOTE D—Before adjusting Pri. core connect 1000 ohm load resistor
across the 2nd I.F. secondary terminals. Input may have
to be increased to .1 volt if receiver is badly mis-aligned.

NOTE E—Disconnect 1000 ohm load resistor from secondary ter-
minals and connect across the 2nd I.F. primary terminals.
Input may have to be increased to .1 volt if receiver is
badly mis-aligned.

NOTE F—Input can be reduced to 10,000 microvolts.

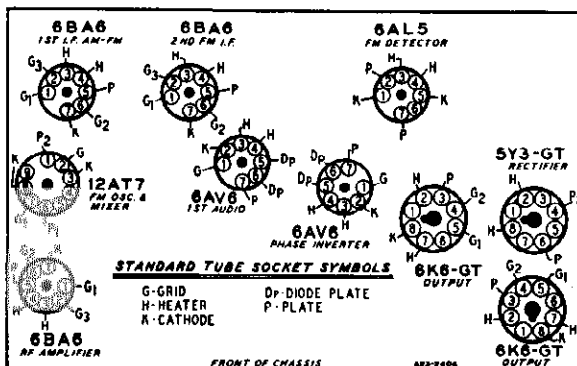
NOTE G—Oscillator frequency above signal frequency.

NOTE H—Remove the 1000 ohm load resistor before attempting to
check the R-F and oscillator adjustments.



NOTE—T-5 discriminator transformers with Part No. 9A1970 stamped on the can must be aligned as outlined in this service manual.

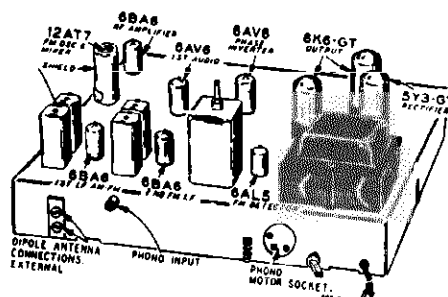
Discriminator transformers with Part No. 9A2064 stamped on the can have the primary adjustment at the top and the secondary adjustment at the bottom.

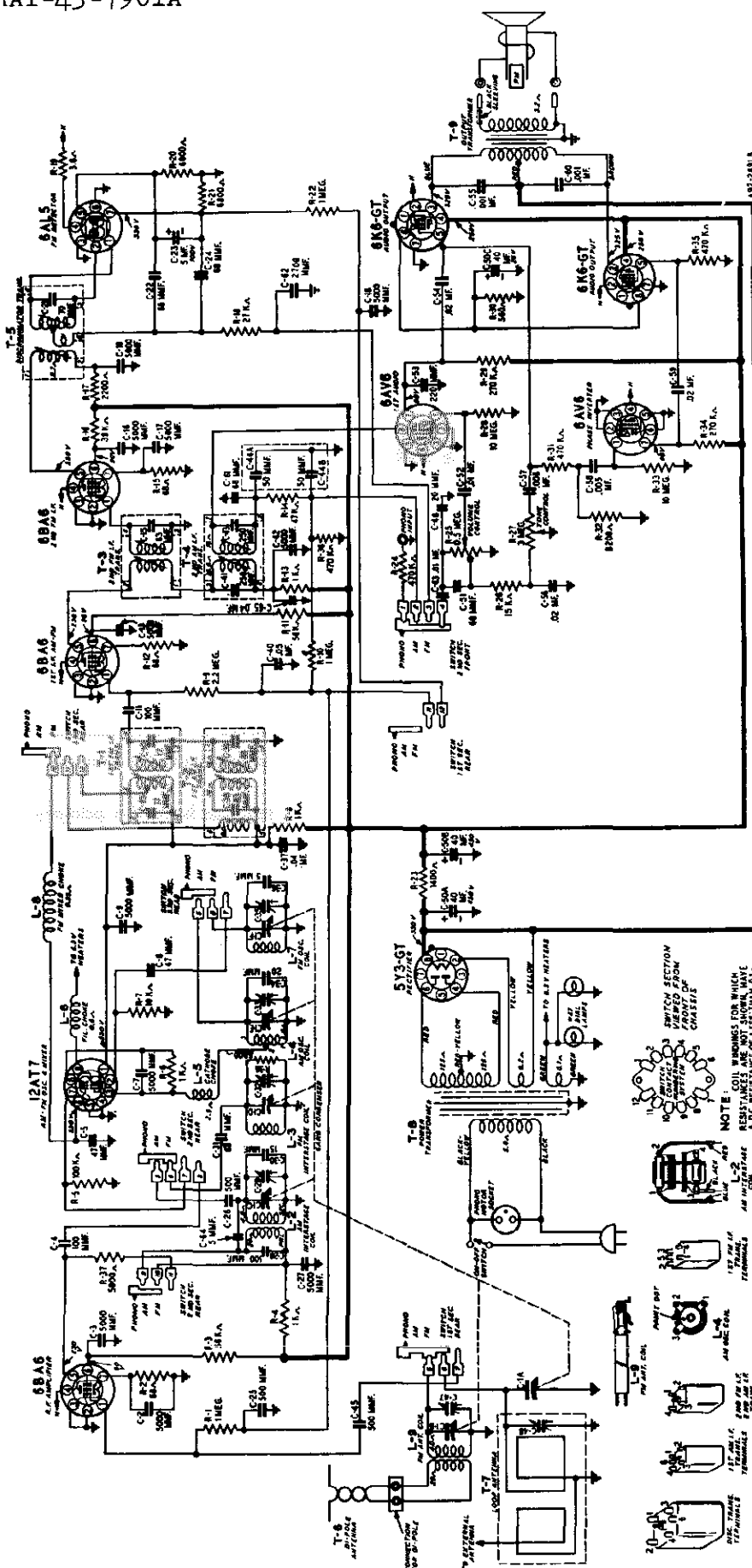


TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage 117 Volts AC
Signal Input None
A variation of $\pm 10\%$ is usually permissible.





REPLACEMENT PARTS LIST

When ordering parts, specify part number, model number and any other pertinent information

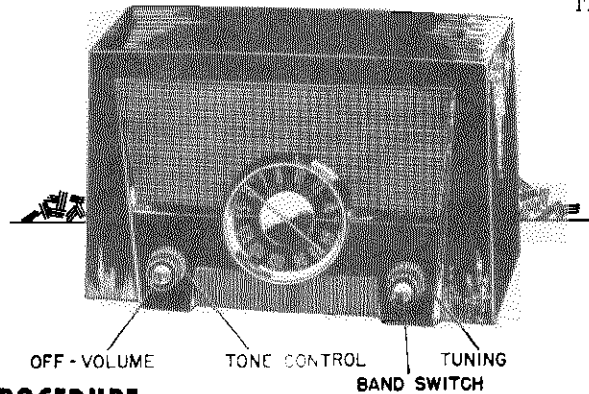
Ref. No.	DESCRIPTION	Part No.	Ref. No.	DESCRIPTION	Part No.
CAPACITORS					
C-1	Gang Condenser and Pulley	14A207	C-52	Capacitor, Tubular, .01 mf 600 V.	F66103
C-2 }			C-53	Capacitor, Ceramic, 220 mmf \pm 20%	47X468
C-3 }			C-54 }	Capacitor, Tubular, .02 mf 600 V	F66203
C-7 }			C-55 }	Capacitor, Tubular, .001 mf 600 V	F66102
C-9 }			C-60 }	Capacitor, Tubular, .02 mf 200 V	B66203
C-13 }			C-57	Capacitor, Tubular, .006 mf 600 V	F66602
C-16 }	Capacitor, Silvered Mica, 5000 mmf	47X507	C-58	Capacitor, Tubular, .005 mf 200 V	B66502
C-17 }			C-61	Capacitor, Ceramic, 68 mmf \pm 20%	47X471
C-18 }			C-62	Capacitor, Molded Mica, 2700 mmf \pm 10% ..	47X492
C-19 }			C-63	Capacitor, Tubular, .01 mf 120 V	46X328
C-27 }			RESISTORS		
C-42 }			R-1 }	Resistor, Carbon 1 Megohm .5 W.	B85105
C-4	Capacitor, Ceramic, 100 mmf \pm 20%	47X497	R-10 }		
C-5	Capacitor, Ceramic, 47 mmf \pm 5%	47X499	R-22 }		
C-8	Capacitor, Ceramic 47 mmf \pm 10%	47X498	R-2 }	Resistor, Carbon 68 Ohms .5 W.	B83680
C-10 }	Part of T-1		R-12 }		
C-65 }			R-15 }	Resistor, Carbon 56K Ohms .5 W.	B84563
C-11 }	Capacitor, Ceramic, 100 mmf \pm 10%	47X550	R-3 }		
C-28 }			R-11 }	Resistor, Carbon 1000 Ohms .5 W.	B84102
C-15	Part of T-3		R-4 }		
C-21	Part of T-5		R-6 }		
C-22 }			R-8 }		
C-24 }	Capacitor, Ceramic, 68 mmf \pm 10%	47X501	R-13 }		
C-31 }			R-5	Resistor, Carbon 100K Ohms .5W.	B85104
C-51 }			R-7	Resistor, Carbon 10K Ohms .5 W.	B84103
C-23	Capacitor, Dry Electrolytic, 5 mf 100 V	45X361	R-9	Resistor, Carbon 2.2 Megohm .5 W.	B85225
C-25 }			R-14	Resistor, Carbon 47K Ohms .5 W.	B85473
C-45 }	Capacitor, Ceramic, 500 mmf \pm 20%	47X496	R-16	Resistor, Carbon 39K Ohms 1.0 W	C84393
C-26	Capacitor, Ceramic, 5 mmf	47X549	R-17	Resistor, Carbon 2200 Ohms .5 W.	B85222
C-29 }			R-18	Resistor, Carbon 27K Ohms .5 W.	B84273
C-32 }			R-19	Resistor, Wire Wound 3.6 Ohms .5 W.	43X233
C-33 }	Part of C-1		R-20 }		
C-47 }			R-21 }	Resistor, Carbon 6800 Ohms .5 W.	B83682
C-30	Capacitor, Ceramic, 15 mmf \pm 10%	47X552	R-23	Resistor, Wire Wound 1400 Ohms 5.0 W.	43X242
C-34 }			R-25	Volume Control & Switch .5 meg.	36X379
C-46 }	Capacitor, Ceramic 20 mmf \pm 10%	47X516	R-26	Resistor, Carbon 15K Ohms .5 W.	B85153
C-35	Capacitor, Trimmer, 1-8 mmf	26A489	R-27	Tone Control 3 meg.	40X288
C-36 }			R-28 }		
C-64 }	Capacitor, Ceramic, 5 mmf \pm 10%	47X549	R-33 }	Resistor, Carbon 10 Megohm .5 W.	B85106
C-37 }			R-29 }		
C-65 }	Capacitor, Tubular, .04 mf 600 V	F66403	R-34 }	Resistor, Carbon 270K Ohms .5 W.	B85274
C-38 }			R-30	Resistor, Carbon 560 Ohms 2.0 W.	D83561
C-39 }	Part of T-2		R-31 }		
C-40	Capacitor, Tubular, .05 mf 200 V	B66503	R-35 }	Resistor, Carbon, 470 K Ohms .5 W	B85474
C-41 }			R-38 }		
C-43 }	Part of T-4				
C-44A }					
C-44B }	Capacitor, Dual Mica, 50-50 mmf.	47X112			
C-48	Part of T-7				
C-50A }	Capacitor, 3 section	40 mf 450 V.			
C-50B }	Electrolytic	40 mf 450 V.			
C-50C }		40 mf 25 V.			
		45X374			

MODEL 05RA1-43-7901A

REPLACEMENT PARTS LIST (continued)*When ordering parts, specify part number, model number and any other pertinent information*

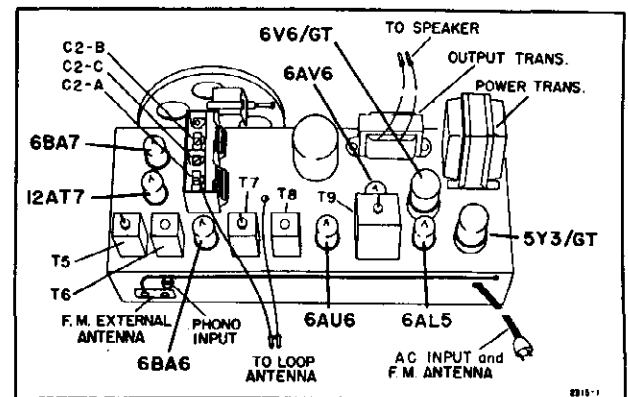
Ref. No.	DESCRIPTION	Part No.
R-32	Resistor, Carbon 8200 Ohms .5 W.	B84822
R-36	Resistor, Carbon 6800 Ohms .5 W.	B84682
R-37	Resistor, Carbon 5600 Ohms .5 W.	B84562
COILS AND TRANSFORMERS		
L-2	Coil, Interstage (AM)	9A2025
L-3	Coil, Interstage (FM)	9A2024
L-4	Coil, Oscillator (AM)	9A2022
L-5	Choke, Insulated	35A5
L-6	Choke, Filament	9A1881
L-7	Coil, Oscillator (FM)	9A2023
L-8	Choke (FM Mixer Plate)	35A7
L-9	Coil, Antenna (FM)	9A2027
T-1	1st I.F. Coil Assembly (FM)	9A2043
T-2	1st I.F. Coil Assembly (AM)	9A2029
T-3	2nd I.F. Coil Assembly (FM)	9A2030
T-4	2nd I.F. Coil Assembly (AM)	9A2042
T-5	Discriminator Coil Assembly	9A2064
T-6	Dipole Antenna Assembly	9A2004
T-7	"B" Range Loop Antenna Assembly	9A1972
T-8	Power Transformer	53X286
T-9	Output Transformer	51X142
DIAL AND TUNING PARTS		
Escutcheon		4X1073
Rubber Grommets		6X67
Condenser Mtg. Bracket	Mtg. Gang Condenser	25X1630
Drive Cord Assembly		10X38
Pointer		15X251
"C" Washer (Drive Shaft)		19X192
Drive Shaft		26X509
Drive Cord Tension Spring		28X113

Ref. No.	DESCRIPTION	Part No.
Dial Bracket Assembly		S-25X31
Consisting of:		
Tubular Rivet		20X1564
Shoulder Rivet		20X1580
Shoulder Rivet		20X1581
Eyelet		20X1508
Dial Bracket		25X1610
Support bracket, L. H.		25X1611
Support Bracket, R. H.		25X1612
Dial Assembly		S-58X41
Consisting of:		
Dial Bracket Assembly		S-25X31
Rubber Strip		8X195
Trimount Stud		28X56
Spring		28X564
Light Shield		41X86
Dial Glass		58X716
MISCELLANEOUS		
Band Change Switch		2A404
Phono Motor Socket		3A304
Phono Socket (Single Pin)		3A305
Molded Octal Tube Socket		3A435
Tube Socket (miniature, for AM-FM Converter)		3A436
Tube Socket (Miniature)		3A439
No. 47 Pilot Light		7A103
Pilot Light Socket Assembly		7A215
Knobs		10A767
12" P.M. Speaker		12A502
Record Changer		28A171
Line Cord & Plug Assembly		13X546
Tube Shield (AM-FM Converter)		32X388
Tube Shield (Miniature)		32X390

**ALIGNMENT PROCEDURE***Broadcast Band Section I. F. and R. F.*

The alignment procedure below includes the sensitivities at the inputs of various stages. All signal input values are based on an output of 500 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2-ohm resistor across the secondary winding of the output transformer. A reading of 1.27 volts AC across this resistor will be approximately equivalent to 500 milliwatt output with the speaker connected. The volume control must be set at maximum. The tone control must be set for maximum treble.

The signal source must be an accurately calibrated signal generator capable of supplying the frequencies designated, modulated 30% with a 400-cycle audio signal. A 400 cycle audio signal is required for the audio measurement. Variations in sensitivities of plus or minus 25% are usually permissible.



Chassis View

AM—I. F. ALIGNMENT*Band Switch in AM Position, Gang Open, Dummy Antenna .1 Mfd.*

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
400 cycles. Use 65 millivolts	High Side of Volume Control and chassis	None	Maximum output Should be 500 Milliwatts
455 Kc. Use 3300 microvolts	Pin 1 of 6BA6 I.F. Amp. and chassis	Primary and Secondary of T8. See chassis view.	Maximum output Should be 500 Milliwatts
455 Kc. Use 55 microvolts	Pin 7 of 6BA7 Converter and chassis	Primary and Secondary of T6. See chassis view.	Maximum output Should be 500 Milliwatts

BROADCAST BAND—R. F. ALIGNMENT

Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of dial marker at the extreme left when gang is closed.

For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	SET POINTER AT	CONNECT TO RADIO	ADJUST
1620 Kc.	Extreme Right Calibration Marker	RADIATION COUPLING Use six turn loop across generator output. Place close to cabinet back.	Oscillator trimmer C2-B for maximum
1400 Kc.	Third Calibration from Right		Antenna Trimmer C2-A for maximum

Check tracking at 1000 Kc, 600 Kc, and 535 Kc to be sure oscillator is set correctly.

MODEL 05RA2-43-8515A

ELECTRICAL SPECIFICATIONS

Power Supply	115 volts, AC, 60-cycles; Chassis only 75 watts.	FM Sensitivity	(For .5 watt output)—12 microvolts average.
Frequency Ranges	Broadcast Band—535 to 1620 kc. FM Band—88 to 108 mc.	Power Output	2.0 watts. 10% distortion. 4.5 watts maximum.
Intermediate Freq.	AM-455 kc.; FM-10.7 mc.	Loud Speaker	5"x7" PM. Voice coil impedance 3.2 ohms, 400 cycles.
Selectivity	AM-47 kc. broad at 1000 times signal, measured at 1000 kc. I.F. FM-230 kc. broad at 2 times down. I.F. FM-470 kc. broad at 10 times down.	Tube Complement	12AT7, FM-RF amp. mixer; 6AL5, FM detector; 6BA7, AM converter, FM oscillator; 6BA7, IF amplifier; 6AU6, FM driver; 6AV6, AM detector; 6V6 output; 5Y3, rectifier.
AM Sensitivity	(For .5 watt output)—200 microvolts per meter average.		

ALIGNMENT PROCEDURE

FM Band Section I. F. and R. F.

A non-metallic alignment tool must be used.

IMPORTANT

No alignment of the FM section of this radio should be attempted unless you are positive that the circuits are in need of adjustment and you have the necessary equipment.

All components used in this radio are extremely stable and the tuned circuits should require no adjustment over a long period of time.

NOTE

The following alignment is based on the use of the new Simpson vacuum tube voltmeter which has a "floating ground". In other words, the meter, when used as a vacuum tube voltmeter, can have both the positive and negative sides connected to points above ground and still give true readings. (See note "C" below.)

A standard AM signal generator is required.

FM — I. F. ALIGNMENT

Band Switch in FM Position. Dummy Antenna .1 Mfd

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	VACUUM TUBE VOLT METER CONNECTION TO RADIO	ADJUSTMENTS TO BE MADE	ADJUST FOR
10.7 Mc. Use about .05 volt	Pin No. 1 of 6AU6	Pin No. 7 of 6AL5 and chassis	Bottom Core Primary of T9 Ratio Detector	Resonance should be about 3 volts
10.7 Mc. Use about .05 volt	Pin No. 1 of 6AU6	See note "A"	Top Core Secondary of T9 Ratio Detector	Zero. Use zero center scale See note "B"
10.7 Mc. Use about 1800 microvolts	Pin No. 1 of 6BA6	Pin No. 7 of 6AL5 and chassis	Primary and Secondary of T7. FM Driver IF See chassis view	Resonance should be about 3 volts
10.7 Mc. Use about 400 microvolts	Top end of C2-C	Pin No. 7 of 6AL5 and chassis	Primary and Secondary of T5. FM Input IF See chassis view	Resonance should be about 3 volts

NOTES ON FM — I. F. ALIGNMENT

NOTE "A"—Connect two resistors in series, 100K OHMS each, from Pin No. 7 of 6AL5 to chassis (Pin No. 5). These resistors must be matched within 5%. Connect vacuum tube voltmeter between the midpoint of the resistors and point Σ .

NOTE "B"—If T9 has been tampered with, it is possible that no crossover point will be found at first. Careful adjustment of both primary and secondary is necessary.

NOTE "C"—To use a VTVM which does not have the "floating ground" feature, in step 2 above, connect "ground" side of VTVM to midpoint of resistors (Note "A") and "high" side to point Σ .

GENERAL—Input signals should be adjusted to give approximately 3 volts. The ratio detector is operating at a reasonable level at this point and will give the truest indication of correct alignment with the procedure specified.

FM—R. F. ALIGNMENT

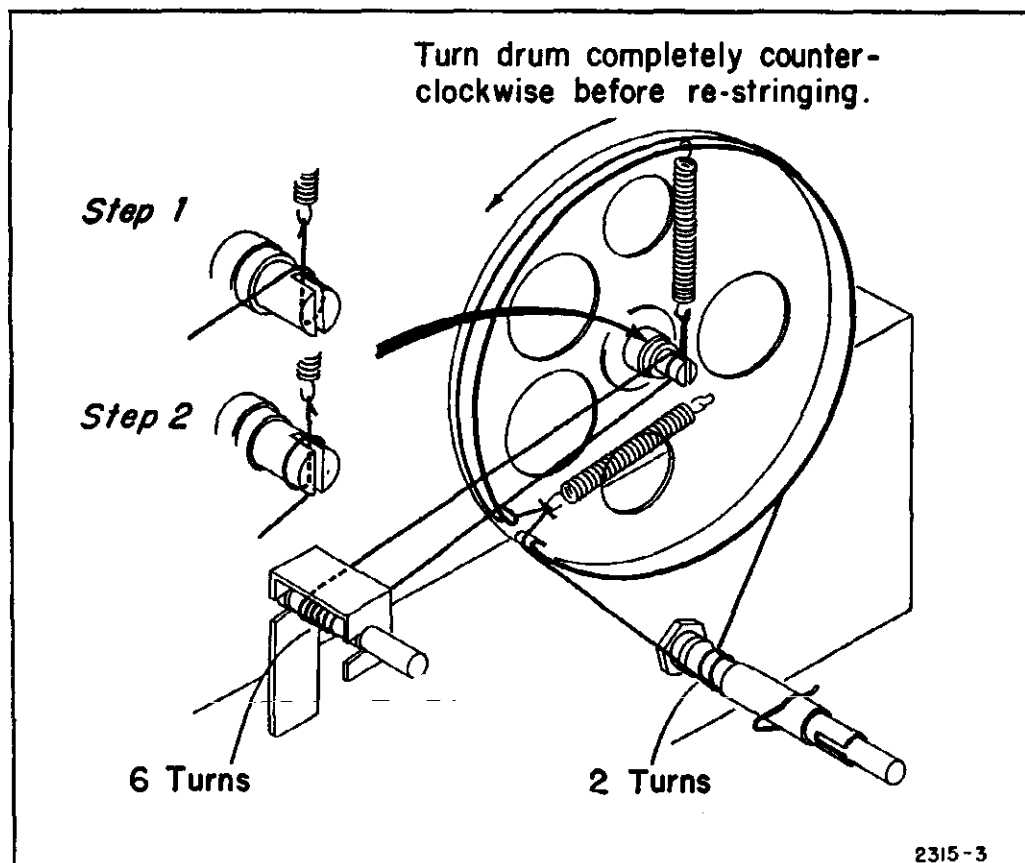
Check pointer so that the right hand edge of the pointer skirt coincides with the right hand edge of dial marker at the extreme left when gang is closed.

For adjustment, see dial mechanism illustration.

SIGNAL GENERATOR FREQUENCY	POINTER	CONNECTION TO RADIO	ADJUST	V T V M CONNECTIONS
108 mc.	108 mc. Marker	FM antenna terminals	FM Osc. C3 for maximum	Pin No. 7 of 6AL5 to chassis.
98 mc.	Tune in Gen. Signal	See Note "B" below	FM Mixer C2-C for maximum	

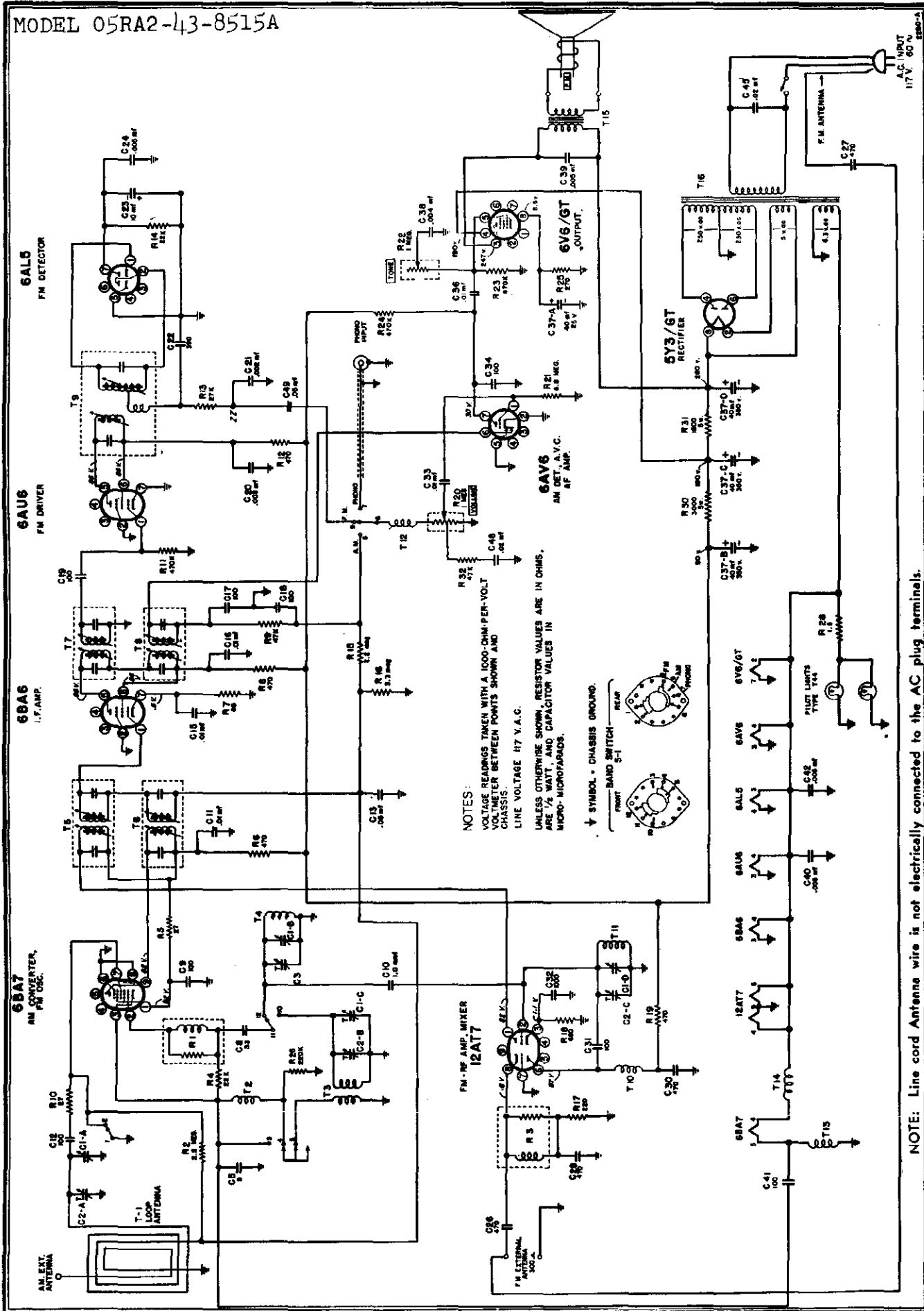
NOTE "A"—If a signal generator with the above fundamental frequency is not available, it is sometimes possible to use harmonics. An alternate procedure is to use a local station carrier of known frequency to align the FM Band and to use the vacuum tube voltmeter as above for resonance indication. A weak carrier, however, will not produce 3 volts.

NOTE "B"—Connect 300 ohms in series with "hot" side of generator and connect to left hand screw of external FM Antenna Terminals. Connect cold side of generator to right hand screw.

REPLACEMENT OF DIAL CORDS

Pointer Stringing and Alignment

MODEL 05RA2-43-8515A



Please specify *PART* number and chassis model number when ordering replacements.

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
CAPACITORS				COILS, TRANSFORMERS, CHOKES			
C1A,B,C,D	B-8A-18706	Gang tuning condenser	1	T1	C-13E-18849	Loop antenna assembly	1
C2A,B,C		Trimmers on gang	3	T2-T13-T14	A-16B-16023	RF choke coil assembly	3
C3	A-201-15142	Trimmer condenser	1	T3	B-13D-16611	Oscillator coil (AM)	1
C5	C-8G-12166	5 mmf, ceramic, 10%	1	T4	A-13D-16617	Oscillator coil (FM)	1
C8	C-8G-14172	33 mmf, ceramic, 10%	1	T5	B-13A-18567	Input IF transformer (FM)	1
C9-31-41	C-8G-12759	100 mmf, ceramic, 10%	3	T6	B-13A-16662	Input IF transformer (AM)	1
C10	A-8G-12495-2	1.0 mmf, ceramic, 20%	1	T7	B-13B-18568	Output IF transformer (FM)	1
C11-16-36	C-8D-10761	.01 mfd, 400 volts, 20%	3	T8	B-13A-16662	Output IF transformer (AM)	1
C12	C-8G-13131	100 mmf, ceramic, 10%	1	T9	B-13M-16001	Ratio detector transformer	1
C13-49	C-8D-10770	.05 mfd, 200 volts, 20%	2	T10	A-16B-16613	RF choke coil	1
C15-33	C-8D-11738	.01 mfd, 200 volts, 20%	2	T11	A-13E-16618	RF coil (FM)	1
C17-18	A-8F-13127	.0001 mfd, dual mica, +30% -20%	1	T12	A-16A-16637	RF choke coil	1
C-19-34	C-8G-11734	100 mmf, ceramic, 10%	2	T15	B-12C-18143	Output transformer	1
C20	C-8D-11013	.003 mfd, 600 volts, 10%	1	T16	B-12A-18856	Power transformer	1
C21	C-8G-16049	.002 mf, ceramic, 10%	1				
C22	C-8F3-120	390 mmf, mica, 10%	1	MISCELLANEOUS			
C23	A-8C-18128	10 mfd, 50 volts	1	A-15B-13430	9-prong, miniature tube socket	2	
C24-40-42	A-8G-13962	.005 mfd, ceramic	3	A-15B-10440	8-prong, octal socket	2	
C26-27-28-30	C-8G-11732	470 mmf, ceramic, 20%	4	A-15C-16007	7-prong, miniature tube socket	4	
C32	C-8G-13201	1000 mmf, ceramic	1	B-20A-18705	Band change switch	1	
C37-A,B,C,D	A-8C-18125	40-40-40 mfd x 350 volts, 40 mfd x 25 volts	1	B-14M-18147	AC line cord and plug	1	
C38	C-8D-10788	.004 mfd, 600 volts, 20%	1	A-23A-16328	Line cord lock	1	
C39	C-8D-10935	.005 mfd, 600 volts, +40% 15%	1	A-19A-12170	Phono pick-up socket	1	
C45	C-8J-11321	.02 mfd, 600 volts, 20%	1	A-7B-13050	Dipole socket	1	
C48	C-8D-11304	.02 mfd, 200 volts, 20%	1	A-3A-18704	Tuning shaft	1	
				A-2D-10033	Tuning shaft bracket	1	
				B-47A-18855	Pilot light assembly	1	
				A-46A-11971	Pilot light bulb, T-51	2	
				B-18A-18857	5" x 7" PM speaker	1	
RESISTORS				DIAL PARTS			
R1	A-16B-16615	Suppressor	1	A-3A-18702	Pointer shaft	1	
R2-15	C-9B1-33	2.2 megohms, 1/2 watt, 20%	2	A-2D-18701	Pointer bracket	1	
R3	A-16B-16616	Suppressor	1	A-53A-10989	Dial string	13"	
R4-14	C-9B1-78	22K ohms, 1/2 watt, 10%	2	B-53A-18547	Dial string	20"	
R5-10	C-9B1-43	27 ohms, 1/2 watt, 10%	1	A-49A-10078	Tension spring	2	
R6-8-12-19	C-9B1-58	470 ohms, 1/2 watt, 10%	4	B-2G-18792	Dial pointer	1	
R7	C-9B1-48	68 ohms, 1/2 watt, 10%	1	A-43D-18853	Compression spring	1	
R9-32	C-9B1-82	47K ohms, 1/2 watt, 10%	2	B-2M-19071	Dial scale	1	
R11-23-24	C-9B1-94	470K ohms, 1/2 watt, 10%	3				
R13	C-9B1-79	27K ohms, 1/2 watt, 10%	1				
R16	C-9B1-34	3.3 megohms, 1/2 watt, 20%	1				
R17	C-9B1-54	220 ohms, 1/2 watt, 10%	1				
R18	C-9B1-60	680 ohms, 1/2 watt, 10%	1				
R20-22	A-10A-18703	Dual volume and Tone control	2				
R21	C-9B1-36	6.8 megohms, 1/2 watt, 20%	1				
R25	C-9B1-55	270 ohms, 1/2 watt, 10%	1				
R26	C-9B1-27	220K ohms, 1/2 watt, 20%	1				
R28	C-9C2-1065	1.5 ohms, 1 watt, 10%	1				
R30	C-9C12-2059	3000 ohms, 5 watts, 5%	1				
R31	C-9C12-1102	1800 ohms, 5 watts, 10%	1				
				CABINET PARTS			
				R-5C-18750-78	Bakelite cabinet	1	
				C-24M-18858	Baffle board	1	
				B-23K-18863	Grille cloth	1	
				B-5B-18832-80	Knob (tone-tuning)	2	
				B-5B-18831-80	Knob	1	
				B-5B-18867-80	Knob	1	

MODEL 05RA4-43-9876A



ELECTRICAL SPECIFICATIONS

Power Supply.....90 volts "B"; 9 volts "A"
117 volts AC/DC

Frequency Range.....540-1605 KC

I.F. Frequency.....455 KC

Antenna.....Self-contained loop

Tuning.....3 gang capacitor

Speaker.....5" P.M. Dynamic
3.2 ohm voice coil

Power Consumption.....11 watts

Power Output.....250 milliwatts maximum
120 milliwatts @ 10%

Sensitivity, loop.....100 microvolts/meter average
for 50 milliwatts

Selectivity...45 KC broad at 1000 times signal at 1000 KC

BATTERIES

2 CORONADO 45 volt portable "B" batteries, #43-302
2 CORONADO 4½ volt portable "A" batteries, #43-266

THIS RECEIVER CONTAINS THE FOLLOWING:

1U4 R.F. Amplifier
1R5 Oscillator - Converter
1U4 I.F. Amplifier
1U5 Detector - Audio - AVC
3V4 Power Output

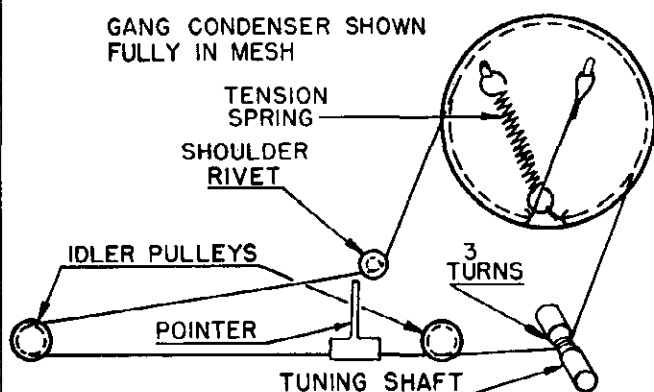


Fig. 1—Dial Stringing

Selenium Rectifier

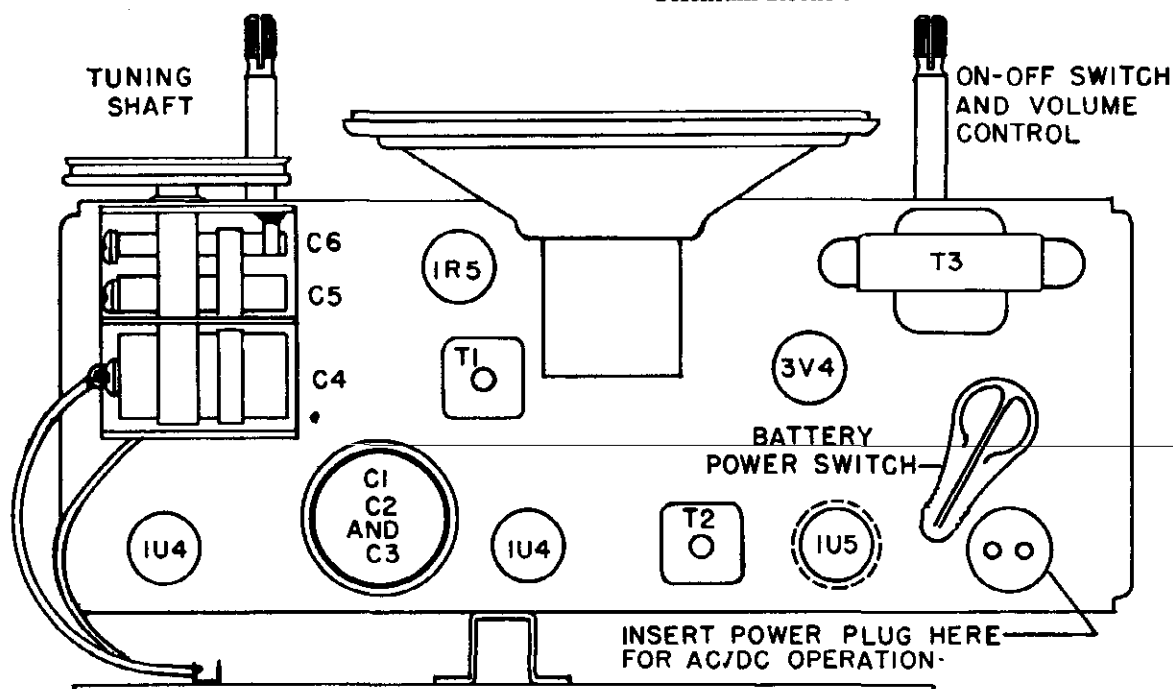


Fig. 2. Top Chassis View.

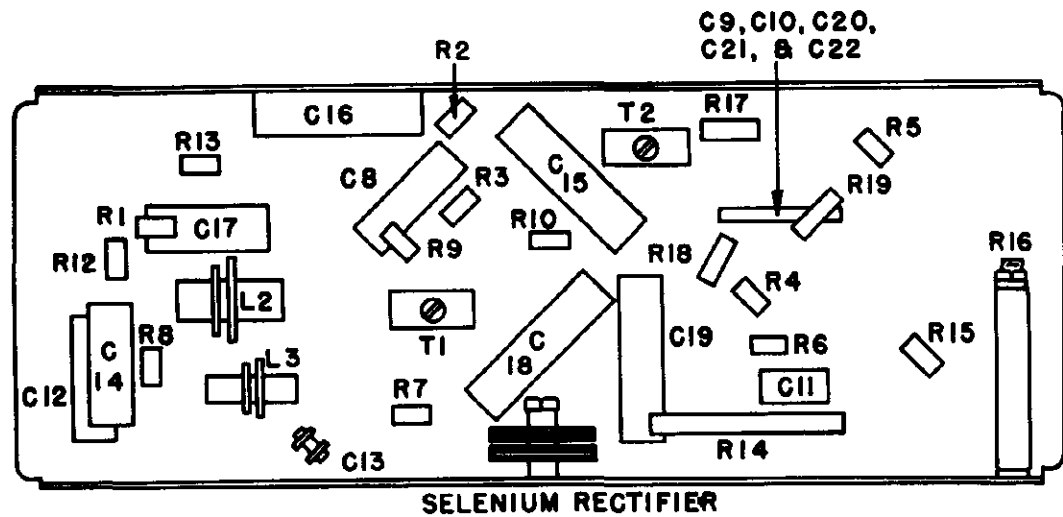


Fig. 3. Bottom Chassis View.

TO REMOVE CHASSIS FROM CABINET

Remove control knobs. Loosen retaining brackets on rear apron of chassis. Remove shelf above batteries. Pull chassis straight back.

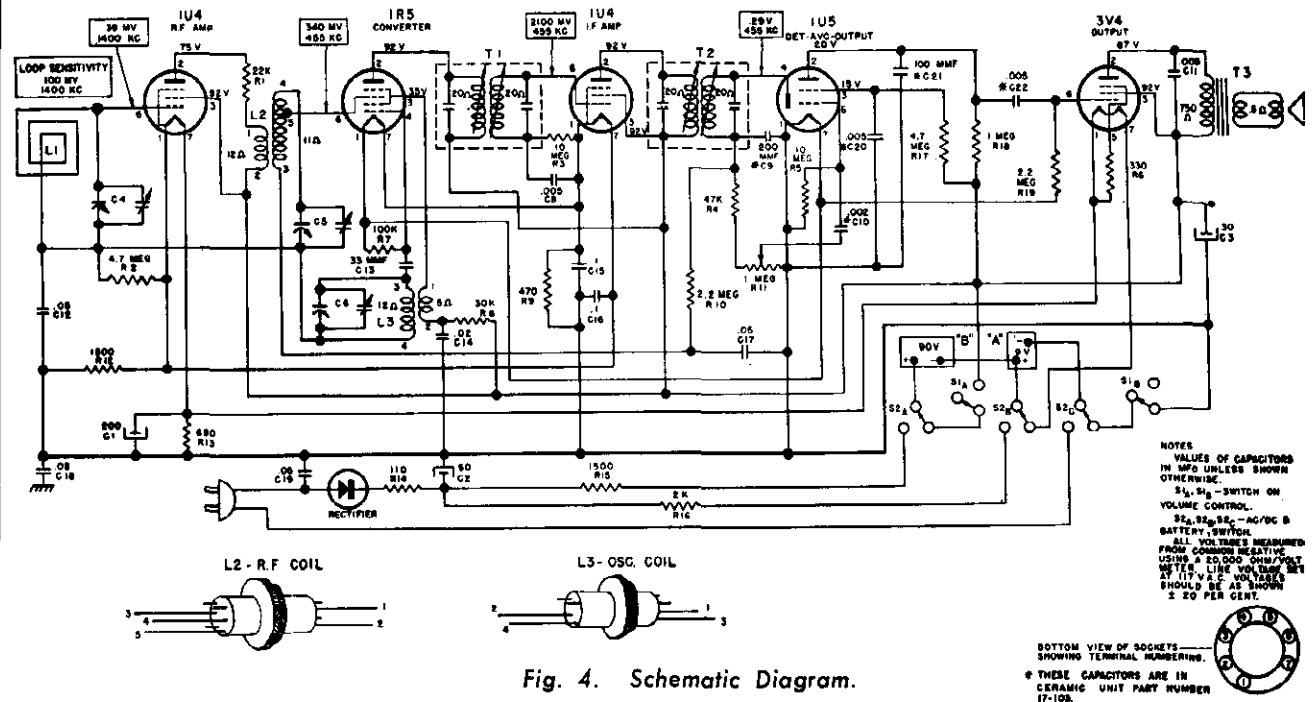


Fig. 4. Schematic Diagram.

ALIGNMENT PROCEDURE

- | | |
|--|---|
| Output meter reading to indicate 0.05 watt across voice coil | 0.4 v. |
| Generator ground lead connected | To B- through 0.1 mfd. capacitor |
| Generator modulation | 30%, 400 cycles |
| Position of volume control | Fully on |
| Position of pointer with tuner fully closed | Center of pointer lined up with extreme right dot on dial backing plate. (Chassis right side up.) |

MODEL 05RA4-43-9876A

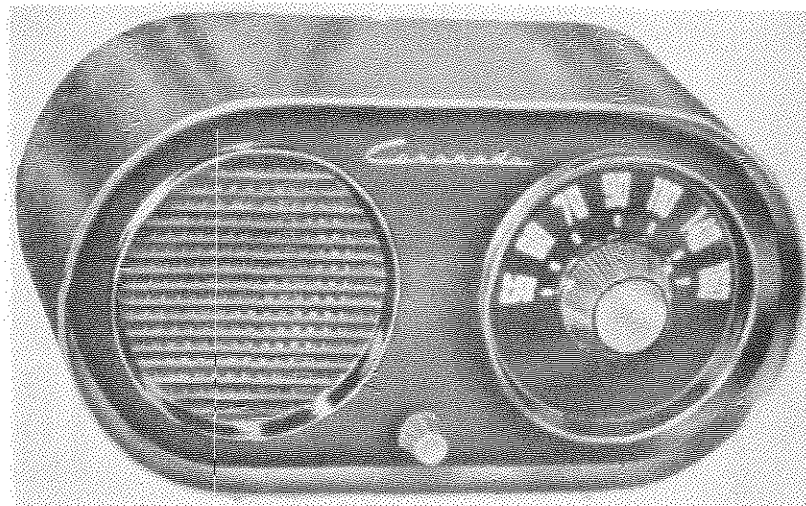
Position of Tuner	Generator Freq.	Dummy Antenna	Generator Connection	Adjustments (in order shown)	Function	Max. Microvolts Input to produce .05 w. output
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1U4 I-F Amp.	T2 (top and bottom)	I.F.	5000
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1R5 Conv.	T1 (top and bottom)	I.F.	250
Min. Cap.	1610 kc	0.1 mfd.	Stator ant. tuner	C6	Osc.	
1400 kc	1400 kc	0.1 mfd.	Stator ant. tuner	C5	R.F.	30
1400 kc	1400 kc		Loosely coupled to loop	C4	Loop	

ALIGNMENT NOTES:

1. It is recommended that this set be connected to an isolation transformer when aligning on AC.
2. The alignment must be done in the order given above.
3. While making the above adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	
CAPACITORS			MISCELLANEOUS
C1, C2, C3	18-296	Capacitor, electrolytic	44-11 Baffle
C4, C5, C6	19-208	Capacitor, variable (3 gang)	42-465 Cabinet
C8, C11	16-153	Capacitor, .005 mfd. 600 v.	84-419 Cable assembly, battery
C9, C10, C20 } C21, C22 }	17-103	Ceramic unit	83-421 Clip, I.F., transformer mounting
C12, C17	16-152	Capacitor, .05 mfd. 200 v.	84-77 Cord, power AC/DC
C13	15-186	Capacitor, 10 mmfd. mica	51-105 Cord, pointer travel, 28"
C14	16-150	Capacitor, .02 mfd. 400 v.	67-552 Dial scale
C15, C16	16-157	Capacitor, .1 mfd. 200 v.	40-156 Escutcheon
C18, C19	16-179	Capacitor, .05 mfd. 400 v.	98-13 Grille cloth
RESISTORS			47-108 Grommet, variable condenser
R1	60-744	Resistor, 22,000 ohm, 1/2 watt, 10%	76-13 Insulator, electrolytic
R2, R17	60-669	Resistor, 4.7 megohm, 1/2 watt	52-196 Knob, AC/DC/battery
R3, R5	60-728	Resistor, 10 megohm, 1/2 watt	52-305 Knob, ON-OFF-VOLUME and TUNING
R4	60-730	Resistor, 47,000 ohm, 1/2 watt	45-121 Plug, AC/DC
R6	60-704	Resistor, 330 ohm, 1/2 watt, 10%	58-63 Pointer
R7	60-727	Resistor, 100,000 ohm, 1/2 watt	84-418 Pointer rail assembly
R8	60-676	Resistor, 30,000 ohm, 1/2 watt	83-642 Rectifier, selenium
R9	60-770	Resistor, 470 ohm, 1/2 watt, 10%	71-42 Shield, tube
R10, R19	60-726	Resistor, 2.2 megohm, 1/2 watt	68-39 Socket, miniature wafer
R11, S1	24-186	Volume control and switch	79-380 Speaker, 5" P.M.
R12, R15	60-729	Resistor, 1500 ohm, 1/2 watt, 10%	70-122 Spring, dial cord
R13	60-708	Resistor, 680 ohm, 1/2 watt, 10%	69-173 Switch, AC/DC/battery
R14	60-796	Resistor, 110 ohm, 3 watt, 10%	
R16	60-757	Resistor, 2000 ohm, 10 watt, 5%	
R18	60-668	Resistor, 1 megohm, 1/2 watt	
COILS AND TRANSFORMERS			
L1	82-66	Loop, antenna	
L2	10-535	R.F. coil	
L3	10-553	Oscillator coil	
T1, T2	10-508	Transformer, 1st and 2nd I.F.	
T3	80-228	Transformer, output	



SPECIFICATIONS

Power Supply	117 volts 60 cycle AC, 117 volts DC, 28 watts
Frequency Range	535 KC to 1630 KC
Intermediate Frequency	455 KC
Antenna	Hank style
Tuning	Variable Capacity
Speaker	4", P.M. voice coil impedance 3.2 ohms
Power Output	0.75 watt undistorted, 1.8 watts maximum
Sensitivity	500 uv average for 50 milliwatts output
Selectivity	70 KC broad at 100 times, signal at 1000 KC

Tubes used are as follows:

12BE6 Oscillator-Converter

12AT6 AVC, Detector, and Audio

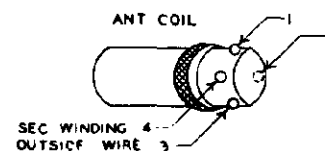
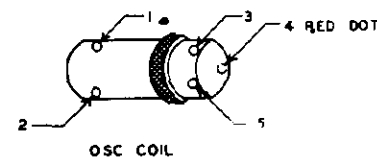
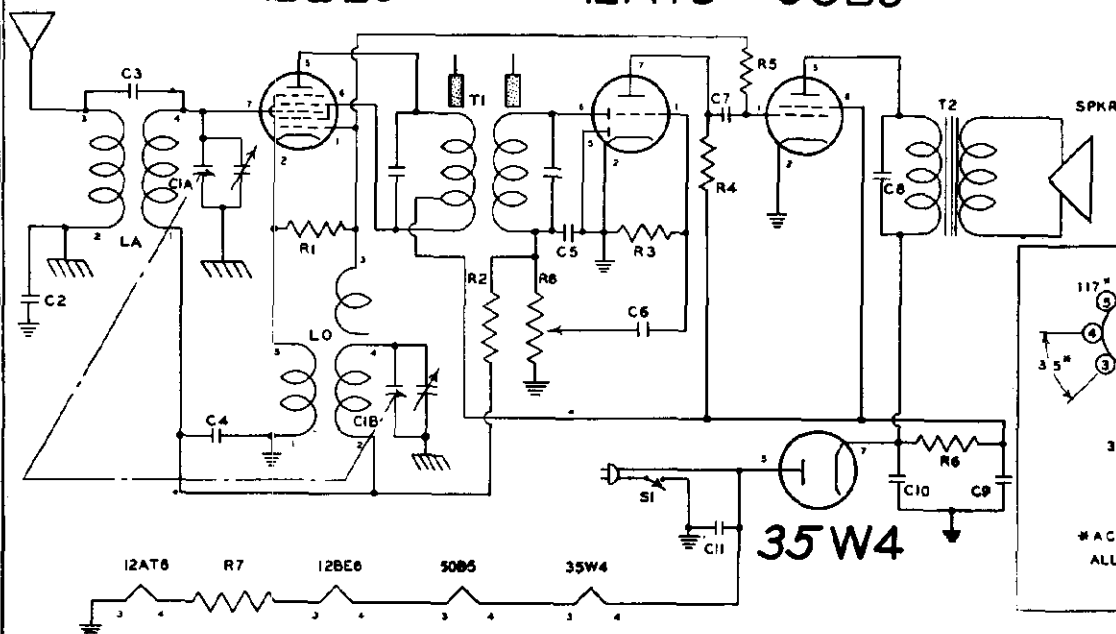
50B5 Power Output

35W4 Power Rectifier

12BE6

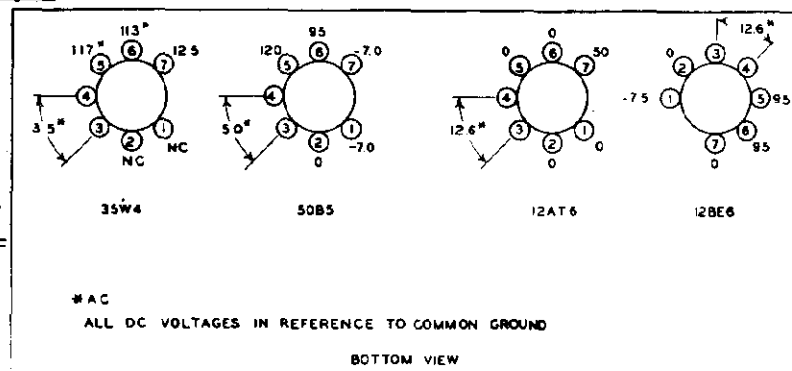
12AT6

50B5



CHASSIS
GROUND

COMMON
GROUND



* AC

ALL DC VOLTAGES IN REFERENCE TO COMMON GROUND

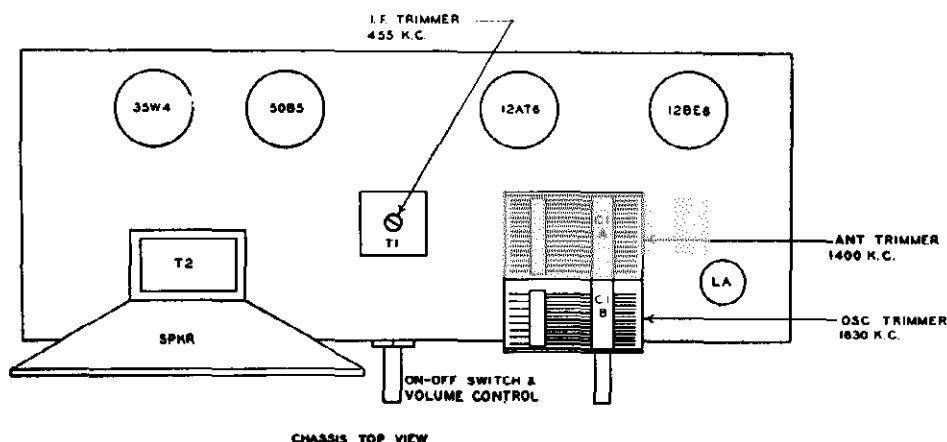
BOTTOM VIEW

VOLTAGE DIAGRAM

MODEL 05RA33-43
8120A, Bantam

GAMBLE-SKOGMO PAGE 21

MODEL 05RA33-43-8120A,
Bantam



ALIGNMENT PROCEDURE

The following procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent AVC action from interfering with proper alignment.

With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milliwatts is 0.4 volts, using a signal which is modulated 400 c.p.s.

Adjust all trimmers for maximum output. Repeat the alignment procedure given below as a final check.

CAUTION: This is an AC/DC receiver and when aligning the set it is necessary to isolate the signal generator or the receiver from the line by use of a transformer, or to place a .2 MFD condenser in each test lead of the signal generator.

SIGNAL GENERATOR			POSITION OF VARIABLE	ADJUST FOR MAXIMUM OUTPUT
Frequency	Dummy Antenna	Connection to Radio		
455 KC	100 MMFD	12BE6 Grid Stator C1A	Fully Open	T1
1630 KC	100 MMFD	12BE6 Grid Stator C1A	Fully Open	C1B Oscillator
1400 KC	100 MMFD	Coupled to Antenna Lead	Tune in Signal Generator	C1A Antenna

Connect low side of signal generator to chassis.

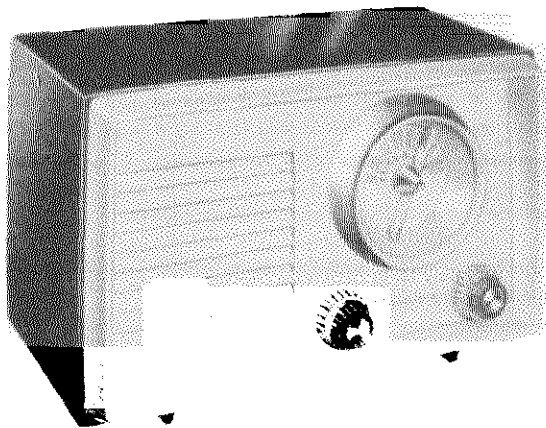
PARTS VALUES FOR T-64 GAMBLE'S AC-DC BANTAM

SYMBOL	CIRCUIT COMPONENTS PART NO.	DESCRIPTION	VALUE	RATING
C1A-C1B	C8120	Condenser, 2 gang	.05 MFD	200 volt
C2, C4	C052	Condenser, paper	5 MMFD	500 volt
C3	C55C	Condenser, ceramic	100 MMFD	500 volt
C5	C1005M	Condenser, mica	.002 MFD	600 volt
C6	C0026	Condenser, paper	.005 MFD	600 volt
C7, C8	C0056	Condenser, paper	20 MFD	150 volt
C9	C40-20-1.5	Electrolytic	40 MFD	150 volt
C10	C40-20-1.5	Electrolytic	.05 MFD	400 volt
C11	C054	Condenser, paper	22K ohm	1/2 watt
R1	R223.5	Resistor	2.2 megohm	1/2 watt
R2	R225.5	Resistor	10 megohm	1/2 watt
R3	R106.5	Resistor	220K ohm	1/2 watt
R4	R224.5	Resistor	330K ohm	1/2 watt
R5	R334.5	Resistor	2200 ohm	1/2 watt
R6	R222.5	Resistor	68 ohm	2 watt
R7	R6802	Resistor	1 megohm	
R8	VRT64	Volume control		
S1	VRT64	Switch S.P.S.T. on volume control		
LA	T64LA	Antenna coil		
LO	T64LO	Oscillator coil		
T1	T112-10	I.F. transformer		
T2	SPKT64-T	Output transformer		
SPKR	SPKT64-S	Speaker, 4" P.M.		

MECHANICAL PARTS

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
M-1701	Chassis T64	T-112-10-B	I.F. mounting clip
H-81644-6	Miniature tube socket, wafer	P-1701	Cabinet T64
W-1701	Line cord and plug	P-1706	Cabinet back
H-1701	Bushing T64	P-1704-A	Pointer knob
W-1702	Antenna hank	P-1704-B	Round knob

MODEL 05RA37-43-8360A



GENERAL DESCRIPTION

This radio is a 6 tube (including rectifier tube) AC-DC receiver housed in a beautiful plastic cabinet. Controls are provided on the front of the set for tuning, volume and tone operation. Special features include a built-in loop antenna, 3 section tuning condenser, automatic volume control, continuously variable tone control, beam power output tube and a permanent magnet dynamic speaker. Provision has been made for connection of an external antenna. The receiver is designed for reception of radio stations in the standard broadcast band between 540 and 1600 kilocycles.

ELECTRICAL SPECIFICATIONS

Power Supply:

117 volts A.C. 50 or 60 cycles or
117 volts D.C.

Frequency Range:

Broadcast 540-1600 Kc.

Intermediate Frequency:

455 Kc.

Antenna:

High impedance loop

Tuning:

3 section, shock mounted gang condenser

Speaker:

5 inch PM Dynamic
Voice coil impedance—3.2 ohms

Power Consumption:

30 watts

Power Output:

Undistorted — .6 watts
Maximum — 1 watt

Sensitivity—(Measured with signal injection at external antenna terminal and for 50 milliwatt output):

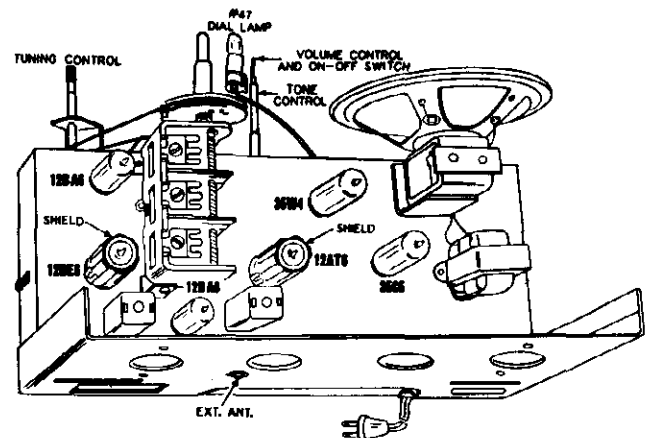
12 microvolts average

Selectivity:

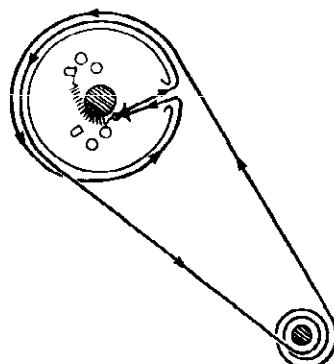
40 Kc. broad at 1000 times signal, measured at 1000 Kc.

Tube and Dial Lamp Complement:

- 1 12BA6 R.F. Amplifier
- 1 12BE6 Converter
- 1 12BA6 I.F. Amplifier
- 1 12AT6 Detector—A.V.C.—
Audio Amplifier
- 1 35C5 Audio Output
- 1 35W4 Rectifier
- 1 #47 Dial Lamp



DIAL CORD ARRANGEMENT



To string dial cord, turn the main drive drum to maximum counter-clockwise position and use following parts:

114955 Clip on end of cord

117057 Cord (2 feet)

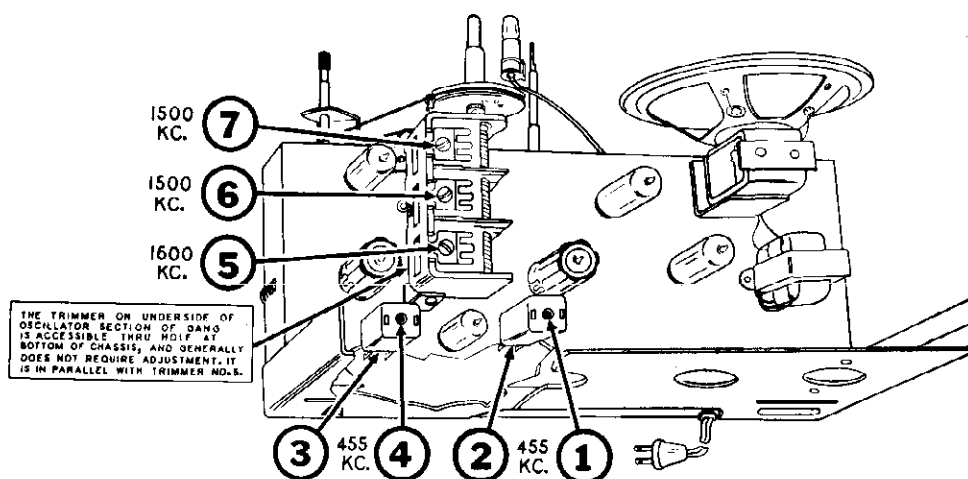
505161 Tension Spring

MODEL 05RA37-43-8360A

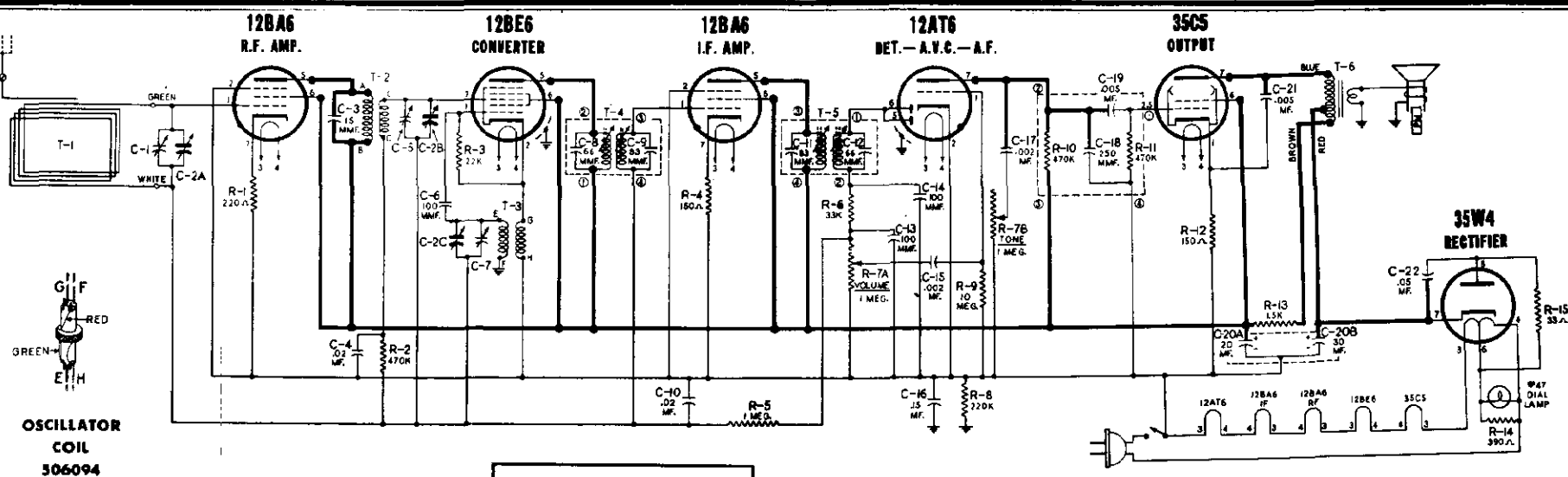
ALIGNMENT PROCEDURE

1. Remove chassis from cabinet. Allow loop antenna to remain attached to chassis.
 2. With gang condenser fully closed, dial pointer should be in the position indicated by the last division below 55 on the dial. If it is set incorrectly, hold gang in this position and reset pointer.
 3. Connect an output meter across the speaker voice coil or from plate of 35C5 to B- through a 0.1 Mfd. condenser. (See voltage chart for convenient B- connection.)
 4. Connect ground lead of signal generator to B- lug.
- CAUTION: If your signal generator is designed with an AC-DC power supply, connect ground lead to B- lug through a .25 Mfd. condenser. (See voltage chart for convenient B- connection.)
5. Set tone control to its maximum clockwise position.
 6. Set volume control to maximum volume position and use a weak signal from the signal generator.

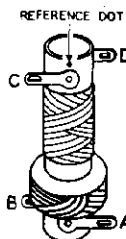
RANGE	SIGNAL GENERATOR		DUMMY ANTENNA	GANG CONDENSER SETTING	ADJUST SLUGS OR TRIMMERS
	FREQUENCY SETTING	CONNECTION AT RADIO			
I.F. 455 KC	455 KC	Grid pin #7 of 12BE6 Converter tube.	0.1 Mfd. Condenser	Any point where it does not affect the signal.	(2nd I.F.) #1 & #2 for maximum output
	455 KC	Grid pin #7 of 12BE6 Converter tube.	0.1 Mfd. Condenser	Any point where it does not affect the signal.	(1st I.F.) #3 & #4 for maximum output
BROADCAST 540—1600 KC	1600 KC	External Antenna Terminal on Loop Frame.	200 Mmfd. Condenser	1600 KC	(Oscillator) Trimmer #5 for maximum output
	1500 KC	External Antenna Terminal on Loop Frame.	200 Mmfd. Condenser	Tune to 1500 KC generator signal	(R.F.) Trimmer #6 for maximum output
	1500 KC	External Antenna Terminal on Loop Frame.	200 Mmfd. Condenser	Tune to 1500 KC generator signal	(Antenna) Trimmer #7 for maximum output



TRIMMER LOCATION CHART



OSCILLATOR
COIL
506094



R.F. COIL
508692

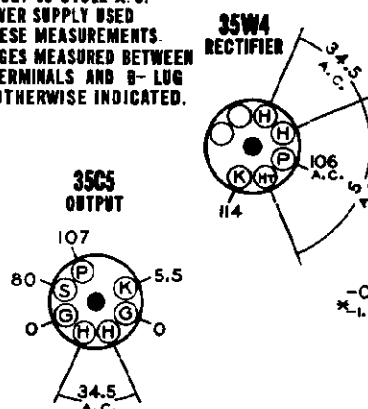
SOCKET VOLTAGES

1. All measurements made with a voltmeter having a sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.
2. Terminals on loop antenna are shorted together to minimize noise signal pickup.
3. Dial tuned to 540 Kc.
4. Volume control set to maximum with no signal.
5. Tone control set at its maximum clockwise position.

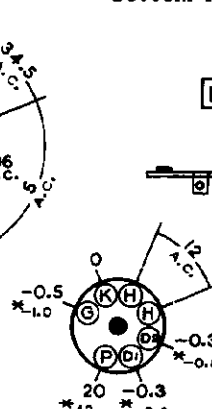
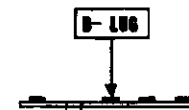
NOTE A: The center stud of this tube must be connected to B- to reduce capacity coupling between pins. Oscillation may result if this connection is omitted.

Lettered terminals in illustration correspond to similarly lettered terminals on the circuit diagram.

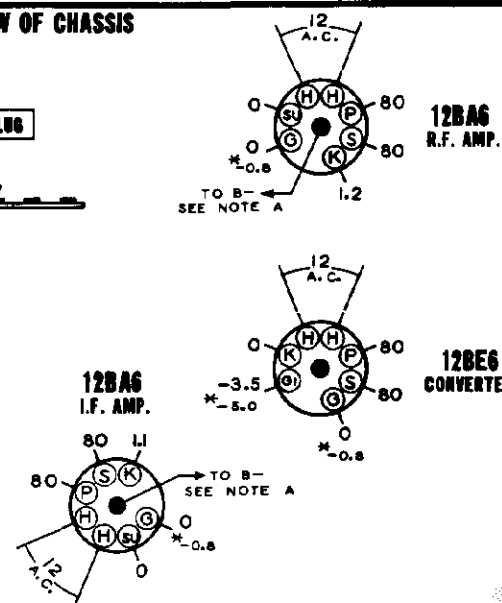
117 VOLT 60 CYCLE A.C.
POWER SUPPLY USED
FOR THESE MEASUREMENTS.
ALL VOLTAGES MEASURED BETWEEN
SOCKET TERMINALS AND B- LUG
UNLESS OTHERWISE INDICATED.



BOTTOM VIEW OF CHASSIS



12AT6
DET.-A.V.C.-A.F.



12BA6
I.F. AMP.

12BE6
CONVERTER

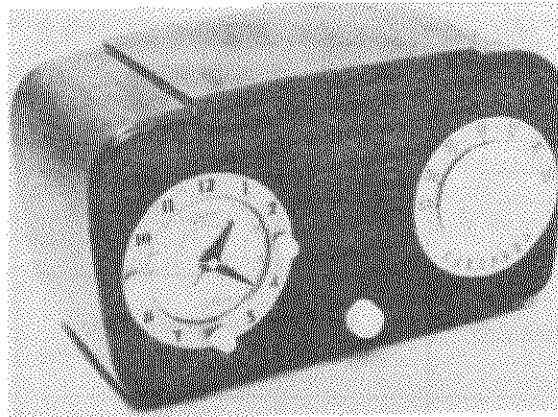
REAR OF CHASSIS

REPLACEMENT PARTS LIST

REF. NO.	DESCRIPTION	PART NO.
CONDENSERS		
C-1	Condenser—trimmer; part of Gang Condenser C-2	—
C-2	Condenser—variable gang (with drum)	508584
C-3	Condenser—ceramic 15 Mmfd. 500 volt. (Temperature Compensating)	513405
C-4	Condenser—.02 Mfd. 400 volt.	512016
C-5	Condenser—trimmer; part of Gang Condenser C-2	—
C-6	Condenser—mica; 100 Mmfd. 500 volt.	512503
C-7	Condenser—trimmer; part of Gang Condenser C-2	—
C-8	Condenser—ceramic 66 Mmfd.; part of 1st I.F. Transformer T-4	—
C-9	Condenser—ceramic 83 Mmfd.; part of 1st I.F. Transformer T-4	—
C-10	Condenser—.02 Mmfd. 400 volt.	512016
C-11	Condenser—ceramic 83 Mmfd.; part of 2nd I.F. Transformer T-5	—
C-12	Condenser—ceramic 66 Mmfd.; part of 2nd I.F. Transformer T-5	—
C-13 } C-14 }	Condenser—mica 100 Mmf. 500 volt.	512503
C-15	Condenser—.002 Mfd. 600 volt.	512002
C-16	Condenser—.15 Mfd. 400 volt.	512040
C-17	Condenser—.002 Mfd. 600 volt.	512002
C-18	Condenser—ceramic 250 Mmfd. 450 volt; part of Audio Coupling Unit, see miscellaneous listing	—
C-19	Condenser—ceramic .005 Mfd. 450 volt; part of Audio Coupling Unit, see miscellaneous listing	—
C-20A } C-20B }	Condenser—electrolytic A—20 Mfd. 150 volt } B—30 Mfd. 150 volt }	508147
C-21	Condenser—.005 Mfd. 600 volt.	512006
C-22	Condenser—.05 Mmfd. 600 volt.	512030
RESISTORS		
R-1	Resistor—carbon 220 Ohms 1/2 watt.	510125
R-2	Resistor—carbon 470,000 Ohms 1/2 watt.	510185
R-3	Resistor—carbon 22,000 Ohms 1/2 watt.	510161
R-4	Resistor—carbon 150 Ohms $\pm 10\%$ 1/2 watt.	510121
R-5	Resistor—carbon 1 Meg. 1/2 watt.	510191
R-6	Resistor—carbon 33,000 Ohms 1/2 watt.	510164
R-7A } R-7B }	Volume Control and ON-OFF Switch—1 Meg. } Tone Control—1 Meg. }	508583
R-8	Resistor—carbon 220,000 Ohms 1/2 watt.	510179
R-9	Resistor—carbon 10 Meg. 1/2 watt.	510197
R-10 } R-11 }	Resistor—carbon 470,000 Ohms 1/5 watt; part of Audio Coupling Unit, see miscellaneous listing	—
R-12	Resistor—carbon 150 Ohms $\pm 10\%$ 1/2 watt.	510121
R-13	Resistor—carbon 1500 Ohms 1 watt.	510240
R-14	Resistor—carbon 390 Ohms $\pm 10\%$ 1/2 watt.	510129
R-15	Resistor—carbon 33 Ohms 1 watt.	510210

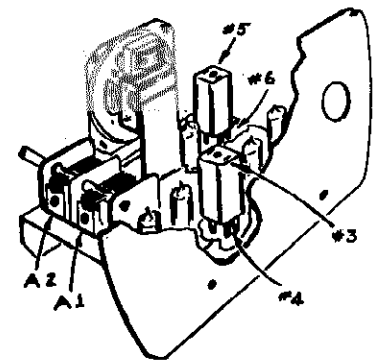
REF. NO.	DESCRIPTION	PART NO.
TRANSFORMER AND COILS		
T-1	Loop Antenna	508740
T-2	Coil—R.F.	508692
T-3	Coil—oscillator	506094
T-4	Transformer—1st I.F.	505867
T-5	Transformer—2nd I.F.	505867
T-6	Transformer—output	508146
DIAL AND TUNING PARTS		
	"C" washer for tuning shaft	505165
	Clip—retainer on end of dial cord	114955
	Cord—dial drive (2 ft. required)	117057
	Dial cup and bracket	508686
	Dial scale (plastic)	508690
	Pointer	508653
	Shaft, tuning	508587
	Spring, dial cord tension	505161
	Window for dial; clear plastic	508601
MISCELLANEOUS		
	Audio Coupling Unit	—
	A—Condenser—ceramic .005 Mfd. 450 volt	505858
	B—Resistor—carbon 470,000 Ohms 1/5 watt	
	C—Condenser—ceramic 250 Mmfd. 450 volt	
	D—Resistor—carbon 470,000 Ohms 1/5 watt	
	Base for tube shield (miniature)	505368
	Back for cabinet	508244
	Cabinet	508759
	Clip for mounting R.F. coil	112745
	Clip for mounting I.F. transformer	505101
	Clip for mounting loop antenna	508149
	Clip retains cabinet back	508235
	Diffuser for dial light	508689
	Knob—tone (clear plastic)	508628
	Knob—"TUNING" (brown and clear)	508602
	Knob—"VOLUME-ON" (brown)	508625
	Lamp—dial (Mazda #47) 6-8 V. 150 Ma.	118921
	Screw #8 x 7/8" chassis mounting	18785
	Socket—dial lamp (with leads)	500499
	Socket—miniature (7 pin)	507364
	Shield pilot light	508652
	Shield, tube (miniature)	505367
	Speaker—P.M. Dynamic (5")	508699

MODELS 15RA38-43-8235A,
15RA38-43-8236A



ELECTRICAL SPECIFICATIONS

Power Supply:—105-125 Volts AC, 60 Cycles
 Freq. Range:—540-1650 Kilocycles
 Intermediate Frequency:—455 Kilocycles
 Antenna:—Duron high impedance loop with external antenna terminal
 Tuning:—Shock mounted, 2 section gang condenser, direct knob drive
 Speaker:—4 inch PM Voice Coil Impedance 3.2 OHM
 Power Consumption:—30 Watts
 Power Output:—1.6 Watts Max., 10% distortion, 95 Watts
 Sensitivity:—Measured with signal radiated by signal generator into receiver loop antenna for 05 W output 400 μ V 600 KC; 250 μ V 1000 KC; 200 μ V 1500 KC
 Selectivity:—Bandwidths 2 times down 10 KC; 10 times down 22 KC; 100 times down 22 KC; 1000 times down 76 KC



GENERAL DESCRIPTION

This 5-Tube AC Receiver (including rectifier tube) houses a Telechron Electric Clock Movement which actuates contacts that connect the receiver to the power line at a pre-set time.

The Clock "Radio" Control Knob located at nine o'clock position is a single pole double thrown switch. (A)—Thrown counter clockwise it connects the line to the clock contactor for automatic closing by the clock movement. (B)—In mid-position the receiver is disconnected (Lullaby Time Switch being at O). (C)—Thrown clockwise closes the line to the receiver.

The "Lullaby" Switch Knob located at six o'clock position is a time switch which closes the line to the receiver for the number of minutes its adjustment calls for.

The "Alarm" Control located at three o'clock position when pulled out engages the alarm setting position. When in out position turns on buzzer alarm approximately 10 minutes after radio circuit.

Tuning and volume controls are provided.

An external antenna connection is provided.

TUBE COMPLEMENT

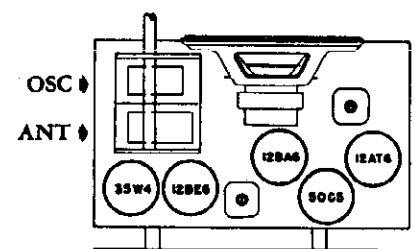
12BE6 Converter

12BA6 I.F. Amplifier

12AT6 Det. AVC-AUDIO

50C5 Power Output

35W4 Rectifier



MODELS 15RA38-43-8235A,
15RA38-43-8236A

ALIGNMENT PROCEDURE

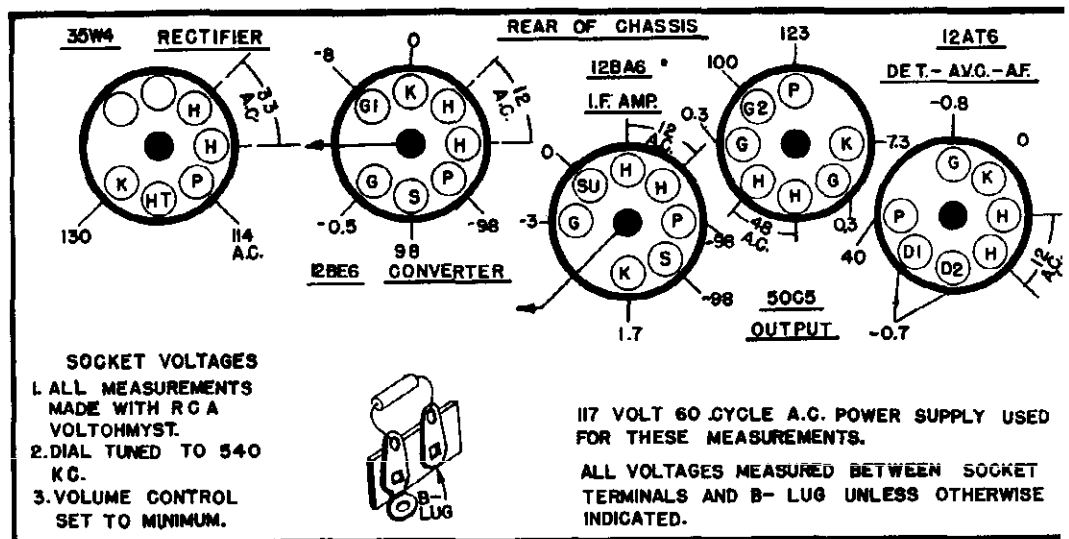
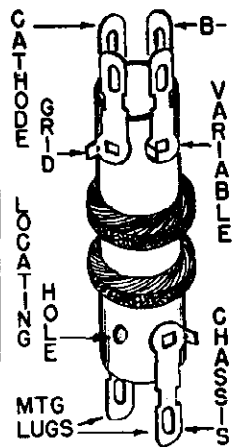
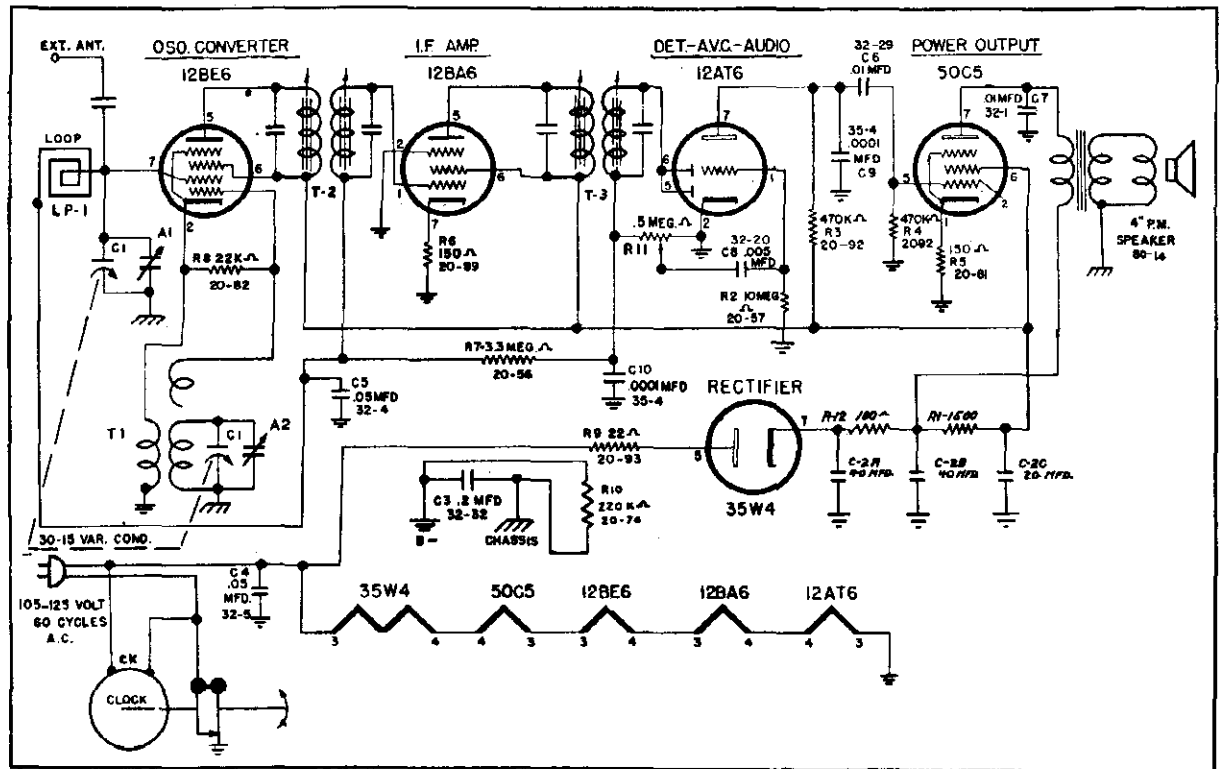
- Output meter across voice coil (3.2 ohm)
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 1.28 volts (0.5 watt).

SIGNAL GENERATOR				TUNER SETTING	ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown)
Frequency	Coupling Capacitor	Connections to Receiver	Ground Connection		
455 kc	0.1 mfd.	12BE6 grid	B—	Rotor full open (Plates out of mesh)	Input and output slugs of IF cans
1650 kc	0.1 mfd.	12BE6 grid	B—	Rotor full open (Plates out of mesh)	Oscillator trimmer A2
1500 kc		Radiating Loop		1500 kc	Antenna trimmer A1

REPLACEMENT PARTS LIST

Ref. No.	Part No.	DESCRIPTION	Ref. No.	Part No.	DESCRIPTION
CAPACITORS			RESISTORS — (Continued)		
C1	30-15	Variable Condenser, 2 gang	R8	20-82	22,000 ohm, 1/4 watt 20%
C2	31-13	40 mfd.—40 mfd., 150 volt dual electrolytic condenser	R9	20-93	22 ohm, 1/2 watt 20%
C3	32-32	.2 mfd., 200 volt, paper	R10	20-74	220,000 ohm, 1/4 watt 20%
C4	32-5	.05 mfd., 400 volt, paper	R11	50-15B	1/2 meg. volume control
C5	32-4	.05 mfd., 200 volt, paper	COILS AND TRANSFORMERS		
C6	32-1	.01 mfd., 400 volt, paper	O-1	60-9	Oscillator coil
C7	32-1	.01 mfd., 400 volt, paper	T-2	61-11	Input IF transformer
C8	32-20	.005 mfd., 600 volt, paper	T-3	61-11	Output IF transformer
C9	35-4	.0001 mfd., 500 volt, mica	LP-1	A125-32	Loop antenna
C10	35-4	.0001 mfd., 500 volt, mica	MISCELLANEOUS		
RESISTORS			80-14	80-14	4 inch P.M. speaker with output transformer
R1	20-73	1500 ohm, 1 watt 20%	122-19		Selector knob
R2	20-57	10 megohm, 1/4 watt 20%	122-15		Volume knob
R3	20-92	470,000 ohm, 1/4 watt 20%	120-33		Cabinet—ivory { in carton specify color walnut }
R4	20-92	470,000 ohm, 1/4 watt 20%	CK	140-6	Clock
R5	20-81	150 ohm, 1/2 watt 20%			
R6	20-89	150 ohm, 1/4 watt 20%			
R7	20-56	3.3 megohm, 1/4 watt 20%			

MODELS 15RA38-43-8235A,
15RA38-43-8236A



MODELS 15RA38-43-8235A,
15RA38-43-8236A

SERVICING OF TELECHRON MOVEMENT

The Telechron movement is warranted under normal use and service against defects in workmanship and material for a period of one year from the date that the timer is sold by Telechron. Telechron agrees to repair or replace without charge any part or parts proved to be defective within the warranty period.

Telechron has established service stations which are prepared to service the movement unit when delivered by itself—that is when physically removed from the plastic cabinet. These service stations, under no circumstances, will service clocks not removed from cabinets. For information regarding service on Telechron clock movements, see your Service Reference File.

"CAUTION"—See instructions for clock removal below.

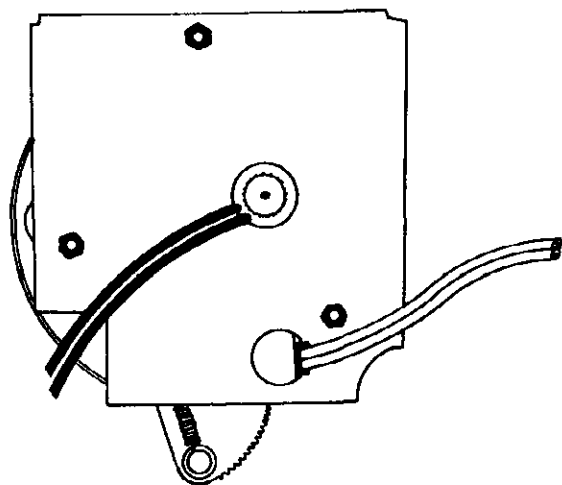


FIGURE A

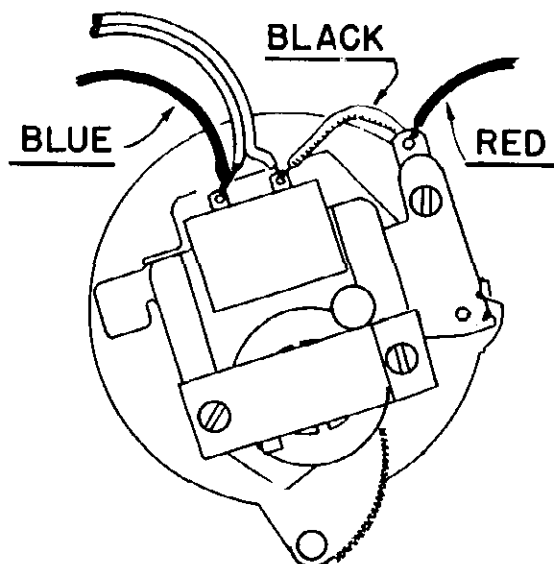
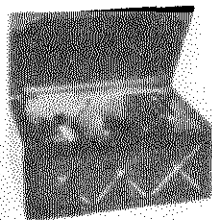


FIGURE B

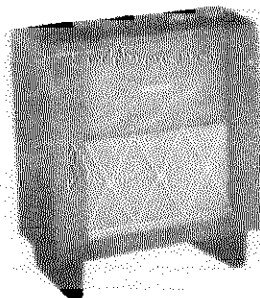
To take clock movement out of cabinet proceed as follows:

Remove the following:

- A**—Line cord from power line.
- B**—Tuning knob, volume control knob, and chassis from cabinet.
- C**—3 nuts holding clock clamping shield shown in Figure A above.
- D**—As this shield is sufficiently pulled back unsolder red and blue wires and power cord shown in Figure B above.
- E**—Before movement can be withdrawn from cabinet, it is necessary to have the lullaby time switch in the full 60-minute position. With this switch in this position, the clock can be withdrawn by turning the rim clockwise approximately 5 to 10 degrees so that movement parts can pass openings in cabinet.
- F**—In shipping a movement to a service station, be certain that it is suitably packed to withstand transportation. Care should be taken with the glass crystal so that it is not subject to strain during shipment.



Model 129



Model 131

SPECIFICATIONS

CABINET:

Model	129	131
Material	Wood	Wood
Height	10 $\frac{1}{4}$ in.	31 $\frac{1}{4}$ in.
Width	21 in.	28 in.
Depth	14 $\frac{1}{4}$ in.	14 $\frac{1}{4}$ in.

ELECTRICAL (INPUT):

Voltage (A-C only)	105-125
Frequency	60 cps
Wattage (on Radio)	35
Wattage (on Phono)	55

OPERATING FREQUENCIES:

Broadcast Band	540-1600 kc
I-F Amplifier	455 kc

POWER OUTPUT (117 Volts Line):

Undistorted	.95 watts
Maximum	2.2 watts

LOUDSPEAKER:

Model	129	131
Type	Alnico PM	Alnico PM
Outside Cone Diameter	5.25 inches	12 inches
Voice Coil Impedance at 400 cps	3.2 ohms	3.2 ohms

PHONOGRAPH PICKUP:

Type	Variable Reluctance
D-C Resistance	340 ohms

TUBE COMPLEMENT:

Converter-Oscillator	Type 12BE6
I-F Amplifier	Type 12SK7
Detector and Audio Amplifier	Type 12SQ7
Output	Type 50L6
Phono Preamplifier	Type 6SC7
Rectifier	Type 35Z5
Pilot Lamps	Mazda No. 47

GENERAL INFORMATION

The Models 129 and 131 are combination radio-phonograph receivers which differ in cabinet. Each employs a 6-tube super-heterodyne receiver and a record changer, Model P15. The servicing information given herein is complete except that it does not cover servicing of the record changer. Service data on record changer Model P15 is covered in service notes ER-S-P15.

CAUTION

One side of the power line is connected to B—. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

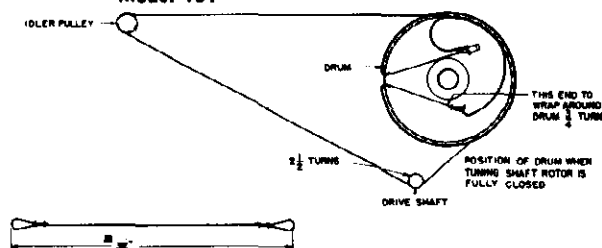


Fig. 1 Dial cord stringing

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements may be made with a vacuum tube voltmeter to check circuit performance and to locate stages which are not operating properly. The gain values listed may have a tolerance of 20 per cent. Readings should be taken with the AVC shorted to B minus.

1. R-F STAGE GAINS.

Antenna to 12BE6 Grid	3.5 at 1000 kc
12BE6 Grid to 12SK7 Grid	50. at 455 kc

2. AUDIO GAIN.

The power output across the speaker voice coil should be approximately $\frac{1}{2}$ watt with .95 volts at 400 cps applied between the high side of the volume control (R11) and ground.

3. OSCILLATOR GRID BIAS.

The d-c voltage developed across the oscillator grid leak resistor (R1) averages 4.5 volts at 1000 kc.

4. SOCKET PIN VOLTAGES.

Figure 4 shows typical tube pin voltages. All readings should be made from the pins to B minus unless otherwise indicated.

ELECTRICAL CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED:

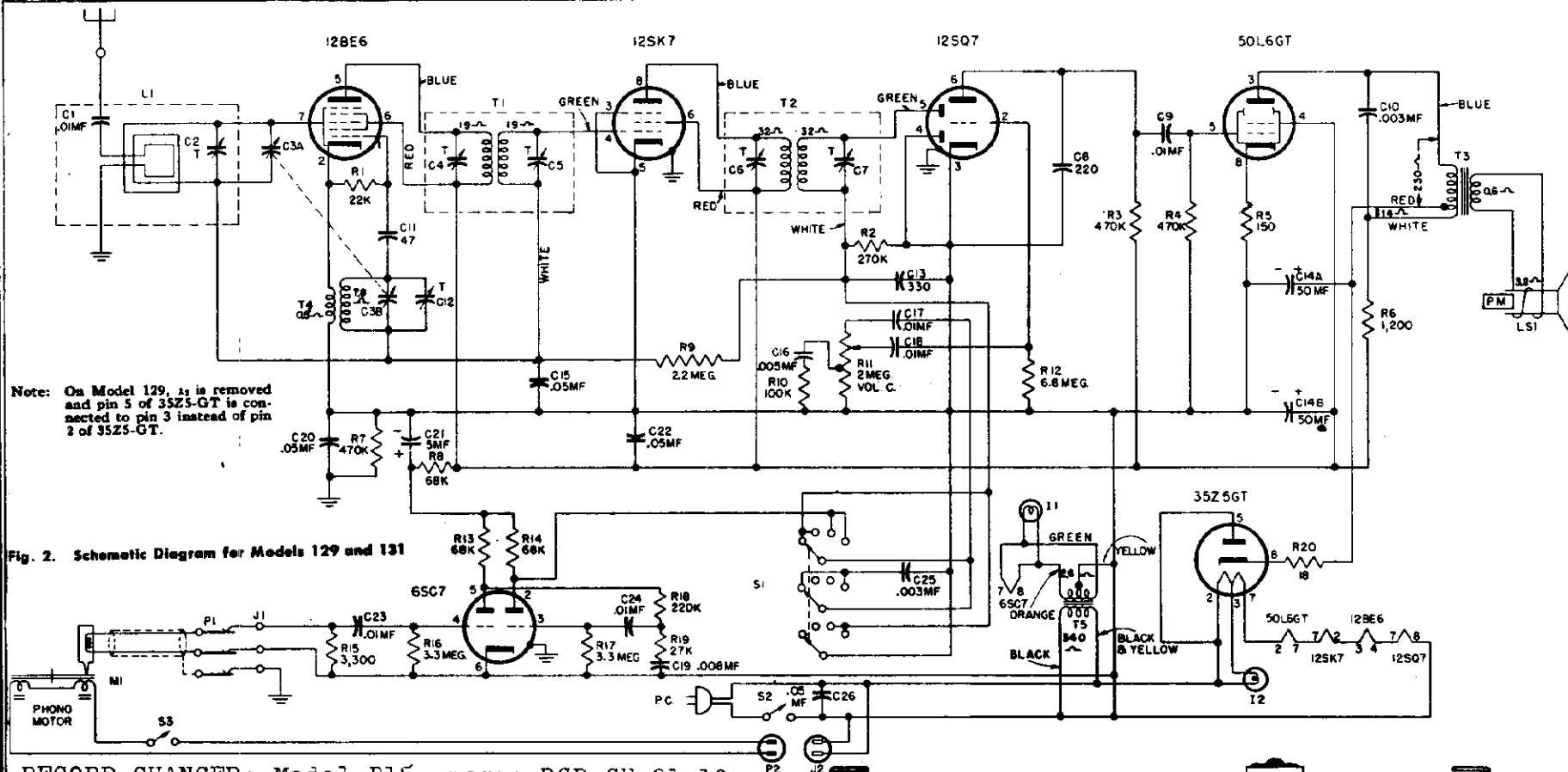
1. Test oscillator with audio tone modulation.
2. A-C output meter, 1 $\frac{1}{2}$ volts full scale.
3. Insulated screwdriver.

ALIGNMENT PROCEDURE:

The Alignment Procedure is given in table form. All i-f alignments may be made with the chassis removed from the cabinet. However, the r-f alignments should be made with the chassis and loop mounted in the cabinet, as the relative position of the loop antenna with respect to the chassis materially affects the alignment.

The oscillator trimmer is accessible by tilting the chassis slightly if the cabinet. The antenna trimmer is on the loop and is accessible from the rear of the cabinet. The locations of these trimmers are shown in Figure 3.

The output meter should be connected across the loudspeaker voice coil terminals. The low side of the test oscillator should be connected to B minus; the high side should be connected as indicated in the Alignment Chart. During the entire alignment procedure, the radio volume control should be in its maximum position. The test oscillator output signal should be attenuated so that the output meter reading never exceeds 1 $\frac{1}{4}$ volts.

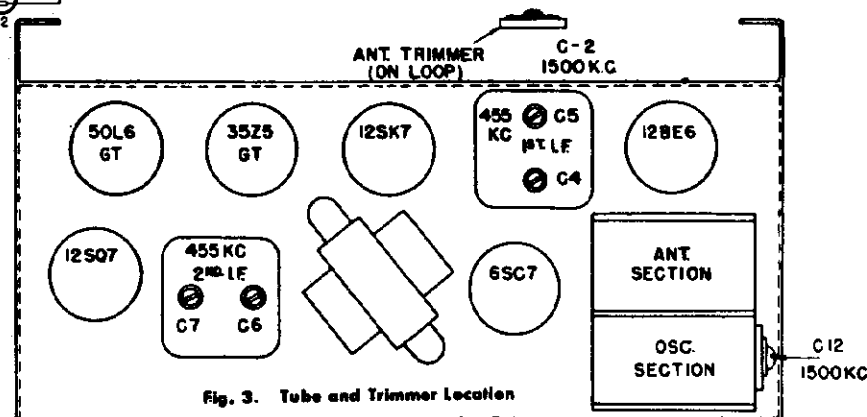


RECORD CHANGER: Model P15, pages RCD.CH.21-13, through RCD.CH.21-18.

ALIGNMENT CHART

Step	Connect Test-Oscillator To:	Test Oscillator Setting	Dial Setting	Adjust Trimmers For Max. Output
1	12SK7 grid (Pin 4) in series with .05 mf.	455 kc	—	C6 and C7
2	12BE6 grid (Pin 7) in series with .05 mf.	455 kc	—	C4 and C5 Readjust C6 and C7
3	Blue wire on loop in series with 200 mmf. and 470 ohms.	1500 kc	1500 kc	C12 (Osc.); C2 (Ant.)*

* Rock gang condenser when making alignment.

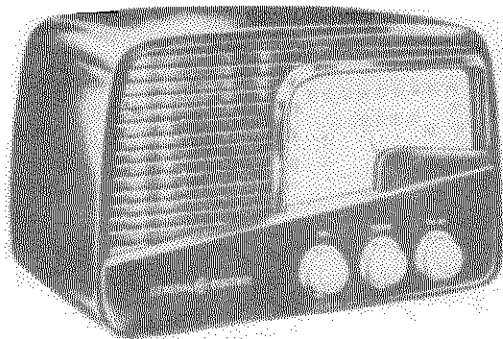


REPLACEMENT PARTS LIST—MODELS 129, 131

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS					
*UCC-008	C23	CAPACITOR—.01 mf., 200 v., paper	*RCE-050	C14A, 14B	CAPACITOR—50-50 mfd., 150 v., electrolytic
*UCC-020	C25	CAPACITOR .003 mfd., 400 v., paper	*RCE-056	C21	CAPACITOR—5 mf., 150 v., electrolytic
*UCC-025	C17	CAPACITOR—.01 mf., 400 v., paper	*RCT-026	C3A, 3B	CAPACITOR—Tuning capacitor
*UCC-028	C15, 20, 22	CAPACITOR—.05 mf., 400 v., paper	*RCY-005	C2	CAPACITOR—Trimmer for Model 129
*UCC-040	C1, 24	CAPACITOR—.01 mf., 600 v., paper	*RCY-034	C2	CAPACITOR—Trimmer for Model 131
*UCC-045	C26	CAPACITOR—.05 mf., 600 v., paper	*RDC-032		CORD—Dial cord (10 yds. min.)
*UCU-020	C11	CAPACITOR—47 mmf., mica	*RDK-036		KNOB—Plain
*UCU-036	C8	CAPACITOR—220 mmf., mica	*RDK-039		KNOB—With arrow
*UCU-040	C13	CAPACITOR—330 mmf., mica	*RDS-055		SCALE—Dial scale
*UOP-557		SPEAKER Model 129, Same as S525D-7	*RDX-033		POINTER—Dial scale pointer assembly
*UOP-1241		SPEAKER—Model 131. Same as S1200D-7	*RHC-008		CLIP—For mounting filter capacitor
*UOX-005		SPEAKER REPAIR KIT—For Model 131	*RHG-015		GROMMET—Rubber grommet for mounting tuning capacitor
*UOX-008		SPEAKER REPAIR KIT—For Model 129	*RHJ-005		SPACER—For mounting tuning capacitor
*URD-029	R5	RESISTOR—150 ohms, ½ w., carbon	*RHM-001		RING—Tuner shaft retaining ring
*URD-061	R15	RESISTOR—3300 ohms, ½ w., carbon	*RHM-014		STUD—For dial idler pulley
*URD-081	R1	RESISTOR—22,000 ohms, ½ w., carbon	*RHM-016		CLIP—Oscillator coil clip
*URD-083	R19	RESISTOR—27,000 ohms, ½ w., carbon	*RHM-037		CLIP—For mounting dial scale
*URD-093	R8, 13, 14	RESISTOR—68,000 ohms, ½ w., carbon	*RHR-003		STUD—For mounting scale
*URD-097	R10	RESISTOR—100,000 ohms, ½ w., carbon	*RHS-004		SPACER—Between loop and cabinet
*URD-105	R18	RESISTOR—220,000 ohms, ½ w., carbon	*RJP-003	P2, 3	PLUG—Phono power
*URD-107	R2	RESISTOR—270,000 ohms, ½ w., carbon	*RJS-006		SOCKET—Octal tube socket
*URD-113	R3, 4, 7	RESISTOR—470,000 ohms, ½ w., carbon	*RJS-027		SOCKET—For dial light
*URD-129	R9	RESISTOR—2.2 meg., ½ w., carbon	*RJS-031		SOCKET—Tube socket for 6SC7
*URD-133	R16, 17	RESISTOR—3.3 meg., ½ w., carbon	*RJS-034		SOCKET—Bezel pilot light socket
*URD-141	R12	RESISTOR—6.8 meg., ½ w., carbon	*RJS-049	J2, 3	SOCKET—Phono power
*URF-051	R6	RESISTOR—1200 ohms, 2 w., carbon	*RJS-092		SOCKET—Miniature for 12BE6
			*RJS-097	J1	SOCKET—Phono pickup socket
			*RJX-007	P1	Phono plug
			*RLC-061	T4	COIL—Oscillator coil
			*RLI-026	L1	LOOP ASSEMBLY—Model 131
			*RLI-028	L1	LOOP ASSEMBLY—Model 129
			*RMM-034		HOOD—Hood for dial light
			*RMM-054		SUPPORT—Lid support
			*RMS-118		SPRING—Dial cord tension spring
			*RMU-036		SHAFT—Tuning shaft
			*RMW-037		PULLEY—Dial cord idler pulley
			*RRC-060	R11	VOLUME CONTROL 2 meg.
			*RRW-005	R21	RESISTOR—70 ohms, wirewound, for 50-cycle operation of phono motor
			*RRW-008	R20	RESISTOR—18 ohms, 1 w., wirewound
			*RSW-065	S1	SWITCH—Radio phono switch
			*RTF-001	T5	TRANSFORMER—Filament transformer for 6SC7
			*RTL-050	T1	TRANSFORMER—1st I-F transformer
			*RTL-051	T2	TRANSFORMER—2nd I-F transformer
			*RTO-038	T3	TRANSFORMER—Output transformer
			*RWL-009		CORD—Power cord
SPECIALIZED REPLACEMENT PARTS					
*RAC-051		LID—For Model 131 (mahogany)			
*RAC-058		LID—For Model 129			
*RAL-001		BEZEL—For pilot light			
*RAM-003		BASE—2 for Model 131 (mahogany)			
*RAV-045		CABINET—For Model 131 (mahogany)			
*RAV-054		CABINET—Model 129			
*RCC-040	C9	CAPACITOR—.01 mf., 600 v., paper			
*RCC-074	C10	CAPACITOR—.003 mf., 600 v., paper			
*RCC-082	C18	CAPACITOR—.01 mf., 200 v., paper			
*RCC-084	C19	CAPACITOR—.008 mf., 400 v., paper			
*RCC-085	C16	CAPACITOR—.005 mf., 200 v., paper			

* Used on previous production receivers.

MODEL 218



MODEL 218

CAUTION

ALWAYS USE AN ISOLATION TRANSFORMER IN THE RECEIVER POWER LINE, WHEN SERVICING OR ALIGNING THIS RECEIVER, TO PROTECT TEST EQUIPMENT.

SPECIFICATIONS

CABINET

Material.....	plastic
Color.....	mahogany
Height.....	8 $\frac{3}{8}$ inches
Width.....	13 $\frac{5}{8}$ inches
Depth.....	6 $\frac{7}{8}$ inches

ELECTRICAL

Voltage.....	105-125 v. AC or DC
Frequency on AC.....	50 to 60 cps
Wattage.....	33 watts

TUNING RANGE

AM.....	540-1620 kc
FM.....	88-108 mc

INTERMEDIATE FREQUENCIES

AM.....	455 kc
FM.....	10.7 mc

POWER OUTPUT (120 VOLTS LINE)

Undistorted.....	1.1 watt
Maximum.....	1.8 watt

LOUDSPEAKER

Type.....	permanent magnet
Cone Diameter.....	5 $\frac{1}{4}$ inches
Voice Coil Impedance at 400 cps.....	3.2 ohms

TUBE COMPLEMENT

(V1) FM R-F and 1st I-F Amplifier.....	12BA6
(V2) Oscillator and Converter.....	12BE6
(V3) I-F Amplifier.....	12BA6
(V4) Limiter.....	12AU6
(V5) FM Discriminator, AM Detector and Audio Amplifier.....	19T8
(V6) Power Output.....	50B5

ANTENNA

AM.....	loop antenna
FM.....	power line antenna or 300-ohm FM antenna

GENERAL

Model 218 is a table model receiver providing reception on the AM and FM bands. The receiver is housed in a mahogany colored plastic cabinet.

The receiver has a built-in FM power line antenna; to operate from this antenna it is necessary to connect the brown wire coming out of the cabinet back to the right-hand screw of the antenna terminal strip.

On AM operation, the AM r-f signal is fed directly into the grid of the converter V2 through the 1st AM i-f transformer T2 into the grid of V3. From V3 the signal is fed to the second AM i-f transformer T5 and is detected by a diode section of V5 which is pin 6. The secondary of T1 which is in series with the primary of T2 offers a low impedance to the AM i-f frequency.

V1 (12BA6) in the FM reflex circuit acts both as an r-f and an i-f amplifier. The r-f signal is put into the grid (pin 1) of V1 through the secondary of T1. It is amplified by V1 and put into the grid of V2 the converter through capacitor C7. Choke L3 prevents the r-f signal from getting into the second FM i-f trans-

former T3. The 10.7 mc FM i-f is fed from the plate of V2 to the primary of T1 the 1st FM i-f transformer which now puts the FM i-f signal onto the grid of V1. From the plate of V1 the FM i-f signal is fed through choke L3 to the primary of T3 through to the grid of V3. The plate of V3 feeds the FM i-f signal through C50 in the primary of T5 to the 3rd FM i-f tuning coil T4 and through C21 to the grid of the limiter grid pin 1 of V4. The FM i-f signal is detected in T6 discriminator transformer and two diode sections of V5, pins 1 and 2.

STAGE GAIN AND VOLTAGE CHECKS

1. R-F AND I-F STAGE GAINS

Signal applied through an IRE dummy antenna:

V2 Grid to V3 Grid.....	38 at 455 kc
Dipole Terminals to V1 Grid.....	1.3 at 98 mc
V1 to V2 Grid.....	8.0 at 98 mc
V2 to V1 Grid.....	1.5 at 10.7 mc
V1 to V3 Grid.....	22 at 10.7 mc
V3 to V4 Grid.....	26 at 10.7 mc

2. AUDIO GAIN

.09 volts at 400 cps across the volume control with the volume control set at maximum should give approximately $\frac{1}{2}$ watt output across the speaker voice coil.

3. OSCILLATOR GRID BIAS

D-c voltage developed across R6:	
4.8 volts at 1000 kc	
2.2 volts at 98 mc	

4. SOCKET PIN VOLTAGES

Figure 4 shows typical tube pin voltages.

5. HUM MEASUREMENT

Hum measured across the voice coil of the speaker with the volume control at minimum and the band switch on AM should not exceed 7 millivolts.

On FM ground the limiter grid (pin 1 of V4) through a .01 mfd. capacitor and measure the hum across the voice coil terminals with the volume control at maximum. Hum should not exceed 15 millivolts.

ALIGNMENT

EQUIPMENT NECESSARY FOR METER ALIGNMENT

1. Signal generator G-E YGS-3, or equivalent.
2. 20,000 ohm-per-volt meter.
3. Output meter.
4. .01 mfd. capacitor.
5. Four-turn, six-inch diameter loop of bell wire for AM, r-f and oscillator alignment.
6. Isolation transformer.

NOTES FOR METER ALIGNMENT

1. Connect a 20,000 ohm-per-volt meter from junction of C29 and R18 to chassis. Use a ten-volt scale for steps 3, 4 and 5.
2. Connect a 20,000 ohm-per-volt meter from the grid of the limiter (pin 1 of V4) to cathode of limiter (pins 2 or 7 of V4) in series with a 200,000-ohm resistor. The resistor must be connected directly to the grid pin to minimize capacity loading and to isolate the i-f signal voltage from the meter. Keep signal generator down so that the meter does not indicate more than one volt at the grid (5 microamps through 200,000 ohms).

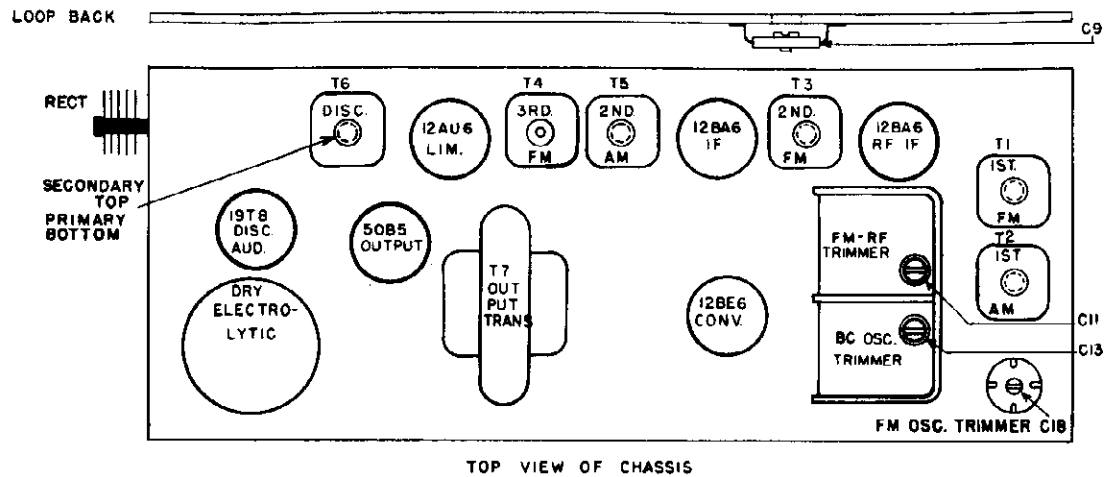


Fig. 1. Tube and Trimmer Location

3. Connect a standard output meter across the speaker voice coil. Turn volume control full on. Keep signal generator output low so that output meter indicates not more than $\frac{1}{2}$ watt during alignment.

4. Align the AM oscillator trimmer (C13) and the AM r-f trimmer (C9) by coupling the signal to the loop antenna inductively. Connect a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and locate the loop about one foot from the radio loop antenna. The position of the loop in respect to the radio loop antenna should not be changed during any one set of adjustments to prevent possible errors in the peak readings.

5. Disconnect the copper strap from the band switch to pin 7 of the 12BE6 to align the 1st FM i-f transformer. Unsolder the strap from the tube pin connection. Resolder the strap after T1 is aligned to 10.7 mc as in step 8.

6. The AM r-f alignment should be made before the FM r-f alignment. With the gang condenser fully closed, the pointer should point to the dot on the dial scale after the letters "FM" on the left end of the dial scale.

7. The termination impedance of the signal generator should be 300 ohms for FM r-f alignment.

METER ALIGNMENT CHART

Step	Signal Generator Frequency	Signal Input Point	Band Switch Setting	Dial Setting	Adjust	See Note
AM I-F ALIGNMENT						
1	455 kc modulated with 400 cps	12BE6 grid (pin 7 of V2) thru .01 mfd.	AM	550 kc	Secondary and primary slugs of T5 for maximum.	3
2					Secondary and primary slugs of T2 for maximum.	
FM DISCRIMINATOR AND I-F ALIGNMENT						
3	10.7 unmodulated	12BA6 grid (pin 1 of V3) thru 0.1 mfd.	FM		Adjust T6 secondary for zero. Apply 1 volt signal input.	1
4	See adjust col.				Detune signal generator to point of maximum meter reading.	
5	Same freq. as in step 4				Adjust T6 primary for maximum meter reading.	
6	10.7 mc unmodulated	12BA6 grid (pin 1 of V1) thru .01 mfd.			Adjust slug of T4 for maximum.	2
7					Adjust secondary and primary slugs of T3 for maximum.	
8		12BE6 grid (pin 7 of V2) thru .01 mfd. and 4700 ohms. See note 5.			Adjust secondary and primary slugs of T1 for maximum.	2, 5

MODEL 218

METER ALIGNMENT CHART (Cont'd)

Step	Signal Generator Frequency	Signal Input Point	Band Switch Setting	Dial Setting	Adjust	See Note
AM R-F ALIGNMENT						
9	1500 kc AM modulated with 400 cps	Inductively coupled. See note 4.	AM	1500 kc	Adjust C13 for maximum.	3, 4, 6.
10					Adjust C9 for maximum while rocking dial.	
FM R-F ALIGNMENT						
11	108 mc unmodulated	Dipole terminals	FM	108 mc	Adjust C18 for maximum.	2, 6, 7.
12	98 mc unmodulated			For max. output	Adjust C11 for maximum while rocking dial.	

EQUIPMENT REQUIRED FOR VISUAL ALIGNMENT

1. General Electric YGS-3 sweep generator or equivalent.
2. General Electric ST-2A oscilloscope or equivalent.
3. 200,000 ohms, $\frac{1}{2}$ watt, resistor.
4. .01 mfd. paper capacitor.
5. Isolation transformer.

NOTES FOR VISUAL ALIGNMENT

1. Connect the vertical plates of the scope across R11 in the grid circuit of V4 (steps 3, 4, 5, 11 and 12).
2. Connect the vertical plates of the scope between the junction of R18 and C29 and chassis (FM audio) (steps 6, 7, 8).
3. Connect the vertical plates of the scope between the junction of R14 and C27 and chassis (steps 1, 2, 9, 10).
4. In some cases tuning of the converter grid will cause "pulling in" of the oscillator and will change the oscillator frequency.

If peaking C9 or C11 as in steps 10 or 12 causes the curve to move off the screen, it is necessary to recalibrate the oscillator as in steps 9 or 11.

5. The termination impedance of the signal generator should be 300 ohms to properly match the FM input impedance of this receiver (steps 11 and 12).

6. To align the 1st i-f transformer T1 (step 5), it is necessary to disconnect the copper strap from pin 7 of V2, the 12BE6. After alignment of T1, resolder the copper strap to pin 7 of the 12BE6.

7. To position the dial pointer, close the gang condenser. The pointer should be set to the dot on the dial scale after the letters FM on the left end of the dial scale.

8. For alignment of the AM oscillator and r-f trimmers (steps 9 and 10), the signal should be inductively coupled to the loop antenna by connecting a four-turn, six-inch diameter loop of bell to the signal generator terminals. Locate this loop about one foot from the radio loop antenna. To prevent possible errors in peak readings, the position of the loop with respect to the radio loop antenna should not be changed during any one set of adjustments.

VISUAL ALIGNMENT CHART

Step	Sweep Generator Frequency	Signal Input Point	Band Switch Setting	Dial Setting	Adjust	See Note
AM I-F VISUAL ALIGNMENT						
1	455 KC ±20 KC at 60 cps sweep rate	12BE6 grid (pin 7 of V2) thru .01 mfd.	AM	—	Two slugs of T5 for maximum amplitude and minimum distortion of curve.	3
2					Two slugs of T2 for maximum amplitude and minimum distortion of curve.	
FM I-F AND DISCRIMINATOR VISUAL ALIGNMENT						
3	10.7 MC ±300 KC at 60 cps sweep rate	12BA6 grid (pin 1 of V1) thru .01 mfd.	FM	—	Tuning slugs of T4 for maximum amplitude of curve, Fig. 2A.	1
4					Tuning slugs of T3 for maximum amplitude of curve, Fig. 2A.	
5		12BE6 grid (pin 1 of V2). See note 7.			Tuning slugs of T1 for maximum amplitude of curve, Fig. 2A.	1, 6
6		12BA6 grid (pin 1 of V3)			Primary of T6 for maximum amplitude of positive and negative peaks of output curve. Fig. 2B.		2
7					Secondary of T6 for vertical symmetry with respect to the mid-point horizontal trace. See Fig. 2B.	
8					Primary of T6 for straightest line between positive and negative peaks of output curve. See Fig. 2B.	

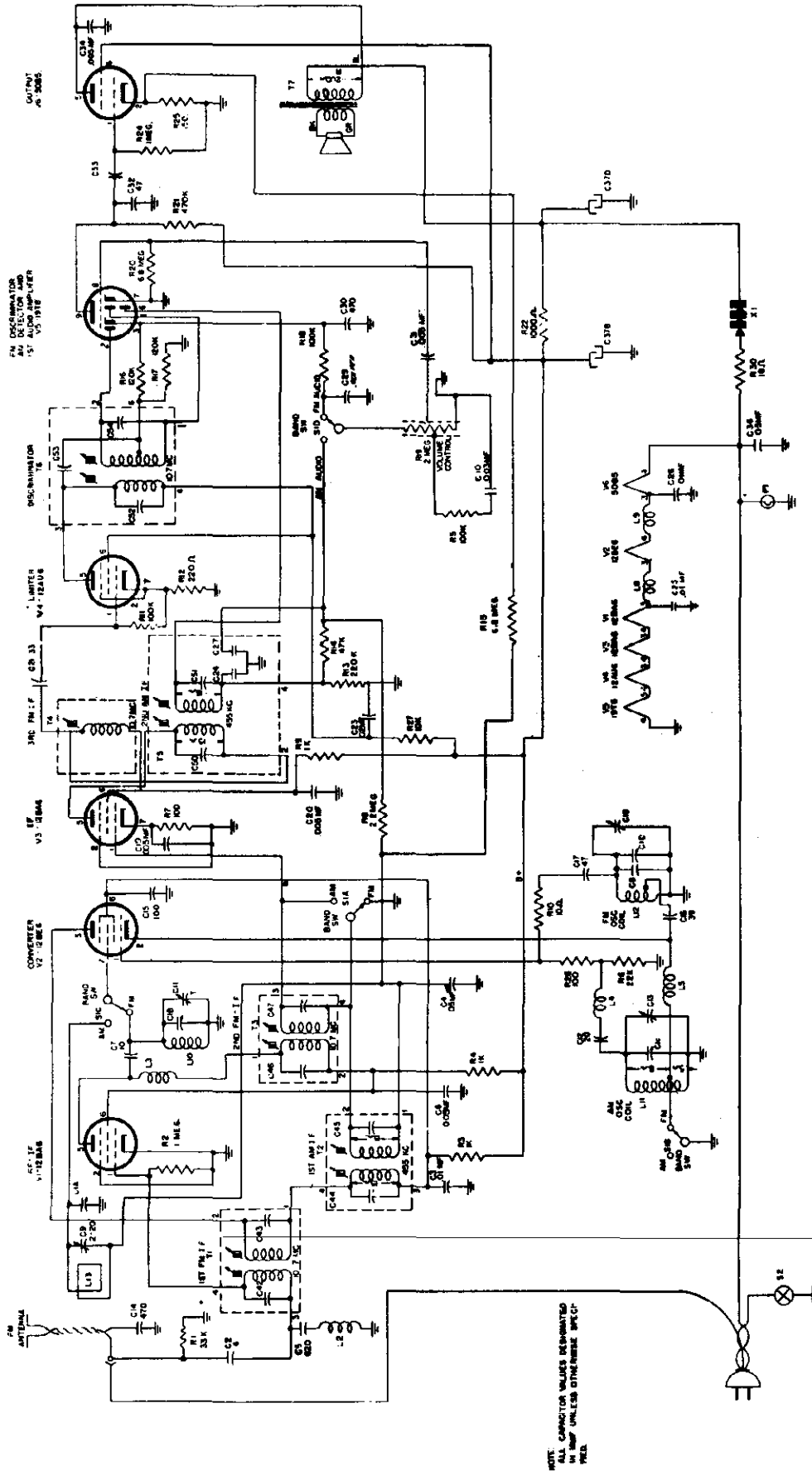


Fig. 5. Schematic diagram

NOTE:
ALL CAPACITOR VALUES DESIGNATED
IN SHIP UNLESS OTHERWISE SPECIFIED

MODEL 218 REPLACEMENT PARTS LIST

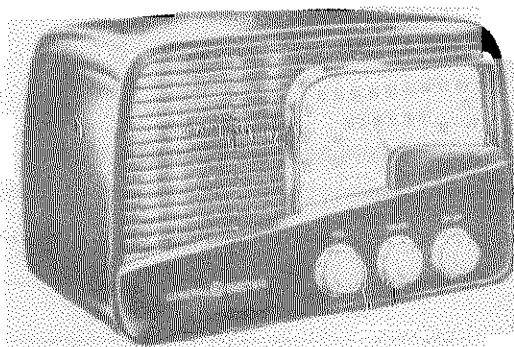
Cat. No.	Symbol	Description		Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS						
UCC-037	C10	CAPACITOR—.003 mfd., 600 v., paper		URD-033	R12	RESISTOR—220 ohms, $\frac{1}{2}$ w., carbon
UCC-039	C6, 19, 20, 31, 34	CAPACITOR—.005 mfd., 600 v., paper		URD-049	R3, 4, 9	RESISTOR—1000 ohms, $\frac{1}{2}$ w., carbon
UCC-040	C3, 23, 25, 26, 33	CAPACITOR—.01 mfd., 600 v., paper		URD-073	R27	RESISTOR—10,000 ohms, $\frac{1}{2}$ w., carbon
UCC-045	C4, 36	CAPACITOR—.05 mfd., 600 v., paper		URD-081	R6	RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon
UCU-001	C2	CAPACITOR—4 mmf., 500 v., mica		URD-085	R1	RESISTOR—33,000 ohms, $\frac{1}{2}$ w., carbon
UCU-020	C32	CAPACITOR—47 mmf., 500 v., mica		URD-089	R14	RESISTOR—47,000 ohms, $\frac{1}{2}$ w., carbon
UCU-028	C15	CAPACITOR—100 mmf., 500 v., mica		URD-097	R5, 11, 18	RESISTOR—100,000 ohms, $\frac{1}{2}$ w., carbon
UCU-044	C29, 30	CAPACITOR—470 mmf., 500 v., mica		URD-099	R16, 17	RESISTOR—120,000 ohms, $\frac{1}{2}$ w., carbon
UCU-516	C21	CAPACITOR—33 mmf., 500 v., mica		URD-105	R13	RESISTOR—220,000 ohms, $\frac{1}{2}$ w., carbon
UCU-2047	C5	CAPACITOR—620 mmf., 500 v., mica		URD-113	R21, 24	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon
UOP-577		SPEAKER		URD-121	R2	RESISTOR—1 meg., $\frac{1}{2}$ w., carbon
URD-001	R10	RESISTOR—10 ohms, $\frac{1}{2}$ w., carbon		URD-129	R8	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon
URD-007	R30	RESISTOR—18 ohms, $\frac{1}{2}$ w., carbon		URD-141	R15, 20	RESISTOR—5.8 meg., $\frac{1}{2}$ w., carbon
URD-025	R7, 28	RESISTOR—100 ohms, $\frac{1}{2}$ w., carbon		URE-029	R25	RESISTOR—150 ohms, 1 w., carbon
				URF-049	R22	RESISTOR—1000 ohms, 2 w., carbon

SPECIALIZED REPLACEMENT PARTS

RAB-104	L13	LOOP AND BACK ASSEMBLY		*RJS-118		SOCKET—9 prong tube socket for V5
RAU-309		CABINET—Brown		*RJS-125		SOCKET—7 prong tube socket for V1, V2, V3, V4, V6
RCE-101	C37A, 37B	CAPACITOR—80 mfd.—40 mfd., 150 v., electrolytic		RJX-033		SOCKET ASSEMBLY—For pilot light
RCT-038	C1A, 1B, 1C, 1D, C11, 13	CAPACITOR—Tuning capacitor		RJX-034		INTERLOCK ASSEMBLY—Female
*RCW-176	C14	CAPACITOR—470 mmf., Hi-K		*RLB-029	L10	COIL—FM r-f choke coil
*RCW-1043	C17	CAPACITOR—47 mmf.		RLC-092	L11	COIL—B-C oscillator coil
*RCW-1057	C16	CAPACITOR—39 mmf.		RLC-093	L12	COIL—FM oscillator coil
*RCW-1060	C7	CAPACITOR—10 mmf.		*RLI-085	L4, 8, 9	COIL—2 mmh. choke
*RCW-1070	C12	CAPACITOR—20 mmf., ceramic		RLI-087	L3, 5	COIL—5 mmh. choke
*RCW-1075	C8	CAPACITOR—4 mmf., ceramic		RLI-088	L2	COIL—FM antenna choke
RCY-055	C18	CAPACITOR—Trimmer		*RMS-035		SPRING—Dial cord tension
RCY-056	C9	CAPACITOR—2-20 mmf., trimmer		RUM-054		SHAFT—Tuning
*RDC-032		CORD—Dial cord		RRC-111	R19, S2	VOLUME CONTROL
RDK-177		KNOB AND BEZEL ASSEMBLY		*RSI-003		INTERLOCK ASSEMBLY—Male
*RDP-048		POINTER		*RSW-072	S1	BAND SWITCH
RDS-086		PLATE—Dial scale back plate		*RTD-006	T6	TRANSFORMER—Discriminator
RDW-029		WINDOW—For dial scale		RTL-097	T2	TRANSFORMER—1st BC i-f
*RER-001		RECTIFIER—Selenium rectifier		RTL-098	T5	TRANSFORMER—2nd BC i-f
*RHF-006	X1	CHASSIS FOOT		RTL-099	T1, 3	TRANSFORMER—1st and 2nd FM i-f
*RHH-002		STUD—Tri-mount				
RHH-004		SNAP FASTENER		RTL-100	T4	TRANSFORMER—3rd FM i-f
RII-028		INSULATOR—Pointer insulator		*RTO-039	T7	TRANSFORMER—Output
RIX-001		BRACKET—Tuning shaft bracket and insulating strip		RWL-022		POWER CORD—3 wire

*USED ON PREVIOUS RECEIVERS

MODEL 218,
"H" Version



MODEL 218 "H" VERSION

CAUTION

ALWAYS USE AN ISOLATION TRANSFORMER IN THE RECEIVER POWER LINE, WHEN SERVICING OR ALIGNING THIS RECEIVER, TO PROTECT TEST EQUIPMENT.

SPECIFICATIONS

CABINET

Material..... plastic
Color..... mahogany
Height..... 8 $\frac{3}{4}$ inches
Width..... 13 $\frac{3}{4}$ inches
Depth..... 6 $\frac{1}{4}$ inches

ELECTRICAL

Voltage..... 105-125 v. AC or DC
Frequency on AC..... 50 to 60 cps
Wattage..... 33 watts

TUNING RANGE

AM..... 540-1620 kc
FM..... 88-108 mc

INTERMEDIATE FREQUENCIES

AM..... 455 kc
FM..... 10.7 mc

POWER OUTPUT (120 VOLTS LINE)

Undistorted..... 1.1 watts
Maximum..... 1.8 watts

LOUDSPEAKER

Type..... permanent magnet
Cone Diameter..... 5 $\frac{1}{4}$ inches
Voice Coil Impedance at 400 cps..... 3.2 ohms

TUBE COMPLEMENT

(V1) FM R-F and 1st I-F Amplifier..... 12BA6
(V2) Oscillator and Converter..... 12BE6
(V3) I-F Amplifier..... 12BA6
(V4) Limiter..... 12AU6
(V5) FM Discriminator, AM Detector and Audio Amplifier..... 19T8
(V6) Power Output..... 50B5

ANTENNA

AM..... loop antenna
FM..... power line antenna or 300-ohm FM antenna

GENERAL

Model 218 "H" version is a table model receiver providing reception on the AM and FM bands. It is housed in a mahogany colored plastic cabinet.

It is the same as the Model 218 except that the local oscillator is designed to operate on the high side of the incoming signal on FM reception. This change reduces the possibility of local oscillator radiation interfering with television reception.

The receiver has a built-in FM power line antenna; to operate from this antenna it is necessary to connect the brown wire coming out of the cabinet back to the right-hand screw of the antenna terminal strip.

On AM operation, the AM r-f signal is fed directly into the grid of the converter V2 through the 1st AM i-f transformer T2 into the grid of V3. From V3 the signal is fed to the second AM i-f transformer T5 and is detected by a diode section of V5 which is pin 6. The secondary of T1 which is in series with the primary of T2 offers a low impedance to the AM i-f frequency.

V1 (12BA6) in the FM reflex circuit acts both as an r-f and an i-f amplifier. The r-f signal is put into the grid (pin 1) of V1 through the secondary of T1. It is amplified by V1 and put into the grid of V2 the converter through capacitor C7. Choke L3 prevents the r-f signal from getting into the second FM i-f transformer T3. The 10.7 mc FM i-f is fed from the plate of V2 to the primary of T1 the 1st FM i-f transformer which now puts the FM i-f signal onto the grid of V1. From the plate of V1 the FM i-f signal is fed through choke L3 to the primary of T3 through to the grid of V3. The plate of V3 feeds the FM i-f signal through C50 in the primary of T5 to the 3rd FM i-f tuning coil T4 and through C21 to the grid of the limiter grid pin 1 of V4. The FM i-f signal is detected in T6 discriminator transformer and two diode sections of V5, pins 1 and 2.

ALIGNMENT

For the Model 218 receivers "H" version, the alignment remains the same as that outlined for Model 218 in service notes ER-S-218. However, the calibration will change in the "H" version receiver which necessitates the use of a new back plate, Stock No. RDS-093.

REPLACEMENT PARTS

All parts for the Model 218 "H" version are identical to those listed in Service Notes ER-S-218 except for those parts listed below.

Cat. No.	Sym- bol	Description
*URD-069	R31	RESISTOR -6800 ohms, $\frac{1}{2}$ w.
*RCW-1077	C61	CAPACITOR - 22 mmf., ceramic
*RCW-2027	C60	CAPACITOR -15 mmf., ceramic
RDS-093		DIAL SCALE -Model 218 "H" back plate dial scale
RLC-102	L14	COIL -FM oscillator coil
RTD-010	T8	TRANSFORMER -Discriminator IF transformer
URD-077	R32	RESISTOR -15,000 ohms, $\frac{1}{2}$ w.

MODEL 218,
"H" Version

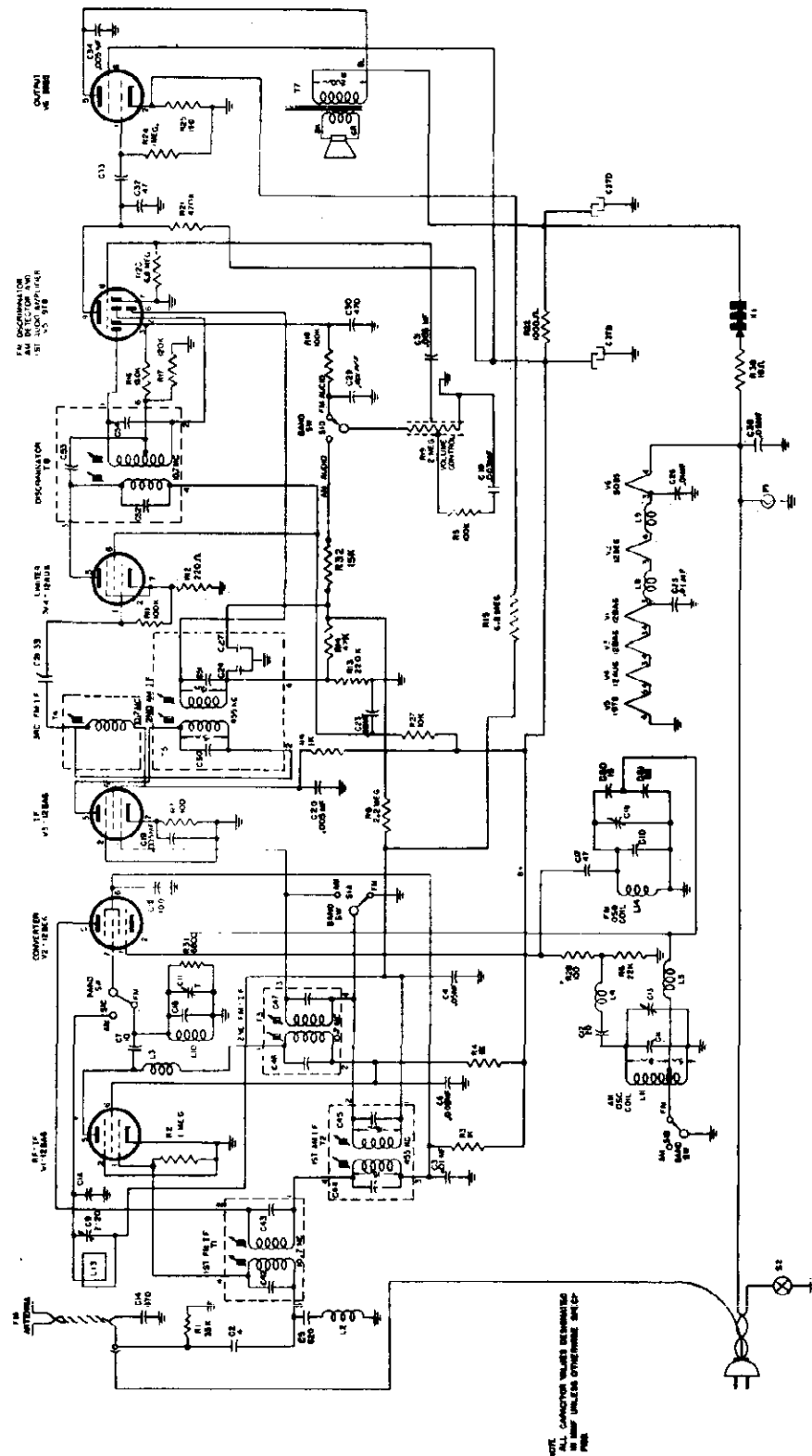
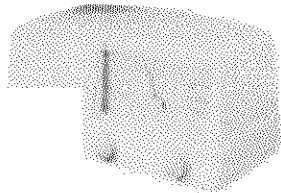
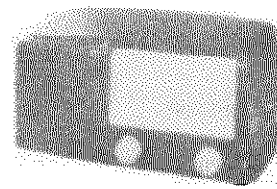


Fig. 1. Schematic Diagram, Model 218 "H" Version

MODELS 400,
401, 411



MODEL 401



MODELS 400, 411

SPECIFICATIONS

CABINET	Model	400	411	401
	Material	Brown	Maroon	Ivory
ELECTRICAL RATING	Height		6 1/8 in.	
	Width		12 1/2 in.	
	Depth		7 1/4 in.	
OPERATING FREQUENCIES	Voltage	105-125		
	Frequency	50-60 cycles or DC		
POWER OUTPUT	Wattage	26 watts at 117 volts input		
LOUDSPEAKER	Standard Broadcast	540-1600 kc		
	I-F Amplifier	455 kc		
TUBE COMPLEMENT	Undistorted	1 watt		
	Maximum	1.75 watts		
TUBE COMPLEMENT	Type	Alnico V PM		
	Outside Cone Diameter	4 inches		
TUBE COMPLEMENT	Voice Coil Impedance at 400 Cycles	3.2 ohms		
TUBE COMPLEMENT	(V1) Oscillator-Converter	12SA7		
	(V2) I-F Amplifier	12BA6		
	(V3) Detector-Audio	12SQ7		
	(V4) Rectifier	35W4		
	(V5) Audio Power Amplifier	50C5		
	(I1) Pilot Lamp	G-E Mazda No. 47		

GENERAL INFORMATION

The Models 400, 401 and 411 are five-tube a-c or d-c super-heterodyne AM standard broadcast receivers equipped with an efficient built-in antenna loop and incorporating automatic volume control, a permanent magnet speaker, and beam power output.

ELECTRICAL CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED

1. Test oscillator, tone amplitude-modulated.
2. A-C output meter, 1 1/2 volts full scale.
3. .05 mfd., paper capacitor.
4. Insulated screwdriver.
5. Coupling loop for test oscillator (see text).
6. Isolation power transformer.

ALIGNMENT PROCEDURE

The alignment steps are given in the table form of the Alignment Chart. Adjustment trimmers are shown in the illustration of Fig. 2.

1. The chassis is removed from the cabinet with the antenna loop and back attached and the speaker leads reconnected.
2. An isolation transformer should be used for the receiver power source when aligning or servicing, AC-DC receivers, to prevent short circuiting of equipment and shock hazard.
3. The output meter is connected across the terminals of the loudspeaker voice coil.
4. The receiver volume control should be turned to maximum and test oscillator signal output attenuated during alignment to develop not more than 1 1/4 volts output meter reading at the loudspeaker.
5. For i-f alignment, the high side of the signal generator output cable should be connected through a .05 mfd. paper ca-

pacitor to the points indicated in the Alignment Chart. The low side of the output cable is connected to the receiver chassis.

6. To align the oscillator and r-f trimmers, the signal generator output is inductively coupled to the radio loop, L1, by connecting a four-turn, six-inch diameter loop of bell wire across its output terminals and then locating the loop about one foot from the radio loop antenna. To prevent possible errors in comparative peak readings, the position of signal generator loop with respect to the radio loop antenna should not be changed during measurement.

ALIGNMENT CHART

Step	Connect Test Oscillator to:	Test Osc. Setting	Radio Dial Setting	Adjust Trimmers For Maximum
I-F ALIGNMENT				
1	V2, 12BA6 grid (Pin 1), in series with .05 mfd.	455 KC		C9 and C8 of second i-f transformer, T3
2	V1, 12SA7 grid (Pin 8), in series with .05 mfd.	455 KC		C6 and C5 of first i-f transformer, T2
3	V1, 12SA7 grid (Pin 8), in series with .05 mfd.	455 KC		Recheck adjustment of C9, C8, C6, C5, for maximum
R-F ALIGNMENT				
4	Inductively coupled to radio loop	1620 KC	Minimum capacity C2A, C2B	C3, oscillator trimmer
5	Inductively coupled to radio loop	1500 KC	1500 KC	C1, r-f trimmer

STAGE GAINS AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring device may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20 per cent. Readings are taken with low signal input so that AVC is not effective.

1. I-F GAIN

- 12SA7 Grid to 12BA6 Grid. 50 @ 455 KC
12BA6 Grid to 12SQ7 Diode Plate. 50 @ 455 KC

2. AUDIO GAIN

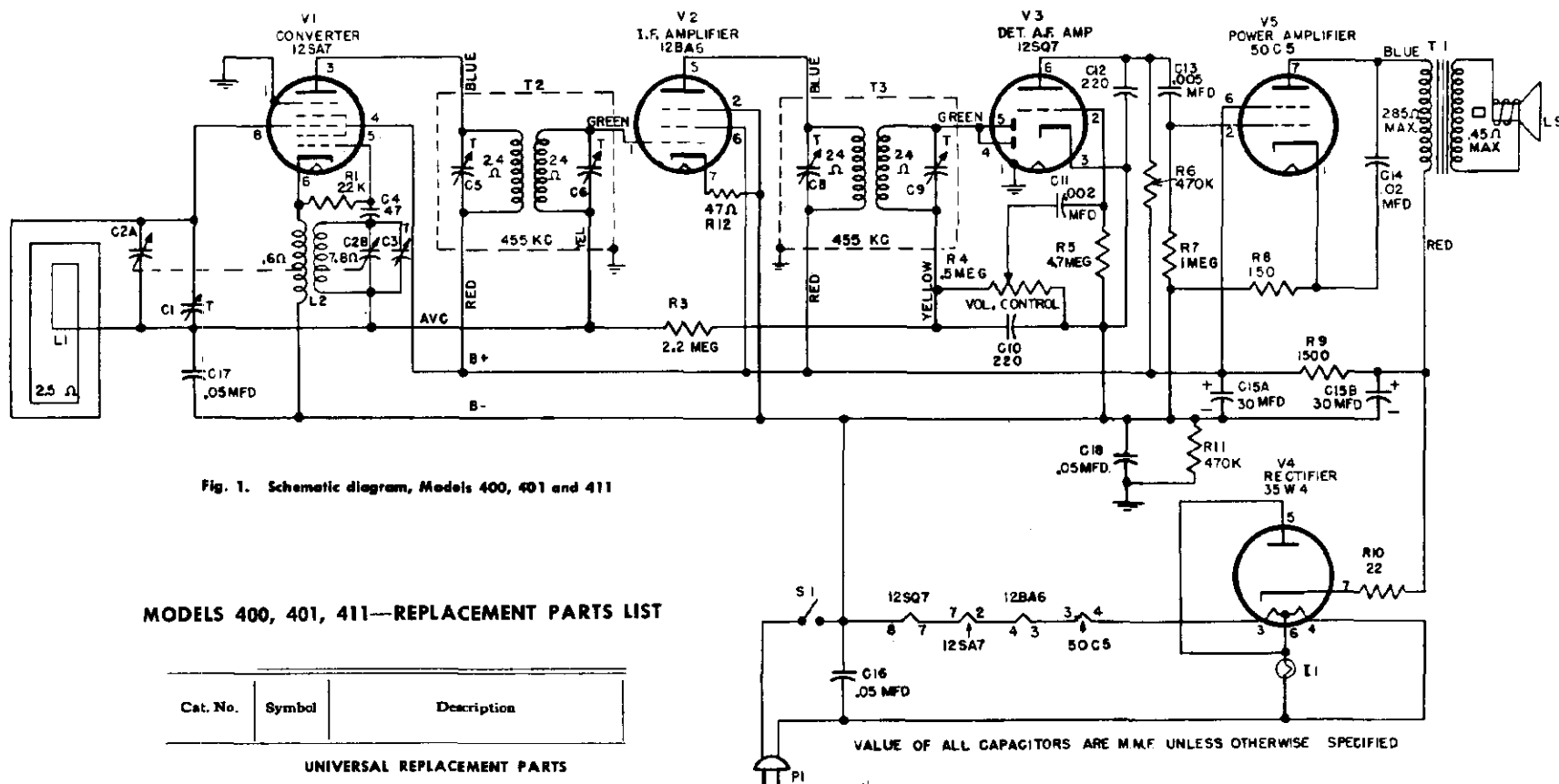
Input of 0.15 volts at 400 cycles across volume control (R4) with control set at maximum will develop approximately 1/2 watt output across the speaker voice coil terminals.

3. OSCILLATOR GRID BIAS

D-C voltage developed across the oscillator grid leak (R1) averages 8.5 volts at 1000 kc.

4. TUBE SOCKET PIN VOLTAGES

Fig. 3 shows voltages from tube pins to B-. Voltage readings differing greatly from those specified may help localize defective components.



MODELS 400, 401, 411—REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description
----------	--------	-------------

UNIVERSAL REPLACEMENT PARTS

*UCC-041	C14	CAPACITOR—02 mfd., 600 v., paper
*UCC-045	C16, C17, C18	CAPACITOR—.05 mfd., 600 v., paper
*UCC-020	C4	CAPACITOR—47 mmf., 600 v., mica
*URD-009	R10	RESISTOR—22 ohms, $\frac{1}{2}$ w., carbon
*URD-017	R12	RESISTOR—47 ohms, $\frac{1}{2}$ w., carbon
*URD-029	R8	RESISTOR—150 ohms, $\frac{1}{2}$ w., carbon
*URD-081	R1	RESISTOR—22K ohms, $\frac{1}{2}$ w., carbon
*URD-113	R6, R11	RESISTOR—470K ohms, $\frac{1}{2}$ w., carbon
*URD-121	R7	RESISTOR—1 meg., $\frac{1}{2}$ w., carbon
*URD-129	R3	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon
*URD-137	R5	RESISTOR—4.7 meg., $\frac{1}{2}$ w., carbon
*URF-053	R9	RESISTOR—1500 ohms, 2 w., carbon
*S403D	LS1	SPEAKER, PM SPEAKER—4 inch

SPECIALIZED REPLACEMENT PARTS

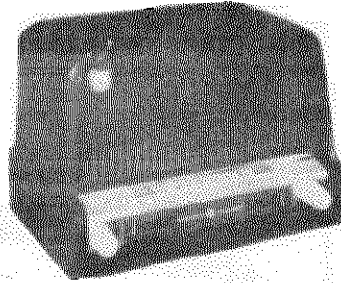
*RAB-095	L1	LOOP BACK
*RAU-306		CABINET (400) (Brown)
*RAU-307		CABINET (401) (Ivory)
*RAU-321		CABINET (411) (Maroon)
*RCB-046	C15A, C15B, C1, C2A, C2B, C3	ELECTROLYTIC CAPACITOR—30-30 mfd., 150 v.
RCT-042		TUNING CAPACITOR

* Used on previous models.

SPECIALIZED REPLACEMENT PARTS (Cont'd)

*RCW-3013	C10, 11, 12, 13	CAPACITOR—BULL PLATE, .002 mf., 220 mmf., 220. mmf., and .005 mfd.
*RDC-032		DIAL CORD—25 yards
*RDK-174		KNOB (400) (Wheat)
*RDK-175		KNOB (401, 411) (Maroon)
*RDP-052		POINTER—Dial pointer
*RDS-095		BACK PLATE AND DIAL SCALE
*RDW-021		WINDOW—Dial window
*RHC-017		CLIP—Oscillator mounting
*RHG-018		GROMMET (For mounting tuning capacitor)
*RHH-002		TRIMONT STUD (For mounting dial glass)
*RHJ-007		SPACER (For mounting tuning capacitor)
*RJS-003		TUBE SOCKET—For V1 and V3
*RJS-092		TUBE SOCKET—For V4
*RJS-141		TUBE SOCKET—For V2
*RJX-031		PILOT LIGHT SOCKET ASSEMBLY
*RLC-090		OCCILLATOR COIL
*RMS-118		SPRING—Drum spring
*RMX-170		DRIVE SHAFT BUSHING ASSEMBLY
*RRC-106		VOLUME CONTROL AND SWITCH
*RTL-094	T2	1st I.F. TRANSFORMER
*RTO-095	T3	2nd I.F. TRANSFORMER
*RTO-069	T1	OUTPUT TRANSFORMER
*RWL-009		POWER CORD





SPECIFICATIONS

CABINET	Material.....Plastic (brown)
	Height.....8 $\frac{3}{8}$ in.
ELECTRICAL RATING	Width.....13 $\frac{1}{8}$ in.
	Depth.....8 in.
ELECTRICAL RATING	Voltage.....105-125
	Frequency.....50-60 cycles or DC
OPERATING FREQUENCIES	Wattage.....25 at 117 volts input
	Standard Broadcast.....540-1600 kc
POWER OUTPUT	I-F Amplifier.....455 kc
	Undistorted.....1 watt
LOUDSPEAKER	Maximum.....1.75 watts
	Type.....Alnico V PM
TUBE COMPLEMENT	Outside Cone Diameter.....5 $\frac{1}{2}$ inches
	Voice Coil Impedance at 400 Cycles 3.2 ohms
TUBE COMPLEMENT	(V1) Oscillator-Converter.....12SA7
	(V2) I-F Amplifier.....12BA6
TUBE COMPLEMENT	(V3) Detector-Audio.....12SQ7
	(V4) Rectifier.....35Z5GT
TUBE COMPLEMENT	(V5) Audio Power Amplifier.....50L6GT
	(I1) Pilot Lamp.....G-E Mazda No. 47

GENERAL INFORMATION

The Model 402 is a four-tube (plus rectifier tube) a-c or d-c superheterodyne AM standard broadcast receiver equipped with an efficient built-in antenna loop and incorporating automatic volume control, an oversize permanent magnet speaker, and beam power output.

ELECTRICAL CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED

1. Test oscillator, tone amplitude-modulated.
2. A-C output meter, 1 $\frac{1}{2}$ volts full scale.
3. .05 mfd., paper capacitor.
4. Insulated screwdriver.
5. Coupling loop for test oscillator (see text).
6. Isolation power transformer.

ALIGNMENT PROCEDURE

The alignment steps are given in the table form of the Alignment Chart. Adjustment trimmers are shown in the illustration of Fig. 3.

1. The chassis is removed from the cabinet with the antenna loop and back attached and the speaker leads reconnected.
2. An isolation transformer should be used for the receiver power source when aligning or servicing AC-DC receivers, to prevent short circuiting of equipment and shock hazard.
3. The output meter is connected across the terminals of the loudspeaker voice coil.
4. The receiver volume control should be turned to maximum and test oscillator signal output attenuated during alignment to develop not more than 1 $\frac{1}{4}$ volts output meter reading at the loudspeaker.
5. For i-f alignment, the high side of the signal generator output cable should be connected through a .05 mfd. paper capacitor to the points indicated in the Alignment Chart. The low side of the output cable is connected to the receiver chassis.

6. To align the oscillator and r-f trimmers, the signal generator output is inductively coupled to the radio loop, L1, by connecting a four-turn, six-inch diameter loop of bell wire across its output terminals and then locating the loop about one foot from the radio loop antenna. To prevent possible errors in comparative peak readings, the position of signal generator loop with respect to the radio loop antenna should not be changed during measurement.

ALIGNMENT CHART

Step	Connect Test Oscillator to:	Test Osc. Setting	Radio Dial Setting	Adjust Trimmers For Maximum
I-F ALIGNMENT				
1	V2, 12BA6 grid (Pin 1), in series with .05 mfd.	455 KC	.....	C9 and C8 of second i-f transformer, T3
2	V1, 12SA7 grid (Pin 8), in series with .05 mfd.	455 KC	.....	C6 and C5 of first i-f transformer, T2
3	V1, 12SA7 grid (Pin 8), in series with .05 mfd.	455 KC	.....	Recheck adjustment of C9, C8, C6, C5, for maximum
R-F ALIGNMENT				
4	Inductively coupled to radio loop	1620 KC	Minimum capacity C2A, C2B	C3, oscillator trimmer
5	Inductively coupled to radio loop	1500 KC	1500 KC	C1, r-f trimmer

STAGE GAINS AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring device may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20 per cent. Readings are taken with low signal input so that AVC is not effective.

1. I-F GAIN

12SA7 Grid to 12BA6 Grid.....50 @ 455 KC
12BA6 Grid to 12SQ7 Diode Plate.....50 @ 455 KC

2. AUDIO GAIN

Input of 0.15 volts at 400 cycles across volume control (R4) with control set at maximum will develop approximately $\frac{1}{2}$ watt output across the speaker voice coil terminals.

3. OSCILLATOR GRID BIAS

DC voltage developed across the oscillator grid leak (R1) averages 8.5 volts at 1000 kc.

4. TUBE SOCKET PIN VOLTAGES

Fig. 5 shows voltages from tube pins to B-. Voltage readings differing greatly from those specified may help localize defective components.

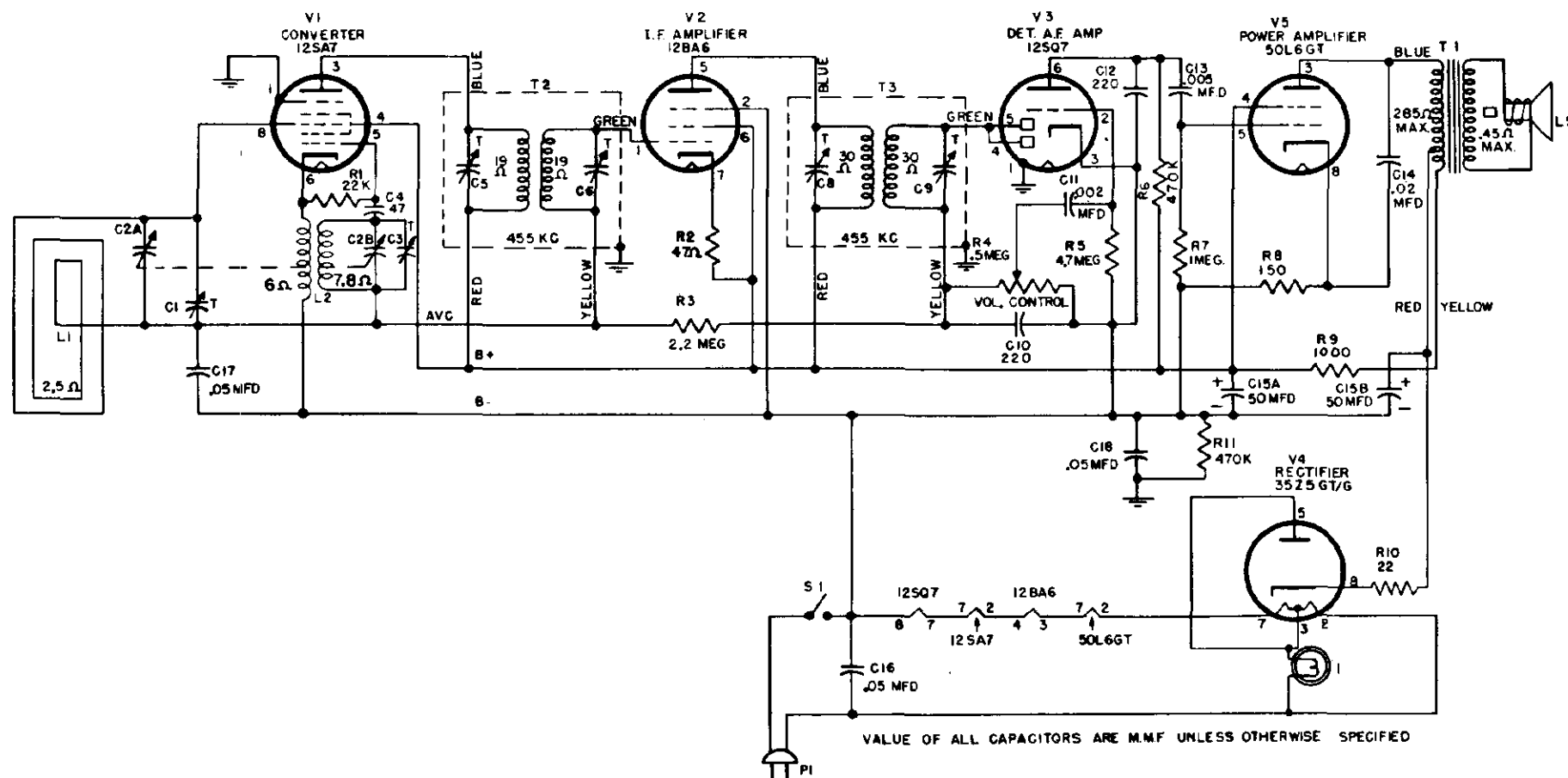


Fig. 1. Schematic Diagram, Model 402

CAPACITORS C10, 11, 12, AND C13

UNIT K67J836

Some production receivers use a four-section ceramic unit incorporating capacitors C10, 11, 12 and C13. The ceramic unit, RCW-3013, is illustrated in Fig. 2 for lead identification to capacitor sections and chassis circuit wiring. Other receivers may be found to have individual component capacitors in place of the four-section ceramic unit.

REPLACEMENT

If in a circuit analysis the ceramic unit is found to be defective; the entire unit may be replaced by the identical part RCW-3013 or, the defective section may be located and disconnected from the receiver circuit and the equivalent single components used in its place. The alternate capacitors are listed in the parts section as follows: UCC-036, C11, UCC-039, C13; and UCU-1036, C10 or C12.

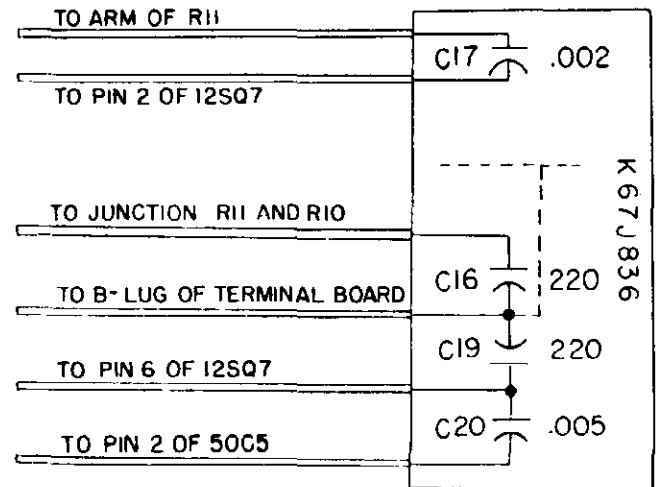


Fig. 2. Capacitor RCW-3013 (K67J836)

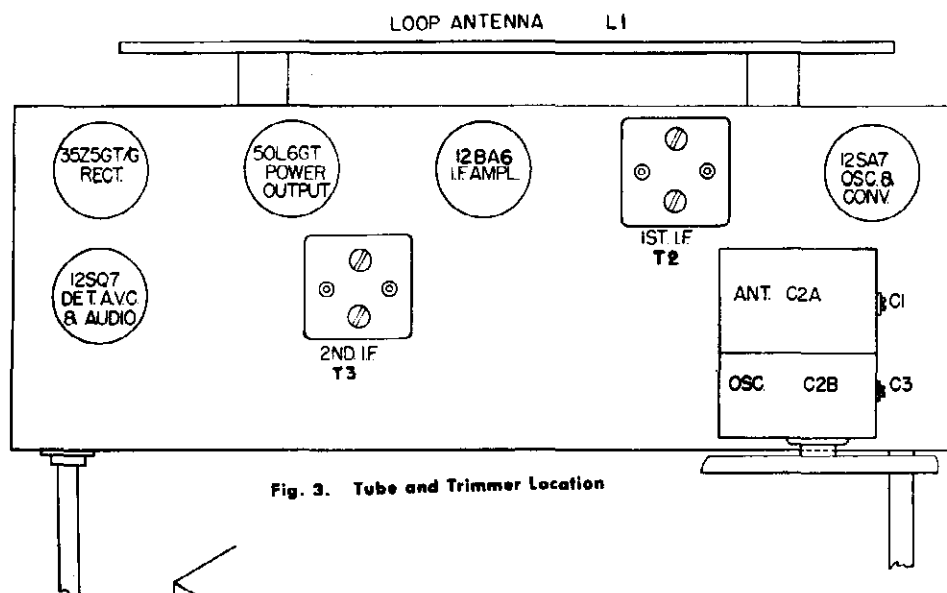


Fig. 3. Tube and Trimmer Location

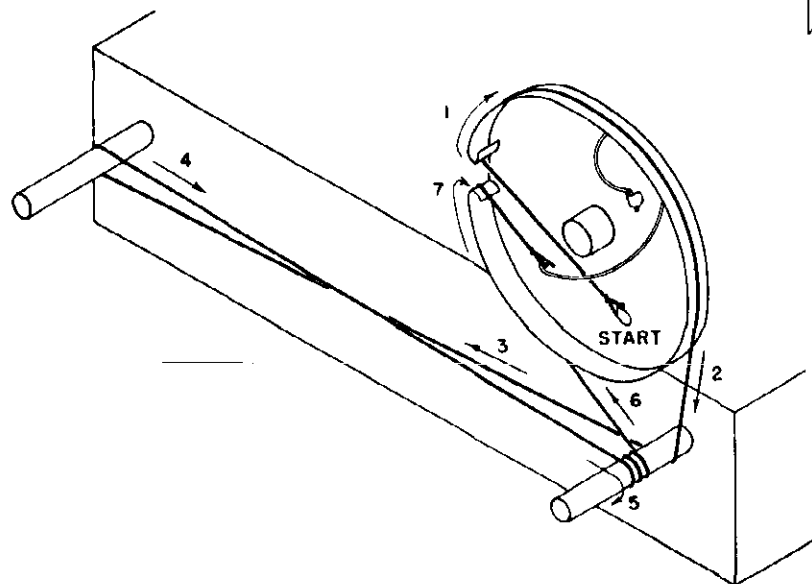


Fig. 4. Dial Stringing Diagram

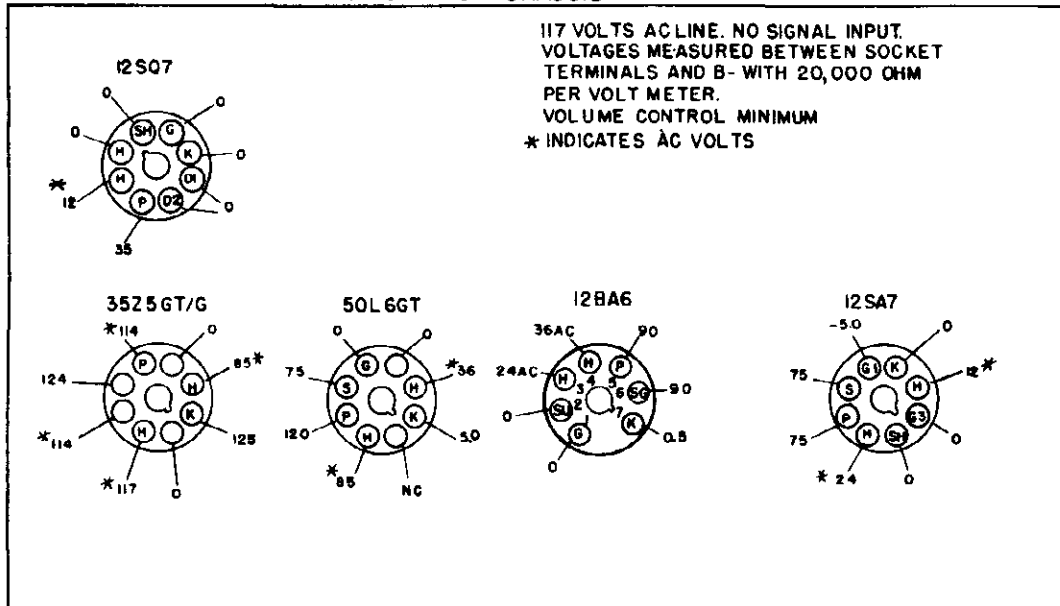
MODEL 402

MODEL 402 PRELIMINARY REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS			SPECIALIZED REPLACEMENT PARTS (CONT'D)		
*UCC-041 UCC-036	C14 C11	CAPACITOR—.01 mf., 600 v., paper CAPACITOR—.002 mf., 600 v., paper (alternate replacement for C11 of RCW-3013)	*RCE-050	C15A, B	CAPACITOR—Electrolytic—50 mf., 150 v., 50 mf., 150 v.
UCC-039	C13	CAPACITOR—.005 mf., 600 v., paper (alternate replacement for C13 of RCW-3013)	*RCT-036 *RCW-3013	C2A, B C10, 11, 12, 13	CAPACITOR—Tuning CAPACITOR—.220 mmf., .002 mf., 220 mmf., .005 mf. respectively (Bull Plate)
*UCC-045	C15, C17, C18	CAPACITOR—.05 mf., 600 v., paper	*RDC-032 *RDK-181 *RDP-049 *RDS-096 *RHC-017 *RHC-024 *RHG-018 *RHH-004 *RHJ-007 *RHM-039 *RHM-046 *RJC-004 *RJS-003 *RJS-141 *RJS-096 *RLC-090 *RMS-118 *RMX-149	L2	DIAL CORD—Quantity, 25 yds. KNOB—Volume or tuning control POINTER—Dial scale pointer DIAL SCALE CLIP—Osc. coil clip for L2 CLIP—(capacitor mounting) 1 in. GROMMET (Tuning Gang mounting) SNAP FASTENER (For Loop Back) SPACER (Tuning Gang Mounting) CLIP—(Pilot light) 1/2 in. MOUNTING CLIP (Dial scale) CLIP (Antenna loop connecting clip) TUBE SOCKET—For V1, 3, 4 and 5 TUBE SOCKET—For V2 PILOT LIGHT SOCKET OSCILLATOR COIL DRUM SPRING (Dial cord spring) TUNING SHAFT AND BUSHING ASSEMBLY VOLUME CONTROL AND SWITCH 1st I.F. TRANSFORMER 2nd I.F. TRANSFORMER OUTPUT TRANSFORMER POWER CORD SPEAKER—5 1/2 in.
*UCU-020 UCU-1036	C4 C10, C12	CAPACITOR—47 mmf., 500 v., mica CAPACITOR—.220 mmf., mica (alternate replacement for C10 or C12 of RCW-3013)	*RRC-077 *RTL-092 *RTL-093 *RTO-078 *RWL-009 S527D	R4, S1 T2 T3 T1	
*URD-009 URD-017 *URD-029 *URD-081 *URD-113	R10 R2 R8 R1 R6, R11	RESISTOR—22 ohms, 1/2 w., carbon RESISTOR—47 ohms, 1/2 w., carbon RESISTOR—150 ohms, 1/2 w., carbon RESISTOR—22,000 ohms, 1/2 w., carbon RESISTOR—470,000 ohms, 1/2 w., carbon			
*URD-121 *URD-129 *URD-137 *URF-049	R7 R3 R5 R9	RESISTOR—1 megohm, 1/2 w., carbon RESISTOR—2.2 megohms, 1/2 w., carbon RESISTOR—4.7 megohms, 1/2 w., carbon RESISTOR—1000 ohms, 2 w., carbon			
SPECIALIZED REPLACEMENT PARTS					
*RAB-108	L1	CABINET BACK AND LOOP ASSEMBLY			
*RAU-311		CABINET—(brown)			

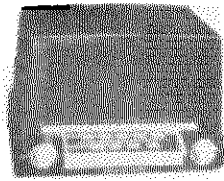
*Used on previous Models.

FRONT OF CHASSIS

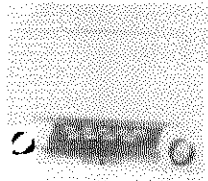


BOTTOM VIEW OF CHASSIS

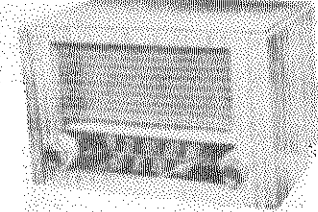
Fig. 5. Socket Voltages

MODELS 404,
405, 410

MODEL 404



MODEL 405



MODEL 410

SPECIFICATIONS

CABINET:	Model	404	405	410
	Composition	Brown, plastic	Ivory, plastic	Wood, mah.
	Height	8 $\frac{3}{4}$ in.		9 $\frac{1}{8}$ in.
	Width	7 $\frac{1}{4}$ in.		7 in.
	Length	13 in.		13 $\frac{1}{4}$ in.
POWER SUPPLY:	Voltage	105-120 volts		
	Frequency	50-60 cycles or DC		
	Voltage	30 watts		
OPERATING FREQUENCIES:	Broadcast Band	540-1600 KC		
	IF Amplifier	455 KC		
POWER OUTPUT:	Undistorted	1 watt		
	Maximum	1.75 watts		
LOUDSPEAKER:	Type	Alnico 5 PM		
	Outside Cone Diameter	5 $\frac{1}{4}$ inches		
	Voice coil impedance at 400 cycles	3.2 ohms		
TUBE COMPLEMENT:	Symbol	Purpose	Type	
	V1	RF Amplifier	12SK7	
	V2	Oscillator Converter	12SA7	
	V3	IF Amplifier	12BA6	
	V4	Detector-Audio Amplifier	12SQ7	
	V5	Rectifier	35Z5	
	V6	Audio Power Amplifier	35L6GT	
	I1	Pilot Lamp	GE Mazda No. 47	

STAGE GAINS AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring device may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of ± 20 per cent. Readings are taken with low signal input so that AVC is not effective.

1. I-F Gain

12SA7 Grid to 12BA6 Grid 50 @ 455 KC
12BA6 Grid to 12SQ7 Diode Plate 50 @ 455 KC

2. Audio Gain

Input of 0.15 volts at 400 cycles across volume control (R6) with control set at maximum will develop approximately $\frac{1}{2}$ watt output across the speaker voice coil terminals.

3. Oscillator Grid Bias

D-C voltage developed across the oscillator grid leak (R4) averages 8.5 volts at 1000 kc.

4. Tube Socket Pin Voltages

Fig. 3 shows voltages from tube pins to B-. Voltage readings differing greatly from those specified may help localize defective components.

RCW-3036, Bull Plate K71J736

The lead connections for the three-section ceramic capacitor unit containing C11, C12 and C13 are identified from the illustration of Fig. 4.

Replacement

The three-section unit is cataloged RCW-3036 in the parts list for direct replacement. However, any single section may be replaced by one of the single unit capacitors cataloged for the respective capacitor symbol. These items are: UCC-037, C11; UCC-039, C13; and UCU-1036, C12.

ELECTRICAL CIRCUIT ALIGNMENT

Equipment required:

1. Test oscillator with tone modulation
2. AC voltmeter, 1 $\frac{1}{2}$ volts full scale.
3. Paper capacitor, 0.05 mf.
4. Insulated screwdriver.
5. Coupling loop for test oscillator (see text).
6. Isolation transformer.

Alignment Procedure

The alignment steps are given in table form of the Alignment Chart. Adjustment trimmers are shown in the illustration of Fig. 5.

1. The chassis is removed from the cabinet with the antenna loop and back attached and the speaker leads reconnected.

2. An isolation transformer should be used for the receiver power source when aligning or servicing AC-DC receivers to prevent short circuiting of equipment and shock hazard.

3. The output meter is connected across the terminals of the loudspeaker voice coil.

4. The receiver volume control should be turned to maximum and test oscillator signal output attenuated during alignment to develop not more than 1 $\frac{1}{4}$ volts output meter reading at the loudspeaker.

5. For i-f alignment, the high side of the signal generator output cable should be connected through a .05 mfd. paper capacitor to the points indicated in the Alignment Chart. The low side of the output cable is connected to the receiver chassis.

6. To align the oscillator and r-f trimmers, the signal generator output is inductively coupled to the radio loop, L1, by connecting a four-turn, six-inch diameter loop of bell wire across its output terminals and then locating the loop about one foot from the radio loop antenna. To prevent possible errors in comparative peak readings, the position of signal generator loop with respect to the radio loop antenna should not be changed during measurement.

ALIGNMENT CHART

Step	Connect Test Oscillator to:	Test Osc. Setting	Radio Dial Setting	Adjust Trimmers for Maximum
------	-----------------------------	-------------------	--------------------	-----------------------------

I-F ALIGNMENT

1	V3, 12BA6 grid (Pin 1), in series with 0.5 mfd.		.....	C9 and C8 of second i-f transformer, T3.
2		455 KC	.....	C7 and C6 of first i-f transformer, T2.
3	V2, 12SA7 grid (Pin 8), in series with .05 mfd.		.....	Recheck adjustment of C9, C8, C7, C6, for maximum

R-F ALIGNMENT

4	Inductively coupled to radio loop.	1620 KC	Minimum capacity C1A, C1B	C3, oscillator trimmer
5		1500 KC	Tune for Maximum	C1, r-f trimmer C2, ant. trimmer

MODELS 404,
405, 410

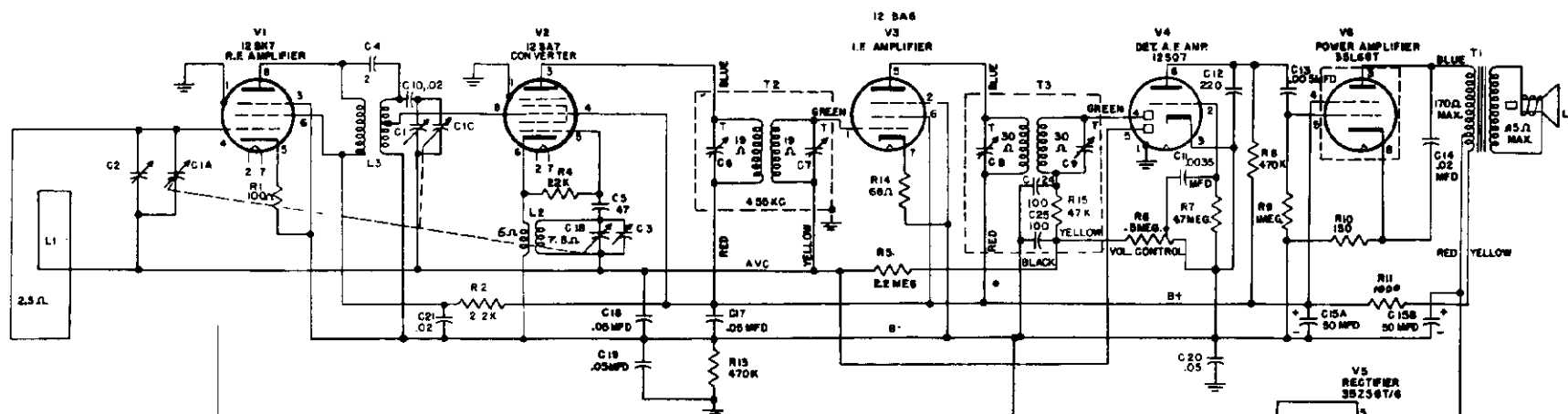
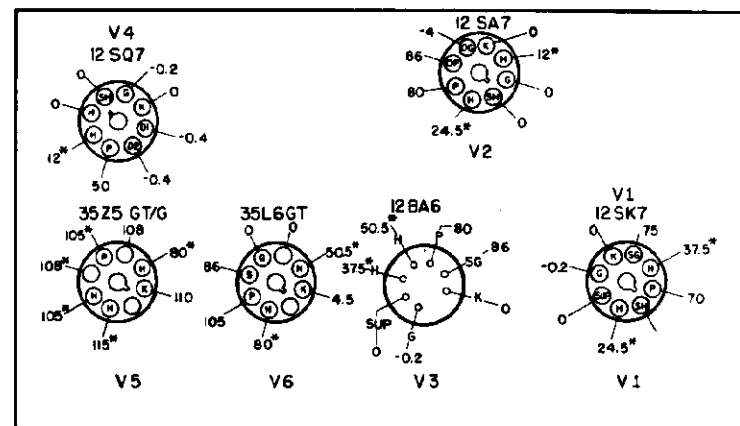
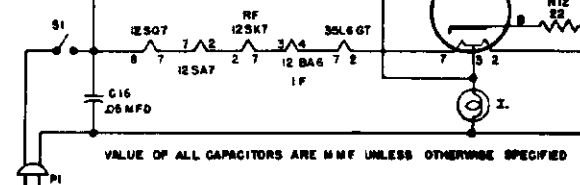
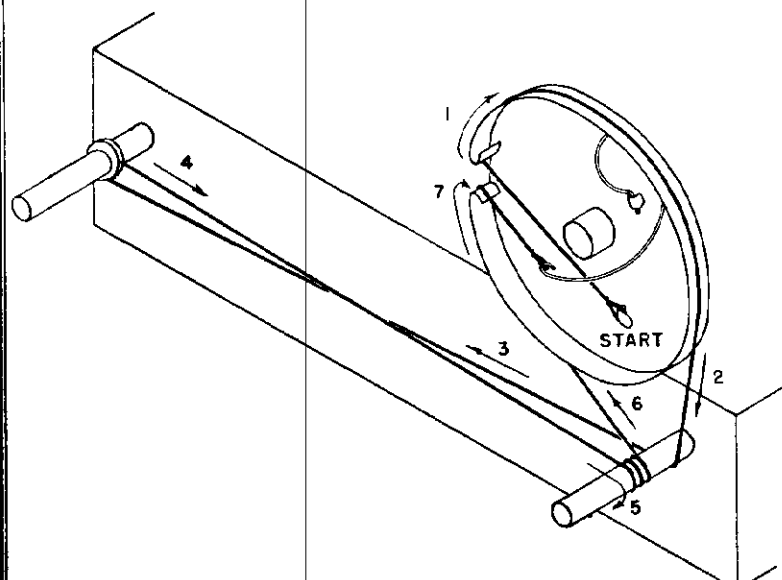


Fig. 2. Schematic Diagram, Models 404, 405 and 410

Fig. 1. Dial Stringing Diagram



117 VOLTS AC LINE, NO SIGNAL INPUT. BOTTOM VIEW OF CHASSIS
VOLTAGES MEASURED BETWEEN
SOCKET TERMINALS AND B- WITH
20,000 OHMS PER VOLT METER.
VOLUME CONTROL MINIMUM
* INDICATES AC VOLTS.

Fig. 3. Socket Voltage Diagram

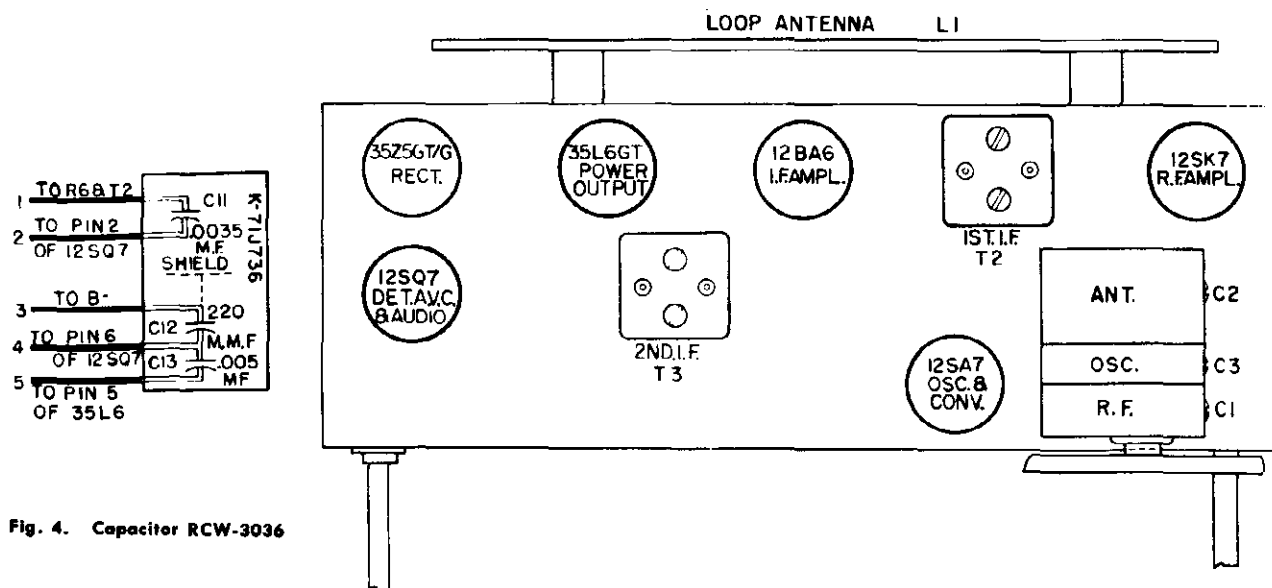
MODELS 404,
405, 410

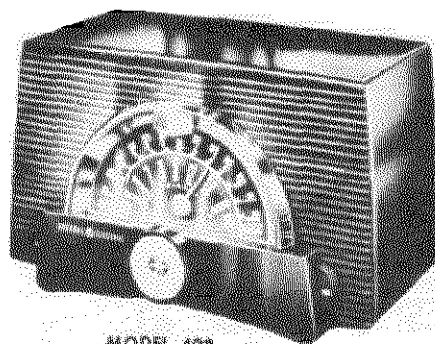
Fig. 4. Capacitor RCW-3036

Fig. 5. Tube and Trimmer Location

MODELS 404, 405 AND 410 REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	RDC-032 RDK-181 RDK-228	CORD—Bulk dial cord KNOB—Model 404 KNOB—Knob and Bezel assembly, Model 410
UNIVERSAL REPLACEMENT PARTS				
UCC-037	C11	CAPACITOR—.003 mf., 600 v., paper (alternate replacement for RCW-3036)	RDC-032 RDK-181 RDK-228	
UCC-039	C13	CAPACITOR—.005 mf., 600 v., paper (alternate replacement for RCW-3036)		
UCC-041	C14, C21	CAPACITOR—.02 mf., 600 v., paper		
UCC-045	C16, C17, C18, C19, C20	CAPACITOR—.05 mf., 600 v., paper		
UCU-020	C5	CAPACITOR—47 mmf., mica		
UCU-028	C4	CAPACITOR—100 mmf., mica		
UCU-1036	C10, C12	CAPACITOR—220 mmf., mica (alternate replacement for RCW-3036)		
URD-009	R12	RESISTOR—22 ohms, $\frac{1}{2}$ w., carbon		
URD-021	R14	RESISTOR—68 ohms, $\frac{1}{2}$ w., carbon		
URD-025	R1	RESISTOR—100 ohms, $\frac{1}{2}$ w., carbon		
URD-029	R10	RESISTOR—150 ohms, $\frac{1}{2}$ w., carbon		
URD-057	R2	RESISTOR—2.2 K ohms, $\frac{1}{2}$ w., carbon		
URD-081	R4	RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon		
URD-113	R8, R13	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon		
URD-121	R9	RESISTOR—1 meg., $\frac{1}{2}$ w., carbon		
URD-129	R5	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon		
URD-137	R7	RESISTOR—4.7 meg., $\frac{1}{2}$ w., carbon		
URF-049	R11	RESISTOR—1000 ohms, 2 w., carbon		
SPECIALIZED REPLACEMENT PARTS				
RAB-142	L1	CABINET BACK—With antenna loop, Models 404 & 405	RDC-032 RDK-181 RDK-228	
RAB-143	L1	CABINET BACK—With antenna loop, Model 410		
RAV-128		CABINET—Wood cabinet, Model 410		
RAU-345		CABINET—Brown cabinet (plastic) with dial scale & knob bezels, for Model 404		
RAU-346		CABINET—Ivory cabinet (plastic) with dial scale & knob bezels, 405		
RCE-050	C15A, B	CAPACITOR—50 mf., 150 v., 50 mf., 150 v.; dry electrolytic		
RCN-039	C4	CAPACITOR—2 mmf., mica		
RCT-046	C1A, B, C, C2, C3	CAPACITOR—Tuning capacitor with trimmers		
RCW-3036	C11, C12, C13	CAPACITOR—.0035 mf., 220 mmf., .005 mf., three section, ceramic (see UCC-037, UCC-039, UCU-1036)		
SPECIALIZED REPLACEMENT PARTS (CONT'D)				
RDM-024			RDC-032 RDK-181 RDK-228	
RDP-055				
RDP-057				
RDS-100				
RDS-101				
RHC-017				
RHC-037				
RHC-038				
RHG-006				
RHG-018				
RHG-032				
RHH-004				
RHJ-007				
RHS-061				
RHS-062				
RHS-063				
RJC-004				
RJS-003				
RJS-141				
RJS-151				
RLC-105				
RLI-125				
RMS-118				
RMW-070				
RMX-174				
RMX-175				
ROP-020				
RRC-149				
RRC-150				
RTL-115				
RTL-116				
RTO-083				
RWL-009				
KNOB—Model 405				
MASK—Cardboard mask				
POINTER—Dial scale pointer Models 404, 405				
POINTER—Dial scale pointer Model 410				
DIAL SCALE, Models 404 & 405				
DIAL SCALE, Model 410				
CLIP—Mounting clip for oscillator coil L2				
CLIP—for dial drum				
CLIP—for RF coil				
GROMMET—On tuning shaft				
GROMMET Cushion mounting for tuning capacitor				
GROMMET—Speaker lead ins.				
SNAP FASTENER Holds loop back to cabinet				
SPACER—Spacer bushing for mounting tuning capacitor				
SCREW—for loop back mounting				
SCREW—for chassis mounting				
SCREW—for tuning capacitor mounting				
CONNECTOR—Antenna loop lead connecting clip				
SOCKET—Tube socket				
SOCKET—Tube socket for 12 BA6				
SOCKET ASSEMBLY—Pilot light socket				
COIL—Oscillator coil				
COIL—R-F coil				
SPRING—Dial cord tension spring				
PULLEY—Idle pulley				
SHAFT AND BUSHING—Tuning shaft and mounting bushing, Models 404 & 405				
DRIVE SHAFT AND BUSHING ASSEMBLY, for Model 410				
SPEAKER—PM speaker, Models 404 and 405				
POTENTIOMETER—500,000 ohms; volume control and switch S1, Models 404 and 405				
POTENTIOMETER—0.5 megohm volume control and switch, Model 410				
TRANSFORMER—First i-f transformer				
TRANSFORMER—Second i-f transformer				
TRANSFORMER—Audio output transformer				
POWER CORD—A-c power cord and plug				

MODEL 408



MODEL 408

CAUTION

ALWAYS USE AN ISOLATION TRANSFORMER IN THE RECEIVER POWER LINE WHEN SERVICING OR ALIGNING THIS RECEIVER TO PROTECT TEST EQUIPMENT.

SPECIFICATIONS

CABINET

Material	plastic
Color	mahogany
Height	8 1/2 inches
Width	13 1/2 inches
Depth	7 1/2 inches

ELECTRICAL

Voltage	105-125 AC or DC
Frequency on AC	50 to 60 cps
Wattage	40 watts

TUNING RANGE

AM	540-1620 kc
FM	88-108 mc

INTERMEDIATE FREQUENCIES

AM	455 kc
FM	10.7 mc

POWER OUTPUT

Undistorted	1.0 watts
-------------	-----------

LOUDSPEAKER

Type	permanent magnet
Size	5 1/4 inches
Voice Coil Impedance at 410 cps	3.2 ohms

ANTENNA

AM	built-in loop
FM	power line antenna or 300 FM ant.

GENERAL

Model 408 is a table model receiver providing reception on the AM band (540 to 1620 kc) and the FM band (88-100 mc). The receiver is housed in a mahogany colored plastic cabinet.

The receiver has a built-in FM power-line antenna. To operate the receiver from the built-in FM power cord antenna it is necessary to connect the power-line antenna wire to FM antenna terminal which is connected to pin 1 of V2 through C3.

Note: To remove the dial scale it is necessary to remove the escutcheon to gain access to the dial scale mounting screws. Remove the escutcheon by pushing forward on the escutcheon mounting studs from inside of the cabinet.

VOLTAGE CHECKS

1. AM STAGE GAIN MEASUREMENTS AT 455 KC.

Grid (Pin 1) of V3 to Grid (Pin 1) of V4	70
Grid (Pin 1) of V4 to Pin 6 of V6	80

2. FM SENSITIVITY MEASUREMENTS.

The following voltages are required at the point of input designated to produce one volt d-c from the limiter grid (pin 1 of V5) to chassis. Measure with a VTVM or a 20,000 ohm per volt meter in series with a 200,000 ohm resistor. Connect the 200,000 ohm resistor directly to the grid of V5. Use the microamp scale of meter to measure 5 microamps d-c through 200,000 ohms (1 volt d-c). Use a 10,000 ohm resistor connected directly to the grid (pin 1) of V5 to isolate the VTVM.

FM-IF.

Couple the input signal to the point of input through a 3300 ohm resistor and a 1000 mmfd. capacitor in series. Make chassis connections short and as close to the point of input as possible.

V4 Grid (Pin 1) for One Volt at

Pin 1 of V5 45,000 microvolts at 10.7 mc

V3 Grid (Pin 1) for One Volt at

Pin 1 of V5 1,000 microvolts at 10.7 mc

V1 Cathode (Pin 8) for One Volt at

Pin 1 of V5 30,000 microvolts at 10.7 mc

*V1 Grid (Pin 7) for One Volt at

Pin 1 of V5 100 microvolts at 10.7 mc

*Note: It is necessary to disconnect the copper strap from pin 7 of V1 to the gang condenser C1 at the gang end when coupling into the converter grid.

FM-RF.

Couple the input signal into the antenna terminals.

The signal generator should be properly terminated in 300 ohms to match the input impedance of this receiver. This may be done by adding a resistor in the high side of the generator output so that the sum of the generator output impedance and the resistor totals 300 ohms. Connect high side of generator to antenna terminal which is connected to Pin 1 of V2 by C3.

Disconnect power cord antenna from the antenna terminal 25 microvolts at 88 mc for 1 volt d-c at pin 1 of V5.

3. AUDIO GAIN

1 Volt at 400 cps applied across the volume control with volume control set at maximum should give approximately 1/2 watt output.

4. OSCILLATOR GRID BIAS

D-c voltage developed across R28 should be approximately 8 volts at 1000 kc, and approximately 3 volts at 98 mc measured with a vacuum tube voltmeter.

5. HUM MEASUREMENT

Hum measured across the voice coil of the speaker, with the volume control set at minimum and the band switch set on AM should not exceed 7 millivolts.

Turn the band switch to FM and connect the limiter grid (Pin 1 of V5) to chassis through .01 mfd. Set the volume control at maximum. The hum should not exceed 15 millivolts.

ALIGNMENT

EQUIPMENT REQUIRED FOR METER ALIGNMENT

1. General Electric YGS-3 or equivalent signal generator.
2. 20,000 ohm per voltmeter or vacuum tube voltmeter.
3. One 200,000 ohm 1/2 watt resistor.
4. Output meter.
5. Loop for coupling AM r-f signal to radio loop.
6. One 3,300 ohm 1/2 watt resistor.
7. One 1000 mmfd mica capacitor.

METER ALIGNMENT NOTES

1. Connect a 20,000 ohm-per-volt meter across the volume control. Use the ten volt d-c scale.

2. Connect a 20,000 ohm per volt meter from the grid (pin 1 of V5) to the chassis in series with a 200,000 ohm resistor. The resistor must be connected directly to the grid pin to minimize capacity loading and to isolate the i-f signal from the meter. Keep the signal generator output low so that the meter does not indicate more than one volt d-c at the grid (pin 1) of V5 (5 microamps through 200,000 ohms). (Use microamp scale of meter.)

A vacuum tube voltmeter may be used to measure the one volt d-c at the grid of V5.

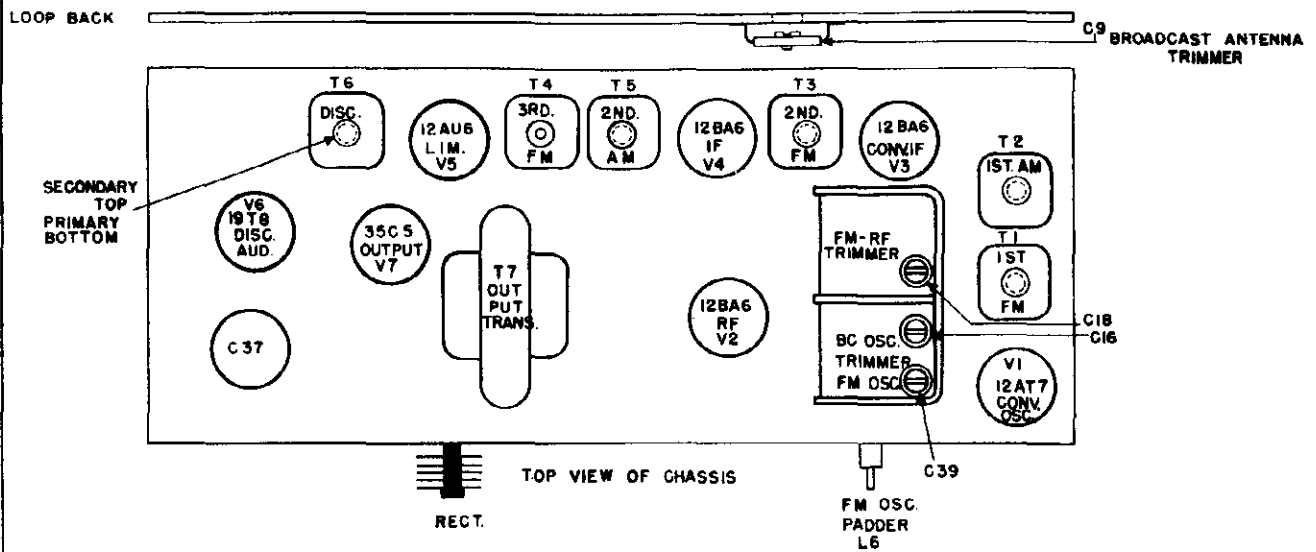


Fig. 1. Tube and Trimmer Location

3. Connect an output meter across the speaker voice coil. Turn the volume control full on. Keep the signal generator output low so that the output meter does not indicate more than $\frac{1}{2}$ watt output.

4. Align the AM oscillator (C16) and the r-f trimmer (C9) by coupling the signal to the loop antenna inductively. Connect a four-turn, six-inch diameter loop of wire across the signal generator output terminals and locate the loop about one foot from the radio loop antenna. The position of the loop should not be changed during alignment to prevent possible errors in peak readings.

5. Calibration points are stamped on the back side of the

tuning drum of C1. Set the wire indicator to the zero mark with C1 at maximum capacity (gang fully closed).

6. The pointer must be indexed to the vertical mark on the cabinet when the 98 mark on the back side of the tuning drum is opposite the wire indicator.

7. The termination impedance of the signal generator should be 300 ohms for FM r-f alignment. The generator impedance should be low for step 10 alignment. For steps 5, 6, 7, 8 and 9 couple the high side of the signal generator to the signal input point through a 1000 mmf capacitor in series with a 3300 ohm $\frac{1}{2}$ watt carbon resistor. Make chassis connections for FM i-f alignment as short as possible and near to the input point.

METER ALIGNMENT CHART

Step No.	Signal Generator Frequency	Signal Input Point	Band Switch Setting	Dial Setting	Adjust	See Note
AM I-F ALIGNMENT						
1	455 kc AM modulated	Pin 1 of V4 chassis.	AM	—	T5 for max.	3
2		Pin 1 of V3 and chassis			T2 for max.	
RF I-F ALIGNMENT						
3	1620 kc AM mod.	Inductively coupled. See note 4.	AM	Gang C1 fully open	C16 for max.	3, 4, 5, 6
4	1500 kc AM mod.			Tune for max. output	C9 for max. while rocking gang C1	
FM DISCRIMINATOR AND I-F ALIGNMENT						
5	10.7 mc unmodulated	Pin 1 of V4 and chassis	FM	—	Core of T4 for max.	2, 7
6	Detune signal generator for max. reading				Secondary of T6 for zero.	1, 7
7					Primary of T6 for max.	
8	10.7 mc unmodulated	Pin 1 of V3 and chassis.	FM	—	Core of T4 for max.	2, 7
9					Cores of T3 for max.	
10					Cores of T1 for max.	
FM R-F ALIGNMENT						
11	88 mc unmodulated	FM antenna terminals.	FM	At 88 on drum	Core of L6 for max.	2, 5, 6, 7
12	108 mc unmodulated			At 108 on drum	C39 for max.	
13				Rock in C1 for max.	C18 for max.	

MODEL 408

EQUIPMENT REQUIRED FOR VISUAL ALIGNMENT

1. General Electric YGS-3 or equivalent sweep generator.
2. General Electric ST2A scope or equivalent and chassis.
3. One megohm $\frac{1}{2}$ watt resistor.
4. One 3300 ohm $\frac{1}{2}$ watt resistor.
5. One 1000 mmfd mica capacitor.

NOTES FOR VISUAL ALIGNMENT

1. Connect vertical plates of scope to the grid of limiter (pin 1 of V5) through 1 meg. resistor and to chassis.
2. Connect vertical plates of scope to pin 3 of V6 through 1 meg. and to chassis.
3. Connect vertical plates of scope across volume control R19 through 1 meg.
4. In some cases tuning of the converter grid will cause "pulling in" of the oscillator and will change the oscillator frequency. If peaking C9 or C18 as in steps 4 or 14 causes the curve to move off the screen, it is necessary to recalibrate the oscillator as in steps 3, 12 and 13.

5. The termination impedance of the signal generator should be 300 ohms to properly match the FM input impedance on this receiver.

6. The pointer must be indexed to the vertical mark on the cabinet when the 98 mark on the back of the tuning drum is opposite the wire indicator (see note 7).

7. Calibration points are stamped on the rear side of the tuning drum of C1. Set the wire indicator to the zero mark with C1 at maximum capacity (gang condenser fully closed).

8. For alignment of the AM oscillator and r-f trimmers the signal should be inductively coupled to the loop antenna, by connecting a four-turn six-inch diameter loop of wire to the signal generator terminals. Locate this loop about one foot from the radio loop antenna. The position of this loop to the radio antenna loop should not be changed during alignment to prevent errors in the peak readings.

9. When coupling generator to grid in steps 5, 6, 7, 8, 9, and 10 use couple through a 3300 ohm resistor and a 1000 mmfd mica capacitor in series. Use short chassis connections to prevent regeneration. When coupling to the grid of V1 pin 8 in step 11 the output impedance of the signal generator should be low (below 100 ohms) to give maximum signal for alignment.

VISUAL ALIGNMENT CHART

Step No.	Signal Generator Frequency	Signal Input Point	Band Switch Setting	Dial Setting	Adjust	See Note
AM I-F VISUAL ALIGNMENT						
1	455 kc FM mod. ± 20 kc at 60 cps rate	Pin 1 of V4 through .01 mfd. and chassis	AM	—	T5 for max. amplitude of curve. See Fig. 2A.	3
2		Pin 1 of V3 through .01 mfd. and chassis			T2 for max. amplitude of curve. See Fig. 2A.	
AM R-F ALIGNMENT						
3	1620 kc AM mod. with 60 cps	Inductively coupled	AM	Gang C1 completely open	C16 for steepest slope of straight line on scope.	3, 4, 6, 7, 8
4	1500 kc FM mod. ± 20 kc at 60 cps rate			Gang C1 for max amplitude of curve	C9 for max. amplitude of curve. See Fig. 2A.	
FM I-F AND DISCRIMINATOR ALIGNMENT						
5	10.7 mc FM mod. ± 300 kc at 60 cps rate	Pin 1 of V4	—	—	Core of T4 for max. amplitude of curve. See Fig. 2A.	1, 9
6					Secondary of T6 for symmetry of curve of Fig. 2B.	2, 9
7					Primary of T6 for max. amplitude of positive and negative peak.	
8 Repeat step 6						
9	10.7 mc FM mod. ± 300 kc at 60 cps rate	Pin 1 of V4	FM	—	Core of T4 for max. amplitude of curve. See Fig. 2A.	1, 9
10		Pin 1 of V3 and chassis			Cores of T3 for max. amplitude of curve. See Fig. 2A.	
11		Pin 8 of V1 and chassis			Cores of T1 for max. amplitude of curve. See Fig. 2A.	
FM R-F VISUAL ALIGNMENT						
12	88 mc AM mod. at 60 cps.	FM antenna terminals	FM	At 88 on C1 drum	Core of L6 steepest slope of straight line trace on scope.	1, 4, 5, 6, 7
13	108 mc AM mod. at 60 cps.			At 108 on C1 drum	C39 for steepest slope of straight line trace on scope.	
14	108 mc FM mod. ± 300 kc at 60 cps rate			Rock in C1 for max.	Adjust C18 for max. amplitude of response. See Fig. 2A.	

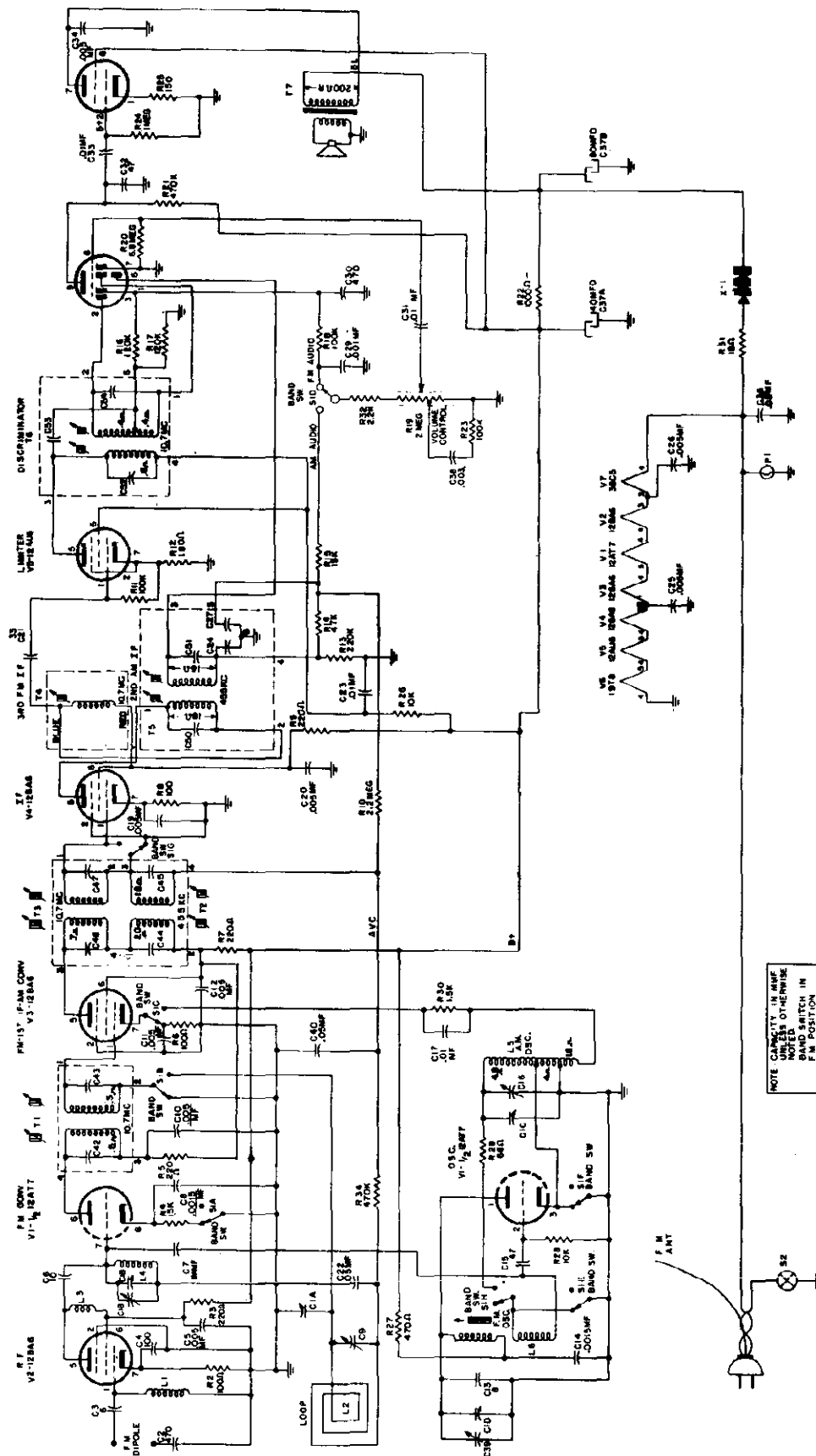


Fig. 6. Schematic diagram

NOTE CAPACITY IN MMF
UNLESS OTHERWISE
SPECIFIED
BAND SWITCH IN
FM POSITION

MODEL 408 REPLACEMENT PARTS LIST

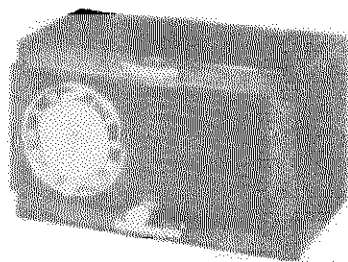
Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS					
*UCC-035	C29	CAPACITOR—.001 mfd., 600 v., paper	*URD-041	R27	RESISTOR—470 ohms, $\frac{1}{4}$ w., carbon
UCC-037	C38	CAPACITOR—.003 mfd., 600 v., paper	*URD-053	R4, R30	RESISTOR—1500 ohms, $\frac{1}{4}$ w., carbon
*UCC-039	C34, 36	CAPACITOR—.005 mfd., 600 v., paper	*URD-057	R32	RESISTOR—2200 ohms, $\frac{1}{4}$ w., carbon
*UCC-040	C17, C23, C31, C33	CAPACITOR—.01 mfd., 600 v., paper	*URD-073	R26, R28	RESISTOR—10,000 ohms, $\frac{1}{4}$ w., carbon
*UCC-045	C40, C22	CAPACITOR—.05 mfd., 600 v., paper	*URD-077	R15	RESISTOR—15,000 ohms, $\frac{1}{4}$ w., carbon
UCG-002	C3	CAPACITOR—6 mmf., mica	*URD-089	R14	RESISTOR—47,000 ohms, $\frac{1}{4}$ w., carbon
UCG-004	C6	CAPACITOR—10 mmf., mica	*URD-097	R11, R18, R23	RESISTOR—100,000 ohms, $\frac{1}{4}$ w., carbon
UCG-016	C21	CAPACITOR—33 mmf., mica	*URD-099	R16, R17	RESISTOR—120,000 ohms, $\frac{1}{4}$ w., carbon
*UCG-020	C15, C32	CAPACITOR—47 mmf., mica	*URD-105	R13	RESISTOR—220,000 ohms, $\frac{1}{4}$ w., carbon
*UCU-044	C2, C30	CAPACITOR—470 mmf., mica	*URD-113	R21, R24, R34	RESISTOR—470,000 ohms, $\frac{1}{4}$ w., carbon
*URD-007	R31	RESISTOR—18 ohms, $\frac{1}{4}$ w., carbon	*URD-129	R10	RESISTOR—2.2 meg., $\frac{1}{4}$ w., carbon
*URD-021	R29	RESISTOR—68 ohms, $\frac{1}{4}$ w., carbon	*URD-141	R20	RESISTOR—6.8 meg., $\frac{1}{4}$ w., carbon
*URD-025	R2, R6, R8	RESISTOR—100 ohms, $\frac{1}{4}$ w., carbon			
*URD-029	R25	RESISTOR—150 ohms, $\frac{1}{4}$ w., carbon			
*URD-031	R12	RESISTOR—180 ohms, $\frac{1}{4}$ w., carbon			
*URD-033	R3, R5, R7, R9	RESISTOR—220 ohms, $\frac{1}{4}$ w., carbon			

SPECIALIZED REPLACEMENT PARTS

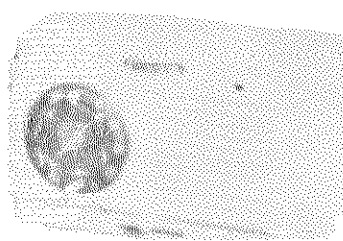
RAB-129	L2	LOOP AND BACK ASSEMBLY	*RHX-010		SPACER—(Tuning condenser)
RAD-049		BRACKET (Pilot light)	RJS-118		GROMMET—(Tuning condenser)
RAU-335		CABINET (408)	RJS-125		TUBE SOCKET—Nine prong for V6
RCE-101	C37A-B	CAPACITOR—150 v., electrolytic—80-40 mfd.	RJS-143		SUB TUBE SOCKET—(Seven prong)
RCN-001	C7	CAPACITOR—1 mmf., ceramic	*RJX-034		TUBE SOCKET—For VI
RCT-041	C1A, B, C, D, 16, 18	CAPACITOR—Tuning	RLA-035	L1	INTERLOCK TERMINAL—Female
*RCW-026	C8, C14	CAPACITOR—1500 mmf., ceramic	*RLB-029	L4	METAL CAP—Female
RCW-3029	C4	CAPACITOR—100 mmf., ceramic	RLC-103	L5	INSULATING CAP—Female
*RCW-3014	C5, C10, C11, C12, C19, C20, C25, C26	CAPACITOR—.005 mfd., 600 v., ceramic	RLC-104	L6	CHOKE—F.M. Antenna
RCW-3034	C13	CAPACITOR—8 mmf., ceramic	RLP-017	L3	CHOKE—F.M. R.F. Grid
*RCY-016	C9	CAPACITOR—2-20 mf., trimmer	*RMF-006		COIL—B.C. Oscillator
*RDC-032		DIAL CORD	RML-049		COIL—F.M. Oscillator
RDE-080		ESCUTCHEON—(Cabinet)	*RMS-111		CHOKE—R.F. Plate
RDK-208		KNOB—(408) (band)	RMU-062		CHASSIS FOOT
RDK-210		KNOB ASSEMBLY (tuning) (408)	RMU-063		KNOB LINK
RDK-211		KNOB (volume) (408)	RRC-148	R19, S2	SPRING (Lg. Drum)
RDP-051		POINTER—Dial pointer	*RRW-055	R22	TUNING SHAFT ASSEMBLY
RDS-094		DIAL SCALE	*RSI-003		SHAFT (Band Switch)
RDX-046		POINTER SHAFT AND DRUM	RSW-078	S1	VOLUME CONTROL AND SWITCH
RER-010	X1	SELENIUM RECTIFIER	*RTD-006	T6	RESISTOR—1000 ohms, w.w., 2 w.
*RHC-017		CLIP—(Coil mounting)	*RTL-079	T2	INTERLOCK—Male
RHC-034		CLIP—(Coil mounting)	*RTL-100	T4	BAND SWITCH
*RHH-004		SNAP FASTENER	RTL-111	T5	F.M. DISCRIMINATOR
*RHM-043		RETAINING RING—Type "C"	RTL-112	T1	I.F. TRANSFORMER—1st B.C.
RHS-048		TUBE SHIELD	RTL-113	T3	I.F. TRANSFORMER—3rd F.M.
			RTO-087	T7	I.F. TRANSFORMER—2nd B.C.
			*RWL-022		I.F. TRANSFORMER—1st F.M.
			RWX-031		I.F. TRANSFORMER—2nd F.M.
			S527D		OUTPUT TRANSFORMER
					POWER CORD SET—(Three wire)
					PILOT LIGHT SOCKET ASSEMBLY
					SPEAKER—5 $\frac{1}{4}$ -inch

*USED ON PREVIOUS MODELS

MODELS 500, 501



Model 500



Model 501

SPECIFICATIONS

CABINET

Model	500	501
Color	Mahogany	Ivory
Height	6 $\frac{1}{4}$ in.	6 $\frac{1}{4}$ in.
Width	10 $\frac{1}{2}$ in.	10 $\frac{1}{2}$ in.
Depth	5 $\frac{3}{8}$ in.	5 $\frac{3}{8}$ in.

ELECTRICAL RATING (INPUT)

Voltage	105-120 volts, a-c
Frequency	60 cycles
Wattage	30 watts

OPERATING FREQUENCIES

Intermediate Frequency	455 kc
Broadcast Band	540-1600 kc

POWER OUTPUT

Undistorted	1
Maximum	1.75

LOUDSPEAKER

Type	Alnico 5 PM
Outside Cone Diameter	4-inch
Voice Coil Impedance (400 Cycles)	3.5 ohms

TUBE COMPLEMENT

Oscillator-Converter	Type 12SA7
I-F Amplifier	Type 12BA6
Detector and 1st Audio	Type 12SQ7
Power Output	Type 35W4
Rectifier	Type 50C5

CAUTION: One side of the power line is connected to B-. Avoid any ground connections direct to B-. Use an isolating transformer when making service adjustments, with the chassis removed from the cabinet.

RADIO CIRCUIT ALIGNMENT

ALIGNMENT FREQUENCIES

R-F	1500 kc
R-F	1620 kc
I-F	455 kc

EQUIPMENT REQUIRED

1. Test oscillator with tone modulation.
2. A-c output meter, 1 $\frac{1}{2}$ volts full scale.
3. 0.05 mf. paper capacitor.
4. Loop.
5. Insulated screwdriver.

PROCEDURE—GENERAL

1. With the tuning scale control wheel turned so that the gang condenser plates are fully meshed, the index should read approximately $\frac{1}{8}$ inch to the right of the 550 kc scale calibration mark. If it does not, remove the control wheel from the gang condenser shaft and replace it for correct position. **CAUTION:** Do not attempt to correct the position by rotating the wheel on the shaft as this will cause the knob to slip.
2. For i-f alignment, it is necessary to remove the chassis from the cabinet.
3. Connect the output meter across the loudspeaker voice coil terminals.
4. Keep radio volume control at maximum and attenuate the test oscillator signal output so that the output meter reading never exceeds 1.0 volt.
5. Connect the capacitor as listed in column 2 between the output "High Side" of the test oscillator and the point of input specified.
6. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and then locating the loop to face the radio antenna loop about one foot away. To prevent possible errors in reference to previous signal measurement readings, the loop with respect to the radio loop should not be changed during any one set of adjustments.

ALIGNMENT CHART

Step	Connect Test Oscillator to	Test Osc. Setting	Dial Drum Setting	Adjust Trimmers for Maximum Output
1	12BA6 grid (1) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	2nd i-f trans. trimmers, C14 and C15
2	12SA7 grid (8) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	1st i-f trans. trimmers, C8 and C9
3	Inductively coupled to radio loop	1620 kc	Minimum Capacity	C4 (oscillator)
4	Inductively coupled to radio loop	1500 kc	Tune for Maximum	C3 (antenna)

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20%. Readings taken with low signal input so that AVC is not effective.

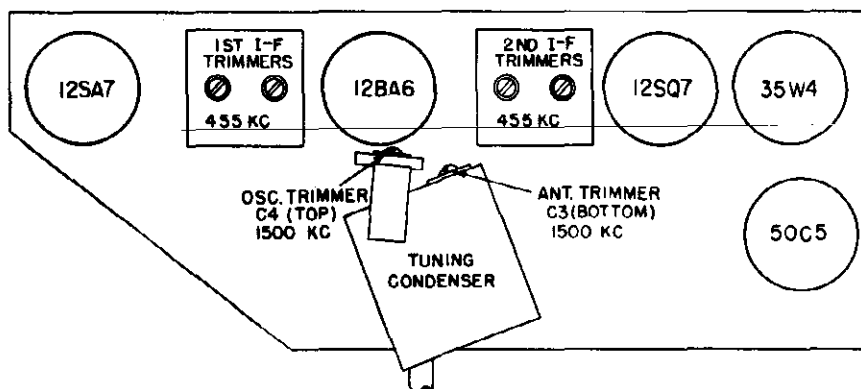


Fig. 1. Tube and Trimmer Location

MODELS 500, 501

- (1) R-F and I-F Stage Gains.
12SA7 Grid to 12BA6 Grid.....50 @ 455 kc
12BA6 Grid to 12SQ7 Diode Plate.....50 @ 455 kc
- (2) Audio Gain.
0.15 volts at 400 cycles across the volume control (R11) with control set at maximum will give approximately $\frac{1}{2}$ -watt output across the loudspeaker, LS1, voice coil.
- (3) Oscillator Grid Bias.
D-c voltage developed across the oscillator grid leak (R1) averages 8.5 volts at 1000 kc.
- (4) Socket Pin Voltages.
Figure 3 shows d-c voltages from all tube pins to B— unless otherwise specified. Voltage readings much higher or lower than those specified may help localize defective components or tubes.

CLOCK SERVICE

Figure 4 shows clock parts referred to in the following paragraphs and the parts list.

CLOCK MOVEMENT DISASSEMBLY

1. Remove clock movement from case. When removing knobs, note that the Alarm-Set knob is a left-hand thread, while Alarm-Radio is a pull-off knob.
2. Remove Bezel, Hands and Dial Face.
3. Remove the motor assembly by removing two screws (A) and break two soldered joints on Field. The Field and Rotor Assembly (R) can now be removed. The Rotor is held by friction only to the Field.
4. Remove Switch Assembly (B) by removing two screws from base plate.
5. Remove Switch Shaft Assembly (C) and spacer.
6. Remove Alarm-Set Shaft Assembly (D) and spacer.
7. Remove the three front plate assembly screws that are located under the Dial Face and then remove Front Plate.
8. Remove Alarm Gear Sleeve Assembly (E), Hour Gear Sleeve Assembly (F), Minute Gear Sleeve Assembly (G), and Sweep Second Gear Shaft Assembly (H).
9. Remove Alarm Cam Gear Assembly (I) and Spring Washer (J).
10. Remove Alarm-Set Gear (K).
11. Remove Time-Set Gear and Shaft Assembly (L).
12. Remove Switch Cam Lever (M).

CLOCK MOVEMENT REASSEMBLY

Reassemble in the reverse order of disassembly, observing the following precautions:

1. The spring washer (J) should curve away from the gear when placed on the Alarm Cam Gear Assembly (I).
2. The Switch Cam Lever (M) fork must straddle the base plate post as shown in the illustration.
3. After reassembly of front plate, check the Sweep Second Gear (H) through the hole in the base plate to make sure it is free to turn.
4. Proceed with Alarm and Switch Adjustments as described below before installing hands.

ALARM AND SWITCH ADJUSTMENTS

1. Turn Alarm-Radio shaft to ALARM position.
2. Slowly rotate Time-Set shaft clockwise until the contacts of the Switch Assembly (B) close.
3. Replace Dial Face, Alarm Dial, the Minute, Hour and Second Hands. Set all Hands and Dial so that they indicate 12 o'clock. Make sure all Hands and Alarm Dial are tight on their respective shafts.
4. With Alarm-Set knob pulled out, continue to rotate Time-Set shaft clockwise and note that the vibrator arm (N) drops against field core approximately 7-10 minutes later.
5. Set alarm at some other selected position and make sure mechanism actuates within limits (± 1 minute).
6. Check alarm tone of vibrator. This can be adjusted by either bending vibrator arm nearer or farther away from field core. Bend arm near anchor point.

CLEANING AND LUBRICATION

To clean, completely disassemble and clean all moving parts in carbon tetrachloride or some similar cleaner.

The inside of the sleeves and shaft surfaces may be cleaned of oxidized oil by rubbing with a fine grade of steel wool dampened in carbon tetrachloride.

Do not use too much oil and apply by means of a small wire (drop oiler). Too much oil collects dust and later oxidizes. Use only recommended clock oil, such as Nye's Celebrated Oil which may be purchased from Wm. F. Nye Co., Inc., New Bedford, or equivalent.

CLOCK TROUBLES

1. Clock will not operate—Defective field coil, defective rotor, binding of parts.
2. Clock loses time—Binding parts, too little friction on minute hand sleeve assembly, defective rotor. Clock time-set shaft bent and rubs against hole in clock bracket.
3. Noisy Clock—Rotor defective, alarm armature improperly adjusted, loose parts, or binding of moving parts.

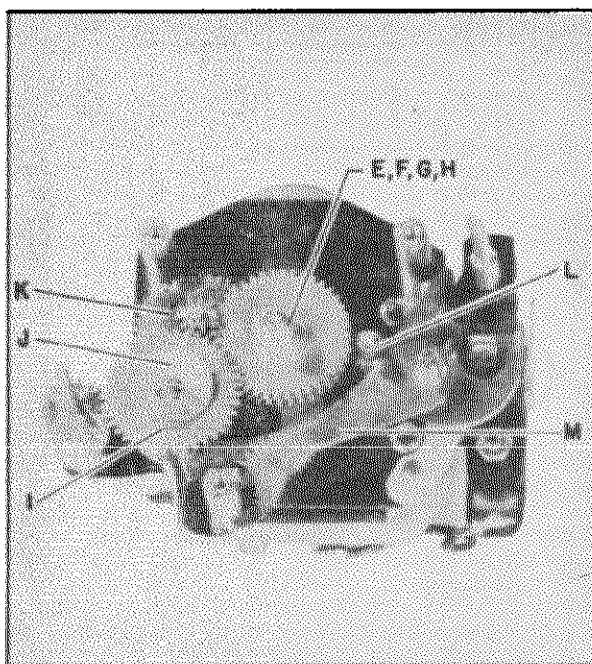
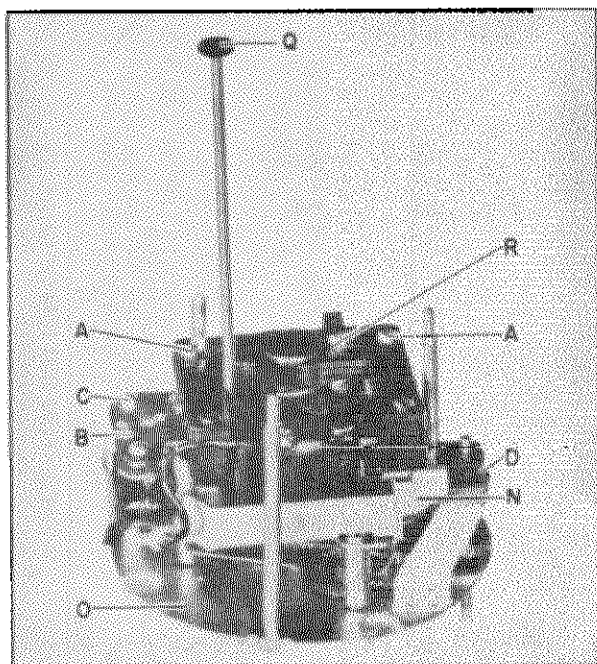


Fig. 5. Clock Part Identification

MODEL 500 AND 501 REPLACEMENT PARTS

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS			SPECIALIZED REPLACEMENT PARTS (Cont'd)		
*UCC-045	C5, 10, 11, 21	CAPACITOR—.05 mf., 600 v., paper	*RCT-021	C2A, 2B, C3, C4	CAPACITOR—Tuning capacitor (oscillator and r-f section) with trimmers
*UCC-630	C17, 20	CAPACITOR—.01 mf., 600 v., paper (used in early production) (may replace respective sections of RCW-3013)	*RCW-1043	C25	CAPACITOR—47 mmf., ceramic
*UCU-036	C16, 19	CAPACITOR—220 mmf., mica (used in early production) (may replace respective sections of RCW-3013)	*RCW-3013	C16, 17, 19, 20	CAPACITOR—220 mmf., .002 mf., 220 mmf., .005 mf., (4 section ceramic) (see UCC-630, UCU-036)
*UOP-421	LS1	SPEAKER—PM loudspeaker	*RDK-028		KNOB—Volume control knob
*URD-009	R17	RESISTOR—22 ohms, $\frac{1}{2}$ w., carbon	*RDK-094		KNOB—Tuning dial wheel
*URD-017	R18	RESISTOR—47 ohms, $\frac{1}{2}$ w., carbon	*RDS-047		SCALE—Dial scale (Model 500)
*URD-029	R15	RESISTOR—150 ohms, $\frac{1}{2}$ w., carbon	*RDS-050		SCALE—Dial scale (Model 501)
*URD-081	R1	RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon	*RJC-004		CLIP—Loop connector clip
*URD-113	R2, 13, 14	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon	*RJS-092		SOCKET—Tube socket for 50C5, 35W4
*URD-129	R10	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon	*RJS-116		SOCKET—Tube socket for 12SA7
*URD-141	R12	RESISTOR—6.8 meg., $\frac{1}{2}$ w., carbon	*RJS-117		SOCKET—Tube socket for 12SQ7, 35Z5-GT
*URF-049	R16	RESISTOR—1000 ohms, 2 w., carbon	*RJS-141		SOCKET—Tube socket for 12BA6
			*RLC-090	T4	COIL—Oscillator coil
			*RHG-015		GROMMET—Cushion mounting for C2A, C2B
			*RHH-004		SNAP FASTENER—For cabinet back
			*RHJ-005		SPACER—Washer used with RHG-015
			*RRC-054	R11	POTENTIOMETER—0.5 meg., volume control
			*RTL-094	T1, C8, C9	TRANSFORMER—1st I-F transformer
			*RTL-095	T2, C14, C15	TRANSFORMER—2nd I-F transformer
			*RTO-036	T3	TRANSFORMER—Output transformer
			*RWL-009		CORD—Power cord (brown) for Model 500
			*RWL-016		CORD—Power cord (white) for Model 501
			*RYN-005		NAMEPLATE—G-E monogram
			*RZC-010	M1	CLOCK—60 cycle, 105-125 v., clock assembly
SPECIALIZED REPLACEMENT PARTS					
*RAB-097	L1	BACK—Cabinet back cover (includes loop L1)			
*RAC-074		MOUNTING BRACKET—Metal back cover holds clock to cabinet			
RAU-319		CABINET—Brown plastic (Model 500)			
RAU-320		CABINET—White plastic (Model 501)			
*RCC-074	C22	CAPACITOR—.003 mf., 600 v., paper			
*RCE-050	C23A, 23B	CAPACITOR—50 mf., 150 v., 50 mf., 150 v., dry electrolytic			

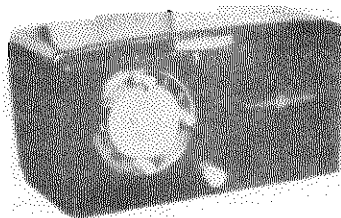
CLOCK REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
MISCELLANEOUS			CLOCK MOVEMENT (Cont'd)		
*XC3X49	Q	TIME SET SHAFT KNOB—Bronze	*XC14X15	G	MINUTE GEAR SLEEVE ASSEMBLY
*XC4X5		ALARM SET KNOB—Ivory	*XC15X3	E	ALARM GEAR SLEEVE ASSEMBLY
*XC10X131	L	TIME SET GEAR AND SHAFT ASSEMBLY	*XC16X14	H	SWEEP SECOND GEAR SHAFT ASSEMBLY
*XC11X11	D	ALARM SET SHAFT ASSEMBLY	*XC17X8	I	ALARM GEAR SHAFT ASSEMBLY
*XC31X26		SWEEP SECOND HAND	*XC35X39		BASEPLATE ASSEMBLY
*XC32X199		HOUR AND MINUTE HANDS	*XC40X13		RIVET—Vibrator
*XC34X139	O	FRONTPLATE ASSEMBLY	*XC40X76		SWITCH ASSEMBLY—Consists of
*XC55X15		ALARM DIAL			Contact Block (top),
*XC58X16		CRYSTAL—2 9/16 in., round			Contact Block (bottom),
*XC59X247		NUMERAL COLOR RING—Red			Contact Spring Insulator
*XC59X699	C	SWITCH SHAFT ASSEMBLY	*XC40X77	K	ALARM SET GEAR ASSEMBLY
*XC59X716		SWITCH KNOB—Ivory	*XC40X78	M	SWITCH CAM LEVER ASSEMBLY
*XC61X941		DIAL FACE (On frontplate)	*XC40X79		UPPER CONTACT SPRING ASSEMBLY
*XC53X128		NUMERAL RING—Bronze	*XC40X80		LOWER CONTACT SPRING AND TIP ASSEMBLY
CLOCK MOVEMENT			*XC40X202		SPREADER POST
			*XC40X252	J	CAM GEAR SPRING WASHER
			*XC40X260		SPACER—Switch shaft
*XC1X1	A	SCREW—Holds Field, No. 4-40X1 $\frac{1}{4}$ in. R.H.	*XC40X261		TIME SET SHAFT SPACER
*XC1X2		No. 1204 LOCKWASHER	*XC40X262		TIME SET SHAFT SPACER
*XC1X6		SCREW No. 4-40 x $\frac{1}{8}$ in. R. H.	*XC40X263		ALARM SHUT-OFF SPACER
*XC1X43		HEX NUT	*XC44X38	R	ROTOR UNIT—60 cycles
*XC13X11	F	HOUR GEAR SLEEVE ASSEMBLY	*XC45X69		FIELD COIL ASSEMBLY—60 cycles
			*XC64X1		FRONTPLATE SCREW

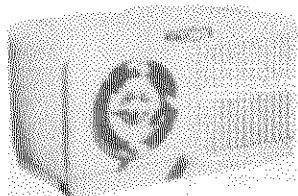
* Used on other models.

PAGE 21-32 GENERAL ELECTRIC

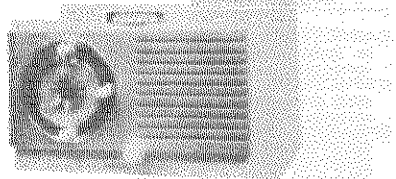
MODELS 505,
506, 507, 508



MODEL 505, 507



MODEL 506



MODEL 508

SPECIFICATIONS

CABINET:

Model	508	505	507	506
Color	Blond Mah.	Brown	Maroon	Ivory
Height	6 $\frac{3}{8}$ in.	6 $\frac{3}{8}$ in.	6 $\frac{3}{8}$ in.	6 $\frac{3}{8}$ in.
Width	11 $\frac{1}{2}$ in.	11 $\frac{1}{2}$ in.	11 $\frac{1}{2}$ in.	11 $\frac{1}{2}$ in.
Depth	6 $\frac{1}{4}$ in.	6 $\frac{1}{4}$ in.	6 $\frac{1}{4}$ in.	6 $\frac{1}{4}$ in.

ELECTRICAL RATING (INPUT):

Voltage	105-120 volts, a-c
Frequency	60 cycles
Wattage	30 watts

OPERATING FREQUENCIES:

Intermediate Frequency	455 kc
Broadcast Band	540-1600 kc

POWER OUTPUT:

Undistorted	1
Maximum	1.75

LOUDSPEAKER:

Type	Alnico 5 PM
Outside Cone Diameter	4-inch
Voice Coil Impedance (400 cycles)	3.5 ohms

TUBE COMPLEMENT:

Oscillator-Converter	Type 12SA7
I-F Amplifier	Type 12BA6
Detector and 1st Audio	Type 12SQ7
Power Output	Type 50C5
Rectifier	Type 35W4

CAUTION: One side of the power line is connected to B-. Avoid any ground connections direct to B-. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

GENERAL INFORMATION

The Models 505, 506, 507 and 508 are four-tube, plus rectifier tube, a-c/d-c superheterodyne receivers, employing a Beam-antenna antenna. Special features include an electric time clock with wake-up alarm and sleep control switch. In addition, the timer receptacle at the rear of the receiver provides an outlet connection for external appliances which is controlled by the normal function of the alarm and sleep control mechanism of the clock. The radio OFF-ON switch adjacent to the timer outlet provides control of radio operation so that the radio receiver may be turned off if so desired while using the external appliance. When radio operation is to be resumed, this switch must be turned to the on position.

RADIO CIRCUIT ALIGNMENT

ALIGNMENT FREQUENCIES:

R-F	1500 kc
R-F	1620 kc
I-F	455 kc

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation.
2. A-c output meter, 1 $\frac{1}{2}$ volts full scale.
3. 0.05 mf. paper capacitor.
4. Loop
5. Insulated screwdriver.

PROCEDURE—GENERAL:

1. With the tuning scale control wheel turned so that the gang condenser plates are fully meshed, the index should read approximately $\frac{1}{8}$ inch to the right of the 550 kc scale calibration mark. If it does not, remove the control wheel from the gang condenser shaft and replace it for correct position. **CAUTION:** Do not attempt to correct the position by rotating the wheel on the shaft as this will cause the knob to slip.
2. For i-f alignment, it is necessary to remove the chassis from the cabinet.
3. Connect the output meter across the loudspeaker voice coil terminals.
4. Keep radio volume control at maximum and attenuate the test oscillator signal output so that the output meter reading never exceeds 1.0 volt.
5. Connect the capacitor as listed in column 2 between the output "High Side" of the test oscillator and the point of input specified. The oscillator output cable ground lead is connected to receiver chassis.
6. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and then locating the loop to face the radio antenna loop about one foot away. To prevent possible errors in reference to previous signal measurement readings, the loop with respect to the radio loop should not be changed during any one set of adjustments.

ALIGNMENT CHART

Step	Connect Test Oscillator to	Test Osc. Setting	Dial Drum Setting	Adjust Trimmers for Maximum Output
1	12SK7 grid (4) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	2nd I-F trans. trimmers, C14 and C15
2	12BA6 grid (1) in series with 0.05 mf. cap	455 kc	Minimum Capacity	1st I-F trans. trimmers, C8 and C9
3	Inductively coupled to radio loop	1620 kc	Minimum Capacity	C4 (oscillator)
4	Inductively coupled to radio loop	1500 kc	Tune for Maximum	C3 (antenna)

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit per-

formance and isolate trouble. The gain values listed may have tolerances of 20%. Readings taken with low signal input so that AVC is not effective.

- (1) I-F Stage Gains.
 12SA7 Grid to 12SK7 Grid.....50 @ 455 kc
 12SK7 Grid to 12SQ7 Diode Plate.....50 @ 455 kc
- (2) Audio Gain.
 0.15 volts at 400 cycles across the volume control (R11)
 with control set at maximum will give approximately $\frac{1}{2}$ -

watt output across the loudspeaker, LS1, voice coil.

- (3) Oscillator Grid Bias.
 D-c voltage developed across the oscillator grid leak (R1)
 averages 8.5 volts at 1000 kc.
- (4) Socket Pin Voltages.
 Figure 3 shows voltages from all tube pins to B- unless
 otherwise specified. Voltage readings much higher or lower
 than those specified may help localize defective components
 or tubes.

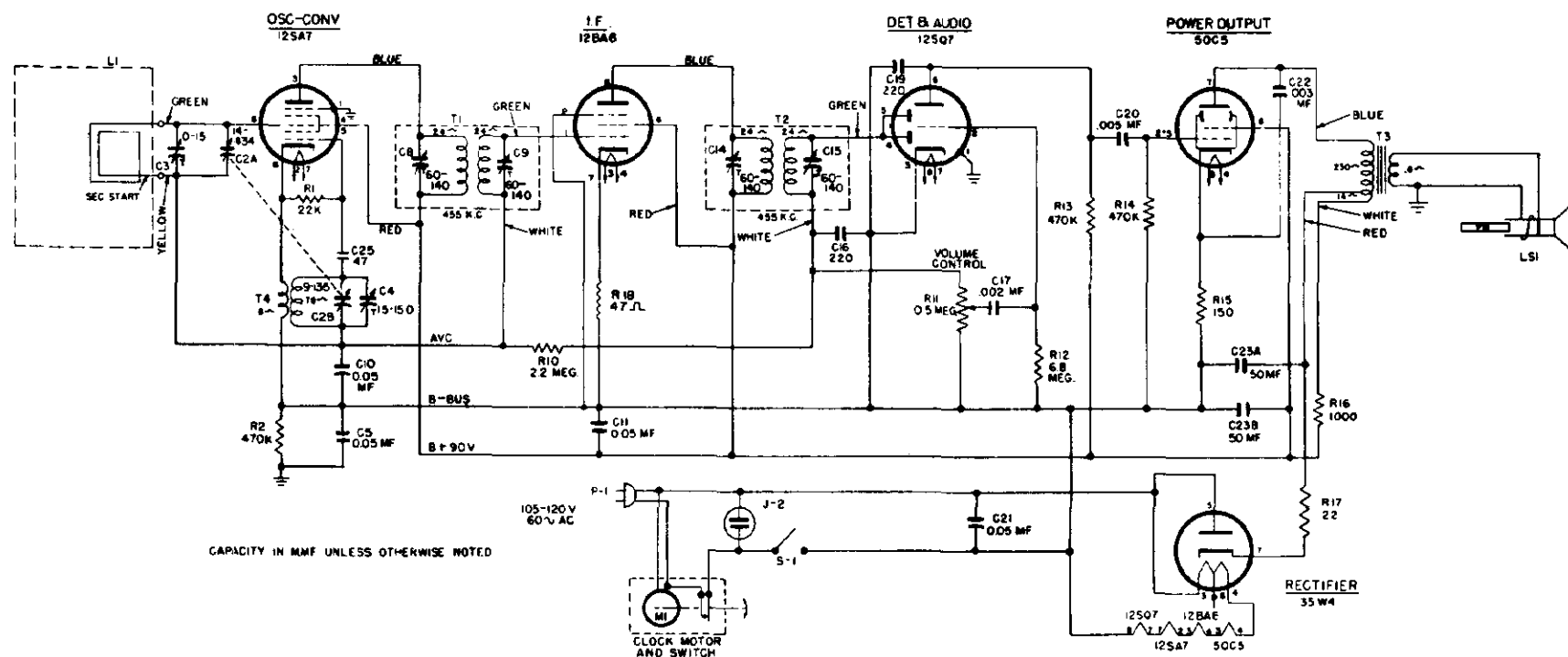


Fig. 1. Schematic Diagram

NOTE: Loop connections are: green lead to inside turn of antenna loop, yellow lead to outside turn.

MODELS 505,
506, 507, 508

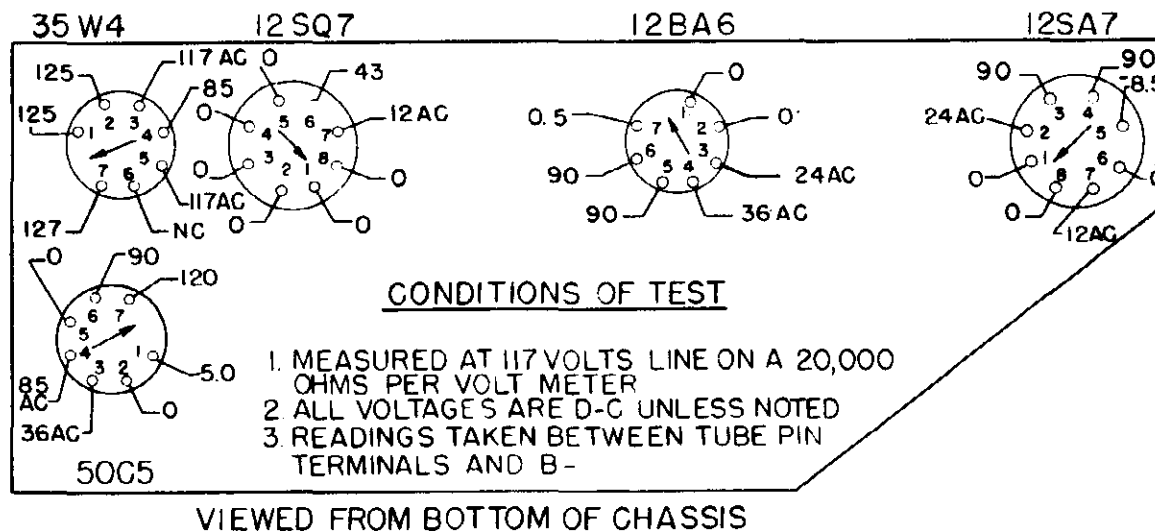


Fig. 2. Socket Voltages

CLOCK SERVICE

Figures 4 and 5 show clock parts referred to in the following paragraphs and the parts list.

CLOCK MOVEMENT DISASSEMBLY

1. Remove clock movement from case. When removing knobs, note that the Alarm-Set knob is a left-hand thread, while Wake-Up Manual and Sleep are pull-off knobs.
2. Remove Bezel, Hands and Dial Faces.
3. Remove the motor assembly by removing two screws (3 and 4) and break two soldered joints on Field. The Field and Rotor Assembly (11 and 2) can now be removed. The Rotor is held by friction only, to the Field.
4. Remove Switch Assembly by removing two screws (12) from base plate.
5. Remove Switch Shaft Assembly (13) and spacer.
6. Remove Alarm-Set Shaft Assembly (6) and spacer.
7. Remove the three front plate assembly screws that are located under the Dial Face and then remove Front Plate.
8. Remove the following gear assemblies and control levers in the order listed below:
 - (a) Sweep Control Shaft and Segment Gear (30)
 - (b) Alarm Dial Gear (16)
 - (c) Hour Hand Gear (17)
 - (d) Alarm Signal Cam and Gear, and Friction Washer (27, 26)
 - (e) Sweep Control Switch Lever (29)
 - (f) Pinion Drive Gear Assembly (15) (drives Sleep Control Segment Gear)
 - (g) Alarm Control Switch Cam Lever (8)
 - (h) Time Set Shaft and Gear, and Spacer (14, 20)
 - (i) Drive Gear and Pinion Assembly (28)
 - (j) Minute Hand Gear (18)
 - (k) Sweep Second Hand Gear (19)

CLOCK MOVEMENT REASSEMBLY

Reassemble in the reverse order of disassembly, observing the following precautions:

1. The spring washer (26) should curve away from the gear when placed on the Alarm Cam Gear Assembly (27).
2. The Switch Cam Lever fork (8) must straddle the base plate post as shown in the illustration.
3. After reassembly of front plate, check the Sweep Second

Gear (19) through the hole in the base plate to make sure it is free to turn.

4. Proceed with Alarm and Switch Adjustments as described below before installing hands.

ALARM AND SWITCH ADJUSTMENTS

1. Turn Wake-Up Manual shaft to WAKE UP position.
2. Slowly rotate Time Set shaft clockwise until the contacts 21 and 22 of the Switch Assembly close.
3. Replace Dial Face, Alarm Dial, the Minute, Hour and Second Hands. Set all Hands so that they indicate 12 o'clock. Set figure 12 of the alarm dial to index with the smaller pointer of the hour hand. Make sure all Hands and Alarm Dial are tight on their respective shafts.
4. With Alarm Set knob pulled out, continue to rotate Time Set shaft clockwise and note that the Alarm vibrator arm drops against field core approximately 7-10 minutes later.
5. Set alarm at some other selected position and make sure mechanism actuates within limits (± 1 minute).
6. Check alarm tone of vibrator. This can be adjusted by either bending vibrator arm nearer or farther away from field core. Bend arm near anchor point.

CLEANING AND LUBRICATION

To clean, completely disassemble and clean all moving parts in carbon tetrachloride or some similar cleaner.

The inside of the sleeves and shaft surfaces may be cleaned of oxidized oil by rubbing with a fine grade of steel wool dampened in carbon tetrachloride.

Do not use too much oil and apply by means of a small wire (drop oiler). Too much oil collects dust and later oxidizes. Use only recommended clock oil, such as Nye's Celebrated Oil which may be purchased from Wm. F. Nye Co., Inc., New Bedford, or equivalent.

CLOCK TROUBLES

1. Clock will not operate—Defective field coil, defective rotor, binding of parts.
2. Clock loses time—Binding parts, too little friction on minute hand sleeve assembly, defective rotor. Clock time set shaft bends and rubs against hole in clock bracket.
3. Noisy Clock—Rotor defective, alarm armature improperly adjusted, loose parts, or binding of moving parts.

MODELS 505,
506, 507, 508

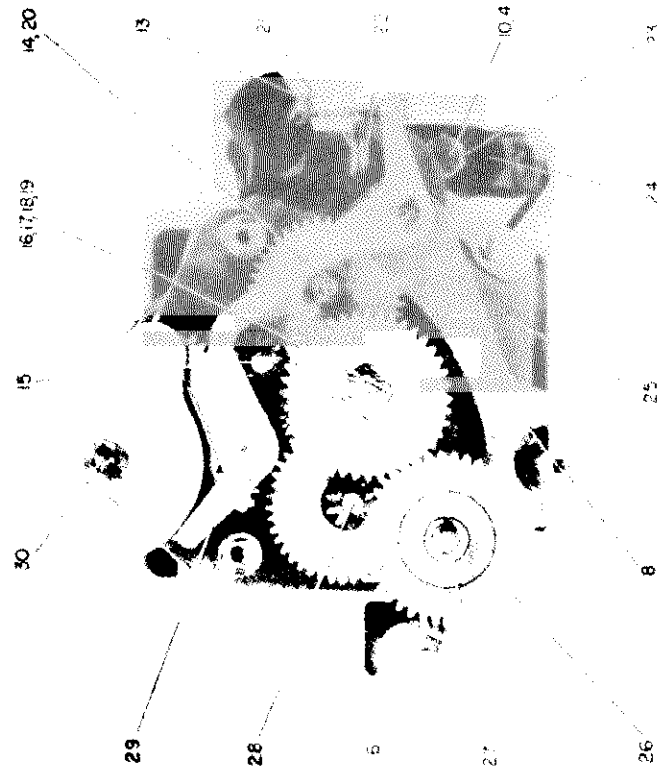


Fig. 4. Front View of Clock, Front Plate Removed

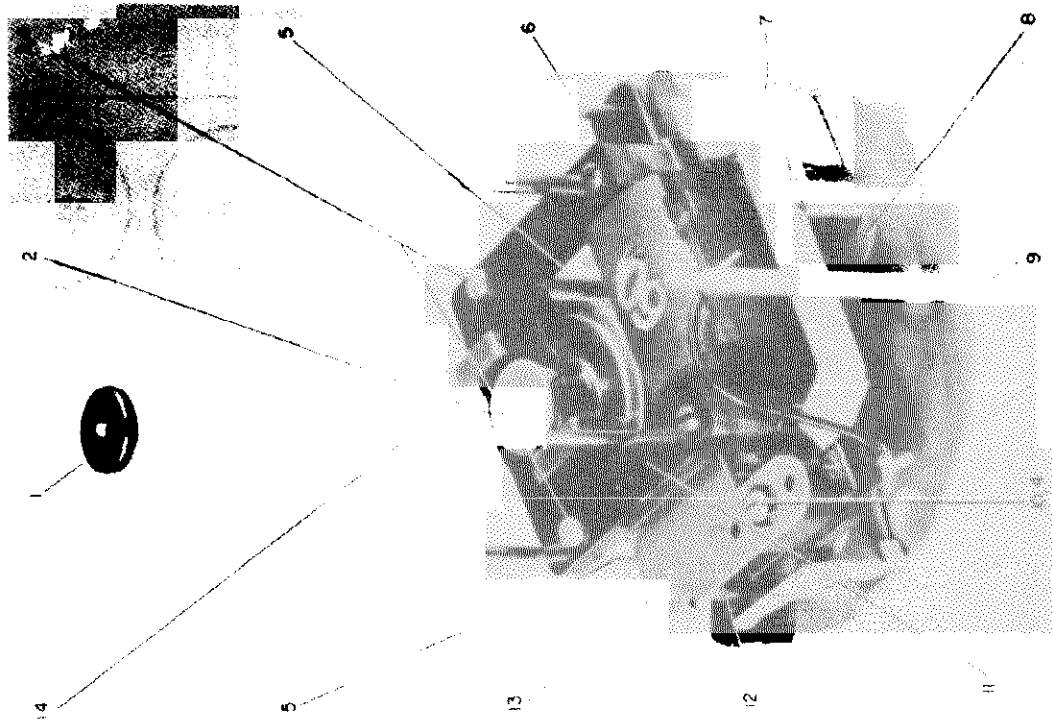


Fig. 3. Back View of Clock

MODELS 505,
506, 507, 508

SLEEP CONTROL BOOSTER SPRING

The illustration of Figure 5 shows the position of the booster spring, Cat. No. RMS-205, as viewed from the rear of the clock mechanism. This spring provides tension for proper segment gear and cam operation. One end of the spring is fastened to the cam stud, the other end to the brass Front Plate Stud.

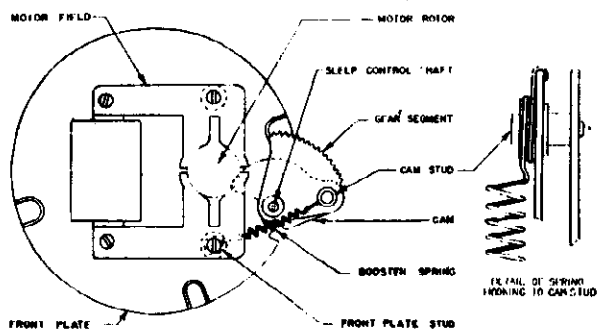


Fig. 5. Sleep Control Mechanism

C16, C17, C19, AND C20

The lead identification for the four-section ceramic capacitor RCW-3013 (K67J836) can be observed from the illustration of Figure 6.

Should it become necessary to service this unit, either the defective section can be cut out of the circuit and replaced by an individual capacitor (see Parts Replacement List, items UCC-036, UCU-039 and UCU-1036), or a complete new four-section unit, RCW-3013, can be installed.

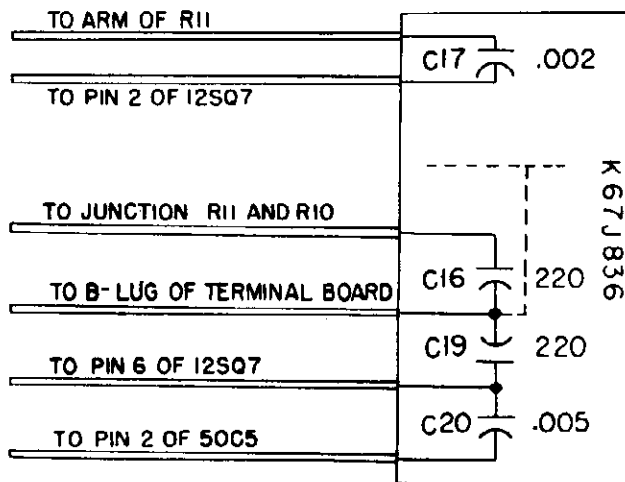


Fig. 6. Capacitor RCW-3013 (K67J836)

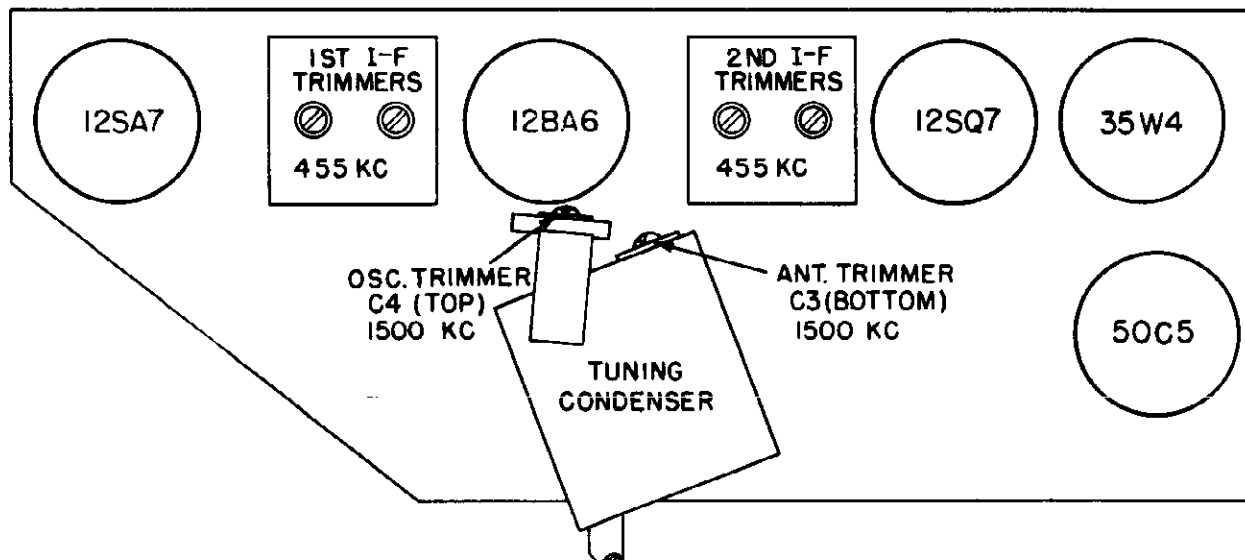


Fig. 7. Tube and Trimmer Location

MODELS 505,
506, 507, 508

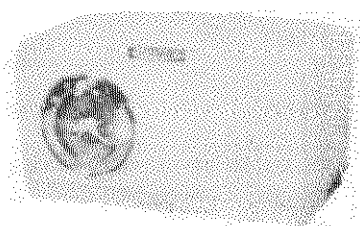
RADIO REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS			SPECIALIZED REPLACEMENT PARTS (Cont.)		
UCC-028	C5, 10, 11	CAPACITOR—.05 mf., 400 v., paper	*RCT-021	C2A, 2B	CAPACITOR—Tuning capacitor (oscillator and r-f section)
UCC-036	C17	CAPACITOR—.002 mf., 600 v., paper	*RCW-1043	C25	CAPACITOR—47 mmf., ceramic
UCC-039	C20	CAPACITOR—.005 mf., 600 v., paper	*RCW-3013	C16, 17, 19, 20	CAPACITOR—220 mmf., .002 mf., 220 mmf., .005 mf. (4 section ceramic)
UCC-045		CAPACITOR—.05 mf., 600 v., paper (will replace respective sections of RCW-3013).	*RDK-028		KNOB—Volume control knob
UCU-1036	C16, 19	CAPACITOR—220 mmf., mica	*RDK-094		KNOB—Tuning dial wheel. Does not include dial scale, see item RDS-090
UOP-421	LS1	SPEAKER PM loudspeaker	RDS-090		DIAL SCALE—Paper scale
URD-009	R17	RESISTOR—22 ohms, $\frac{1}{2}$ w., carbon	*RHC-018		SNAP FASTENER—For cabinet back
URD-017	R18	RESISTOR—47 ohms, $\frac{1}{2}$ w., carbon	RHG-015		GROMMET—For tuning cond.
URD-029	R15	RESISTOR 150 ohms, $\frac{1}{2}$ w., carbon	RHH-004		FASTENER—Snap fastener for holding back
URD-081	R1	RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon	RHI-010		STRAIN RELIEF GROMMET
URD-113	R2, 13, 14	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon	*RHJ-005		SPACER FOR TUNING CONDENSER
URD-129	R10	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon	RHS-043		PLUG AND SWITCH MOUNTING CABINET—Model 508
URD-141	R12	RESISTOR—6.8 meg., $\frac{1}{2}$ w., carbon	*RJC-004		CLIP—Loop connector clip
URF-049	R16	RESISTOR 1000 ohms, 1 w., carbon	RJI-008		APPLIANCE RECEPTACLE
SPECIALIZED REPLACEMENT PARTS			*RJS-116		SOCKET—Tube socket for 12SA7
RAB-116	L1	BACK—Cabinet back cover (includes loop L1) for Models 505, 506, 507	*RJS-117		SOCKET—Tube socket for 12SQ7
RAB-120	L1	BACK—Cabinet back cover (includes loop L1) for Model 508	*RJS-092		SOCKET—Tube socket for 50C5, 35W4
*RAC-060		SHIELD PLATE—Metal plate covers bottom of chassis, Models 505, 506, 507	*RJS-141		SOCKET—For 12BA6 tube, 7 pin
*RAC-073		MOUNTING BRACKET—Metal back cover holds clock to cabinet	*RLC-090	T4	COIL—Oscillator coil
RAU-305		CABINET—Ivory plastic (Model 506)	RMS-205		SLEEP CONTROL BOOSTER SPRING
RAU-317		CABINET—Brown plastic (Model 505)	*RRC-054	R11	POTENTIOMETER—.05 meg., volume control
RAU-318		CABINET—Maroon plastic (Model 507)	*RSS-005		SWITCH—ON-OFF Switch
RAU-322		CABINET—Blond mahogany finish plastic (Model 508)	*RTL-094	T1	TRANSFORMER—1st I-F transformer
*RCC-045	C21	CAPACITOR—.05 mf., 600 v., paper	*RTL-095	T2	TRANSFORMER—2nd I-F transformer
*RCC-074	C22	CAPACITOR—.003 mf., 600 v., paper	RTO-036	T3	TRANSFORMER—Output transformer
*RCE-050	C23A, B	CAPACITOR—50 mf., 150 v.; 50 mf., 150 v., dry electrolytic	*RWL-009		CORD—Power cord (brown) for Model 64
			*RWL-016		CORD—Power cord (white) for Model 65
			RYN-005		NAMEPLATE G.E. MONOGRAM
			*RZC-009	M1	CLOCK—60 cycle, 105-125 v., clock assembly

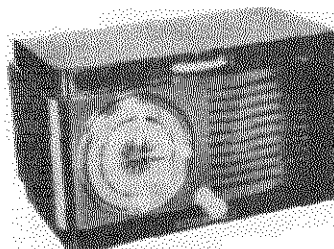
CLOCK REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
MISCELLANEOUS			CLOCK MOVEMENT (Cont.)		
*XC3X36	1	KNOB—Time set shaft knob (bronze)	*XC40X76	24	SWITCH INSULATOR ASSEMBLY—Consists of: two plastic and one fibre switch contact spring spacers
*XC4X5		KNOB—Alarm set knob (ivory)	*XC40X77	28	GEAR AND SPRING ASSEMBLY—Drives alarm dial gear and hour hand gear (complete with pinion and shaft, pinion and gear, spring, washers and retaining clip)
*XC31X26		HAND—Sweep second hand	*XC40X80	21	CONTACT ASSEMBLY—Lower switch contact and spring
*XC32X199		HANDS—Hour and minute hands (luminous)	*XC40X185		SPRING—Switch control shaft index spring (for cam indexed control shafts)
*XC53X31		BEZEL—Outer mounting rim	*XC40X194	29	LEVER—Sleep control switch lever
*XC53X117		BEZEL—Numeral ring (gold finish)	*XC40X196	15	GEAR AND SPRING ASSEMBLY—Pinion drive for sleep control segment gear (consists of pinion gear, pinion gear and shaft, spring, washers, and retaining clip)
*XC55X15		DIAL—Alarm dial scale	*XC40X197	8	LEVER—Alarm control switch cam lever
*XC58X16		CRYSTAL—Glass crystal	*XC40X198	22	CONTACT ASSEMBLY—Upper switch contact and spring with attached fibre arm
*XC59X247		RING—Color ring for numeral bezel	*XC40X202	5	SPACER BUSHING—Field core spacer at screw mounting to base plate
*XC59X716		KNOB—Wake-up Manual and Sleep control knob (ivory)	*XC40X252	26	WASHER—Alarm signal cam and gear friction washer
*XC61X937		DIAL—Clock dial scale (luminous)	*XC40X275		SPACER BUSHING—Wake-up Manual switch control shaft bushing
CLOCK MOVEMENT			*XC40X276	20	SPACER BUSHING—For time set shaft
*XC1X1	3	SCREW—Holds field core to baseplate, #4-40 x 1 $\frac{1}{2}$ " long, round head	*XC40X277	30	SHAFT—Sleep control shaft and gear segment assembly
*XC1X2	4	LOCK WASHER—Under screw head of switch assembly mounting screw and field core mounting	*XC44X28	2	MOTOR ROTOR ASSEMBLY—Cased rotor and pinion (60 cycles)
*XC1X6	10	SCREW—Used to assemble switch assembly to switch bracket	*XC45X69	11	MOTOR FIELD ASSEMBLY—Consists of: core, shading poles, and field coil (60 cycles)
*XC1X43	23	HEX NUT—For screw mounting switch assembly to switch bracket	*XC59X699	13	SHAFT ASSEMBLY—Wake-up Manual control shaft assembly (detent spring index type)
*XC10X141	14	SHAFT ASSEMBLY—Time set shaft and gear assembly	*XC59X723	13	SHAFT ASSEMBLY—Wake-up Manual control shaft assembly (cam index type)
*XC11X11	6	SHAFT ASSEMBLY—Alarm set shaft and gear assembly	*XC64X1		SCREW—Switch bracket and front plate mounting screws
*XC13X11	17	GEAR ASSEMBLY—Hour hand gear and sleeve assembly			
*XC14X32	18	GEAR ASSEMBLY—Minute hand friction gear, pinion gear and sleeve assembly			
*XC15X3	16	GEAR ASSEMBLY—Alarm dial gear and sleeve assembly			
*XC16X14	19	GEAR ASSEMBLY—Sweep second hand gear and shaft assembly			
*XC17X8	27	GEAR AND CAM—Alarm signal cam and gear assembly			
*XC34X173	9	FRONT PLATE ASSEMBLY—Complete with case studs and alarm set shaft spring (7)			
*XC35X93	25	BASE PLATE AND BACK GEAR—Base plate assembled complete with studs, back gear and pinion, and vibrator			

MODELS 509, 530



MODEL 509



MODEL 530

SPECIFICATIONS

CABINET:

Model	530	509
Color	Bleached Mah.	White
Height	6 $\frac{3}{8}$ in.	6 $\frac{3}{8}$ in.
Width	11 $\frac{1}{2}$ in.	11 $\frac{1}{2}$ in.
Depth	6 $\frac{1}{4}$ in.	6 $\frac{1}{4}$ in.

ELECTRICAL RATING (INPUT):

Voltage	105-120 volts, a-c
Frequency	60 cycles
Wattage	30 watts

OPERATING FREQUENCIES:

Intermediate Frequency	455 kc
Broadcast Band	540-1600 kc

POWER OUTPUT:

Undistorted	1
Maximum	1.75

LOUDSPEAKER:

Type	Alnico 5 PM
Outside Cone Diameter	4-inch
Voice Coil Impedance (400 cycles)	3.5 ohms

TUBE COMPLEMENT:

Oscillator-Converter	Type 12SA7
I-F Amplifier	Type 12BA6
Detector and 1st Audio	Type 12SQ7
Power Output	Type 50C5
Rectifier	Type 35W4

CAUTION: One side of the power line is connected to B-. Avoid any ground connections direct to B-. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

GENERAL INFORMATION

The Models 509 and 530 are four-tube, plus rectifier tube, a-c/d-c superheterodyne receivers, employing a Beam-a-scope antenna. Special features include an electric time clock with wake-up alarm and sleep control switch. In addition, the timer receptacle at the rear of the receiver provides an outlet connection for external appliances which is controlled by the normal function of the alarm and sleep control mechanism of the clock. The radio OFF-ON switch adjacent to the timer outlet provides control of radio operation so that the radio receiver may be turned off if so desired while using the external appliance. When radio operation is to be resumed, this switch must be turned to the on position.

RADIO CIRCUIT ALIGNMENT

ALIGNMENT FREQUENCIES:

R-F	1500 kc
R-F	1620 kc
I-F	455 kc

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation.
2. A-c output meter, 1 $\frac{1}{2}$ volts full scale.
3. 0.05 mf. paper capacitor.
4. Loop.
5. Insulated screwdriver.

PROCEDURE—GENERAL:

1. With the tuning scale control wheel turned so that the gang condenser plates are fully meshed, the index should read approximately $\frac{1}{8}$ inch to the right of the 550 kc scale calibration mark. If it does not, remove the control wheel from the gang condenser shaft and replace it for correct position. **CAUTION:** Do not attempt to correct the position by rotating the wheel on the shaft as this will cause the knob to slip.
2. For i-f alignment, it is necessary to remove the chassis from the cabinet.
3. Connect the output meter across the loudspeaker voice coil terminals.
4. Keep radio volume control at maximum and attenuate the test oscillator signal output so that the output meter reading never exceeds 1.0 volt.
5. Connect the capacitor as listed in column 2 between the output "High Side" of the test oscillator and the point of input specified. The oscillator output cable ground lead is connected to receiver chassis.
6. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and then locating the loop to face the radio antenna loop about one foot away. To prevent possible errors in reference to previous signal measurement readings, the loop with respect to the radio loop should not be changed during any one set of adjustments.

ALIGNMENT CHART

Step	Connect Test Oscillator to	Test Osc. Setting	Dial Drum Setting	Adjust Trimmers for Maximum Output
1	12SK7 grid (4) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	2nd I-F trans. trimmers, C14 and C15
2	12BA6 grid (1) in series with 0.05 mf. cap	455 kc	Minimum Capacity	1st I-F trans. trimmers, C8 and C9
3	Inductively coupled to radio loop	1620 kc	Minimum Capacity	C4 (oscillator)
4	Inductively coupled to radio loop	1500 kc	Tune for Maximum	C3 (antenna)

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit per-

formance and isolate trouble. The gain values listed may have tolerances of 20%. Readings taken with low signal input so that AVC is not effective.

(1) I-F Stage Gains.

12SA7 Grid to 12SK7 Grid 50 @ 455 kc
12SK7 Grid to 12SQ7 Diode Plate 50 @ 455 kc

(2) Audio Gain.

0.15 volts at 400 cycles across the volume control (R11)
with control set at maximum will give approximately $\frac{1}{2}$ -

watt output across the loudspeaker, LS1, voice coil.

(3) Oscillator Grid Bias.

D-c voltage developed across the oscillator grid leak (R1)
averages 8.5 volts at 1000 kc.

(4) Socket Pin Voltages.

Figure 2 shows voltages from all tube pins to B- unless otherwise specified. Voltage readings much higher or lower than those specified may help localize defective components or tubes.

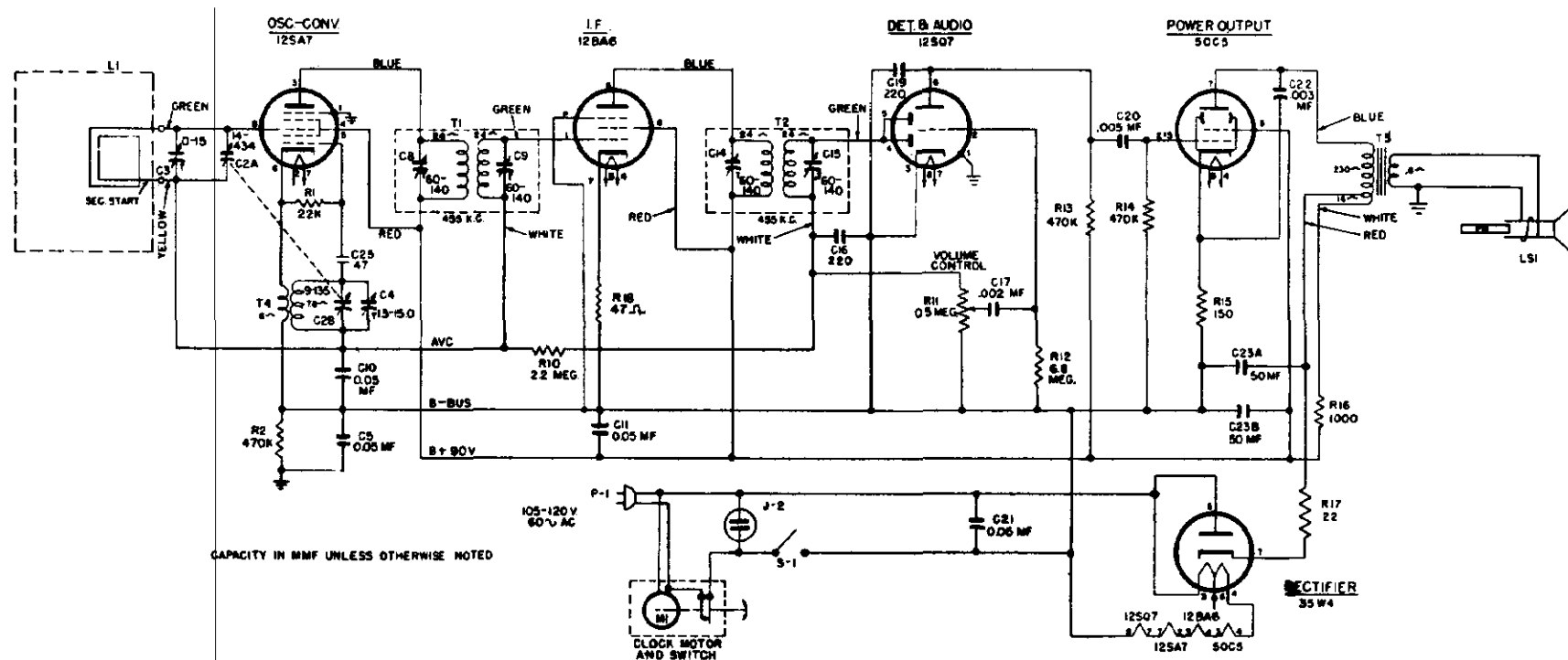


Fig. 1. Schematic Diagram

NOTE: Loop connections are: green lead to inside turn of antenna loop, yellow lead to outside turn.

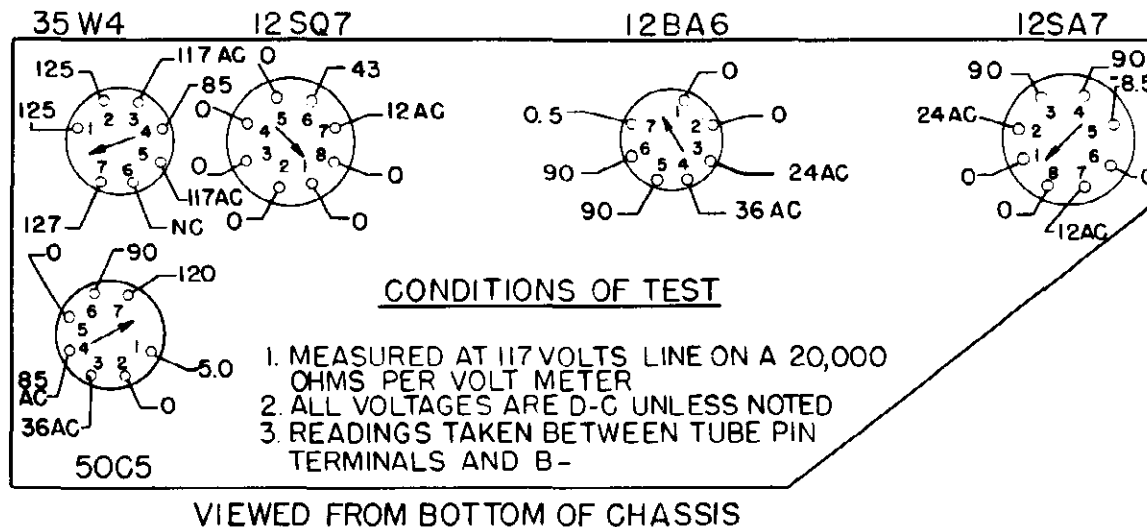


Fig. 2. Socket Voltages

CLOCK SERVICE

Figures 3 and 4 show clock parts referred to in the following paragraphs and the parts list.

CLOCK MOVEMENT DISASSEMBLY

1. Remove clock movement from case. When removing knobs, note that the Alarm-Set knob is a left-hand thread, while Wake-Up Manual and Sleep are pull-off knobs.
2. Remove Bezel, Hands and Dial Faces.
3. Remove the motor assembly by removing two screws (3 and 4) and break two soldered joints on Field. The Field and Rotor Assembly (11 and 2) can now be removed. The Rotor is held by friction only, to the Field.
4. Remove Switch Assembly by removing two screws (12) from base plate.
5. Remove Switch Shaft Assembly (13) and spacer.
6. Remove Alarm-Set Shaft Assembly (6) and spacer.
7. Remove the three front plate assembly screws that are located under the Dial Face and then remove Front Plate.
8. Remove the following gear assemblies and control levers in the order listed below:
 - (a) Sweep Control Shaft and Segment Gear (30)
 - (b) Alarm Dial Gear (16)
 - (c) Hour Hand Gear (17)
 - (d) Alarm Signal Cam and Gear, and Friction Washer (26, 27)
 - (e) Sweep Control Switch Lever (29)
 - (f) Pinion Drive Gear Assembly (15) (drives Sleep Control Segment Gear)
 - (g) Alarm Control Switch Cam Lever (8)
 - (h) Time Set Shaft and Gear, and Spacer (14, 20)
 - (i) Drive Gear and Pinion Assembly (28)
 - (j) Minute Hand Gear (18)
 - (k) Sweep Second Hand Gear (19)

CLOCK MOVEMENT REASSEMBLY

Reassemble in the reverse order of disassembly, observing the following precautions:

1. The spring washer (26) should curve away from the gear when placed on the Alarm Cam Gear Assembly (27).
2. The Switch Cam Lever fork (8) must straddle the base plate post as shown in the illustration.
3. After reassembly of front plate, check the Sweep Second

Gear (19) through the hole in the base plate to make sure it is free to turn.

4. Proceed with Alarm and Switch Adjustments as described below before installing hands.

ALARM AND SWITCH ADJUSTMENTS

1. Turn Wake-Up Manual shaft to WAKE UP position.
2. Slowly rotate Time Set shaft clockwise until the contacts 21 and 22 of the Switch Assembly close.
3. Replace Dial Face, Alarm Dial, the Minute, Hour and Second Hands. Set all Hands so that they indicate 12 o'clock. Set figure 12 of the alarm dial to index with the smaller pointer of the hour hand. Make sure all Hands and Alarm Dial are tight on their respective shafts.
4. With Alarm Set knob pulled out, continue to rotate Time Set shaft clockwise and note that the Alarm vibrator arm drops against field core approximately 7-10 minutes later.
5. Set alarm at some other selected position and make sure mechanism actuates within limits (± 1 minute).
6. Check alarm tone of vibrator. This can be adjusted by either bending vibrator arm nearer or farther away from field core. Bend arm near anchor point.

CLEANING AND LUBRICATION

To clean, completely disassemble and clean all moving parts in carbon tetrachloride or some similar cleaner.

The inside of the sleeves and shaft surfaces may be cleaned of oxidized oil by rubbing with a fine grade of steel wool dampened in carbon tetrachloride.

Do not use too much oil and apply by means of a small wire (drop oiler). Too much oil collects dust and later oxidizes. Use only recommended clock oil, such as Nye's Celebrated Oil which may be purchased from Wm. F. Nye Co., Inc., New Bedford, or equivalent.

CLOCK TROUBLES

1. Clock will not operate—Defective field coil, defective rotor, binding of parts.
2. Clock loses time—Binding parts, too little friction on minute hand sleeve assembly, defective rotor. Clock time set shaft bends and rubs against hole in clock bracket.
3. Noisy Clock—Rotor defective, alarm armature improperly adjusted, loose parts, or binding of moving parts.

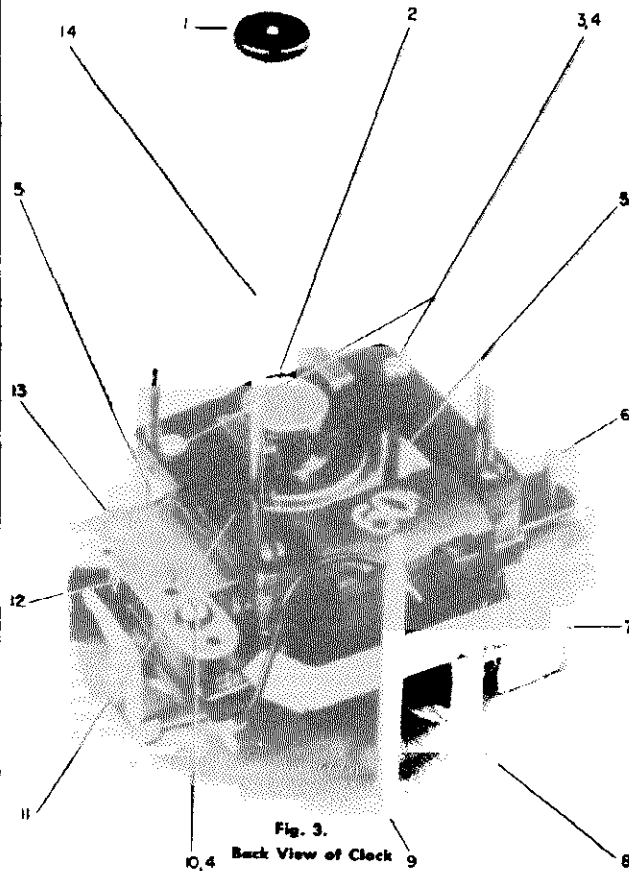


Fig. 3.

Back View of Clock

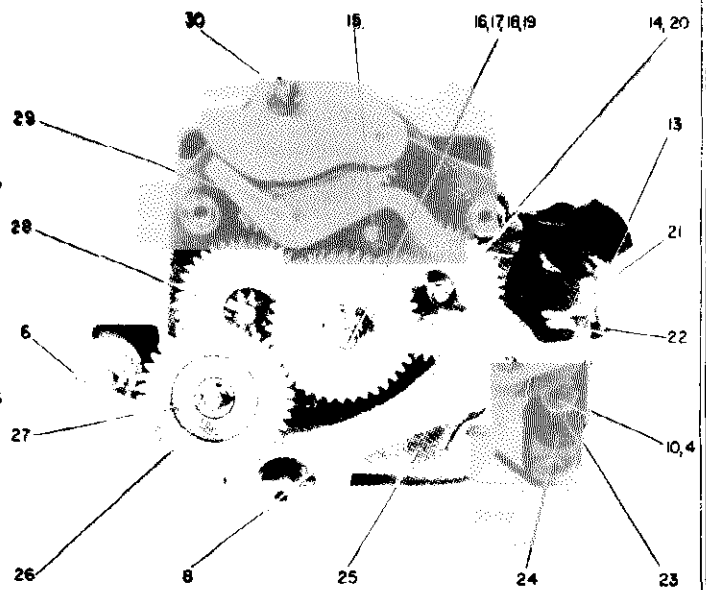


Fig. 4. Front View of Clock, Front Plate Removed

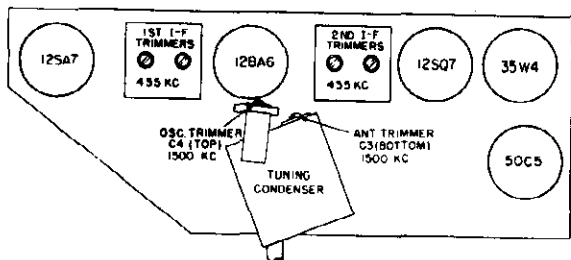


Fig. 5. Tube and Trimmer Location

SLEEP CONTROL BOOSTER SPRING

The illustration of Figure 7 shows the position of the booster spring, Cat. No. RMS-205, as viewed from the rear of the clock mechanism. This spring provides tension for proper segment gear and cam operation. One end of the spring is fastened to the cam stud, the other end to the brass Front Plate Stud.

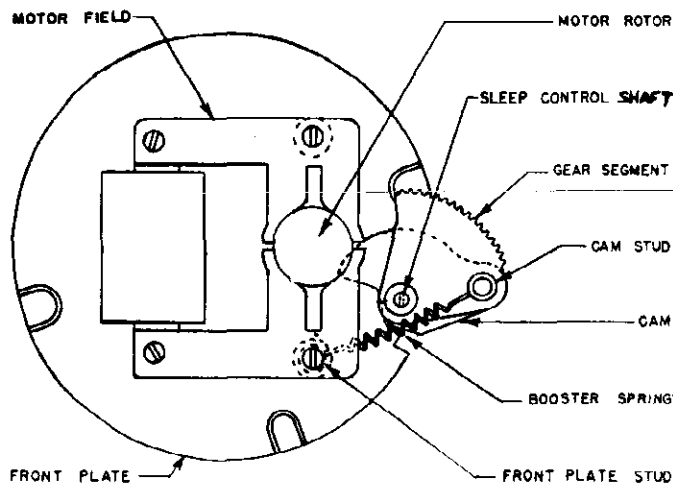


Fig. 6. Capacitor RCW-3013 (K67J836)

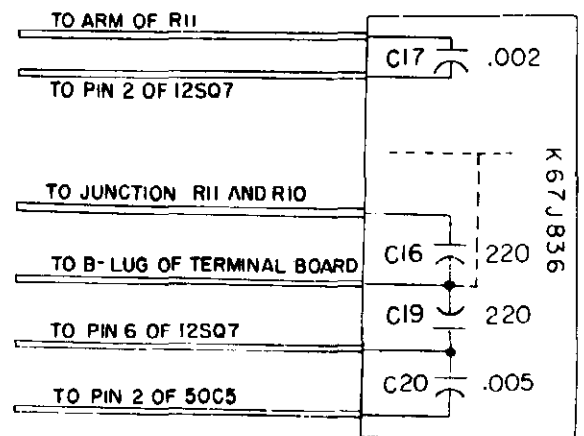


Fig. 7. Sleep Control Mechanism

MODELS 509, 530

RADIO REPLACEMENT PARTS LIST—MODELS 509 AND 530

Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS		
*UCC-028	C5, 10, 11	CAPACITOR—.05 mf., 400 v., paper
*UCC-036	C17	CAPACITOR—.002 mf., 600 v., paper (will replace respective sections of RCW-3013)
*UCC-039	C20	CAPACITOR—.005 mf., 600 v., paper (will replace respective sections of RCW-3013)
*UCC-045	C21	CAPACITOR—.05 mf., 600 v., paper
*UCU-1036	C16, 19	CAPACITOR 220 mmf., mica (will replace respective sections of RCW-3013)
*URD-009	R17	RESISTOR—22 ohms, $\frac{1}{2}$ w., carbon
*URD-017	R18	RESISTOR—47 ohms, $\frac{1}{2}$ w., carbon
*URD-029	R15	RESISTOR—150 ohms, $\frac{1}{2}$ w., carbon
*URD-081	R1	RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon
*URD-113	R2, 13, 14	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon
*URD-129	R10	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon
*URD-141	R12	RESISTOR—6.8 meg., $\frac{1}{2}$ w., carbon
*URF-049	R16	RESISTOR—1000 ohms, 2 w., carbon
*DLIRS-400-CG16	LS1	SPEAKER—PM loudspeaker (less T3)

SPECIALIZED REPLACEMENT PARTS		
*RAB-116	L1	BACK—Cabinet back cover (includes loop L1) for Model 509
*RAB-120	L1	BACK—Cabinet back cover (includes loop L1) for Model 530
*RAC-060		SHIELD PLATE—Metal plate covers bottom of chassis
*RAC-073		MOUNTING BRACKET—Metal back cover holds clock to cabinet
RAU-325		CABINET—White plastic (Model 509)
RAU-330		CABINET—Bleached mahogany finish plastic (Model 530)
*RCC-074	C22	CAPACITOR—.003 mf., 600 v., paper
*RCE-050	C23A, B	CAPACITOR—50 mf., 150 v.; 50 mf., 150 v., dry electrolytic
*RCT-021	C2A, 2B	CAPACITOR—Tuning capacitor (oscillator and r-f section)

SPECIALIZED REPLACEMENT PARTS (Cont.)		
*RCW-1043	C25	CAPACITOR—47 mmf., ceramic
*RCW-3013	C16, 17, 19, 20	CAPACITOR—220 mmf., .002 mf., 220 mmf., .005 mf. (4 section ceramic)
*RDK-028		KNOB—Volume control knob, Model 530
*RDK-094		KNOB—Tuning dial wheel. Does not include dial scale, see item RDS-090
RDK-203		KNOB—Volume control knob (red) for Model 509
*RDS-090		DIAL SCALE—Paper scale
*RHG-015		GROMMET—For tuning cond.
*RHH-004		FASTENER—Snap fastener for holding back
RHI-010		STRAIN RELIEF INSULATOR
*RHJ-005		SPACER FOR TUNING CONDENSER
RHS-043		BRACKET—For receptacle, J2 and switch, S1
*RJC-004	J2	CLIP—Loop connector clip
*RJJ-008		APPLIANCE RECEPTACLE
*RJS-116		SOCKET—Tube socket for 12SA7
*RJS-117		SOCKET—Tube socket for 12SQ7
*RJS-092		SOCKET—Tube socket for 50C5, 35W4
*RJS-141	T4	SOCKET—For 12BA6 tube, 7 pin
*RLC-090		COIL—Oscillator coil
RMS-205		SLEEP CONTROL BOOSTER SPRING
*RRC-054	R11	POTENTIOMETER—.5 meg., volume control
RSW-067	S1	SWITCH—Radio ON-OFF switch at rear of receiver
*RTL-094	T1	TRANSFORMER—1st I-F transformer
*RTL-095	T2	TRANSFORMER—2nd I-F transformer
RTO-036	T3	TRANSFORMER—Output transformer
*RWL-009		CORD—Power cord (brown) for Model 530
*RWL-106		CORD—Power cord (white) for Model 509
RYN-007		NAMEPLATE—General Electric monogram
*RZC-009	M1	CLOCK—60 cycle, 105-125 v., clock assembly for Model 530
RZC-011	M1	CLOCK—60 cycle, 105-125 v., clock assembly

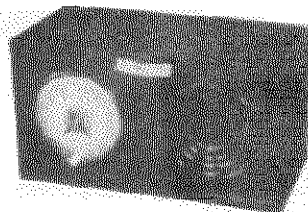
CLOCK REPLACEMENT PARTS LIST—MODELS 509 AND 530

Cat. No.	Symbol	Description
MISCELLANEOUS		
*XC3X36	1	KNOB—Time set shaft knob (bronze)
*XC4X5		KNOB—Alarm set knob (ivory)
*XC31X26		HAND—Sweep second hand (Model 530)
*XC32X199		HANDS—Hour and minute hands (luminous) (Model 530)
*XC53X31		BEZEL—Outer mounting rim (Model 530)
*XC53X117		BEZEL—Numeral ring (gold finish) (Model 530)
*XC55X15		DIAL—Alarm dial scale
*XC58X16		CRYSTAL—Glass crystal
*XC59X247		RING—Color ring for numeral bezel (Model 530)
*XC59X716		KNOB—Wake-up Manual and Sleep control knob (ivory)
*XC61X937		DIAL—Clock dial scale (luminous) (Model 530)
*RZA-001		BEZEL—Outer mounting rim
*RZA-002		BEZEL—Numeral ring (gold finish)
*RZA-003		RING—Color ring for numeral bezel
*RZD-001		DIAL—Clock dial scale (luminous)
*RZH-001		HAND—Sweep second hand
*RZH-002		HANDS—Hour and minute hands

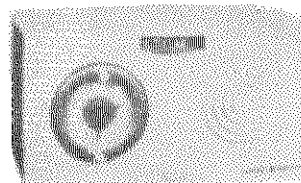
CLOCK MOVEMENT		
*XC1X1	3	SCREW—Holds field core to baseplate, .4-40 x 1 $\frac{1}{4}$ " long, round head
*XC1X2	4	LOCKWASHER—Under screw head of switch assembly mounting screw and field core mounting
*XC1X6	10	SCREW—Used to assemble switch assembly to switch bracket
*XC1X43	23	HEX NUT—For screw mounting switch assembly to switch bracket
*XC10X141	14	SHAFT ASSEMBLY—Time set shaft and gear assembly
*XC11X11	6	SHAFT ASSEMBLY—Alarm set shaft and gear assembly
*XC13X11	17	GEAR ASSEMBLY—Hour hand gear and sleeve assembly
*XC14X32	18	GEAR ASSEMBLY—Minute hand friction gear, pinion gear and sleeve assembly
*XC15X3	16	GEAR ASSEMBLY—Alarm dial gear and sleeve assembly
*XC16X14	19	GEAR ASSEMBLY—Sweep second hand gear and shaft assembly
*XC17X8	27	GEAR AND CAM—Alarm signal cam and gear assembly

Cat. No.	Symbol	Description
CLOCK MOVEMENT (Cont.)		
*XC34X173	9	FRONT PLATE ASSEMBLY—Complete with case studs and alarm set shaft spring (7)
*XC35X93	25	BASE PLATE AND BACK GEAR—Base plate assembled complete with studs, back gear and pinion, and vibrator
*XC40X76	24	SWITCH INSULATOR ASSEMBLY—Consists of: two plastic and one fibre switch contact spring spacers
*XC40X77	28	GEAR AND SPRING ASSEMBLY—Drives alarm dial gear and hour hand gear (complete with pinion and shaft, pinion and gear, spring, washers and retaining clip)
*XC40X80	21	CONTACT ASSEMBLY—Lower switch contact and spring
*XC40X185		SPRING—Switch control shaft index spring (for cam indexed control shafts)
*XC40X194	29	LEVER—Sleep control switch lever
*XC40X196	15	GEAR AND SPRING ASSEMBLY—Pinion drive for sleep control segment gear (consists of pinion gear, pinion gear and shaft, spring, washers, and retaining clip)
*XC40X197	8	LEVER—Alarm control switch cam lever
*XC40X198	22	CONTACT ASSEMBLY—Upper switch contact and spring with attached fibre arm
*XC40X202	5	SPACER BUSHING—Field core spacer at screw mounting to base plate
*XC40X252	26	WASHER—Alarm signal cam and gear friction washer
*XC40X275		SPACER BUSHING—Wake-up Manual switch control shaft bushing
*XC40X276	20	SPACER BUSHING—For time set shaft
*XC40X277	30	SHAFT—Sleep control shaft and gear segment assembly
*XC44X38	2	MOTOR ROTOR ASSEMBLY—Cased rotor and pinion (60 cycles)
*XC45X69	11	MOTOR FIELD ASSEMBLY—Consists of: core, shading poles, and field coil (60 cycles)
*XC59X699	13	SHAFT ASSEMBLY—Wake-up Manual control shaft assembly (detent spring index type)
*XC59X723	13	SHAFT ASSEMBLY—Wake-up Manual control shaft assembly (cam index type)
*XC64X1		SCREW—Switch bracket and front plate mounting screws

* Parts used on previous receivers.



Model 510



Model 511

SPECIFICATIONS

CABINET	Model	510	511
	Composition	Brown plastic	Ivory plastic
	Height	6 $\frac{1}{4}$ inches	
	Width	5 $\frac{1}{4}$ inches	
	Length	11 $\frac{3}{8}$ inches	
POWER SUPPLY	Voltage	105-120 volts	
	Frequency	60 cycles	
	Wattage	30 watts	
OPERATING FREQUENCIES	Broadcast Band	540-1600 kc	
	I-F Amplifier	455 kc	
POWER OUTPUT	Undistorted	1 watt	
	Maximum	1.75 watts	
LOUDSPEAKER	Type	Alnico 5 PM	
	Outside Cone Diameter	4 inches	
	Voice Coil Impedance (400 cycles)	3.5 ohms	
TUBE COMPLEMENT	Oscillator-Converter	12SA7	
	I-F Amplifier	12BA6	
	Detector and 1st Audio	12SQ7	
	Power Output	50C5	
	Rectifier	35W4	

GENERAL INFORMATION

The Models 510 and 511 are table model receivers providing reception on the Broadcast Band and incorporate as a special feature an electric time clock with wake-up alarm. A Beam-a-scope antenna is built in the radio providing good reception without an outside antenna.

RADIO CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED

1. Test oscillator with tone modulation.
2. A-c output meter, 1 $\frac{1}{2}$ volts full scale.
3. Paper capacitor, 0.05 mf.
4. Loop (see explanation below).
5. Insulated screwdriver.
6. Isolation transformer.

PROCEDURE—GENERAL

1. With the tuning scale control wheel turned so that the tuning condenser plates are fully meshed, the index should read approximately $\frac{1}{4}$ inch to the right of the 500 kc scale calibration mark. If the reading is incorrect, remove the control wheel from the tuning condenser and replace for correct position. Do not attempt to correct the position by rotating the wheel on the shaft as this will cause the knob to slip.
2. For i-f alignment, it is necessary to remove the chassis from the cabinet.
3. Connect the output meter across the loudspeaker voice terminals.
4. Keep volume control at maximum and attenuate the test oscillator signal output so that the output meter reading never exceeds 1.0 volt.
5. Connect the capacitor as listed in column 2 between the output "High Side" of the test oscillator and the point of input specified. The oscillator output cable ground lead is connected to the receiver B.

ALIGNMENT CHART

Step	Connect Test Oscillator to	Test Osc. Setting	Dial Drum Setting	Adjust Trimmer for Max. Output
1	12BA6 grid (1) in series with 0.05 mf. cap.	455 kc	Minimum capacity	2nd i-f trans. trimmers, C14 and C15.
2	12SA7 grid (8) in series with 0.05 mf. cap.			1st i-f trans. trimmer, C8 and C9.
3	Inductively coupled to radio loop.	1620 kc	Tune for maximum	C4 (oscillator)
4		1500 kc		C3 (antenna) (Rock-in)

6. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and then locating the loop to face the radio antenna loop about one foot away. To prevent possible errors in reference to previous signal measurement readings, the loop should not be changed with respect to the radio loop during any one set of adjustments.

STAGE GAIN AND VOLTAGE CHECKS

Trouble shooting is greatly enhanced by stage gain measurements which must be made by vacuum tube voltmeter or similar measuring instrument. The gain listed may have tolerances of $\pm 20\%$. Use only low signal input so that the AVC is inoperative.

1. I-F STAGE GAINS

12SA7 Grid to 12BA6 Grid	50 @ 455 kc
12BA6 Grid to 12SQ7 Diode Plate	50 @ 455 kc

2. AUDIO GAINS

With the volume control (R11) at maximum, an input signal of 0.15 volts at 400 cycles across the control R11 will give approximately 0.5 watt output across the loudspeaker voice coil.

3. OSCILLATOR GRID BIAS

The d-c voltage developed across the oscillator grid leak (R1) averages 8.5 volts at 1000 kc, measured with V.T.V.M.

4. SOCKET VOLTAGES

The tube voltages are shown on Figure 3. They are taken from tube pins to B— unless specified otherwise. Great deviations of voltage values may help to localize defective components or tubes.

5. HUM

The hum voltage measured at the primary of the output transformer should not exceed 3mV volts. This measurement should be made with an a-c voltmeter of a sensitivity of 20,000 ohm/volt in series with 0.5 mf. capacitor.

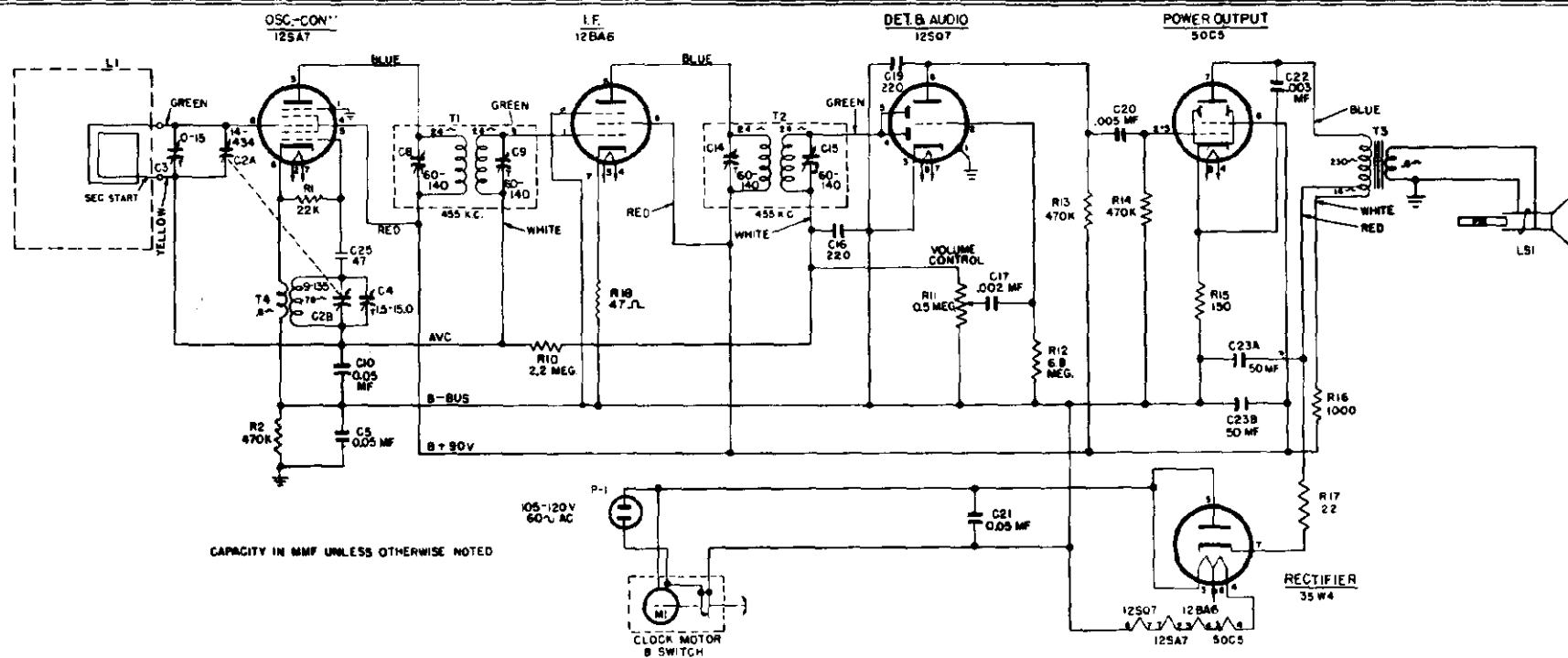


Fig. 1. Schematic Diagram, Models 510 and 511

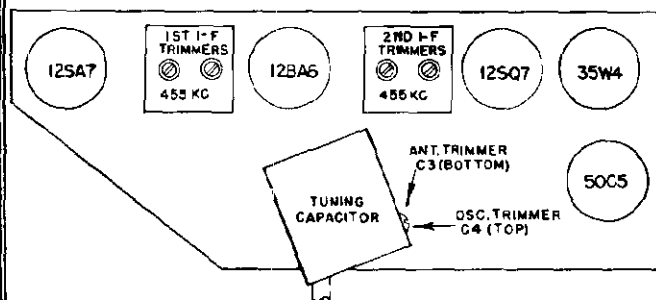


Fig. 2. Tube and Trimmer Location

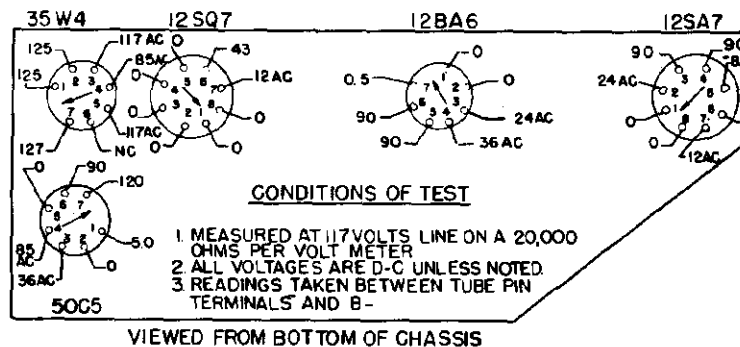


Fig. 3. Socket Voltage Diagram

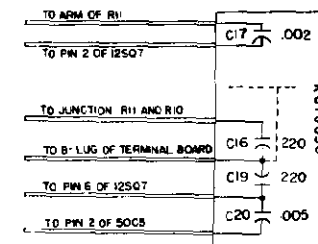


Fig. 4. Capacitor RC-3013 (K67J836)

CLOCK SERVICE

Figure 5 shows clock parts referred to in the following paragraphs and the parts list.

CLOCK MOVEMENT DISASSEMBLY

1. Remove clock movement from case. When removing knobs, note that the Alarm-Set knob is a left-hand thread, while Alarm-Radio is a pull-off knob.
2. Remove Bezel, Hands and Dial Face.
3. Remove the motor assembly by removing two screws (A) and break two soldered joints on Field. The Field and Rotor Assembly (R) can now be removed. The Rotor is held by friction only to the Field.
4. Remove Switch Assembly (B) by removing two screws from base plate.
5. Remove Switch Shaft Assembly (C) and spacer.
6. Remove Alarm-Set Shaft Assembly (D) and spacer.
7. Remove the three front plate assembly screws that are located under the Dial Face and then remove Front Plate.
8. Remove Alarm Gear Sleeve Assembly (E), Hour Gear Sleeve Assembly (F), Minute Gear Sleeve Assembly (G), and Sweep Second Gear Shaft Assembly (H).
9. Remove Alarm Cam Gear Assembly (I) and Spring Washer (J).
10. Remove Alarm-Set Gear (K).
11. Remove Time-Set Gear and Shaft Assembly (L).
12. Remove Switch Cam Lever (M).

CLOCK MOVEMENT REASSEMBLY

Reassemble in the reverse order of disassembly, observing the following precautions:

1. The spring washer (J) should curve away from the gear when placed on the Alarm Cam Gear Assembly (I).
2. The Switch Cam Lever (M) fork must straddle the base plate post as shown in the illustration.
3. After reassembly of front plate, check the Sweep Second Gear (H) through the hole in the base plate to make sure it is free to turn.

4. Proceed with Alarm and Switch Adjustments as described below before installing hands.

ALARM AND SWITCH ADJUSTMENTS

1. Turn Alarm-Radio shaft to ALARM position.
2. Slowly rotate Time-Set shaft clockwise until the contacts of the Switch Assembly (B) close.
3. Replace Dial Face, Alarm Dial, the Minute, Hour and Second Hands. Set all Hands and Dial so that they indicate 12 o'clock. Make sure all Hands and Alarm Dial are tight on their respective shafts.
4. With Alarm-Set knob pulled out, continue to rotate Time-Set shaft clockwise and note that the vibrator arm (N) drops against field core approximately 7-10 minutes later.
5. Set alarm at some other selected position and make sure mechanism actuates within limits (± 1 minute).
6. Check alarm tone of vibrator. This can be adjusted by either bending vibrator arm nearer or farther away from field core. Bend arm near anchor point.

CLEANING AND LUBRICATION

To clean, completely disassemble and clean all moving parts in carbon tetrachloride or some similar cleaner.

The inside of the sleeves and shaft surfaces may be cleaned of oxidized oil by rubbing with a fine grade of steel wool dampened in carbon tetrachloride.

Do not use too much oil and apply by means of a small wire (drop oiler). Too much oil collects dust and later oxidizes. Use only recommended clock oil, such as Nye's Celebrated Oil, which may be purchased from Wm. F. Nye Co., Inc., New Bedford, or equivalent.

CLOCK TROUBLES

1. Clock will not operate—Defective field coil, defective rotor, binding of parts.
2. Clock loses time—Binding parts, too little friction on minute hand sleeve assembly, defective rotor. Clock time-set shaft bent and rubs against hole in clock bracket.
3. Noisy Clock—Rotor defective, alarm armature improperly adjusted, loose parts, or binding of moving parts.

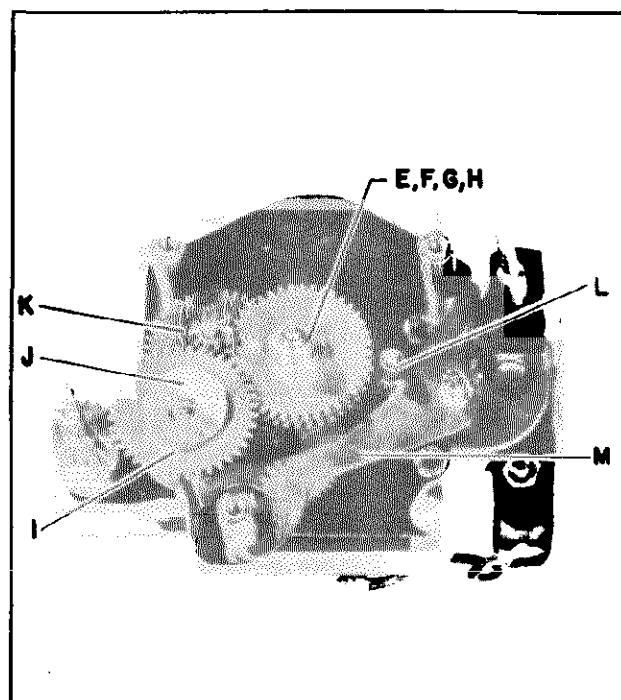
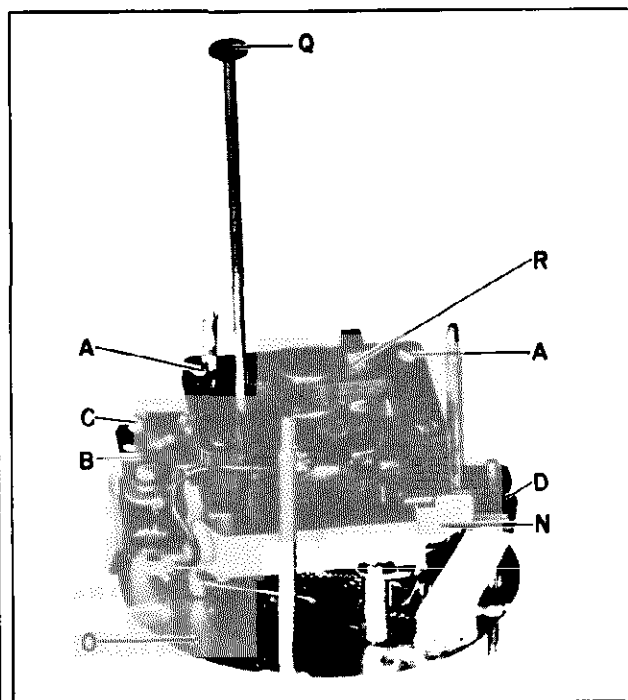


Fig. 5. Clock Part Identification

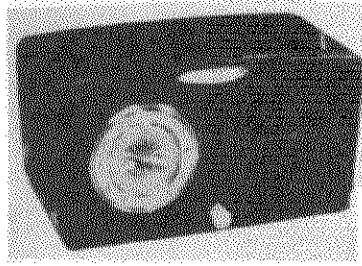
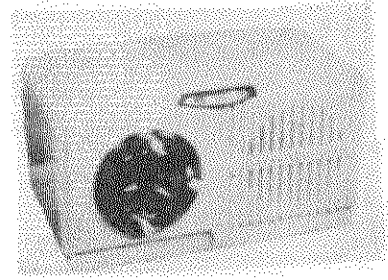
MODEL 510 AND 511 REPLACEMENT PARTS

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS			SPECIALIZED REPLACEMENT PARTS (Cont'd)		
UCC-037	C22	CAPACITOR—.003 mf., 600 v., paper	RAU-337		CABINET—White plastic (Model 511)
*UCC-045	C5, C10, C11, C21	CAPACITOR—.05 mf., 600 v., paper	*RCC-074	C22	CAPACITOR—.003 mf., 600 v., paper
*UCC-630	C17, C20	CAPACITOR—.01 mf., 600 v., paper (may replace respective sections of RCW-3013)	*RCE-116	C23A, C23B	CAPACITOR—50 mf., 150 v., dry electrolytic
UCG-020	C25	CAPACITOR—47 mmf., silver mica	*RCT-045	C2A, C2B, C3, C4	CAPACITOR—Tuning capacitor (oscillator and r-f section) with trimmers
*UCU-036	C16, C19	CAPACITOR—220 mmf., mica (may replace respective sections of RCW-3013)	*RCW-3013	C16, C17, C19, C20	CAPACITOR—220 mmf., .002 mf., 220 mmf., .005 mf. (4 section ceramic) (see UCC-630, UCU-036)
*URD-009	R17	RESISTOR—22 ohms, $\frac{1}{2}$ w., carbon	*RDK-216		KNOB—Tuning dial wheel
*URD-017	R18	RESISTOR—47 ohms, $\frac{1}{2}$ w., carbon	*RDK-218		KNOB—Volume control knob
*URD-029	R15	RESISTOR—150 ohms, $\frac{1}{2}$ w., carbon	RHC-017		CLIP—Coil clip
*URD-081	R1	RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon	RHC-024		CLIP—Condenser clip
*URD-113	R2, R13, R14	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon	*RHG-015		GROMMET—Cushion mounting for C2A, C2B
*URD-129	R10	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon	*RHI-010		STRAIN RELIEF
*URD-141	R12	RESISTOR—6.8 meg., $\frac{1}{2}$ w., carbon	*RHJ-005		SPACER—Washer used with RHG-015
*URF-049	R16	RESISTOR—1000 ohms, 2 w., carbon	*RJC-004		CLIP—Loop connector clip
S400C	LS1	SPEAKER—4-in. PM speaker, less output transformer	*RJS-092		SOCKET—Tube socket for 50C5, 35W4
			*RJS-116		SOCKET—Tube socket for 12SA7
			*RJS-117		SOCKET—Tube socket for 12SQ7, 35Z5-GT
			*RJS-141		SOCKET—Tube socket for 12BA6
			*RLC-090	T4	COIL—Oscillator coil
			RMS-214		SPRING—Compression spring
			*RRC-034	R11	POTENTIOMETER—0.5 meg., volume control
			*RTL-094	T1, C8, C9	TRANSFORMER—1st I-F transformer
			*RTL-095	T2, C14, C15	TRANSFORMER—2nd I-F transformer
			*RTO-036	T3	TRANSFORMER—Output transformer
			RTO-091	T3	TRANSFORMER—Output transformer (bolt mount)
			*RWL-009		CORD—Power cord (brown) for Model 510
			*RWL-016		CORD—Power cord (white) for Model 511
			*RZC-012	M1	CLOCK—60 cycle, 105-125 v., clock assembly
SPECIALIZED REPLACEMENT PARTS					
*RAB-131	L1	BACK—Cabinet back cover (includes loop L1)			
RAC-060		SHIELD—Bottom shield			
*RAC-085		MOUNTING BRACKET—Metal back cover holds clock to cabinet			
RAG-033		GRILLE CLOTH ASSEMBLY—Model 510			
RAG-034		GRILLE CLOTH ASSEMBLY—Model 511			
RAU-336		CABINET—Brown plastic (Model 510)			

CLOCK REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
MISCELLANEOUS			CLOCK MOVEMENT (Cont'd)		
XC3X49	Q	TIME SET SHAFT KNOB—Bronze	*XC14X15	G	MINUTE GEAR SLEEVE ASSEMBLY
XC4X5		ALARM SET KNOB—Ivory	*XC15X3	E	ALARM GEAR SLEEVE ASSEMBLY
XC10X131	L	TIME SET GEAR AND SHAFT ASSEMBLY	*XC16X14	H	SWEEP SECOND GEAR SHAFT ASSEMBLY
XC11X11	D	ALARM SET SHAFT ASSEMBLY	*XC17X8	I	ALARM GEAR SHAFT ASSEMBLY
RZH-003		SWEEP SECOND HAND	*XC35X39		BASEPLATE ASSEMBLY
RZH-004		HOUR AND MINUTE HANDS	*XC40X13		RIVET—Vibrator
XC34X139	O	FRONTPLATE ASSEMBLY	*XC40X76		SWITCH ASSEMBLY—Consists of Contact Block (top), Contact Block (bottom), Contact Spring Insulator
RZA-004		ALARM DIAL	*XC40X77	K	ALARM SET GEAR ASSEMBLY
XC58X16		CRYSTAL—2 $\frac{3}{16}$ in., round	*XC40X78	M	SWITCH CAM LEVER ASSEMBLY
RZA-004		NUMERAL COLOR RING—Red	*XC40X79		UPPER CONTACT SPRING ASSEMBLY
XC59X699	C	SWITCH SHAFT ASSEMBLY	*XC40X80		LOWER CONTACT SPRING AND TIP ASSEMBLY
XC59X716		SWITCH KNOB—Ivory	*XC40X202		SPREADER POST
RZD-003		DIAL FACE—(On front plate)	*XC40X252	J	CAM GEAR SPRING WASHER
RZA-005		NUMERAL RING—Bronze	*XC40X260		SPACER—Switch shaft
			*XC40X261		TIME SET SHAFT SPACER
			*XC40X262		TIME SET SHAFT SPACER
			*XC40X263		ALARM SHUT-OFF SPACER
			*XC44X38		ROTOR UNIT—60 cycles
			*XC45X69	R	FIELD COIL ASSEMBLY—60 cycles
			*XC64X1		FRONTPLATE SCREW
CLOCK MOVEMENT					
*XC1X1	A	SCREW—Holds Field, No. 4-40X1 $\frac{1}{2}$ in. R.H.			
*XC1X2		No. 1204 LOCKWASHER			
*XC1X6		SCREW No. 4-40 x $\frac{3}{4}$ in. R.H.			
*XC1X43		HEX NUT			
*XC13X11	F	HOUR GEAR SLEEVE ASSEMBLY			

*Used on other models.

MODELS 515,
516, 517, 518MODEL 515 (Brown Mottle)
MODEL 517 (Maroon)MODEL 516 (Ivory)
MODEL 518 (White)

SPECIFICATIONS

CABINET:

Height.....6 $\frac{1}{8}$ inches
Width.....11 $\frac{1}{8}$ inches
Depth.....4 $\frac{1}{4}$ inches

ELECTRICAL RATING (INPUT):

Voltage.....105-120 volts, a-c
Frequency.....60 cycles
Wattage.....30 watts

OPERATING FREQUENCIES:

Intermediate Frequency.....455 kc
Broadcast Band.....540-1600 kc

POWER OUTPUT:

Undistorted.....1 watt
Maximum.....1.75 watts

LOUDSPEAKER:

Type.....Alnico 5 PM
Outside Cone Diameter.....4-inch
Voice Coil Impedance (400 cycles).....3.5 ohms

TUBE COMPLEMENT:

Oscillator-Converter.....Type 12SA7
I-F Amplifier.....Type 12BA6
Detector and 1st Audio.....Type 12SQ7
Power Output.....Type 50C5
Rectifier.....Type 35W4

CAUTION: One side of the power line is connected to B—. Avoid any ground connections direct to B—. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

GENERAL INFORMATION

The Models 515, 516, 517 and 518 are four-tube, plus rectifier tube, a-c/d-c superheterodyne receivers, employing a Beam-antenna. Special features include an electric time clock with wake-up alarm and sleep control switch. In addition, the timer receptacle at the rear of the receiver provides an outlet connection for external appliances which is controlled by the normal function of the alarm and sleep control mechanism of the clock. The radio OFF-ON switch adjacent to the timer outlet provides control of radio operation so that the radio receiver may be turned off if so desired while using the external appliance. When radio operation is to be resumed, this switch must be turned to the on position.

C16, C17, C19, AND C20

The lead identification for the four-section ceramic capacitor RCW-3013 (K67J836) can be observed from the illustration of Figure 1.

Should it become necessary to service this unit, either the defective section can be cut out of the circuit and replaced by an individual capacitor (see Parts Replacement List, items UCC-036, UCC-039 and UCU-1036), or a complete new four-section unit, RCW-3013, can be installed.

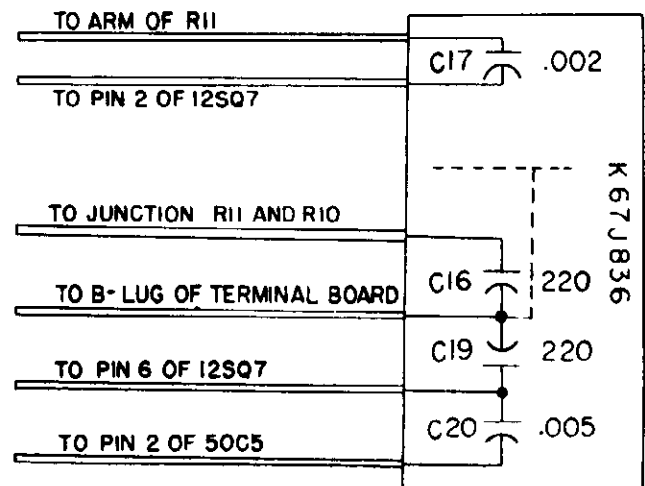


Fig. 1. Capacitor RCW-3013

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20%. Readings taken with low signal input so that AVC is not effective.

(1) I-F Stage Gains.

12SA7 Grid to 12BA6 Grid.....50 @ 455 kc
12BA6 Grid to 12SQ7 Diode Plate.....50 @ 455 kc

(2) Audio Gain.

0.15 volts at 400 cycles across the volume control (R11) with control set at maximum will give approximately $\frac{1}{2}$ -watt output across the loudspeaker, LS1, voice coil.

(3) Oscillator Grid Bias.

D-c voltage developed across the oscillator grid leak (R1) averages 8.5 volts at 1000 kc.

(4) Socket Pin Voltages.

Figure 3 shows voltages from all tube pins to B— unless otherwise specified. Voltage readings much higher or lower than those specified may help localize defective components or tubes.

MODELS 515,
516, 517, 518

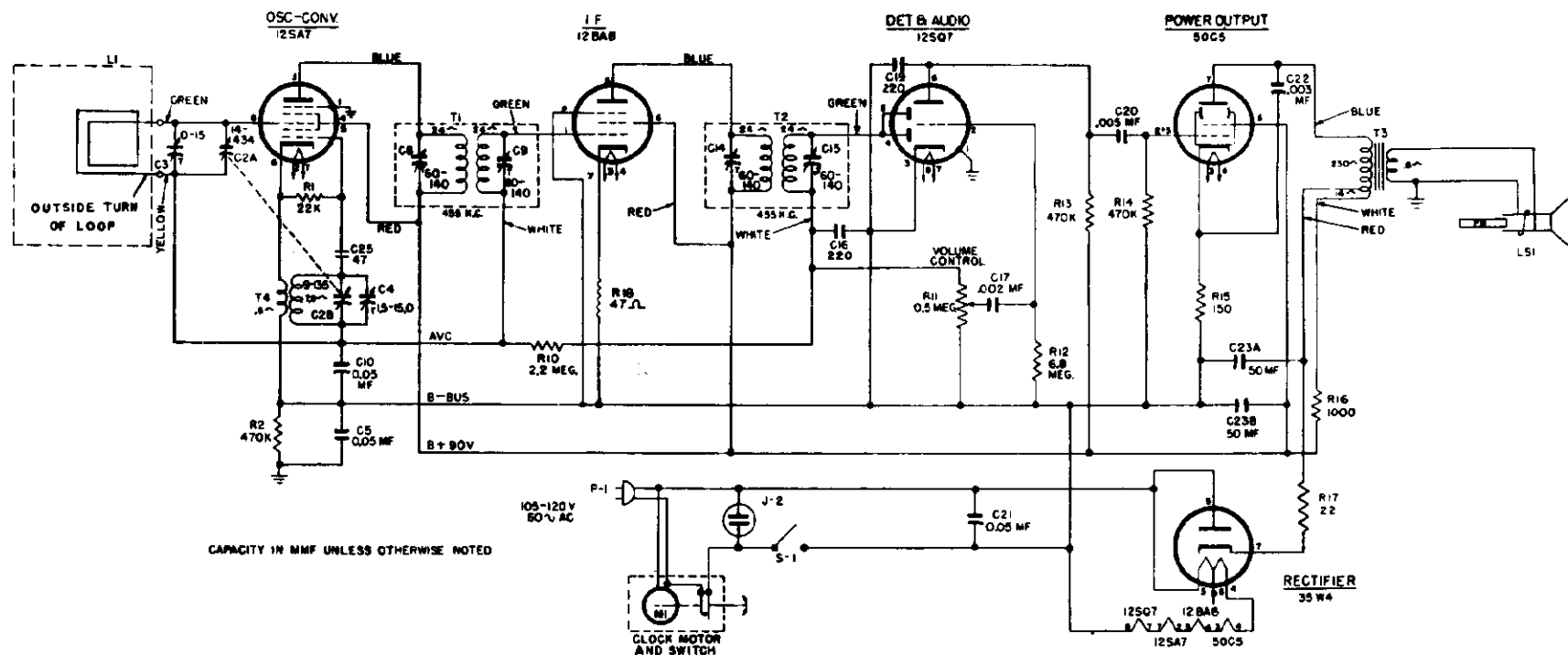


Fig. 2. Schematic Diagram

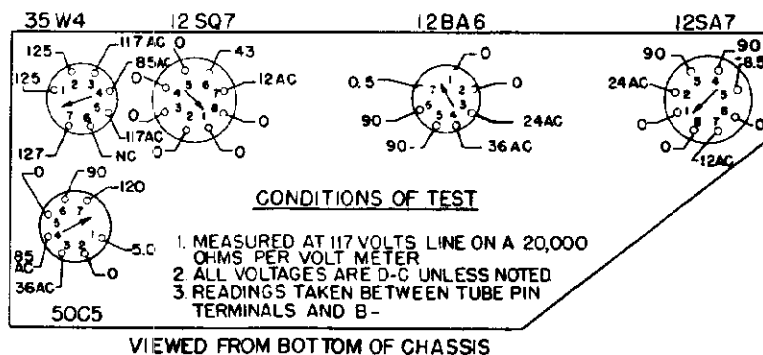


Fig. 3. Socket Voltages

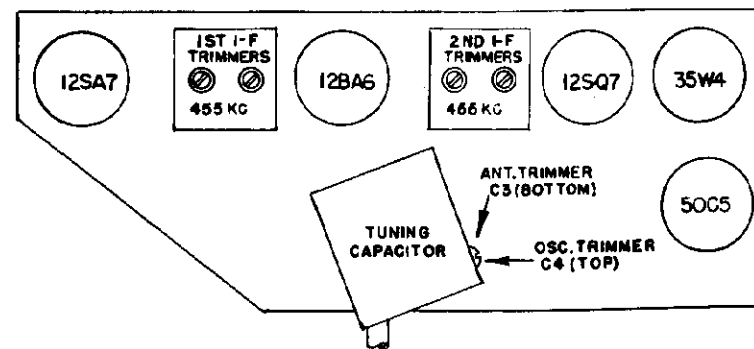


Fig. 4. Tube and Trimmer Location

MODELS 515,
516, 517, 518**RADIO CIRCUIT ALIGNMENT****ALIGNMENT FREQUENCIES:**

R-F	1500 kc
R-F	1620 kc
I-F	455 kc

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation.
2. A-c output meter, 1½ volts full scale.
3. 0.05 mf. paper capacitor.
4. Loop. (See note 6.)
5. Insulated screwdriver.

PROCEDURE—GENERAL:

1. With the tuning scale control wheel turned so that the gang condenser plates are fully meshed, the index should read approximately 1/8 inch to the right of the 550 kc scale calibration mark. If it does not, remove the control wheel from the gang condenser shaft and replace it for correct position. CAUTION: Do not attempt to correct the position by rotating the wheel on the shaft as this will cause the knob to slip.
2. For i-f alignment, it is necessary to remove the chassis from the cabinet.
3. Connect the output meter across the loudspeaker voice coil terminals.
4. Keep radio volume control at maximum and attenuate the test oscillator signal output so that the output meter reading never exceeds 1.0 volt.
5. Connect the capacitor as listed in column 2 between the output "High Side" of the test oscillator and the point of input specified. The oscillator output cable ground lead is connected to receiver chassis.

6. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and then locating the loop to face the radio antenna loop about one foot away. To prevent possible errors in reference to previous signal measurement readings, the loop with respect to the radio loop should not be changed during any one set of adjustments.

ALIGNMENT CHART

Step	Connect Test Oscillator to	Test Osc. Setting	Dial Drum Setting	Adjust Trimmers for Maximum Output
1	12BA6 grid (1) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	2nd I-F trans. trimmers, C14 and C15
2	12SA7 grid (8) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	1st I-F trans. trimmers, C8 and C9
3	Inductively coupled to radio loop	1620 kc	Minimum Capacity	C4 (oscillator)
4	Inductively coupled to radio loop	1500 kc	Tune for Maximum	C3 (antenna)

CLOCK SERVICE

Figures 5 and 6 show clock parts referred to in the following paragraphs and the parts list.

CLOCK MOVEMENT DISASSEMBLY

1. Remove clock movement from case. When removing knobs, note that the Alarm-Set knob is a left-hand thread, while Wake-Up Manual and Sleep are pull-off knobs.
2. Remove Bezel, Hands and Dial Faces.
3. Remove the motor assembly by removing two screws (3) and break two soldered joints on Field. The Field and Rotor Assembly (11 and 2) can now be removed. The Rotor is held by friction only, to the Field.
4. Remove Switch Assembly by removing two screws (12) from base plate.
5. Remove Switch Shaft Assembly (13) and spacer.
6. Remove Alarm-Set Shaft Assembly (6) and spacer.
7. Remove the three front plate assembly screws that are located under the Dial Face and then remove Front Plate.
8. Remove the following gear assemblies and control levers in the order listed below:

- (a) Sweep Control Shaft and Segment Gear (30)
- (b) Alarm Dial Gear (16)
- (c) Hour Hand Gear (17)
- (d) Alarm Signal Cam and Gear, and Friction Washer (27, 26)
- (e) Sweep Control Switch Lever (29)
- (f) Pinion Drive Gear Assembly (15) (drives Sleep Control Segment Gear)
- (g) Alarm Control Switch Cam Lever (8)
- (h) Time Set Shaft and Gear, and Spacer (14, 20)
- (i) Drive Gear and Pinion Assembly (28)
- (j) Minute Hand Gear (18)
- (k) Sweep Second Hand Gear (19)

CLOCK MOVEMENT REASSEMBLY

Reassemble in the reverse order of disassembly, observing the following precautions:

1. The spring washer (26) should curve away from the gear when placed on the Alarm Cam Gear Assembly (27).
2. The Switch Cam Lever fork (8) must straddle the base plate post as shown in the illustration.
3. After reassembly of front plate, check the Sweep Second

Gear (19) through the hole in the base plate to make sure it is free to turn.

4. Proceed with Alarm and Switch Adjustments as described below before installing hands.

ALARM AND SWITCH ADJUSTMENTS

1. Turn Wake-Up Manual shaft to WAKE UP position.
2. Slowly rotate Time Set shaft clockwise until the contacts 21 and 22 of the Switch Assembly close.
3. Replace Dial Face, Alarm Dial, the Minute, Hour and Second Hands. Set all Hands so that they indicate 12 o'clock. Set figure 12 of the alarm dial to index with the smaller pointer of the hour hand. Make sure all Hands and Alarm Dial are tight on their respective shafts.
4. With Alarm Set knob pulled out, continue to rotate Time Set shaft clockwise and note that the Alarm vibrator arm drops against field core approximately 7-10 minutes later.
5. Set alarm at some other selected position and make sure mechanism actuates within limits (±1 minute).
6. Check alarm tone of vibrator. This can be adjusted by either bending vibrator arm nearer or farther away from field core. Bend arm near anchor point.

CLEANING AND LUBRICATION

To clean, completely disassemble and clean all moving parts in carbon tetrachloride or some similar cleaner.

The inside of the sleeves and shaft surfaces may be cleaned of oxidized oil by rubbing with a fine grade of steel wool dampened in carbon tetrachloride.

Do not use too much oil and apply by means of a small wire (drop oiler). Too much oil collects dust and later oxidizes. Use only recommended clock oil, such as Nye's Celebrated Oil which may be purchased from Wm. F. Nye Co., Inc., New Bedford, or equivalent.

CLOCK TROUBLES

1. Clock will not operate—Defective field coil, defective rotor, binding of parts.
2. Clock loses time—Binding parts, too little friction on minute hand sleeve assembly, defective rotor. Clock time set shaft bends and rubs against hole in clock bracket.
3. Noisy Clock—Rotor defective, alarm armature improperly adjusted, loose parts, or binding of moving parts.

MODELS 515,
516, 517, 518

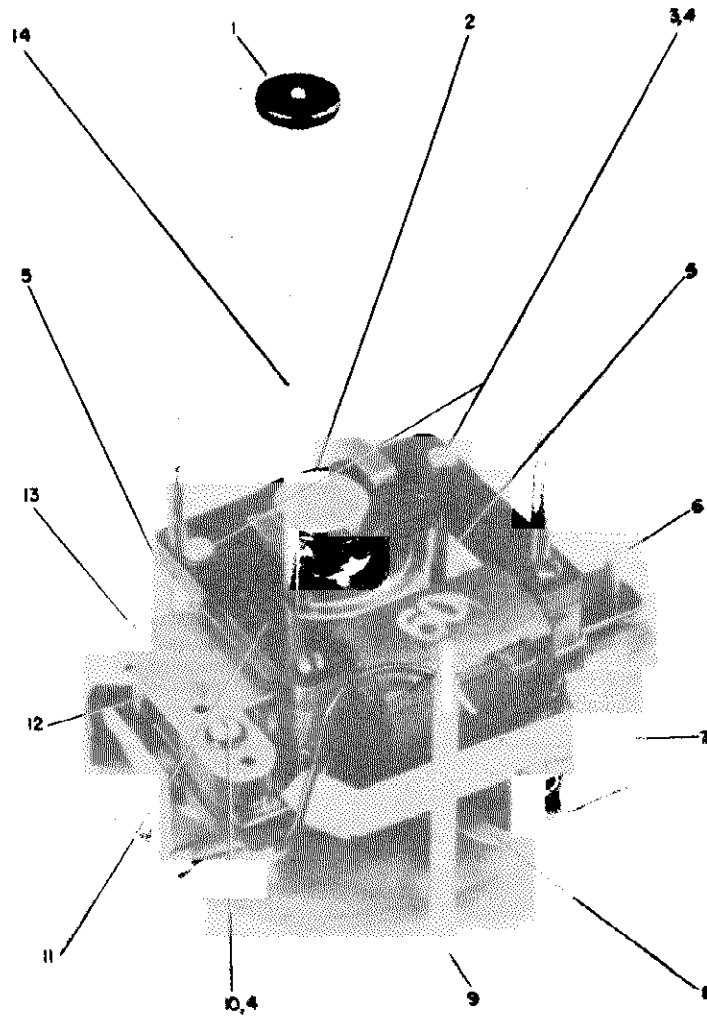


Fig. 5. Back View of Clock

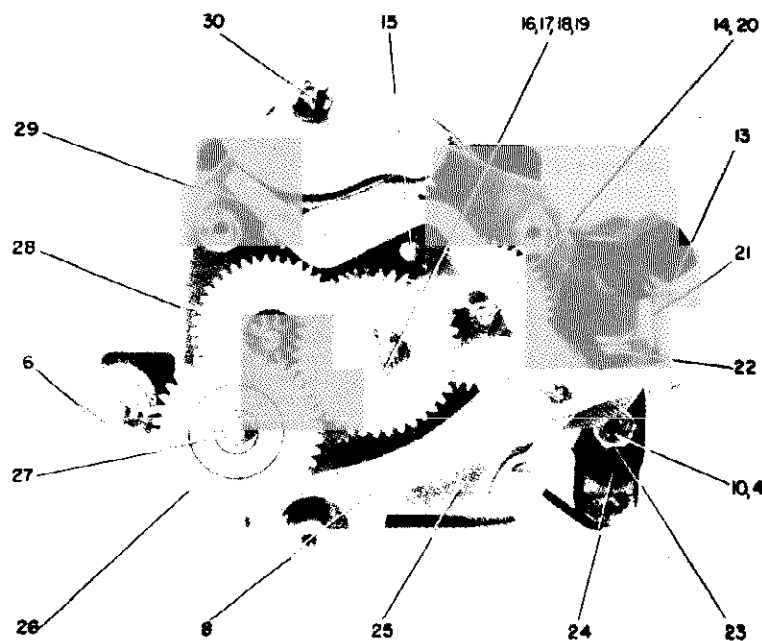


Fig. 6. Front View of Clock, Front Plate Removed

MODELS 515,
516, 517, 518

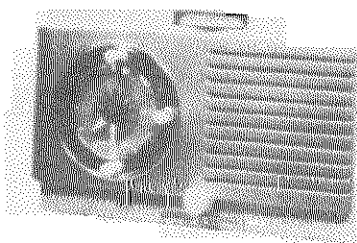
REPLACEMENT PARTS LIST—MODELS 515, 516, 517 AND 518

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL RADIO PARTS			MISCELLANEOUS CLOCK PARTS (Cont'd)		
*UCC-036	C17	CAPACITOR—.002 mf., 600 v., paper (see paragraph, page 5)	*XC59X716		KNOB—Wake-up Manual and Sleep control knob (ivory)
*UCC-037	C22	CAPACITOR—.003 mf., 600 v., paper	*XC61X937		DIAL—Clock dial scale (luminous) (Model 515, 516, 517)
*UCC-039	C20	CAPACITOR—.005 mf., 600 v., paper, (see paragraph, page 5)	*TRZA-001		BEZEL—Outer mounting rim (Model 518)
*UCC-045	C5, C10, C21	CAPACITOR—.05 mf., 600 v., paper	*TRZA-002		BEZEL—Numeral ring (gold finish) (Model 518)
*UCG-1020	C25	CAPACITOR—47 mmf., silver mica	*TRZA-003		RING—Color ring for numeral bezel (Model 518)
*UCU-1036	C16, C19	CAPACITOR—220 mmf., mica (see paragraph, page 5)	*TRZD-001		DIAL—Clock dial scale (luminous) (Model 518)
*URD-009	R17	RESISTOR—22 ohms, $\frac{1}{2}$ w., carbon	*TRZH-001		HAND—Sweep second hand (Model 518)
*URD-017	R18	RESISTOR—47 ohms, $\frac{1}{2}$ w., carbon	*TRZH-002		HANDS—Hour and minute hands (Model 518)
*URD-029	R15	RESISTOR—150 ohms, $\frac{1}{2}$ w., carbon			
*URD-081	R1	RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon			
*URD-113	R2, R13, R14	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon			
*URD-129	R10	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon			
*URD-141	R12	RESISTOR—6.8 meg., $\frac{1}{2}$ w., carbon			
*URF-049	R16	RESISTOR—1000 ohms, 2 w., carbon			
SPECIALIZED RADIO PARTS			CLOCK MOVEMENT PARTS		
RAB-130		CABINET BACK—includes antenna loop, L1	*XC1X1	3	SCREW—Holds field core to baseplate, #4-40 x $1\frac{1}{2}$ " long, round head
*RAC-060		BOTTOM SHIELD—Metal plate, covers bottom of chassis	*XC1X2	4	LOCK WASHER—Under screw head of switch assembly mounting screw and field core mounting
RAC-085		CLOCK MOUNTING BRACKET ASSEMBLY—Clock back cover	*XC1X6	10	SCREW—Used to assemble switch assembly to switch bracket
RAG-033		GRILLE CLOTH ASSEMBLY—For speaker grille on models 515, 517	*XC1X43	23	HEX NUT—For screw mounting switch assembly to switch bracket
RAG-034		GRILLE CLOTH ASSEMBLY—For speaker grille on Model 516	*XC10X141	14	SHAFT ASSEMBLY—Time set shaft and gear assembly
RAG-035		GRILLE CLOTH ASSEMBLY—For speaker grille on Model 518	*XC11X11	6	SHAFT ASSEMBLY—Alarm set shaft and gear assembly
RAU-338		CABINET—Model 515 (brown)	*XC13X11	17	GEAR ASSEMBLY—Hour hand gear and sleeve assembly
RAU-339		CABINET—Model 516 (ivory)	*XC14X32	18	GEAR ASSEMBLY—Minute hand friction gear, pinion gear and sleeve assembly
RAU-340		CABINET—Model 517 (maroon)	XC15X3	16	GEAR ASSEMBLY—Alarm dial gear and sleeve assembly
RAU-341		CABINET—Model 518 (white)	*XC16X14	19	GEAR ASSEMBLY—Sweep second hand gear and shaft assembly
RCE-116	C23, A & B	CAPACITOR—50 50 mf., 150 v., electrolytic	*XC17X8	27	GEAR AND CAM—Alarm signal cam and gear assembly
RCT-045		CAPACITOR—(420-126 mmf.) tuning	*XC34X173	9	FRONT PLATE ASSEMBLY—Complete with case studs and alarm set shaft spring (7)
*RCW-3013	C16, C17, C19, C20	CAPACITOR—220 mmf., .002 mf., 220 mmf., .005 mf., Ceramic (bulbplate)	*XC35X93	25	BASE PLATE AND BACK GEAR—Base plate assembled complete with studs, back gear and pinion, and vibrator
RDK-215		KNOB—Volume control—For Model 518	*XC40X76	24	SWITCH INSULATOR ASSEMBLY—Consists of: two plastic and one fiber switch contact spring spacers
*RDK-217		KNOB—Dial tuning—For Models 515, 516, 517	*XC40X77	28	GEAR AND SPRING ASSEMBLY—Drives alarm dial gear and hour hand gear (complete with pinion and shaft, pinion and gear, spring, washers and retaining clip)
*RDK-218		KNOB—Volume control—For Models 516, 517, 518	*XC40X80	21	CONTACT ASSEMBLY—Lower switch contact and spring
RDK-219		KNOB—Dial tuning—For Model 518	*XC40X185		SPRING—Switch control shaft index spring (for cam indexed control shafts)
*RHC-017		COIL CLIP—For oscillator coil	*XC40X194	29	LEVER—Sleep control switch lever
*RHC-024		CONDENSER CLIP—For mounting electrolytic, C23	*XC40X196	15	GEAR AND SPRING ASSEMBLY—Pinion drive for sleep control segment gear (consists of pinion gear, pinion gear and shaft, spring, washers, and retaining clip)
*RHG-015		GROMMET—Tuning capacitor mounting	*XC40X197	8	LEVER—Alarm control switch cam lever
*RHI-010		STRAIN RELIEF—Grommet in chassis for power cord	*XC40X198	22	CONTACT ASSEMBLY—Upper switch contact and spring with attached fiber arm
*RHJ-005		SPACER—Tuning capacitor mounting	*XC40X202	5	SPACER BUSHING—Field core spacer at screw mounting to base plate
*RHS-043		BRACKET—For receptacle J2 and switch S1	*XC40X252	26	WASHER—Alarm signal cam and gear friction washer
*RJC-004		CLIP—Loop connector lead clip	*XC40X275		SPACER BUSHING—Wake-up Manual switch control shaft bushing
*RJJ-008	J2	RECEPTACLE—Appliance outlet (rear of receiver)	*XC40X276	20	SPACER BUSHING—For time set shaft
*RJS-092		TUBE SOCKET—For 50C5, 35W4	*XC40X277	30	SHAFT—Sleep control shaft and gear segment assembly
*RJS-116		TUBE SOCKET—For 12SA7	*XC44X38	2	MOTOR ROTOR ASSEMBLY—Cased rotor and pinion (60 cycles)
*RJS-117		TUBE SOCKET—For 12SQ7	*XC45X69	11	MOTOR FIELD ASSEMBLY—Consists of: core, shading poles, and field coil (60 cycles)
RJS-141		TUBE SOCKET—For 12BA6 (7 Pin)	*XC59X699	13	SHAFT ASSEMBLY—Wake-up Manual Control shaft assembly (detent spring index type)
*RLC-090	T4	OSCILLATOR COIL	*XC59X723	13	SHAFT ASSEMBLY—Wake-up Manual control shaft assembly (cam index type)
*RMS-214		SPRING CLIP—Locks drum dial to shaft	*XC64X1		SCREW—Switch bracket and front plate mounting screws
*RRC-054	R11	POTENTIOMETER—0.5 meg., volume control			
*RSW-067	S1	SWITCH—ON-OFF switch			
*RTL-094	T1	TRANSFORMER—1st I.F.			
*RTL-095	T2	TRANSFORMER—2nd I.F.			
RTO-036	T3	TRANSFORMER—Output transformer			
*RWL-009		CORD SET (brown) for Models 515, 517			
*RWL-016		CORD SET (ivory) for Model 516			
*RWL-024		CORD SET (white) for Model 518			
*RZC-009		CLOCK—60 cycles, 105-125 v., clock assembly for Models 515, 516, 517			
*RZC-011		CLOCK—60 cycles, 105-125 v., clock assembly for Model 518			
*S400C		SPEAKER—4" PM loudspeaker			
MISCELLANEOUS CLOCK PARTS					
*XC3X36	1	KNOB—Time set shaft knob (bronze)			
*XC4X5		KNOB—Alarm set knob (ivory)			
*XC31X26		HAND—Sweep second hand (Model 515, 516, 517)			
*XC32X199		HANDS—Hour and minute hands (luminous) (Model 515, 516, 517)			
*XC53X31		BEZEL—Outer mounting rim (Model 518)			
*XC53X117		BEZEL—Numeral ring (gold finish) (Model 515, 516, 517)			
*XC55X15		DIAL—Alarm dial scale			
*XC58X16		CRYSTAL—Glass crystal			
*XC59X247		RING—Color ring for numeral bezel (Model 515, 516, 517)			

* Parts used on previous receivers.

† These are temporary Cat. No. assignments to be superseded by regular Cat. No. at a later date.

MODELS 521, 522



SPECIFICATIONS

CABINET

Model	521	522
Color	Dark Mahogany	Blond Mahogany
Height	6 ³ / ₈ in.	6 ³ / ₈ in.
Width	10 ¹ / ₂ in.	10 ¹ / ₂ in.
Depth	6 in.	6 in.

ELECTRICAL RATING (INPUT):

Voltage	105-120 volts, a-c
Frequency	60 cycles
Wattage	30 watts

OPERATING FREQUENCIES:

Intermediate Frequency	455 kc
Broadcast Band	540-1600 kc

POWER OUTPUT:

Undistorted	1 watt
Maximum	1.75 watts

LOUDSPEAKER:

Type	Alnico 5 PM
Outside Cone Diameter	4-inch
Voice Coil Impedance (400 cycles)	3.5 ohms

TUBE COMPLEMENT:

Oscillator-Converter	Type 12SA7
I-F Amplifier	Type 12BA6
Detector and 1st Audio	Type 12SQ7
Power Output	Type 50C5
Rectifier	Type 35W4

CAUTION: One side of the power line is connected to B-. Avoid any ground connections direct to B-. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

GENERAL INFORMATION

*The Models 521 and 522 are four-tube, plus rectifier tube, a-c/d-c superheterodyne receivers, employing a Beam-a-scope antenna. Special features include an electric time clock with wake-up alarm and sleep control switch. In addition, the timer receptacle at the rear of the receiver provides an outlet connection for external appliances which is controlled by the normal function of the alarm and sleep control mechanism of the clock. The radio OFF-ON switch adjacent to the timer outlet provides control of radio operation so that the radio receiver may be turned off if so desired while using the external appliance. When radio operation is to be resumed, this switch must be turned to the on position.

RADIO CIRCUIT ALIGNMENT

ALIGNMENT FREQUENCIES:

R-F	1500 kc
R-F	1620 kc
I-F	455 kc

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation.
2. A-c output meter, 1 ¹/₂ volts full scale.
3. 0.05 mf. paper capacitor.
4. Loop. (See note 6.)
5. Insulated screwdriver.

PROCEDURE—GENERAL:

1. With the tuning scale control wheel turned so that the gang condenser plates are fully meshed, the index should read approximately ³/₈ inch to the right of the 550 kc scale calibration mark. If it does not, remove the control wheel from the gang condenser shaft and replace it for correct position. **CAUTION:** Do not attempt to correct the position by rotating the wheel on the shaft as this will cause the knob to slip.
2. For i-f alignment, it is necessary to remove the chassis from the cabinet.
3. Connect the output meter across the loudspeaker voice coil terminals.
4. Keep radio volume control at maximum and attenuate the test oscillator signal output so that the output meter reading never exceeds 1.0 volt.
5. Connect the capacitor as listed in column 2 between the output "High Side" of the test oscillator and the point of input specified. The oscillator output cable ground lead is connected to receiver chassis.
6. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and then locating the loop to face the radio antenna loop about one foot away. To prevent possible errors in reference to previous signal measurement readings, the loop with respect to the radio loop should not be changed during any one set of adjustments.

ALIGNMENT CHART

Step	Connect Test Oscillator to	Test Osc. Setting	Dial Drum Setting	Adjust Trimmers for Maximum Output
1	12BA6 grid (1) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	2nd I-F trans. trimmers, C14 and C15
2	12SA7 grid (8) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	1st I-F trans. trimmers, C8 and C9
3	Inductively coupled to radio loop	1620 kc	Minimum Capacity	C4 (oscillator)
4	Inductively coupled to radio loop	1500 kc	Tune for Maximum	C3 (antenna)

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit per-

formance and isolate trouble. The gain values listed may have tolerances of 20%. Readings taken with low signal input so that AVC is not effective.

- (1) I-F Stage Gains.
 12SA7 Grid to 12BA6 Grid..... 50 @ 455 kc
 12BA6 Grid to 12SQ7 Diode Plate..... 50 @ 455 kc
- (2) Audio Gain.
 0.15 volts at 400 cycles across the volume control (R11) with control set at maximum will give approximately $\frac{1}{2}$ -

watt output across the loudspeaker, LS1, voice coil.

- (3) Oscillator Grid Bias.
 D-c voltage developed across the oscillator grid leak (R1) averages 8.5 volts at 1000 kc.
- (4) Socket Pin Voltages.
 Figure 2 shows voltages from all tube pins to B- unless otherwise specified. Voltage readings much higher or lower than those specified may help localize defective components or tubes.

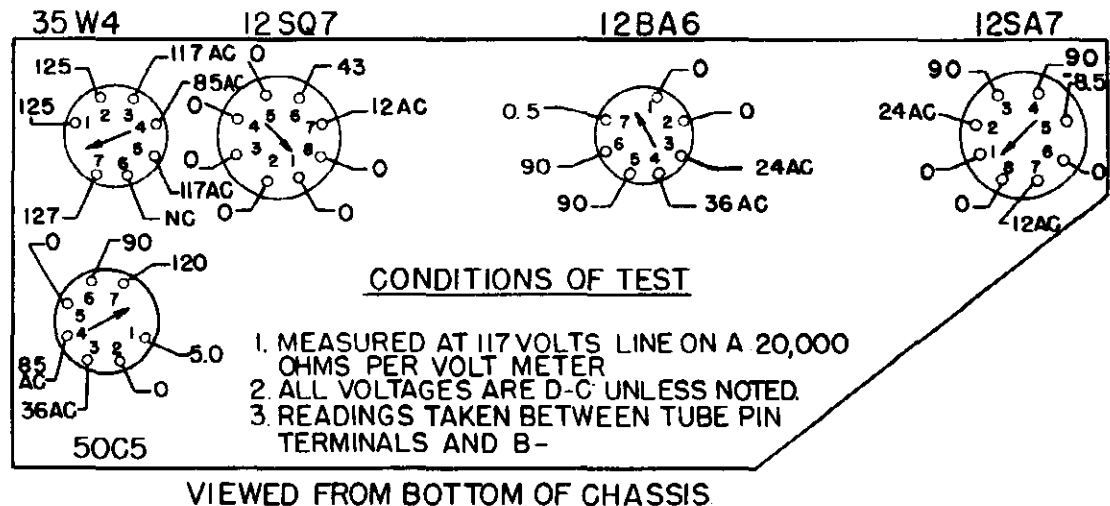


Fig. 2. Socket Voltages

CLOCK SERVICE

Figures 3 and 4 show clock parts referred to in the following paragraphs and the parts list.

CLOCK MOVEMENT DISASSEMBLY

1. Remove clock movement from case. When removing knobs, note that the Alarm-Set knob is a left-hand thread, while Wake-Up Manual and Sleep are pull-off knobs.
2. Remove Bezel, Hands and Dial Faces.
3. Remove the motor assembly by removing two screws (3) and break two soldered joints on Field. The Field and Rotor Assembly (11 and 2) can now be removed. The Rotor is held by friction only, to the Field.
4. Remove Switch Assembly (12) by removing two screws from base plate.
5. Remove Switch Shaft Assembly (13) and spacer.
6. Remove Alarm-Set Shaft Assembly (6) and spacer.
7. Remove the three front plate assembly screws that are located under the Dial Face and then remove Front Plate.
8. Remove the following gear assemblies and control levers in the order listed below:
 - (a) Sweep Control Shaft and Segment Gear (30)
 - (b) Alarm Dial Gear (16)
 - (c) Hour Hand Gear (17)
 - (d) Alarm Signal Cam and Gear, and Friction Washer (27, 26)
 - (e) Sweep Control Switch Lever (29)
 - (f) Pinion Drive Gear Assembly (15) (drives Sleep Control Segment Gear)
 - (g) Alarm Control Switch Cam Lever (8)
 - (h) Time Set Shaft and Gear, and Spacer (14, 20)
 - (i) Drive Gear and Pinion Assembly (28)
 - (j) Minute Hand Gear (18)
 - (k) Sweep Second Hand Gear (19)

CLOCK MOVEMENT REASSEMBLY

Reassemble in the reverse order of disassembly, observing the following precautions:

1. The spring washer (26) should curve away from the gear when placed on the Alarm Cam Gear Assembly (27).
2. The Switch Cam Lever fork (8) must straddle the base plate post as shown in the illustration.
3. After reassembly of front plate, check the Sweep Second

Gear (19) through the hole in the base plate to make sure it is free to turn.

4. Proceed with Alarm and Switch Adjustments as described below before installing hands.

ALARM AND SWITCH ADJUSTMENTS

1. Turn Wake-Up Manual shaft to WAKE UP position.
2. Slowly rotate Time Set shaft clockwise until the contacts 21 and 22 of the Switch Assembly close.
3. Replace Dial Face, Alarm Dial, the Minute, Hour and Second Hands. Set all Hands so that they indicate 12 o'clock. Set figure 12 of the alarm dial to index with the smaller pointer of the hour hand. Make sure all Hands and Alarm Dial are tight on their respective shafts.
4. With Alarm Set knob pulled out, continue to rotate Time Set shaft clockwise and note that the Alarm vibrator arm drops against field core approximately 7-10 minutes later.
5. Set alarm at some other selected position and make sure mechanism actuates within limits (± 1 minute).
6. Check alarm tone of vibrator. This can be adjusted by either bending vibrator arm nearer or farther away from field core. Bend arm near anchor point.

CLEANING AND LUBRICATION

To clean, completely disassemble and clean all moving parts in carbon tetrachloride or some similar cleaner.

The inside of the sleeves and shaft surfaces may be cleaned of oxidized oil by rubbing with a fine grade of steel wool dampened in carbon tetrachloride.

Do not use too much oil and apply by means of a small wire (drop oiler). Too much oil collects dust and later oxidizes. Use only recommended clock oil, such as Nye's Celebrated Oil which may be purchased from Wm. F. Nye Co., Inc., New Bedford, or equivalent.

CLOCK TROUBLES

1. Clock will not operate—Defective field coil, defective rotor, binding of parts.
2. Clock loses time—Binding parts, too little friction or minute hand sleeve assembly, defective rotor. Clock time set shaft bends and rubs against hole in clock bracket.
3. Noisy Clock—Rotor defective, alarm armature improperly adjusted, loose parts, or binding of moving parts.

MODELS 521, 522

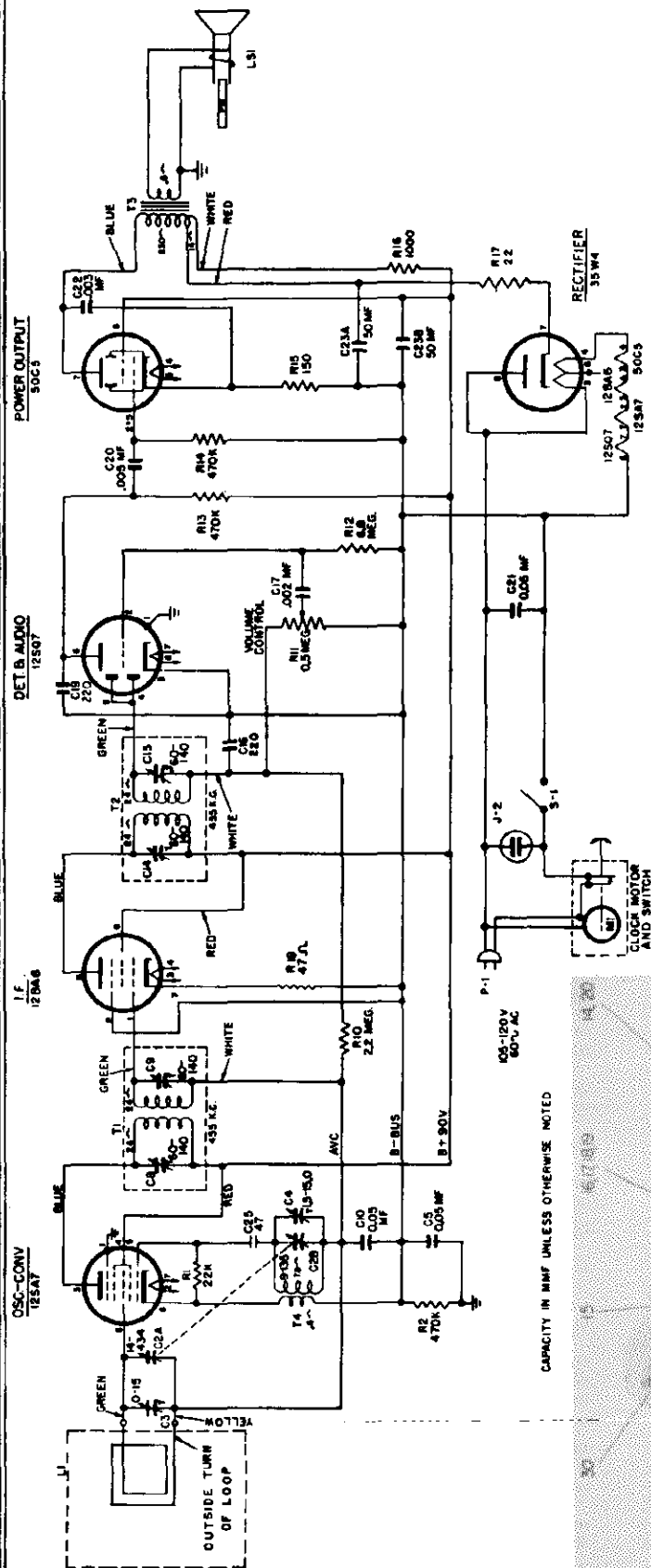


Fig. 1. Schematic Diagram

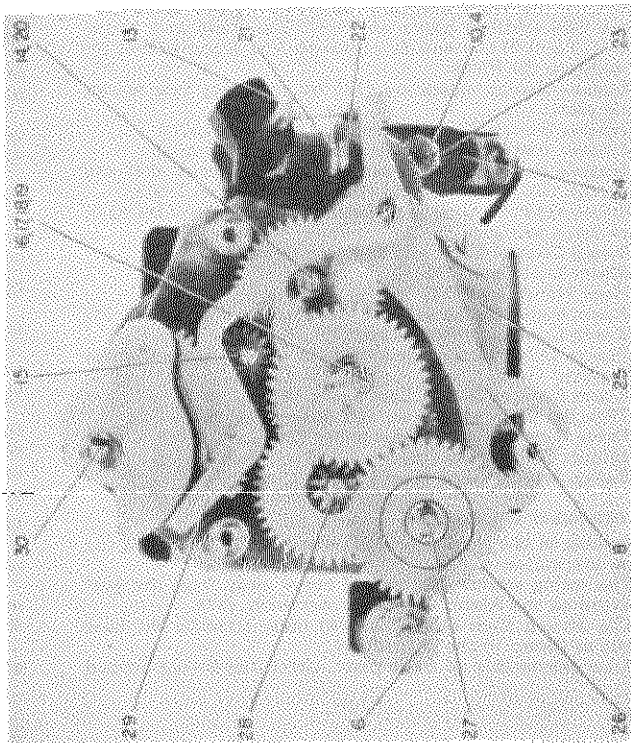


Fig. 4. Front View of Clock, Front Plate Removed

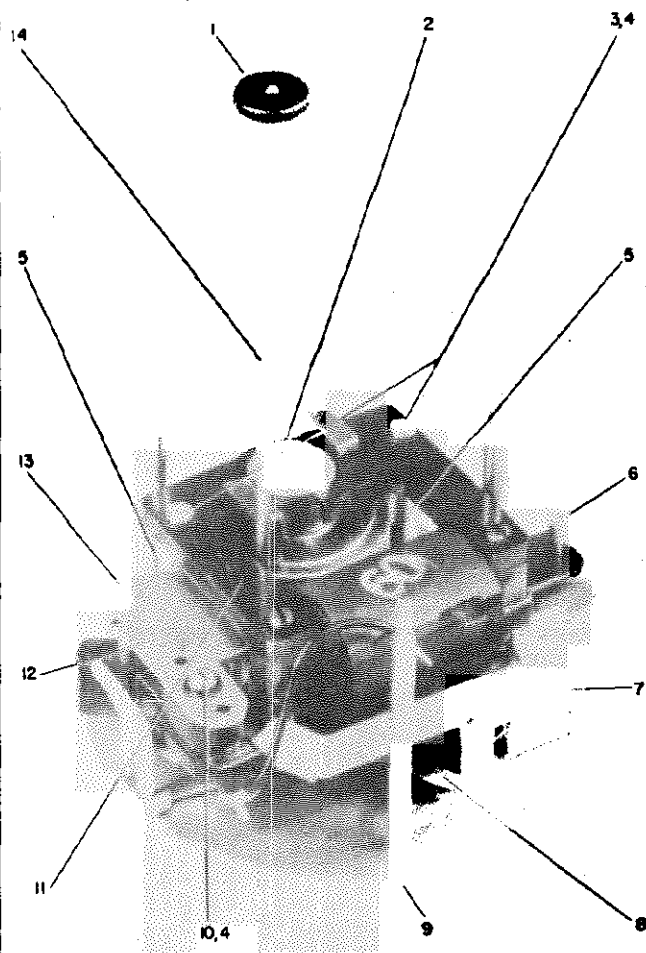


Fig. 3. Back View of Clock

C16, C17, C19, AND C20

The lead identification for the four-section ceramic capacitor RCW-3013 (K67J836) can be observed from the illustration of Figure 6.

Should it become necessary to service this unit, either the defective section can be cut out of the circuit and replaced by an individual capacitor (see Parts Replacement List, items UCC-036, UCU-039 and UCU-1036), or a complete new four-section unit, RCW-3013, can be installed.

Fig. 5. Capacitor RCW-3013 (K67J836)

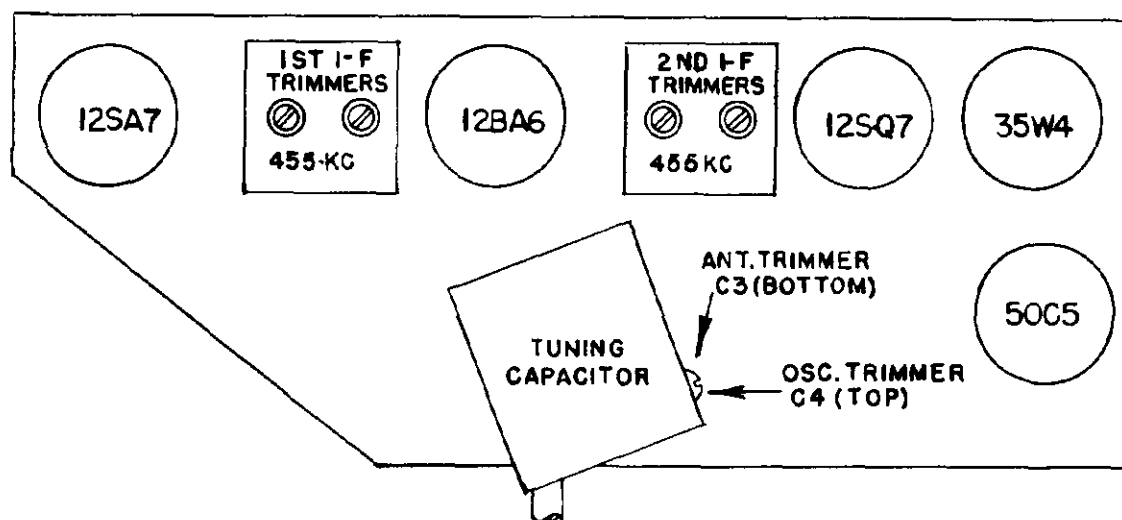
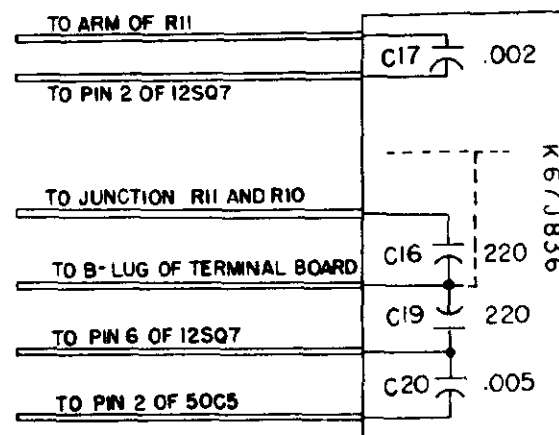


Fig. 6. Tube and Trimmer Location

MODELS 521, 522

RADIO REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS			SPECIALIZED REPLACEMENT PARTS (Cont.)		
*UCC-036	C17	CAPACITOR—.002 mf., 600 v., paper	RDK-218		KNOB—Volume control knob
*UCC-039	C20	CAPACITOR—.005 mf., 600 v., paper	*RDS-090		DIAL SCALE—Paper scale
*UCC-045	C5, 10, 21	CAPACITOR—.05 mf., 600 v., paper (will replace respective sections of RCW-3013).	*RHC-017		CLIP—For mounting osc. coil, T4
*UCU-1036	C16, 19	CAPACITOR—220 mmf., mica	*RHC-024		CLIP—For mounting C23
*URD-009	R17	RESISTOR—22 ohms, $\frac{1}{2}$ w., carbon	*RHG-015		GROMMET—For tuning cond.
*URD-017	R18	RESISTOR—47 ohms, $\frac{1}{2}$ w., carbon	*RHH-004		FASTENER—Snap fastener for holding back
*URD-029	R15	RESISTOR—150 ohms, $\frac{1}{2}$ w., carbon	*RHI-010		STRAIN RELIEF GROMMET—For power cord
*URD-081	R1	RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon	*RHJ-005		SPACER FOR TUNING CONDENSER
*URD-113	R2, 13, 14	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon	*RHS-043		PLUG AND SWITCH MOUNTING
*URD-129	R10	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon	*RJC-004		BRACKET—For J2 and S1
*URD-141	R12	RESISTOR—6.8 meg., $\frac{1}{2}$ w., carbon	*RJI-008	J2	CLIP—Loop connector clip
*URF-049	R16	RESISTOR—1000 ohms, 2 w., carbon	*RJS-092		APPLIANCE RECEPTACLE
SPECIALIZED REPLACEMENT PARTS			*RJS-116		SOCKET—Tube socket for 50C5, 35W4
RAB-135	L1	BACK—Cabinet back cover (includes loop L1)	*RJS-117		SOCKET—Tube socket for 12SA7
*RAC-085		MOUNTING BRACKET—Metal back cover holds clock to cabinet	*RJS-141		SOCKET—Tube socket for 12SQ7
RAU-342		CABINET—Dark mahogany, Model 521	*RLC-090	T4	COIL—Oscillator coil
RAU-343		CABINET—Blond mahogany, Model 522	*RMS-205	R11	SLEEP CONTROL BOOSTER SPRING
*RCC-074	C22	CAPACITOR—.003 mf., 600 v., paper	*RRC-054		POTENTIOMETER—.05 meg., volume control
*RCB-116	C23A, B	CAPACITOR—50 mf., 150 v.; 50 mf., 150 v., dry electrolytic	RSW-067	S1	SWITCH—ON-OFF Switch
*RCT-045	C2A, 2B	CAPACITOR—Tuning capacitor (oscillator and r-f-section)	*RTL-094	T1	TRANSFORMER—1st I-F transformer
*RCW-1043	C3, 4	CAPACITOR—47 mmf., ceramic	*RTL-095	T2	TRANSFORMER—2nd I-F transformer
*RCW-3013	C25	CAPACITOR—220 mmf., .002 mf., 220 mmf., .005 mf. (4 section ceramic)	*RTO-036	T3	TRANSFORMER—Output transformer
RDK-217	C16, 17, 19, 20	KNOB—Tuning dial wheel. Does not include dial scale, see item RDS-090	*RWL-009		CORD—Power cord (brown)
			*RYN-005	M1	NAMEPLATE G.E. MONOGRAM
			*RZC-009		CLOCK—60 cycle, 105-125 v., clock assembly
			*S400C	LS1	SPEAKER—PM loudspeaker

CLOCK REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
MISCELLANEOUS			CLOCK MOVEMENT (Cont.)		
*XC3X36	1	KNOB—Time set shaft knob (bronze)	*XC40X76	24	SWITCH INSULATOR ASSEMBLY—Consists of: two plastic and one fibre switch contact spring spacers
*XC4X5		KNOB—Alarm set knob (ivory)	*XC40X77	28	GEAR AND SPRING ASSEMBLY—Drives alarm dial gear and hour hand gear (complete with pinion and shaft, pinion and gear, spring, washers and retaining clip)
*XC31X26		HAND—Sweep second hand	*XC40X80	21	CONTACT ASSEMBLY—Lower switch contact and spring
*XC32X199		HANDS—Hour and minute hands (luminous)	*XC40X185		SPRING—Switch control shaft index spring (for cam indexed control shafts)
*XC53X31		BEZEL—Outer mounting rim	*XC40X194	29	LEVER—Sleep control switch lever
*XC53X117		BEZEL—Numeral ring (gold finish)	*XC40X196	15	GEAR AND SPRING ASSEMBLY—Pinion drive for sleep control segment gear (consists of pinion gear, pinion gear and shaft, spring, washers, and retaining clip)
*XC55X15		DIAL—Alarm dial scale	*XC40X197	8	LEVER—Alarm control switch cam lever
*XC58X16		CRYSTAL—Glass crystal	*XC40X198	22	CONTACT ASSEMBLY—Upper switch contact and spring with attached fibre arm
*XC59X247		RING—Color ring for numeral bezel	*XC40X202	5	SPACER BUSHING—Field core spacer at screw mounting to base plate
*XC59X716		KNOB—Wake-up Manual and Sleep control knob (ivory)	*XC40X252	26	WASHER—Alarm signal cam and gear friction washer
*XC61X937		DIAL—Clock dial scale (luminous)	*XC40X275		SPACER BUSHING—Wake-up Manual switch control shaft bushing
CLOCK MOVEMENT			*XC40X276	20	SPACER BUSHING—For time set shaft
*XC1X1	3	SCREW—Holds field core to baseplate, No. 4-40 x $1\frac{1}{8}$ in. long, round head	*XC40X277	30	SHAFT—Sleep control shaft and gear segment assembly
*XC1X2	4	LOCKWASHER—Under screw head of switch assembly mounting screw and field core mounting	*XC44X38	2	MOTOR ROTOR ASSEMBLY—Cased rotor and pinion (60 cycles)
*XC1X6	10	SCREW—Used to assemble switch assembly to switch bracket	*XC45X69	11	MOTOR FIELD ASSEMBLY—Consists of: core, shading poles, and held coil (60 cycles)
*XC1X43	23	HEX NUT—For screw mounting switch assembly to switch bracket	*XC59X699	13	SHAFT ASSEMBLY—Wake-up Manual control shaft assembly (detent spring index type)
*XC10X141	14	SHAFT ASSEMBLY—Time set shaft and gear assembly	*XC59X723	13	SHAFT ASSEMBLY—Wake-up Manual control shaft assembly (cam index type)
*XC11X11	6	SHAFT ASSEMBLY—Alarm set shaft and gear assembly	*XC64X1		SCREW—Switch bracket and front plate mounting screws
*XC13X11	17	GEAR ASSEMBLY—Hour hand gear and sleeve assembly			
*XC14X32	18	GEAR ASSEMBLY—Minute hand friction gear, pinion gear and sleeve assembly			
*XC15X3	16	GEAR ASSEMBLY—Alarm dial gear and sleeve assembly			
*XC16X14	19	GEAR ASSEMBLY—Sweep second hand gear and shaft assembly			
*XC17X8	27	GEAR AND CAM—Alarm signal cam and gear assembly			
*XC34X173	9	FRONT PLATE ASSEMBLY—Complete with case studs and alarm set shaft spring (7)			
*XC35X93	25	BASE PLATE AND BACK GEAR—Base plate assembled complete with studs, back gear and pinion, and vibrator			

MODELS 600, 601
603, 604

SPECIFICATIONS

CABINET:	Composition	plastic
	Height	7½ inches
	Length	10½ inches
	Width	5½ inches
	Weight (with batteries)	
	Model 600	8 pounds
	Model 601, 3, 4	8¾ pounds
POWER SUPPLY:	Model 600	
	Battery Operation only.	
	Battery	Eveready No. 756, or equivalent
	Model 601, 3, 4	
	(AC or DC Operation)	
	Voltage	105-120 volts
	Frequency (on AC)	50-60 cycles
	Power Consumption	15 watts
	Battery Operation	
	Battery	Eveready No. 756 or equivalent
OPERATING FREQUENCIES:	Broadcast Band	540-1600 KC
	I-F Amplifier	455 KC
POWER OUTPUT:	Undistorted	130 milliwatts
	Maximum	200 milliwatts
LOUDSPEAKER:	Type	Alnico PM
	Outside Cone Diameter	4 inches
	Voice Coil Impedance (400 cycles)	3.2 ohms
TUBE COMPLEMENT:	Oscillator-Converter	1R5
	I-F Amplifier	1T4
	Detector Audio Amplifier	1S5
	Power Amplifier	3V4

GENERAL INFORMATION

The Model 600 or 601, 3, 4, portable radio is a four-tube superheterodyne broadcast receiver with a range of 540 to 1600 kc. The Model 600 operates on battery only, while for the Model 601, 3, 4 the power source may be either 105 to 120 volts, 50 to 60 cycles, or direct current, when a power outlet is available. The receiver will also operate from its battery source, thus making it independent of external electric power, providing excellent operation in any location where external power is not available.

BATTERY—AC OR DC OPERATION (MODEL 601, 603, 604 ONLY)

The left knob turns on the battery provided that the power plug is well inserted into the socket on the chassis.

For AC or DC supply (105-120 volts, 50 to 60 cycle operation), the same knob switches on the power when the power plug is pulled out of its socket on the chassis and inserted into the house outlet.

ELECTRICAL CIRCUIT ALIGNMENT

ALIGNMENT FREQUENCIES

R-F	1620 and 1500 KC
I-F	455 KC

EQUIPMENT REQUIRED

1. Test Oscillator with Tone Modulation.
2. AC Output Meter.
3. .05 Mf. Paper Capacitor.
4. Insulated Screwdriver.
5. Antenna Loop.

PROCEDURE—GENERAL

The Alignment Chart gives the alignment procedure with correct sequence of trimmer adjustments.

The chassis must be removed from the cabinet during i-f alignment.

ALIGNMENT CHART

Step	Test-Osc. Connected to:	Test-Osc. Frequency	Radio Pointer Setting	Adjust for Maximum Meter Reading
1	1T4 grid (Pin 6) in series with .05 mf capacitor	455 KC	550 KC	2nd I-F transformer (T2) primary and secondary coils.
2	1R5 grid (Pin 6) in series with .05 mf capacitor	455 KC	550 KC	1st I-F transformer (T1) primary and secondary coils.
3	Inductively coupled	1620 KC	Gang condenser completely open	C2B
4	Inductively coupled	1500 KC	Tune for max. signal. Then set dial pointer at 1500 KC on dial mark	C1B

The test oscillator output signal should be attenuated so that the output meter reading never exceeds ½ volt. Connect the capacitor listed in column 2 of Alignment Chart between the "high side" of the test oscillator and the point of input specified.

The output meter should be connected to the chassis ground the "high side" of the oscillator output should be connected as indicated in the Alignment Chart. During the entire alignment procedure, the volume control should be at its maximum position. For alignment of the oscillator and r-f trimmers, the input signal should be inductively coupled to the radio loop antenna by connecting a 4-turn, 6-inch diameter loop of bell wire across the signal generator output terminals, and locate the loop about one foot from the radio loop antenna. To prevent possible errors in peak readings, the position of the loop with respect to the radio loop antenna should not be changed during any one set of adjustments.

STAGE GAIN AND VOLTAGE CHECKS

Stage gain by vacuum voltmeter or similar measuring device may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20 per cent. Reading should be taken with low signal input so that the AVC is no effective.

1. R-F STAGE GAINS

	600	601, 3, 4,	
1R5 Grid (Pin 6) to 1T4 (Pin 6)	17	20	@1000 KC
1T4 Grid (Pin 6) to 1S5 Diode Plate (Pin 3)	65	50	@ 455 KC

2. AUDIO GAINS

.02 volt at 400 cycles across volume control (R4) with control set at maximum will give approximately .050 watts output across speaker voice coil.

3.

DC voltage developed across oscillator grid resistor (R1) averages 2.0 volts at 1000 kc with respect to B minus.

4. SOCKET PIN VOLTAGES

Fig. 5 and 6 show voltages from all tube pins to B—. Voltage readings much lower than those specified may help localize defective components or tubes.

MODEL'S 600,
601,
603, 604

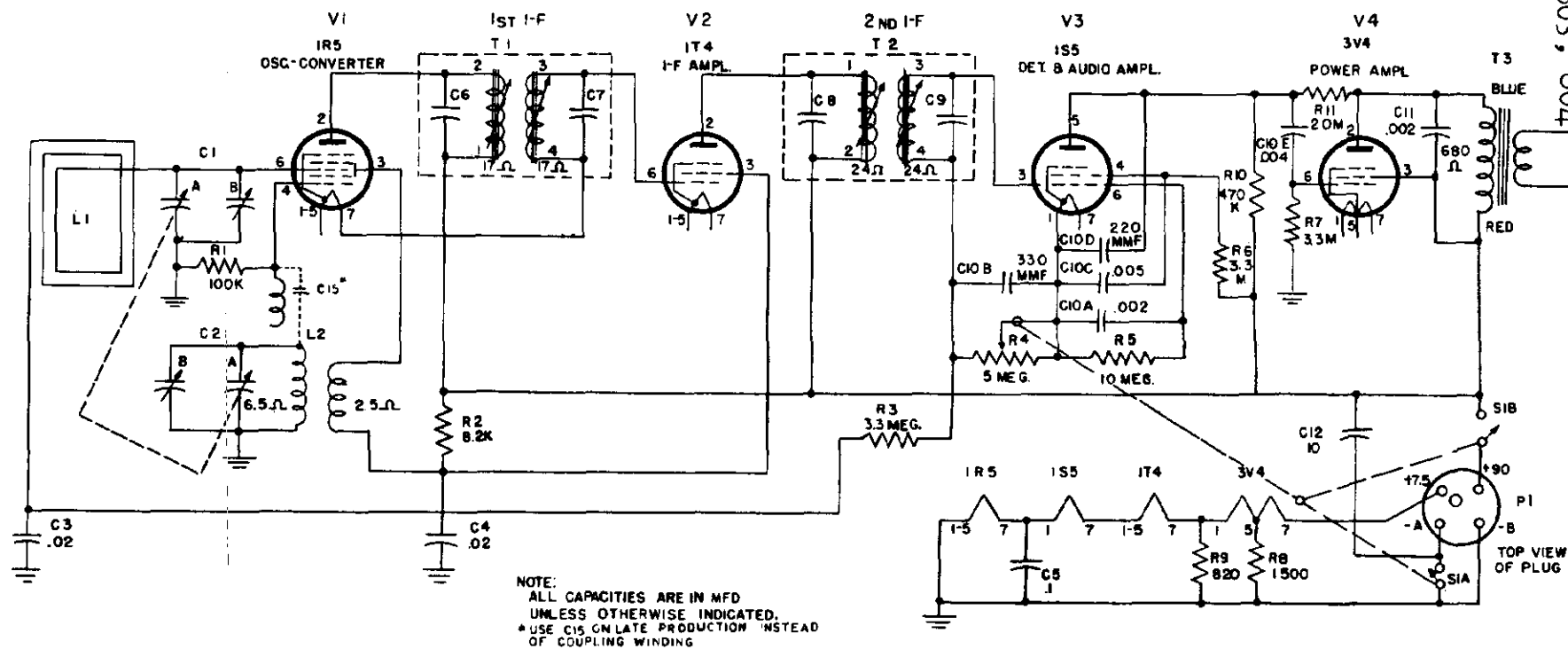


Fig. 1. Schematic Diagram, Model 600

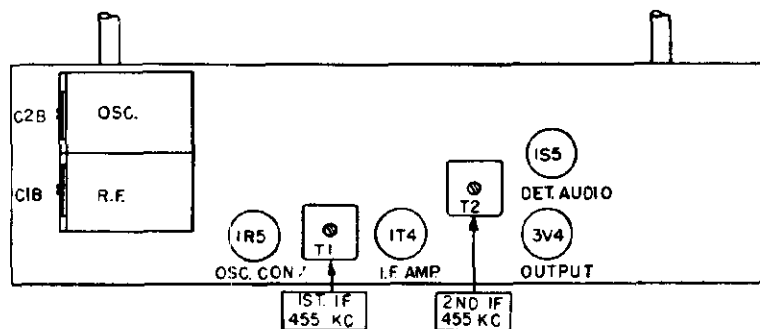


Fig. 2. Tube and Trimmer Location (Model 600, 601, 603 and 604)

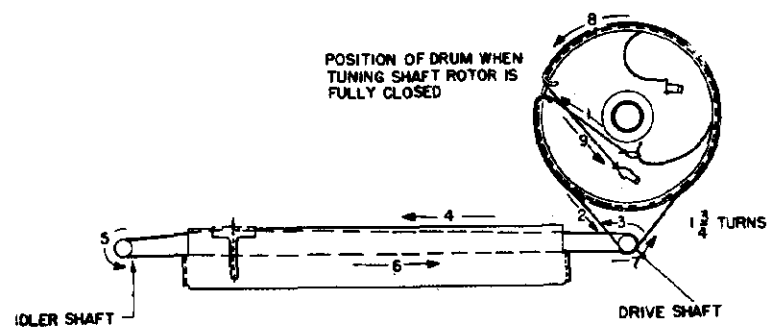


Fig. 3. Dial Stringing Diagram (Model 600, 601, 603 and 604)

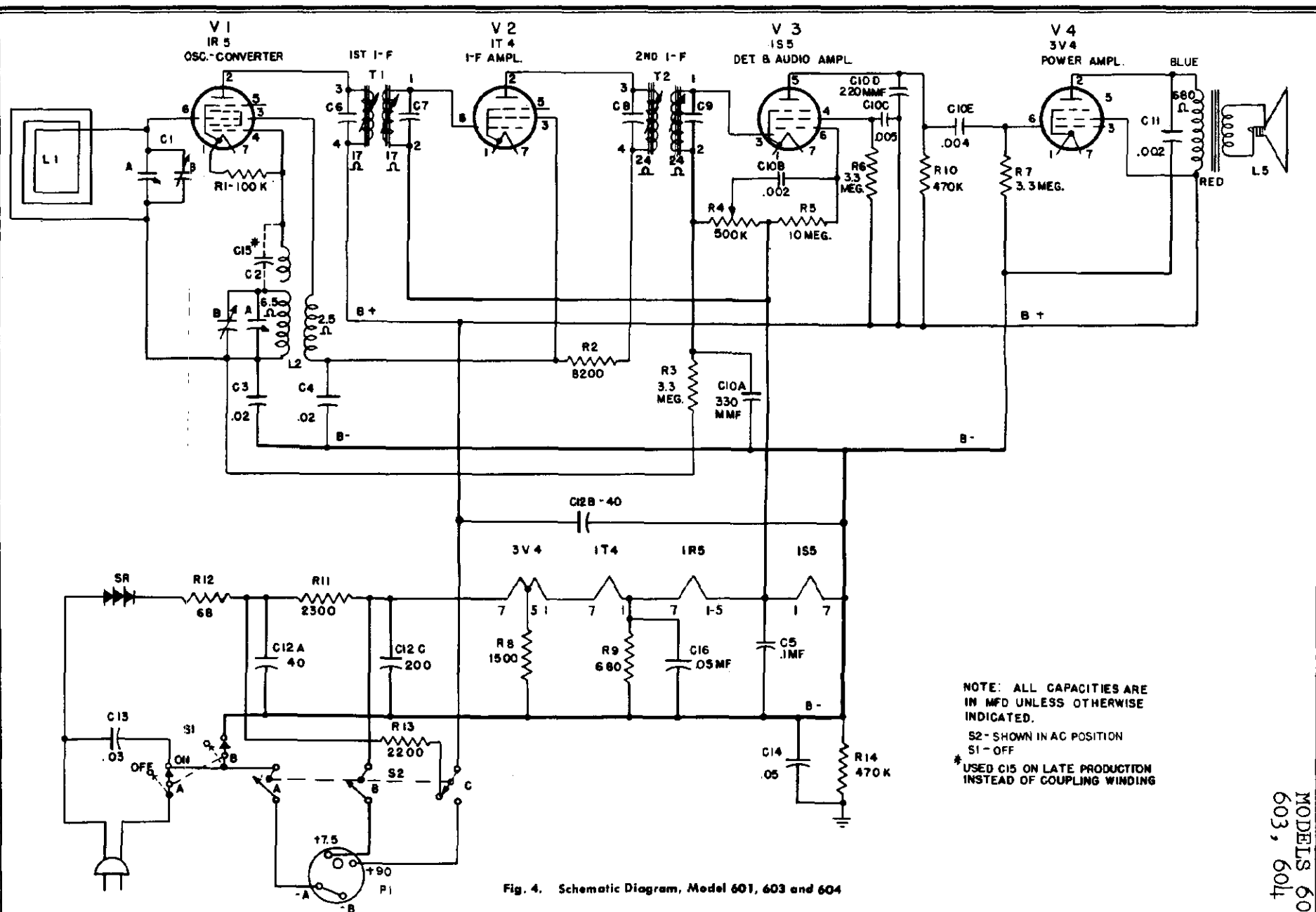


Fig. 4. Schematic Diagram, Model 601, 603 and 604

MODELS 600,
601, 603, 604

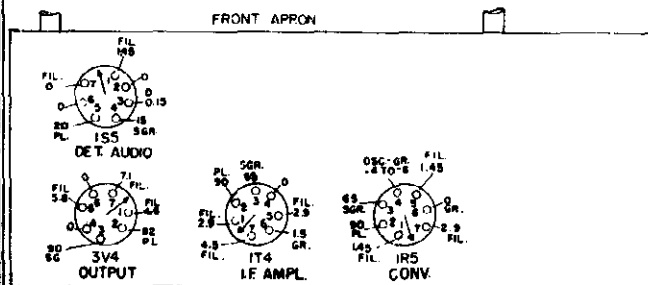


Fig. 5. Socket Voltages, Model 600

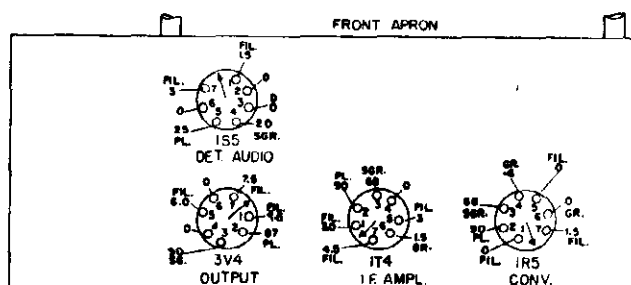
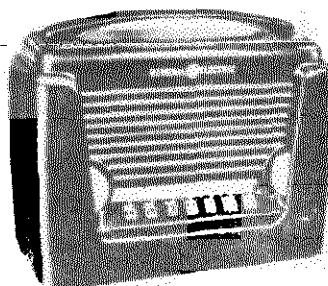


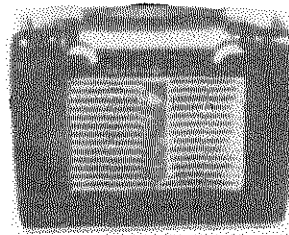
Fig. 6. Socket Voltages, Model 601, 603 and 604

MODELS 600, 601, 603, AND 604 REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS					
*UCC-002	C11	CAPACITOR—.002 mf, 200 v, paper	*RRC-107	R4, S1	VOLUME CONTROL—Volume control and switch
*UCC-009	C3, 4	CAPACITOR—.02 mfd, 200 v, paper	*RRD-1015	R11†	RESISTOR—20 meg, ½ w, carbon
*UCC-028	C14	CAPACITOR—.05 mfd, 400 v, paper	*RRW-042	R11†	RESISTOR—2300 ohms, 10 w, w.w.
*UCC-042	C13	CAPACITOR—.03 mfd, 400 v, paper	*RSW-058	S21†	SWITCH—Power plug switch
*UCC-048	C5	CAPACITOR—.1 mfd, 400 v, paper	*RTL-052	T1†	TRANSFORMER—1-F transformer
*URD-045	R9†	RESISTOR—680 ohms, ½ w, carbon	*RTL-051	T2†	TRANSFORMER—1-F transformer
*URD-047	R9†	RESISTOR—820 ohms, ½ w, carbon	*RTL-079	T1†, 2†	TRANSFORMER—1-F transformer
*URD-053	R8	RESISTOR—1500 ohms, ½ w, carbon	*RTO-070	T3	TRANSFORMER—Output transformer
*URD-071	R2	RESISTOR—8200 ohms, ½ w, carbon	*RWL-005†		POWER CORD
*URD-097	R1	RESISTOR—100,000 ohms, ½ w, carbon	SPECIALIZED REPLACEMENT PARTS		
*URD-113	R10†, 14†	RESISTOR—470,000 ohms, ½ w, carbon	*RAB-096		BACK—Cabinet back
*URD-133	R3, 6, 7	RESISTOR—3.3 meg, ½ w, carbon	*RAU-308		CABINET—Plastic cabinet
*URD-145	R5	RESISTOR—10 meg, ½ w, carbon	*RCE-095†	C12A, B, C	CAPACITOR—Electrolytic capacitor
*URE-021	R12†	RESISTOR—68 ohms, 1 w, carbon			40 mf, 150 v; 40 mf, 250 v; 200 mf, 20 v
*URE-057	R13†	RESISTOR—2200 ohms, 1 w, carbon	*RCE-098†	C12	CAPACITOR—Electrolytic capacitor
*UOP-457		SPEAKER—PA speaker, 4 inches			10 mf
*RHJ-005†		SPACER—For tuning capacitor	*RCT-036	C1, 2	CAPACITOR—Tuning capacitor
*RHM-062		CLIP—Speaker clip	*RCW-3015	C10A, B, 10C, D, E	CAPACITOR—Ceramic combination
*RHY-010		HANDLE—Handle for cabinet			220 mmf, .002 mf, .005, 220 mmf, .004 mf
*RJC-016		TERMINAL—Speed nut	*RDC-032		DIAL CORD
*RJS-024†		MOUNTING PLATE—For electrolytic capacitor	*RDK-136		KNOB
			*RDP-050		POINTER—Dial pointer
*RJS-100		SOCKET—Tube socket for 1R5	*REX-005		RECTIFIER—Selenium rectifier
*RJS-124		SOCKET—Tube socket for 1S5 & 3V4	*RHB-006		BUTTON—Plug button
*RJS-125		SOCKET—Tube socket for 1T4 tube	*RHC-015		CLIP—Oscillator coil clip
*RHC-015		CLIP—Oscillator coil clip	*RHC-016		COTTER PIN—For drive axle
*RJC-016		TERMINAL—Speed nut	*RHC-020		COTTER PIN—Cotter pin for handle
*RLC-101	L2	COIL—Oscillator coil	*RHE-009		EYELET—Eyelet for cabinet
*RLL-035	L1	LOOP—Loop antenna	*RHG-006†		GROMMET—For power cord
*RMC-040		CATCH—Spring catch	*RHG-018†		GROMMET—For tuning capacitor
*RMS-118		SPRING—Dial spring	*RHI-009		HINGE—Hinge for cabinet
*RMU-049		SHAFT—Tuning shaft			

*Used on other Models.
†For Model 600 only.
††for Model 601, 3, 4 only.





SPECIFICATIONS

CABINET:	Composition	Plastic
	Height	9½ inches
	Length	12½ inches
	Width	5½ inches
	Weight (with batteries)	11 pounds
POWER SUPPLY:	Battery	Eveready No. 753, or equivalent
	AC or DC operation	105-115 volts
	Frequency (on AC)	60 cycles
	Power Consumption	25 watts
OPERATING FREQUENCIES:	Broadcast Band	540-1600 kc
	I-F Amplifier	455 kc
POWER OUTPUT:	Undistorted	180 milliwatts
	Maximum	250 milliwatts
LOUDSPEAKER:	Type	Alnico PM
	Outside Cone Diameter	4 inches
	Voice Coil Impedance (400 cycles)	3.2 ohms
TUBE COMPLEMENT:	R-F Amplifier	1T4
	Oscillator-Converter	1R5
	I-F Amplifier	1T4
	Detector Audio Amplifier	1S5
	Power Amplifier	3V4

ALIGNMENT CHART

Step	Test-Osc. Connected to:	Test-Osc. Frequency	Radio Pointer Setting	Adjust for Maximum Meter Reading
1	1T4 I-F grid in series with .05 mf. capacitor	455 KC	550 KC	Iron cores of I-F transformer T2
2	1R5 converter grid in series with .05 mf. capacitor	455 KC	550 KC	Iron cores of I-F transformer T1
3	Repeat Step 1 and 2			
4	Inductively coupled	1500 KC	1500 KC	Trimmers C15 and C16*
5	Inductively coupled	600 KC	600 KC	Iron core of T4 or back apron of chassis

*Chassis in cabinet and cabinet back (with loop) closed; remove plug buttons for adjustment.

signal should be attenuated so that the output meter reading never exceeds ½ volt. Connect the capacitor listed in column of the alignment chart between the "high" side of the test oscillator and the point of input specified.

PRECAUTION: If the signal generator is a-c operated, use an isolating transformer between the power supply and the radio receiver input. The use of an isolating capacitor is not recommended, as a-c through the capacitor will introduce hum modulation and/or create the possibility of a burned out signal generator attenuator.

3. The output meter should be connected across the voice coil terminals of the speaker.

4. During the entire alignment procedure the volume control should be rotated clockwise to its maximum position.

5. For alignment of the oscillator and r-f trimmers, the input signal should be inductively coupled to the radio loop antenna by connecting a 4-turn, 6-inch diameter loop of bell wire across the signal generator output terminals, and locate the loop about one foot from the radio loop for alignment. The position of the loop with respect to the radio loop should not be changed during any one set of adjustments to prevent possible errors in peak readings.

6. The antenna loop acquires a different inductance in its position when the back is closed. Therefore, the adjustment of the antenna and r-f trimmers has to be made with the back closed, through the two openings on the right side of the cabinet which normally are closed by plug buttons. After adjustments have been completed, the two plug buttons have to be put in place again.

GENERAL INFORMATION

The Model 650 portable radio is a five-tube superheterodyne broadcast receiver with a range of 540 to 1600 kc. The power source may be either 105-115 volts, 50-60 cycles a-c, or d-c, when a power outlet is available. The receiver will also operate from its battery source, thus making it independent of external electrical power, providing excellent operation in any location where external power is not available.

BATTERY—AC OR DC OPERATION.

The left knob turns on the battery, provided that the power plug is well inserted into the socket in the chassis.

For a-c or d-c supply (105-115 volts, 50 to 60 cycle operation), the same knob switches on the power when the power plug is pulled out of its socket in the chassis and inserted into the house outlet.

ELECTRICAL CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED:

1. Test Oscillator with Tone Modulation.
2. A-C Output Meter.
3. Paper Capacitor .05 Mf.
4. Insulated Screwdriver.
5. Coupling Loop for Test Oscillator (see text).
6. Isolation Transformer.

PROCEDURE—GENERAL.

1. The Alignment Chart gives the alignment procedure with correct sequence of trimmer adjustments. The chassis must be removed from the cabinet during i-f alignment. The locations of the i-f and r-f adjustments are shown in Figure 2.

2. The "low" side of the test oscillator output should be connected to the chassis ground; the "high" side should be connected as indicated in the alignment chart. The test oscillator output

STAGE GAINS AND VOLTAGE CHECKS

In order to check circuit performance and facilitate troubleshooting, the measurement of stage gain by means of a vacuum voltmeter or similar measuring device is recommended. The gain values listed may have tolerances of 20%. Readings should be taken with low signal input so that the AVC is not effective.

(1) R-F STAGE GAINS.

1T4 R-F Grid (Pin 6) to 1R5 Grid (Pin 6) 12 @ 1000 K
1R5 Grid (Pin 6) to 1T4 Grid (Pin 6) 18 @ 1000 K
1T4 Grid (Pin 6) to 1S5 Diode Plate (Pin 3) 45 @ 455 K

(2) AUDIO GAIN.

.020 volt at 400 cycles across volume control (R13) with control set at maximum will give approximately .05 watts output across speaker voice coil.

MODEL 650

(3) D-C voltage developed across oscillator grid resistor (R9) averages -8 volts at 1000 kc with respect to B-.

(4) HUM

The hum voltage measured at the primary of the output transformer should not exceed 0.4 volts. This measurement should be made with an a-c voltmeter of a sensitivity of 20,000 ohm/volt in series with .5 mf. capacitor.

(5) SOCKET PIN VOLTAGES.

Figure 4 shows voltages from all tube pins to B-. Voltage

readings much lower than those specified may help localize defective components or tubes.

(6) MULTIPLE CERAMIC CAPACITOR (K68J128).

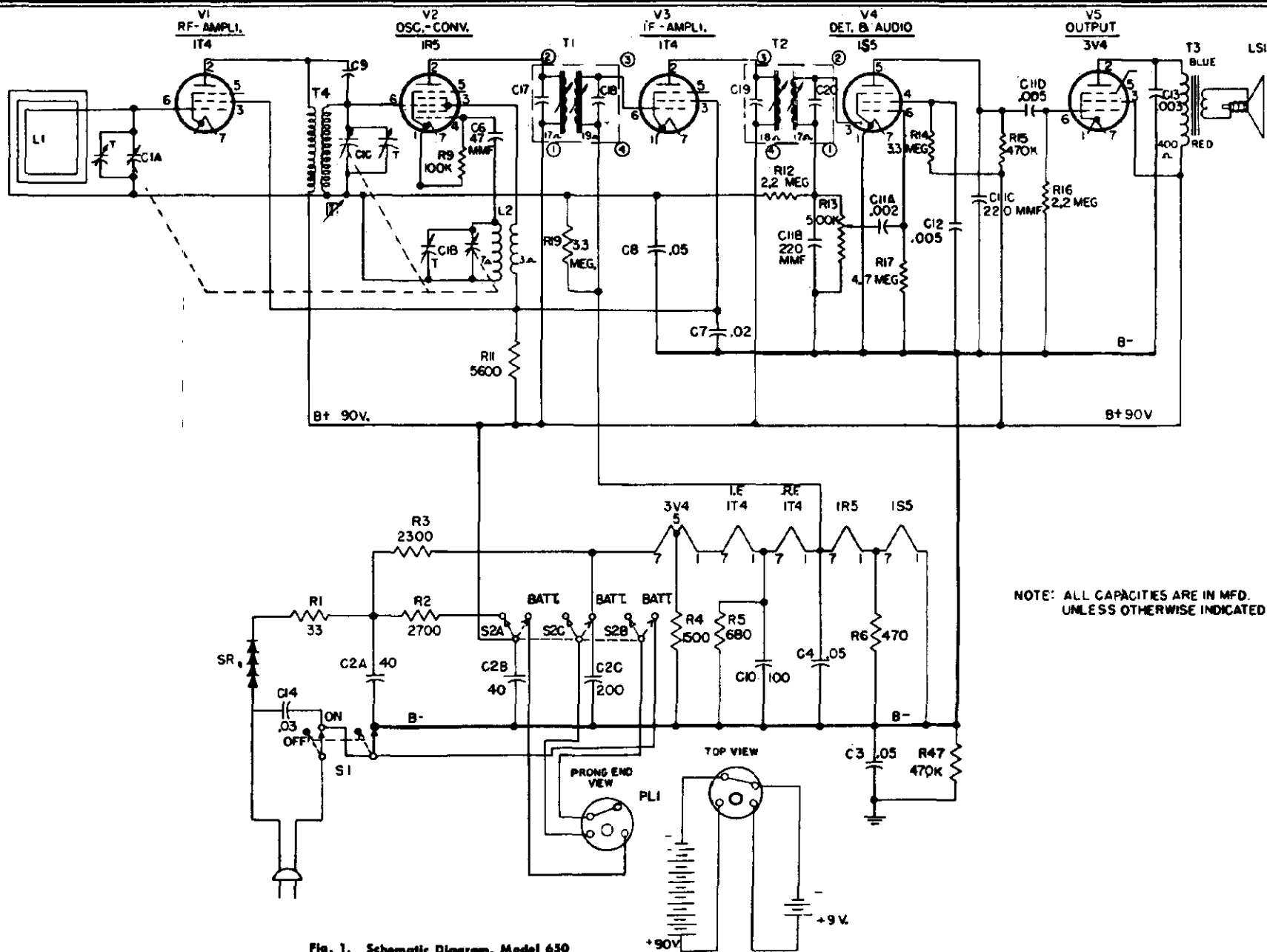
This multiple capacitor unit is of the ceramic capacitor type and contains five capacitors C11A, B, C, D and C12. This unit, RCW-3015, is illustrated in Figure 5 for lead identification. If during service the ceramic capacitor unit is found to be defective, the entire unit may be replaced by the identical part, RCW-3015, or the defective section may be located and disconnected from the receiver circuit and a single universal capacitor of equivalent electrical value used in its place.

MODEL 650
REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS			SPECIALIZED REPLACEMENT PARTS (Cont'd)		
*UCC-037	C13	CAPACITOR—.003 mfd., 400 v., paper	*RHB-006		PLUG BUTTON—(Maroon) on cabinet door
*UCC-041	C7	CAPACITOR—.02 mfd., 200 v., paper	RHB-012		PLUG BUTTON—(Grey) on cabinet door
*UCC-042	C14	CAPACITOR—.03 mfd., 600 v., paper	*RHC-015		CLIP—(Osc. coil)
UCC-045	C3, 4, 8	CAPACITOR—.05 mfd., 600 v., paper	*RHC-016		HAIRPIN COTTER—On tuning control shaft
*UCE-067	C10	CAPACITOR—100 mfd., 10 v., electrolytic	*RHG-018		GROMMET—Tuning capacitor mounting
*URD-043	R6	RESISTOR—470 ohms, $\frac{1}{2}$ w., carbon	*RHJ-005		SPACER—Tuning capacitor mounting
*URD-045	R5	RESISTOR—680 ohms, $\frac{1}{2}$ w., carbon	*RHM-052		CLIP—(Speaker mounting)
*URD-053	R4	RESISTOR—1500 ohms, $\frac{1}{2}$ w., carbon	RHM-056		CLIP—(Grille mounting)
*URD-067	R11	RESISTOR—5600 ohms, $\frac{1}{2}$ w., carbon	RHM-067		CAP—Brass cover over item RHS-047
*URD-097	R9	RESISTOR—100,000 ohms, $\frac{1}{2}$ w., carbon	RHM-068		CAP—Aluminum cover over item RHS-047
*URD-113	R7, 15	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon	*RHR-005		TUBULAR RIVET—.121" x $\frac{1}{16}$ " for door hinge
*URD-129	R12, 16	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon	*RHS-010		TUBE SHIELD—For V4 tube
*URD-133	R14, 19	RESISTOR—3.3 meg., $\frac{1}{2}$ w., carbon	*RHS-041		SCREW FOR HINGE—(Hex head) $\frac{1}{16}$ x $\frac{3}{16}$
*URD-137	R17	RESISTOR—4.7 meg., $\frac{1}{2}$ w., carbon	RHS-047		SCREW—(For handle mounting)
*URE-013	R1	RESISTOR—33 ohms $\pm 10\%$, 1 w., carbon	RHN-012		TEE NUT—(For handle mounting)
*URE-059	R2	RESISTOR—2700 ohms, 1 w., carbon	RHW-023		WASHER—(For handle mounting)
SPECIALIZED REPLACEMENT PARTS			RHY-014		HANDLE—(Maroon)
RAB-122		CABINET BACK—(maroon)	RHY-015		HANDLE—(Grey)
RAB-123		CABINET BACK—(grey)	*RJS-024		MOUNTING PLATE—(Electrolytic)
RAG-029		GRILLE—(For maroon cabinet)	*RJS-100		TUBE SOCKET—For V2
RAG-030		GRILLE—(For grey cabinet)	*RJS-124		TUBE SOCKET—For V4, V5
*RAS-001		BATTERY STRAP—Metal strap holds battery	*RJS-125		TUBE SOCKET—For V1, V3
RAU-323		CABINET—(Maroon)	*RLB-030	T4	R-F TRANSFORMER
RAU-324		CABINET—(Grey)	*RLC-068	L2	OSCILLATOR COIL
*RCE-095	C2A, B, C	CAPACITOR—200 mfd., 25 v; 40 mfd., 150 v; 40 mfd., 150 v; electrolytic	*RLI-038	L1	LOOP ANTENNA
*RCT-039	C1	TUNING CAPACITOR	RMS-039		"C" CLIP—On idler pulley shaft
*RCW-1063	C6	CAPACITOR—47 mmf., ceramic	RMS-116		SPRING—(Dial tension)
*RCW-3015	C11A, B, C, D, C12	CAPACITOR—.002 mf., 220 mf., .005 mfd., 220 mmf., .005 mf., ceramic	*RMS-191		SPRING CATCH—For back cover
*RDC-032		DIAL CORD	RMW-009		IDLER PULLEY—For dial cord
*RDK-136		KNOB—(Fawn) Volume or tuning	*RPJ-025	PL1	BATTERY PLUG
*RDK-202		KNOB—(Grey) Volume or tuning	*RRC-083	R13, S1	VOLUME CONTROL AND SWITCH
*RDP-040		POINTER—Dial pointer	*RRW-027	R3	RESISTOR—2300 ohms, 10 w., w.w.
RDS-092		DIAL SCALE	*RSW-056	S2	SWITCH—(Power cord)
*RER-001	SR	SELENIUM RECTIFIER	*RTL-052	T1	TRANSFORMER—1st 1-F transformer
			*RTL-079	T2	TRANSFORMER—2nd 1-F transformer
			*RTO-050	T3	OUTPUT TRANSFORMER
			*RWL-005		POWER CORD
			*DL-1RS-400D		SPEAKER—4 inch PM speaker

*Used on previous production receivers.

600 volt paper capacitors are stocked to replace 200 or 400 volt rated production units, providing their larger size does not prohibit their use.



MODEL 650

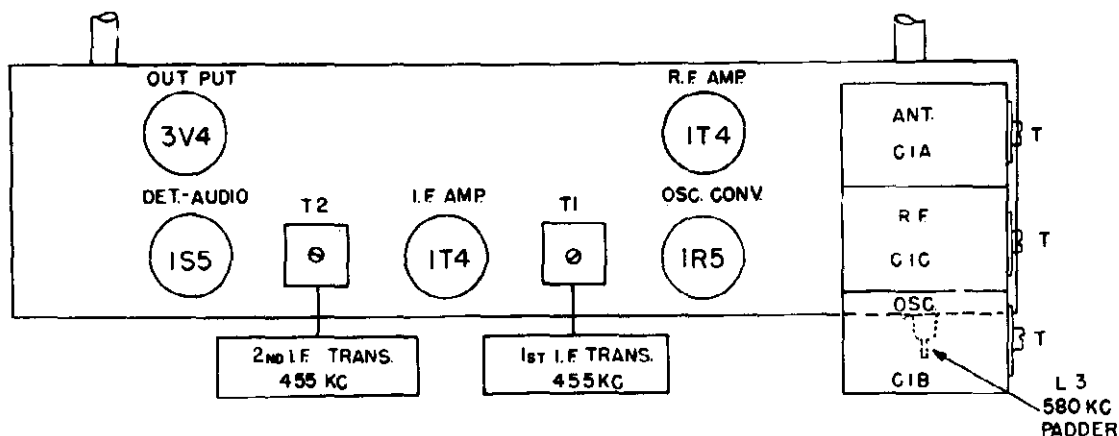


Fig. 2. Tube and Trimmer Location (Model 650)

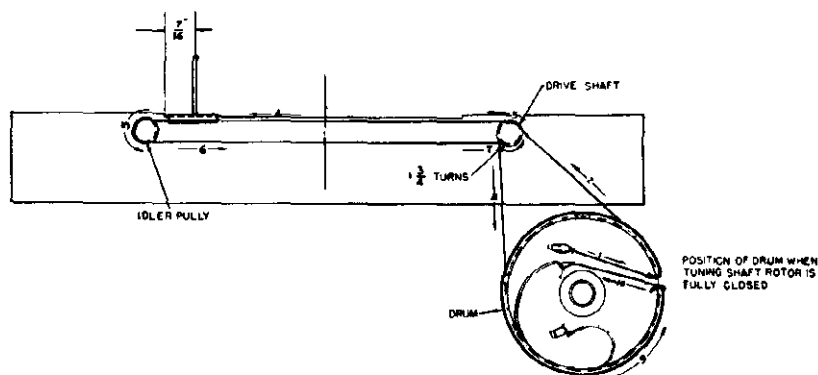
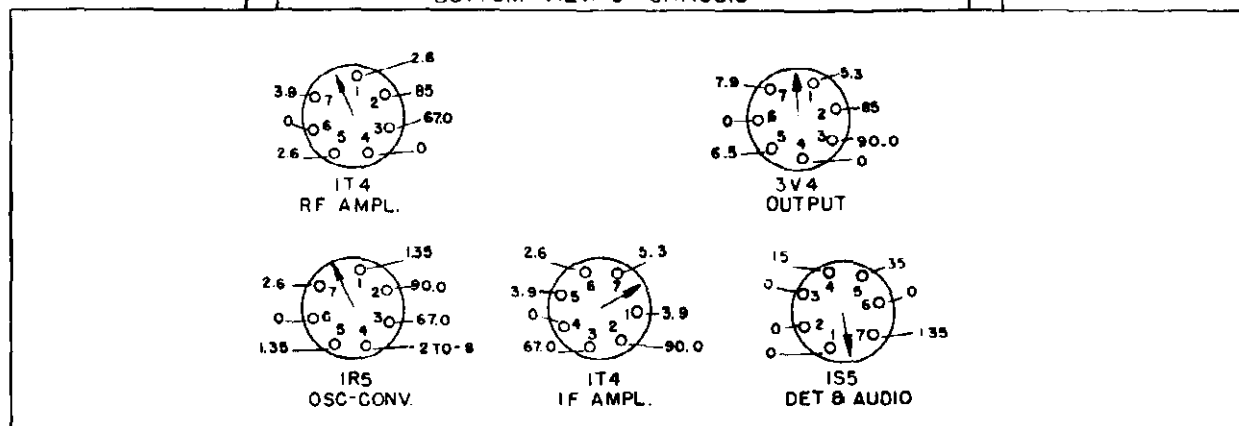


Fig. 3. Dial Stringing Diagram (Model 650)

BOTTOM VIEW OF CHASSIS



D C VOLTAGES TO GROUND UNLESS OTHERWISE SPECIFIED
ALL RATINGS ARE AC OPERATION MEASURED WITH REFERENCE TO B-
RATINGS FOR BATTERY ARE SIMILAR TO AC RATINGS
VOLTAGE IS MEASURED WITH 20,000 OHMS PER VOLT METER

Fig. 4. Socket Voltages (Model 650)

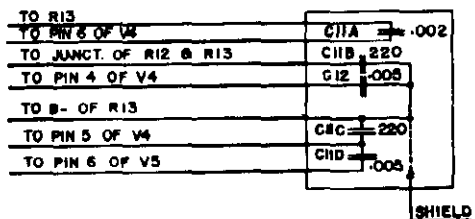
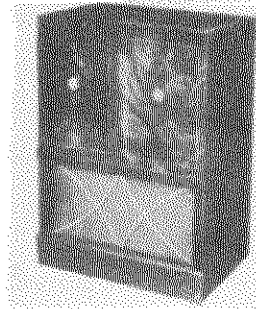


Fig. 5. Connections for Capacitor RCW-3015 (K68J128)



SPECIFICATIONS

CABINET:

Material.....	Wood
Height.....	33 $\frac{7}{8}$ inches
Width.....	25 inches
Depth.....	15 $\frac{1}{8}$ inches

ELECTRICAL (INPUT):

Voltage (AC only).....	105-120
Frequency.....	60 cps
Wattage (on Radio).....	35
Wattage (on Phono).....	55

OPERATING FREQUENCIES:

Broadcast Band.....	540-1600 kc
I-F Amplifier.....	455 kc

POWER OUTPUT (117 Volts Line):

Undistorted.....	1 watt
Maximum.....	1.75 watts

LOUDSPEAKER:

Type.....	Alnico PM
Outside Cone Diameter.....	10 inches
Voice Coil Impedance at 400 cps.....	3.2 ohms

PHONOGRAPH PICKUP:

Type.....	Dual Stylus Variable Reluctance
DC Resistance.....	280 ohms

RECORD CHANGER:

P15.....	33 $\frac{1}{3}$, 45 and 78 RPM
----------	----------------------------------

TUBE COMPLEMENT:

V1	RF Amplifier.....	12SK7
V2	Oscillator Converter.....	12SA7
V3	IF Amplifier.....	12BA6
V4	Detector-Audio Amplifier.....	12SQ7
V5	Rectifier.....	35Z5GT/G
V6	Audio Power Amplifier.....	35L6GT
V7	Phono Preamplifier.....	6AU6
I1	Pilot Lamp.....	GE Mazda No. 47

GENERAL INFORMATION

The Model 740 is a combination radio-phonograph receiver. It employs a 6-tube superheterodyne receiver and a record changer, Model P15. The servicing information given herein is complete except that it does not cover servicing of the record changer. Service data on record changer Model P15 is covered in service notes ER-S-P15.

CAUTION

One side of the power line is connected to B-. Use an isolation transformer when making service adjustments with the chassis removed from the cabinet.

STAGE GAINS AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring device may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of ± 20 per cent. Readings are taken with low signal input so that AVC is not effective.

1. I-F Gain

12SA7 Grid to 12BA6 Grid	50 @ 455 KC
12BA6 Grid to 12SQ7 Diode Plate	50 @ 455 KC

2. Audio Gain

Input of 0.15 volts at 400 cycles across volume control (R6) with control set at maximum will develop approximately $\frac{1}{2}$ watt output across the speaker voice coil terminals.

3. Oscillator Grid Bias

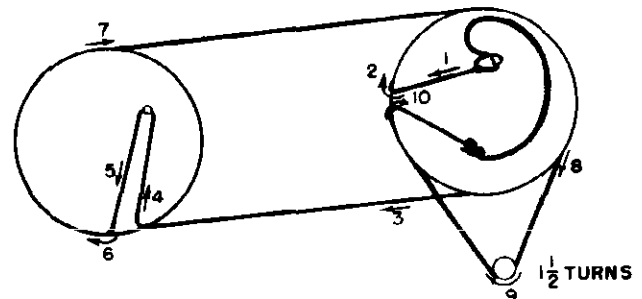
DC voltage developed across the oscillator grid leak (R4) averages 8.5 volts at 1000 kc.

4. Tube Socket Pin Voltages

Fig. 3 shows voltages from tube pins to B-. Voltage readings differing greatly from those specified may help localize defective components.

5. Hum Measurement

Hum measured across the voice coil of the speaker with the volume control set at minimum and band switch in the radio position should not exceed 7 millivolts.



TUNING CAP. AT MAX. CAP.

Fig. 1. Dial Stringing Diagram

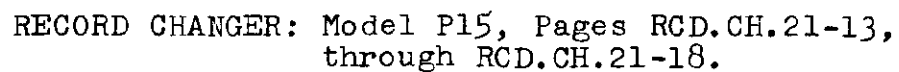


Fig. 2. Schematic Diagram

ELECTRICAL CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation.
2. AC voltmeter, $1\frac{1}{2}$ volts full scale.
3. Paper capacitor, 0.05 mfd.
4. Insulated screwdriver.
5. Coupling loop for test oscillator (see text).
6. Isolation transformer.

ALIGNMENT PROCEDURE:

The alignment steps are given in table form of the Alignment Chart. Adjustment trimmers are shown in the illustration of Fig. 4.

1. The chassis should be removed from the cabinet with the antenna loop and back attached and the speaker leads reconnected.

2. An isolation transformer should be used for the receiver power source when aligning or servicing AC-DC receivers to prevent short circuiting of equipment and shock hazard.

3. The output meter should be connected across the terminals of the loudspeaker voice coil.

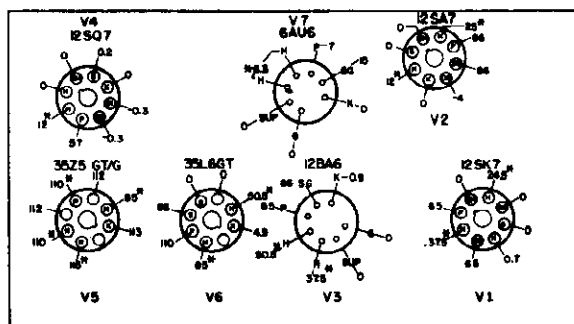
4. The receiver volume control should be turned to maximum and test oscillator signal output attenuated during alignment to develop not more than $1\frac{1}{4}$ volts output meter reading at the loudspeaker.

5. For i-f alignment, the high side of the signal generator output cable should be connected through a .05 mfd. paper capacitor to the points indicated in the Alignment Chart. The low side of the output cable is connected to the receiver chassis.

6. To align the oscillator and r-f trimmers, the signal generator output is inductively coupled to the radio loop, L1, by connecting a four-turn, six-inch diameter loop of bell wire across its output terminals and then locating the loop about one foot from the radio loop antenna. To prevent possible errors in comparative peak readings, the position of signal generator loop with respect to the radio loop antenna should not be changed during measurement.

ALIGNMENT CHART

Step	Connect Test Oscillator to:	Test Osc. Setting	Radio Dial Setting	Adjust Trimmers for Maximum
I-F ALIGNMENT				
1	V3, 12BA6 grid (Pin 1), in series with .05 mfd.	455 KC	.....	C9 and C8 of second i-f transformer T3
2	V2, 12SA7 grid (Pin 8), in series with .05 mfd.		.....	C7 and C6 of first i-f transformer, T2
3			.....	Recheck adjustment of C9, C8, C7, C6, for maximum
R-F ALIGNMENT				
4	Inductively coupled to radio loop.	1620 KC	Minimum capacity C1A, C1B	C3, oscillator trimmer
5		1500 KC	Tune for Maximum	C1, r-f trimmer C2, ant. trimmer on Loop



97 VOLTS AC LINE VOLTAGE
NO SIGNAL INPUT
MEASURE BETWEEN SOCKET TERMINALS B-B'
USE 20,000 OHM PER VOLT METER
SET VOLUME CONTROL TO MINIMUM
4* INDICATES AC FILAMENT VOLTAGES
SWITCH S2 IN RADIO POSITION

Fig. 3. Socket Voltage Diagram

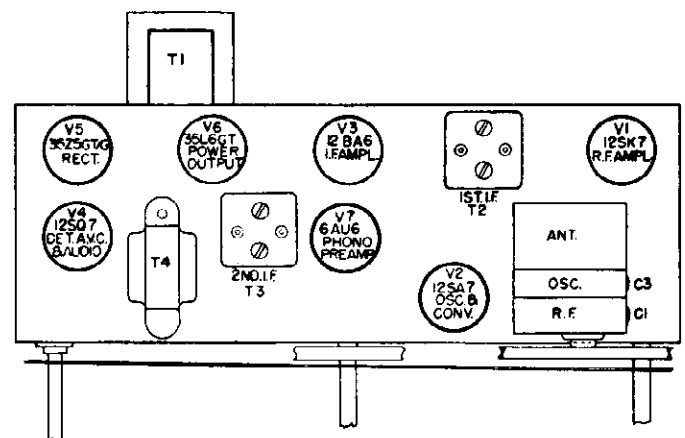


Fig. 4. Tube and Trimmer Location

MODEL 740

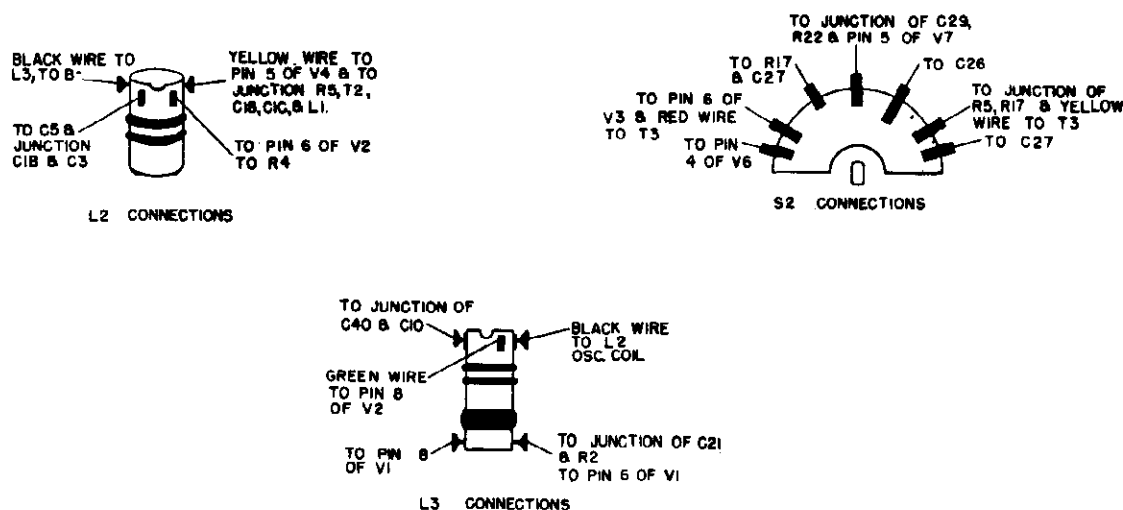
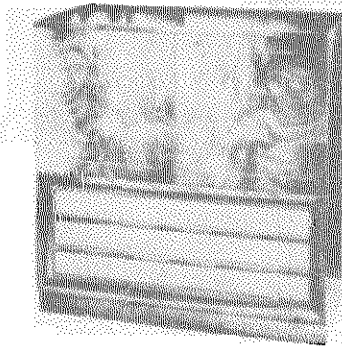


Fig. 5. Coil and Switch Connections

REPLACEMENT PARTS LIST—MODEL 740

Cat. No.	Symbol	Description	Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS			SPECIALIZED REPLACEMENT PARTS (Cont'd)		
UCC-035	C27	CAPACITOR—.001 mf., 600 v., paper	RDC-032		DIAL CORD
UCC-036	C22, 29	CAPACITOR—.002 mf., 600 v., paper	RDE-097		ESCUTCHEON
UCC-039	C11	CAPACITOR—.005 mf., 600 v., paper	RDK-212		DRAWER PULL
UCC-040	C13, 26	CAPACITOR—.01 mf., 600 v., paper	RDK-231		KNOB
UCC-041	C21, 28, 10	CAPACITOR—.02 mf., 600 v., paper	RDK-232		KNOB (ARROW)
UCC-045	C17, 18, 19, 20, 30	CAPACITOR—.05 mf., 600 v., paper	RDP-051		POINTER—Dial pointer
UCC-048	C31	CAPACITOR—.1 mf., 600 v., paper	RDS-102		BACK PLATE AND DIAL SCALE
UCU-020	C5	CAPACITOR—47 mmf., mica	RMC-002		CLIP—Oscillator coil
UCU-036	C12	CAPACITOR—220 mmf., mica	RHC-024		CLIP for capacitor
URD-005	R12	RESISTOR—15 ohms, $\frac{1}{2}$ w., carbon	RHC-038		MOUNTING CLIP (RF CLIP)
URD-021	R14	RESISTOR—68 ohms, $\frac{1}{2}$ w., carbon	RHG-018		GROMMET (TUNING CAPACITOR MTG.)
URD-025	R1	RESISTOR—100 ohms, $\frac{1}{2}$ w., carbon	RHG-029		GROMMET
URD-029	R10	RESISTOR—150 ohms, $\frac{1}{2}$ w., carbon	RHJ-007		SPACER (TUNING CAP. MTG.)
URD-057	R2	RESISTOR—2200 ohms, $\frac{1}{2}$ w., carbon	RHS-064		SCREW—Wood, No. 4 x $\frac{7}{16}$ in., lg. rd. hd.
URD-073	R18	RESISTOR—10,000 ohms, $\frac{1}{2}$ w., carbon	RJC-001		SPEAKER LEAD PINS
URD-081	R4	RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon	RJS-003		TUBE SOCKET for V1, V2, V4, V5, V6
URD-097	R20, 23	RESISTOR—100,000 ohms, $\frac{1}{2}$ w., carbon	RJS-049	J2	PHONO POWER SOCKET
URD-101	R16	RESISTOR—150,000 ohms, $\frac{1}{2}$ w., carbon	RJS-092		TUBE SOCKET for V7
URD-109	R17	RESISTOR—330,000 ohms, $\frac{1}{2}$ w., carbon	RJS-097	J1	PHONO SOCKET
URD-113	R8, 13	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon	RJS-141		TUBE SOCKET for V3
URD-121	R9, 22	RESISTOR—1 meg., $\frac{1}{2}$ w., carbon	RJX-031		PILOT LAMP SOCKET
URD-129	R5, 21	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon	RLC-015	L2	OSCILLATOR COIL
URD-137	R7, 19	RESISTOR—4.7 meg., $\frac{1}{2}$ w., carbon	RLI-125	L3	RF COIL
URF-049	R11	RESISTOR—1000 ohms, 2 w., carbon	RLL-041	L1	LOOP—Antenna loop
SPECIALIZED REPLACEMENT PARTS			RMM-151		CHANNEL RUBBER
RAB-144		CABINET BACK	RMM-153		DRAWER SLIDE
RAC-084		CHANGER PAN (COVER)	RMS-130		DIAL CORD SPRING
RAV-140		CABINET (MAHOGANY)	RMS-221		STABILIZER SPRING
RCE-117	C15A,B,C,D	CAPACITOR—Electrolytic	RMX-174		DRIVE SHAFT AND BUSHING ASSEMBLY
RCN-039	C4	CAPACITOR—2 mmf., mica	ROP-018		SPEAKER—10 inch
RCT-048	C1A,B,C,C3	TUNING CAPACITOR	RJP-003	P2	AC POWER PLUG
RCY-016	C2	CAPACITOR—Trimmer	RJX-007	P1	PHONO PLUG
			RRC-151	R6, S3	VOLUME CONTROL AND SWITCH
			RSW-084	S2	PHONO-RADIO-TONE SWITCH
			RTF-001	T4	FILAMENT TRANSFORMER
			RTL-115	T2	1st I-F TRANSFORMER
			RTL-116	T3	2nd I-F TRANSFORMER
			RTO-038	T1	OUTPUT TRANSFORMER
			RWL-004		POWER CORD



MODEL 752 MAHOGANY
MODEL 753 BLONDE

SPECIFICATIONS

CABINET

Model	752	753
Material	Wood	Wood
Color	Mahogany	Blonde
Height, inches	33 $\frac{1}{4}$	33 $\frac{1}{4}$
Width, inches	32	32
Depth, inches	15 $\frac{1}{4}$	15 $\frac{1}{4}$

ELECTRICAL

Voltage	105-125 volts
Frequency	60 cps
Wattage (Radio)	65 w.
Wattage (Phono)	85 w.

OPERATING FREQUENCIES

AM Band	540-1620 kc
FM Band	88-108 mc

INTERMEDIATE FREQUENCIES

AM Band	455 kc
FM Band	10.7 mc

AUDIO POWER OUTPUT

Undistorted	3.0 watts
Maximum	5.0 watts

LOUDSPEAKER

Type	Permanent magnet
Size	12 inches
Voice Coil Impedance at 400 cycles	3.2 ohms

TUBES

(V1) Converter	6BE6
(V2) RF and 1st FM Amplifier	6BA6
(V3) I-F Amplifier	6BA6
(V4) FM Limiter	6AU6
(V5) FM Discriminator, AM Detector and Audio Amplifier	6T8
(V6) Audio Power Output	6V6
(V7) Rectifier	5Y3GT
(V8) Phono Preamplifier	6AU6

DIAL LAMP Mazda No. 42

RECORD CHANGER P15 (33 $\frac{1}{2}$, 45 and 78 RPM)

PHONOGRAPH PICK-UP

Type	Dual Stylus, variable reluctance
DC Resistance	340 ohms

ANTENNA

AM	Built-in loop
FM	Power cord antenna or 300 ohm FM antenna

GENERAL

Models 752 and 753 are similar except for cabinet. For service information for the record changer, refer to General Electric service notes ER-S-P15.

These models are designed to operate from built-in antennas or from an external FM 300 ohm antenna. The receiver may be operated on the built-in FM antenna by connecting the brown wire which extends from the rear of the chassis to the left hand terminal of the dipole antenna terminals. If it is necessary to install an external FM antenna, the brown wire extending from the rear of the chassis should be disconnected from the antenna terminal strip.

These receivers use a reflex circuit to amplify the FM r-f signal in V2. The FM r-f signal is coupled to the grid of V2 through C46 and is amplified by V2. It is then coupled from the plate of V2 to the grid of V1, the converter, by C7. L9 keeps the FM r-f signal out of the FM i-f transformer T3, while C7 is a small value to keep the FM i-f from grid of the converter tube.

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements, by a vacuum tube voltmeter or similar measuring device, may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of ± 20 per cent. Readings should be taken with low signal input so that AVC is not effective.

1. R-F AND I-F STAGE GAINS

Signal applied through an IRE dummy antenna:

(AM) V1 to V3 Grid	40 at 455 KC
(FM) Dipole Terminals to V1 Grid	1.0 at 98 MC
(FM) V1 Grid to V2 Grid	1.5 at 10.7 MC
(FM) V2 Grid to V3 Grid	50 at 10.7 MC
(FM) V3 Grid to V4 Grid	22 at 10.7 MC

2. AUDIO GAIN

.07 volts at 400 cps across the volume control will give approximately $\frac{1}{2}$ watt output across the speaker voice coil. Set volume control at maximum.

3. OSCILLATOR GRID BIAS

D-c voltage developed across R3:
7 volts at 1000 KC (use 220K resistor to isolate VTVM)
3 volts at 98 MC (use 220K resistor to isolate VTVM)

4. SOCKET VOLTAGES

Figure 6 shows typical tube pin voltages. All readings should be made from the tube pin to chassis, unless otherwise indicated.

5. HUM MEASUREMENT

Hum measured across the voice coil of the speaker with the volume control set at minimum and band switch in the AM position should not exceed 7 millivolts.

On FM position ground the limiter grid through a .01 mfd. capacitor and measure the hum across the voice coil with volume control at maximum. Hum should not exceed 15 millivolts.

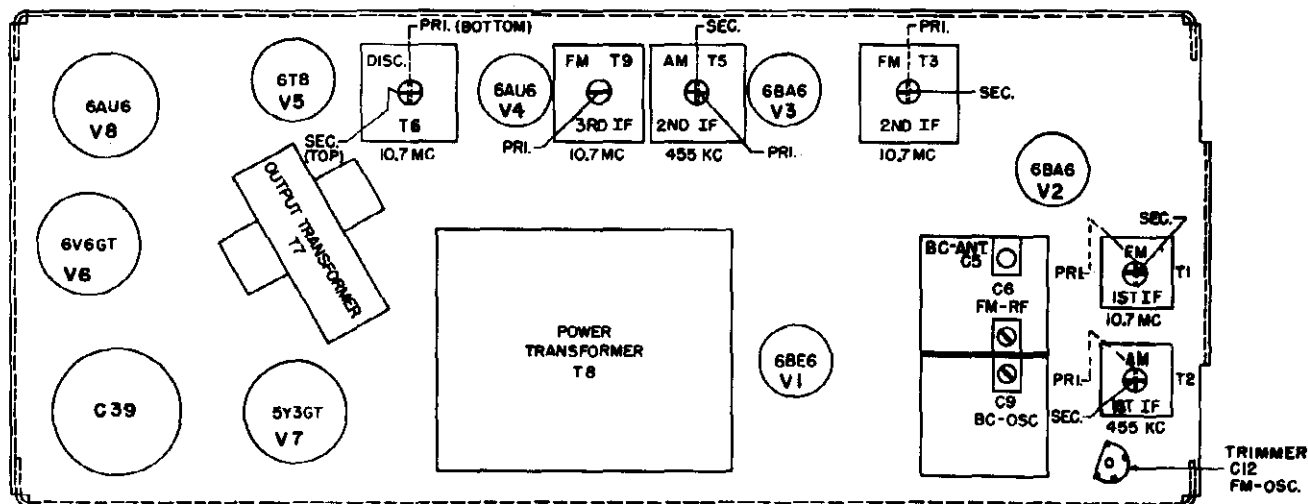


Fig. 1. Tube and Trimmer Location

METER ALIGNMENT

Two methods of alignment are given below (1) meter, and (2) visual alignment, which allows more precision in aligning the i-f transformers and particularly the discriminator transformer, T6.

EQUIPMENT REQUIRED FOR METER ALIGNMENT

1. Test oscillator with tone modulation to cover 455 kc; 520 to 1620 kc, 10.7 mc, and 88 to 108 mc.
2. 20,000 ohm-per-voltmeter, or vacuum tube voltmeter.
3. Output meter.
4. .01 mfd. paper capacitor.
5. 200,000 ohm, $\frac{1}{2}$ watt resistor.
6. Loop of wire. See note 6.

METER ALIGNMENT NOTES

1. Use unmodulated signal.
2. Connect 20,000 ohm-per-volt meter from junction of R26 and C27 to chassis. Use 10-volt scale, steps 4 and 5.
3. Connect 20,000 ohm-per-volt meter from pin 1 of V4 to ground in series with a 200,000 ohm resistor. The resistor must be connected directly to the grid pin to minimize capacity loading and to isolate the i-f signal from the meter. Keep signal generator down so that meter indicates not more than 1 volt (5 microamps through 200,000 ohms). (Use microamp scale.) A vacuum tube voltmeter may be used to measure 1 volt at the grid of V4.
4. Use 400 cycle modulation.
5. Connect a standard output meter across speaker voice coil.

Turn volume control full on. Keep signal generator output down so that output meter indicates not more than $\frac{1}{2}$ watt output during alignment.

6. For alignment of the AM oscillator and R-F trimmer, the signal should be inductively coupled to the loop antenna by connecting a four turn, six inch diameter loop of wire across the signal generator terminals, and then locate the loop about one foot from the radio loop antenna. To prevent possible errors in peak readings, the position of the loop in respect to the radio loop should not be changed during any one set of adjustments.

7. To align the first FM i-f transformer T1, it is necessary to disconnect the copper strap from the band switch to pin 7 of V1 (6BE6) by unsoldering the strap from the tube pin connection. Resolder the strap after T1 is aligned.

8. When tuning the secondary of T6 three minimum points will be obtained. The center one is the correct setting. As the transformer is tuned either side of 10.7 MC, the meter reading should increase.

9. Termination impedance of signal generator should be 300 ohms.

10. When detuning the signal generator in step (4), two maximum meter readings will be obtained, one on each side of 10.7 MC. The primary of T6 should be aligned to maximum when the signal generator is tuned to the smaller of these two peaks.

11. Make all chassis connections for FM-IF alignment as short as possible. In step 9 connect the ground side of the signal generator at the chassis ground in the center of the 6BE6 socket using a short ground connection.

METER ALIGNMENT CHART

Step No.	Signal Generator Frequency	Signal Input Point	Band Switch	Dial Setting	Adjust	See Note
AM-IF ALIGNMENT						
1	455 KC	6BE6 grid (Pin 7 of V1) thru .01 mfd.	AM	550 KC	Primary and secondary cores of T5 for maximum.	4, 5
2					Primary and secondary cores of T2 for maximum.	

FM DISCRIMINATOR ALIGNMENT

3	10.7 MC			..	T6 secondary core for minimum.	4, 5, 8
4	See Note 10.	6BA6 grid (Pin 1 of V3) thru .01 mfd.	FM	..	Detune signal generator to point of max. meter reading.	1, 2, 10
5					T6 primary for maximum.	
6	Repeat Step 3.					

FM-IF ALIGNMENT

7	10.7 MC unmodulated	6BA6 grid (Pin 1 of V3) thru .01 mfd.	FM	..	Core of T9 for maximum.	1, 3, 11
8		6BA6 grid (Pin 1 of V2) thru .01 mfd.			Primary and secondary cores of T3 for maximum.	
9		6BE6 grid (Pin 1 of V1) thru 22K resistor.			Primary and secondary cores of T1 for maximum.	1, 3, 7, 11

AM-RF ALIGNMENT

10	1620 KC	Inductively coupled	AM	C1 completely open.	Adjust C9 for maximum.	4, 5, 6
11	1500 KC			For maximum output.	Adjust C5 for maximum while rocking generator. Set pointer to 1500 KC.	

FM-RF ALIGNMENT

12	108 MC unmodulated	Dipole terminals	FM	C1 completely open.	Adjust C12 for maximum.	1, 3, 6, 9
13	108 MC unmodulated			For maximum output.	Adjust C6 for maximum while rocking generator.	

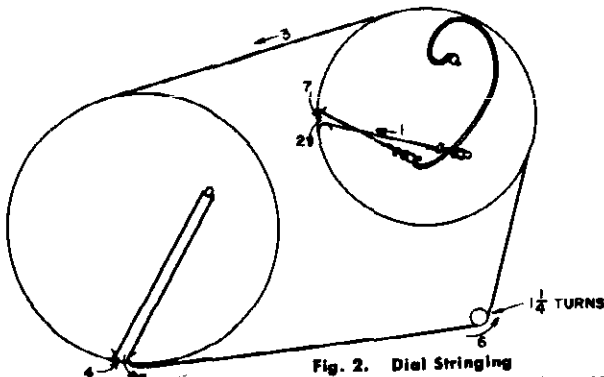
VISUAL ALIGNMENT

EQUIPMENT REQUIRED FOR VISUAL ALIGNMENT

1. General Electric YGS-3 AM and FM signal generator, or equivalent.
2. General Electric ST-2A oscilloscope or equivalent.
3. One meg. resistor, one 22,000-ohm resistor, one .01 mfd capacitor.

NOTES FOR VISUAL ALIGNMENT

1. Connect vertical plates of scope to the limiter grid, pin 1 of V4, through 1 meg. and chassis.
2. Connect vertical plates of scope to junction of C24, R14, and R13 through 1 meg. Connect low side of scope to chassis.
3. Connect vertical plates of scope across C27 to align the discriminator transformer (T6). Connect high side of scope to junction of C27 and R26 through 1 meg.
4. Use a 60 cycle amplitude modulated signal for AM and FM oscillator alignment. Apply a 60 cps voltage to the horizontal plates of the scope.
5. In some cases tuning of the converter grid will cause "pulling" of the oscillator and will change the oscillator frequency. After centering the response curve on the screen if peaking of C5 on AM alignment or C6 on FM alignment causes the curve to move off the screen, it will be necessary to recalibrate the oscillator as in steps 3 and 12.



6. The termination impedance of the signal generator should be 300 ohms to properly match the input impedance of this receiver for FM r-f alignment.

7. To align the 1st i-f FM transformer T1, it is necessary to disconnect the copper strap from pin 7 of V1 (6BE6 converter) to the band switch by unsoldering it from the tube pin. Resolder after aligning T1.

8. For alignment of the AM oscillator and r-f trimmers, the signal should be inductively coupled to the loop antenna by connecting a four turn, six inch diameter loop of bell wire across the signal generator terminals, and then locate this loop about one foot from the radio loop antenna. To prevent possible errors in peak readings, the position of the loop with respect to the radio loop should not be changed during any one set of adjustments.

9. When using a sweep signal, it is necessary to apply the same sweep voltage to the horizontal plates of the oscilloscope which is used to sweep the r-f frequency.

It may be necessary to use an RF phase shift network to properly phase the input to the scope. This may be done by shunting a .005 mfd. capacitor across the horizontal plate terminals of the scope and by using a 1/2 megohm potentiometer in series with the high side of the horizontal sweep voltage line. Adjust the potentiometer to superimpose the retrace on the trace.

10. Make all chassis connections for FM-IF alignment as short as possible. In step 7 connect the ground side of the signal generator at the chassis ground at the center pin of the 6BE6 socket using a short ground connection.

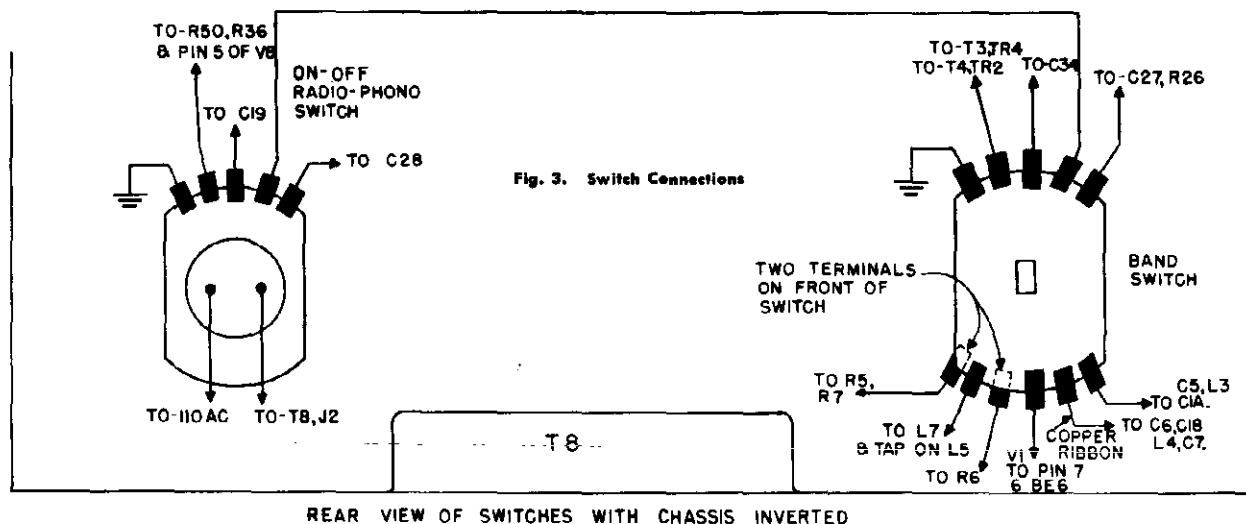
11. If slight distortion is encountered on weak FM stations, it may be necessary to increase the FM-IF bandwidth to a minimum of 120 kc or a maximum of 140 kc wide at 50% of peak amplitude. This should be done by stagger tuning T3 only. The amplitude of the video IF response should not be reduced more than 20%. Use a signal generator accurately calibrated to supply markers for the bandwidth measurement.

To stagger tune T3, use a sweep voltage as in step 7, page 4. Connect a scope as in note 1. Turn the primary of T3 (bottom core) slightly clockwise. Turn the secondary of T3 (top core) counterclockwise to center the 10.7 mc marker at the peak of the curve. Check the bandwidth.

MODELS 752, 753

VISUAL ALIGNMENT CHART

Step No.	Signal Generator Frequency	Signal Input Point	Band Switch	Dial Setting	Adjust	Sec Note
AM-IF ALIGNMENT						
1	455 KC \pm 20 KC at 60 cps sweep rate	6BE6 grid (pin 1 of V1) thru .01 mfd.	AM		Cores of T5 for max. amplitude and symmetry. See Fig. 4 (A).	2
2					Cores of T2 for max. amplitude and symmetry. See Fig. 4 (A).	
AM-RF ALIGNMENT						
3	1620 KC AM modulated with 60 cps.	Inductively coupled.	AM	C1 completely open. Min. capacity.	C9 for steepest slope of straight line trace.	2, 4, 8
4	1500 KC \pm 20 KC at 60 cps sweep rate			For max. amplitude of curve.	C5 for max. amplitude and symmetry of curve. See Fig. 4 (A).	2, 5, 8
FM-IF ALIGNMENT						
5	10.7 MC \pm 300 KC at 60 cps sweep rate	6BA6 grid (Pin 1 of V2) thru .01 mfd.	FM		Core of T4 for max. amplitude and symmetry. See Fig. 4 (A).	1, 10
6		6BE6 grid (pin 1 of V1) thru 22K (See note 7)			Cores of T3 for max. amplitude and symmetry. See Fig. 4 (A).	1, 7, 10
7					Cores of T1 for max. amplitude and symmetry. See Fig. 4 (A).	
FM DISCRIMINATOR ALIGNMENT						
8	10.7 MC \pm 300 KC at 60 cps sweep rate.	6BA6 grid (pin 1 of V3) thru .01 mfd.	FM		Primary of T6 for maximum amplitude. See Fig. 4 (B).	3, 10
9					Secondary of T6 for equal amplitude and symmetry of positive and negative peaks of curve. See Fig. 4 (B).	
10	Recheck step 8					
11	Recheck step 9					
FM-RF ALIGNMENT						
12	108 MC AM modulated with 60 cps.	Dipole terminals	FM	C1 completely open. (Min. capacity)	C12 for steepest slope of straight line trace.	1, 4, 6
13	98 MC \pm 300 KC at 60 cps sweep rate			For max. amplitude of curve.	C6 for max. amplitude and symmetry of curve. See Fig. 4 (A).	1, 5, 6



REAR VIEW OF SWITCHES WITH CHASSIS INVERTED

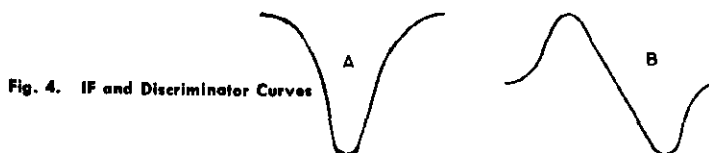
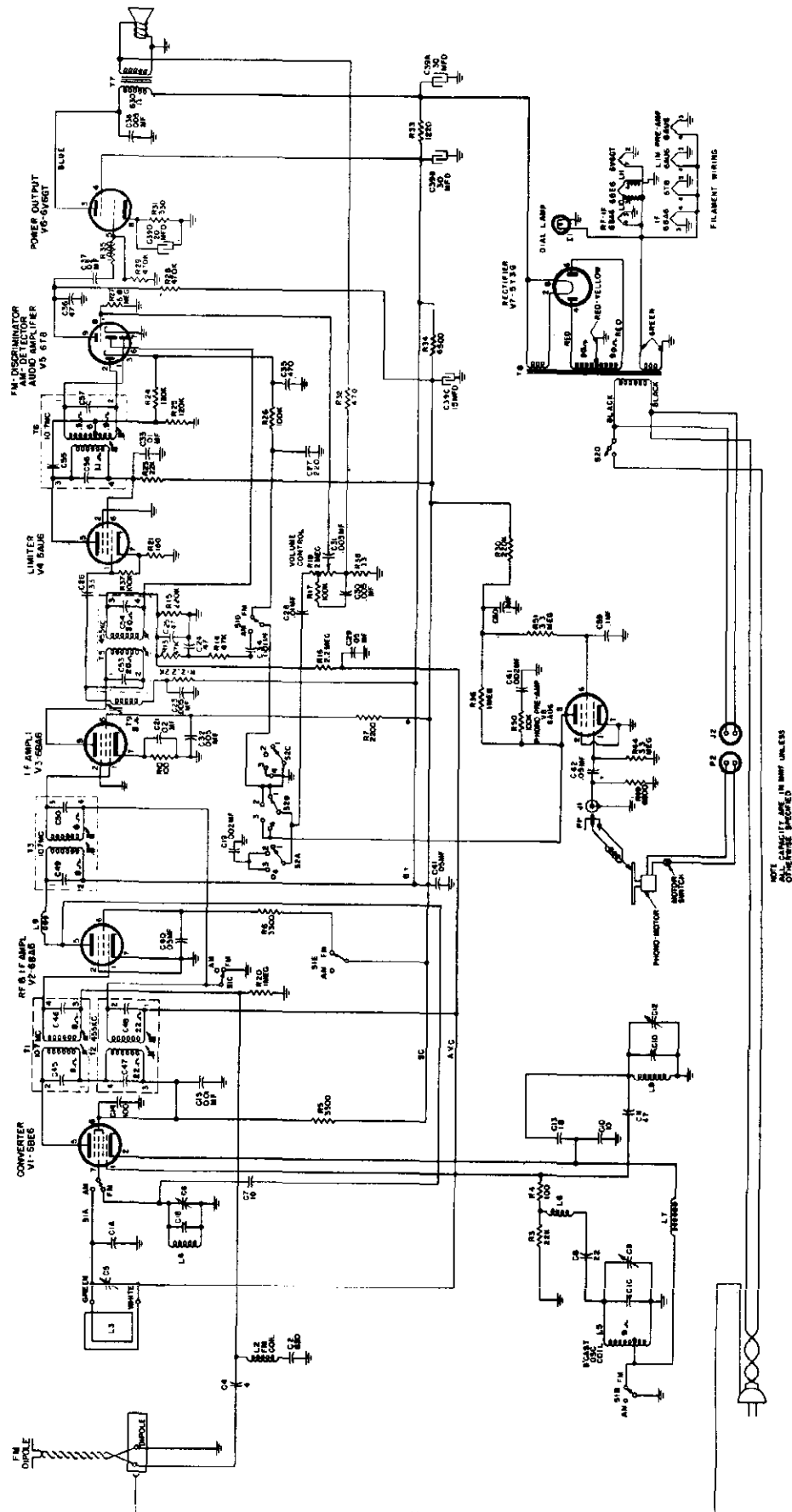


Fig. 5. Schematic Diagram

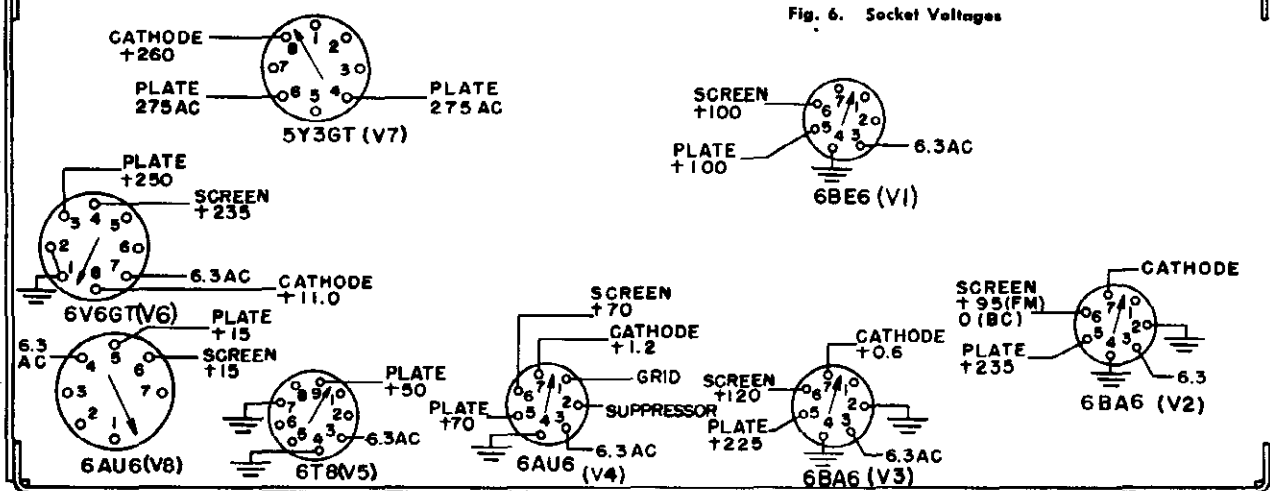


RECORD CHANGER: Model PL5, Pages RCD.CH.21-13,
through RCD.CH.21-18.

MODELS 752, 753

BOTTOM VIEW OF CHASSIS

Fig. 6. Socket Voltages



ALL VOLTAGES MEASURED TO CHASSIS USING A 20,000 OHM PER VOLT METER
ALL VOLTAGES ON BC BAND UNLESS OTHERWISE NOTED

REPLACEMENT PARTS LIST

Cat. No. | Symbol | Description
UNIVERSAL REPLACEMENT PARTS

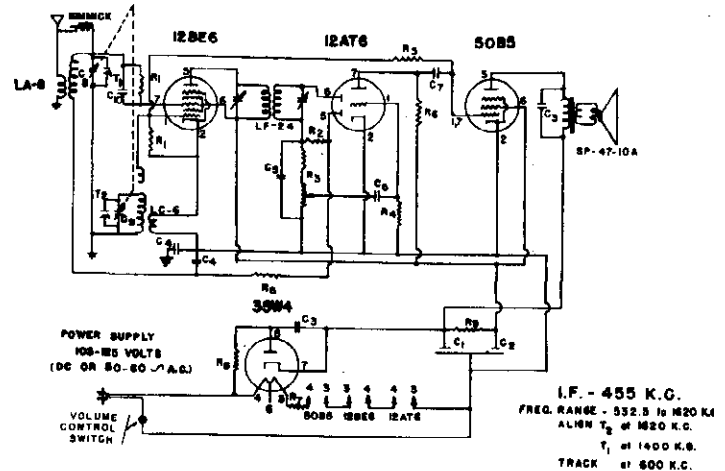
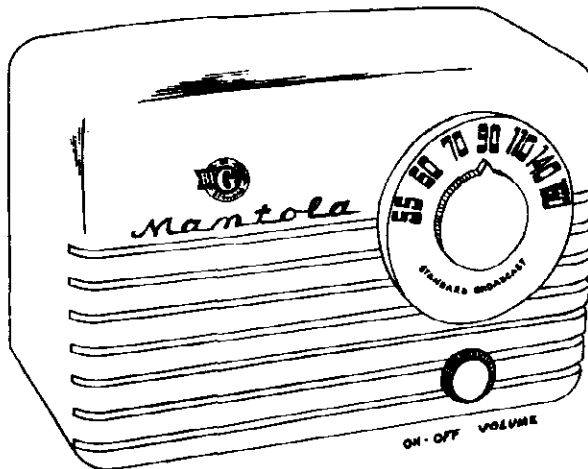
*UCC-035	C34	CAPACITOR—.001 mfd., 600 v., paper.
*UCC-036	C19, C61	CAPACITOR—.002 mfd., 600 v., paper.
*UCC-037	C31	CAPACITOR—.003 mfd., 600 v., paper.
*UCC-039	C30, C23, C32	CAPACITOR—.005 mfd., 600 v., paper.
*UCC-040	C28, C15, C23, C42	CAPACITOR—.01 mfd., 600 v., paper.
*UCC-041	C21, C37	CAPACITOR—.02 mfd., 600 v., paper.
*UCC-045	C40, C41, C44	CAPACITOR—.05 mfd., 600 v., paper.
*UCC-048	C59, C60	CAPACITOR—.1 mfd., 600 v., paper.
*UCC-059	C38	CAPACITOR—.005—1000 v., paper.
*UCU-001	C4	CAPACITOR—4 mmfd., 500 v., mica.
*UCU-016	C26	CAPACITOR—33 mmfd., 500 v., mica.
*UCU-020	C36	CAPACITOR—47 mmfd., 500 v., mica.
*UCU-044	C35	CAPACITOR—470 mmfd., 500 v., mica.
*UCU-1036		CAPACITOR—220 mmfd., 500 v., mica.
*UCU-2047	C2	CAPACITOR—620 mmfd., 500 v., mica.
*URD-013	R38	RESISTOR—33 ohms, $\frac{1}{2}$ w., carbon.
*URD-025	R4, R10	RESISTOR—100 ohms, $\frac{1}{2}$ w., carbon.
*URD-031	R21	RESISTOR—180 ohms, $\frac{1}{2}$ w., carbon.
*URD-041	R32	RESISTOR—470 ohms, $\frac{1}{2}$ w., carbon.
*URD-049	R35	RESISTOR—1000 ohms, $\frac{1}{2}$ w., carbon.
*URD-057	R7, R12	RESISTOR—2200 ohms, $\frac{1}{2}$ w., carbon.
*URD-061	R6, R5	RESISTOR—3300 ohms, $\frac{1}{2}$ w., carbon.
*URD-069	R49	RESISTOR—6800 ohms, $\frac{1}{2}$ w., carbon.
*URD-081	R3, R23	RESISTOR—22,000 ohms, $\frac{1}{2}$ w., carbon.
*URD-089	R13, R14	RESISTOR—47,000 ohms, $\frac{1}{2}$ w., carbon.
*URD-097	R17, R26, R37, R50	RESISTOR—100,000 ohms, $\frac{1}{2}$ w., carbon.
*URD-099	R24, R25	RESISTOR—120,000 ohms, $\frac{1}{2}$ w., carbon.
*URD-105	R15, R30	RESISTOR—220,000 ohms, $\frac{1}{2}$ w., carbon.
*URD-113	R28, R29	RESISTOR—470,000 ohms, $\frac{1}{2}$ w., carbon.
*URD-121	R20, R36	RESISTOR—1 meg., $\frac{1}{2}$ w., carbon.
*URD-129	R16	RESISTOR—2.2 meg., $\frac{1}{2}$ w., carbon.
*URD-133	R44, R51	RESISTOR—3.3 meg., $\frac{1}{2}$ w., carbon.
*URD-141	R27	RESISTOR—6.8 meg., $\frac{1}{2}$ w., carbon.
*URE-037	R31	RESISTOR—330 ohms, 1 w., carbon.

SPECIALIZED REPLACEMENT PARTS

RAC-084		CHANGER PAN (COVER)
RAV-122		CABINET-752 (MAHOGANY)
RAV-123		CABINET-753 (BLONDE)
*RCE-039	C39A, C39B, C39C, C39D	CAPACITOR—Electrolytic
RCT-043	C1A, C1B, C1C, C1D	CAPACITOR (TUNING)
*RCW-1043	C11	CAPACITOR—47 mmf., ceramic
*RCW-1047	C14	CAPACITOR—100 mmf., ceramic
*RCW-1053	C8	CAPACITOR—22 mmf., ceramic
*RCW-1060	C7, C10	CAPACITOR—10 mmf., 0-coef., ceramic
*RCW-2031	C13	CAPACITOR—18 mmf., ceramic
*RCY-055	C12	CAPACITOR—Trimmer
*RDC-032		DRIVE CORD
RDE-087		ESCUTCHEON
RDK-212		DRAWER PULL
RDK-213		KNOB
RDK-214		KNOB (ARROW)
RDP-053		POINTER
*RHC-017		COIL CLIP—For mounting L5
*RHC-034		CLIP—For mounting IF can
*RHG-010		GROMMET RUBBER (tube)
*RHG-015		GROMMET TUNING (gang)

Cat. No.	Symbol	Description
RHI-011		STRAIN RELIEF—On power cord
*RHJ-006		SPACER TUNING (gang)
RII-047		INSULATING WASHER—Under J1
*RJC-001		SPEAKER LEAD PINS
*RJC-002		SPEAKER LEAD CLIPS for S1212D7
RJP-003	P2	AC POWER PLUG
*RJP-004	P1	PHONO PLUG
*RJP-010	J1	PHONO JACK & PLUG (Female)
RJS-003		SOCKET—Tube socket for V6, V7
RJS-012		MOUNTING PLATE—For electrolytic
*RJS-049	J2	PHONO POWER SOCKET (Female)
RJS-092		SOCKET—Tube socket for V8
RJS-118		SOCKET—Tube socket for V5
RJS-145		SOCKET—Tube socket for V1, V2, V3, V4
RJX-031		PILOT LIGHT SOCKET
*RLB-029	L4	COIL—FM R-F
*RLC-066	L5	COIL—B C osc.
*RLC-102	L8	COIL—FM osc.
*RLI-088	L2	CHOKE COIL—FM antenna
*RLI-122	L6, L7, L10, L11	CHOKE COIL
RLI-124	L9	CHOKE COIL—FM R-F pl. osc. cathode
RLL-039	L3	LOOP ASSEMBLY
RMM-151		CHANNEL RUBBER
RMM-153		DRAWER SLIDE, GRANT PULLEY
		HARDWARE
*RMS-111		SPRING (DIAL CORD)
RMS-221		STABILIZER SPRING—On changer pan
RMX-171		DRIVE SHAFT & BUSHING ASSEMBLY
RMX-172		DRUM AND SHAFT ASSEMBLY
RRC-141	R18	VOLUME CONTROL
*RRT-003	R33, R34	RESISTOR—1220-6500 ohms, $\frac{1}{2}$ w., w.w.
RSW-079	S1A, S1B, S1C, S1D	BAND CHANGE SWITCH
RSW-080	S2A, S2B, S2C, S2D	TONE CONTROL SWITCH
*RTD-010	T6, C55, C56, C57	DISCRIMINATOR TRANSFORMER
*RTL-097	T2, C47, C48	1st I-F TRANSFORMER—AM
*RTL-098	T5, C25, C24, C53, C54	2nd I-F TRANSFORMER—AM
*RTL-099	T1, T3, C45, C46, C49, C50	1st, 2nd I-F TRANSFORMER—FM
*RTL-114	T9	FM COIL
RTO-089	T7	OUTPUT TRANSFORMER
RTP-304	T8	POWER TRANSFORMER
RWL-023		POWER CORD—3 wire, 8 ft.
S1212D7		SPEAKER—12 inch

*Parts used on previous models.

MODELS 92-520, 92-521,
92-522, Ch. AR**ALIGNMENT PROCEDURE**

- Output meter across 3.5 ohm output load.
- Volume control at maximum for all adjustments.
- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

SIGNAL GENERATOR				SETTING TUNER	ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown)
Frequency	Coupling Factor	Connection to Receiver	Ground Connection		
455 kc	.1 mfd	12BE6 Grid	B—	Rotor full open (Plates out of mesh)	Input and output trimmers on IF cans
1620 kc	.1 mfd	12BE6 Grid	B—	Rotor full open (Plates out of mesh)	Oscillator trimmer T ₂
1400 kc	.75 mmf	Hank	B—	1400 kc	Antenna trimmer T ₁
Ref. No	Part No.	Description			

CAPACITORS

C1, C2	CE-15	2 x 40 mfd 150V. Elect.
C3	CP203-1	.02 mfd 400V paper cond.
C4	CP503-1	.05 mfd 400V paper cond.
C5	CM-101-1	.100 mmf 500V mica cond.
C6	CP202-2	.002 mfd 400V paper cond.
C7	CP502-3	.005 mfd 200V paper cond.
C8, C9	CV-14	Variable Condenser (2 gang)
C10	CM501-1	.500 mmf 500V mica cond.

RESISTORS

R1	RC183-2	18,000 ohms 1/2W 10%
R2	RC475-1	4.7 megohms 1/2W 20%
R3	VC-11	2 meg. vol. cont., 100 K stop
R4	RC106-1	10 megohms 1/2W 20%
R5	RC334-1	330,000 ohms 1/2W 20%
R6	RC224-1	220,000 ohms 1/2W 20%
R7	RW390-5	39 ohms 1W 10%
R8	RC180-2	18 ohms 1/2W 10%
R9	RC222-5	2200 ohms 1W 10%

COILS & TRANSFORMERS

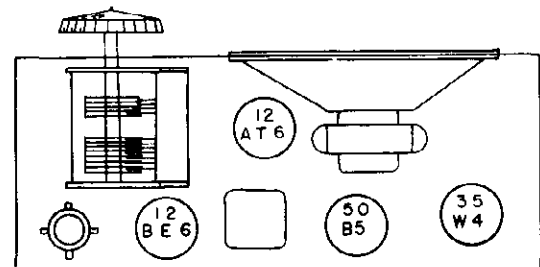
LA-8	Antenna Coil
LC-6	Oscillator Coil
LF-24	I.F. Transformer

MISCELLANEOUS

CB-106	Cabinet
	Mahogany 92-520
	Ivory 92-521
	Sand 92-522
KN-20-2	Knob
KN-21-2	Pointer Knob
SP-47-10A	4" PM Speaker w Output Trans.

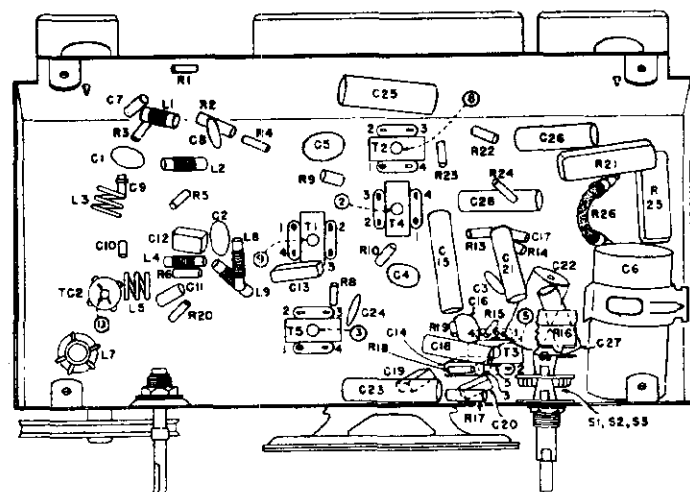
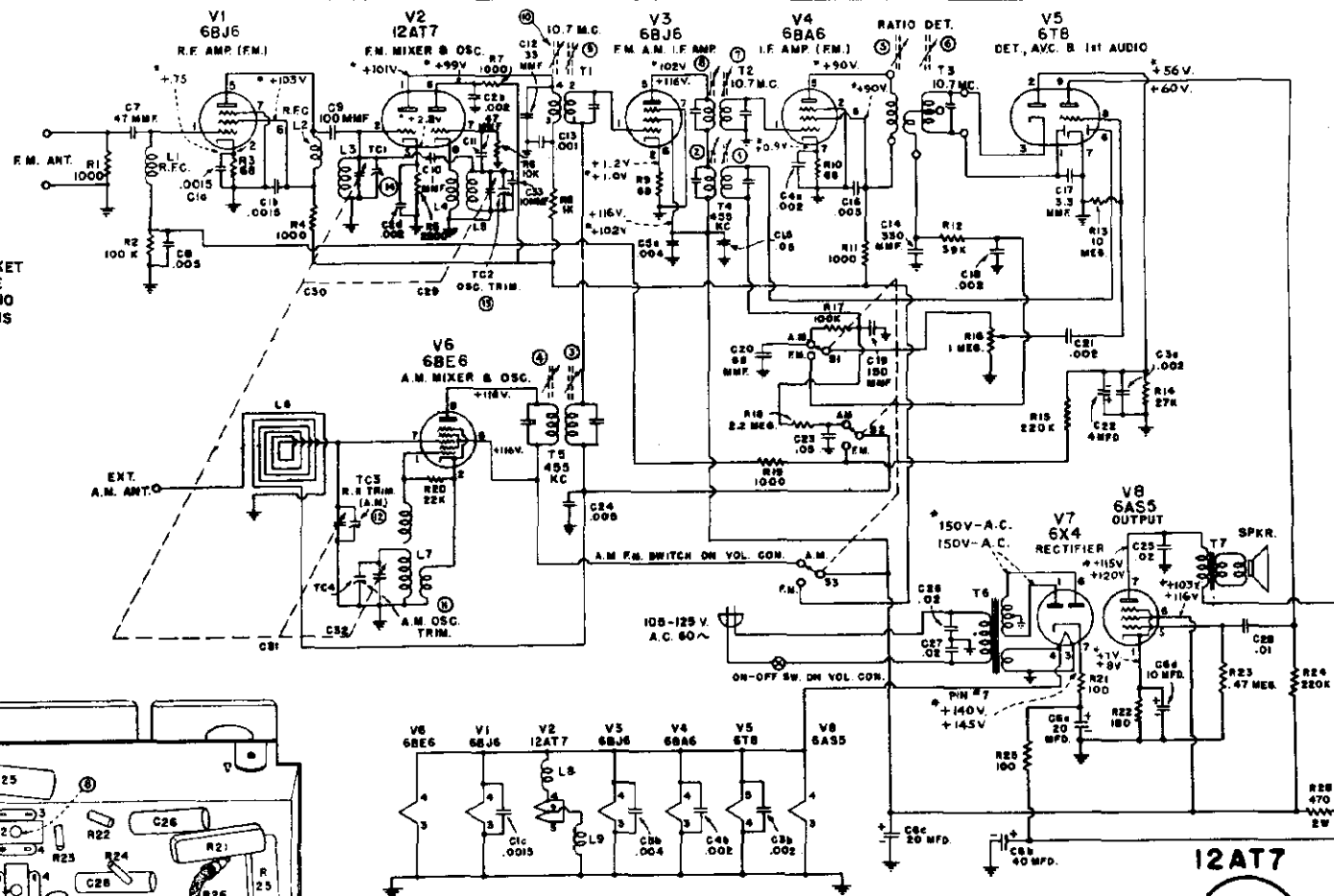
ELECTRICAL SPECIFICATIONS

Power Supply	105-125 Volts D.C. or 50-60 Cycles A.C. 30 Watts
Frequency Range	532.5 to 1620 kc.
Intermediate Freq.	455 kc.
Tuning	Two gang capacitor
Speaker	4 inch PM 3.5 ohm voice coil impedance
Power Output	1 watt undistorted 1.5 watt maximum
Sensitivity	800 Microvolts at 50 milli-watts Output
Selectivity	120 kc broad at 1000 times signal at 1000 kc.



NOTE: VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO CHASSIS, AND ARE TAKEN WITH NO SIGNAL. WHERE NO READING IS GIVEN, THE VOLTAGE IS ZERO OR TOO LOW TO READ.

* DENOTES F.M. VOLTAGES. UNDESIGNATED VOLTAGES ARE IN THE A.M. CIRCUIT.



LOCATION OF PARTS UNDER CHASSIS
FIG. 1

CHASSIS SERIES "BJ"

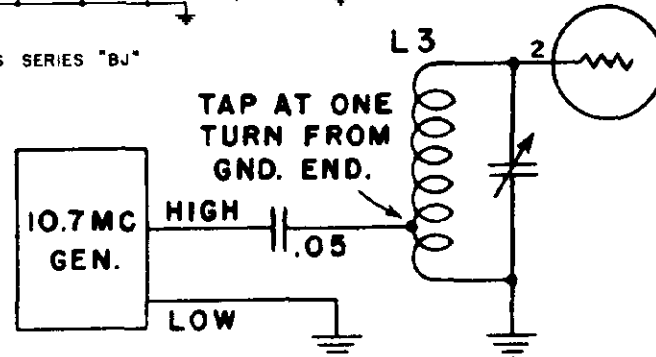


FIG. 2

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection Across speaker voice coil
 Output meter reading to indicate 500 MW (Standard Output) 1.27 volt
 Generator modulation 30% 400 cycles
 Position of volume control Fully clockwise
 Set Dial Pointer 1-3/32" from center of left shaft, variable condenser closed
 Set band switch To left for AM alignment; to right for FM alignment

AM ALIGNMENT

POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION HIGH SIDE	GENERATOR CONNECTION GROUND LEAD	ADJUST TRIMMERS IN ORDER SHOWN FOR MAX. OUTPUT	TRIMMER FUNCTION
Open	455 Kc	.05 Mfd	Mixer grid	Chassis	1, 2, 3, 4	I.F.
1620 Kc	1620 Kc		*Test loop	Test loop	11	Oscillator
1400 Kc	1400 Kc		*Test loop	Test loop	12	Antenna
*600 Kc	600 Kc		*Test loop	Test loop	Check-point	Antenna

*Connect generator lead to a Standard Hazeltine Test Loop, Model 1150, placed two feet from the set loop, or three turns of wire about six inches in diameter, placed about one foot from the set loop.

**With a generator signal of 600 Kc, tune the set to the point where maximum output is obtained, which should be approximately 600 Kc on the dial. Adjust antenna section plates of variable for maximum output.

The alignment procedure should be repeated in the original order for greatest accuracy.

Always keep the output from the signal generator at its lowest possible value to make the A. V. C. action of the receiver ineffective.

FM ALIGNMENT

DETECTOR AND IF ALIGNMENT USING SIGNAL GENERATOR AND OSCILLOSCOPE

1. Connect vertical input of scope across volume control of receiver (Grounded terminal to chassis, ungrounded terminal to high side of the control).
2. Connect FM Generator, High Side, to grid of 2nd IF tube through .01 mfd. dummy, Low Side, to chassis.
3. Connect sweep voltage of generator to horizontal terminals of scope.
4. Set generator frequency to 10.7 Mc modulated either 60 cycles or 400 cycles, 250 Kc sweep (125 Kc deviation).
5. Set volume control to maximum, variable condenser fully open, band switch to right (FM).
6. Adjust detector primary slug #5 for maximum vertical sweep of the scope pattern.
7. Adjust detector secondary slug #6 for symmetry of the pattern. Pattern should look like Fig. 4, with the same amount of curve on both ends.
8. Connect generator, high side, to mixer coil as in Fig. 2, low side to chassis.
9. Short A. V. C. to chassis at junction of R15 and R19.
10. Disconnect the negative lead of C22 from pin #2 of 6T8.
11. Connect vertical input of scope across R14. (Grounded terminal to chassis, ungrounded terminal to high side of resistor.)
12. Adjust IF slugs 7, 8, 9, 10 for greatest vertical sweep of the pattern. Stagger tune (detune) slightly so that pattern looks like Fig. 7.
13. Resolder the negative lead of condenser disconnected after alignment is completed.

NOTE: A double trace pattern, as in Fig. 5 or Fig. 6 for detector alignment, or Fig. 8 for IF alignment, may be caused by a slight out of phase condition between the sweep voltage to the horizontal terminals of the scope and the modulation on the generator signal. To correct this condition, connect a condenser of about .0005 mf. across the horizontal input terminals of the scope and a 1 megohm variable resistance in series with the lead to the ungrounded terminal. Adjust the resistance until the two traces coincide.

DETECTOR ALIGNMENT USING SIGNAL GENERATOR AND VTVM

POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION HIGH SIDE	GENERATOR CONNECTION GROUND LEAD	ADJUST TRIMMERS IN ORDER SHOWN	TRIMMER FUNCTION
Open	10.7 Mc	.01 Mfd.	2d IF grid	Chassis	#5, #6	Detector

#5 is adjusted for maximum A. V. C. voltage. A vacuum tube voltmeter or a 20,000 ohm per volt voltmeter with a low V. range can be used to measure the A. V. C. voltage. Connect negative lead to junction of R15 and R19 on band switch and positive lead to the chassis.

#6 is adjusted for zero reading of a vacuum tube voltmeter or a 20,000 ohm per volt voltmeter, connected as shown in Fig. 3. Rock this adjustment through the zero point to see that the voltage is positive on one side of the zero point and negative on the other.

NOTE: If a 10.7 Mc FM generator is not available for alignment of detector, an unmodulated signal of 10.7 Mc from an accurately calibrated conventional AM type generator can be used. (Voltmeter alignment only).

I.F. alignment using signal generator and V.T.V.M. not recommended.

RF

POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION HIGH SIDE	GENERATOR CONNECTION GROUND LEAD	ADJUST TRIMMERS IN ORDER SHOWN	TRIMMER FUNCTION
Open	109 Mc	300 Ohm	Ant. Term.	Ant. Term.	#13	Oscillator
Closed	87.5 Mc	300 Ohm	Ant. Term.	Ant. Term.	Spacing of L-5	Oscillator

Repeat the above oscillator adjustments until proper coverage is obtained on both ends of band since the two adjustments effect each other.

106 Mc	106 Mc	300 Ohm	Ant. Term.	Ant. Term.	#14	RF
90 Mc	90 Mc	300 Ohm	Ant. Term.	Ant. Term.	Spacing of L-3	RF

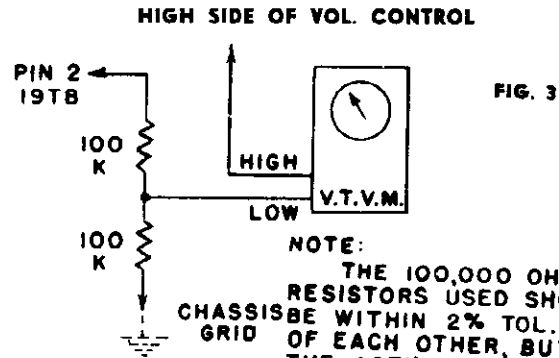
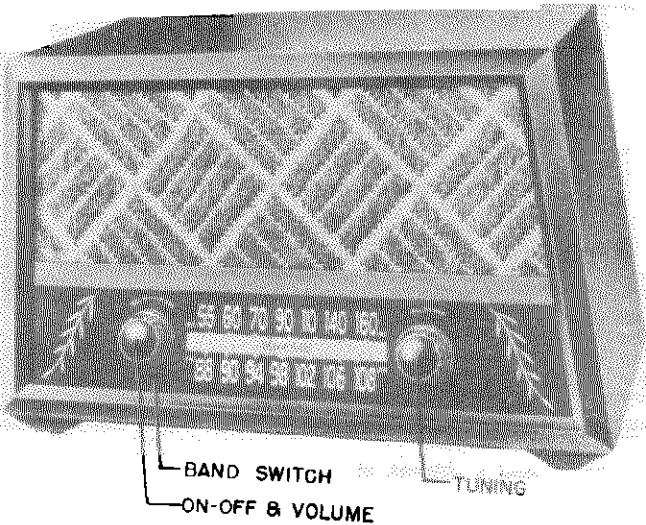
Repeat "RF and Ant." adjustments until proper tracking is obtained at both 90 and 106 Mc, since tracing the set at one frequency effects the tracking at the other frequency.

All RF trimmers are adjusted for maximum output, measured with output meter across speaker voice coil.

For RF alignment, use FM generator signal modulated with 400 cycles 45 Kc sweep (22.5 Kc deviation).

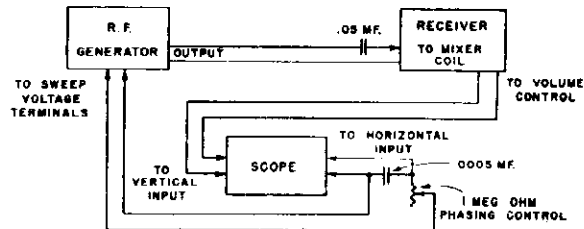
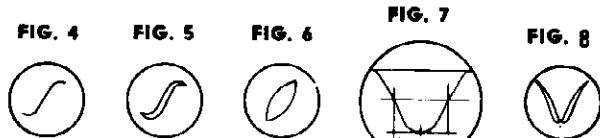
PAGE 21-4 GOODRICH

MODEL 92-529,
Ch. BJ



NOTE:
THE 100,000 OHM
RESISTORS USED SHOULD
CHASSISBE WITHIN 2% TOL.
GRID OF EACH OTHER, BUT
THE ACTUAL VALUE MAY
BE $\pm 20\%$

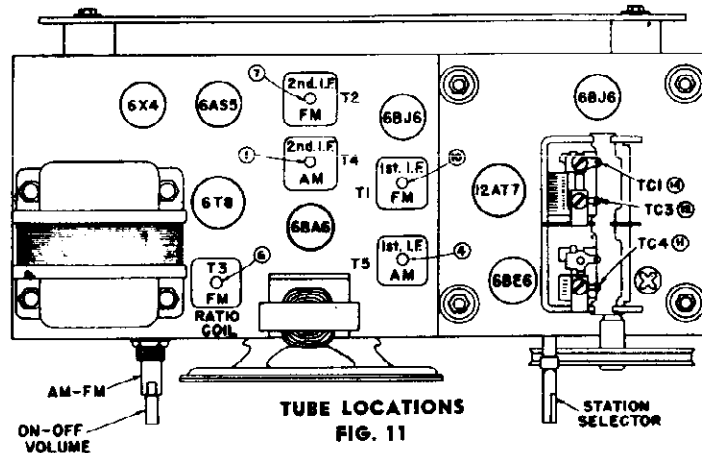
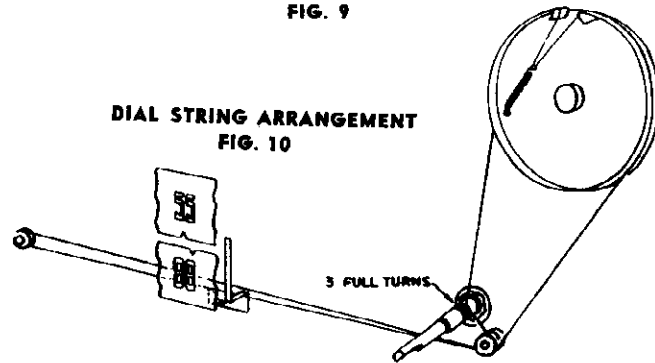
OSCILLOSCOPE PATTERNS



BLOCK DIAGRAM FOR I.F. AND DETECTOR ALIGNMENT
USING SIGNAL GENERATOR AND OSCILLOSCOPE.

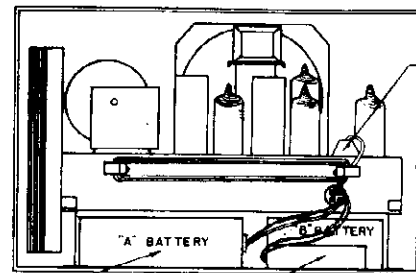
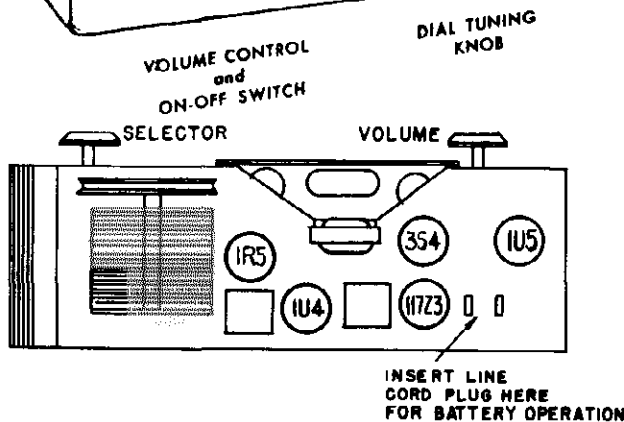
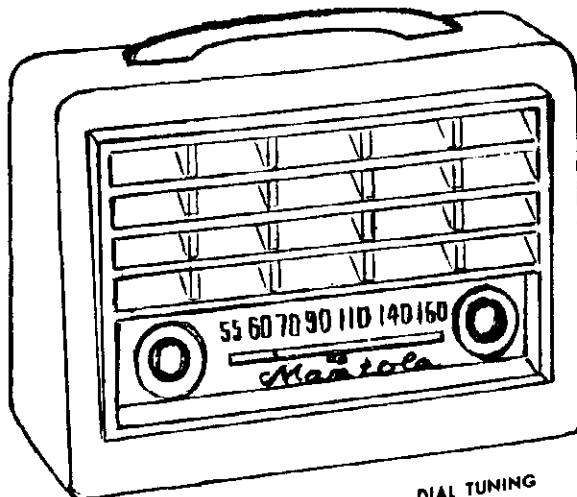
FIG. 9

DIAL STRING ARRANGEMENT
FIG. 10



TUBE LOCATIONS
FIG. 11

Schematic Location	Part Number	Description
C17	CC-3.3-11	Capacitor, 3.3 MMF $\pm 10\%$
C29, 30, 31, 32	CV-17	Capacitor, Variable (AM-FM)
TC1, TC3, TC4		Capacitors, Trimmer
C26, 27	CP-203-1	Capacitor, .02 — 400 V. Paper
R1, 4, 7, 8, 11, 19	RC-102-1	Resistor, 1000 ohms $\frac{1}{2}W$ 20%
R2, 17	RC-104-1	Resistor, 100,000 ohms $\frac{1}{2}W$ 20%
R3, 9, 10	RC-680-2	Resistor, 68 ohms $\frac{1}{2}W$ $\pm 10\%$
R5	RC-222-2	Resistor, 2200 ohms $\frac{1}{2}W$ $\pm 10\%$
R6	RC-103-2	Resistor, 10,000 ohms $\frac{1}{2}W$ $\pm 10\%$
R18	RC-225-1	Resistor, 2.2 Meg ohms $\frac{1}{2}W$ 20%
R22	RC-181-2	Resistor, 180 ohms $\frac{1}{2}W$ $\pm 10\%$
R14	RC-273-2	Resistor, 27,000 ohms $\frac{1}{2}W$ 5%
R21, 25	RW-101-8	Resistor, 100 ohms W.W. 2W $\pm 10\%$
R12	RC-393-2	Resistor, 39,000 ohms $\frac{1}{2}W$ 10%
R13	RC-106-1	Resistor, 10 Meg ohms $\frac{1}{2}W$ 20%
R16	VC-17	Control, On-Off & Volume 1 meg
		Includes S1, S2, S3-D.T. Switch
R15, 24	RC-224-1	Resistor, 220,000 ohms $\frac{1}{2}W$ 20%
R20	RC-223-1	Resistor, 22,000 ohms $\frac{1}{2}W$ 20%
R23	RC-474-1	Resistor, .47 Meg ohms $\frac{1}{2}W$ 20%
R26	RW-471-8	Resistor, 470 ohms 2W W.W. $\pm 10\%$
L6	LP-22-D	Loop Antenna
	CB-124-D	Cabinet
	BF-21-D	Baffle
	MS-129-D	Brass Angle
	DL-34-D	Plastic Dial
	PN-17	Dial Pointer
	KN-28	Knob Assembly
	KN-26	Knob, Large
	KN-27	Knob, Small
	IB-29	Instruction Booklet
	PY-3	Drive Shaft Pulley
	SA-24	Drive Shaft
	SG-1	Dial Spring
	CR-2	Dial Cord
	SP41-10B	Speaker 4" P.M. & O.T.
T7	LF-30	Transformer, FM-IF
T1	LF-32	Transformer, AM-IF
T5	LF-33	Transformer, Ratio Det.
T3	LF-34	Transformer, FM-IF
T2	LF-35	Transformer, AM-IF
T4	TR-21	Transformer, Power
T6	LC-9	Coil, Oscillator AM
L7	LC-11	Coil, Oscillator FM
L5	LC-12	Coil, RF FM
L3	LC-13	Choke, Filament
L8, 9	LC-14	Choke, Plate
L2	LC-15	Choke, Grid
L1	LC-16	Choke, Cathode
L4	TA-3	Ceramic Trimmer 5-20 MMF
TC-2	CC-2-1	Capacitor, 2 x .002 MFD Ceramic
C2a, 2b, 3a	CC-2-2	Capacitor, 2 x .004 MFD Herlec
3b, 4a, 4b	CC-1-1	Capacitor, .005 MFD Herlec
C5a, 5b	CE-22	Capacitor, 20 x 40 x 20 (200V) x 10 (25V) Electrolytic
C6a, 6b, 6c, 6d		
C1a, 1b, 1c	CC-3-0	Capacitor, 3 x .0015 Herlec
C18, 21	CP-202-2	Capacitor, .002 MFD 400 V.
C7, 11	CC-047-8	Capacitor, .47 MMF Ceramic 10%
C9	CC-101-7	Capacitor, 100 MMF Ceramic 20%
C-33	CMS-010-8	Capacitor, 10 MMF Silver Mica 10%
C12	CMS-033-9	Capacitor, 33 MMF Silver Mica 5%
C13	CM-102	Capacitor, .001 MFD Mica
C10	CSP-1	Capacitor, 1 MMF 10%
C20	CC-068-7	Capacitor, 68 MMF Ceramic $\pm 20\%$
C19	CM-151-1	Capacitor, 150 MMF Mica 20%
C14	CM-331-8	Capacitor, 330 MMF Mica $\pm 10\%$ 500 V.
C15, 23	CP-503-1	Capacitor, .05 MFD 400 V.
C22	CE-19	Capacitor, 4 MFD 50 W.V. Electrolytic
C25	CP-203-20	Capacitor, .02 MFD 800V.
C28	CP-103-1	Capacitor, .01 MFD 400 V.

MODEL 92-753
Ch. BF

Line cord plug shown in position for battery operation, with line cord wrapped around line cord retainers.

For A.C.-D.C. operation remove plug from chassis, unwrap cord and bring out of notch in side of cover.

Insert two-prong plug into "A" BATTERY. Make sure large pin engages large contact in battery. Excessive force is not required to push plug into battery.

Place "B" BATTERY so that contacts are toward bottom. Snap fasteners onto battery.

POWER SUPPLY

This receiver is designed to operate on either an A.C. or D.C. power supply. The following operation ratings should be observed:

Voltages.....105 - 125 Volts, A.C. or D.C.

Frequency.....50 to 60 cycles on A.C.

If in doubt as to the voltage and frequency supplied to your home, telephone your local Power Company.

When operating on a D.C. source, it is necessary to insert the power plug with the proper polarity. If the set fails to function after an interval sufficient for the tubes to reach their operating temperature, reverse the power plug in the outlet.

The battery supply to be used with this receiver is as follows:

"A" supply.....4½ volts
Eveready No. 746 "A" Battery or equivalent.

"B" supply.....67½ volts
Eveready Minimax "B" Battery No. 467 or equivalent.

CAUTION

Always remove the power cord from its receptacle before starting to replace tubes or batteries.

Do not allow cells which have become too weak to operate the set properly to remain in the set for any length of time.

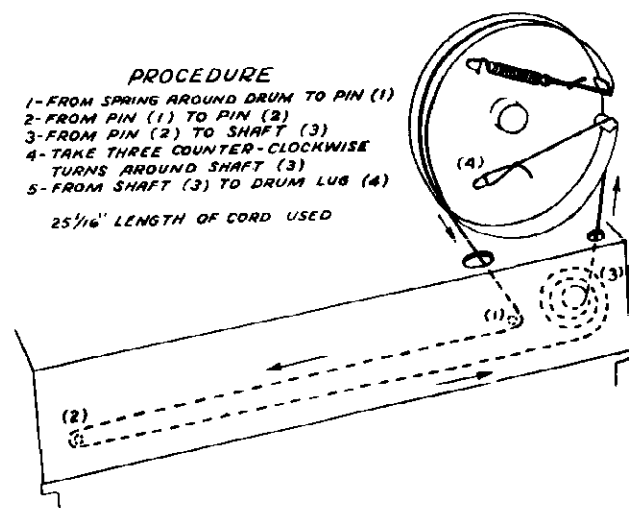
ELECTRICAL SPECIFICATIONS

Power Supply.....	105-125 volts DC or 50-60 cycles AC 15 watts
Batteries.....	A—4½ volts, 100 ma. B—67½ volts, 8 ma. average.
Frequency Range.....	532.5 to 1620 kc.
Intermediate Freq.....	455 kc.
Tuning.....	Two-gang capacitor
Antenna.....	Built-in loop
Speaker.....	4 inch PM; voice coil Impedance 3.5 ohms.
Power Output.....	80 milliwatts undistorted 140 milliwatts maximum
Sensitivity.....	750 microvolts per meter for 50 milliwatt output
Selectivity.....	55 kc broad at 1000 times signal at 1000 kc.

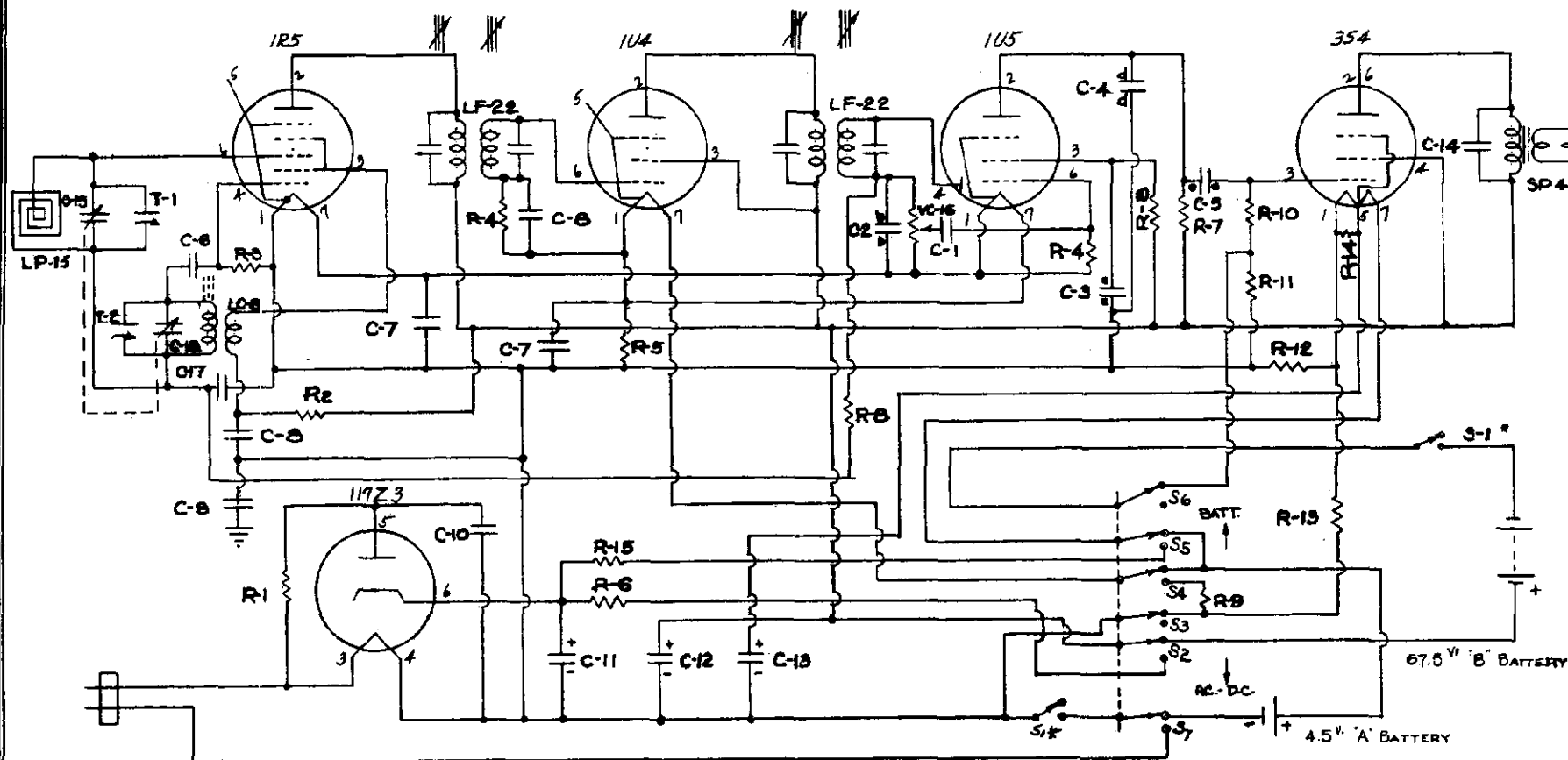
PROCEDURE

- 1-FROM SPRING AROUND DRUM TO PIN (1)
- 2-FROM PIN (1) TO PIN (2)
- 3-FROM PIN (2) TO SHAFT (3)
- 4-TAKE THREE COUNTER-CLOCKWISE TURNS AROUND SHAFT (3)
- 5-FROM SHAFT (3) TO DRUM LUG (4)

25 1/16" LENGTH OF CORD USED



MODEL 92-753,
Ch. BF



*S1 - DPST SW. ON VOLUME CONTROL

POWER SUPPLY

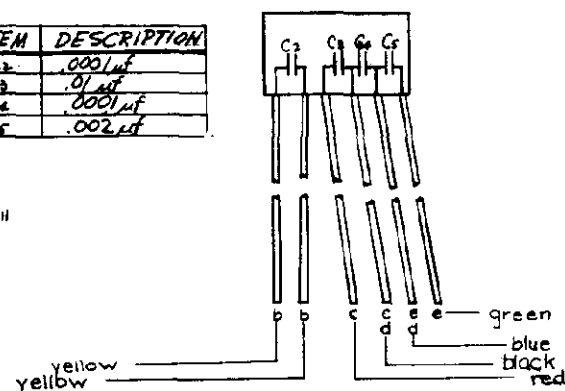
105-125 vdc
50-60 CYCLES AC.

ALIGNMENT DATA
I.F. 455 KC.
PEAK T₂ 1620 KC.
T₁ 1400 KC.
FREQ RANGE - 1620-532.5 KC.

ITEM	DESCRIPTION
C ₂	.0001μf
C ₃	.01μf
C ₄	.0001μf
C ₅	.002μf

NOTE:
ON SOME SETS SECTIONS OF
OR THE ENTIRE CERAMIC BLOCK
MAY BE REPLACED BY INDIVIDUAL
CONDENSERS.

CHASSIS SERIES "BF"



MODEL 92-753
Ch. BF**ALIGNMENT PROCEDURE**

- Output meter across 5.2 ohm output load.
- Volume control at maximum for all adjustments.

- Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

SIGNAL GENERATOR				SETTING TUNER	ADJUST TRIMMERS TO MAXIMUM OUTPUT (in order shown)
Frequency	Coupling Factor	Connection to Receiver	Ground Connection		
455 kc	.1 mfd	1R5 Grid	B—	Rotor full open (Plates out of mesh)	Input and output trimmers on IF cans
1620 kc	.1 mfd	1R5 Grid	B—	Rotor full open (Plates out of mesh)	Oscillator trimmer T2
1400 kc		Radiating Loop		1400 kc*	Antenna trimmer T1

* Five markings on the dial bracket represent respectively 532½, 600 kc., 1000 kc., 1400 kc. and 1620 kc., reading from left to right. These points are to be used for the alignment of the receiver.

REPLACEMENT PARTS LIST

When ordering parts, specify part number, model number and series.

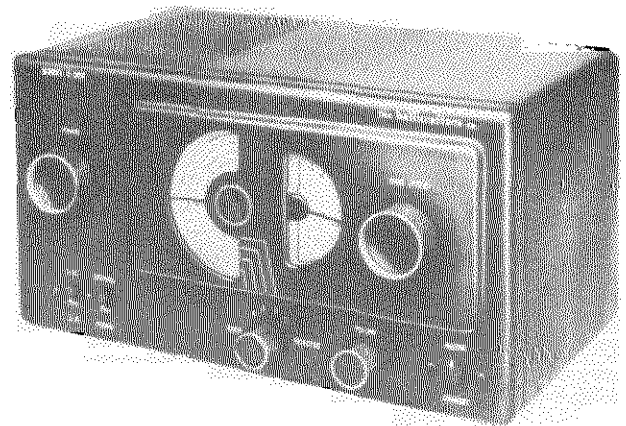
Ref. No.	Part No.	Description
CAPACITORS		
C1	CP-102-3	.001 mfd, 200 volt, paper
C1-C2-C3 } C4-C5 }	CC-5-2	ceramic condenser block
C6	CM-470-1	.000047 mfd, Mica Cond.
C7	CP-503-2	.05 mfd, 150 volt, paper
C8	CP-103-2	.01 mfd, 150 volt, paper
C9	CP-104-1	.1 mfd, 200 volt, paper
C10, C17	CP-503-1	.05 mfd, 400 volt, paper
C11 } C12 } C13 }	CE-17	Elect. con. 40 mfd, 150 volt Elect. con. 40 mfd, 150 volt Elect. con. 200 mfd, 10 volt
C14	CP-502-2	.005 mfd, 400 volt, paper
C15, C16 } T1, T2 }	CV-15	Variable condenser Trimmers on variable
C18	CP-103-7	.01 mfd, 400 volt, paper
RESISTORS		
R1	RC-180-1	18 ohms, ½ watt 20%
R2	RC-153-1	15,000 ohms, ½ watt 20%
R3	RC-104-1	100,000 ohms, ½ watt 20%
R4	RC-106-1	10 megohms, ½ watt 20%
R5	RC-222-2	2,200 ohms, ½ watt 10%
R6	RC-682-5	6800 ohms, 1 watt 10%
R7	RC-105-1	1 megohm, ½ watt 20%
R8	RC-335-1	3.3 megohms, ½ watt 20%
R9	RC-390-2	39 ohms, ½ watt 10%
R10	RC-225-1	2.2 megohms, ½ watt 20%
R11	RC-681-2	680 ohms, ½ watt 10%
R12	RC-152-2	1500 ohms, ½ watt 10%
R13	RC-270-3	27 ohms, ½ watt 5%
R14	RC-391-2	390 ohms, ½ watt 10%
R15	RP-5	Candohm Res., 2550 ohms. ±5%

Ref. No.	Part No.	Description
COILS AND TRANSFORMERS		
	LC-8	Oscillator coil
	LF-22	IF transformer
	LP-15	Loop antenna
MISCELLANEOUS		
	VC-16	Vol. Control, 1 meg., D.P.S.T., S.W.
S2, 3, 4 } 5, 6, 7 }	SW-11	Battery Switch, 6 Pole, D.T.
	SP-41-18	4 inch Speaker, 1 oz. Mag., O.T.
	PN-16	Pointer
	CR-2	Drive cord
	SG-1	Spring for drive cord
	KN-24	Knob
	CB-112A	Assembled cabinet (without back and handle)
	HA-2	Handle for cabinet

MODELS S-38A
S-38B

GENERAL

Tubes	Four plus rectifier.	
Speaker	5-inch PM.	
Voice Coil Impedance	3.2 ohms.	
Headset Output	Low impedance.	
Antenna	Provisions for external antenna with transmission line or single wire feed.	
Tuning	Manual	
Tuning Range	Band Selector Position	Frequency Range
	1	550 kc - 1650 kc.
	2	1.7 mc - 5.1 mc.
	3	5 mc - 14.5 mc.
	4	13 mc - 31 mc.
Intermediate Frequency.....	455 kc.	
Power Supply.....	105-125 V. DC or 60 cycles AC.	
Power Consumption	30 Watts	



92X1153

CAUTION - The four rubber grommets insulate the chassis from the cabinet. Check the condition of these grommets and replace if necessary.

The standard RMA dummy antenna specified in the alignment chart consists of a 200 mmf condenser in series with a 20 uh r-f choke which is shunted by a 400 mmf condenser in series with a 400 ohm carbon resistor.

Set the following controls before alignment.

AM/CW	Set at AM
SPEAKER/PHONES	Set at SPEAKER
VOLUME	Set at maximum
RECEIVE/STANDBY.....	RECEIVE
BAND SPREAD	Set at zero

For the settings of the remaining controls, see alignment chart.

ALIGNMENT PROCEDURE

Holes in the bottom cover permit minor adjustment of the oscillator and mixer stage trimmers, however for complete alignment, the chassis will have to be removed from the cabinet. To separate the chassis from the cabinet, remove the back cover and bottom plate. The chassis is fastened to the cabinet by four front panel screws located near the slide switches and two cabinet screws located at the bottom rear of the cabinet.

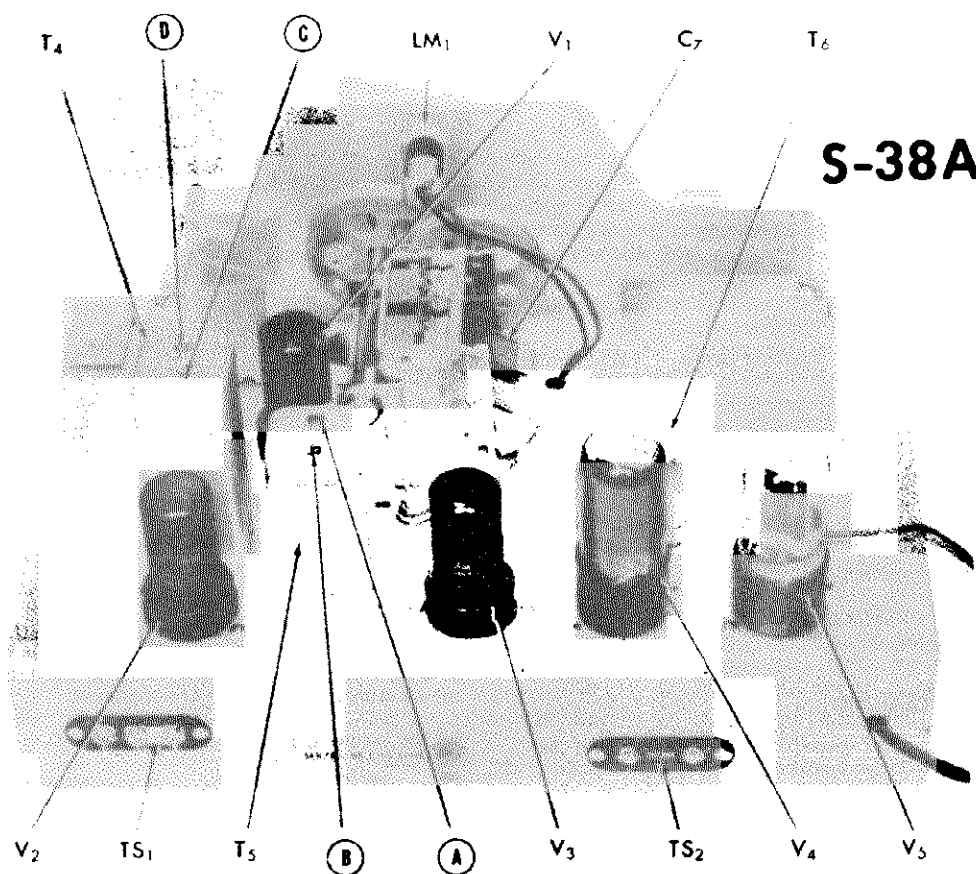
ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Selector Setting	Receiver Dial Setting	Adjust	Remarks
1	.01 mfd cap.	Stator plates, front section of tuning gang.	455 kc	1	1000 kc	A,B,C,D	Adjust for max. audio output at speaker voice coil. Use just enough signal generator output to obtain a 50 mw signal level.
2**	See step 1	See step 1	455 kc (No modulation)	1	1000 kc	E	Set the AM/CW switch at CW. (Reset the switch at AM when step 2 is completed.) Correct BFO operation is obtained by varying the coupling between the wire "E" and the 12SK7 tube grid and plate terminals (Pins 4 and 8.) Pushing the wire toward the grid terminal increases the capacity and the strength of the beat.
3	Std. RMA dummy	High side to term. A1 on antenna strip. Jumper wire between A2 and G	30 mc	4	30 mc	*F,G	Max. output as in step 1.
4	Std. RMA dummy	See step 3.	14 mc	3	14 mc	*H,J	Max. output as in step 1.
5	Std. RMA dummy	See step 3	5 mc	2	5 mc	*K,L	Max. output as in step 1.
6	Std. RMA dummy	See step 3	1500 kc 600 kc	1	1500 kc 600 kc	*M,N *P	Max. output as in step 1.

* Note - Calibration adjustments.

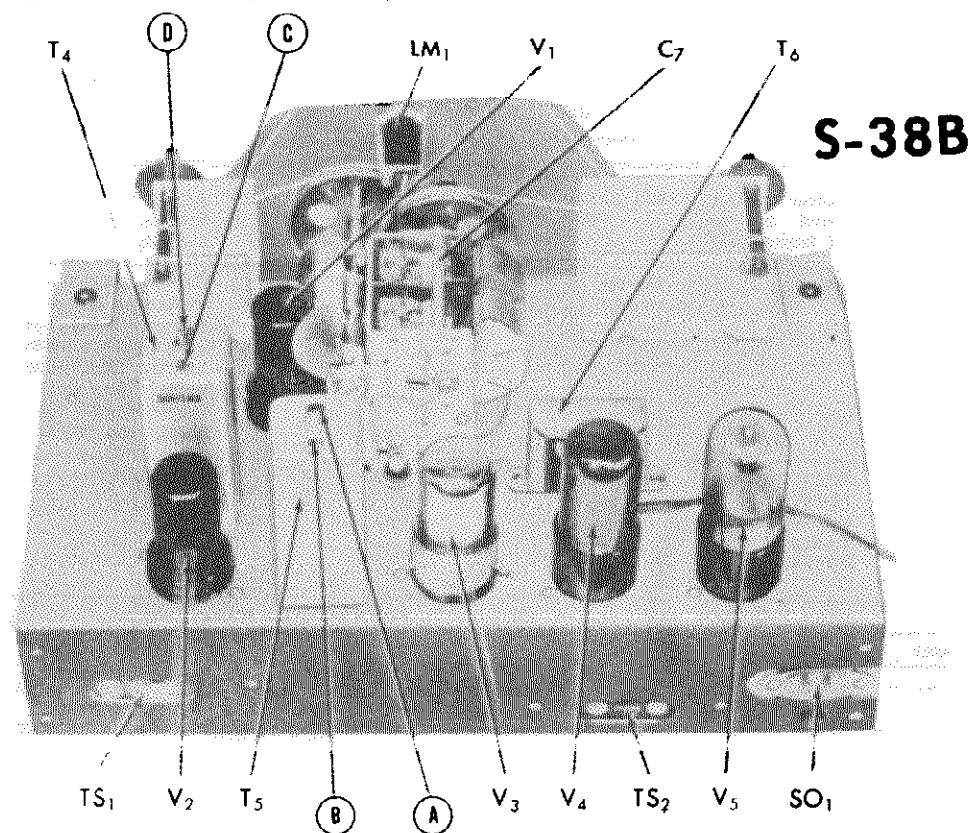
** Note - This step is generally unnecessary. Adjustment should be made if a weak beat note is obtained on strong c-w signals indicating lack of coupling between wire "E" and tube socket wiring.

MODELS S-38A,
S-38B



92X812

Fig. 2. Top view, alignment adjustments and component location



92X1154

Fig. 2. Top view, alignment adjustments and component location

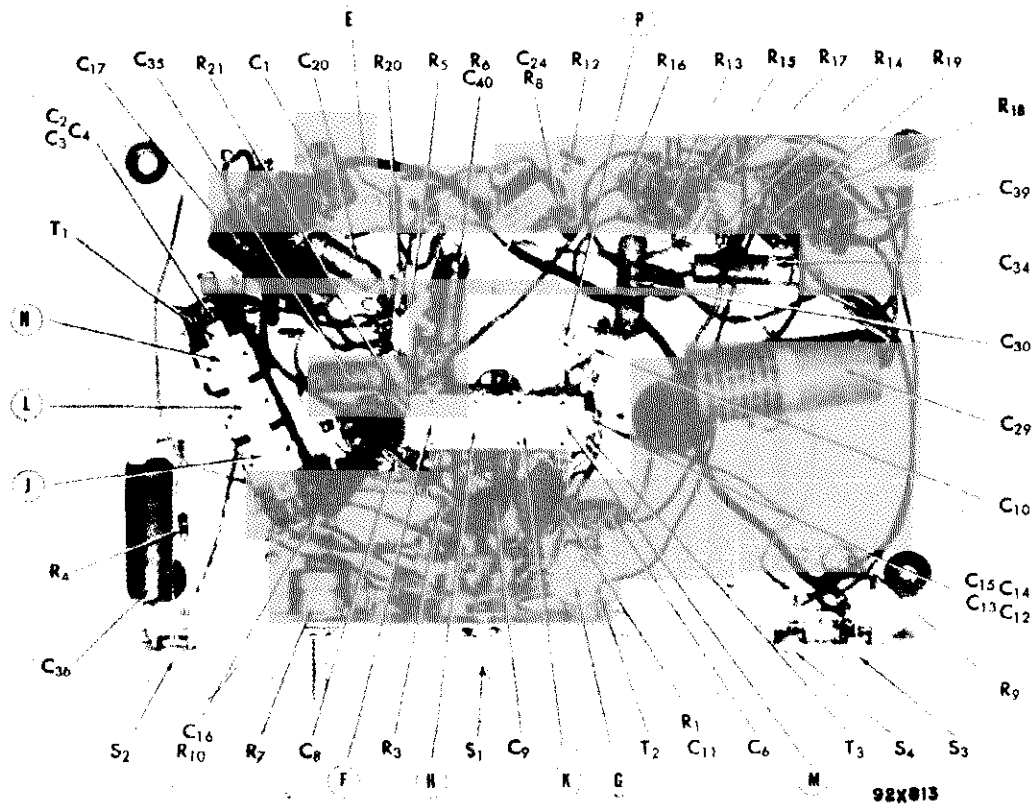


Fig. 3. Bottom view, alignment adjustments and component location

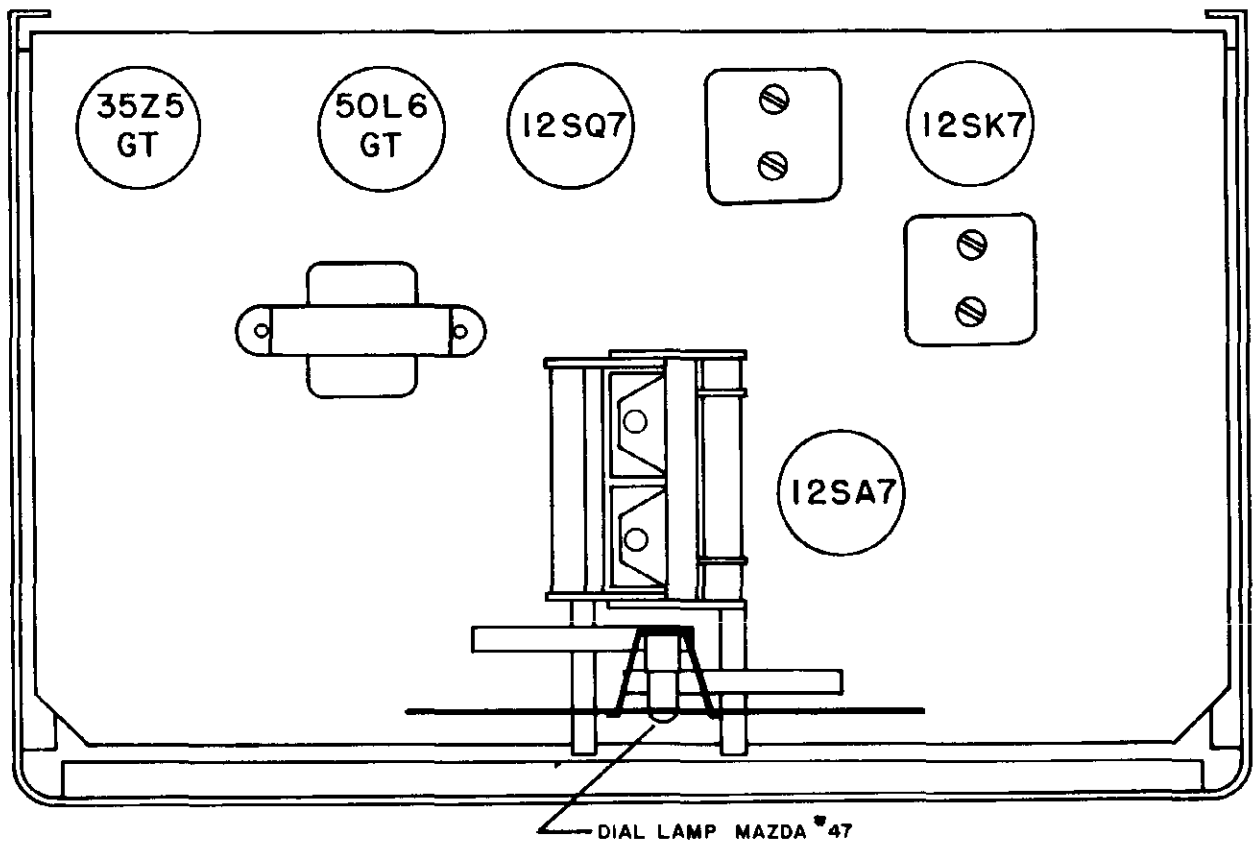
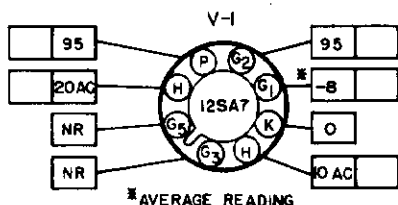
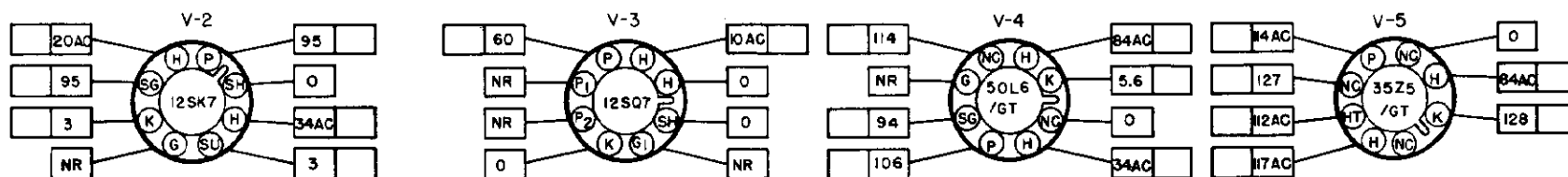


Fig. 4. Top view, location of tubes and dial lamps.

MODELS S-38A,
S-38B



1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS & CHASSIS, WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE—117 V. AC. AC VOLTAGES WILL BE DC VOLTAGES WHEN OPERATING FROM A DC SOURCE.
4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLT-METER.
6. "NG" NO CONNECTION. (VOLTAGES SHOWN FOR THIS TERMINAL ONLY WHEN TERMINALS ARE USED AS A TIE LUG.)
7. "NR" NOT READABLE (READING GENERALLY MEANINGLESS)
8. SPACE PROVIDED FOR SERVICE METER READINGS.

92C786

Fig. 5. Tube socket voltage chart.

FRONT APRON

BOTTOM VIEW OF CHASSIS

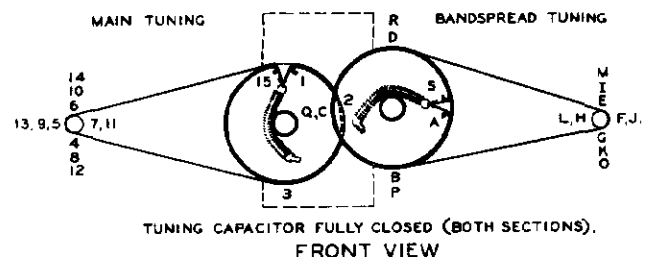
RESTRINGING DIAL CORD

To restring the general coverage tuning dial cord cut a 14-inch length of 30 lb. test dial cord and tie one end to the tension spring at position "1" on the diagram. Follow the sequence "1" through "15", and at position "15" stretch the tension spring and tie the cord securely.

To restring the band spread tuning dial cord, cut a 16-inch length of dial cord and follow the procedure as above, starting at position "A" on the diagram. Note that the tuning drive shafts are wrapped with two and a fraction turns of dial cord for proper traction.

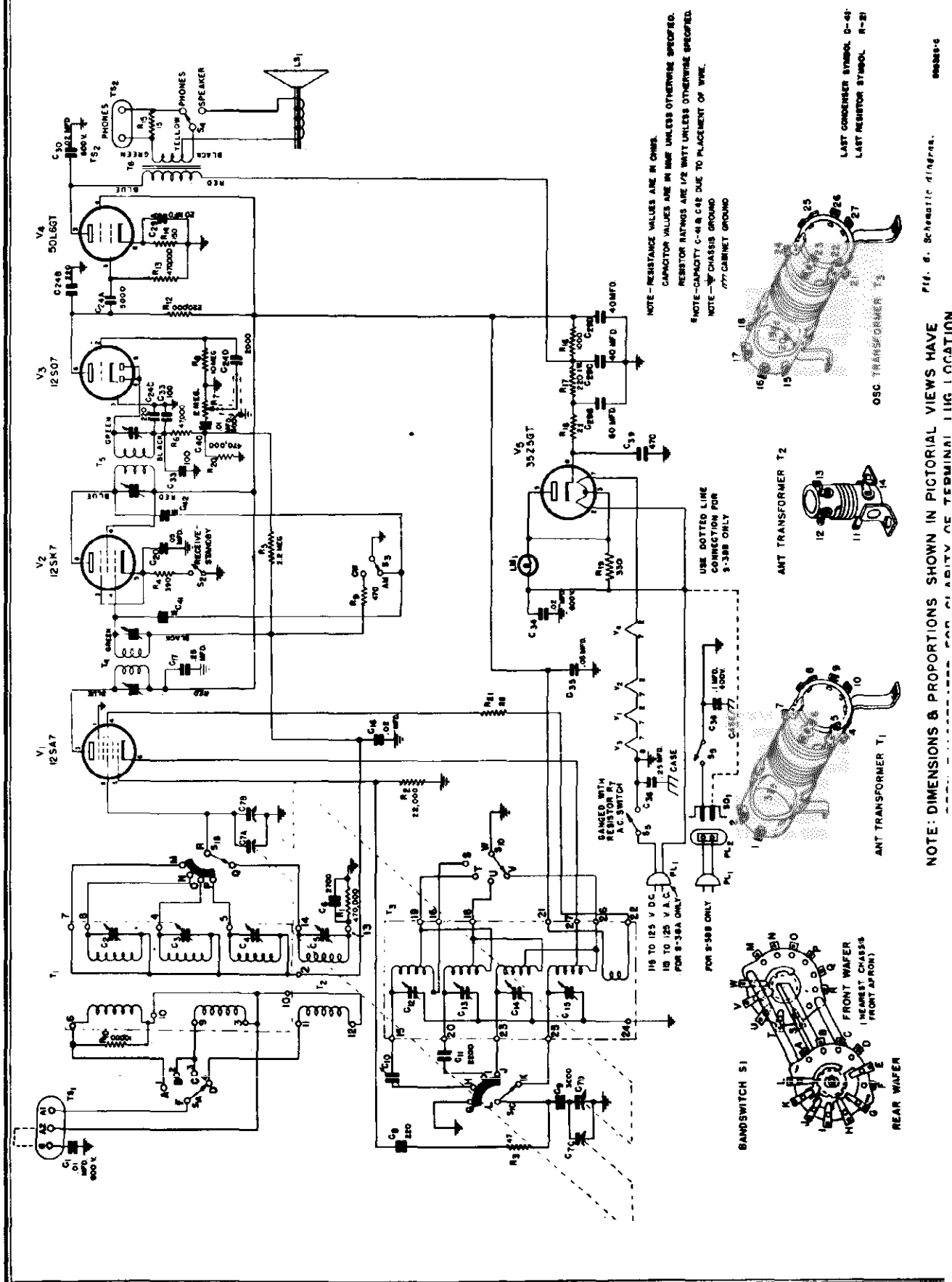
REPLACING LAMPS

Refer to Fig. 4, for the location of the dial lamp used in receiver. To gain access to the defective lamp, reach in through the rear of the cabinet (cover removed) and unclip the dial lamp socket by compressing the side springs. The socket may then be brought out into the open to change the defective lamp. Replace defective lamps with 6-8 V. Mazda #47 (Brown bead) lamps or equivalent.



92X24

Fig. 1. Dial cable stringing procedure.



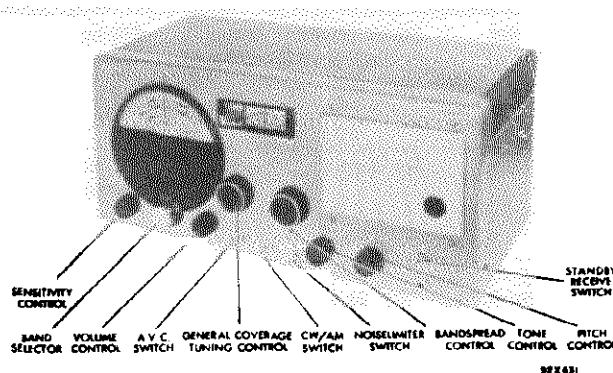
PAGE 21-6 HALLICRAFTERS

MODELS S-38A,
S-38B

SERVICE PARTS LIST

Ref. No.	Description	Manufacturer's Part Number	Ref. No.	Description	Manufacturer's Part Number
CONDENSERS			SWITCHES		
C-1,40	.01 mfd. 600 V., tubular	46AY103J	S-1	Bandswitch assembly	60C393
C-2,3,4	Trimmers, adjustable (Part of transformer T-1)		S-2	Switch, slide; RECEIVE-STANDBY	60A244
C-5	Trimmer, adjustable (For transformer T-2)	44A039	S-3,4	Switch, slide; SPST; AM-CW & SPEAKER-PHONES	60A243
C-6	2700 mmf 500 V, mica	47X30A272J	S-5	Switch, power (Part of VOLUME control R-7)	
C-7	Tuning condenser, 2 sections	48C162-1			
C-8	220 mmf 500 V, mica	47X20A221K			
C-9	3000 mmf 500 V, mica	47X30A302J			
C-10	Padder, adjustable (Band 1)	44A349			
C-11	2200 mmf 500 V, mica	47X30A222J			
C-12,13,14,15	Trimmers, adjustable (Part of transformer T-3)		PL-1	Line cord (Includes PL-2)	87B1668-1
C-16	.02 mfd 400 V, tubular	46AW203J	TS-2	Terminal strip, antenna	88A671
C-17	.25 mfd 200 V, tubular	46AT254J	SO-1	Headset, jack	88A071
C-20,35	.05 mfd. 200 V, tubular	46AU503J		Socket, a-c	10A286
C-24	Capacitor, composite; 5,000, 2X220, and 2000 mmf; 500 V.; ceramic	46A151		Socket, octal (tube)	6A250
C-29	60-40-40 mfd 150 V, 20 mfd. 25 V, electrolytic	45B091		Socket, dial light	86A011
C-30,34	.02 mfd 600 V, tubular	46AY203J			
C-33	100 mmf. 500 V, mica	47X20B101K	V-1	Type 12SA7, mixer/oscillator	90X12SA7
C-36	.1 mfd. 400 V., tubular	46AV104J	V-2	Type 12SK7, i-f amplifier & BFO	90X12SK7
C-39	470 mmf 500 V, mica	CM20A471M	V-3	Type 12SQ7, detector & 1st audio amplifier	90X12SQ7
C-41,42	Wiring capacity.		V-4	Type 50L6GT, audio power amplifier	90X50L6GT
			V-6	Type 35Z5GT, rectifier	90X35Z5GT
			LM-1	Lamp, dial light, Mazda #47	39A004
RESISTORS			TUBES, RECTIFIERS AND LAMPS		
R-1,13,20	470,000 ohms 1/2 watt, carbon	23X20X474M			
R-2	22,000 ohms 1/2 watt, carbon	23X20X223M			
R-3	47 ohms 1/2 watt, carbon	23X20X470M			
R-4	390 ohms 1/2 watt, carbon	23X20X391K			
R-5	2.2 megohms 1/2 watt, carbon	23X20X225M			
R-6	47,000 ohms 1/2 watt, carbon	23X20X473M			
R-7	Resistor, variable; VOLUME control	25B896			
R-8	10 megohms 1/2 watt, carbon	23X20X106M			
R-9	470 ohms 1/2 watt, carbon	23X20X471K			
R-10	10,000 ohms 1/2 watt, carbon	23X20X103M			
R-12	220,000 ohms 1/2 watt, carbon	23X20X224M			
R-14	150 ohms 1/2 watt, carbon	23X20X151K			
R-15	15 ohms 1/2 watt, carbon	23X20X150M			
R-16	1000 ohms 1/2 watt, carbon	23X20X102M			
R-17	220 ohms 1 watt, carbon	23X30X221M			
R-18,21	22 ohms 1/2 watt, carbon	23X20X220M			
R-19	330 ohms 1/2 watt, carbon	23X20X221M			
TRANSFORMERS AND COILS			CABINET PARTS		
T-1	Transformer, antenna stage, Bands 1, 2 and 3	51C821		Clip, coil mtg (For transformer T-2)	76A362
T-2	Transformer, antenna stage, Band 4	51B1015	LS-1	Shaft, main tuning	74A318
T-3	Transformer, oscillator stage, Bands 1, 2, 3 and 4	51C822		Shaft, bandspread	74A319
T-4	Transformer, i-f amp. stage	50B183		Washer, spring (for main tuning and bandspread drive shafts)	4A043
T-5	Transformer, i-f amp. stage (diode)	50B184		Spring, retainer ("C" washer type)	75A062
T-6	Transformer, audio output	55A127		Dial cord	38A019
				Spring, dial cord	75A012
				Pointer, main tuning	82A177
				Pointer, bandspread tuning	82A103
				Dial scale	83C373
				Knob, VOLUME control and BAND SELECTOR	15A049
				Knob, TUNING and BAND-SPREAD	15A047
				Speaker, PM	85C030
				Baffle, speaker	78B198
				Cabinet back	8C1139
				Cabinet bottom	8C1140
				Mounting foot, rubber	16A007
				Window, dial	22B311

Tubes	Seven plus rectifier	
Speaker	5-inch PM	
Speaker V.C. Impedance..	3.2 ohms	
Headset Output	High Impedance	
Antenna	Provision for external antenna	
Tuning.	Manual	
Tuning Range.	Band Selector Position	Frequency Range
	1.	540 kc - 1680 kc
	2.	1680 kc - 5.4 mc
	3.	5.3 mc - 15.5 mc
	4.	15.5 mc - 44 mc
Intermediate Frequency .	455 kc.	
Power Supply.	105-125 V. DC or 60 cycles AC	
Power Consumption . . .	40 Watts	



Refer to Fig. 7 for the location of the two dial lamps used in the receiver. To gain access to defective lamps, reach in through cabinet cover and unclip the dial lamp sockets. The sockets may then be brought out into the open to change the defective lamp. Replace lamps with 6-8 V. Mazda #47 (Brown bead) lamps or equivalent.

To restring the band spread tuning dial cord, cut a 36-inch length of dial cord and follow the procedure as above, starting at position "A" on the diagram. Note that the tuning drive shafts are wrapped with two and a fraction turns of dial cord for proper traction.

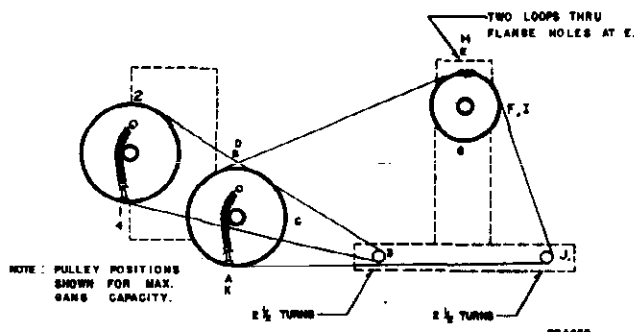


Fig. 1. Dial cable stringing procedure

SENSITIVITY	Set at maximum
VOLUME	Set at maximum
AVC switch.	Set at OFF
BAND SPREAD	Set at zero
CW/AM	Set at AM (See step 2)
NOISE LIMITER	Set at OFF
STANDBY RECEIVE.	Set at RECEIVE
tone switch	Set at HIGH

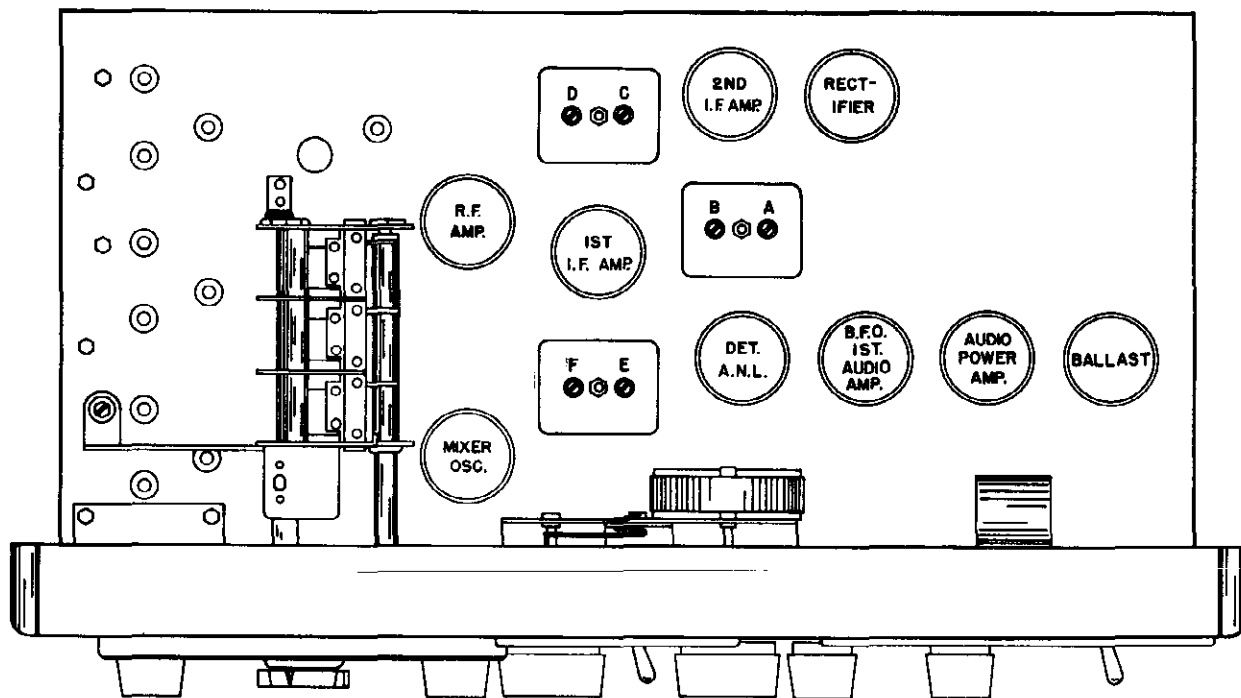
For the settings of the remaining controls, see alignment chart

MODEL S-52

ALIGNMENT CHART

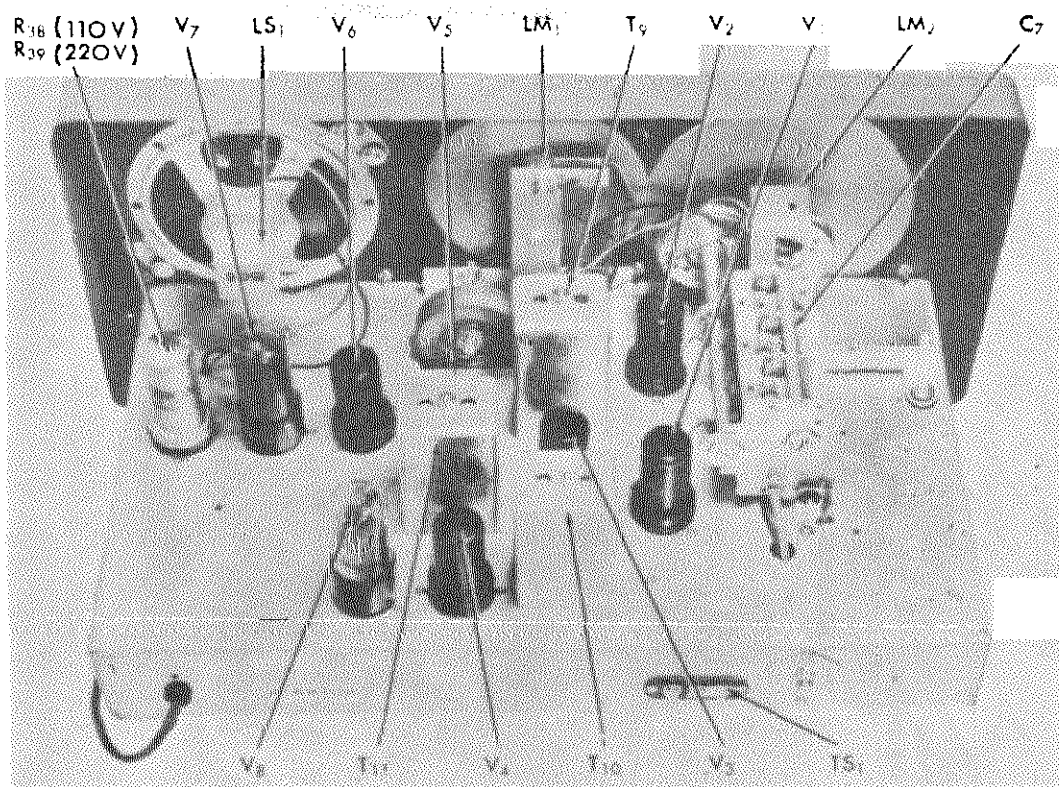
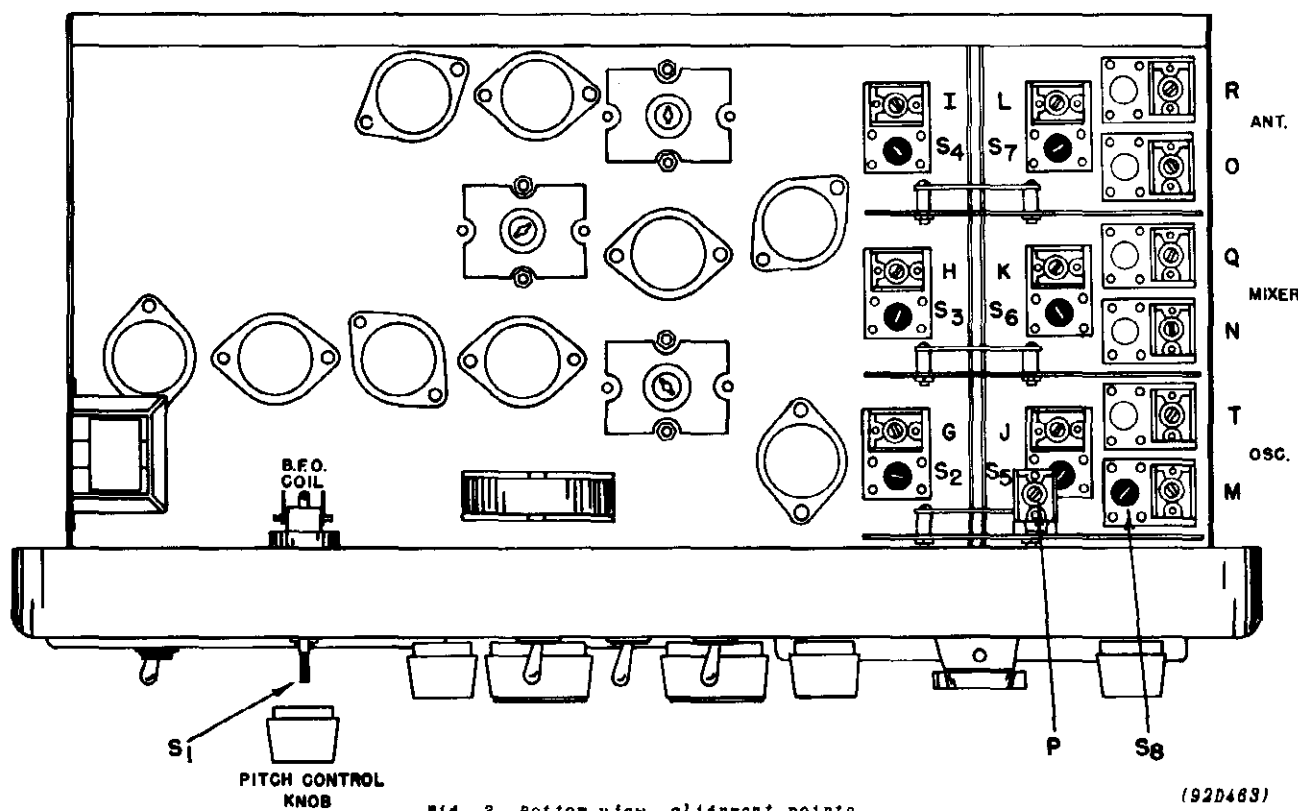
Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Switch Setting	Receiver Dial Setting	Adjust	Remarks
1	None	Stator plates in center section of tuning gang.	455 kc	"1"	1000 kc	A, B, C, D, E, F	Maximum audio output at speaker voice coil. Use just enough signal generator output to obtain a 50 mw signal level.
2	None	See step 1	455 kc (No modulation)	"1"	1000 kc	S1	With the CW/AM switch set at CW, remove the pitch control knob and adjust S1 for zero beat. Replace the knob with the dot in the center position.
3	Std RMA dummy	"A1" on antenna strip. Jumper connected between "A2" and "G"	36 mc 18 mc	"4"	36 mc 18 mc	*G, H, I *S2, S3, S4	Maximum output as in step 1.
4	Std RMA dummy	See step 3	14 mc 10 mc	"3"	14 mc 10 mc	*J, K, L *S5, S6, S7	Maximum output as in step 1.
5	Std RMA dummy	See step 3	5 mc 1.8 mc	"2"	5 mc 1.8 mc	*M, N, O *S8	Maximum output as in step 1.
6	Std RMA dummy	See step 3	1500 kc 600 kc	"1"	1500 kc 600 kc	*P, Q, R *T	Maximum output as in step 1.

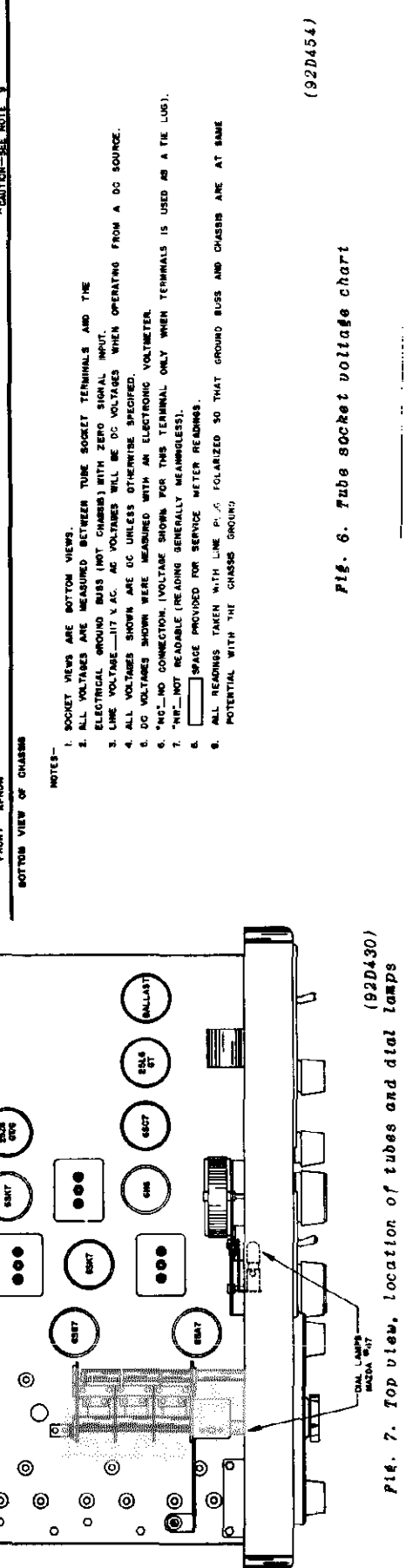
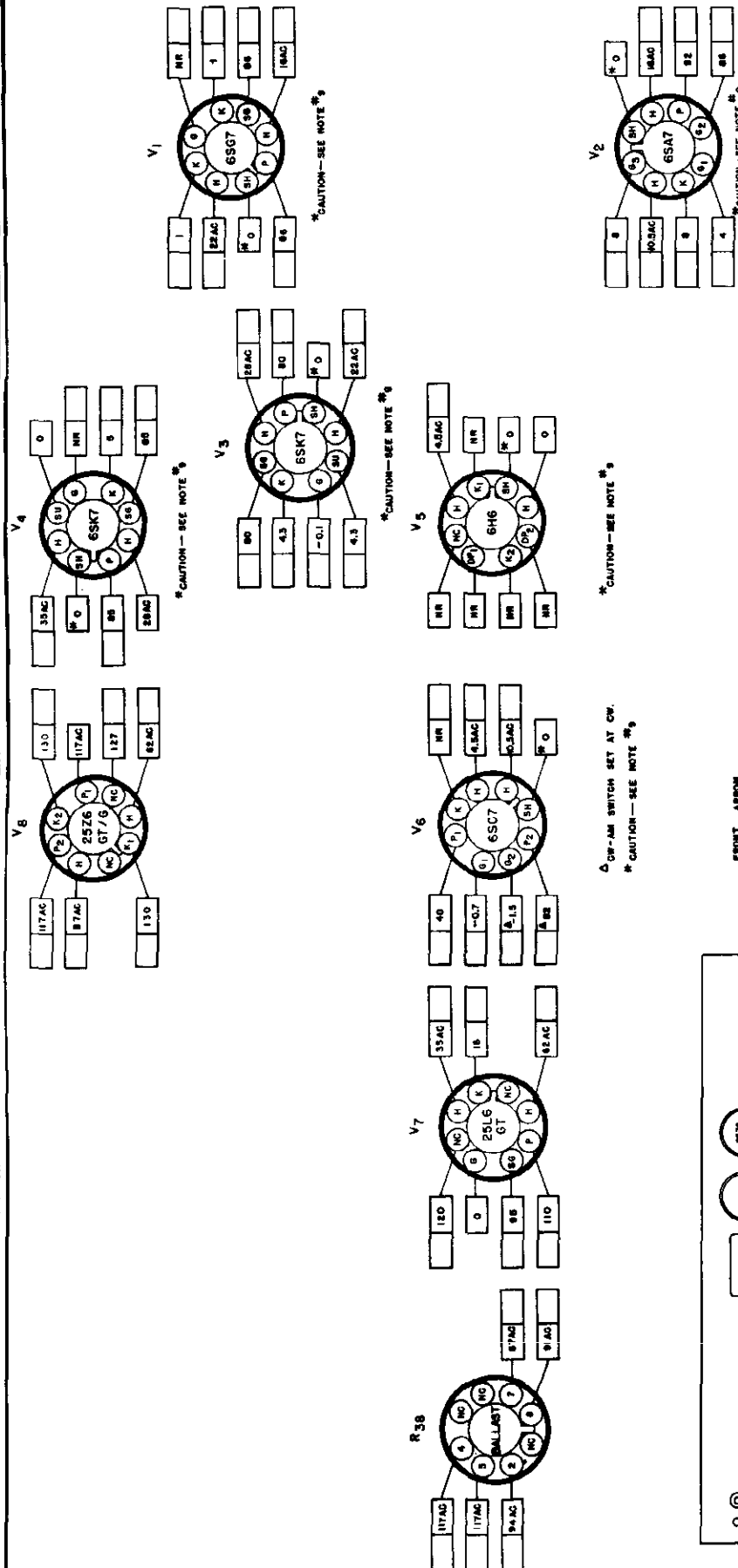
*Note - Calibration adjustments.



(92D462)

Fig. 2. Top view, alignment points





(92D454)

Fig. 6. Tube socket voltage chart

Fig. 7. Top view, location of tubes and dial lamps

- NOTES—
1. SOCKET VIEWS ARE BOTTOM VIEWS.
 2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND THE ELECTRICAL GROUND BUSH (NOT CHASSIS) WITH ZERO SIGNAL INPUT.
 3. LINE VOLTAGE—117 V. AC. AC VOLTAGES WILL BE DC VOLTAGES WHEN OPERATING FROM A DC SOURCE.
 4. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED.
 5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER.
 6. *NO—NO CONNECTION (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUG).
 7. *NR—NOT READABLE (READING GENERALLY MEANINGLESS).
 8. *SPACE PROVIDED FOR SERVICE METER READINGS.
 9. ALL READINGS TAKEN WITH LINE P. G. POLARIZED SO THAT GROUND BUSH AND CHASSIS ARE AT SAME POTENTIAL WITH THE CHASSIS GROUND.

△ ON-AM SWITCH SET AT CW.
* CAUTION—SEE NOTE #9

FRONT VIEW
BOTTOM VIEW OF CHASSIS

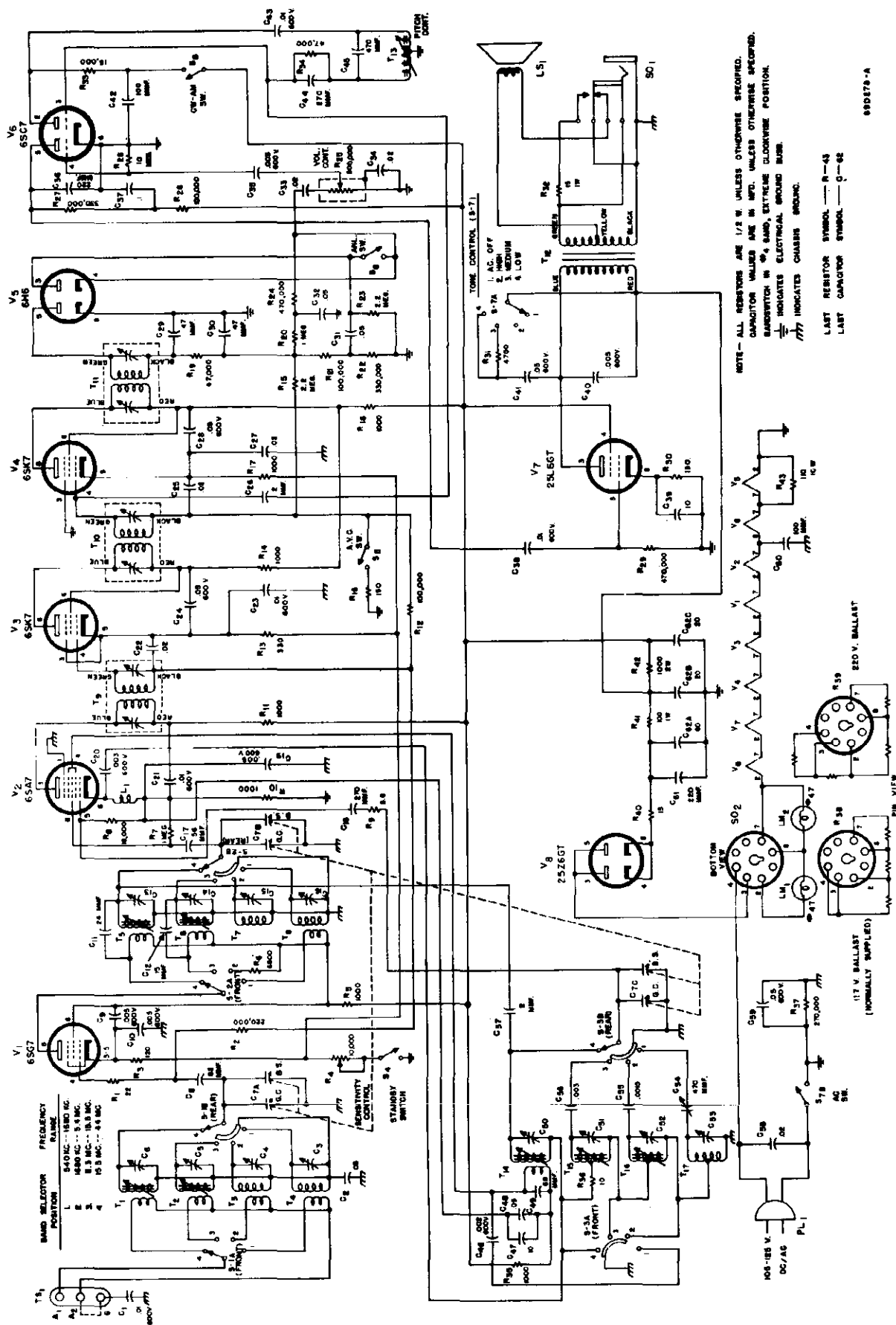


FIG. 8. Schematic diagram

SERVICE PARTS LIST

Ref. No.	Description	Hallcrafters Part Number
CONDENSERS		
C-1,21,23,38,43	.01 mfd. 600 V., tubular paper	48AZ103J
C-2	.05 mfd. 200 V., tubular paper, braided leads	48A091
C-3,4	Trimmers, adjustable, part of transformers T-4,3 respectively	44A147
C-5,6	Trimmers, adjustable, part of transformers T-2,1 respectively	44A149
C-7	Tuning condenser, 3 section	48C138
C-8	82 mmf. 500 V., mica	CM20A820K
C-9,10,19,40	.005 mfd. 600 V., tubular paper	48AZ502J
C-11	24 mmf. 500 V., ceramic	CC21UK240M
C-12	15 mmf. 500 V., ceramic	CC21UK150M
C-13,14	Trimmers, adjustable, part of transformers T-5,6 respectively	44A149
C-15,16	Trimmers, adjustable, part of transformers T-7,8 respectively	44A147
C-17	56 mmf. 500 V., mica	CM20A560K
C-18,44	270 mmf. 500 V., mica	CM20A271K
C-20,35	.003 mfd. 600 V., tubular paper	48AZ302J
C-22,25,27,33,34	.02 mfd. 200 V., tubular paper	48AU203J
C-24,28,41	.05 mfd. 600 V., tubular paper	48AY503J
C-26,57	2 mmf., twisted wire gimmick	
C-29,30	47 mmf. 500 V., mica	CM20A470M
C-31,32,48	.05 mfd. 200 V., tubular paper	48AU503J
C-36,61	220 mmf. 500 V., mica	CM20A221M
C-37	.1 mfd. 600 V., tubular paper	48AY104J
C-39	10 mfd. 25 V., electrolytic	45A121
C-42,60	100 mmf. 500 V., mica	CM20A101M
C-45	470 mmf. 500 V., mica	CM20A471J
C-46	.002 mfd. 600 V., tubular paper	48AZ202J
C-47	10 mfd. 150 V., electrolytic	45A097
C-49	63 mmf. 500 V., ceramic	CC25UK680K
C-50	Trimmer, adjustable, part of transformer T-14	44A149
C-51	Trimmer, adjustable, part of transformer T-15	44A148
C-52	Trimmer, adjustable, part of transformer T-16	44A147
C-53	Trimmer, adjustable	44A191
C-54	Trimmer, adjustable, part of transformer T-17	44A188
C-55	1500 mmf. 5% 500 V., mica	CM30C152J
C-56	3000 mmf. 500 V., mica	CM30C302K
C-58	.02 mfd. 600 V., moulded paper	48AC203J
C-59	.05 mfd. 600 V., tubular (Special)	46A150
C-62	60-20-20 mfd. 150 V., electrolytic	45B128
RESISTORS		
R-1	22 ohms $\frac{1}{2}$ watt, carbon	RC20AE220M
R-2	220,000 ohms $\frac{1}{2}$ watt, carbon	RC20AE224M
R-3	120 ohms $\frac{1}{2}$ watt, carbon	RC20AE121M
R-4	Resistor, variable, 10,000 ohms, SENSITIVITY control	25B587
R-5,11,14,18,35	1,000 ohms $\frac{1}{2}$ watt, carbon	RC20AE102M
R-6	6800 ohms $\frac{1}{2}$ watt, carbon	RC20AE682K
R-7,20	1 megohm $\frac{1}{2}$ watt, carbon	RC20AE105M
R-8	18,000 ohms $\frac{1}{2}$ watt, carbon	RC20AE183K
R-9	6.8 ohms $\frac{1}{2}$ watt, carbon	RC20AE068K
R-10,17	1,000 ohms $\frac{1}{2}$ watt, carbon	RC20AE102K
R-12,21,28	100,000 ohms $\frac{1}{2}$ watt, carbon	RC20AE104M
R-13	330 ohms $\frac{1}{2}$ watt, carbon	RC20AF331K
R-15,23	2.2 megohms $\frac{1}{2}$ watt, carbon	RC20AE225M
R-16,30	150 ohms $\frac{1}{2}$ watt, carbon	RC20AE151M
R-19,34	47,000 ohms $\frac{1}{2}$ watt, carbon	RC20AE473M
R-22,27	330,000 ohms $\frac{1}{2}$ watt, carbon	RC20AE334M
R-24,29	470,000 ohms $\frac{1}{2}$ watt, carbon	RC20AE474M
R-25	Resistor, variable, 500,000 ohms, VOLUME control	25B586
R-26	10 megohms $\frac{1}{2}$ watt, carbon	RC20AE106M
R-31	4700 ohms $\frac{1}{2}$ watt, carbon	RC20AE472M
R-32	15 ohms 1 watt, carbon	RC30AE150M
R-33	15,000 ohms $\frac{1}{2}$ watt, carbon	RC20AE153M
R-36	10 ohms $\frac{1}{2}$ watt, carbon	RC20AE100M
R-37	270,000 ohms $\frac{1}{2}$ watt, carbon	RC20AE274M
R-38	Resistor, ballast, 110 V. operation	24B875
R-39	Resistor, ballast, 220 V. operation	24B874
R-40	15 ohms $\frac{1}{2}$ watt, carbon	RC20AE150M
R-41	100 ohms 1 watt, carbon	RC30AE101K
R-42	1,000 ohms 2 watt, carbon	RC40AE102K
R-43	110 ohms 10 watt, carbon	24BG111E

SERVICE PARTS LIST (Cont.):

Ref. No.	Description	Hallcrafters Part Number
TRANSFORMERS AND COILS		
T-1	Transformer, antenna stage, band 4	51B783
T-2	Transformer, antenna stage, band 3	51B782
T-3	Transformer, antenna stage, band 2	51B781
T-4	Transformer, antenna stage, band 1	51B780
T-5	Transformer, mixer stage, band 4	51B787
T-6	Transformer, mixer stage, band 3	51B786
T-7	Transformer, mixer stage, band 2	51B785
T-8	Transformer, mixer stage, band 1	51B784
T-9	Transformer, 1st I.F.	50C185
T-10	Transformer, 2nd I.F.	50C186
T-11	Transformer, detector stage	50C192
T-12	Transformer, audio output	55A110
T-13	Transformer, B.F.O.	54B033-2
T-14	Transformer, osc. stage, band 4	51B791
T-15	Transformer, osc. stage, band 3	51B913
T-16	Transformer, osc. stage, band 2	51B789
T-17	Transformer, osc. stage, band 1	51B912
L-1	Choke, R.F.	53B138
SWITCHES		
S-1	Band switch section, antenna stage	62B039
S-2	Band switch section, mixer stage	62B039
S-3	Band switch section, oscillator stage	62B044
S-4,5,6,8	Switch, toggle, S.P.S.T., STANDBY-RECEIVE, A.V.C., A.N.L., and CW-AM	60A138
S-7	Switch, PWR-TONE control	60A225
PLUGS AND SOCKETS		
PL-1	Line cord	87B1573
SO-1	Headset jack	36A004
SO-2	Socket, octal (tube and ballast)	8A035
	Socket, dial light, general coverage dial	86B071
	Socket, dial light, bandspread dial	86B068
TUBES, RECTIFIERS AND LAMPS		
V-1	Type 6SG7, antenna	90X6SG7
V-2	Type 6SA7, mixer	90X6SA7
V-3,4	Type 6SK7, 1st and 2nd I.F. amplifiers	90X6SK7
V-5	Type 6H6, detector and noise limiter	90X6H6
V-6	Type 6SC7, 1st audio and B.F.O.	90X6SC7
V-7	Type 25L6GT, audio power amplifier	90X25L6GT
V-8	Type 25Z6GT, rectifier	90X25Z6GT
LM-1,2	Lamp, dial light, Mazda #47	39A004
MISCELLANEOUS		
TS-1	Terminal strip, antenna	88A032
	Lock, line cord	76A397
	Shaft, bandswitch and index plate	74B172
	Collar, bandswitch	77A043
	Bracket, dial drive mtg.	87B503
	Dial shaft, bandspread	74A169
	Drive shaft, main tuning	74A171
	Drive shaft, bandspread	74A170
	Washer, spring (Bandswitch, bandspread dial, and main tuning drive shafts)	4A043
	Spring, retainer (Bandspread, and main tuning drive shaft)	75A062
	Flywheel, bandspread tuning	71A178
	Pulley, bandspread dial	28A012
	Dial cord	38A001
	Spring, dial cord	75A012
	Dial, bandspread	83B254
	Dial, general coverage	83D240
	Escutcheon, bandspread dial	7B017
	Escutcheon, general coverage dial	7C034
	Speaker, P.M.	85B050
	Baffle, speaker	63C223
	Grill, speaker	7C016
	Knob, PITCH CONTROL	15A058
	Knob, SENSITIVITY, VOLUME and and TONE	15A049
	Knob, TUNING and BANDSPREAD	15A047
	Knob, BAND SELECTOR	15B053

MODELS S-53-A,
S-53-AU

GENERAL

Tubes	Seven plus rectifier
Speaker	5-inch PM
Voice Coil Impedance.	3.2 ohms
Headset Output	Low Impedance
Antenna	Provision for external antenna
Tuning.	Manual
Tuning Range.	Range Frequency Coverage
	A 550 KC - 1850 KC
	B 2.6 MC - 6.4 MC
	C 6.2 MC - 16.5 MC
	D 14 MC - 31 MC
	E 48 MC - 55 MC
Intermediate Frequency	2,075 mc
Power Supply S-53A	105-125 V. 50 to 60 cycles AC
S-53AU.	105-250 V. 40 to 130 cycles AC
Power Consumption	50 watts

RESTRINGING DIAL CORD

To restring the general coverage dial cord, cut a 48-inch length of 30 lb. test dial cord and tie one end to the tension spring of the general coverage tuning capacitor drive pulley at position "1" on the diagram. Follow the sequence "1" through "12" and at position "12" stretch the tension spring and tie the cord securely.

Set the general coverage tuning condenser at maximum capacity and attach and set the pointer in line with the left hand index marker.

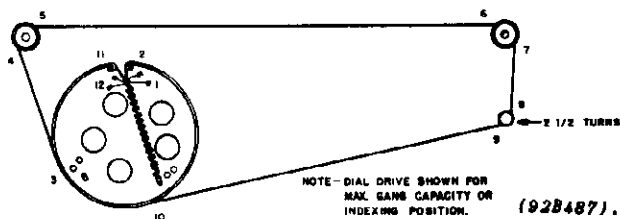


Fig. 1. Dial cable stringing procedure, general coverage dial.

To restring the band spread dial cord, cut a 36-inch length of 30 lb. test dial cord and follow the procedure as above, starting at position "A" ending at "L".

Set the bandspread condenser at minimum capacity and attach and set the pointer at "100" on the logging scale.

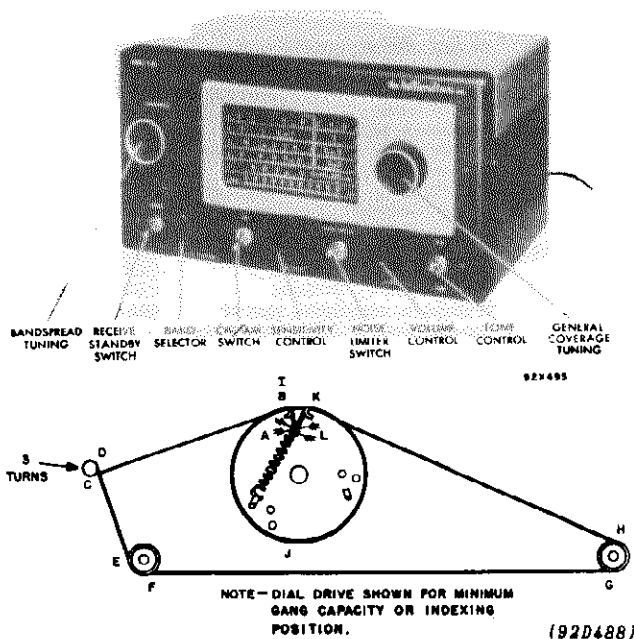


Fig. 2. Dial cable stringing procedure, band spread dial.

REPLACING LAMPS

Refer to Fig. 8. for the location of the two dial lamps used in the receiver. To gain access to defective lamps, reach in through cabinet cover and unclip the dial lamp sockets. The sockets may then be brought out into the open to change the defective lamp. Replace lamps with 6-8 V. Mazda #44, (Blue bead) lamps or equivalent.

ALIGNMENT PROCEDURE

Set the following controls before alignment.

STANBY/RECEIVE	Set at RECEIVE
CW/AM	Set at AM (see step 2)
SENSITIVITY	Set at maximum
NOISE LIMITER	Set at OFF
VOLUME	Set at maximum
TONE switch.	Set at HIGH
BANDSPREAD	Set at 100
SPEAKER/PHONES switch.	Set at SPEAKER

Remove the receiver chassis from the cabinet to make alignment adjustments. The chassis is held in the cabinet by three screws along both the bottom edge of the front panel and the rear of the cabinet, and two screws on either side of the front panel.

Before starting the alignment procedure, index the general coverage dial pointer on the low frequency end of the range and index the bandspread dial pointer at 100. The general coverage condenser should index at maximum capacity and the bandspread condenser should index at minimum capacity.

MODELS S-53-A,
S-53-AU

ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Selector Setting	Receiver Dial Setting	Adjust	Remarks
1	0.1 mfd. capacitor	High side to front stator section of tuning cap. Low side to chassis.	455 kc	A	Tuning cap. fully open	S1,S2,S3,S4,S5, S6,	Adjust for maximum audio output at speaker voice coil. Use just enough signal generator output to obtain a 50 mw audio level.
2	See step 1.	See step 1.	455 kc	A	See step 1.	S9	With the CW/AM switch set at CW, adjust S-9 for zero beat.
3	300 ohm carbon resistor	High side to "A1" on antenna strip. Jumper connected between "A2" and "G"	1500 kc 600 kc	A	1500 kc 600 kc	*A,B *C	Adjust for maximum output as in step 1.
4	See step 3.	See step 3.	6 mc	B	6 mc	*D,E	Adjust for maximum output as in step 1.
5	See step 3.	See step 3.	15 mc	C	15 mc	*F,G	Adjust for maximum output as in step 1.
6	See step 3.	See step 3.	30 mc	D	30 mc	*I,H	Adjust for maximum output as in step 1.
7	See step 3.	See step 3.	52 mc	E	52 mc	*J,K	Adjust for maximum output as in step 1.

*Note - Calibration adjustments.

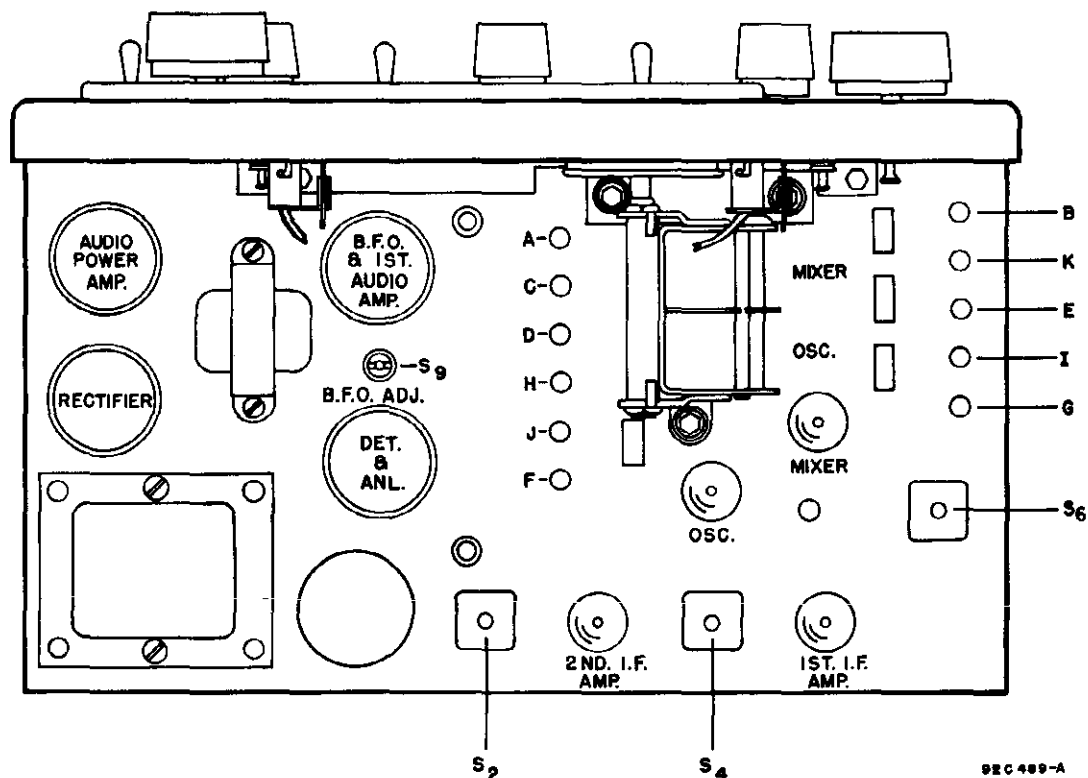
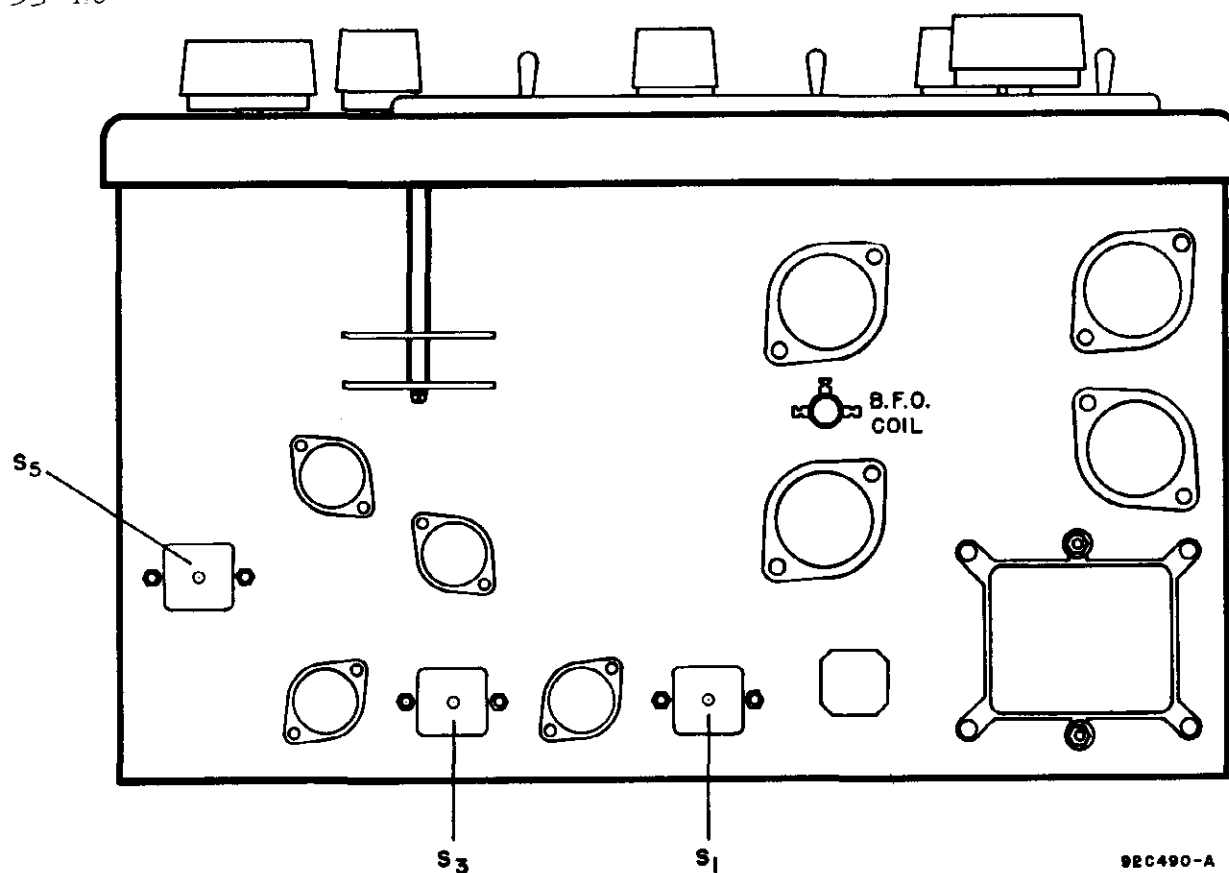


Fig. 3. Alignment points, top view.

PAGE 21-16 HALLICRAFTERS

MODELS S-53-A,
S-53-AU



92C490-A

Fig. 4. Alignment points, bottom view.

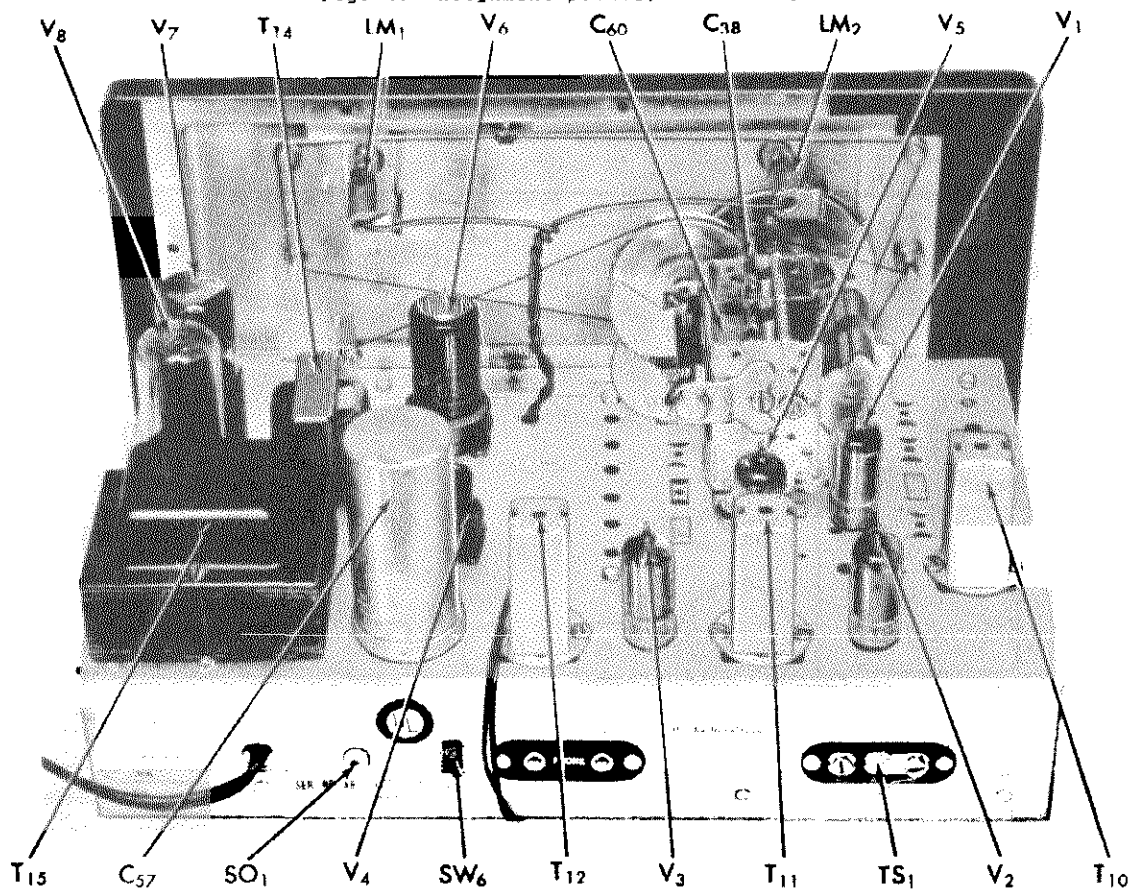


Fig. 5. Component location, top view.

92X1103

MODELS S-53-A,
S-53-AU

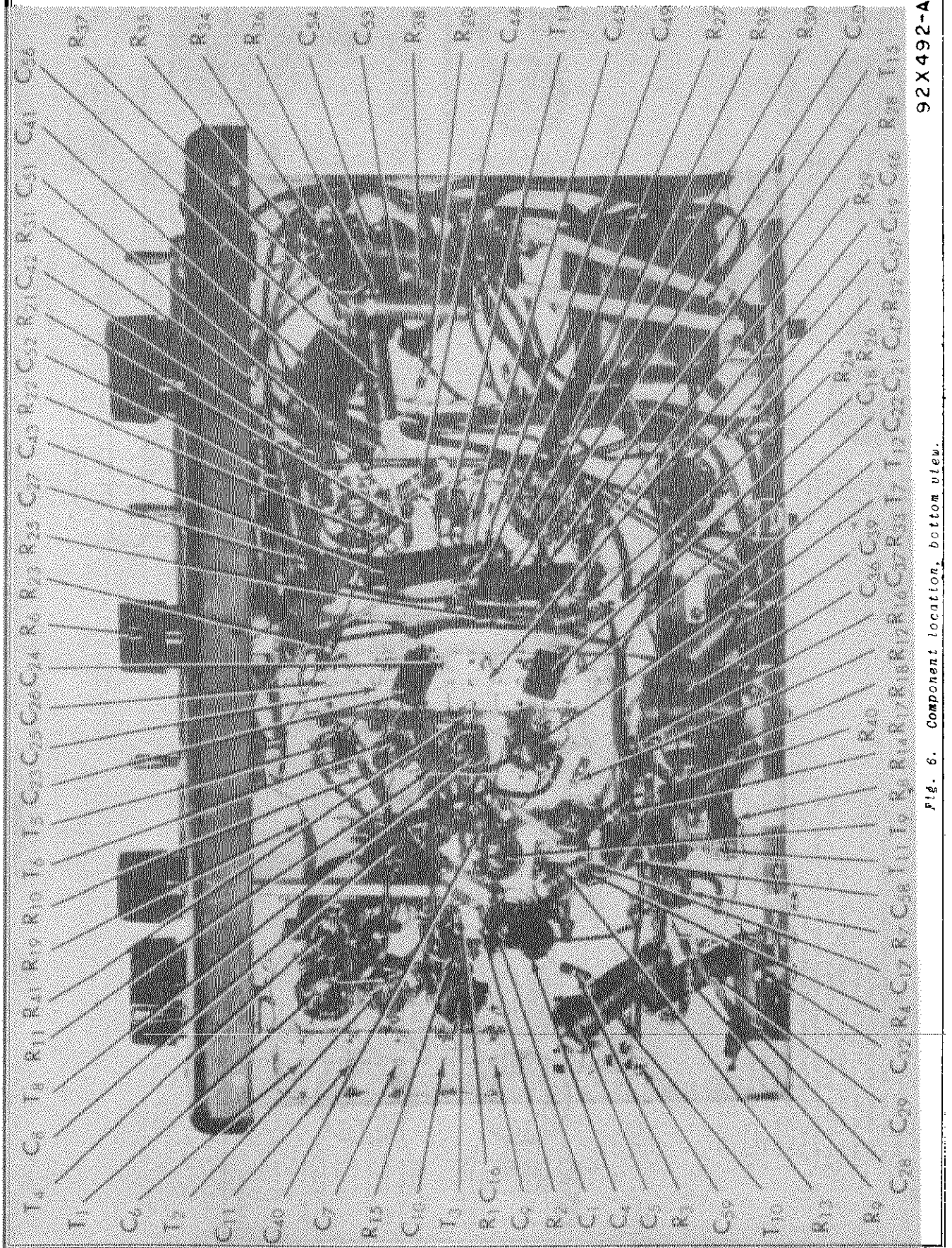


Fig. 6. Component location, bottom view.

92X492-A

NOTES -

1. SOCKET VIEWS ARE BOTTOM VIEWS.
2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH ZERO SIGNAL INPUT.
3. LINE VOLTAGE 117 V. AC. (60 CYCLES).
4. ALL VOLTAGES SHOWN ARE DC. UNLESS OTHERWISE SPECIFIED.
5. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER.
6. READINGS TAKEN WITH STANDBY/RECEIVE SWITCH SET AT "RECEIVE"; CW/AM SWITCH SET AT "AM"; NOISE LIMITER SWITCH ON.
7. "NO" - NO CONNECTION. (VOLTAGE SHOWN FOR THIS TERMINAL ONLY WHEN TERMINAL IS USED AS A TIE LUB).
8. "NR" - NOT READABLE. (READING GENERALLY MEANINGLESS).
9. SPACE PROVIDED FOR SERVICE METER READINGS.

Fig. 7. Tube socket voltage chart

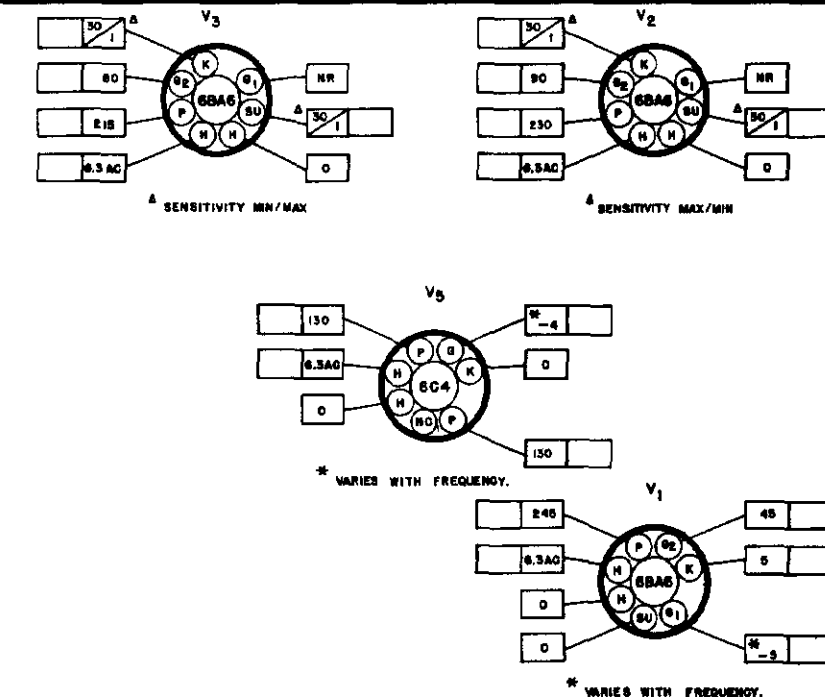
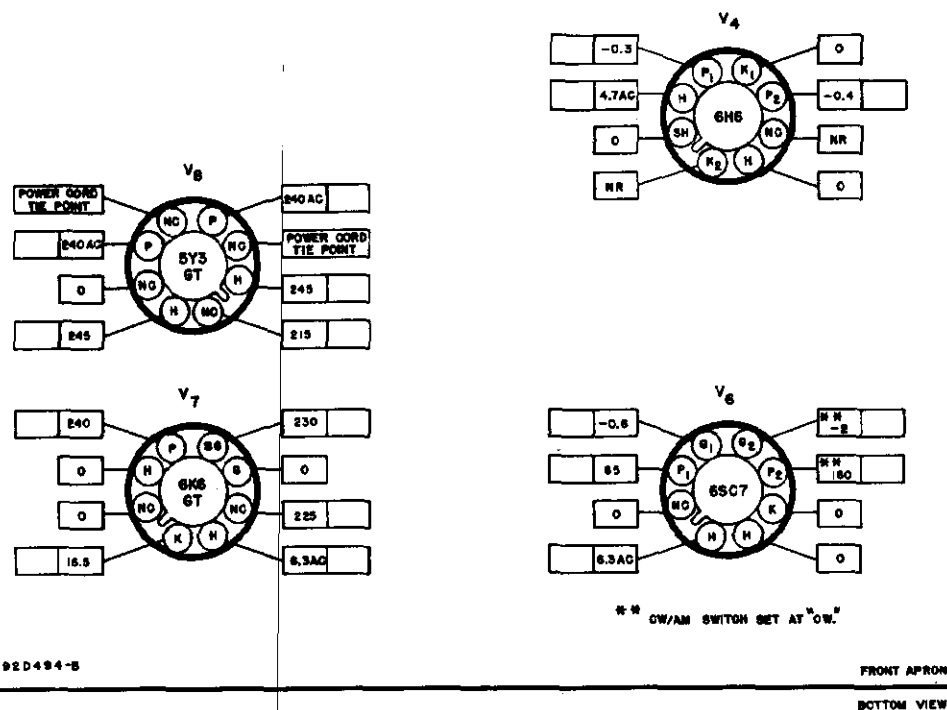


Fig. 8. Top view, location of tubes and dial lamps.

92D484-B

FRONT APRON

BOTTOM VIEW

DIAL LAMPS
MAZDA 944

92C4098A

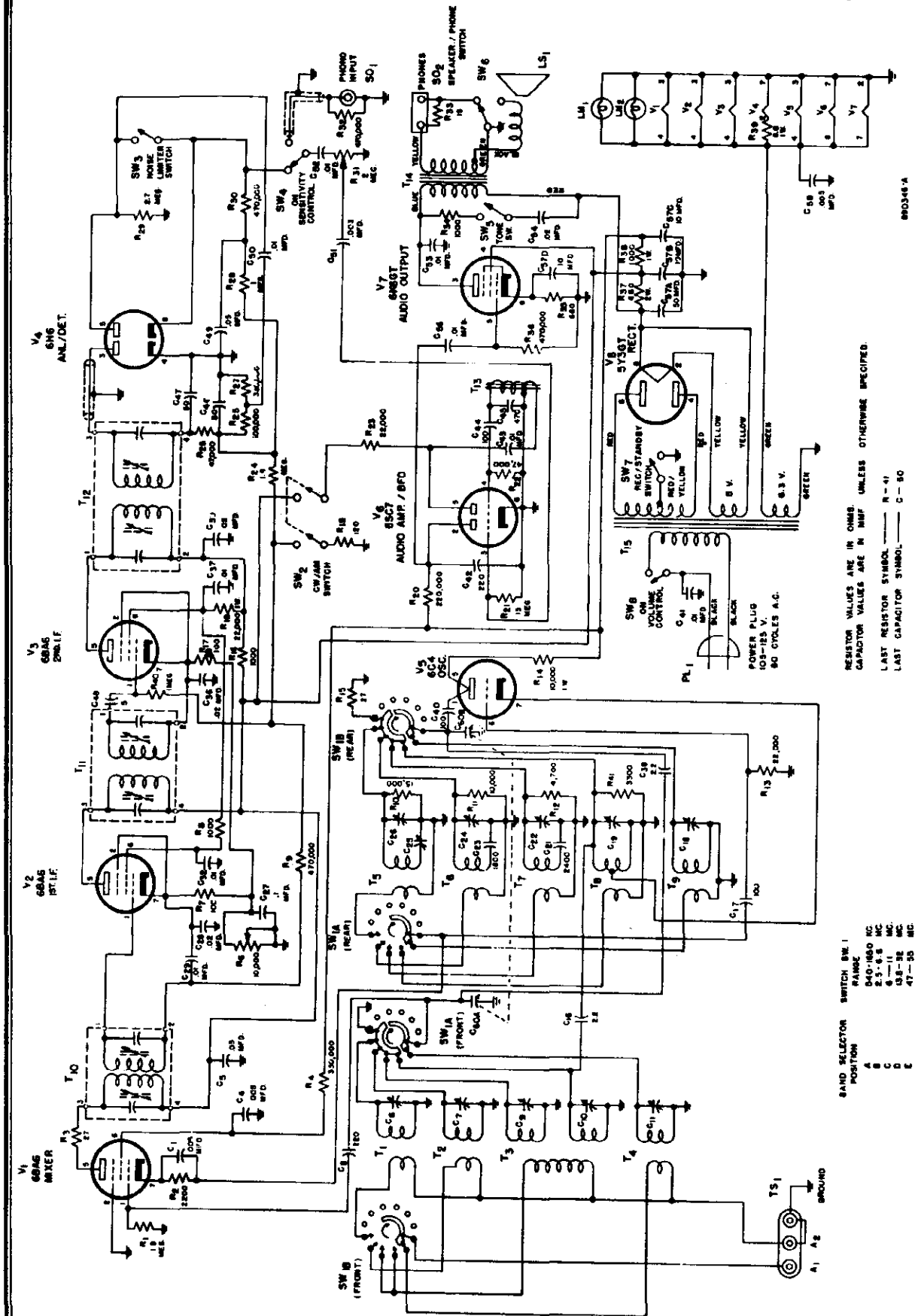


Fig. 9. Schematic diagram.

PAGE 21-20 HALLICRAFTERS

MODELS S-53-A,
S-53-AU

SERVICE PARTS LIST

Ref. No.	Description	Manufacturers Part Number	Ref. No.	Description	Manufacturers Part Number
CONDENSERS			TRANSFORMERS AND COILS (Cont.)		
C-1,4,58	.005 mfd. 450 V., ceramic	47A168	T-7	Transformer, oscillator stage, band C	51A1237
C-5,39,49	.05 mfd. 400 V., tubular	46AW503J	T-8	Transformer, oscillator stage, band D	51B1238
C-6,7,9,10 11	Trimmer assembly, 5 sec- tions, antenna stage	44B355	T-9	Transformer, oscillator stage, band E	51B1239
C-8,42	220 mmf. 500 V., mica	47X20B221K	T-10,11	Transformer, 1st and 2nd IF	50C241
C-16,38	2.2 mmf. 500 V., ceramic	47A160-4	T-12	Transformer, 3rd IF	50C242
C-17,40,44	100 mmf. 500 V., ceramic	47A086	T-13	Transformer, BFO	54B043
C-18,19,22, 24,25,26	Trimmer assembly, 6 sections, oscillator stage	44B388	T-14	Transformer, audio output	55B107
C-21	2400 mmf. 500 V., silver mica	47X20C242J	T-15	Transformer, power (Standard) (Used on S-53-A)	52C164
C-23	1800 mmf. 2 1/2 500 V., silver mica	47X20C182G	T-15	Transformer, power (Universal) (Used on S-53-AU)	52C165
C-27	.1 mfd. 200 V., tubular	46AU104J	SWITCHES		
C-28,36,54	.02 mfd. 600 V., tubular	46AY203J	SW-1	Band switch assembly	60B323
C-29,32,37, 43,50,52, 53,56	.01 mfd. 600 V., tubular	46AZ103J	SW-2	Switch, toggle DPST, CW/AM control	60A285
C-41	.01 mfd. 600 V., molded paper	46AC103J	SW-3,5,7	Switch, toggle, SPST, STANDBY/ REC., NOISE LIMITER & TONE control	60A138
C-45	470 mmf. 500 V., mica	47X20B471J	SW-4	Switch, part of SENSITIVITY control, R-6	60A243
C-46,47	50 mmf. 500 V., ceramic	47A091	SW-6	Switch, slide, SPDT, SPEAKER/ PHONE control	60A243
C-48	5 mmf. 500 V., ceramic	47X20UK050K	SW-8	Switch, part of VOLUME control R-31	
C-51	.003 mfd. 600 V., tubular	46AZ302J	PLUGS AND SOCKETS		
C-57	50-10-10 mfd. 350-10-25 V., electrolytic	45B122	PL-1	Line cord and plug	87A078
C-60	Tuning condenser, 2 section	48C198	SO-1	Receptacle, phono	36A041
RESISTORS			SO-2	Receptacle, headphone jack	88A071
R-1,24	1.8 megohms 1/2 watt, carbon	23X20X185M		Socket, octal (tube)	6A269
R-2	2200 ohms 1/2 watt, carbon	23X20X222M		Socket, miniature (tube)	6A297
R-3,15	27 ohms 1/2 watt, carbon	23X20X270M		Socket, dial light	86B063
R-4,27	330,000 ohms 1/2 watt, carbon	23X20X334K	TUBES, RECTIFIERS AND LAMPS		
R-6	10,000 ohms, variable SENSITIVITY control	25B603	V-1,2,3	6BA6, mixer, 1st & 2nd IF amplifier	90X6BA6
R-7,17	100 ohms 1/2 watt, carbon	23X20X101K	V-4	6H6, detector & ANL	90X6H6
R-8,16,34	1000 ohms 1/2 watt, carbon	23X20X102M	V-5	6C4, oscillator	90X6C4
R-9,30,32, 36	470,000 ohms 1/2 watt, carbon	23X20X474M	V-6	6SC7, audio amplifier & BFO	90X6SC7
R-10	15,000 ohms 1/2 watt, carbon	23X20X153K	V-7	6K6-GT, power amplifier	90X6K6-GT
R-11	10,000 ohms 1/2 watt, carbon	23X20X103K	V-8	5Y3-GT, rectifier	90X5Y3-GT
R-12	4700 ohms 1/2 watt, carbon	23X20X472K	LM-1,2	Lamp, 6-8 V., 250 ma., Mazda #44	39A003
R-13,23	22,000 ohms 1/2 watt, carbon	23X20X223M	MISCELLANEOUS		
R-14	10,000 ohms 1 watt, carbon	23X30X103K	TS-1	Terminal strip, antenna	88A032
R-18	22,000 ohms 1 watt, carbon	23X30X223M		Lock, line cord	76A299
R-19	120 ohms 1/2 watt, carbon	23X20X121M		Clip, coil mtg.	76A325
R-20	220,000 ohms 1/2 watt, carbon	23X20X224K		Shaft, tuning drive	74A248
R-21	15 megohms 1/2 watt, carbon	23X20X156K		"C" washer (tuning drive shaft)	4A139
R-22,26	47,000 ohms 1/2 watt, carbon	23X20X473M		Spring, dial cord	75A012
R-25	100,000 ohms 1/2 watt, carbon	23X20X104K		Dial cord	38A019
R-28,40	1 megohm 1/2 watt, carbon	23X20X105M		Plate, dial	63C333
R-29	2.7 megohms 1/2 watt, carbon	23X20X275M		Pointer, general coverage dial	82A149
R-31	2 megohms, variable, VOLUME control	25B602		Pointer, band spread dial	82A148
R-33	15 ohms 1/2 watt, carbon	23X20X150M		Dial Glass (Calibrated)	22C204
R-35	680 ohms 1/2 watt, carbon	23X20X681K		Gasket, dial glass	12A042
R-37	680 ohms 2 watts, carbon	23X40X681M		Clip, dial glass mtg.	76A390
R-38	1000 ohms 1 watt, carbon	23X30X102M		Pad, dial clip	16A126
R-39	6.8 ohms 1 watt, carbon	23X30X068K		Pad, felt (round disc)	14A166
R-41	3300 ohms 1/2 watt, carbon	23X20X332K		Pad, sponge rubber	16A047-1
TRANSFORMERS AND COILS				Mounting feet, rubber	16A007
T-1	Transformer, antenna stage, band A	51B1028	LS-1	Speaker, P.M.	85C030
T-2	Transformer, antenna stage, band B	51B1244		Knob, BAND SELECTOR, SENSITIVITY and VOLUME controls	15A050
T-3	Transformer, antenna stage, band C & D	51B1026		Knob, BANDSPREAD & general coverage controls	15A047
T-4	Transformer, antenna stage, band E	51B1030			
T-5	Transformer, oscillator stage, band A	51B1235			
T-6	Transformer, oscillator stage, band B	51B1236			

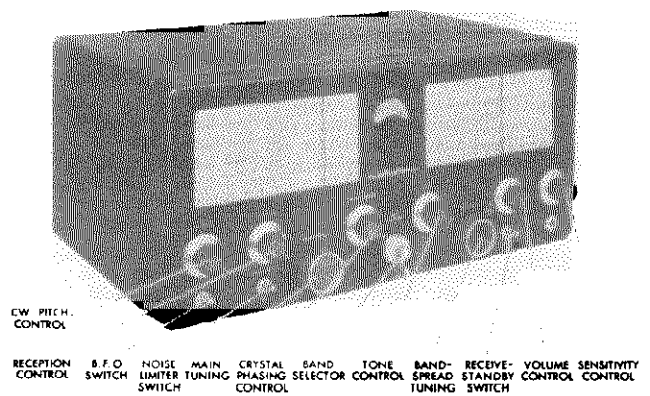
Tubes	eleven plus voltage regulator and rectifier
Speaker Output	3.2/500 ohms
Headset Output	500 ohms
Antenna Input	For 50 to 600 ohm line or single wire lead-in.
Phono Input	High impedance
External Power Connector . . .	Std. octal socket
Tuning Range	

Band	*Frequency Range	Type of Reception
1	560 KC - 1600 KC	AM/NBFM/CW
2	1650 KC - 4700 KC	AM/NBFM/CW
3	4.7 MC - 13.4 MC	AM/NBFM/CW
4	12.8 MC - 34 MC	AM/NBFM/CW
5	48 MC - 56 MC	AM/NBFM/CW

Intermediate Frequency 455kc/2.075 MC
Power Supply Standard Model 105-125 V. 60
Cycles AC
Universal Model 105-250 V. 25/130
Cycles AC
Power Consumption 90 Watts.

The dial drive system of the SX-71 consists of four separate spring drives. The two drive shaft string systems are identical; the two pointer drive systems are similar but right and left handed.

(2) **POINTER DRIVE** - To restring either one, use a 66 inch length of 30 lb. test dial cord. Tie one end of the dial cord to position "A" and follow the stringing sequence "A" to "U" as shown. At position "U", stretch the tension spring and tie the cord securely to the spring. Two small pieces of spaghetti tubing approximately one half inch long should be threaded on



the cord, as shown, to provide a suitable purchase for the dial pointer. With the pointer drive, pulleys positioned as shown on the diagram (Fig. 1.), the tuning capacitor should be entirely closed. The pointer may now be fastened to the cord and aligned with the 0 position on the logging scale and the index marks on the dial scales. The ends of the pointer should be carefully crimped around the spaghetti tubing and cemented fast.

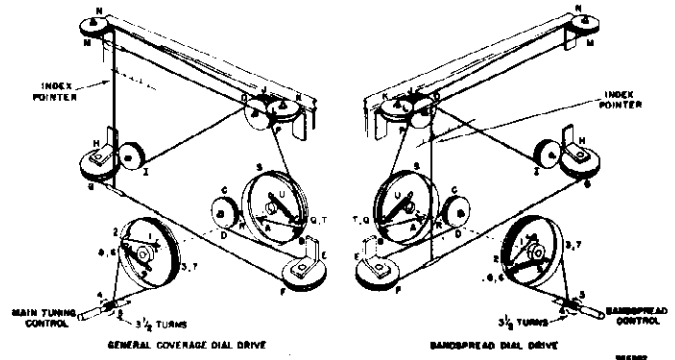
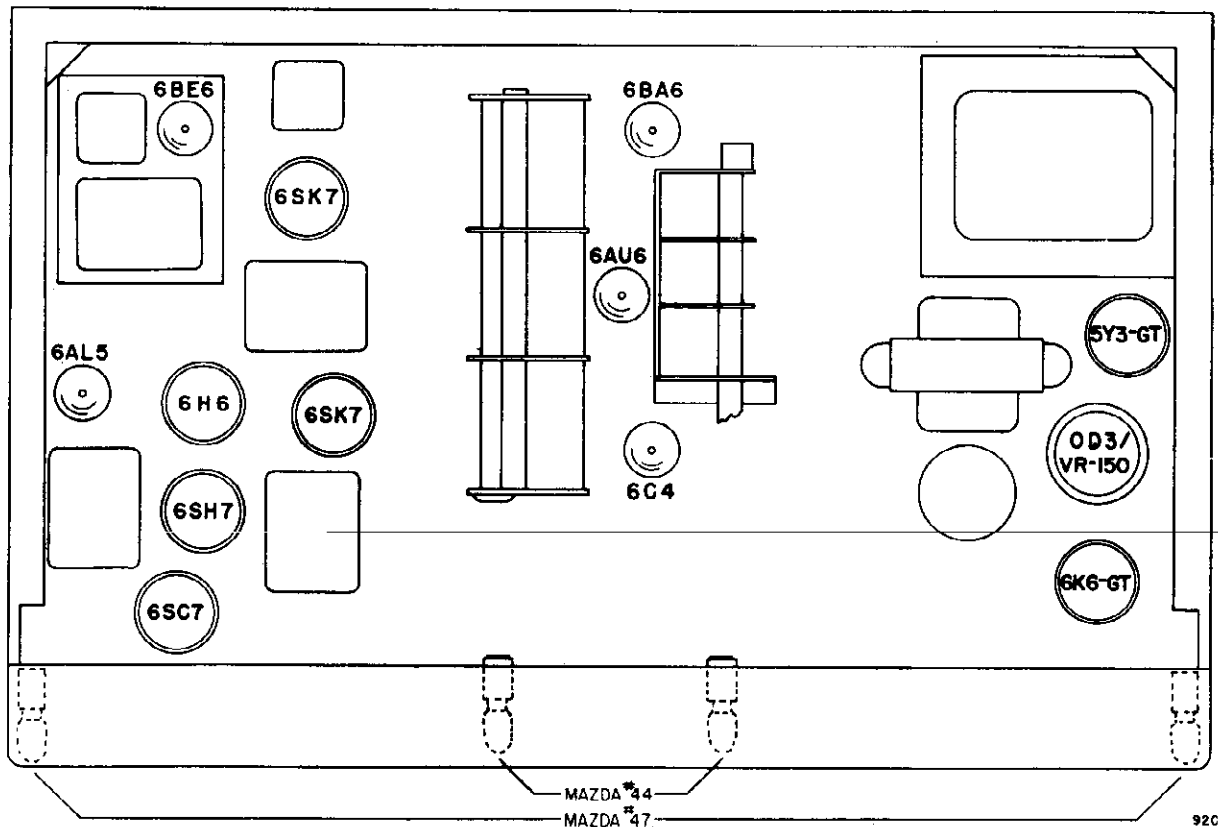


Figure 1. Dial cable stringing procedure



MODEL SX-71

ALIGNMENT PROCEDURE

It will be necessary to remove the receiver chassis from the cabinet to make all alignment adjustments. The chassis is held in the cabinet by two screws on the bottom rear and by the flanges on the side and bottom.

The following control settings are to be set before alignment: TONE control at maximum. SENSITIVITY control at maximum. VOLUME control at maximum. NOISE LIMITER switch at OFF. RECEIVE/STANDBY switch at RECEIVE.

I-F ALIGNMENT

Step	Signal Gen. Coupling	Signal Gen. Frequency	Receiver Control Settings	Receiver Dial Set	Adjust	Remarks
1	Connect gen. to stator of gang, mixer sect.	455 KC Unmodulated	BAND SELECTOR at 2. RECEPTION switch at BROAD CRYSTAL. BFO switch at BFO.	Both dials set at 50 on the logging scale		Remove CW PITCH control knob and set shaft for zero beat. Replace knob with the zero at the index line.
2	Same as step 1.	Same as step 1.	Adjust CW-PITCH for a 1000 cycle note. Other controls same as step 1.	Same as step 1.	U	While turning the slug very slowly in one direction, "rock" the signal generator. As the adjustment passes thru the response of the crystal filter, the output goes thru a maximum, dips down, and starts going up again. The correct setting of this slug is in the center of the observed dip. A swishing note, in contrast to the sharp crystal tone will be apparent when the correct adjustment has been reached.
3	Same as step 1.	Same as step 1.	RECEPTION switch at SHARP CRYSTAL. Other controls same as step 1.	Same as step 1.		Set the generator frequency for maximum output on the crystal frequency.
4	Same as step 1.	Same as step 3. Modulated	RECEPTION switch at NORMAL I.F. BFO switch at OFF. Other controls same as step 1.	Same as step 1.	V W X Y Z (1) (2)	Maximum output Maximum output Maximum output Maximum output Maximum output Maximum output Repeat above until maximum gain is obtained.

F-M ALIGNMENT

5	Same as step 1.	Same as step 3. Increase output to approx. 1000 microvolts.	RECEPTION switch at NBFM. Other controls same as step 1.	Same as step 1.	(3)	Set up circuit shown in Fig. 2. Until vacuum tube voltmeter shows zero voltage.
---	-----------------	---	--	-----------------	-----	---

I-F ALIGNMENT

6	Same as step 1.	2.075 MC Modulated	RECEPTION switch at NORMAL I.F. BAND SELECTOR at 4.	Same as step 1.	(4) (5) (6)	Until a signal is heard. For maximum output. For maximum output. Repeat until the maximum output is obtained.
---	-----------------	--------------------	---	-----------------	-------------------	--

R-F ALIGNMENT

Leave BANDSPREAD dial at 100 for all steps. The following adjustments can be made without removing the chassis from the cabinet.

1	Connect the high side of the gen. thru a 300 ohm resistor to term. A1 of the ant. term. strip. Connect a jumper between A2 & G. Use just enough gain to obtain a 500 milliwatt audio output level.	1500 KC 600 KC 1500 KC	BAND SELECTOR at 1. RECEPTION switch at NORMAL I.F. BFO switch at BFO	1500 KC 600 KC 1500 KC	A(osc.trim) B C D(osc.pad) A B Repeat	Until a signal is heard. For maximum output. For maximum output. Until a signal is heard. For maximum output. For maximum output. Until maximum output is obtained.
2	Same as step 1	4 MC	BAND SELECTOR at 2. Other controls as in step 1.	4 MC	E(osc.trim) F G E F G	Until a signal is heard. For maximum output For maximum output For maximum output For maximum output For maximum output Repeat until maximum output is obtained
3	Same as step 1.	12 MC 5.2 MC 12 MC	BAND SELECTOR at 3. Other controls as in step 1.	12 MC 5.2 MC 12 MC	H(osc.trim) I H J K	Until a signal is heard Until a signal is heard For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) Repeat until maximum results are obtained.
4	Same as step 1	30 MC 14 MC	BAND SELECTOR at 4. Other controls as in step 1.	30 MC 14 MC	L(osc.trim) M (slug) N O L P Q	Until a signal is heard. Until a signal is heard. For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) Repeat until maximum results are obtained.
5	Same as step 1.	54 MC	BAND SELECTOR at 5. Other controls as in step 1.	100 on logging scale.	R(osc.trim) S T	Until a signal is heard. For maximum output. ("Rock" the gang) For maximum output. ("Rock" the gang) Repeat until maximum results are obtained.

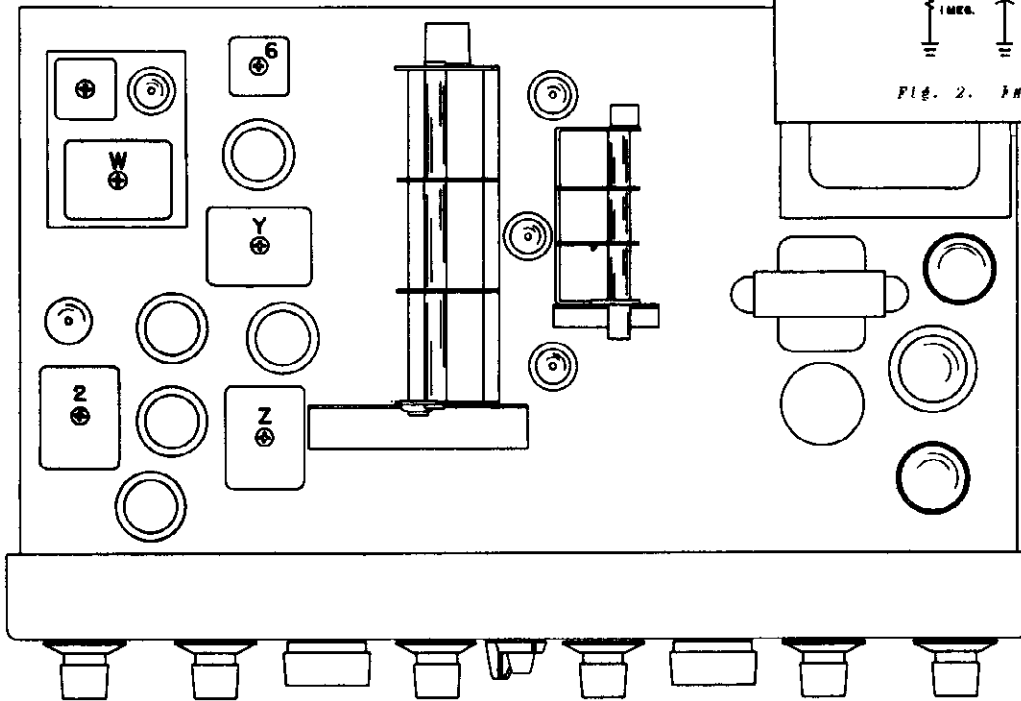
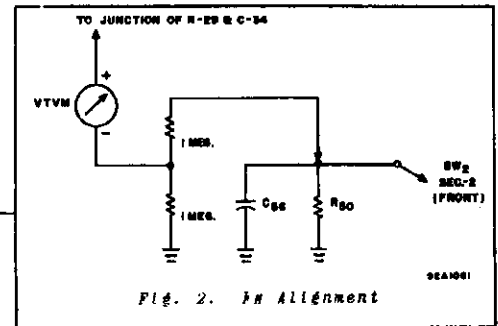


Fig. 3. Alignment adjustments, top view

92D964

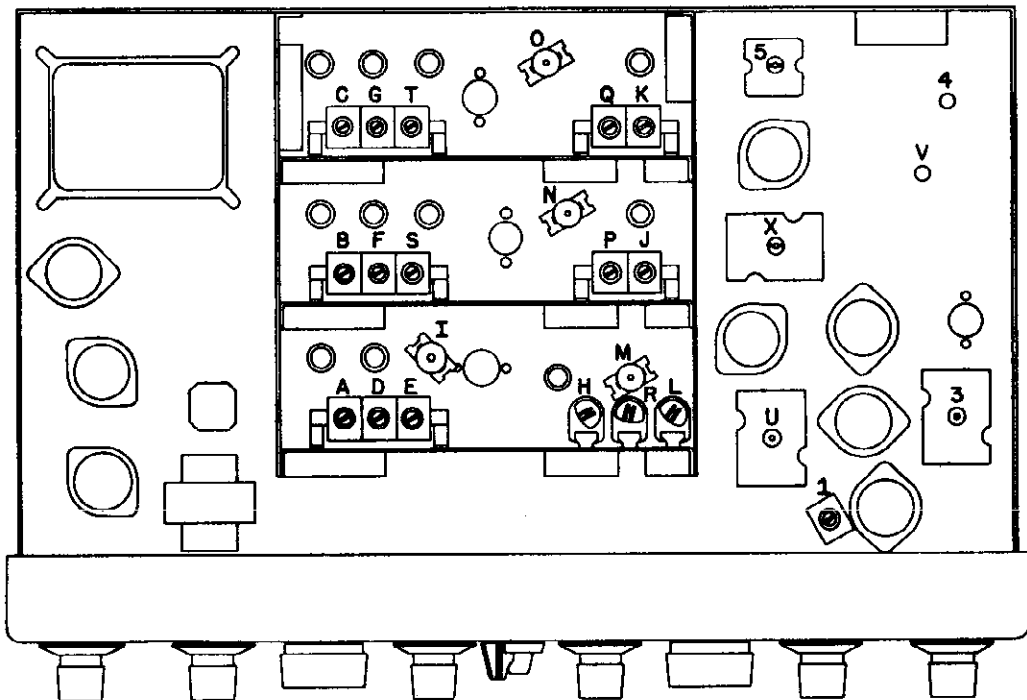


Fig. 4. Alignment adjustments, bottom view

92D965

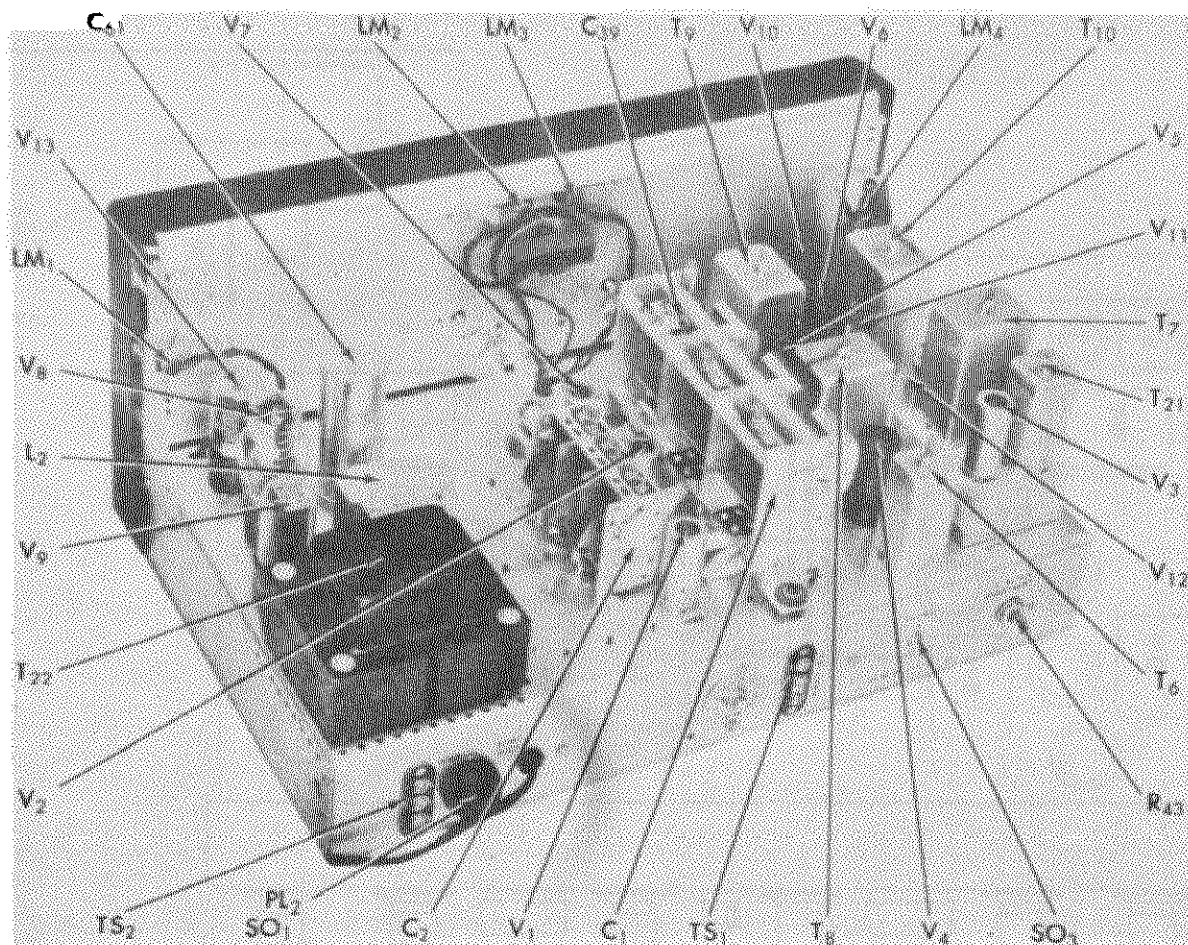


FIG. 5. Component locations, top view

92X966

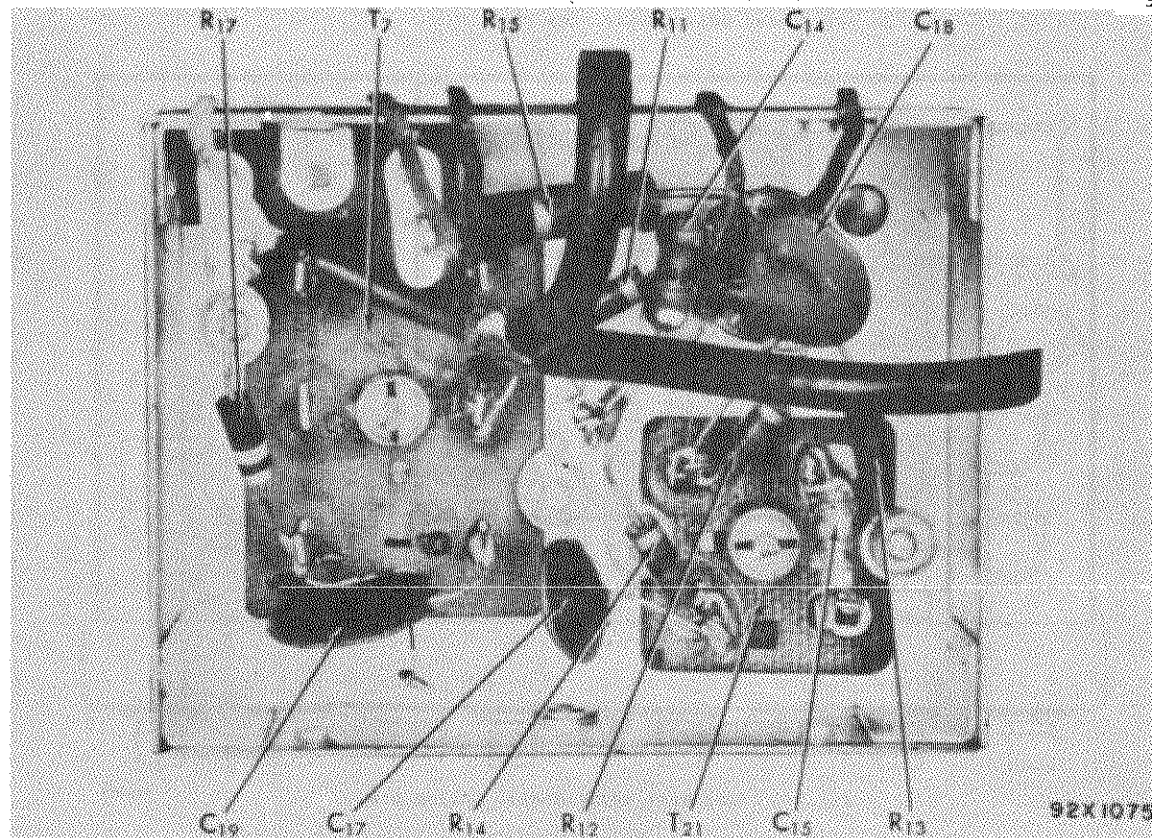
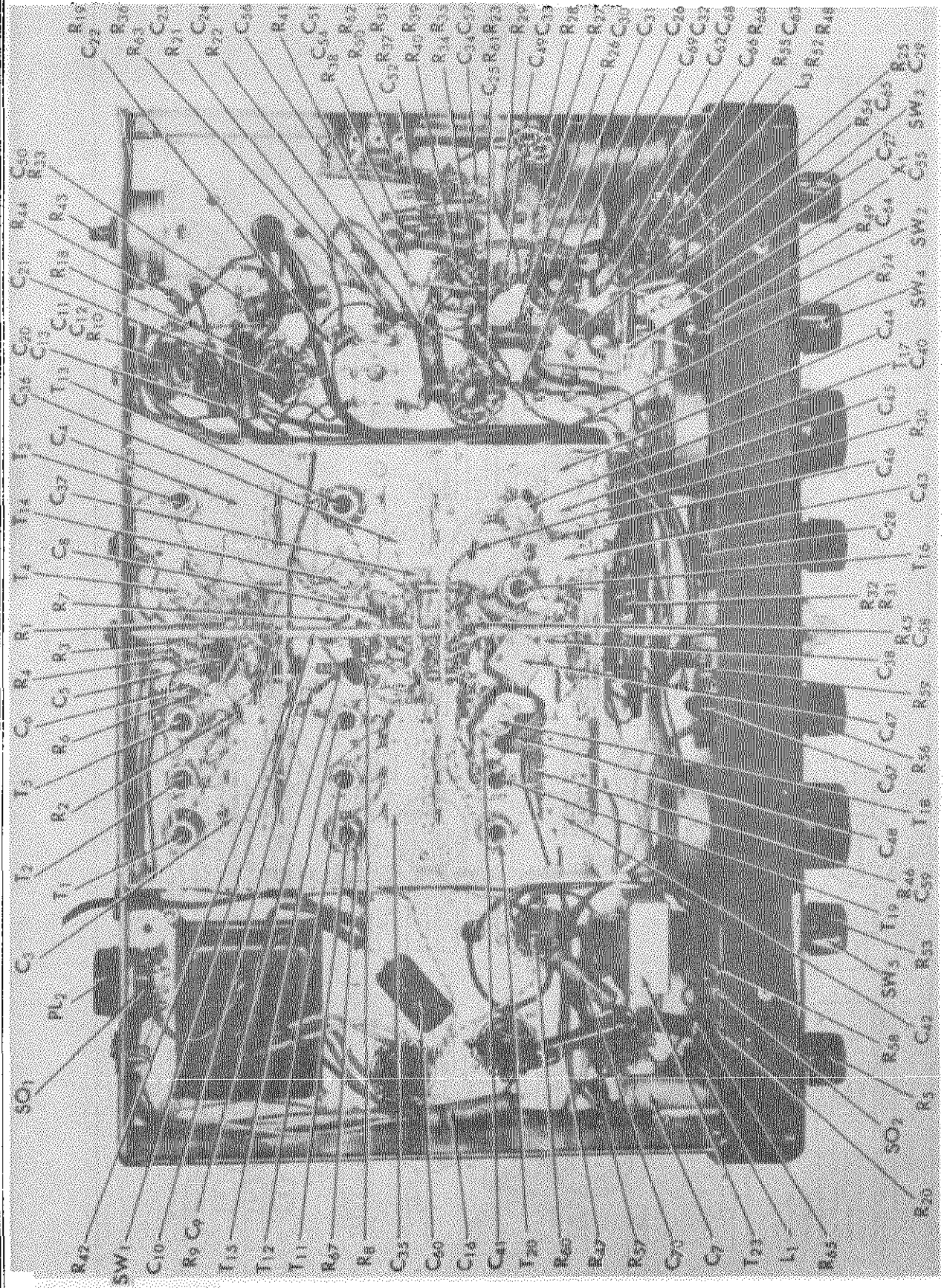


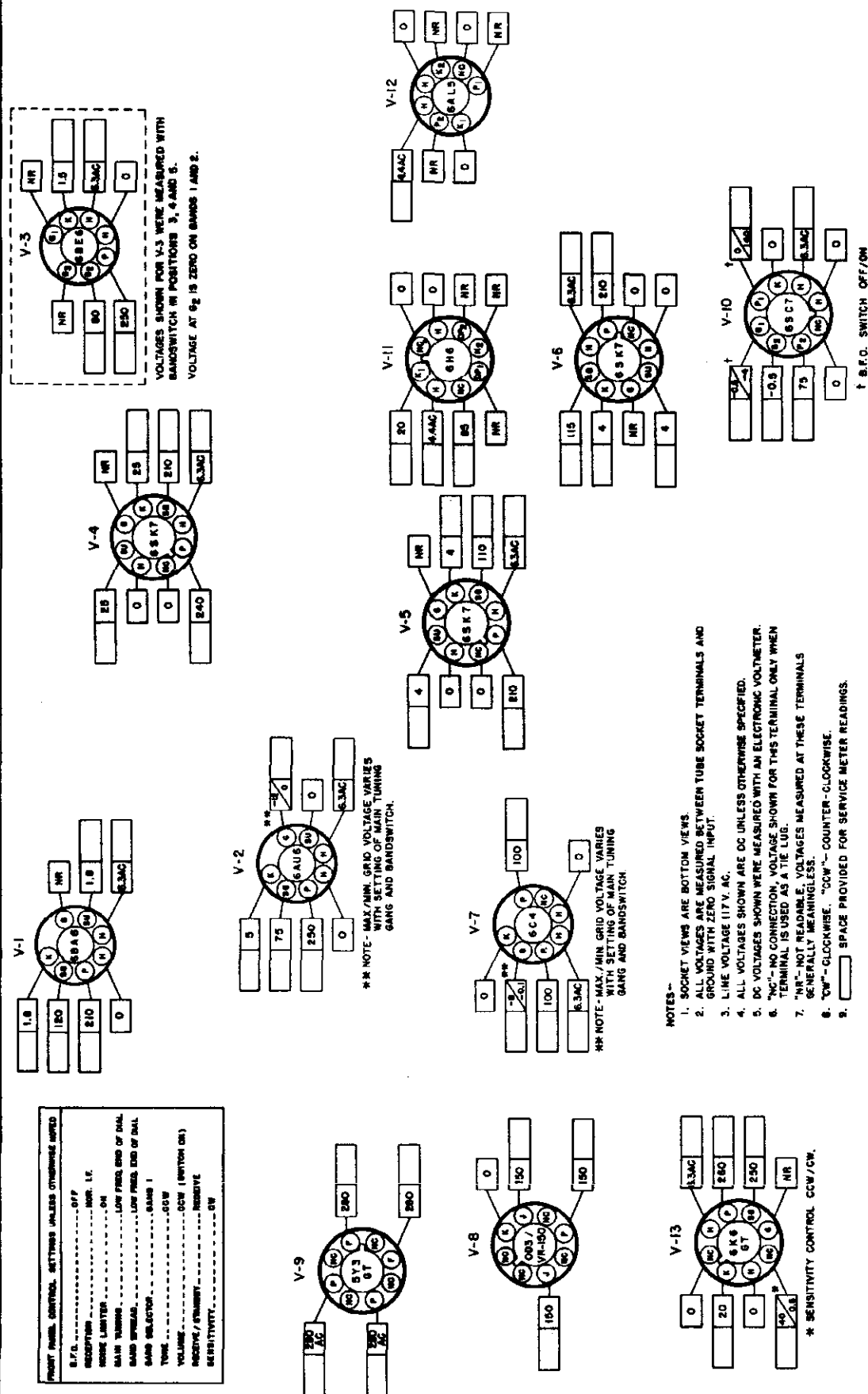
FIG. 6. Component locations, bottom view second converter unit

92X1075



92X967

Fig. 7. Component locations, bottom view



912043

FRONT PANEL

Fig. 9. Tube socket voltage chart

SERVICE PARTS LIST

Ref. No.	Description	Manufacturer's Part Number	Ref. No.	Description	Manufacturer's Part Number
CONDENSERS			RESISTORS (Cont.)		
C-1	Capacitor, MAIN TUNING (3 section)	48D209	R-9	330,000 ohms 1/2 watt, carbon	23X20X334K
C-2	Capacitor, BANDSPREAD (3 section)	48C210	R-10, 24, 28, 42	3300 ohms 1/2 watt, carbon	23X20X332K
C-3	Trimmer Ass'y, antenna stage (Bands 1, 2 & 5)	44B381	R-11	220 ohms 1/2 watt, carbon	23X20X221K
C-4	Trimmer Ass'y, antenna stage (Bands 3 & 4)	44B379	R-12, 45, 52	22,000 ohms 1/2 watt, carbon	23X20X223K
C-5, 33, 34, 52, 57, 63, 68	220 mmf. 500 V., ceramic	47B20221K5	R-14, 48	150 ohms 1/2 watt, carbon	23X20X151K
C-6, 10, 19, 67	2 x 4,000 mmf. 450 V., ceramic	47A218	R-15, 46, 60	10,000 ohms 1 watt, carbon	23X30X103K
C-7	.25 mfd. 200 V., tubular	46AT254J	R-17, 21, 25, 49, 55	100,000 ohms 1/2 watt, carbon	23X20X104K
C-8, 14, 38, 41, 58	100 mmf. 500 V., ceramic	47X20UJ101K	R-18, 22, 26	270 ohms 1/2 watt, carbon	23X20X271K
C-9, 12, 17, 18, 21, 22, 23, 25, 26, 31, 64, 65,	5,000 mmf. 450 V., ceramic	47A168	R-19, 27	33,000 ohms 1/2 watt, carbon	23X20X333K
**C-11, 13	300 mmf. 500 V., mica	47X20B301J	R-20	47,000 ohms 1 watt, carbon	23X30X473K
C-15	47 mmf. 500 V., ceramic	47X20UK470K	R-23	6800 ohms 1/2 watt, carbon	23X20X682K
C-16, 20, 24, 30, 50	.05 mfd. 400 V., tubular	46AW503J	R-29	56,000 ohms 1/2 watt, carbon	23X20X563K
C-27	Trimmer, adjustable	44A047	R-31	680 ohms 1/2 watt, carbon	23X20X681K
C-28	Capacitor, variable CRYSTAL PHASING	48A182	R-32, 33	2700 ohms 1/2 watt, carbon	23X20X272K
C-29	33 mmf. 500 V., mica	47X20A330K	R-34, 35, 40	470,000 ohms 1/2 watt, carbon	23X20X474K
C-32	.25 mfd. 600 V., tubular	46AX254J	R-36	180,000 ohms 1/2 watt, carbon	23X20X184K
C-35	Trimmer Ass'y, mixer stage (Bands 1, 2 & 5)	44B382	R-37	82,000 ohms 1/2 watt, carbon	23X20X823K
C-36	Trimmer Ass'y, mixer stage (Bands 3 & 4)	44B380	R-38, 50, 59	220,000 ohms 1/2 watt, carbon	23X20X224K
C-37	15 mmf. 500 V., ceramic	47X20UJ150K	R-43	Resistor, variable, 500 ohms, S-METER ADJUSTMENT	25C022
C-39	2.2 mmf. 450 V., ceramic	47A160-4	R-47	Resistor, 2500 ohms 10 watts, wirewound	24BG252D
C-40, 49	25 mmf. 500 V., ceramic	47X20UK250K	R-51	39,000 ohms 1/2 watt, carbon	23X20X393K
C-42	Trimmer Ass'y, oscillator stage (Bands 1 & 2)	44B383	R-53	Resistor, variable, 500,000 ohms, VOLUME control	25B604
C-43, 44, 45	Trimmer Ass'y, oscillator stage (Bands 3, 4, & 5)	44A378	R-54	15 megohms 1/2 watt, carbon	23X20X156K
**C-46	2200 mmf. 500 V., mica	47X30D222J	R-56	Resistor, variable, 500,000 ohms, TONE control	25B589
**C-47	910 mmf. 500 V., mica	47X30D911J	R-57, 58	560 ohms 1 watt, carbon	23X30X561K
**C-48	1500 mmf. 500 V., mica	47X30D152G	R-61, 82	6.8 ohms 1 watt, carbon	23X30X068K
C-51	.1 mfd. 200 V., tubular	46AU104J	R-63	27,000 ohms 1/2 watt, carbon	23X20X273K
C-54	.02 mfd. 200 V., tubular	46AU203J	R-65	47,000 ohms 2 watts, carbon	23X40X473K
C-55	10 mmf. 500 V., ceramic	47X20UK100K	R-67	100 ohms 1/2 watt, carbon	23X20X101K
C-56	1 mfd. 50 V., electrolytic	45A163	TRANSFORMERS AND COILS		
**C-59	Capacitor, temperature compensator	44A158	T-1	Transformer, antenna stage, band 1	51B1088
**C-60	.01 mfd. 600 V., moulded	46X35X103M	T-2	Transformer, antenna stage, band 2	51B1089
C-61	60-20 mfd. 450 V., & 20 mfd. 400 V., electrolytic	45B113	T-3	Transformer, antenna stage, band 3	51B1090
C-62, 70	.01 mfd. 600 V., tubular	46AY103J	T-4	Transformer, antenna stage, band 4	51B1091
C-66	1 mmf. 450 V., ceramic	47A160-2	T-5	Transformer, antenna stage, band 5	51B1092
C-69	470 mmf. 500 V., mica	47X20B471J	T-6	Transformer, 1st IF (2.075 MC)	50C414
RESISTORS			T-7, 8	Transformer, 1st and 2nd IF (455 KC)	50C416
R-1, 30	10 ohms 1/2 watt, carbon	23X20X100K	T-9	Transformer, 3rd IF (455 KC)	50C415
R-2, 13	15 ohms 1/2 watt, carbon	23X20X150K	T-10	Transformer, FM detector	50C418
R-3, 41	1 megohm 1/2 watt, carbon	23X20X105K	T-11	Transformer, mixer stage, band 1	51B1093
R-4, 44	82 ohms 1/2 watt, carbon	23X20X820K	T-12	Transformer, mixer stage, band 2	51B1094
R-5	Resistor, variable, 10,000 ohms, SENSITIVITY control	25B582	T-13	Transformer, mixer stage, band 3	51B1095
R-6	8200 ohms 1/2 watt, carbon	23X20X822K	T-14	Transformer, mixer stage, band 4	51B1096
R-7, 39, 66	2.2 megohms 1/2 watt, carbon	23X20X225K	T-15	Transformer, mixer stage, band 5	51B1097
R-8	2200 ohms 1/2 watt, carbon	23X20X222K	T-16	Transformer, osc. stage, band 5	51B1160
			T-17	Transformer, osc. stage, band 4	51B1101

* Used on universal model SX-71U only.

** Use exact replacement part only.

MODEL SX-71

Ref. No.	Description	Manufacturer's Part Number	Ref. No.	Description	Manufacturer's Part Number
TRANSFORMERS AND COILS (Cont.)			TUBES, RECTIFIERS AND LAMPS (Cont.)		
T-18	Transformer, osc. stage, band 3	51B1100	V-10	Type 6SC7, 1st audio amplifier and beat frequency oscillator	90X6SC7
T-19	Transformer, osc. stage, band 2	51B1099	V-11	Type 6H6, automatic volume control and automatic noise limiter	90X6H6
T-20	Transformer, osc. stage, band 1	51B1098	V-12	Type 6AL5, detector	90X6AL5
T-21	Transformer, 2.53 MC osc. stage, bands 3, 4 and 5	50C448	V-13	Type 6K6GT, audio output	90X6K6GT
T-22	Transformer, power	52C174	LM-2,3	Lamp, carrier level meter light GE #44	39A003
*T-22	Transformer, power (Universal)	52C175	LM-1,4	Lamp, main dial scale light GE #47	39A004
T-23	Transformer, output	55B120	MISCELLANEOUS		
L-1	Choke, RF	53A107	TS-1	Terminal strip, antenna	88A032
L-2	Choke, filter	56B107	TS-2	Terminal strip, speaker	88B578
L-3	Coil, BFO	54B039		Escutcheon, meter	7B124
SWITCHES			M-1	Meter, carrier level	82B166
SW-1	Switch, BAND SELECTOR Section 1 (Antenna stage) and Section 2 (Mixer stage)	62B051		Plate, dial drive mounting	63B415
	Section 3 (Osc. grid)	62B049		Bracket, pulley mounting	67A1140
	Section 4 (Osc. plate)	62B050		Pulley, small idler	28A078
	Section 5 (Converter plate and bias)	62B048		Pulley, large idler	28A079
SW-2	Switch, RECEPTION	60B343		Cord, dial	38A019
SW-3	Switch, BFO-OFF	60A285		Spring, dial cord	75A173
SW-4	Switch, NOISE LIMITER-OFF	60A138		Pointer, bandspread and main tuning	82A169
SW-6	Switch, RECEIVE-STANDBY	60A139		Scale, dial	83D358
PLUGS AND SOCKETS				Window, dial	22C284
PL-1	Line Cord	87B1573		Flywheel, bandspread and main tuning	71A178
PL-2	Plug, AC shorting	35A003		Drum, bandspread and main tuning gang drives	28A080
SO-1	Socket, POWER (DC operation)	6B296		Shaft, bandspread and main tuning pulley drives	74A298
SO-2	Jack, PHONES	36A036		Shaft, bandspread and main tuning gang drives	74A299
SO-3	Jack, PHONO	36A041		Ring, retainer, tuning assembly drive shafts	76A552
	Socket, octal (tube)	6B296		Ring, retainer, tuning assembly pulley shafts	76A551
	Socket, octal (tube) with center shield	6A315		Washer, spring	4A043
	Socket, miniature	6A347		Coupling, bandspread gang shaft	29A126
	Socket, tuning dial scale lamps	86B092		Coupling, main tuning gang shaft	29A123
	Socket, carrier lever meter dial lamps	86B091		Shaft and index plate, band switch	74B267
TUBES, RECTIFIERS AND LAMPS				Collar, band switch	77A055
V-1	Type 6BA6, RF amplifier	90X6BA6		Lock, line cord	76A397
V-2	Type 6AU6, 1st converter	90X6AU6		Knob, BANDSPREAD and MAIN TUNING	15A047
V-3	Type 6BE6, 2nd converter	90X6BE6		Knob, CRYSTAL PHASING	15A087
V-4,5	Type 6SK7, 1st and 2nd IF amplifiers	90X6SK7		Knob, CW PITCH	15A089
V-6	Type 6SH7, 3rd IF amplifier	90X6SH7		Knob, POWER-VOLUME, TONE and SENSITIVITY	15A097
V-7	Type 6C4, oscillator	90X6C4		Knob, BAND SELECTOR	15B209
V-8	Type VR-150/OD3, voltage regulator	90XVR-150/OD3		Knob, RECEPTION	15A212
V-9	Type 5Y3GT, rectifier	90X5Y3GT		Foot, rubber	16A007
			X-1	Crystal, 455 KC	19A123

* Used on universal model SX-71U Only.

REPLACING LAMPS

Refer to Fig. 8 for the location of the dial lamps in the receiver. To gain access to the defective lamps, remove the chassis from the cabinet by removing the screws on the sides and bottom. The two end lamps are fastened by screws to an angle bracket. Remove the screws and change the lamp using a type Mazda #47 (brown bead) or equivalent. To change the two dial lamps in the center, remove the screws holding the sockets in place and replace the lamps using a type Mazda #44 (blue bead) or equivalent.

"S" METER ADJUSTMENT

MECHANICAL:

Turn off the receiver.

Immediately below the dial face of the "S" meter is a round metal disc. This disc is pivoted so that it may be moved to one side. Doing this discloses the pivot adjustment screw of the "S" meter. Use a screw driver and carefully rotate the screw in either direction until the needle indicates zero.

ELECTRICAL ADJUSTMENT:

Turn the receiver on.

Set the RECEIVE/STANDBY switch at RECEIVE.

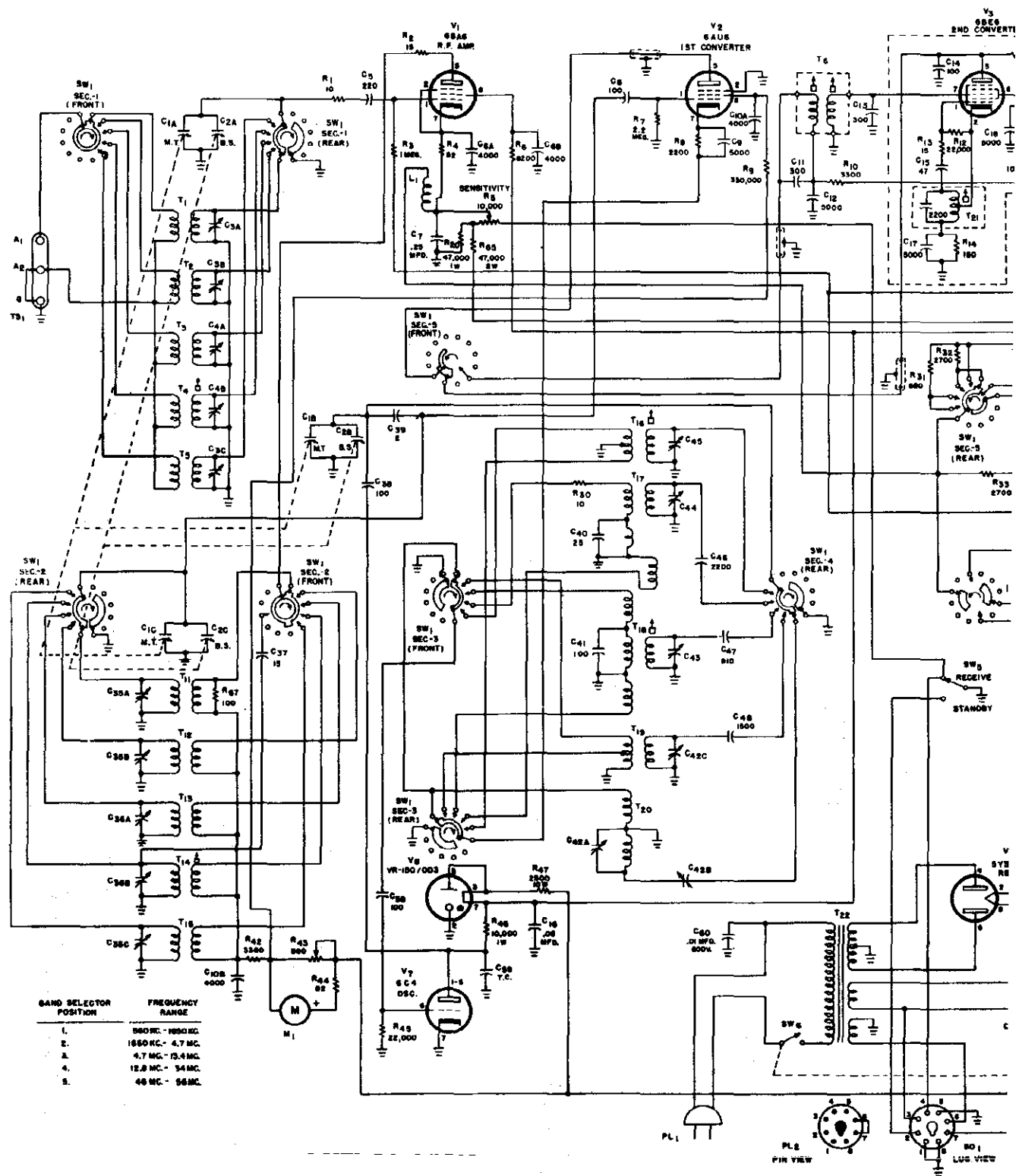
Set BFO at OFF

Set the SENSITIVITY control at maximum.

Set the NOISE-LIMITER at OFF.

Short the antenna terminals to ground.

The "S" meter adjustment control is located on the left rear apron of the chassis. Turn this control slowly until the needle in the "S" meter indicates zero.



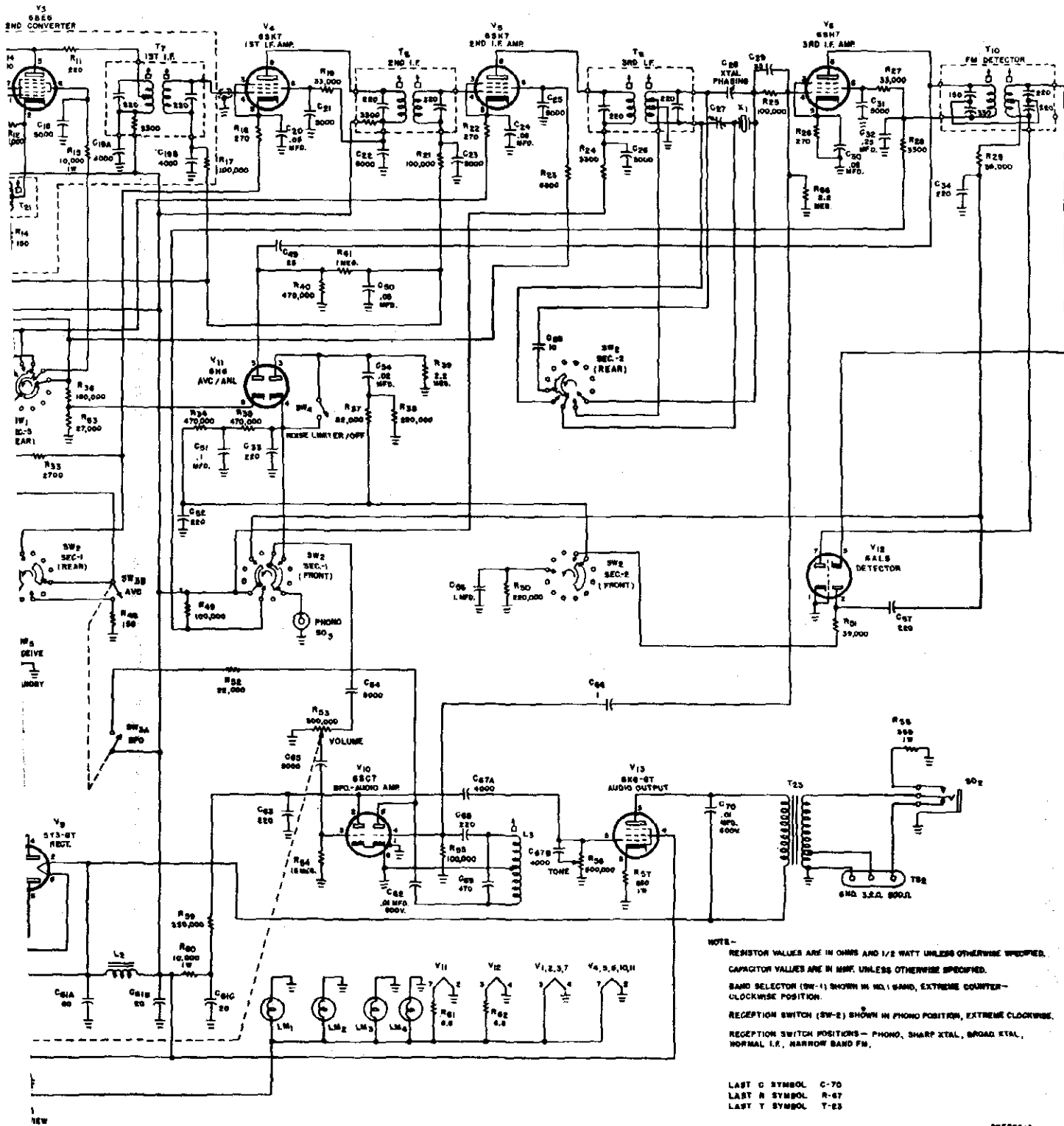


Fig. 10. Schematic diagram

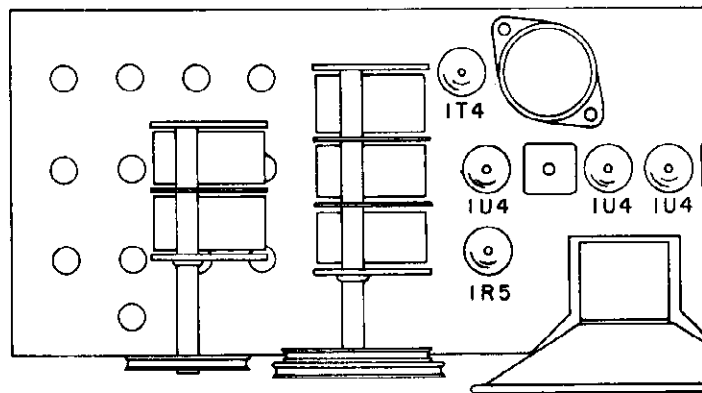


Fig. 8. Top view, location of tubes

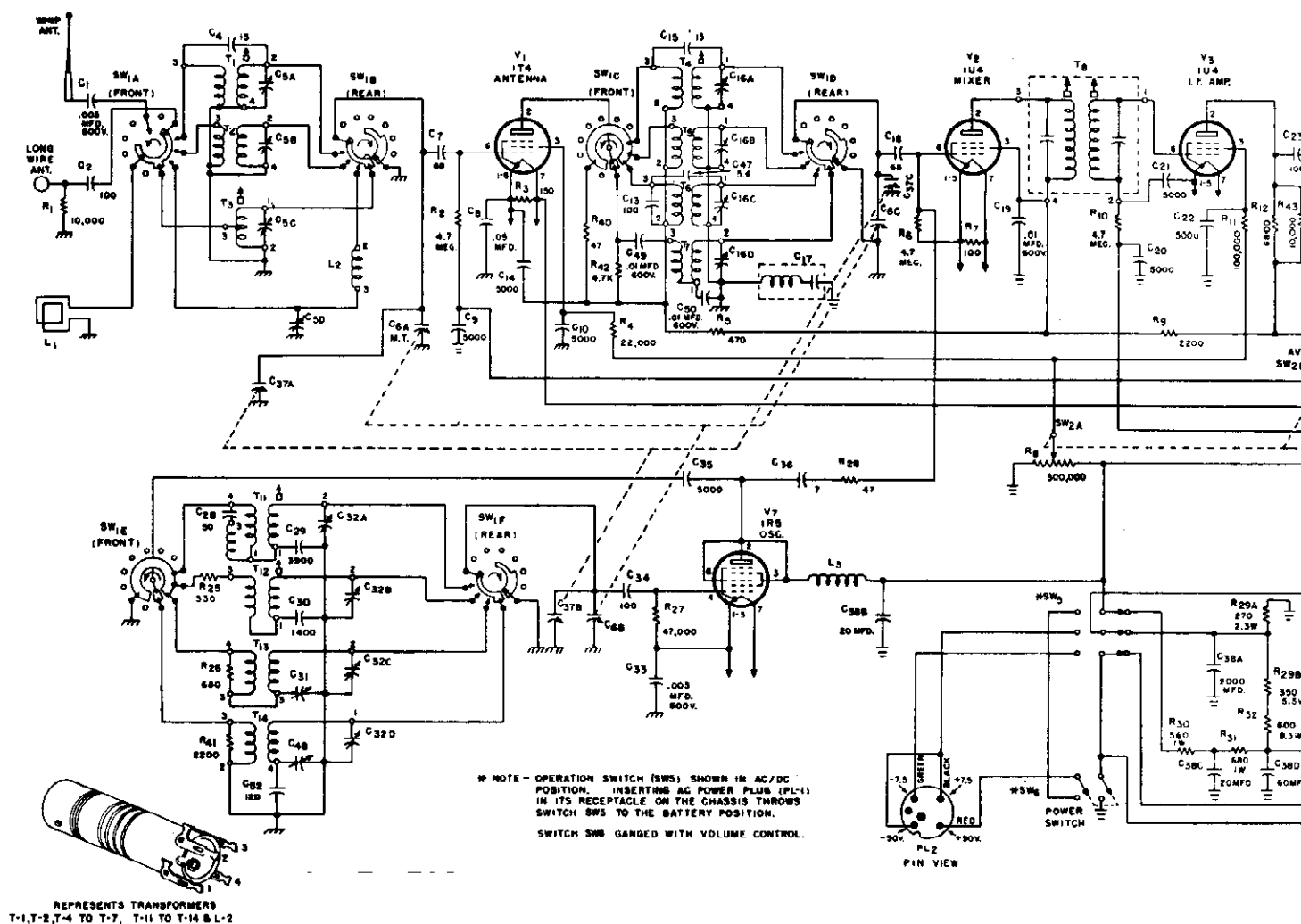
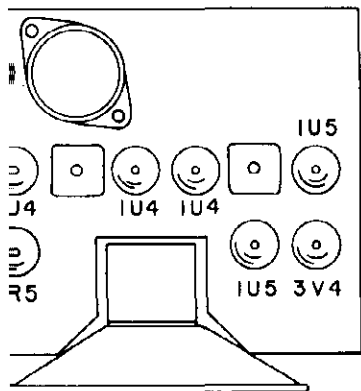
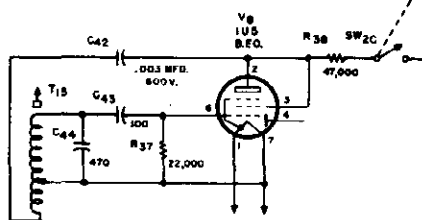
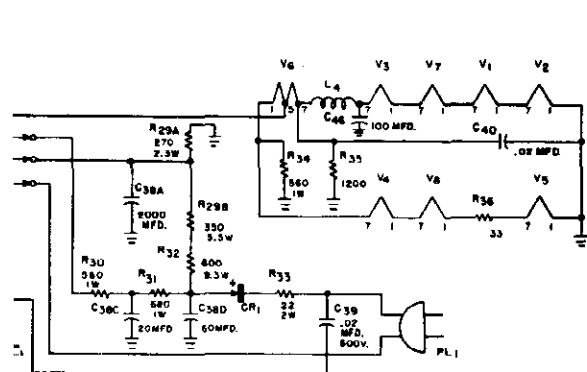
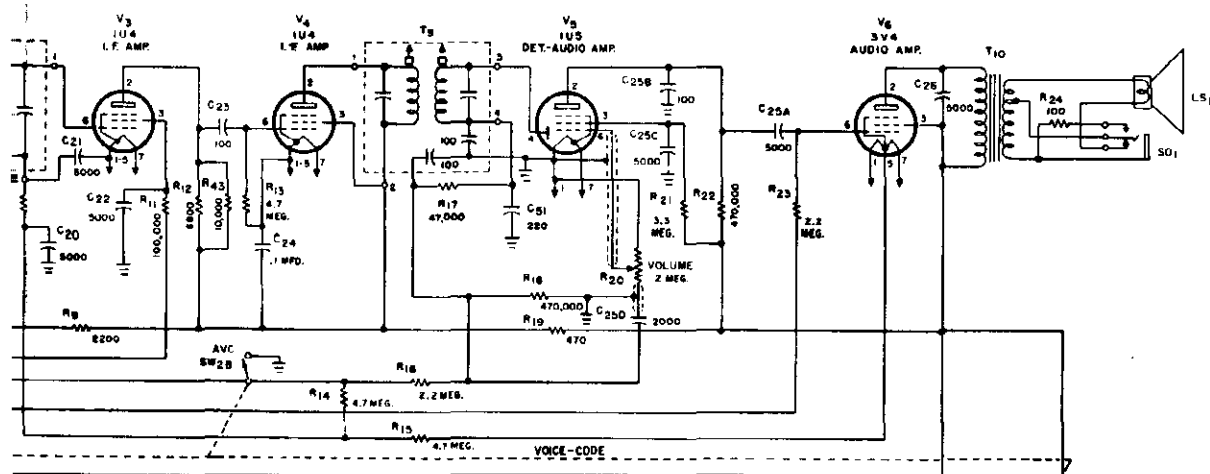


Fig. 9. Schematic diagram.



92C890-0

ation of tubes



NOTE - ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.
CAPACITOR VALUES ARE IN MMF. UNLESS OTHERWISE SPECIFIED.
⊥ INDICATES ELECTRICAL GROUND BUSS.
--- INDICATES CHASSIS GROUND.
BAND SWITCH SHOWN IN NO. 1 BAND POSITION.

LAST RESISTOR SYMBOL - R43
LAST CAPACITOR SYMBOL - C53

89E334-0

tic diagram.

GENERAL

Tubes Eight plus selenium rectifier

Speaker 5-inch PM

Speaker V.C. Impedance . . . 3.2 ohms (100 ohm headset tap)

Headset Output. For 500 to 5000-ohm phones

Antenna Loop for bands 1 and 2.
Whip for bands 3 and 4.

Provisions for connection to an external antenna

Tuning Manual

Tuning Range. Band Selector *Frequency
Position Range

1.	180 kc - 400 kc
2.	550 kc - 1600 kc
3.	1.6 mc - 4.4 mc
4.	4.5 mc - 11.5 mc

*First and last dial calibration.

Intermediate Frequency. . . 455 kc.

Power Supply. 105-125 V. DC/60 cycles AC or Battery Pack

Power Consumption 25 Watts

RESTRINGING DIAL CORD

GENERAL COVERAGE DIAL

The general coverage dial drive is a two string system, one between the drive shaft and the rear gang drum and the other between the front gang drum and the general coverage dial pointer. The drive shaft system requires a 30-inch length of 30 lb test dial cord, and the pointer system requires a 24-inch length of the same type cord.

To restringing the drive shaft system, tie the string at position "1" (Fig. 1) and follow the sequence, "1" through "11". Stretch the tension spring at "11" and tie the cord securely.

To restringing the general coverage pointer drive system, tie the string at position "A" (Fig. 1) and follow the Sequence "A" through "I". Stretch the tension spring at "I" and tie the cord securely. Set the general coverage gang at maximum capacity and attach and index the pointer with the left hand reference mark on the dial scale.

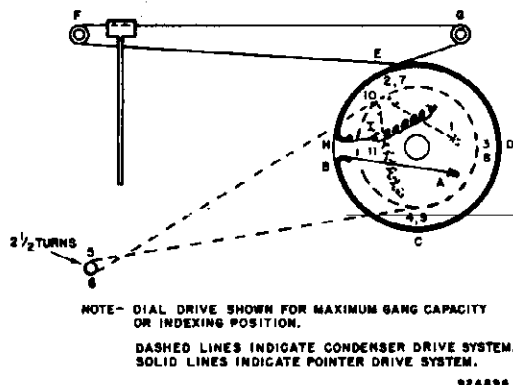
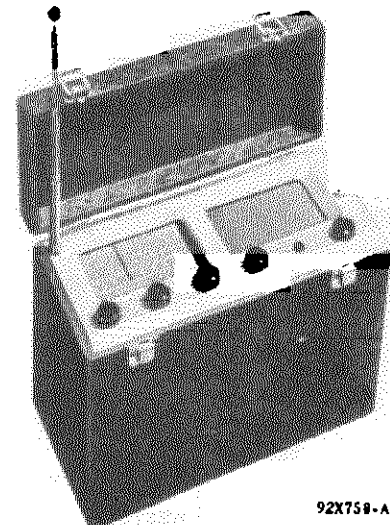


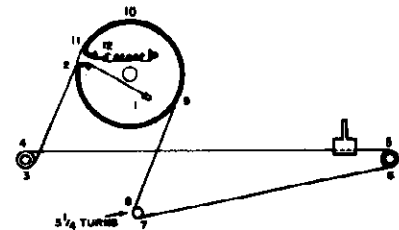
Fig. 1. Dial cable stringing procedure, general coverage



92X758-A

BAND SPREAD DIAL

To restringing the bandspread tuning dial drive, cut an 18-inch length of 30 lb test dial cord and tie one end to the pulley anchor at position "1" shown in Fig. 2. String up the drive following the sequence "1" through "12" and at position "12" stretch the tension spring and tie the cord securely. Set the bandspread gang at minimum capacity and attach and index the pointer at "0" on the bandspread scale.



92A893

Fig. 2. Cable stringing procedure, band spread

BATTERY REPLACEMENT

A strip of canvas webbing and a hold down screw are used to keep the battery in the cabinet. To replace the battery, disconnect the battery plug and loosen the hold down screw. Refer to Fig. 3.

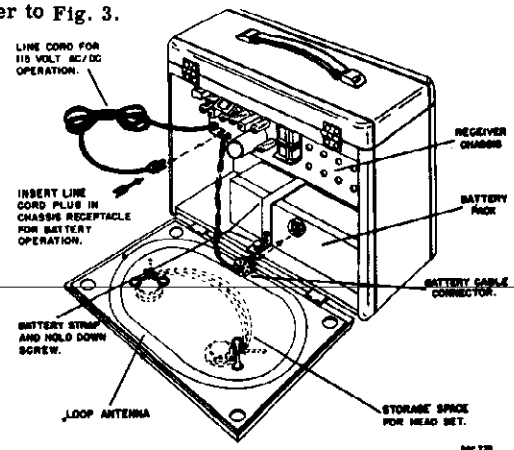


Figure 3. Battery compartment

MODEL S-72L

Suitable replacement packs can be found from the list shown below.

REPLACEMENT BATTERY LIST

Manufacturer	Type No.	Manufacturer	Type No.
BRIGHT STAR	86-50	OLIN	0615 0614
BURGESS	G6M60 F6A60	RAY-O-VAC	AB878 AB994
DELCO	8760	RCA	VS018 VS019
EVERREADY	754 753	SEARS	
GENERAL	60BF65 60A6F65	ROEBUCK	67E605
MONTGOMERY		USALITE	680
WARD	62A35M 62A33	WESTERN	
NATIONAL UNION	N808	WIZARD	60B6F6/5 60A6F6/5

NOTE - Only one battery pack of the type listed above is required.

CAUTION - When the receiver is to operate on batteries it is necessary to insert the line cord plug in the chassis receptacle as shown in Fig. 3.

ALIGNMENT PROCEDURE

It will be necessary to remove the battery and receiver chassis from the cabinet to make the I.F. alignment adjustments. To do this remove the knobs and jack nut from the control panel; remove the panel escutcheon and unfasten the phone jack; unsolder the antenna connections, two for the loop antenna and one for the whip antenna; and remove the two wood screws anchoring the angle brackets of the chassis to the cabinet and lift out of the case.

The primaries of the I.F. transformers are adjusted from the bottom of the chassis and the secondaries are adjusted from the top of the chassis.

Before making any alignment adjustments, check the general coverage dial pointer and bandspread dial pointer for proper index. The general coverage dial pointer should index with its gang condenser set at maximum capacity and the bandspread dial pointer should index at zero with its gang condenser set at minimum capacity.

Set the following controls before alignment.

VOLUME Set at maximum

VOICE/CODE Set max. clockwise (VOICE)

BAND SPREAD Set at 0

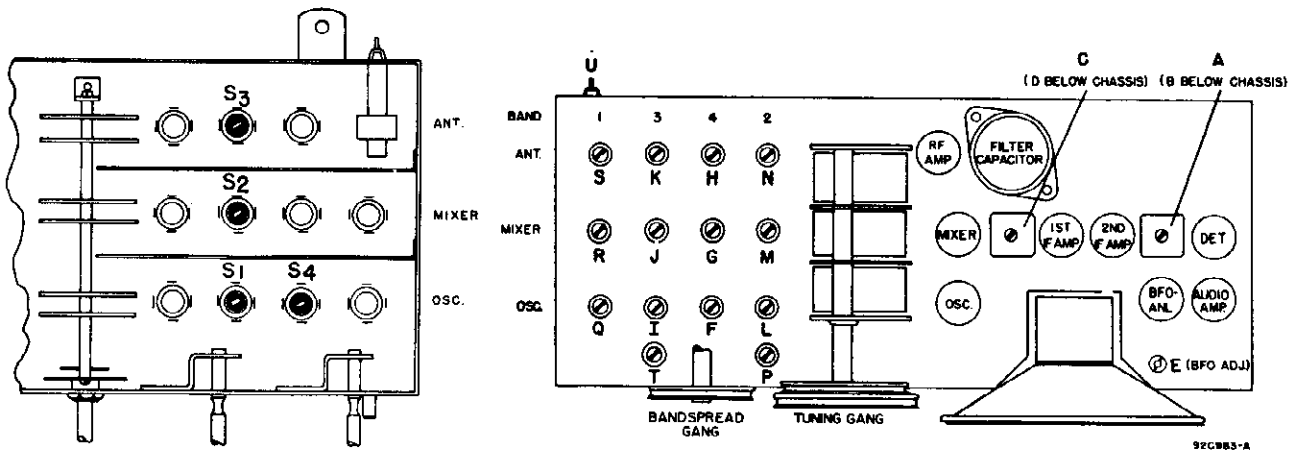
ALIGNMENT CHART

Step	Dummy Antenna	Signal Generator Coupling	Signal Generator Frequency	Band Switch Setting	Receiver Dial Setting	Adjust	Remarks
1.	None	Stator plates in center section of tuning gang	455 kc	"1"	1000 kc	A,B,C,D	Maximum audio output at speaker voice coil. Use just enough signal generator output to obtain a 50 mw signal level.
2.	None	See step 1.	455 kc (No mod.)	"1"	1000 kc	E	With the VOICE/CODE control set for code reception, adjust E for a 1000 cycle note.
3.	10 mmf from ext. antenna lead to chassis.	Couple the generator to the ext. ant. lead thru a 15 mmf capacitor	11.5 mc 5 mc	"4"	11.5 mc 5 mc	*F,G,H *S1,S2, S3	Maximum output as in step 1.
4.	See step 3	See step 3	4.4 mc 1800 kc	"3"	4.4 mc 1800 kc	*I,J,K *S4	Maximum output as in step 1.
**5.	See step 3	See step 3.	1500 kc 600 kc	"2"	1500 kc 600 kc	*L,M,N *P	Maximum output as in step 1.
**6.	See step 3.	See step 3.	400 kc 180 kc	"1"	400 kc 180 kc	*Q,R,S *T,U	Maximum output as in step 1.

NOTES -

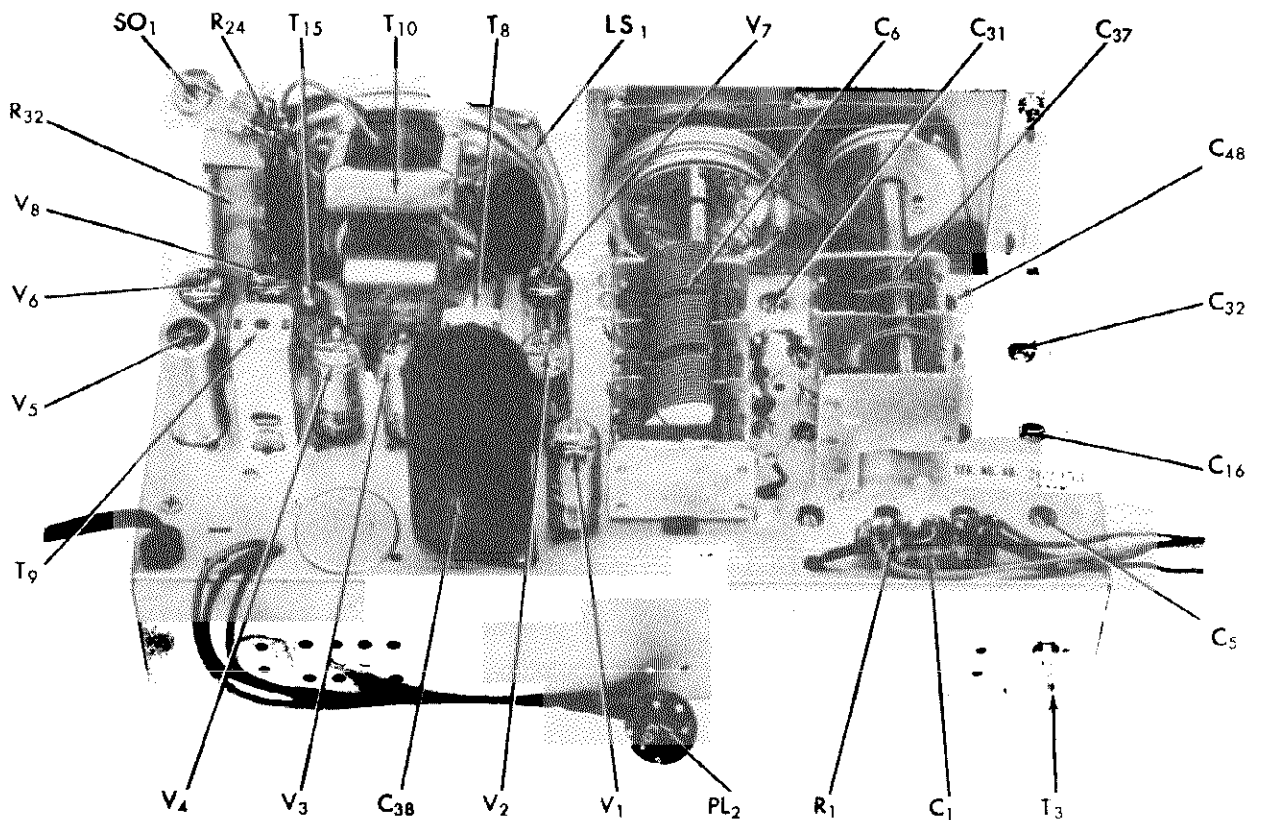
*Calibration adjustment.

**Loop must be connected for this step.



Bottom view alignment points.

Figure 4. Alignment points



92X977

Figure 5. Top view, component location

MODEL S-72L

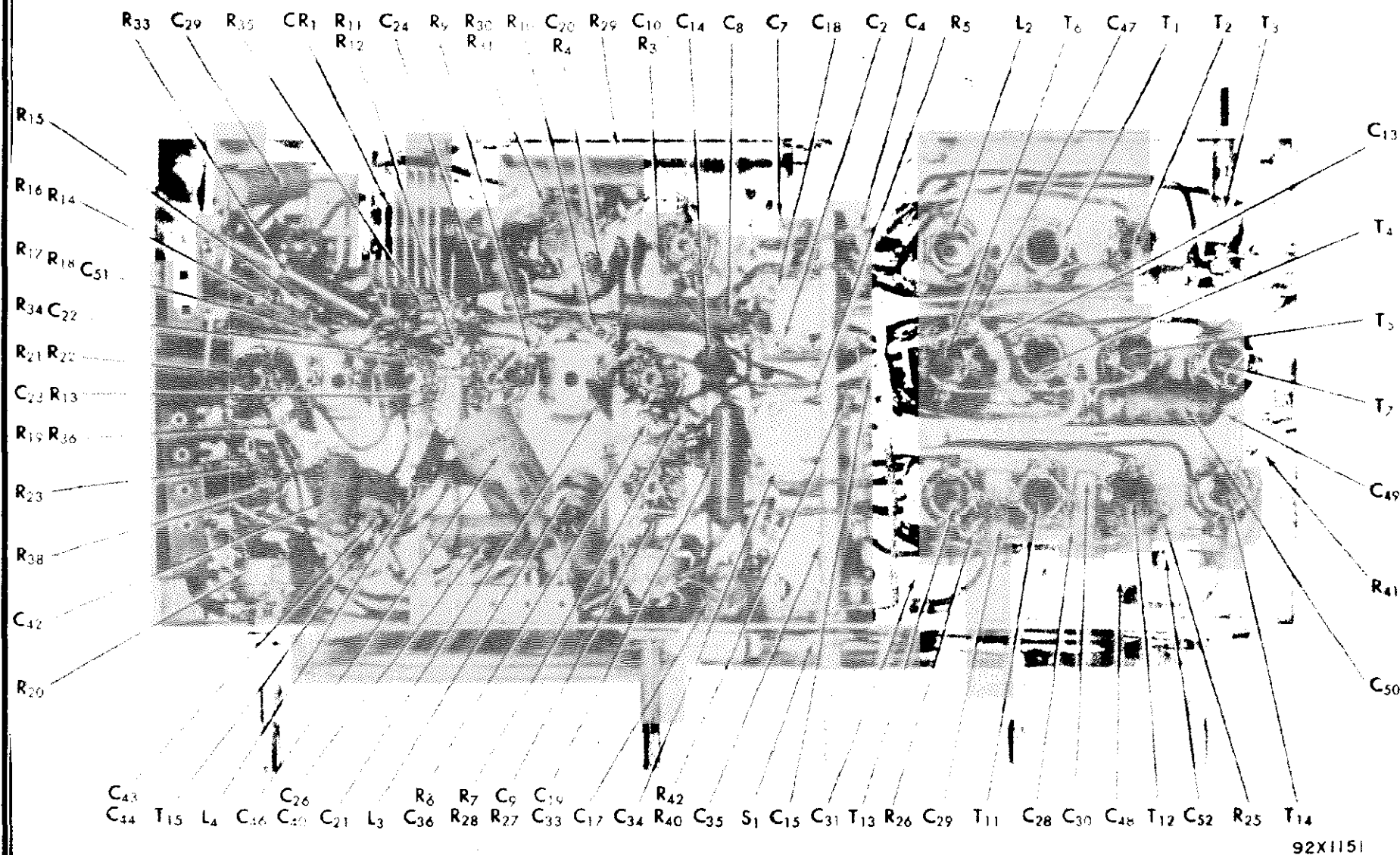
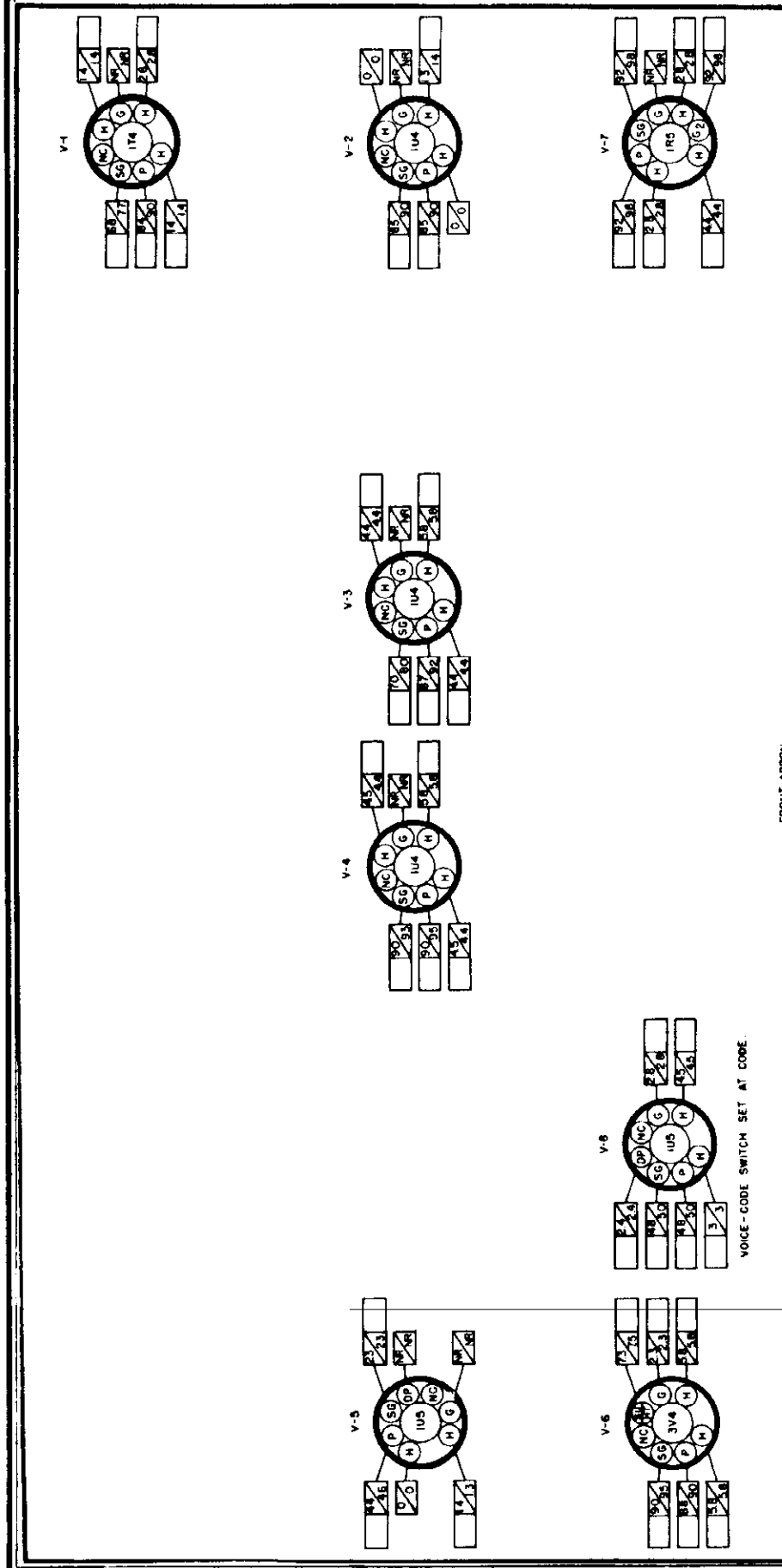


Figure 6. Bottom view, component location

92X1151



- NOTES -
1. SOCKET VIEWS ARE BOTTOM VIEWS
 2. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS & THE ELECTRICAL GROUND BUSS (NOT CHASSIS) WITH ZERO SIGNAL INPUT
 3. LINE VOLTAGE - 117V AC
 4. BATTERY VOLTAGES TAKEN WITH FRESH BATTERY PACK
 5. ALL VOLTAGES SHOWN ARE DC UNLESS OTHERWISE SPECIFIED
 6. DC VOLTAGES SHOWN WERE MEASURED WITH AN ELECTRONIC VOLTMETER
 7. 'NC' - NO CONNECTION
 8. 'NR' - NOT READABLE (READING GENERALLY MEANINGLESS)
 9. SPACE PROVIDED FOR SERVICE METER READINGS
 10. UPPER VOLTAGE READINGS IN INDICATOR SPACE SHOW BATTERY OPERATION
 11. VOLTAGES FOR TUBE V-8 ARE SHOWN WITH VOICE-CODE SWITCH IN CODE POSITION
 12. ALL READINGS TAKEN WITH LINE PLUG POLARIZED SO THAT GROUND BUSS & CHASSIS ARE AT SAME POTENTIAL AS THE CHASSIS GROUND

Figure 7. Tube socket voltage chart

MODEL S-72L

SERVICE PARTS LIST

Ref. No.	Description	Manufacturer's Part Number	Ref. No.	Description	Manufacturer's Part Number
CAPACITORS			TRANSFORMERS AND COILS		
C-1,33,42	.003 mfd., 600 V., tubular	46A2302J	T-1	Transformer, antenna stage, band 4	51B1250
C-2,13,23,34	100 mmf., 500 V., ceramic	47B20101K5	T-2	Transformer, antenna stage, band 3	51B1137
C-4,15	15 mmf., 500 V., ceramic	47B20150K5	T-3	Transformer, antenna stage, band 1	51B1191
C-5	Trimmer, ant. ass'y., 4 sections (Bands 1,2,3,4)	44B385	T-4	Transformer, mixer stage, band 4	51B1253
C-6	Tuning capacitor, 3 sections	48C221	T-5	Transformer, mixer stage, band 3	51B1248
C-7,18	68 mmf., 500 V., ceramic	47B20680K5	T-6	Transformer, mixer stage, band 2	51B1247
C-8	.05 mfd., 200 V., tubular	46AU503J	T-7	Transformer, mixer stage, band 1	51B1192
C-9,10,14,20	5000 mmf., 500 V., ceramic	47A168	T-8	Transformer, 1st I.F.	50C233
21,22,26			T-9	Transformer, 2nd I.F.	50C234
35			T-10	Transformer, audio output (part of speaker ass'y. LS-1)	
C-16	Trimmer, mixer ass'y., 4 sections, (Bands 1,2,3,4)	44B386	T-11	Transformer, osc. stage, band 4	51B1254
C-17	Capacitor, resonant (455KC)	46A174	T-12	Transformer, osc. stage, band 3	51B1255
C-19,49,50	.01 mfd., 600 V., tubular	46AY103J	T-13	Transformer, osc. stage, band 2	51B1144
C-24	.1 mfd., 200 V., tubular	46AU104J	T-14	Transformer, osc. stage, band 1	51B1193
C-25	Capacitor, composite; .002, .005, .0001, .005 mfd., 500 V., ceramic	47A203	T-15	Transformer, B.F.O. (With mtg. clip)	50B402
C-28	50 mmf., 500 V., ceramic	47B20500K5	L-1	Loop antenna	57C125
C-29	3900 mmf., 500 V., mica	47X35A392J	L-2	Coil, antenna loading band 2	51B1136
C-30	1400 mmf., 500 V., mica	47X30A142J	L-3	Choke, R.F.	53A008
C-31	Padder, adjustable (Band 2)	44A376	L-4	Choke, filament	53A121
C-32	Trimmer, osc. ass'y., 4 section (Bands 1,2,3,4)	44B387			
C-36	7 mmf., 500 V., ceramic	47X20UK070K		SWITCHES	
C-37	Capacitor, band spread	48C227	SW-1	Switch, band (6 section ass'y. complete)	60C380
C-38	60-20-20 mfd., 150 V., 2000 mfd., 15 V., electrolytic	45B162	SW-2	Switch, VOICE/CODE, (Part of r-f gain control, R-8)	
C-39	.02 mfd., 600 V., moulded paper	46BR203L6	SW-5	Switch, AC/DC - battery change over	60A363
C-40	.02 mfd., 200 V., tubular	46AU203J	SW-6	Switch, ON-OFF (D.P.S.T. power switch, part of volume control R-20)	
C-43	100 mmf., 500 V., mica	47X20A101M		PLUGS AND SOCKETS	
C-44	470 mmf., 500 V., mica	47X20A471K	PL-1	Line cord	87B1683
C-46	100 mfd., 25 V., electrolytic	45A116	PL-2	Battery plug, 6 prong	10A344
C-47	5.6 mmf., 500 V., composition	47A160-7	SO-1	Jack, phone	36A036
C-48	Padder, adjustable (Band 1)	44A364		TUBES AND RECTIFIERS	
C-51	220 mmf., 500 V., ceramic	47B20221K5	V-1	Type 1T4, r-f amplifier	90X1T4
C-52	120 mmf., 500 V., mica	47X20B121K	V-2,3,4	Type 1U4, mixer, 1st and 2nd i-f amplifier	90X1U4
	RESISTORS		V-5,8	Type 1U5, detector and B.F.O.	90X1U5
R-1,43	10,000 ohms, 1/2 watt, carbon	23X20X103K	V-6	Type 3V4, audio power amplifier	90X3V4
R-2,6,10,13,14,15	4.7 megohms, 1/2 watt, carbon	23X20X475M	V-7	Type 1R5, oscillator	90X1R5
R-3	150 ohms, 1/2 watt, carbon	23X20X151K	CR-1	Rectifier, selenium	27A151
R-4,37	22,000 ohms, 1/2 watt, carbon	23X20X223K		MISCELLANEOUS	
R-5,19	470 ohms, 1/2 watt, carbon	23X20X471K		Socket, 7 prong miniature (tube)	6B300
R-7,24	100 ohms, 1/2 watt, carbon	23X20X101K		Lock, line cord (Female)	76A397-2
R-8	Resistor, variable, 500,000 ohms, VOICE/CODE control	25B847		Lock, line cord (Male)	76A397-1
R-9,41	2200 ohms, 1/2 watt, carbon	23X20X222K		Escutcheon	7D109
R-11	100,000 ohms, 1/2 watt, carbon	23X20X104K		Escutcheon, dial	22B250
R-12	6800 ohm, 1/2 watt, carbon	23X20X682K		Plate, dial (calibrated)	83C359
R-16,23	2.2 megohms, 1/2 watt, carbon	23X20X225M		Knob	15B172
R-17,27,38	47,000 ohms, 1/2 watt, carbon	23X20X473K		Knob (with dot)	15B177
R-18,22	470,000 ohms, 1/2 watt, carbon	23X20X474K		Pointer, main tuning	82A161
R-20	Resistor, variable, 2 megohms, VOLUME control	25B839		Pointer, band spread	82A161-1
R-21	3.3 megohms, 1/2 watt, carbon	23X20X335M		Cord, dial drive	38A001
R-25	330 ohms, 1/2 watt, carbon	23X20X331K		Cord, pointer drive	38A017
R-26	680 ohms, 1/2 watt, carbon	23X20X681K		Spring, dial drive	75A012
R-28,40	47 ohms, 1/2 watt, carbon	23X20X470K		Pulley, idler	28A052-7
R-29	270 ohms, 2.3 watts; 350 ohms, 5.5 watts; WW	24A912		Shaft, tuning	74A274
R-30,34	560 ohms, 1 watt, carbon	23X30X561K		Antenna, whip	57B142
R-31	680 ohms, 1 watt, carbon	23X30X681K		Antenna, insulator	65A534
R-32	600 ohms, 9.3 watts, WW	24A913	LS-1	Speaker	85C093
R-33	22 ohms, 2 watts, WW	24BV220E		Strap, battery	76B467
R-35	1200 ohms, 1/2 watt, carbon	23X20X122K		Cabinet	78F491
R-36	33 ohms, 1/2 watt, carbon	23X20X330K			
R-42	4700 ohms, 1/2 watt, carbon	23X20X472K			

The RF section uses separate oscillator and mixer tubes to allow maximum conversion gain over the short wave bands. The mixer and I.F. stages use 12SH7 high frequency type tubes and the sensitivity thus obtained is higher than normally obtained with an additional stage. Full AVC action is provided with both I.F. and mixer tubes controlled. Diode detection is used for maximum fidelity. The 12A6 beam power output is driven by the pentode section of the 12C8, giving adequate output. Inverse feedback is used from the voice coil winding to the 12A6 cathode, improving the frequency response.

The power supply uses a 5Y3 full wave rectifier and a husky, high quality varnish impregnated power transformer, with a metal cased filter condenser for adequate filtering and long life, thus providing full operating voltages for all tubes.

NOTE: If replacement of the 1626 oscillator tube is required, either another 1626, or a 12J5 tube may be used.

The band switching coil unit is assembled on a separate small chassis to simplify its construction resulting in one of the simplest coil turrets ever designed. The IF transformers are of the dual iron core tuned type which give the greatest gain per stage and are far more stable than the cheaper trimmer type usually supplied. The six inch calibrated slide rule dial has a 9 to 1 vernier drive to allow tuning of weak short wave signals.

Upon completion of the wiring, the tuned circuits must be aligned to produce maximum sensitivity and selectivity, and to calibrate the dial scale. If a signal generator is available (your own, or borrowed from a friend), follow the procedure as outlined. If a signal generator cannot be obtained, we suggest that you have your local radio service man align the receiver in accordance with the instructions in this manual.

For local reception, a short indoor antenna is generally sufficient. For best reception, a high outdoor antenna is recommended. The antenna should be connected to the antenna terminal (screw terminal nearest edge of chassis).

A ground connection may improve reception also, and should be tried if maximum performance is desired. For a good ground, use a COLD water pipe or a ground rod. Use as short and direct a wire as possible between the pipe or rod and the ground terminal (screw terminal farthest from edge of chassis).

A loudspeaker of the PM dynamic type with 3-4 ohm voice coil impedance should be connected to the set by attaching the two prong speaker plug to the speaker leads and plugging into the speaker socket. If a 6-8 ohm speaker is available, it may be used without materially affecting the performance. For best results in small cabinets, we recommend the Heathkit 5" speaker (Stock #320). If a larger cabinet is available, the Heathkit 8" speaker (Stock #325) will provide better reproduction of the lower register.

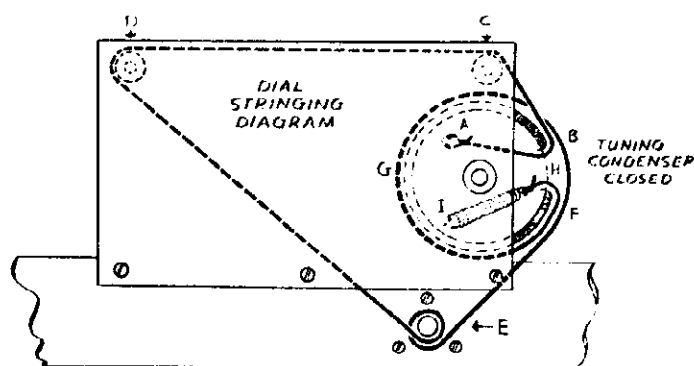
A record player or changer using a crystal type pickup cartridge may be connected to this receiver to provide superior reproduction of recordings. Connect the pickup by plugging the lead into the phono socket. If your player does not have the standard plug, remove existing plug and attach the phono plug supplied with the kit. Plug the line cord for the turn table motor into the 110V. outlet on the chassis.

The phono-radio switch is combined with the tone control. Turning the control fully counter-clockwise connects the record player, while turning the control fully clockwise connects the radio circuits. Full use of the tone control is possible on either switch setting.

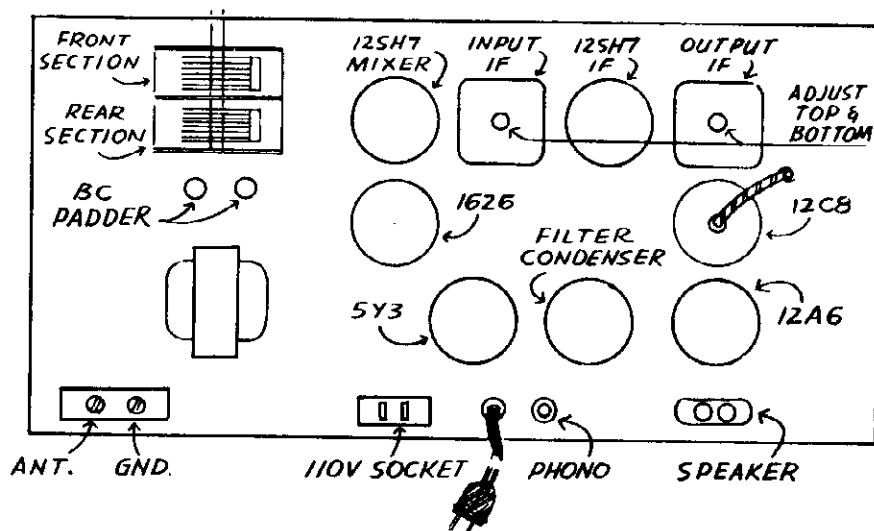
Four controls are provided on the front of the receiver. From left to right, they are the on-off switch and volume control, the phono-radio switch and tone control, the tuning control and the band switch.

NOTE: The pilot light is connected in the rectifier circuit to permit the use of a standard pilot light bulb. The socket is, therefore, about 300 Volts above chassis. DO NOT TOUCH SOCKET WITH SET TURNED ON.

MODEL AR-1



TOP VIEW OF CHASSIS
SHOWING LOCATION
OF TUBES - I.F. ADJUSTMENT
SCREWS - B.C. PADDER
(SEE COIL BRACKET
PICTORIAL FOR S.W. -
POLICE - B.C. ADJUSTMENT
SCREWS)



ALIGNMENT

Connect a signal generator ground lead to the chassis. Connect the signal generator output ("hot") lead through a .01 MFD condenser to pin #4 on the 12SH7 IF socket (IF grid). Turn signal generator on and set to 456 kc. The signal, if modulated, may be observed by noting the loudness at the speaker, or on the scale of an output meter connected across the speaker terminals. If the signal is unmodulated it may be observed on the scale of a vacuum tube voltmeter connected across the volume control. With the volume and tone controls turned fully clockwise, turn the brass screws in the top and bottom of the output IF transformer for maximum indication. Use as low an indication as possible by reducing the output from the signal generator as the receiver sensitivity increases.

Without disturbing the signal generator dial, remove the .01 MFD condenser from pin #4 on the 12SH7 IF socket and connect to pin #4 on the 12SH7 mixer socket (mixer grid). Set band switch to center (BC) position. Remove 1626 (oscillator) tube from its socket. Adjust the brass screws in top and bottom of input IF transformer for maximum indication as described in step 23. Note: Do not adjust the output IF screws with the signal generator connected to the converter grid. This completes the IF alignment.

Replace the oscillator tube. Remove the generator from the converter grid. Connect the generator to the ANT. post through a 400 ohm resistor (used as dummy antenna). Set band-switch clockwise to SW position. Turn tuning condenser till fully unmeshed or open. Set signal generator to 20.5 MC. Adjust the SW oscillator trimmer for reception of signal. Then check if setting is correct by tuning signal generator to 21.412 MC. (approximately), where the image should be observed. If the second signal is found at a signal generator setting of 19.588 MC. (approximately), the SW oscillator trimmer should be unscrewed slightly until proper response is obtained. Now set signal generator to 18 MC. Tune receiver to receive this signal at 18 MC., and adjust SW antenna trimmer for maximum indication. This completes the SW alignment.

Set the bandswitch counter clockwise to the police band. Turn tuning condenser till fully unmeshed or open. Set signal generator to 5.6 MC. Adjust the police oscillator trimmer for reception of signal. Then check if setting is correct by tuning signal generator to 6.512 MC (approximately), where the image should be observed. If the second signal is observed at a signal generator setting of 4.688 MC. (approximately), the police oscillator trimmer should be unscrewed until proper response is obtained. Now set signal generator to 5.0 MC. Tune receiver to receive this signal at 5.0 MC., and adjust police antenna trimmer for maximum indication. This completes the police band alignment.

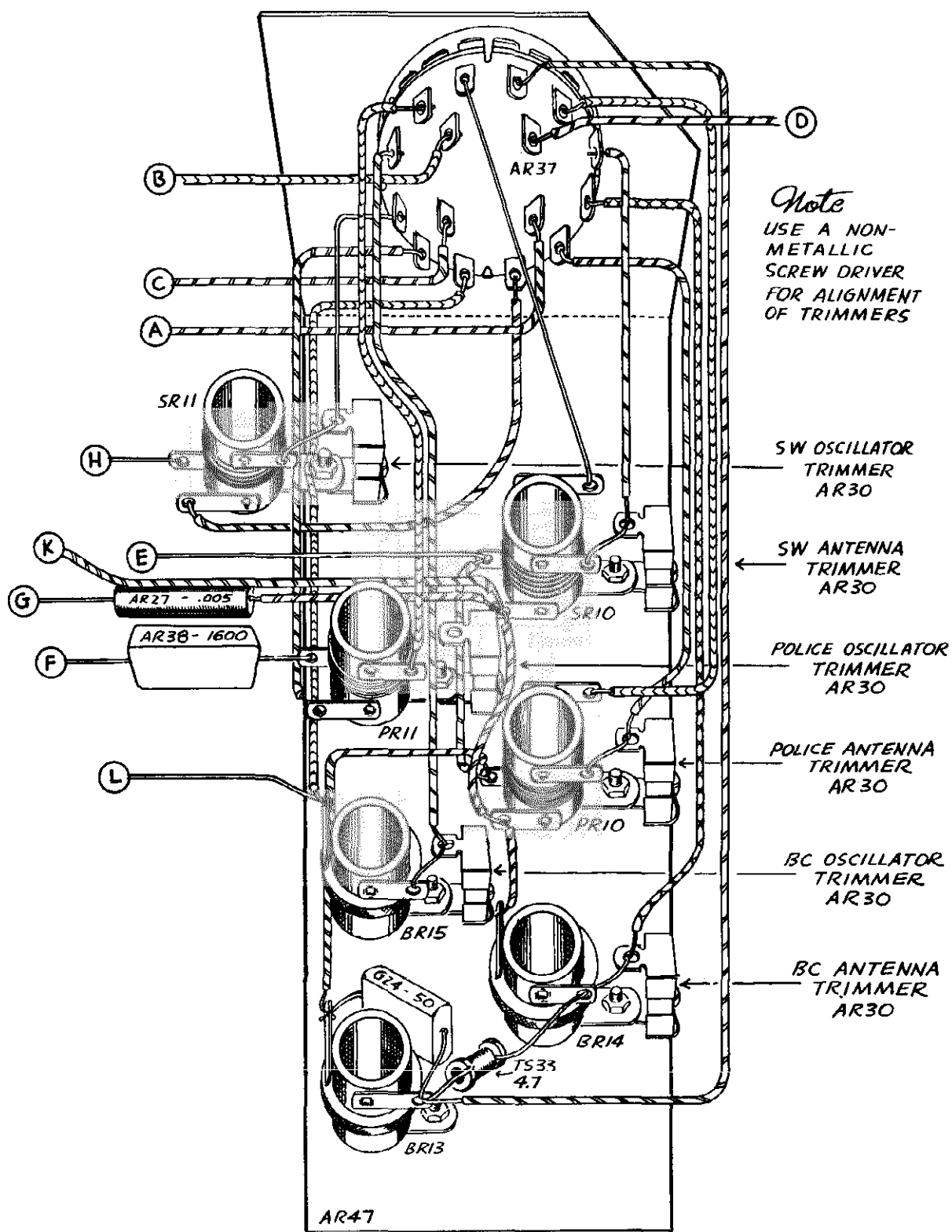
Remove the 400 ohm resistor and use a 250 MMF condenser instead in series with the signal generator to the ANT. post. Set the bandswitch to center position (BC). Turn tuning condenser till fully unmeshed or open. Set signal generator to 1620 kc. Adjust the BC oscillator trimmer for reception of signal. Reset signal generator to 540 kc. Turn tuning condenser till fully meshed or closed. Adjust the BC Padder for maximum indication. Recheck the BC oscillator trimmer adjustment, as above. Set signal generator to 1500 kc. Tune receiver to receive this signal at 1.5 MC., and adjust BC antenna trimmer for maximum indication. This completes the alignment of the receiver.

Check the voltages at the tube sockets. A table of approximate voltages is given below. These readings were obtained with a Heathkit VTVM with 11 megohms input resistance. Variation of plus or minus 15% may be expected.

Pin No.	1626	12SH7 Mixer	12SH7 I.F.	12C8	12A6	5Y3
1	0	0	0	0	0	
2	10-14 VAC	10-14 VAC	10-14 VAC	10-14 VAC	10-14 VAC	290-330
3	70-120	1-2	$\frac{1}{2}$ -1	50-90	280-320	
4	0	Slightly Neg.	Slightly Neg.	Slightly Neg.	220-260	300-340V A
5	5-50 V Neg.	1-2	$\frac{1}{2}$ -1	Slightly Neg.	0	
6		120-150	120-150	25-50		300-340V A
7	0	0	0	0	0	Tie Point
8	0	220-260	220-260	0	9-15	290-330

HEATHKIT REPLACEABLE PARTS AVAILABLE

AR29 15-10 MFD--El. Cond. . .
 AR10 Dual Tuning Cond. . . .
 AR18 1 Meg. Control w. Sw. . .
 AR41 500 K. Control w. Sw. . .
 AR37 4 Pole 3 pos. Bandsw. . .
 BR16 Input IF Transformer . . .
 BR17 Output IF Transformer . .
 BR24 Power Transformer. . . .
 AR44 Output Transformer. . . .
 BR13 Ant. Pri. (BC) Coil
 BR14 Ant. Sec. (BC) Coil
 BR15 Oscillator (BC) Coil. . . .
 PR10 Ant. (Police) Coil.
 PR11 Oscillator (Police) Coil. .
 SR10 Ant. (SW) Coil.
 SR11 Oscillator (SW) Coil. . . .
 AR48 Panel



AR - 1

PARTS LIST

Part No.	Parts Per Kit	Description	Part No.	Parts Per Kit	Description
Resistors			Sockets-Plugs-Terminal Strips		
SW11	2	100 Ohm	AR32	6	Tube Sockets
AR25	1	330 Ohm	AR12	1	Speaker Socket
T11	1	470 Ohm 1 Watt	AR13	1	Speaker Plug
BR26	1	2,700 Ohm 2 Watt	A14	1	Phono Socket
FM36	1	27 K Ohm	A19	1	Phono Plug
BR43	1	25K-30K Ohm 2 Watt	P13	1	110V Socket
A10	2	47 K Ohm	C25A	1	Pilot Lamp Socket
O12	1	100 K Ohm	FM17	1	Dual Binding Post
O18	2	470 K Ohm	O38	2	Single Terminal Strip
O17	2	1 Megohm	S32	1	Dual Terminal Strip
C10	1	10 Megohm	Dial Parts-Knobs		
Condensers			AR42	1	Dial Drum Assembly
TS33	1	4.7 MMF Ceramic	AR16	1	Dial Plate Assembly
G24	2	47-50 MMF Mica	FM20	1	Dial Cord
AR26	2	150 MMF Ceramic	FM21	1	Dial Cord Spring
AR38	1	1,600 MMF Mica	AR33	1	Dial Pointer
AR27	7	.005 MFD Paper	AR24	1	Drive Shaft Bracket
AR28	4	.05 MFD Paper	AR21	1	Drive Shaft
T40	1	10 MFD-25V. Electrolytic	AR23	2	"E" Washers
AR29	1	15 - 10 MFD-450V Electro-	V48	4	Acorn Knobs
AR30	6	3-30 MMF Trimmer	Transformers		
AR43	1	300-450 MMF Padder	BR24	1	Power
AR10	1	Dual tuning Condenser	AR44	1	Output
Coils			Screws-Nuts-Washers-Spacers		
BR13	1	Ant. Pri (BC)	O31	41	6-32 x $\frac{1}{2}$ Screws
BR14	1	Ant. Sec. (BC)	IB48	1	6-32 x 1 Screw
BR15	1	Oscillator (BC)	TC46	7	#6 x $\frac{1}{2}$ Sheet Metal Screws
PR10	1	Antenna (Police)	G52	4	8-32 x $\frac{1}{2}$ Screws
PR11	1	Oscillator (Police)	S22	43	6-32 Nuts
SR10	1	Antenna (SW)	TP16	4	8-32 Nuts
SR11	1	Oscillator (SW)	O33	4	Control Nuts
BR16	1	Input IF Transformer	TS72	46	#6 Lockwashers
BR17	1	Output IF Transformer	BR36	4	#8 Lockwashers
Controls-Switches			O101	4	Control Lockwashers
AR18	1	1 Megohm with SPST Sw.	FM18	1	8-32 x 3/16 Set Screw
AR41	1	500K Ohm with SPDT Sw.	AR35	3	$\frac{1}{8}$ " Spacer
AR37	1	4 Pole 3 Pos. Bandswitch	AR45	3	$\frac{3}{16}$ " Spacer
Tubes-Lamps			AR36	5	$\frac{1}{4}$ " Spacer
K42	1	1626 or 12J5 tube	Wire-Spaghetti		
AR31	2	12SH7 or 12SH7GT Tubes	AR19	1	Line Cord
K24	1	12C8 Tube	IB43	1	Length Bare Wire
K23	1	12A6 or 12A6GT Tube	A21	1	Length Shielded Wire
O66	1	5Y3GT Tube	O77	1	Roll Hookup Wire
O39	1	#47 Pilot Lamp	O81	1	Length Spaghetti
Grommets-Wafer-Clip-Lugs			CHASSIS PARTS		
O35	1	3/8 Grommet	AR46	1	Chassis
C24	1	7/16 Grommet	AR47	1	Coil Mounting Bracket
SW43	1	Condenser Mounting Wafer	BR35	1	Panel
K18	1	Grid Clip	BR19	4	Angle Brackets
O37	2	Solder Lugs			

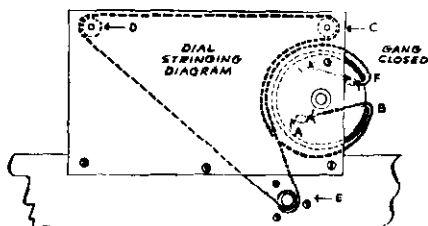
MODEL BR-1

A ground connection may improve reception also, and should be tried if maximum performance is desired. For a good ground, use a COLD water pipe or a ground rod. Use as short and direct a wire as possible between the pipe or rod and the ground terminal (screw terminal farthest from edge of chassis).

A loudspeaker of the PM dynamic type with 3-4 ohm voice coil impedance should be connected to the set by attaching the two prong speaker plug to the speaker leads and plugging into the speaker socket. If a 6-8 ohm speaker is available, it may be used without materially affecting the performance.

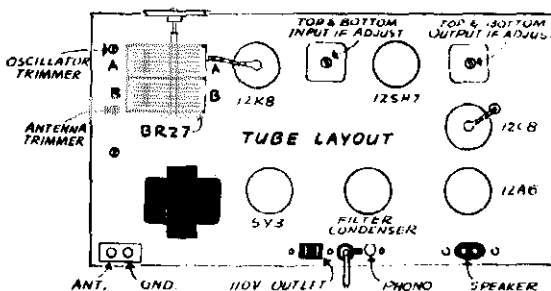
A record player or changer using a crystal type pickup cartridge may be connected to this receiver to provide superior reproduction of recordings. Connect the pickup by plugging the lead into the phono socket. If your player does not have the standard plug, remove existing plug and attach the phono plug supplied with the kit. Plug the line cord for the turn table motor into the 110V. outlet on the chassis. Turn the phono switch clockwise to switch from radio to record player.

NOTE: The pilot light is connected in the rectifier circuit to permit the use of a standard pilot light bulb. The socket is, therefore, about 300 Volts above chassis. DO NOT TOUCH SOCKET WITH SET TURNED ON.



ALIGNMENT

Connect a signal generator ground lead to the chassis. Connect the signal generator output ("hot") lead through a .01 MFD condenser to pin #4 on the 12SH7 socket (IF grid). Turn signal generator on and set dial to 456 Kc. The signal, if modulated, may be observed by noting the loudness at the speaker, or on the scale of an output meter connected across the speaker terminals, or with the aid of a vacuum tube voltmeter across the volume control. With the volume and tone controls turned fully clockwise, turn the brass screws in the output IF transformer for maximum indication. Use as low an indication as possible by reducing the output from the signal generator as the receiver sensitivity increases.



Without disturbing the signal generator dial, remove the .01 MFD condenser from pin #4 on the 12SH7 socket and connect to the grid cap of the 12K8 tube. Adjust the brass screws in the input IF transformer as above. NOTE: Do not adjust the output IF screws with the signal fed into the 12K8 tube. This completes the IF alignment.

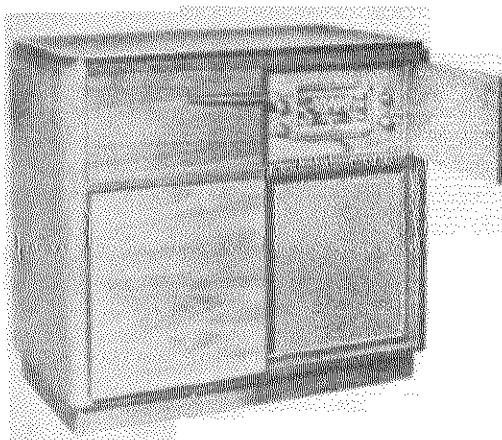
Connect the signal generator output lead through a 200-300 MMF condenser to the ANT. terminal. Turn the tuning control until the condenser plates are fully unmeshed. Set the signal generator to 1720 Kc. Adjust the oscillator trimmer till the signal is noted. Reset the signal generator to 1400 Kc. Find the signal by turning the receiver tuning control. Now adjust the antenna trimmer for maximum indication. This completes the alignment. A short antenna should now bring in many stations.

BR 1 RECEIVER PARTS LIST

Part No.	Parts Per Kit	Description	Part No.	Parts Per Kit	Description
Resistors			Tubes and Lamps		
SW11	2	100 Ohm Resistor	O66	1	5Y3 Tube
O11	1	10000 Ohm Resistor	K23	1	12A6 Tube
BR 43	1	25000 Ohm Resistor 2 W	K24	1	12C8 Tube
A10	2	47000 Ohm Resistor	BR29	1	12K8 Tube
O12	1	100000 Ohm Resistor	AR31	1	12SH7 Tube
O18	2	470000 Ohm Resistors	O39	1	6V Pilot Lamp
O17	1	1 Megohm Resistor	Miscellaneous		
C10	1	10 Megohm Resistor	BR19	4	Angle brackets
T11	1	470 Ohm 1 Watt Resistor	BR22	1	Condenser Mounting Bracket
BR26	1	2700 Ohm 2 Watt Resistor	BR21	1	Dial Drum Assembly
Condensers			BR30	1	Dial Plate Assembly
TS33	1	4.7 MMF Fixed Condenser	FM21	1	Dial Spring
G24	2	47-50 MMF Fixed Cond.	BR31	1	Dial Cable (31")
AR26	2	150 MMF Fixed Cond.	AR33	1	Pointer
AR27	5	.005 MFD Fixed Cond.	AR21	1	Dial Drive Shaft
AR28	5	.05 MFD Fixed Cond.	AR23	2	Dial Drive E Washers
T40	1	10 MFD 25V Electrolytic Cond.	AR24	1	Drive Shaft Bracket
AR29	1	15 + 10 MFD 450V Electrolytic Cond.	TS55	1	#8-32 X $\frac{1}{4}$ " Set Screw
AR30	2	3-30 MMF Trimmer Cond.	SW43	1	Condenser Mounting Wafer
BR27	1	Dual Tuning Cond.	O31	32	#6-32 X $\frac{1}{4}$ " Screws
Coils			TS74	3	#8-32 X $\frac{1}{4}$ " Screws
BR13	1	Antenna Primary Coil	G52	4	#8-32 X $\frac{1}{4}$ " Screws
BR14	1	Antenna Secondary Coil	O102	3	#6- $\frac{1}{8}$ " Sheet Metal Screws
BR18	1	Oscillator Coil	TC46	7	#6- $\frac{1}{8}$ " Sheet Metal Screws
BR16	1	IF Trans. (Input)	S22	36	#6-32 Nuts
BR17	1	IF Trans. (Output)	TP16	4	#8-32 Nuts
Controls and Switches			O33	3	Control Nuts
BR23	1	500000 Ohm-6 Control	TS72	35	#6 Lock Washers
AR18	1	1 Megohm-6 Control with Sw.	BR36	7	#8 Lock Washers
BR28	1	SPDT Rotary Switch	O101	3	Control Lock Washers
Knobs-Sockets-Terminal Strips			AR35	3	$\frac{1}{4}$ " Spacers
V48	4	Knobs	AR36	4	$\frac{1}{8}$ " Spacers
AR32	5	Tube Sockets	K18	2	Grid Clips
AR12	1	Speaker Socket	O35	1	$\frac{1}{8}$ " Grommet
AR13	1	Speaker Plug	C24	1	7/16" Grommet
A14	1	Phono Spcket	O37	2	Solder Lugs
A19	1	Phono Plug	BR24	1	Power Transformer
C25A	1	Pilot Socket	AR34	1	Output Transformer
P13	1	110V Socket	BR32	1	Chassis
FM17	1	Dual Binding Post	BR35	1	Panel
O38	3	Single Terminal Strips	AR19	1	Line Cord 8'
			BR33	1	Shielded Wire (30")
			IB43	1	Length Bare Wire (18")
			T24	1	Roll Hookup Wire (10")
			P24	1	Length of Spaghetti (6")
			BR1	1	Instruction Manual

Check the voltages at the tube sockets. A table of approximate voltages is given below. These readings were obtained with a Heathkit VTVM with 11 megohms input resistance. The occasional lower readings in brackets were obtained with a Heathkit Handitester at 1,000 ohms per volt. Variations of plus or minus 15% may be expected.

MODELS 522,
524, Ch. 138



MODEL 522

Modern style cabinet

Blonde oak
Mahogany
Walnut



MODEL 524

Traditional style cabinet

Mahogany finish

SPECIFICATIONS

The Hoffman Models 522 and 524 are 15 tube phonograph combination receivers for reception on the standard broadcast AM and FM radio frequencies. The sound is reproduced by a 12" PM speaker, and has an audio power output of 15 watts.

The record changer will automatically change and play up to twelve 10" records or ten 12" records. An optional record changer is available which will play either the standard 78 rpm records or the Long Playing 33 1/3 rpm records.

Connections are available at the rear of the radio tuner chassis for installation of a separate wire recorder, disc recorder, or 45 rpm record changer.

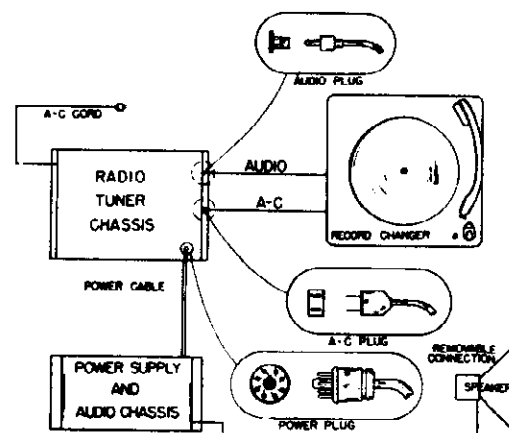
BLOCK DIAGRAM

MAJOR COMPONENTS

Radio chassis	138
Cabinet	Model 522, Part No. 7523-1 Model 524, Part No. 7524-1
Speaker	12" PM, Part No. 9015 Voice coil impedance, 3.2 ohms
Record changer	One of the following: Webster Model 148, 78 rpm Webster Model 149, 78 rpm Webster Model 246, 78 and 33 1/3 rpm V-M Corp. Model 400D, 78 and 33 1/3 rpm
Dial Escutcheon	Part No. 8080

ELECTRICAL AND MECHANICAL DATA

Frequency Range	(AM) 535 KC to 1650 KC (FM) 88 MC to 108 MC
Intermediate Frequency	(AM) 455 KC, (FM) 10.7 MC
Power Source	117 volts AC, 60 cycles, 15 watts
Output Impedance, Audio	3.2 ohms at 400 cycles
Power Output, Audio	15 watts



TUBE COMPLEMENT

1	6BA6	AM RF Amplifier
1	6BE6	AM Oscillator—Converter
1	7F8	FM Oscillator—Converter
1	6BA6	AM-FM 1st IF Amplifier
1	6BA6	FM 2nd IF Amplifier
1	6AL5	FM Ratio Detector
1	6AT6	AM 2nd Det., AVC, 1st Audio (AM & FM)
1	6J5	2nd Audio Amplifier
1	6J5	Audio Phase Inverter
4	6K6GT	Audio Power Output
1	5U4G	Power Rectifier
1	6E5	Tuning Indicator

MODELS 522,
524, Ch. 138

ALIGNMENT PROCEDURE

NOTES

- 1—Before beginning alignment, the pointer must be set at the highest mark on the dial with the tuning condenser fully open.
- 2—The AM section should be completely aligned before beginning the FM alignment.
- 3—The set should be allowed to warm up 15 minutes before aligning.
- 4—An output meter should be connected across the speaker voice coil for AM alignment. Keep the volume control at maximum on AM and use as low a signal input as possible for AM and FM.
- 5—For AM and FM tracking, bend plates of the variable (RF Section) as required.
- 6—In FM alignment, care must be taken to set the receiver oscillator frequency 10.7 MC *above* the incoming signal frequency.
- 7—The dummy antenna for FM alignment is two 150 ohm composition resistors; one in series with each generator lead.

ALIGNMENT CHART

STEP NO.	BAND SWITCH POSITION	SIGNAL GENERATOR FREQ.	CONNECTION TO RECEIVER	DUMMY ANTENNA	DIAL SETTING	ADJUST	REMARKS
1	AM	455 KC Mod.	6BE6 Conv. Grid Pin 7	0.1 mfd	1600 KC	T2 Pri., Sec., T4 Pri., Sec.	Tuning gang wide open. Adjust trans. for max. output
2	AM	1600 KC Mod.	Ext. Ant. Clip	0.1 mfd	1600 KC	C10 BC Osc. Trimmer	Adjust for max. output
3	AM	1400 KC Mod.	Ext. Ant. Clip	0.1 mfd	1400 KC	C9, C8 RF Trimmer	Adjust for max. output
4	AM	600 KC Mod.	Ext. Ant. Clip	0.1 mfd	600 KC	T6 Sec.	Adjust for max. output
5	AM	600 KC Mod.	Ext. Ant. Clip	0.1 mfd	600 KC	See Note 5	See Note 5
6	AM	1000 KC Mod.	Ext. Ant. Clip	0.1 mfd	1000 KC	See Note 5	See Note 5
7	FM	10.7 MC CW	FM Ant. Terminals	0.1 mfd	107 MC	T1 Pri., Sec., T3 Pri., Sec. T5 Pri. only	Disconnect C23 at point A. Tune for maximum reading. VTVM from point A to chassis. See Ratio Det. Alignment.
8	FM	10.7 MC CW	FM Ant. Terminals	0.1 mfd	107 MC	T5 Sec.	Reconnect C23 to point A. Tune for zero reading, VTVM from resistor junction to point C. See Ratio Det. Alignment.
9	FM	107 MC CW	FM Ant. Terminals	300 ohms See Note 7	107 MC	C7 FM Osc. Trimmer	Adjust for max. with VTVM from point A to chassis. See Note 6.
10	FM	107 MC CW	FM Ant. Terminals	300 ohms See Note 7	107 MC	C6 FM RF Trimmer	Adjust for max. with VTVM from point A to chassis.
11	FM	98 MC CW	FM Ant. Terminals	300 ohms	98 MC	See Note 5	Adjust for max. with VTVM from point A to chassis.
12	FM	88 MC CW	FM Ant. Terminals	300 ohms	88 MC	See Note 5	Adjust for max. with VTVM from point A to chassis.

RATIO DETECTOR ALIGNMENT

TUNING T5 PRIMARY

(T1 and T3 should be tuned before tuning T5.)

Locate the ratio detector test points A, B, and C on the schematic diagram. Solder two 100,000 ohm composition resistors in series from point "A" to chassis. Connect a VTVM from point "A" to chassis and feed 10.7 MC CW into the FM antenna terminals. Adjust T5 primary (bottom slug) for maximum reading, setting the generator output to give about one volt meter reading. (An insulated aligning tool should be used for this adjustment.) Condenser C23 should be disconnected at point "A" during IF and ratio detector primary adjustments. This prevents any stored charge on C23 from causing a time lag in the VTVM reading, and giving misleading peak indications.

TUNING T5 SECONDARY

Reconnect C23 to point "A." Connect the VTVM probe

to point "C" and the VTVM common or ground lead to the junction of the two 100,000 ohm resistors. Tune T5 secondary until the meter reading reverses polarity. Set the slug at this zero point.

CHECKING BAND WIDTH

Connect the signal generator to the grid of the 2nd FM IF tube. Set the generator to 100,000 microvolts at 10.7 MC CW. Shift the generator frequency above and below 10.7 MC and record the frequencies at which the maximum positive and negative meter readings are obtained. The difference between these two readings is the bandwidth of the ratio detector and should be 250 to 300 KC.

Remove the two 100,000 ohm resistors before beginning the FM RF alignment.

MODELS 522,
524, Ch. 138

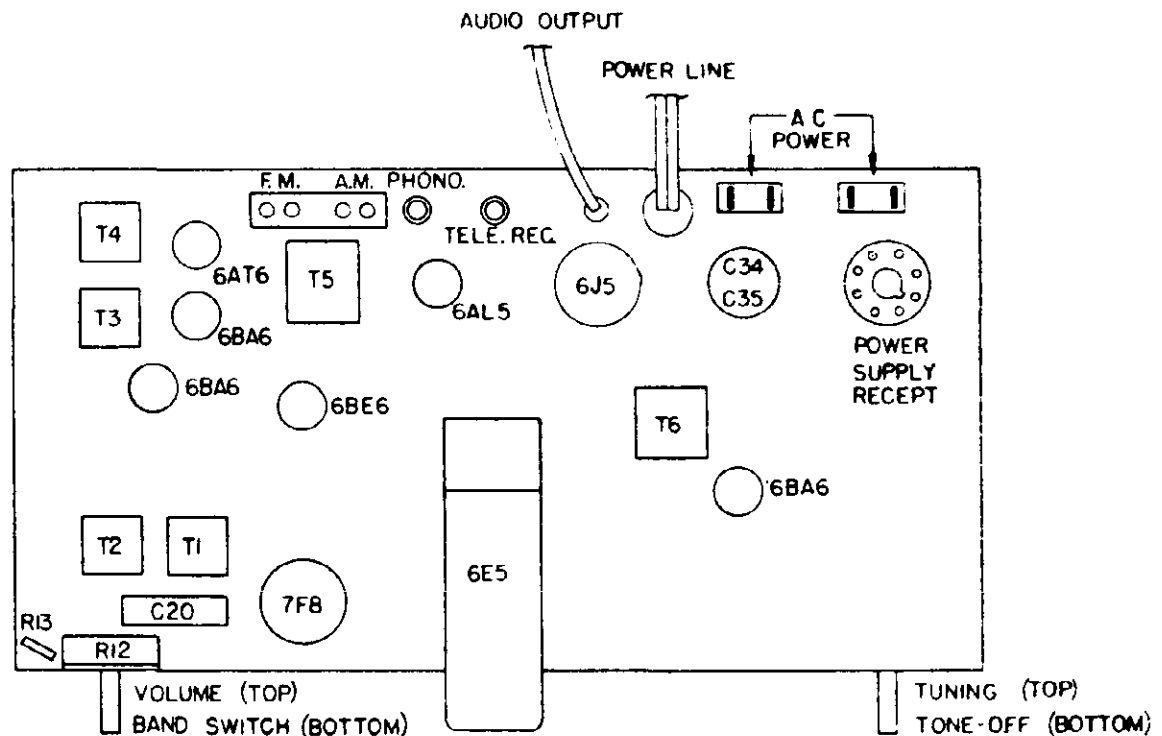
SOCKET VOLTAGES

Tube	Circuit	1	2	3	4	5	6	7	8	Band Switch
6BA6	AM RF Amp.	-.73*	G	6.2ac	G	232	168	.4	—	AM
6BE6	AM Osc. Conv.	-1.0*	0	G	6.2ac	222	104	-.55*	—	AM
7F8	FM Osc. Conv.	0	G	216	0	3.6	225	6.2ac	0	FM
6BA6	FM-AM IF	-.55*	G	G	6.2ac	217	115	1.0	—	FM-AM
6BA6	FM 2nd IF	0	G	G	6.2ac	212	96	1.1	—	FM-AM
6AL5	Ratio Det.	0	-.2*	G	6.2ac	-.1*	NC	0	—	FM
6AT6	AM Det.-1st AF	0	G	G	6.2ac	-.7*	G	48	—	AM
6J5	2nd AF Amp.	G	6.2ac	70	NC	0	NC	G	2.8	AM
6J5	Phase Invert.	G	6.2ac	140	NC	55	67'	G	70	AM
6K6	Audio Output	NC	6.2ac	290	270	0	NC	G	22	AM
5U4	Rectifier	NC	4.9ac ¹	NC	320ac	NC	320ac	NC	300	AM
6E5	Tuning Ind.	6.1ac	205*	-9.4*	255	G	G	—	—	FM-AM

All voltages measured to chassis unless otherwise noted.
 DC voltages measured with 20,000 ohm/volt meter.
 AC voltages measured with 1000 ohm/volt meter.
 All measurements made with signal input to receiver.

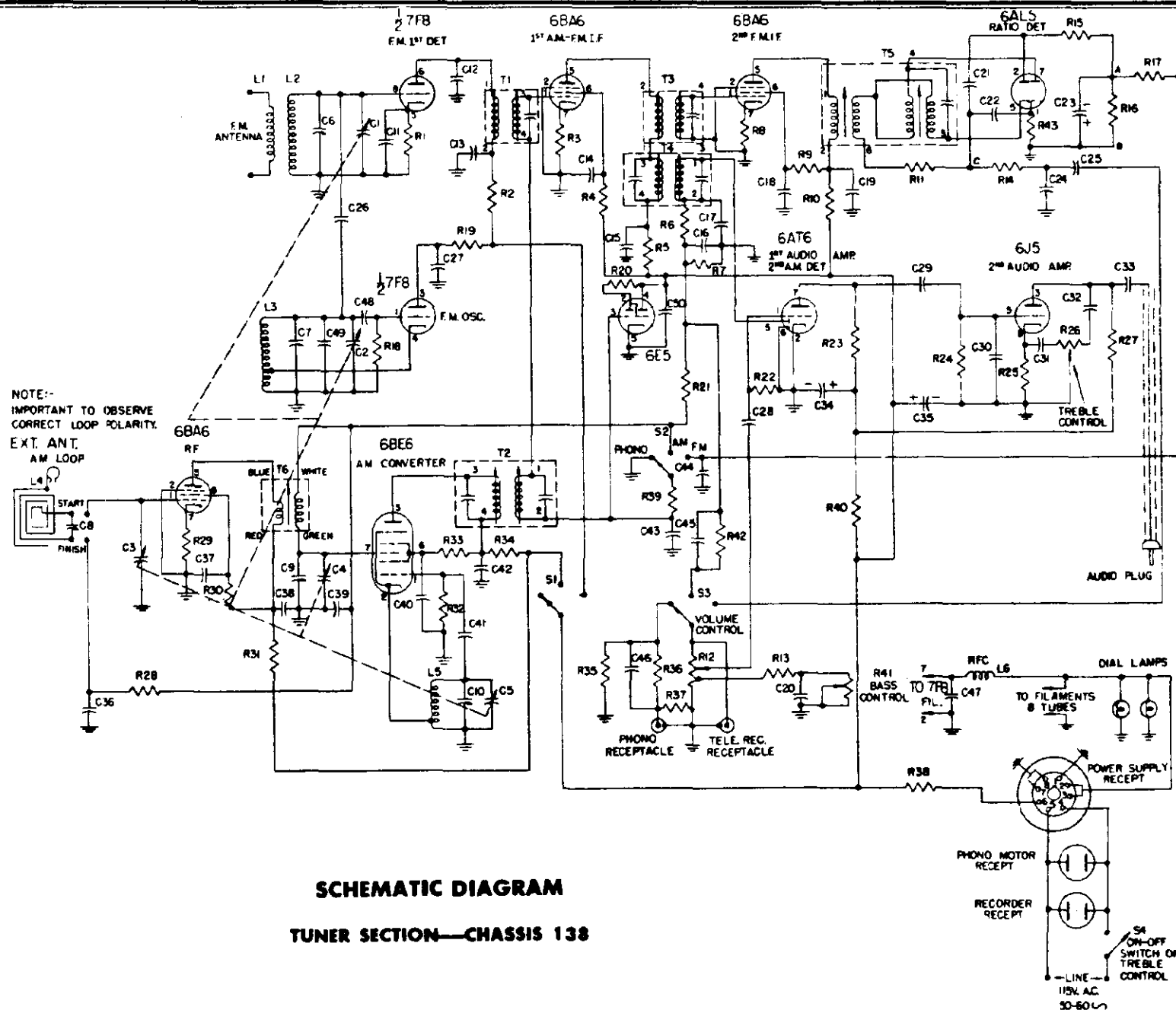
*—Measured with VTVM.
 G—Terminal grounded to chassis.
 '—Tie point for R2-R3.
¹—Measured from pin 2 to 8.

TUBE AND TRIMMER CONDENSER LOCATIONS



TOP VIEW OF CHASSIS

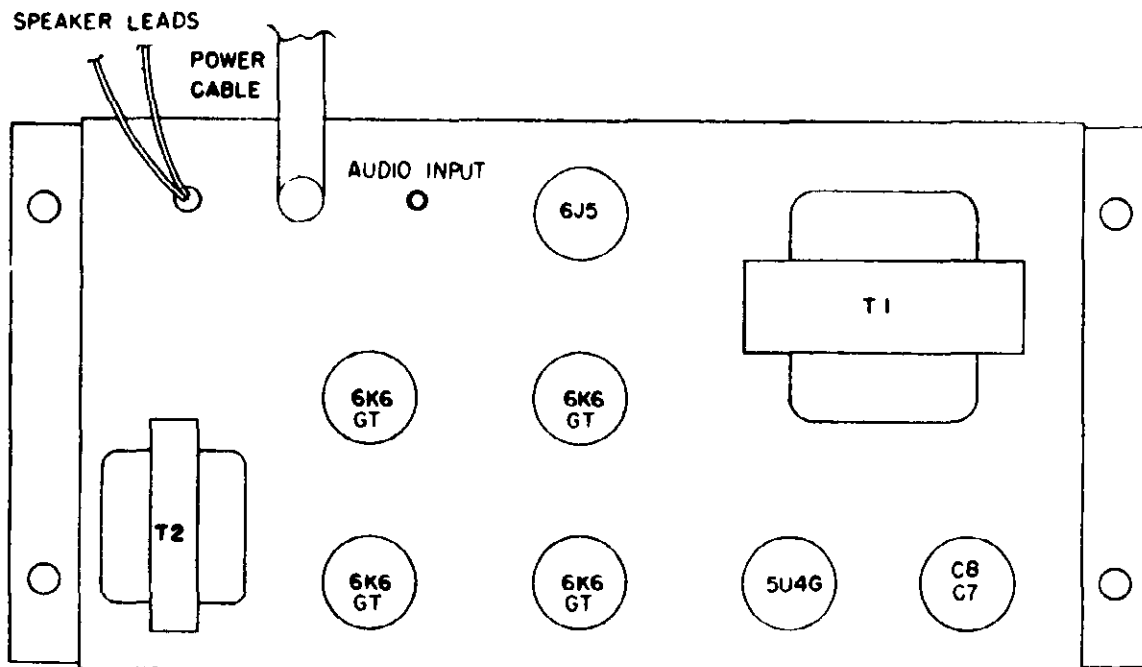
Tube Locations—Top View of Tuner Section



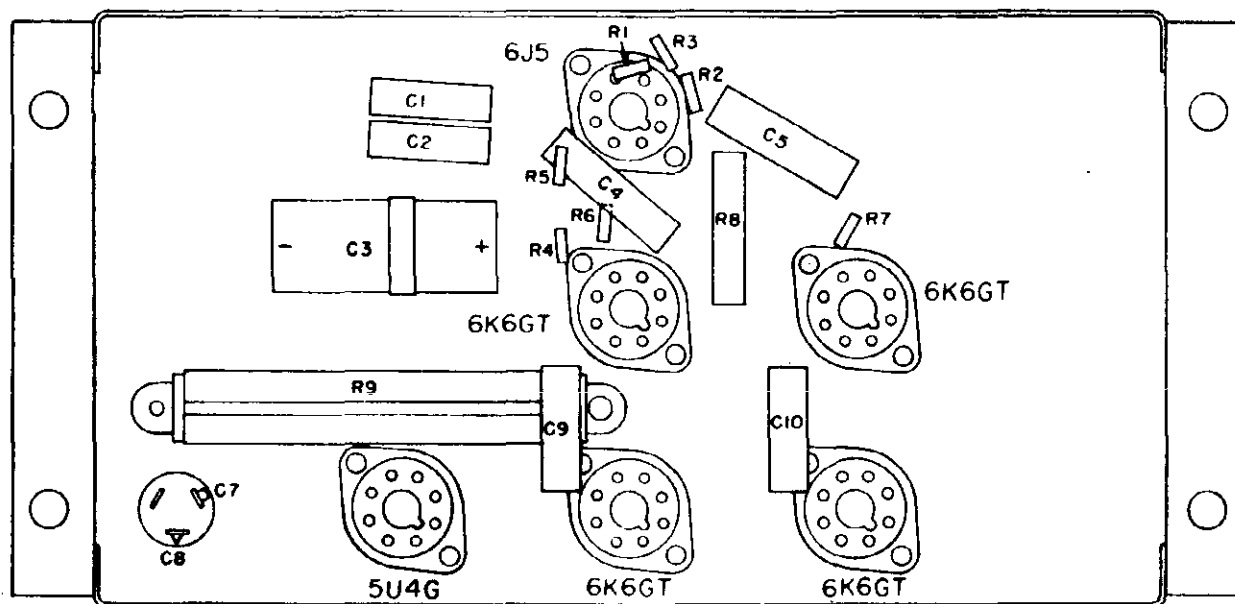
SCHEMATIC DIAGRAM
TUNER SECTION—CHASSIS 138

MODELS 522,
524, Ch. 138

POWER SUPPLY AND AUDIO SECTION



Tube Locations—Top View of Chassis

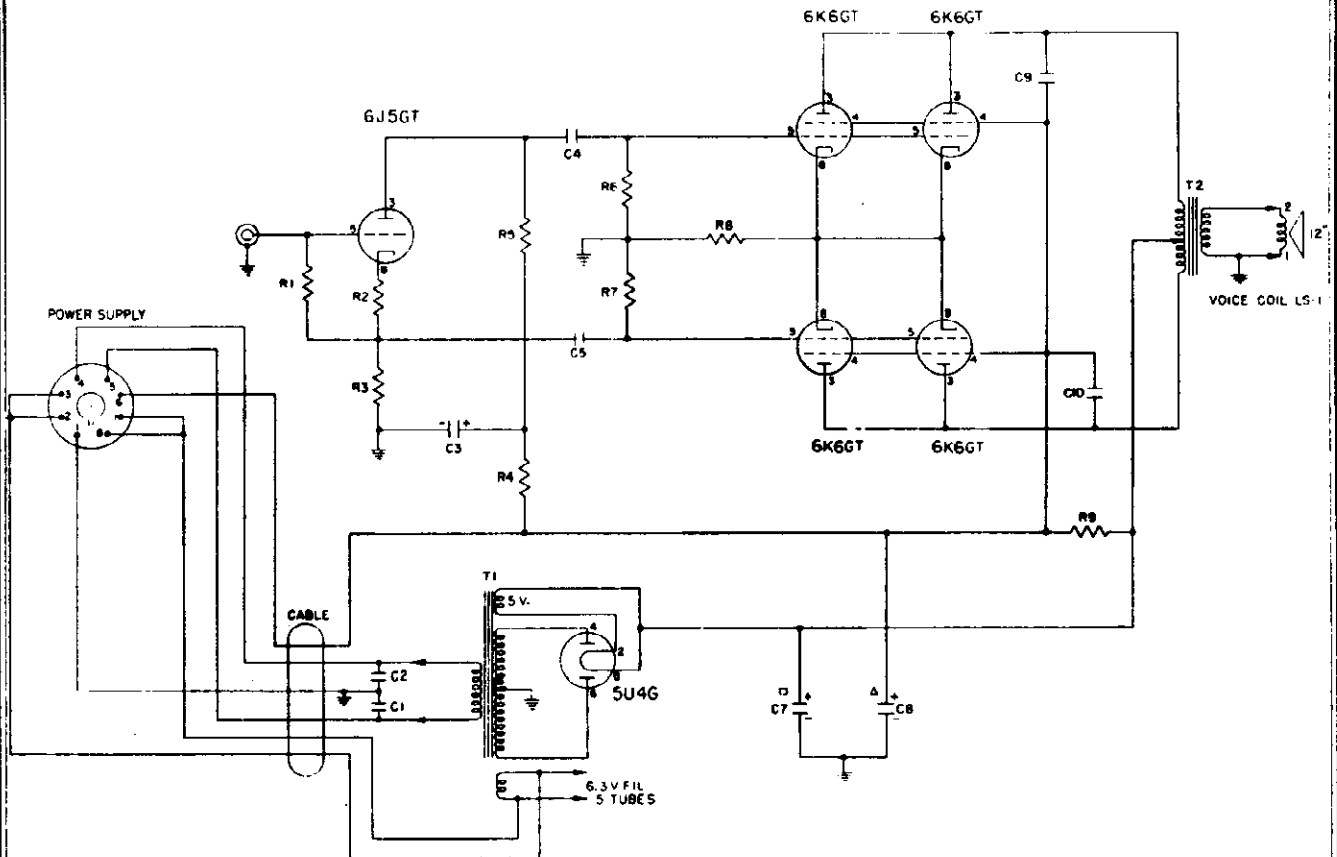


Parts Layout—Bottom View of Chassis

MODELS 522,
524, Ch. 138

SCHEMATIC DIAGRAM

POWER SUPPLY AND AUDIO SECTION—CHASSIS 138



PARTS LIST—POWER SUPPLY AND AUDIO SECTION

Symbol	Description			Hoffman Number
C1, C2	.01 Mfd.	600V	Paper	4103
C3	10 Mfd.	450V Tub.	Electro	4203
C4, C5	.05	400V	Paper	4101
C6, C7, C8	20/45V, 20/450V, 20/450V		Electro	4200
C9, C10	.001	600 V	Paper	4104
R1	1 Meg.	20%	1/2 Watt	4513
R2	2200 Ohms	20%	1/2 Watt	4512
R3, R5	47000 Ohms	10%	1/2 Watt	4559
R4	10000 Ohms	20%	1/2 Watt	4515
R6, R7	.22 Meg.	20%	1/2 Watt	4500
R8	220 Ohms	20%	3 Watt	4706
R9	1500 Ohms	5%	6 1/2 Watt	4701
LS1	Loudspeaker 12" P.M.			9044
T1	Power Transformer			5001
T2	Output Transformer			5108

MODELS 522,
524, Ch. 138

RADIO TUNER SECTION PARTS LIST

Symbol	Description	Hoffman Part No.
C1, C2, C3, C4, C5	3 Gang AM, FM (1 Section unused)	4411
C6, C7	Trimmers (FM Section)	4318
C8, C9, C10	Trimmers (AM Section)	4313
C11, C27	1000 Mmf	4025
C12	10 Mmf $\pm 10\%$	4027
C13, C19, C40, C44, C47, C50	5000 Mmf	4029
C14, C15, C18, C25, C28, C33, C37, C38, C42	.01 Mfd 400V Paper	4112
C16, C17, C21, C22	270 Mmf $\pm 20\%$	4001
C20	.02 Mfd 400V Paper	4106
C23	5 Mfd 50V Electrolytic	4209
C24	.002 Mfd 600V Paper	4118
C29, C32	.005 Mfd 600V Paper	4102
C30	470 Mmf $\pm 20\%$	4003
C31, C36, C39, C43	.05 Mfd 200V Paper	4100
C34, C35	20-20 Mfd 450V Electrolytic	4200
C41, C45	100 Mmf $\pm 20\%$	4000
C46, C48	22 Mmf $\pm 10\%$	4021
C49	5 Mmf $\pm 10\%$	4028
R1	1,200 Ohm $\pm 20\%$	4553
R2, R5, R10, R19, R31, R34	1,500 Ohm $\pm 20\%$	4534
R4, R9, R30	33,000 Ohm $\pm 20\%$	4556
R6, R14, R40	47,000 Ohm $\pm 20\%$	4504
R7	.68 Meg $\pm 20\%$	4555
R11	120 Ohm $\pm 10\%$	4546
R12	.5 Meg Vol. Control, tapped	4814
R13	6800 Ohm $\pm 10\%$	4557
R15, R43	560 Ohm $\pm 10\%$	4507
R16	15,000 Ohm $\pm 20\%$	4521
R17, R28, R35, R39	.22 Meg $\pm 20\%$	4500
R18, R32	22,000 Ohm $\pm 20\%$	4501
R20, R42	1 Meg $\pm 20\%$	4513
R21, R22	2.2 Meg $\pm 20\%$	4502
R23, R24	.47 Meg $\pm 20\%$	4506
R25	2,700 Ohm $\pm 10\%$	4519
R26, R41	.5 Meg Dual Bass & Treble Controls	4813
R27	100,000 Ohm $\pm 20\%$	4511
R33	15,000 Ohm $\pm 20\%$	4539
R36, R37	4.7 Meg $\pm 20\%$	4544
R38	500 Ohm $\pm 10\%$	4700
L1	FM Antenna Primary	5258
L2	FM Antenna Secondary	5248
L3	FM Oscillator Coil	5247
L4	AM Loop Antenna	5279
L5	AM Oscillator Coil	5282
L6	RFC Filament Choke	5266
T1	FM 1st IF Transformer	5284
T2	AM 1st IF Transformer	5286
T3	FM 2nd IF Transformer	5285
T4	AM 2nd IF Transformer	5287
T5	FM Discriminator (Ratio Detector)	5288
T6	AM RF Interstage Transformer	5289
S1, S2, S3	Band Change Switch (3 Pole - 3 Position Rotary)	6002
S4	Power Switch on Bass & Treble Control (Part of 4813)	
	Knob, Dual (Bass-Treble) (Specify Color)	3584
	Knob, Single (Specify Color)	3583
	Plug, Audio Output (Single prong)	6203
	Plug, Power Supply	6212
	Pointer, Dial	518
	Receptacle, Phono	6121
	Receptacle, Power Outlet	6108
	Socket, Local	6105
	Socket, Miniature	6118
	Socket, Oval	6103
	Socket, Pilot Lamp	6110
	Spring, Dial	9507
	Strip, Antenna Terminal	424
	Tuning Dial Backplate	2217



PAGE 21-2 JACKSON INDUSTRIES

MODEL 150

HOW TO OPERATE THE RADIO:

This radio is equipped with four controls, the left hand control is the combined off-on switch and volume control. The second knob from the left is the phono-radio switch, the third knob is the tone control, the fourth control is used for tuning the desired station. To place the set in operation, rotate on-off volume control knob to right and allow 30 seconds for set to warm up. Rotate tuning control to desired station. Adjust volume control to desired volume, set tone control to treble or base response. To use phonograph follow above steps, except turn phono-radio switch, to phono position. Place records on changer in sequence desired, push reject button, and allow changer to cycle.

ALIGNMENT PROCEDURE

Feed a 455 K.C. modulated signal from grid to ground (pin #7 12 BE6). Connect A output meter across the voice coil. Tune trimmers on first and second IF transformers for maximum indication on meter. Set signal generator to 1600 K.C. Modulated signal and couple loosely to loop antenna. Set dial to 1600 K.C. and tune oscillator trimmer for maximum indication on meter.

Set signal generator and dial to 1400 K.C. and tune R.F. trimmer, for maximum indication on meter. Check tracking at 600 K.C., knife gang if necessary. Repeat these adjustments until the receiver tracks correctly

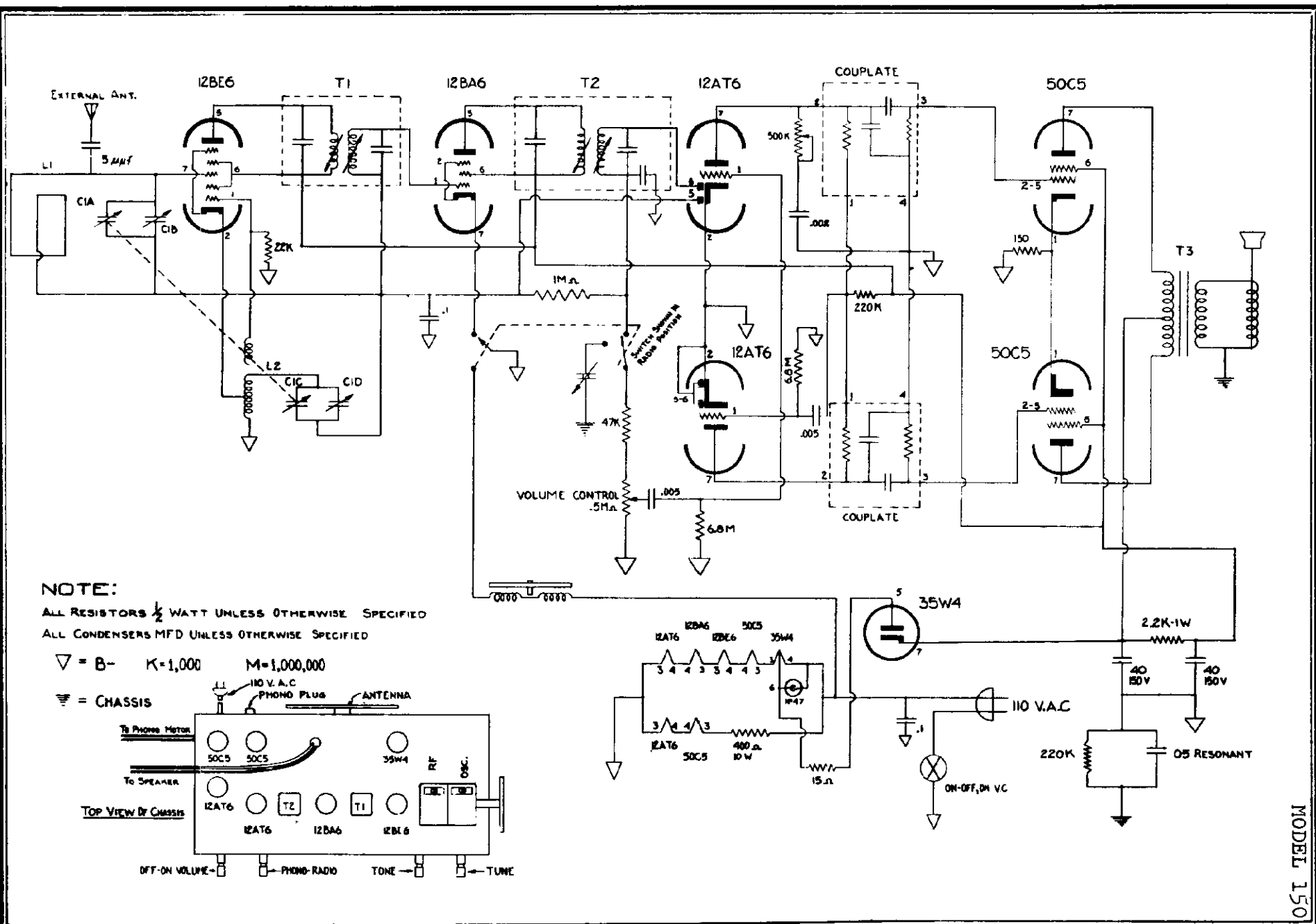
PIN	#1	#2	#3	#4	#5	#6	#7
12BE6	- 7.3	0	24 *	24 *	78	78	0
12BA6	- 8.	0	24 *	12 *	89	89	0
12AT6	- 1.8	0	0	8. *	- 8.	- 2.3	34
12AT6	- .45	0	0	12 *	0	0	45
50C5	- 7.2	0	60 *	12 *	0	89	120
50C5	- 7.2	0	80 *	36 *	0	89	120
35W4	- 0	0	86 *	120 *	115 *	115 *	120

Measured with V.T V M from

Pin to B-line.

Set in radio position.

* A.C. Volts



MODELS 152,
153, 316

SPECIFICATIONS

Power Supply.....	105-125 volts 60 cycle AC only.
Power Consumption.....	65 Watts.
Frequency Range FM.....	88 to 108 MC.
Frequency Range AM.....	540 to 1600 KC.
I.F. Frequency FM.....	10.7 MC.
I.F. Frequency AM.....	455 KC.
Band width, FM, Ratio Detector.....	330 KC.
Band width, FM, 1st I.F.....	280 KC.
Band width, FM, Converter.....	220 KC.

The tubes used are as follows:

12AT7	FM RF Amplifier, Converter
6BE6	FM Osc, Am Osc, Converter
6BA6	FM-AM, 1st I.F. Amplifier
6BA6	FM, 2nd I.F. Amplifier
6AL5	FM Detector
6AT6	AM Detector, AVC, Audio
6AQ5	Power Output
6X4	Power Rectifier
No. 44	Pilot Lights (2)

SERVICE NOTES

GENERAL

CAUTION: If realignment is necessary be sure the proper test equipment is available, as listed below, before proceeding with the alignment procedure as given on page 5.

Due to the high frequencies at which FM signals are received the service man must use great care when servicing these sets. Extreme caution must be used regarding the moving of component parts in the R.F. and oscillator circuits of the receiver as those circuits can be detuned in this manner.

If it becomes necessary to replace components such as resistors and condensers they must be replaced with parts of the same size, type, voltage rating and tolerance as called for in the parts list.

When installing new parts they should be placed in the same position as the original, and the leads should be cut to the same length.

ALIGNMENT NOTES

This receiver has been thoroughly inspected and tested at the factory, using the most modern test equipment available, such as FM sweep generators and oscilloscopes. All R.F. and I.F. circuits have been accurately adjusted at the factory and no attempt should be made to realign these circuits unless it is absolutely necessary.

EQUIPMENT USED FOR ALIGNMENT

Vacuum tube voltmeter.
AM Signal generator
FM Sweep generator.
Oscilloscope.
Insulated screw driver.
Dummy antenna:
.1 MFD condenser
.00025 MFD mica condenser
150 ohm resistor (2)
Output meter.

All voltage readings are taken from tube pin to chassis.

All measurements are made with no signal, using a 20,000 ohm per volt meter.

AC input voltage must be maintained at 117 volts for accurate readings.

AC voltages shown are at 1000 ohms per volt.

All voltages shown are approximate.

VOLTAGE CHART

	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
6BE6 FM & AM OSC AM CONV	0	0	0	6 AC	155	125	0		
12AT7 FM RF AMP & CONV	170	0	1.5	0	0	155	0	1	6 AC
6BA6 1st IF AM & FM	0	0	6 AC	0 AC	150	100	0		
6BA6 2nd IF FM	0	0	6 AC	0 AC	155	110	1		
6AL5 FM DETECTOR	0	0	6 AC	0 AC		0	0		
6AT6 AM DETECTOR, AVC, AUDIO	—5	0	6 AC	0 AC	0	0	60		
6AQ5 POWER OUTPUT	0	7.5	6 AC	0 AC	215	170	0		
6X4 POWER RECTIFIER	230 AC		6 AC	0 AC	235	230	235 AC		

Band Switch on AM position. Dial 1600 KC. No Signal.

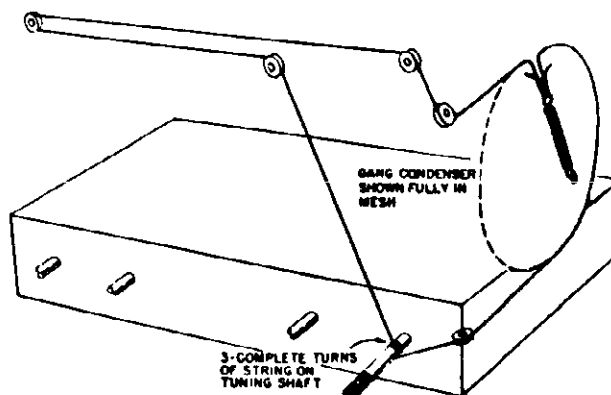


FIG. 4 DIAL CORD STRINGING

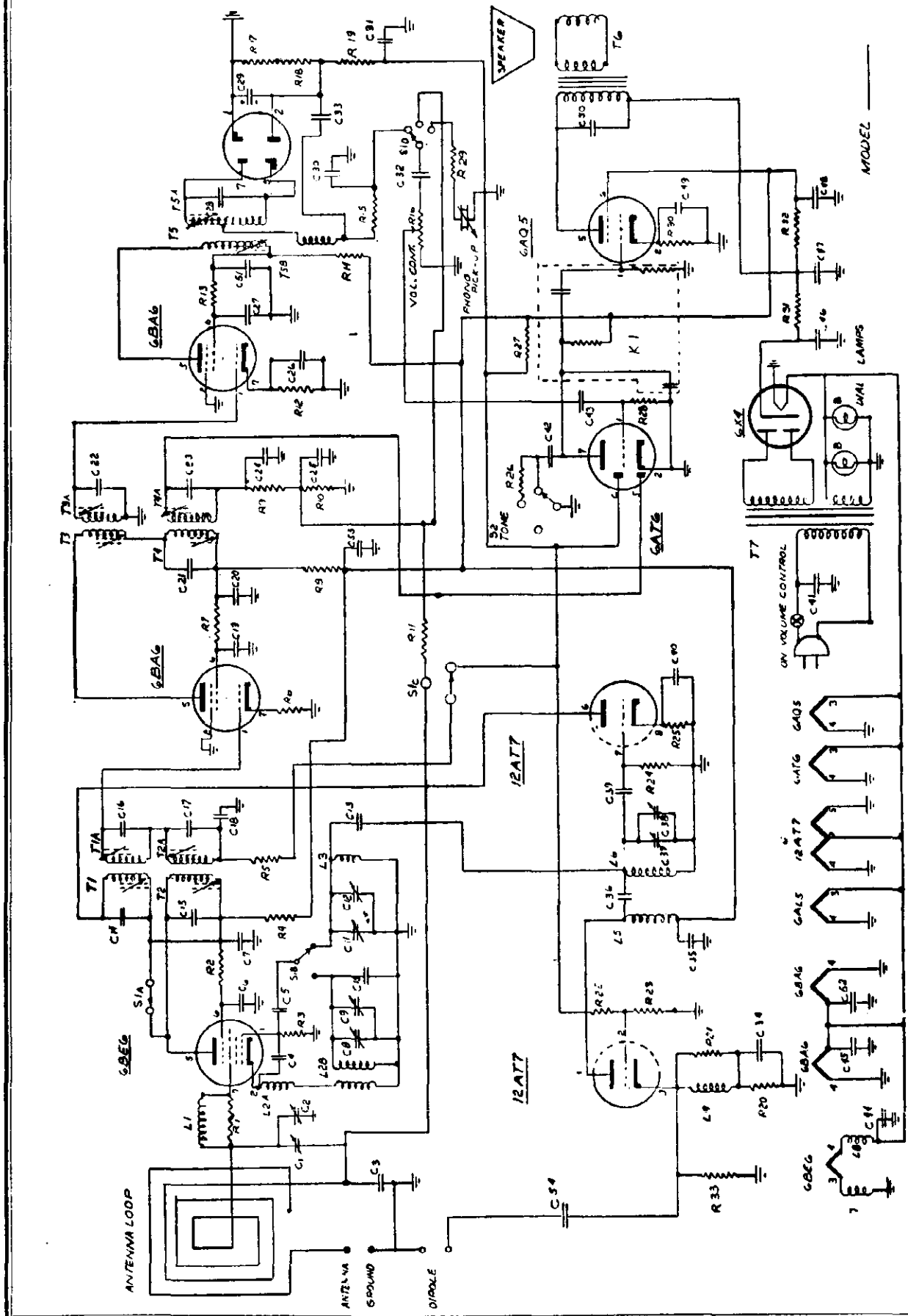


FIG. 1 SCHEMATIC DIAGRAM

[illegible]

FIG. 3 TUBE AND TRIMMER LOCATIONS

STEPS	RECEIVER DIAL SETTING	BAND SWITCH POSITION	SIGNAL GENERATOR FREQUENCY	DUMMY ANTENNA	SIGNAL GENERATOR CONNECTIONS	OUTPUT INDICATOR	TRIMMER ADJUSTMENT	TRIMMER FUNCTION	REMARKS
1	Minimum capacity	AM	455 KC 400 cycle AM	.1 MFD	High side—grid of AM converter tube (6BE6) Low side—chassis	Output Meter across voice coil	T2 & T4	AM I.F.	Adjust for maximum output
2	"	"	1600 KC 400 cycle AM	"	"	"	AM OSC	AM Oscillator	"
3	1400 KC	"	1400 KC 400 cycle AM	.00025 MFD	High side—One ant. terminal Low side—Other ant. terminal	"	Ant Loop	AM Antenna	"
4	Any position where there is no station interference.	FM	10.7 MC unmodulated .1 volt output.	.1 MFD	High side—grid of 2nd I.F. amplifier tube (6BA6) Low side—chassis	Connect V.T.V.M. to plate of Ratio Detector tube, pin 2 (6AL5)	Top T5	Ratio detector primary	Adjust for maximum negative voltage.
5	"	"	10.7 MC 400 cycle 250 KC Deviation	"	"	Connect scope to audio take-off point (across vol. cont.)	Bottom T5	Ratio detector secondary	Adjust for a balanced pattern on scope. See Fig. 2
6	"	"	10.7 MC 400 cycle 80 KC Deviation	"	High side—grid of 1st I.F. amplifier tube (6BA6) Low side—chassis	"	T3	FM 2nd I.F.	Adjust for maximum gain and best pattern on scope. See Fig. 2
7	"	"	"	"	High side—grid (pin 7) of FM converter tube (12AT7) Low side—chassis	"	T1	FM 1st I.F.	"
8	108.5 MC	"	108.5 MC 400 cycle 30% modulation (22.5 KC deviation)	300 ohms in high side	High side—ant. terminal Low side—chassis	Connect output meter across voice coil	FM OSC.	FM oscillator	Adjust for maximum output
9	105 MC	"	105 MC 400 cycle 30% modulation (22.5 KC deviation)	"	"	"	FM RF	FM R.F.	"

PARTS LIST

Schematic Diagram Reference	Description		
C1	Loop Trimmer.....	R10, R23, R24	470K ohm Resistor.....
C2	Variable Cond.....	R11, R22	2.2M ohm Resistor.....
C8, C9		R16	.5M Vol. Cont. — SPST.....
C11, C37		R17, R18	12K Resistor.....
C38	.05-200V Condenser	R20	220 ohm Resistor.....
C3		R25	2.2K ohm.....
C4	2.2 MMF Gimmick Cond.....	R27	3.3M ohm
C5	33 MMF (Erie Style A N14004).....	R28	6.8M ohm
C6, 18		R30	270 ohm — 1 Watt.....
C19, 27	5000 MMFD GMV.....	R31	100 ohm — 1 Watt.....
C26		R32	1000 ohm — 5 Watt.....
C42, C45, 51		R33	560 ohm
C50, C52		K1	CRL Triode couplate.....
C10	15 MMFD + or — 10% O° T.C. (Erie).....	L1	AM Grid Choke on R1.....
C12	FM Osc Trimmer.....	L2A, B	AM Osc. Coil.....
C13	1.5 MMFD (Erie Style "A").....	L3	FM Osc. Coil.....
C14, 15, 16, 17	Integral part of respective IF—XFMR5	L4	FM Cathode choke on R21.....
21, 22, 23, 24, 28		L5	FM plate choke.....
C31, 32, 53,	10,000 MMFD GMV.....	L6	FM RF Coil.....
7, 20			
C25	100 MMF ceramic cond.....	D-1	Dial Scale
36, 39, 54		L7, 8	Filament choke
C29	4 - 50V Lytic condenser.....	T1	1st FM IF.....
C30	2000 MMFD Condenser.....	T2	1st AM IF.....
C33	470 MMFD Condenser.....	T3	2nd FM IF.....
C34, 35	1000 MMFD GMV condenser.....	T4	2nd AM IF.....
40, 44, 53		T5	Ratio Detector
C41	.1 - 400V condenser.....	T6	Out Put XFMR.....
C43	.01 - 200V condenser.....	T7	Power XFMR
C46, 47	40-350V, 30-300V FP Lytic Condenser.....		Loop Ant.
48, 49		B	No. 44 Pilot Light.....
R2	4.7K ohm Resistor.....		Line cord
R3, R15	22K ohm Resistor.....		300 ohm Line Di-Pole Ant.....
R4, R8, R14	1K ohm Resistor.....		
R5, R19	100K ohm Resistor.....		
R6, R12	68 ohm Resistor.....		
R7, R13	10K ohm Resistor.....		
R9, R26	47K ohm Resistor.....		

K=1000

M=1,000,000

All Resistors ½ Watt unless otherwise noted.

Values of Capacitors in MFD. unless otherwise stated.

Tolerance on Capacitors and Resistors + or — 20% unless otherwise stated.

MODELS 200,
300, 1250

SPECIFICATIONS

Power Supply.....105-125 volts 60 cycle AC only.
 Power Consumption.....65 Watts.
 Frequency Range FM.....88 to 108 MC.
 Frequency Range AM.....540 to 1600 KC.
 I.F. Frequency FM.....10.7 MC.
 I.F. Frequency AM.....455 KC.
 Band width, FM, Ratio Detector.....330 KC.
 Band width, FM, 1st I.F.....280 KC.
 Band width, FM, Converter.....220 KC.

The tubes used are as follows:

12AT7 FM RF Amplifier, Converter
 6BE6 FM Osc, Am Osc, Converter
 6BA6 FM-AM, 1st I.F. Amplifier
 6BA6 FM, 2nd I.F. Amplifier
 6AL5 FM Detector
 6AT6 AM Detector, AVC, Audio
 6AQ5 Power Output
 6X4 Power Rectifier
 No. 44 Pilot Lights (2)

SERVICE NOTES

GENERAL

CAUTION: If realignment is necessary be sure the proper test equipment is available, as listed below, before proceeding with the alignment procedure as given on page 5.

Due to the high frequencies at which FM signals are received the service man must use great care when servicing these sets. Extreme caution must be used regarding the moving of component parts in the R.F. and oscillator circuits of the receiver as those circuits can be detuned in this manner.

If it becomes necessary to replace components such as resistors and condensers they must be replaced with parts of the same size, type, voltage rating and tolerance as called for in the parts list.

When installing new parts they should be placed in the same position as the original, and the leads should be cut to the same length.

ALIGNMENT NOTES

This receiver has been thoroughly inspected and tested at the factory, using the most modern test equipment available, such as FM sweep generators and oscilloscopes. All R.F. and I.F. circuits have been accurately adjusted at the factory and no attempt should be made to realign these circuits unless it is absolutely necessary.

EQUIPMENT USED FOR ALIGNMENT

Vacuum tube voltmeter.
 AM Signal generator
 FM Sweep generator.
 Oscilloscope.
 Insulated screw driver.
 Dummy antenna:
 .1 MFD condenser
 .00025 MFD mica condenser
 150 ohm resistor (2)
 Output meter.

VOLTAGE CHART

	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
63E6 FM & AM OSC AM CONV	0	0	0	6 AC	155	125	0		
12AT7 FM RF AMP & CONV	170	0	1.5	0	0	155	0	1	6 AC
6BA6 1st IF AM & FM	0	0	6 AC	0 AC	150	100	0		
6BA6 2nd IF FM	0	0	6 AC	0 AC	155	110	1		
6AL5 FM DETECTOR	0	0	6 AC	0 AC		0	0		
6AT6 AM DETECTOR, AVC, AUDIO	—5	0	6 AC	0 AC	0	0	60		
6AQ5 POWER OUTPUT	0	7.5	6 AC	0 AC	215	170	0		
6x4 POWER RECTIFIER	250 AC		6 AC	0 AC	235	230 AC	235		

All voltage readings are taken from tube pin to chassis.

All measurements are made with no signal, using a 20,000 ohm per volt meter.

AC input voltage must be maintained at 117 volts for accurate readings.

AC voltages shown are at 1000 ohms per volt.

All voltages shown are approximate.

Band Switch on AM position. Dial 1600 KC. No Signal.

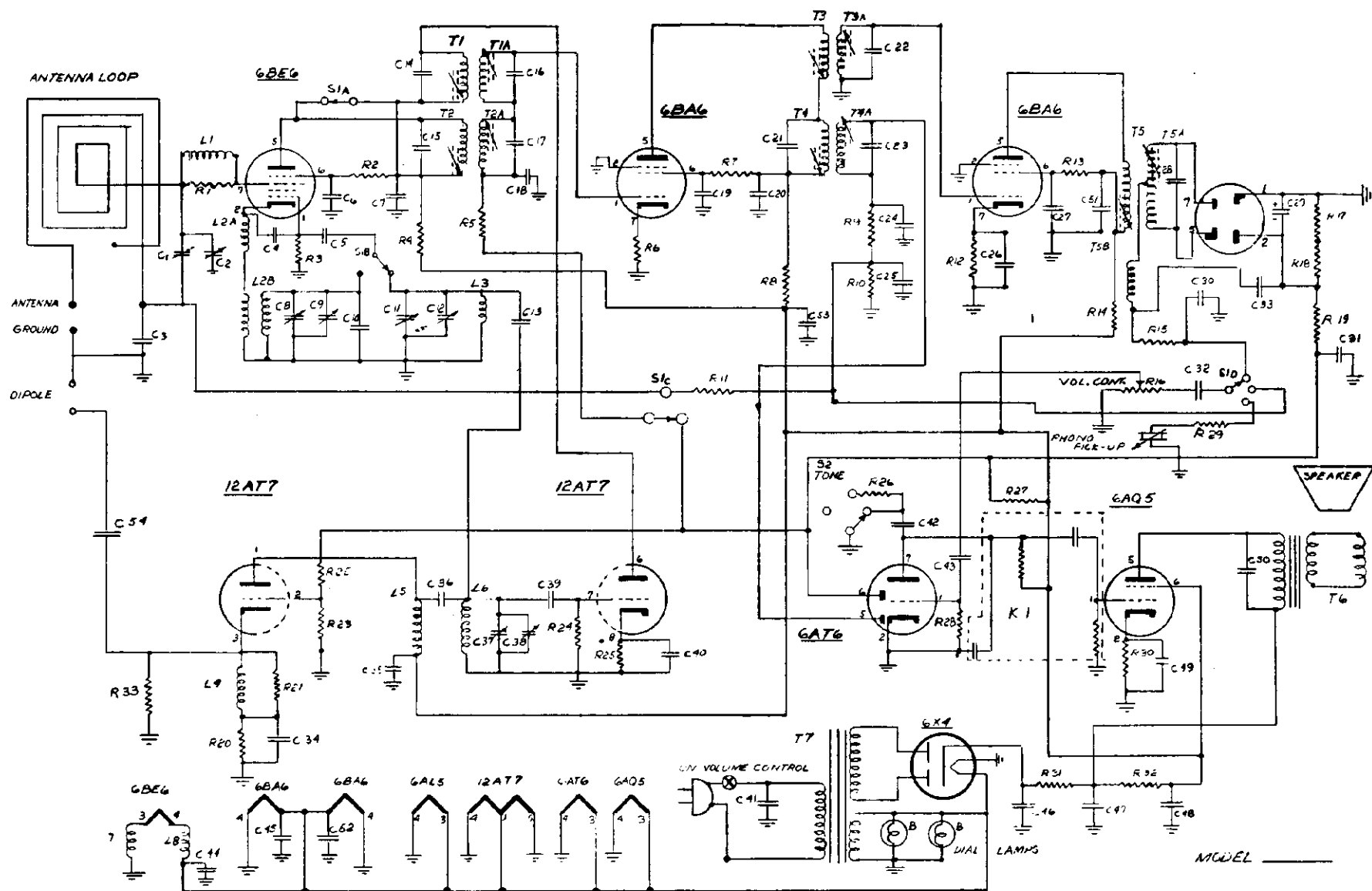


FIG. 1 SCHEMATIC DIAGRAM

ALIGNMENT PROCEDURE

STEPS	RECEIVER DIAL SETTING	BAND SWITCH POSITION	SIGNAL GENERATOR FREQUENCY	DUMMY ANTENNA	SIGNAL GENERATOR CONNECTIONS	OUTPUT INDICATOR	TRIMMER ADJUSTMENT	TRIMMER FUNCTION	REMARKS
1	Minimum capacity	AM	455 KC 400 cycle AM	.1 MFD	High side—grid of AM converter tube (6BE6) Low side—chassis	Output Meter across voice coil	T2 & T4	AM I.F.	Adjust for maximum output
2	"	"	1600 KC 400 cycle AM	"	"	"	AM OSC	AM Oscillator	"
3	1400 KC	"	1400 KC 400 cycle AM	.00025 MFD	High side—One ant. terminal Low side—Other ant. terminal	"	Ant Loop	AM Antenna	"
4	Any position where there is no station interference.	FM	10.7 MC unmodulated .1 volt output.	.1 MFD	High side—grid of 2nd I.F. amplifier tube (6BA6) Low side—chassis	Connect V.T.V.M. to plate of Ratio Detector tube, pin 2 (6AL5)	Top T5	Ratio detector primary	Adjust for maximum negative voltage.
5	"	"	10.7 MC 400 cycle 250 KC Deviation	"	"	Connect scope to audio take-off point (across vol. cont.)	Bottom T5	Ratio detector secondary	Adjust for a balanced pattern on scope. See Fig. 2
6	"	"	10.7 MC 400 cycle 80 KC Deviation	"	High side—grid of 1st I.F. amplifier tube (6BA6) Low side—chassis	"	T3	FM 2nd I.F.	Adjust for maximum gain and best pattern on scope. See Fig. 2
7	"	"	"	"	High side—grid (pin 7) of FM converter tube (12AT7) Low side—chassis	"	T1	FM 1st I.F.	"
8	108.5 MC	"	108.5 MC 400 cycle 30% modulation (22.5 KC deviation)	300 ohms in high side	High side—ant. terminal Low side—chassis	Connect output meter across voice coil	FM OSC	FM oscillator	Adjust for maximum output
9	105 MC	"	105 MC 400 cycle 30% modulation (22.5 KC deviation)	"	"	"	FM RF	FM R.F.	"

NOTE A: When aligning the FM I.F. circuits, keep the output from the signal generator as low as possible.

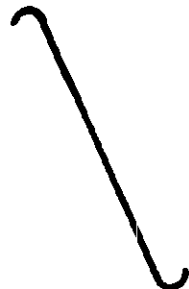


FIGURE 2

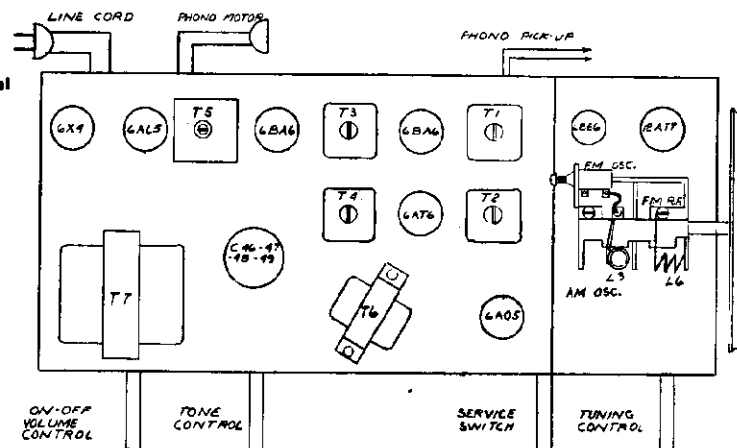


FIG. 3 TUBE AND TRIMMER LOCATIONS

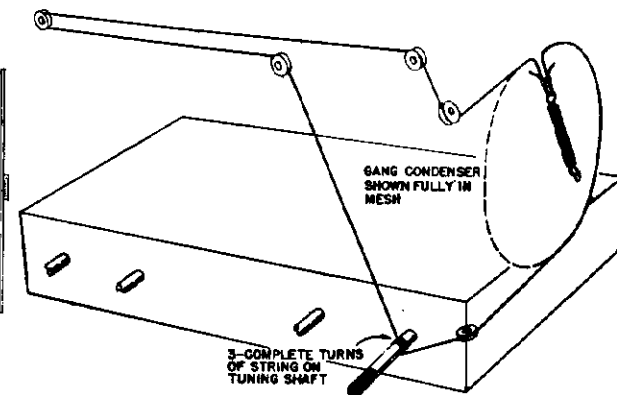


FIG. 4 DIAL CORD STRINGING

PARTS LIST

Schematic Diagram Reference	Description		
C1	Loop Trimmer.....	R5, R19	100K ohm Resistor.....
C2	Variable Cond.....	R6, R12	68 ohm Resistor.....
C8, C9		R7, R13	10K ohm Resistor.....
C11, C37		R9, R26	47K ohm Resistor.....
C38	.05-200V Condenser	R10, R23, R24	470K ohm Resistor.....
C3		R11, R22	2.2M ohm Resistor.....
C4	2.2 MMF Gimmick Cond.....	R16	.5M Vol. Cont. — SPST.....
C5	33 MMF (Erie Style A N14004).....	R17, R18	12K Resistor.....
C6, 18		R20	220 ohm Resistor.....
C19, 27		R25	2.2K ohm.....
C26		R27	3.3M ohm.....
C42, C45, 51		R28	6.8M ohm.....
C50, C52		R30	270 ohm — 1 Watt.....
C10	15 MMFD + or — 10% O° T.C. (Erie).....	R31	100 ohm — 1 Watt.....
C12	FM Osc Trimmer.....	R32	1000 ohm — 5 Watt.....
C13	1.5 MMFD (Erie Style "A").....	R33	560 ohm.....
C14, 15, 16, 17		K1	CRL Triode couplate.....
21, 22, 23, 24, 28	Integral part of respective IF—XFMRS	L1	AM Grid Choke on R1.....
C31, 32, 53,		L2A, B	AM Osc. Coil.....
7, 20	10,000 MMFD GMV.....	L3	FM Osc. Coil.....
C25		L4	FM Cathode choke on R21.....
36, 39, 54	100 MMF ceramic cond.....	L5	FM plate choke.....
C29	4 - 50V Lytic condenser.....	L6	FM RF Coil.....
C30	2000 MMFD Condenser.....	L7, 8	Filament choke.....
C33	470 MMFD Condenser.....	T1	1st FM IF.....
C34, 35		T2	1st AM IF.....
40, 44, 53	1000 MMFD GMV condenser.....	T3	2nd FM IF.....
C41	.1 - 400V condenser.....	T4	2nd AM IF.....
C43	.01 - 200V condenser.....	T5	Ratio Detector.....
C46, 47	40-350V, 30-300V FP Lytic Condenser.....	T6	Out Put XFMR.....
48, 49	30-300V, 10-25V	T7	Power XFMR.....
R2	4.7K ohm Resistor.....		Loop Ant.....
R3, R15	22K ohm Resistor.....	B	No. 44 Pilot Light.....
R4, R8, R14	1K ohm Resistor.....		Line cord.....
			300 ohm Line Di-Pole Ant.....

K=1000

M=1,000,000

All Resistors ½ Watt unless otherwise noted.

Values of Capacitors in MFD. unless otherwise stated.

Tolerance on Capacitors and Resistors + or — 20% unless otherwise stated.

SPECIFICATIONS

Intermediate frequency	455 kc./10.7 mc.
Tuning frequency range:	
Broadcast Band	540 1620 kc.
Short Wave Band	5.9 17.3 mc.
FM Band	88 108 mc.
Tubes:	
R-F Amplifier	6BA6
Converter	6SB7Y
1st I-F Amplifier (AM-FM)	6SG7
2nd I-F Amplifier (AM-FM)	6SG7
Limiter	6SH7
Discriminator	6H6
Detector and AVC (AM) and Tuning Indicator Amplifier	6SQ7
First Audio	6J5
Second Audio	6J5
Noise Suppressor Input	6J7
Noise Suppressor AVC Amplifier and Detector	6SQ7
Noise Suppressor Reactance Tube	6SG7
Tuning Indicator	6U5
Dial Lamps	Mazda No. 44

GENERAL

Model CR-211 radio chassis is an AM-FM tuner that must be used in conjunction with a power amplifier such as the AMP-111 for speaker operation. Heater and plate voltages for the CR-211 radio chassis are

supplied from the amplifier chassis; it is therefore essential that the radio and amplifier chassis be interconnected during alignment or for other electrical service operations.

METHOD OF REMOVING CHASSIS FROM CABINET

Model CR-211 radio chassis is designed for easy removal from the cabinet in which it is installed. As the radio panel is permanently fastened to the chassis, the control knobs need not be removed when the chassis is taken out of the cabinet for service.

To remove the chassis, first remove the antenna leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the two Phillips-head screws from the angular slots in the flange at the rear of the chassis. Lift the rear of the chassis about one inch and pull it straight back. Never remove the chassis tray from the cabinet; it has been properly positioned to bring the

radio panel in place when the chassis is replaced. In replacing the chassis, slide it so that the small hooks near the front ride inside the flanges on the sides of the chassis tray. Push the chassis forward as far as it will go and the hook should then engage the slots in the chassis tray. Replace the two Phillips-head screws and nuts and tighten securely. Replace all plugs in their receptacles and the antenna leads on their correct terminals. The antenna terminal board for the loop antenna connections is designated L-H. The two terminals on the loop are designated L and H; the leads connected to these terminals should be wired to the corresponding terminals (L and H) on the chassis.

ALIGNMENT PROCEDURE

Alignment of this receiver requires the use of an accurately calibrated RF signal generator, range 455 kc. to 107mc., an output meter, and a vacuum tube voltmeter of approximately 10 megohm input impedance. All trimmer condensers can be identified by stampings on the chassis and gang condenser cover and are shown on the chassis layout diagram.

The pointer on the radio dial should line up with the first horizontal mark on the low frequency end of the dial glass. If the pointer does not line up, loosen the screws on the pointer drive pulley at the end of the tuning gang and adjust the pointer setting; tighten the screws after this adjustment. Be sure the gang is fully meshed for this pointer alignment.

MODEL CR-211

AM ALIGNMENT

I-F ALIGNMENT

1. Set range control to position No. 1. Set volume, treble and bass controls to maximum, the Band Switch to Broadcast position, and dial pointer to 1000 kc.
2. Tune the signal generator to EXACTLY 455 kc.
3. Connect output of modulated signal generator to the signal grid of the 6SB7Y (pin 8) through a .01 mfd. capacitor and signal generator ground to radio chassis.
4. All i-f transformers on this chassis are slug-tuned. Both slug adjustments for 455 kc. are located on top of the transformers; the 10.7 mc. adjustments are accessible on the bottom.
5. Connect output meter across voice coil of 15-inch speaker and peak in order the third, second and first i-f transformers.
6. Use only enough signal input to give a readable indication on voltmeter so that the AVC will not operate and give false readings.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Connect 455 kc. sweep generator having approximately 40 kc. sweep to signal grid of 6SB7Y (pin 8) through a .01 mfd. capacitor. Connect an oscilloscope through a 1 megohm isolating resistor across the 220,000 ohm diode load resistor. Align for best possible peak with range switch in position No. 1, and symmetry in position No. 4.

BROADCAST BAND R-F ALIGNMENT

1. Connect signal generator through .00025 mfd. capacitor to antenna and ground terminals on antenna terminal strip on rear of chassis. Be sure "Ant-loop" switch on top of the chassis is in the ANT. position. Connect output meter as for AM i-f alignment.
2. Tune signal generator to 1400 kc.
3. Set dial to 1400 kc. and adjust oscillator, r-f and antenna trimmers for maximum indication on meter.
4. Set signal generator to 600 kc. and tune radio to signal. Adjust the 600 kc. padder to maximum output while simultaneously rocking the gang.
5. 1400 kc. calibration should then be checked and re-adjusted if necessary with the 1400 kc. oscillator trimmer.

SHORT WAVE BAND R-F ALIGNMENT

1. Set the Band Switch to Short Wave and replace the .00025 mfd. capacitor in series with the signal generator lead to the antenna terminal, with a 400-ohm resistor.
2. Set the signal generator and the receiver to 15 mc. and adjust the oscillator, r-f and antenna trimmers for maximum indication on the meter. While adjusting the 15 mc. oscillator trimmer, two peaks may be observed; only one is the correct peak for 15 mc. alignment. To obtain the correct peak, screw trimmer in to maximum capacitance, then decrease until the first peak is observed. This is the correct one.

Another method for checking for the correct peak is to tune the receiver to 15.91 mc. with signal generator at 15 mc. and with the output increased. If the 15 mc. oscillator trimmer is properly adjusted, the signal will be received at 15.91 mc.—if incorrectly aligned, the signal will be received at 14.09 mc.

FM ALIGNMENT

DISCRIMINATOR ALIGNMENT

1. Tune signal generator to EXACTLY 10.775 mc. and connect to pin 4 of the 6SH7 limiter tube socket through a .01 mfd. capacitor.
2. Connect a DC vacuum tube voltmeter from Pin 4 on 6H6 tube socket to ground through a 1 megohm isolating resistor.
3. Peak both discriminator slugs at 10.775 mc.
4. Retune signal generator to exactly 10.7 mc. and adjust bottom slug for zero volts.
5. The DC voltage at 10.625 mc. should be within 10% of the voltage at 10.775 mc. and of opposite polarity.

Note: If the signal generator is not capable of sufficient output to produce a readable DC voltage, the amplification of the last i-f stage can be used to increase the signal input to the limiter for discriminator alignment. To accomplish this, align the last i-f stage as indicated in "IF Alignment". Then align discriminator as above leaving the signal generator connected to the grid of the 6SG7 2nd i-f tube.

I-F ALIGNMENT

1. Connect high side of signal generator, through a .01 mfd. capacitor and a 1000 ohm resistor in series, to pin 4 of the 6SG7 2nd i-f tube. Connect low side of generator to chassis.

2. Close gang condenser and connect vacuum tube voltmeter across 220,000 ohm limiter grid resistor; (Points "A" to "X" on schematic). Adjust signal generator output until a reading of at least 3 volts is obtained. In order to reduce regeneration caused by the vacuum tube voltmeter leads, a 1-megohm isolating resistor, connected with as short leads as possible to point "A" should be used in series with the vacuum tube voltmeter. Align the 3rd i-f transformer for best peak as indicated on voltmeter.

3. Repeat above for the 2nd and 1st transformer by connecting signal generator to signal grid of first i-f tube 6SG7 then to the signal grid of 6SB7Y converter. The i-f stages should be aligned in this order.

WARNING After each i-f stage has been individually aligned, do not repeat with the signal into the grid of the 6SB7Y.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Replace signal generator with sweep generator having approximately 300 kc. sweep and tune generator to 10.7 mc. Connect oscilloscope across 220,000 ohm limiter grid resistor through a 1-megohm isolating resistor. The order of alignment is the same as when using a vacuum tube voltmeter. Each i-f transformer should be individually aligned for best peak and symmetry.

R-F ALIGNMENT

1. Connect vacuum tube voltmeter across limiter grid resistor as in FM I-F alignment. Adjust signal generator output until a reading of at least 3 volts is obtained.
2. Ground one side of the FM Antenna by placing a wire jumper from one FM connection on the antenna terminal strip to the ground connection.
3. Connect unmodulated signal generator through a 300 ohm resistor to ungrounded antenna post and chassis, and tune signal generator to 107 mc.
4. Set radio dial to 107 mc. and tune oscillator trimmer to peak output on vacuum tube voltmeter.
5. Tune 107 mc. r-f and antenna trimmers for maximum indication on voltmeter it may be necessary to rock the gang while adjusting the r-f trimmer.

THE NOISE SUPPRESSOR

This chassis incorporates an automatic noise suppressor to reduce scratch and noise from phonograph reproduction.

The noise suppressor functions only when the band control switch is in "Phono" position and is automatically switched out of the circuit when the band control switch is in any position except "Phono"

To turn the noise suppressor on press the noise suppressor button and release so that the white dot on the top side of the knob is visible. To disconnect the noise suppressor from the circuit press the button in and release so that the white dot is no longer visible.

Tube replacements in the noise suppressor circuit will usually necessitate an adjustment of the bias gain control.

ADJUSTMENT

It is recommended that the following equipment be used in making noise suppressor adjustments:

DC vacuum tube voltmeter, 10 megohm or greater input impedance.

Columbia No. 10004 test record.

1. Connect record changer to noise suppressor and noise suppressor to radio chassis. Obtain test signal by playing Columbia No. 10004 test record at 1500 cycles with radio band switch in "Phono" position. Set bias gain control to give 4.0 volts bias measured from pins 4 and 5 on 6SQ7 to ground with DC vacuum tube voltmeter.
2. If the recommended test equipment is not available the noise suppressor can be adjusted to a reasonably accurate degree by a listening test using a 12-inch record having a moderate amount of surface noise. Turn noise suppressor on, range and treble controls to maximum (clockwise) and bias gain control to extreme counter-clockwise position. Then place stylus in outside groove of record with the turn-table running and adjust bias gain control to a point where the surface noise is barely audible. In making this adjustment the stylus should not be permitted to run into the recorded section of the record.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid at:

600 kc.	5.8
6.5 mc.	2.9
98 mc.	1.0

R-F Grid to Converter Grid at:

600 kc.	11.6
6.5 mc.	9.5
98 mc.	6.8

R-F on Converter Grid to 455 kc. on I-F Grid at:

600 kc.	1.7
6.5 mc.	2.4
98 mc.	6.8

MODEL CR-211

I-F on Converter Grid to 1st I-F Grid at:	
455 kc. (dial pointer at 600 kc.)	2.6
1st I-F Grid to 2nd I-F Grid at:	
455 kc.	20.5
10.7 mc.	37
2nd I-F Grid to Limiter Grid at:	
10.7 mc.	34.5

AUDIO GAIN

Voltage required across the Volume Control to produce 0.1 watt speaker output** at 400 cycles is:
 .013 volt with Amplifier AMP-111A
 .008 volt with Amplifier AMP-111B or C
 with Band Switch in BDCST setting.

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across the Oscillator Grid Resistor (105) at:

600 kc.	4.5V.
6.5 mc.	4.6V.
98 mc.	5.4V.

or 0.3 ma. through 15,000 ohm Oscillator Grid Resistor at 600 kc., 0.31 ma. at 6.5 mc. and 0.36 ma. at 98 mc.

*Variations of $\pm 20\%$ are permissible. All AM readings made with sufficient input signal to provide 0.5 watt speaker output. 0.5 watt speaker output at 400 cycles is equivalent to a reading of 2.75V. as measured by a high resistance AC voltmeter across the voice coil of the 15-inch speaker.

**0.1 watt speaker output at 400 cycles is equivalent to a reading of 1.22 volts as measured by a high resistance AC voltmeter across the voice coil of 15-inch speaker.

10 KC. FILTER ADJUSTMENT

This chassis incorporates a 10 kc. filter circuit to eliminate the beat note heard as a whistle between stations on the broadcast band. If the trimmer is out of adjustment the following procedure should be observed:

1. Adjust the treble control switch to the No. 3 setting.
2. Remove the noise suppressor plug from the radio chassis and connect the output of an audio oscillator to the phonograph pickup socket. Adjust the oscillator to exactly 10,000 cycles.
3. Set the band selector to PHONO and adjust the 10 kc. trimmer for minimum output.
4. If an audio oscillator is not available for making this adjustment set the band selector to BDCST, set the range control to position 3, connect the antenna to the receiver and set the gang condenser to a point between two stations on adjacent channels having approximately the same power. If the 10 kc. trimmer is out of adjustment, a whistle will be heard. Adjust the trimmer until the whistle is eliminated.

DIAL CORD REPLACEMENT

Rotate the brass pulley designated "A" in Figure 1 until the dial pointer strikes the stop at the high frequency end of the dial calibration. In this condition the slot in pulley "A" should be approximately ten degrees to the left of being vertical—see Figure 1. If the slot in the pulley is in some other position under the above mentioned conditions, the pointer set screw is probably loose and has allowed the pointer to slip.

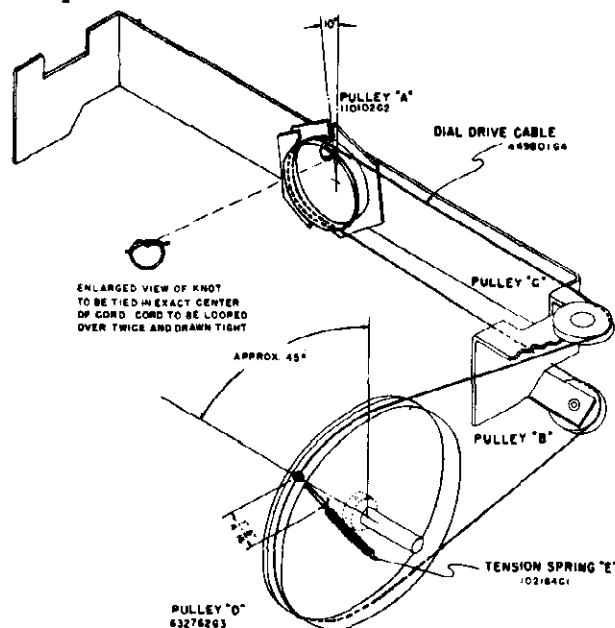


FIGURE 1

To correct this condition, first remove the glass dial and loosen the pointer screw. Then while holding pulley "A" so that its slot is approximately ten degrees to the left of vertical (when viewed from the rear) adjust the pointer until it is resting against the stop at the high frequency end of its travel. Then tighten the pointer set screw securely and replace the glass dial.

Completely unmesh the condenser gang and check the location of the hole or slot in pulley "D". If this hole is not approximately 45 degrees back from vertical as shown on Figure 1, loosen the two No. 6 Allen set screws in the hub of pulley "D" and slip the pulley on its shaft (while holding the condenser gang unmeshed) until the specified adjustment is obtained; then tighten one of the set screws securely. It will be shown later that this is a temporary setting. Next, tie a double knot in the exact center of a 25-inch length of dial cable and fold the cable back on itself so that the knot is at one end. The correct method for tying this knot is shown as an inset on Figure 1. Grasp the cable near the knotted end and slide it into the pulley slot so that the knot is against

CONDENSER GANG DRIVE ADJUSTMENTS

Whenever any of the mechanical parts in the condenser gang drive assembly require replacement due to rough handling or for any other reason, it is extremely important that clearances and adjustments shown on Figures 2 and 3 are correct; otherwise, the tuning mechanism will be sluggish or it may slip during operation.

In reassembling the mechanism after any part was replaced, follow the procedure outlined below:

1. Assemble the Tuning Shaft, Drive Collar, Compression Spring and Flywheel in the order shown on Figure 3. The distance between the front of the Drive Collar and the front of the Tuning Shaft must be $1\frac{1}{8}$ inches as specified on Figure 2. Install the Flywheel on the rear of the Tuning Shaft and slide it forward until it nearly touches the edge of the Drive Wheel; then tighten one of the set screws in the Flywheel hub. Insert a .010" gauge between the Flywheel and the Pin, and while holding the gauge in this position, loosen the set screw in the Flywheel hub that was previously tightened. The Compression Spring should force the Flywheel back against the gauge—when this occurs, tighten both set screws in the Flywheel hub.

2. Adjust the Muting Switch contact clearance by loosening the two screws in the Contact Bracket and

the inside rim of the pulley as shown in the sketch. The piece of cable nearest the dial frame should be wound in the direction shown for one-half turn; then over the lower pulley "B", around the bottom of the large pulley "D" and into the hole. Pull the cable taut and wrap the end around the small hook on pulley "D" temporarily.

The remaining piece of cable should be wound around pulley "A" in the direction shown, for one complete turn, over the upper pulley "C", and over the top of pulley "D". Thread the end through the small hole in pulley "D" and pull both ends of the cable taut. With one end of tension spring "E" fastened to the hook on pulley "D" lace the two free ends of the cable through the opposite end of the spring and tie a knot at a point that will allow $\frac{1}{4}$ " to $\frac{5}{16}$ " of cable between the spring and the inside rim of pulley "D". Be sure to tie the knot around one coil of the spring in the manner shown.

Now with the condenser gang completely meshed, check the position of the dial pointer. If it is not in line with the last calibration mark at the low frequency end of the dial, loosen the set screw in pulley "D" and turn it until the pointer is in the specified position. Be sure that the condenser gang does not move during this adjustment. Then tighten the two screws in pulley "D" securely completing the operation.

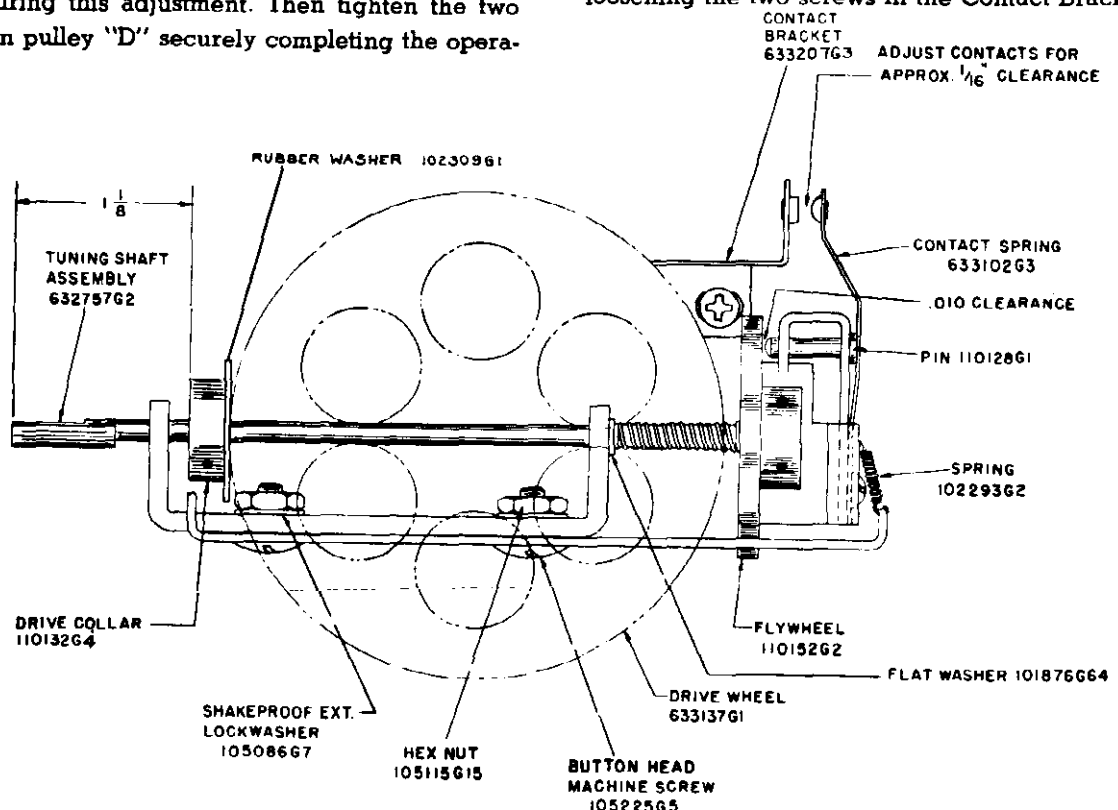


FIGURE 2

sliding the bracket in the required direction until a $1/16"$ clearance is obtained. If this adjustment cannot be obtained in the manner prescribed, bend the Contact Bracket until proper clearance is realized.

3. The Drive Wheel is properly located on its shaft when its edge nearest the hub is in line with the outside edge of the Drive Collar as shown on Figure 3. Two Allen set screws in the Drive Wheel hub provide a means of adjusting the position of this wheel.

4. When the adjustment outlined in paragraph 2 is correct, the proper contact clearance will automatically be obtained when the Muting Switch is to be

"unmuted" while the push buttons are being set. While pressure is applied to any one of the push buttons while they are being set up, a pressure applied simultaneously to the Tuning Control knob will cause the Muting Switch contacts to open. Detailed instructions on setting up these push buttons are shown elsewhere in this bulletin.

5. If the push button shafts at both ends do not engage the Treadle Bar as shown on Figure 3, the three screws in the Treadle Bar must be loosened and the Treadle Bar should be moved until the required condition is obtained.

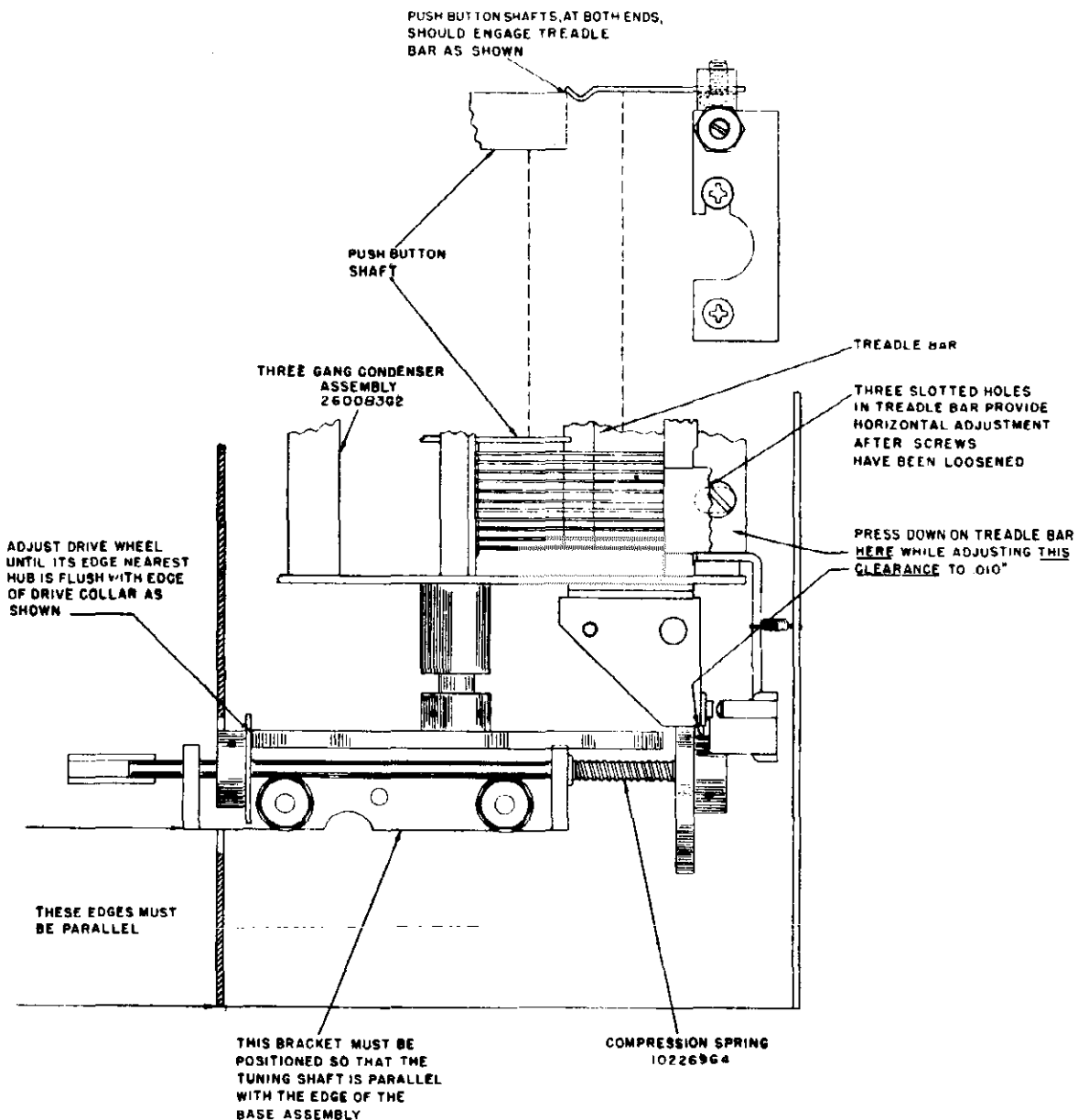
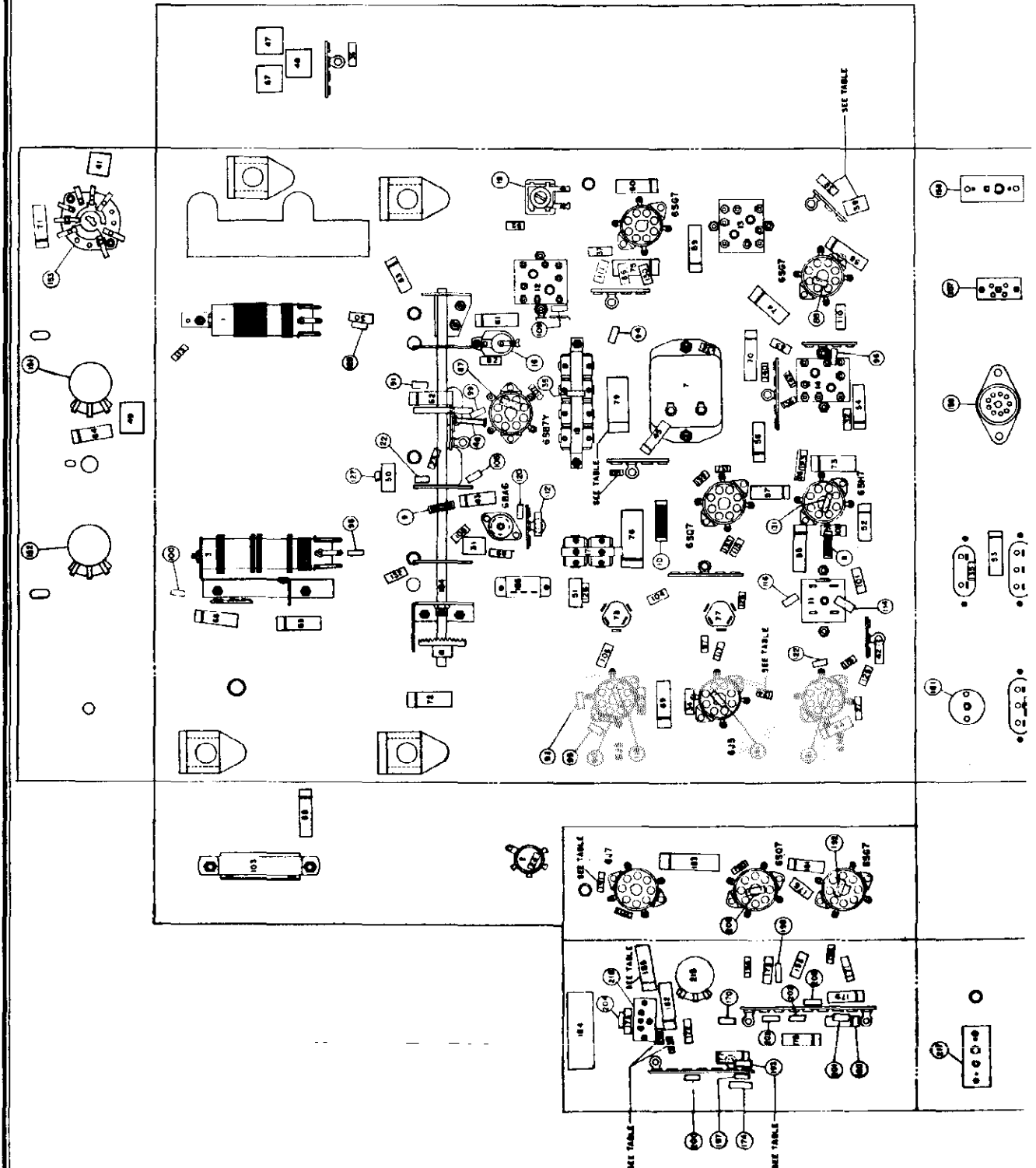


FIGURE 3



REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.	REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.	REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Coil Assembly, Oscillator (AM)	360298G1	68	Capacitor, Paper, .015 mfd., $\pm 10\%$, 200 V.	250169G5	139	Resistor, Composition, 2.2 Megohm, $\frac{1}{2}$ W.	230084G33
2	Coil Assembly, Antenna (AM)	360299G1	69	Capacitor, Paper, .02 mfd., 400 V.	250152G26	140	Resistor, Composition, 2.2 Megohm, $\frac{1}{2}$ W.	230084G33
3	Coil Assembly, R.F. (AM)	360300G1	70	Capacitor, Paper, .02 mfd., 400 V.	250152G26	141	Resistor, Composition, 4.7 Megohm, $\frac{1}{2}$ W.	230084G35
4	Coil Assembly, Antenna (FM)	360296G3	71	Capacitor, Paper, .02 mfd., 400 V.	250152G26	142	Resistor, Composition, 4.7 Megohm, $\frac{1}{2}$ W.	230084G35
5	Coil Assembly, Oscillator (FM)	360295G1	72	Capacitor, Paper, .05 mfd., 200 V.	250152G26	143	Resistor, Composition, 33,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$, (Used on CR 211B Only)	230084G80
6	Coil Assembly, R.F. (FM)	360297G4	73	Capacitor, Paper, .05 mfd., 200 V.	250152G15	150	Control, Volume, 1 Megohm	220044G24
7	Coil Assembly, 10 K.C.	360244G1	74	Capacitor, Paper, .05 mfd., 200 V.	250152G15	151	Control, Bass, 1 Megohm with Switch	230073G5
8	Coil, Choke	360284G1	75	Capacitor, Paper, .05 mfd., 200 V.	250152G15	152	Control, Treble	160178G1
9	Coil, Choke	360284G1	76	Capacitor, Paper, .1 mfd., 400 V.	250152G15	153	Control, Balance	220044G26
10	Coil, Choke Filament	360284G1	77	Capacitor, Electrolytic, 10 mfd., 450 V., 20 mfd., 25 V.	250152G22	154	Switch, Rotary, Band Switch	160179G1
11	Transformer, Discriminator	360305G1	78	Capacitor, Electrolytic, 10 mfd., 450 V., 20 mfd., 25 V.	270023G6	155	Switch, Slide SPDT	160176G1
12	Transformer, I.F.	360285G1	79	Capacitor, Molded Paper, .005 mfd., 400 V., (Used on CR 211B Only)	270023G6	156	Switch, Reject	160189G1
13	Transformer, I.F.	360285G1	86	Resistor, Composition, 33 Ohms, $\frac{1}{2}$ W.	250129G10	157	Socket, External Input	180060G1
14	Transformer, Limiter	360286G1	87	Resistor, Composition, 33 Ohms, $\frac{1}{2}$ W.	230084G4	158	Socket, Phone	189741G1
15	Capacitor, Variable, Three Gang Tuning	260075G1	88	Resistor, Composition, 68 Ohms, $\frac{1}{2}$ W.	230084G6	159	Socket, Amplifier	180427G2
16	Capacitor, Variable, Oscillator Trimmer (Broadcast)	260067G4	89	Resistor, Composition, 68 Ohms, $\frac{1}{2}$ W.	230084G6	160	Antenna Loop Assembly	460637G1
17	Capacitor, Variable, 2 Gang Trimmer	260080G1	90	Resistor, Composition, 100 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G6	161	Socket, Solenoid	182776G1
18	Capacitor, Variable, 4 Gang Trimmers and Oscillator Padder	260082G1	91	Resistor, Composition, 100 Ohms, $\frac{1}{2}$ W.	230084G7	162	Solenoid	360313G1
19	Capacitor, Variable, 10 K.C. Trimmer	259610G2	92	Resistor, Composition, 150 Ohms, $\frac{1}{2}$ W.	230084G8	163	Plug, Solenoid	180147G1
20	Capacitor, Trimmer Assembly	260084G1	93	Resistor, Composition, 220 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G54		Dial Glass Assembly	190305G1
21	Capacitor, Ceramic, 3 mmf.	250088G38	94	Resistor, Composition, 220 Ohms, $\frac{1}{2}$ W.	230084G9		Push Button Assembly for Gang	260093G1
22	Capacitor, Ceramic & Composition, 6 mmf.	250164G2	95	Resistor, Composition, 470 Ohms, $\frac{1}{2}$ W.	230084G11	NOISE SUPPRESSOR		
23	Capacitor, Ceramic & Composition, 10 mmf.	250164G3	96	Resistor, Composition, 1000 Ohms, $\frac{1}{2}$ W.	230084G13	170	Capacitor, Ceramic & Composition, 6 mmf. ± 1 mmf., 500 V.	250164G2
24	Capacitor, Ceramic & Composition, 10 mmf.	250164G3	97	Resistor, Composition, 2200 Ohms, $\frac{1}{2}$ W.	230084G15	171	Capacitor, Mica, 47 mmf., 500 V.	250158G26
25	Capacitor, Ceramic, 35 mmf.	250088G40	98	Resistor, Composition, 4700 Ohms, $\frac{1}{2}$ W.	230084G17	172	Capacitor, Mica, 82 mmf., $\pm 10\%$, 500 V.	250159G81
26	Capacitor, Mica, 47 mmf.	250159G96	99	Resistor, Composition, 5600 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G17	173	Capacitor, Mica, 120 mmf., $\pm 10\%$, 500 V.	250159G83
27	Capacitor, Mica, 47 mmf.	250159G96	100	Resistor, Composition, 5600 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G17	174	Capacitor, Mica, 150 mmf., $\pm 10\%$, 500 V.	250159G84
28	Capacitor, Ceramic, 50 mmf.	250088G39	101	Resistor, Composition, 8200 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G17	175	Capacitor, Mica, 330 mmf., 500 V.	250159G101
29	Capacitor, Ceramic, 50 mmf.	250088G39	102	Resistor, Composition, 8200 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230085G73	176	Capacitor, Ceramic, 590 mmf.	250088G41
30	Capacitor, Mica, 100 mmf.	250159G98	103	Resistor, Strip, 8500 Ohms	260035G5	177	Capacitor, Paper, .001 mfd., $\pm 10\%$, 600 V.	250168G11
31	Capacitor, Mica, 100 mmf.	250159G98	104	Resistor, Composition, 10,000 Ohms, $\frac{1}{2}$ W.	230085G19	178	Capacitor, Paper, .003 mfd., $\pm 10\%$, 600 V.	250189G6
32	Capacitor, Mica, 220 mmf.	250159G100	105	Resistor, Composition, 10,000 Ohms, $\frac{1}{2}$ W.	230084G19	179	Capacitor, Paper, .005 mfd., 400 V.	250152G30
33	Capacitor, Mica, 220 mmf.	250159G100	106	Resistor, Composition, 15,000 Ohms, $\frac{1}{2}$ W.	230085G20	180	Capacitor, Paper, .005 mfd., 400 V.	250152G30
34	Capacitor, Mica, 330 mmf.	250159G101	107	Resistor, Composition, 15,000 Ohms, $\frac{1}{2}$ W.	230084G20	181	Capacitor, Paper, .01 mfd., 200 V.	250152G18
35	Capacitor, Silver Mica, 335 mmf., $\pm 1\%$	250085G38	108	Resistor, Composition, 20,000 Ohms, $\frac{1}{2}$ W., $\pm 5\%$	230085G190	182	Capacitor, Paper, .05 mfd., 200 V.	250152G15
36	Capacitor, Mica, 470 mmf.	250159G102	109	Resistor, Composition, 22,000 Ohms, $\frac{1}{2}$ W.	230084G21	183	Capacitor, Paper, .1 mfd., 200 V.	250152G13
37	Capacitor, Mica, 470 mmf.	250159G102	110	Resistor, Composition, 33,000 Ohms, $\frac{1}{2}$ W.	230085G22	184	Capacitor, Electrolytic, 20 mfd., 25 V.	270027G2
38	Capacitor, Mica, 510 mmf., $\pm 5\%$, (Used on CR 211A Only)	250159G64	111	Resistor, Composition, 33,000 Ohms, $\frac{1}{2}$ W.	230085G22	185	Capacitor, Paper, .1 mfd., 400 V., (Used on Amp. 119B Only)	250152G22
39	Capacitor, Mica, 510 mmf., $\pm 5\%$, (Used on CR 211B Only)	250159G64	112	Resistor, Composition, 33,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230086G80	190	Resistor, Composition, 3300 Ohms, $\frac{1}{2}$ W.	230084G16
40	Capacitor, Mica, 510 mmf., $\pm 5\%$	250159G64	113	Resistor, Composition, 47,000 Ohms, $\frac{1}{2}$ W.	230084G23	191	Resistor, Composition, 5600 Ohms, $\frac{1}{2}$ W., $\pm 10\%$, (Used on 119A Only)	230084G71
41	Capacitor, Mica, 1000 mmf.	250160G82	114	Resistor, Composition, 68,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G23	192	Resistor, Composition, 1000 Ohms, $\frac{1}{2}$ W., (Used on 119B Only)	230084G13
42	Capacitor, Mica, 1800 mmf., $\pm 10\%$	250160G67	115	Resistor, Composition, 100,000 Ohms, $\frac{1}{2}$ W.	230084G25	193	Resistor, Composition, 8200 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G73
43	Capacitor, Paper, .002 mfd., 600 V.	250152G44	116	Resistor, Composition, 100,000 Ohms, $\frac{1}{2}$ W.	230084G25	194	Resistor, Composition, 68,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$, (Used on 119A Only)	230084G94
44	Capacitor, Paper, .002 mfd., 600 V., $\pm 10\%$	250169G2	117	Resistor, Composition, 100,000 Ohms, $\frac{1}{2}$ W.	230084G25	195	Resistor, Composition, 22,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$, (Used on 119B Only)	230084G78
45	Capacitor, Paper, .003 mfd., 600 V., $\pm 10\%$	250169G6	118	Resistor, Composition, 100,000 Ohms, $\frac{1}{2}$ W.	230084G25	196	Resistor, Composition, 100,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230085G86
46	Capacitor, Ceramic, .004 mfd.	250088G34	119	Resistor, Composition, 100,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G25	197	Resistor, Composition, 100,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G75
47	Capacitor, Molded Paper, .004 mfd., 600 V.	250129G7	120	Resistor, Composition, 39,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G81	198	Resistor, Composition, 220,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G90
48	Capacitor, Molded Paper, .004 mfd., 600 V.	250129G7	121	Resistor, Composition, 150,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G88	199	Resistor, Composition, 220,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G28
49	Capacitor, Molded Paper, .005 mfd., 400 V.	250129G10	122	Resistor, Composition, 150,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G88	200	Resistor, Composition, 330,000 Ohms, $\frac{1}{2}$ W., (Used on 119A Only)	230084G28
50	Capacitor, Mica, .0062 mfd., $\pm 5\%$	250161G27	123	Resistor, Composition, 220,000 Ohms, $\frac{1}{2}$ W.	230084G27	201	Resistor, Composition, 330,000 Ohms, $\frac{1}{2}$ W.	230084G28
51	Capacitor, Mica, .0062 mfd., $\pm 5\%$	250161G27	124	Resistor, Composition, 220,000 Ohms, $\frac{1}{2}$ W., (Used on CR 211A Only)	230084G27	202	Resistor, Composition, 470,000 Ohms, $\frac{1}{2}$ W.	230084G29
52	Capacitor, Paper, .01 mfd., 400 V.	250152G27	125	Resistor, Composition, 220,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$, (Used on CR 211B Only)	230084G27	203	Resistor, Composition, 470,000 Ohms, $\frac{1}{2}$ W.	230084G29
53	Capacitor, Paper, .01 mfd., 400 V.	250152G27	126	Resistor, Composition, 220,000 Ohms, $\frac{1}{2}$ W.	230084G27	204	Resistor, Composition, 470,000 Ohms, $\frac{1}{2}$ W.	230084G29
54	Capacitor, Paper, .01 mfd., 400 V.	250152G27	127	Resistor, Composition, 220,000 Ohms, $\frac{1}{2}$ W.	230084G27	205	Resistor, Composition, 1 Megohm, $\frac{1}{2}$ W.	230084G31
55	Capacitor, Paper, .01 mfd., 400 V.	250152G27	128	Resistor, Composition, 220,000 Ohms, $\frac{1}{2}$ W.	230084G27	206	Resistor, Composition, 1 Megohm, $\frac{1}{2}$ W.	230084G31
56	Capacitor, Paper, .01 mfd., 400 V.	250152G27	129	Resistor, Composition, 220,000 Ohms, $\frac{1}{2}$ W., $\pm 10\%$	230084G27	207	Resistor, Composition, 2.7 Megohm, $\frac{1}{2}$ W., $\pm 10\%$	230084G33
57	Capacitor, Paper, .01 mfd., 400 V.	250152G27	130	Resistor, Composition, 470,000 Ohms, $\frac{1}{2}$ W.	230084G29	215	Potentiometer, Control Channel Gain	230084G87
58	Capacitor, Paper, .01 mfd., 400 V.	250152G27	131	Resistor, Composition, 470,000 Ohms, $\frac{1}{2}$ W.	230084G29	216	Switch	180187G1
59	Capacitor, Paper, .01 mfd., 400 V.	250152G27	132	Resistor, Composition, 470,000 Ohms, $\frac{1}{2}$ W.	230084G29	217	Socket, Phone, Input	189741G1
60	Capacitor, Paper, .01 mfd., 400 V.	250152G27	133	Resistor, Composition, 470,000 Ohms, $\frac{1}{2}$ W.	230084G29	218	Socket, Switch	180139G4
61	Capacitor, Paper, .01 mfd., 400 V.	250152G27	134	Resistor, Composition, 1 Megohm, $\frac{1}{2}$ W.	230084G29	219	Plug, Switch	180311G8
62	Capacitor, Paper, .01 mfd., 400 V.	250152G27	135	Resistor, Composition, 1 Megohm, $\frac{1}{2}$ W.	230084G31	220	Plug, Phone	180311G1
63	Capacitor, Paper, .01 mfd., 400 V.	250152G27	136	Resistor, Composition, 1 Megohm, $\frac{1}{2}$ W.	230084G31			
64	Capacitor, Paper, .01 mfd., 400 V.	250152G27	137	Resistor, Composition, 1.5 Megohm, $\frac{1}{2}$ W.	230084G32			
65	Capacitor, Paper, .01 mfd., 400 V.	250152G27	138	Resistor, Composition, 1.5 Megohm, $\frac{1}{2}$ W.	230084G32			
66	Capacitor, Paper, .01 mfd., 400 V.	250152G27						
67	Capacitor, Molded Paper, .012 mfd., 200 V.	250129G13						

MODEL CR-213

SPECIFICATIONS

Intermediate frequency.....	455 kc./10.7 mc.
Tuning frequency range:	
Broadcast Band.....	540—1620 kc.
Short Wave Band.....	5.9—17.3 mc.
FM Band.....	88—108 mc.
Tubes:	
R-F Amplifier.....	6BA6
Converter.....	6SB7Y
1st I-F Amplifier (AM-FM).....	6SG7
2nd I-F Amplifier (AM-FM).....	6SG7
Limiter.....	6SH7
Discriminator.....	6H6
Detector and AVC (AM) and Tuning Indicator Amplifier.....	6SQ7
First Audio.....	6J5
Second Audio.....	6J5
Noise Suppressor Input.....	6J7
Noise Suppressor AVC Amplifier and Detector.....	6SQ7
Noise Suppressor Reactance Tube.....	6SG7
Tuning Indicator.....	6U5
Dial Lamps.....	Mazda No. 44

GENERAL

Model CR-213 radio chassis is an AM-FM tuner that must be used in conjunction with a power amplifier such as the AMP-116 for speaker operation. Heater and plate voltages for the CR-213 radio chassis are

supplied from the amplifier chassis; it is therefore essential that the radio and amplifier chassis be interconnected during alignment or for other electrical service operations.

METHOD OF REMOVING CHASSIS FROM CABINET

Model CR-213 radio chassis is designed for easy removal from the cabinet in which it is installed. As the radio panel is permanently fastened to the chassis, the control knobs need not be removed when the chassis is taken out of the cabinet for service.

To remove the chassis, first remove the antenna leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the two Phillips-head screws from the angular slots in the flange at the rear of the chassis. Lift the rear of the chassis about one inch and pull it straight back. Never remove the chassis tray from the cabinet: it has been properly positioned to bring the

radio panel in place when the chassis is replaced. In replacing the chassis, slide it so that the small hooks near the front ride inside the flanges on the sides of the chassis tray. Push the chassis forward as far as it will go and the hook should then engage the slots in the chassis tray. Replace the two Phillips-head screws and nuts and tighten securely. Replace all plugs in their receptacles and the antenna leads on their correct terminals. The antenna terminal board for the loop antenna connections is designated L-H. The two terminals on the loop are designated L and H; the leads connected to these terminals should be wired to the corresponding terminals (L and H) on the chassis.

ALIGNMENT PROCEDURE

Alignment of this receiver requires the use of an accurately calibrated RF signal generator, range 455 kc. to 107mc., an output meter, and a vacuum tube voltmeter of approximately 10 megohm input impedance. All trimmer condensers can be identified by stampings on the chassis and gang condenser cover and are shown on the chassis layout diagram.

The pointer on the radio dial should line up with the first horizontal mark on the low frequency end of the dial glass. If the pointer does not line up, loosen the screws on the pointer drive pulley at the end of the tuning gang and adjust the pointer setting; tighten the screws after this adjustment. Be sure the gang is fully meshed for this pointer alignment.

AM ALIGNMENT

I-F ALIGNMENT

1. Set range control to position No. 1. Set volume, treble and bass controls to maximum, the Band Switch, to Broadcast position, and dial pointer to 1000 kc.
2. Tune the signal generator to EXACTLY 455 kc.
3. Connect output of modulated signal generator to the signal grid of the 6SB7Y (pin 8) through a .01 mfd. capacitor and signal generator ground to radio chassis.
4. All i-f transformers on this chassis are slug-tuned. Both slug adjustments for 455 kc. are located on top of the transformers; the 10.7 mc. adjustments are accessible on the bottom.
5. Connect output meter across voice coil of 15-inch speaker and peak in order the third, second and first i-f transformers.
6. Use only enough signal input to give a readable indication on voltmeter so that the AVC will not operate and give false readings.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Connect 455 kc. sweep generator having approximately 40 kc. sweep to signal grid of 6SB7Y (pin 8) through a .01 mfd. capacitor. Connect an oscilloscope through a 1 megohm isolating resistor across the 220,000 ohm diode load resistor. Align for best possible peak with range switch in position No. 1, and symmetry in position No. 4.

BROADCAST BAND R-F ALIGNMENT

1. Connect signal generator through .00025 mfd. capacitor to antenna and ground terminals on antenna terminal strip on rear of chassis. Be sure "Ant-loop" switch on top of the chassis is in the ANT. position. Connect output meter as for AM i-f alignment.
2. Tune signal generator to 1400 kc.
3. Set dial to 1400 kc. and adjust oscillator, r-f and antenna trimmers for maximum indication on meter.
4. Set signal generator to 600 kc. and tune radio to signal. Adjust the 600 kc. padder to maximum output while simultaneously rocking the gang.
5. 1400 kc. calibration should then be checked and re-adjusted if necessary with the 1400 kc. oscillator trimmer.

SHORT WAVE BAND

R-F ALIGNMENT

1. Set the Band Switch to Short Wave and replace the .00025 mfd. capacitor in series with the signal generator lead to the antenna terminal, with a 400-ohm resistor.
2. Set the signal generator and the receiver to 15 mc. and adjust the oscillator, r-f and antenna trimmers for maximum indication on the meter. While adjusting the 15 mc. oscillator trimmer, two peaks may be observed; only one is the correct peak for 15 mc. alignment. To obtain the correct peak, screw trimmer in to maximum capacitance, then decrease until the first peak is observed. This is the correct one.

Another method for checking for the correct peak is to tune the receiver to 15.91 mc. with signal generator at 15 mc. and with the output increased. If the 15 mc. oscillator trimmer is properly adjusted, the signal will be received at 15.91 mc. if incorrectly aligned, the signal will be received at 14.09 mc.

FM ALIGNMENT DISCRIMINATOR ALIGNMENT

1. Tune signal generator to EXACTLY 10.775 mc. and connect to pin 4 of the 6SH7 limiter tube socket through a .01 mfd. capacitor.
2. Connect a DC vacuum tube voltmeter from Pin 4 on 6H6 tube socket to ground through a 1 megohm isolating resistor.
3. Peak both discriminator slugs at 10.775 mc.
4. Retune signal generator to exactly 10.7 mc. and adjust bottom slug for zero volts.
5. The DC voltage at 10.625 mc. should be within 10% of the voltage at 10.775 mc. and of opposite polarity.

Note: If the signal generator is not capable of sufficient output to produce a readable DC voltage, the amplification of the last i-f stage can be used to increase the signal input to the limiter for discriminator alignment. To accomplish this, align the last i-f stage as indicated in "IF Alignment". Then align discriminator as above leaving the signal generator connected to the grid of the 6SG7 2nd i-f tube.

I-F ALIGNMENT

1. Connect high side of signal generator, through a .01 mfd. capacitor and a 1000 ohm resistor in series, to pin 4 of the 6SG7 2nd i-f tube. Connect low side of generator to chassis.

MODEL CR-213

2. Close gang condenser and connect vacuum tube voltmeter across 220,000 ohm limiter grid resistor; (Points "A" to "X" on schematic). Adjust signal generator output until a reading of at least 3 volts is obtained. In order to reduce regeneration caused by the vacuum tube voltmeter leads, a 1-megohm isolating resistor, connected with as short leads as possible to point "A" should be used in series with the vacuum tube voltmeter. Align the 3rd i-f transformer for best peak as indicated on voltmeter.

3. Repeat above for the 2nd and 1st transformer by connecting signal generator to signal grid of first i-f tube 6SG7 then to the signal grid of 6SB7Y converter. The i-f stages should be aligned in this order.

WARNING After each i-f stage has been individually aligned, do not repeak with the signal into the grid of the 6SB7Y.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Replace signal generator with sweep generator having approximately 300 kc. sweep and tune generator to 10.7 mc. Connect oscilloscope across 220,000 ohm limiter grid resistor through a 1-megohm isolating resistor. The order of alignment is the same as when using a vacuum tube voltmeter. Each i-f transformer should be individually aligned for best peak and symmetry.

R-F ALIGNMENT

1. Connect vacuum tube voltmeter across limiter grid resistor as in FM I-F alignment. Adjust signal generator output until a reading of at least 3 volts is obtained.

2. Ground one side of the FM Antenna by placing a wire jumper from one FM connection on the antenna terminal strip to the ground connection.

3. Connect unmodulated signal generator through a 300 ohm resistor to ungrounded antenna post and chassis, and tune signal generator to 107 mc.

4. Set radio dial to 107 mc. and tune oscillator trimmer to peak output on vacuum tube voltmeter.

5. Tune 107 mc. r-f and antenna trimmers for maximum indication on voltmeter- it may be necessary to rock the gang while adjusting the r-f trimmer.

THE NOISE SUPPRESSOR

This chassis incorporates an automatic noise suppressor to reduce scratch and noise from phonograph reproduction.

The noise suppressor functions only when the band control switch is in "Phono" position and is automatically switched out of the circuit when the band control switch is in any position except "Phono"

To turn the noise suppressor on press the noise suppressor button and release so that the white dot on the top side of the knob is visible. To disconnect the noise suppressor from the circuit press the button in and release so that the white dot is no longer visible.

Tube replacements in the noise suppressor circuit will usually necessitate an adjustment of the bias gain control.

ADJUSTMENT

It is recommended that the following equipment be used in making noise suppressor adjustments:

DC vacuum tube voltmeter, 10 megohm or greater input impedance.

Columbia No. 10004 test record.

1. Connect record changer to noise suppressor and noise suppressor to radio chassis. Obtain test signal by playing Columbia No. 10004 test record at 1500 cycles with radio band switch in "Phono" position. Set bias gain control to give -4.0 volts bias measured from pins 4 and 5 on 6SQ7 to ground with DC vacuum tube voltmeter.

2. If the recommended test equipment is not available the noise suppressor can be adjusted to a reasonably accurate degree by a listening test using a 12-inch record having a moderate amount of surface noise. Turn noise suppressor on, range and treble controls to maximum (clockwise) and bias gain control to extreme counter-clockwise position. Then place stylus in outside groove of record with the turn-table running and adjust bias gain control to a point where the surface noise is barely audible. In making this adjustment the stylus should not be permitted to run into the recorded section of the record.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid at:

600 kc.....	5.8
6.5 mc.....	2.9
98 mc.....	1.0

R-F Grid to Converter Grid at:

600 kc.....	11.6
6.5 mc.....	9.5
98 mc.....	6.8

R-F on Converter Grid to 455 kc. on I-F Grid at:

600 kc.....	1.7
6.5 mc.....	2.4
98 mc.....	6.8

I-F on Converter Grid to 1st I-F Grid at:	
455 kc. (dial pointer at 600 kc.)	2.6
1st I-F Grid to 2nd I-F Grid at:	
455 kc.	20.5
10.7 mc.	37
2nd I-F Grid to Limiter Grid at:	
10.7 mc.	34.5

AUDIO GAIN

Voltage required across the Volume Control to produce 0.1 watt speaker output** at 400 cycles is:

.013 volt with Amplifier AMP-116A
with Band Switch in BDCST setting.

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across the Oscillator Grid

Resistor (105) at:

600 kc.	4.5V.
6.5 mc.	4.6V.
98 mc.	5.4V.

or 0.3 ma. through 15,000 ohm Oscillator Grid Resistor at 600 kc., 0.31 ma. at 6.5 mc. and 0.36 ma. at 98 mc.

*Variations of $\pm 20\%$ are permissible. All AM readings made with sufficient input signal to provide 0.5 watt speaker output. 0.5 watt speaker output at 400 cycles is equivalent to a reading of 2.75V. as measured by a high resistance AC voltmeter across the voice coil of the 15-inch speaker.

**0.1 watt speaker output at 400 cycles is equivalent to a reading of 1.22 volts as measured by a high resistance AC voltmeter across the voice coil of 15-inch speaker.

10 KC. FILTER ADJUSTMENT

This chassis incorporates a 10 kc. filter circuit to eliminate the beat note heard as a whistle between stations on the broadcast band. If the trimmer is out of adjustment the following procedure should be observed:

1. Adjust the range control switch to the No. 3 setting.
2. Remove the noise suppressor plug from the radio chassis and connect the output of an audio oscillator to the phonograph pickup socket. Adjust the oscillator to exactly 10,000 cycles.
3. Set the band selector to PHONO and adjust the 10 kc. trimmer for minimum output.
4. If an audio oscillator is not available for making this adjustment set the band selector to BDCST, set the range control to position 4, connect the antenna to the receiver and set the gang condenser to a point between two stations on adjacent channels having approximately the same power. If the 10 kc. trimmer is out of adjustment, a whistle will be heard. Adjust the trimmer until the whistle is eliminated.

DIAL CORD REPLACEMENT

Rotate the brass pulley designated "A" in Figure 1 until the dial pointer strikes the stop at the high frequency end of the dial calibration. In this condition the slot in pulley "A" should be approximately ten degrees to the left of being vertical—see Figure 1. If the slot in the pulley is in some other position under the above mentioned conditions, the pointer set screw is probably loose and has allowed the pointer to slip.

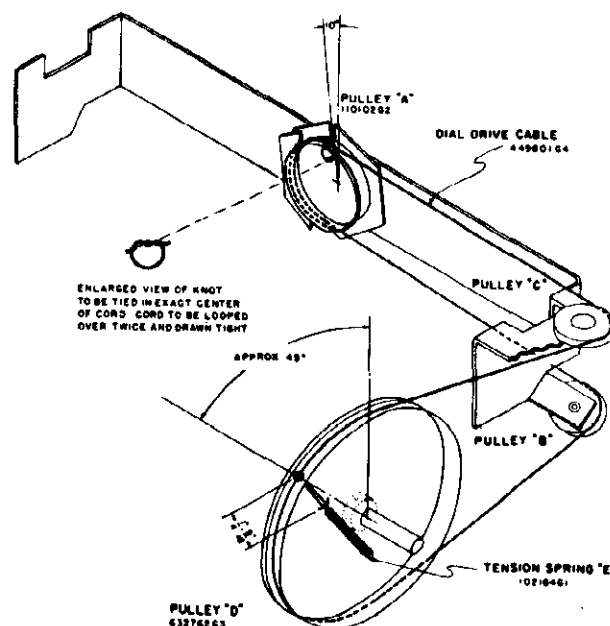


FIGURE 1

To correct this condition, first remove the glass dial and loosen the pointer screw. Then while holding pulley "A" so that its slot is approximately ten degrees to the left of vertical (when viewed from the rear) adjust the pointer until it is resting against the stop at the high frequency end of its travel. Then tighten the pointer set screw securely and replace the glass dial.

Completely unmesh the condenser gang and check the location of the hole or slot in pulley "D". If this hole is not approximately 45 degrees back from vertical as shown on Figure 1, loosen the two No. 6 Allen set screws in the hub of pulley "D" and slip the pulley on its shaft (while holding the condenser gang unmeshed) until the specified adjustment is obtained; then tighten one of the set screws securely. It will be shown later that this is a temporary setting. Next, tie a double knot in the exact center of a 25-inch length of dial cable and fold the cable back on itself so that the knot is at one end. The correct method for tying this knot is shown as an inset on Figure 1. Grasp the cable near the knotted end and slide it into the pulley slot so that the knot is against

MODEL CR-213

the inside rim of the pulley as shown in the sketch. The piece of cable nearest the dial frame should be wound in the direction shown for one-half turn; then over the lower pulley "B", around the bottom of the large pulley "D" and into the hole. Pull the cable taut and wrap the end around the small hook on pulley "D" temporarily.

The remaining piece of cable should be wound around pulley "A" in the direction shown, for one complete turn, over the upper pulley "C", and over the top of pulley "D". Thread the end through the small hole in pulley "D" and pull both ends of the cable taut. With one end of tension spring "E" fastened to the hook on pulley "D" lace the two free ends of the cable through the opposite end of the spring and tie a knot at a point that will allow $\frac{1}{4}$ " to $\frac{5}{16}$ " of cable between the spring and the inside rim of pulley "D". Be sure to tie the knot around one coil of the spring in the manner shown.

Now with the condenser gang completely meshed, check the position of the dial pointer. If it is not in line with the last calibration mark at the low frequency end of the dial, loosen the set screw in pulley "D" and turn it until the pointer is in the specified position. Be sure that the condenser gang does not move during this adjustment. Then tighten the two screws in pulley "D" securely completing the operation.

CONDENSER GANG DRIVE ADJUSTMENTS

Whenever any of the mechanical parts in the condenser gang drive assembly require replacement due to rough handling or for any other reason, it is extremely important that clearances and adjustments shown on Figures 2 and 3 are correct; otherwise, the tuning mechanism will be sluggish or it may slip during operation.

In reassembling the mechanism after any part was replaced, follow the procedure outlined below:

1. Assemble the Tuning Shaft, Drive Collar, Compression Spring and Flywheel in the order shown on Figure 3. The distance between the front of the Drive Collar and the front of the Tuning Shaft must be $1\frac{1}{8}$ inches as specified on Figure 2. Install the Flywheel on the rear of the Tuning Shaft and slide it forward until it nearly touches the edge of the Drive Wheel; then tighten one of the set screws in the Flywheel hub. Insert a .010" gauge between the Flywheel and the Pin, and while holding the gauge in this position, loosen the set screw in the Flywheel hub that was previously tightened. The Compression Spring should force the Flywheel back against the gauge—when this occurs, tighten both set screws in the Flywheel hub.

2. Adjust the Muting Switch contact clearance by loosening the two screws in the Contact Bracket and

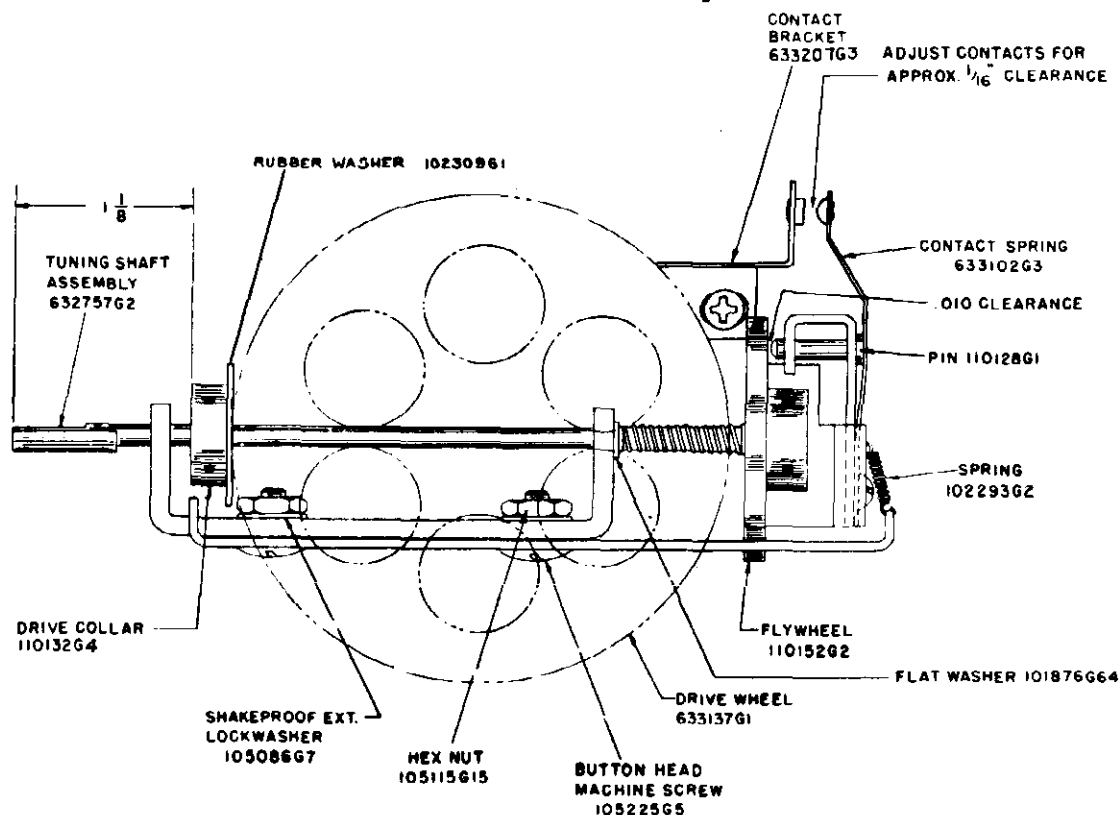


FIGURE 2

sliding the bracket in the required direction until a $1/16"$ clearance is obtained. If this adjustment cannot be obtained in the manner prescribed, bend the Contact Bracket until proper clearance is realized.

3. The Drive Wheel is properly located on its shaft when its edge nearest the hub is in line with the outside edge of the Drive Collar as shown on Figure 3. Two Allen set screws in the Drive Wheel hub provide a means of adjusting the position of this wheel.

4. When the adjustment outlined in paragraph 2 is correct, the proper contact clearance will automati-

cally be obtained when the Muting Switch is to be "unmuted" while the push buttons are being set. While pressure is applied to any one of the push buttons while they are being set up, a pressure applied simultaneously to the Tuning Control knob will cause the Muting Switch contacts to open. Detailed instructions on setting up these push buttons are shown elsewhere in this bulletin.

5. If the push button shafts at both ends do not engage the Treadle Bar as shown on Figure 3, the three screws in the Treadle Bar must be loosened and the Treadle Bar should be moved until the required condition is obtained.

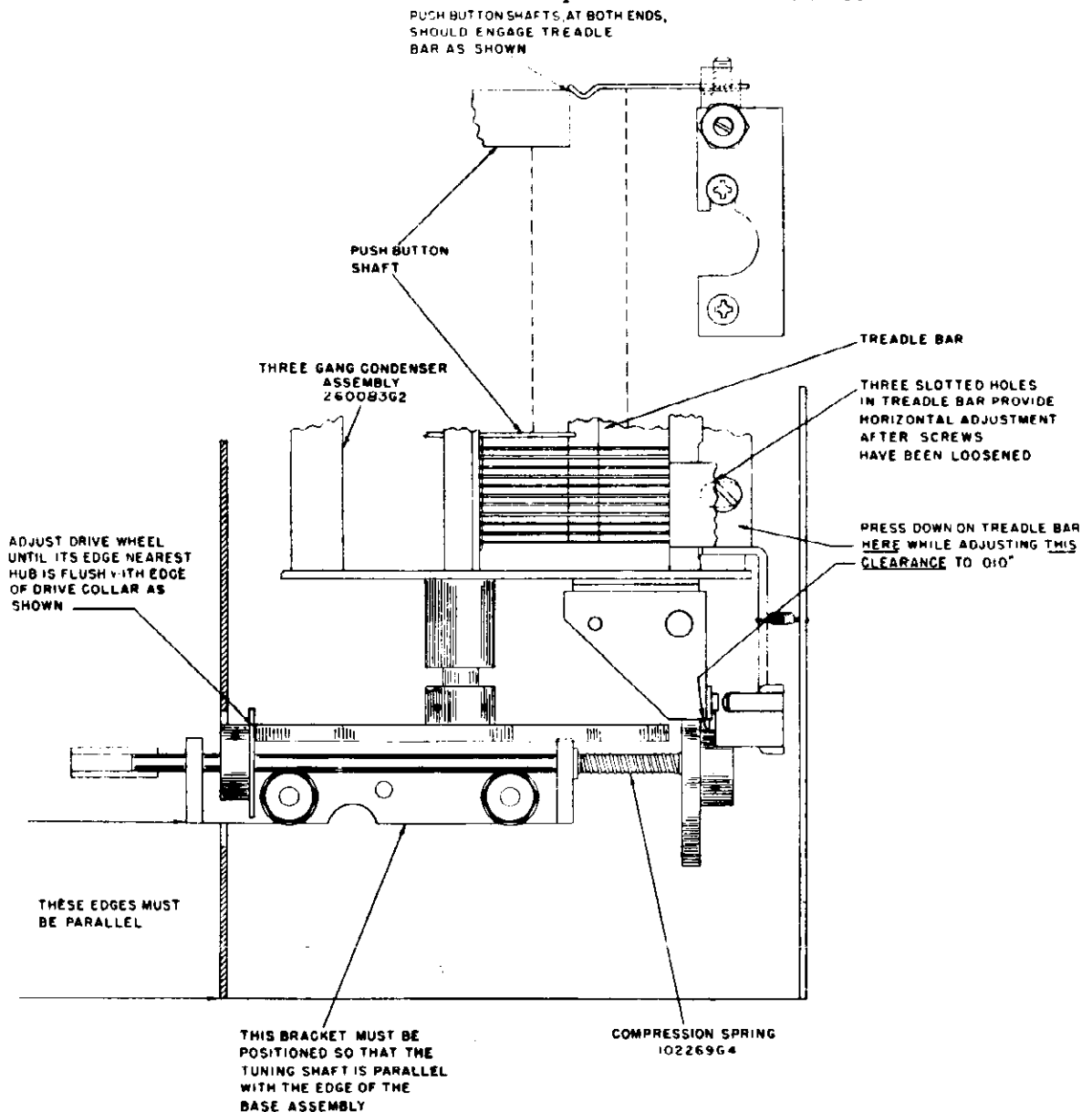
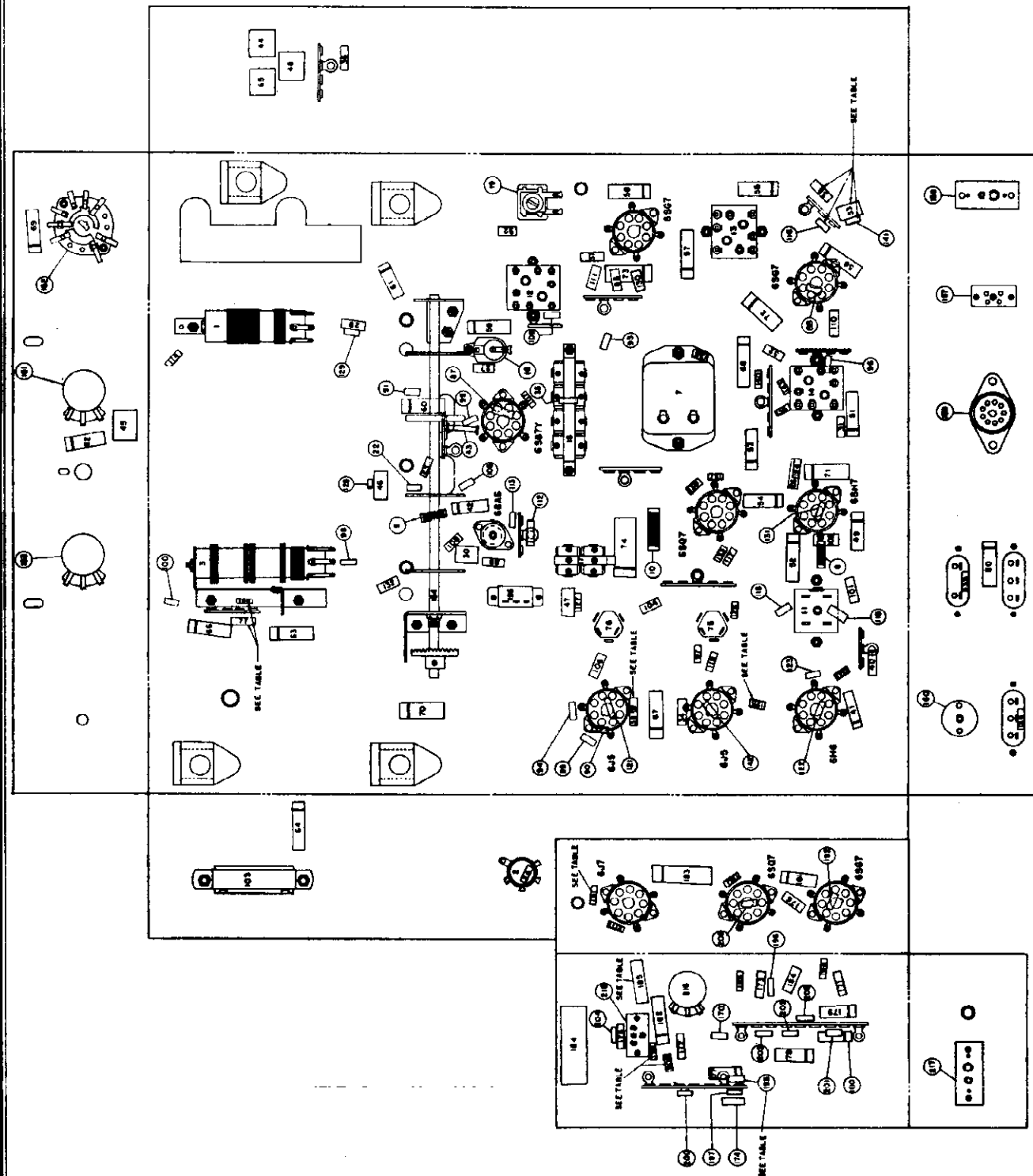


FIGURE 3

MODEL CR-213



REFERENCE NO.	MAGNAVOX PART NO.	DESCRIPTION	REFERENCE NO.	MAGNAVOX PART NO.	DESCRIPTION
1	360298621	Coil Assembly, Oscillator (AM)	58	29015026	Capacitor, Paper, .02 mfd., 100 V.
2	360298621	Coil Assembly, Antenna (AM)	59	29015026	Capacitor, Paper, .02 mfd., 100 V.
3	360298621	Coil Assembly, R.F. (AM)	60	29015026	Capacitor, Paper, .05 mfd., 200 V.
4	360298621	Coil Assembly, Antenna (FM)	70	29015026	Capacitor, Paper, .05 mfd., 200 V.
5	360298621	Coil Assembly, Oscillator (FM)	71	29015026	Capacitor, Paper, .05 mfd., 200 V.
6	360298621	Coil Assembly, R.F. (FM)	72	29015026	Capacitor, Paper, .05 mfd., 200 V.
7	360298621	Coil Assembly, 10 K.C.	73	29015026	Capacitor, Paper, .05 mfd., 200 V.
8	360298621	Coil Assembly, 10 K.C.	74	29015026	Capacitor, Paper, .05 mfd., 200 V.
9	360298621	Coil Assembly, 10 K.C.	75	29015026	Capacitor, Paper, .05 mfd., 200 V.
10	360298621	Coil Assembly, 10 K.C.	76	29015026	Capacitor, Paper, .05 mfd., 200 V.
11	360298621	Coil Assembly, 10 K.C.	77	29015026	Capacitor, Paper, .05 mfd., 200 V.
12	360298621	Coil Assembly, 10 K.C.	78	29015026	Capacitor, Paper, .05 mfd., 200 V.
13	360298621	Coil Assembly, 10 K.C.	79	29015026	Capacitor, Paper, .05 mfd., 200 V.
14	360298621	Coil Assembly, 10 K.C.	80	29015026	Capacitor, Paper, .05 mfd., 200 V.
15	360298621	Coil Assembly, 10 K.C.	81	29015026	Capacitor, Paper, .05 mfd., 200 V.
16	360298621	Coil Assembly, 10 K.C.	82	29015026	Capacitor, Paper, .05 mfd., 200 V.
17	360298621	Coil Assembly, 10 K.C.	83	29015026	Capacitor, Paper, .05 mfd., 200 V.
18	360298621	Coil Assembly, 10 K.C.	84	29015026	Capacitor, Paper, .05 mfd., 200 V.
19	360298621	Coil Assembly, 10 K.C.	85	29015026	Capacitor, Paper, .05 mfd., 200 V.
20	360298621	Coil Assembly, 10 K.C.	86	29015026	Capacitor, Paper, .05 mfd., 200 V.
21	360298621	Coil Assembly, 10 K.C.	87	29015026	Capacitor, Paper, .05 mfd., 200 V.
22	360298621	Coil Assembly, 10 K.C.	88	29015026	Capacitor, Paper, .05 mfd., 200 V.
23	360298621	Coil Assembly, 10 K.C.	89	29015026	Capacitor, Paper, .05 mfd., 200 V.
24	360298621	Coil Assembly, 10 K.C.	90	29015026	Capacitor, Paper, .05 mfd., 200 V.
25	360298621	Coil Assembly, 10 K.C.	91	29015026	Capacitor, Paper, .05 mfd., 200 V.
26	360298621	Coil Assembly, 10 K.C.	92	29015026	Capacitor, Paper, .05 mfd., 200 V.
27	360298621	Coil Assembly, 10 K.C.	93	29015026	Capacitor, Paper, .05 mfd., 200 V.
28	360298621	Coil Assembly, 10 K.C.	94	29015026	Capacitor, Paper, .05 mfd., 200 V.
29	360298621	Coil Assembly, 10 K.C.	95	29015026	Capacitor, Paper, .05 mfd., 200 V.
30	360298621	Coil Assembly, 10 K.C.	96	29015026	Capacitor, Paper, .05 mfd., 200 V.
31	360298621	Coil Assembly, 10 K.C.	97	29015026	Capacitor, Paper, .05 mfd., 200 V.
32	360298621	Coil Assembly, 10 K.C.	98	29015026	Capacitor, Paper, .05 mfd., 200 V.
33	360298621	Coil Assembly, 10 K.C.	99	29015026	Capacitor, Paper, .05 mfd., 200 V.
34	360298621	Coil Assembly, 10 K.C.	100	29015026	Capacitor, Paper, .05 mfd., 200 V.
35	360298621	Coil Assembly, 10 K.C.	101	29015026	Capacitor, Paper, .05 mfd., 200 V.
36	360298621	Coil Assembly, 10 K.C.	102	29015026	Capacitor, Paper, .05 mfd., 200 V.
37	360298621	Coil Assembly, 10 K.C.	103	29015026	Capacitor, Paper, .05 mfd., 200 V.
38	360298621	Coil Assembly, 10 K.C.	104	29015026	Capacitor, Paper, .05 mfd., 200 V.
39	360298621	Coil Assembly, 10 K.C.	105	29015026	Capacitor, Paper, .05 mfd., 200 V.
40	360298621	Coil Assembly, 10 K.C.	106	29015026	Capacitor, Paper, .05 mfd., 200 V.
41	360298621	Coil Assembly, 10 K.C.	107	29015026	Capacitor, Paper, .05 mfd., 200 V.
42	360298621	Coil Assembly, 10 K.C.	108	29015026	Capacitor, Paper, .05 mfd., 200 V.
43	360298621	Coil Assembly, 10 K.C.	109	29015026	Capacitor, Paper, .05 mfd., 200 V.
44	360298621	Coil Assembly, 10 K.C.	110	29015026	Capacitor, Paper, .05 mfd., 200 V.
45	360298621	Coil Assembly, 10 K.C.	111	29015026	Capacitor, Paper, .05 mfd., 200 V.
46	360298621	Coil Assembly, 10 K.C.	112	29015026	Capacitor, Paper, .05 mfd., 200 V.
47	360298621	Coil Assembly, 10 K.C.	113	29015026	Capacitor, Paper, .05 mfd., 200 V.
48	360298621	Coil Assembly, 10 K.C.	114	29015026	Capacitor, Paper, .05 mfd., 200 V.
49	360298621	Coil Assembly, 10 K.C.	115	29015026	Capacitor, Paper, .05 mfd., 200 V.
50	360298621	Coil Assembly, 10 K.C.	116	29015026	Capacitor, Paper, .05 mfd., 200 V.
51	360298621	Coil Assembly, 10 K.C.	117	29015026	Capacitor, Paper, .05 mfd., 200 V.
52	360298621	Coil Assembly, 10 K.C.	118	29015026	Capacitor, Paper, .05 mfd., 200 V.
53	360298621	Coil Assembly, 10 K.C.	119	29015026	Capacitor, Paper, .05 mfd., 200 V.
54	360298621	Coil Assembly, 10 K.C.	120	29015026	Capacitor, Paper, .05 mfd., 200 V.
55	360298621	Coil Assembly, 10 K.C.	121	29015026	Capacitor, Paper, .05 mfd., 200 V.
56	360298621	Coil Assembly, 10 K.C.	122	29015026	Capacitor, Paper, .05 mfd., 200 V.
57	360298621	Coil Assembly, 10 K.C.	123	29015026	Capacitor, Paper, .05 mfd., 200 V.
58	360298621	Coil Assembly, 10 K.C.	124	29015026	Capacitor, Paper, .05 mfd., 200 V.
59	360298621	Coil Assembly, 10 K.C.	125	29015026	Capacitor, Paper, .05 mfd., 200 V.
60	360298621	Coil Assembly, 10 K.C.	126	29015026	Capacitor, Paper, .05 mfd., 200 V.
61	360298621	Coil Assembly, 10 K.C.	127	29015026	Capacitor, Paper, .05 mfd., 200 V.
62	360298621	Coil Assembly, 10 K.C.	128	29015026	Capacitor, Paper, .05 mfd., 200 V.
63	360298621	Coil Assembly, 10 K.C.	129	29015026	Capacitor, Paper, .05 mfd., 200 V.
64	360298621	Coil Assembly, 10 K.C.	130	29015026	Capacitor, Paper, .05 mfd., 200 V.
65	360298621	Coil Assembly, 10 K.C.	131	29015026	Capacitor, Paper, .05 mfd., 200 V.
66	360298621	Coil Assembly, 10 K.C.	132	29015026	Capacitor, Paper, .05 mfd., 200 V.
67	360298621	Coil Assembly, 10 K.C.	133	29015026	Capacitor, Paper, .05 mfd., 200 V.
68	360298621	Coil Assembly, 10 K.C.	134	29015026	Capacitor, Paper, .05 mfd., 200 V.
69	360298621	Coil Assembly, 10 K.C.	135	29015026	Capacitor, Paper, .05 mfd., 200 V.
70	360298621	Coil Assembly, 10 K.C.	136	29015026	Capacitor, Paper, .05 mfd., 200 V.
71	360298621	Coil Assembly, 10 K.C.	137	29015026	Capacitor, Paper, .05 mfd., 200 V.
72	360298621	Coil Assembly, 10 K.C.	138	29015026	Capacitor, Paper, .05 mfd., 200 V.
73	360298621	Coil Assembly, 10 K.C.	139	29015026	Capacitor, Paper, .05 mfd., 200 V.
74	360298621	Coil Assembly, 10 K.C.	140	29015026	Capacitor, Paper, .05 mfd., 200 V.
75	360298621	Coil Assembly, 10 K.C.	141	29015026	Capacitor, Paper, .05 mfd., 200 V.
76	360298621	Coil Assembly, 10 K.C.	142	29015026	Capacitor, Paper, .05 mfd., 200 V.
77	360298621	Coil Assembly, 10 K.C.	143	29015026	Capacitor, Paper, .05 mfd., 200 V.
78	360298621	Coil Assembly, 10 K.C.	144	29015026	Capacitor, Paper, .05 mfd., 200 V.
79	360298621	Coil Assembly, 10 K.C.	145	29015026	Capacitor, Paper, .05 mfd., 200 V.
80	360298621	Coil Assembly, 10 K.C.	146	29015026	Capacitor, Paper, .05 mfd., 200 V.
81	360298621	Coil Assembly, 10 K.C.	147	29015026	Capacitor, Paper, .05 mfd., 200 V.
82	360298621	Coil Assembly, 10 K.C.	148	29015026	Capacitor, Paper, .05 mfd., 200 V.
83	360298621	Coil Assembly, 10 K.C.	149	29015026	Capacitor, Paper, .05 mfd., 200 V.
84	360298621	Coil Assembly, 10 K.C.	150	29015026	Capacitor, Paper, .05 mfd., 200 V.
85	360298621	Coil Assembly, 10 K.C.	151	29015026	Capacitor, Paper, .05 mfd., 200 V.
86	360298621	Coil Assembly, 10 K.C.	152	29015026	Capacitor, Paper, .05 mfd., 200 V.
87	360298621	Coil Assembly, 10 K.C.	153	29015026	Capacitor, Paper, .05 mfd., 200 V.
88	360298621	Coil Assembly, 10 K.C.	154	29015026	Capacitor, Paper, .05 mfd., 200 V.
89	360298621	Coil Assembly, 10 K.C.	155	29015026	Capacitor, Paper, .05 mfd., 200 V.
90	360298621	Coil Assembly, 10 K.C.	156	29015026	Capacitor, Paper, .05 mfd., 200 V.
91	360298621	Coil Assembly, 10 K.C.	157	29015026	Capacitor, Paper, .05 mfd., 200 V.
92	360298621	Coil Assembly, 10 K.C.	158	29015026	Capacitor, Paper, .05 mfd., 200 V.
93	360298621	Coil Assembly, 10 K.C.	159	29015026	Capacitor, Paper, .05 mfd., 200 V.
94	360298621	Coil Assembly, 10 K.C.	160	29015026	Capacitor, Paper, .05 mfd., 200 V.
95	360298621	Coil Assembly, 10 K.C.	161	29015026	Capacitor, Paper, .05 mfd., 200 V.
96	360298621	Coil Assembly, 10 K.C.	162	29015026	Capacitor, Paper, .05 mfd., 200 V.
97	360298621	Coil Assembly, 10 K.C.	163	29015026	Capacitor, Paper, .05 mfd., 200 V.
98	360298621	Coil Assembly, 10 K.C.	164	29015026	Capacitor, Paper, .05 mfd., 200 V.
99	360298621	Coil Assembly, 10 K.C.	165	29015026	Capacitor, Paper, .05 mfd., 200 V.
100	360298621	Coil Assembly, 10 K.C.	166	29015026	Capacitor, Paper, .05 mfd., 200 V.
101	360298621	Coil Assembly, 10 K.C.	167	29015026	Capacitor, Paper, .05 mfd., 200 V.
102	360298621	Coil Assembly, 10 K.C.	168	29015026	Capacitor, Paper, .05 mfd., 200 V.
103	360298621	Coil Assembly, 10 K.C.	169	29015026	Capacitor, Paper, .05 mfd., 200 V.
104	360298621	Coil Assembly, 10 K.C.	170	29015026	Capacitor, Paper, .05 mfd., 200 V.
105	360298621	Coil Assembly, 10 K.C.	171	29015026	Capacitor, Paper, .05 mfd., 200 V.
106	360298621	Coil Assembly, 10 K.C.	172	29015026	Capacitor, Paper, .05 mfd., 200 V.
107	360298621	Coil Assembly, 10 K.C.	173	29015026	Capacitor, Paper, .05 mfd., 200 V.
108	360298621	Coil Assembly, 10 K.C.	174	29015026	Capacitor, Paper, .05 mfd., 200 V.
109	360298621	Coil Assembly, 10 K.C.	175	29015026	Capacitor, Paper, .05 mfd., 200 V.
110	360298621	Coil Assembly, 10 K.C.	176	29015026	Capacitor, Paper, .05 mfd., 200 V.
111	360298621	Coil Assembly, 10 K.C.	177	29015026	Capacitor, Paper, .05 mfd., 200 V.
112	360298621	Coil Assembly, 10 K.C.	178	29015026	Capacitor, Paper, .05 mfd., 200 V.
113	360298621	Coil Assembly, 10 K.C.	179	29015026	Capacitor, Paper, .05 mfd., 200 V.
114	360298621	Coil Assembly, 10 K.C.	180	29015026	Capacitor, Paper, .05 mfd., 200 V.
115	360298621	Coil Assembly, 10 K.C.	181	29015026	Capacitor, Paper, .05 mfd., 200 V.
116	360298621	Coil Assembly, 10 K.C.	182	29015026	Capacitor, Paper, .05 mfd., 200 V.
117	360298621	Coil Assembly, 10 K.C.	183	29015026	Capacitor, Paper, .05 mfd., 200 V.
118	360298621	Coil Assembly, 10 K.C.	184	29015026	Capacitor, Paper, .05 mfd., 200 V.
119	360298621	Coil Assembly, 10 K.C.	185	29015026	Capacitor, Paper, .05 mfd., 200 V.
120	360298621	Coil Assembly, 10 K.C.	186	29015026	Capacitor, Paper, .05 mfd., 200 V.
121	360298621	Coil Assembly, 10 K.C.	187	29015026	Capacitor, Paper, .05 mfd., 200 V.
122	360298621	Coil Assembly, 10 K.C.	188	29015026	Capacitor, Paper, .05 mfd., 200 V.
123	360298621	Coil Assembly, 10 K.C.	189	29015026	Capacitor, Paper, .05 mfd., 200 V.
124	360298621	Coil Assembly, 10 K.C.	190	29015026	Capacitor, Paper, .05 mfd., 200 V.
125	360298621	Coil Assembly, 10 K.C.	191	29015026	Capacitor, Paper, .05 mfd., 200 V.
126	360298621	Coil Assembly, 10 K.C.	192	29015026	Capacitor, Paper, .05 mfd., 200 V.
127	360298621	Coil Assembly, 10 K.C.	193	29015026	Capacitor, Paper, .05 mfd., 200 V.
128	360298621	Coil Assembly, 10 K.C.	194	29015026	Capacitor, Paper, .05 mfd., 200 V.
129	360298621	Coil Assembly, 10 K.C.	195	29015026	Capacitor, Paper, .05 mfd., 200 V.
130	360298621	Coil Assembly, 10 K.C.	196	29015026	Capacitor, Paper, .05 mfd., 200 V.
131	360298621	Coil Assembly, 10 K.C.	197	29015026	Capacitor, Paper, .05 mfd., 200 V.
132	360298621	Coil Assembly, 10 K.C.	198	29015026	Capacitor, Paper, .05 mfd., 200 V.
133	360298621	Coil Assembly, 10 K.C.	199	29015026	Capacitor, Paper, .05 mfd., 200 V.
134	360298621	Coil Assembly, 10 K.C.	200	29015026	Capacitor, Paper, .05 mfd., 200 V.
135	360298621	Coil Assembly, 10 K.C.	201	29015026	Capacitor, Paper, .05 mfd., 200 V.
136	360298621	Coil Assembly, 10 K.C.	202	29015026	Capacitor, Paper, .05 mfd., 200 V.
137	360298621	Coil Assembly, 10 K.C.	203	29015026	Capacitor, Paper, .05 mfd., 200 V.
138	360298621	Coil Assembly, 10 K.C.	204	29015026	Capacitor, Paper, .05 mfd., 200 V.
139	360298621	Coil Assembly, 10 K.C.	205	29015026	Capacitor, Paper, .05 mfd., 200 V.
140	360298621	Coil Assembly, 10 K.C.	206	29015026	Capacitor, Paper, .05 mfd., 200 V.
141	360298621	Coil Assembly, 10 K.C.	207	29015026	Capacitor, Paper, .05 mfd., 200 V.
142	360298621	Coil Assembly, 10 K.C.	208	29015026	Capacitor, Paper, .05 mfd., 200 V.
143	360298621	Coil Assembly, 10 K.C.	209	29015026	Capacitor, Paper, .05 mfd., 200 V.
144	360298621	Coil Assembly, 10 K.C.	210	29015026	Capacitor, Paper, .05 mfd., 200 V.
145	360298621	Coil Assembly, 10 K.C.	211	29015026	Capacitor, Paper, .05 mfd., 200 V.
146	360298621	Coil Assembly, 10 K.C.	212	29015026	Capacitor, Paper, .05 mfd., 200 V.
147	360298621	Coil Assembly, 10 K.C.	213	29015026	Capacitor, Paper, .05 mfd., 200 V.
148	360298621	Coil Assembly, 10 K.C.	214	29015026	Capacitor, Paper, .05 mfd., 200 V.
149	360298621	Coil Assembly, 10 K.C.	215	29015026	Capacitor, Paper, .05 mfd., 200 V.
150	360298621	Coil Assembly, 10 K.C.	216	29015026	Capacitor, Paper, .05 mfd., 200 V.
151	360298621				

MODEL CR-226

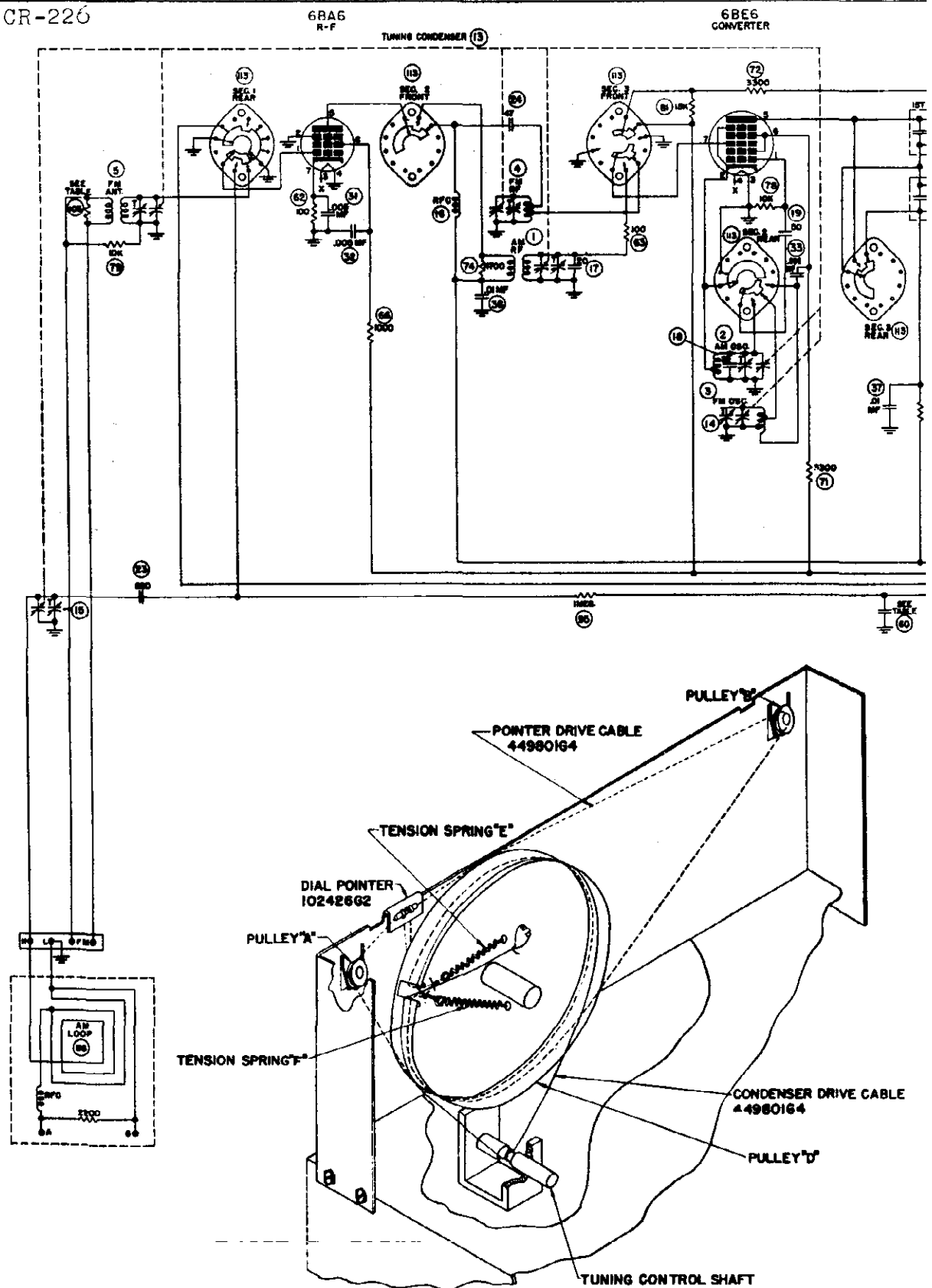


FIGURE 1

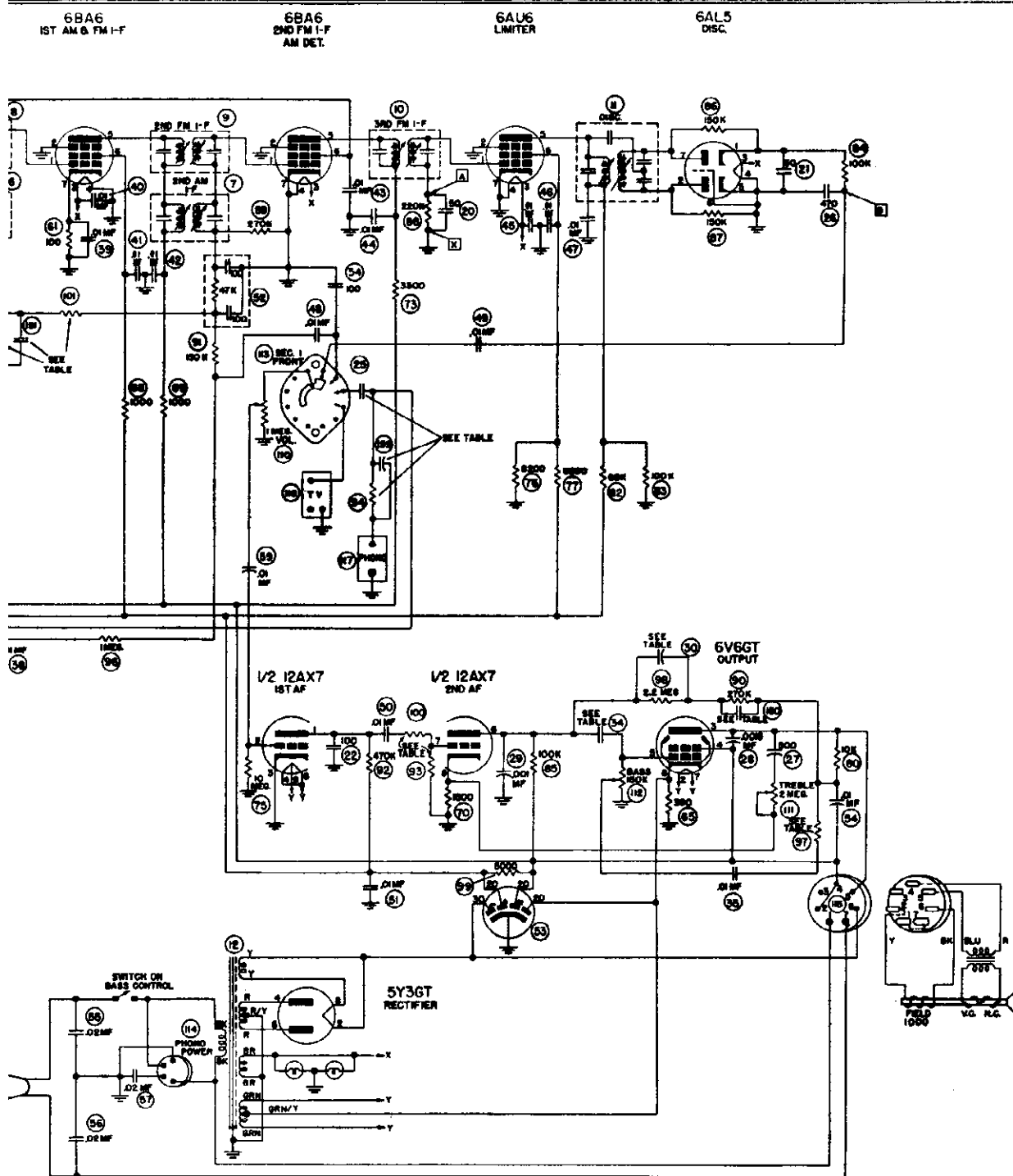


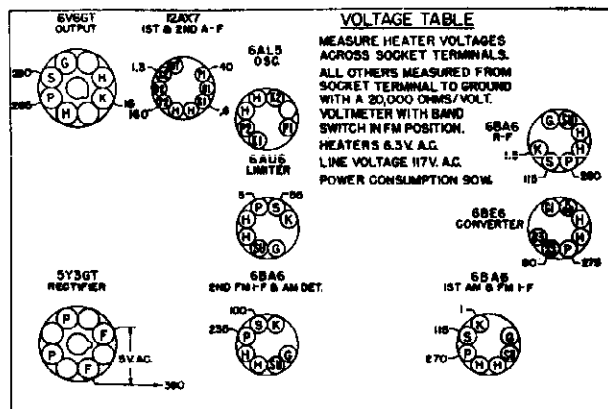
FIGURE 2

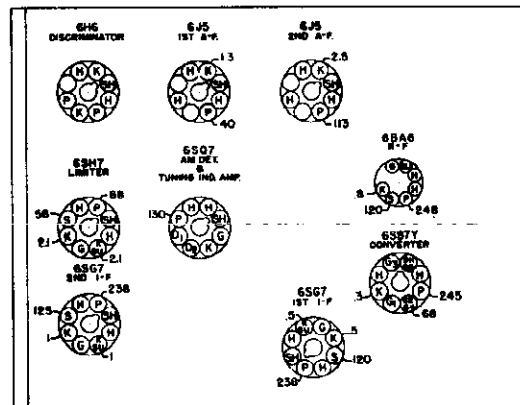
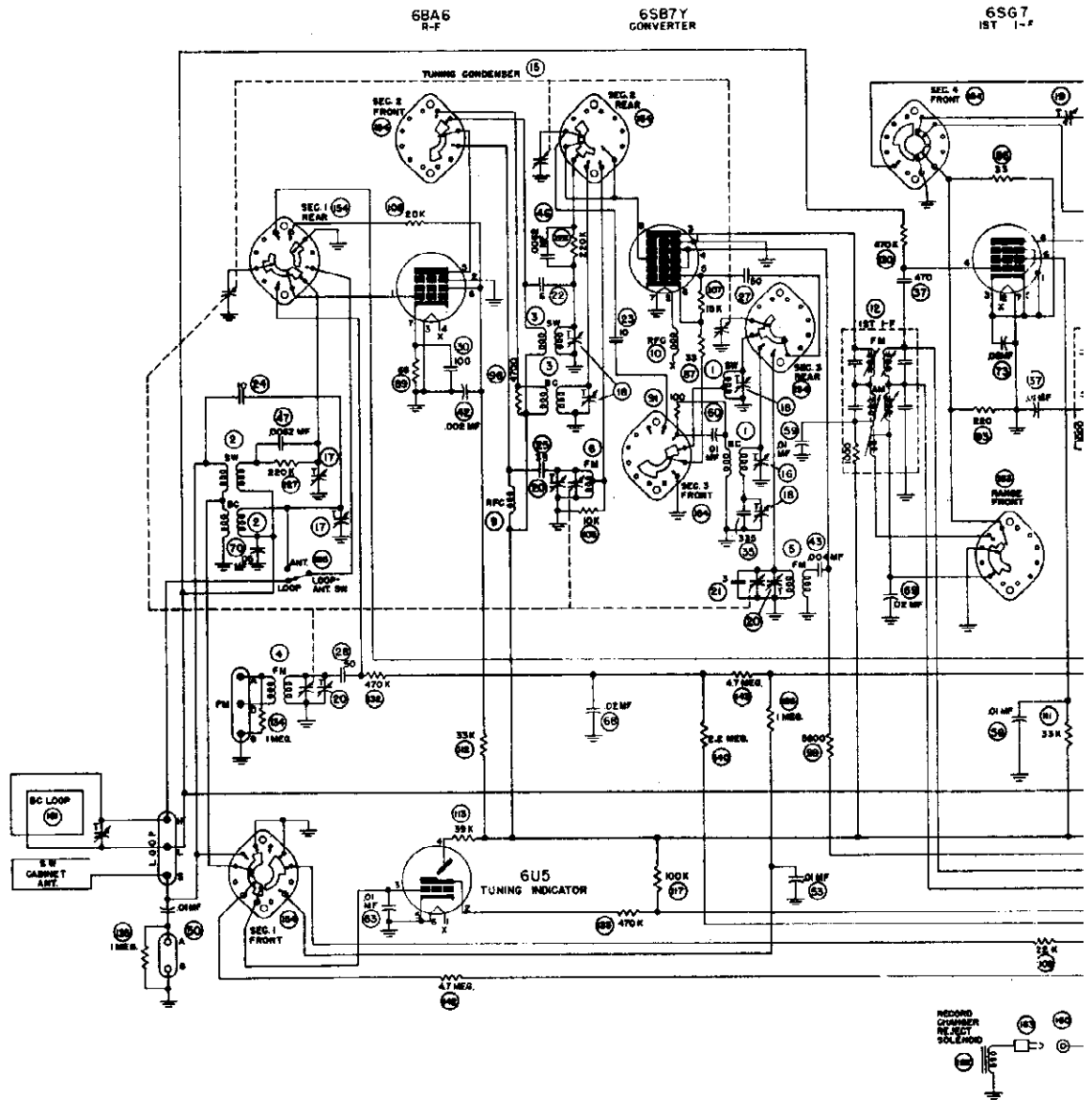
I-F'S

FM 10.7 MC AM 455 KC

NOTES

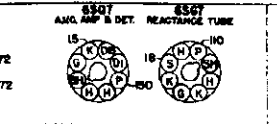
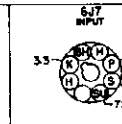
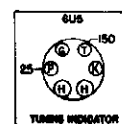
BAND SWITCH SHOWN IN C'LOCKWISE (FM) POSITION WHEN VIEWED FROM THE FRONT PANEL. ALL ELECTRICAL VALUES SHOWN ARE IN MMF OR OHMS UNLESS OTHERWISE SPECIFIED. LETTERS SHOWN IN SQUARES DESIGNATE METER CONNECTION POINTS FOR ALIGNMENT DESCRIBED IN TEXT.





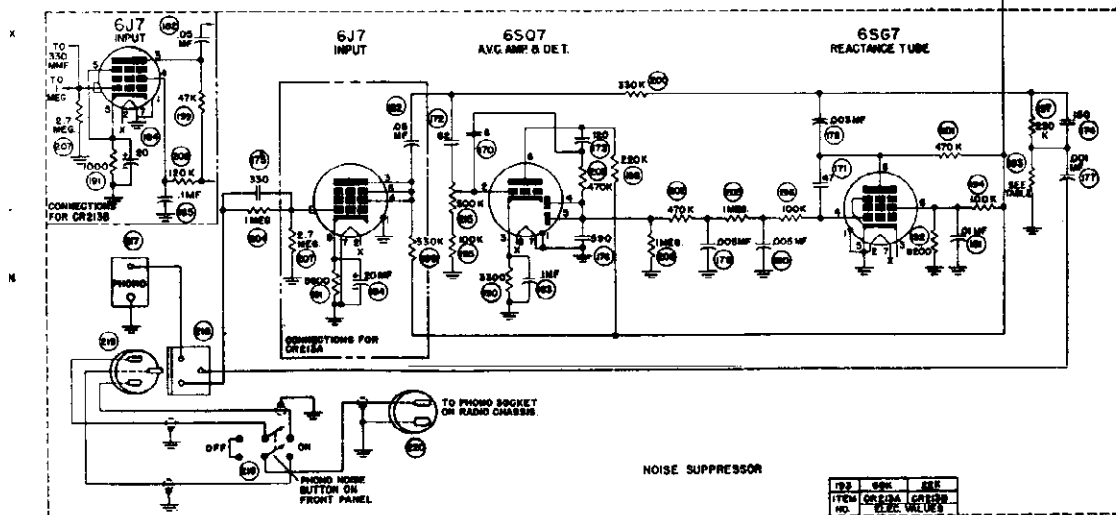
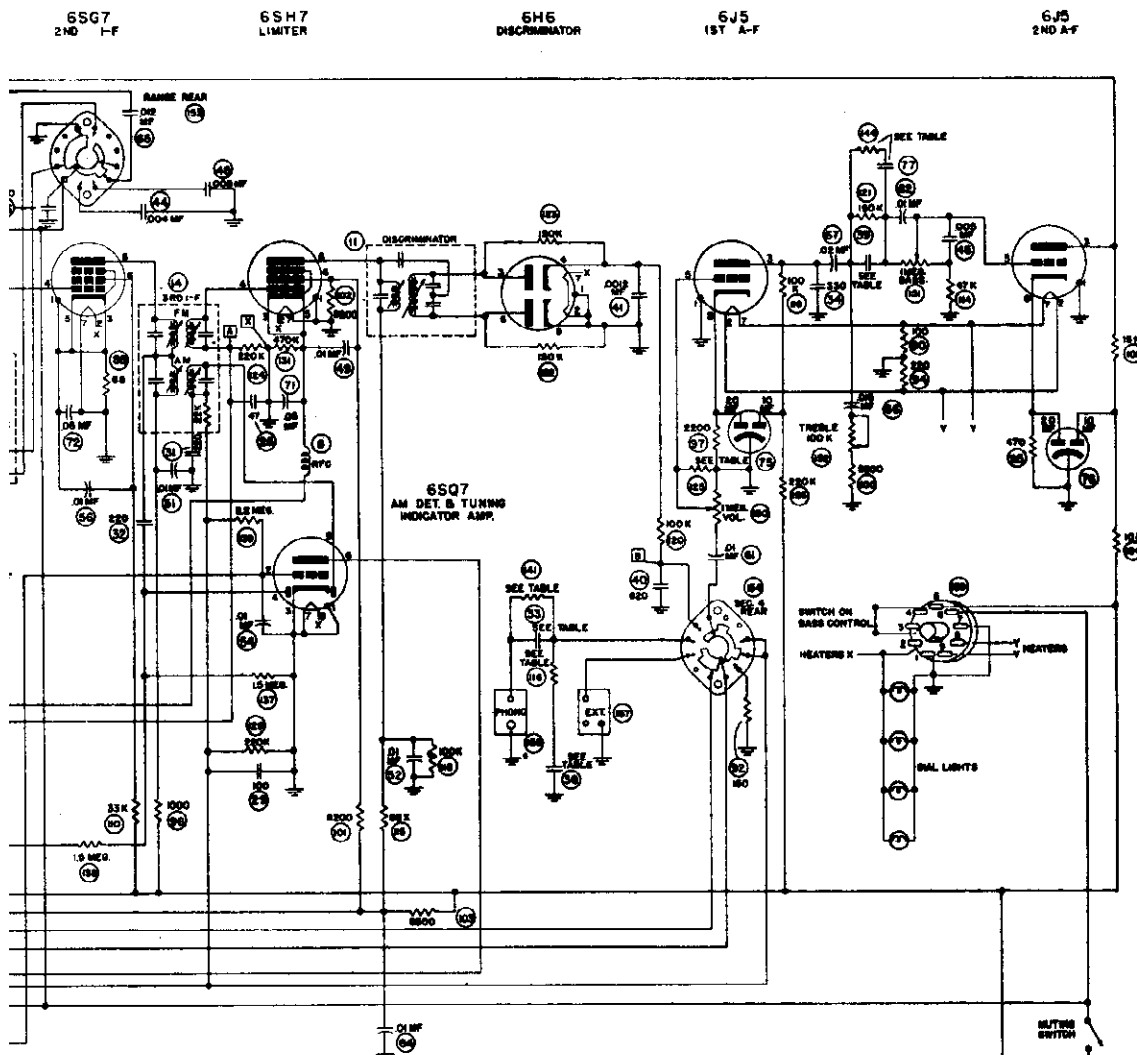
VOLTAGE TABLE
 MEASURE HEATER VOLTAGES ACROSS SOCKET TERMINALS.
 ALL OTHERS MEASURED FROM SOCKET TERMINAL TO GROUND WITH A 2000 OHMS/VOL.T VOLTMETER WITH BAND SWITCH IN SHORT WAVE POSITION.
 HEATERS (H) 6.3 V. A.C.
 LINE VOLTAGE 117 V. A.C.

ITEM NO.	ELECTRICAL VALUES
33	OR 250K 330 MMF
38	500 OHM
39	500 OHM
77	OMIT
116	42K
125	250K
141	5.5 MEG
144	OMIT



- NOTES**
 1. BANDSWITCH, ITEM 154, SHOWN IN CLOCKWISE POSITION WHEN VIEWED FROM THE FRONT PANEL.
 2. ALL ELECTRICAL VALUES SHOWN ARE IN MMF OR OHM OTHERWISE SPECIFIED.
 3. LETTERS SHOWN IN SQUARES DESIGNATE POINTS FOR ALIGNMENT AS DESCRIBED IN TEXT.
 4. RANGE SWITCH, ITEM 153, SHOWN IN CLOCKWISE POSITION WHEN VIEWED FROM THE FRONT PANEL.

FIGURE 5



SPECIFICATIONS

MODEL CR-226

2nd I-F (FM), Detector and AVC (AM)	6BA6	Power supply	117 volts 50/60 cycles AC
Limiter	6AU6	Power consumption	85 watts
Discriminator	6AL5	Power output	6 watts
First and Second Audio	12AX7	Intermediate frequency	455 kc./10.7 mc.
Power output	6V6GT	Tuning frequency range:	
Rectifier	5Y3GT	Broadcast Band	540-1620 kc.
Dial Lamps	Mazda No. 44	FM Band	88 108 mc.
Speaker:		Tubes:	
Field coil resistance	1000 ohms	R-F Amplifier	6BA6
Voice coil impedance (400 cycles)	3.0 ohms	Converter	6BE6
Output transformer	6500/3 ohms	1st I-F Amplifier (AM-FM)	6BA6

METHOD FOR REMOVING CHASSIS FROM CABINET

Model CR-226 radio chassis is designed for easy removal from the cabinet in which it is installed. As the radio panel is not fastened to the chassis, the control knobs must be removed when the chassis is taken out of the cabinet for service.

To remove the chassis, first remove the loop leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the four screws securing the chassis and lift it from the

cabinet. To replace chassis in cabinet, line up mounting holes and replace mounting screws. Replace all plugs in their receptacles and the loop leads on their correct terminals. The antenna terminal board for the loop antenna connections is designated L-H. The two terminals on the loop are designated L and H; the leads connected to these terminals should be wired to the corresponding terminals (L and H) on the chassis.

ALIGNMENT PROCEDURE

Alignment of this receiver requires the use of an accurately calibrated RF signal generator, range 455 kc. to 107 mc., an output meter, and a vacuum tube voltmeter of greater than 10 megohm input impedance. All trimmer condensers can be identified by stampings on the chassis and gang condenser cover and are shown on the chassis layout diagram. The pointer on the radio dial should line up with the

first vertical mark on the low frequency end of the dial glass. If the pointer does not line up, loosen the pointer on the dial string and move it to correct position. Re-tighten and re-cement the pointer to the string. Be sure the gang is fully meshed for this pointer alignment. Align AM first. The oscillator frequency is higher than the carrier on the broadcast band, and lower than the carrier on FM.

AM ALIGNMENT**I-F ALIGNMENT**

1. Set volume, treble, and bass controls to maximum. Set Band Switch to Broadcast position, and dial pointer to 1000 kc.
2. Tune the signal generator to EXACTLY 455 kc.
3. Connect output of modulated signal generator to the signal grid of the 6BE6 (pin 7) through a .01 mfd. capacitor and signal generator ground to radio chassis.
4. AM and FM i-f transformers on this model are separate and can be identified on the chassis layout diagram Figure 3.
5. Connect output meter across voice coil of speaker and adjust the i-f transformers for peak output as indicated on the output meter.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Connect 455 kc. sweep generator having approximately 20 kc. sweep to signal grid of 6BE6 (pin 7) through a .01 mfd. capacitor. Connect an oscilloscope through a 1 megohm isolating resistor across the 150,000 ohm diode load resistor. Align for best possible peak and symmetry.

R-F ALIGNMENT

1. Remove the signal generator lead from the 6BE6 grid and connect it across H and L on terminal strip on the rear of the chassis. The high side of the signal generator should be connected to H and the signal generator ground to L.

MODEL CR-226

2. Check the tuning dial pointer adjustment. When the plates of the tuning condenser are completely meshed, the dial pointer must be in line with the last calibration mark at the low frequency end of the dial. If it is not, slide the pointer on its string to the correct position. Be sure to crimp the lugs (on the rear of the pointer) tightly around the string to hold the pointer in adjustment.
3. Set the signal generator and the radio receiver to 1400 kc., adjust the 1400 kc. oscillator trimmer and the 1400 kc. r-f trimmer for maximum output.

4. Set the signal generator and radio receiver to 600 kc. Adjust the oscillator and r-f coil slugs for maximum output. If considerable adjustment was necessary re-check the 1400 kc. trimmer settings.
5. Replace chassis in cabinet and connect loop antenna leads to proper terminals on the rear of the chassis.
6. Form three turns of wire into a loop, connect this loop to the signal generator and loosely couple it to the receiver loop antenna.
7. With the signal generator and dial at 1400 kc., adjust the loop antenna trimmer for maximum output.

FM ALIGNMENT

DISCRIMINATOR ALIGNMENT

1. Tune signal generator to EXACTLY 10.775 mc. and connect to pin 1 of the 6AU6 Limiter tube socket through a .01 mfd. capacitor.
2. Connect a DC vacuum tube voltmeter between point "B" on schematic diagram, and ground (across .00047 mfd. capacitor—Pin 1 on 6AL5 to ground).
3. Peak both discriminator slugs at 10.775 mc.
4. Retune signal generator to exactly 10.7 mc. and adjust bottom slug for zero volts.
5. The DC voltage at 10.625 mc. should be within 10% of the voltage at 10.775 mc. and of opposite polarity.

Note: If the signal generator is not capable of sufficient output to produce a readable DC voltage, the amplification of the last i-f stage can be used to increase the signal input to the limiter for discriminator alignment. To accomplish this, align the last i-f stage as indicated in "IF Alignment". Then align discriminator as above leaving the signal generator connected to the grid of the 6BA6 2nd i-f tube.

I-F ALIGNMENT

1. Connect high side of signal generator, through a .01 mfd. capacitor and a 1000 ohm resistor in series, to pin 1 of the 6BA6 2nd i-f tube. Connect low side of generator to chassis.
2. Close gang condenser and connect vacuum tube voltmeter across 220,000 ohm limiter grid resistor; (Point "A" on schematic to ground). Adjust signal generator output until a reading of approximately 3 volts is obtained. In order to reduce regeneration caused by the vacuum tube voltmeter leads, a 1-megohm isolating resistor, connected with as short leads as possible to point "A" should be used in series with the vacuum tube voltmeter. Align the 3rd i-f transformer for best peak as indicated on voltmeter.

3. Repeat above for each succeeding transformer by connecting signal generator to signal grid (pin 1) of first i-f tube 6BA6 then to the signal grid (pin 7) of 6BE6 converter. The i-f stages should be aligned in this order.

WARNING—After each i-f stage has been aligned, do not repeak with the signal into the grid of the 6BE6.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Replace signal generator with sweep generator having approximately 300 kc. sweep and tune generator to 10.7 mc. Connect oscilloscope across 220,000 ohm limiter grid resistor through a 1-megohm isolating resistor. The order of alignment is the same as when using a vacuum tube voltmeter. Each i-f transformer should be individually aligned for best peak and symmetry.

R-F ALIGNMENT

1. Connect vacuum tube voltmeter across limiter grid resistor as in FM I-F alignment.
2. Ground one side of the FM Antenna by placing a wire jumper from one FM connection on the antenna terminal strip to the ground connection.
3. Connect unmodulated signal generator through a 300 ohm resistor to ungrounded antenna post and chassis, and tune signal generator to 107 mc.
4. Set radio dial to 107 mc. and tune oscillator trimmer to peak output on vacuum tube voltmeter. Adjust signal generator output until a reading of approximately 3 volts is obtained.
5. Tune 107 mc. r-f and antenna trimmers for maximum indication on voltmeter. It may be necessary to rock the dial while adjusting the r-f trimmer.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid at:	
600 kc.	5.00
98 mc.	1.15
R-F Grid to Converter Grid at:	
600 kc.	18.5
98 mc.	9.0
R-F on Converter Grid to I-F on I-F Grid at:	
600 kc.	8.3
98 mc.	6.0
I-F on Converter Grid to 1st I-F Grid at:	
455 kc. (gang closed)	11.5

1st I-F Grid to 2nd I-F Grid** at:

455 kc.	64
10.7 mc.	30

2nd I-F Grid to Limiter Grid at:

10.7 mc.	30
----------	----

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across the Oscillator Grid Resistor at:

600 kc.	4.5V.
98 mc.	3.5V.

or 0.45 ma. through 10,000 ohm Oscillator Grid Resistor at 600 kc. and 0.35 ma. at 98 mc.

AUDIO GAIN

Voltage required across the Volume Control to produce 0.1 watt speaker output*** at 400 cycles is .01 volt with Input Selector Switch in Broadcast Setting.

*Variations of $\pm 20\%$ are permissible. Broadcast readings made with sufficient input signal to provide 0.5 watt speaker output. 0.5 watt speaker output at 400 cycles is equivalent to a reading of 1.25V. as measured by a high resistance AC voltmeter across the voice coil of the speaker.

**Detector Plate on AM.

***0.1 watt speaker output at 400 cycles is equivalent to a reading of 0.55 volts as measured by a high resistance AC voltmeter across the voice coil of speaker.

DIAL CORD REPLACEMENT

CONDENSER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out two screws on each side of chassis. In a length of dial cable, form a small loop and tie a knot in the manner shown on Figure 1. Tie spring to opposite end of cable making length excluding spring $19\frac{1}{2}$ inches. Hook loop over the metal hook in pulley "D" and lace the cable through the pulley slot and around the pulley in a counterclockwise direction when viewed from the rear of the dial assembly keeping the cable to the rear of the pulley groove. Lace the cable around the smaller diameter portion of the tuning control shaft wrapping $2\frac{1}{2}$ turns from front to back; then around the opposite side of pulley "D" into the pulley through the slot. Hook the end of tension spring "F" in the hole provided in pulley "D", completing this operation.

Two separate drive cables are used in the CR-226 dial assembly. One cable is used to transmit the motion from the tuning knob to the large pulley that is coupled to the condenser gang; the other cable actuates the dial pointer whenever the large pulley on the condenser gang is rotated. Separate instructions for replacing either of these cables is given in the following paragraphs.

DIAL POINTER DRIVE CABLE REPLACEMENT

Remove dial assembly after taking out two screws on each side of chassis. Slip a one-half inch length of sleeving over a 42-inch length of dial cable. Tie

the two ends to the loop end of the cable spring "E" securely so that the cable doubled measures $19\frac{5}{8}$ inches end to end excluding spring.

Place spring hook in top hole and draw cable through slot of pulley "D". Loop one end of cable around pulley "D" in a clockwise direction in front of condenser drive cable (viewing dial assembly from front) then loop the remaining end around pulley in a counterclockwise direction. Secure both ends of cable to chassis at edge of pulley slot with scotch tape, keeping piece of sleeving on remaining loop of cable.

Replace dial assembly and loop cable over pulley "A". While holding cable taut remove scotch tape and loop cable over pulley "B" as shown in Figure 1.

Turn the tuning control shaft until the condenser gang is completely meshed and slide the dial pointer on its track until it is in line with the last calibration mark at the low frequency end of the dial. The short piece of sleeving installed prior to the stringing operation should be slid to the rear of the dial pointer and the crimping lug on the pointer pressed over the sleeving. After checking to make certain that the condenser gang is completely meshed and the dial pointer is in the position specified previously, apply a few drops of cement to each end of the sleeving to which the dial pointer is fastened. This completes the operation.

MODEL CR-226

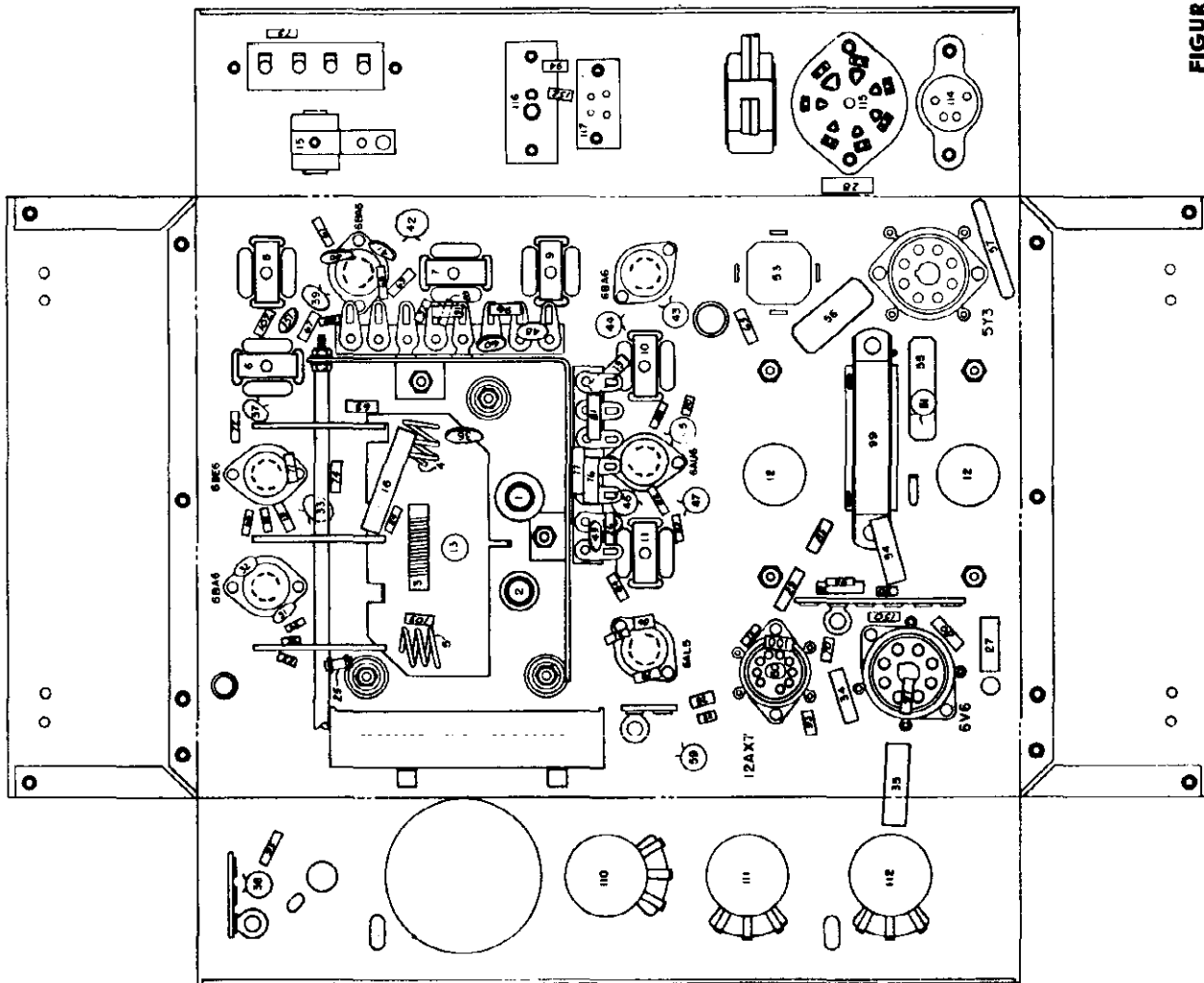
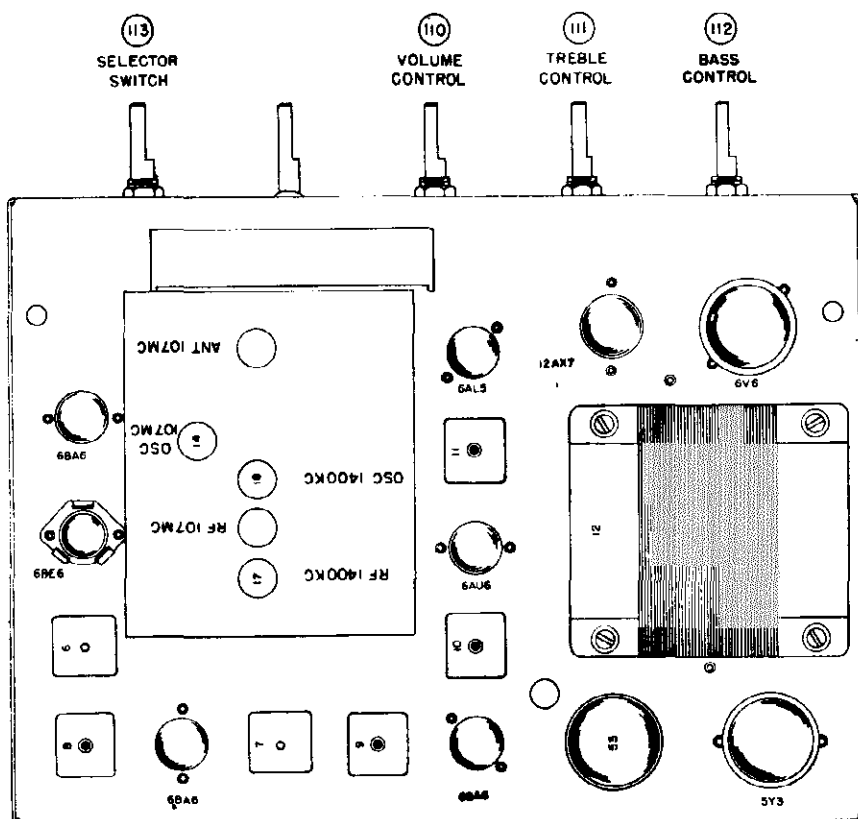


FIGURE 3

PARTS LIST

REFERENCE NO.	MAGNAVOX PART NO.	REFERENCE NO.	MAGNAVOX PART NO.
1 Coil assembly, r-f (AM)	360405G1	46 Capacitor, ceramic, .01 mfd.	250175G2
2 Coil assembly, oscillator (AM)	360407G1	47 Capacitor, ceramic, .01 mfd.	250175G2
3 Coil assembly, oscillator (FM)	360323G1	48 Capacitor, ceramic, .01 mfd.	250175G2
4 Coil assembly, r-f (FM)	360322G2	49 Capacitor, ceramic, .01 mfd.	250175G2
5 Coil assembly, antenna (FM)	360321G2	50 Capacitor, ceramic, .01 mfd.	250175G2
6 Transformer, first i-f (AM)	360406G1	51 Capacitor, ceramic, .01 mfd.	250175G2
7 Transformer, second i-f (AM)	360374G1	52 Capacitor, resistor, filter	250170G1
8 Transformer, first i-f (FM)	360374G1	53 Capacitor, electrolytic, 30 mfd. 475V.	270021G7
9 Transformer, second i-f (FM)	360374G1	20 mfd. 475V. 20 mfd. 350V. 20 mfd. 25 V.	
10 Transformer, third i-f (FM)	360374G1	54 Capacitor, paper, .01 mfd. 600 V.	250201G7
11 Transformer, discriminator	360375G1	55 Capacitor, molded paper, .02 mfd. 600 V.	250129G3
12 Transformer, power	300056G1	56 Capacitor, molded paper, .02 mfd. 600 V.	250129G3
13 Capacitor, gang tuning	260107G1	57 Capacitor, molded paper, .02 mfd. 600 V.	250201G3
14 Capacitor, trimmer	260067G6	58 Capacitor, ceramic, 100 mmf.	250176G6
15 Capacitor, trimmer	250046G2	59 Capacitor, ceramic, .01 mfd.	250175G2
16 Choke, insulated r-f	360372G2	60 Capacitor, ceramic, .01 mfd. (CR 226B only)	250175G2
17 Capacitor, ceramic, 10 mmf.	250088G8	150 Capacitor, ceramic, 100 mmf. (CR 226B only)	250159G82
18 Capacitor, ceramic, 10 mmf.	250088G8	151 Capacitor, ceramic, .01 mfd. (CR 226B only)	250175G2
19 Capacitor, ceramic, 50 mmf. $\pm 10\%$	250176G9	152 Capacitor, ceramic, 10 mmf. (CR 226B only)	250088G8
20 Capacitor, ceramic, 50 mmf. $\pm 10\%$	250176G9	61 Resistor, carbon, 100 ohms, $\frac{1}{2}$ W.	230104G50
21 Capacitor, ceramic, 50 mmf. $\pm 10\%$	250176G9	62 Resistor, carbon, 100 ohms, $\frac{1}{2}$ W.	230104G50
22 Capacitor, ceramic, 100 mmf.	250176G6	63 Resistor, carbon, 100 ohms, $\frac{1}{2}$ W.	230104G50
23 Capacitor, ceramic, 220 mmf.	250176G10	65 Resistor, carbon, 390 ohms, $\pm 10\%$, 1 W.	230105G57
24 Capacitor, ceramic, 47 mmf.	250159G96	66 Resistor, carbon, 1000 ohms, $\frac{1}{2}$ W.	230104G62
25 Capacitor, ceramic, 470 mmf.	250176G11	67 Resistor, carbon, 1000 ohms, $\frac{1}{2}$ W.	230104G62
26 Capacitor, ceramic, 470 mmf.	250176G11	68 Resistor, carbon, 1000 ohms, $\frac{1}{2}$ W.	230104G62
27 Capacitor, paper, .0005 mfd. 1000 V.	250185G8	69 Resistor, carbon, 1000 ohms, $\frac{1}{2}$ W.	230104G62
28 Capacitor, paper, .0015 mfd. 600 V.	250201G2	70 Resistor, carbon, 1500 ohms, $\frac{1}{2}$ W.	230104G64
29 Capacitor, paper, .001 mfd. 600 V.	250201G1	71 Resistor, carbon, 3300 ohms, $\frac{1}{2}$ W.	230104G68
30 Capacitor, paper, .0022 mfd. 600 V. (CR 226A only)	250201G3	72 Resistor, carbon, 3300 ohms, $\frac{1}{2}$ W.	230104G68
Capacitor, paper, .0033 mfd. 600 V. (CR 226B only)	250201G4	73 Resistor, carbon, 3300 ohms, 1 W.	230105G68
31 Capacitor, ceramic, .005 mfd.	250175G1	74 Resistor, carbon, 4700 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230104G70
32 Capacitor, ceramic, .005 mfd.	250175G1	75 Resistor, carbon, 10 megohms, $\frac{1}{2}$ W.	230104G110
33 Capacitor, ceramic, .005 mfd.	250175G1	76 Resistor, carbon, 8200 ohms, $\pm 10\%$, 1 W.	230105G73
34 Capacitor, paper, .0047 mfd. 600 V. (CR 226A only)	250201G5	77 Resistor, carbon, 8200 ohms, $\pm 10\%$, 1 W.	230105G73
Capacitor, paper, .01 mfd. 600 V. (CR 226B only)	250201G7	78 Resistor, carbon, 10,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230104G74
35 Capacitor, paper, .01 mfd. 600 V.	250201G7	79 Resistor, carbon, 10,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230104G74
36 Capacitor, ceramic, .01 mfd.	250175G2	80 Resistor, carbon, 10,000 ohms, 1 W.	230105G74
37 Capacitor, ceramic, .01 mfd.	250175G2	81 Resistor, carbon, 15,000 ohms, 1 W.	230105G76
38 Capacitor, ceramic, .01 mfd.	250175G2	82 Resistor, carbon, 68,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230104G84
39 Capacitor, ceramic, .01 mfd.	250175G2	83 Resistor, carbon, 100,000 ohms, $\frac{1}{2}$ W.	230104G86
40 Capacitor, ceramic, .01 mfd.	250175G2	84 Resistor, carbon, 100,000 ohms, $\frac{1}{2}$ W.	230104G86
41 Capacitor, ceramic, .01 mfd.	250175G2	85 Resistor, carbon, 100,000 ohms, 1 W.	230105G86
42 Capacitor, ceramic, .01 mfd.	250175G2	86 Resistor, carbon, 150,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230104G88
43 Capacitor, ceramic, .01 mfd.	250175G2	87 Resistor, carbon, 150,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230104G88
44 Capacitor, ceramic, .01 mfd.	250175G2	88 Resistor, carbon, 220,000 ohms, $\frac{1}{2}$ W.	230104G90
45 Capacitor, ceramic, .01 mfd.	250175G2	89 Resistor, carbon, 270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230104G91
		90 Resistor, carbon, 270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230104G91
		91 Resistor, carbon, 150,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230104G88
		92 Resistor, carbon, 470,000 ohms, 1 W.	230105G94

REFERENCE NO.	MAGNAVOX PART NO.	REFERENCE NO.	MAGNAVOX PART NO.
93 Resistor, carbon, 270,000 ohms, $\frac{1}{2}$ W. (CR 226A only)	230104G91	110 Control, volume	220072G15
Resistor, carbon, 330,000 ohms, $\frac{1}{2}$ W. (CR 226B only)	230104G92	111 Control, treble	220072G19
94 Resistor, carbon, 820,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230104G97	112 Control, bass, with switch	220073G16
95 Resistor, carbon, 1 megohm, $\frac{1}{2}$ W.	230104G98	113 Switch, selector	160207G1
96 Resistor, carbon, 1 megohm, $\frac{1}{2}$ W.	230104G98	114 Socket, phono motor	180501G5
97 Resistor, carbon, 1 megohm, $\frac{1}{2}$ W. (CR 226A only)	230104G98	Plug, phono motor	180053G1
Resistor, carbon, 470,000 ohms, $\frac{1}{2}$ W. (CR 226B only)	230104G94	115 Socket, speaker	180504G16
98 Resistor, carbon, 2.2 megohm, $\frac{1}{2}$ W.	230104G102	Plug, speaker	180503G4
99 Resistor, wire wound, 5000 ohms, 11 W.	240035G4	116 Socket, television	180060G1
100 Resistor, carbon, 220,000 ohms, $\frac{1}{2}$ W. (CR 226A only)	230104G90	Plug, television	180311G2
Resistor, carbon, 180,000 ohms, $\frac{1}{2}$ W. (CR 226B only)	230104G89	117 Socket, phono	189741G1
101 Resistor, carbon, 4.7 megohm, $\frac{1}{2}$ W. (CR 226B only)	230104G106	Plug, phono	180311G1
102 Resistor, carbon, 220,000 ohms, $\frac{1}{2}$ W. (CR 226B only)	230104G90	118 Loop antenna	360336G2
103 Resistor, carbon, 330,000 ohms, $\frac{1}{2}$ W. (CR 226B only)	230104G56	Dial pointer	102426G2
		Dial glass	150330G1
		Panel escutcheon	
		Maroon	150318G7
		Beige	150318G8
		Decal for above	150375G1
		Knob, band switch, bass on off	
		Maroon	143727G3
		Beige	143727G2
		Knob, tuning	
		Maroon	140025G4
		Beige	140025G2
		Knob, treble, volume	
		Maroon	140025G5
		Beige	140025G3

*The part number of the loop antenna assembly changes with different cabinets. It is therefore important that you specify the Style Number of the instrument when ordering a replacement loop antenna assembly.

MODEL CR-227

SPECIFICATIONS

Intermediate frequency..... 455 kc./10.7 mc.

Tuning frequency range:

Broadcast Band	540--1620 kc.
Short Wave Band	5.9--17.3 mc.
FM Band	88--108 mc.

Tubes:

R-F Amplifier.....	6BA6
Converter	6SB7Y
1st I-F Amplifier (AM-FM)	6SG7
2nd I-F Amplifier (AM-FM)	6SG7
Limiter	6SH7
Discriminator	6H6
Detector and AVC (AM) and Tuning Indicator Amplifier	6SQ7
First Audio.....	6J5
Second Audio.....	6J5
Tuning Indicator.....	6U5
Dial Lamps	Mazda No. 44

GENERAL

Model CR-227 radio chassis is an AM-FM tuner that must be used in conjunction with a power amplifier such as the AMP-116 for speaker operation. Heater and plate voltages for the CR-227 radio chassis are supplied from the amplifier chassis; it is therefore essential that the radio and amplifier chassis be interconnected during alignment or for other electrical service operations.

METHOD FOR REMOVING CHASSIS FROM CABINET

Model CR-227 radio chassis is designed for easy removal from the cabinet in which it is installed. As the radio panel is permanently fastened to the chassis, the control knobs need not be removed when the chassis is taken out of the cabinet for service.

To remove the chassis, first remove the antenna leads from their terminals and all plugs from the receptacles on the rear of the chassis. Then remove the two Phillips-head screws from the angular slots in the flange at the rear of the chassis. Lift the rear of the chassis about one inch and pull it straight back. Never remove the chassis tray from the cabinet it has been properly positioned to bring the radio panel in place when the chassis is replaced. In replacing the chassis, slide it so that the small hooks near the front ride inside the flanges on the sides of the chassis tray. Push the chassis forward as far as it will go and the hook should then engage the slots in the chassis tray. Replace the two Phillips-head screws and nuts and tighten securely. Replace all plugs in their receptacles and the antenna leads on their correct terminals. The antenna terminal board for the loop antenna connections is designated L-H. The two terminals on the loop are designated L and H; the leads connected to these terminals should be wired to the corresponding terminals (L and H) on the chassis.

ALIGNMENT PROCEDURE

Alignment of this receiver requires the use of an accurately calibrated RF signal generator, range 455 kc. to 107 mc., an output meter, and a vacuum tube voltmeter of approximately 10 megohm input impedance. All trimmer condensers can be identified by stampings on the chassis and gang condenser cover and are shown on the chassis layout diagram. The pointer on the radio dial should line up with the first horizontal mark on the low frequency end of the dial glass. If the pointer does not line up, loosen the screws on the pointer drive pulley at the end of the tuning gang and adjust the pointer setting; tighten the screws after this adjustment. Be sure the gang is fully meshed for this pointer alignment.

AM ALIGNMENT**I-F ALIGNMENT**

1. Set range control to position No. 1. Set volume, treble and bass controls to maximum, the Band Switch to Broadcast position, and dial pointer to 1000 kc.
2. Tune the signal generator to EXACTLY 455 kc.
3. Connect output of modulated signal generator to the signal grid of the 6SB7Y (pin 8) through a .01 mfd. capacitor and signal generator ground to radio chassis.
4. All i-f transformers on this chassis are slug-tuned. Both slug adjustments for 455 kc. are located on top of the transformers; the 10.7 mc. adjustments are accessible on the bottom.
5. Connect output meter across voice coil of 15-inch speaker and peak in order the third, second and first i-f transformers.
6. Use only enough signal input to give a readable indication on voltmeter so that the AVC will not operate and give false readings.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Connect 455 kc. sweep generator having approximately 40 kc. sweep to signal grid of 6SB7Y (pin 8) through a .01 mfd. capacitor. Connect an oscilloscope through a 1 megohm isolating resistor across the 220,000 ohm diode load resistor. Align for best possible peak with range switch in position No. 1, and symmetry in position No. 4.

BROADCAST BAND R-F ALIGNMENT

1. Connect signal generator through .00025 mfd. capacitor to antenna and ground terminals on antenna terminal strip on rear of chassis. Be sure "Ant-loop" switch on top of the chassis is in the ANT. position. Connect output meter as for AM i-f alignment.
2. Tune signal generator to 1400 kc.
3. Set dial to 1400 kc. and adjust oscillator, r-f and antenna trimmers for maximum indication on meter.
4. Set signal generator to 600 kc. and tune radio to signal. Adjust the 600 kc. padder to maximum output while simultaneously rocking the gang.
5. 1400 kc. calibration should then be checked and re-adjusted if necessary with the 1400 kc. oscillator trimmer.

SHORT WAVE BAND**R-F ALIGNMENT**

1. Set the Band Switch to Short Wave and replace the .00025 mfd. capacitor in series with the signal generator lead to the antenna terminal, with a 400-ohm resistor.

2. Set the signal generator and the receiver to 15 mc. and adjust the oscillator, r-f and antenna trimmers for maximum indication on the meter. While adjusting the 15 mc. oscillator trimmer, two peaks may be observed; only one is the correct peak for 15 mc. alignment. To obtain the correct peak, screw trimmer in to maximum capacitance, then decrease until the first peak is observed. This is the correct one.

Another method for checking for the correct peak is to tune the receiver to 15.91 mc. with signal generator at 15 mc. and with the output increased. If the 15 mc. oscillator trimmer is properly adjusted, the signal will be received at 15.91 mc.—if incorrectly aligned, the signal will be received at 14.09 mc.

FM ALIGNMENT DISCRIMINATOR ALIGNMENT

1. Tune signal generator to EXACTLY 10.775 mc. and connect to pin 4 of the 6SH7 limiter tube socket through a .01 mfd. capacitor.
2. Connect a DC vacuum tube voltmeter from Pin 4 on 6H6 tube socket to ground through a 1 megohm isolating resistor.
3. Peak both discriminator slugs at 10.775 mc.
4. Retune signal generator to exactly 10.7 mc. and adjust bottom slug for zero volts.
5. The DC voltage at 10.625 mc. should be within 100% of the voltage at 10.775 mc. and of opposite polarity.

Note: If the signal generator is not capable of sufficient output to produce a readable DC voltage, the amplification of the last i-f stage can be used to increase the signal input to the limiter for discriminator alignment. To accomplish this, align the last i-f stage as indicated in "IF Alignment". Then align discriminator as above leaving the signal generator connected to the grid of the 6SG7 2nd i-f tube.

I-F ALIGNMENT

1. Connect high side of signal generator, through a .01 mfd. capacitor and a 1000 ohm resistor in series, to pin 4 of the 6SG7 2nd i-f tube. Connect low side of generator to chassis.

MODEL CR-227

2. Close gang condenser and connect vacuum tube voltmeter across 220,000 ohm limiter grid resistor; (Points "A" to "X" on schematic). Adjust signal generator output until a reading of at least 3 volts is obtained. In order to reduce regeneration caused by the vacuum tube voltmeter leads, a 1-megohm isolating resistor, connected with as short leads as possible to point "A" should be used in series with the vacuum tube voltmeter. Align the 3rd i-f transformer for best peak as indicated on voltmeter.

3. Repeat above for the 2nd and 1st transformer by connecting signal generator to signal grid of first i-f tube 6SG7 then to the signal grid of 6SB7Y converter. The i-f stages should be aligned in this order.

WARNING—After each i-f stage has been individually aligned, do not repeat with the signal into the grid of the 6SB7Y.

ALTERNATE VISUAL ALIGNMENT OF I-F STAGES

1. Replace signal generator with sweep generator having approximately 300 kc. sweep and tune generator to 10.7 mc. Connect oscilloscope across 220,000 ohm limiter grid resistor through a 1-megohm isolating resistor. The order of alignment is the same as when using a vacuum tube voltmeter. Each i-f transformer should be individually aligned for best peak and symmetry.

R-F ALIGNMENT

1. Connect vacuum tube voltmeter across limiter grid resistor as in FM I-F alignment. Adjust signal generator output until a reading of at least 3 volts is obtained.

2. Ground one side of the FM Antenna by placing a wire jumper from one FM connection on the antenna terminal strip to the ground connection.

3. Connect unmodulated signal generator through a 300 ohm resistor to ungrounded antenna post and chassis, and tune signal generator to 107 mc.

4. Set radio dial to 107 mc. and tune oscillator trimmer to peak output on vacuum tube voltmeter.

5. Tune 107 mc. r-f and antenna trimmers for maximum indication on voltmeter—it may be necessary to rock the gang while adjusting the r-f trimmer.

SPECIAL SERVICE INFORMATION

The following information is provided for the service man who has a vacuum tube voltmeter or a similar measuring instrument available.

STAGE GAINS*

Antenna Post to R-F Grid at:

600 kc.	5.8
6.5 mc.	2.9
98 mc.	1.0

R-F Grid to Converter Grid at:

600 kc.	11.6
6.5 mc.	9.5
98 mc.	6.8

R-F on Converter Grid to 455 kc. or I-F Grid at:

600 kc.	1.7
6.5 mc.	2.4
98 mc.	6.8

I-F on Converter Grid to 1st I-F Grid at:

455 kc. (dial pointer at 600 kc.)	2.6
-----------------------------------	-----

1st I-F Grid to 2nd I-F Grid at:

455 kc.	20.5
10.7 mc.	37

2nd I-F Grid to Limiter Grid at:

10.7 mc.	34.5
----------	------

AUDIO GAIN

Voltage required across the Volume Control to produce 0.1 watt speaker output** at 400 cycles is:

.013 volt with Amplifier AMP-116A with Band Switch in BDCST setting.

OSCILLATOR OUTPUT VOLTAGE

The DC voltage developed across the Oscillator Grid Resistor (105) at:

600 kc.	4.5V.
6.5 mc.	4.6V.
98 mc.	5.4V.

or 0.3 ma. through 15,000 ohm Oscillator Grid Resistor at 600 kc., 0.31 ma. at 6.5 mc. and 0.36 ma. at 98 mc.

*Variations of $\pm 20\%$ are permissible. All AM readings made with sufficient input signal to provide 0.5 watt speaker output. 0.5 watt speaker output at 400 cycles is equivalent to a reading of 2.75V. as measured by a high resistance AC voltmeter across the voice coil of the 15-inch speaker.

**0.1 watt speaker output at 400 cycles is equivalent to a reading of 1.22 volts as measured by a high resistance AC voltmeter across the voice coil of 15-inch speaker.

10 KC. FILTER ADJUSTMENT

This chassis incorporates a 10 kc. filter circuit to eliminate the beat note heard as a whistle between stations on the broadcast band. If the trimmer is out of adjustment the following procedure should be observed:

1. Adjust the range control switch to the No. 3 setting.
2. Connect the output of an audio oscillator to the phonograph pickup socket. Adjust the oscillator to exactly 10,000 cycles.
3. Set the band selector to PHONO and adjust the 10 kc. trimmer for minimum output.
4. If an audio oscillator is not available for making this adjustment set the band selector to BDCST, set the range control to position 4, connect the antenna to the receiver and set the gang condenser to a point between two stations on adjacent channels having approximately the same power. If the 10 kc. trimmer is out of adjustment, a whistle will be heard. Adjust the trimmer until the whistle is eliminated.

DIAL CORD REPLACEMENT

Rotate the brass pulley designated "A" in Figure 1 until the dial pointer strikes the stop at the high frequency end of the dial calibration. In this condition the slot in pulley "A" should be approximately ten degrees to the left of being vertical see Figure 1. If the slot in the pulley is in some other position under the above mentioned conditions, the pointer set screw is probably loose and has allowed the pointer to slip.

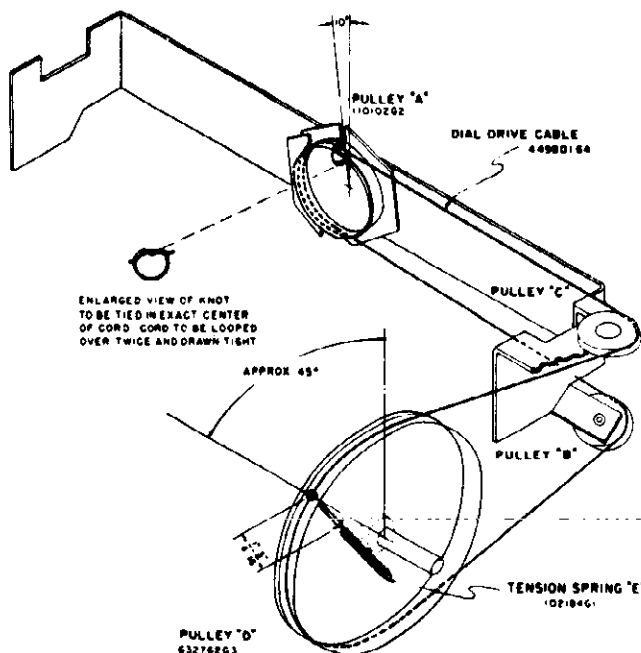


FIGURE 1

To correct this condition, first remove the glass dial and loosen the pointer screw. Then while holding pulley "A" so that its slot is approximately ten degrees to the left of vertical (when viewed from the rear) adjust the pointer until it is resting against the stop at the high frequency end of its travel. Then tighten the pointer set screw securely and replace the glass dial.

Completely unmesh the condenser gang and check the location of the hole or slot in pulley "D." If this hole is not approximately 45 degrees back from vertical as shown on Figure 1, loosen the two No. 6 Allen set screws in the hub of pulley "D" and slip the pulley on its shaft (while holding the condenser gang unmeshed) until the specified adjustment is obtained; then tighten one of the set screws securely. It will be shown later that this is a temporary setting. Next, tie a double knot in the exact center of a 25-inch length of dial cable and fold the cable back on itself so that the knot is at one end. The correct method for tying this knot is shown as an inset on Figure 1. Grasp the cable near the knotted end and slide it into the pulley slot so that the knot is against the inside rim of the pulley as shown in the sketch. The piece of cable nearest the dial frame should be wound in the direction shown for one-half turn; then over the lower pulley "B," around the bottom of the large pulley "D" and into the hole. Pull the cable taut and wrap the end around the small hook on pulley "D" temporarily.

The remaining piece of cable should be wound around pulley "A" in the direction shown, for one complete turn, over the upper pulley "C," and over the top of pulley "D." Thread the end through the small hole in pulley "D" and pull both ends of the cable taut. With one end of tension spring "E" fastened to the hook on pulley "D" lace the two free ends of the cable through the opposite end of the spring and tie a knot at a point that will allow $\frac{1}{4}$ " to $\frac{5}{16}$ " of cable between the spring and the inside rim of pulley "D." Be sure to tie the knot around one coil of the spring in the manner shown.

Now with the condenser gang completely meshed, check the position of the dial pointer. If it is not in line with the last calibration mark at the low frequency end of the dial, loosen the set screw in pulley "D" and turn it until the pointer is in the specified position. Be sure that the condenser gang does not move during this adjustment. Then tighten the two screws in pulley "D" securely completing the operation.

CONDENSER GANG DRIVE ADJUSTMENTS

Whenever any of the mechanical parts in the condenser gang drive assembly require replacement due to rough handling or for any other reason, it is extremely important that clearances and adjustments shown on Figures 2 and 3 are correct; otherwise, the tuning mechanism will be sluggish or it may slip during operation.

In reassembling the mechanism after any part was replaced, follow the procedure outlined below:

1. Assemble the Tuning Shaft, Drive Collar, Bracket, Tension Spring, Washer, and Flywheel in the order shown on Figure 3. The distance between the front of the Drive Collar and the front of the Tuning Shaft must be $1\frac{1}{8}$ inches as specified on Figure 2. Install

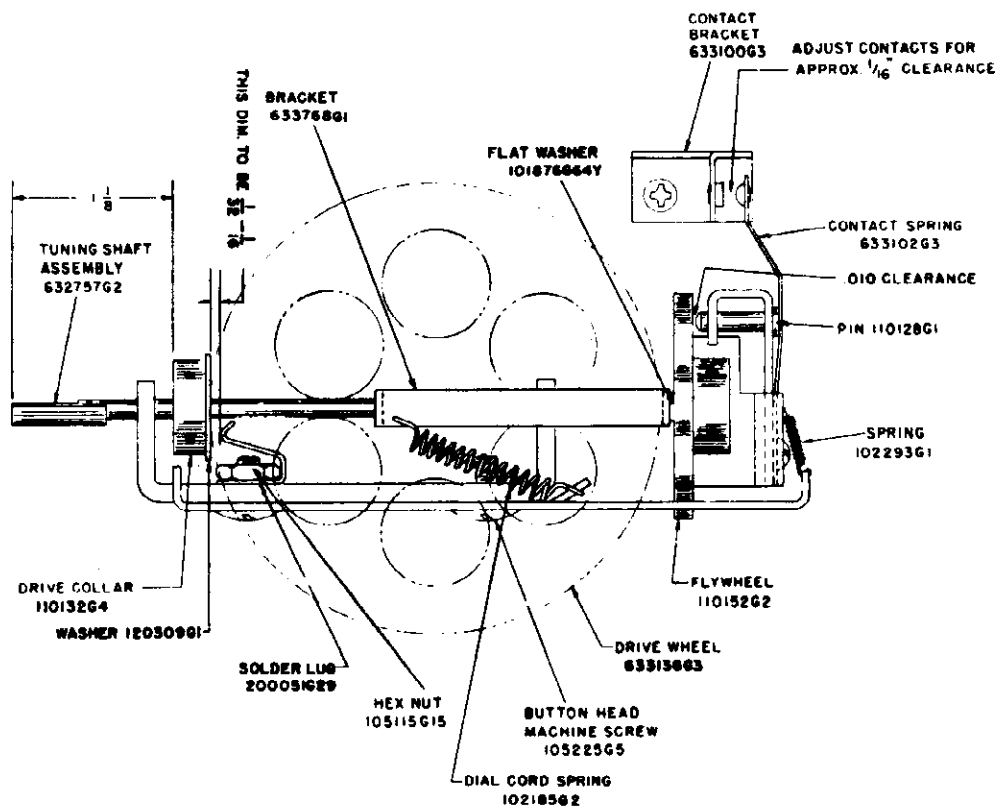


FIGURE 2

the Flywheel on the rear of the Tuning Shaft and slide it forward until it nearly touches the edge of the Drive Wheel; then tighten one of the set screws in the Flywheel hub. Insert a .010" gauge between the Flywheel and the Pin, and while holding the gauge in this position, loosen the set screw in the Flywheel hub that was previously tightened. The Tension Spring should force the Flywheel back against the gauge—when this occurs, tighten both set screws in the Flywheel hub.

2. Adjust the Muting Switch contact clearance by loosening the two screws in the Contact Bracket and sliding the bracket in the required direction until a $1/16$ " clearance is obtained. If this adjustment cannot be obtained in the manner prescribed, bend the Contact Bracket until proper clearance is realized.
3. The Drive Wheel is properly located on its shaft when its edge nearest the hub is in line with the outside edge of the Drive Collar as shown on Fig-

ure 3. Two Allen set screws in the Drive Wheel hub provide a means of adjusting the position of this wheel.

4. When the adjustment outlined in paragraph 2 is correct, the proper contact clearance will automatically be obtained when the Muting Switch is to be "unmuted" while the push buttons are being set. While pressure is applied to any one of the push buttons while they are being set up, a pressure ap-

plied simultaneously to the Tuning Control knob will cause the Muting Switch contacts to open. Detailed instructions on setting up these push buttons are shown elsewhere in this bulletin.

5. If the push button shafts at both ends do not engage the Treadle Bar as shown on Figure 3, the three screws in the Treadle Bar must be loosened and the Treadle Bar should be moved until the required condition is obtained.

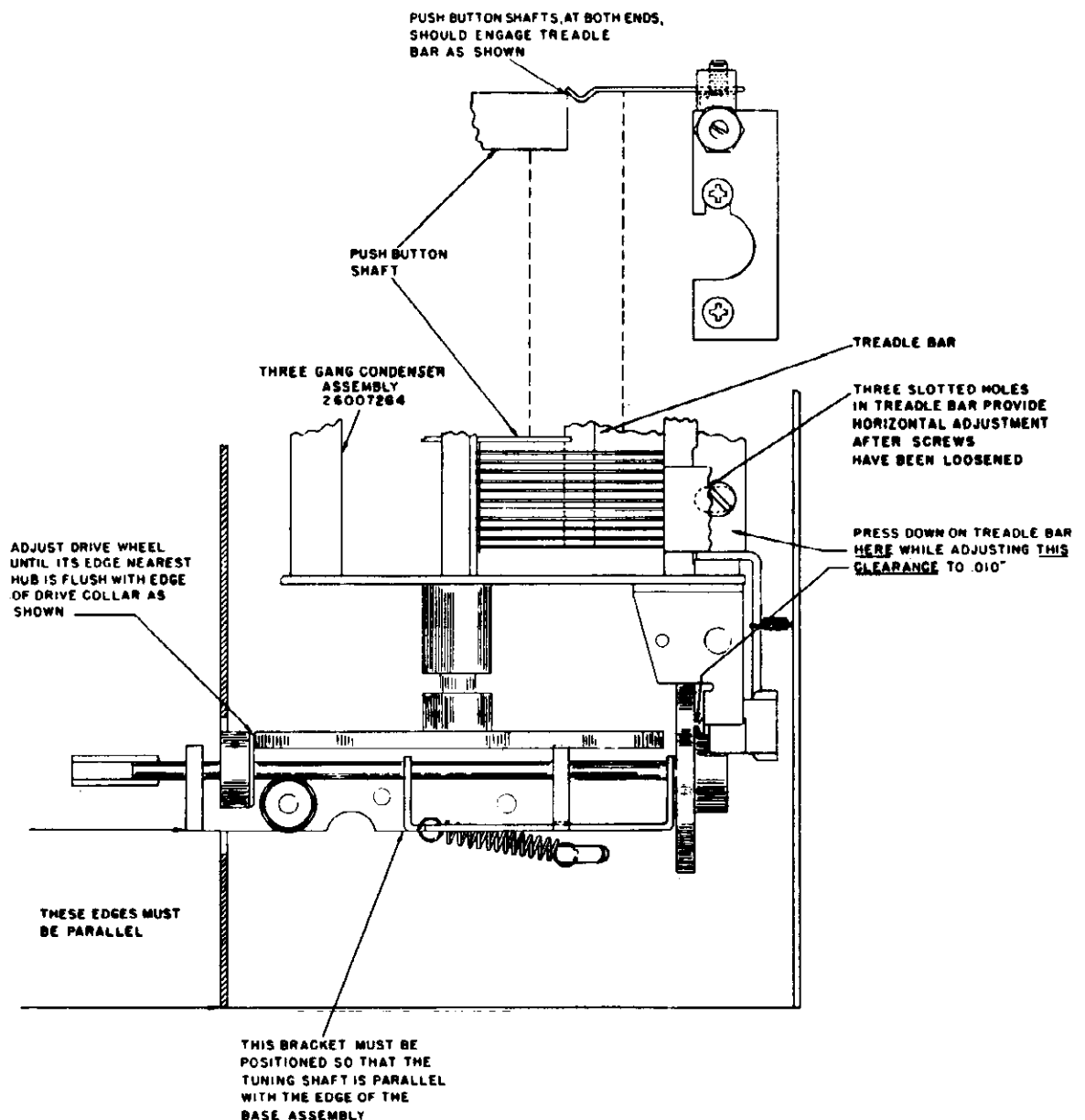


FIGURE 3

MODEL CR-227

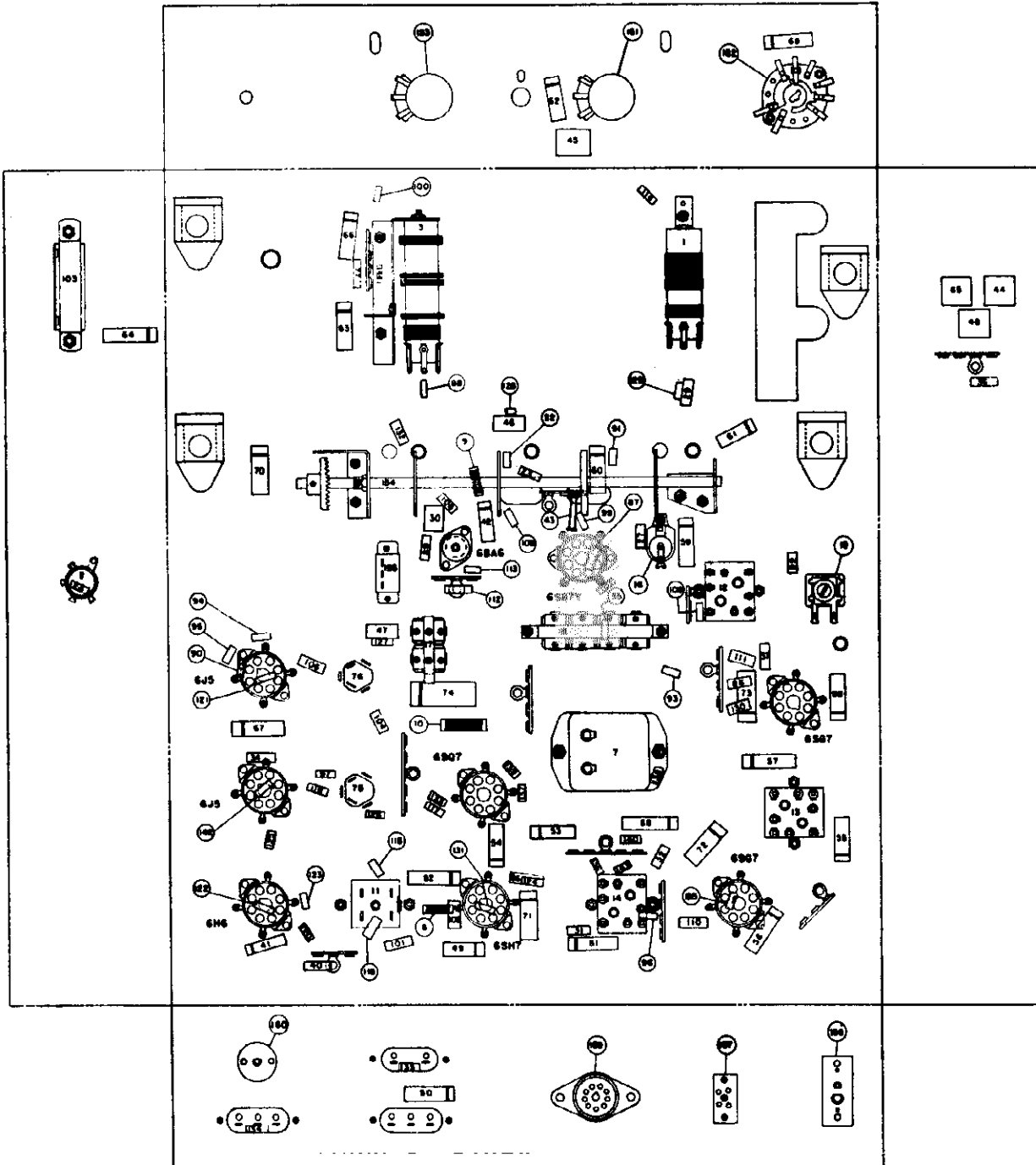
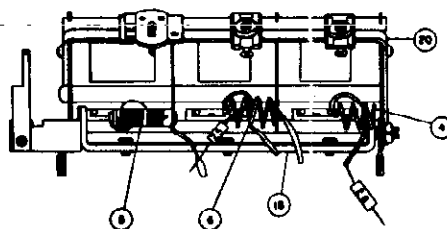


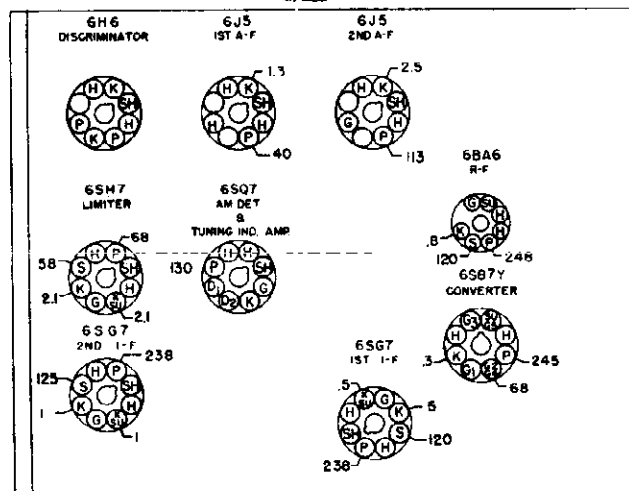
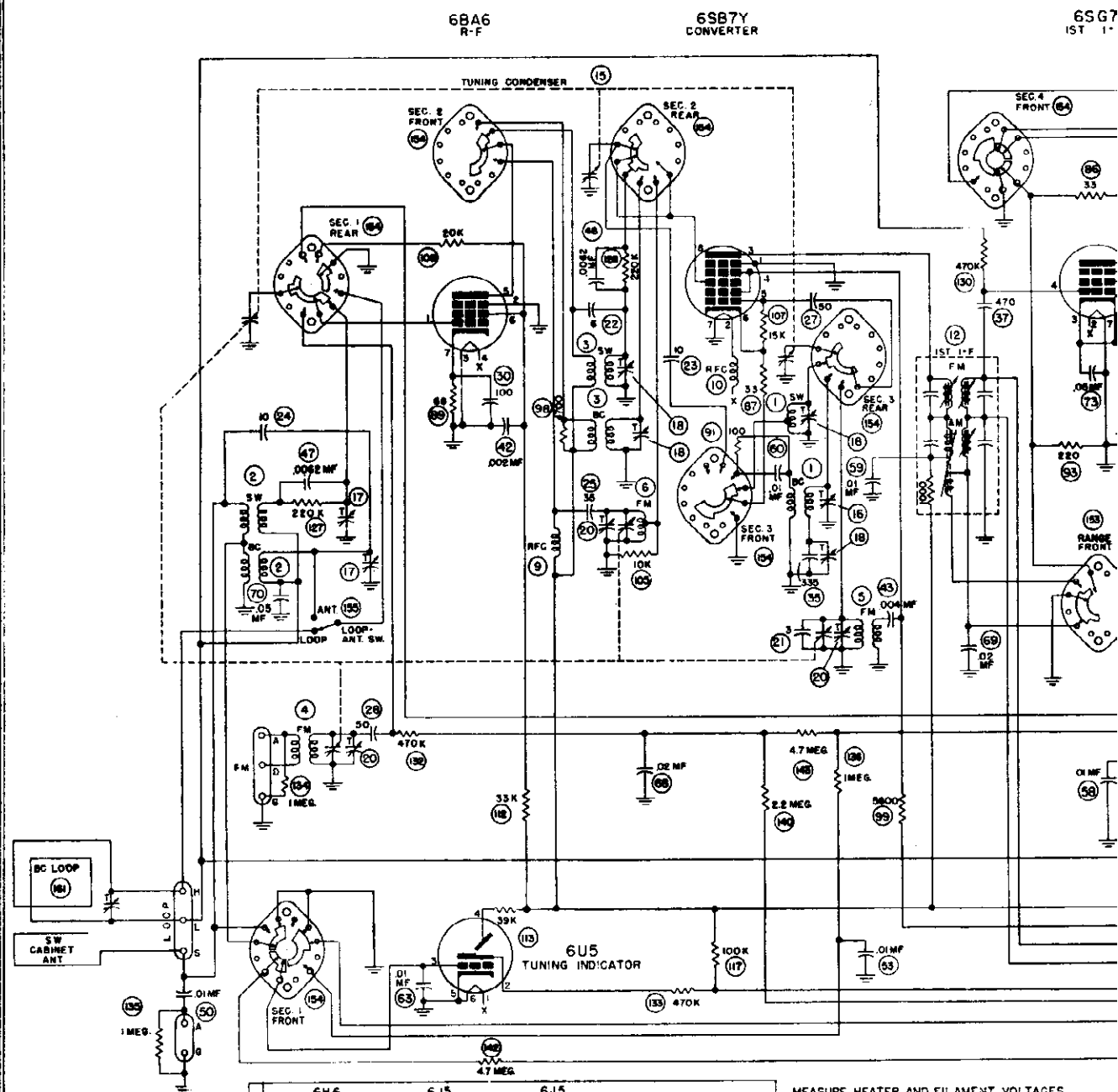
FIGURE 5



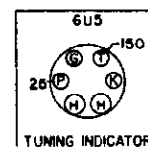
REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
1	Coil Assembly, oscillator, AM	360298-1
2	Coil Assembly, antenna, AM	360299-1
3	Coil Assembly, r-f, AM	360300-1
4	Coil Assembly, antenna, FM	360296-3
5	Coil Assembly, oscillator, FM	360295-1
6	Coil Assembly, r-f, FM	360297-3
7	Coil Assembly, 10 kc.	360244-1
8	Choke Coil	360284-1
9	Choke Coil	360284-1
10	Choke Coil, filament	360264-1
11	Transformer, discriminator	360305-1
12	Transformer, i-f	360285-1
13	Transformer, i-f	360285-1
14	Transformer, limiter	360286-1
15	Capacitor, variable, three gang tuning	260075-1
16	Capacitor, variable, oscillator trimmer (broadcast)	260067-4
17	Capacitor, variable, 2 trimmer	260080-1
18	Capacitor, variable, 4 trimmer and oscillator padder	260082-1
19	Capacitor, variable, 10 kc., trimmer	259610-2
20	Capacitor, trimmer assembly	260084-1
21	Capacitor, ceramic, 3 mmf.	250088-38
22	Capacitor, ceramic & composition, 6 mmf.	250164-2
23	Capacitor, ceramic & composition, 10 mmf.	250164-3
24	Capacitor, ceramic & composition, 10 mmf.	250164-3
25	Capacitor, ceramic, 35 mmf.	250088-40
26	Capacitor, mica, 47 mmf.	250159-96
27	Capacitor, ceramic, 50 mmf.	250088-39
28	Capacitor, ceramic, 50 mmf.	250088-39
29	Capacitor, mica, 100 mmf.	250159-98
30	Capacitor, mica, 100 mmf.	250159-98
31	Capacitor, mica, 220 mmf.	250159-100
32	Capacitor, mica, 220 mmf.	250159-100
34	Capacitor, mica, 330 mmf.	250159-101
35	Capacitor, silver mica, 335 mmf., $\pm 1\%$	250085-38
36	Capacitor, mica, 470 mmf.	250159-102
37	Capacitor, mica, 470 mmf.	250159-102
40	Capacitor, mica, 820 mmf., $\pm 10\%$	250159-132
41	Capacitor, paper, .0012 mfd., $\pm 10\%$, 600 V.	250169-12
42	Capacitor, paper, .002 mfd., 600 V.	250152-44
43	Capacitor, ceramic, .004 mfd.	250088-34
44	Capacitor, molded paper, .004 mfd., 600 V.	250129-7
45	Capacitor, molded paper, .005 mfd., 400 V.	250129-10
46	Capacitor, mica, .0062 mfd., $\pm 5\%$	250161-27
47	Capacitor, mica, .0062 mfd., $\pm 5\%$	250161-27
48	Capacitor, molded paper, .008 mfd., 400 V.	250129-11
49	Capacitor, paper, .01 mfd., 600 V.	250152-38
50	Capacitor, paper, .01 mfd., 600 V.	250152-38
51	Capacitor, paper, .01 mfd., 600 V.	250152-38
52	Capacitor, paper, .01 mfd., 600 V.	250152-38
53	Capacitor, paper, .01 mfd., 600 V.	250152-38

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
54	Capacitor, paper, .01 mfd., 600 V.	250152-38
55	Capacitor, paper, .01 mfd., 600 V.	250152-38
56	Capacitor, paper, .01 mfd., 600 V.	250152-38
57	Capacitor, paper, .01 mfd., 600 V.	250152-38
58	Capacitor, paper, .01 mfd., 600 V.	250152-38
59	Capacitor, paper, .01 mfd., 600 V.	250152-38
60	Capacitor, paper, .01 mfd., 600 V.	250152-38
61	Capacitor, paper, .01 mfd., 600 V.	250152-38
62	Capacitor, paper, .01 mfd., 600 V.	250152-38
63	Capacitor, paper, .01 mfd., 600 V.	250152-38
64	Capacitor, paper, .01 mfd., 600 V.	250152-38
65	Capacitor, molded paper, .012 mfd., 200 V.	250129-13
66	Capacitor, paper, .015 mfd., $\pm 10\%$, 200 V.	250169-5
67	Capacitor, paper, .02 mfd., 600 V.	250152-37
68	Capacitor, paper, .02 mfd., 600 V.	250152-37
69	Capacitor, paper, .02 mfd., 600 V.	250152-37
70	Capacitor, paper, .05 mfd., 200 V.	250152-15
71	Capacitor, paper, .05 mfd., 200 V.	250152-15
72	Capacitor, paper, .05 mfd., 200 V.	250152-15
73	Capacitor, paper, .05 mfd., 200 V.	250152-15
74	Capacitor, paper, .1 mfd., 600 V.	250152-33
75	Capacitor, electrolytic, 10 mfd., 450 V.—20 mfd., 25 V.	270023-6
76	Capacitor, electrolytic, 10 mfd., 450 V.—20 mfd., 25 V.	270023-6
77	Capacitor, mica, 1500 mmf., $\pm 10\%$, 500 V.	250160-66
86	Resistor, composition, 33 ohms, $\frac{1}{2}$ W.	230084-4
87	Resistor, composition, 33 ohms, $\frac{1}{2}$ W.	230084-4
88	Resistor, composition, 68 ohms, $\frac{1}{2}$ W.	230084-6
89	Resistor, composition, 68 ohms, $\frac{1}{2}$ W.	230084-6
90	Resistor, composition, 100 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230084-50
91	Resistor, composition, 100 ohms, $\frac{1}{2}$ W.	230084-7
92	Resistor, composition, 150 ohms, $\frac{1}{2}$ W.	230084-8
93	Resistor, composition, 220 ohms, $\frac{1}{2}$ W.	230084-9
94	Resistor, composition, 220 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230084-54
95	Resistor, composition, 470 ohms, $\frac{1}{2}$ W.	230084-11
96	Resistor, composition, 1000 ohms, $\frac{1}{2}$ W.	230084-13
97	Resistor, composition, 2200 ohms, $\frac{1}{2}$ W.	230084-15
98	Resistor, composition, 4700 ohms, $\frac{1}{2}$ W.	230084-17
99	Resistor, composition, 5600 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230084-71
100	Resistor, composition, 5600 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230084-71
101	Resistor, composition, 8200 ohms, $\pm 10\%$, 1 W.	230085-73
102	Resistor, composition, 8200 ohms, $\pm 10\%$, 1 W.	230085-73
103	Resistor, strip, 8500 ohms	240035-5
104	Resistor, composition, 10,000 ohms, 1 W.	230085-19
105	Resistor, composition, 10,000 ohms, $\frac{1}{2}$ W.	230084-19
106	Resistor, composition, 15,000 ohms, 1 W.	230085-20
107	Resistor, composition, 15,000 ohms, $\frac{1}{2}$ W.	230084-20
108	Resistor, composition, 20,000 ohms, $\pm 5\%$, 1 W.	230085-190
109	Resistor, composition, 22,000 ohms, $\frac{1}{2}$ W.	230084-21
110	Resistor, composition, 33,000 ohms, 1 W.	230085-22
111	Resistor, composition, 33,000 ohms, 1 W.	230085-22

REFERENCE NO.	DESCRIPTION	MAGNAVOX PART NO.
112	Resistor, composition, 33,000 ohms, $\pm 10\%$, 2 W.	230086-80
113	Resistor, composition, 39,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230086-81
114	Resistor, composition, 47,000 ohms, $\frac{1}{2}$ W.	230084-23
115	Resistor, composition, 68,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230084-84
117	Resistor, composition, 100,000 ohms, $\frac{1}{2}$ W.	230084-25
118	Resistor, composition, 100,000 ohms, $\frac{1}{2}$ W.	230084-25
119	Resistor, composition, 100,000 ohms, $\frac{1}{2}$ W.	230084-25
120	Resistor, composition, 100,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230084-86
121	Resistor, composition, 150,000 ohms, $\frac{1}{2}$ W.	230084-26
122	Resistor, composition, 150,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230084-88
123	Resistor, composition, 150,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230084-88
124	Resistor, composition, 220,000 ohms, $\frac{1}{2}$ W.	230084-27
125	Resistor, composition, 470,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230084-94
126	Resistor, composition, 220,000 ohms, $\frac{1}{2}$ W.	230084-27
127	Resistor, composition, 220,000 ohms, $\frac{1}{2}$ W.	230084-27
128	Resistor, composition, 220,000 ohms, $\frac{1}{2}$ W.	230084-27
129	Resistor, composition, 220,000 ohms, $\frac{1}{2}$ W.	230084-27
130	Resistor, composition, 470,000 ohms, $\frac{1}{2}$ W.	230084-29
131	Resistor, composition, 470,000 ohms, $\frac{1}{2}$ W.	230084-29
132	Resistor, composition, 470,000 ohms, $\frac{1}{2}$ W.	230084-29
133	Resistor, composition, 470,000 ohms, $\frac{1}{2}$ W.	230084-29
134	Resistor, composition, 1 megohm, $\frac{1}{2}$ W.	230084-11
135	Resistor, composition, 1 megohm, $\frac{1}{2}$ W.	230084-31
136	Resistor, composition, 1 megohm, $\frac{1}{2}$ W.	230084-31
137	Resistor, composition, 1.5 megohm, $\frac{1}{2}$ W.	230084-32
138	Resistor, composition, 1.5 megohm, $\frac{1}{2}$ W.	230084-32
139	Resistor, composition, 2.2 megohm, $\frac{1}{2}$ W.	230084-33
140	Resistor, composition, 2.2 megohm, $\frac{1}{2}$ W.	230084-33
142	Resistor, composition, 4.7 megohm, $\frac{1}{2}$ W.	230084-35
143	Resistor, composition, 4.7 megohm, $\frac{1}{2}$ W.	230084-35
144	Resistor, composition, 33,000 ohms, $\pm 10\%$, $\frac{1}{2}$ W.	230084-80
150	Control, volume, 1 megohm	220044-24
151	Control, bass, 1 megohm, with switch	220073-6
		220045-7
152	Control, treble	160178-1
153	Switch, range	220044-26
		220072-12
154	Switch, rotary band switch	160179-1
155	Switch, slide SPDT	160176-1
156	Switch, reject	160188-1
157	Socket, external input	180060-1
158	Socket, phone	189741-1
159	Socket, amplifier	180427-2
160	Socket, solenoid	182776-1
161	Antenna Loop Assembly *The part number of the loop antenna assembly changes with different Cabinets. It is therefore important that you specify the STYLE NUMBER of the instrument when ordering a replacement loop antenna assembly.	
162	Solenoid	360313-1
163	Plug, solenoid	189147-1
	Dial Glass Assembly	150303-1
	Push Button Assembly for Gang	260093-1



MEASURE HEATER AND FILAMENT VOLTAGES
DIRECTLY ACROSS SOCKET TERMINALS.
ALL OTHER VOLTAGES MEASURED FROM
SOCKET TERMINAL TO GROUND WITH A 20,000
OHMS/VOLT VOLT-METER WITH BAND SWITCH
IN SW POSITION.
HEATERS (H) 6.3 V. AC.
LINE VOLTAGE 117V AC.



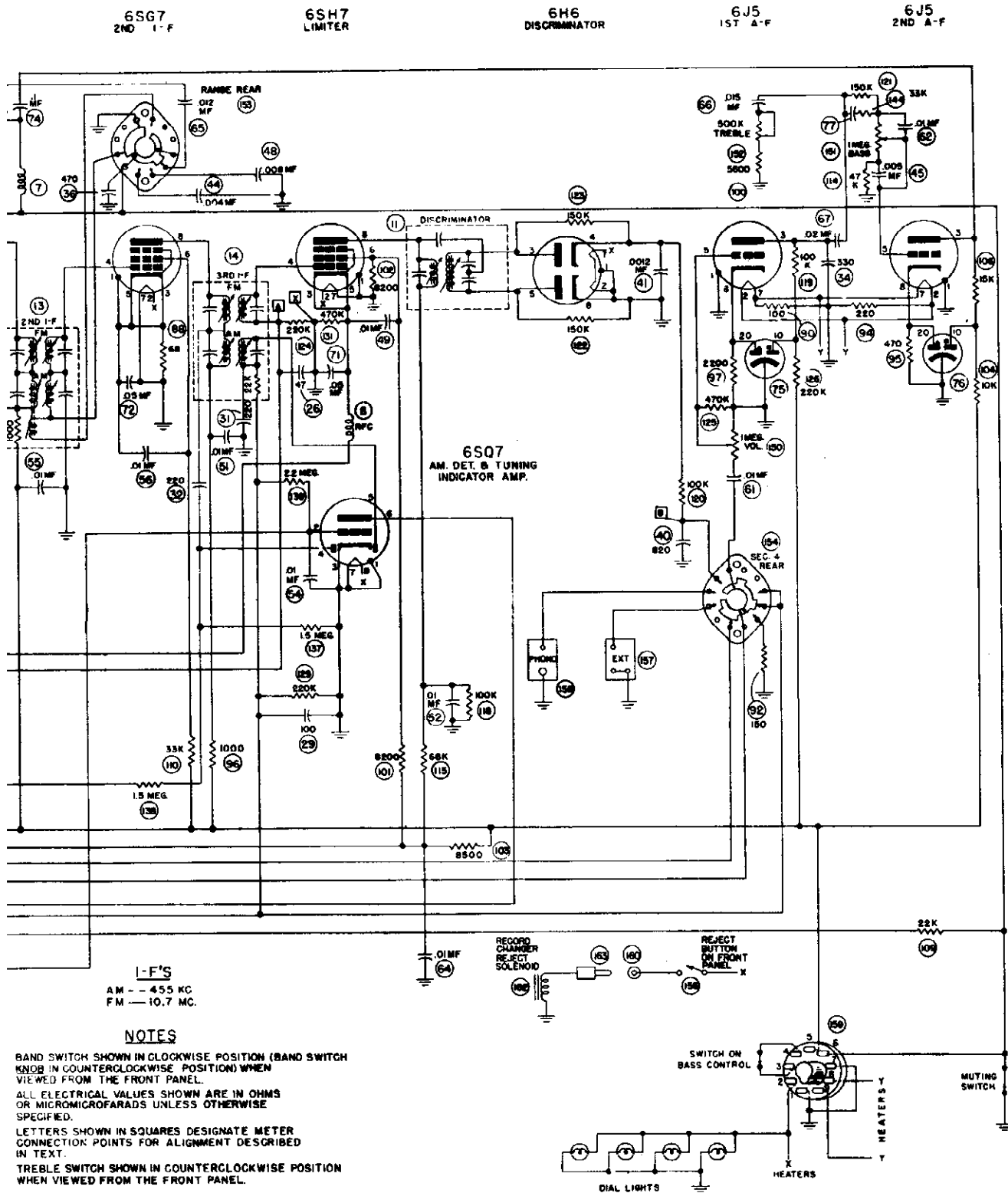
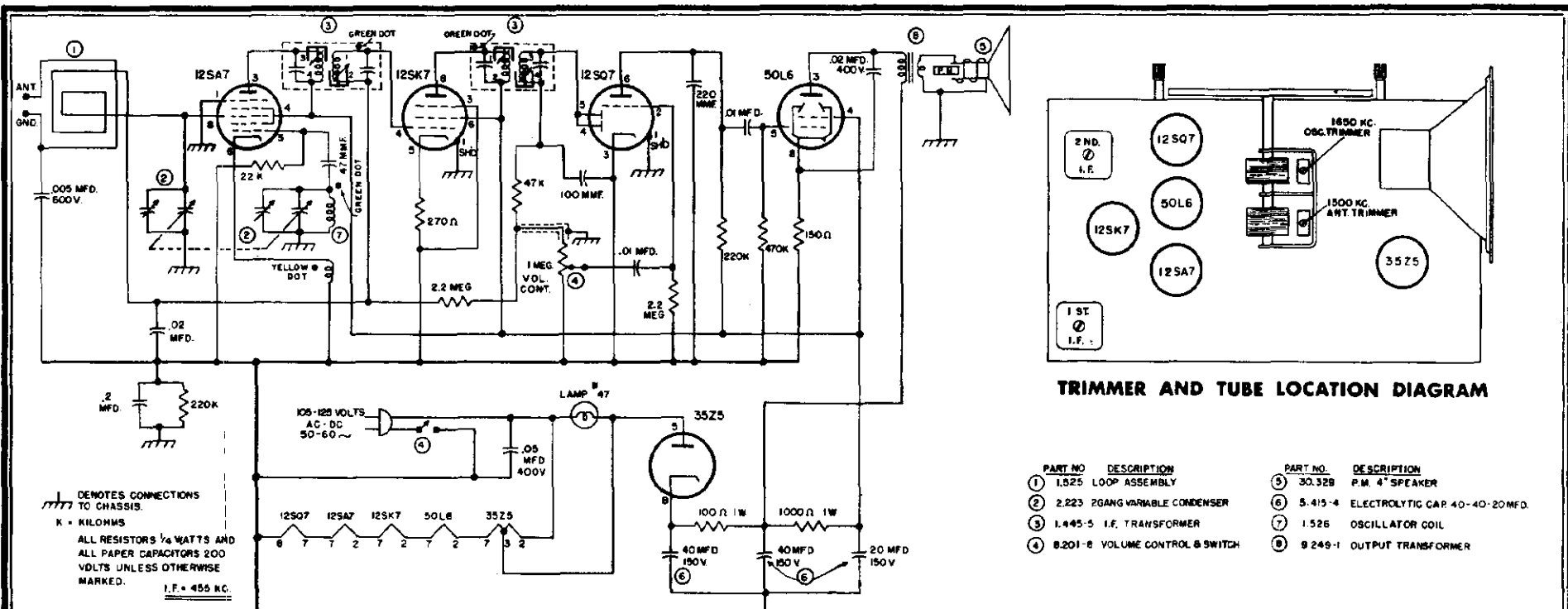


FIGURE 4



ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

- (1) Set the Signal Generator to 455 KC and connect to the stator lug on the rear section of the Variable Capacitor. Connect the Signal Generator Ground lead to the chassis. Connect a suitable output meter across the Speaker Voice Coil Connections. Turn the Volume Control to the maximum position. Turn the Variable Capacitor to the extreme clockwise position.
- (2) Adjust the trimmers located at the top of the first and second I. F. Transformers or the iron cores located at the top and bottom of each I. F. for maximum output as indicated on the Output Meter.
- (3) Loosely couple the Signal Generator lead to the Loop and set to 1650 KC.
- (4) With Variable Capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable Capacitor (front section).

(5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum output. No other adjustments are necessary.

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts, 50-60 Cycles, either Alternating or Direct Current (AC-DC).

POWER CONSUMPTION: 30 Watts.

TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 meters).

DIAL: The Dial Scale is calibrated in Kilocycles times 10 to correspond with newspaper or periodical listings.

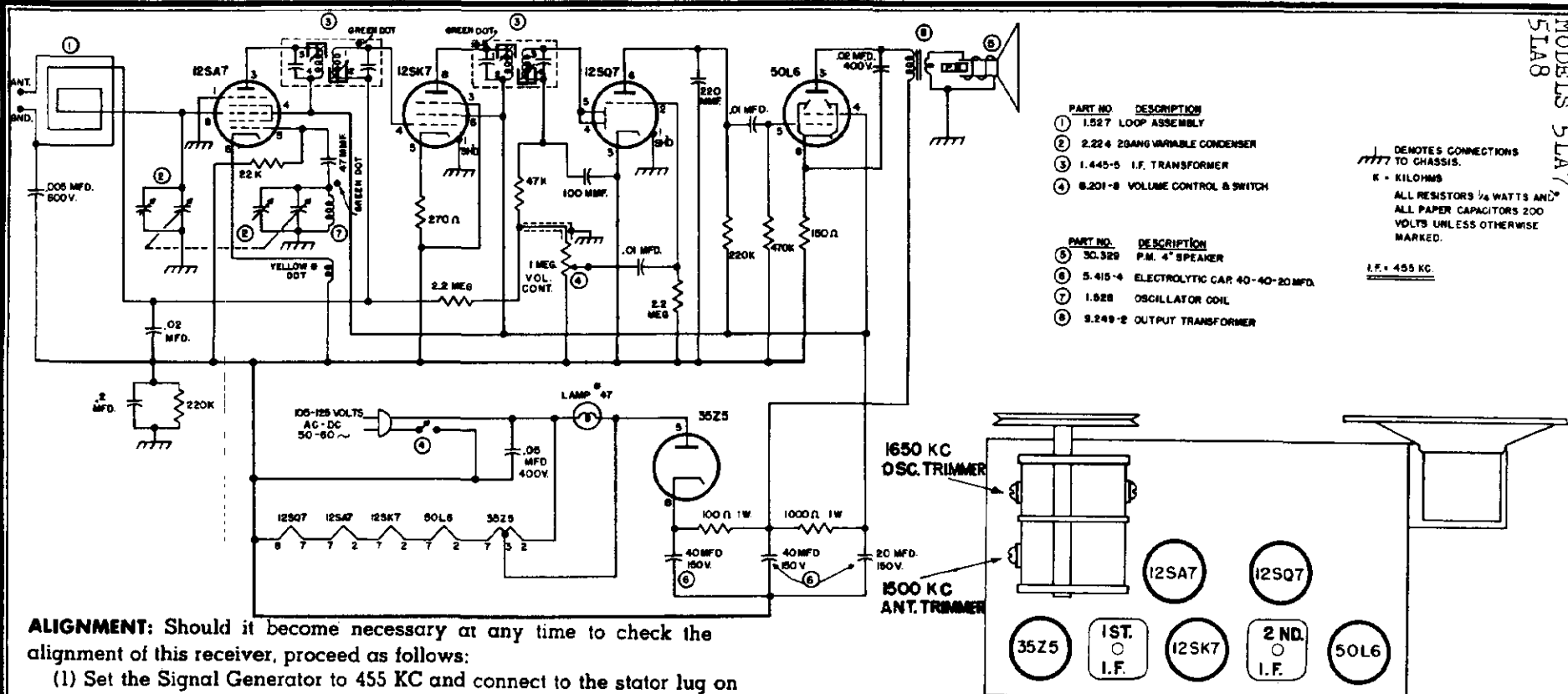
TUBES: The tubes used, and their functions, are as follows:

12SA7 Converter 12SQ7 Detector, Avc and Audio Amp.

12SK7 I.F. Amplifier 50L6 Beam Power Amplifier

3525 Rectifier

MODELS 51A7
51A8



ALIGNMENT: Should it become necessary at any time to check the alignment of this receiver, proceed as follows:

- (1) Set the Signal Generator to 455 KC and connect to the stator lug on the rear section of the Variable Capacitor. Connect the Signal Generator Ground lead to the chassis. Connect a suitable output meter across the Speaker Voice Coil Connections. Turn the Volume Control to the maximum position. Turn the Variable Capacitor to the extreme clockwise position.
- (2) Adjust the trimmers located at the top of the first and second I. F. Transformers or the iron cores located at the top and bottom of each I. F. for maximum output as indicated on the Output Meter.
- (3) Loosely couple the Signal Generator lead to the Loop and set to 1650 KC.
- (4) With Variable Capacitor set at the extreme clockwise position, tune in the 1650 KC signal by means of the Oscillator Trimmer on the Variable Capacitor (front section).
- (5) Set the Signal Generator to 1500 KC and turn the Tuning Control so that this frequency is indicated on the dial. Adjust the Antenna Trimmer on the Variable Capacitor (rear section) for maximum out-

put. No other adjustments are necessary.

LINE VOLTAGE: This receiver is designed for operation on 105-125 Volts, 50-60 Cycles, either Alternating or Direct Current (AC-DC).

POWER CONSUMPTION: 30 Watts.

TUNING RANGE: Broadcast: 540 to 1650 Kilocycles (180 to 555 meters).

DIAL: The Dial Scale is calibrated in Kilocycles times 10 to correspond with newspaper or periodical listings.

TUBES: The tubes used, and their functions, are as follows:

12SA7 Converter	12SQ7 Detector, Avc and Audio Amp.
12SK7 I.F. Amplifier	50L6 Beam Power Amplifier
35Z5 Rectifier	

MEISSNER T.R.F. BANDPASS TUNER MODEL 4E

The Meissner Model 4E T.R.F. Bandpass Tuner is designed for superior high fidelity broadcast reception. It is specifically designed for custom installation and may be used in connection with a power amplifier and speaker system to fit a wide variety of installations ranging from the simplest home installation consisting of a low power amplifier and a speaker, to the largest high power installations designed to serve large auditoriums and consisting of one or more high power amplifiers and multiple speakers.

The Power Amplifier

The output impedance of the 4E Tuner is 100,000 ohms and should be worked into an amplifier having high impedance input. High impedance amplifiers usually have an input impedance of 500,000 ohms, but some have a lower impedance than this and the 4E may be worked into an impedance as low as 100,000 ohms with no appreciable loss of low frequencies or increase in distortion. An amplifier having provision for phonograph input from a crystal pickup is satisfactory for use with the 4E, but under no conditions should the 4E be worked into a microphone input channel. The relatively high output of the 4E would cause overloading and severe distortion in the microphone input stage and the hum level would be too high to be considered acceptable.

The Cabinet

One thing that should be observed in planning an installation is to use the normal precautions against microphonics. Since the 4E is a T.R.F. circuit and has no local oscillator, its tendency toward microphonism will be much less than in a similar superhet unit; but the 6AT6 audio amplifier tube may produce microphonics if subjected to severe vibration. This vibration may be transmitted through the cabinet or through the air from the speaker and the installation layout should be planned to avoid it.

The Record Player (or Changer)

The phonograph system of the 4E chassis is designed for use with crystal type pickups, and any record player or changer having this type pickup may be used. The following notes should be observed:

1. The record player frame must be connected to the tuner chassis in order to prevent hum pickup. In some record players the connecting lead from the phonograph pickup cartridge to the tuner chassis is a shielded lead with the shield connected to the pickup cartridge and to the record player frame. In this case the record player frame is automatically connected to the tuner chassis; but in record players which do not have this connection, a separate connecting lead between the record player frame and tuner may be used.
2. The record player motor may be plugged into the convenient outlet on the rear of the tuner chassis. A power switch must be provided on the record player to turn the motor on and off.
3. The connecting lead from the pickup cartridge must be provided with a miniature phonograph plug. The 4E chassis is shipped with a proper plug in the input jack for use on phono units not so equipped. The outer band or shield is connected to the shell of the plug, and the center wire is soldered in the pin of the plug.

MODEL 4E

In circuits formerly employing a small value of fixed condenser across the output transformer as a permanent minimum tone control, it is desirable to cut this capacity to approximately one-half its former value when the 10-kc filter is added. Pentode amplifiers usually employ such condensers. Triode amplifiers seldom use such condensers, but if they do, it is well to reduce their value to half.

Alignment Procedure (use 200 uuf. dummy)

1. Using an F.M. Signal Generator and Oscilloscope:

Connect the vertical plates of the oscilloscope to the chassis and top of the volume control. Connect the horizontal plates to the sync terminals of the F.M. signal generator.

Set the dial of the tuner to 1,400 kc and the generator to 1,400 kc. using a sweep frequency of 400 cycles and deviation of about ± 50 kc. Set the output of the generator to the least that will give a useful picture, connecting generator to antenna terminal.

Adjust the 4 trimmers at the top of the gang condenser to obtain a pattern of the greatest amplitude, reducing generator input as alignment proceeds, and at the same time adjusting the trimmers to give a double-humped pattern with humps of equal magnitude and with the center of the pattern centered on the scope.

2. Using an A.M. Signal Generator:

Connect the signal generator as usual, with an output meter as indicator connected to top of volume control or audio cable.

Set generator at 1,385 kc and tuner to 1,400 kc. Loosen the 4 trimmers on top of the gang and slowly tighten one at a time to obtain a maximum output reading. Keep each trimmer on the loose side of resonance until all trimmers are nearly peaked; then carefully peak each trimmer. Check alignment by slowly tuning generator to about 1,415 kc, during which the output meter should show a slight drop and then arise again. This alignment centers the response at 1,400 kc so that the dial calibration will be accurate. If the generator had been set at 1,400 kc initially, the center of the tuner's response would be below 1,400 kc on the tuner dial.

Resistance and Voltage Chart

Resistance between pin and chassis

Tube	Pin Number						
	1	2	3	4	5	6	7
6BA6 1st RF	2.1 meg.	0	*0-25	*0-25	**5 meg.	**5 meg.	470
6BA6 2nd RF	470K	0	*0-25	*0-25	**5 meg.	**5 meg.	470
6AT6 Detector	10 meg.	0	*0-25	*0-25	940K	147K	**5 meg.
6X4 Rectifier	240 Tie	Point	*0-25	*0-25	Tie Point	240	**5 meg.

*Reading subject to position of hum balance control.

**Reading subject to variation depending upon the filter condensers.

CAUTION: Discharge filter condensers before making measurements.

Voltage between pin and chassis.

No signal condition.

Measurements to ground with 20,000 ohm/volt meter, 1,000 ohm/volt on AC

Tube	Pin Number						
	1	2	3	4	5	6	7
6BA6 1st RF	Sl.Neg.	0	*	*	200	132	3.5
6BA6 2nd RF	Sl.Neg.	0	*	*	200	132	3.9
6AT6 Detector	Sl.Neg.	0	*	*	Sl.Neg.	Sl.Neg.	85
6X4 Rectifier	185 VAC	Tie Point	*	*	Tie Point	185 VAC	237

*Reading will range from 0 to 6.3 volts AC depending on setting of hum control.

General

Service Data

Power Supply 110-120 V 50-60 cycles.

Power Consumption 25 watts.

Undistorted Output 2 to 15 volts.

Replacement Part Numbers - as shown on circuit diagram

Circuit T.R.F. Bandpass.

Audio Frequency Response - flat ± 2 db. 40 to 15,000 cycles.

Hum Output .002 volts.

Tubes: 6BA6 R.F. Amplifier

6AT6 Detector - Audio Amplifier

6BA6 R.F. Amplifier

6X4 Rectifier

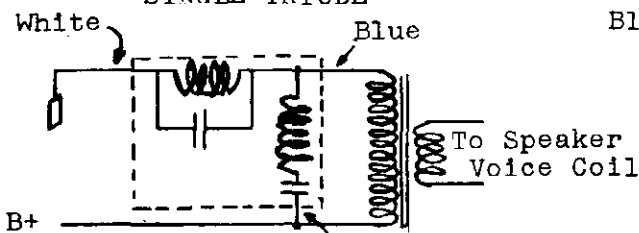
10-kc Filter

In the case where two strong broadcast signals are received on adjacent channels, a 10-kc beat note is formed by the two broadcast signals heterodyning together and when this happens a broad band, high fidelity receiver or tuner will pass this 10-kc beat note and produce an annoying high pitched whistle in the speaker.

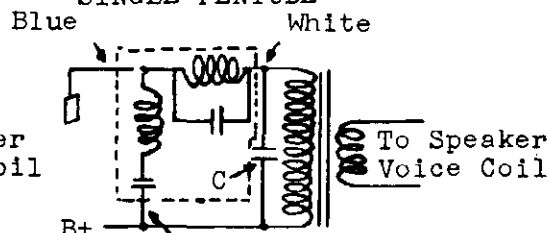
The Meissner 10-kilocycle filter is designed to eliminate the 10-kc whistle between stations being received on high-fidelity radio installations. This filter has several points of superiority listed below:

1. It is placed in the output stage where it will not pick up hum voltages from filter chokes and power transformers, a common fault of high-impedance filter sections connected one or more stages ahead of the output tube.
2. It employs two filter circuits instead of the single circuit usually used, producing far greater attenuation of the 10-kc note than a single-section filter can produce.
3. It requires no tuning, being manufactured of close-tolerance circuit elements of fixed values.
4. Requires a minimum of space for the attenuation produced, both filter circuits being placed in the same can but shielded from each other.
5. Can be utilized efficiently in either pentode or triode circuits.
6. Works well with a single tube, or two identical filters usable for a push-pull stage.
7. Current-carrying capacity of 75 ma. permits it to be used in any receiver and in all but the very high power Public Address systems.

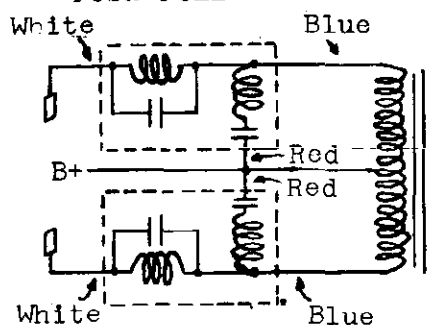
SINGLE TRIODE



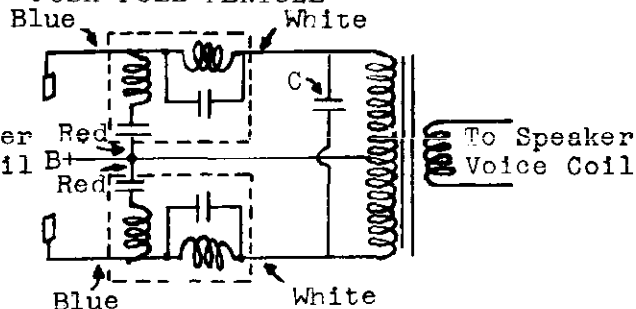
SINGLE PENTODE



PUSH PULL TRIODE

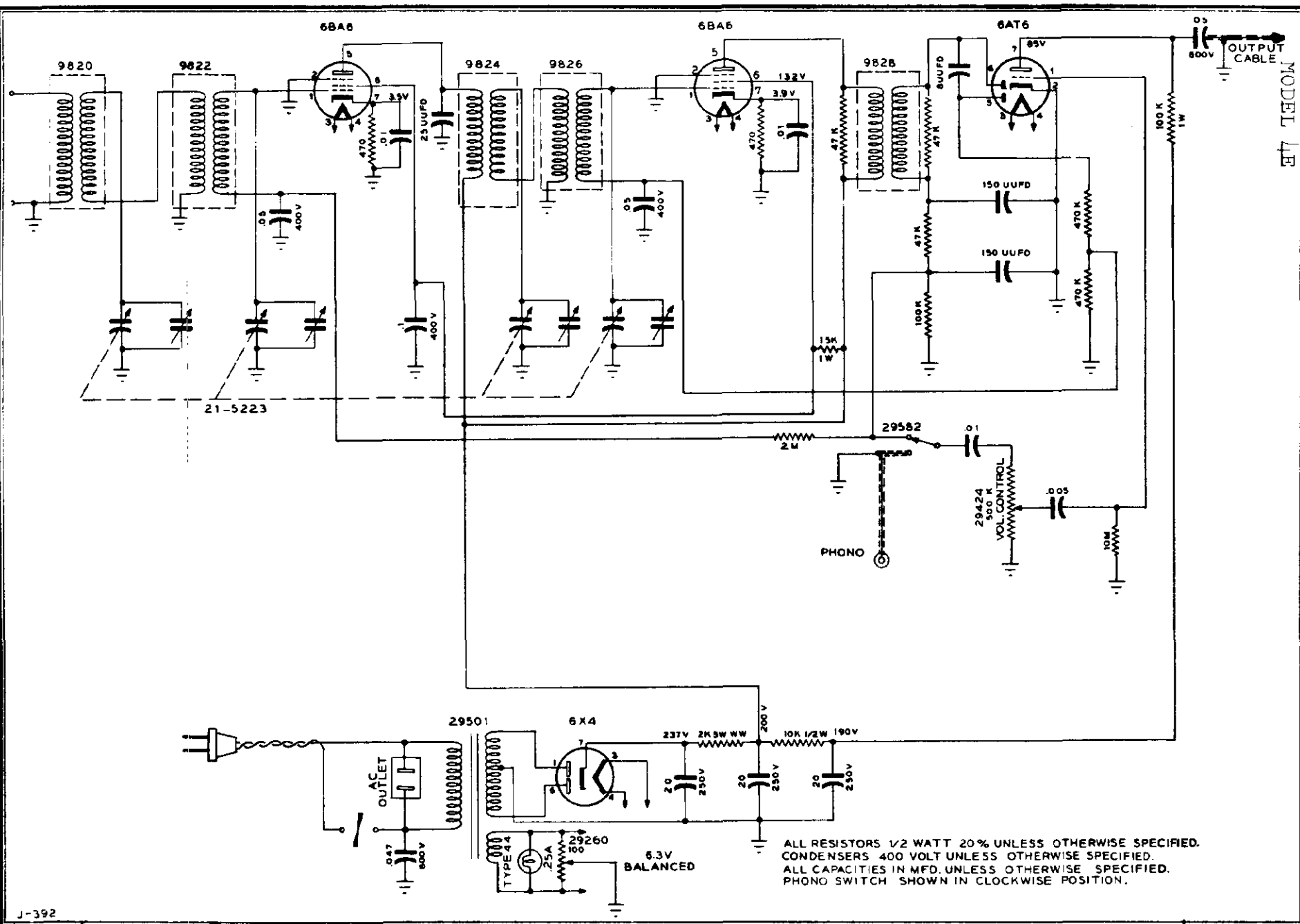


PUSH PULL PENTODE



NOTE: C = approx. 1/2 original fixed tone control capacity.

MODEL 4E



Service DataGeneral:

Power Supply	110-120 V 50-60 cycles
Power Consumption	65 watts
Power Output	4 watts
AM I.F.	455 kc.
FM I.F.	10.7 mc.

Replacement part numbers - as shown on schematic diagram.

AM Alignment

I.F. 455 kc.
Align Ant. and Osc. Trimmers at 1400 kc.

FM Alignment

Alignment may be carried out with an unmodulated R.F. signal generator covering 10.7 mc. and 88 to 108 mc. and a high impedance DC voltmeter having a low range of 1 to 5 volts DC.

Connect the positive lead of the DC voltmeter to pin #1 of the 6AL5 detector tube, and the negative lead to pin #2 of the 6AL5. Apply an unmodulated 10.7 mc. signal to the grid of the second 6BA6 I.F. amplifier tube, through an .05 mfd. coupling condenser. Tune the bottom adjustment screw of the detector coil for maximum indication on the DC voltmeter. This completes this part of the adjustment.

Next, locate the 220 ohm resistor which is connected to the center lug of three lugs of the detector coil (on the side next to the 6AL5 socket). Connect the negative lead of the DC voltmeter to the junction of this 220 ohm resistor and the two 100 mmf. condensers on the tie lug near 6AL5. Connect positive lead of the voltmeter to chassis. With 10.7 mc. signal still applied to the grid of the second 6BA6, tune the top adjustment screw of the detector coil for a point of zero voltage. If more than a half turn adjustment was necessary in either of the preceding steps, then both of the adjustments should be repeated.

Connect negative lead of DC voltmeter to pin #2 of 6AL5.

Without changing the signal generator frequency, connect the 10.7 mc. signal across the FM converter coil (rear FM section of gang). Rotate tuning knob slightly to determine that receiver is not tuned to a harmonic of the generator. Adjust both top and bottom cores of FM I.F. transformers for maximum DC indication on the meter, keeping the signal level from the generator low enough so that this DC voltage does not exceed 5 volts.

R.F. alignment is carried out by setting signal generator to 108 mc. Connect generator to G and A2 antenna terminal through a 300 ohm dummy and adjust converter trimmer for maximum DC indication. Tune generator to 88 mc. and adjust converter coil by squeezing or spreading turns for maximum DC indication. There is some pulling between oscillator and converter, so the tuning control should be rocked slightly as these adjustments are made. The oscillator trimmer and coil should not be adjusted unless the receiver is noticeable off calibration.

MODELS 9AJ, 9AJ-1

Voltage Chart 9AJ

Tube	Pin Number								
	1	2	3	4	5	6	7	8	9 &
6BA6 FM RF	0	0	0	6.3AC	52*	94*	1*		
12AT7 FM Conv. Osc.	105*	Sl.Neg.	0	6.3AC	6.3AC	106*	0	1.4* 0	
6BE6 AM Conv. Osc.	-6.8	0	0	6.3AC	95	95	Sl.Neg.		
6BA6 IF	Sl.Neg.	0	0	6.3AC	105	105	1		
6BA6 FM Driver	0	0	0	6.3AC	102	102	1		
6AL5 Ratio Det.	Sl.Pos.	Sl.Neg.	0	6.3AC	Sl.Pos.	0	Sl.Pos.		
6AT6 Det. AF	-0.3	0	0	6.3AC	Sl.Neg.	Sl.Neg.	57		
6V6 Power Amp.	0	0	245	258	0	57	6.3AC	13.5	
5Y3 Rectifier	0	272	117AC	265AC	0	265AC	0	272	

DC voltages with 20,000 ohm/volt meter, 117V AC line, switch in AM pos. except * in FM.

AC voltages with 1,000 ohm/volt meter. Voltage from pin to chassis.

RESISTANCE CHART 9AJ

Tube	Pin Number								
	1	2	3	4	5	6	7	8	9
6BA6 FM RF	0	0	0	0	100K*	100K*	68		
12AT7 FM Conv. Osc.	130K	10K	0	1	1	130K*	0	560	0
6BE6 AM Conv. Osc.	22K	0.5	0	0	150K*	150K*	2.5M		
6BA6 IF	1M	0	0	0	150K*	150K*	68		
6BA6 FM Driver	1	0	0	0	150K*	150K*	68		
6AL5 Ratio Det.	6.8K	6.8K	0	0	∞	∞	∞		
6AT6 Det. AF	10M	0	0	0	1.5M	500K	225K*		
6V6 Power Amp.	0	0	250K*	250K*	500K	225K*	0	330	
5Y3 Rectifier	∞	250K*	∞	80	∞	100	∞	250K*	

*Subject to variation depending on condition of filter condensers. Readings on 6BA6 RF and 12AT7 with switch in FM pos.

K= 1,000

M= 1,000,000

9AJ1 VOLTAGE CHART 117 V Line

Pin Number	1	2	3	4	5	6	7	8	9
6BA6 FM RF	0	0	0	6.3AC	85	85	1		
12AT7 FM osc.-Conv.	98	-.2	0	6.3AC	6.3AC	96	0	1.3	0
Above readings in FM position									
6BE6 AM Conv.	-7	0	0	6.3AC	95	95	0		
6BA6 AM FM IF	0	0	0	6.3AC	102	102	1		
6BA6 FM IF	0	0	0	6.3AC	103	103	1		
6AL5 Ratio Det.	0	0	0	6.3AC	0	0	0		
6AT6 Det. Audio	0	0	0	6.3AC	0	0	56		
6V6 Power Amp.	0	0	255	196	0	56	6.3AC	11	
5Y3 Rectifier	0	272	117AC	280AC	0	280AC	0	272	

DC Readings 20,000 ohms/v meter - voltages from tube pin to chassis.

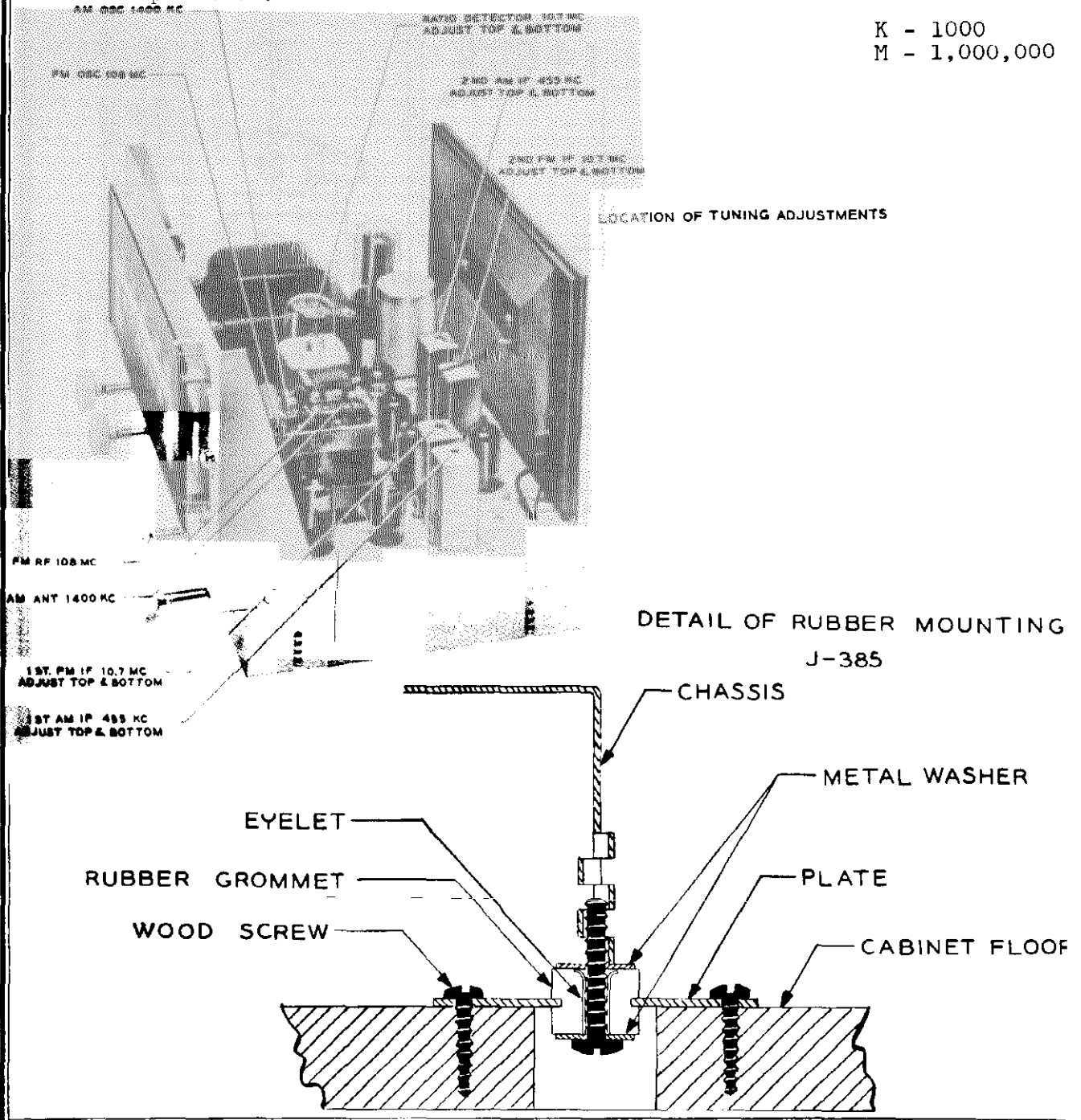
AC Readings 1000 ohms/volt.

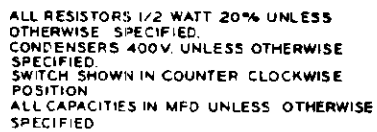
9AJ1 RESISTANCE CHART

Pin Number	1	2	3	4	5	6	7	8	9
6BA6 FM RF	0	0	0	0	280K*	280K*	68		
12AT7 FM Osc.-Conv.	280K*	10K	0	1 ohm	1 ohm	280K*	0	560	0
Above readings in FM position									
6BE6 AM Conv.	22K	.5 ohm	0	0	280K*	280K*	2.5M		
6BA6 AM FM IF	1.6M	0	0	0	280K*	280K*	68		
6BA6 AM IF	1 ohm	0	0	0	280K*	280K*	68		
6AL5 Ratio Det.	6.8K	6.8K	0	0	∞	∞	∞		
6AT6 Det. Audio	10M	0	0	0	1.5M	500K	500K*		
6V6 Power Amp.	0	0	250K*	250K*	500K	500K*	0	330	
5Y3 Rectifier	∞ *	250K*	∞	100	∞	100	∞	250K*	

*Resistance reading subject to wide variation depending on condition of filter capacitor.

K - 1000
M - 1,000,000





MODEL 8BT

Power Amplifier

The output impedance of the 8BT tuner is 220,000 ohms and should be worked into an amplifier having high impedance input. High impedance amplifiers usually have an input impedance of 500,000 ohms, but some have a lower impedance than this, and the 8BT may be worked into an impedance as low as 250,000 ohms with no appreciable loss of low frequencies or increase in distortion. An amplifier having provision for phonograph input from a crystal pickup is satisfactory for use with the 8BT, but under no conditions should the 8BT be worked into a microphone input channel. The relatively high output of the 8BT would cause overloading and distortion in the microphone input stage and the hum level would be too high to be considered acceptable.

SERVICE DATA

General:

Power Supply	110-120 V 50-60 cycles
Power Consumption	40 watts
Output	1 to 15 volts
AM I.F.	455 kc
FM I.F.	10.7 mc
Replacement part numbers - as shown on schematic diagram.	

AM Alignment

I.F. 455 kc.
Align Ant. and Osc. Trimmers at 1400 kc.

FM Alignment

Alignment may be carried out with an unmodulated R.F. signal generator covering 10.7 mc. and 88 to 108 mc. and a high impedance DC voltmeter having a low range of 1 to 5 volts DC.

Connect the positive lead of the DC voltmeter to pin #1 of the 6AL5 detector tube, and the negative lead to pin #2 of the 6AL5. Apply an unmodulated 10.7 mc signal to the grid of the second 6BA6 I.F. amplifier tube, through an .05 mfd. coupling condenser. Tune the bottom adjustment screw of the detector coil for maximum indication on the DC voltmeter. This completes this part of the adjustment.

Next, locate the 220 ohm resistor which is connected to the center lug of the detector coil (on the side next to the 6AL5 socket). Connect the negative lead of the DC voltmeter to the junction of this 220 ohm resistor and the two 100 mmfd. condensers on the tie lug near 6AL5. Connect positive lead of the voltmeter to chassis. With 10.7 mc. signal still applied to the grid of the second 6BA6, tune the top adjustment screw of the detector coil for a point of zero voltage. If more than a half turn adjustment was necessary in either of the preceding steps then both of the adjustments should be repeated.

Connect negative lead of DC voltmeter to pin #2 of 6AL5.

Without changing the signal generator frequency, connect the 10.7 mc. signal across the FM converter coil (rear FM section of gang). Rotate tuning knob slightly to determine that receiver is not tuned to a harmonic of the generator. Adjust both top and bottom cores of FM I.F. transformers for maximum DC indication on the meter, keeping the signal level from the generator low enough so that this DC voltage does not exceed 5 volts.

R.F. alignment is carried out by setting signal generator to 108 mc. Connect generator to G and A2 antenna terminal through a 300 ohm dummy and adjust converter coil by squeezing or spreading turns for maximum DC indication. There is some pulling between oscillator and converter, so the tuning control should be rocked slightly as these adjustments are made. The oscillator trimmer and coil should not be adjusted unless the receiver is noticeably off calibration.

Resistance Chart 8BT

<u>Tube</u>	<u>Pin Number</u>								
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
6BA6 FM RF	0	0	0	0	500K*	500K*	68		
12AT7 FM Conv. Osc.	500K*	10K	0	1	1	500K*	0	560	0
6BE6 AM Conv. Osc.	22K	0.5	0	0	500K*	500K*	2.5M		
6BA6 IF	1M	0	0	0	500K*	500K*	68		
6BA6 FM Driver	0.5	0	0	0	500K*	500K*	68		
6AL5 Ratio Det.	6.8K	6.8K	0	0	Inf.	Inf.	Inf.		
6AT6 Det. AF	10M	0	0	0	1.5M	500K*	500K*		
6X5 Rectifier	0	0	250	Inf.	250	Inf.	0	500K*	

* Subject to variation depending on condition of filter condensers.
 Readings on 6BA6 FM RF and 12AT7 with switch in FM pos.
 k = 1000 M = 1,000,000

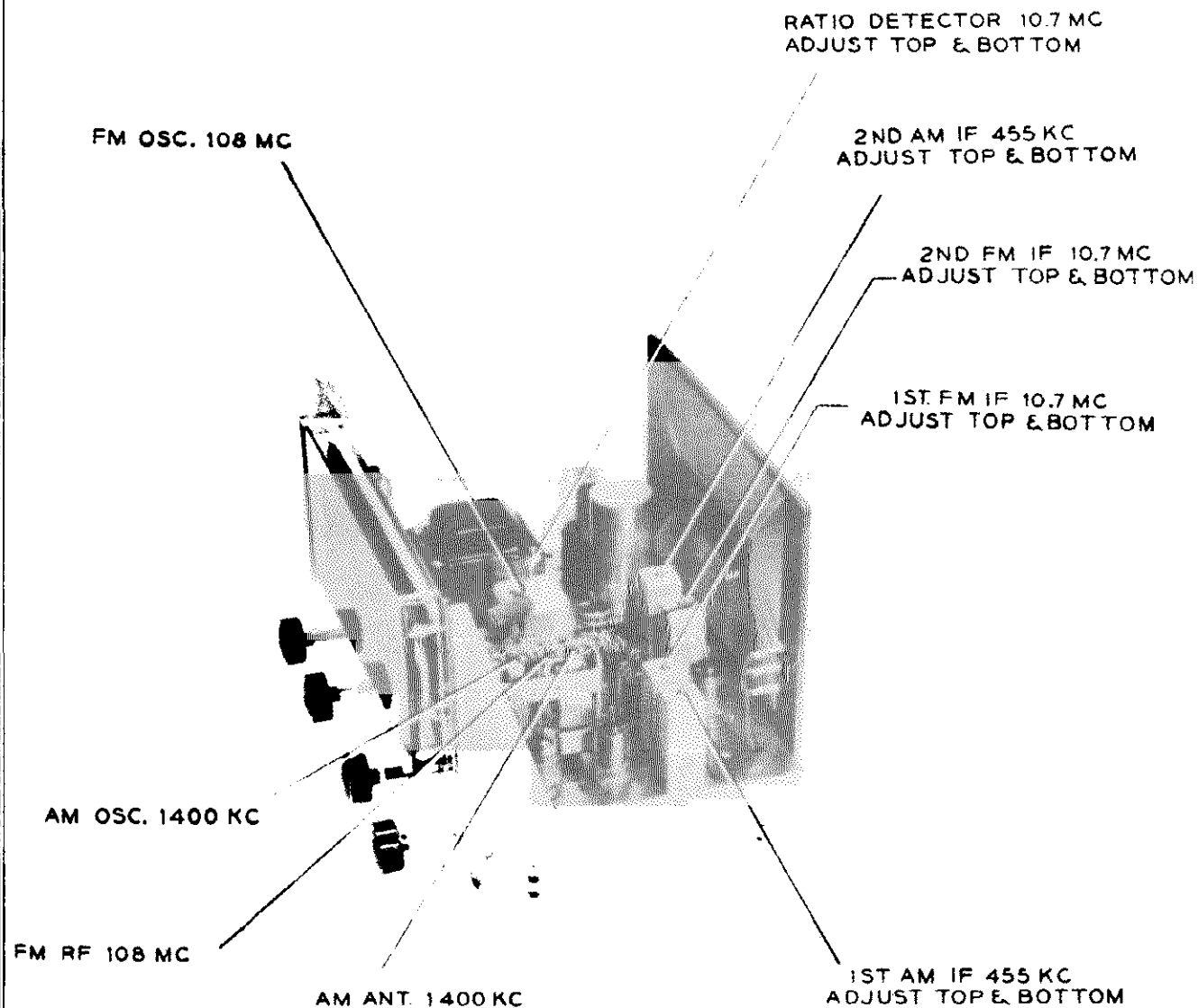
Voltage Chart

<u>Tube</u>	<u>Pin Number</u>								
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
6BA6 FM RF	0	0	0	6.3AC	57	97	1		
12AT7 FM Conv. Osc.	106	Sl. Neg.	0	6.3AC	6.3AC	104	0	1.2	0
6BE6 AM Conv. Osc.	-6.8	0	0	6.3AC	96	96	Sl. neg.		
6BA6 IF	Sl.Neg.	0	0	6.3AC	108	108	1		
6BA6 FM Driver	0	0	0	6.3AC	102	102	1		
6AL5 Ratio Det.	Sl.Pos.	Sl.Neg.	0	6.3AC	0	0	Sl.Pos.		
6AT6 Det. AF	-.5	0	0	6.3AC	Sl.Neg.	Sl.Neg.	57		
6X5 Rectifier	0	0	180AC	117AC	180AC	0	6.3AC	200	

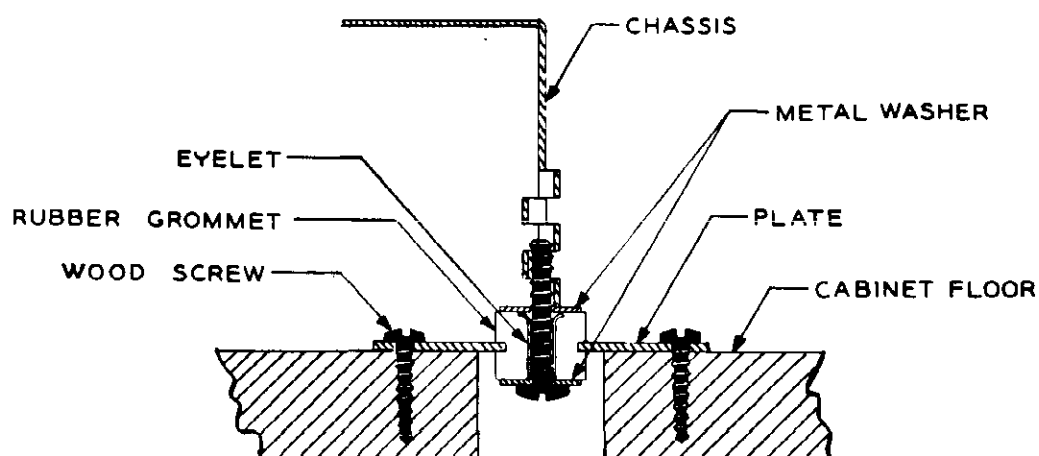
117V AC line, switch in AM position except 6BA6 FM RF and 12AT7.

DC readings with 20,000 ohm/volt meter, AC readings 1000 ohm/volt.

MODEL 8BT



LOCATION OF TUNING ADJUSTMENTS



DETAIL OF RUBBER MOUNTING

MODEL TK16,
Ch. KC-16

SPECIFICATIONS

Power Requirement: 120 volts, 50 to 60 cycles, 110 watts.
Frequency Coverage:

Band A—540 to 1600 KC, AM
Band B—1.6 to 4.7 MC Band D—11 to 22 MC
Band C—4.7 to 10 MC Band E—88 to 108 MC, FM

Audio Sensitivity: .02 volts for ½ watt output.

Maximum Undistorted Audio: 10 watts.

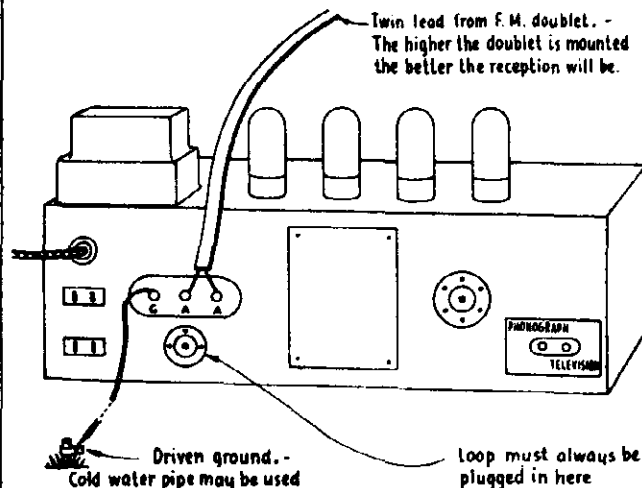
AM Sensitivity: 2 to 4 microvolts.

FM Sensitivity: 20 microvolts, quieting signal.
5 microvolts, minimum signal.

Tube Complement:

RF	6BA6	FM Detector	6AL5
Mixer	12AT7	1st AF	6C4
Oscillator	12AT7	2nd AF	6C4
1st IF	6BA6	Phase Inv.	6C4
2nd IF	6BA6	AF output, two	6V6GT
AM Detector	6AL5	Rectifiers, two	5Y3GT
3rd IF, FM	6BA6	Tuning Ind.	6U5

INSTALLATION

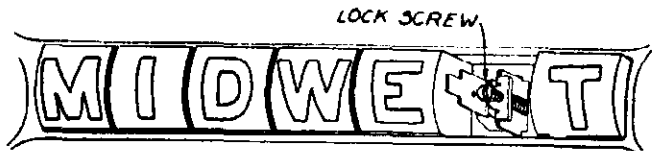


PRECAUTIONS. Be sure that the speaker and Magna Tenna Loop are plugged in, also the flexible dipole leads must be connected to screw strip at "A-A". A ground wire may be connected to "G" but it is usually not needed. See that all tubes are seated and light up.

The next step to select the type of entertainment you wish is to turn the **SELECTOR**. The pointer has seven positions: TV, PH, A, B, C, D and E. The letters represent television adaptor, phonograph, and radio bands A—Standard American Broadcast, BCD—short wave bands and E—FM Broadcast.

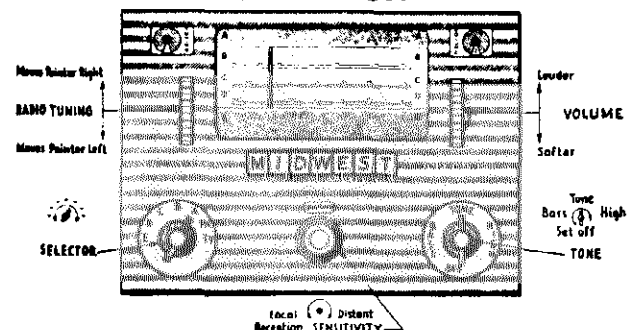
The push buttons are for your convenience in selecting stations without the bother of making the exact tuning adjustments necessary for best reception. There are seven buttons and each button may be set for a station

at any point on the dial. We do not recommend the use of the push buttons for short wave stations. To set the push buttons this exact procedure should be followed. A screwdriver will be needed.



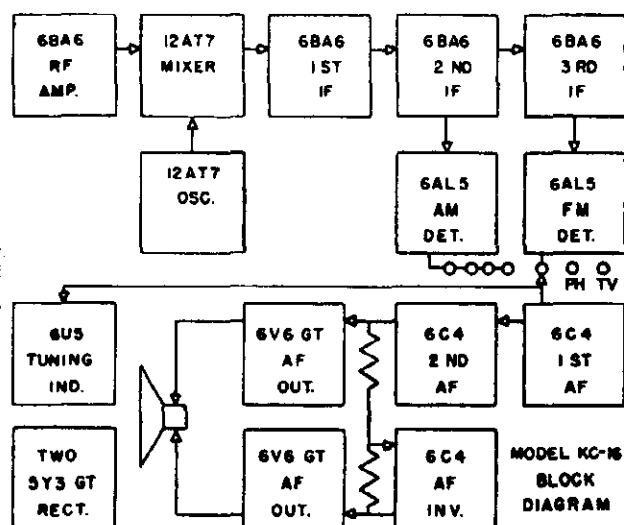
1. Turn on the receiver and allow ten minutes to warm up.
2. Remove the push button by pulling straight out. A hooked instrument will be of assistance.
3. Loosen the **LOCK SCREW** at least one half turn.
4. Using the screwdriver with the blade in the screw slot, push the mechanism in firmly. Hold in during step 5. The mechanism may bind at first and you must use sufficient force to break it loose so that the push button and **TUNING** control wheel are independent, that is, the **TUNING** control does not try to push the button mechanism outward when the pointer is tuned across the dial.
5. Tune the pointer past the desired station, then back to the desired station and make the tuning adjustment as carefully as you know how.
6. Tighten the **LOCK SCREW**.
7. Check the setting of this push button by tuning away from the station manually then push the button down firmly maintaining pressure until the pointer moves to the position it had when the **LOCK SCREW** was tightened. If the station is not tuned in perfectly repeat steps 2 to 6 carefully.

OPERATION



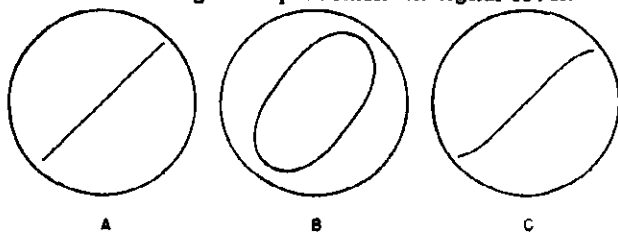
8. Adjust each of the seven buttons, or as many as you need, exactly as outlined above.

Any button can be set for any pointer position, however, you will find it more desirable to select the button nearest the pointer position so that each button may be more easily identified with the station. For example, the "M" button will be set for a station at the left of the dial, the "W" button will be set for a station near the center, etc.



The alignment points are shown on the top and bottom views of the chassis as well as certain part numbers. **AM IF** should be aligned at 456 KC. There are three transformers and six adjustments, the transformers are coupled with less than critical coupling and there is only one peak. Couple the generator into the mixer grid and use either AVC or audio for the output meter.

1. Connect generator to 3rd IF grid and vertical input of scope to the audio of the receiver at any point where sufficient signal is available and phasing can be properly adjusted.
2. Adjust the top screw for greatest length of straight line. This is the secondary winding, the bottom screw should give improvement in signal level.



C is preferred because it shows the limits of deviation and you obtain it simply by adjusting the deviation (sweep width) control on the signal generator. Approximately 150 KC is normal.

- Alternate Method:** The IF response of the 1st, 2nd and 3rd transformer may be observed more directly if

Notice: Do not use AM or CM signal to peak the FM transformers. Regeneration may result and bandwidth and noise rejection will be poor, although signal strength will increase.

Notice: Use as low signal input as possible for readable output indication. Feed signal in from FM RF generator through 150 ohms in each lead to "A-A." Use 400 ohms in lead from AM RF generator and connect to either "A" terminal.

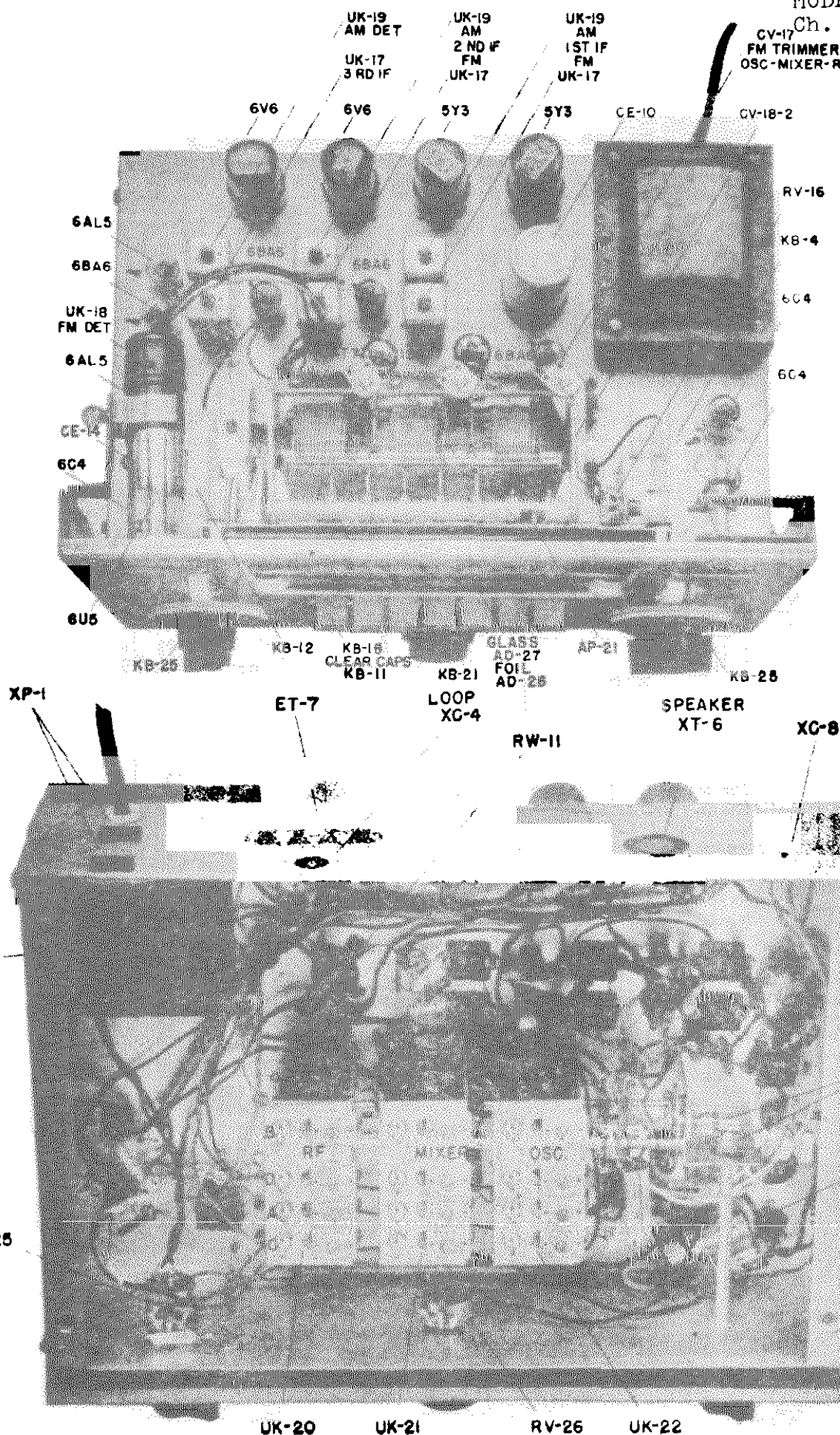
This diagram illustrates the assembly of a dial drum. It shows a horizontal line representing a thread that passes through a series of four small circles on the left, which represent holes in the dial drum. The thread then passes through a larger circular component on the right, which is the dial drum itself. A label 'Tie knot here' points to a knot in the thread. Another label 'Gang closed - Pointer to left' points to the thread. A third label 'Thread through holes in dial drum' points to the thread passing through the holes. The dial drum is shown with a pointer and a scale.

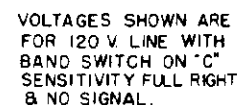
Radio Band	Coil Adj.	Trimmer Adj.
A	560 KC	1500 KC
B	1.6 MC	4.7 MC
C	5 MC	10 MC
D	11.5 MC	22 MC
E	.....	105 MC

Repair data for the record changer mechanism is available separately, please specify Model.

MODEL TK16,
Ch. KC-16

CV-17
FM TRIMMERS
OSC-MIXER-RF





TOLERANCE IS
± 20% UNLESS
INDICATED

CODE 118

During Early production the following changes have been made.

1. The ground end of the padder on the "C" band, in the oscillator plate must return to ground lug on the coil plate near the "C" trimmer. This is done to prevent coupling into the "D" band.
2. There should be an additional .01 condenser from the 1st IF grid return to the saddle of the 6V6 socket. This is added to reduce regeneration.
3. There should be an additional .01 condenser from the screen supply end of the 15K dropping resistor to a ground on the saddle of the 5Y3 socket. To reduce regeneration.
4. The .01 ground return of the capristor at the B+ side of the 1st AM IF transformer may return to the ground on the saddle of the 5Y3 socket. To reduce regeneration.
5. The blue plate lead on the AM section of the triode mixer must be dressed away from the grid pin of that section. To reduce regeneration.
6. The RF stage may regenerate on FM. The cure is to ground the 6BA6 RF tube suppressor separately, to the front of the socket; solder the wire to the chassis if the socket does not have the saddle below the chassis.
7. Four ceramic B+ decoupling condensers should be replaced by paper condensers of .01 MFD capacity and 600 volts rating. These are in the IF B+ lead string and one in the mixer coil plate.
8. Remove ceramic .01 MFD condensers at the 3rd 6BA6 IF screen, at the 1st 6BA6 IF screen and at the terminal feeding mixer plate voltage to the 1st IF transformers. Replace with .01MFD ceramic disc capacitors.
9. The black wire used to ground the arm of the tone control should be connected directly to the 6C4 socket ground. To reduce hum.
10. To prevent overload on strong local FM Stations the grid return of the 2nd IF grid should be made directly to ground instead of through the .01-1 meg capristor.
11. To prevent regeneration in the "C" band, in addition to revision 4, add a 1000 mmf disc condenser from B+ side of 1st AM, IF transformer to ground on the mounting foot of the adjacent terminal strip.

CONNECTING THE SET

POWER SUPPLY. This receiver is designed to operate on an alternating current supply (AC) ranging from 110 to 120 volts, 60 Cycles only. *Do Not Operate on Direct Current.*

Before connecting the set be sure that your house is wired for the voltage and current for which the set is designed. If in doubt, call your local power company for the necessary information. Connecting the set to a supply outlet furnishing the wrong type of current will result in improper operation or damage.

ANTENNA. This receiver has a built-in "loop" aerial. Its excellent design is such as to increase pick-up from stations having wide variations in signal strength. The efficiency and selectivity of the loop provide outstanding reception without the use of an external aerial.

TUBES. Five tubes (including rectifier) are used. Type numbers and locations are shown in the tube location diagram on the bottom of the cabinet.

GROUND. No ground connection should be used when operating this receiver. The receiver gets its ground connection through the power line and any external connection to the chassis may cause a short circuit and consequent damage.

CAUTION. Do not place receiver on hot objects such as stoves, radiators, etc. Heat will damage the cabinet and the internal components of the receiver.

RADIO OPERATION

AUTO-OFF-ON SWITCH KNOB (Bottom of Clock Face). Turn this knob to the right (clockwise), so that the indicator points to "ON", to turn on the radio. To turn off the radio, turn this knob so that the indicator points straight up to "OFF".

VOLUME CONTROL KNOB (Bottom Knob on Front of Cabinet) This knob controls the volume of the signal received. To reduce the volume, rotate this knob to the left (counter-clockwise). When this knob is rotated to the right it will increase the volume.

STATION SELECTOR KNOB. (Large Knob on Front of Cabinet) Rotate this knob over a narrow range of the dial where the desired station is located, until the station is received with maximum volume and clarity. Then readjust the volume control to the proper level. NEVER use the station selector knob to adjust the volume as this will result in the signal being received with distorted tone quality.

The station selector knob is calibrated in Kilocycles with the last zero of the actual frequency omitted. For instance, the numeral 55 on the knob indicates 550 Kilocycles and 160 indicates 1600 Kilocycles.

OPERATION OF CLOCK

This clock-radio is equipped with a self-starting clock. As soon as the power plug is inserted into the wall outlet, the sweep second hand will begin to operate.

To set the time hands, rotate the knob located at the rear of the receiver so that the hands will rotate in a clockwise rotation. Once the clock is set, it needs no further attention unless you remove the plug or there is a power interruption.

The clock of this clock-radio is equipped to automatically turn on the radio at any time during the course of approximately 10- $\frac{1}{2}$ hours after the controls are properly set. The controls may be properly set by following the instructions itemized below:

1. **SET TURN-ON TIME.** Pull out and turn the knob at the top of clock face to the left (counter-clockwise) until the selected TURN-ON time is indicated on the small center dial by the small pointer on the opposite end of the hour hand.

Leave this knob out if you wish the conventional alarm to turn on in addition to the radio. The conventional alarm will sound approximately seven minutes after the radio is turned on.

If you prefer to have the radio turned on without the conventional alarm, push the knob in after the TURN-ON time is set.

2. **SELECT PROGRAM TO BE TURNED ON.** Tune in the station that will carry the desired program at the selected time, and adjust the volume to the proper level.

3. **SET AUTO-OFF-ON SWITCH KNOB.** Turn this knob to the left until the indicator points to "AUTO". This will turn off the radio and set the switch so that it automatically comes on again at the selected time.

To turn the radio on before the "TONE-ALARM" time, turn the AUTO-OFF-ON knob to the "ON" position. It will then be necessary to repeat the steps listed above to again use the alarm feature.

Radio Clock

USE OF "CONVENTIONAL ALARM"

The clock may be set to turn on the conventional buzzer alarm without turning on the radio. To accomplish this set the TURN-ON time as explained under "USE OF TONE-ALARM" and leave the knob out from the cabinet. Set "AUTO-OFF-ON" switch knob to the "OFF" position. At the selected time, the buzzer will sound and will continue to sound until you turn it off by pushing knob all the way in.

USE OF TURN-ON FEATURE WITH EXTERNAL APPLIANCES

An electrical outlet is provided at the rear of the receiver to use the TURN-ON feature on any electrical appliance which operates on a 110-120 volt, 60 cycle power supply.

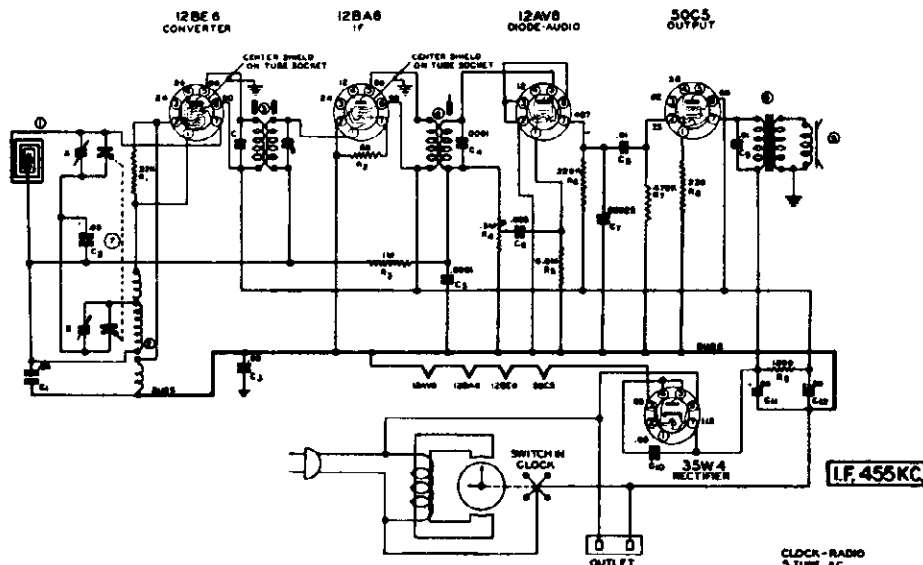
To use this outlet, simply plug in the appliance and set the controls on the clock the same as explained in the paragraph "USE OF TONE-ALARM" This will automatically start the appliance AND the radio at the selected time.

CAUTION: THE RATING OF THE EXTERNAL ELECTRICAL APPLIANCE MUST NOT EXCEED 660 WATTS.

Current is available at this outlet whenever the radio is turned on.

ALIGNMENT

Step No.	Position of Gang	Signal Generator Frequency	Generator Connection	Dummy Antenna	Adjustment	Type of Adjustment
1.	Open	455 KC.	Rear Gang Terminal	.1 Mfd.	I.F. Slugs	Adjust for Maximum Output
2.	Open	1620 KC.	Dummy Antenna	2 Turns of Hookup Wire 6" in Dia. (Place Approx. a Foot from & parallel to loop.)	Front Gang Trimmer	Adjust for Maximum Output
3.	1400 KC	1400 KC.			Rear Gang Trimmer	Adjust for Maximum Output
4.	600 KC	600 KC.				Check Gang Alignment



PARTS LIST

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
C1,C2,C3	N-1345	Capacitor-Paper .05 MFD. 200 V
C4	N-7549	Capacitor-Ceramic 100 MMFD 500 V. 10%
C5	N-4015	Capacitor-Ceramic 100 MMFD 500 V. 20%
C6	N-4894	Capacitor-Paper .005 MFD. 600 V.
C7	N-6468	Capacitor-Ceramic 250 MMFD. 500 V. 20%
C8,C9	N-1344	Capacitor-Paper .01 MFD. 400 V.
C10	N-1346	Capacitor-Paper .05 MFD. 400 V.
C11)	N-7889	Capacitor-Electrolytic 50 MFD. 150 V.
C12)		30 MFD. 150 V

R1	N-4025	Resistor - 22,000 Ohm - 1/2W. - 20%
R2	N-6485	Resistor - 68 Ohm - 1/2W. - 10%
R3	N-1282	Resistor - 1.0 Megohm - 1/2 W. - 20%
R4	N-7957	Control - On-Off & Volume
R5	N-4028	Resistor - 6.8 Megohm - 1/2 W. - 20%
R6	N-4026	Resistor - 220,000 Ohm - 1/2W. - 20%
R7	N-4027	Resistor - 470,000 Ohm - 1/2W. - 20%
R8	N-4024	Resistor - 220 Ohm - 1/2W. - 10%
R9	N-4900	Resistor - 1,200 Ohm - 1.0W. - 10%

N-7884	Speaker - 4" P.M. with Output Transformer
N-7956	Coil - Loop Antenna
N-7888	Coil - 1st. I.F.
N-7542	Coil - 2nd. I.F.
N-7139	Coil - Oscillator

MODELS 05FJB-6775B,
61-6775

INSTALLATION

Due to the compact size of this receiver, many mounting positions are possible. However, the most convenient is directly below the instrument panel as illustrated in figure 1. The following step by step procedure will facilitate the installation of the receiver.

1. With the receiver itself as a model, select the desired position.
2. Using the mounting bracket as a template locate the two front mounting holes and drill a $\frac{1}{4}$ " hole at each point.
3. Locate the position for the rear mounting stud in the bulkhead and drill a $\frac{1}{2}$ " hole.
4. With the stud mounted on the receiver and the inside nut and washer in place, insert the stud through the bulkhead hole and attach the front end of the receiver to the instrument panel with the two 8-32 machine screws contained in kit of mounting hardware.
5. Open the engine compartment and remove the paint on the bulkhead around the stud. Assemble the washer and nut on this side and adjust both this nut and the inside nut for perfect alignment of the receiver and for good contact with the brightened surface of the bulkhead.

Caution: Do not screw stud in case beyond point necessary to insure support, otherwise, it may penetrate rear wall of case and cause damage to the instrument.

6. Attach the terminal of the "A" battery cable to one of the posts on the ammeter, preferably on the battery side. This may be ascertained by switching the receiver on. If no deflection of the ammeter occurs, the receiver is properly connected.

7. Insert plug on the end of the antenna lead into socket connector located on the left side of the radio.

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

1 mounting stud	2 8-32 machine screws
2 $\frac{3}{8}$ -16 hex nuts	2 8-32 hex nuts
2 $\frac{3}{8}$ " I.D. washers	2 No. 8 washers
	2 No. 8 lock washers

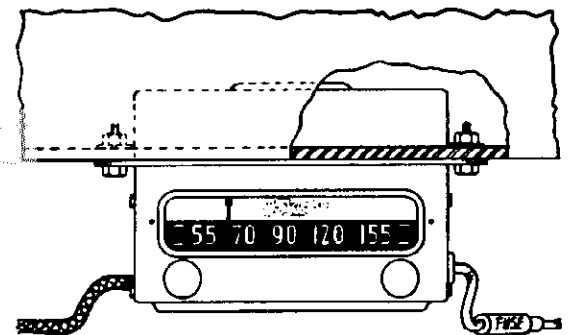
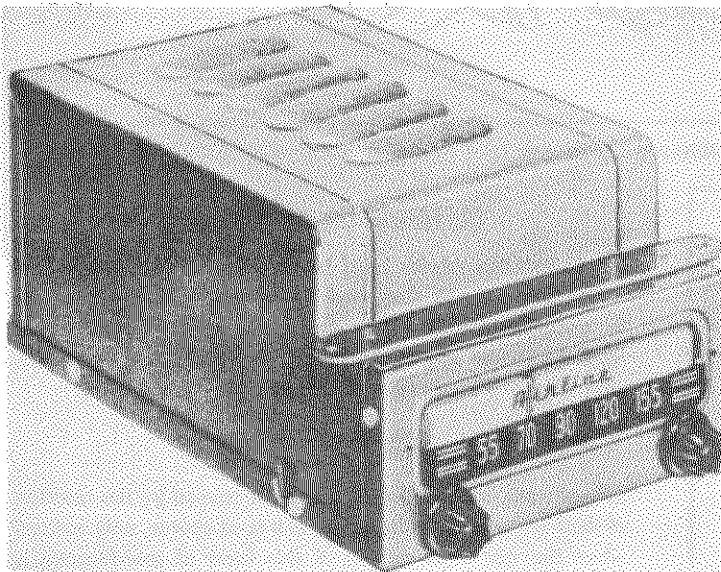
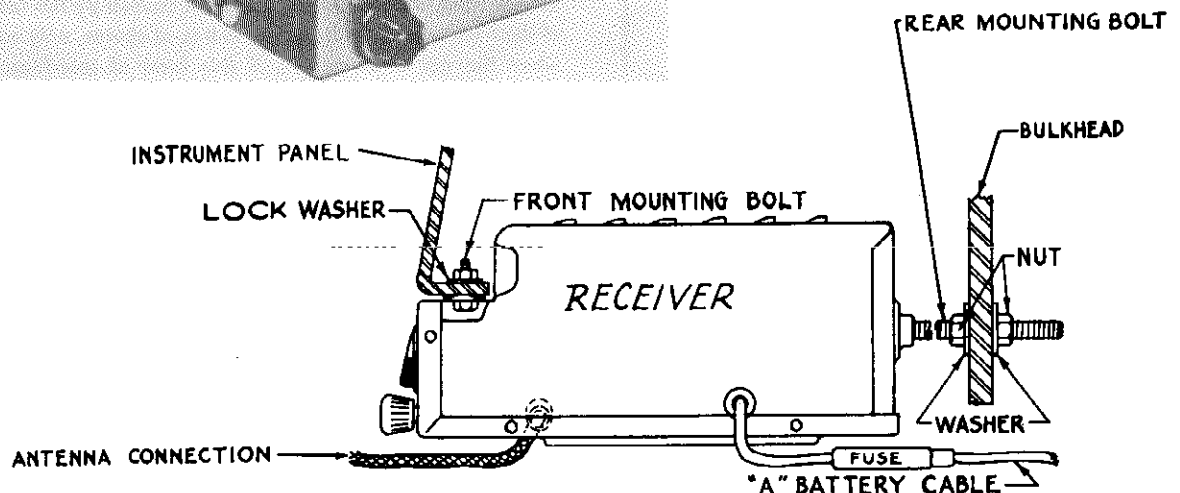


FIG. 1 RECEIVER MOUNTING DIAGRAM



MODELS 05FJB-6775B,
61-6775

MOTOR NOISE ELIMINATION SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

1 Generator Condenser. 1 Distributor Suppressor.

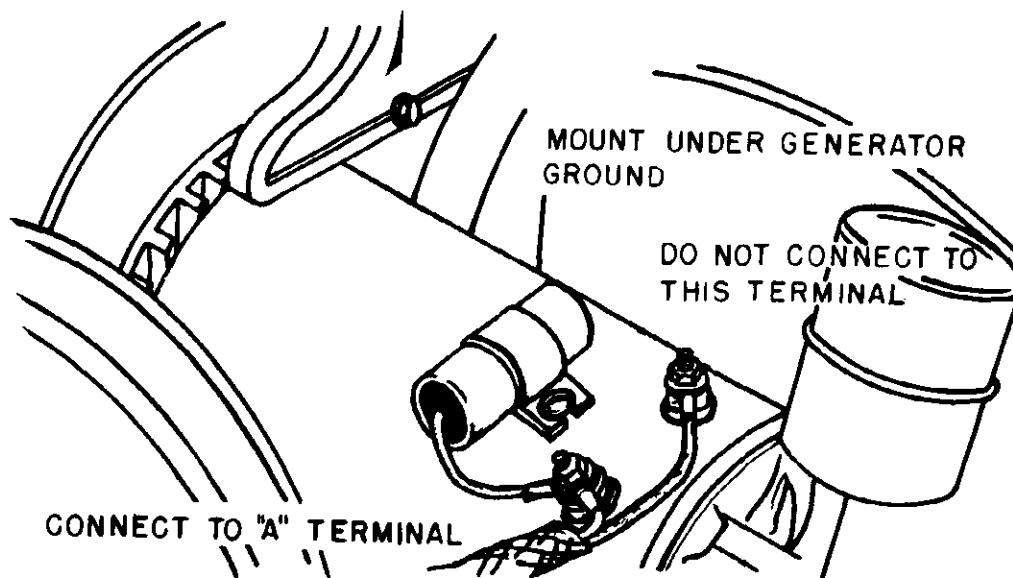


FIG. 2 GENERATOR CONDENSER

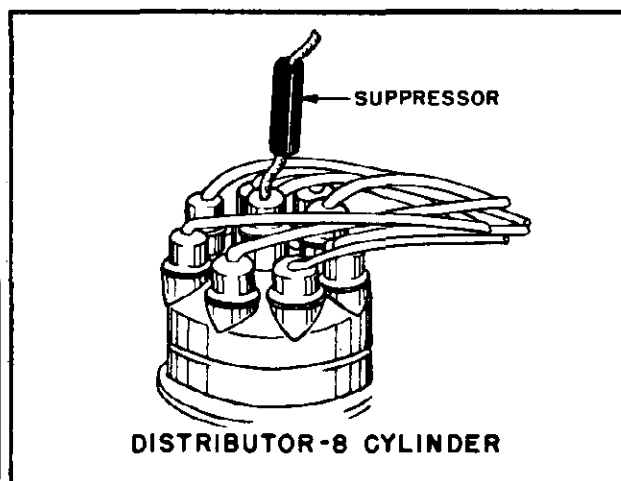


FIG. 3 DISTRIBUTOR SUPPRESSOR

GENERATOR CONDENSER

The generator condenser (Installed as shown in Figure 2) and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

DISTRIBUTOR SUPPRESSOR

Disconnect the center lead in the distributor head of the motor (see Fig. 3). Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

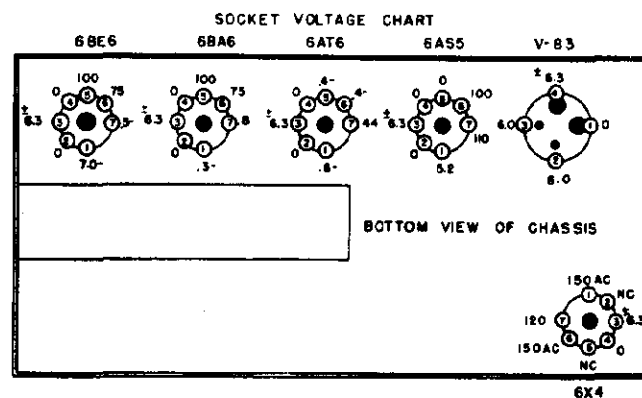
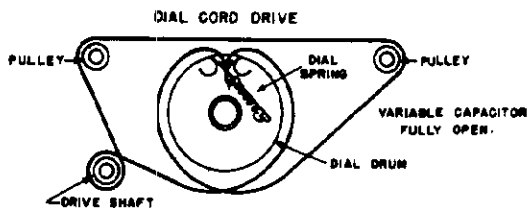
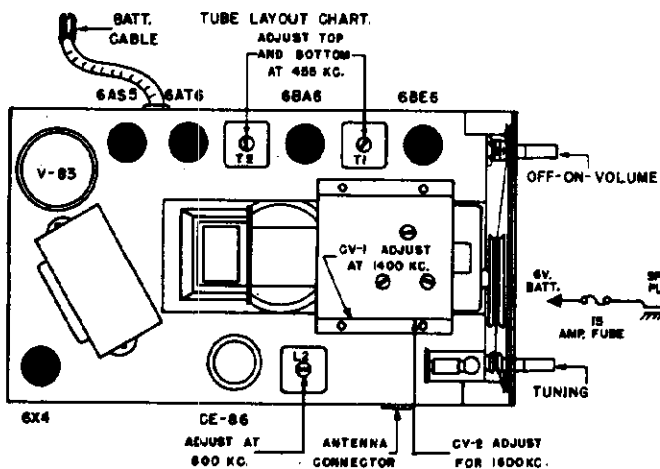
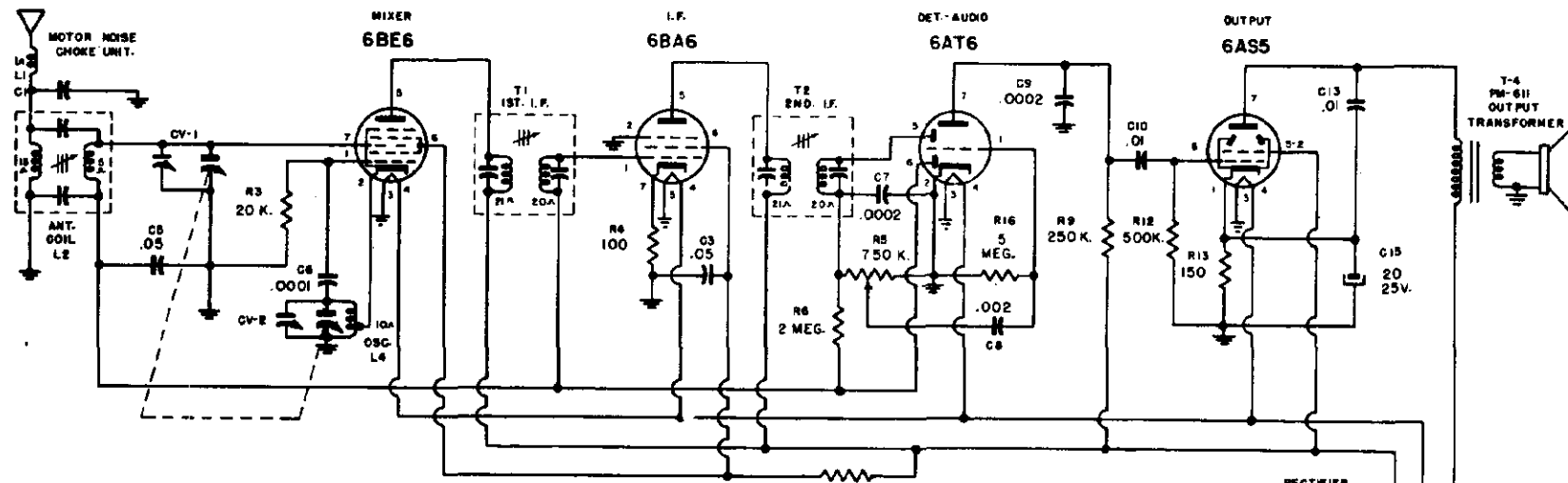
WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

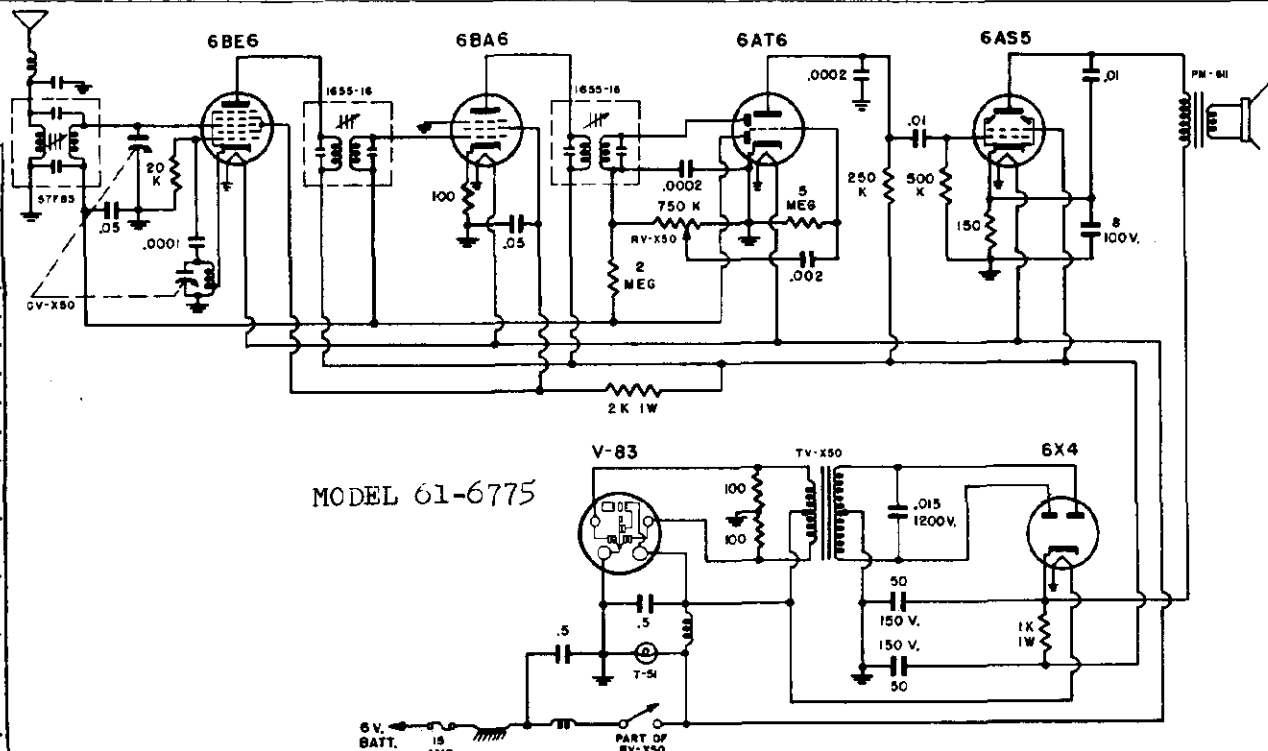
In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

MODEL 05FJB-6775B



REPLACEMENT PARTS LIST

SCHEMATIC DIAGRAM REF. NO.	PART NO.	DESCRIPTION
CONDENSERS		
C3, C5	C207	.05 MFD 200 volt condenser . . .
C4, C12	C209	.5 MFD 100 volt condenser
C6	CC200	100 MMFD ceramic condenser . . .
C7, C9	CC201	200 MMFD ceramic condenser . . .
C8	C203	.002 MFD 400 volt condenser . . .
C10, C13	C206	.01 MFD 600 volt condenser
C11	C220	.0125 MFD 1200 volt condenser . .
C15	CE-X50	20 MFD 150 volt electrolytic condenser
		20 MFD 150 volt electrolytic condenser
		20 MFD 25 volt electrolytic condenser
RESISTORS		
R3	R306	20K ohm 1/2 watt 20% resistor . . .
R4, R10, R11	R301	100 ohm 1/2 watt 20% resistor
R5	RV-X50	Volume control 3/4 megohm with switch
R6	R310	2 megohm 1/2 watt 20% resistor . .
R8	R326	2K ohm 1 watt 20% resistor
R9	R307	250K ohm 1/2 watt 20% resistor . .
R12	R308	500K ohm 1/2 watt 20% resistor . .
R13	R327	150 ohm 1/2 watt 20% resistor . . .
R14	R312	1K ohm 1 watt 20% resistor
COILS AND TRANSFORMERS		
L1-C1	L200	Motor noise elimination Unit
L2	57FB-3	Antenna Coil
L4	L201	R.F. Oscillator coil
L5	L203	Choke "A" line
L6	L202	Choke, vibrator hash



T1	1655-16	1st IF transformer.....
T2	1655-16	2nd IF transformer.....
T3	TV-X50	Vibrator transformer.....
T4		Output transformer (Part of speaker, not furnished separately)....

DIAL PARTS

H201	Grommet, rubber drive.....
T51	Pilot light.....
H202	Pilot light socket.....
H203	Pulley, idler.....
H204	Spring, Dial drive string tension.....
H531	String, Dial drive.....
DP 530	Dial Pan.....
PS 800	Dial Pointer.....

DS 540	Drive shaft assembly.....
S556	Dial scale window.....
H508	Knob.....
F555	Felt washers (for knobs).....
MISCELLANEOUS	
A300	"A" lead assembly.....
A201	Fuse 15 Amp.....
V83	Vibrator.....
H207	Clip, case anti-rattle.....
H208	Clip, coil mounting.....
PM611	Speaker 5" (includes output transformer)....
H212	Receptacle, Antenna cable.....
GC607	Speaker Grill cloth.....
H601	Case bottom.....
H602	Case cover.....

MODELS 05F06-6775B,
61-0775

MODELS 05FJR-6776B,
61-6776

INSTALLATION

Due to the compact size of this receiver, many mounting positions are possible. However, the most convenient is directly below the instrument panel as illustrated in figure 1. The following step by step procedure will facilitate the installation of the receiver.

1. With the receiver itself as a model, select the desired position.
2. Using the front mounting bracket as a template locate the two front mounting holes and a $\frac{1}{4}$ " hole at each point.
3. Attach front mounting bracket to the receiver by two No. 6 self-tapping screws.
4. Locate the position for the rear mounting stud in the bulkhead and drill a $\frac{1}{2}$ " hole.
5. With the stud mounted on the receiver and the inside nut and washer in place, insert the stud through the bulkhead hole and attach the front end of the receiver to the instrument panel with two 8-32 machine screws contained in kit of mounting hardware.
6. Open the engine compartment and remove the paint on the bulkhead around the stud. Assemble the washer and nut on this side and adjust both this nut and the inside nut for

perfect alignment of the receiver and for good contact with the brightened surface of the bulkhead.

Caution: Do not screw stud in case beyond point necessary to insure support, otherwise, it may penetrate rear wall of case and cause damage to the instrument.

7. Attach the terminal of the "A" battery cable to one of the posts on the ammeter, preferably on the battery side. This may be ascertained by switching the receiver on. If no deflection of the ammeter occurs, the receiver is properly connected.
8. Insert plug on the end of the antenna lead into socket connector located on the left side of the radio.

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

- | | |
|--------------------------------|----------------------|
| 1 mounting stud | 2 8-32 hex nuts |
| 2 $\frac{3}{8}$ -16 hex nuts | 2 No. 8 washers |
| 2 $\frac{3}{8}$ " I.D. washers | 2 No. 8 lock washers |
| 2 8-32 machine screws | |

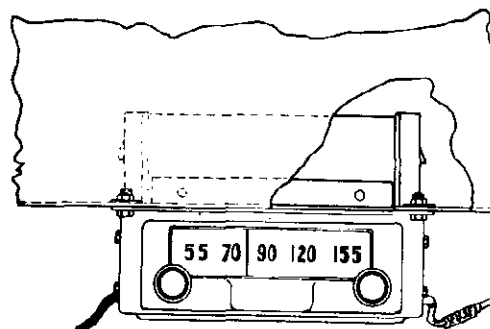
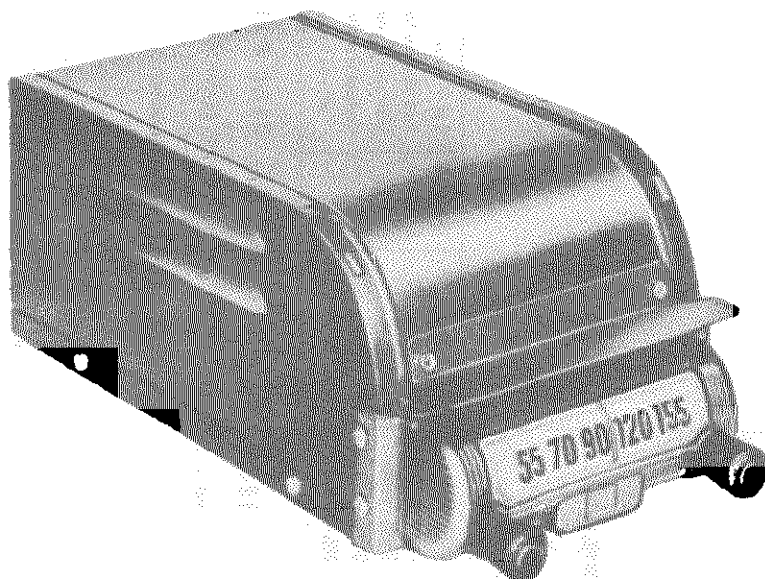
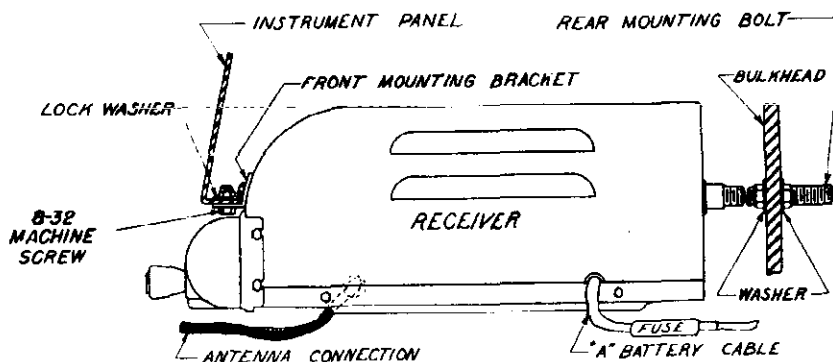


FIG. 1 DETAIL MOUNTING ASSEMBLY



MODELS 05FJB-6776B,
61-6776**MOTOR NOISE ELIMINATION****SUPPRESSION KIT**

1 .5 MFD Generator Condenser

1 Distributor Suppressor

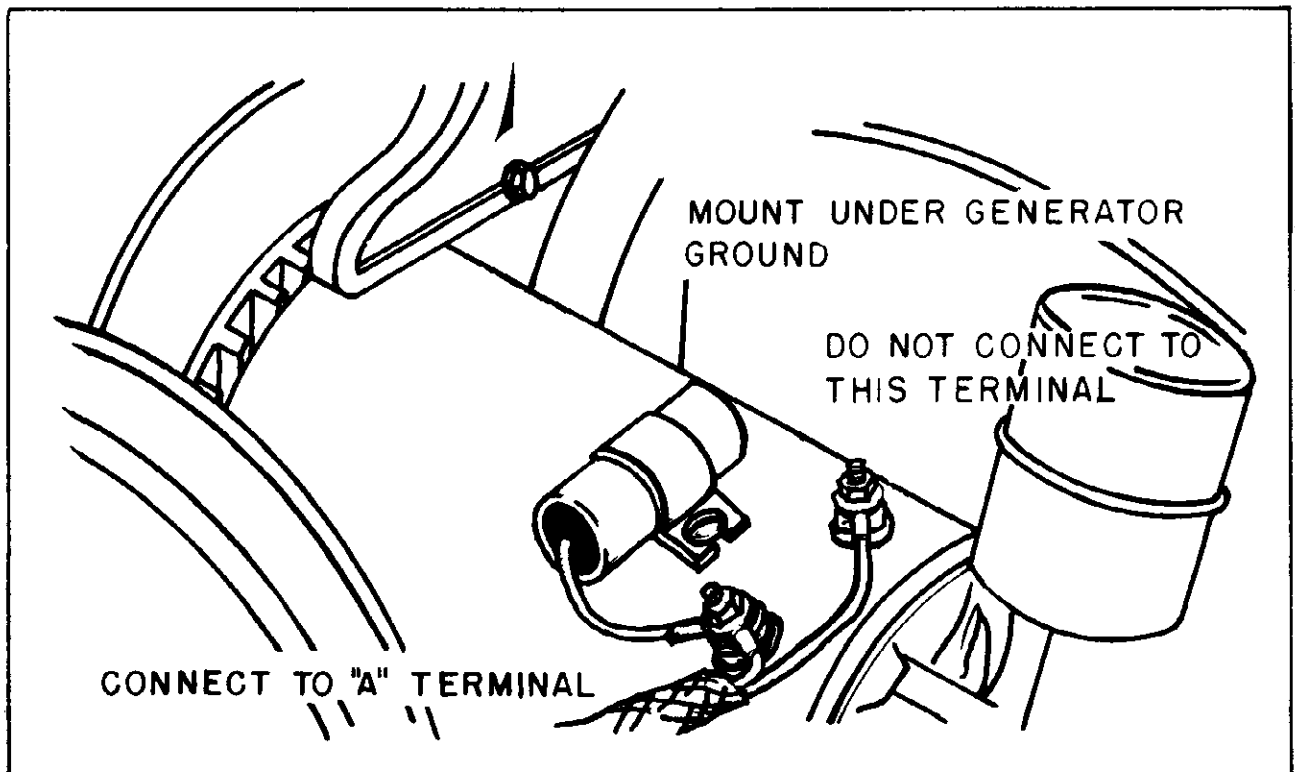


FIG. 2 GENERATOR CONDENSER

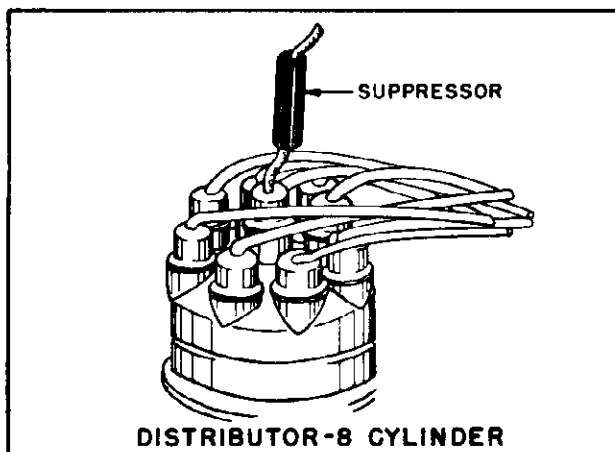


FIG. 3 DISTRIBUTOR SUPPRESSOR

GENERATOR CONDENSER

The generator condenser (Installed as shown in Figure 2) and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

DISTRIBUTOR SUPPRESSOR

Disconnect the center lead in the distributor head of the motor (see Fig. 3). Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

ELECTRICAL SPECIFICATIONS

This receiver contains the following:

- 1 — 6BA6 — RF Amplifier
- 1 — 6BE6 — Converter
- 1 — 6BA6 — I. F. Amplifier
- 1 — 6AT6 — Detector — AVC — 1st Audio
- 1 — 6AQ5 — Power Output
- 1 — 6X4 — Rectifier

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum posi-

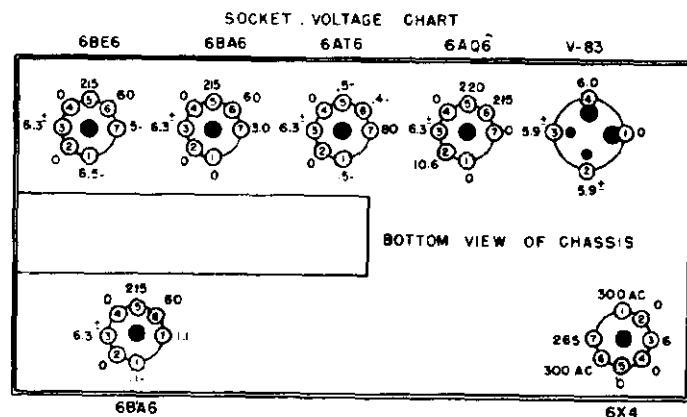
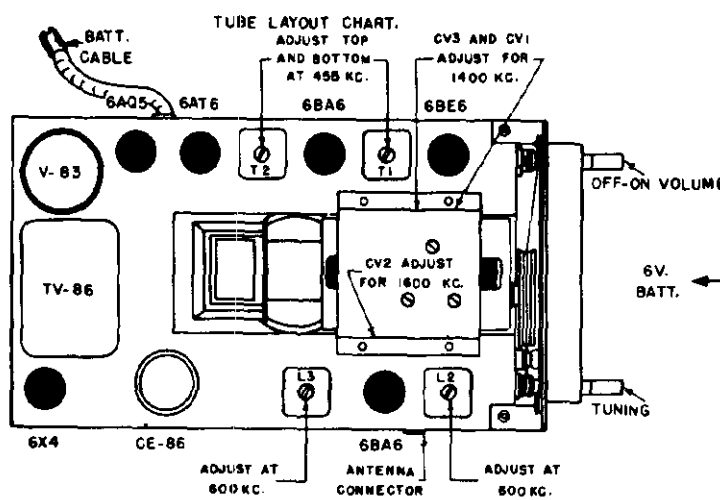
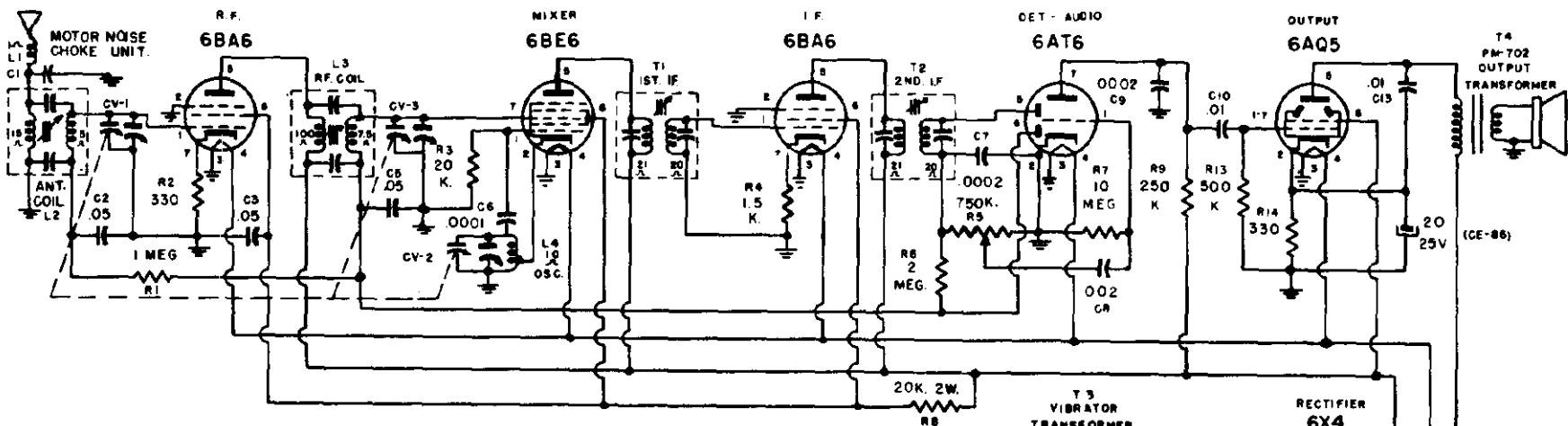
To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

Repeat alignment procedure as a final check.

For alignment points refer to Schematic Diagram.

DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANT.	GENERATOR CONNECTION	TRIMMER REFERENCE	TRIMMER ADJUSTMENT	TRIMMER FUNCTION
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						



MODELS 05FB-0770B,
61-6776

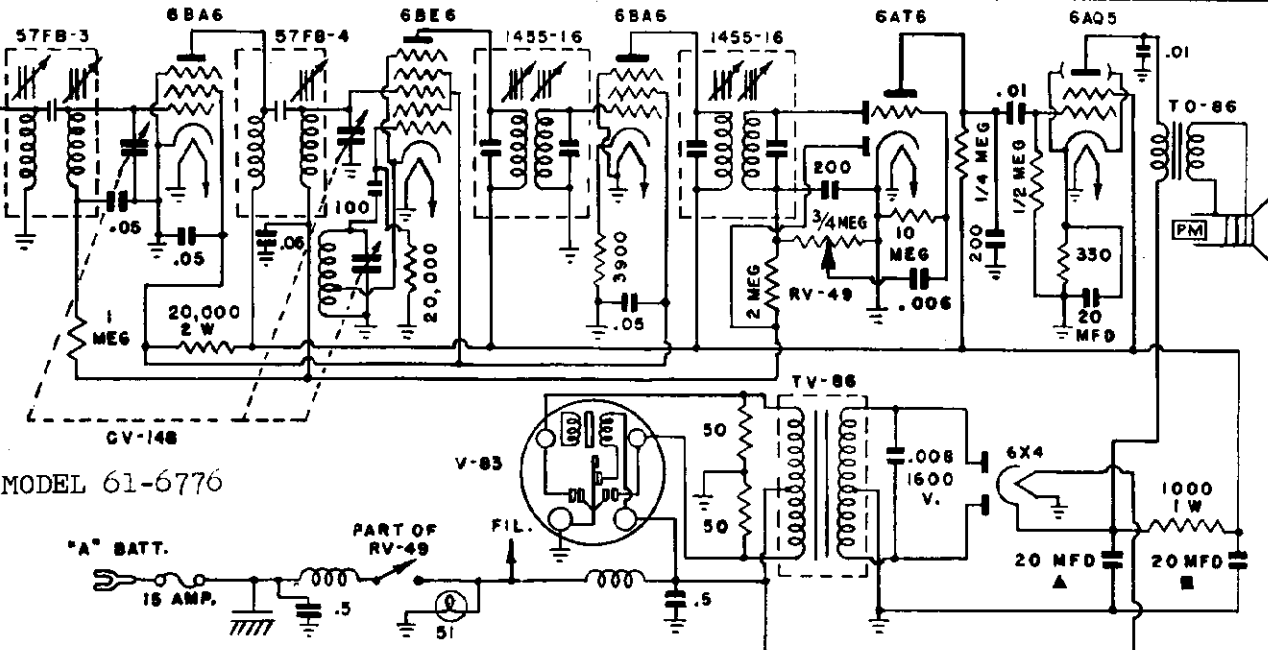
REPLACEMENT PARTS LIST

SCHEMATIC DIAGRAM REFERENCE	PART NO.	DESCRIPTION
CONDENSERS		
C2, C3, C5	C207	.05 MFD 200 volt condenser...
C4, C12	C209	.5 MFD 100 volt condenser...
C6	CC200	100 MMFD ceramic condenser...
C7, C9	CC201	200 MMFD ceramic condenser...
C8	C203	.002 MFD 400 volt condenser...
C10, C13	C206	.01 MFD 600 volt condenser...
C11	C205	.008 MFD 1600 volt condenser...
CE-86	CE-86	20 MFD 350 volt electrolytic condenser.....
		20 MFD 350 volt electrolytic condenser.....
		20 MFD 25 volt electrolytic condenser.....
CV1, CV2, CV3	CV-148	3 section variable condenser...

RESISTORS		
R1	R-309	1 megohm 1/2 watt 20% resistor...
R2, R14	R-303	330 ohm 1/2 watt 20% resistor...
R3	R-306	20K ohm 1/2 watt 20% resistor...
R4	R-314	1.5K ohm 1/2 watt 20% resistor...
R5	RV-57	Volume control 3/4 megohm with switch.....
R6	R-310	2 megohm 1/2 watt 20% resistor...
R7	R-311	10 megohm 1/2 watt 20% resistor...
R8	R-313	20K ohm 2 watt 20% resistor...
R9	R-307	250K ohm 1/2 watt 20% resistor...
R10, R11	R-301	100 ohm 1/2 watt 20% resistor...
R12	R-312	1k ohm 1 watt 20% resistor.....

COILS AND TRANSFORMERS

L1-C1	L-200	Motor Noise elimination unit....
L2	57FB-3	Antenna Coil.....
L3	57FB-4	R.F. Coil.....
L4	L-201	R.F. Oscillator Coil.....



MODEL 61-6776

L5	L-203	Choke "A" Line.....
L6	L-202	Choke, vibrator hash.....
T1	1655-16	1st I.F. Transformer.....
T2	1655-16	2nd I.F. Transformer.....
T3	TV86 or TV86A	Vibrator Transformer.....
T4		Output transformer (Part of speaker not furnished separately)....

PART NO.	DESCRIPTION
DIAL PARTS	
H201	Grommet, rubber drive.....
T51	Pilot light.....
H202	Pilot light socket.....
H203	Pulley, idler.....
H204	Spring, Dial drive string tension.....
H503	String, Dial drive.....
DP505	Dial Pan.....

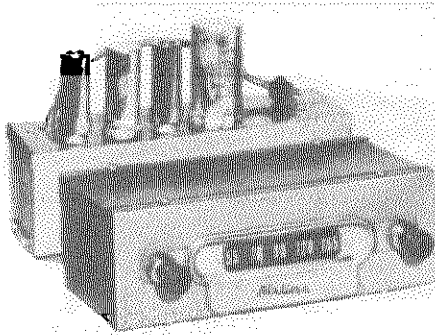
ELECTROLYTIC CONDENSER CE-86	
■	20 MFD 350 VDC
▲	20 MFD 350 VDC
	20 MFD 25 VDC
I.F. 455 KC RANGE 538 TO 1600 KC	

PS 1024	Dial Pointer.....
DS -500	Drive shaft assembly.....
	Plastic Dial Scale front.....
H508	Knob.....

MISCELLANEOUS	
A300	"A" lead assembly.....
A201	Fuse 15 Amp.....
V-83	Vibrator.....
H-207	Clip, case anti-rattle.....
H-208	Clip, coil mounting.....
H-501	Case bottom.....
H-502	Case cover.....
PM-702-A	Speaker 5" (includes output transformer)...
H-212	Receptacle, Antenna Cable.....
GC-507	Speaker Grill Cloth and cardboard baffle...

ISSUE 1247

MODELS 05FJB-6777B,
61-6777, Ford, 1949-1950



INSTALLATION

1. Remove two speed nuts securing radio opening cover plate to instrument panel.
2. Remove cover plate.
3. Place speaker and power pack unit over four threaded stud bolts located on the underside of the instrument panel. (Position power pack unit so that power cable is located on the left hand side.) See Fig. 1.
4. Secure power pack into position with four 8-32 nuts and washers supplied in kit of mounting hardware.
5. Remove knobs, cup washers and hex mounting nuts from tuning units. Do not remove escutcheon.
6. Place tuning unit behind instrument panel so that mounting bushings and shafts protrude through the front panel.
7. Attach tuning unit with a hex nut on each mounting bushing.

8. Replace cup washers, grommets and knobs over shafts.
9. Secure a supporting bracket (2 supplied in kit of hardware) to each side of the power pack unit by means of two No. 8 self-tapping screws. Use end of supporting bracket with round hole. If more convenient, these brackets may be attached before power pack unit is positioned in place.
10. Swing supporting brackets so that slotted holes are in line with the holes on each side of the tuning unit.
11. Secure to tuning unit with two No. 8 self-tapping screws.
12. Insert power cable plug into socket on rear of tuning unit.
13. Plug antenna cable into tuning unit.
14. Secure power cable under cable clamp and tighten clamp screw.
15. Connect "A" lead to accessory terminal marked RAD. GA, on the ignition switch.

ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver. (See detail assembly drawing Fig. 1).

- 2 $\frac{1}{8}$ -28 hex nuts
- 2 Cup washers
- 2 Grommets
- 2 Knobs
- 1 Cable clamp

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 2 Supporting brackets
- 4 No. 8 self-tapping screws
- 4 8-32 nuts
- 4 No. 8 washers

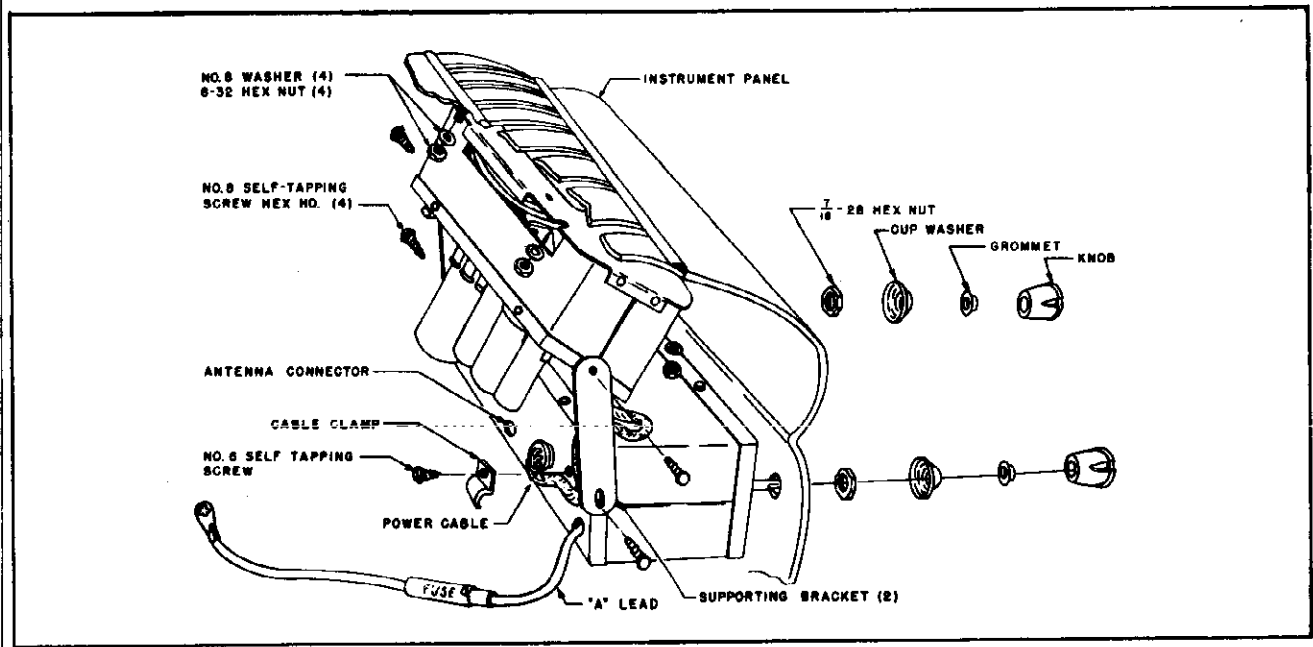
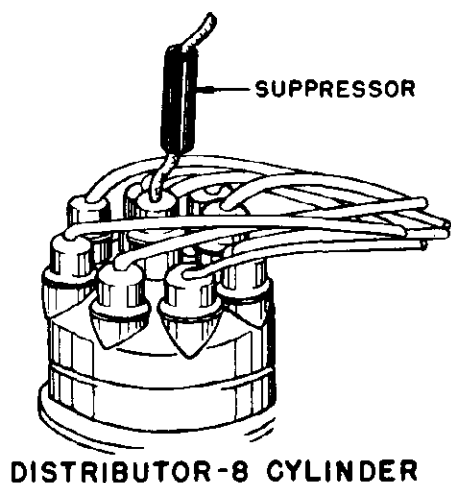


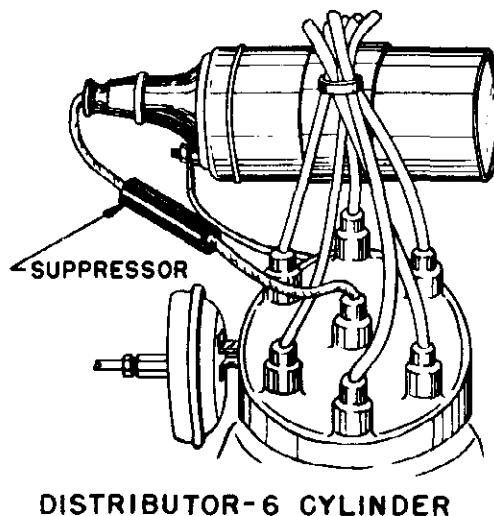
FIG. 1 DETAIL MOUNTING ASSEMBLY

MODELS 05FJB-6777B,
61-6777, Ford, 1949-1950

MOTOR NOISE ELIMINATION



DISTRIBUTOR-8 CYLINDER



DISTRIBUTOR-6 CYLINDER

FIG. 2 DISTRIBUTOR SUPPRESSOR

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser
- 1 Distributor suppressor

DISTRIBUTOR SUPPRESSOR

Disconnect high tension wire that runs from the ignition coil to the center hole of the distributor head. Cut lead one and one-half inches back from metal tip end for 8 cylinder Ford or two and one-half inches back for 6 cylinder Ford. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead with attached suppressor, back into distributor head.

GENERATOR CONDENSER

Loosen the top assembly bolt from the rear end plate of the generator. DO NOT REMOVE. Mount .5MFD generator condenser under this bolt. Tighten bolt and connect condenser lead to the armature terminal of the generator.

The generator condenser and distributor suppressor should eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

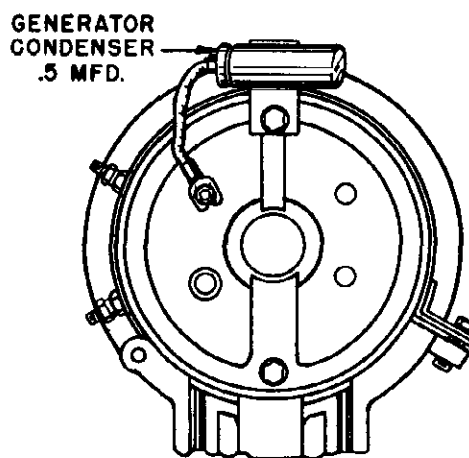


FIG. 3 GENERATOR CONDENSER

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

SERVICE DATA

ELECTRICAL SPECIFICATIONS

Power Supply	6.3 Volts DC
Current	5.5 Amp. average
Frequency Range	538-1600 KC
Speaker	5¼" PM 3.2 Ohm V.C.
Power Output	2 watts, undistorted 3 watts, maximum
Sensitivity	2-3 microvolts average for 1 watt output
Selectivity ..	40 KC broad at 1000 times signal, at 1000 KC

This receiver contains the following:

- 1 - 6BA6 - RF Amplifier
- 1 - 6BE6 - Converter
- 1 - 6BA6 - I. F. Amplifier
- 1 - 6AT6 - Detector - AVC - 1st Audio
- 1 - 6AQ5 - Power Output
- 1 - 6X4 - Rectifier

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart.

All voltages should be measured with an input voltage of 6.3 volts DC.

ALIGNMENT PROCEDURE

Volume control — Maximum all adjustments.
No signal applied to antenna.
Power input — 6.3 volts.
Connect dummy antenna in series with output lead of signal generator.
Connect ground lead of signal generator to chassis.
Repeat alignment procedure as a final check.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

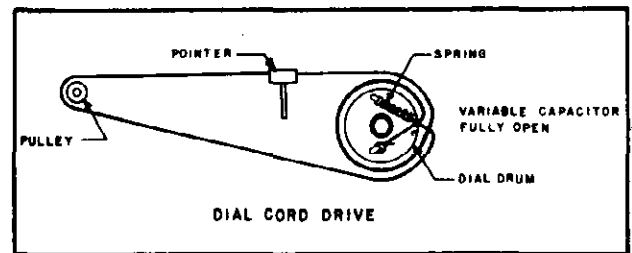


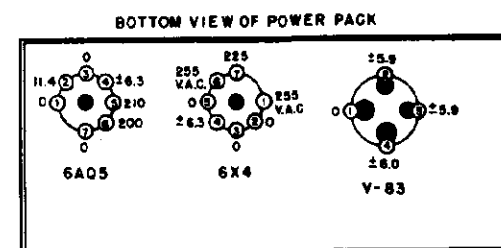
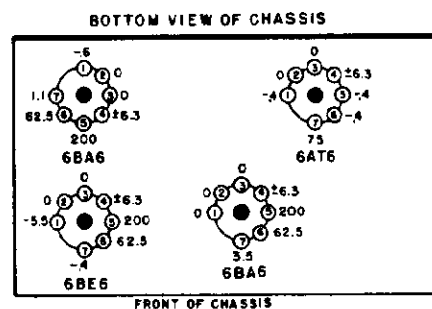
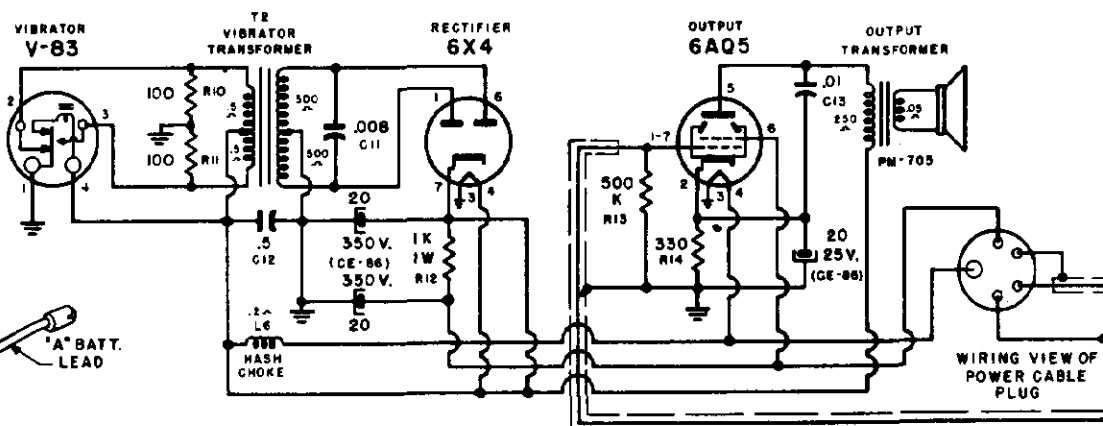
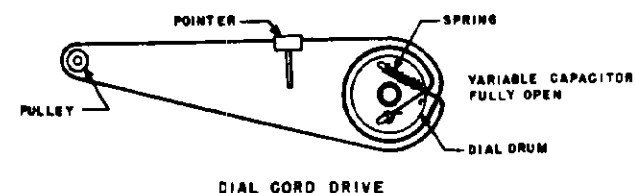
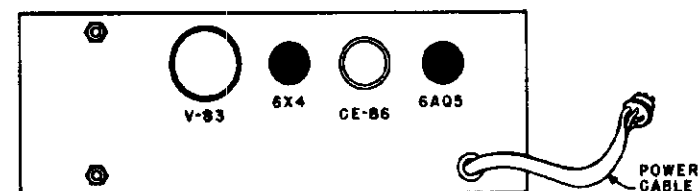
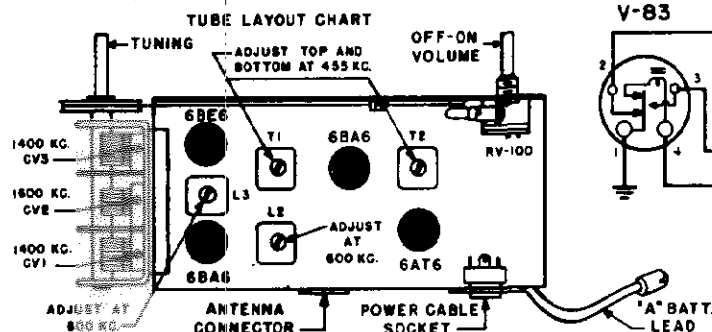
FIG. 4 DIAL CORD DRIVE

The following equipment is necessary for proper alignment:

- Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
- Non-metallic screwdriver.
- Output meter. (1.8 volt for 1 watt output.)
- Dummy antennas — .1 MFD., 100 MMFD.

For alignment points refer to Schematic Diagram.

DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANT.	GENERATOR CONNECTION	TRIMMER REFERENCE	TRIMMER ADJUSTMENT	TRIMMER FUNCTION
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						



SOCKET VOLTAGES CHART

REPLACEMENT PARTS LIST

SCHEMATIC DIAGRAM REF. NO.	PART NO.	DESCRIPTION
----------------------------------	----------	-------------

CONDENSERS

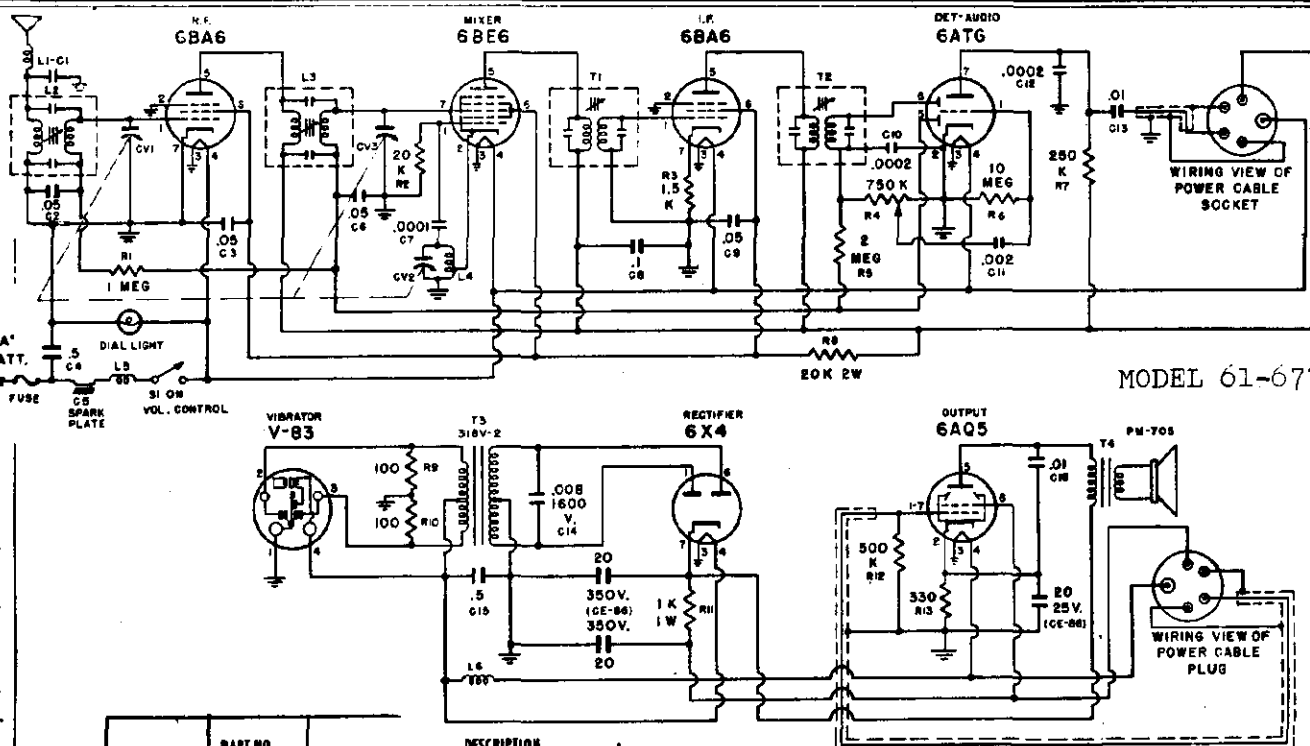
C2, C3, C5	C207	.05 MFD 200 volt condenser...
C4, C12	C209	.5 MFD 100 volt condenser...
C6	CC200	100 MMFD ceramic condenser...
C7, C9	CC201	200 MMFD ceramic condenser...
C8	C203	.002 MFD 400 volt condenser...
C10, C13	C206	.01 MFD 400 volt condenser... "A"
C11	C205	.008 MFD 1600 volt condenser...
		20 MFD 350 volt electrolytic condenser.....
CE-86	CE-86	20 MFD 350 volt electrolytic condenser.....
		20 MFD 25 volt electrolytic condenser.....
CV1-CV2- CV3	CV-100A	3 section variable.....

RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor...
R2, R14	R303	330 ohm 1/2 watt 20% resistor...
R3	R306	20K ohm 1/2 watt 20% resistor...
R4	R314	1.5K ohm 1/2 watt 20% resistor...
R5	RV-100	Volume control 3/4 megohm with switch.....
R6	R310	2 megohm 1/2 watt 20% resistor...
R7	R311	10 megohm 1/2 watt 20% resistor...
R8	R313	20K ohm 2 watt 20% resistor...
R9	R307	250K ohm 1/2 watt 20% resistor...
R10, R11	R301	100 ohm 1/2 watt 20% resistor...
R12	R312	1K ohm 1 watt 20% resistor.....
R13	R308	500K ohm 1/2 watt 20% resistor...

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit....
L2	15053 or 57FB-3	Antenna coil.....
L3	15054 or 57FB-4	R.F. coil.....
L4	L201	R. F. oscillator coil.....
L5	L203	Choke "A" line.....
L6	L202	Choke, vibrator hash.....



MODEL 61-6777

PART NO.	DESCRIPTION
T2	14977 or 1655-16 2nd IF transformer.....
T1	14977 or 1655-16 1st IF transformer.....
T3	TV-100 or 318V-2 Vibrator transformer.....
T4	Output transformer (Part of speaker not furnished separately)....

DIAL PARTS

D100	Dial Scale Escutcheon, Plastic.....
PS100	Dial Pointer.....
T47	Pilot Light.....
H114	Pilot Light Socket.....
H203	Pulley, Idler.....
H204	Spring, Dial drive String Tension.....
H115	String, dial drive.....

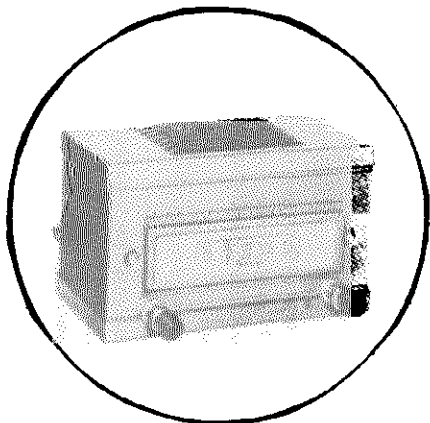
MISCELLANEOUS

A300	"A" lead assembly.....
H301	Case, less covers for Power Supply Unit..

H100	Case, complete with covers for R.F. tuning unit.....
H207	Clip, Anti-rattle.....
H208	Clip, coil mounting.....
H102	Cover, power supply unit mounting (with speaker louvers).....
A201	Fuse 15 Amp.....
504PC-300	Power Cable Assembly (complete with plug).....
H212	Receptacle, Antenna cable.....
504-FC	Socket, power cable.....
PM-705	Speaker, 5 1/4" PM (includes output trans- former).....
V-83	Vibrator.....
H310	Knob.....
H311	Cup washer.....
H113	7/16-28 Hex nut.....
C100	.5 MFD generator condenser.....
R100	Distributor suppressor.....

MODELS 05FJB-6777B,
61-6777, Ford, 1949-1950

MODEL 05FJB-6778B,
Dodge, Plymouth,
1949-1950



INSTALLATION

PLYMOUTH P18 SPECIAL DELUXE

1. Remove six screws securing Radio Grille in place and remove Radio Grille.
2. Remove dummy plates covering radio dial and control openings.
3. Remove knobs, cup washers, hex nuts and washers from control shafts and mounting bushings.
4. Secure two mounting brackets to Radio Grille with $\frac{3}{8}$ inch long 10-32 self-tapping screws, lockwashers, and cup washers as shown in detail assembly, Fig. 1.
5. Place radio controls cover plate over mounting bushings.
6. Position receiver behind Radio Grille so that mounting bushings and shafts protrude through the grille.

7. Attach receiver by replacing washers and hex nuts on mounting bushings.
8. Replace cup washers and knobs over shafts.
9. Secure receiver to mounting brackets with two No. 8 self-tapping thumb screws.
10. Insert radio with attached grille through front opening on instrument panel.
11. Replace grille mounting screws.
12. Connect battery lead to terminal marked "ACC" on ignition switch.
13. Plug antenna cable into receiver.

DODGE "CORONET"

Install in the same manner as outlined for the P18 Deluxe Plymouth except do not remove radio grille.

PLYMOUTH P17, P18 4-DOOR DELUXE AND

P18 CLUB COUPE DELUXE

DODGE "WAYFARER" AND "MEADOWBROOK"

These models are not equipped by the car manufacturers with a radio grille.

The following parts must be obtained from any authorized Plymouth or Dodge dealer before an installation can be made in any of these cars.

Plymouth P17, P18 4-Door DeLuxe, P18 Club Coupe DeLuxe
Radio Grill No. 1299913

Dodge "Meadowbrook" or "Wayfarer"
Radio Grill No. 1301360

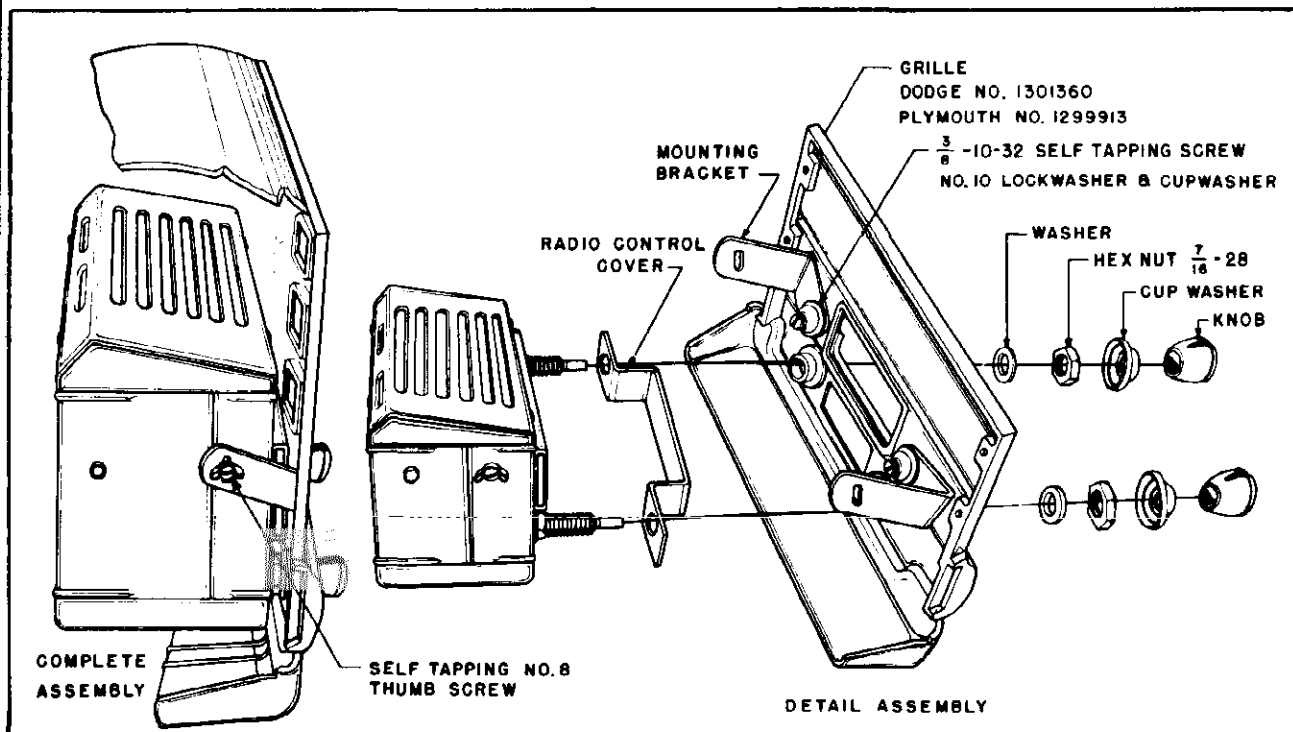


FIG. 1 RECEIVER MOUNTING DIAGRAM

MODELS 05FJB-6778B,
61-6778, Dodge,
Plymouth, 1949-1950

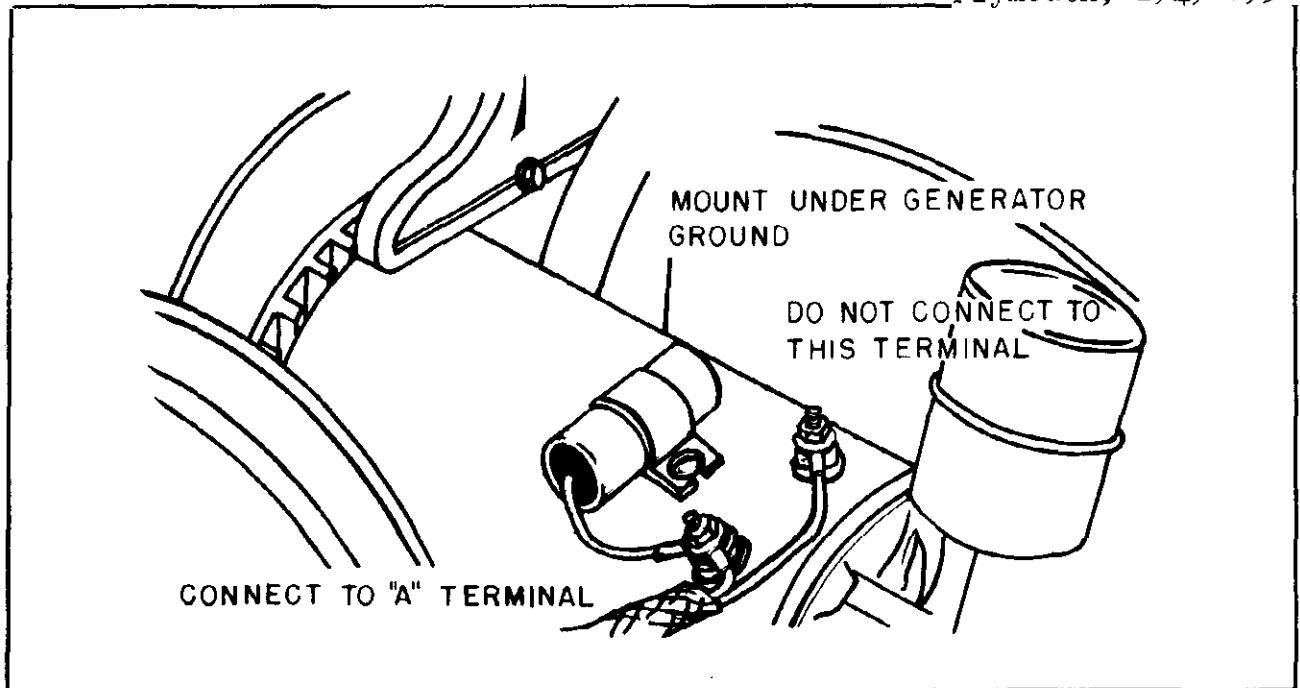


FIG. 2 GENERATOR CONDENSER

ACCESSORIES FURNISHED FOR INSTALLATION

Mounting Parts Kit

The following mounting hardware parts are shipped attached to the receiver. (See detail assembly drawing Fig. 1)

- 2 Washers
- 2 $\frac{1}{8}$ -28 hex nuts
- 2 Cup washers
- 2 Knobs
- 2 Mounting Brackets
- 2 No. 8 self-tapping thumb screws
- 1 Radio control cover

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

- 2 $\frac{3}{16}$ 10-32 self-tapping screws
- 2 Cup washers
- 2 No. 10 lockwashers

MOTOR NOISE ELIMINATION SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Distributor Suppressor
- 1 .5 MFD Generator Condenser

DISTRIBUTOR SUPPRESSOR

NOTE: 1950 Dodge and Plymouth automobiles do not require distributor suppressors.

1949 DODGE AND PLYMOUTH: Remove metal tip from the distributor center tower lead and screw lead into the suppressor. Plug suppressor with attached lead back into distributor head.

GENERATOR CONDENSER

The generator condenser and distributor suppressor should eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

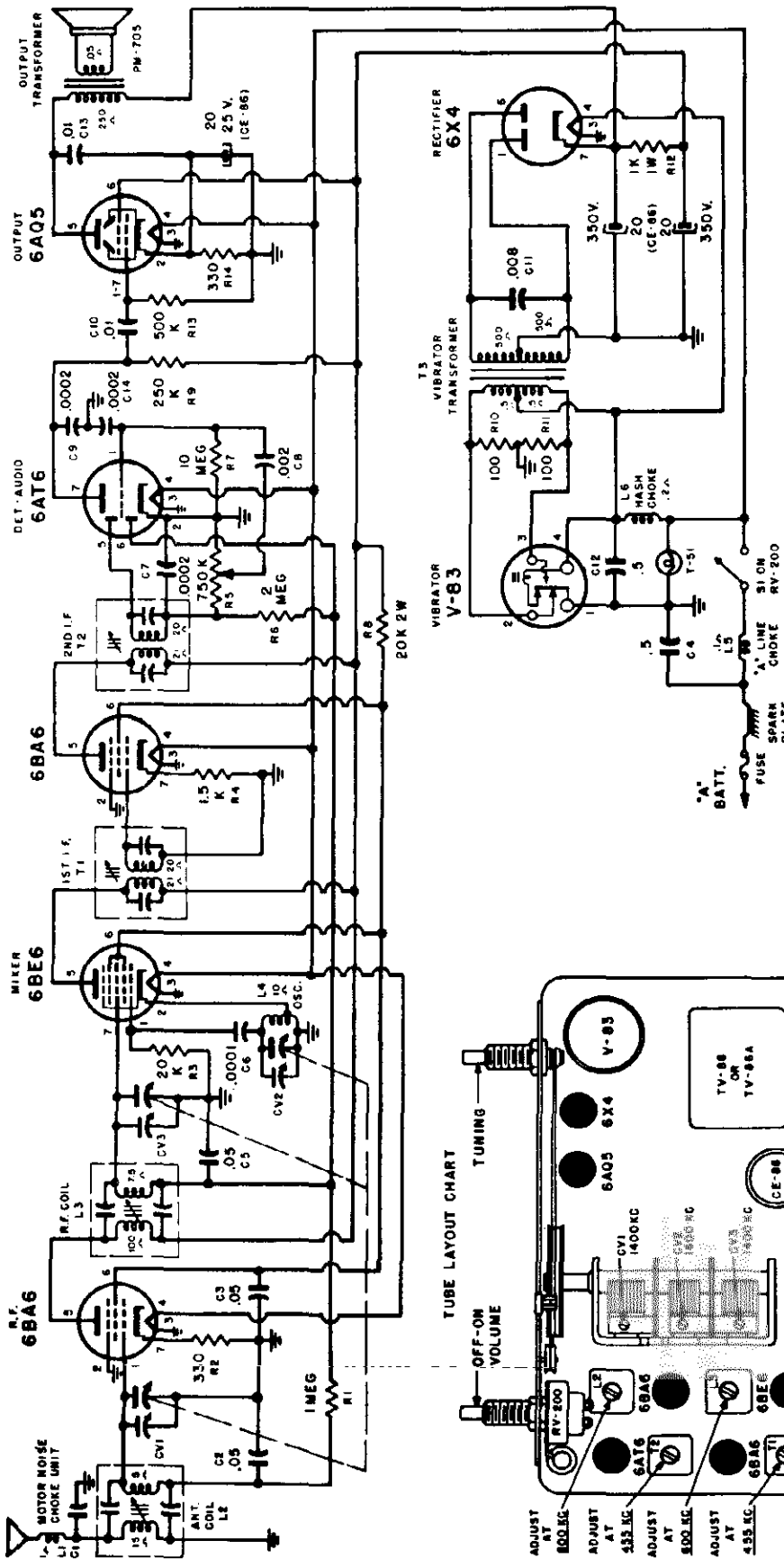
ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

Power Supply	6.3 Volts DC
Current	5.5 Amp. average
Frequency Range	538-1600 KC
Speaker	5" PM 3.2 Ohm V.C.
Power Output	2 watts, undistorted 3 watts, maximum
Sensitivity	2-3 microvolts average for 1 watt output
Selectivity ..	40 KC broad at 1000 times signal, at 1000 KC

DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANT.	GENERATOR CONNECTION	TRIMMER REFERENCE	TRIMMER ADJUSTMENT	TRIMMER FUNCTION
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						

MODELS 05FJB-6778B,
Dodge,
Plymouth, 1949-1950





PART NO.

DESCRIPTION

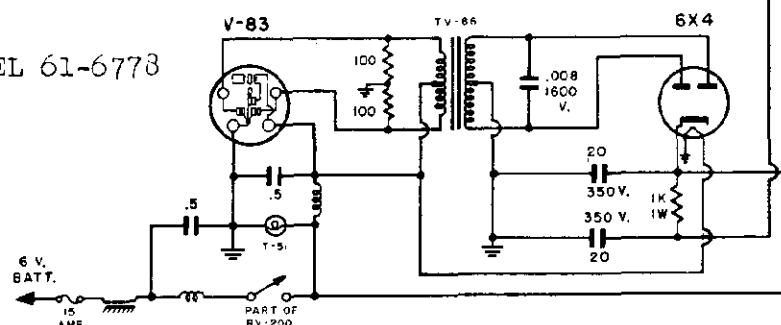
MODEL 61-6778

CONDENSERS

C2, C3, C4	C207	.05 MFD 200 volt condenser
C5	CC200	100 MMFD ceramic condenser . . .
C6, C13, C14	CC201	200 MMFD ceramic condenser . . .
C7	C203	.002 MFD 400 volt condenser
C8, C9	C206	.01 MFD 600 volt condenser
C10, C11	C209	.5 MFD 100 volt condenser
C12	C205	.008 MFD 1600 volt condenser . . .
		20 MFD 350 volt electrolytic condenser
CE-86	CE-86	20 MFD 350 volt electrolytic condenser
		20 MFD 25 volt electrolytic condenser
CV-200	CV-200	3 section variable tuning condenser

RESISTORS

R1	R309	1 megohm ½ watt 20% resistor . .
R2	R306	20K ohm ½ watt 20% resistor . . .
R3	R314	1.5K ohm ½ watt 20% resistor . . .
R4	R310	2 megohm ½ watt 20% resistor . .
R5	R311	10 megohm ½ watt 20% resistor .
R6	R307	250K ohm ½ watt 20% resistor . .
R7	R308	500K ohm ½ watt 20% resistor . .
R8, R13	R303	330 ohm ½ watt 20% resistor . . .
R9	R313	20K ohm 2 watt 20% resistor . . .
R10, R11	R301	100 ohm ½ watt 20% resistor . . .



R12	R312	1K ohm 1 watt 20% resistor.....
RV-200	RV-200	Volume control $\frac{3}{4}$ megohm with switch.....

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit.....
L2	57FB-3	Antenna Coil.....
L3	57FB-4	RF coil.....
L4	L201	RF Oscillator coil.....
L5	L202	Choke, vibrator hash.....
L6	L203	Choke, "A" line.....
T1	1655-16	1st IF transformer.....
T2	1655-16	2nd IF transformer.....
T3		Output transformer (Part of speaker not furnished separately)....
T4	TV-86 or TV-86A	Vibrator transformer.....

DIAL PARTS

D200	Dial Scale
PS200	Dial Pointer
DS200	Drive shaft assembly
H201	Grommet, rubber drive
T51	Pilot light
H202	Pilot light socket
H203	Pulley, idler
H204	Spring, Dial Drive String Tension
H205	String, Dial Drive

MISCELLANEOUS

A200	"A" lead assembly.....
H216	Bracket, mounting.....
H206	Case, (less covers).....
H207	Clip, antirattle.....
H208	Clip, coil mounting.....
H209	Cover, bottom case.....
H218	Cover, radio control.....
H210	Cover, top case (with speaker louvres) ..
H311	Cup washers, shaft.....
A201	Fuse, 15 amp.....
H211	Grommet, rubber, gang mounting.....
H310	Knob.....
H217	Nuts, mounting.....
H212	Receptacle, antenna cable.....
PM-250	Speaker, 5" PM includes output transformer
V-83 or V-94	Vibrator.....
H113	7/8—28 Hex nut.....
C100	.5 MFD Generator condenser.....
R100	Distributor suppressor.....

MODELS 05FJB-6779B,
61-6779, Chevrolet,
1949-1950

INSTALLATION

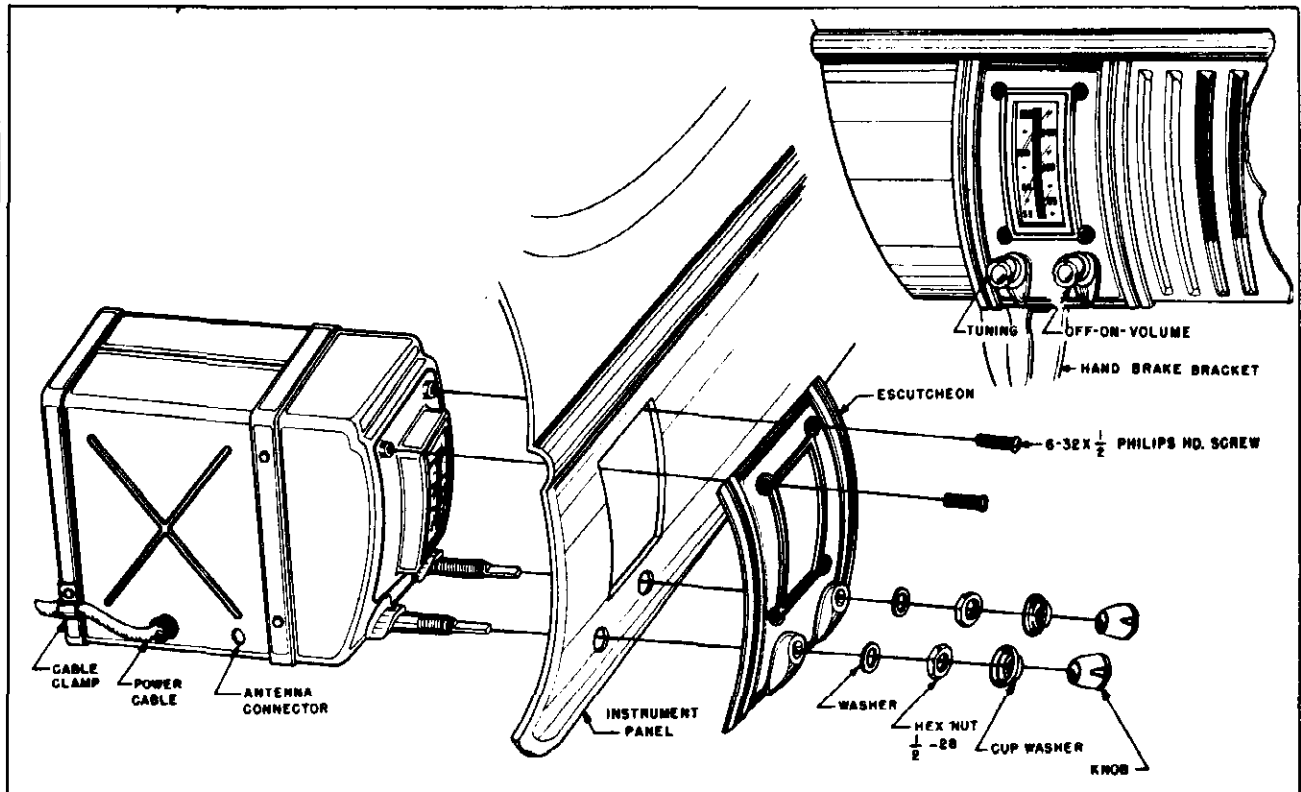


FIG. 1 R.F. TUNING UNIT DETAIL MOUNTING ASSEMBLY

R. F. TUNING UNIT

1. Loosen nuts on the two moulding studs located behind the instrument panel cover plate.
2. Remove sheet metal screw from the lower edge of the instrument panel cover plate and the two screws and washers attaching the hand brake to the instrument panel. Keep these parts.
3. Remove instrument panel cover plate and discard.
4. Tighten nuts on the two moulding studs located behind the instrument panel cover plate.
5. Drop vent controls by removing screws, lockwashers, and flat washers securing these controls to the instrument panel. This will facilitate installation of both receiver units. Save parts removed.
6. Install R.F. Tuning Unit behind instrument panel so that mounting bushings and tuning shafts protrude through the instrument panel.
7. Slide plastic escutcheon over mounting bushings and secure with flat washers, nuts, cup washers, and knobs as shown in Fig. 1.
8. Secure top part of plastic escutcheon to R.F. Tuning Unit with two No. 6-32 x 1/2" long Philips Head screws.

POWER SUPPLY UNIT

1. Insert a thin blade screwdriver or a flat strip of metal through the Radio Grille and slit fiberboard Radio Grille

screen. Reach in back of Radio Grille and remove screen by grasping slit edge. Discard fiberboard screen.

2. Remove 10-32 nuts and washers from the moulding studs behind the Radio Grille.
3. Remove 10-32 nuts, screws, and washers securing the lower tabs of the Radio Grille to the instrument panel.
4. Install Power Supply Unit behind Radio Grille and position into place so that holes in top of unit slide over moulding studs as shown in Fig. 2.

NOTE: It may be more convenient, in car models with air conditioner heaters, to remove the vibrator before installing this unit. The vibrator can be replaced after the power unit is mounted.

5. Replace 10-32 nuts and washers on moulding studs.
6. Replace lower grille tab 10-32 mounting screws, nuts, and washers so that screws secure the lower grille tabs and Power Supply Unit to the instrument panel.
7. Connect cable from Power Supply Unit to R.F. Tuning Unit.
8. Secure Power Supply Cable under clamp on R.F. Tuning Unit.
9. Replace vent controls.
10. Replace screws and washers securing hand brake. Connect battery lead to terminal on Ignition Switch. Plug Antenna cable into receiver.

MODELS 05FJB-6779B,
61-6779, Chevrolet,
1949-1950

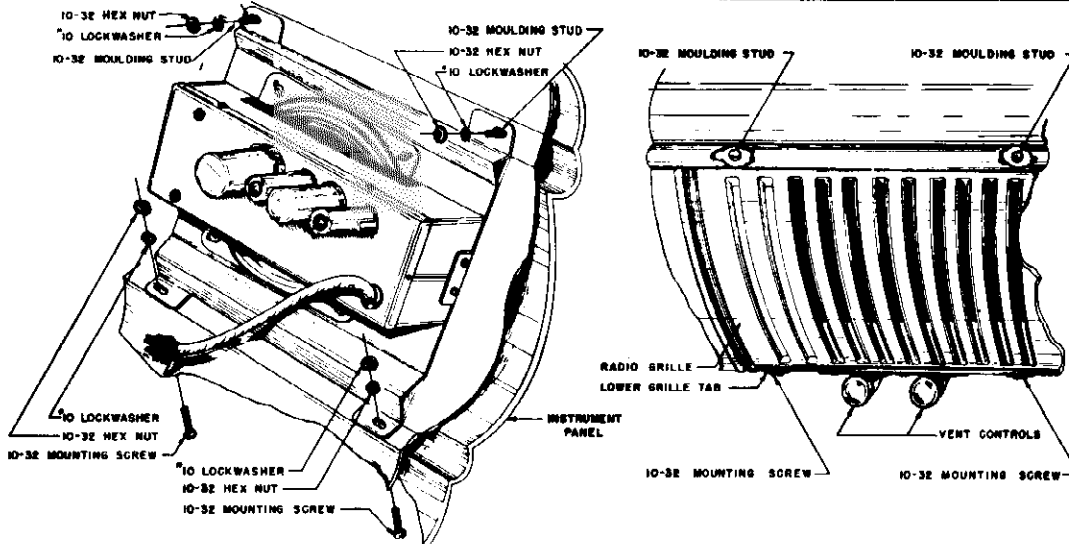


FIG. 2 POWER SUPPLY UNIT DETAIL MOUNTING ASSEMBLY

MOTOR NOISE ELIMINATION SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Distributor Suppressor. 1 Generator Condenser.

DISTRIBUTOR SUPPRESSOR

Disconnect the center lead in the distributor head of the motor. Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

GENERATOR CONDENSER

The generator condenser and distributor suppressor will normally eliminate all objectionable motor noise. If the motor noise persists, a .5 MFD by-pass condenser may be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

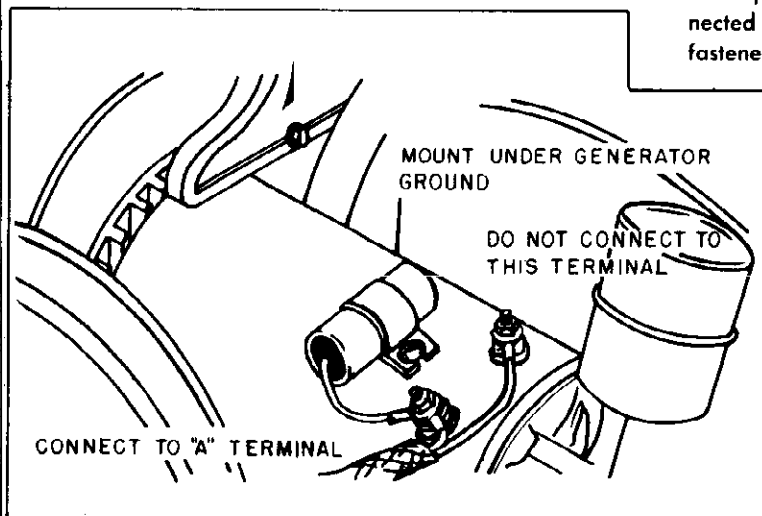
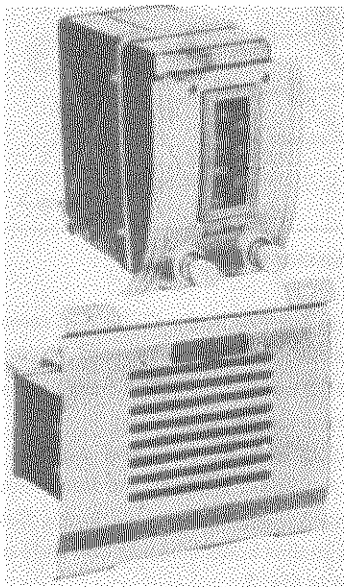


FIG. 3 GENERATOR CONDENSER

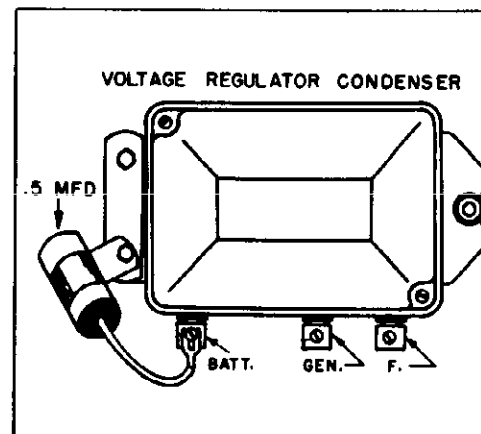


FIG. 4 VOLTAGE REGULATOR CONDENSER

MODELS 05FJB-6779B,
61-6779, Chevrolet,
1949-1950

VOLTAGE REGULATOR

Voltage Regulator contacts may cause interference in some cases. Connect a .5 MFD by-pass condenser from ground to the "BATT" terminal on the voltage regulator to eliminate this source of interference.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference

is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

SERVICE DATA

ELECTRICAL SPECIFICATIONS

Power Supply 6.3 Volts DC
Current 5.5 Amp. average
Frequency Range 538-1600 KC
Speaker 5 1/4" PM 3.2 Ohm V.C.
Power Output 2 watts, undistorted 3 watts, maximum
Sensitivity 2-3 microvolts average for 1 watt output
Selectivity 40 KC broad at 1000 times signal, at 1000 KC
This receiver contains the following:
1 - 6BA6 - RF Amplifier 1 - 6AT6 - Detector - AVC - 1st Audio
1 - 6BE6 - Converter 1 - 6AQ5 - Power Output
1 - 6BA6 - I. F. Amplifier 1 - 6X4 - Rectifier

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt.

ALIGNMENT PROCEDURE

Volume control - Maximum all adjustments.
No signal applied to antenna.
Power input - 6.3 volts.
Connect dummy antenna in series with output lead of signal generator.
Connect ground lead of signal generator to chassis.
Repeat alignment procedure as a final check.

These voltages are clearly shown on the voltage chart.
All voltages should be measured with an input voltage of 6.3 volts DC.
To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

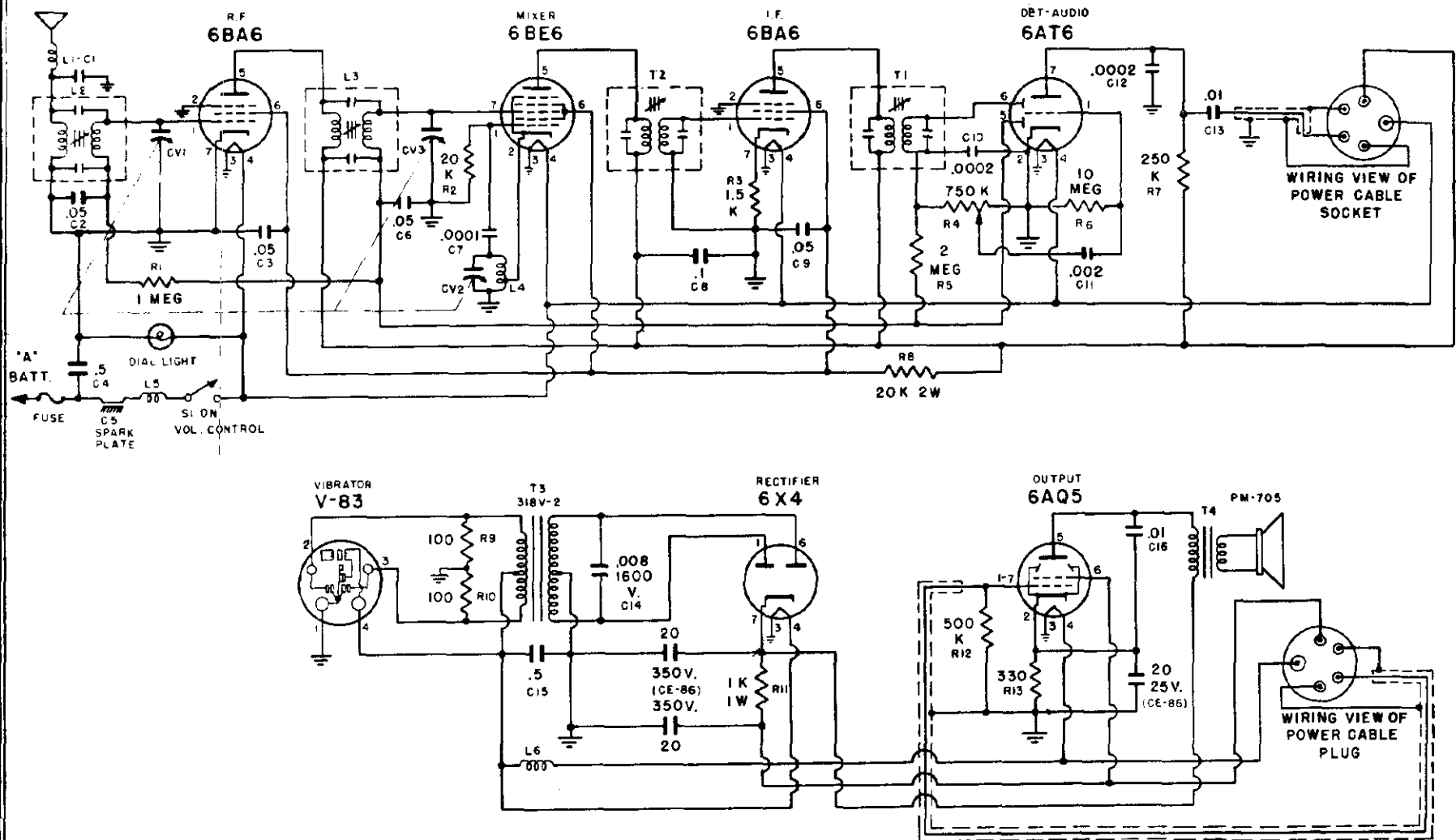
Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure." After realignment has been completed repeat the procedure as final check.

The following equipment is necessary for proper alignment:
Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.
Non-metallic screwdriver.
Output meter. (1.8 volt for 1 watt output.)
Dummy antennas - .1 MFD., 100 MMFD.
For alignment points refer to Schematic Diagram.

DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANT.	GENERATOR CONNECTION	TRIMMER REFERENCE	TRIMMER ADJUSTMENT	TRIMMER FUNCTION
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						





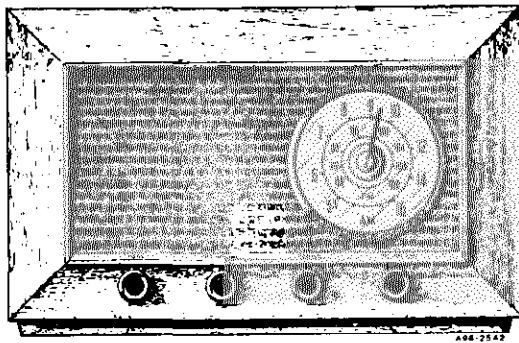
MODEL 61-6779,
Chevrolet, 1949-1950

MODELS 05FJB-6779B,
61-6779, Chevrolet,
1949-1950

REPLACEMENT PARTS LIST

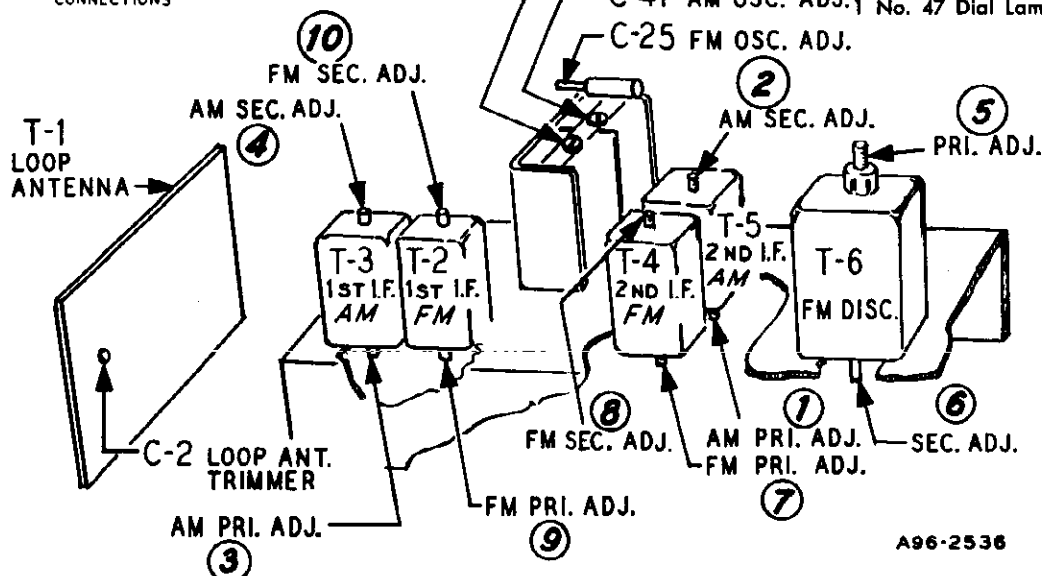
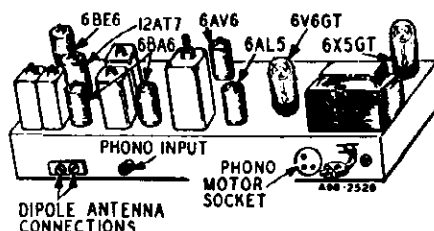
SCHEMATIC DIAGRAM REFERENCE	PART NO.	DESCRIPTION
CONDENSERS		
C2, C3, C5	C207	.05 MFD 200 Volt Condenser....
C4, C12	C209	.5 MFD 100 Volt Condenser.....
C6	CC200	100 MMFD Ceramic Condenser..
C7, C9, C14	CC201	200 MMFD Ceramic Condenser..
C8	C203	.002 MFD 400 Volt Condenser...
C10, C13	C206	.01 MFD 600 Volt Condenser....
C11	C205	.008 MFD 1600 Volt Condenser..
		20 MFD 350 Volt Electrolytic Condenser.....
CE-86	CE-86	20 MFD 350 Volt Electrolytic Condenser.....
		20 MFD 25 Volt Electrolytic Condenser.....
CV1-CV2- CV3	CV-300	3 Section Variable Tuning.....
RESISTORS		
R1	R309	1 megohm ½ Watt 20% Resistor..
R2, R14	R303	330 Ohm ½ Watt 20% Resistor..
R3	R306	20K Ohm ½ Watt 20% Resistor..
R4	R314	1.5K Ohm ½ Watt 20% Resistor..
R5	RV300	Volume Control ¼ megohm with switch.....
R6	R310	2 megohm ½ Watt 20% Resistor..
R7	R311	10 megohm ½ Watt 20% Resistor..
R8	R313	20K Ohm 2 Watt 20% Resistor...
R9	R307	250K Ohm ½ Watt 20% Resistor..
R10, R11	R301	100 Ohm ½ Watt 20% Resistor..
R12	R312	1K Ohm 1 Watt 20% Resistor....
R13	R308	500K Ohm ½ Watt 20% Resistor..
COILS AND TRANSFORMERS		
L1-C1	L200	Motor noise elimination unit....
L2	15053 or 57FB-3	Antenna coil.....
L3	15054 or 57FB-4	R.F. coil.....
L4	L201	R.F. oscillator coil.....
L5	L203	Choke, "A" line.....
L6	L202	Choke, vibrator hash.....

SCHEMATIC DIAGRAM REFERENCE	PART NO.	DESCRIPTION
T1	14977 or 1655-16	1st IF transformer.....
T2	14977 or 1655-16	2nd IF transformer.....
T3	TV-100	Vibrator transformer.....
T4		Output transformer (Part of speak- er not furnished separately)
DIAL PARTS		
	D300	Dial scale.....
	PS300	Dial Pointer.....
	DS300	Drive Shaft Assembly.....
	H201	Grommet, rubber drive.....
	T51	Pilot Light.....
	H214	Pilot Light Socket.....
	H203	Pulley, idler.....
	H204	Spring, Dial drive String Tension.....
	H215	String, dial drive.....
MISCELLANEOUS		
	A300	"A" lead assembly.....
	H301	Case, less covers for Power Supply Unit..
	H300	Case, complete with covers for R.F. tuning unit.....
	H207	Clip, Anti-rattle.....
	H208	Clip, coil mounting.....
	H302	Cover, power supply unit mounting (with speaker louvres).....
	A201	Fuse, 15 Amp.....
	504PC-300	Power Cable Assembly (complete with plug).....
	H212	Receptacle, Antenna cable.....
	504-FC	Socket, power cable.....
	PM-705	Speaker, 5¼" PM (includes output trans- former).....
	V-83	Vibrator.....
	H310	Knob.....
	H311	Cup washer.....
	H312	Plastic Escutcheon.....
	H313	½ x 28 hex nut.....
	C100	.5 MFD Generator Condenser.....
	R100	Distributor Suppressor.....



GENERAL DESCRIPTION

This is a two band, seven tube (plus rectifier tube) AM and FM receiver. Controls are provided at the front of the cabinet for tuning, volume, tone and band or phono selection. Phono input and phono motor sockets are provided at the rear of the receiver to which a record player may be connected. The I-F stages use high gain miniature type tubes. Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.



A96-2536

ELECTRICAL SPECIFICATIONS

Power Supply..... 105-125 volts AC 50-60 cycles, 40 watts.

Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC

Intermediate Frequency.. AM—455KC
FM—10.7 MC

Selectivity..... AM—45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times down
I.F. FM—950 KC broad at 200 times down

AM Sensitivity..... (For .5 watt output with external antenna) 50 microvolts average

FM Sensitivity..... (For .5 watt output) 25 microvolts average

Power Output..... 1.9 watts maximum
.8 watts 10% distortion

Loud Speaker..... 6" PM Dynamic

Voice Coil Impedance..... 3.2 ohms 400 cycles

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 1 No. 47 Dial Lamp

MODEL 94WG-1811A

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
— .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Del.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Clip	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR				BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA				
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	Maximum Deflection

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect hank antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.

Note output voltage on the zero center DC vacuum tube voltmeter

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



MODEL 94WG-1811A

REPLACEMENT PARTS INFORMATION

Ref. No.	Part No.	Description	Qty. Used in Set	Ref. No.	Part No.	Description	Qty. Used in Set
CAPACITORS				RESISTORS			
C-1	14A210	Gang Condenser Assembly	1	R-1	B85470	47 Ohms 0.5 Watts Carbon	1
C-2	17A256	2-24 mmf Trimmer	1	R-2 } R-3 } R-6 }	B85102*	1000 0.5 Carbon	3
C-3	47X559	130 mmf Ceramic	1	R-4 } R-8 }	B84680	68 0.5 Carbon	2
C-4 } C-5 } C-9 } C-10 } C-11 } C-17 } C-27 } C-43 }	47X507	5000 mmf Ceramic	8	R-5 } R-12 } R-13 }	B84682	6800 0.5 Carbon	3
C-6 } C-7 }		Part of T-2 (1st I-F Trans. FM)		R-7 } R-25 }	B85473	47 K 0.5 Carbon	2
C-8		Part of T-3 (1st I-F Trans. AM)		R-9	B85222	2200 0.5 Carbon	1
C-12 } C-13 }		Part of T-5 (2nd I-F Trans. AM)		R-10	B85273	27 K 0.5 Carbon	1
C-14 } C-15 }		Part of T-4 (2nd I-F Trans. FM)		R-11	43X233	3.6 0.5 Wirewound	1
C-16A } C-16B }	47X112	50-50 mmf Dual Mica	1	R-14 } R-16 }	B85104	100 K 0.5 Carbon	2
C-18		Part of T-6 (Discriminator Trans.)		R-15	B85223	22 K 0.5 Carbon	1
C-19	47X492	2700 mmf Molded Mica	1	R-17	B84221	220 0.5 Carbon	1
C-20 } C-35 }	47X468	220 mmf Ceramic	2	R-18 } R-19 } R-24 } R-26 }	B85474	470 K 0.5 Carbon	4
C-21	45X361	5 mf 100 V Dry Electrolytic	1	R-20	B85153	15 K 0.5 Carbon	1
C-22 } C-42 }	47X557	2.2 mmf Ceramic	2	R-21	36X385	.5 meg. Volume Control & Switch	1
C-23	47X558	30 mmf Ceramic	1	R-23	40X296	3 meg. Tone Control	1
C-24	47X516	20 mmf Ceramic	1	R-27	B85106	10 meg. 0.5 Carbon	1
C-25	17A255	1-8 mmf Trimmer	1	R-28	D84821	820 2.0 Carbon	1
C-26	B66503	.05 mf 200 V Tubular	1	R-29	B85105	1 meg. 0.5 Carbon	1
C-28A } C-28B } C-28C }	45X360	20 mf 20 V 40 mf 150 V 40 mf 200 V Dry Electrolytic	1	R-30	B84271	270 0.5 Carbon	1
C-29	H66102	.001 mf 800 V Tubular	1	R-31	B85225	2.2 meg. 0.5 Carbon	1
C-30	47X470	330 mmf Molded Mica	1	TRANSFORMERS AND COILS			
C-31	47X508	500 mmf Ceramic	1	L-1	35A5	Insulated Choke	1
C-32A } C-32B }	76X4	100 mmf Dual Ceramic	1	L-2	9A2068	Parasitic Choke Assembly	1
C-33	B66403	.04 mf 200 V Tubular	1	L-3	35A9	Insulated Choke	1
C-34	D66502	.005 mf 400 V Tubular	1	L-4	35A8	Insulated Choke	1
C-36	B66402	.004 mf 200 V Tubular	1	T-1	9A2079	"B" Range Loop Antenna	1
C-37	D66104	.1 mf 400 V Tubular	1	T-2	9A2060	1st I-F Trans. (FM)	1
C-38	D66203	.02 mf 400 V Tubular	1	T-3	9A2062	1st I-F Trans. (AM)	1
C-39 } C-41 }		Part of C-1 (Gang Condenser)		T-4	9A2061	2nd I-F Trans. (FM)	1
C-40	47X471	68 mmf Ceramic	1	T-5	9A2063	2nd I-F Trans. (AM)	1
				T-6	9A2064	Discriminator Transformer	1
				T-7	9A2065	Oscillator Coil (AM)	1
				T-8	9A2067	Oscillator Coil (FM)	1
				T-9	51X144	Output Transformer	1
				T-11	53X291	Power Transformer	1
				T-12	9A2066	Antenna Coil (FM)	1

REPLACEMENT PARTS LIST (continued)

Ref. No.	Part No.	Description	Qty. Used in Set	Ref. No.	Part No.	Description	Qty. Used in Set
MISCELLANEOUS				DIAL AND DRIVE ASSEMBLY			
	12A498	6" P.M. Speaker	1	58X728	Dial Glass	1	
	3A303	Tube Socket—Octal (8 prong) Molded	2	15X253	Pointer	1	
	3A426	Tube Socket—Miniature	4	7A103	No. 47 Pilot Light Bulb	1	
	3A427	Tube Socket (12AT7)	1	7A226	Pilot Light Socket Assembly	1	
	3A443	Tube Socket (6BE6)	1	26X514	Drive Shaft	1	
	3A304	Phono Motor Socket	1	28X113	Drive Cord Tension Spring	1	
	3A305	Phono Socket—Single Pin Tip	1	10X74	Drive Cord Assembly	1	
	2A394	Band Change Switch	1	19X192	"C" Washer (Mtg. Drive Shaft)	2	
	13X546	Line Cord and Plug Assembly	1	28X292	Snap Button	4	
	10A750	Knob	4	6X66	Rubber Grommet (Mtg. Gang Condenser)	3	
	4X1071	Escutcheon	1	26X513	Pointer Shaft	1	
				28X206	Pointer Cord Tension Spring	1	
				25X1672	Pointer Bracket	1	
				10X73	Pointer Cord Assembly	1	

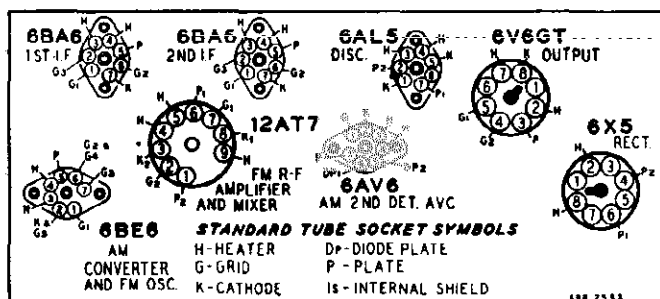
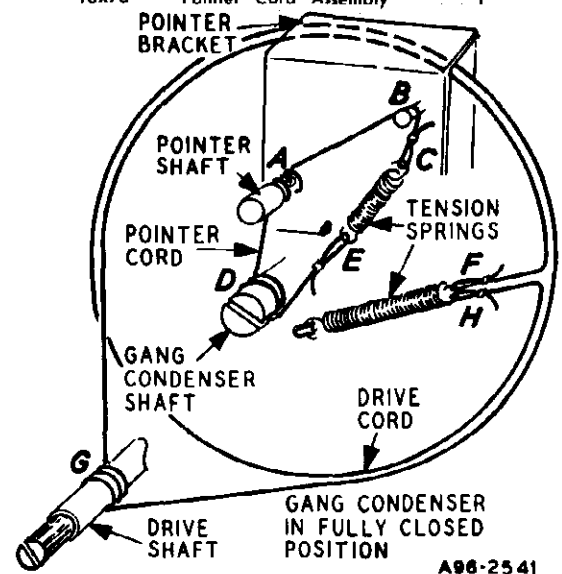
DRIVE CORD REPLACEMENTS

POINTER CORD

With the opening in the pointer shaft A in a horizontal position, insert looped end of cord through the opening and then one and one-half turns clockwise around pointer shaft A. Pass the cord around idler stud B and attach to tension spring at C. Then pass the remaining cord one turn counterclockwise and then down. Wind cord two complete turns counterclockwise around drive shaft D and then pass the cord through the slot and attach to tension spring at E.

DIAL CORD

Install the cord as shown in the illustration, winding three turns counterclockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



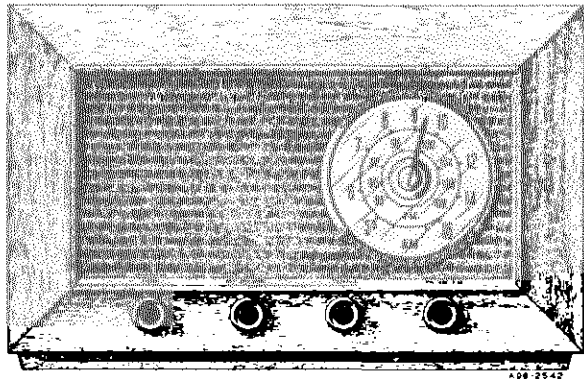
TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage.....117 Volts AC
Signal Input.....None

A variation of $\pm 10\%$ is usually permissible.

MODEL 05WG-1811B



ELECTRICAL SPECIFICATIONS

Power Supply..... 105-125 volts AC 50-60 cycles, 40 watts.

Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC

Intermediate Frequency... AM—455 KC
FM—10.7 MC

Selectivity..... AM—45 KC broad at 1000 times
signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times
down
I.F. FM—950 KC broad at 200
times down

AM Sensitivity..... (For .5 watt output with external
antenna) 25 microvolts average

FM Sensitivity..... (For .5 watt output)
25 microvolts average

Power Output..... 1.9 watts maximum
0.8 watts 10% distortion

Loud Speaker..... 6" PM Dynamic

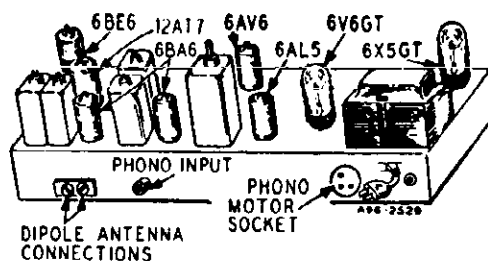
Voice Coil Impedance..... 3.2 ohms 400 cycles

GENERAL DESCRIPTION

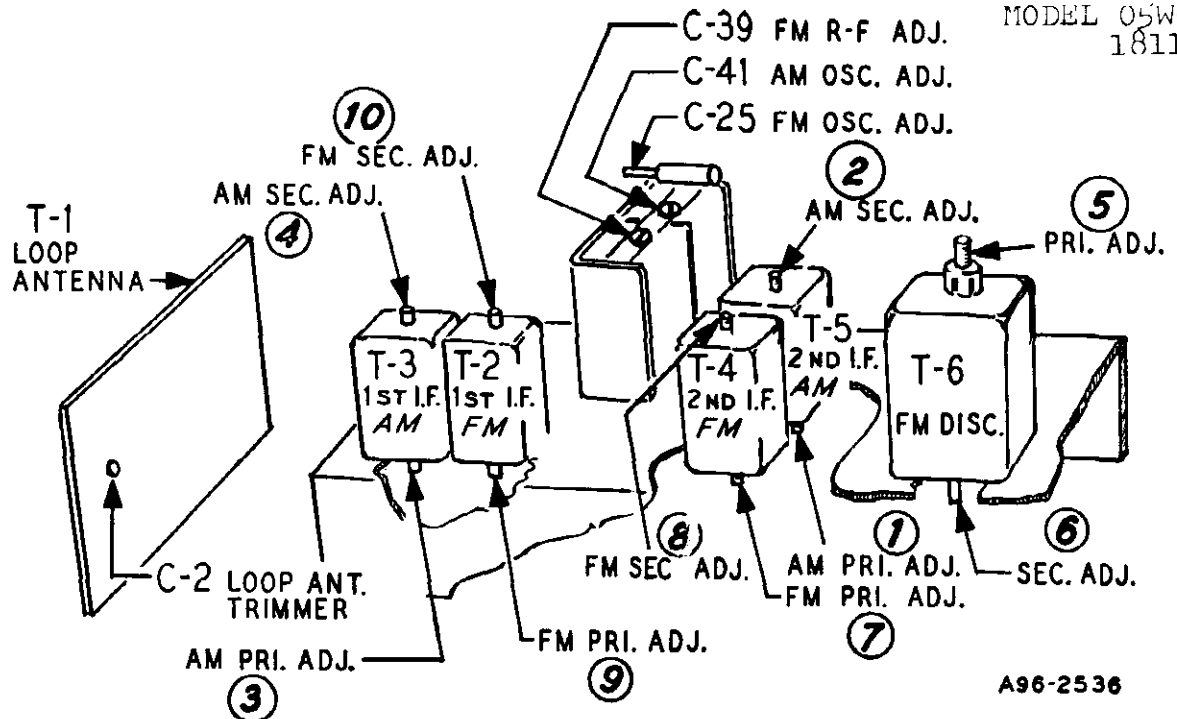
This is a two band, seven tube (plus rectifier tube) AM and FM receiver. Controls are provided at the front of the cabinet for tuning, volume, tone and band or phono selection. Phono input and phono motor sockets are provided at the rear of the receiver to which a record player may be connected. The I-F stages use high gain miniature type tubes. Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM
2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 1 No. 47 Dial Lamp



MODEL 05WG-1811B



DRIVE CORD REPLACEMENTS

POINTER CORD

Install the cord as shown in the illustration making sure that the center turn of the three turns rests in the groove of the brass pointer pulley.

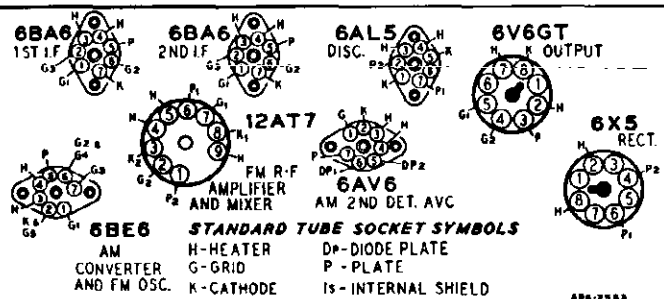
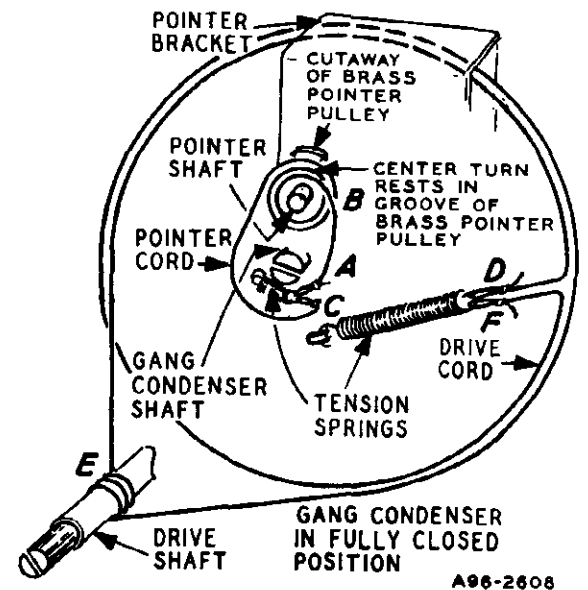
TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram of the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter.

Conditions of measurement are:

Line voltage 117 Volts AC
Signal Input None

A variation of $\pm 10\%$ is usually permissible.



DIAL CORD

Install the cord as shown in the illustration, winding three turns counterclockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

MODEL 05WG-1811B

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR						
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Terminal	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR							
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect hank antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

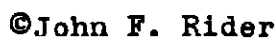
NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment. Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



REPLACEMENT PARTS INFORMATION

HOW TO ORDER PARTS—Should it be necessary to write us or to order any repair parts, it is important that the complete model number which appears on the label

attached to the rear of the chassis be specified.

Ref. No.	Part No.	Description	Qty. Used in Set		
CAPACITORS					
C-1	14A214	Gang Condenser Assembly	1		
C-2	17A256	2-24 mmf Trimmer	1		
C-3	47X559	130 mmf Ceramic	1		
C-4	47X507	5000 mmf Ceramic	8		
C-5					
C-9					
C-10					
C-11					
C-17					
C-27					
C-43					
C-6	47X507	5000 mmf Ceramic	8		
C-7					
C-8	Part of T-2 (1st I-F Trans. FM)				
C-12	Part of T-3 (1st I-F Trans. AM)				
C-13	Part of T-5 (2nd I-F Trans. AM)				
C-14	Part of T-4 (2nd I-F Trans. FM)				
C-15	Part of T-4 (2nd I-F Trans. FM)				
C-16A	47X112	50-50 mmf	Dual Mica	1	
C-16B					
C-18	Part of T-6 (Discriminator Trans.)				
C-19	47X492	2700 mmf	Molded Mica	1	
C-20	47X468	220 mmf	Ceramic	2	
C-35					
C-21	45X361	5 mf	100 V Dry Electrolytic	1	
C-22	47X557	2.2 mmf	Ceramic	2	
C-42					
C-23	47X558	30 mmf	Ceramic	1	
C-24	47X516	20 mmf	Ceramic	1	
C-25	17A255	1.8 mmf	Trimmer	1	
C-26	B66503	.05 mf	200 V Tubular	1	
C-28A	45X360	20 mf	20 V	Dry Electrolytic	1
C-28B		40 mf	150 V		
C-28C		40 mf	200 V		
C-29	H66102	.001 mf	800 V Tubular	1	
C-30	47X470	330 mmf	Molded Mica	1	
C-31	47X508	500 mmf	Ceramic	1	
C-32A	76X4	100 mmf	Dual Ceramic	1	
C-32B					

Ref. No.	Part No.	Description		Qty. Used in Set
C-33	B66403	.04 mf	200 V Tubular.....	1
C-34	D66502	.005 mf	400 V Tubular.....	1
C-36	B66402	.004 mf	200 V Tubular.....	1
C-37	D66104	.1 mf	400 V Tubular.....	1
C-38	D66203	.02 mf	400 V Tubular.....	1
C-39 } C-41 }	Part of C-1 (Gang Condenser)			
C-40	47X471	68 mmf	Ceramic.....	1
RESISTORS				
		Ohms	Watts	
R-1	B85470	47	0.5 Carbon.....	1
R-2 } R-3 } R-6 }	B85102	1000	0.5 Carbon.....	3
R-4 } R-8 }	B84680	68	0.5 Carbon.....	2
R-5 } R-12 } R-13 }	B84682	6800	0.5 Carbon.....	3
R-7 } R-25 }	B85473	47 K	0.5 Carbon.....	2
R-9	B85222	2200	0.5 Carbon.....	1
R-10	B85273	27 K	0.5 Carbon.....	1
R-11	43X233	3.6	0.5 Wirewound ...	1
R-14 } R-16 }	B85104	100 K	0.5 Carbon.....	2
R-15	B85223	22 K	0.5 Carbon.....	1
R-17	B84221	220	0.5 Carbon.....	1
R-18 } R-19 } R-24 } R-26 }	B85474	470 K	0.5 Carbon.....	4
R-20	B85153	15 K	0.5 Carbon.....	1
R-21	36X385	.5 meg. Volume	Control & Switch	1
R-23	40X296	3 meg.	Tone Control ...	1
R-27	B85106	10 meg.	0.5 Carbon.....	1
R-28	D84821	820	2.0 Carbon.....	1
R-29	B85105	1 meg.	0.5 Carbon.....	1
R-30	B84271	270	0.5 Carbon.....	1
R-31	B85225	2.2 meg.	0.5 Carbon.....	1
TRANSFORMERS AND COILS				
L-1	35A5	Insulated	Choke	1
L-2	9A2103	Parasitic	Choke Assembly	1
L-3	35A9	Insulated	Choke	1
L-4	35A8	Insulated	Choke	1

Ref. No.	Part No.	Description	Qty. Used in Set
T-1	9A2079	"B" Range Loop Antenna	1
T-2	9A2060	1st I-F Trans. (FM)	1
T-3	9A2062	1st I-F Trans. (AM)	1
T-4	9A2061	2nd I-F Trans. (FM)	1
T-5	9A2063	2nd I-F Trans. (AM)	1
T-6	9A2064	Discriminator Transformer	1
T-7	9A2065	Oscillator Coil (AM)	1
T-8	9A2067	Oscillator Coil (FM)	1
T-9	51X144	Output Transformer	1
T-11	53X291	Power Transformer	1
T-12	9A2066	Antenna Coil (FM)	1

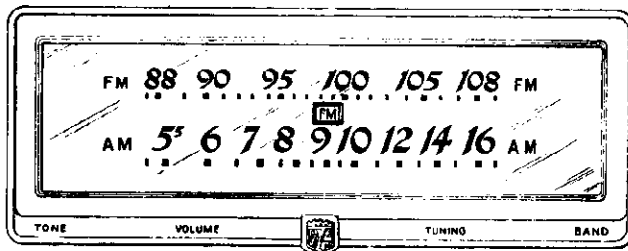
MISCELLANEOUS

12A498	6" P.M. Speaker	1
3A435	Tube Socket—Octal (8 prong) Molded	2
3A426	Tube Socket (1st 6BA6)	1
3A427	Tube Socket (6BE6)	1
3A443	Tube Socket (12AT7)	1
3A439	Tube Socket (Miniature)	3
3A304	Phono Motor Socket	1
3A305	Phono Socket—Single Pin Tip	1
2A394	Band Change Switch	1
13X546	Line Cord and Plug Assembly	1
4X1071	Escutcheon	1
10A757	Knob	4

DIAL AND DRIVE ASSEMBLY

58X728	Dial Glass	1
15X253	Painter	1
7A103	No. 47 Pilot Light Bulb	1
7A226	Pilot Light Socket Assembly	1
26X514	Drive Shaft	1
28X113	Drive Cord Tension Spring	1
10X74	Drive Cord Assembly	1
19X192	"C" Washer (Mtg. Drive Shaft)	2
28X292	Snap Button	4
6X66	Rubber Grommet (Mtg. Gang Condenser)	3
25A1079	Pointer Shaft & Pulley Assembly	1
28X524	Pointer Cord Tension Spring	1
25X1672	Pointer Bracket	1
10X76	Pointer Cord Assembly	1

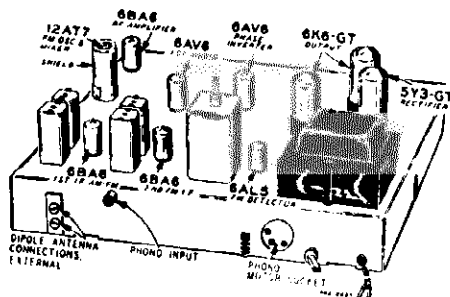
MODEL 05WG-2745B



GENERAL DESCRIPTION

This is a two band, nine tube (plus rectifier tube) AM and FM receiver with automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, compensator circuits to prevent oscillator drift, automatic volume control, push-pull pentode power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.



DRIVE CORD REPLACEMENT

Use a new 10X54 drive cord assembly or a new length of cord 48 inches long for the installation, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation, rotate the drive shaft a few turns to take up the slack in the cord.

ELECTRICAL SPECIFICATIONS

Power Supply 105-125 volts AC 60 cycles, 80 watts, 100 watts with record changer

Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC

Intermediate Frequency.. AM-455 KC
FM-10.7 MC

Selectivity AM-43 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM-200 KC broad at 2 times down
I.F. FM-760 KC broad at 200 times down

AM Sensitivity (For .5 watt output with external antenna)
10 microvolts average

FM Sensitivity (For .5 watt output)
30 microvolts average

Power Output 8.5 watts maximum
6.0 watts 10% distortion

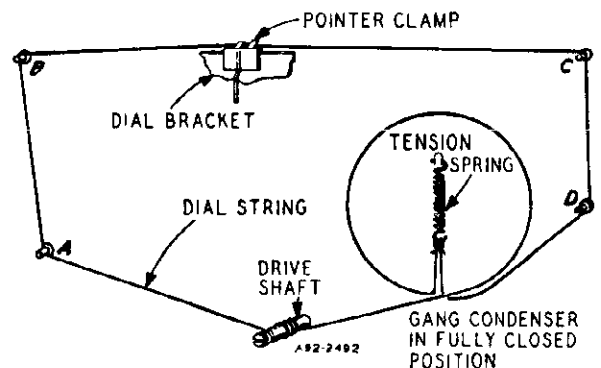
Loud Speaker 12" PM Dynamic

Voice Coil Impedance... 3.2 ohms 400 cycles

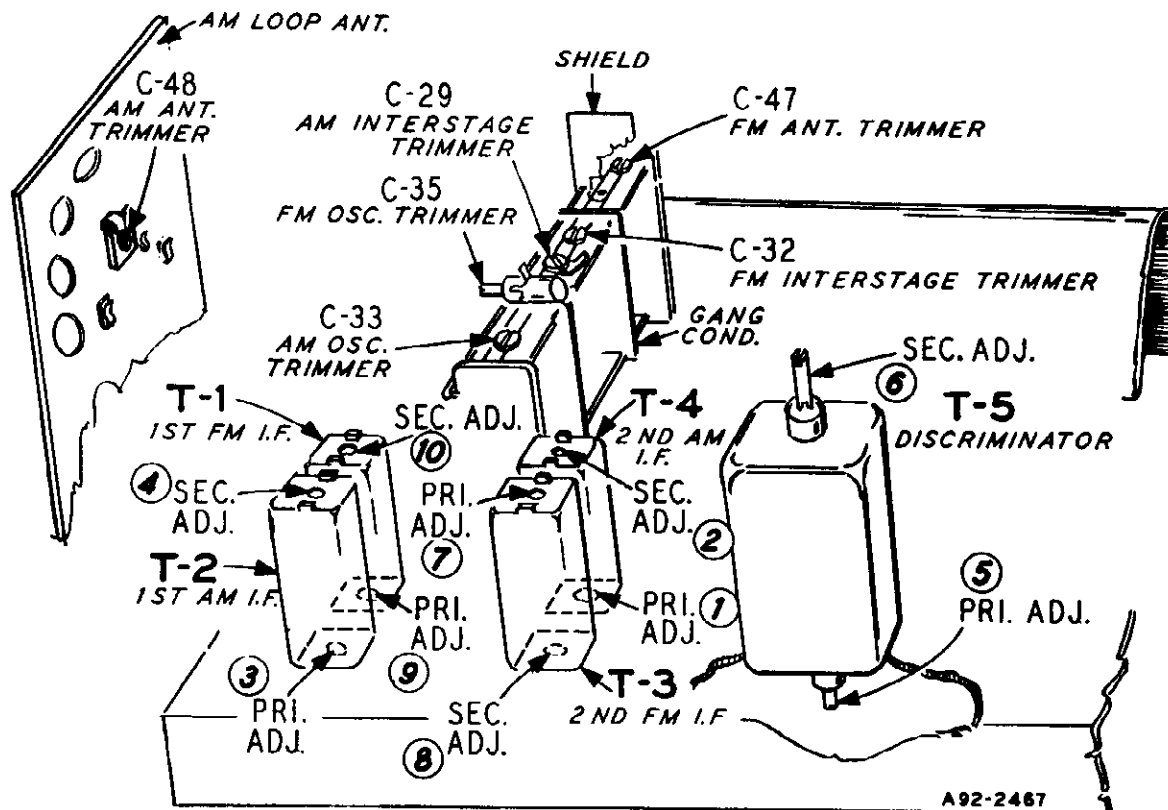
Record Changer See Manual No. 5096A

Tube and Dial Lamp Complement

- 1 6BA6 AM-FM R-F Amplifier
- 1 12AT7 FM & AM Osc. & Mixer
- 1 6BA6 FM-AM 1st I-F Amplifier
- 1 6BA6 FM 2nd I-F Amplifier
- 1 6AL5 FM Detector
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 2 6K6-GT Audio Output
- 1 5Y3-GT Rectifier
- 1 6AV6 Phase Inverter
- 2 No. 47 Dial Lamps



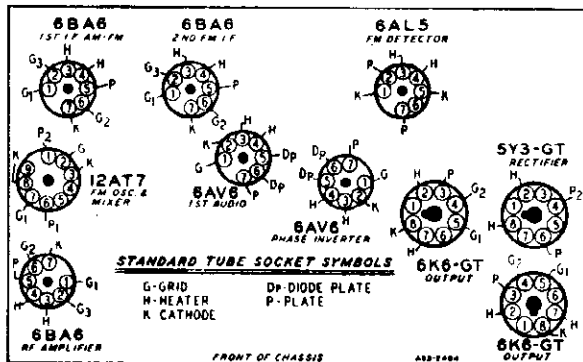
MODEL 05WG-2745B



TUBE SOCKET VOLTAGES

Socket voltages are shown on the Schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage 117 Volts AC
Signal Input None
A variation of $\pm 10\%$ is usually permissible.



ALIGNMENT PROCEDURE AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
—.1 mf, 200 mmf.

Volume Control—Maximum all Adjustments
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR		CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING						
I-F	455 kc	12AT7 Pin 7 and Chassis	.1 mf	Broadcast	Rotor Fully Open	2nd I-F Pri. & Sec. ① & ② 1st I-F Pri. & Sec. ③ & ④	Maximum Output
Broadcast	1620 kc	External ant. lead	200 mmf	Broadcast	Rotor Fully Open	Broadcast Oscillator C-33	
	1400 kc	External ant. lead	200 mmf	Broadcast	Turn Rotor to Max. Output Set pointer to	Broadcast Interstage C-29	
	1400 kc	External ant. lead	200 mmf	Broadcast	1400 kc See Note A	Loop Antenna C-48	

Note A—If the pointer is not at 1400 KC on dial, reset pointer at the 1400 KC mark on the dial scale.

MODEL 05WG-2745B

FM STAGES

The following equipment is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—.01 mf, 300 ohms and 1000 ohms.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings.)

Allow chassis and signal generator to warm up for several minutes.

	SIGNAL GENERATOR		THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC Note B	6BA6 2nd I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (6) Note C	Zero Center
I-F	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	2nd I-F Pri. Note A and D (7) 2nd I-F Sec. Note A and E (8)	Maximum Deflection
Discriminator	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC Note F	6BA6 1st I-F Pin 1 and Chassis	.01 mf	FM	Rotor Fully Open	Disc. Sec. (6) Note C	Zero Center
	10.7 MC Note F	FM-RF Gang Condenser terminal	.01 mf	FM	Rotor Fully Open	1st I-F Pri. (9) 1st I-F Sec. (10) Notes A, D & E	Maximum Deflection

Recheck I-F Adjustments in order given

R-F & Osc.	108.4 Note H	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Rotor Fully Open	Oscillator C-35 Note G	Maximum Deflection
	104.5	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Tune Rotor for Max. AVC voltage	FM Interstage C-32	Maximum Deflection
	104.5	Disconnect dipole and connect generator to dipole terminals with resistor in series	300 ohms	FM	Tune Rotor for Max. AVC voltage	Ant. C-47	Maximum Deflection

Recheck R-F and Osc. Adjustments in order given

NOTE A—Test Equipment connections are as given in the table. The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line at the junction of resistor R-22 and condenser C-18 for all adjustments except the discriminator secondary adjustment, for which See Note C.

NOTE B—A signal of .1 volt must be fed into the receiver for this adjustment.

NOTE C—Disconnect zero center DC vacuum tube voltmeter from AVC and connect to junction of R-18 and C-62. Adjust for zero voltage indication.

NOTE D—Before adjusting Pri. core connect 1000 ohm load resistor across the 2nd I-F. secondary terminals. Input may have to be increased to .1 volt if receiver is badly mis-aligned.

NOTE E—Disconnect 1000 ohm load resistor from secondary terminals and connect across the 2nd I-F. primary terminals. Input may have to be increased to .1 volt if receiver is badly mis-aligned.

NOTE F—Input can be reduced to 10,000 microvolts.

NOTE G—Oscillator frequency above signal frequency.

NOTE H—Remove the 1000 ohm load resistor before attempting to check the R-F and oscillator adjustments.

REPLACEMENT PARTS INFORMATION

HOW TO ORDER PARTS—Should it be necessary to write us or to order any repair parts, it is important that the complete model number which appears on the label attached to the rear of the chassis be specified.

REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Qty. Used in Set
C-48	Part of T-7 (Loop Antenna)		
C-50A	45X374	40 mf 450 V	Dry Electrolytic 1
C-50B		40 mf 450 V	
C-50C		40 mf 25 V	
C-52	F66103	.01 mf 600 V Tubular.....	1
C-53	47X468	220 mmf Ceramic.....	1
C-54	F66203	.02 mf 600 V Tubular.....	2
C-59			

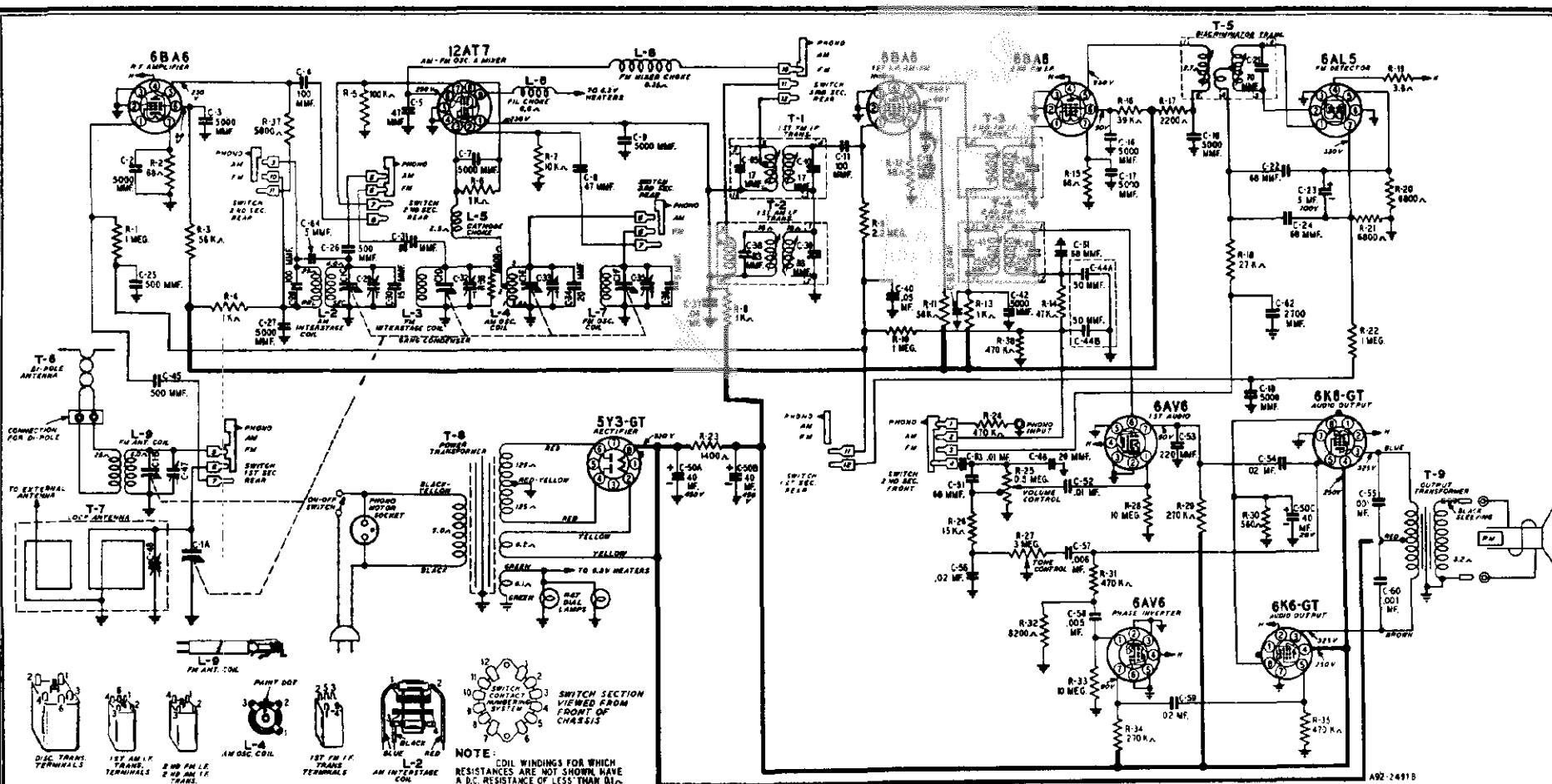
C-55	F66102	.001 mf 600 V Tubular.....	2
C-60			
C-56	B66203	.02 mf 200 V Tubular.....	1
C-57	F66602	.006 mf 600 V Tubular.....	1
C-58	B66502	.005 mf 200 V Tubular.....	1
C-61	47X471	68 mmf Ceramic.....	1
C-62	47X492	2700 mmf Molded Mica...	1
C-63	46X328	.01 mf 120 V Tubular.....	1

MODEL 05WG-2745B

Ref. No.	Part No.	Description	Qty. Used in Set
CAPACITORS			
C-1	14A207	Gang Condenser	1
C-2	47X507	5000 mmf	Ceramic.....11
C-3			
C-7			
C-9			
C-12			
C-16			
C-17			
C-18			
C-19			
C-27			
C-42			
C-4	47X497	100 mmf	Ceramic..... 1
C-5	47X499	47 mmf	Ceramic..... 1
C-8	47X498	47 mmf	Ceramic..... 1
C-10	Part of T-1 1st I-F (FM)		
C-65			
C-11	47X550	100 mmf	Ceramic..... 2
C-28			
C-15	Part of T-3 2nd I-F (FM)		
C-21	Part of T-5 Discriminator		
C-22	47X501	63 mmf	Ceramic..... 4
C-24			
C-31			
C-31			
C-31			
C-23	45X361	5 mf 100 V	Dry Electrolytic 1
C-25	47X496	500 mmf	Ceramic..... 3
C-26			
C-45			
C-29	Part of Gang Condenser		
C-32			
C-33			
C-47			
C-47			
C-30	47X552	15 mmf	Ceramic..... 1
C-34	47X516	20 mmf	Ceramic..... 2
C-46			
C-35	26A489	1.8 mmf	Trimmer..... 1
C-36	47X549	5 mmf	Ceramic..... 2
C-64			
C-37	F66403	.04 mf 600 V	Tubular..... 2
C-65			
C-38	Part of T-2 1st I-F (AM)		
C-39			
C-40	B66503	.05 mf 200 V	Tubular..... 1

Ref. No.	Part No.	Description	Qty. Used in Set
C-41 } C-43 }	Part of T-4 2nd I-F (AM)		
C-44A } C-44B }	47X112	50-50 mmf Dual Mica....	1
RESISTORS			
		Ohms Watts	
R-1 } R-10 } R-22 }	B85105	1 meg. 0.5 Carbon.....	3
R-2 } R-12 } R-15 }	B83680	68 0.5 Carbon.....	3
R-3 } R-11 }	B84563	56K 0.5 Carbon.....	2
R-4 } R-6 } R-8 } R-13 }	B84102	1000 0.5 Carbon.....	4
R-5	B85104	100K 0.5 Carbon.....	1
R-7	B84103	10K 0.5 Carbon.....	1
R-9	B85225	2.2 meg. 0.5 Carbon.....	1
R-14	B85473	47K 0.5 Carbon.....	1
R-16	C84393	39K 1.0 Carbon.....	1
R-17	B85222	2200 0.5 Carbon.....	1
R-18	B84273	27K 0.5 Carbon.....	1
R-19	43X233	3.6 0.5 Wire wound..	1
R-20 } R-21 }	B83682	6800 0.5 Carbon.....	2
R-23	43X242	1400 5.0 Wire wound..	1
R-24 } R-31 } R-35 } R-38 }	B85474	470K 0.5 Carbon.....	4
R-25	36X383	0.5 meg. Volume Control	1
R-26	B85153	15K 0.5 Carbon.....	1
R-27	40X285	3 meg. Tone Control..	1
R-28 } R-33 } R-29 } R-34 }	B85106	10 meg. 0.5 Carbon.....	2
	B85274	270K 0.5 Carbon.....	2
R-30	D83561	560 2.0 Carbon.....	1
R-32	B84822	8200 0.5 Carbon.....	1
R-36	B84682	6800 0.5 Carbon.....	1
R-37	B84562	5600 0.5 Carbon.....	1

Ref. No.	Part No.	Description	Qty. Used in Set
TRANSFORMERS AND COILS			
L-2	9A2025	Interstage Coil (AM)	1
L-3	9A2024	Interstage Coil (FM)	1
L-4	9A2022	Oscillator Coil (AM)	1
L-5	35A5	Insulated Choke	1
L-6	9A1881	Filament Choke	1
L-7	9A2023	Oscillator Coil (FM)	1
L-8	35A7	Mixer Choke (FM)	1
L-9	9A2027	Antenna Coil (FM)	1
T-1	9A2043	1st I-F Trans. (FM)	1
T-2	9A2029	1st I-F Trans. (AM)	1
T-3	9A2030	2nd I-F Trans. (FM)	1
T-4	9A2042	2nd I-F Trans. (AM)	1
T-5	9A1970	Discriminator Coil	1
T-6	9A2004	Dipole Antenna	1
T-7	9A2041	"B" Range Loop Antenna	1
T-8	53X286	Power Transformer	1
T-9	51X142	Output Transformer	1
DIAL AND DRIVE ASSEMBLY			
	58X723	Dial Glass	1
	25X1634	Dial Bracket	1
	41X87	Dial Light Reflector	2
MISCELLANEOUS			
	12A490	Speaker 12" P.M.	1
	3A304	Phono Motor Socket	1
	3A305	Phono Socket—Single Pin Tip ..	1
	3A435	Tube Socket—Octal (8 prong) Molded	3
	15X246	Pointer	1
	10X54	Drive Cord Assembly	1
	28X113	Drive Cord Spring	1
	7A103	No. 47 Pilot Light	2
	7A199	Pilot Light Socket Assembly	1
	19X192	"C" Washer (mtg. Drive Shaft) 2	
	26X512	Drive Shaft	1
	6X67	Rubber Grommet	4



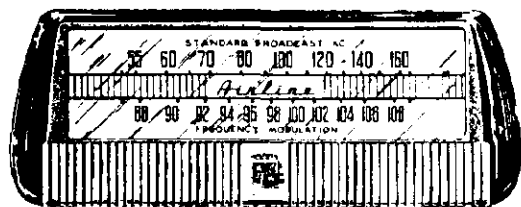
Part No.	Description	Qty. Used in Set
3A436	Tube Socket—Noval (miniature)	1
32X388	Tube Shield—Noval	1
32X390	Tube Shield (miniature)	1
3A439	Tube Socket (miniature)	6
2A391	Band Change Switch	1
13X546	Line Cord & Plug Assembly	1
10A713	Knobs	4
4X1049	Escutcheon	1

REPLACEMENT PARTS LIST (continued)

TYPE V-28A170 RECORD CHANGER PARTS

V-2727B	Motor Assembly, 60 Cycles	1
	105-125 Volts AC	1
Shure P-77V	Crystal Cartridge	1
	Needs, Microgroove (Red)	1
	Needs, Regular	1

(When ordering needles, specify part number and letter stamped on cartridge)



GENERAL DESCRIPTION

This is a two band, seven tube (plus rectifier tube) AM and FM receiver with automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.

ELECTRICAL SPECIFICATIONS

Power Supply.....	105-125 volts AC 60 cycles, 40 watts, 60 watts with record changer.
Frequency Ranges.....	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency.....	AM—455KC FM—10.7 MC
Selectivity.....	AM—45 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—950 KC broad at 200 times down
AM Sensitivity.....	(For .5 watt output with external antenna) 25 microvolts average

FM Sensitivity.....	(For .5 watt output) 25 microvolts average
Power Output.....	1.9 watts maximum .8 watts 10% distortion
Loud Speaker.....	8" PM Dynamic
Voice Coil Impedance.....	3.2 ohms 400 cycles
Record Changer.....	See Manual No. 5081A.

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps

TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter.

Conditions of measurement are:

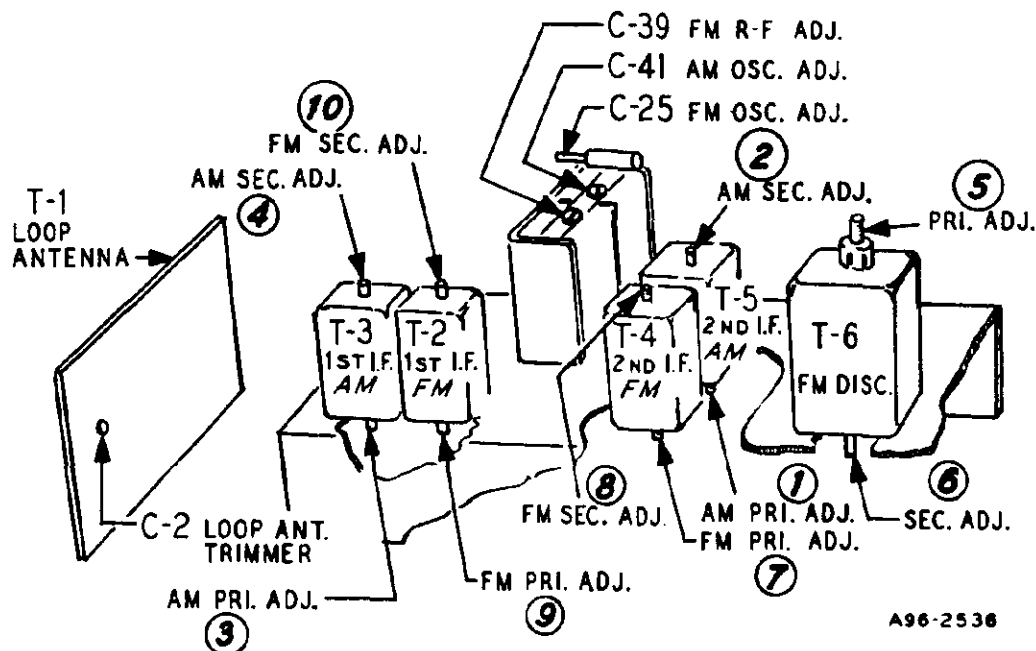
Line voltage.....	117 Volts AC
Signal Input.....	None

A variation of $\pm 10\%$ is usually permissible.

DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new 10X56 drive cord assembly or a new length of cord 46 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



A96-2538

ALIGNMENT PROCEDURES**AM STAGES**

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately
Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
— .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a
Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several
Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I-F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I-F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I-F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Lead	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodu-
lated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of
approximately 3 volts.

(If a zero center scale meter is not available, a standard scale
vacuum tube voltmeter may be used by reversing the meter connec-
tions for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR *			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	Maximum Deflection

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole an- tenna and connect generator to dipole terminals with re- sistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN**FM ALIGNMENT NOTES**

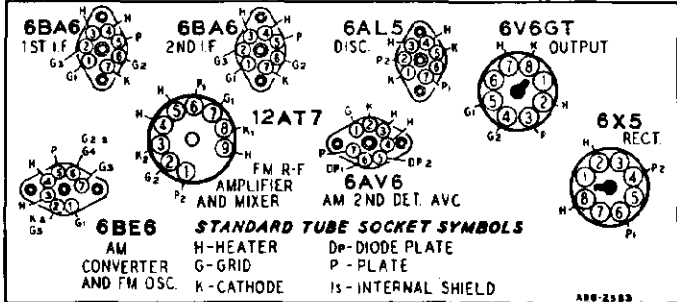
NOTE A—The zero center scale DC vacuum tube voltmeter is to be
connected between chassis ground and the AVC line.
A signal of .1 volt must be fed into the receiver for
this adjustment.
Note output voltage on the zero center DC vacuum
tube voltmeter

NOTE B—Disconnect zero center DC vacuum tube voltmeter from
AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal
strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align
the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note
A. Adjust input to give same output on the zero center DC
vacuum tube voltmeter as in Note A.



Ref. No.	Part No.	Description	Qty. Used in Set
----------	----------	-------------	------------------

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke	1
L-2	9A2068	Parasitic Choke Assembly	1
L-3	35A9	Insulated Choke	1
L-4	35A8	Insulated Choke	1
T-1	9A2099	"B" Range Loop Antenna	1
T-2	9A2060	1st I-F Trans. (FM)	1
T-3	9A2062	1st I-F Trans. (AM)	1
T-4	9A2061	2nd I-F Trans. (FM)	1
T-5	9A2063	2nd I-F Trans. (AM)	1
T-6	9A2064	Discriminator Transformer	1
T-7	9A2065	Oscillator Coil (AM)	1
T-8	9A2067	Oscillator Coil (FM)	1
T-9	51X134	Output Transformer	1
T-10	9A2002	Dipole Antenna	1
T-11	53X291	Power Transformer	1
T-12	9A2066	Antenna Coil (FM)	1

CAPACITORS

C-1	14A209	Gang Condenser Assembly	1
C-2	17A256	2-24 mmf Trimmer	1
C-3	47X559	130 mmf Ceramic	1
C-4			
C-5			
C-9			
C-10	47X507	5000 mmf Ceramic	8
C-11			
C-17			
C-27			
C-43			
C-6		Part of T-2 (1st I-F Trans. FM)	
C-7			
C-8		Part of T-3 (1st I-F Trans. AM)	
C-12		Part of T-5 (2nd I-F Trans. AM)	
C-13			
C-14		Part of T-4 (2nd I-F Trans. FM)	
C-15			
C-16A	47X112	50-50 mmf Dual Mica	1
C-16B			
C-18		Part of T-6 (Discriminator Trans.)	
C-19	47X492	2700 mmf Molded Mica	1
C-20	47X468	220 mmf Ceramic	2
C-35			
C-21	45X351	5 mf 100 V Dry Electrolytic	1
C-22	47X557	2.2 mmf Ceramic	2
C-42			
C-23	47X558	30 mmf Ceramic	1
C-24			

REPLACEMENT PARTS

C-25	17A255	1.8 mmf Trimmer	1
C-26	B66503	.05 mf 200 V Tubular	1
C-28A		20 mf 20 V	
C-28B	45X360	40 mf 150 V Dry Electrolytic	1
C-28C		40 mf 200 V	
C-29	H66102	.001 mf 800 V Tubular	1
C-30	47X470	330 mmf Molded Mica	1
C-31	47X508	500 mmf Ceramic	1
C-32A			
C-32B	76X4	100 mmf Dual Ceramic	1
C-33	B66403	.04 mf 200 V Tubular	1
C-34	D66502	.005 mf 400 V Tubular	1
C-36	B66402	.004 mf 200 V Tubular	1
C-37	D66104	.1 mf 400 V Tubular	1
C-38	D66203	.02 mf 400 V Tubular	1
C-39		Part of C-1 (Gang Condenser)	
C-41			
C-40	47X471	68 mmf Ceramic	1

RESISTORS

		Ohms	Watts		
R-1	B85470	47	0.5	Carbon	1
R-2					
R-3	B85102	1000	0.5	Carbon	3
R-6					
R-4	B84680	68	0.5	Carbon	2
R-8					
R-5	B84682	6800	0.5	Carbon	3
R-12					
R-13					
R-7	B85473	47 K	0.5	Carbon	2
R-25					
R-9	B85222	2200	0.5	Carbon	1
R-10	B85273	27 K	0.5	Carbon	1
R-11	43X233	3.6	0.5	Wirewound	1
R-14	B85104	100 K	0.5	Carbon	2
R-16					
R-15	B85223	22 K	0.5	Carbon	1
R-17	B84221	220	0.5	Carbon	1
R-18					
R-19					
R-24	B85474	470 K	0.5	Carbon	4
R-26					
R-20	B85153	15 K	0.5	Carbon	1
R-21	36X372	.5 meg.	Volume Control & Switch	1	
R-23	40X285	3 meg.	Tone Control	1	
R-27	B85106	10 meg.	0.5	Carbon	1
R-28	D84821	820	2.0	Carbon	1
R-29	B85105	1 meg.	0.5	Carbon	1
R-30	B84271	270	0.5	Carbon	1
R-31	B85225	2.2 meg.	0.5	Carbon	1

TYPE V-28A166 RECORD CHANGER PARTS

V-2727B	Motor Assembly, 60 cycles 105-125 Volts AC	1
Shure P-81	Crystal Cartridge	1
	Semi-Permanent Needle	1

(When ordering needles, specify part number and letter stamped on cartridge.)

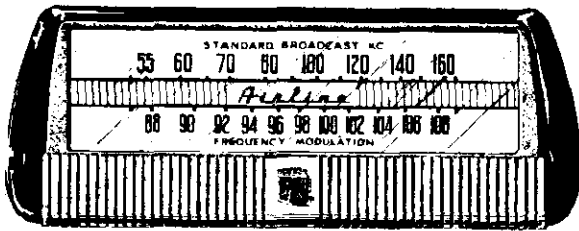
MISCELLANEOUS

12A477	8" P.M. Speaker	1
3A303	Tube Socket—Octal (8 prong) Molded	2
3A426	Tube Socket—Miniature	4
3A427	Tube Socket (12AT7)	1
3A443	Tube Socket (6BE6)	1
3A304	Phono Motor Socket	1
3A305	Phono Socket—Single Pin Tip	1
2A395	Band Change Switch	1
13X546	Line Cord and Plug Assembly	1
4X1020	Escutcheon	1
10A695	Knob (Tuning)	1
10A696	Knob (Volume Control & Switch)	1
10A697	Knob (Tone)	1
10A698	Knob (Phono—BC—FM)	1

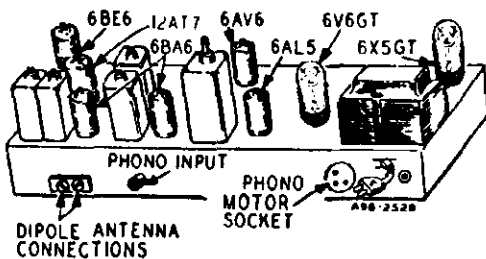
DIAL AND DRIVE ASSEMBLY

58X727	Dial Glass	1
24X446	Idler Pulley	2
15X257	Pointer	1
25X1569	Dial Bracket	1
7A103	No. 47 Pilot Light Bulb	2
7A202	Pilot Light Socket Assembly	1
26X486	Drive Shaft	1
41X26	Reflector, Dial Light	2
28X113	Drive Cord Tension Spring	1
10X56	Drive Cord Assembly	1
19X192	"C" Washer (Mtg. drive Shaft)	2
6X66	Rubber Grommet (Mtg. drive cord.)	3

MODELS 94WG-2748C,
05WG-2748C



A96-2529



DIPOLE ANTENNA
CONNECTIONS

ELECTRICAL SPECIFICATIONS

Power Supply..... 105-125 volts AC 60 cycles, 40
watts. 60 watts with record chang-
er.

Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC

Intermediate Frequency.. AM—455 KC
FM—10.7 MC

Selectivity..... AM—45 KC broad at 1000 times
signal, measured at 1000 KC
I.F. FM—200 KC broad at 2 times
down
I.F. FM—950 KC broad at 200
times down

AM Sensitivity(For .5 watt output with external
antenna) 25 microvolts average

FM Sensitivity.....(For .5 watt output)
25 microvolts average

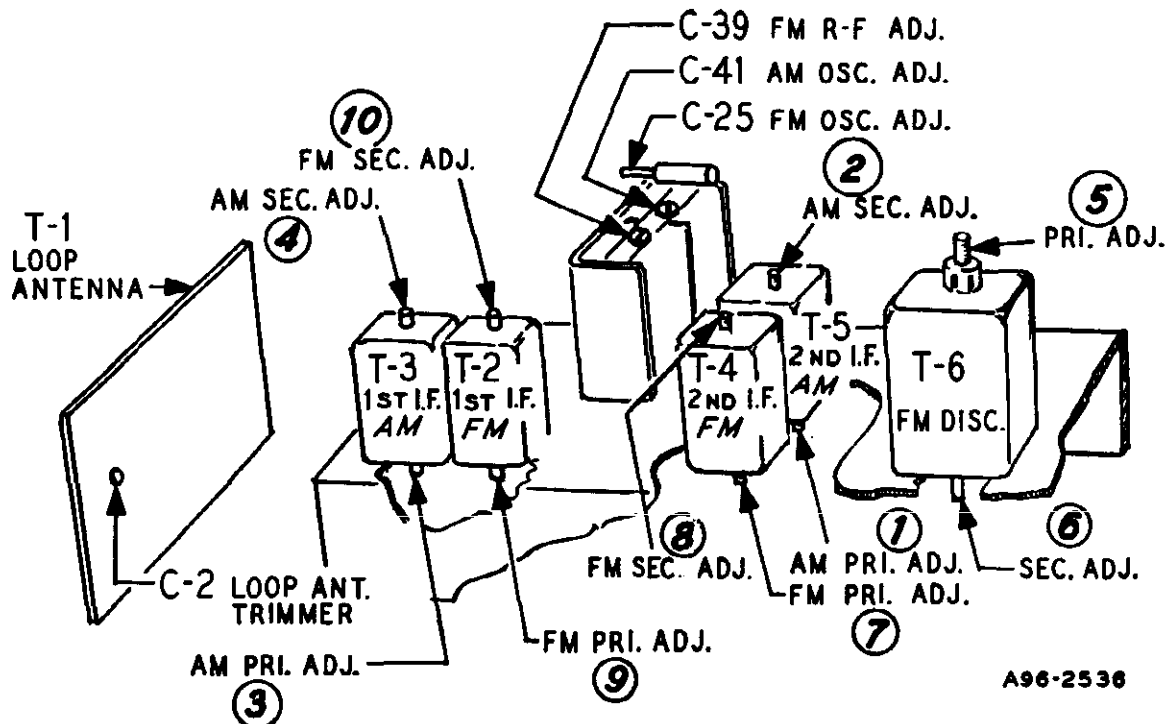
Power Output 1.9 watts maximum
0.8 watts 10% distortion

Loud Speaker..... 10" PM Dynamic

Voice Coil Impedance..... 3.2 ohms 400 cycles

Tube and Dial Lamp Complement

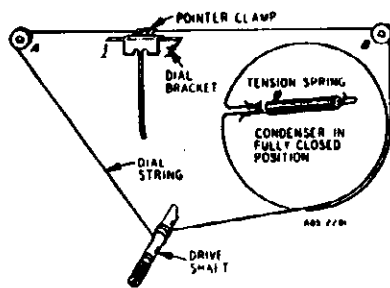
- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM
2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps



A96-2536

MODELS 94WG-2748C,
05WG-2748C**DRIVE CORD REPLACEMENT****DIAL POINTER CORD**

Use a new 10X56 drive cord assembly or a new length of cord 46 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

**TUBE SOCKET VOLTAGES**

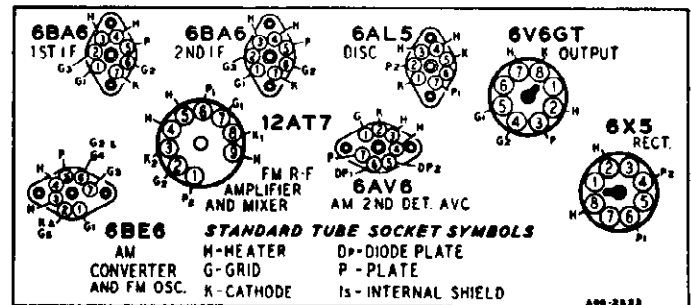
Socket voltages are shown on the schematic diagram of the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter.

Conditions of measurement are:

Line voltage 117 Volts AC

Signal Input None

A variation of $\pm 10\%$ is usually permissible.

**ALIGNMENT PROCEDURES****AM STAGES**

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Terminal	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

MODELS 94WG-2748C,
05WG-2748C

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole antenna and connect gen- erator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

Ref. No.	Part No.	Description	Qty. Used in Set
CAPACITORS			
C-1	14A209	Gang Condenser Assembly	1
C-2	17A255	2-24 mmf Trimmer	1
C-3	47X559	130 mmf Ceramic	1
C-4 C-5 C-9			
C-10 C-11 C-17 C-27 C-43	47X507	5000 mmf Ceramic	8
C-6 C-7		Part of T-2 (1st I-F Trans. FM)	
C-8		Part of T-3 (1st I-F Trans. AM)	
C-12 C-13		Part of T-5 (2nd I-F Trans. AM)	
C-14 C-15		Part of T-4 (2nd I-F Trans. FM)	
C-16A C-16B	47X112	50-50 mmf Dual Mica	1
C-18		Part of T-6 (Discriminator Trans.)	
C-19	47X492	2700 mmf Molded Mica	1

C-20 C-35	47X468	220 mmf Ceramic	2
C-21	45X361	5 mf 100 V Dry Electrolytic	1
C-22 C-42	47X557	2.2 mmf Ceramic	2
C-23	47X558	30 mmf Ceramic	1
C-24	47X516	20 mmf Ceramic	1
C-25	17A255	1-8 mmf Trimmer	1
C-26	B66503	.05 mf 200 V Tubular	1
C-28A C-28B C-28C	45X360	20 mf 20 V 40 mf 150 V 40 mf 200 V Dry Electrolytic	1
C-29	H66102	.001 mf 800 V Tubular	1
C-30	47X470	330 mmf Molded Mica	1
C-31	47X508	500 mmf Ceramic	1
C-32A C-32B	76X4	100 mmf Dual Ceramic	1
C-33	B66403	.04 mf 200 V Tubular	1
C-34	D66502	.005 mf 400 V Tubular	1
C-36	B66402	.004 mf 200 V Tubular	1
C-37	D66104	.1 mf 400 V Tubular	1
C-38	D66203	.02 mf 400 V Tubular	1
C-39 C-41		Part of C-1 (Gang Condenser)	
C-40	47X471	68 mmf Ceramic	1

MODELS 94WG-2743
05WG-2748C

Ref. No.	Part No.	Description	Qty. Use in Set
RESISTORS			
		Ohms Watts	
R-1	B85470	47 0.5 Carbon.....	1
R-2	B85102	1000 0.5 Carbon.....	3
R-3			
R-6			
R-4	B84680	68 0.5 Carbon.....	2
R-8			
R-5	B84682	6800 0.5 Carbon.....	3
R-12			
R-13			
R-7	B85473	47 K 0.5 Carbon.....	2
R-25			
R-9	B85222	2200 0.5 Carbon.....	1
R-10	B85273	27 K 0.5 Carbon.....	1
R-11	43X233	3.6 0.5 Wirewound	1
R-14	B85104	100 K 0.5 Carbon.....	2
R-16			
R-15	B85223	22 K 0.5 Carbon.....	1
R-17	B84221	220 0.5 Carbon.....	1
R-18	B85474	470 K 0.5 Carbon.....	4
R-19			
R-24			
R-26			
R-20	B85153	15 K 0.5 Carbon	1
R-21	36X372	.5 meg. Volume Control & Switch	1
R-23	40X285	3 meg. Tone Control	1
R-27	B85106	10 meg. 0.5 Carbon.....	1
R-28	D84821	820 2.0 Carbon.....	1
R-29	B85105	1 meg. 0.5 Carbon.....	1
R-30	B84271	270 0.5 Carbon.....	1
R-31	B85225	2.2 meg. 0.5 Carbon.....	1

TRANSFORMERS AND COILS			
L-1	35A5	Insulated Choke	1
L-2	9A2103	Parasitic Choke Assembly	1
L-3	35A9	Insulated Choke	1
L-4	35A8	Insulated Choke	1
T-1	9A2146	"B" Range Loop Antenna	1
T-2	9A2060	1st I-F Trans. (FM)	1
T-3	9A2062	1st I-F Trans. (AM)	1
T-4	9A2061	2nd I-F Trans. (FM)	1
T-5	9A2063	2nd I-F Trans. (AM)	1
T-6	9A2064	Discriminator Transformer	1
T-7	9A2065	Oscillator Coil (AM)	1
T-8	9A2067	Oscillator Coil (FM)	1
T-9	51X134	Output Transformer	1
T-10	9A2004	Dipole Antenna	1
T-11	53X291	Power Transformer	1
T-12	9A2066	Antenna Coil (FM)	1

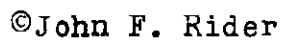
Ref. No.	Part No.	Description	Qty. Used in Set
MISCELLANEOUS			
12A483	10"	P.M. Speaker	1
3A435		Tube Socket—Octal (8 prong) Molded	2
3A426		Tube Socket (1st 6BA6).....	1
3A427		Tube Socket (6BE6)	1
3A443		Tube Socket (12A77)	1
3A439		Tube Socket (Miniature)	3
3A304		Phono Motor Socket	1
3A305		Phono Socket—Single Pin Tip.....	1
2A393		Band Change Switch	1
13X546		Line Cord and Plug Assembly.....	1
4X1020		Escutcheon	1
10A695		Knob (Tuning)	1
10A696		Knob (Volume Control & Switch)	1
10A697		Knob (Tone)	1
10A698		Knob (Phono-BC-FM)	1
DIAL AND DRIVE ASSEMBLY			
58X727		Dial Glass	1
24X446		Idle Pulley	2
15X257		Pointer	1
25X1569		Dial Bracket	1
7A103		No. 47 Pilot Light Bulb	2
7A202		Pilot Light Socket Assembly	1
26X486		Drive Shaft	1
41X26		Reflector, Dial Light	2
28X113		Drive Cord Tension Spring	1
10X55		Drive Cord Assembly	1
19X192		"C" Washer (Mtg. drive Shaft)	2
6X66		Rubber Grommet (Mtg. gang cond.)	3

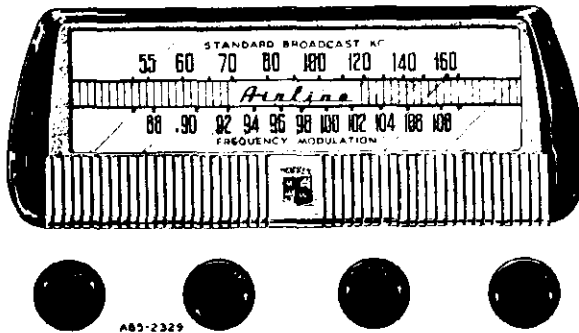
TYPE G.I.-28A168 RECORD CHANGER PARTS (Model 94WG-2748C)

G.I.-56-76527	Motor Assembly, 60 cycles 105-125 Volts AC	1
AST-LT3D	Crystal Cartridge	1
	Needle, Regular	1
	Needle, Microgroove (Red)	1
(When ordering needles, specify part number and letter stamped on cartridge.)		

TYPE G.I.-29A169 RECORD CHANGER PARTS (Model 05WG-2748C)

G.I.-56-76507	Motor Assembly, 60 cycles 105-125 Volts AC	1
E.V. No. 33-4	Crystal Cartridge with Needle	1
	Semi-Permanent Needle Only	1
(When ordering needles, specify part number and letter stamped on cartridge.)		





ELECTRICAL SPECIFICATIONS

Power Supply..... 105-125 volts AC 60 cycles, 40 watts. 60 watts with record changer.

Frequency Ranges..... Broadcast 540-1600 KC
Frequency Modulation 88-108 MC

Intermediate Frequency..... AM-455 KC
FM-10.7 MC

Selectivity..... AM-45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM-200 KC broad at 2 times down
I.F. FM-950 KC broad at 200 times down

AM Sensitivity..... (For .5 watt output with external antenna) 25 microvolts average

FM Sensitivity..... (For .5 watt output) 25 microvolts average

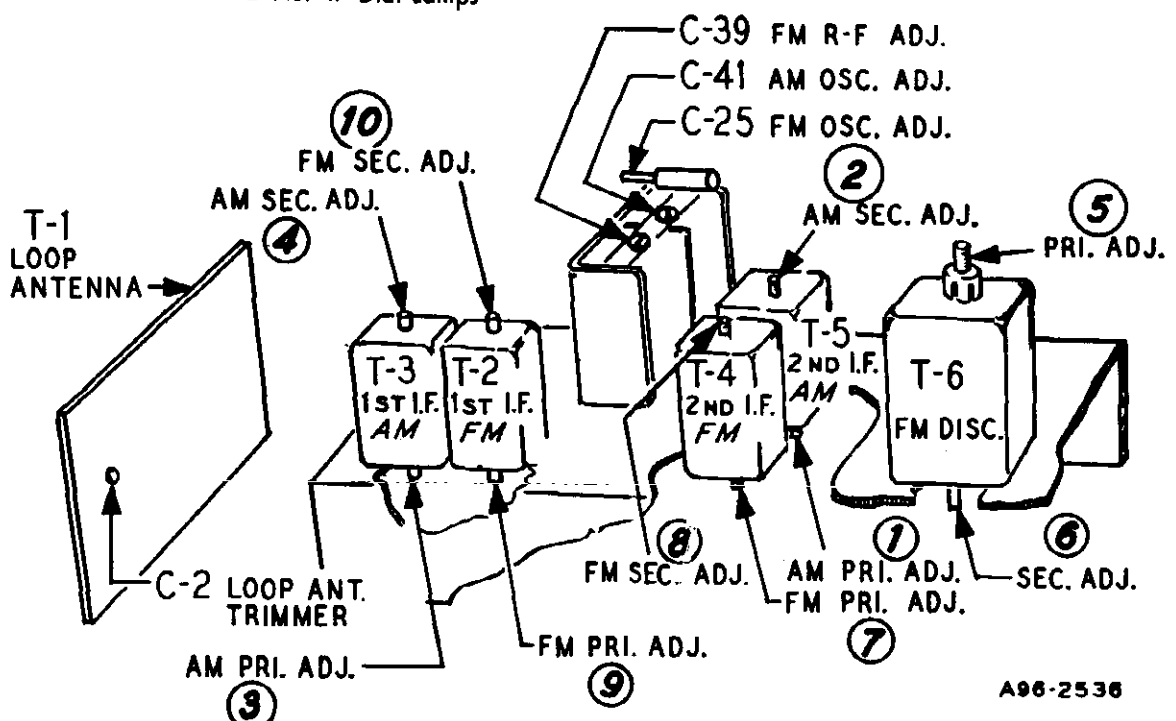
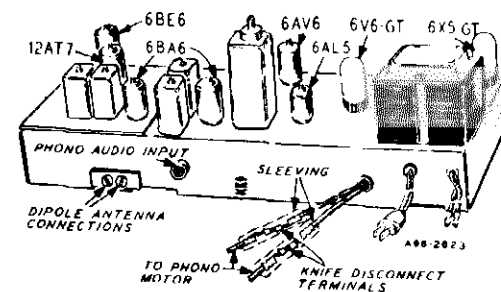
Power Output..... 1.9 watts maximum
0.8 watts 10% distortion

Loud Speaker..... 10" PM Dynamic

Voice Coil Impedance..... 3.2 ohms 400 cycles

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps

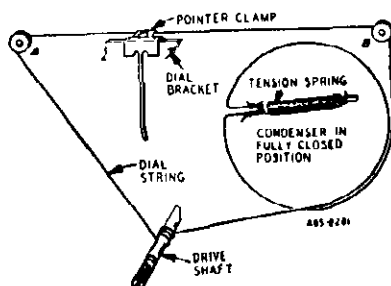


MODEL 05WG-2748D

DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new 10X56 drive cord assembly or a new length of cord 46 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



TUBE SOCKET VOLTAGES

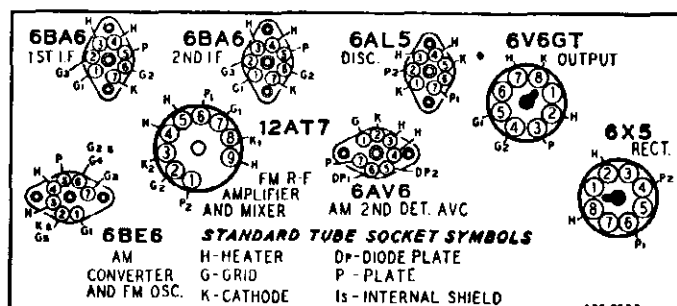
Socket voltages are shown on the schematic diagram of the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter.

Conditions of measurement are:

Line voltage117 Volts AC

Signal InputNone

A variation of $\pm 10\%$ is usually permissible.



ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Terminal	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
RECHECK I-F ADJUSTMENTS IN ORDER GIVEN							
Oscillator	108.5	Disconnect built-in dipole antenna and connect gen- erator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection
RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN							

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

Ref. No.	Part No.	Description	Qty. Used in Set
CAPACITORS			
C-1	14A209	Gang Condenser Assembly	1
C-2	17A256	2-24 mmf Trimmer	1
C-3	47X559	130 mmf Ceramic	1
C-4	47X507	5000 mmf Ceramic	8
C-5			
C-9			
C-10			
C-11			
C-17			
C-27			
C-43			
C-6	}	Part of T-2 (1st I-F Trans. FM)	
C-7			
C-8	Part of T-3 (1st I-F Trans. AM)		
C-12	}	Part of T-5 (2nd I-F Trans. AM)	
C-13			
C-14			
C-15	}	Part of T-4 (2nd I-F Trans. FM)	
C-16A			
C-16B	47X112	50-50 mmf Dual Mica	1
C-18	Part of T-6 (Discriminator Trans.)		
C-19	47X492	2700 mmf Molded Mica	1

C-20	47X468	220 mmf	Ceramic	2
C-35	45X361	5 mf	100 V Dry Electrolytic	1
C-21	47X557	2.2 mmf	Ceramic	2
C-22	47X558	30 mmf	Ceramic	1
C-42	47X516	20 mmf	Ceramic	1
C-23	17A255	1-8 mmf	Trimmer	1
C-24	B66503	.05 mf	200 V Tubular	2
C-25	45X360	20 mf	20 V	Dry Electrolytic 1
C-26		40 mf	150 V	
C-44		40 mf	200 V	
C-28A	H66102	.001 mf	800 V Tubular	1
C-28B	47X470	330 mmf	Molded Mica	1
C-28C	47X508	500 mmf	Ceramic	1
C-29	76X4	100 mmf	Dual Ceramic	1
C-30				
C-31	B66403	.04 mf	200 V Tubular	1
C-32A	D66502	.005 mf	400 V Tubular	1
C-32B	B66402	.004 mf	200 V Tubular	1
C-33	D66104	.1 mf	400 V Tubular	1
C-34	D66203	.02 mf	400 V Tubular	1
C-36	Part of C-1 (Gang Condenser)			
C-37	Part of C-1 (Gang Condenser)			
C-38	Part of C-1 (Gang Condenser)			
C-39	Part of C-1 (Gang Condenser)			
C-40	47X471	68 mmf	Ceramic	1

MODEL 05WG-2748D

Ref. No.	Part No.	Description	Qty. Used in Set
RESISTORS			
		Ohms Watts	
R-1	B85470	47 0.5 Carbon.....	1
R-2 } R-3 } R-6 }	B85102	1000 0.5 Carbon.....	3
R-4 } R-8 }	B84680	68 0.5 Carbon.....	2
R-5 } R-12 } R-13 }	B84682	6800 0.5 Carbon.....	3
R-7 } R-25 }	B85473	47 K 0.5 Carbon.....	2
R-9	B85222	2200 0.5 Carbon.....	1
R-10	B85273	27 K 0.5 Carbon.....	1
R-11	43X233	3.6 0.5 Wirewound	1
R-14 } R-16 }	B85104	100 K 0.5 Carbon.....	2
R-15	B85223	22 K 0.5 Carbon.....	1
R-17	B84221	220 0.5 Carbon.....	1
R-18 } R-19 } R-24 } R-26 }	B85474	470 K 0.5 Carbon.....	4
R-20	B85153	15 K 0.5 Carbon.....	1
R-21	36X372	.5 meg. Volume Control & Switch	1
R-23	40X285	3 meg. Tone Control.....	1
R-27	B85106	10 meg. 0.5 Carbon.....	1
R-28	D84821	820 2.0 Carbon.....	1
R-29	B85105	1 meg. 0.5 Carbon.....	1
R-30	B84271	270 0.5 Carbon.....	1
R-31	B84274	270 K 0.5 Carbon.....	1
TRANSFORMERS AND COILS			
L-1	35A5	Insulated Choke	1
L-2	9A2103	Parasitic Choke Assembly	1
L-3	35A9	Insulated Choke	1
L-4	35A8	Insulated Choke	1
T-1	9A2146	"B" Range Loop Antenna	1
T-2	9A2060	1st I-F Trans. (FM)	1
T-3	9A2062	1st I-F Trans. (AM)	1
T-4	9A2061	2nd I-F Trans. (FM)	1
T-5	9A2063	2nd I-F Trans. (AM)	1
T-6	9A2064	Discriminator Transformer	1
T-7	9A2065	Oscillator Coil (AM)	1
T-8	9A2067	Oscillator Coil (FM)	1
T-9	51X134	Output Transformer	1
T-10	9A2004	Dipole Antenna	1
T-11	53X291	Power Transformer	1
T-12	9A2066	Antenna Coil (FM)	1

Ref. No.	Part No.	Description	Qty. Used in Set
MISCELLANEOUS			
	12A480	10" P.M. Speaker	1
	3A435	Tube Socket—Octal (8 prong) Molded	2
	3A426	Tube Socket (1st 6BA6).....	1
	3A427	Tube Socket (6BE6)	1
	3A443	Tube Socket (12AT7)	1
	3A439	Tube Socket (Miniature)	3
	*3A304	Phono Motor Socket	1
	3A305	Phono Socket—Single Pin Tip.....	1
	2A393	Band Change Switch	1
	13X546	Line Cord and Plug Assembly.....	1
	4X1020	Escutcheon	1
	10A695	Knob (Tuning)	1
	10A696	Knob (Volume Control & Switch)	1
	10A697	Knob (Tone)	1
	10A698	Knob (Phono-BC-FM)	1

*In some receivers knife type connectors are used.

DIAL AND DRIVE ASSEMBLY

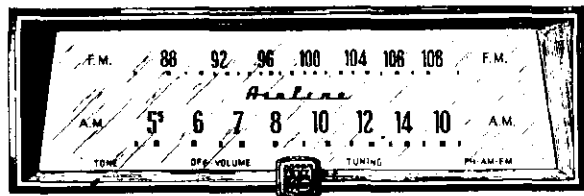
58X727	Dial Glass	1
24X446	Idler Pulley	2
15X257	Pointer	1
25X1569	Dial Bracket	1
7A103	No. 47 Pilot Light Bulb	2
7A202	Pilot Light Socket Assembly	1
26X486	Drive Shaft	1
41X26	Reflector, Dial Light	2
28X113	Drive Cord Tension Spring	1
10X56	Drive Cord Assembly	1
19X192	"C" Washer (Mtg. drive Shaft) 2	
6X66	Rubber Grommet (Mtg. gang cond.)	3

TYPE G.I. 28A169 RECORD CHANGER PARTS

G.I.-56-76507	Motor Assembly, 60 cycles 105-125 Volts AC	1
E.V. No. 33-4	Crystal Cartridge with Needle Semi-Permanent Needle Only	1

(When ordering needles, specify part number and letter stamped on cartridge.)

MODEL 05WG-2748E



ELECTRICAL SPECIFICATIONS

Power Supply.....105-125 volts AC 60 cycles, 40 watts. 60 watts with record changer.

Frequency Ranges.....Broadcast 540-1600 KC
Frequency Modulation 88-108 MC

Intermediate Frequency...AM-455 KC
FM-10.7 MC

Selectivity.....AM-45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM-200 KC broad at 2 times down
I.F. FM-950 KC broad at 200 times down

AM Sensitivity.....(For .5 watt output with external antenna) 25 microvolts average

FM Sensitivity.....(For .5 watt output) 25 microvolts average

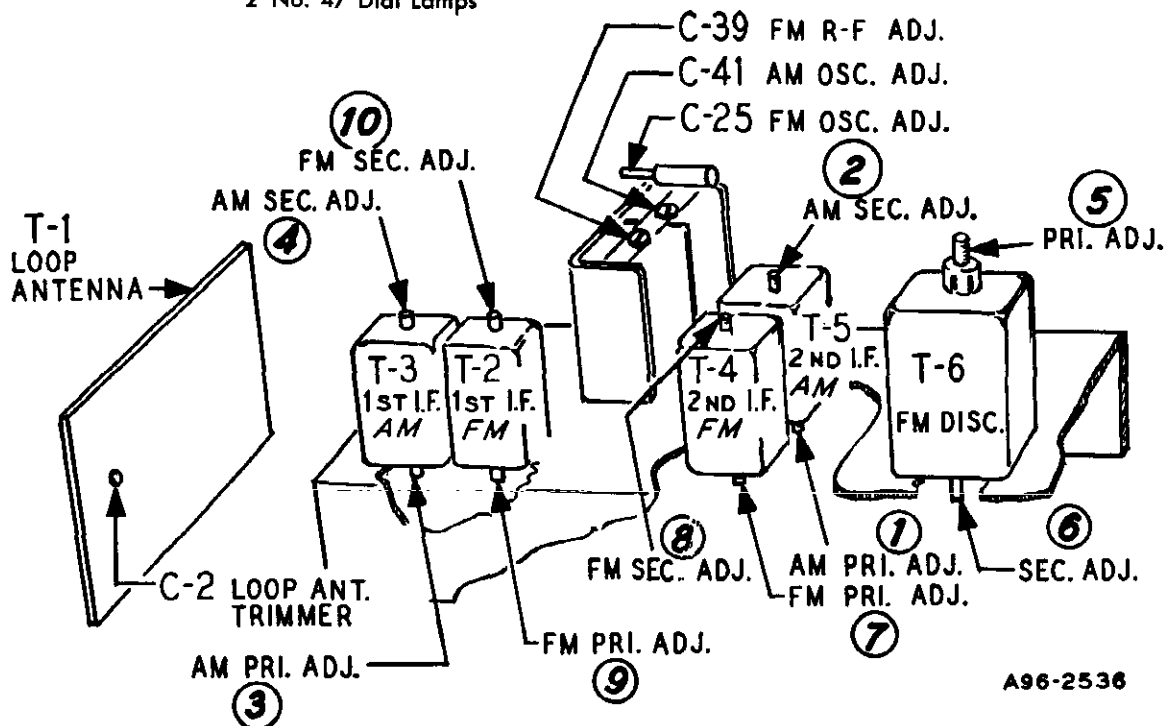
Power Output.....1.9 watts maximum
0.8 watts 10% distortion

Loud Speaker.....10" PM Dynamic

Voice Coil Impedance.....3.2 ohms 400 cycles

Tube and Dial Lamp Complement

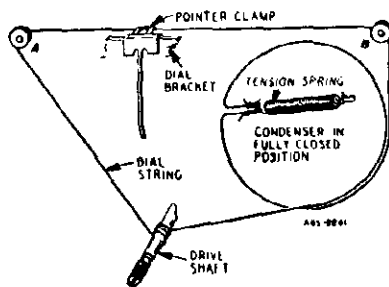
- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 6X5GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

Use a new 10X72 drive cord assembly or a new length of cord 44 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.



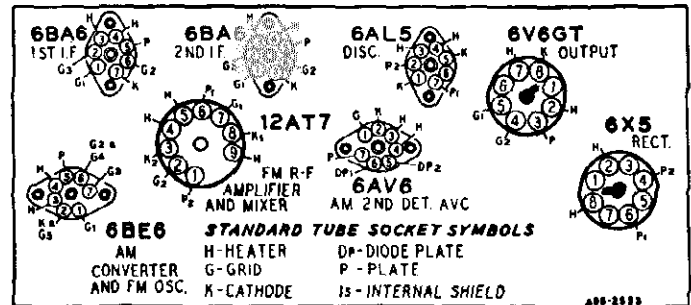
TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audi grid voltages were read with a vacuum tube volt-meter.

Conditions of measurement are:

Line voltage 117 Volts AC
Signal Input None

A variation of $\pm 10\%$ is usually permissible.



ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I-F Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Terminal	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:
An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.
Non-metallic screwdriver.
Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.
(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).
Allow chassis and signal generator to "Heat Up" for several minutes.

MODEL 05WG-2748E

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-23	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

Ref. No.	Part No.	Description	Qty. Used in Set
CAPACITORS			
C-1	14A209	Gang Condenser Assembly	1
C-2	17A235	2-24 mmf Trimmer	1
C-3	47X559	130 mmf Ceramic	1
C-4			
C-5			
C-9			
C-10	47X507	5000 mmf Ceramic	8
C-11			
C-17			
C-27			
C-43			
C-6		Part of T-2 (1st I-F Trans. FM)	
C-7			
C-8		Part of T-3 (1st I-F Trans. AM)	
C-12		Part of T-5 (2nd I-F Trans. AM)	
C-13			
C-14		Part of T-4 (2nd I-F Trans. FM)	
C-15			
C-16A	47X112	50-50 mmf Dual Mica	1
C-16B			
C-18		Part of T-6 (Discriminator Trans.)	
C-19	47X492	2700 mmf Molded Mica	1

C-20	47X468	220 mmf	Ceramic	2
C-35				
C-21	45X361	5 mf 100 V	Dry Electrolytic	1
C-22				
C-42	47X557	2.2 mmf	Ceramic	2
C-23	47X558	30 mmf	Ceramic	1
C-24	47X516	20 mmf	Ceramic	1
C-25	17A255	1-8 mmf	Trimmer	1
C-26				
C-44	B66503	.05 mf 200 V	Tubular	2
C-28A		20 mf 20 V		
C-28B	45X360	40 mf 150 V	Dry Electrolytic	1
C-28C		40 mf 200 V		
C-29	H66102	.001 mf 800 V	Tubular	1
C-30	47X470	330 mmf	Molded Mica	1
C-31	47X508	500 mmf	Ceramic	1
C-32A				
C-32B	76X4	100 mmf	Dual Ceramic	1
C-33	B66403	.04 mf 200 V	Tubular	1
C-34	D66502	.005 mf 400 V	Tubular	1
C-36	B66103	.01 mf 200 V	Tubular	1
C-37	D66104	.1 mf 400 V	Tubular	1
C-38	D66203	.02 mf 400 V	Tubular	1
C-39				
C-41		Part of C-1 (Gang Condenser)		
C-40	47X471	68 mmf	Ceramic	1

Ref. No.	Part No.	Description	Qty. Used in Set
RESISTORS			
		Ohms Watts	
R-1	B85470	47 0.5 Carbon.....	1
R-2	B85102	1000 0.5 Carbon.....	4
R-3			
R-6			
R-9	B84680	68 0.5 Carbon.....	2
R-4			
R-8	B84682	6800 0.5 Carbon.....	3
R-5			
R-12			
R-13	B85473	47 K 0.5 Carbon.....	2
R-7			
R-25			
R-10	B85273	27 K 0.5 Carbon.....	1
R-11	43X233	3.6 0.5 Wirewound	1
R-14	B85104	100 K 0.5 Carbon.....	2
R-16			
R-15	B85223	22 K 0.5 Carbon.....	1
R-17	B84221	220 0.5 Carbon.....	1
R-18	B85474	470 K 0.5 Carbon.....	4
R-19			
R-24			
R-26			
R-20	B85153	15 K 0.5 Carbon.....	1
R-21	36X372	.5 meg. Volume Control & Switch	1
R-23	40X310	.5 meg. Tone Control	1
R-27	B85106	10 meg. 0.5 Carbon.....	1
R-28	D84821	820 2.0 Carbon.....	1
R-29	B85105	1 meg. 0.5 Carbon.....	1
R-30	B84271	270 0.5 Carbon.....	1
R-31	B84274	270 K 0.5 Carbon.....	1

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke	1
L-2	9A2103	Parasitic Choke Assembly	1
L-3	35A9	Insulated Choke	1
L-4	35A8	Insulated Choke	1
T-1	9A2146	"B" Range Loop Antenna	1
T-2	9A2060	1st I-F Trans. (FM)	1
T-3	9A2062	1st I-F Trans. (AM)	1
T-4	9A2061	2nd I-F Trans. (FM)	1
T-5	9A2063	2nd I-F Trans. (AM)	1
T-6	9A2064	Discriminator Transformer	1
T-7	9A2065	Oscillator Coil (AM)	1
T-8	9A2067	Oscillator Coil (FM)	1
T-9	51X134	Output Transformer	1
T-10	9A2004	Dipole Antenna	1
T-11	53X291	Power Transformer	1
T-12	9A2066	Antenna Coil (FM)	1

Ref. No.	Part No.	Description	Qty. Used in Set
MISCELLANEOUS			
	12A480	10" P.M. Speaker	1
	3A435	Tube Socket—Octal (8 prong) Molded	2
	3A426	Tube Socket (1st 6BA6).....	1
	3A427	Tube Socket (6BE6)	1
	3A443	Tube Socket (12AT7)	1
	3A439	Tube Socket (Miniature)	3
	*3A304	Phono Motor Socket	1
	3A305	Phono Socket—Single Pin Tip.....	1
	2A393	Band Change Switch	1
	13X546	Line Cord and Plug Assembly.....	1
	4X1114	Escutcheon	1
	10A759	Knob	4

*In some receivers knife type connectors are used.

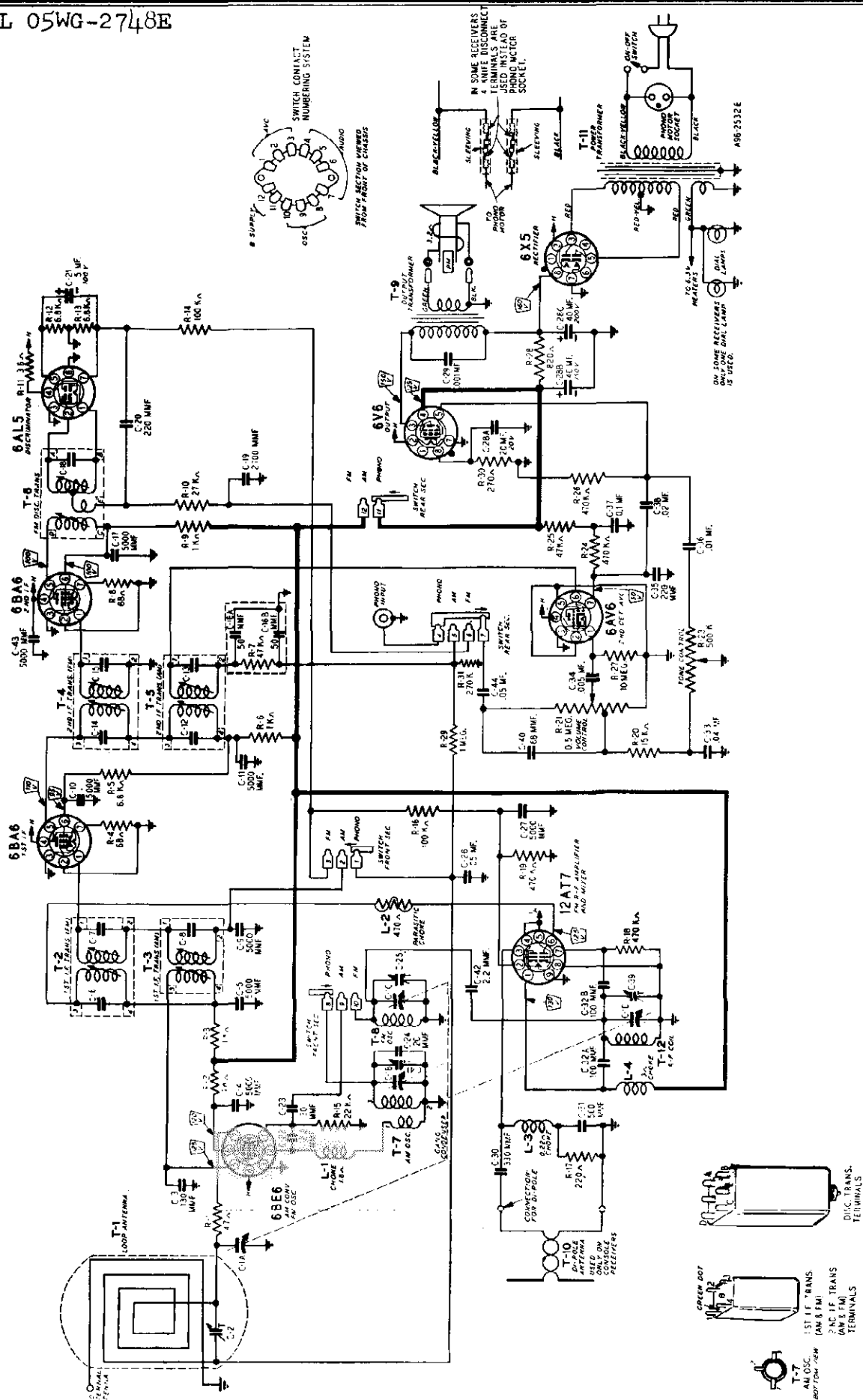
DIAL AND DRIVE ASSEMBLY

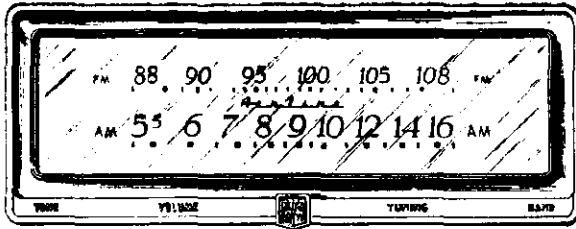
58X741	Dial Glass	1
24X446	Idler Pulley	2
15X251	Pointer	1
25X1650	Dial Bracket	1
7A103	No. 47 Pilot Light Bulb	2
7A199	Pilot Light Socket Assembly	1
26X486	Drive Shaft	1
41X88	Reflector, Dial Light	2
28X113	Drive Cord Tension Spring	1
10X72	Drive Cord Assembly	1
19X192	"C" Washer (Mtg. drive Shaft)	2
6X66	Rubber Grommet (Mtg. gang cond.)	3

TYPE G.I. 28A168 RECORD CHANGER PARTS

G.I.-56-76507	Motor Assembly, 60 cycles 105-125 Volts AC	1
G.I.-69-75506	Tone Arm	1
AST-LT3D	Crystal Cartridge & Needle Assembly	1
AST-4999-D	Needle, Regular	1
AST-4999-D-033	Needle, Microgroove	1

MODEL 05WG-2748E

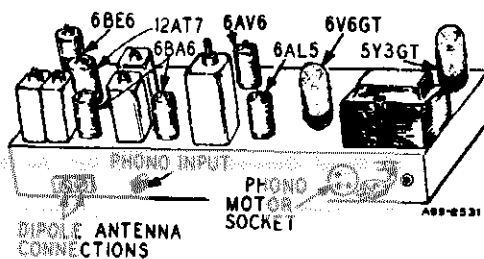


MODELS 05WG-2751A,
05WG-2752B

GENERAL DESCRIPTION

This is a two band, seven tube (plus rectifier tube) AM and FM receiver with automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.



DRIVE CORD REPLACEMENT

DIAL POINTER CORD

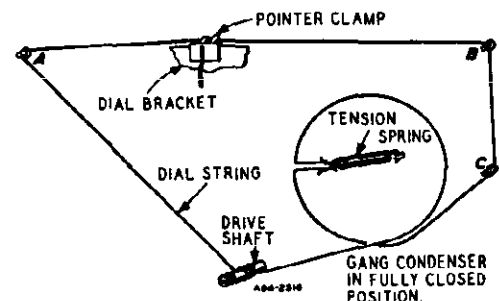
Use a new 10X38 drive cord assembly or a new length of cord 48 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

ELECTRICAL SPECIFICATIONS

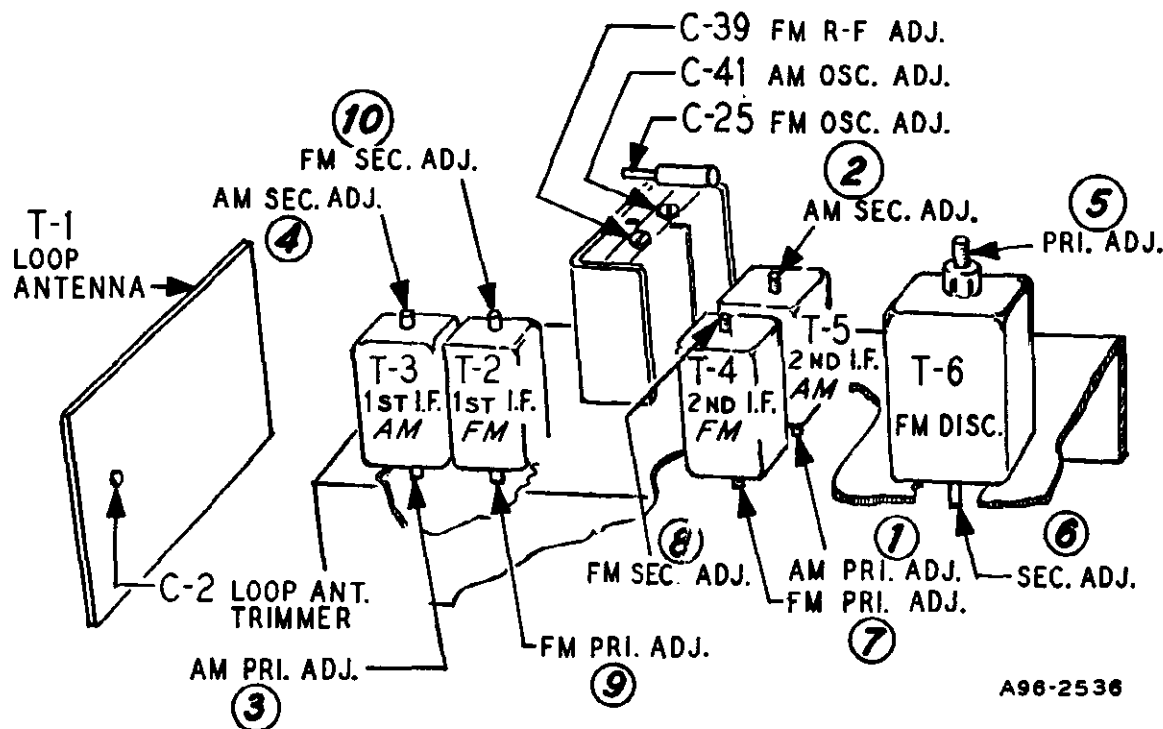
Power Supply.....	105-125 volts AC 60 cycles, 60 watts, 80 watts with record changer.
Frequency Ranges.....	Broadcast 540-1600 KC Frequency Modulation 88-108 MC
Intermediate Frequency.....	AM—455KC FM—10.7 MC
Selectivity.....	AM—45 KC broad at 1000 times signal, measured at 1000 KC I.F. FM—200 KC broad at 2 times down I.F. FM—950 KC broad at 200 times down
AM Sensitivity.....	(For .5 watt output with external antenna) 25 microvolts average
FM Sensitivity.....	(For .5 watt output) 25 microvolts average
Power Output.....	4.5 watts maximum 2.5 watts 10% distortion
Loud Speaker	12" PM Dynamic
Voice Coil Impedance.....	3.2 ohms 400 cycles
Record Changer	See Manual 5089A

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 5Y3GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps



MODELS 05WG-2751A,
05WG-2752B



TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter.

Conditions of measurement are:

Line voltage.....117 Volts AC

Signal Input.....None

A variation of $\pm 10\%$ is usually permissible.

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas - .1 mf. and 50mmf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR						
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Lead	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A - If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

MODELS 05WG-2751A,
05WG-2752B

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	Maximum Deflection

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.

Note output voltage on the zero center DC vacuum tube voltmeter

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.

REPLACEMENT PARTS INFORMATION

HOW TO ORDER PARTS—Should it be necessary to write us or to order any repair parts, it is important that the complete model number which appears on the label

attached to the rear of the chassis be specified. Repair parts should be ordered from your nearest Wards Retail Store, Catalog Order office or Mail Order House.

REPLACEMENT PARTS LIST

Use only genuine factory tested parts to insure service jobs you can depend on and to obtain original set performance

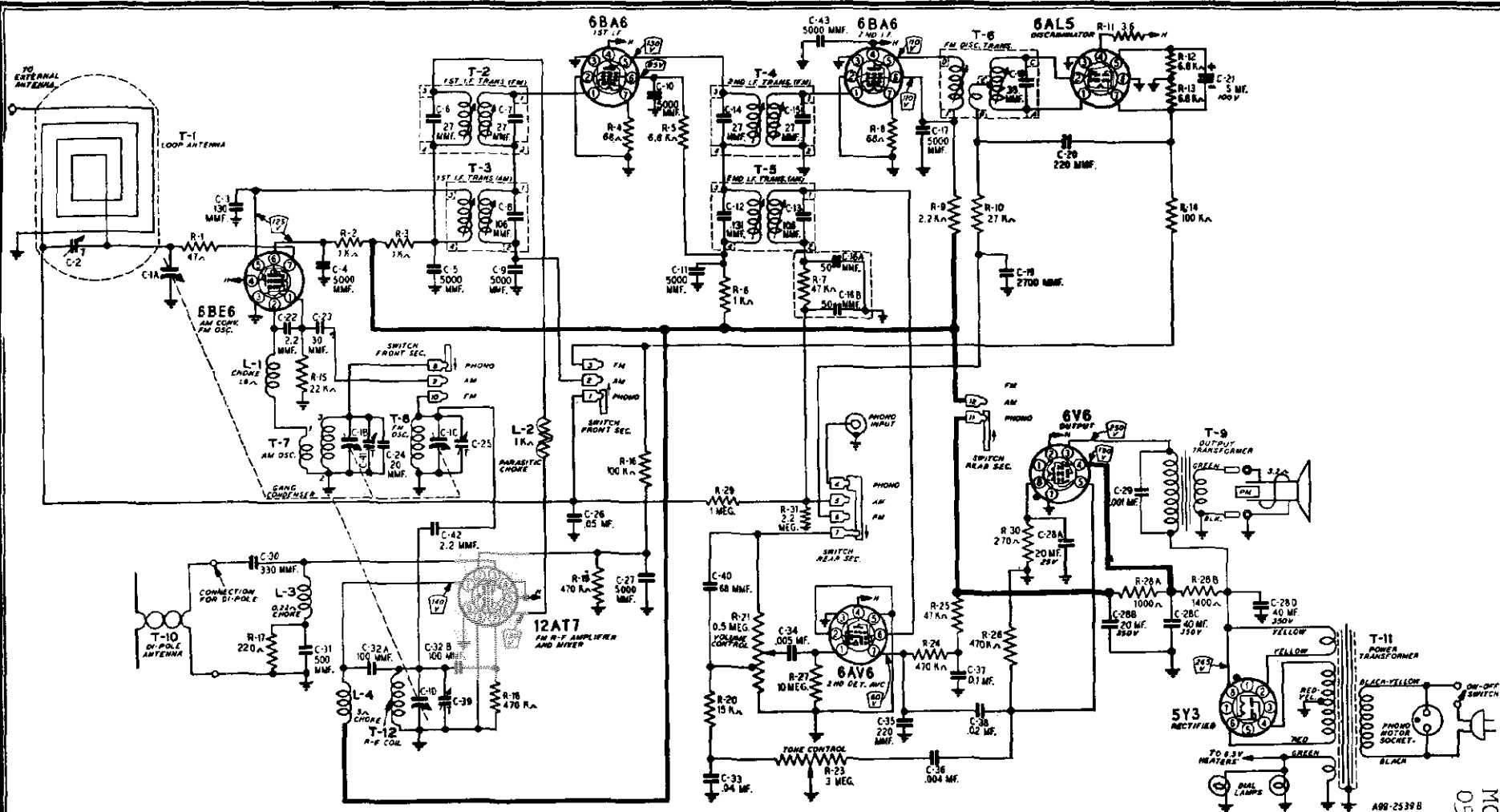
Ref. No.	Part No.	Description	Qty. Used in Set	Ref. No.	Part No.	Description	Qty. Used in Set
CAPACITORS				C-8		Part of T-3 (1st I-F Trans. AM)	
C-1	14A209	Gang Condenser Assembly	1	C-12 } C-13 }		Part of T-5 (2nd I-F Trans. AM)	
C-2	17A256	2-24 mmf Trimmer.....	1	C-14 } C-15 }		Part of T-4 (2nd I-F Trans. FM)	
C-3	47X559	130 mmf Ceramic.....	1	C-16A } C-16B }	47X112	50-50 mmf Dual Mica....	1
C-4 } C-5 } C-9 } C-10 } C-11 } C-17 } C-27 } C-43 }	47X507	5000 mmf Ceramic.....	8	C-18		Part of T-6 (Discriminator Trans.)	
C-6 } C-7 }		Part of T-2 (1st I-F Trans. FM)		C-19	47X492	2700 mmf Molded Mica	1
				C-20 } C-35 }	47X468	220 mmf Ceramic.....	2
				C-21	45X361	5 mf 100 V Dry Electrolytic	1
				C-22 } C-42 }	47X557	2.2 mmf Ceramic.....	2

MODELS 05WG-
2751A, 05WG-
2752B

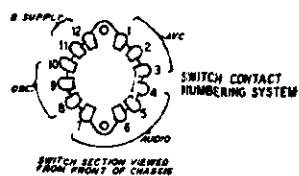
REPLACEMENT PARTS LIST (continued)

Ref. No.	Part No.	Description	Qty. Used in Set	Ref. No.	Part No.	Description	Qty. Used in Set
C-23	47X558	30 mmf Ceramic.....	1	T-2	9A2060	1st I-F Trans. (FM)	1
C-24	47X516	20 mmf Ceramic.....	1	T-3	9A2062	1st I-F Trans. (AM)	1
C-25	17A255	1-8 mmf Trimmer.....	1	T-4	9A2061	2nd I-F Trans. (FM)	1
C-26	B66503	.05 mf 200 V Tubular.....	1	T-5	9A2063	2nd I-F Trans. (AM)	1
C-28A }	45X359	20 mf 25 V Dry Electrolytic	1	T-6	9A2064	Discriminator Transformer	1
C-28B }		20 mf 350 V		T-7	9A2065	Oscillator Coil (AM)	1
C-28C }		40 mf 350 V		T-8	9A2067	Oscillator Coil (FM)	1
C-28D }		40 mf 350 V		T-9	51X134	Output Transformer	1
C-29	H66102	.001 mf 800 V Tubular.....	1	T-10	9A2004	Dipole Antenna	1
C-30	47X470	330 mmf Molded Mica.....	1	T-11	53X290	Power Transformer	1
C-31	47X508	500 mmf Ceramic.....	1	T-12	9A2066	Antenna Coil (FM)	1
C-32A }	76X4	100 mmf Dual Ceramic ..	1	MISCELLANEOUS			
C-32B }				12A490	12" P.M. Speaker	1	
C-33	B66403	.04 mf 200 V Tubular.....	1	3A435	Tube Socket—Octal (8 prong) Molded	2	
C-34	D66502	.005 mf 400 V Tubular.....	1	3A426	Tube Socket (1st 6BA6).....	1	
C-36	B66402	.004 mf 200 V Tubular.....	1	3A427	Tube Socket (6BE6)	1	
C-37	D66104	.1 mf 400 V Tubular.....	1	3A443	Tube Socket (12AT7)	1	
C-38	D66203	.02 mf 400 V Tubular.....	1	3A439	Tube Socket (Miniature)	3	
C-39 }	Part of C-1 (Gang Condenser)			3A304	Phono Motor Socket	1	
C-41 }				3A305	Phono Socket—Single Pin Tip	1	
C-40	47X471	68 mmf Ceramic.....	1	2A393	Band Change Switch	1	
RESISTORS				13X546	Line Cord and Plug Assembly.....	1	
		Ohms Watts		4X1049	Escutcheon (2752)	1	
R-1	B85470	47 0.5 Carbon.....	1	4X1088	Escutcheon (2751)	1	
R-2 }	B85102	1000 0.5 Carbon.....	3	10A754	Knob (2752)	4	
R-3 }				10A758	Knob (2751)	4	
R-4 }				DIAL AND DRIVE ASSEMBLY			
R-8 }	B84680	68 0.5 Carbon.....	2	58X729	Dial Glass	1	
R-5 }	B84682	6800 0.5 Carbon.....	3	24X446	Idler Pulley	2	
R-12 }				15X251	Pointer	1	
R-13 }				25X1616	Dial Bracket	1	
R-7 }	B85473	47 K 0.5 Carbon.....	2	7A103	No. 47 Pilot Light Bulb	2	
R-25 }				7A199	Pilot Light Socket Assembly	1	
R-9	B85222	2200 0.5 Carbon.....	1	26X486	Drive Shaft	1	
R-10	B85273	27 K 0.5 Carbon.....	1	41X88	Reflector, Dial Light	2	
R-11	43X233	3.6 0.5 Wirewound	1	28X113	Drive Cord Tension Spring	1	
R-14 }	B85104	100 K 0.5 Carbon.....	2	10X38	Drive Cord Assembly	1	
R-16 }				19X192	"C" Washer (Mtg. drive Shaft)....	2	
R-15	B85223	22 K 0.5 Carbon.....	1	6X66	Rubber Grommet (Mtg. gang cond.)	3	
R-17	B84221	220 0.5 Carbon.....	1	TYPE G.I.-28A168 RECORD CHANGER PARTS			
R-18 }	B85474	470 K 0.5 Carbon.....	4	G.I.-56-76507	Motor Assembly, 60 cycles 105-125 Volts AC	1	
R-19 }				AST-LT3D	Crystal Cartridge	1	
R-24 }					Needle, Regular	1	
R-26 }					Needle, Microgroove (Red)	1	
R-20	B85153	15 K 0.5 Carbon.....	1	(When ordering needles, specify part number and letter stamped on cartridge.)			
R-21	36X372	.5 meg. Volume Control & Switch	1				
R-23	40X285	3 meg. Tone Control.....	1				
R-27	B85106	10 meg. 0.5 Carbon.....	1				
R-28	D84821	820 2.0 Carbon.....	1				
R-28A }	43X224	1000 4.0 Wirewound ..	1				
R-28B }		1400 6.0					
R-29	B85105	1 meg. 0.5 Carbon.....	1				
R-30	B84271	270 0.5 Carbon.....	1				
R-31	B85225	2.2 meg. 0.5 Carbon.....	1				
TRANSFORMERS AND COILS							
L-1	35A5	Insulated Choke	1				
L-2	9A2103	Parasitic Choke Assembly	1				
L-3	35A9	Insulated Choke	1				
L-4	35A8	Insulated Choke	1				
T-1	9A1972	"B" Range Loop Antenna	1				

MODELS 05WG-2751A,
05WG-2752B



RECORD CHANGER: G.I. Model 700F,
pages RCD.CH.19-1,2 to RCD.CH.19-9.



ELECTRICAL SPECIFICATIONS

Power Supply.....105-125 volts AC 60 cycles, 60 watts. 80 watts with record changer.

Frequency Ranges.....Broadcast 540-1600 KC
Frequency Modulation 88-108 MC

Intermediate Frequency.....AM-455KC
FM-10.7 MC

Selectivity.....AM-45 KC broad at 1000 times signal, measured at 1000 KC
I.F. FM-200 KC broad at 2 times down
I.F. FM-950 KC broad at 200 times down

AM Sensitivity.....(For .5 watt output with external antenna) 15 microvolts average

FM Sensitivity.....(For .5 watt output)
25 microvolts average

Power Output.....4.5 watts maximum
2.5 watts 10% distortion

Loud Speaker.....12" PM Dynamic

Voice Coil Impedance.....3.2 ohms 400 cycles

Record Changer.....See Manual No. 5081A.

Tube and Dial Lamp Complement

- 1 6BE6 AM Converter & FM Osc.
- 1 6BA6 1st I-F Amplifier
- 1 6BA6 2nd I-F Amplifier
- 1 6AL5 FM Discriminator
- 1 6AV6 Audio Amplifier, AM 2nd Detector and AVC
- 1 6V6GT Audio Output
- 1 5Y3GT Rectifier
- 1 12AT7 R-F Amplifier & Mixer
- 2 No. 47 Dial Lamps

C-39 FM R-F ADJ.

C-41 AM OSC. ADJ.

C-25 FM OSC. ADJ.

FM SEC. ADJ.

AM SEC. ADJ.

AM SEC. ADJ.

PRI. ADJ.

T-1
LOOP
ANTENNA

T-3
1ST I.F.
AM

T-2
1ST I.F.
FM

T-4
2ND I.F.
FM

T-5
2ND I.F.
AM

T-6
FM DISC.

FM SEC. ADJ.

AM PRI. ADJ.

FM PRI. ADJ.

A96-2536

AM PRI. ADJ.

TUBE SOCKET VOLTAGES

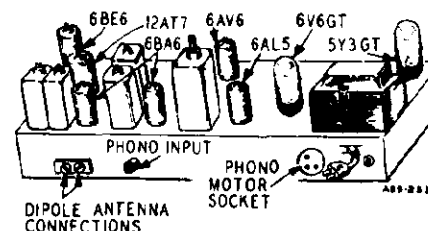
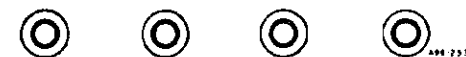
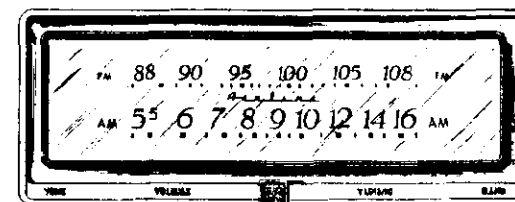
Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket

terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter.

GENERAL DESCRIPTION

This is a two band, seven tube (plus rectifier tube) AM and FM receiver with automatic record changer. The I-F stages use high gain miniature type tubes. Built-in Air Wave Aerials are provided for the FM and Broadcast bands. Features include, a grounded grid R-F amplifier stage on the FM band, compensator circuits to prevent oscillator drift, automatic volume control, beam power output stage, PM dynamic loud speaker and an electrostatic shield in the power transformer to reduce power line noise.

The receiver and record changer are housed in a console combination cabinet with controls provided for tuning, volume, tone and band or phono selection.



Conditions of measurement are:

Line voltage.....117 Volts AC

Signal Input.....None

A variation of $\pm 10\%$ is usually permissible.

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
— .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I-F Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Lead	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	Maximum Deflection

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give some output on the zero center DC vacuum tube voltmeter as in Note A.

DIAL POINTER CORD

Use a new 10X38 drive cord assembly or a new length of cord 48 inches long for the installation. Install the cord as shown in the illustration, winding three turns clockwise around the drive shaft with the turns progressing away from the chassis. After completing the installation rotate the drive shaft a few turns to take up the slack in the cord.

REPLACEMENT PARTS

Ref. No.	Part No.	Description	Qty. Used in Set
CAPACITORS			
C-1	14A209	Gang Condenser Assembly	1
C-2	17A256	2-24 mmf Trimmer	1
C-3	47X559	130 mmf Ceramic	1
C-4 C-5 C-9 C-10 C-11 C-17 C-27 C-43	47X507	5000 mmf Ceramic	8
C-6 C-7	Part of T-2 (1st I-F Trans. FM)		
C-8	Part of T-3 (1st I-F Trans. AM)		
C-12 C-13	Part of T-5 (2nd I-F Trans. AM)		
C-14 C-15	Part of T-4 (2nd I-F Trans. FM)		
C-16A C-16B	47X112	50-50 mmf Dual Mica	1
C-18	Part of T-6 (Discriminator Trans.)		
C-19	47X492	2700 mmf Molded Mica	1
C-20 C-35	47X468	220 mmf Ceramic	2
C-21	45X361	5 mf 100 V Dry Electrolytic	1
C-22 C-42	47X557	2.2 mmf Ceramic	2
C-23	47X558	30 mmf Ceramic	1
C-24	47X516	20 mmf Ceramic	1
C-25	17A255	1-8 mmf Trimmer	1
C-26	B66533	.05 mf 200 V Tubular	1
C-28A C-28B C-28C C-28D	45X359	20 mf 25 V 20 mf 350 V 40 mf 350 V 40 mf 350 V Dry Electrolytic	1
C-29	H66102	.001 mf 800 V Tubular	1
C-30	47X470	330 mmf Molded Mica	1
C-31	47X508	500 mmf Ceramic	1
C-32A C-32B	76X4	100 mmf Dual Ceramic	1
C-33	B66403	.04 mf 200 V Tubular	1
C-34	D66502	.005 mf 400 V Tubular	1
C-36	B66402	.004 mf 200 V Tubular	1
C-37	D66104	.1 mf 400 V Tubular	1
C-38	D66203	.02 mf 400 V Tubular	1

C-39 C-41 C-40	47X471	68 mmf Ceramic	1
----------------------	--------	----------------	---

RESISTORS

		Ohms	Watts		
R-1	B85470	47	0.5	Carbon	1
R-2 R-3 R-6	B85102	1000	0.5	Carbon	3
R-4 R-8	B84680	68	0.5	Carbon	2
R-5 R-12 R-13	B84682	6800	0.5	Carbon	3
R-7 R-25	B85473	47 K	0.5	Carbon	2
R-9	B85222	2200	0.5	Carbon	1
R-10	B85273	27 K	0.5	Carbon	1
R-11	43X233	3.6	0.5	Wirewound	1
R-14 R-16	B85104	100 K	0.5	Carbon	2
R-15	B85223	22 K	0.5	Carbon	1
R-17	B84221	220	0.5	Carbon	1
R-18 R-19 R-24 R-26	B85474	470 K	0.5	Carbon	4
R-20	B85153	15 K	0.5	Carbon	1
R-21	36X372	.5 meg.	Volume Control & Switch	1	
R-23	40X285	3 meg.	Tone Control	1	
R-27	B85106	10 meg.	0.5 Carbon	1	
R-28A R-28B	43X224	1000 1400	4.0 6.0	Wirewound	1
R-29	B85105	1 meg.	0.5 Carbon	1	
R-30	B84271	270	0.5 Carbon	1	
R-31	B85225	2.2 meg.	0.5 Carbon	1	

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke	1
L-2	9A2068	Parasitic Choke Assembly	1
L-3	35A9	Insulated Choke	1
L-4	35A8	Insulated Choke	1
T-1	9A1972	"B" Range Loop Antenna	1
T-2	9A2060	1st I-F Trans. (FM)	1
T-3	9A2062	1st I-F Trans. (AM)	1
T-4	9A2061	2nd I-F Trans. (FM)	1
T-5	9A2063	2nd I-F Trans. (AM)	1
T-6	9A2064	Discriminator Transformer	1
T-7	9A2065	Oscillator Coil (AM)	1
T-8	9A2067	Oscillator Coil (FM)	1
T-9	51X134	Output Transformer	1
T-10	9A2004	Dipole Antenna	1
T-11	53X290	Power Transformer	1
T-12	9A2066	Antenna Coil (FM)	1

MISCELLANEOUS

12A490	12" P.M. Speaker	1
3A303	Tube Socket—Octal (8 prong) Molded	2
3A426	Tube Socket—Miniature	4
3A427	Tube Socket (12AT7)	1
3A443	Tube Socket (6BE6)	1
3A304	Phono Motor Socket	1
3A305	Phono Socket—Single Pin Tip	1
2A393	Band Change Switch	1
13X546	Line Cord and Plug Assembly	1
4X1049	Escutcheon	1

DIAL AND DRIVE ASSEMBLY

10A754	Knob	4
58X729	Dial Glass	1
24X446	Idler Pulley	2
15X251	Painter	1
25X1616	Dial Bracket	1
7A103	No. 47 Pilot Light Bulb	2
7A199	Pilot Light Socket Assembly	1
26X486	Drive Shaft	1
41X26	Reflector, Dial Light	2
28X113	Drive Cord Tension Spring	1
10X38	Drive Cord Assembly	1
19X192	"C" Washer (Mtg. drive Shaft)	2
6X66	Rubber Grommet (Mtg. gang cond.)	3

TYPE V-28A166 RECORD CHANGER PARTS

V-27278	Motor Assembly, 60 cycles 105-125 Volts AC	1
Shure P-81	Crystal Cartridge Semi Permanent Needle	1

(When ordering needles, specify part number and letter stamped on cartridge.)

DESCRIPTION

SPECIFICATIONS

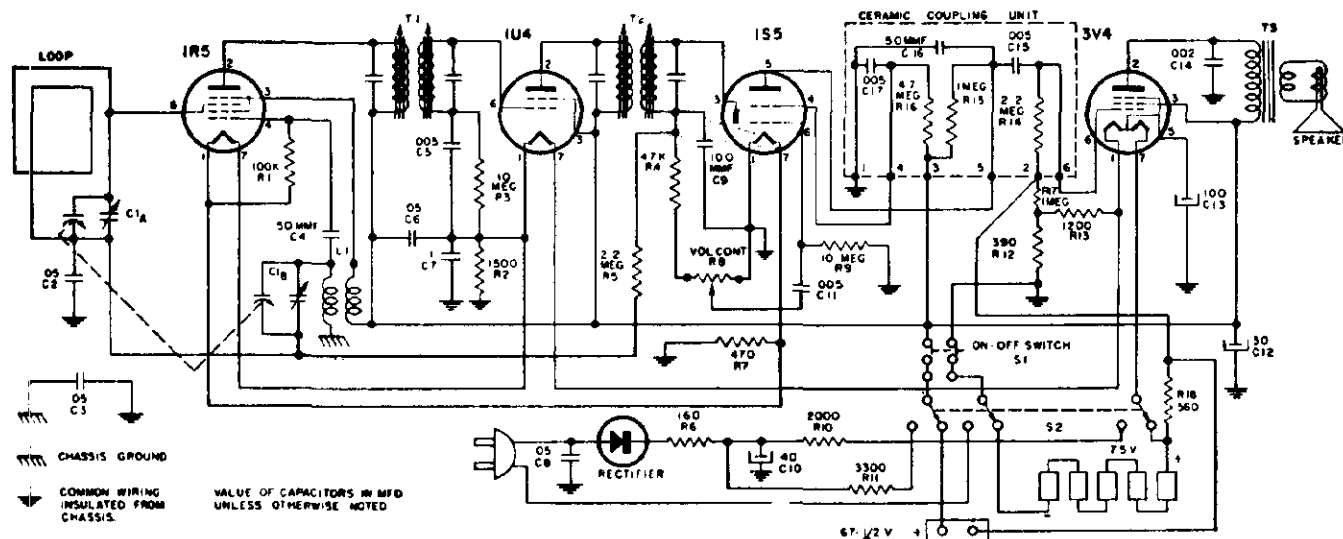
Tube Complement

1 R5—Oscillator Converter

1U4—I.F. Amplifier

1S5—AVC, Detector, 1st Audio

3V4—Power Output



ALIGNMENT INSTRUCTIONS

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed.

Output meter.

Non-metallic screwdriver.

Dummy antenna—.1 mfd.

Volume control—Maximum: all adjustments.

Connect ground lead of signal generator to common negative.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil of speaker.

ALIGNMENT PROCEDURE

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Adjust Trimmer for	Trimmer Function
Fully open	455 KC	.1	*1R5 Grid (Stator of C1A)	T2	Maximum	Output I.F.
Fully open	455 KC	.1	*1R5 Grid (Stator of C1A)	T1	Maximum	Input I.F.
Fully open	1610 KC	.1	*1R5 Grid (Stator of C1A)	C1B	Maximum	Oscillator
Tune in signal from generator	1400 KC	—	Loosely coupled to loop	C1A	Maximum	Antenna

*Connect ground lead of signal generator to common negative.

RECEIVER STAGE SENSITIVITIES

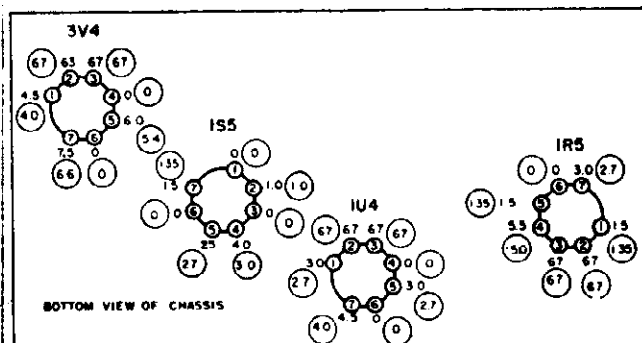
The table below lists the sensitivity at the input of each stage. The receiver should be tuned to 1000 KC for all readings. All measurements are based on an output of 50 milliwatts. This may be measured by disconnecting the speaker voice coil and substituting a 3.2 ohm 5 watt resistor across the secondary winding of the output transformer. A reading of .4 volt across this resistor will be equivalent to a 50 milliwatt out-

put. The volume control must be set to maximum. The signal source must be an accurately calibrated signal generator capable of supplying both 1000 KC and 455 KC signals modulated 30% with a 400 cycle audio signal. Variations in sensitivity of plus or minus 25% are usually permissible.

SIGNAL GENERATOR

Freq.	Coupling Condenser	Connection to Receiver	Ground Connection	INPUT FOR 50 MILLIWATT OUTPUT
1000 kc	.1 mfd	1R5 Mixer Pin 6	Common Negative	150 microvolts
455 kc	.1 mfd	1R5 Mixer Pin 6	Common Negative	120 microvolts
455 kc	.1 mfd	1U4 IF Amp. Pin 6	Common Negative	4000 microvolts
400 cycles	.1 mfd	1S5 2nd Det. Pin 6	Common Negative	.028 volts
400 cycles	.1 mfd	3V4 Output Pin 6	Common Negative	2.8 volts

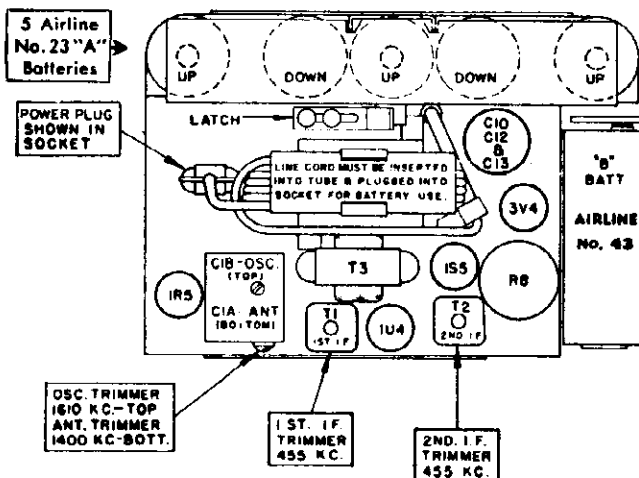
MODEL 84GWM-1058A



All voltages are measured from tube pin to common negative with a 20,000 ohm per volt voltmeter.

Voltages shown in circles are obtained when set is operated on 117 volt current.

Voltages shown outside the circles are obtained when the set is operated on batteries. New batteries in good condition should be used for these measurements.



REPLACEMENT PARTS LIST

Circuit Diagram Reference	Part No.	Description
CONDENSERS		
C1A, C1B	B19-197	Variable condenser
C2, C6	A16-152	.05 MFD 200 volt condenser
C3	A16-158	.05 MFD 400 volt condenser
C4	A15-175	50 MMF mica condenser
C5, C11	A16-153	.005 MFD 600 volt condenser
C7	A16-157	.1 MFD 200 volt condenser
C8	A16-189	.05 MFD 400 volt condenser
C9	A15-188	100 MMF mica condenser
C10 } C12 } C13 }	A18-290	{ 40 MFD 150 volt electrolytic condenser 30 MFD 150 volt electrolytic condenser 100 MFD 10 volt electrolytic condenser }
C14	A16-182	.002 MFD 200 volt condenser
C15 } C16 } C17 }	*A17-100	{ .005 MFD 50 MMF ......005 MFD } See Note Below
RESISTORS		
R1	A60-671	100K ohm 1/2 watt 20% resistor
R2	A60-680	1500 ohm 1/2 watt 10% resistor
R3, R9	A60-663	10 megohm 1/2 watt 20% resistor
R4	A60-685	47K ohm 1/2 watt 20% resistor
R5	A60-684	2.2 megohm 1/2 watt 20% resistor
R6	A60-725	160 ohm 5 watt 10% resistor
R7	A60-722	470 ohm 1/2 watt 10% resistor
R8	A24-178	Volume control, with switch
R10	A60-757	2000 ohm 10 watt 10% resistor
R11	A60-724	3300 ohm 1 watt, 10% resistor
R12	A60-665	390 ohm 1/2 watt 10% resistor
R13	A60-756	1200 ohm 1/2 watt 10% resistor
R14 } R15 } R16 }	*A17-100	{ 2.2 megohm 1 megohm 4.7 megohm } See Note Below

Circuit Diagram Reference	Part No.	Description
COILS		
L1	A10-514	Oscillator coil
T1, T2	C10-475	1st and 2nd I.F. transformer
T3	B80-245	Output transformer
MISCELLANEOUS		
	B83-586	Baffle, speaker
	A11-322	Bracket, handle, mounting
	S84-242	Bracket, "A" battery retainer
	A72-32	Bushing, thimble, chassis mounting
	D42-448	Cabinet, (includes back cover)
		Cover, Back for Cabinet
	S84-257	Chassis Cover Assembly
	A83-421	Clip, I.F. transformer mounting
	B98-9	Grille Cloth
	C83-585	Handle, molded
	C52-278	Knob, dial
	C52-277	Knob, tuning
	C52-276	Knob, volume
	A83-568	Rectifier, selenium
	A71-38	Retainer, paper tube, for line cord
	A68-35	Socket, tube
	B79-367	Speaker, 4" P.M.
	A70-141	Spring, compression for handle
S2	A69-182	Switch AC-DC battery
	A76-49	Terminal for "B" battery
	B82-58	Loop Antenna

*NOTE: C15, C16, C17, R14, R15, R16, are contained in the Ceramic Coupling Unit, Part No. A17-100.

MODELS BKO-A, CT8-A, GM9T-A,
HNO, ILOT, PC9-A, Ch. 10A

GENERAL INFORMATION

TYPE - Chassis 10A is a universal, push-button tuned, automotive type, superheterodyne chassis, used in Motorola Models CT8-A, GM9T-A, BKO-A, PC9-A, HNO, ILOT, etc. An external speaker is used.

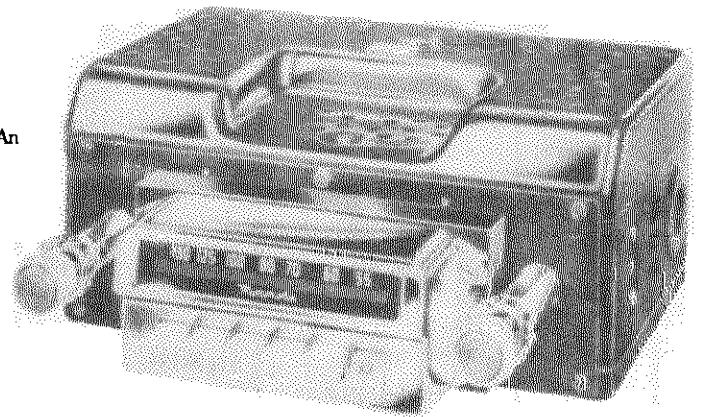
TUNING RANGE - 535 to 1600 Kc IF - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
6BE6 - Converter
6BA6 - IF Amplifier
6AT6 - Det AVC & 1st AF Amp
6AQ5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 6.8 amps at 6.3V DC

POWER OUTPUT - 3 watts (max.)

PUSH BUTTON TUNER - Automatic Tuner AT-58. For complete service information on this tuner, refer to Motorola AT-58 Service Manual.



Typical Auto Receiver Using 10A Chassis
(Model CT8-A Illustrated)

NOTE:

This manual contains a complete list of replacement parts for the 10A chassis. Replacement parts for specific receivers in which the 10A chassis is used, will be found in separate service manuals bearing the appropriate receiver model numbers.

TO SET THE PUSH BUTTONS

1. Turn radio ON and allow it to warm up for a few minutes.
2. Push the number '1' button in as far as it will go and HOLD IT THAT WAY.
3. With the tuning knob, tune in the station you desire to set up. Tune carefully until you are ex-

actly on the station; tuning to either side of it will result in poor tone quality. Release button and knob after tuning-in station.
4. Follow above steps 2 and 3 for the remaining four buttons.

ALIGNMENT

Expose alignment adjustment screws as follows:

Remove the top and bottom covers; replace front plate screws to hold front plate in position after making sure that the plastic idler gear engages gear on tuner. On some models it will also be necessary to remove the escutcheon and escutcheon spacer.

Connect a PM speaker (3.2 ohm VC) to VC and GND terminals and connect a low range output meter across voice coil.

Connect a 6 volt storage battery to GND (or chassis) and BAT terminals of receiver; turn receiver on and allow it to warm up for a few minutes. Set receiver volume control at maximum. Push 'M' button (far enough so it will lock in) to place tuner in manual position.

For greatest accuracy, keep output of receiver

at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part Number 66A76278, is required for adjusting the tuner cores. IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores; the slightest inward pressure may move the tuner carriage and result in inaccurate alignment.

Construct a dummy antenna as shown in Fig. 1. POINTER ADJUSTMENT. The pointer can be moved slightly for calibration correction by turning the eccentric adjustment rivet. This rivet has a slotted head and is exposed only when tuner is tuned to high frequency end. See Figure 1 for its location.

PAGE 21-2 MOTOROLA

MODELS BKO-A, CT8-A, GM9T-A,
HNO, ILOT, PC9-A, Ch. 10A

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SET TO	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	6BE6 grid (pin #7) & chassis	455 Kc	High frequency end- (cores out)	1, 2, 3 & 4	Peak for maximum in order indicated. Check by re-peating step.
RF ALIGNMENT						
2.	See Fig. 1	Ant receptacle thru dummy	1610 Kc	High frequency end; cores should project 1-1/8" from cans. (Screw out if necessary)	5, 6 & 7	Peak for maximum in order indicated.
3.	"	"	1425 Kc	1425 Kc-Per Fig. 1	8, 9 & 10	Peak for maximum in order indicated.
4.	"	"	Turn generator power off.	'Osc Pad' Adj per Fig. 1	11	Peak oscillator padder for maximum noise. See*

5. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

- * If padder core (11) must be moved more than 1/2 turn from its original position, repeat steps 2, 3 & 4 until it is necessary to move the padder core less than 1/2 turn in this step.

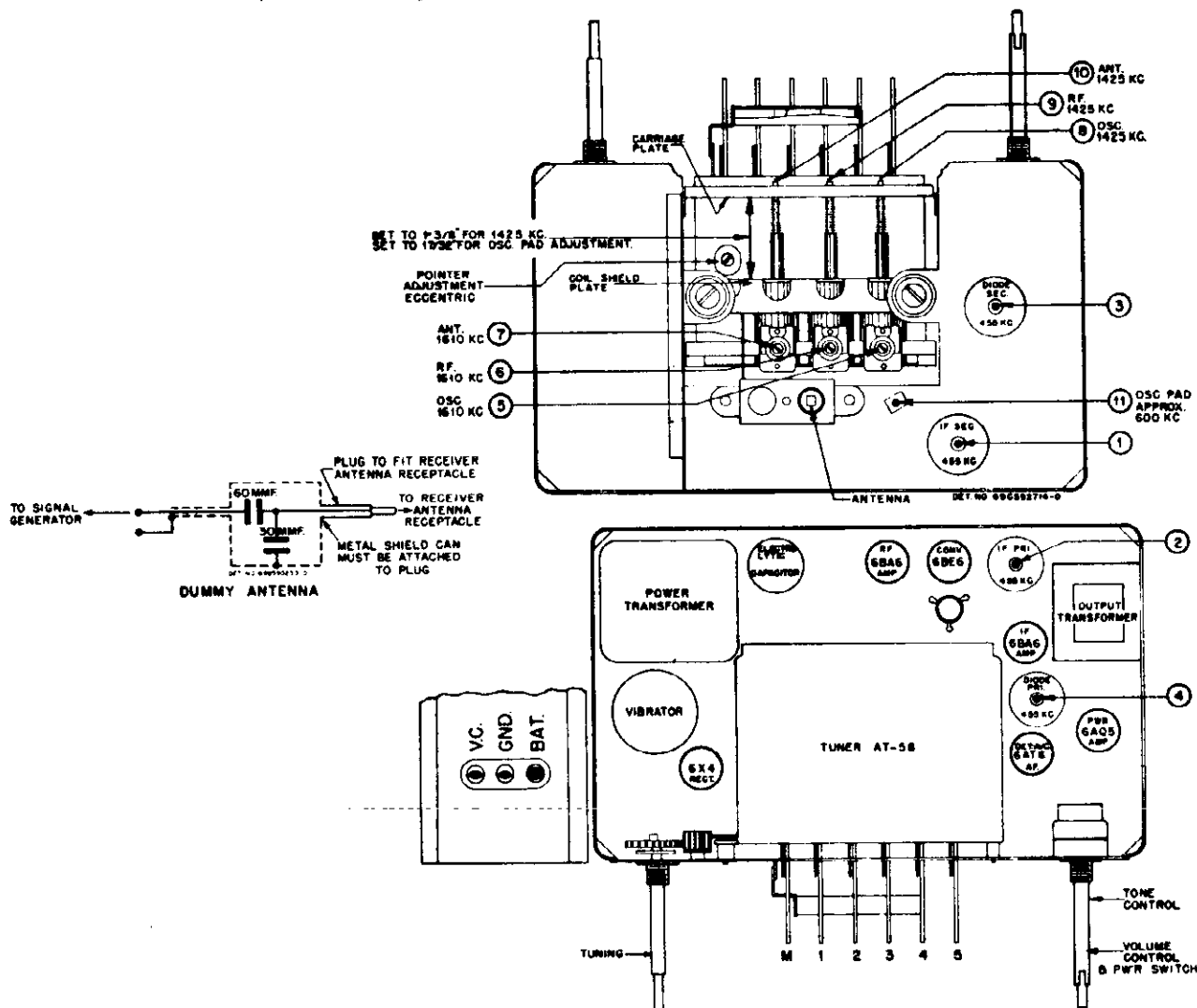


FIGURE 1. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA



PAGE 21-4 MOTOROLA

MODELS BKO-A, CT8-A, GM9T-A,
HNO, ILOT, PC9-A, Ch. 10A

REPLACEMENT PARTS LIST

REF.
NO. PART NO. DESCRIPTION

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1	21B591682	Ceramic: 90 muf 500V
C-2	8A4529	Paper: .006 mf 100V
C-3	20A480600	Trimmer, variable: mica; 50 to 280 muf; on same bracket as C-8 and C-9
C-4	8R13514	Paper: .05 mf 100V
C-5	8R14791	Paper: .05 mf 400V
C-6	8R13166	Paper: .1 mf 400V
C-7	21K70720	Molded: 5 muf 500V
C-8	20A480600	Trimmer, variable: mica; 50 to 180 muf; on same bracket as C-3 and C-9
C-9	20A480600	Trimmer, variable: mica; 30 to 60 muf; on same bracket as C-3 and C-8
C-10	21R6513	Mica: 50 muf 300V
C-11	21A71872	Ceramic: 400 muf 5% 500V
C-12	8K17028	Paper: .5 mf 100V
C-13	8R13514	Paper: .05 mf 100V
C-14	8H472754	Paper: .01 mf 100V
C-15	8R13514	Paper: .05 mf 100V
C-16	21B77562	Paper: 100 muf 500V
C-17	21B77562	Paper: 100 muf 500V
C-18	21K70720	Molded: 5 muf 500V
C-19	8K17028	Paper: .5 mf 100V
C-20	21R6639	Mica: 500 muf 500V 20%
C-21	8K71910	Paper: .006 mf 400V
C-22	8R71911	Paper: .03 mf 400V
C-23	8K12840	Paper: .006 mf 1600V
C-24	23A473015	Electrolytic: 30-30-20 mf/350-300-25V
C-25	8K71910	Paper: .006 mf 400V

FUSE

F-1	65A10266	Fuse: 10 amp; 3AG
-----	----------	-------------------------

VIBRATOR

G-1	48B3333	Vibrator, non-sync: 4-pin
-----	---------	---------------------------------

DIAL LIGHT

I-1	65X10867	Bulb: 6.3V; .25A; bayonet base; clear
-----	----------	---

COILS

L-1,2	24B71881	RF and Antenna (specify color of paint dot on old coil when ordering)
L-3	24B71879	Oscillator (specify color of paint dot on old coil when ordering)
L-4	24B70227	Oscillator Padder: complete with iron core..
L-5	24K591605	Choke, RF
L-6	24A472535	Choke, hash

RESISTORS

Note: All resistors are carbon insulated type unless otherwise specified.

R-1	6R6032	470,000 20% 1/2W
R-2	6R5554	390 10% 1/2W
R-3	6R6075	100,000 20% 1/2W
R-4	6R6056	47,000 20% 1/2W
R-5	6R476060	10,000 20% 2W
R-6	6R3992	150 20% 1/2W
R-7	6R6010	330 20% 1/2W
R-8	6R6004	1 meg 20% 1/2W
R-9	6R6056	47,000 20% 1/2W
R-10	18A591550	Volume Control: 500,000; tapped at 50,000 (dual - also includes tone control R-17)
R-11	6R6028	22,000 20% 1/2W
R-12	6R6004	1 meg 20% 1/2W
R-13	6R5614	56 10% 1/2W
R-14	6R5614	56 10% 1/2W
R-15	6R5577	2700 10% 1/2W
R-16	6R2118	3.3 meg 20% 1/2W

REF.
NO. PART NO. DESCRIPTION

R-17		Tone Control: See volume control R-10 ..
R-18	6R6032	470,000 20% 1/2W
R-19	6R6054	10,000 20% 1/2W
R-20	6R6015	220,000 20% 1/2W
R-21	6R6336	270 10% 1W
R-22	6R476004	1000 20% 2W

SPARK PLATE

SP-1	1A472606	Spark Plate Assembly
------	----------	----------------------------

TRANSFORMERS

T-1,2	24B485670	IF and Diode, 455 Kc: complete with padding capacitors and tuning cores but less shield
T-3	25B70171	Output Transformer
T-4	25B472533	Power Transformer

TUNER

1X472770	AT-58 Automatic Tuner (see Service Manual Motorola Part No. 54P480955 for complete breakdown)
----------	---

PART
NUMBER DESCRIPTION

CHASSIS PARTS - MECHANICAL

7A472580	Bracket, antenna receptacle mtg
42A4215	Clip, vibrator grounding
15C472596	Cover, bottom
15K591601	Cover, top
4A51289	Cupwasher (tuner mtg)
37A12949	Grommet, rubber (tuner mtg)
457671	Lockwasher, split: #8; cad pl (tuner mtg)....
29R5239	Lug, soldering
1X70646	Receptacle, antenna
5S7771	Rivet: .088 x 3/16; stl; nkl pl (tube socket and soldering lug mtg)
5S7706	Rivet: .122 x 1/8; stl; nkl pl (term strip mtg)
5S7707	Rivet: .122 x 5/32; stl; nkl pl (ant receptacle, tuner shield, hash shield and output trans mtg)
5S7701	Rivet: .122 x 3/16; stl; nkl pl (vib socket mtg)
5S7751	Rivet: .122 x 1/4; stl; antique copper finish (spark plate mtg)
3S7454	Screw, sheet metal: #8 x 1/4; PKZ plain hex head; stl; cad pl (pilot light socket mtg)
3S7475	Screw, sheet metal: #8 x 1/4; PKZ slotted acorn head; stl; cad pl (housing screws)....
3S7154	Screw, machine: 8-32 x 1/4 slotted binderhead; stl; cad pl (tuner mtg)
3S3397	Screw, sheet metal: #8 x 5/16; PKZ plain hex head; stl; cad pl (pwr trans mtg)
1X473150	Shield Assembly, light
26A472560	Shield, hash
26K485936	Shield, coil (for T-1 and T-2)
26A472602	Shield, tuner
9A472905	Socket, pilot light: includes brackets
9A70208	Socket, tube: 4-pin; with grounding lug (vibrator socket)
9A472534	Socket, tube: miniature; 7-prong
9A580002	Socket, tube: miniature; 7-prong (for 6AQ5 tube)
31C490140	Strip, terminal: 1 insulated lug, #1 mtg
31K86126	Strip, terminal: 2 insulated lugs, #2 mtg
31A472574	Strip, terminal: 4 insulated lugs, #4 mtg
39A26068	Wiper, grounding

GENERAL INFORMATION

TYPE - Automotive type superheterodyne receiver specifically designed to fit the 1950 and 1949 Chevrolet. Receiver consists of two units; the RF tuner and the Power & Audio Unit.

TUNING RANGE - 535 to 1600 Kc

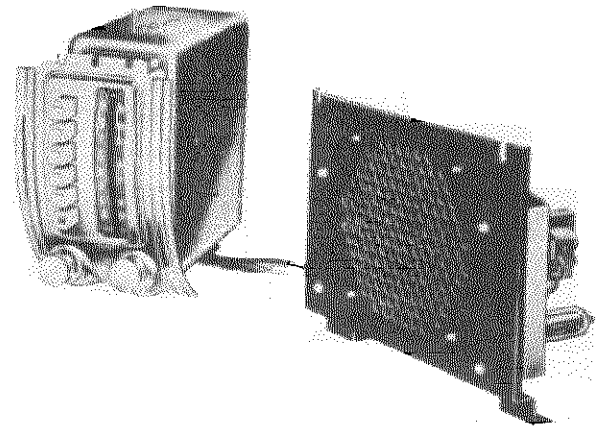
IF - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
6BE6 - Converter
6BA6 - IF Amplifier
6AT6 - Diode detector, AVC & 1st AF Amp
6AQ5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 6.8 amps at 6.3V DC

POWER OUTPUT - 3 watts (max)

PUSH BUTTON TUNER - Automatic Tuner AT-71



ALIGNMENT

EQUIPMENT REQUIRED

1. A special tool for adjusting the tuner cores. Use Alignment Tool, Motorola Part No. 66A76278.
2. A small screwdriver for IF & RF alignment.
3. An accurately calibrated AM modulated signal generator.
4. A low range output meter.
5. A special dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 1. The 21" coaxial lead needed in its construction is the same type as used for lead-in on Motorola car antennas.

PROCEDURE

1. Expose the alignment screws as follows: remove escutcheon, dial background and rear cover.
2. Connect the power & audio unit to the tuner unit and connect the output meter across the voice coil.
3. Connect a 6 volt storage battery to the power & audio unit chassis and 'A' lead. Turn on the receiver and allow it to warm up a few minutes. Set the receiver volume control at maximum and the tone control on 'high'.

4. For greatest accuracy, keep the output of the receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment.

5. IF & RF ALIGNMENT - See Alignment Chart & Fig. 1
IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores. The slightest inward pressure on the alignment tool may move the tuner carriage and result in inaccurate alignment.

6. ANTENNA TRIMMER ADJUSTMENT. Once alignment has been satisfactorily performed, no further adjustment of any alignment screws should be made except to align the antenna trimmer (7) to the antenna after receiver is installed in car. This adjustment should be made with the antenna fully extended and receiver set to approximately 1400 Kc. Peak the trimmer for maximum volume of a weak station or background noise between stations. Trimmer can be reached from front by removing the top push button.

7. POINTER ADJUSTMENT. The pointer can be moved slightly for calibration correction by turning the eccentric adjustment rivet. This rivet has a slotted head and is exposed only when tuner is tuned to high frequency end. See Figure 1 for its location.

MODEL CTO,
Chevrolet

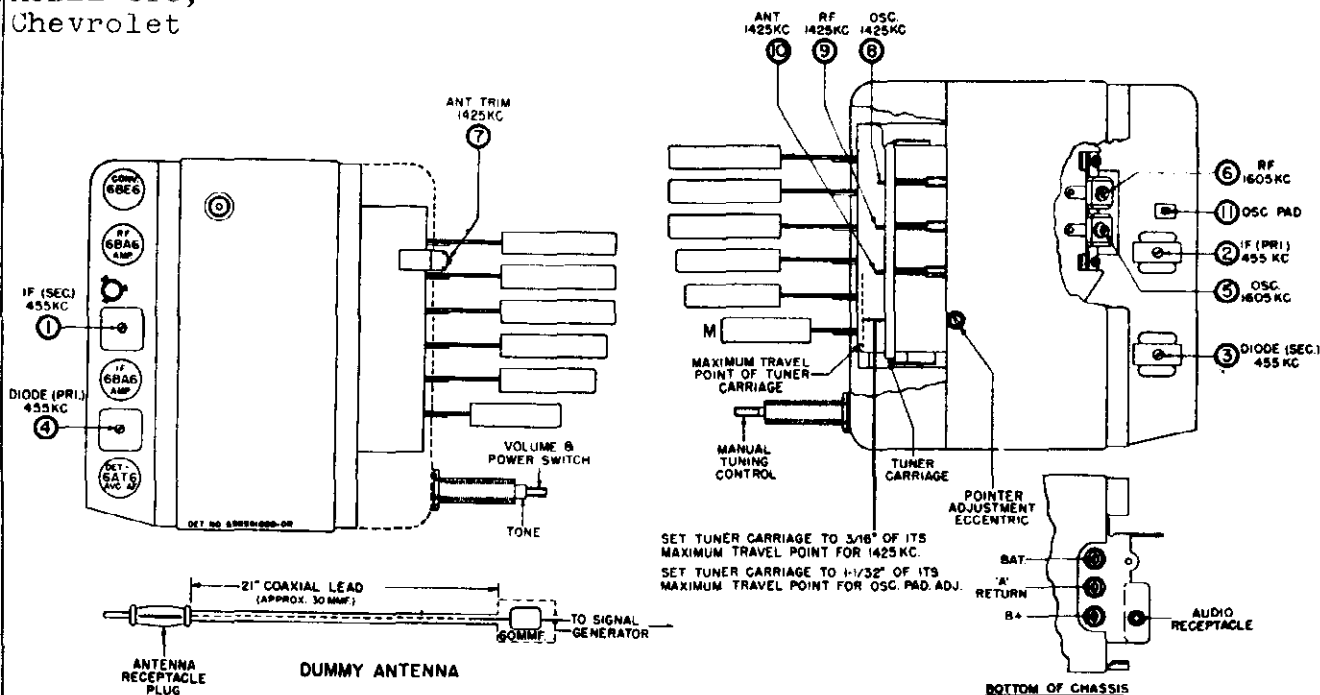


FIGURE 1. TUBE & TRIMMER LOCATIONS

ALIGNMENT CHART

STEP	TUNER SET TO	DUMMY ANTENNA	SIGNAL GENERATOR CONNECTED TO	SIGNAL GENERATOR FREQUENCY	ADJUST	REMARKS
1.	High frequency end (cores out)	.1 mf	Hi side -6BE6 grid (pin #7) Lo side -chassis.	455 Kc	1, 2, 3 & 4	Peak for maximum in order indicated. Check by repeating procedure.
2.	High frequency end; Core screws should project 5/16" from core adjustment clip	Special -See Fig. 1	Ant. receptacle through special dummy.	1605 Kc	5, 6, & 7	Peak for maximum in order indicated.
3.	Using manual knob, set tuner to extreme HF position, then move carriage inward 3/16" (see 'Measurements', Fig. 1)	Special -See Fig. 1	Ant. receptacle through special dummy.	1425 Kc	8, 9 & 10	Peak for max. in order indicated.
4.	Move carriage 1-1/32" inward from point of maximum travel	Special -See Fig. 1	Ant. receptacle through special dummy.	Turn generator power off.	11	Peak oscillator padder for maximum noise. See*
5.	Approx. 1400 Kc	-	-	-	7	With set installed in car, peak antenna trimmer for maximum noise or volume of a weak station. Car antenna should be fully extended.

* If padder core (11) must be moved more than 1/2 turn from its original position, repeat steps 2, 3 & 4 until it is necessary to move the padder core less than 1/2 turn in this step.



FIGURE 2. SCHEMATIC DIAGRAM

REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
TUNER UNIT - ELECTRICAL PARTS					
CAPACITORS					
C-1	21B77562	Ceramic; 100 mmf 500V	L-4	24A70227	Oscillator ladder coil; complete with iron tuning core
C-2	20A590629	Trimmer, variable mica; 50-220 mmf; with brkt	RESISTORS		
C-3	8C4529	Paper; .006 mf 300V	Note: All resistors are insulated carbon type, unless otherwise specified.		
C-4	8k13514	Paper; .05 mf 100V	R-1	6R6032	470,000 20% 1/2W
C-5	8k14791	Paper; .05 mf 400V	R-2	6R6010	330 20% 1/2W
C-6	21K70720	Ceramic; 5 mmf 500V	R-3	6R6075	100,000 20% 1/2W
C-7	20A590639	Trimmer, variable mica; 20-180 mmf; includes C-9 and brkt	R-4	6R6056	47,000 20% 1/2W
C-8	21K74661	Ceramic; 50 mmf 300V	R-5	6R6010	330 20% 1/2W
or	21H6513	Mica; 50 mmf 300V	R-7	6R6004	1 meg 20% 1/2W
C-9	20A590639	Trimmer, variable mica; 5-80 mmf; includes C-7 & brkt	R-8	6R6010	330 20% 1/2W
C-10	21A71872	Ceramic; 400 mmf 5% 500V	R-10	6R6287	6800 20% 1W N.I.
C-11	8k13514	Paper; .05 mf 100V	R-11	6R6001	68,000 20% 1/2W
C-14	8k17028	Paper; .05 mf 100V	R-13	6R602H	22,000 20% 1/2W
C-15	8k13514	Paper; .05 mf 100V	R-14	6R6056	47,000 20% 1/2W
C-16	21K74661	Ceramic; 50 mmf 300V	R-15	18B540604	Volume Control; 500,000 ohms; tapped at 50,000 ohms (includes tone control R-20 and switch S-1)
C-19	8H472754	Paper; .01 mf 100V	R-18	6R6161	1500 20% 1/2W
C-20	8C4529	Paper; .006 mf 100V	R-19	6R2118	3.3 meg 20% 1/2W
C-21	8K71911	Paper; .03 mf 400V	R-20		500,000 ohm tone control (part of vol cont).
C-22	21K481377	Ceramic; 500 mmf 500V	R-21	6R6032	470,000 20% 1/2W
			R-22	6R6004	1 meg 20% 1/2W
DIAL LIGHT			SWITCH		
I-1	65X10867	Bulb; 6.3V; .25A; bayonet base; clear #44	S-1		Switch (Part of Volume Control)
COILS			SPARK PLATE		
L-1	24B71881*	RF & Antenna coil (specify color of paint dot on old coil when ordering)	SP-1	1A590637	Spark Plate Assembly
L-2	24B71881*	MF & Antenna coil (specify color of paint dot on old coil when ordering)			
L-3	24B71879*	Oscillator coil (specify color of paint dot on old coil when ordering)			

MODEL CTO,
Chevrolet

REF. NO.	PART NO.	DESCRIPTION
TRANSFORMERS		
T-1	24B485553	IF, 455 Kc: complete with padding capacitors and tuning cores
T-2	24K485555	Diode, 455 Kc: complete with padding capacitors and tuning core
TUNER		
1X590784	AT-71 Automatic Tuner.....	
POWER & AUDIO UNIT - ELECTRICAL PARTS		
CAPACITORS		
C-12	8K17028	Paper: .5 mf 100V
C-13	8K12840	Paper: .006 mf 1600V
C-17	23A473015	Electrolytic: 30-30-20 mf/350-300-25V
C-18	8K71910	Paper: .006 mf 400V
FUSE		
F-1	65A10266	Fuse, 10 amp: type 3AG
VIBRATOR		
G-1	48B3333	Vibrator, non-sync: 4-pin
COILS		
L-5	24A472535	Choke, hash
SPEAKER		
LS-1	50K590681	Speaker: 6" PM; 3.2 ohm VC
RESISTORS		
Note: All resistors are insulated carbon type unless otherwise specified.		
R-6	6R6415	100 10% 1 watt
R-9	6R6054	10,000 20% 1/2W
R-12	6R6015	220,000 20% 1/2W
R-16	6R6336	270 10% 1 watt
R-17	6R6184	1000 20% 1 watt N.I.
TRANSFORMERS		
T-3	25K590650	Power transformer
T-4	25B590648	Output transformer

PART
NUMBER DESCRIPTION

TUNER UNIT - CHASSIS MECHANICAL PARTS

43A590605	Bushing, tuning shaft
42A485548	Clip, coil can mounting (T-1 & T-2)
2S8397	Nut, hex: 1/2-28 x 5/8 stl; cad pl (volume control and tuning control bushings mtg)
1X590785	Pointer and Sleeve Assembly
1X590794	Receptacle, antenna input: includes bracket and terminal strip
9A54664	Receptacle, 1-pin (audio input)
5S7771	Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg)
5S7706	Rivet: .122 x 1/8 stl; pol nkl (terminal strip mtg)
5S7701	Rivet: .122 x 3/16; stl; pol nkl (audio receptacle mtg)
3S7205	Screw, machine: 8-32 x 1/4; slotted hex head; locking type; stl; cad pl (automatic tuner mtg)
3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (variable cap brkt, antenna receptacle brkt, and pilot lamp brkt mtg)
26A473011	Shield, light
9A472905	Socket, pilot light & brkt
9A472534	Socket, tube: miniature; 7-prong
9K580218	Socket, tube: miniature; 8-prong
31K490141	Strip, terminal: 1 ins lugs, #2 mtg (part of antenna receptacle brkt)
31K490143	Strip, terminal: 2 ins lugs, #2 mtg
1K590623	Tuning Shaft and Gear Assembly
4A21577	Washer, "C" (tuning shaft mtg)
4S490351	Washer, flat: 11/16 x .515 x .033 thick; stl; cad pl (tuning shaft bushing and volume control mtg)
4A580282	Washer, spring (tuning shaft mtg)

PART
NUMBER DESCRIPTION

TUNER UNIT HOUSING PARTS

7B590696	Background, dial
1X590783	Cover, front: includes gear mounting stud
15D590615	Cover, rear
13K590702	Eascutcheon, dial
7B590693	Frame, dial retaining
44B472872	Gear, idler (mounted on front cover)
2S8397	Nut, hex: 1/2-28 x 5/8 stl; cad pl (tuner bushing mtg)
34C590802	Scale, dial
3S7156	Screw, machine: 6-32 x 3/16 slotted binderhead; stl; cad pl (dial retaining frame mtg)
3S7205	Screw, machine: 8-32 x 1/4 slotted hex head; stl; cad pl (shell housing)
3S7475	Screw, sheet metal: #8 x 1/4 plain acorn head; stl; cad pl (front cover and rear cover mtg)
3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (front cover mtg)
15D590600	Shell, housing
46A590602	Stud, idler gear mtg
4K73809	Washer, "C" (idler gear mtg)
4S490351	Washer, 11/16 x .515 x .033 thick; stl; cad pl (tuner bushing mtg)

POWER & AUDIO UNIT - CHASSIS MECHANICAL PARTS

42A4215	Clip, vibrator grounding
14A590633	Insulator, armite (used on 4-pin connector)
14K590653	Insulator, armite (cable insulator)
1X590689	Lead Assembly, "A": includes fuse & fuse receptacle, 4-pin connector and insulator
1X590691	Lead Assembly, audio: includes plug
4S7666	Lockwasher, ext: #6; stl; cad pl (power trans mtg)
2S7005	Nut, hex: 6-32 x 1/4; stl; cad pl (power trans mtg)
64C590641	Plate, speaker mtg
28K71775	Plug, 1-pin (audio plug)
28A590611	Plug, 4-pin ("A" lead connector)
9B591314	Receptacle, fuse (complete)
5S7769	Rivet: .088 x 3/32 stl; pol nkl (connector plug insulator mtg)
5S7771	Rivet: .088 x 3/16; stl; pol nkl (miniature socket mtg)
5S7701	Rivet: .122 x 3/16; stl; pol nkl (vibrator socket and output trans mtg)
5S7707	Rivet: .122 x 5/32; stl; pol nkl (terminal strip mtg)
3S7475	Screw, sheet metal: #8 x 1/4 PKZ slotted acorn head; stl; cad pl (spkr plate mtg)
3S8176	Screw, sheet metal: #10 x 3/8 PKZ plain hex head; stl; cad pl (spkr mtg)
9A472534	Socket, tube: miniature; 7-prong
9K580218	Socket, tube: miniature (for 6AQ5 tube)
9A70208	Socket, tube: 4-prong (for vibrator)
31K490143	Strip, terminal: 2 ins lugs, #2 mtg
4S1706	Washer, flat: 3/8 x .203 x .033 thick; stl; cad pl (spkr mtg)
4S7555	Washer, flat: 1/4 x .128 x .033 thick; stl; cad pl (output transformer mtg)

MOUNTING PARTS & ACCESSORIES

7B590609	Bracket, tuning unit mtg
1X590563	Button, push: includes clip; 2-3/32" long
1X590656	Button, push: includes clip; 2-3/64" long
1X590661	Button, push: includes clip; 1-15/16" long
1X590662	Button, push: includes clip; 1-25/32" long
1X590663	Button, push: includes clip; "M"
43A590621	Bushing, spacer: chrome pl (large)
43A590603	Bushing, spacer (small)
8A4491	Capacitor, generator
32C590643	Gasket, speaker: rubber
36K472939	Knob, reset: chrome pl (tone control)
36K590638	Knob, volume and tuning control
4S7693	Lockwasher, split: 1/4 stl; cad pl (tuner unit mtg)
2S7022	Nut, hex: 1/4-20 x 7/16; stl; cad pl (tuner unit mtg)
2S8397	Nut, hex: 1/2-28 x 5/8; stl; cad pl (tuner unit mtg to instrument panel)
64A13637	Plate, serrated (tuner unit mtg)
64D590704	Plate, trim: chrome pl
2S490342	Speednut: 10-24 blue (power & audio unit mtg)
46A590644	Stud, threaded shoulder (power & audio unit mtg)
6A4141	Suppressor, distributor
4K590606	Washer, cup: chrome pl
4K489323	Washer, felt (reset knob)

GENERAL INFORMATION

TYPE - Specifically designed for installation in the 1950 and 1949 Chevrolet

TUNING RANGE - 540 to 1600 Kc

IF FREQUENCY - 455 Kc

TUBE COMPLEMENT - 6BE6 - Converter
6BA6 - IF Amplifier
6AV6 - Det, AVC & 1st AF Amp
6AS5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 5.0 amps at 6.3V DC

POWER OUTPUT - 2 watts (maximum)

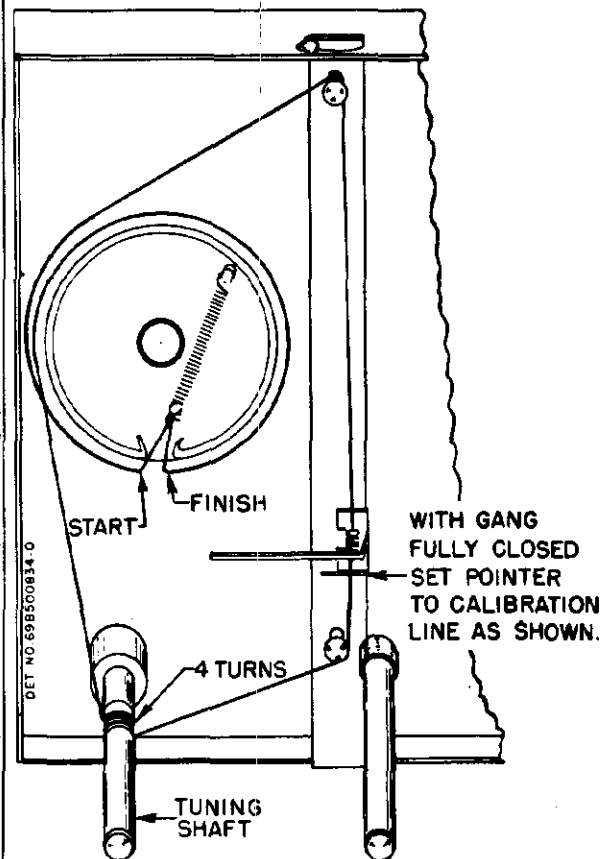
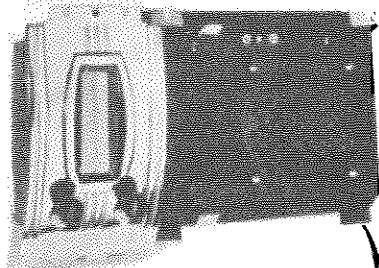


FIGURE 1 STRING DRIVE DETAIL



OPERATING INSTRUCTIONS

VOLUME CONTROL & ON-OFF SWITCH. The volume control and on-off switch are combined and are operated by the right-hand knob. Turn radio on by turning knob to the right until a "click" is heard. Continued rotation to the right will increase volume. To turn radio off, turn knob fully to left until a "click" is heard.

TUNING. Tune stations with the left-hand knob. Always tune carefully until you are exactly on the station; tuning to either side of it will result in poor tone quality.

ALIGNMENT

EQUIPMENT REQUIRED

1. A small screwdriver for IF & RF alignment.
2. An accurately calibrated 400 cycle, AM modulated signal generator.
3. A low range output meter.
4. A special dummy antenna for RF alignment. Construct dummy antenna as shown in Figure 2.

PROCEDURE

1. All adjustments are accessible without removing the covers, through holes provided.
2. Connect an output meter across the voice coil.
3. Connect a 6 volt storage battery to chassis and BATT terminal of receiver; turn receiver on and allow it to warm up for a few minutes.
4. For greatest accuracy, keep output of receiver at approximately 1/2 watt (1/2 watt = 1.25 volts on output meter) throughout alignment by reducing generator output (not receiver volume control) as stages are brought into alignment.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTED TO	GENERATOR FREQUENCY	GANG SET TO	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Hi side - 6BE6 grid (pin #7) Lo side - chassis	455 Kc	High freq. end	1, 2, 3 & 4	Peak for maximum in order indicated. Check by repeating procedure.
RF ALIGNMENT						
2.	Special see Fig. 2.	Ant. receptacle thru special dummy	1605 Kc	Gang open	5	Peak for maximum
3.	"	"	1400 Kc	Tune in signal	6	Peak for maximum
4.	"	"	600 Kc	"	7	Peak antenna padder for maximum while rocking gang.

5. Repeat steps 3 & 4 until maximum output is obtained. The last adjustment should be trimmer (6).
6. With set installed in car, peak antenna trimmer (6) for maximum noise or volume of a weak station. Car antenna should be fully extended, and receiver set to approximately 1400 Kc.

MODEL CTOM,
Chevrolet, 1949-1950

FIGURE 3. PARTS LOCATION - RECEIVER REAR VIEW

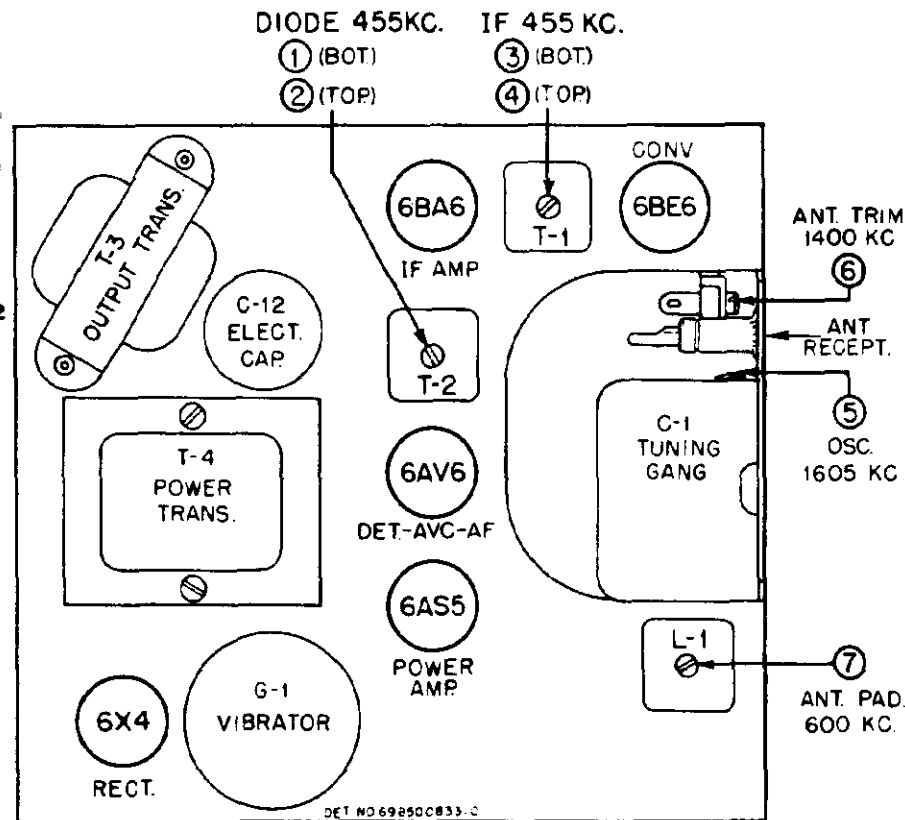


FIGURE 2. TUBE & TRIMMER LOCATIONS

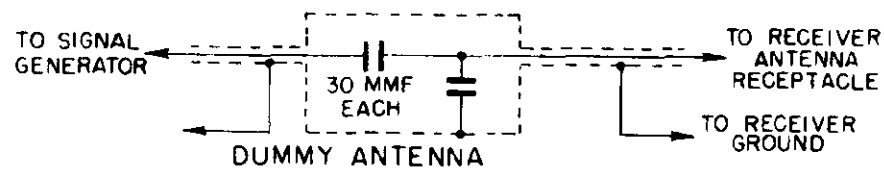
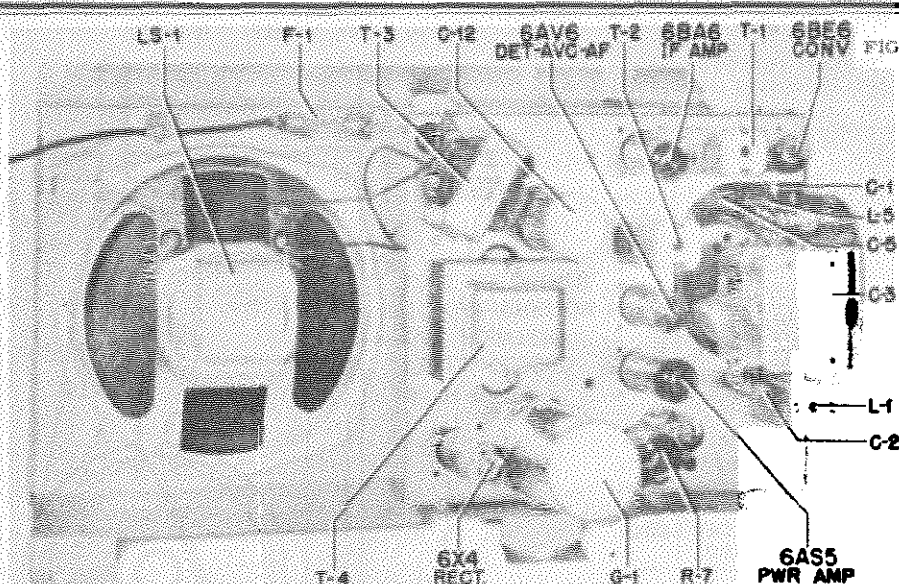
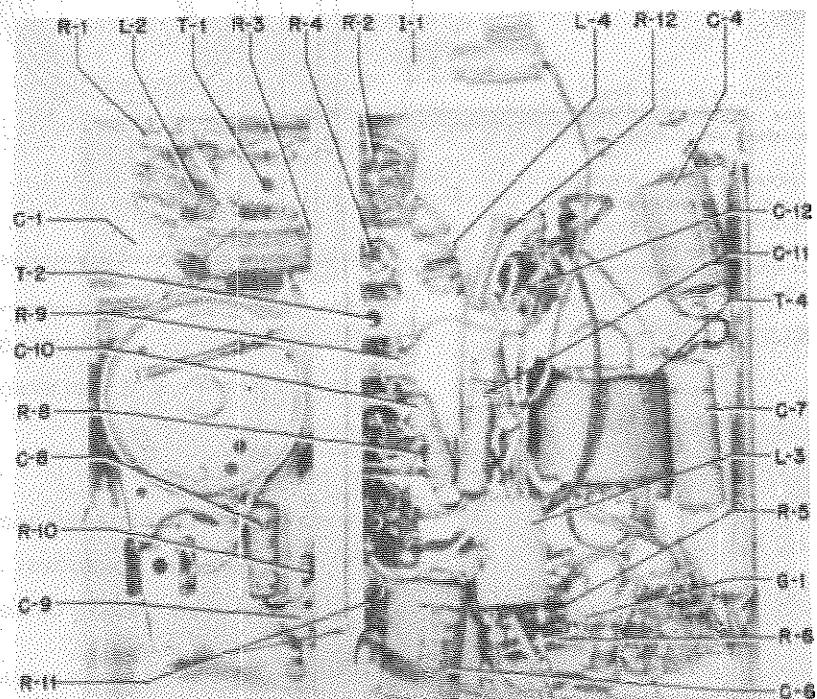


FIGURE 4. PARTS LOCATION - CHASSIS BOTTOM VIEW



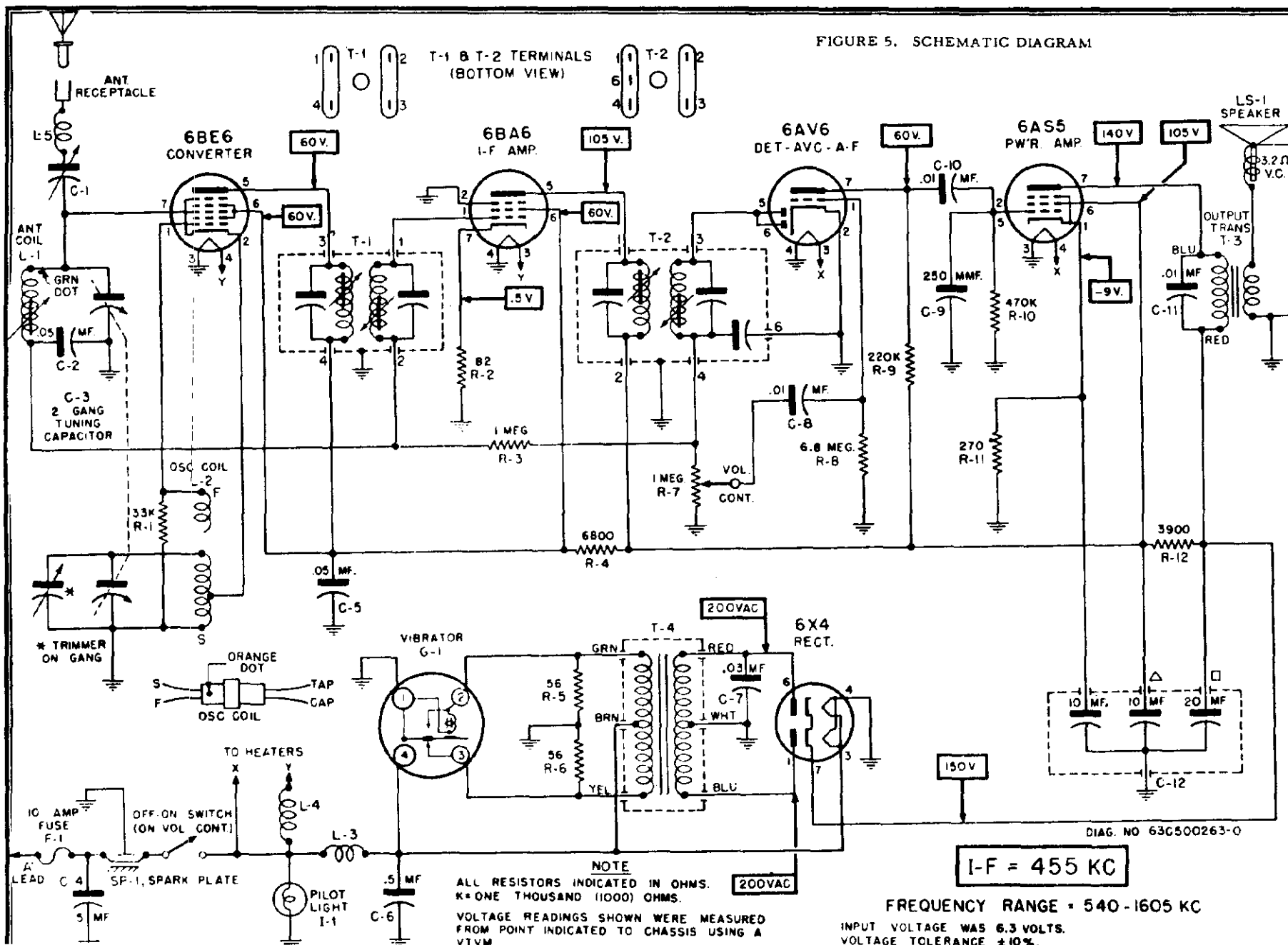


FIGURE 5. SCHEMATIC DIAGRAM

PAGE 21-12 MOTOROLA

MODEL C TOM,
Chevrolet, 1949-1950

REPLACEMENT PARTS LIST

NOTE: When ordering parts specify model number of set in addition to part number and description of part.

Ref. No.	Part No.	Description
CHASSIS PARTS - ELECTRICAL		
Capacitors		
C-1	20K500197	Trimmer, variable mica: 70 mmf; includes mounting brkt.....
C-2	8R13514	Paper: .05 mf 100V.....
C-3	19B500195	Variable, 2-gang.....
C-4	8K17028	Paper: .5 mf 100V.....
C-5	8R23146	Paper: .05 mf 200V.....
C-6	8K17028	Paper: .5 mf 100V.....
C-7	8R592154	Paper: .03 mf 600V.....
C-8	8R472754	Paper: .01 mf 100V.....
C-9	21R6662	Mica: 250 mmf 500V.....
C-10	8R23690	Paper: .01 mf 400V.....
C-11	8R23053	Paper: .01 mf 200V.....
C-12	23A500059	Electrolytic: 20 mf-10 mf 250V; 10 mf 25V.....
Fuse		
F-1	65A10266	Fuse: 10 amp.....
Vibrator		
G-1	48B3333	Vibrator: non-sync; 4-pin full wave.....
Bulb		
I-1	65X11854	Bulb: 6-8V; .20 amp; round; bayonet base; clear.....
Coils		
L-1	24B591628	Antenna coil.....
L-2	24A591629	Oscillator coil.....
L-3	24A472535	Choke, hash.....
L-4	24K78026	Choke, hash.....
L-5	24K592197	Choke, antenna spark.....
Speaker		
LS-1	50B500460	Speaker, P: 5-1/4"; 3.2 ohm VC....
Resistors		
Note: All resistors are carbon, insulated type unless otherwise specified.		
R-1	6R6012	33,000 20% 1/2W.....
R-2	6R2035	82 10% 1/2W.....
R-3	6R6004	1 meg 20% 1/2W.....
R-4	6R6428	6800 10% 1/2W.....
R-5	6R5614	56 10% 1/2W.....
R-6	6R5614	56 10% 1/2W.....
R-7	18A500423	Volume control: 1 meg; includes on-off switch.....
R-8	6R3987	6.8 meg 20% 1/2W.....
R-9	6R6015	220,000 20% 1/2W.....
R-10	6R6032	470,000 20% 1/2W.....
R-11	6R6336	270 10% 1W.....
R-12	6R488313	3900 10% 1W N.I.....
Spark Plate		
SP-1	1A591512	Spark Plate Assembly.....
Transformers		
T-1	24K591556	IF, 455 Kc: complete with padding capacitors, tuning cores and shield.....

Ref. No.	Part No.	Description
T-2	24K591555	Diode, 455 Kc: complete with padding capacitors, tuning cores and shield.....
T-3	25K500194	Output Transformer.....
T-4	25C500189	Power Transformer.....
CHASSIS PARTS - MECHANICAL		
1X500445		Bracket, pointer: with two shoulder rivets.....
43A500497		Bushing, tuning shaft.....
42A4215		Clip, vibrator grounding.....
11M8877		Cord, dial: #20 nylon black.....
15C500406		Cover, rear.....
4S7666		Lockwasher ext: #6; stl; cad pl (power trans mtg).....
2S7005		Nut, hex: 6-32 x 1/4 stl; cad pl (power trans mtg).....
2S7051		Nut, hex: 3/8-32; Palnut; stl; cad pl (volume control mtg).....
1K500174		Pointer and Slider Assembly.....
9A472148		Receptacle, antenna contact.....
5S7771		Rivet: .088 x 3/16 stl; nkl pl (tube socket mtg).....
5S7707		Rivet: .122 x 5/32; stl; nkl pl (terminal strip, spark plate and capacitor bracket mtg).....
5S7701		Rivet: .122 x 3/16 stl; nkl pl (vibrator clip and output transformer mtg)...
5K12814		Rivet, shoulder: stl; nkl pl (dial cord guide).....
3S7350		Screw, machine: 6-32 x 1/4; slotted hex head; locking type; stl; cad pl (gang mtg).....
3S7454		Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (dial bracket mtg).....
47A500422		Shaft, tuning.....
9A500198		Socket, pilot light: includes bracket
9A70208		Socket, tube: 4 prong.....
9A472534		Socket, tube: 7 prong.....
9K580218		Socket, tube: 8 prong.....
41A14111		Spring, slider tension.....
22S7906		Staple, flat head.....
31A500418		Strip, terminal: 1 insulated lug #2 mtg.....
4S7555		Washer: 1/4 x .128 x .033 thick; stl; cad pl (output trans mtg).....
4A11291		Washer "C" (tuning shaft retainer)...
HOUSING PARTS & ACCESSORIES		
7C500409		Bracket, dial background.....
8A4491		Capacitor, noise suppression.....
42A500196		Clip, dial scale retainer.....
1X500450		Cover Assembly, front: includes fuse mtg strip.....
4K590653		Insulator, armite (used on "A" lead)...
36B500459		Knob, control.....
1X500451		Lead Assembly, "A".....
64D500416		Plate, trim: chrome pl.....
34B500179		Scale, dial.....
3S7454		Screw, sheet metal: #8 x 1/4; PKZ plain hex head; stl; cad pl (chassis to front plate and dial bracket mtg).....
3S8176		Screw, sheet metal: #10 x 3/8 PKZ plain hex head; stl; cad pl (speaker mtg).....
3S7104		Setscrew: 8-32 x 3/16 slotted headless; stl; cad pl (knob retainer).....
2S490342		Speednut: 10-24; blued (receiver mtg)...
6A4141		Suppressor, noise.....

CHASSIS HS-190,
HS-190A, HS-234

RECEIVER MODELS

Model	Radio Chassis Used	Record Changer Used	TV Chassis Used	Model	Radio Chassis Used	Record Changer Used	TV Chassis Used
12VF4R	HS-190	M4RC	TS-23 Series	12VF26R-C	HS-190A	W5RC	TS-23 Series
12VF4B	HS-190	M4RC	TS-23 Series	12VF26B-C	HS-190A	W5RC	TS-23 Series
12VF4R-C	HS-190	W6RC	TS-23 Series	16F1	HS-234	RC-36	TS-60
12VF26R	HS-190A	M3RC	TS-23 Series	16F1B	HS-234	RC-36	TS-60
12VF26B	HS-190A	M3RC	TS-23 Series				

RECORD CHANGER: Model RC-36, page RCD.CH.21-1.

RADIO CHASSIS - HS-190: Radio chassis HS-190 contains 6 tubes, plus a selenium rectifier, and it receives both AM and FM broadcast programs. Except for common speakers, it operates entirely independently of the television receiver.

HS-190A: Same as chassis HS-190 except for shorter AC power lead and loop lead.

HS-234: Similar to chassis HS-190 except for different lead lengths, different phono motor and pick-up connectors, and the addition of a phono power switch to the tone control.

RADIO TUNING RANGE - AM - 535 to 1620 Kc
FM - 88 to 108 Mc

RADIO IF FREQUENCIES - AM IF - 455 Kc
FM IF - 10.7 Mc

ANTENNAS - AM: Loop antenna mounted in the cabinet

FM: Built into the power cord, with terminals for connection of an external antenna, if required.

SPEAKERS - RADIO: 10" PM

TV: Dual 10" PM and 5" electrodynamic

POWER SUPPLY - 117 volts, 60 cycle alternating current only

RADIO POWER CONSUMPTION - 60 watts, including phono motor

RADIO AUDIO OUTPUT - 2 watts.

RADIO CHASSIS TUBE COMPLEMENT -

- 12BA6 - FM-AM RF Amplifier
- 12BA7 - FM-AM Converter
- 12BA6 - FM-AM IF Amplifier
- 12BA6 - FM-IF Amplifier
- 19T8 - FM Ratio Detector, AM Detector & 1st Audio Amp
- 50C5 - Power Amplifier
- Rectifier - Selenium type

INSTALLATION & OPERATING INSTRUCTIONS

ANTENNAS

No outside antenna or ground is normally required for standard broadcast (AM) reception, as a loop antenna is located at the rear of the cabinet. In locations where additional pick-up is desired, an external antenna may be connected to the loop antenna by taping the lead-in wire over the dashed lines on the loop panel. Do not use a shorted turn.

An FM antenna, built into the power cord, eliminates the need for an external FM antenna when the receiver is used in normal FM service areas, such as are found in and for a few miles around metropolitan areas. In 'fringe' or weak signal areas, improved FM reception can be obtained by using an outside FM antenna. The external antenna should be connected through a 300 ohm twin transmission line to screws #1 and #2 on the terminal strip on the loop antenna panel, as in Figure 1. The link between screws #2 and #3 should be opened. Orient the antenna to obtain maximum volume of the FM stations.

For best FM reception from the built-in power line cord antenna, it is important to stretch the cord to its full length. Changing the direction or

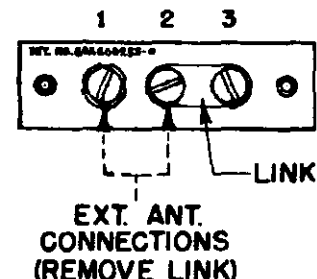


FIGURE 1 ANTENNA CONNECTIONS

position of the line cord, or reversing the plug in the wall outlet, will often improve reception from weak stations. Connect the link between screws #2 and #3 on the terminal strip on the loop antenna when the built-in antenna is used.

CAUTION: Do not connect the antenna or chassis to a water pipe, radiator, or other ground.

CHASSIS HS-190,
HS-190A, HS-234

CONTROLS

Refer to Figure 2 for the location of the radio controls.

POWER SWITCH AND VOLUME CONTROL. The volume control and power switch for both radio and phonograph operation are combined and are operated with the extreme left-hand knob. **CAUTION:** The power switches on the AM-FM radio and on the television receiver are independent. Make sure both are turned off when the set is not in use.

PHONO-TONE-RADIO CONTROL. For phonograph operation, rotate the second knob from the left fully clockwise until a 'click' is heard. For radio operation, rotate the knob fully counterclockwise until a 'click' is heard. Tone may be varied between these two positions. **NOTE:** On the 16F1 model, rotating the control to the "PHONO" position also

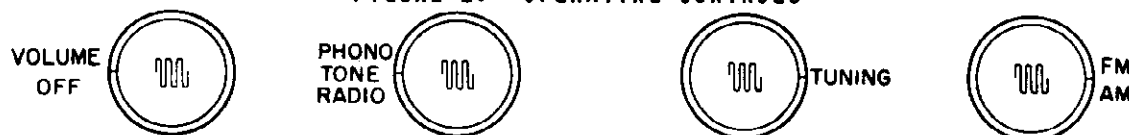
starts the phono motor. Models 12VF4 and 12VF26 have separate power switches on the phonograph itself.

FM-AM SELECTOR SWITCH. Rotate the extreme right-hand control clockwise for AM (Standard Broadcast) or counterclockwise for FM (Frequency Modulation), as desired.

TUNING CONTROL. The third control from the left selects the desired FM or AM station. The standard broadcast scale (AM) is read in kilocycles by adding one '0' to the figures. The frequency modulation scale (FM) is read in megacycles (88 to 108).

Tuning of FM stations should be done very carefully, for best sound reproduction, not necessarily for strongest volume received.

FIGURE 2. OPERATING CONTROLS



SERVICE NOTES

DET. NO. 650681643-0

The chassis of this receiver is connected directly to the power line. When operating the chassis outside of its cabinet, use an isolation transformer between the power line and the receiver to reduce the possibility of electrical shock. If an isolation transformer is not available, check the AC voltage between the chassis and the bench ground. If there is any indication of voltage, reverse the line plug before handling the set.

TO REMOVE RADIO CHASSIS FROM CABINET

1. Remove the large panel covering the rear of the cabinet.
2. Pull off the four knobs on the front of the cabinet.
3. Remove the five screws holding the radio loop panel to the cabinet.

4. Pull the loop panel loose from the interlock plug.
5. Disconnect the power and loop leads between the loop panel and the television and radio chassis.
6. Disconnect the speaker and phonograph leads.
7. Remove the two screws holding the interlock plug bracket.
8. Remove the three chassis mounting screws.
9. Slide the chassis from the cabinet.
10. Refer to Figure 3 when reassembling the chassis into the cabinet.

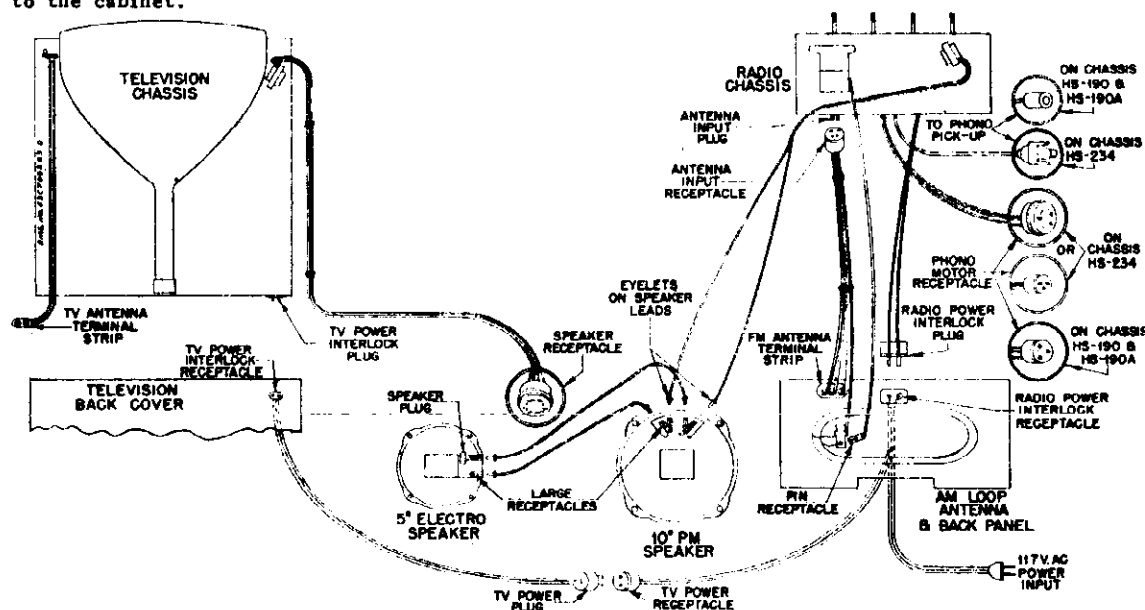


FIGURE 3. INTERCONNECTING CABLE DIAGRAM

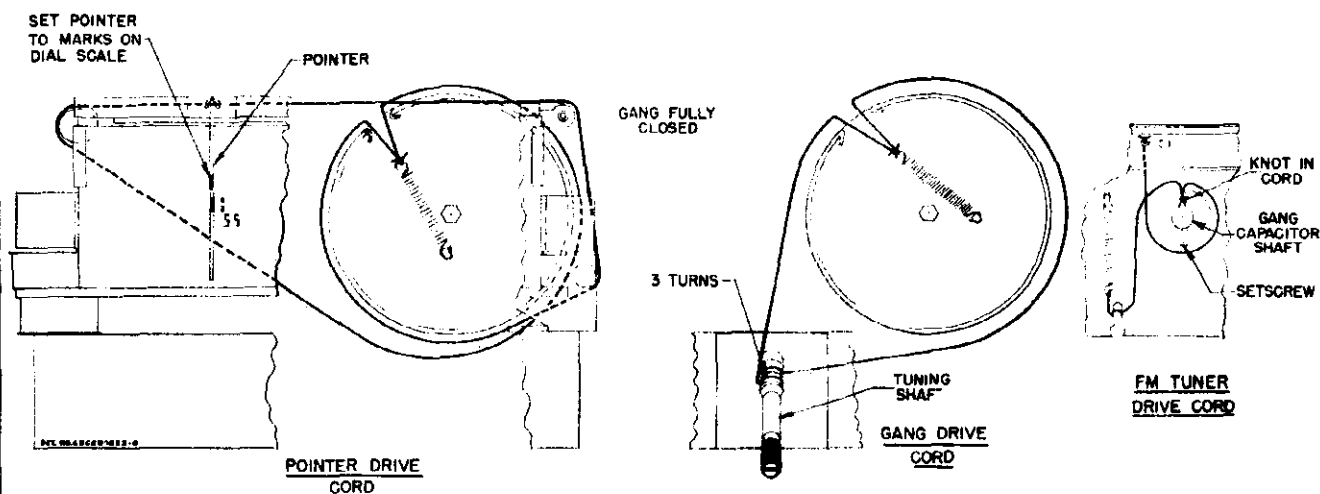


FIGURE 4. DIAL RESTRINGING DETAIL
ALIGNMENT

GENERAL INFORMATION

- Maximum performance can be obtained only if extreme care is exercised during alignment.
- It is recommended that an isolation transformer be placed between the power line and the receiver during alignment to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to the receiver chassis through a .1 mf capacitor.
- Use a small fibre screwdriver for aligning the IF transformer.
- Refer to Figure 5 for the location of all alignment trimmers and cores.
- As the stages are brought into alignment, reduce the signal generator output to a low value to avoid overloading the receiver.

ORDER OF ALIGNMENT AND EQUIPMENT REQUIRED

- Broadcast Band IF & RF Alignment
 - 455 to 1620 Kc AM signal generator
 - Low range output meter
- (A) FM Band IF & RF Alignment (Preferred Method)
 - 10.7 to 108 Mc FM signal generator
 - Oscilloscope
- (B) FM Band IF & RF Alignment (Alternate Method)
 - 10.7 to 108 Mc signal generator (unmod.)
 - Low range DC electronic voltmeter

BROADCAST BAND - IF & RF ALIGNMENT

- With the gang fully closed, adjust the pointer to coincide with the calibration marks at the left of "55" on the dial scale. See Figure 4.
- Connect the AM signal generator as in chart below, with 400 cycle, 30% modulation.
- Connect the output meter across the speaker voice coil. Throughout alignment, reduce the generator output to a level which produces less than 1.27 volts across the voice coil to avoid overloading the receiver.
- Set the bandswitch to the AM position.
- Turn the receiver volume control to maximum.
- Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. V-2 (pin 7, 12BA7)	455 Kc	Fully opened	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. V-2 (pin 7, 12BA7)	1620 Kc	Fully opened	5 (BC osc)	Adjust for maximum.*
3.	-	Across radiation loop**	1400 Kc	Tune in signal	8 (BC ant)	Adjust for maximum.

- If, after the receiver has been aligned as above, it is found to be badly off calibration, it will be necessary to adjust oscillator core (7) as follows: connect the generator to the grid of the converter tube and, with the gang fully closed, adjust core (7) at 535 kc. It is advisable to repeat the oscillator adjustments at 1620 Kc and 535 kc several times until the tuning range is correct. Core (7) has been pre-set at the factory and normally should require no retuning.

* If difficulty is encountered in tuning trimmer (5), adjust trimmer (6) to $\frac{1}{2}$ turn from tight.

** Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

CHASSIS HS-190,
HS-190A, HS-234

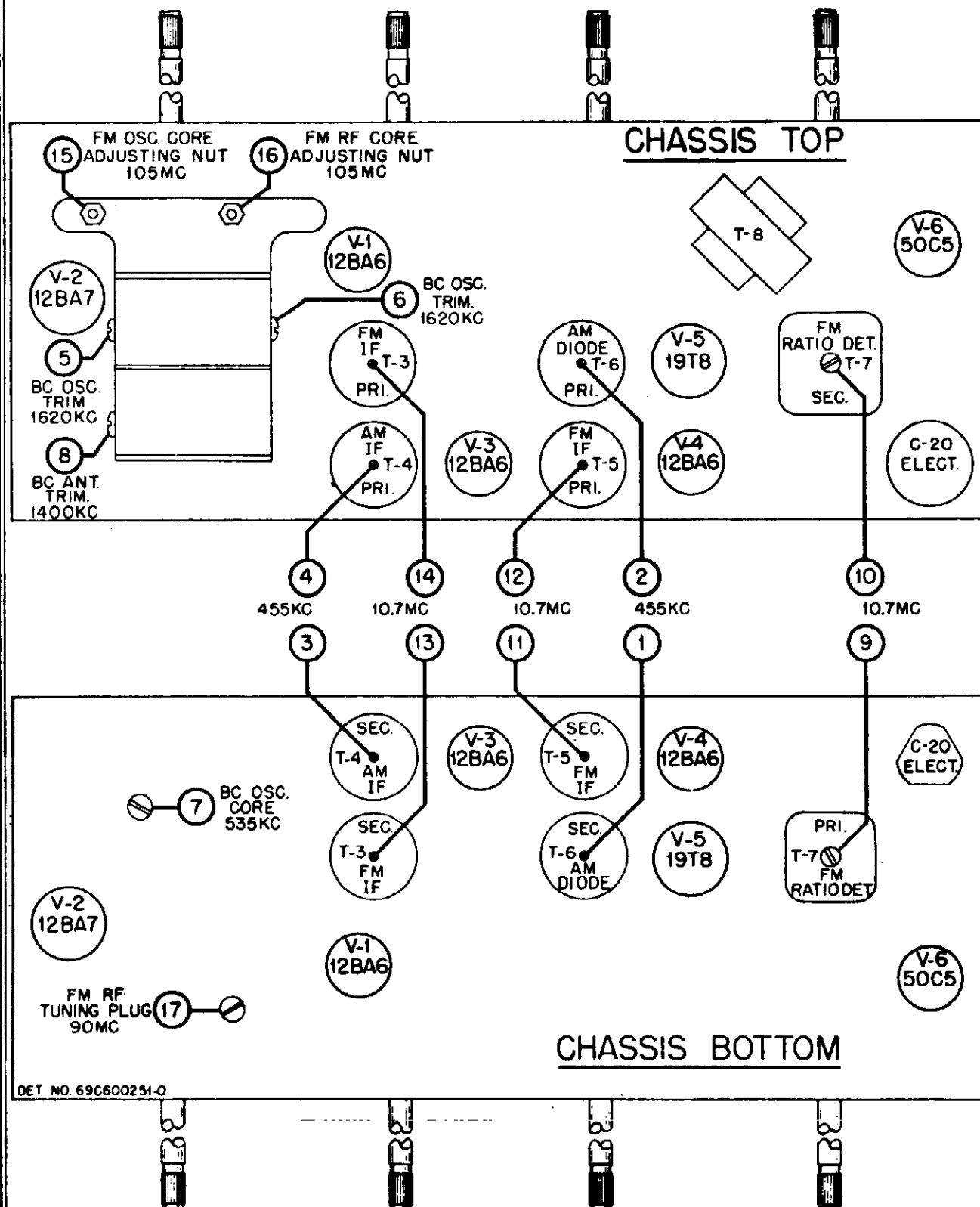


FIGURE 5. TUBE & TRIMMER LOCATION

CHASSIS HS-190,
HS-190A, HS-234

FM BAND - IF & RF ALIGNMENT (PREFERRED METHOD)

1. The following FM alignment procedure, using an FM signal generator and an oscilloscope, is to be preferred because the actual response pattern may be observed on the scope and adjusted for best symmetry and maximum amplitude.

2. Connect the vertical input terminals of the oscilloscope between the chassis and the junction of resistor R-24 (22K) and capacitor C-35 (1000 mmf).

3. Connect the FM signal generator sync voltage output terminals, through a phase shifting network, to the horizontal input terminals of the scope, as in Figure 6. (Other values of resistance and capa-

citance may be required, depending upon the scope). The phasing control should be adjusted to give only one trace on the scope. NOTE: If the FM generator has a built-in phase control, the phase shifting network is not necessary.

4. Set the bandswitch to the FM position.

5. Throughout alignment, reduce the generator output to keep the signal just above the noise level, to avoid overloading the receiver.

6. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 12BA6)	10.7 mc ± 100 kc dev	Fully opened	9 (ratio det pri)	Adjust for maximum amplitude of pattern.*
2.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 12BA6)	10.7 mc ± 100 kc dev	Fully opened	10 (ratio det sec)	Adjust for symmetrical curve, as shown in Figure 7.
3.	-	-	-	-	-	Repeat steps 1 & 2 for maximum amplitude and best symmetry.
4.	1000 mmf	Grid of 1st IF Amp V-3 (pin 1, 12BA6)	10.7 mc ± 100 kc dev	Fully opened	11 & 12 (2nd IF sec & pri)	Adjust for maximum amplitude of pattern.*
5.	1000 mmf	Grid of conv V-2 (pin 7, 12BA7)	10.7 mc ± 100 kc dev	Fully opened	13 & 14 (1st IF sec & pri)	Adjust for maximum amplitude of pattern.*
6.	1000 mmf	Grid of conv V-2 (pin 7, 12BA7)	10.7 mc ± 100 kc dev	Fully opened	11, 12, 13 & 14	Readjust for maximum amplitude and best symmetry.
RF ALIGNMENT						
7.	270 ohms	FM terminals on loop	105 mc $\pm 22\frac{1}{2}$ kc dev	105 mc on dial	15 (osc adj nut)	Adjust for maximum amplitude of pattern.*
8.	-	-	-	Fully closed	16 (RF adj nut)	Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise.
9.	270 ohms	FM terminals on loop	90 mc $\pm 22\frac{1}{2}$ kc dev	Tune in signal	17 (RF tuning plug)	Adjust for maximum amplitude of pattern.*
10.	270 ohms	FM terminals on loop	105 mc $\pm 22\frac{1}{2}$ kc dev	Tune in signal	16 (RF adj nut)	Adjust for maximum amplitude of pattern.*
11.	-	-	-	-	-	Repeat steps 9 & 10, until no further adjustment is necessary.

*An output meter across the speaker voice coil will also indicate maximum amplitude. It should not be used in place of the scope, however, since it will not show symmetry of the curve.

CHASSIS HS-190,
HS-190A, HS-234

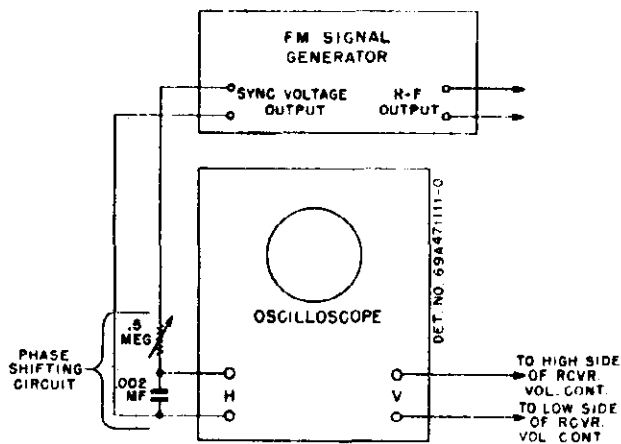


FIGURE 6.

FM SIGNAL GENERATOR & OSCILLOSCOPE HOOK-UP

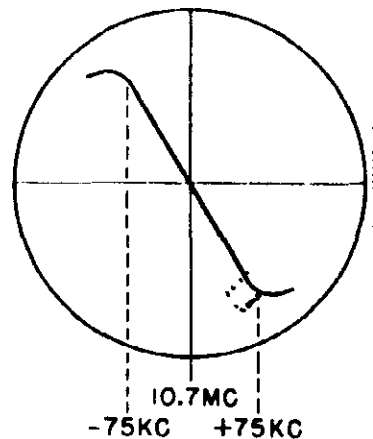


FIGURE 7.

RATIO DETECTOR WAVEFORM

FM BAND - IF & RF ALIGNMENT (ALTERNATE METHOD)

1. The following procedure for FM alignment, with an unmodulated carrier generator and a DC electronic voltmeter, is not as desirable as the preceding method; but it may be used if no FM generator is available.

2. Connect the signal generator as in chart below, with no modulation.

3. Set the bandswitch to the FM position.

4. Except in step 2 below, connect the electronic voltmeter across resistor R-33 (33K) in the ratio detector stage.

5. Throughout alignment reduce the signal generator output to a value which produces no more than a 5 volt rise above no signal voltage, to avoid overloading the receiver.

6. In step 2 below, connect two 100K ohm resistors in series across R-33. Connect the electronic voltmeter between the volume control side of resistor R-24 (22K) and the junction of the two 100K resistors, with the low side of the meter at the 100K resistors.

7. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 muf	Grid of conv V-2 (pin 7, 12BA7)	10.7 mc	Fully opened	9, 11, 12, 13 & 14 (IF cores)	Adjust for maximum.
2.	1000 muf	Grid of conv V-2 (pin 7, 12BA7)	10.7 mc	Fully opened	10 (ratio det sec)	Adjust for zero (connect meter as in step 6 above)
RF ALIGNMENT						
3.	270 ohms	FM terminals on loop	105 mc	105 mc on dial	15 (osc adj nut)	Adjust for maximum
4.	-	-	-	Fully closed	16 (RF adj nut)	Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise.
5.	270 ohms	FM terminals on loop	90 mc	Tune in signal	17 (RF tuning plug)	Adjust for maximum.
6.	270 ohms	FM terminals on loop	105 Mc	Tune in signal	16 (RF adj nut)	Adjust for maximum.
7.	-	-	-	-	-	Repeat steps 5 & 6 until no further adjustment is necessary.



FIGURE 8. SCHEMATIC DIAGRAM - HS-190 & HS-190A

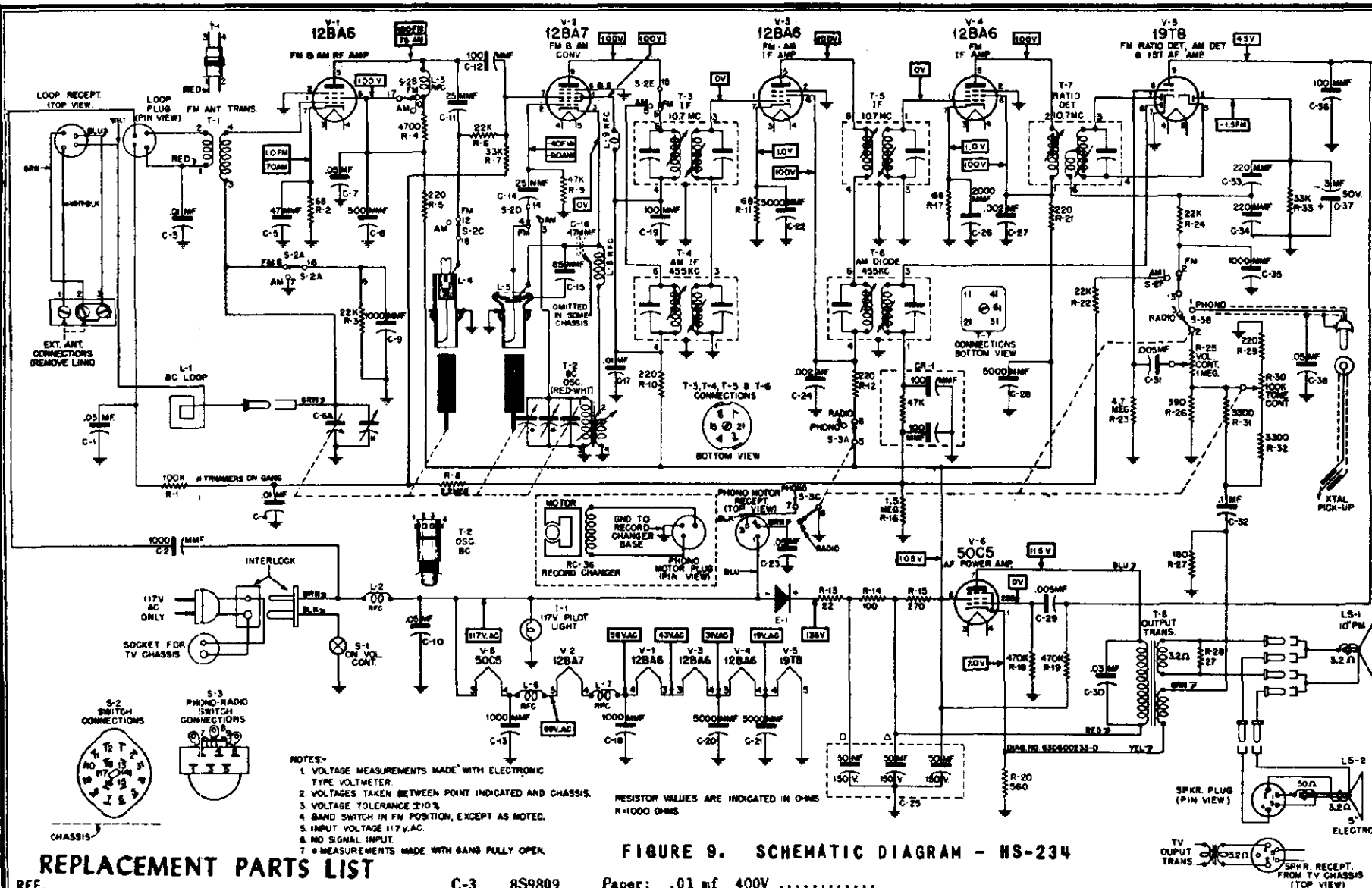


FIGURE 9. SCHEMATIC DIAGRAM - HS-234

REPLACEMENT PARTS LIST

REF. NO. PART NO. DESCRIPTION

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1 8A470606 Paper: .05 mf 400V
C-2 21K478410 Ceramic: 1000 mlf 500V

C-3 8S9809 Paper: .01 mf 400V
C-4 8S9801 Paper: .01 mf 100V
C-5 21K77373 Ceramic: 47 mlf 500V
C-6A,B 19B691877 Variable: 2 gang (use with 24K691878, wht & red, osc trans only)
19B690747 Variable: 2 gang (in some HS-190 chassis)(use with 24B690563,

C-7 8S9821 Paper: .05 mf 200V
C-8 21K481377 Ceramic: 500 mlf 500V
C-9 21K478410 Ceramic: 1000 mlf 500V
C-10 8A470606 Paper: .05 mf 400V
C-11 21K28816 Ceramic: 25 mlf 500V
C-12 21B77286 Ceramic: 100 mlf 500V

wht & blk, osc trans only)

PART NUMBER	DESCRIPTION
C-13	21K478410 Ceramic: 1000 mfm 500V
C-14	21K28816 Ceramic: 25 mfm 500V
C-15	21A690688 Ceramic: 85 mfm 500V
C-16	21K77373 Ceramic: 47 mfm 500V
C-17	8S9809 Paper: .01 mf 400V
C-18	21K471761 Ceramic: 1000 mfm 500V
C-19	21B77286 Ceramic: 100 mfm 500V
C-20	21A470789 Ceramic, disc type: 5000 mfm 450V
C-21	21A470789 Ceramic, disc type: 5000 mfm 450V
C-22	21A470789 Ceramic, disc type: 5000 mfm 450V
C-23	8A470606 Paper: .05 mf 400V
C-24	8S9824 Paper: .002 mf 400V
C-25	23B690539 Electrolytic: 50-50-50 mf/150V...
C-26	21K790912 Ceramic: 2000 mfm 500V
C-27	8S9824 Paper: .002 mf 400V
C-28	21A470789 Ceramic, disc type: 5000 mfm 450V
C-29	8A24966 Paper: .005 mf 100V
C-30	8R9872 Paper: .03 mf 600V
C-31	8A24966 Paper: .005 mf 100V
C-32	8K471636 Paper: .1 mf 200V
C-33	21K77375 Ceramic: 220 mfm 500V
C-34	21K77375 Ceramic: 220 mfm 500V
C-35	21K478410 Ceramic: 1000 mfm 500V
C-36	21B77286 Ceramic: 100 mfm 500V
C-37	23K690543 Electrolytic: 3 mf 50V
C-38	8A470606 Paper: .05 mf 400V
CAPACITOR-RESISTOR	
CR-1	21A473040 Capacitor-Resistor: 100 mfm, 100 mfm, 47,000 ohms
RECTIFIER	
E-1	48B482807 Selenium rectifier: half-wave; 150 ma
PILOT LIGHT	
I-1	65K691040 Bulb, incandescent: 117V; 10W bayonet base
COILS	
L-1	1X790757 Antenna Loop, Panel, and Leads Assembly: complete with line cord (12VF4)
	1X790758 Antenna Loop & Panel Assembly: complete with antenna terminal strip and interlock receptacle cover; less line cord and leads (12VF4)
	1X791664 Antenna Loop, Panel, and Leads Assembly: complete with line cord (12VF26)
	1X791665 Antenna Loop & Panel Assembly: complete with antenna terminal strip and interlock receptacle cover; less line cord and leads (12VF26)
	1X792539 Antenna Loop, Panel, and Leads Assembly: complete with line cord (16F1)
	1X792541 Antenna Loop & Panel Assembly: complete with antenna terminal strip and interlock receptacle cover; less line cord and leads (16F1)

L-2	24K691041 RF choke: insulated
L-3	24A90064 RF choke
L-4	24C690584 Inductor & Capacitor Assembly: FM RF; less tuning core
L-5	24K600519 Inductor & Capacitor Assembly: FM osc; less tuning core
L-6	24K780128 RF choke: insulated
L-7	24K780128 RF choke: insulated
L-8	24K780128 RF choke: insulated
L-9	24A691847 RF choke

SPEAKERS

LS-1	50C791427 Speaker: 10" FM; 3.2 ohm VC..
LS-2	50C791426 Speaker: 5" electrodynamic; 3.2 ohm VC (12VF4 & 12VF26).
	50K792776 Speaker: 5" electrodynamic; 3.2 ohm VC (16F1)

RESISTORS

Note: All resistors are insulated carbon type
unless otherwise specified.

R-1	6R6075	100,000	20%	1/2W	.....
R-2	6R2039	68	10%	1/2W	.....
R-3	6R6028	22,000	20%	1/2W	.....
R-4	6R6039	4700	20%	1/2W	.....
R-5	6R3933	220	20%	1/2W	.....
R-6	6R6028	22,000	20%	1/2W	.....
R-7	6R6012	33,000	20%	1/2W	.....
R-8	6R3927	2.2 meg	20%	1/2W	.....
R-9	6R6056	47,000	20%	1/2W	.....
R-10	6R3933	220	20%	1/2W	.....
R-11	6R2039	68	10%	1/2W	.....
R-12	6R3933	220	20%	1/2W	.....
R-13	17A690578	Wire wound: 22	10%	1.5W	...
R-14	6R3963	100	10%	2W	.....
R-15	6R476116	270	10%	2W	.....
R-16	6R3966	1.5 meg	20%	1/2W	.....
R-17	6R2039	68	10%	1/2W	.....
R-18	6R6032	470,000	20%	1/2W	.....
R-19	6R6032	470,000	20%	1/2W	.....
R-20	6R6291	560	10%	1/2W	.....
R-21	6R3933	220	20%	1/2W	.....
R-22	6R6028	22,000	20%	1/2W	.....
R-23	6R2122	4.7 meg	20%	1/2W	.....
R-24	6R6028	22,000	20%	1/2W	.....
R-25	18A690549	Volume control: 1 meg; with ON-OFF switch			.....
R-26	6R5554	390	10%	1/2W	.....
R-27	6R5660	180	10%	1/2W	.....
R-28	6R5683	27	10%	1/2W	.....
R-29	6R3933	220	20%	1/2W	.....
R-30	18B691152	Tone Control: 100,000; with phono-radio switch (HS-190 & HS-190A)			.....
	18B691882	Tone Control: 100,000; with phono-radio switch (HS-234).			.....
R-31	6R6036	3300	20%	1/2W	.....
R-32	6R6036	3300	20%	1/2W	.....
R-33	6R6012	33,000	20%	1/2W	.....

SWITCHES

S-1	-	On-off Switch (on volume control)
S-2	40B690538	Band Switch, AM-FM
S-3	-	Phono-radio switch (on tone cont)

TRANSFORMERS

T-1	24A690544	FM Antenna Input Transformer
T-2	24K691878	BC Oscillator Transformer: wht & red dot (use with 19B691877 gang only)
	24B690563	BC Oscillator Transformer: wht & blk dot (in some HS-190 chassis) (use with 19B690747 gang only)...
T-3	24B690540	1st FM IF Transformer (orange dot): 10.7 mc; complete with capacitor and cores; less shield
T-4	24B482863	AM IF Transformer (brown dot); 455 Kc; complete with capaci- tors and cores; less shield.....
T-5	24B690541	2nd FM IF Transformer (yellow dot): 10.7 mc; complete with capacitor and cores; less shield
T-6	24B482865	AM Diode Transformer (red dot): 455 kc; complete with capaci- tors and cores; less shield.....
T-7	24B690542	Ratio Detector Transformer: 10.7 mc; complete with capaci- tors, cores, and shield.....
T-8	25B690805	Audio Output Transformer

CHASSIS PARTS - MECHANICAL

1X691054	Bracket and Shield Assembly, pilot light
1X690717	Bracket Assembly, tuning core mtg: includes shoulder rivet and anti- backlash clip
7C690567	Bracket, tuner mtg (gang mtg)
7A77337	Bracket, tuning shaft
42K690561	Clip, anti-backlash: single (on core mtg bracket)
42A690560	Clip, anti-backlash: double (on tuner mtg brkt)
42B482867	Clip, spring: blued finish (holds IF transformers)
39K17396	Contact, pin terminal (in molded phono motor receptacle)(HS-234).
11M488137	Cord, dial (core drive)
11M8944	Cord, dial (pointer drive)
30K21859	Cord, line: with plug; 9 ft long (AC power cord on loop panel).....
46B692164	Core, iron and screw: green dot (FM osc tuning core)
48K692165	Core, iron and screw (FM RF tuning core)
15A690556	Cover, interlock receptacle (on loop panel)
34C691014	Dial Scale: glass
1X691065	Dial Scale and Plate Assembly: complete with cord pulleys
5S7866	Eyelet: .125 x .091 brass; nkl pl (core drive cord retainer).....
5S3113	Eyelet: .182 x .194 brass (pilot light bracket mtg)
5S7820	Eyelet: .450 x .125 (on speaker leads)
5S7855	Eyelet: .484 x .156 (on speaker leads)
5A691144	Grommet, rubber (pilot light brack- et mtg)
14A691961	Insulator, bracket: fibre (dial plate bracket mtg)

CHASSIS HS-190
HS-190A, HS-234

PART NUMBER	DESCRIPTION			CABINET PARTS	
14A690802	Insulator, chassis front: fibre (tuning shaft mtg)	5K27675	Rivet, shoulder (cord pulley mtg).	42A470832	Clamp, cable: plastic (holds line cord)
14A690535	Insulator, chassis front: fibre (volume, tone, and bandswitch mtg)	5K13896	Rivet, shoulder (on core mtg bracket)	13K790751	Escutcheon, radio dial (12VF4)
14A484225	Insulator, chassis mtg: white plastic.	3S7163	Screw, machine: 8-32 x 1/4 plain hex head; cad pl (pointer drive pulley mtg)	13K791032	Escutcheon, radio dial (12VF26)
14A690548	Insulator, control: bakelite (volume, tone, and bandswitch mtg).....	3S7205	Screw, machine: 8-32 x 1/4 slotted locking hex head; cad pl (gang mtg)...	13K792535	Escutcheon, radio dial (16F1)
14A690619	Insulator, tuning shaft: bakelite ..	3S2695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (tuner brkt mtg) ..	14K790743	Insulator, chassis base: bakelite (under radio chassis)
1X691969	Lead and Plug Assembly, phono pick-up (HS-234)	3S3360	Screw, sheet metal: #6 x 1/4 PKZ plain hex head; cad pl (pilot light bracket mtg)	14K791482	Insulator, fibre (clamps power and phono leads)
1X691032	Lead and Receptacle Assembly, phono pick-up (HS-190 & HS-190A)	3S490325	Screw, sheet metal: #6 x 1-1/8" PKZ plain hex head; cad pl (selenium rectifier mtg)	36K791432	Knob, control: tan (radio controls) (12VF4B)
4S7650	Lockwasher, internal: #6; cad pl (interlock receptacle cover mtg) ..	3S7512	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; cad pl (dial plate bracket mtg)	36K691195	Knob, control: tan (radio controls) (12VF26B & 12VF26B-C)
4S9751	Lockwasher, int-ext: #8; cad pl (pointer drive pulley mtg)	3S7471	Screw, thread-cutting: 6-32 x 1/4 plain hex head; cad pl (interlock receptacle mtg)	36K792561	Knob, control: tan (radio controls) (16F1B)
29R5252	Lug, soldering: #6 (holds spkr leads)	3S7103	Setcrew: 8-32 x 1/8 Allen head; cad pl (core drive pulley mtg)	36K691070	Knob, control: wal-mahogany (radio controls)(12VF4R & 12VF4R-C)
2S7019	Nut, hex: 4-40 x 1/4; cad pl (FM tuning core mtg)	1X691025	Shaft, tuning: complete with pulley....	36K690886	Knob, control: wal-mahogany (radio controls)(12VF26R & 12VF26R-C)
2S7051	Nut, hex palmnut: 3/8-32 x 9/16; cad pl (volume, tone and bandswitch mtg)	15A690616	Shell, receptacle (on antenna receptacle) ..	36K792562	Knob, control: wal-mahogany (radio controls)(16F1)
35K691846	Pad, rubber: 1-hole (gang mtg).....	15K74443	Shell, receptacle (on TV power receptacle) ..	2S7005	Nut, hex: 6-32 x 1/4 stl; cad pl (interlock plug mtg)(12VF26 & 16F1) ..
35A691845	Pad, rubber: 2-hole (gang mtg).....	26K485936	Shield, coil (for IF transformers)...	64C791006	Panel, cabinet back (covers radio, phono, and album compartments)(12VF4) ..
1X691062	Plug and Bracket Assembly, interlock.	26A481521	Shield, tube: spring type	64C791659	Panel, cabinet back (covers radio, phono, and album compartments)(12VF26) ..
28A690615	Plug, antenna input: 4-pin	9K691017	Socket, pilot light	64C792544	Panel, cabinet back (covers radio, phono, and album compartments)(16F1) ..
28K71775	Plug, phono pick-up (HS-234)	9K484167	Socket, tube: miniature; 7-prong	3S490354	Screw, machine: 6-32 x 5/8 slotted hex head; cad pl (interlock plug mtg)(12VF26 & 16F1)
52B481704	Pointer, dial	9A485495	Socket, tube: noval; 9-prong	3S7439	Screw, sheet metal: #4 x 1/4 slotted acorn head; ant cop (loop panel mtg)(12VF4)
49A23960	Pulley, cord: 1/4" groove (on dial plate assembly)	41A690598	Spring, coil: 7 turns; cosmoline dipped (FM RF core mtg)	3S490453	Screw, sheet metal: #6 x 3/8 PKA plain acorn head; ant cop (cabinet back panel mtg)(12VF4)
49A21552	Pulley, cord: 1/2" groove (on dial plate assembly)	41K691840	Spring, coil: 8 turns; cop pl (FM oac core mtg)	3S7536	Screw, sheet metal: #6 x 3/8 PKA slotted acorn head; ant cop (cabinet back panel mtg)(16F1)
49A690562	Pulley, core drive: brass	41A14244	Spring, tension (core & pointer drive cord)	3S3387	Screw, sheet metal: #6 x 1/4 PKA plain hex head; ant cop (loop panel mtg) (12VF26)
1A691015	Pulley, pointer drive: 3/4" diam....	37K21114	Strip, channel: rubber; 1" long (dial scale mtg)	3S490454	Screw, sheet metal: #6 x 5/8 PKA plain acorn head; ant cop (cable clamp & cabinet back panel mtg)(12VF4 & 12VF26)
9K690618	Receptacle, antenna: 4-prong; includes shell	41A470403	Strip, terminal: 3-screw (FM ant conn on loop panel)	3S7509	Screw, sheet metal: #6 x 5/8 PKA slotted acorn head; ant cop (loop panel & cable clamp mtg)(16F1)...
9A15907	Receptacle, interlock: 2-prong (on loop panel)	31K85348	Strip, terminal: 1 insulated lug; #2 mtg; 3/8" spacing	3S490452	Screw, sheet metal: #8 x 3/8 PKA plain acorn head; ant cop (loop panel and interlock plug mtg)(12VF4 & 12VF26)
9A30680	Receptacle, phono motor: 3-prong; includes shell (HS-190 & HS-190A)....	31K86126	Strip, terminal: 2 insulated lugs; #2 mtg; 3/8" spacing	3S7457	Screw, sheet metal: #8 x 7/8 PKA plain hex head; cad pl (chassis mtg)....
9K470402	Receptacle, phono motor: 5-prong; molded; includes contacts (HS-234)..	31K470746	Strip, terminal: 3 insulated lugs; #2 mtg; 3/8" spacing	4S1720	Washer, flat: 3/8 x .156 x .030 stl; cad pl (loop panel mtg)(12VF26) ..
9A600040	Receptacle, phono motor: 3-prong; includes shell (HS-234)	31K471568	Strip, terminal: 4 insulated lugs; #2 gnd; 3/8" spacing	4S7562	Washer, flat: 7/16 x .187 x .033 stl; cad pl (interlock plug mtg)(12VF26 & 16F1)
9A71639	Receptacle, phono pick-up (HS-190 & HS-190A)	31K470747	Strip, terminal: 5 insulated lugs; #3 mtg; 3/8" spacing	4S490412	Washer, flat: 11/16 x .156 x .031 stl; cad pl (chassis mtg)
9A470980	Receptacle, pin (on lead from gang to loop)	4A70015	Washer, 'C' (tuning shaft mtg)....	4S7607	Washer, flat: 9/32 x .125 x .027 stl; cad pl (loop panel mtg)(12VF4)...
9A791031	Receptacle, TV power: 2-prong; includes shell	4S7554	Washer, flat: 3/8 x 1/8 x .033 steel; cad pl (tuning shaft brkt mtg)....		
5S8497	Rivet: .088 x 1/8 steel; nkl pl (anti-backlash clip mtg).....	4S7557	Washer, flat: 3/8 x 11/64 x .033 stl; cad pl (dial plate brkt mtg).....		
5S7771	Rivet: .088 x 3/16 steel; nkl pl (min socket mtg)	4S7582	Washer, flat: 1/4 x .195 x .033; cad pl (pointer drive pulley mtg)....		
5S7774	Rivet: .088 x 1/4 steel; nkl pl (noval socket mtg)	4K690812	Washer, shoulder: fibre (tuning shaft brkt mtg)		
5S7707	Rivet: .122 x 5/32 steel; nkl pl (term strip mtg)	4K690571	Washer, shoulder: fibre (volume, tone and bandswitch mtg)		
5S7701	Rivet: .122 x 3/16 steel; nkl pl (ant input plug mtg)	4K691959	Washer, shoulder: fibre (dial plate bracket mtg)		
5S7700	Rivet: .122 x 1/4 steel; nkl pl (interlock receptacle cover mtg) ..				
5S7728	Rivet: .122 x 5/16 steel; nkl pl (tuning shaft bracket mtg)				

RECEIVER MODELS

Model	Radio Chassis Used	Record Changer Used	TV Chassis Used
16VF8R	HS-211	M3RC	TS-16 series
16VF8B	HS-211	M3RC	TS-16 series
19F1	HS-230	RC-36	TS-67 series
19F1B	HS-230	RC-36	TS-67 series

RADIO CHASSIS - HS-211: Radio chassis HS-211 contains 9 tubes and receives both AM and FM broadcast programs. Except for common speakers, it operates entirely independently of the television receiver.

HS-230: Similar to chassis HS-211 except for the addition of a separate phono motor power switch, connected to the AM-FM-PHONO switch control shaft.

RADIO TUNING RANGE - AM - 535 to 1620 Kc
FM - 88 to 108 Mc

RADIO IF FREQUENCIES - AM IF - 455 Kc
FM IF - 10.7 Mc

RADIO ANTENNAS - Separate AM and FM loop antennas, mounted in cabinet

SPEAKERS - Dual 12" PM and 5" PM, common to both radio and television chassis.

POWER SUPPLY - 117 volts, 60 cycle alternating current only

RADIO POWER CONSUMPTION - 100 watts, including phono motor

RADIO AUDIO OUTPUT - 8 watts

RADIO CHASSIS TUBE COMPLEMENT --

6AU6	- FM-AM RF Amplifier
6BA7	- FM-AM Converter
6BA6	- FM-AM IF Amplifier
6AU6	- FM IF Amplifier
6AL5	- FM Ratio Detector
6AV6	- AM Detector & 1st Audio Amp
6V6GT	- Power Amplifier
6V6GT	- Power Amplifier
7Z4	- Rectifier

INSTALLATION & OPERATING INSTRUCTIONS

ANTENNAS

No outside antenna or ground is normally required for standard broadcast (AM) reception, as a loop antenna is located inside the cabinet. Antenna connections are shown in Figure 1. In locations where additional pick-up is desired, an external antenna may be connected to the clip marked "EXT BC ANT" on the loop antenna.

An FM loop antenna, mounted inside the cabinet, eliminates the need for an external FM antenna when the receiver is used in normal FM service areas such as are found in and for a few miles around metropolitan areas.

In "fringe" or weak signal areas, improved FM reception can be obtained by using an outside FM antenna. The loop connections should be removed from the terminal strip on the rear of the chassis and the outside antenna should be connected, through a 300 ohm twin transmission line, to the terminal strip, as shown in Figure 1. Orient the antenna to obtain maximum volume of the FM stations.

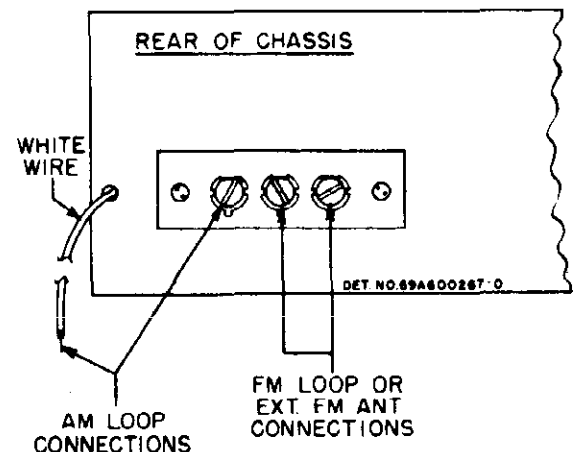


FIGURE 1. EXTERNAL ANTENNA CONNECTIONS

CHASSIS HS-211,
HS-230

CONTROLS

Refer to Figure 2 for the location of the radio controls.

POWER SWITCH AND VOLUME CONTROL. The volume control and power switch for both radio and phonograph operation are combined and are operated with the extreme left-hand knob. **CAUTION:** The power switches on the AM-FM radio and on the television receiver are independent. Make sure both are turned off when the set is not in use.

TONE CONTROL. Tone is varied by adjusting the second knob from the left.

AM-FM-PHONO SWITCH. The third control from the left operates a three-position switch. The extreme counterclockwise position selects the AM (Standard

Broadcast) band, the center position selects the FM (Frequency Modulation) band, and the extreme clockwise position is used for phonograph operation. **NOTE:** On the 19F1 model, rotating the control to the "PHONO" position also starts the phono motor, whereas model 16VF8 has a separate power switch on the record changer itself.

TUNING CONTROL. The extreme right-hand control selects the desired FM or AM station. The standard broadcast scale (AM) is read in kilocycles by adding one '0' to the figures. The frequency modulation scale (FM) is read in megacycles (88 to 108).

Tuning of FM stations should be done very carefully, for best sound reproduction, not necessarily for strongest volume received.

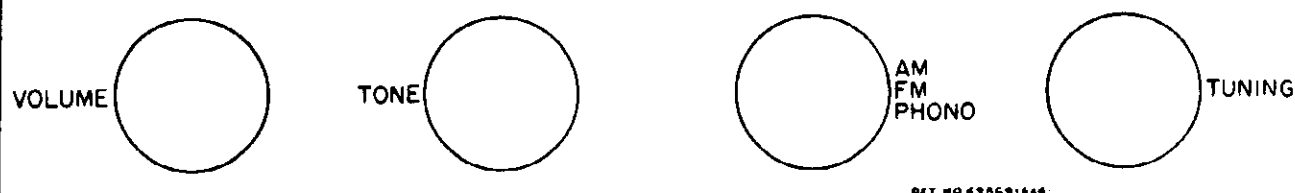


FIGURE 2. RADIO CONTROLS

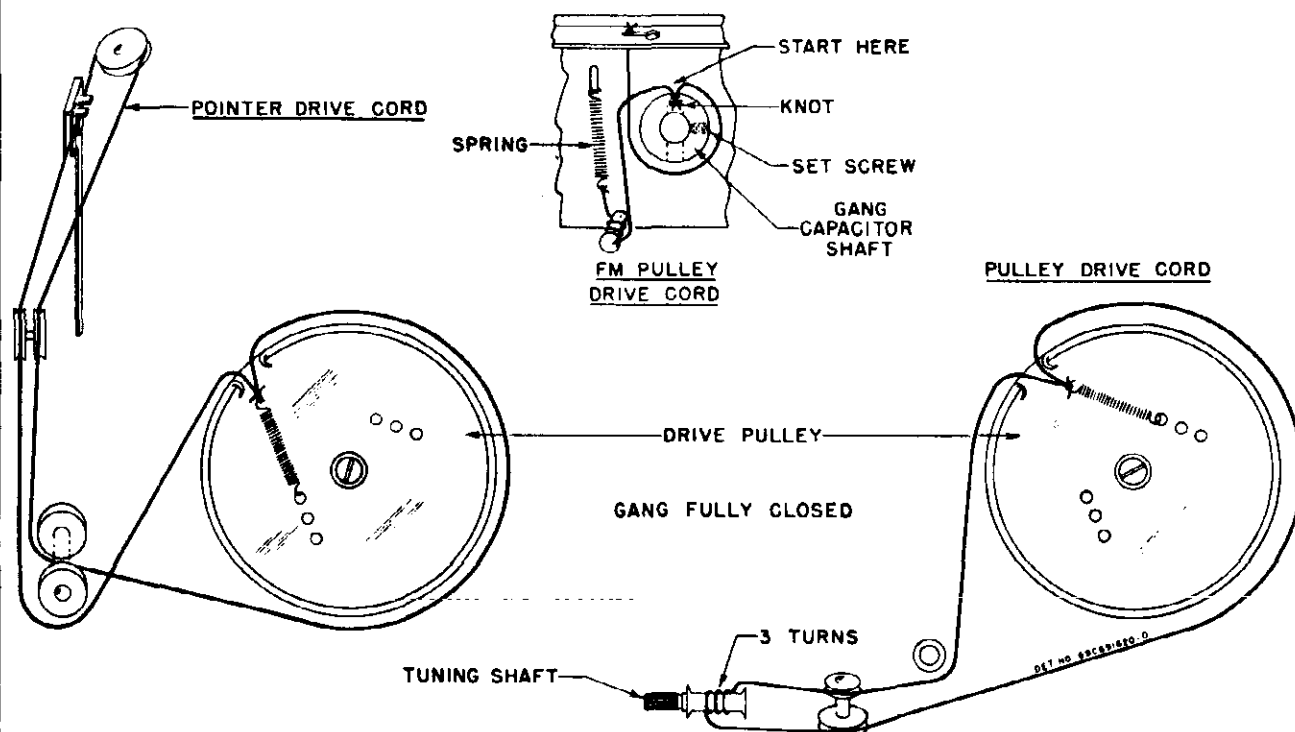


FIGURE 3. STRING DRIVE DETAIL

CHASSIS HS-211,
HS-230

SERVICE NOTE

TO REMOVE RADIO CHASSIS FROM CABINET

1. Pull off the four radio knobs on the front of the cabinet.
2. Remove the AC power plug from the receptacle attached to the cabinet.
3. Remove the large panel covering the rear of the cabinet.
4. Disconnect the AM and FM loop leads from the receiver.
5. Disconnect the phono power plug from the chassis.
6. Disconnect the speaker leads.
7. Remove the three chassis mounting screws.
8. Slide the chassis from the cabinet.

ALIGNMENT

GENERAL INFORMATION

1. Maximum performance can be obtained only if extreme care is exercised during alignment.
2. Use a small fibre screwdriver for aligning the IF transformers.
3. Refer to Figure 4 for the location of all alignment trimmers and cores.
4. As the stages are brought into alignment, reduce the signal generator output to a low value to avoid overloading the receiver.

ORDER OF ALIGNMENT AND EQUIPMENT REQUIRED

1. Broadcast Band IF & RF Alignment
 - a. 455 to 1620 Kc AM Signal Generator
 - b. Low range output meter
- 2 (A) FM Band IF & RF Alignment (Preferred Method)
 - a. 10.7 to 108 Mc FM signal generator
 - b. Oscilloscope
- (B) FM Band IF & RF Alignment (Alternate Method)
 - a. 10.7 to 108 Mc signal generator (unmod.)
 - b. Low range DC electronic voltmeter.

BROADCAST BAND - IF & RF ALIGNMENT

1. With the gang fully closed, adjust the pointer to coincide with the calibration marks at the left of the "55" on the dial scale.
2. Connect the AM signal generator as in chart below, with 400 cycle, 30% modulation.
3. Connect the output meter across the speaker voice coil. Throughout alignment reduce the generator output to a level which produces less than 1.27 volts (.5 watt) across the voice coil, to avoid overloading the receiver.
4. Set the bandswitch to the AM position.
5. Turn the receiver volume control to maximum.
6. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. V-2 (pin 7, 6BA7)	455 Kc	Fully opened	1, 2, 3, & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. V-2 (pin 7, 6BA7)	1620 Kc	Fully opened	5 (AM osc)	Adjust for maximum.
3.	.1 mf	Grid of conv. V-2 (pin 7, 6BA7)	1400 Kc	Tune in signal	6 (AM RF)	Adjust for maximum.
4.	-	-	-	-	-	Connect AM loop to chassis.
5.	-	Across radiation loop*	1400 Kc	Tune in signal	7 (AM ant)	Adjust for maximum.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

PAGE 21-26 MOTOROLA

CHASSIS HS-211,
HS-230

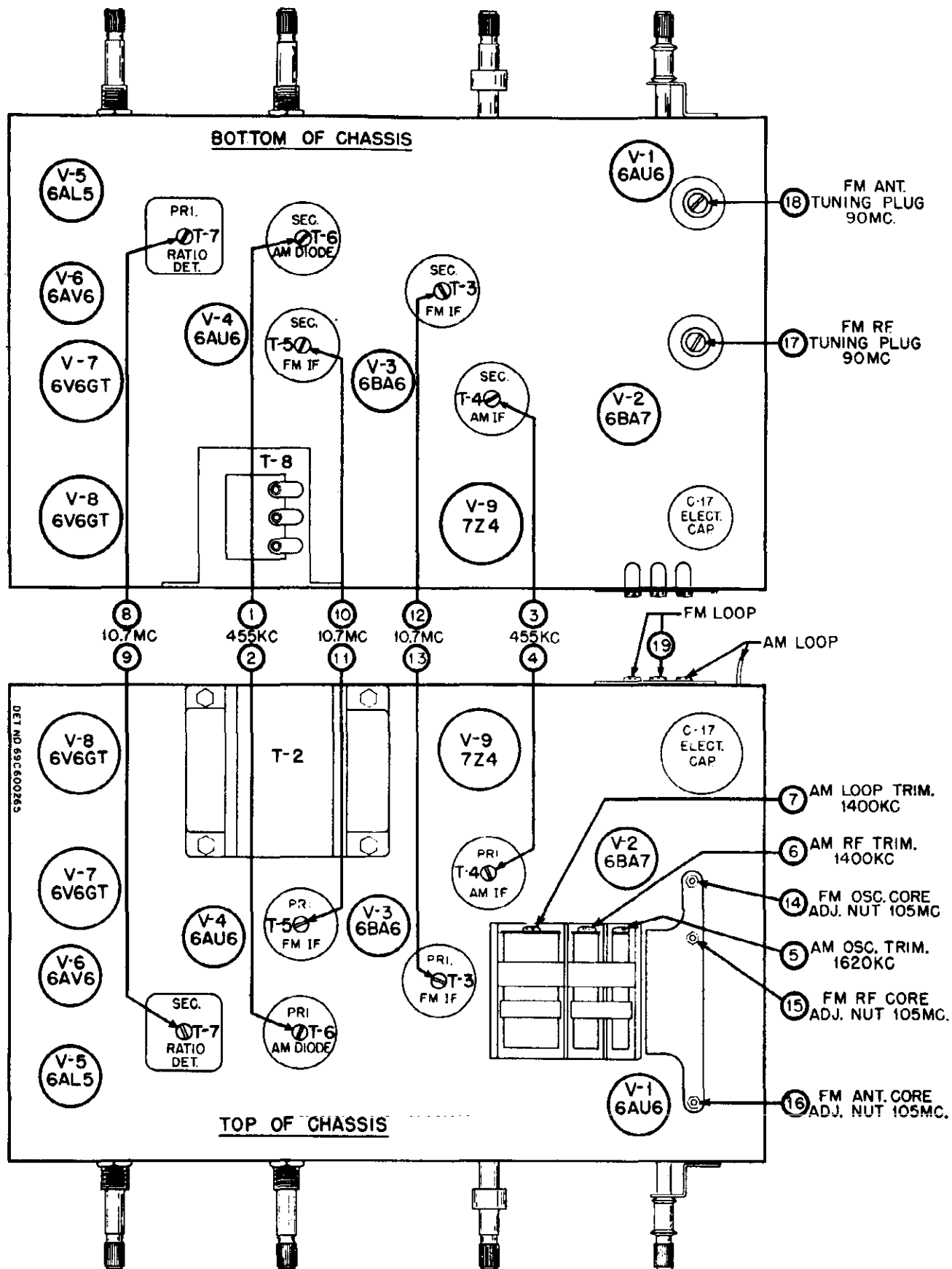


FIGURE 4. TUBE & TRIMMER LOCATIONS

CHASSIS HS-211,
HS-230

FM BAND - IF & RF ALIGNMENT (PREFERRED METHOD)

1. The following FM alignment procedure, using an FM signal generator and an oscilloscope, is to be preferred because the actual response pattern may be observed on the scope and adjusted for best symmetry and maximum amplitude.

2. Connect the vertical input terminals of the oscilloscope between the chassis and the junction of resistor R-17 (47K) and capacitor C-21 (1000 mmf).

3. Connect the FM signal generator sync voltage output terminals, through a phase shifting network, to the horizontal input terminals of the scope, as in Figure 5. (Other values of resistance and capa-

citance may be required, depending upon the scope). The phasing control should be adjusted to give only one trace on the scope. NOTE: If the FM generator has a built-in phase control, the phase shifting network is not necessary.

4. Set the bandswitch to the FM position.

5. Throughout alignment, reduce the generator output to keep the signal just above the noise level, to avoid overloading the receiver.

6. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 6AU6)	10.7 mc ± 100 Kc dev.	Fully opened	8 (ratio det pri)	Adjust for maximum amplitude of pattern.*
2.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 6AU6)	10.7 mc ± 100 Kc dev.	Fully opened	9 (ratio det sec)	Adjust for symmetrical curve, as shown in Figure 6.
3.	-	-	-	-	-	Repeat steps 1 & 2 for maximum amplitude and best symmetry.
4.	1000 mmf	Grid of 1st IF Amp V-3 (pin 1, 6BA6)	10.7 mc ± 100 Kc dev.	Fully opened	10 & 11 (2nd IF sec & pri)	Adjust for maximum amplitude of pattern.*
5.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc ± 100 Kc dev.	Fully opened	12 & 13 (1st IF sec & pri)	Adjust for maximum amplitude of pattern.*
6.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc ± 100 Kc dev.	Fully opened	10, 11 12 & 13	Readjust for maximum amplitude and best symmetry.
RF ALIGNMENT						
7.	270 ohms	FM terminal 19 on rear of chassis	105 mc $\pm 22\frac{1}{2}\%$ Kc dev.	105 mc on dial	14 (osc core)	Adjust for maximum amplitude of pattern.*
8.	-	-	-	Fully closed	15 & 16 (RF & ant cores)	Turn counterclockwise until cores are at bottom of pipe, then turn two turns clockwise.
9.	270 ohms	FM terminal 19 on rear of chassis	90 mc $\pm 22\frac{1}{2}\%$ kc dev.	Tune in signal	17 & 18 (RF & ant tuning plugs)	Adjust for maximum amplitude of pattern.*
10.	270 ohms	FM terminal 19 on rear of	105 mc $\pm 22\frac{1}{2}\%$ kc dev.	Tune in signal	15 & 16 (RF & ant cores)	Adjust for maximum amplitude of pattern.*
11.	-	-	-	-	-	Repeat steps 9 & 10 until no further adjustment is necessary.

An output meter across the speaker voice coil will also indicate maximum amplitude. It should not be used in place of the scope, however, since it will not show symmetry of the curve.

CHASSIS HS-211,
HS-230

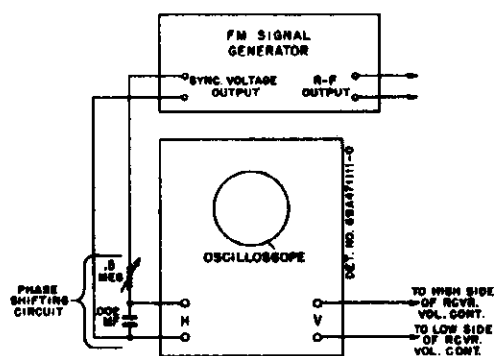


FIGURE 5.

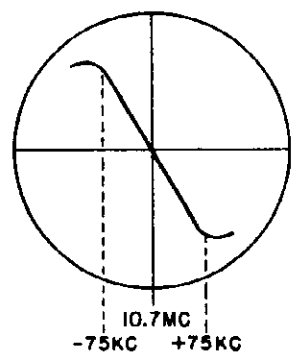


FIGURE 6.

FM SIGNAL GENERATOR & OSCILLOSCOPE HOOK-UP

RATIO DETECTOR WAVEFORM

FM BAND - IF & RF ALIGNMENT (ALTERNATE METHOD)

1. The following procedure for FM alignment, with an unmodulated carrier generator and a DC electronic voltmeter, is not as desirable as the preceding method; but it may be used if no FM generator is available.

2. Connect the signal generator as in chart below, with no modulation.

3. Set the bandswitch to the FM position.

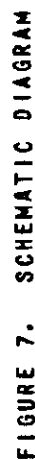
4. Except in step 2 below, connect the electronic voltmeter across resistor R-21 (33K) in the ratio detector stage.

5. Throughout alignment reduce the signal generator output to a value which produces no more than a 5 volt rise above no signal voltage, to avoid overloading the receiver.

6. In step 2 below, connect two 100K ohm resistors in series across R-21. Connect the electronic voltmeter between the volume control side of resistor R-17 (47K) and the junction of the two 100K resistors, with the low side of the meter at the 100K resistors.

7. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc	Fully opened	8, 10, 11, 12 & 13 (IF cores)	Adjust for maximum.
2.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc	Fully opened	9 (ratio det sec)	Adjust for zero. (Connect meter as in step 6 above)
RF ALIGNMENT						
3.	270 ohms	FM terminal 19 on rear of chassis	105 mc	105 mc on dial	14 (osc core)	Adjust for maximum.
4.	-	-	-	Fully closed	15 & 16 (RF & ant cores)	Turn counterclockwise until cores are at bottom of pipe, then turn two turns clockwise.
5.	270 ohms	FM terminal 19 on rear of chassis	90 mc	Tune in signal	17 & 18 (RF & ant tuning plugs)	Adjust for maximum.
6.	270 ohms	FM terminal 19 on rear of chassis	105 mc	Tune in signal	15 & 16 (RF & ant cores)	Adjust for maximum.
7.	-	-	-	-	-	Repeat steps 5 & 6 until no further adjustment is necessary.



RECORD CHANGER: Model RC-36, Pages RCD.CH.
21-1 to RCD.Ch.21-15,16.

PAGE 21-30 MOTOROLA

CHASSIS HS-211,
HS-230

REPLACEMENT PARTS LIST

REF.
NO. PART NO. DESCRIPTION

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1	19B690978	Variable, 3 gang
C-2	21K77375	Ceramic: 220 mmf 500V
C-3	21K70720	Ceramic: 5 mmf 500V
C-4	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-5	21B77286	Ceramic: 100 mmf 500V
C-6	21B77286	Ceramic: 100 mmf 500V
C-7	21B77286	Ceramic: 100 mmf 500V
C-8	21R6554	Mica: 100 mmf 10% 500V
C-9	21K28816	Ceramic: 24 mmf 500V
C-10	21K478410	Ceramic: 1000 mmf 500V
C-11	21K691203	Ceramic: 85 mmf 500V
C-12	8R9821	Paper: .05 mf 200V
C-13	21B77286	Ceramic: 100 mmf 500V
C-14	8R9809	Paper: .01 mf 400V
C-15	8R9809	Paper: .01 mf 400V
C-16	8R9813	Paper: .005 mf 600V
C-17	23B690975	Electrolytic: 40 mf/300V, 40-40 mf/250V, 40 mf/25V
C-18	21K478410	Ceramic: 1000 mmf 500V
C-19	8R9824	Paper: .002 mf 400V
C-20	8K470606	Paper: .05 mf 400V
C-21	21K478410	Ceramic: 1000 mmf 500V
C-22	21B484337	Ceramic: dual; 250-250 mmf/450V
C-23	8K470606	Paper: .05 mf 400V
C-24	8R9824	Paper: .002 mf 400V
C-25	8R9824	Paper: .002 mf 400V
C-26	8R9813	Paper: .005 mf 600V
C-27	8R9821	Paper: .05 mf 200V
C-28	23K690543	Electrolytic: 3 mf 50V
C-29	8R9809	Paper: .01 mf 400V

CAPACITOR-RESISTOR

CR-1	21K690980	Capacitor-Resistor: 50 mmf-50 mmf 47,000 ohms
CR-2	21K680007	Capacitor-Resistor: 10,000 mmf 150 ohms
CR-3	21K691125	Capacitor-Resistor: 5000 mmf 10 meg
CR-4	21K690979	Capacitor-Resistor: 250 mmf 68,000 ohms

DIAL LIGHT

I-1,		
I-2	65X11854	Bulb, dial light: #47; 6-8V; .15 amp; clear; bayonet base

COILS

L-1	24K690985	FM Loop antenna: with lead
L-2	24C690896	AM Loop antenna
L-3	24C690584	Inductor and Capacitor Assembly: FM antenna: less tuning core
L-4	24A484025	RF choke
L-5	24C690584	Inductor and Capacitor Assembly: FM RF; less tuning core
L-6	24K690996	Inductor and Capacitor Assembly: FM oscillator; less tuning core
L-7	24K780128	RF choke: insulated
L-8	24B690976	AM oscillator coil

REF.
NO. PART NO. DESCRIPTION

SPEAKERS

LS-1 50C791631 Speaker: 12" PM; 3.2 ohm VC

LS-2 50C790701
or 50C791430 Speaker: 5" PM; 3.2 ohm VC.

RESISTORS

Note: All resistors are carbon insulated type unless otherwise specified.

R-1	6R6004	1 meg 20% 1/4W
R-2	6R5551	120 10% 1/4W
R-3	6R6048	47,000 10% 1/4W
R-4	6R3949	470 20% 1/4W
R-5	6R490131	3.3 10% 1/4W
R-6	6R6028	22,000 20% 1/4W
R-7	6R5585	8.2 meg 10% 1/4W
R-8	6R6048	47,000 10% 1/4W
R-9	6R6038	1500 10% 1/4W
R-10	6R5725	8200 10% 2W
R-11	6R6497	3.3 meg 10% 1/4W
R-12	6R2039	68 10% 1/4W
R-13	6R5725	8200 10% 2W
R-14	6R6046	1 meg 10% 1/4W
R-15	17A690973	Wirewound: 360 10% 3W; center tapped
R-16	6R6431	15,000 10% 1W
R-17	6R6056	47,000 20% 1/4W
R-18	6R6032	470,000 20% 1/4W
R-19	6R6032	470,000 20% 1/4W
R-20	6R6389	220 10% 1W
R-21	6R6410	33,000 10% 1/4W
R-22	6R5598	390 10% 1W
R-23	6R6012	33,000 20% 1/4W
R-24	18K691192	Volume Control: 1 meg; tapped at 300,000 ohms; includes on-off switch
R-25	18K77399	Tone Control: 1 meg

SWITCHES

S-1	40B690977	Band Switch: AM-FM-PHONO
S-2	-	On-off Switch (on volume control)
S-3	40A691922	Phono-Radio-Switch; SPST (HS-234)

TRANSFORMERS

T-1	24B690899	AM RF Transformer
T-2	25B691035	Power Transformer
T-3	24B690540	1st FM IF Transformer (orange dot): 10.7 mc; complete with capacitor and cores; less shield
T-4	24B482863	AM IF Transformer (brown dot): 455 Kc: complete with capacitors and cores; less shield....
T-5	24R690541	2nd FM IF Transformer (yellow dot): 10.7 mc; complete with capacitor and cores; less shield
T-6	24B482865	AM Diode Transformer (red dot): 455 Kc: complete with capacitors and cores; less shield....
T-7	24B690542	Ratio Detector Transformer: 10.7 mc: complete with capacitors, cores and shield
T-8	25B690898	Audio Output Transformer

PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
CHASSIS PARTS - MECHANICAL					
1X690717	Bracket Assembly, tuning core mtg; includes shoulder rivet and single anti-backlash clip	5S7701	Rivet, .122 x 3/16 stl; nkl pl (power receptacle, ant term strip, and tuning shaft bracket mtg).....	31K37504	Strip, terminal: 1 insulated lug; #1 mtg; 3/8" spacing
1X691127	Bracket & Pullies Assembly; includes two pullies and shoulder rivet (cord guides on chassis front)	5S7700	Rivet, .122 x 1/4; stl; nkl pl (octal tube socket mtg).....	31K51251	Strip, terminal: 1 insulated lug, #1 gnd; 3/8" spacing
7C690567	Bracket, tuner mtg (gang mtg).....	5K13896	Rivet, shoulder (tuning core cord guide and pulley mtg on front of chassis)	31K471565	Strip, terminal: 3 insulated lugs, #4 gnd; 3/8" spacing
7A77337	Bracket, tuning shaft	5K71246	Rivet, shoulder (pulley mtg on side of chassis and on left side of dial plate)	31A690974	Strip, terminal: 7 insulated lugs, #4 & 9 gnd; 3/8" spacing
43K890398	Bushing, line cord retainer (use with 43A890397)	5K481770	Rivet, shoulder (for double pullies on dial plate)	31K471498	Strip, terminal: 3-screw (antenna input)
43A890397	Bushing, line cord strain relief (use with 43K890398)	3S7462	Screw, machine: 6-32 x 3/16 plain hex head; cad pl (electrostatic shield mtg)	29K5412	Terminal, plain pin (on speaker leads)
42A690560	Clip, anti-backlash: double (on tuner mounting brkt)	3S7326	Screw, machine: 8-32 x 3/16 plain locking hex head; cad pl (gang mtg)	4A70015	Washer, 'C' (tuning shaft retainer)
42K690561	Clip, anti-backlash: single (on core mtg brkt)	3S7163	Screw, machine: 8-32 x 1/4 plain hex head; cad pl (pointer drive pulley mtg)	CABINET PARTS	
42B482867	Clip, spring: blued finish (holds IF transformer)	3S2695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (tuner brkt mtg)	39K17396	Contact, pin terminal (in molded phono motor receptacle)(19F1)...
11M488137	Cord, dial (core drive)	3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; cad pl (dial plate assembly mtg)	13C791478	Escutcheon, radio dial: brass....
11M8944	Cord, dial (pointer drive).....	3S7475	Screw, sheet metal: #8 x 1/4 PKZ slotted acorn head; cad pl (power trans mtg)	5A71081	Eyellet (radio chassis mtg).....
30K21859	Cord, line: with plug: 9 ft long	3S7103	Setscrew: 8-32 x 1/8 Allen head; cad pl (core drive pulley mtg).....	5A71092	Grommet, rubber (radio chassis mtg)
46B692164	Core, iron and screw: green dot (FM osc tuning core)	3S7113	Setscrew: 8-32 x 1/4 slab head; cad pl (bandswitch link assembly mtg).....	14K791482	Insulator, fibre (clamps phono and antenna leads)
46K692165	Core, iron and screw (FM RF and ant tuning core)	47A690893	Shaft, bandswitch actuating (HS-211)	36B790569	Knob, control: no dot; beige plastic (radio controls)
34C690897	Dial scale: glass	1X691134	Shaft, tuning: complete with pulley..	36K791630	Knob, control: with dot; beige plastic (radio controls)
1X691136	Dial Scale and Plate Assembly: complete with cord pulleys	26K485936	Shield, coil: for IF transformers....	1X792530	Lead and Plugs Assembly, phono pick-up (shielded lead with two phono pick-up plugs)(19F1)
5S7866	Eyellet: .125 x .091; brass; nkl pl (core drive cord retainer).....	26A470013	Shield, dial light	64D791510	Panel, cabinet back: fibre (covers radio and phono compartments)(16VF8)
1X600081	Link Assembly, bandswitch actuating: complete with bushings; less setscrews	26K690984	Shield, electrostatic (gang shield)...	64K792522	Panel, cabinet back: fibre (covers radio and phono compartments)(19F1)...
4S9751	Lockwasher, int-ext: #8; cad pl (pointer drive pulley mtg).....	26K690981	Shield, tube: spring type	28K71775	Plug, phono pick-up (short plug on phono lead)(19F1)
2S7019	Nut, hex: 4-40 x 1/4; cad pl (FM tuning core mtg)	26A692080	Shield, tube (for V-9)	28K22183	Plug, phono pick-up (long plug on phono lead)(19F1)
2S7051	Nut, hex palnut: 3/8-32 x 9/16; cad pl (bandswitch, tone and volume control mtg)	9K471935	Socket, dial light: includes brkt.....	28K30736	Plug, phono motor: 3-pin; includes shell (on phono motor lead).....
52B481704	Pointer, dial	9A72519	Socket, tube: octal	9K470402	Receptacle, phono motor: 5-prong; molded; includes contacts (19F1)
49A21741	Pulley, cord: 3/8" groove (on chassis front)	9A690129	Socket, tube: midjet; 7 prong (for V-1)	9A600040	Receptacle, phono motor: 3-prong; includes shell (19F1)
49A73807	Pulley, cord: 1/2" groove (on chassis side and on dial plate)	9K484167	Socket, tube: miniature; 7 prong	3S7536	Screw, sheet metal: #6 x 3/8 PKA slotted acorn head; antique copper finish (cabinet back panel mtg).
49A26433	Pulley, cord: 21/32" groove (on chassis front)	9A485495	Socket, tube: oval; 9-prong	3S7534	Screw, sheet metal: #8 x 1-3/8 PKA plain hex head; cad pl (radio chassis mtg)
49A690562	Pulley, core drive: brass	9A76209	Socket, tube: octal	15K74443	Shell, plug (on 28K30736 phono motor plug)
1K691145	Pulley, pointer drive: 3-1/2" diameter	41A690598	Spring, coil: 7 turns; cosmoline dipped (FM RF & ant core mtg)	15A690616	Shell, receptacle (on 9A600040 phono motor receptacle)(19F1)
9K592170	Receptacle, phono pick-up: 1 prong....	41K691840	Spring, coil: 8 turns; copper plated (FM osc core mtg)	4S490513	Washer, flat: 3/4 x 7/32 x .042 stl; cad pl (radio chassis mtg)...
9A27674	Receptacle, phono power: 3-prong.....	41A14244	Spring, tension (core & pointer drive cord)		
5S8497	Rivet: .088 x 1/8 stl; nkl pl (single anti-backlash clip mtg)	41K692081	Spring, tube shield retaining (for V-9 shield)		
5S7771	Rivet: .088 x 3/16; stl; nkl pl (min and midjet tube socket mtg).....	37K21114	Strip, channel: rubber; 1" long (dial scale mtg)		
5S7707	Rivet: .122 x 5/32; stl; nkl pl (octal tube socket, terminal strip, output transformer mtg).....				

CHASSIS HS-253

USED WITH 17F2 Series
TV MODELS 17F3 Series
17F1 Series 17F4 Series
GENERAL INFORMATION

POWER SUPPLY - 117 volts, 60 cycle alternating current only.

SPEAKER - PM type, common to both radio and television chassis.

RADIO CHASSIS - Radio chassis HS-253 contains 8 tubes and receives both AM and FM broadcast programs. Except for common speakers, it operates entirely independently of the television receiver.

RADIO POWER CONSUMPTION - 85 watts, including phono motor.

RADIO AUDIO OUTPUT - 3 watts

RADIO TUNING RANGE - AM 535 to 1620 Kc
FM 88 to 108 Mc

RADIO CHASSIS TUBE COMPLEMENT -

RADIO IF FREQUENCIES - AM IF - 455 Kc
FM IF - 10.7 Mc

6BA6 - FM-AM RF Amplifier
6BA7 - FM-AM Converter
6BA6 - FM-AM IF Amplifier
6BA6 - FM IF Amplifier
6AL5 - FM Ratio Detector
6AV6 - AM Detector & 1st Audio Amp
6K6GT - Power Amplifier
5Y3GT - Rectifier

RADIO ANTENNAS - AM: Loop antenna mounted in cabinet.
FM: Built into the power cord, with terminals for connection of an external antenna, if required.

INSTALLATION & OPERATING INSTRUCTIONS

ANTENNAS

No outside antenna or ground is normally required for standard broadcast (AM) reception, as a loop antenna is located inside the cabinet. Antenna connections are shown in Figure 1. In locations where additional pick-up is desired, an external antenna may be connected to the clip marked "EXT BC ANT" on the loop antenna.

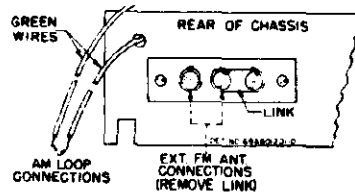


FIGURE 1.
ANTENNA CONNECTIONS

An FM antenna, built into the power cord, eliminates the need for an external FM antenna when the receiver is used in normal FM service areas, such as are found in and for a few miles around metropolitan areas. In "fringe" or weak signal areas, improved FM reception can be obtained by using an outside FM antenna. The external antenna should be connected through a 300 ohm twin transmission line to the 1st & 2nd screws on the terminal strip on the chassis, as in Figure 1. The link between the 2nd & 3rd screws should be opened. Orient the antenna to obtain maximum volume of the FM stations.

For best FM reception from the built-in power line cord antenna, it is important to stretch the cord to its full length. Changing the direction or position of the line cord, or reversing the plug in the wall outlet, will often improve reception from weak stations. Connect the link between the 2nd & 3rd screws on the terminal strip on the chassis when the built-in antenna is used.

ALIGNMENT

GENERAL INFORMATION

1. Maximum performance can be obtained only if extreme care is exercised during alignment.
2. Use a small fibre screwdriver for aligning the IF transformers.

3. Refer to Figure 4 for the location of all alignment trimmers and cores.

4. As the stages are brought into alignment, reduce the signal generator output to a low value to avoid overloading the receiver.

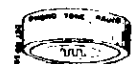
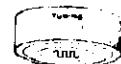


FIGURE 2.
OPERATING CONTROLS
CONTROLS

Refer to Figure 2 for the locations of the radio operating controls.

Power for both the radio and the record changer is controlled by the VOL-ON-OFF knob. The phonograph motor will not operate, however, until the PHONO-TONE-RADIO knob is rotated also to "PHONO". CAUTION: The power switches on the AM-FM radio and on the television receiver are independent. Make sure both are turned off when the set is not in use.

Tuning of FM stations should be done very carefully, for best sound reproduction, not necessarily for the strongest volume received.

ORDER OF ALIGNMENT AND EQUIPMENT REQUIRED

1. AM Broadcast Band IF & RF Alignment
 - a. 455 to 1620 Kc AM Signal Generator
 - b. Low range output meter

- b. Oscilloscope

- 2(A) FM Band IF & RF Alignment (preferred method)
 - a. 10.7 to 108 Mc FM signal generator

- (B) FM Band IF & RF Alignment (alternate method)

- a. 10.7 to 108 Mc signal generator (unmodulated)
- b. Low range DC electronic voltmeter.

AM BROADCAST BAND - IF & RF ALIGNMENT

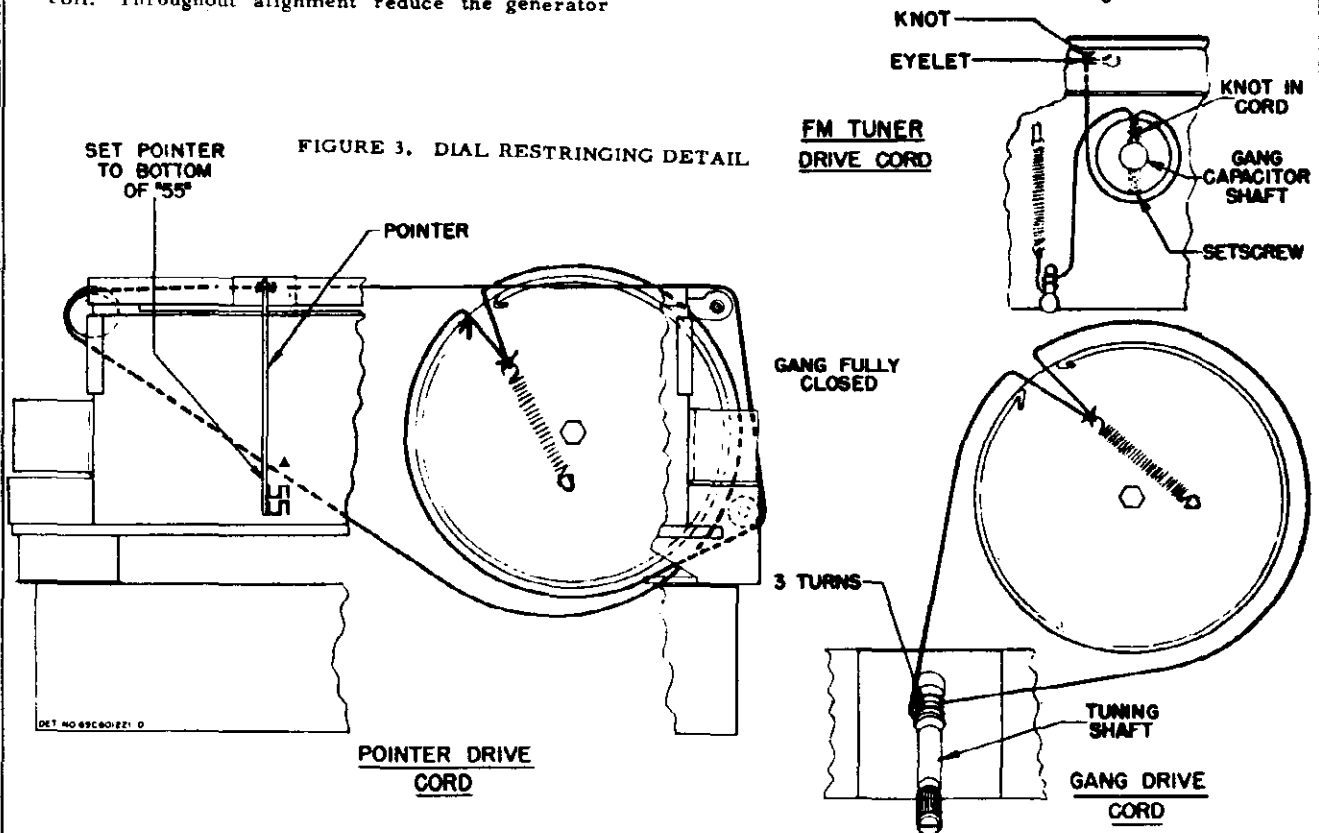
1. With the gang fully closed, adjust the pointer to coincide with the bottom of the "55" on the dial scale. See Figure 3.
2. Connect the AM signal generator as in chart below, with 400 cycle, 30% modulation.
3. Connect the output meter across the speakervoice coil. Throughout alignment reduce the generator

output to a level which produces less than 1.27 volts (.5 watt) across the voice coil, to avoid overloading the receiver.

4. Set the bandswitch to the AM position.

5. Turn the receiver volume control to maximum.

6. Proceed as shown in the following chart.



STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. V-2 (pin 7, 6BA7)	455 Kc	Fully opened	1, 2, 3, & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. V-2 (pin 7, 6BA7)	1620 Kc	Fully opened	5 (AM osc)	Adjust for maximum. *
3.	-	-	-	-	-	Connect AM loop to chassis.
4.	-	Across radiation loop**	1400 Kc	Tune in signal	8 (AM ant)	Adjust for maximum.

CHASSIS HS-253

5. If, after the receiver has been aligned as above, it is found to be badly off calibration, it will be necessary to adjust oscillator core (7) as follows: connect the generator to the grid of the converter tube and, with the gang fully closed, adjust core (7) at 535 kc. It is advisable to repeat the oscillator adjustments at 1620 kc and 535 kc several times until the tuning range is correct. Core (7) has been pre-set at the factory and normally should require no retuning.

* If, difficulty is encountered in tuning trimmer (5), adjust trimmer (6) to 1/2 turn from tight.

** Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

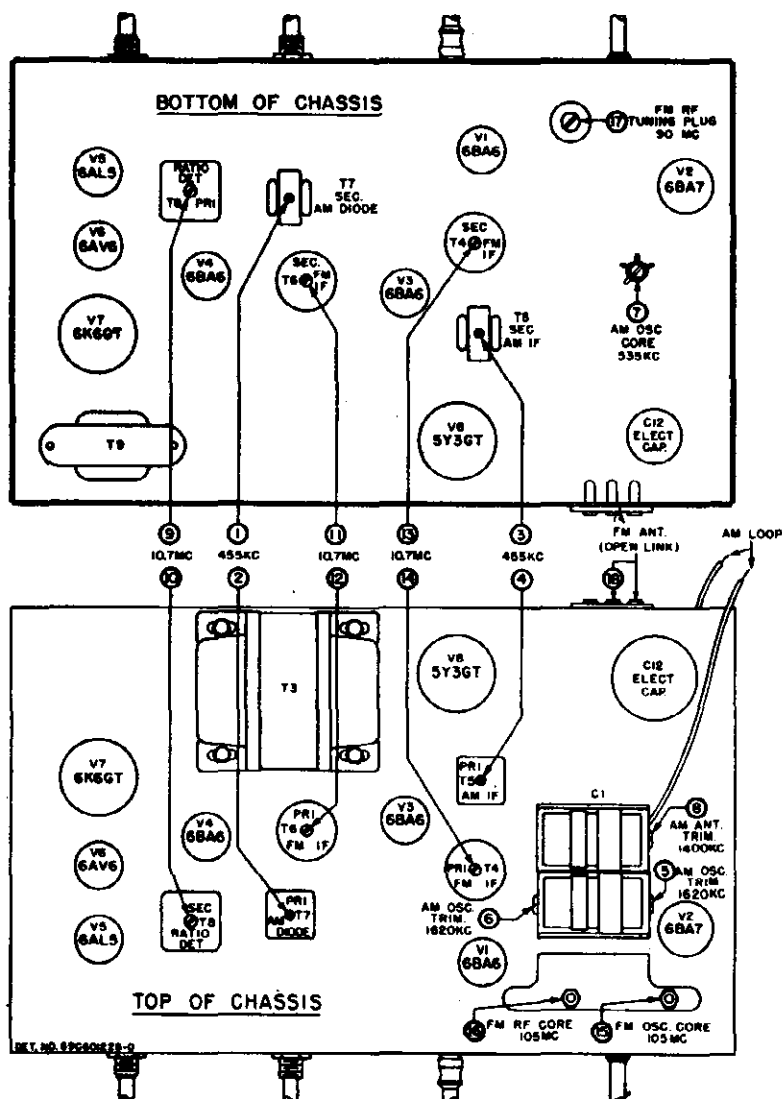


FIGURE 4.
TUBE & TRIMMER LOCATIONS

FM BAND - IF & RF ALIGNMENT (PREFERRED METHOD)

1. The following FM alignment procedure, using an FM signal generator and an oscilloscope, is to be preferred because the actual response pattern may be observed on the scope and adjusted for best symmetry and maximum amplitude.
2. Connect the vertical input terminals of the oscilloscope between the chassis and the junction of resistor R-18 (47K) and capacitor C-23 (1000 mmi).
3. Connect the FM signal generator sync voltage output terminals, through a phase shifting network, to the horizontal input terminals of the scope, as in Figure 5. (Other values of resistance and capacitance may be required, depending upon the scope). The phasing control should be adjusted to give only one trace on the scope. NOTE: If the FM generator has a built-in phase control, the phase shifting network is not necessary.
4. Set the bandswitch to the FM position.
5. Throughout alignment, reduce the generator output to keep the signal just above the noise level, to avoid overloading the receiver.
6. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 6BA6)	10.7 mc ± 100 kc dev	Fully opened	9 (ratio det pri)	Adjust for maximum amplitude of pattern.*
2.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 6BA6)	10.7 mc ± 100 kc dev	Fully opened	10 (ratio det sec)	Adjust for symmetrical curve, as shown in Figure 6.
3.	-	-	-	-	-	Repeat steps 1 & 2 for maximum amplitude and best symmetry.
4.	1000 mmf	Grid of 1st IF Amp V-3 (pin 1, 6BA6)	10.7 mc ± 100 kc dev	Fully opened	11 & 12 (2nd IF sec & pri)	Adjust for maximum amplitude of pattern.*
5.	1000 mmf	Grid of conv V-2 (pin 7, 6BA7)	10.7 mc ± 100 kc dev	Fully opened	13 & 14 (1st IF sec & pri)	Adjust for maximum amplitude of pattern.*
6.	1000 mmf	Grid of conv V-2 (pin 7, 6BA7)	10.7 mc ± 100 kc dev	Fully opened	11, 12, 13 & 14	Readjust for maximum amplitude and best symmetry.
RF ALIGNMENT						
7.	270 ohms	FM terminal 18 on rear of chassis (open link)	105 mc $\pm 22\text{-}1/2$ kc dev	105 mc on dial	15 (osc core)	Adjust for maximum amplitude of pattern.*
8.	-	-	-	Fully closed	16 (RF core)	Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise.
9.	270 ohms	FM terminal 18 on rear of chassis	90 mc $\pm 22\text{-}1/2$ kc dev	Tune in signal	17 (RF tuning plug)	Adjust for maximum amplitude of pattern.*
10.	270 ohms	FM terminal 18 on rear of chassis	105 mc $\pm 22\text{-}1/2$ kc dev	Tune in signal	16 (RF core)	Adjust for maximum amplitude of pattern.*
11.	-	-	-	-	-	Repeat steps 9 & 10, until no further adjustment is necessary.

* An output meter across the speaker voice coil will also indicate maximum amplitude. It should not be used in place of the scope, however, since it will not show symmetry of the curve.

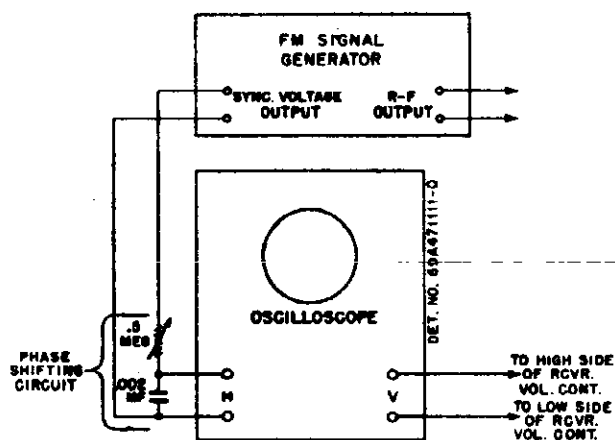


FIGURE 5.
FM SIGNAL GENERATOR & OSCILLOSCOPE HOOK-UP

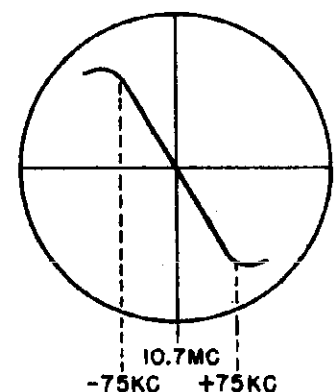


FIGURE 6. RATIO DETECTOR WAVEFORM

CHASSIS HS-253

FM BAND 4 IF & RF ALIGNMENT (ALTERNATE METHOD)

1. The following procedure for FM alignment, with an unmodulated carrier generator and a DC electronic voltmeter, is not as desirable as the preceding method; but it may be used if no FM generator is available.
2. Connect the signal generator as in chart below, with no modulation.
3. Set the bandswitch to the FM position.
4. Except in step 2 below, connect the electronic voltmeter across resistor R-19 (33K) in the ratio detector stage.
5. Throughout alignment reduce the signal generator output to a value which produces no more than a 5 volt rise above no signal voltage, to avoid overloading the receiver.
6. In step 2 below, connect two 100K ohm resistors in series across R-19. Connect the electronic voltmeter between the volume control side of resistor R-18 (47K) and the junction of the two 100K resistors, with the low side of the meter at the 100K resistors.
7. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc	Fully opened	9, 11, 12, 13 & 14 (IF cores)	Adjust for maximum.
2.	1000 mmf	Grid of conv V-2 (pin 7, 6BA7)	10.7 mc	Fully opened	10 (ratio det sec)	Adjust for zero (connect meter as in step 6 above)
RF ALIGNMENT						
3.	270 ohms	FM terminal 18 on rear of chassis (open link)	105 mc	105 mc on dial	15 (osc core)	Adjust for maximum.
4.	-	-	-	Fully closed	16 (RF core)	Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise.
5.	270 ohms	FM terminal 18 on rear of chassis	90 mc	Tune in signal	17 (RF tuning plug)	Adjust for maximum.
6.	270 ohms	FM terminal 18 on rear of chassis.	105 mc	Tune in signal	16 (RF core)	Adjust for maximum.
7.	-	-	-	-	-	Repeat steps 5 & 6 until no further adjustment is necessary.

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part No.	Description
CHASSIS PARTS - ELECTRICAL		
<u>Capacitors</u>		
C-1	19B691877	Variable, 2-gang
C-2	21B77286	Ceramic; 100 mmf 500V
C-3	21K478410	Ceramic; 1000 mmf 500V
C-4	21K481377	Ceramic; 500 mmf 500V
C-5	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-6	21K77373	Ceramic; 47 mmf 500V
C-7	21B77286	Ceramic; 100 mmf 500V
C-8	8R9816	Paper; .05 mf 400V
C-9	21K77373	Ceramic; 47 mmf 500V
C-10	21A690688	Ceramic; 85 mmf 500V
C-11	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-12	23B690975	Electrolytic; 40 mf/300V, 40-40 mf/250V, 40 mf/25V
C-13	21A470789	Ceramic, disc type: 5000 mmf 450V.
C-14	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-15	21A470789	Ceramic, disc type: 5000 mmf 450V.
C-16	8R9809	Paper; .01 mf 400V
C-17	21K482726	Ceramic, disc type: 10,000 450V...
C-18	21K790912	Ceramic; 2000 mmf 500V
C-19	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-20	21K478410	Ceramic; 1000 mmf 500V
C-21	21B484337	Ceramic; dual; 250-250 mmf/450V....
C-22	23K690543	Electrolytic; 3 mf 50V
C-23	21K478410	Ceramic; 1000 mmf 500V
C-24	8R9809	Paper; .01 mf 400V
C-25	8R490232	Tubular, molded; .047 mf 400V
C-26	8R9813	Paper; .005 mf 600V
C-27	8R9809	Paper; .01 mf 400V
C-28	21B77286	Ceramic; 100 mmf 500V
C-29	8R9813	Paper; .005 mf 600V
C-30	8R9813	Paper; .005 mf 600V
C-31	8R9847	Paper; .002 mf 600V
C-32	21K482726	Ceramic, disc type: 10,000 mmf 450V
<u>Pilot Light</u>		
I-1,2	65X11854	Bulb, pilot light: #47; 6-8V; .15 amp; clear; bayonet base

Coils

L-1	24C690896	AM loop antenna
L-2	24A692148	RF choke
L-3	24A90064	RF choke
L-4	24C690584	Inductor and Capacitor Assembly: FM RF; less tuning core
L-5	24K600519	Inductor and Capacitor Assembly: FM osc; less tuning core
L-6	24A791081	RF choke

Resistors

Note: All resistors are insulated carbon type unless otherwise specified.

R-1	6R6004	1 meg 20% 1/2W
R-2	6R5551	120 10% 1/2W
R-3	6R5725	8200 10% 2W
R-4	6R2089	1800 10% 1/2W
R-5	6R6028	22,000 20% 1/2W
R-6	6R6410	33,000 10% 1/2W
R-7	6R6056	47,000 20% 1/2W
R-8	6R2108	47 20% 1/2W
R-9	6R5725	8200 10% 2W
R-10	17A690973	Wire wound: 360 10% 3W; center- tapped
R-11	6R2039	68 10% 1/2W
R-12	6R5725	8200 10% 2W
R-13	6R5551	120 10% 1/2W
R-14	6R6056	47,000 20% 1/2W
R-15	6R3927	2.2 meg 20% 1/2W
R-16	6R6377	470,000 10% 1/2W

Ref.

No.	Part No.	Description
R-17	6R5732	15,000 10% 2W
R-18	6R6056	47,000 20% 1/2W
R-19	6R6410	33,000 10% 1/2W
R-20	18A600974	Volume control: 2 meg; tapped at 600,000 ohms; includes on-off sw
R-21	6R2109	10 meg 20% 1/2W
R-22	6R6074	68,000 10% 1/2W
R-23	6R6032	470,000 20% 1/2W
R-24	18B600683	Tone control: 1 meg; with phono- radio switch
R-25	6R5593	470 10% 1W
R-26	6R6015	220,000 20% 1/2W

Switches

S-1	40B690538	Bandswitch, AM-FM
S-2	-	Phono-radio switch (on tone control)

Transformers

T-1	24A690544	FM Antenna Input Transformer
T-2	24K691878	AM Oscillator Transformer: white & red dot
T-3	25B600684	Power Transformer
T-4	24B690540	1st FM IF Transformer (orange dot): 10.7 mc; complete with capacitors and cores; less shield
T-5	24B485553	AM IF Transformer (green dot): 455 kc; complete with capacitors, cores, and shield
T-6	24B690541	2nd FM IF Transformer (yellow dot): 10.7 mc; complete with capacitors and cores, less shield
T-7	24K485555	AM Diode Transformer (pink dot): 455 Kc; complete with capacitors, cores, and shield
T-8	24K600893	Ratio Detector Transformer: 10.7 mc; complete with capacitors, cores and shield
T-9	25B600969	Audio Output Transformer

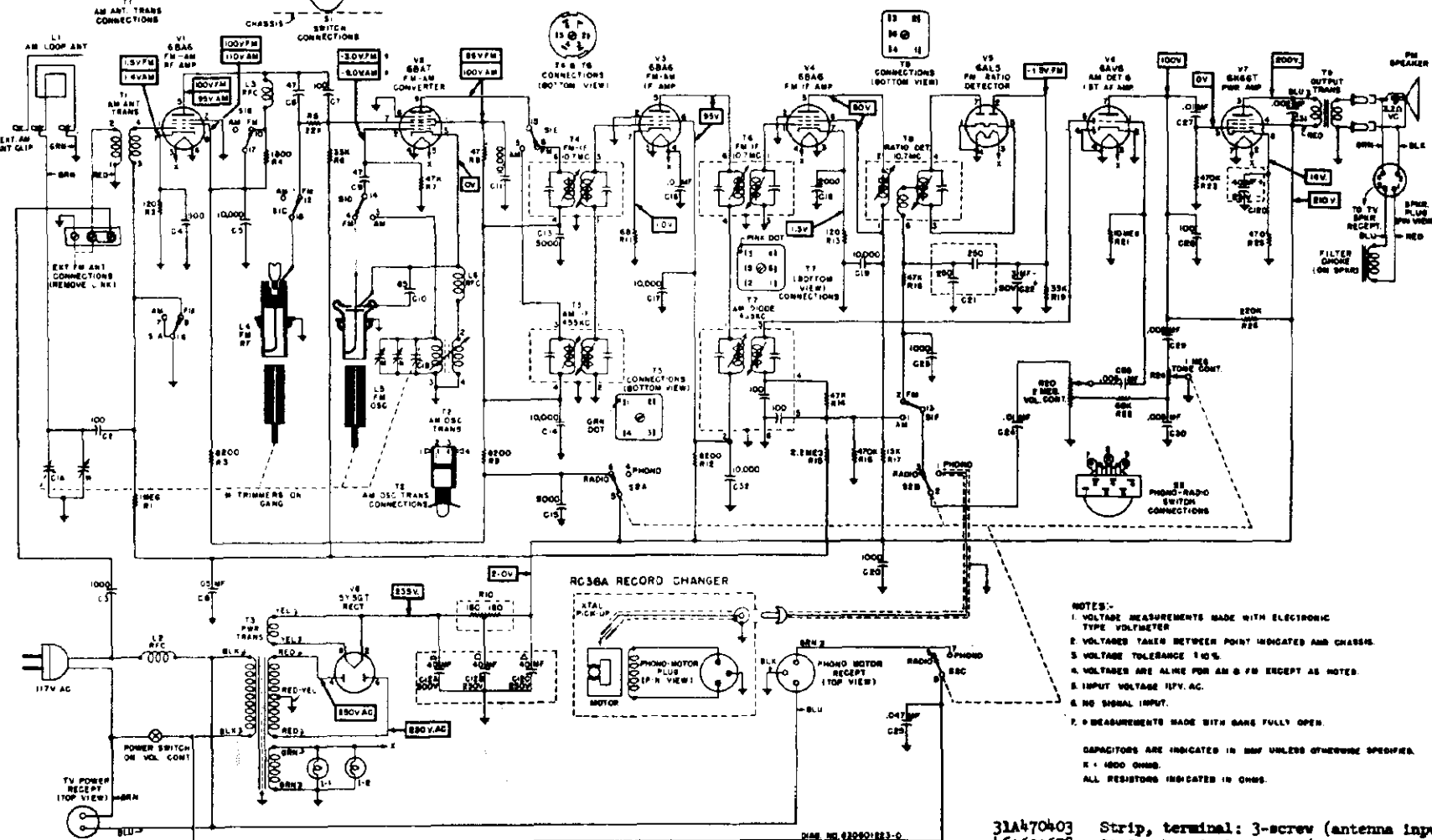
CHASSIS PARTS - MECHANICAL

1X690717	Bracket Assembly, tuning core mtg; in- cludes shoulder rivet and anti-backlash clip
----------	---

Part
NumberDescription

7A600672	Bracket, chassis mtg (on rear of chassis)
7C690567	Bracket, tuning mtg (gang mtg)
7A600476	Bracket, tuning shaft
43A890397	Bushing, line cord strain relief (use with 43K890398)
43K890398	Bushing, line cord retainer (use with 43A890397)
42K690561	Clip, anti-backlash: single (on core mtg bracket)
42A690560	Clip, anti-backlash: double (on tuner mtg bracket)
42A485548	Clip, coil can mtg (AM IF transformer)
42B482867	Clip, spring: blued finish (holds FM IF transformer)
11M8944	Cord, dial (pointer drive)
11M488137	Cord, dial (core drive)
30K21859	Cord, line: with plug; 9 ft long
46B692164	Core, iron and screw: green dot (FM osc tuning core)
46K692165	Core, iron and screw (FM RF tuning core).
1X600490	Dial Plate and Pulleys Assembly: complete, less dial scale
34C600811	Dial scale: glass
5S7866	Eyelet: .125 x .091 brass; nkl pl (core drive cord retainer)
1X600495	Lead and Plug Assembly, phono-pick-up...
4S9751	Lockwasher, int-ext: #8; cad pl (pointer drive pulley mtg)
2S7019	Nut, hex: 4-40 x 1/4; cad pl (FM tuning core mtg)
2S7051	Nut, hex palnut: 3/8-32 x 9/16; cad pl (control mtg)
35K691846	Pad, rubber: 1-hole (gang mtg)
35A691845	Pad, rubber: 2-hole (gang mtg)
28K71775	Plug, phono pick-up
52B481704	Pointer, dial
49A23960	Pulley, cord: 1/4" groove (on dial plate assembly)
49A21552	Pulley, cord: 1/2" groove (on dial plate assembly)
49A690562	Pulley, core drive: brass
1A691015	Pulley, pointer drive: 3-1/2" diameter
9A600040	Receptacle, phono motor: 3-prong; in- cludes shell
9A791031	Receptacle, TV power: 2-prong; includes shell
5S8497	Rivet: .088 x 1/8 stl; nkl pl (anti- backlash clip mtg)
5S7771	Rivet: .088 x 3/16 stl; nkl pl (min socket mtg)
5S7774	Rivet: .088 x 1/4 stl; nkl pl (noval socket mtg)
5S7707	Rivet: .122 x 5/32 stl; nkl pl (term strip mtg)
5S7701	Rivet: .122 x 3/16 stl; nkl pl (ant term strip & output transformer mtg)....
5S7700	Rivet: .122 x 1/4 stl; nkl pl (octal socket mtg)
5A27675	Rivet, shoulder (cord pulley mtg)...
5K13896	Rivet, shoulder (on core mtg brkt)..
3S7163	Screw, machine: 8-32 x 1/4 plain hex head; cad pl (pointer drive pulley mtg)...
3S7205	Screw, machine: 8-32 x 1/4 slotted locking hex head; cad pl (gang mtg)
3S2695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (tuner brkt mtg)...
3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; cad pl (power trans & dial plate mtg)
3S7103	Set screw: 8-32 x 1/8 Allen head; cad pl (core drive pulley mtg)
1X600489	Shaft, tuning: complete with pulley.....
15A690616	Shell, receptacle (on phono motor recep- tacle)
15K74443	Shell, receptacle (on TV power receptacle)
26K485936	Shield, coil (for FM IF transformers)....
26A470013	Shield, pilot light
9K600685	Socket, pilot light
9K484167	Socket, tube: miniature; 7-prong
9A485495	Socket, tube: noval; 9-prong
9A76209	Socket, tube: octal

FIGURE 7. SCHEMATIC DIAGRAM



NOTES:-
 1. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER
 2. VOLTAGES TAKEN BETWEEN POINT INDICATED AND CHASSIS
 3. VOLTAGE TOLERANCE 10%
 4. VOLTAGES ARE ALIVE FOR AM & FM EXCEPT AS NOTED
 5. INPUT VOLTAGE 117V. AC.
 6. NO SIGNAL INPUT.
 7. MEASUREMENTS MADE WITH GAIN FULLY OPEN
 CAPACITORS ARE INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
 R = 1000 OHMS.
 ALL RESISTORS INDICATED IN OHMS.

41A690598 Spring, coil: 7 turns; cosmoline dipped (FM RF core mtg)
 41K691840 Spring, coil: 8 turns; cop pl (FM osc core mtg).....
 41A14244 Spring, tension (core & pointer drive cord)
 37K21114 Strip, channel: rubber; 1" long (dial scale mtg)

31K37504 Strip, terminal: 1 insulated lug; #1 mtg; 3/8" spacing
 31K76184 Strip, terminal: 2 insulated lugs; #1 gnd; 3/8" spacing
 31K26235 Strip, terminal: 3 insulated lugs; #1 gnd; 3/8" spacing
 31K4602 Strip, terminal: 5 insulated lugs; #3 gnd; 1/2" spacing

31A470403 Strip, terminal: 3-screw (antenna input).
 46A600678 Stud, chassis locating (on front of chassis)
 29A76280 Terminal, pin (on speaker l-ads) ...
 4A70015 Washer, "C" (tuning shaft mtg)
 4A600676 Washer, dog (AM-FM switch mtg).....
 487555 Washer, flat: 1/4 x .128 x .033 stl; pl (output transformer mtg).....
 487582 Washer, flat: 1/2 x .195 x .033 stl; pl (pointer drive pulley mtg).....

USED WITH TV MODELS 17F5 Series

SPEAKER - PM type; common to both radio and television chassis

POWER SUPPLY - 117 volts, 60 cycle alternating current only.

RADIO CHASSIS - Radio chassis HS-261 contains 8 tubes and receives both AM and FM broadcast programs. Except for common speakers, it operates entirely independently of the television receiver.

RADIO POWER CONSUMPTION - 85 watts, including phono motor

RADIO AUDIO OUTPUT - 3 watts

RADIO TUNING RANGE - AM - 535 to 1620 Kc
FM - 88 to 108 Mc

RADIO CHASSIS TUBE COMPLEMENT -

RADIO IF FREQUENCIES - AM IF - 455 Kc
FM IF - 10.7 Mc

6BA6	FM-AM RF Amplifier
6BA7	FM-AM Converter
6BA6	FM-AM IF Amplifier
6BA6	FM IF Amplifier
6AL5	FM Ratio Detector
6AV6	AM Detector & 1st Audio Amp
6K6GT	Power Amplifier
5Y3GT	Rectifier

RADIO ANTENNAS - AM: Loop antenna mounted in cabinet.
FM: Built into the power cord, with terminals for connection of an external antenna, if required.

INSTALLATION & OPERATING INSTRUCTIONS

ANTENNAS

No outside antenna or ground is normally required for standard broadcast (AM) reception, as a loop antenna is located inside the cabinet. Antenna connections are shown in Figure 1. In locations where additional pick-up is desired, an external antenna may be connected to the clip marked "EXT BC ANT" on the loop antenna.

An FM antenna, built into the power cord, eliminates the need for an external FM antenna when the receiver is used in normal FM service areas, such as are found in and for a few miles around metropolitan areas. In "fringe" or weak signal areas, improved FM reception can be obtained by using an outside FM antenna. The external antenna should be connected through a 300 ohm twin transmission line to the 1st & 2nd screws on the terminal strip on the chassis, as in Figure 1. The link between the 2nd & 3rd screws should be opened. Orient the antenna to obtain maximum volume of the FM stations.

For best FM reception from the built-in power line cord antenna, it is important to stretch the cord to its full length. Changing the direction or position of the line cord, or reversing the plug in the wall outlet, will often improve reception from weak stations. Connect the link between the 2nd & 3rd screws on the terminal strip on the chassis when the built-in antenna is used.

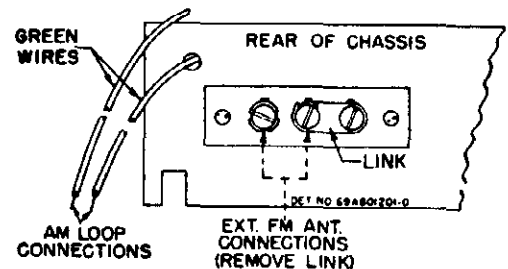


FIGURE 1. ANTENNA CONNECTIONS

CONTROLS

Refer to Figure 2 for the locations of the radio operating controls.

Power for both the radio and the record changer is controlled by the VOL-ON-OFF knob. The phonograph motor will not operate, however, until the PHONO-TONE-RADIO knob is rotated also to "PHONO". CAUTION: The power switches on the AM-FM radio and on the television receiver are independent. Make sure both are turned off when the set is not in use.

Tuning of FM stations should be done very carefully, for best sound reproduction, not necessarily for the strongest volume received.



FIGURE 2. OPERATING CONTROLS

ALIGNMENT

GENERAL INFORMATION

- Maximum performance can be obtained only if extreme care is exercised during alignment.
- Use a small fibre screwdriver for aligning the IF transformers.
- Refer to Figure 4 for the location of all alignment trimmers and cores.
- As the stages are brought into alignment, reduce the signal generator output to a low value to avoid overloading the receiver.

CHASSIS HS-261

ORDER OF ALIGNMENT AND EQUIPMENT REQUIRED

1. AM Broadcast Band IF & RF Alignment

- 455 to 1620 Kc AM Signal Generator
- Low range output meter

b. Oscilloscope

(B) FM Band IF & RF Alignment (alternate method)

- 10.7 to 108 Mc signal generator (unmodulated)
- Low range DC electronic voltmeter

2(A) FM Band IF & RF Alignment (preferred method)

- 10.7 to 108 Mc FM signal generator

AM BROADCAST BAND - IF & RF ALIGNMENT

- With the gang fully closed, adjust the pointer to coincide with the left of the "55" marking on the dial scale. See Figure 3.
- Connect the AM signal generator as in chart below, with 400 cycle, 30% modulation.
- Connect the output meter across the speaker voice coil. Throughout alignment reduce the generator

output to a level which produces less than 1.27 volts (.5 watt) across the voice coil, to avoid overloading the receiver.

- Set the bandswitch to the AM position.
- Turn the receiver volume control to maximum.
- Proceed as shown in the following chart.

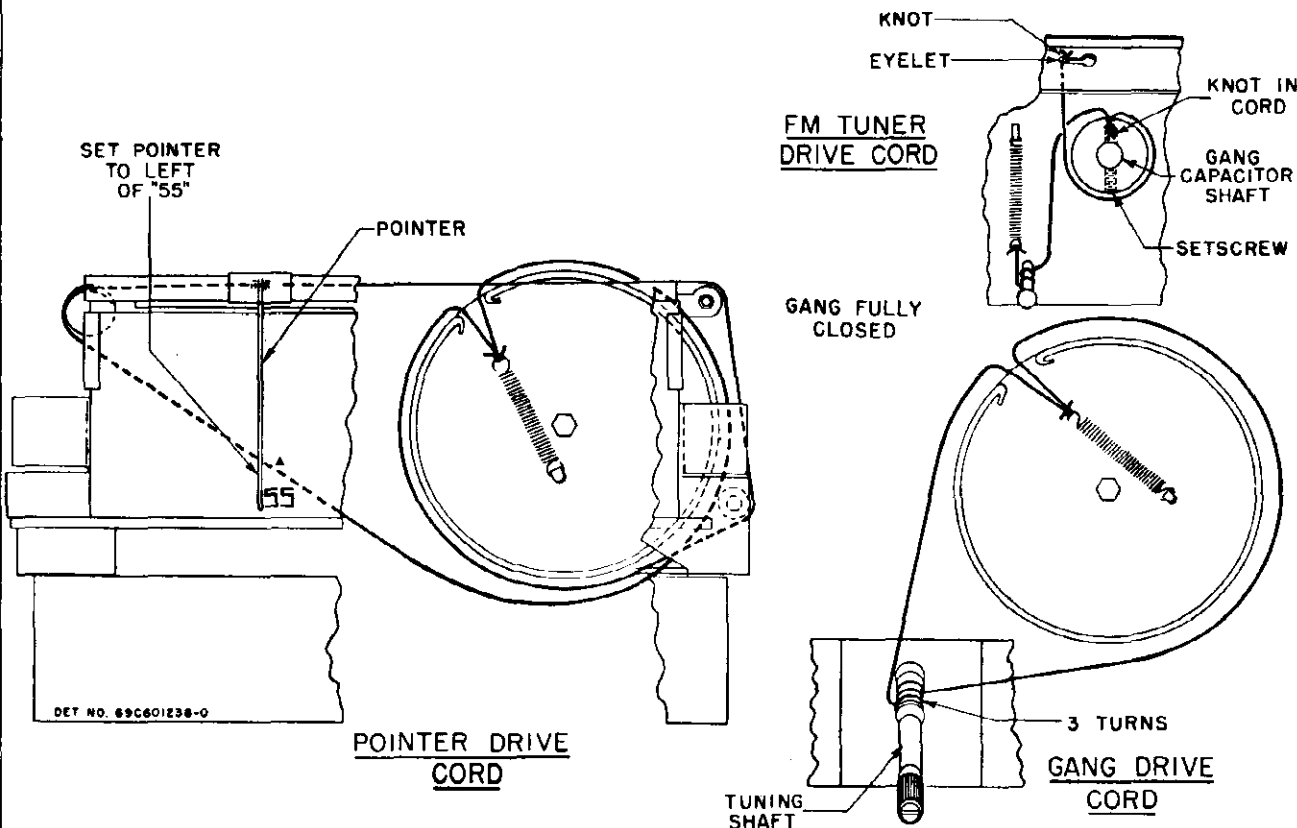


FIGURE 3. DIAL RESTRINGING DETAIL

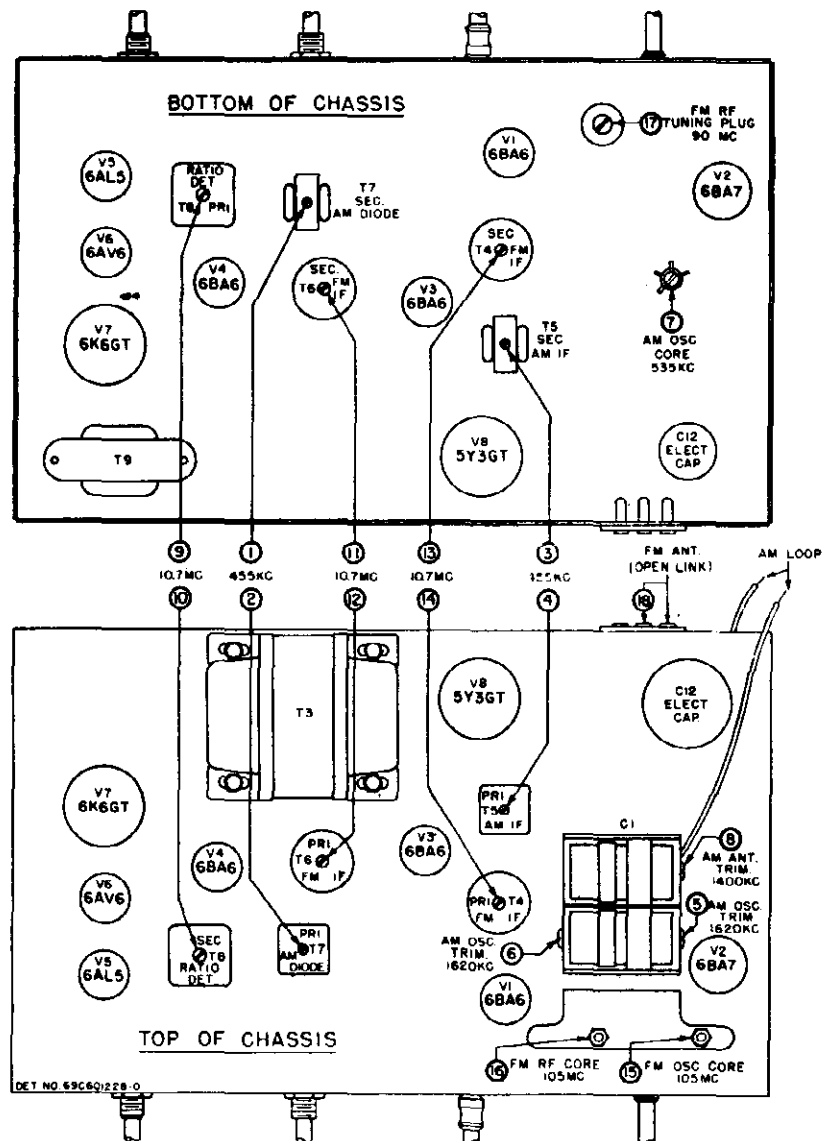
STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv V-2 (pin 7, 6BA7)	455 Kc	Fully opened	1, 2, 3, & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv V-2 (pin 7, 6BA7)	1620 Kc	Fully opened	5 (AM osc)	Adjust for maximum.*
3.	-	-	-	-	-	Connect AM loop to chassis.
4.	-	Across radiation loop**	1400 Kc	Tune in signal	8 (AM ant)	Adjust for maximum.

5. If, after the receiver has been aligned as above, it is found to be badly off calibration, it will be necessary to adjust oscillator core (7) as follows: connect the generator to the grid of the converter tube and, with the gang fully closed, adjust core (7) at 535 kc. It is advisable to repeat the oscillator adjustments at 1620 Kc and 535 Kc several times until the tuning range is correct. Core (7) has been pre-set at the factory and normally should require no retuning.

* If difficulty is encountered in tuning trimmer (5), adjust trimmer (6) to 1/2 turn from tight.

**Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

FIGURE 4.
TUBE & TRIMMER LOCATIONS



FM BAND - IF & RF ALIGNMENT (PREFERRED METHOD)

1. The following FM alignment procedure, using an FM signal generator and an oscilloscope, is to be preferred because the actual response pattern may be observed on the scope and adjusted for best symmetry and maximum amplitude.
2. Connect the vertical input terminals of the oscilloscope between the chassis and the junction of resistor R-18 (47K) and capacitor C-23 (1000 mmf).
3. Connect the FM signal generator sync voltage output terminals, through a phase shifting network, to the horizontal input terminals of the scope, as in Figure 5. (Other values of resistance and capacitance may be required, depending upon the scope). The phasing control should be adjusted to give only one trace on the scope. NOTE: If the FM generator has a built-in phase control, the phase shifting network is not necessary.
4. Set the bandswitch to the FM position.
5. Throughout alignment, reduce the generator output to keep the signal just above the noise level, to avoid overloading the receiver.
6. Proceed as shown in the following chart.

CHASSIS HS-261

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 6BA6)	10.7 mc ± 100 kc dev	Fully opened	9 (ratio det pri)	Adjust for maximum amplitude of pattern. *
2.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 6BA6)	10.7 mc ± 100 kc dev	Fully opened	10 (ratio det sec)	Adjust for symmetrical curve, as shown in Figure 6.
3.	-	-	-	-	-	Repeat steps 1 & 2 for maximum amplitude and best symmetry.
4.	1000 mmf	Grid of 1st IF Amp V-3 (pin 1, 6BA6)	10.7 mc ± 100 kc dev	Fully opened	11 & 12 (2nd IF sec & pri)	Adjust for maximum amplitude of pattern. *
5.	1000 mmf	Grid of conv V-2 (pin 7, 6BA7)	10.7 mc ± 100 kc dev	Fully opened	13 & 14 (1st IF sec & pri)	Adjust for maximum amplitude of pattern. *
6.	1000 mmf	Grid of conv V-2 (pin 7, 6BA7)	10.7 mc ± 100 kc dev	Fully opened	11, 12, 13 & 14	Readjust for maximum amplitude and best symmetry.
RF ALIGNMENT						
7.	270 ohms	FM terminal 18 on rear of chassis (open link)	105 mc $\pm 22\text{-}1/2$ kc dev	105 mc on dial	15 (osc core)	Adjust for maximum amplitude of pattern. *
8.	-	-	-	Fully closed	16 (RF core)	Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise.
9.	270 ohms	FM terminal 18 on rear of chassis	90 mc $\pm 22\text{-}1/2$ kc dev	Tune in signal	17 (RF tuning plug)	Adjust for maximum amplitude of pattern. *
10.	270 ohms	FM terminal 18 on rear of chassis	105 mc $\pm 22\text{-}1/2$ kc dev	Tune in signal	16 (RF core)	Adjust for maximum amplitude of pattern. *
11.	-	-	-	-	-	Repeat steps 9 & 10, until no further adjustment is necessary.

* An output meter across the speaker voice coil will also indicate maximum amplitude. It should not be used in place of the scope, however, since it will not show symmetry of the curve.

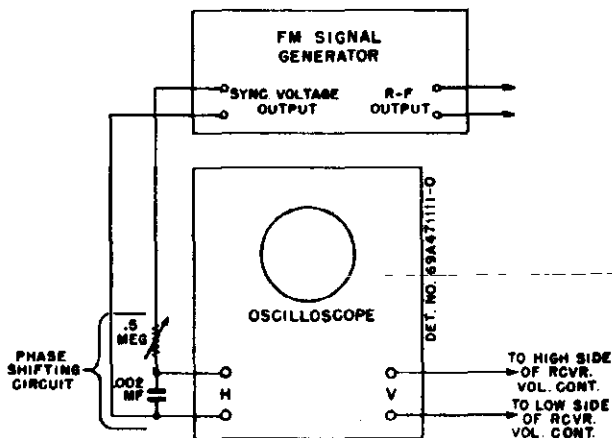


FIGURE 5.
FM SIGNAL GENERATOR AND OSCILLOSCOPE HOOK-UP

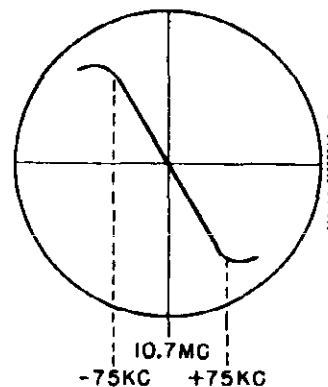


FIGURE 6. RATIO DETECTOR WAVEFORM

FM BAND - IF & RF ALIGNMENT (ALTERNATE METHOD)

1. The following procedure for FM alignment, with an unmodulated carrier generator and a DC electronic voltmeter, is not as desirable as the preceding method; but it may be used if no FM generator is available.
2. Connect the signal generator as in chart below, with no modulation.
3. Set the bandswitch to the FM position.
4. Except in step 2 below, connect the electronic voltmeter across resistor R-19 (33K) in the ratio detector stage.
5. Throughout alignment reduce the signal generator output to a value which produces no more than a 5 volt rise above no signal voltage, to avoid overloading the receiver.
6. In step 2 below, connect two 100K ohm resistors in series across R-19. Connect the electronic voltmeter between the volume control side of resistor R-19 (47K) and the junction of the two 100K resistors, with the low side of the meter at the 100K resistors.
7. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of conv V-2 (pin 7, 6BA7)	10.7 mc	Fully opened	9, 11, 12, 13 & 14 (IF cores)	Adjust for maximum.
2.	1000 mmf	Grid of conv V-2 (pin 7, 6BA7)	10.7 mc	Fully opened	10 (ratio det sec)	Adjust for zero (connect meter as in step 6 above)
RF ALIGNMENT						
3.	270 ohms	FM terminal 18 on rear of chassis (open link)	105 mc	105 mc on dial	15 (osc core)	Adjust for maximum
4.	-	-	-	Fully closed	16 (RF core)	Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise.
5.	270 ohms	FM terminal 18 on rear of chassis	90 mc	Tune in signal	17 (RF tuning plug)	Adjust for maximum.
6.	270 ohms	FM terminal 18 on rear of chassis	105 mc	Tune in signal	16 (RF core)	Adjust for maximum.
7.	-	-	-	-	-	Repeat steps 5 & 6 until no further adjustment is necessary.

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref.
No. Part No. Description

CHASSIS PARTS - ELECTRICAL

Capacitors

C-1	19B691877	Variable, 2-gang
C-2	21B77286	Ceramic; 100 mmf 500V
C-3	21K478410	Ceramic; 1000 mmf 500V
C-4	21K481377	Ceramic; 500 mmf 500V
C-5	21K482726	Ceramic, disc type; 10,000 mmf 450V
C-6	21K77373	Ceramic; 47 mmf 500V
C-7	21B77286	Ceramic; 100 mmf 500V
C-8	8R9816	Paper; .05 mf 400V
C-9	21K77373	Ceramic; 47 mmf 500V
C-10	21A690688	Ceramic; 85 mmf 500V
C-11	21K482726	Ceramic, disc type; 10,000 mmf 450V
C-12	23B690975	Electrolytic; 40 mf/300V, 40-40 mf/250V, 40 mf/25V
C-13	21A470789	Ceramic, disc type; 5000 mmf 450V.
C-14	21K482726	Ceramic, disc type; 10,000 mmf 450V
C-15	21A470789	Ceramic, disc type; 5000 mmf 450V.

C-16	8R9809	Paper; .01 mf 400V
C-17	21K482726	Ceramic, disc type; 10,000 mmf 450V
C-18	21K790912	Ceramic; 2000 mmf 500V
C-19	21K482726	Ceramic, disc type; 10,000 mmf 450V
C-20	21K478410	Ceramic; 1000 mmf 500V
C-21	21B484337	Ceramic; dual; 250-250 mmf/450V.....
C-22	23K690543	Electrolytic; 3 mf 50V
C-23	21K478410	Ceramic; 1000 mmf 500V
C-24	8R9809	Paper; .01 mf 400V
C-25	8R490232	Tubular, molded; .047 mf 400V.....
C-26	8R9813	Paper; .005 mf 600V
C-27	8R9809	Paper; .01 mf 400V
C-28	21B77286	Ceramic; 100 mmf 500V
C-29	8R9813	Paper; .005 mf 600V
C-30	8R9813	Paper; .005 mmf 600V
C-31	8R9847	Paper; .002 mmf 600V
C-32	21K482726	Ceramic, disc type; 10,000 mmf 450V

Pilot Light

I-1,2	65X11854	Bulb, pilot light; #47; 6-8V; .15 amp; clear; bayonet base
-------	----------	--

CHASSIS HS-261

Ref. Part No. Description

Coils

L-1 24C690896 AM loop antenna
 L-2 24A692148 RF choke
 L-3 24A90064 RF choke
 L-4 24C690584 Inductor and Capacitor Assembly: FM
 RF; less tuning core
 L-5 24K600519 Inductor and Capacitor Assembly: FM
 osc; less tuning core
 L-6 24A791081 RF choke

Resistors

Note: All resistors are insulated carbon type
 unless otherwise specified.

R-1 6R6004 1 meg 20% 1/2W
 R-2 6R5551 120 10% 1/2W
 R-3 6R5725 8200 10% 2W
 R-4 6R2089 1800 10% 1/2W
 R-5 6R6028 22,000 20% 1/2W
 R-6 6R6410 33,000 10% 1/2W
 R-7 6R6056 47,000 20% 1/2W
 R-8 6R2108 47 20% 1/2W
 R-9 6R5725 8200 10% 2W
 R-10 17A690973 Wire wound: 360 10% 3W; center-
 tapped
 R-11 6R2039 68 10% 1/2W
 R-12 6R5725 8200 10% 2W
 R-13 6R5551 120 10% 1/2W
 R-14 6R6056 47,000 20% 1/2W
 R-15 6R3927 2.2 meg 20% 1/2W
 R-16 6R6377 470,000 10% 1/2W
 R-17 6R5732 15,000 10% 2W
 R-18 6R6056 47,000 20% 1/2W
 R-19 6R6410 33,000 10% 1/2W
 R-20 18A600974 Volume control: 2 meg; tapped at
 600,000 ohms; includes on-off sw.
 R-21 6R2109 10 meg 20% 1/2W
 R-22 6R6074 68,000 10% 1/2W
 R-23 6R6032 470,000 20% 1/2W
 R-24 18B600683 Tone control: 1 meg; with phono-
 radio switch
 R-25 6R5593 470 10% 1W
 R-26 6R6015 220,000 20% 1/2W

Switches

S-1 40B690538 Bandswitch, AM-FM

Transformers

T-1 24A690544 FM Antenna Input Transformer
 T-2 24K691878 AM Oscillator Transformer: white &
 red dot
 T-3 25B600684 Power Transformer
 T-4 24B690540 1st FM IF Transformer (orange dot):
 10.7 mc; complete with capacitors
 and cores; less shield
 T-5 24B485553 AM IF Transformer (green dot): 455
 kc; complete with capacitors,
 cores, and shield
 T-6 24B690541 2nd FM IF Transformer (yellow dot):
 10.7 mc; complete with capacitors
 and cores; less shield
 T-7 24K485555 AM Diode Transformer (pink dot):
 455 kc; complete with capacitors,
 cores, and shield
 T-8 24K600893 Ratio Detector Transformer: 10.7 mc;
 complete with capacitors, cores
 and shield
 T-9 25B600969 Audio Output Transformer

Part
 Number

Description

CHASSIS PARTS - MECHANICAL

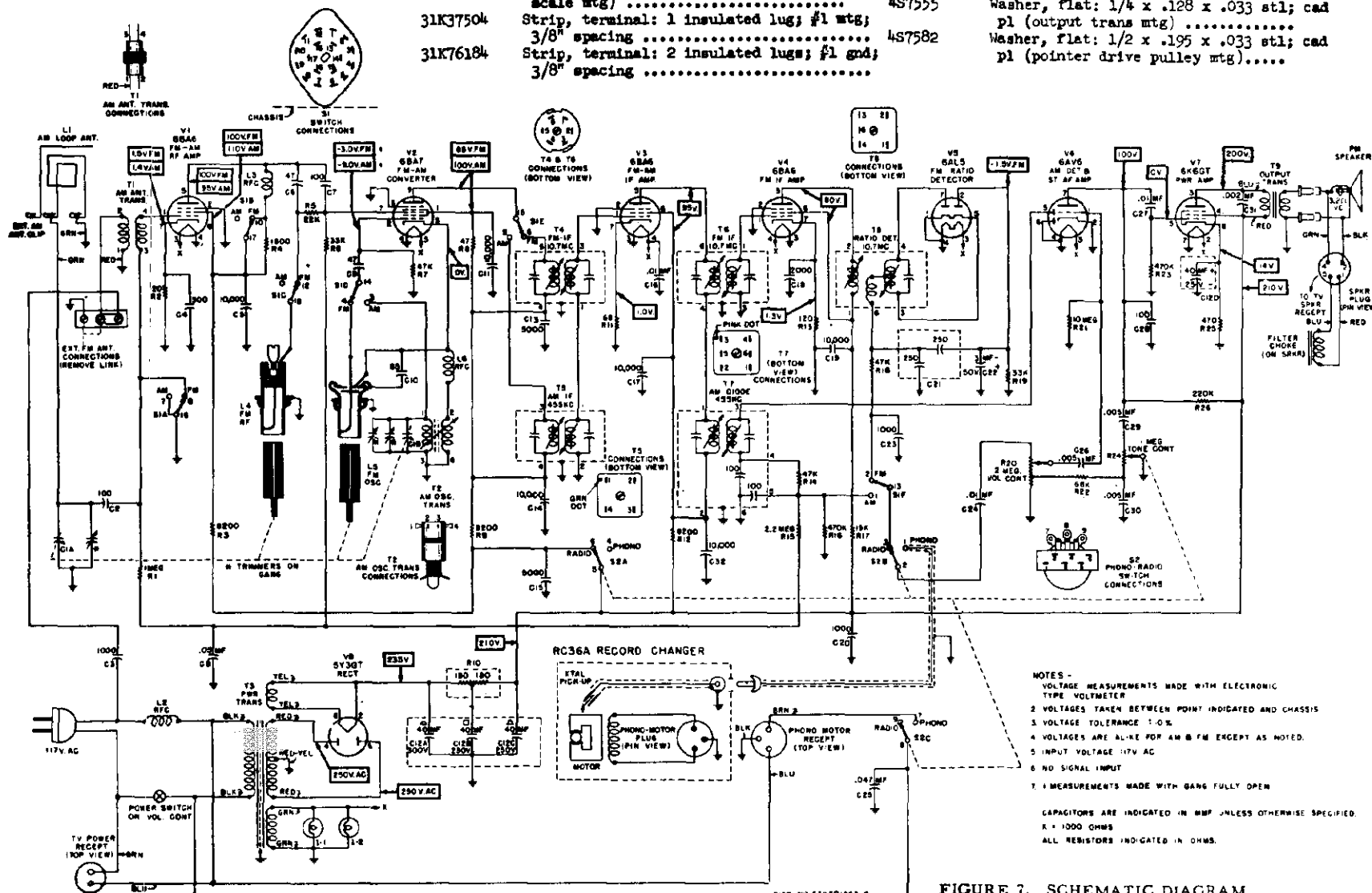
1X690717 Bracket Assembly, tuning core mtg: in-
 cludes shoulder rivet and anti-backlash
 clip
 7C690567 Bracket, tuner mtg (gang mtg)
 7A600476 Bracket, tuning shaft
 43A890397 Bushing, line cord strain relief (use
 with 43K890398)
 43K890398 Bushing, line cord retainer (use with
 43A890397)
 42K690561 Clip, anti-backlash: single (on core mtg
 bracket)
 42A690560 Clip, anti-backlash: double (on tuner mtg
 bracket)
 42A485548 Clip, coil can mtg (AM IF transformer)
 42B482867 Clip, spring: blued finish (holds FM IF
 transformer)
 11M8944 Cord, dial (pointer drive)
 11M488137 Cord, dial (core drive)
 30K21859 Cord, line: with plug; 9 ft long
 46B692164 Core, iron and screw: green dot (FM osc
 tuning core)
 46K692165 Core, iron and screw (FM RF tuning core).
 1X600490 Dial Plate and Pulleys Assembly: complete,
 less dial scale
 34C600868 Dial scale: glass
 5S7866 Eyelet: .125 x .091 brass; nkl pl (core
 drive cord retainer)
 1X601152 Lead and Plug Assembly, phono pick-up....
 4897751 Lockwasher, int-ext: #8; cad pl (pointer
 drive pulley mtg)
 2S7019 Nut, hex: 4-40 x 1/4; cad pl (FM tuning
 core mtg)
 2S7051 Nut, hex palmnut: 3/8-32 x 9/16; cad pl
 (control mtg)
 35K691846 Pad, rubber: 1-hole (gang mtg)
 35A691845 Pad, rubber: 2-hole (gang mtg)
 28K71775 Plug, phono pick-up
 52B481704 Pointer, dial
 49A23960 Pulley, cord: 1/4" groove (on dial plate
 assembly)
 49A21552 Pulley, cord: 1/2" groove (on dial plate
 assembly)
 49A690562 Pulleys, core drive: brass
 1A691015 Pulley, pointer drive: 3-1/2" diameter...
 9A600040 Receptacle, phono motor: 3-prong; includes
 shell
 9A791031 Receptacle, TV power: 2-prong; includes
 shell
 5S8497 Rivet: .088 x 1/8 stl; nkl pl (anti-
 backlash clip mtg)
 5S7771 Rivet: .088 x 3/16 stl; nkl pl (min
 socket mtg)
 5S7774 Rivet: .088 x 1/4 stl; nkl pl (noval
 socket mtg)
 5S7707 Rivet: .122 x 5/32 stl; nkl pl (term
 strip mtg)
 5S7701 Rivet: .122 x 3/16 stl; nkl pl (ant
 term strip & output trans mtg).....
 5S7700 Rivet: .122 x 1/4 stl; nkl pl (octal
 socket mtg)
 5A27675 Rivet, shoulder (cord pulley mtg)....
 5K13896 Rivet, shoulder (on core mtg brkt)....
 3S7163 Screw, machine: 8-32 x 1/4 plain hex head;
 cad pl (pointer drive pulley mtg).
 3S7205 Screw, machine: 8-32 x 1/4 slotted locking
 hex head; cad pl (gang mtg).....
 3S2695 Screw, sheet metal: #6 x 3/16 PKZ plain
 hex head; cad pl (tuner brkt mtg)..
 3S7454 Screw, sheet metal: #8 x 1/4 PKZ plain
 hex head; cad pl (pwr trans & dial
 plate mtg)
 3S7103 Setscrew: 8-32 x 1/8 Allen head; cad pl
 (core drive pulley mtg)
 1X600489 Shaft, tuning: complete with pulley.....

- 15A690616 Shell, receptacle (on phono motor receptacle)
 15K74443 Shell, receptacle (on TV power receptacle)
 26K485936 Shield, coil (for FM IF transformers)....
 26A470013 Shield, pilot light
 9K600685 Socket, pilot light
 9K484167 Socket, tube: miniature; 7-prong
 9A485495 Socket, tube: noval; 9-prong

- 9A76209 Socket, tube: octal
 41A690598 Spring, coil: 7 turns; cosmoline dipped (FM RF core mtg)
 41K691840 Spring, coil: 8 turns; cop pl (FM osc core mtg)
 41A14244 Spring, tension (core & pointer drive cord)
 37K21114 Strip, channel: rubber; 1" long (dial scale mtg)
 31K37504 Strip, terminal: 1 insulated lug; #1 mtg; 3/8" spacing
 31K76184 Strip, terminal: 2 insulated lugs; #1 gnd; 3/8" spacing

- 31K26235 Strip, terminal: 3 insulated lugs; #1 gnd; 3/8" spacing
 31K4602 Strip, terminal: 5 insulated lugs; #3 gnd; 1/2" spacing
 31A470403 Strip, terminal: 3-screw (antenna input)
 5S5405 Terminal, pin (on speaker leads)
 4A70015 Washer, "C" (tuning shaft mtg).....
 4A600767 Washer, dog (AM-FM switch mtg).....
 4S7555 Washer, flat: 1/4 x .128 x .033 stl; cad pl (output trans mtg)
 4S7582 Washer, flat: 1/2 x .195 x .033 stl; cad pl (pointer drive pulley mtg).....

- Strip, terminal: 3 insulated lugs; #1 gnd; 3/8" spacing
 Strip, terminal: 5 insulated lugs; #3 gnd; 1/2" spacing
 Strip, terminal: 3-screw (antenna input)
 Terminal, pin (on speaker leads)
 Washer, "C" (tuning shaft mtg).....
 Washer, dog (AM-FM switch mtg).....
 Washer, flat: 1/4 x .128 x .033 stl; cad pl (output trans mtg)
 Washer, flat: 1/2 x .195 x .033 stl; cad pl (pointer drive pulley mtg).....



NOTES -
 1. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER
 2. VOLTAGES TAKEN BETWEEN POINT INDICATED AND CHASSIS
 3. VOLTAGE TOLERANCE 1:0%
 4. VOLTAGES ARE ALIKE FOR AM & FM EXCEPT AS NOTED.
 5. INPUT VOLTAGE 117V AC
 6. NO SIGNAL INPUT
 7. 1. MEASUREMENTS MADE WITH GANG FULLY OPEN
 CAPACITORS ARE INDICATED IN MMF UNLESS OTHERWISE SPECIFIED.
 R = 1000 OHMS
 ALL RESISTORS INDICATED IN OHMS.

FIGURE 7. SCHEMATIC DIAGRAM

MODEL SROB, Ch.
OB, Studebaker

GENERAL INFORMATION

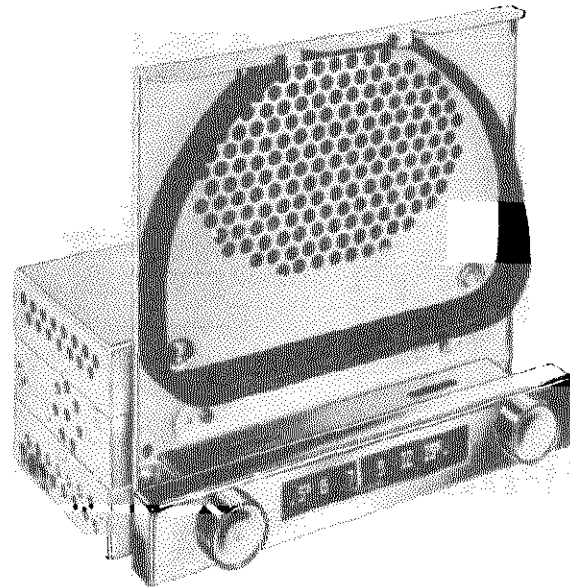
TYPE - Chassis OB is a universal, manually tuned, automotive type, superheterodyne chassis, used in Motorola Models SROB, etc. An external speaker is used.

TUNING RANGE - 540 to 1600 Kc **IF** - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
6BE6 - Converter
6BA6 - IF Amplifier
6AV6 - Det-AVC & AF Amp
6AS5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 5 amps at 6.3V DC

POWER OUTPUT - 2 watts



NOTE:

This manual contains a complete list of parts for the OB chassis. Replacement parts for specific receivers in which the OB chassis is used, will be found in separate service manuals bearing the appropriate receiver model numbers.

ALIGNMENT

Remove receiver top and bottom housing covers and also the escutcheon to expose all alignment adjustments.

Connect a 6 volt storage battery to BAT terminal and chassis of receiver.

Connect a 3.2 ohm PM speaker to VC terminal and chassis of receiver.

Connect a low range output meter across speaker voice coil and set volume control at maximum. For greatest accuracy, keep output of receiver at ap-

proximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part No. 66A76278, is required for adjusting the tuner cores. **IMPORTANT:** Do not push in on the alignment tool when adjusting the tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SET TO	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	6BE6 grid (pin #7) & chassis	455 Kc	High frequency end (cores out)	1, 2, 3 & 4	Peak for maximum in order indicated. Check by repeating step.
RF ALIGNMENT						
2.	See Fig. 1	Antenna receptacle through dummy	1610 Kc	High frequency end; cores should project 1-1/8" from cans (Screw out if necessary)	5, 6, & 7	Peak for maximum in order indicated.
3.	"	"	1425 Kc	1425 Kc-per Fig. 1	8, 9 & 10	Peak for maximum in order indicated.

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

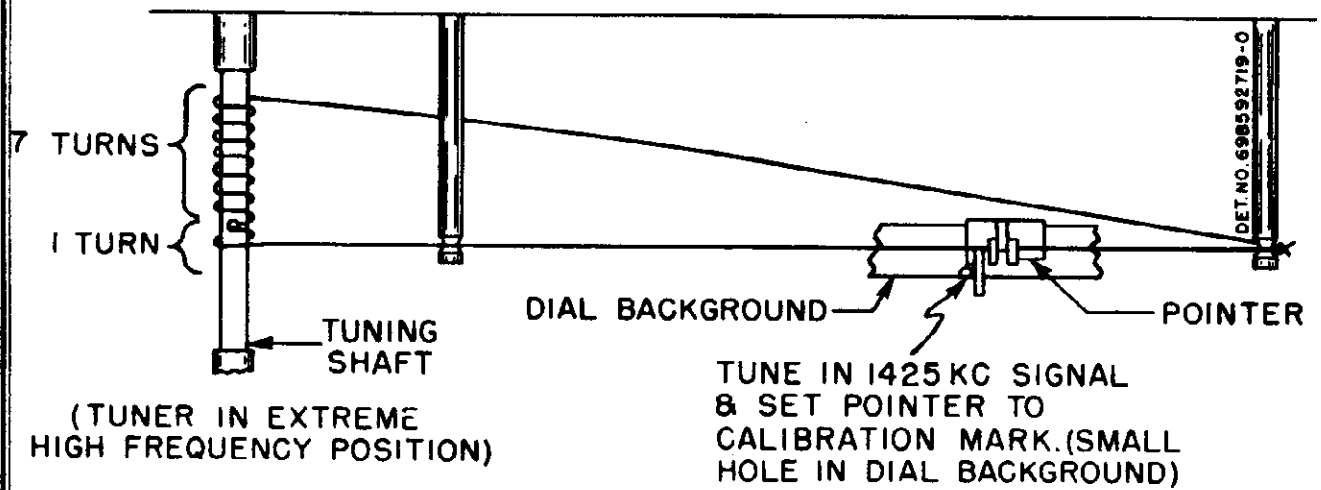


FIGURE 1. RESTRINGING DETAIL

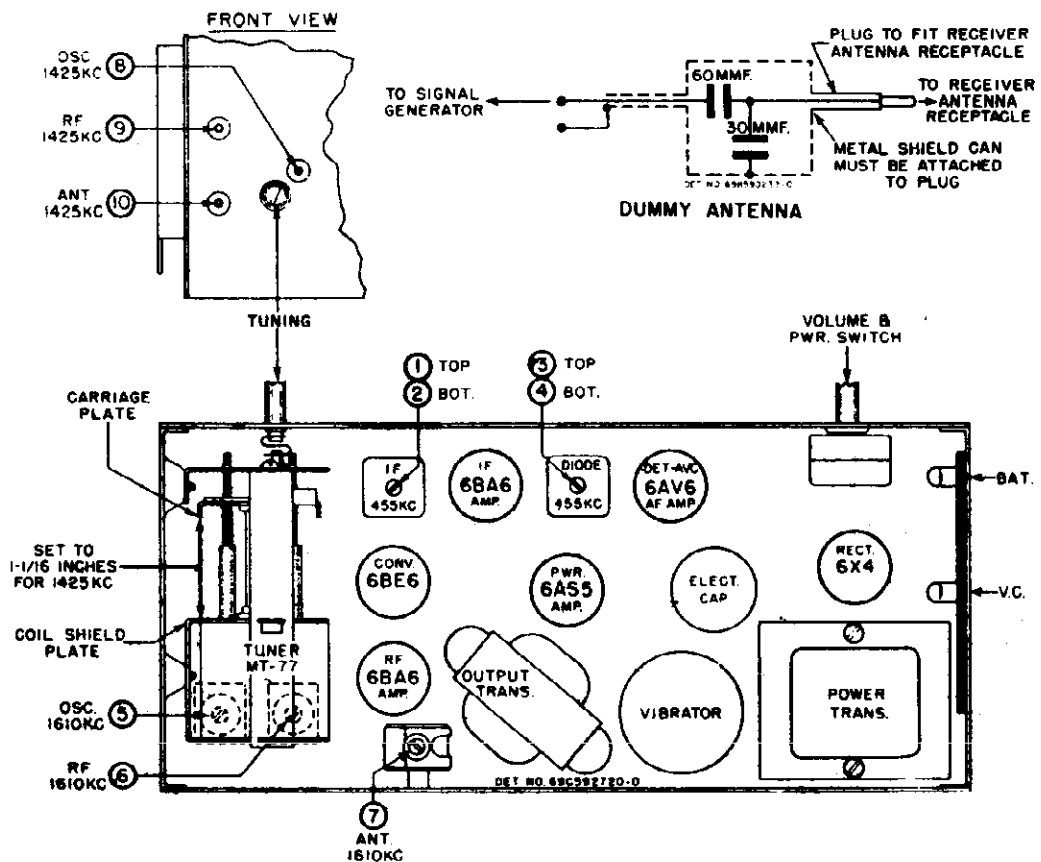


FIGURE 2. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA

MODEL SROB, Ch. OB,
Studebaker

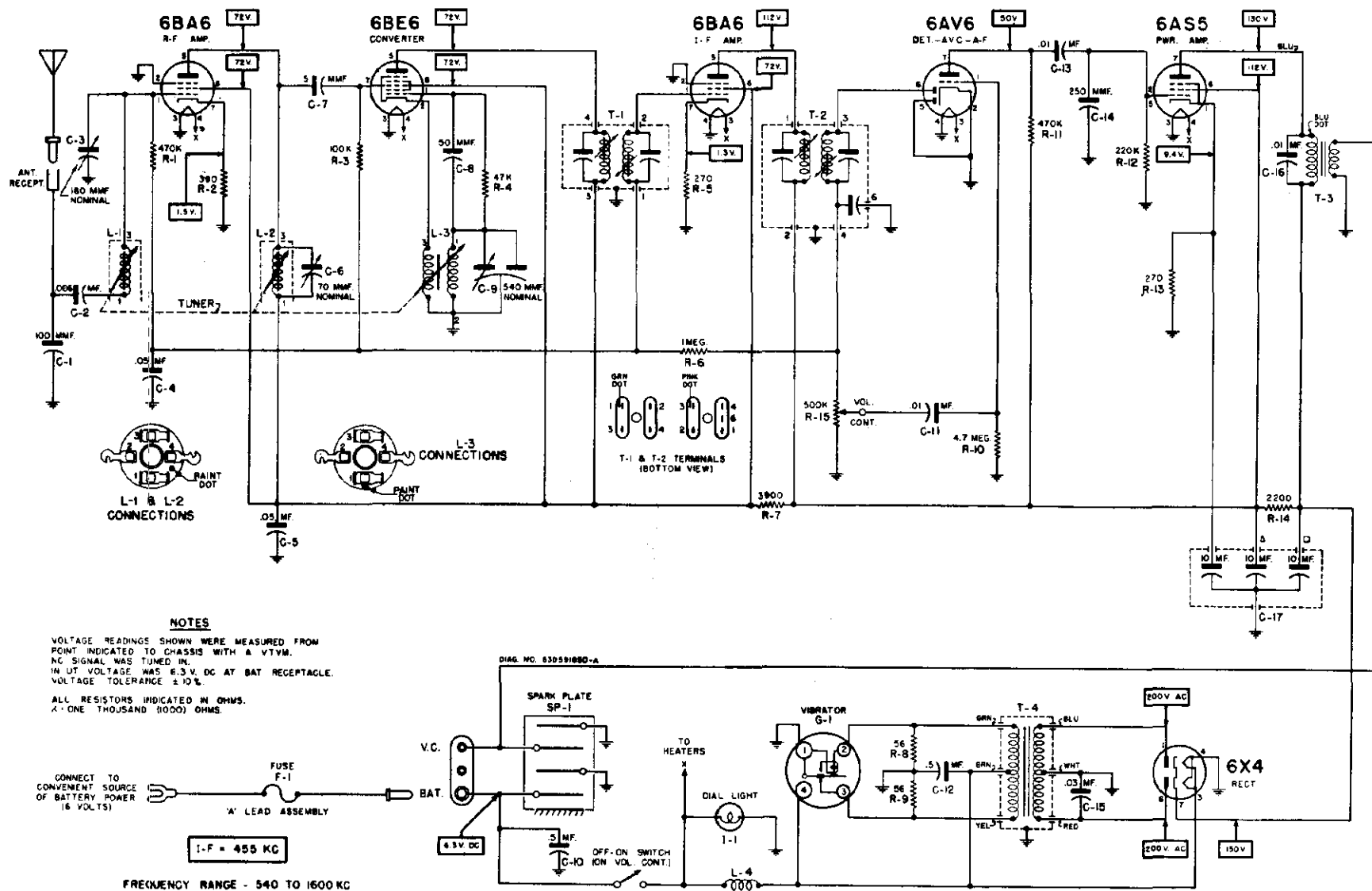


FIGURE 3. SCHEMATIC DIAGRAM

MODEL SROB, Ch.
OB, Studebaker

REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
CHASSIS PARTS - ELECTRICAL			CHASSIS PARTS - MECHANICAL	
CAPACITORS				
C-1	21B77562	Ceramic: 100 mmf 500V	42A485548	Clip, coil can mtg
C-2	8A4529	Paper: .006 mf 100V	42A591959	Clip, spring (tuner drive)
C-3	20K591969	Trimmer, variable: 180 mmf nominal	42A4215	Clip, vibrator grounding
C-4	8K13514	Paper: .05 mf 100V	61A473514	Crystal, transparent green (for dial light)
C-5	8R23146	Paper: .05 mf 200V	1X473150	Light Shield & Plug Assembly
C-6	20A481526	Trimmer, variable: 70 mmf nominal	4S7666	Lockwasher, ext: #6; cad pl (power trans mtg)
C-7	21K70720	Molded: 5 mmf 500V	4S7691	Lockwasher, int: 3/8"; cad pl (vol control mtg)
C-8	21R6513	Mica: 50 mmf 10% 300V	2S7002	Nut, hex: 6-32 x 5/16; cad pl (pwr trans mtg)
C-9	20A591977	Trimmer, variable: 540 mmf nominal	2S1376	Nut, hex: 3/8-32 x 1/2; cad pl (vol control mtg)
C-10	8K17028	Paper: .5 mf 100V	64A591992	Plate, rear cover
C-11	8K472754	Paper: .01 mf 100V	9A472148	Receptacle, antenna contact
C-12	8K17028	Paper: .5 mf 100V	5S7706	Rivet: .122 x 1/8; stl; nkl pl (dial light brkt mtg)
C-13	8R23690	Paper: .01 mf 400V	5S7707	Rivet: .122 x 5/32; stl; nkl pl (terminal strip mtg)
C-14	21R6543	Mica: 250 mmf 20% 500V	5S7771	Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg)
C-15	8K592154	Paper: .03 mf 600V	5S7701	Rivet: .122 x 3/16; stl; nkl pl (vibrator socket mtg)
C-16	8R23690	Paper: .01 mf 400V	5S7700	Rivet: .122 x 1/4; stl; nkl pl (spark plate mtg)
C-17	23A591500	Electrolytic: 10-10/250V; 10-25V.	3S7454	Screw, sheet metal: #8 x 1/4; PKZ; plain hex head (tuner mtg, rear cover mtg)
FUSE			3S8140	Screw, sheet metal: #8 x 3/16; PKZ; plain hex head (tuner mtg)
F-1	65A10266	Fuse: 10 amp (3AG)	9A591971	Socket, pilot light & brkt
PILOT LIGHT			9A70208	Socket, tube: 4-pin; with grounding lug (vibrator socket)
I-1	65X10867	Bulb: 6.3V; .25 amp; tubular; bayonet base; clear	9A472534	Socket, tube: miniature; 7-prong
VIBRATOR			9K580218	Socket, tube: miniature; 8-prong
G-1	48B3333	Vibrator: non-sync; 4-pin	TUNER PARTS - MECHANICAL	
COILS			Note: Electrical parts of the tuner are included in the Electrical Chassis Parts List.	
L-1,2	24B71881	RF & Antenna Coil (specify color of paint dots on old coil when ordering)	1X592120	Model MT-77 Manual Tuner: complete....
L-3	24B592153	Oscillator Coil (specify color of paint dots on old coil when ordering)	1X592099	Base, Sleeve, Shields & Channels Assembly
L-4	24A472535	Choke, bash	1X78034	Carriage Plate, Slug Insulator & Center Guide Rod Assembly
RESISTORS			42A70184	Clip, core adjustment
Note: All resistors are insulated carbon type unless otherwise specified.			46B591654	Core, iron & screw
R-1	6R6032	470,000 20% 1/2W	14A70876	Insulator, coil sleeve
R-2	6R5554	390 10% 1/2W	14B78007	Insulator, slug: bakelite
R-3	6R6075	100,000 20% 1/2W	2A77596	Nut, floating: without ear (on manual lead screw)
R-4	6R6056	47,000 20% 1/2W	2A78005	Nut, floating: with ear (on manual lead screw)
R-5	6R6432	270 10% 1/2W	64K592064	Plate, tuner front
R-6	6R6004	1 meg 20% 1/2W	5S7770	Rivet: .088 x 5/32; stl; pol nkl (slug insulator mtg)
R-7	6R5618	3900 10% 1W	47A78002	Rod, carriage guide
R-8	6R5614	56 10% 1/2W	3S7352	Screw, machine: 8-32 x 2"; slotted round head; stl; cad pl (front plate mtg)
R-9	6R5614	56 10% 1/2W	3A591998	Screw, manual lead (tuning shaft)
R-10	6R2122	4.7 meg 20% 1/2W	43A70881	Sleeve, coil: iron
R-11	6R6032	470,000 20% 1/2W	41A77595	Spring, coil slug
R-12	6R6015	220,000 20% 1/2W	41A77592	Spring, compression (on manual lead screw)
R-13	6R6336	270 10% 1W	4A21577	Washer, 'C' spring (manual lead screw mtg)
R-14	6R6006	2200 20% 1W	4A70873	Washer, coil spacer
R-15	18A591978	Volume Control: 500,000 ohms; includes SPST switch	4A74571	Washer, fishpaper
SPARK PLATE			4A70956	Washer, slug insulator
SP-1	1B592173	Spark Plate Assembly: complete..		
TRANSFORMERS				
T-1	24B485553	IF, 455 Kc: complete with tuning cores & padding capacitors but less shield		
T-2	24B485554	Diode, 455 Kc: complete with tuning cores & padding capacitors but less shield		
T-3	25B70171	Output Transformer		
T-4	25B591533	Power Transformer		

MODEL SROB, Ch.
OB, Studebaker

GENERAL INFORMATION

TYPE - Manually tuned automotive type superheterodyne receiver specifically designed for installation in 1950 Studebaker cars.

CHASSIS USED - Model OB. Refer to Chassis OB Service Manual for chassis alignment, dial re-stringing and replacement parts list.

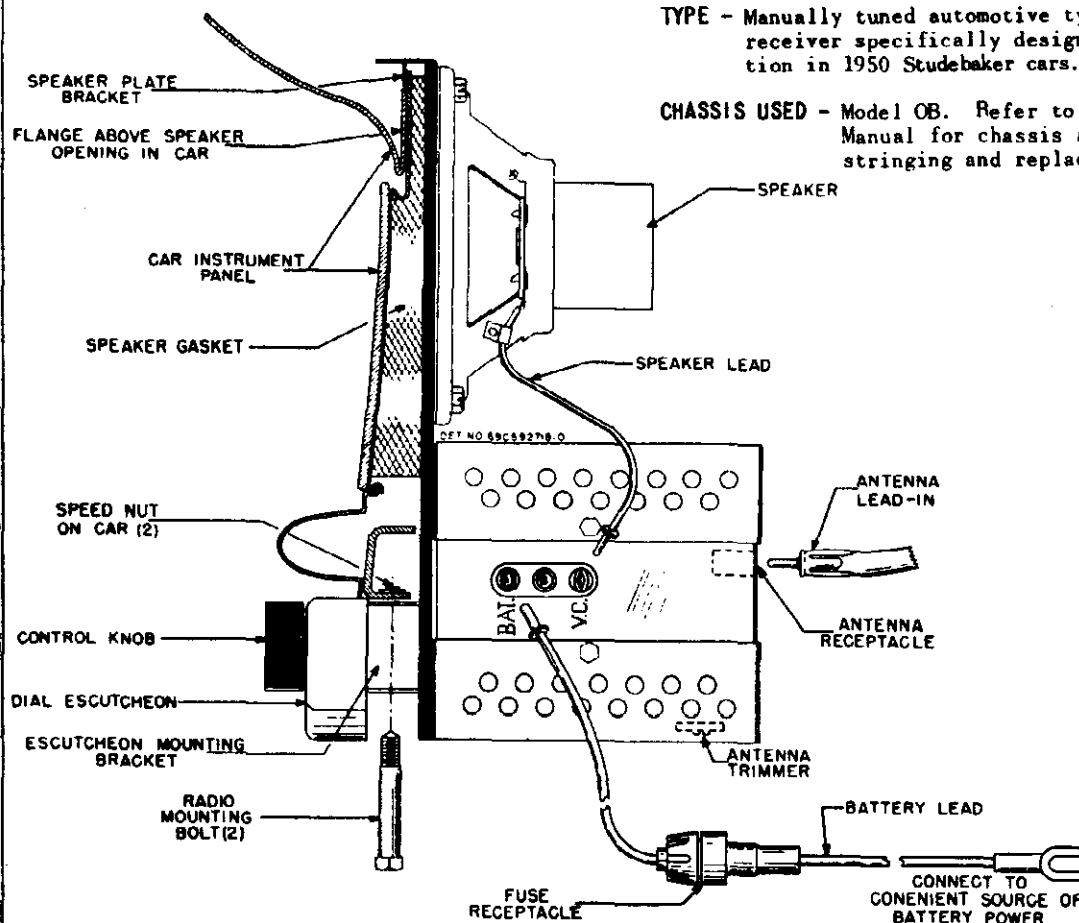


FIGURE 1. RECEIVER INSTALLATION DETAIL

REPLACEMENT PARTS LIST

(For chassis replacement parts, refer to Chassis OB Service Manual)

PART NUMBER	DESCRIPTION		
		3S7370	Screw, machine: 6-32 x 1/4; slotted binderhead; locking type; cad pl (escutcheon mtg)
3A592058	Bolt, radio mounting	3S7454	Screw, sheet metal: #8 x 1/4; PKZ; plain hex head; cad pl (cover, escutcheon bracket & spkr brkt to chassis mtg)
7C592046	Bracket, escutcheon mtg (mounts escutcheon to speaker plate)	3S8176	Screw, sheet metal: #10 x 3/8 PKZ; plain hex head; cad pl (spkr mtg). Shaft, tuning
8A4491	Capacitor, noise suppression (generator capacitor)	47A592070	or
42A591931	Clip, dial scale retaining	50B592106	Speaker, PM: 5 x 7"; 3.2 ohm voice coil
11M8877	Cord, dial: 20 lb; nylon; black	50B592479	
15K592073	Cover, housing (top & bottom)	1X592189	Speaker Plate & Gasket Assembly: less spkr
13C592066	Escutcheon, dial: chrome plated....	6A4141	Suppressor, distributor
32C591967	Gasket, speaker: rubber	29K5407	Terminal, insulated pin: white (spkr lead)
14K590653	Insulator, armite	4B592098	Washer, 'C' (tuning shaft retainer)
36K591949	Knob, control: tuning & volume		
1K592062	Pointer & Slider Assembly		
9B473111	Receptacle, fuse: complete		
34B592149	Scale, dial: glass		

GENERAL INFORMATION

TYPE - AC table model superheterodyne with self-contained electric clock for controlling automatically the operation of the radio.

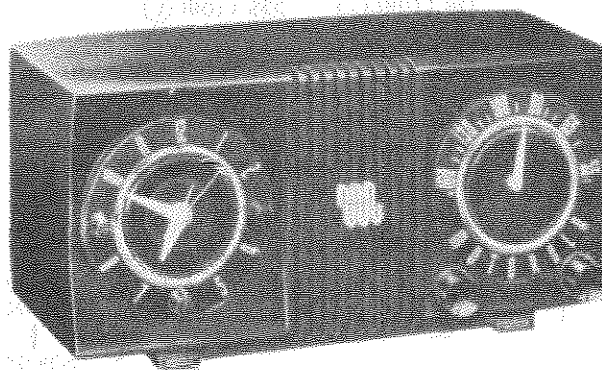
RECEIVER MODELS -

Model	Color	Chassis
SC1	Green	HS-228
SC2	Ivory	HS-258
SC3	Walnut	HS-262

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT -

12BE6	Converter
12BA6	IF Amplifier
12AT6	Det, AVC & AF Amp
50C5	Power Amplifier
35W4	Rectifier



POWER SUPPLY - Operates from 117 volts, 60 cycle, alternating current only. Power consumption 37 watts.

CLOCK - Telechron self-starting electric clock (Telechron basic movement No. C-57, with Motorola face, hands, and escutcheon).

INSTALLATION & OPERATING INSTRUCTIONS

The locations and functions of the clock and radio controls are shown in Figure 1.

NORMAL RADIO OPERATION

Knob "A" on the clock turns the radio on or off. Select stations with the TUNING knob, and adjust volume with the VOLUME control.

A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

CLOCK OPERATION

The clock will start as soon as the receiver is plugged into an electrical outlet. To set the hands to the correct time, rotate the TIME SET knob (on the rear of the radio) in a clockwise direction only.

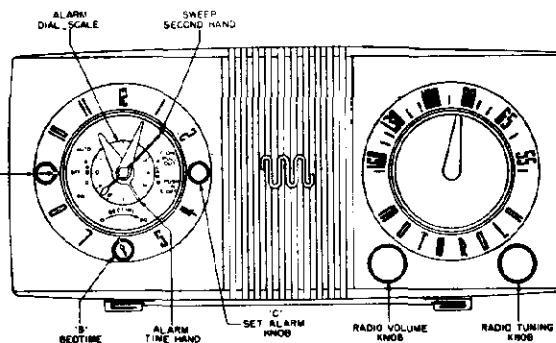


FIGURE 1. OPERATING CONTROLS

BEDTIME CONTROL

The BEDTIME control will turn the radio off after any pre-set interval of time up to one hour.

Turn knob "A" to the "OFF" position and rotate knob "B" to any period of time between 0 and 60

minutes. The radio will be turned off automatically after the proper time has elapsed, and it will remain off until turned on again manually.

AUTOMATIC RADIO OPERATION

The clock controls may be pre-set to turn the radio on automatically at any time up to twelve hours in advance.

Pull out knob "C", rotate it counterclockwise to the desired time on the alarm dial scale, and push the knob back in. Rotate knob "A" first to the "OFF" and then to the "AUTO" position. At the pre-set time, the radio will come on and will continue to play until turned off manually. The alarm will ring also if knob "C" is left pulled out. The radio will come on first and, after an interval of about ten minutes, the alarm will ring.

BEDTIME AND AUTOMATIC OPERATIONS COMBINED

By combining the operations in the two sections above, the radio may be turned off automatically and on again automatically.

When setting the BEDTIME control, rotate knob "A" to the "AUTO" position instead of "OFF". IMPORTANT: It is necessary to turn knob "A" first to the "OFF" position before proceeding to "AUTO", otherwise the radio may not shut off.

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

MODELS SC1, Ch. HS-228; SC2, Ch. HS-258; SC3, Ch. HS-262

MODELS 501, Ch. HS-228; 502
Ch. HS-258; 533, Ch. HS-262

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 7, 12BE6)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum
RF ALIGNMENT						
2.	-	-	-	Fully closed	-	Set pointer to horizontal position
3.	-	Grid of conv. (pin 7, 12BE6)	1620 Kc	Fully open	5 (Osc)	Adjust for maximum
4.	-	Radiation loop*	1400 Kc	Tune for max	6 (Ant)	Adjust for maximum

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

SERVICE NOTES

TO REMOVE RADIO CHASSIS FROM CABINET

1. Pull off the two radio control knobs.
2. Remove the split plugs which hold the loop to the cabinet.
3. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.
4. Slide the radio chassis and loop from the cabinet.
5. Disconnect the two power leads to the radio chassis.

TO REMOVE CLOCK FROM CABINET

1. Remove radio chassis as above.
2. Remove the three nuts and lockwashers holding the shield behind the clock.
3. Slide the shield from the cabinet.
4. Turn the BEDTIME control knob to "60".
5. Pull out the ALARM set knob.
6. Turn the RADIO control knob to "AUTO".
7. While observing the clock from the back to avoid bending or breaking any parts, gently push the clock forward, at the same time twisting it slightly to eliminate binding.

TO REPLACE CLOCK DIAL FACE

1. Remove the clock from the cabinet as above.
2. Pull off the RADIO control and BEDTIME knobs.
3. Turn the ALARM set knob clockwise to remove.
4. Remove the escutcheon and crystal.
5. Carefully pull off the three hands.
6. Remove the alarm dial and the clock face.
7. Turn the radio control shaft to "AUTO" position.
8. Slowly rotate the time set shaft clockwise until the switch contacts behind the radio control shaft close.
9. Reassemble the clock face, alarm dial and three hands. Set all the hands to indicate 12 o'clock. Set Figure 12 on the alarm dial to index with the small pointer on the hour hand.
10. Replace the crystal, the escutcheon, and the knobs.
11. Check the automatic operation to be sure the switch contacts close at the time indicated on the alarm dial.

ALARM OPERATION

To set the alarm, pull out knob "C" and rotate it in a counterclockwise direction to the desired time on the alarm dial scale. The alarm will ring for one hour, or until knob "C" is pushed in. The alarm function is completely independent of the other controls on the clock.

FIGURE 3. STRING DRIVE DETAIL

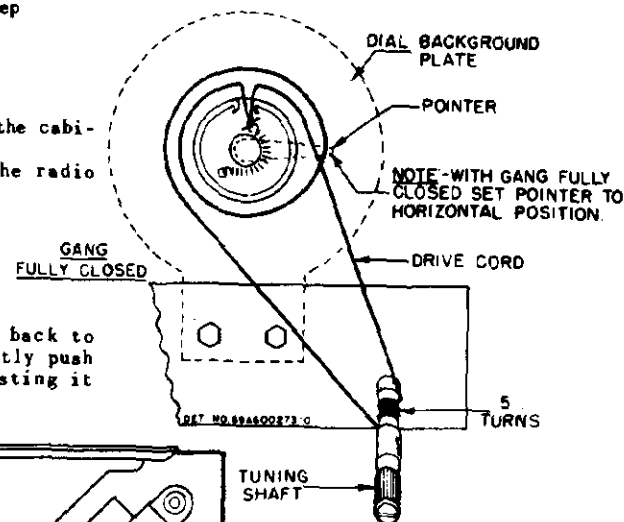
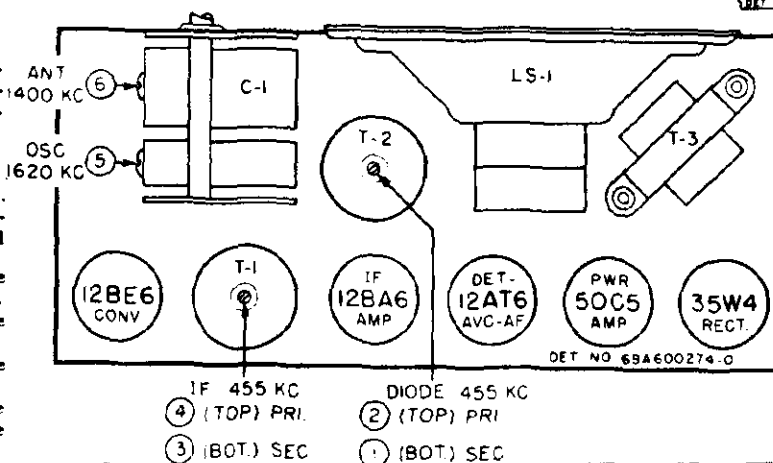


FIGURE 2. TUBE & TRIMMER LOCATIONS



MODELS 5C1, Ch. HS-228; 502,
Ch. HS-258; 533, Ch. HS-262

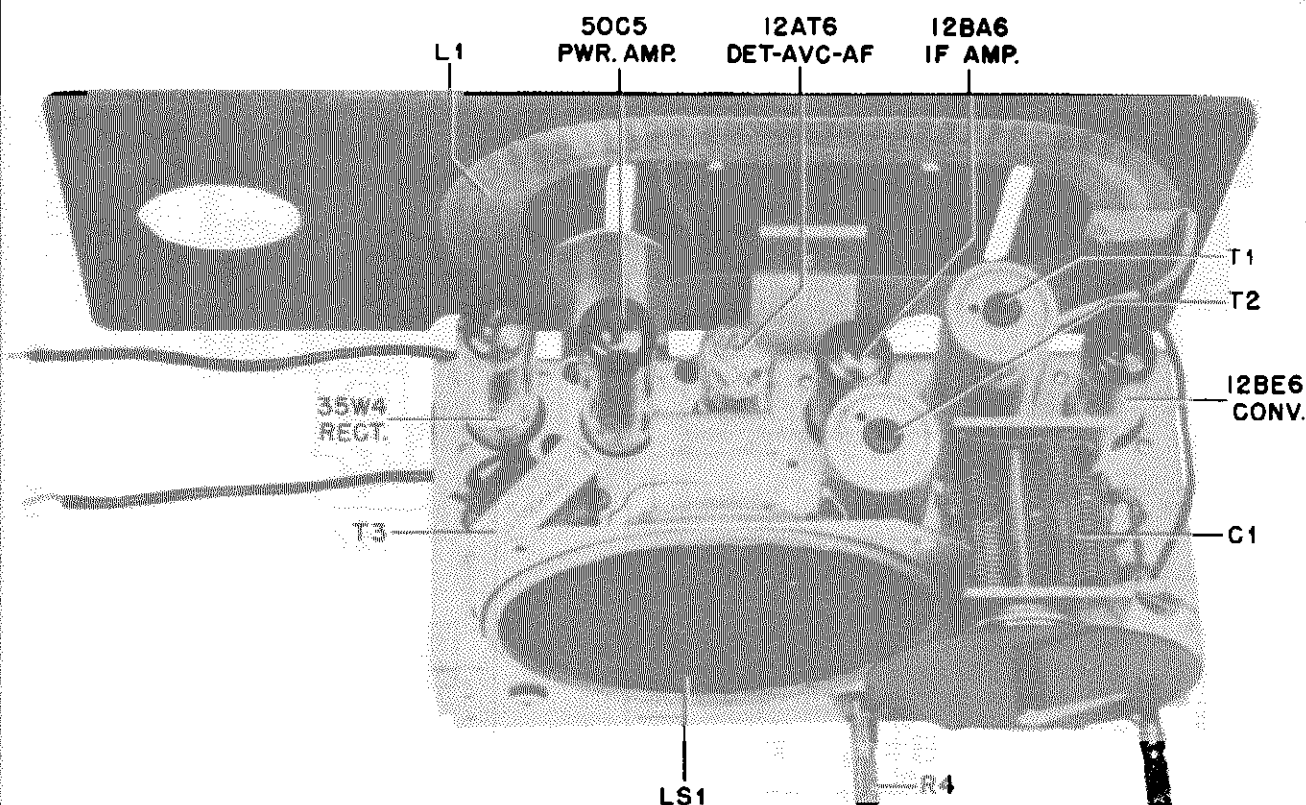


FIGURE 4. TOP VIEW OF CHASSIS

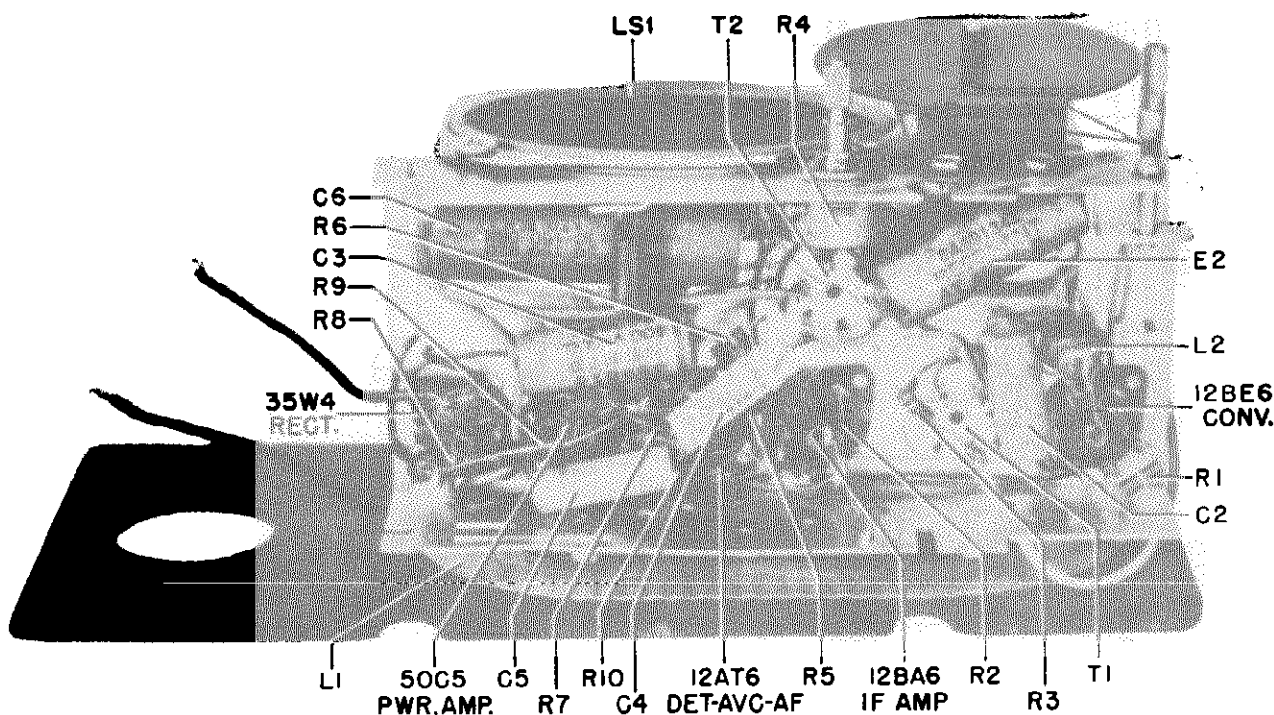


FIGURE 5. BOTTOM VIEW OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR PLATE

MODELS 501, Ch. HS-228; 502,
Ch. HS-258; 533, Ch. HS-262

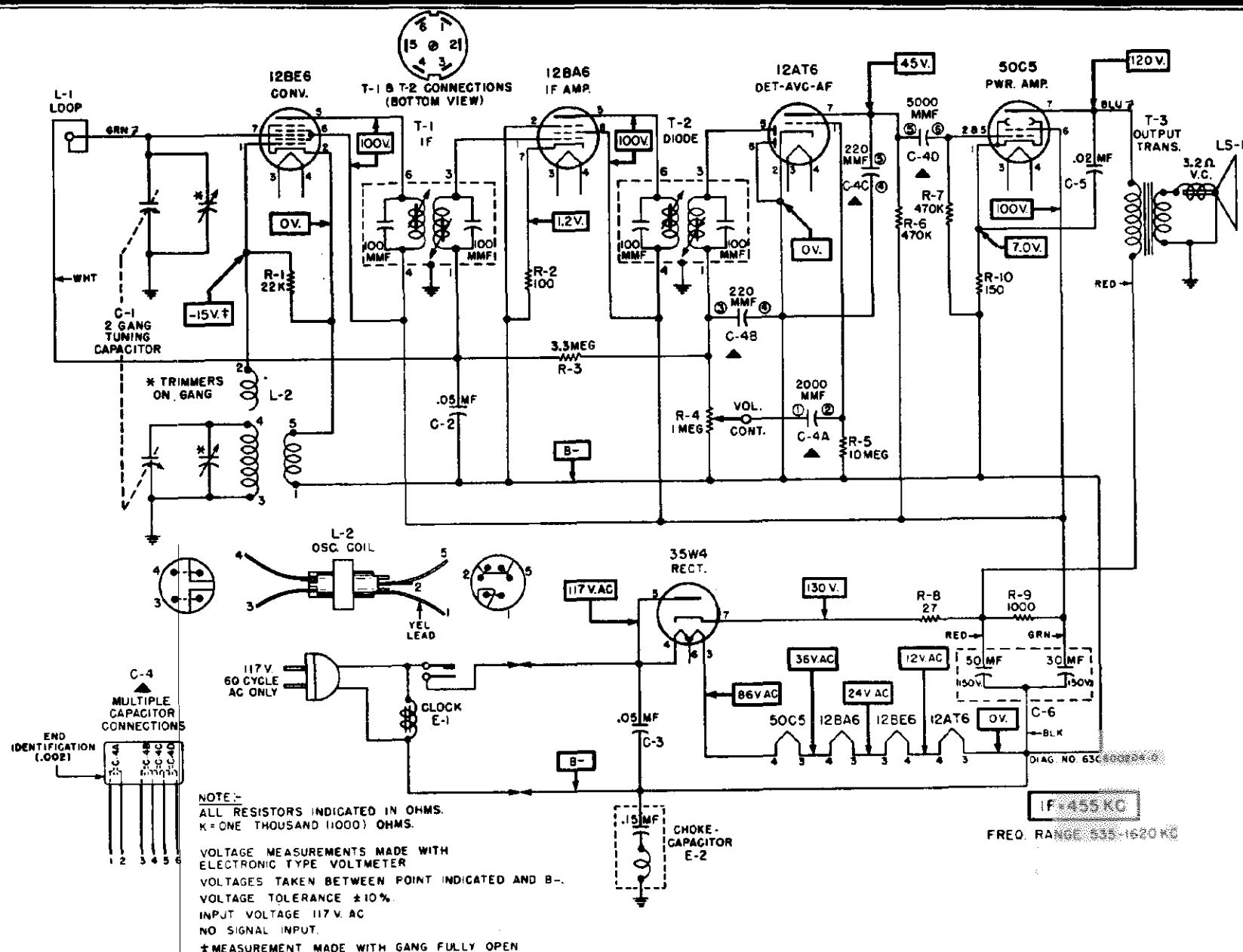
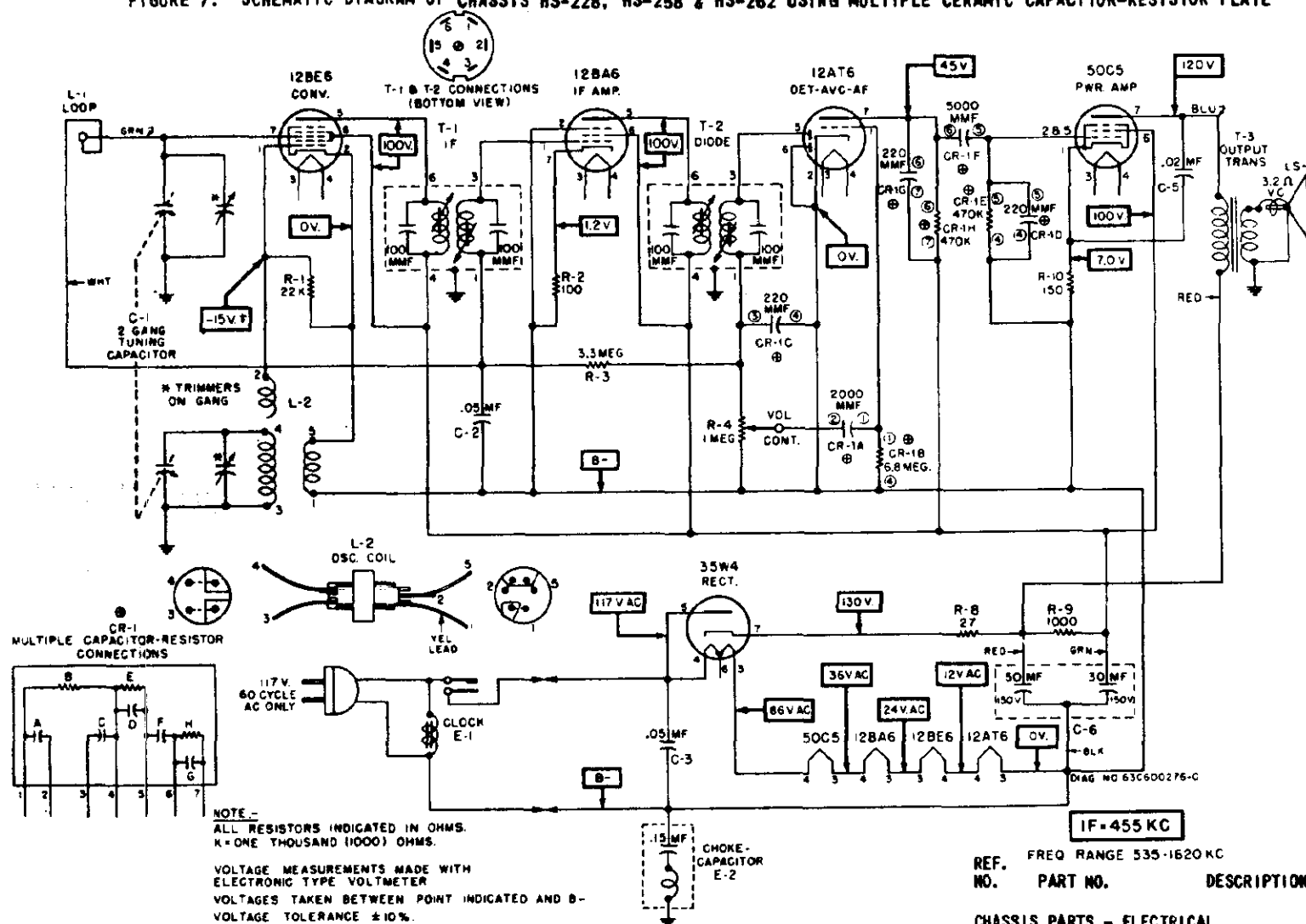


FIGURE 6. SCHEMATIC DIAGRAM OF CHASSIS HS-228, HS-258 & HS-262 USING MULTIPLE CERAMIC CAPACITOR PLATE

FIGURE 7. SCHEMATIC DIAGRAM OF CHASSIS HS-228, HS-258 & HS-262 USING MULTIPLE CERAMIC CAPACITOR-RESISTOR PLATE



REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

REF. FREQ RANGE 535-1620 KC
NO. PART NO. DESCRIPTION

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1	19B600021	Variable: 2 gang; with pulley...
C-2	8R9821	Paper: .05 mf 200V
C-3	8R9816	Paper: .05 mf 400V
C-4	21B482847	Ceramic, multiple: 2000 mmf, 220 umf, 220 mmf, 5000 mmf
C-5	8R9802	Paper: .02 mf 400V
C-6	23B600855	Electrolytic: 50-30 mf/150V ...

MODELS 5C1, Ch. HS-228; 5C2,
Ch. HS-258; 533, Ch. HS-262

MODELS 501, Ch. HS-228; 502,
Ch. HS-258; 533, Ch. HS-262

PART NUMBER	DESCRIPTION
CAPACITOR-RESISTOR	
CR-1 21B601007	Capacitor-Resistor: 2000, 220, 220, 5000, 220 mf; 6.8 meg; 470,000, 470,000 ohms

CLOCK	
E-1 59C600007	Electric Clock Assembly: Tele- chron movement No. C-57, with Motorola face, hands, crystal, escutcheon and knobs (for green cabinet)(5C1)
59K600198	Same as above except color (for ivory cabinet)(5C2)
59K600788	Same as above except color (for walnut cabinet)(5C3)

CHOKE & CAPACITOR	
E-2 8A690487	Choke & .15 mf paper capacitor..

COILS	
L-1 24C600029	Antenna Loop and Panel Assembly.
L-2 24B680364	Oscillator coil

SPEAKER	
LS-1 50C600017 or 50C600857	Speaker: 4" PM; 3.2 ohm VC.

RESISTORS	
Note: All resistors are insulated carbon type unless otherwise specified	

R-1 6R6028	22,000 20% 1/4W
R-2 6R6018	100 20% 1/4W
R-3 6R2118	3.3 meg 20% 1/4W
R-4 18A600018	Volume control: 1 meg
R-5 6R2109	10 meg 20% 1/4W
R-6 6R6032	470,000 20% 1/4W
R-7 6R6032	470,000 20% 1/4W
R-8 6R5683	27 10% 1/4W
R-9 6R3953	1000 20% 1W
R-10 6R3992	150 20% 1/4W

TRANSFORMERS	
T-1 24B482863	IF Transformer (brown dot): 455 Kc: complete with capacitor and cores; less shield
T-2 24B482865	Diode Transformer (red dot): 455 Kc: complete with capacitors and cores; less shield
T-3 25K680345	Output Transformer

CHASSIS PARTS - MECHANICAL

7A478118	Bracket, loop mtg
7A77337	Bracket, tuning shaft
42B482867	Clip, spring: blued finish (holds IF transformers)
11M8944	Cord, dial: 18 lb; black
5A484268	Grommet, speaker mtg: rubber
14A478119	Insulator, loop brkt mtg: fibre...
4S7691	Lockwasher, internal: 3/8; cad pl (vol control mtg)
2A780465	Nut, knurled (vol control mtg)
64A600025	Plate, dial background: green (HS-228)
64K600193	Plate, dial background: ivory (HS-258)
64K600779	Plate, dial background: walnut (HS-262)
52A600027	Pointer, dial: light green color (HS-228 & HS-262)
52K600194	Pointer, dial: dark green color (HS-258)
5S7771	Rivet: .088 x 3/16 stl; nkl pl (tube socket mtg)
5S7707	Rivet: .122 x 5/32 stl; nkl pl (out- put trans mtg)
5S7701	Rivet: .122 x 3/16 stl; nkl pl (tuning shaft brkt mtg)
5S7703	Rivet: .122 x 7/32 stl; nkl pl (loop bracket & spkr mtg)
3S7247	Screw, machine: 6-32 x 3/16 slotted locking hex head; cad pl (gang mtg)
3S7506	Screw, sheet metal: #6 x 1/4 PKZ plain hex head; cad pl (dial background plate mtg)
3S7467	Screw, sheet metal: #8 x 3/8 PKZ plain hex head; cad pl (loop mtg)
47A600022	Shaft, tuning
26K485936	Shield, coil (for IF transformers)
26A478117	Shield, electrostatic (on rear of chassis)
43A600095	Sleeve, paper: black (on pointer shaft)(HS-228, HS-262)
43K600195	Sleeve, paper: ivory (on pointer shaft)(HS-258)
9A472534	Socket, tube: miniature; 7-prong ..
41A73996	Spring, tension (electrolytic mtg).
41A73619	Spring, tension (gang drive cord).
4A70015	Washer, 'C' (tuning shaft mtg)..
4S7633	Washer, flat: 9/16 x 11/64 x .033 stl; cad pl (loop mtg)
14A11493	Washer, shoulder: fibre (loop bracket mtg)

CABINET PARTS

16E600005	Cabinet, table model: plastic; green (5C1)
16K600199	Cabinet, table model: plastic; ivory (5C2)
16K600791	Cabinet, table model: plastic; wal- nut (5C3)

28A600064	Connector, wire (connects clock & radio power leads)
61A600001	Crystal; plastic (cover over radio dial)
13K600003	Escutcheon, radio dial: green (5C1)...
13K600197	Escutcheon, radio dial: ivory (5C2)...
13K600790	Escutcheon, radio dial: walnut (5C3)...
14A16304	Grommet, fibre (on clock shield)
36A600065	Knob, radio control: green plastic(5C1)
36K600192	Knob, radio control: ivory plastic(5C2)
36K600787	Knob, radio control: walnut plastic(5C3)
4S7667	Lockwasher: #4 ext; cad pl (clock shield mtg)
13A792195	Medallion: brass (on front of speaker grille)
2S7019	Nut, hex: 4-40 x 1/4 stl; cad pl (clock shield mtg)
38A25507	Plug, split (mounts loop to cabi- net)
3S476083	Screw, machine: 6-32 x 5/16 slotted locking hex head; cad pl (radio chassis mtg)
1X600799	Shield, clock: with grommet (covers rear of clock)
2S490840	Speednut: for 1/16" stud (medallion mtg)
11M488253	Tape, aluminum foil (inside top of cabinet)

CLOCK PARTS

Note: The following Motorola parts are for use with
the basic Telechron clock movement No. C-57.

34K600993	Alarm Dial: green color (5C1)
34K600994	Alarm Dial: ivory color (5C2)
34K600995	Alarm Dial: walnut color (5C3)
30K680352	Cord, line: with plug; 6 ft long
61A600001	Crystal: plastic (cover over face of clock)
34K600990	Dial Face: green color (5C1)
34K600991	Dial Face: ivory color (5C2)
34K600992	Dial Face: walnut color (5C3)
13C600002	Escutcheon, clock: green color (5C1) ..
13K600196	Escutcheon, clock: ivory color (5C2) ..
13K600789	Escutcheon, clock: walnut color (5C3).
52K600996	Hand, hour: light green color (5C1 & 5C3)
52K600997	Hand, hour: dark green color (5C2)....
52K600998	Hand, minute: light green color (5C1 & 5C3)
52K600999	Hand, minute: dark green color (5C2)..
52K601001	Hand, second: brass
36K600987	Knob, clock control: plain; green (5C1)
36K600988	Knob, clock control: plain; ivory (5C2)
36K600989	Knob, clock control: plain; walnut(5C3)
36K600984	Knob, clock control: with arrow; green (5C1)
36K600985	Knob, clock control: with arrow; ivory (5C2)
36K600986	Knob, clock control: with arrow; wal- nut (5C3)
36K601002	Knob, time set

GENERAL INFORMATION

TYPE - AC-DC table model superheterodyne receiver with loop antenna.

RECEIVER MODELS -

Model	Color
5H11U	Walnut
5H12U	Ivory
5H13U	Green

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT - 12BE6 - Converter
12BA6 - IF Amplifier
12AT6 - Det, AVC & 1st AF Amp
50C5 - Power Amplifier
35W4 - Rectifier

POWER SUPPLY - 117 volts AC or DC, 35 watts

INSTALLATION & OPERATING INSTRUCTIONS

POWER SWITCH AND VOLUME CONTROL. Operated with the left-hand knob. NOTE: Reverse the line cord plug in the wall outlet if radio does not operate from DC. When operating from AC, reversing the line cord plug in the wall outlet may sometimes improve reception.

TUNING. Tune stations with the right-hand knob.

ANTENNA. A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

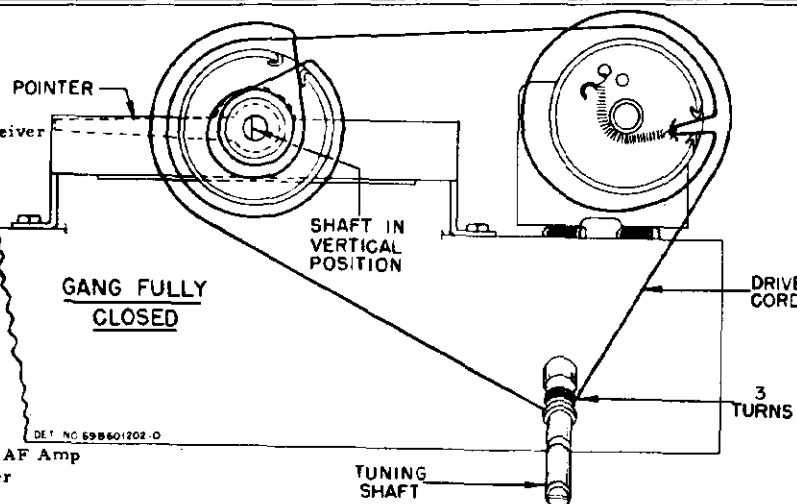
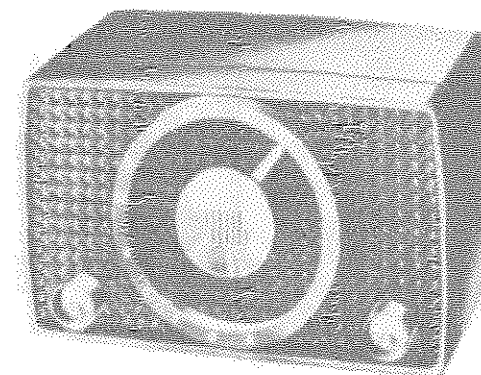


FIGURE 1. STRING DRIVE DETAIL



SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

To remove the chassis from the cabinet:

1. Pull off the two radio control knobs.
2. Pull off the brass cover over the pointer.
3. Pull off the pointer.
4. Remove the split plugs which hold the loop to the cabinet.
5. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.
6. Slide the radio chassis and loop from the cabinet.

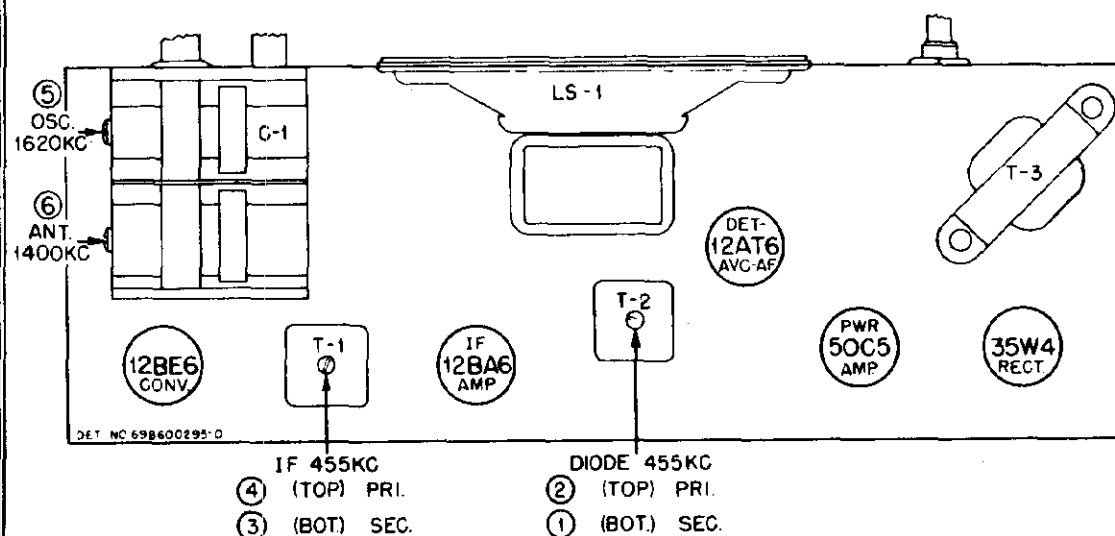
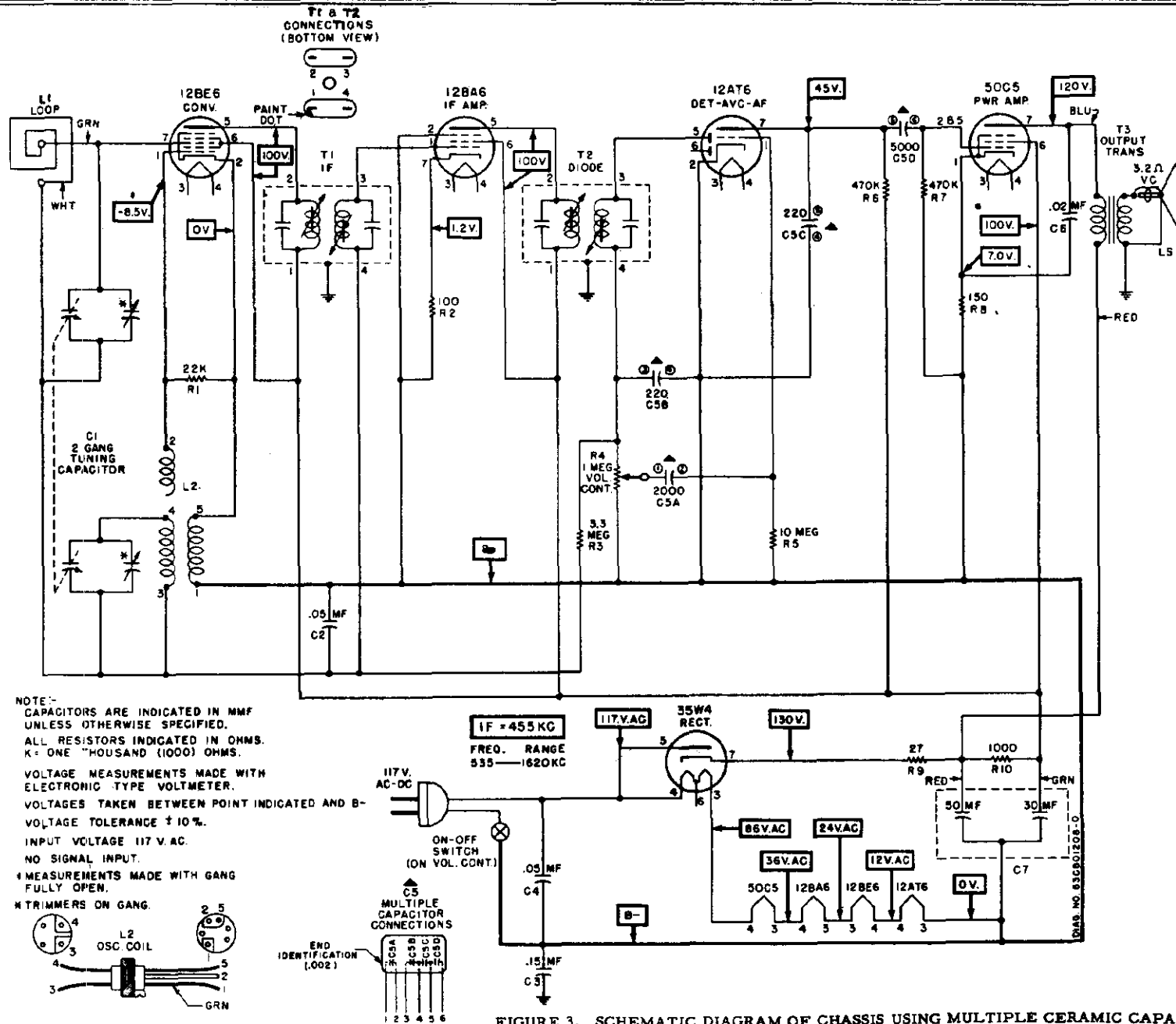


FIGURE 2. TUBE & TRIMMER LOCATIONS

MODELS 5H11U, 5H12U,
5H13U, Ch. HS-244



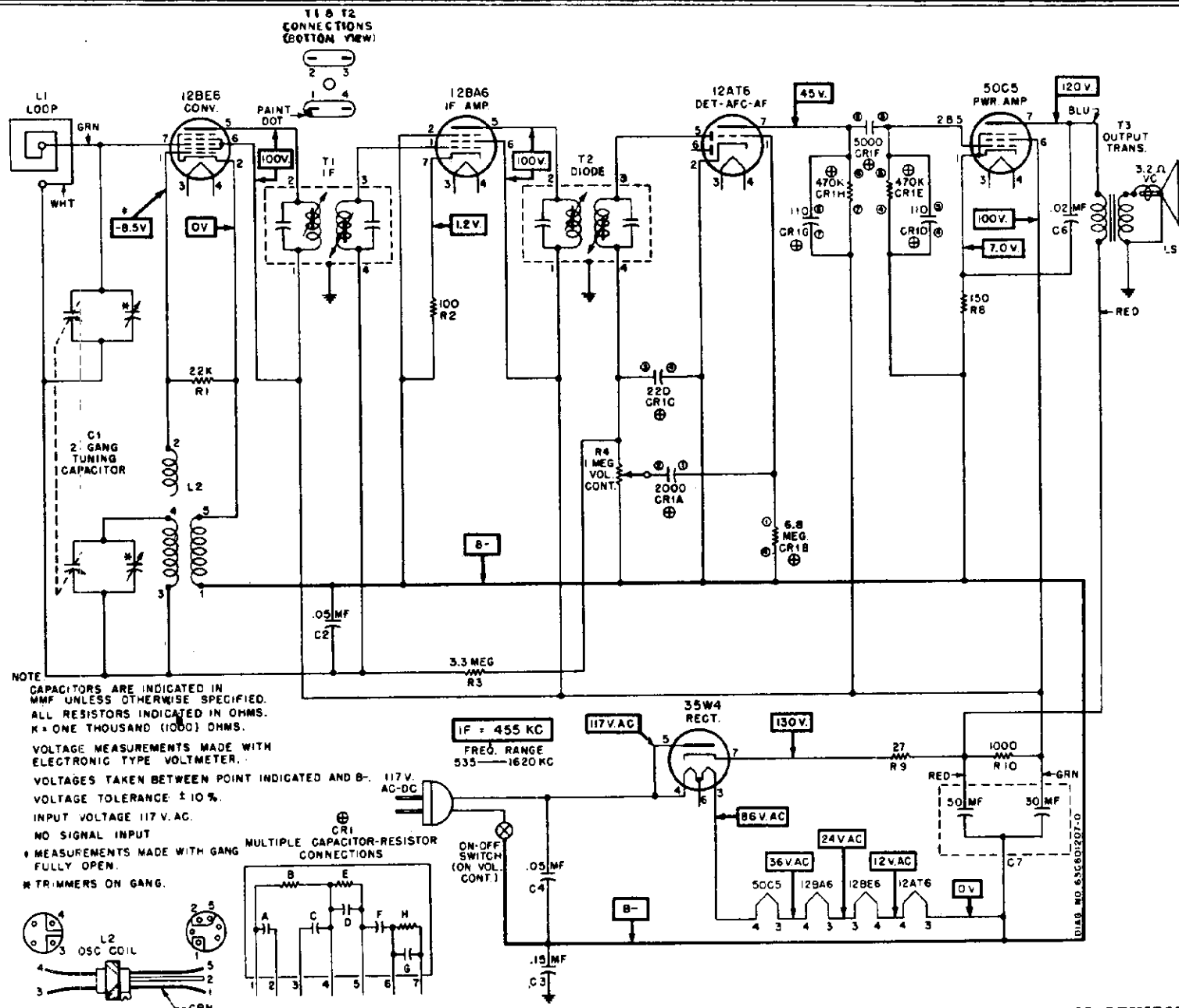


FIGURE 4. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR-RESISTOR

MODELS 5H11U, 5H12U,
5H13U, Ch. HS-211A

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B-through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 7, 12BE6)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	-	Grid of conv. (pin 7, 12BE6)	1620 Kc	Fully open	5 (Osc)	Adjust for maximum.
3.	-	Radiation loop*	1400 Kc	Tune for max	6 (Ant)	Adjust for maximum.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

REPLACEMENT PARTS LIST

NOTE: When ordering parts specify model number of set in addition to part number and description of part.

Ref. Part
No. Number Description

CHASSIS PARTS - ELECTRICAL

Capacitors

C-1	19B600483	Variable, 2 gang; with pulley
C-2	8R9821	Paper: .05 mf 200V
C-3	8R9816	Paper: .05 mf 400V
C-4	8R9843	Paper: .15 mf 200V
C-5	21B482847	Ceramic, multiple: 2000,220,220, 5000 muf
C-6	8R9802	Paper: .02 mf 400V
C-7	23B600855	Electrolytic: 50-30 mf/150V

Capacitor-Resistor

CR-1	21B601007	2000,110,110,5000 muf; 6.8 meg; 470,000, 470,000 ohms
------	-----------	---

Coils

L-1	24C600518	Loop Antenna Assembly: includes back panel
L-2	24K600812	BC Oscillator

Speaker

LS-1	50C691401	Speaker, PM: 4"; 3.2 ohm VC ...
------	-----------	---------------------------------

Resistors

Note: All resistors are insulated carbon type unless otherwise specified.

R-1	6R6028	22,000 20% 1/2W
R-2	6R6018	100 20% 1/2W
R-3	6R2118	3.3 meg 20% 1/2W
R-4	18K600473	Volume control: 1 meg; includes on-off switch
R-5	6R2109	10 meg 20% 1/2W
R-6	6R6032	470,000 20% 1/2W
R-7	6R6032	470,000 20% 1/2W
R-8	6R3992	150 20% 1/2W
R-9	6R5683	27 10% 1/2W
R-10	6R3953	1000 20% 1W

Transformers

T-1,2	24B485553	IF and Diode, 455 Kc: complete; including padding capacitors and tuning cores
T-3	25K485973	Output

Part
Number

Description

CHASSIS PARTS - MECHANICAL

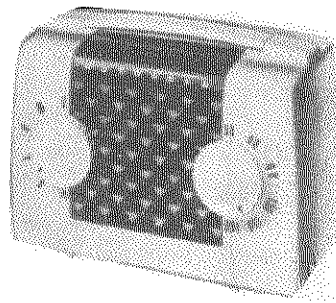
7K485971	Bracket, loop back mtg
7A600476	Bracket, tuning shaft mtg
1X600506	Bracket and Bushing Assembly, pointer
42A485548	Clip, coil can mtg
11M8944	Cord, dial: 18 lb black
30A470651	Cord, line and plug: 6 ft long
5A19658	Eyelet, spacer (gang mtg)
5A70404	Grommet, rubber (gang mtg)
14A482844	Insulator, cord outlet
29R3010	Lug, soldering
287051	Nut, hex: Palnut (volume control mtg)
1X600590	Pulley and Bushing Assembly, pointer drive
5S7771	Rivet: .068 x 3/16 stl; nkl pl (tube socket mtg)
5S7707	Rivet: .122 x 5/32 stl; nkl pl (tube shield mtg, output transformer mtg and tuning shaft bracket mtg)
3S2294	Screw, machine: 6-32 x 1/2; lockscrew; plain hex head; stl; cad pl (gang mtg)
3S7477	Screw, machine: 8-32 x 1/4; type #1; plain hex head; stl; cad pl (back mtg)
3S2695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; stl; cad pl (pointer bracket mtg)
3S3398	Screw, sheet metal: #6 x 3/8 PKZ plain hex head; stl; cad pl (loop bracket mtg)
3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (speaker mtg)
3S7148	Setcrew: 6-32 x 1/8; Allen head; stl; cad pl (pointer drive pulley retainer).
47K600598	Shaft, pointer: brass
1X600594	Shaft and Pulley Assembly, tuning
26A481521	Shield, spring (for 12BA6 tube)
9A472534	Socket, tube: 7-prong
9K580218	Socket, tube: 8-prong
41AT3996	Spring, tension (electrolytic mtg) ...
41A14244	Spring, tension (drive cord)
4K692188	Washer, "C" (tuning shaft retainer and pointer shaft retainer)
4S7633	Washer, flat: 9/16 x 11/64 x .033 thick; stl; cad pl (loop back mtg)
4K482859	Washer, insulated shoulder

CABINET PARTS

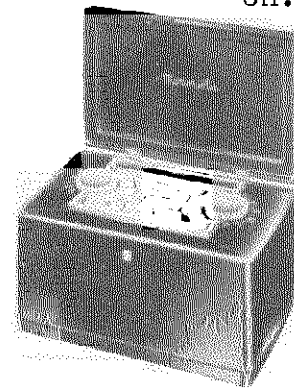
16B600461	Cabinet, table model: walnut (5H11U) ..
16K600463	Cabinet, table model: ivory (5H12U) ..
16K600465	Cabinet, table model: green (5H13U) ..
15B600569	Cover, pointer
36K600566	Knob, control: walnut (5H11U)
36K600567	Knob, control: ivory (5H12U)
36K600568	Knob, control: green (5H13U)
38A25507	Plug, split (back mtg)
52B600537	Pointer, dial
383371	Screw, sheet metal: #8 x 3/8 PKZ plain hex head; stl; cad pl (chassis mtg) ...

MODELS 5J1, 5L1,
Ch. HS-250; 5J1U,
5L1U, Ch.
HS-224

5L1 SERIES



5J1 SERIES



GENERAL INFORMATION

TYPE - A three-power (AC/DC, Battery) portable receiver. Four miniature type tubes and a selenium rectifier are used in a superheterodyne circuit.

MODEL	COLOR	CHASSIS
5L1	Tan	HS-250
5L1U	Tan	HS-224
5J1	Black	HS-250
5J1U	Black	HS-224

TUNING RANGE - 535 to 1620 Kc **IF** - 455 Kc

TUBE COMPLEMENT - 1R5 - Converter
1U4 - IF Amplifier
1U5 - Det, AVC & 1st AF Amp
3S4 - Power Amplifier
Rectifier - Selenium type (for AC/DC operation)

POWER SUPPLY - Operates from 117V AC/DC (15 watts) or from the following batteries:

2 - 1½V flashlight cells (Eveready #950 or equivalent)

1 - 67½V "B" battery (Eveready #467 or equivalent)

OPERATING INSTRUCTIONS

TO OPEN FRONT COVER (5J1 & 5J1U ONLY). The front covers of the models 5J1 and 5J1U contain the loop antenna. They may be opened simply by lifting them upward with the fingers. A special hinge holds the covers in either the closed, half-opened, or fully open position.

VOLUME CONTROL & OFF-ON SWITCH. The "off-on" switch and volume control are combined and are operated with the left-hand knob.

TUNING CONTROL. Stations are tuned in with the right-hand knob.

TO TURN OFF. Turn the receiver "off" by rotating the volume knob to the left until a click is heard.

TO OPEN BACK COVER. The back cover may be opened by inserting the fingertips into the slots in the cover and pulling it open. When closing the cover be careful not to pinch the power line cord or other leads between the cover and the cabinet.

117 VOLT AC OR DC OPERATION. The power cord is located inside the cabinet and may be reached by opening the back cover. Pass the line cord through the slot on the side of the receiver, and plug it into any 117 volt AC or DC power outlet. If the receiver

does not operate from DC power, reverse the plug in the power outlet. When operating from AC power, reception may sometimes be improved by reversing the power plug in the outlet. It is not necessary that batteries be installed if the receiver is to be operated only from house power lines.

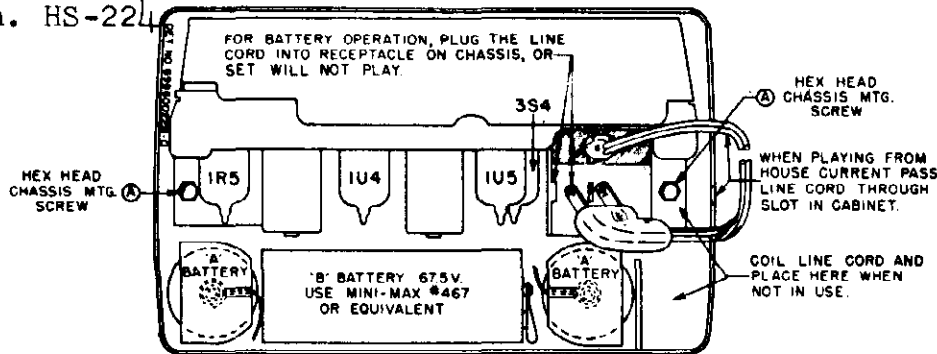
BATTERY OPERATION. Open the back cover and install the batteries, following the instructions on the label inside the back cover (or see Figure 1). Insert the line cord plug into the receptacle on the chassis, or the receiver will not play from batteries. If the receiver is to be operated for a long period of time from 117 volts AC or DC, or is to be placed in storage, remove the batteries and store in a cool place. **IMPORTANT:** Never leave low or run-down batteries in the receiver, as they will leak or swell and damage it.

ANTENNA. A loop antenna is built into the front cover of models 5J1 and 5J1U and into the rear cover of models 5L1 and 5L1U. Because of the slightly directional characteristics of the loop antenna, reception from some stations may be improved by rotating the entire receiver. In extremely noisy locations, rotate the receiver until minimum noise and maximum signal pickup are obtained.

BATTERY REPLACEMENT. If low volume or fuzzy tone is noticed when operating from batteries, replace the flashlight cells. Normally, the 67½V "B" battery will last for 3 or 4 changes of the flashlight cells. The condition of the batteries will not affect the

operation of the receiver from 117 volts AC or DC. Complete battery replacement instructions will be found inside the cabinet back cover (or see Figure 1).

MODELS 5J1, 5L1,
Ch. HS-250: 5J1U.
5L1U, Ch. HS-224



NOTE: 'A' BATTERIES: USE TWO 1-1/2V. FLASHLIGHT CELLS- EVEREADY #950 OR EQUIVALENT. INSTALL 'A' BATTERIES SO SPRING CONTACTS BOTTOM OF BATTERIES.

FIGURE 1. BATTERY INSTALLATION & CHASSIS REMOVAL INSTRUCTIONS

ALIGNMENT

NOTE: The receiver may be operated either from a battery or from the commercial power lines during alignment. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30%

modulation.

4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator input to keep the output of the receiver at approximately .05 watt (.05 watt = .40 volts on the output meter) to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 6, 1R5)*	455 Kc	Fully open	1, 2 & 3	Adjust for maximum.
RF ALIGNMENT						
2.	-	Grid of conv. (pin 6, 1R5)*	1620 Kc	Fully open	4	Adjust for maximum.
3.	-	-	-	-	-	Install chassis in cabinet, leaving output meter connected to speaker. NOTE: Batteries should be in cabinet.
4.	-	Radiation loop**	1400 Kc	Tune for maximum	5	Adjust for maximum. Trimmer is reached through hole under plug button on side of cabinet.

*On chassis HS-250 return the grid of the converter tube to AVC either through the loop or through a 4.7 meg resistor (as in chassis HS-224).

**Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

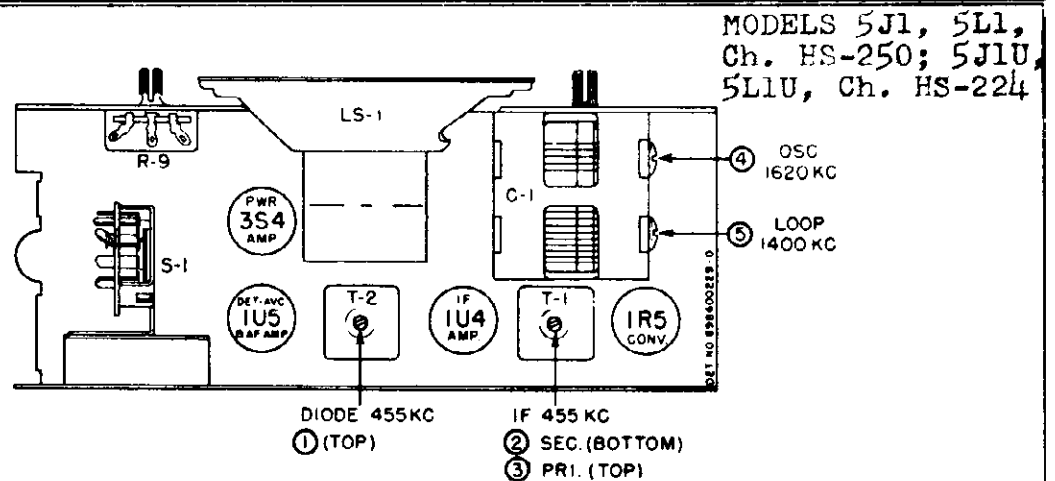


FIGURE 2. TUBE & TRIMMER LOCATIONS

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor-choke assembly to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

The tubes are exposed when the rear cover is opened. It is not necessary to remove the chassis to replace tubes.

To remove the chassis from the cabinet:

1. Pull off the two control knobs on the front of the cabinet.
2. Open the rear cover and remove the batteries.
3. Disconnect the two loop antenna leads from the chassis.
4. Remove the two hex head screws holding the chassis to the cabinet ("A" -- "A" in Figure 1).
5. Slide the chassis out of the cabinet.

REPLACEMENT PARTS LIST

REF.
NO. PART NO. DESCRIPTION

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1	19K692008	Variable, 2-gang
C-2	21K481377	Ceramic, 500 muf 500V
C-3	21K482726	Ceramic, disc type: 10,000 muf 450V
C-4	21K482726	Ceramic, disc type: 10,000 muf 450V
C-5	21K77373	Ceramic, 47 muf 500V
C-6	8K71213	Paper, .05 mf 100V
C-7	8K71213	Paper, .05 mf 100V
C-8	8K471635	Paper, .05 mf 400V
C-9	23B691995	Electrolytic: 40-40 mf 150V/ 250 mf 10V
C-10A, B,C,D	21K691992	Ceramic, multiple: 2000 muf, 100 muf, 100 muf, 5000 muf
C-11	21K482726	Ceramic, disc type: 10,000 muf 450V
C-12	21A470789	Ceramic, disc type: 5000 muf 450V

CHOKE & CAPACITOR

E-2	24K691986	Choke & .05 mf 200V paper capaci- tor
-----	-----------	--

RECTIFIER

E-1	48B791092	Selenium rectifier: half-wave...
-----	-----------	----------------------------------

COILS

L-1	1X692056	Antenna Loop & Leads Assembly (5L1 & 5L1U)
	1X692139	Antenna Loop & Front Cover Assembly: complete; black plastic (5J1 & 5J1U)
	1X692141	Antenna Loop, Panel & Hinge Assembly: less front cover black plastic (5J1 & 5J1U)
	24B691936	Antenna Loop & Panel Assembly: less hinges; black plastic (5J1 & 5J1U)
L-2	24B691987	Oscillator coil (red code) (HS-224 only)
	24K600154	Oscillator coil (white code) (HS-250 only)

REF.
NO. PART NO. DESCRIPTION

SPEAKER

LS-1	50B692037	Speaker: 3 1/2" PM; 3.2 ohm VC.
or	50B692038	Speaker: 3 1/2" PM; 3.2 ohm VC.

RESISTORS

Note: All resistors are insulated, carbon type unless otherwise specified.

R-1	6R2122	4.7 meg 20% 1/2W
R-2	6R6031	100,000 10% 1/2W
R-3	6R6397	22,000 10% 1/2W
R-4	6R2109	10 meg 20% 1/2W
R-5	6R5683	27 10% 1/2W
R-6	6R2118	3.3 meg 20% 1/2W
R-7	17K692009	Wire wound: 2150 5% 10W; tapped
R-8	6R5581	3300 10% 1/2W
R-9	18A692018	Volume control: 1 meg; with on-off switch
R-10	6R5554	390 10% 1/2W
R-11	6R2109	10 meg 20% 1/2W
R-12	6R6004	1 meg 20% 1/2W
R-13	6R2122	4.7 meg 20% 1/2W
R-14	6R2118	3.3 meg 20% 1/2W
R-15	6R6432	270 10% 1/2W
R-16	6R6040	680 10% 1/2W
R-17	6R6269	820 10% 1/2W
R-18	6R6015	220,000 20% 1/2W

SWITCHES

S-1	40B471927	Rotary switch, 5PDT (AC/DC, battery selector)(HS-224 only)
	40K600156	Rotary switch, 4PDT (AC/DC, battery selector)(HS-250 only). On-off switch (on volume control)
S-2		

TRANSFORMERS

T-1	24B692014	IF Transformer, 455 Kc: complete with capacitors, less shield...
T-2	24B692015	Diode Transformer, 455 Kc: com- plete with capacitors, less shield
T-3	25K692006	Output Transformer

PAGE 21-64 MOTOROLA

MODELS 5J1, 5L1,
Ch. HS-250; 5J1U,
5L1U, Ch. HS-224

PART
NUMBER DESCRIPTION

CHASSIS PARTS - MECHANICAL

43A692012 Bushing, strain relief; line cord (use with 43K692013)
42K75826 Clip, electrolytic mtg
42A485548 Clip, IF coil mtg
30B691994 Cord, line; with plug; 6 ft long (HS-224 only)
30K600125 Cord, line; with plug; 6 ft long (HS-250 only)
45T650 Lockwasher, internal; #6; cad pl.
29R5294 Lug, soldering (holds battery leads)

29R5239 Lug, soldering; #8 hole (holds line cord)(HS-224 only)
29R3020 Lug, soldering; battery contact (in 'A' battery retainer)
2S7005 Nut, hex; 6-32 x 1/4 atl; cad pl (R-7 & selenium rect mtg)
2S7051 Nut, hex; palnut; 3/8-32 x 9/16; pl (vol control mtg)
9A691988 Receptacle, 2-pin (ant lead recep)....
15B481896 Retainer, 'A' battery; plastic
43K692013 Retainer, strain relief (on line cord bushing)(use with 43A692012)
5S7771 Rivet: .088 x 3/16 atl; nkl pl (tube socket mtg)
5S7706 Rivet: .122 x 1/8 atl; nkl pl (term strip & switch mtg)
5S7791 Rivet: .122 x 3/8 atl; nkl pl (ant receptacle mtg)
3S490828 Screw, machine: 6-32 x 3/16 plain hex head lockcrew; cad pl (gang mtg)
3S7363 Screw, machine: 6-32 x 1" slotted binder head; cad pl (selenium rect mtg)
3S1451 Screw, machine: 6-32 x 2" slotted round head; cad pl (R-7 mtg)....
3S7205 Screw, machine: 8-32 x 1/4 slotted hex head lockcrew; cad pl (spkr mtg)
3S2695 Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (bottom shield mtg)
3S7462 Screw, thread-cutting: 6-32 x 3/16 plain hex head; cad pl (S-1 mtg)
26K600155 Shield, back: aluminum (on rear of chassis)(HS-250 only)
26C691983 Shield, bottom: black (over chassis bottom)(HS-224 only)
26A692005 Shield, heat (around R-7)
26K691997 Shield, switch: cad pl (over AC/DC, Batt. switch)
9A690129 Socket, tube; miniature; 7-prong
41K680029 Spring, battery contact (in 'A' battery retainer)
31K691985 Strip, 'B' battery terminal; with leads
31K37504 Strip, terminal: 1 insulated lug; #1; mtg; 3/8" spacing
31K470746 Strip, terminal: 3 insulated lugs; #2 mtg; 3/8" spacing
4K470939 Washer, fibre (ant receptacle mtg)
4K470939 Washer, fibre (R-7 mtg)

CABINET PARTS (5L1 & 5L1U)

7B600059 Bracket, chassis support: cad pl (on sides of chassis)
38K692051 Button, plug: tan
16E691902 Cabinet & Grille Assembly, front section; complete, less carrying handle; tan plastic
16K691903 Cabinet, front section: less grille & carrying handle; tan plastic
16D691905 Cover, cabinet back: tan plastic; less latch spring
5S7855 Eyelet: .156 x .484 (on loop leads)dos
16K691904 Grille, speaker: brown plastic
1X600082 Handle Assembly, complete: tan
36B691906 Knob, tuning: tan plastic
29A690089 Lug, crimping (on cover stop cord)dos
3S8175 Screw, sheet metal: #4 x 3/16 PKZ pl hex head; cad pl (chassis support bracket mtg)per/c

PART
NUMBER DESCRIPTION

3S490390 Screw, thread-cutting: #4 x 3/8; type 25 Phillips round head; cad pl (spkr grille mtg)
3S488009 Screw, thread cutting: #6 x 3/8; type 25 plain hex head; cad pl (mounts chassis to cabinet)
2S7089 Speednut: for .187 stud; black parkerized finish (loop mtg)
41A480094 Spring, hinge (rear cover)
55B692068 Spring, rear cover latch
4K19943 Washer, paper: 11/16 x 17/64 x 1/32 (loop mtg)

CABINET PARTS (5J1 & 5J1U)

7A600078 Bracket, chassis support: cad pl (on sides of chassis)
7A692061 Bracket, hinge mtg: black nickel finish (inside cabinet front)
38K692052 Button, plug: black
16E691798 Cabinet, front section: less grille, loop & front cover; black plastic....
42K692143 Clip, cabinet locking (on front section of cabinet)
42A480078 Clip, cabinet locking (on rear cover)
13A691938 Cloth, grille
15D691799 Cover, cabinet back: black plastic....
15D691894 Cover, cabinet front: less medallion and loop; black plastic
55A692058 Cover, handle mtg: brass plated (over ends of handle)
7A691932 Frame, grille: satin brass finish (around top of spkr grille).....
7K691934 Frame, grille: satin brass finish (around bottom of spkr grille).....
13C691896 Grille, speaker: green plastic
55A691944 Handle, carrying: black plastic; less spring
1X692142 Hinge Assembly, front cover: complete.
36B691923 Knob, control: green plastic
1X692137 Lead and Eyelet Assembly: white (loop lead)
1X692138 Lead and Eyelet Assembly: green (loop lead)
4S7695 Lockwasher, internal; #5; cad pl
29A690089 Lug, crimping (on cover stop cord)
29R3037 Lug, soldering: #6 hole (loop lead connector-on loop panel)
13A691927 Medallion: brass plated (on front cover)
64A692191 Plate, handle mtg: cad pl (under ends of handle)
64A600044 Plate, loop panel support (under loop hinges-on loop panel)
5S6833 Rivet: .122 x 3/16 atl; blk nkl (mounts hinge to loop panel)....
3S7327 Screw, machine: 5-40 x 3/8 plain hex head; cad pl (handle mtg)
3S7155 Screw, machine: 6-32 x 3/16 plain hex head; cad pl (holds hinge to hinge mtg brkt)
3S490018 Screw, sheet metal: #2 x 1/4 PKZ Phillips flat head; blk nkl (mounts loop to front cover)
3S8136 Screw, sheet metal: #4 x 1/4 PKZ Phillips round head; blk nkl (chassis support brkt mtg).....
3S400036 Screw, thread-cutting: #6 x 1/4 PKF slotted binderhead; cad pl (holds hinge mtg brkt)
3S488009 Screw, thread-cutting: #6 x 3/8; type 25 plain hex head; cad pl (mounts chassis to cabinet)
2S490840 Speednut: for 1/16 stud; black parkerized finish (medallion mtg)....
2S7092 Speednut: for .125 stud; black parkerized finish (spkr grille mtg)....
2S490842 Speednut: for .271 stud; black parkerized finish (holds cover stop cord)
41A692060 Spring, handle (inside plastic handle)
4S1719 Washer, flat; 3/8 x .140 x .030 atl; cad pl (handle mtg)
4B600136 Washer, paper: 3/4 x 5/16 x .020 (holds cover stop cord)

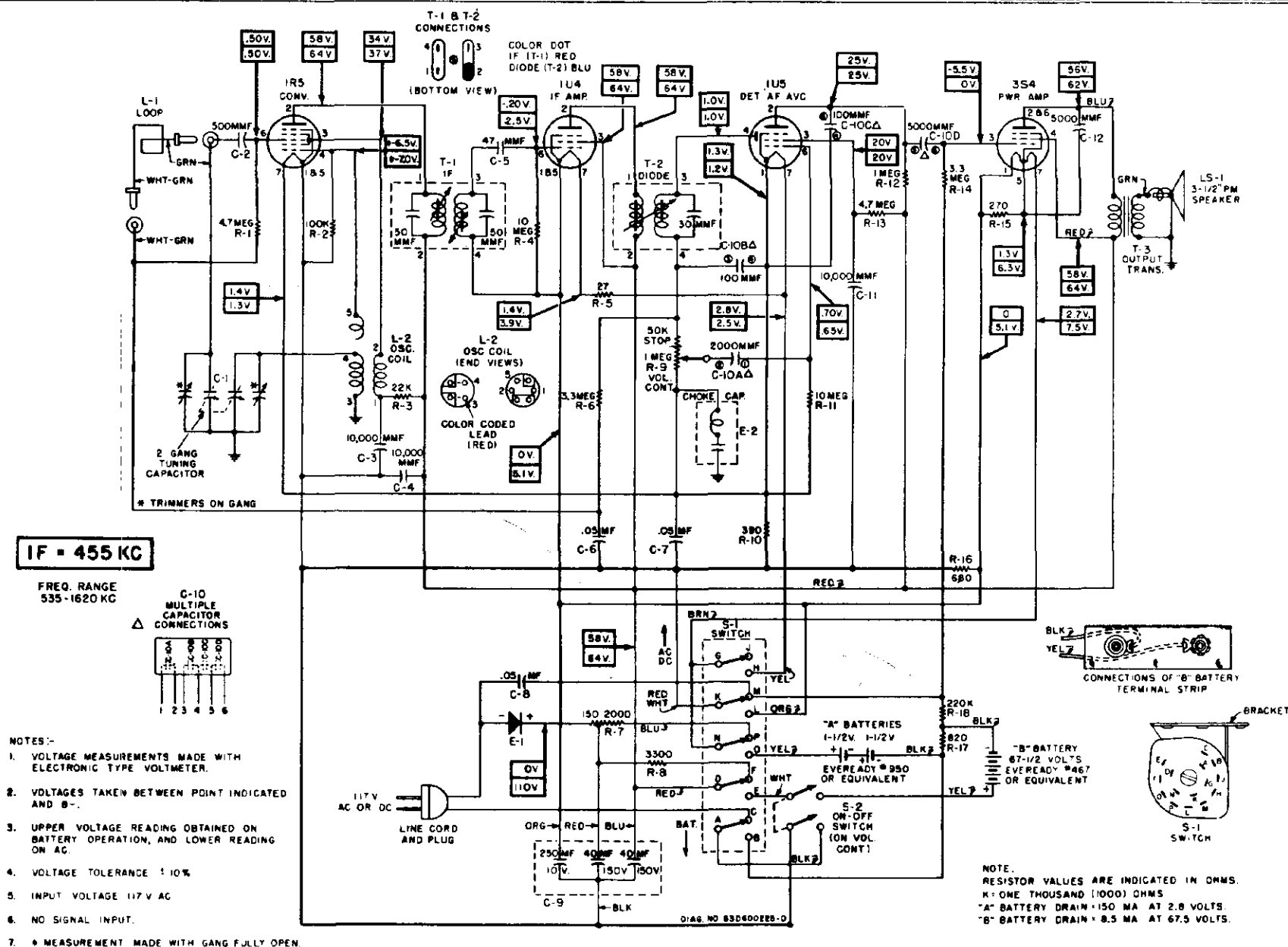


FIGURE 3. SCHEMATIC DIAGRAM, CHASSIS HS-224

MODELS 5J1,
5L1, Ch. HS-250

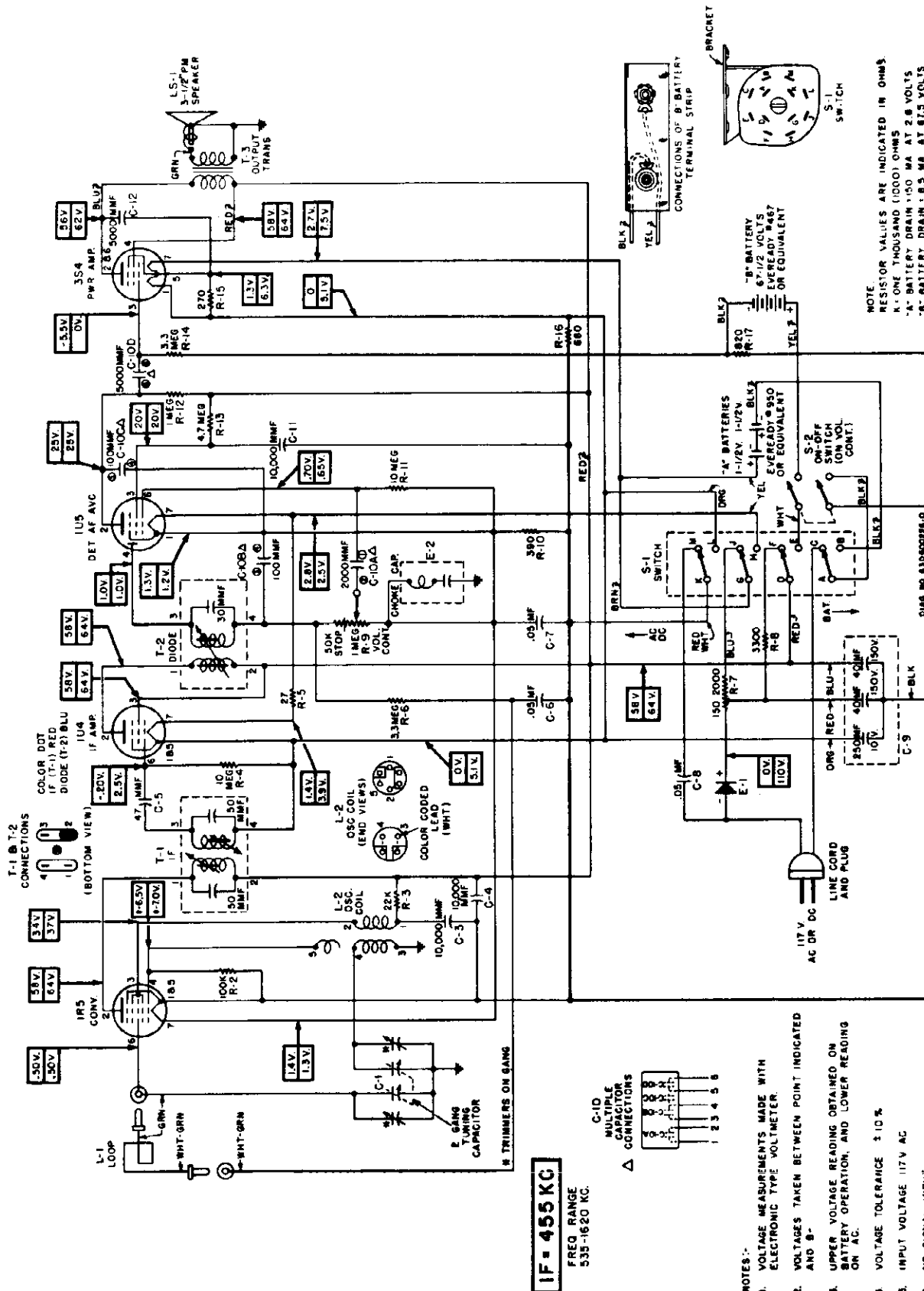


FIGURE 4. SCHEMATIC DIAGRAM, CHASSIS HS-250

GENERAL INFORMATION

TYPE - Three-power (AC/DC, Battery) portable radio receiver. Four miniature type tubes and a selenium rectifier are used in a superheterodyne circuit.

MODEL	COLOR	CHASSIS
5M1	Green	HS-249
5M1U	Green	HS-223
5M2	Maroon	HS-249
5M2U	Maroon	HS-223

TUNING RANGE - 535 to 1620 Kc **IF** - 455 Kc

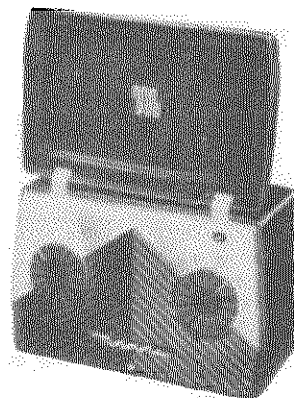
TUBE COMPLEMENT - 1R5 - Converter
 1R4 - IF Amplifier
 1U5 - Det, AVC & 1st AF Amp
 3S4 - Power Amplifier
 Rectifier - Selenium type - for AC/DC operation

POWER SUPPLY - Operates from 117V AC/DC (15 watts) or from the following batteries:

2 - $1\frac{1}{2}$ V flashlight cells (Eveready #950 or equivalent)

1 - $67\frac{1}{2}$ V "B" battery (Eveready #467 or equivalent)

5M1 & 5M2
SERIES



MODELS 5M1,
5M2, Ch. HS-
249; 5M1U,
5M2U, Ch.
HS-223

OPERATING INSTRUCTIONS

TO OPEN FRONT COVER. The front cover is opened by pushing upward on the "M" bar located in the center of the cover. The receiver is automatically turned on when the front cover is opened and raised to a vertical position.

TO OPEN BACK COVER. The back cover may be opened by gently pulling it at the top. When closing the cover, be careful not to pinch the power line cord or other leads between the cover and the cabinet.

117 VOLT AC OR DC OPERATION. The power cord is located inside the cabinet and may be reached by opening the back cover. Pass the line cord through the slot on the side of the receiver, and plug it into any 117 volt AC or DC power outlet. If the receiver does not operate from DC power, reverse the plug in the power outlet. When operating from AC power, reception may sometimes be improved by reversing the power plug in the outlet. It is not necessary that batteries be installed if the receiver is to be operated only from house power lines.

BATTERY OPERATION. Open the back cover and install the batteries, following the instructions on the label inside the back cover (or see Figure 1). Insert the line cord plug into the receptacle on the chassis, or the receiver will not play from

batteries. If the receiver is to be operated for a long period of time from 117 volts AC or DC, or is to be placed in storage, remove the batteries and store them in a cool place. **IMPORTANT:** Never leave low or run-down batteries in the receiver, as they will leak or swell and damage it.

TUNING CONTROL. Stations are tuned in with the right-hand knob. The markings around the tuning knob may be read in kilocycles by adding one zero to the figures.

VOLUME CONTROL. The left-hand knob controls volume.

TO TURN OFF. Closing the front cover will automatically turn off the receiver.

ANTENNA. A loop antenna is built into the front cover. Because of the slightly directional characteristics of the loop antenna, reception from some stations may be improved by rotating the entire receiver. In extremely noisy locations, rotate the receiver until minimum noise and maximum signal pickup are obtained.

BATTERY REPLACEMENT. If low volume or fuzzy tone is noticed when operating from batteries, replace the flashlight cells. Normally, the $67\frac{1}{2}$ V "B" battery will last for 3 or 4 changes of the flashlight cells. The condition of the batteries will not affect the operation of the receiver from 117 volts AC or DC. Complete battery replacement instructions will be found inside the cabinet back cover (or See Figure 1).

SERVICE NOTES

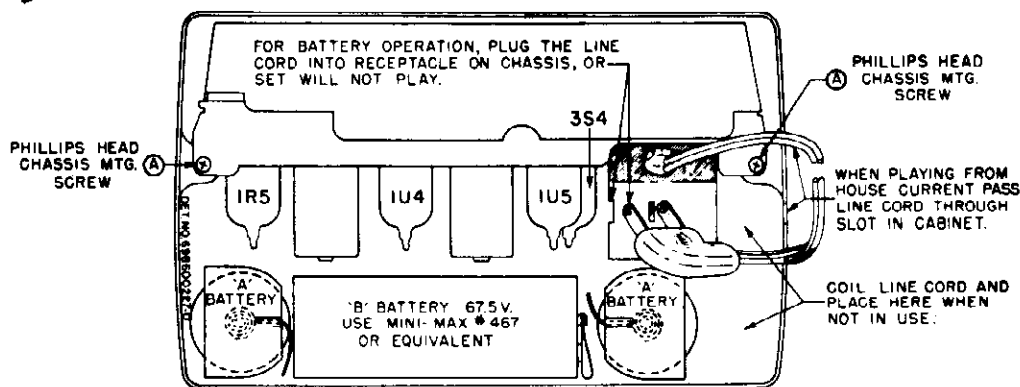
The chassis of this receiver is isolated from the AC power line circuit by a capacitor-choke assembly to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

The tubes are exposed when the rear cover is opened. It is not necessary to remove the chassis to replace tubes.

To remove the chassis from the cabinet:

1. Pull off the two control knobs on the front of the cabinet.
2. Open the rear cover and remove the batteries.
3. Remove the two Phillips head screws holding the chassis to the cabinet ("A" - "A" in Figure 1).
4. Slide the chassis out of the cabinet.
5. Disconnect the two leads from the chassis to the loop antenna hinges.

MODELS 5M1, 5M2, Ch.
HS-249; 5M1U, 5M2U,
Ch. HS-223



NOTE - A BATTERIES: USE TWO 1-1/2V FLASHLIGHT CELLS-EVEREADY #950 OR EQUIVALENT. INSTALL A BATTERIES SO SPRING CONTACTS BOTTOM OF BATTERIES.

FIGURE 1. BATTERY INSTALLATION & CHASSIS REMOVAL INSTRUCTIONS

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv (pin 6, 1R5)*	455 Kc	Fully open	1, 2 & 3	Adjust for maximum.
RF ALIGNMENT						
2.	-	Grid of conv (pin 6, 1R5)*	1620 Kc	Fully open	4	Adjust for maximum.
3.	-	-	-	-	-	Install chassis in cabinet, leaving output meter connected to speaker.
4.	-	Radiation loop**	1400 Kc	Tune for maximum	5	Adjust for maximum. Trimmer is reached through hole under plug button on side of cabinet.

* On chassis HS-249 return the grid of the converter tube to AVC either through the loop or through a 4.7 meg resistor (as in chassis HS-223).

**Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

ALIGNMENT

NOTE: The receiver may be operated either from a battery or from the commercial power lines during alignment. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30%

modulation.

4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator input to keep the output of the receiver at approximately .05 watt (.05 watt = .40 volts on the output meter) to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

MODELS 5M1, 5M2, Ch.
HS-249; 5M1U, 5M2U,
Ch. HS-223

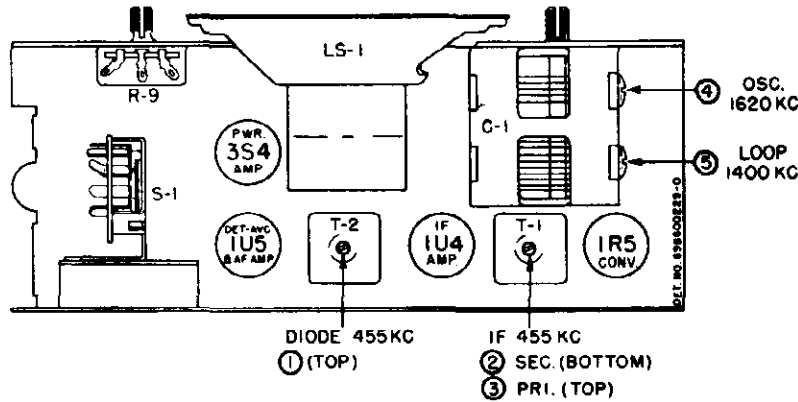
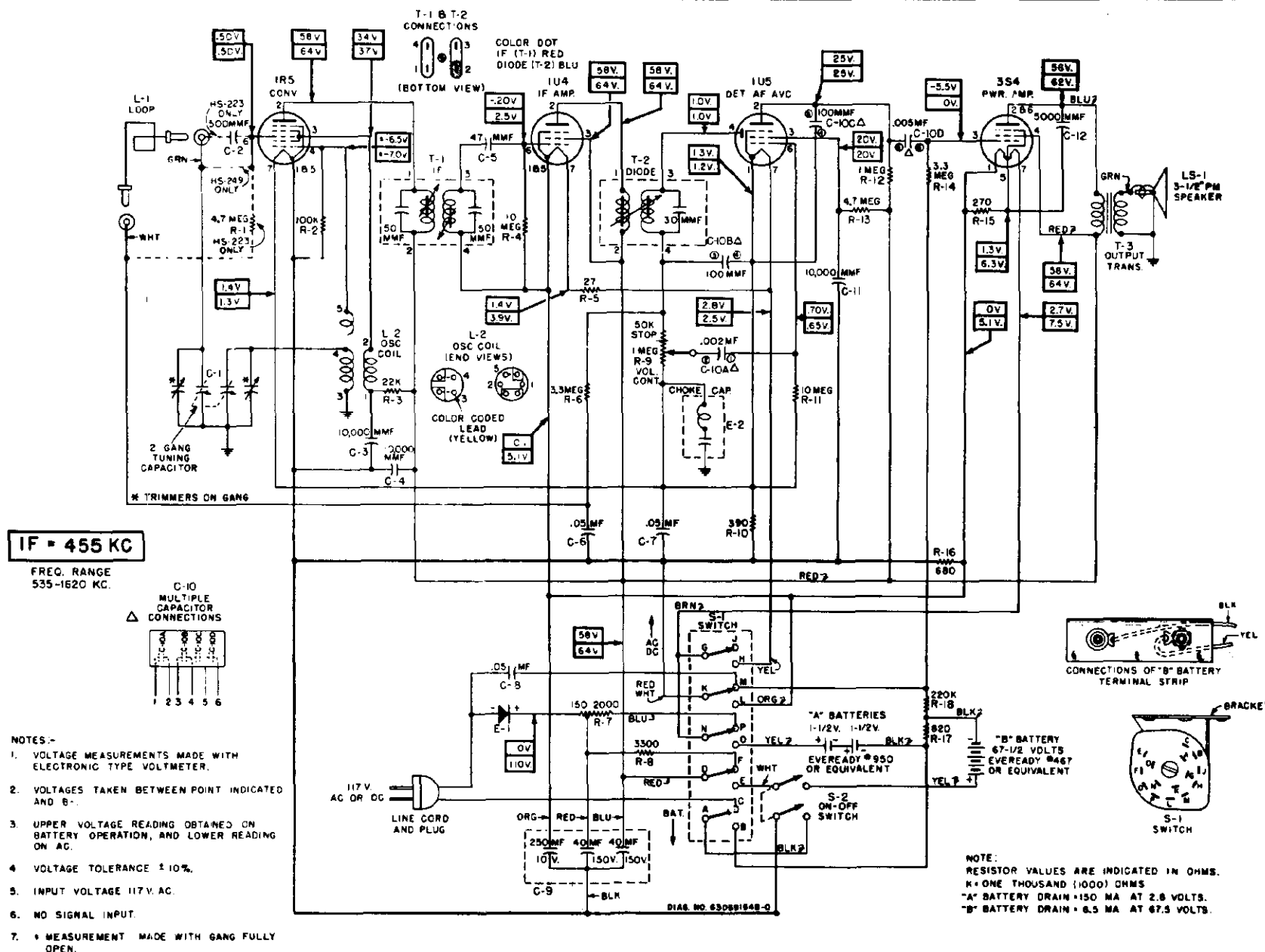


FIGURE 2. TUBE & TRIMMER LOCATIONS
REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
CHASSIS PARTS - ELECTRICAL					
CAPACITORS					
C-1	19K692007	Variable, 2-gang	SWITCHES		
C-2	21K481377	Ceramic, 500 mmf 500V	S-1	40B471927	Rotary switch, 5PDT (AC/DC, battery selector)
C-3	21K482726	Ceramic, disc type; 10,000 mmf 450V	S-2	40A691999	Slide switch (on-off)
C-4	21K482726	Ceramic, disc type; 10,000 mmf 450V	TRANSFORMERS		
C-5	21K77373	Ceramic, 47 mmf 500V	T-1	24B692014	IF Transformer, 455 Kc: complete with capacitors, less shield
C-6	8K71213	Paper, .05 mf 100V	T-2	24B692015	Diode Transformer, 455 Kc: complete with capacitors, less shield
C-7	8K71213	Paper, .05 mf 100V	T-3	25K692006	Output Transformer
C-8	8K471635	Paper, .05 mf 400V	PART NUMBER DESCRIPTION		
C-9	23B691995	Electrolytic; 40-40 mf 150V/250 mf 10V	CHASSIS PARTS - MECHANICAL		
C-10A, B, C, D	21K691992	Ceramic, multiple; 2000 mmf, 100 mmf, 100 mf, 5000 mf	43A692011	Bushing, insulator: fibre (on rear edge of chassis)	
C-11	21K482726	Ceramic, disc type; 10,000 mmf 450V	43A692012	Bushing, strain relief: line cord (use with 43K692013)	
C-12	21A470789	Ceramic, disc type; 5000 mmf 450V	42K75826	Clip, electrolytic mtg	
CHOKE & CAPACITOR					
P-2	24K691986	Choke & .05 mf 200V paper capacitor	42A485548	Clip, IF transformer mtg	
RECTIFIER					
E-1	48B791092	Selenium Rectifier: half-wave...	30B691994	Cord, line: with plug; 6 ft long (HS-223 only)	
COILS					
L-1	1X692159	Antenna Loop & Front Cover Assembly: complete; green plastic (5M1 & 5M1U)	30K600125	Cord, line: with plug; 6 ft long (HS-249 only)	
	1X692160	Antenna Loop, Panel & Hinge Assembly: less front cover; green plastic (5M1 & 5M1U)	457650	Lockwasher, internal; #6; cad pl.	
	24B692200	Antenna Loop & Panel Assembly: less hinges; green plastic (5M1 & 5M1U)	29R5294	Lug, soldering (holds battery leads)	
	1X600129	Antenna Loop & Front Cover Assembly: complete; maroon plastic (5M2 & 5M2U)	29R5239	Lug, soldering: #8 hole (holds line cord) (HS-223 only)	
	1X600130	Antenna Loop, Panel & Hinge Assembly: less front cover; maroon plastic (5M2 & 5M2U)	29R3020	Lug, soldering: battery contact (in 'A' battery retainer)	
	24K600132	Antenna Loop & Panel Assembly: less hinges; maroon plastic (5M2 & 5M2U)	257005	Nut, hex: 6-32 x 1/4 stl; cad pl (R-7 & selenium rect mtg)	
L-2	24K600097	Oscillator Coil (yellow code)	257051	Nut, hex: palmnut; 3/8-32 x 9/16; cad pl (volume control mtg)	
SPEAKER					
LS-1	50K600142	Speaker: 3 1/2" PM; 3.2 ohm VC.	9A470980	Receptacle, loop (on lead to loop)	
or	50K600141	Speaker: 3 1/2" PM; 3.2 ohm VC.	15R481896	Retainer, 'A' battery: plastic	
RESISTORS					
Note: All resistors are insulated, carbon type unless otherwise specified.					
R-1	6R2122	4.7 meg 20% 1/4W	43K692013	Retainer, strain relief (on line cord bushing) (use with 43A692012)	
R-2	6R6031	100,000 10% 1/4W	5S7771	Rivet: .088 x 3/16 stl; skl pl (tube socket mtg)	
R-3	6R6397	22,000 10% 1/4W	5S7706	Rivet: .122 x 1/8 stl; skl pl (term strip & switch mtg)	
R-4	6R2109	10 meg 20% 1/4W	3S490828	Screw, machine: 6-32 x 3/16; plain hex head lockcrew; cad pl (gang mtg)	
R-5	6R5683	27 10% 1/4W	3S7363	Screw, machine: 6-32 x 1 slotted binderhead; cad pl (selenium rect mtg)	
R-6	6R2118	3.3 meg 20% 1/4W	3S1451	Screw, machine: 6-32 x 2 slotted round head; cad pl (R-7 mtg)	
R-7	17K692009	Wire wound: 2150 5% 10W; tapped	3S7205	Screw, machine: 8-32 x 1/4 slotted hex head lockcrew; cad pl (sprk mtg)	
R-8	6R5581	3300 10% 1/4W	3S2695	Screw, sheet metal: #6 x 3/16 PKZ pl hex head; cad pl (rear shield mtg)	
R-9	18A691993	Volume control: 1 megohm	3S7462	Screw, thread-cutting: 6-32 x 3/16 plain hex head; cad pl (S-1 mtg)	
R-10	6R5554	390 10% 1/4W	26K692003	Shield, back (on rear of chassis)	
R-11	6R2109	10 meg 20% 1/4W	26A692005	Shield, heat (around R-7)	
R-12	6R6004	1 meg 20% 1/4W	26K691997	Shield, switch (over AC/DC, Batt. m)	
R-13	6R2122	4.7 meg 20% 1/4W	9A690129	Socket, tube: miniature; 7-prong	
R-14	6R2118	3.3 meg 20% 1/4W	41K680029	Spring, battery contact (in 'A' battery retainer)	
R-15	6R6432	270 10% 1/4W	31K470880	Strip, 'B' battery terminal: with leads	
			31K37504	Strip, terminal: 1 insulated lug; #1 mtg; 3/8" spacing	
			31K470746	Strip, terminal: 3 insulated lugs; #2 mtg; 3/8" spacing	

PART NUMBER	DESCRIPTION
4K470939	Washer, fibre (R-7 mtg)
CABINET PARTS	
7A600092	Bracket, escutcheon support: cad pl (cabinet front support) (5M1U & 5M2U)
38K692050	Button, plug: green finish (5M1 & 5M1U)
38K600106	Button, plug: maroon finish (5M2 & 5M2U)
1X692156	Cabinet: complete, less handle, grille and front cover; green finish (5M1 & 5M1U)
1X600126	Cabinet: complete, less handle, grille and front cover; maroon finish (5M2 & 5M2U)
42A600094	Clip, grille retainer (holds front grille to cabinet)
55A692058	Cover, handle mtg: brass plated (over ends of handle)
13D691949	Escutcheon, dial & volume (on front of cabinet)
55A27113	Foot, cabinet bottom: felt
1X692162	Front Cover Assembly: complete, less loop; green plastic (5M1 & 5M1U)
1X600131	Front Cover Assembly: complete, less loop; maroon plastic (5M2 & 5M2U)
1X692158	Grille Assembly: complete with escutcheon; green plastic (5M1 & 5M1U)
1X600128	Grille Assembly: complete with escutcheon; maroon plastic (5M2 & 5M2U)
55K692166	Handle, carrying: green plastic; less spring (5M1 & 5M1U)
55K600107	Handle, carrying: maroon plastic; less spring (5M2 & 5M2U)
55C692202	Hinge, front cover; complete; left-hand
55K600087	Hinge, front cover; complete; right-hand
55K30198	Hinge, rear cover
36B691899	Knob, control: green plastic (5M1 & 5M1U)
36K600105	Knob, control: maroon plastic (5M2 & 5M2U)
1X692163	Latch and Plate Assembly (inside front cover)
45B406	Lockwasher, internal; #2; cad pl.
457683	Lockwasher, internal; #4; cad pl.
29R5399	Lug, soldering (under front hinge, for loop connection)
13B691901	Medallion (on front cover)
28A692198	Pin, loop connector (on front hinge)
64A692191	Plate, handle mtg: cad pl (under ends of handle)
59B487	Rivet: .088 x 5/32 stl; blk skl (rear cover hinge)
5S8490	Rivet: .088 x 5/32 stl; blk skl (front hinge mtg) (5M1 & 5M1U)
5S2827	Rivet: .088 x 5/32 stl; statuary bronze (front hinge mtg) (5M2 & 5M2U)
3S490849	Screw, machine: 4-40 x 11/32 Phillips round head; cad pl (mounts front hinges to cabinet)
3S2995	Screw, machine: 5-40 x 5/16 plain hex head; cad pl (handle mtg)
3S490018	Screw, sheet metal: #2 x 1/4 PKZ Phillips flat head; blk skl (mounts loop to front cover) (5M1 & 5M1U)
3S3389	Screw, sheet metal: #2 x 1/4 PKZ Phillips flat head; statuary bronze (mounts loop to front cover) (5M2 & 5M2U)
3S490739	Screw, sheet metal: #4 x 1/4 PKZ Phillips binderhead; cad pl (chassis mtg)
41A470909	Spring, door latch (inside front cover)
41K692167	Spring, handle (inside plastic handle)
41A692069	Spring, rear cover latch
42A692189	Spring, door latch retainer (inside front cover)
46A692151	Stud, latch retainer (front cover latch, on grille)
46K690079	Stud, trimount: blk skl (on loop panel for operating on-off switch) (5M1 & 5M1U)
46K680035	Stud, trimount: statuary bronze (on loop panel, for operating on-off switch) (5M2 & 5M2U)
4S1719	Washer, flat: 3/8 x .140 x .030 stl; cad pl (handle mtg)

MODELS 5M1, 5M2, Ch.
HS-249; 5M1U, 5M2U,
Ch. HS-223



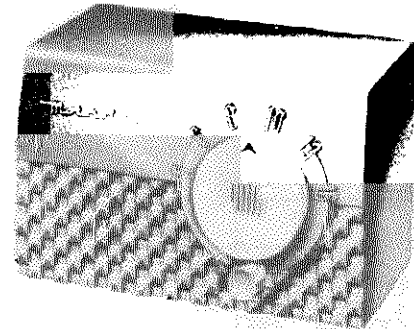
MODELS 5R11U, 5R12U,
5R13U, 5R14U, 5R15U,
5R16U, Ch. HS-242

GENERAL INFORMATION

TYPE - AC-DC table model superheterodyne receiver
with loop antenna.

RECEIVER MODELS -	Model	Color
	5R11U	Walnut-Mahogany
	5R12U	Ivory
	5R13U	Maroon
	5R14U	Gray
	5R15U	Green
	5R16U	Yellow

TUBE COMPLEMENT -	12BE6	Converter
	12BA6	IF Amplifier
	12AT6	Det, AVC & AF Amp
	50C5	Power Amplifier
	35W4	Rectifier



TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 117 volts AC or DC; 35 watts

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces

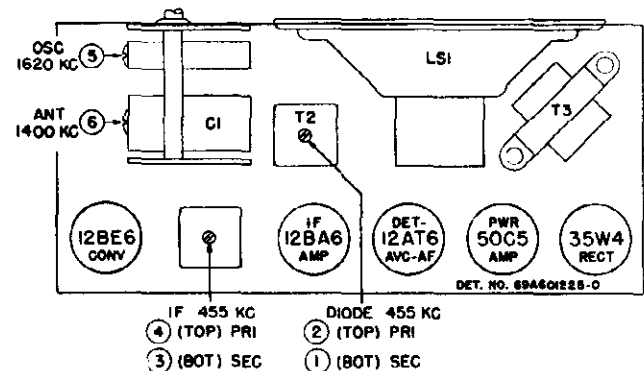


FIGURE 1. TUBE AND TRIMMER LOCATIONS

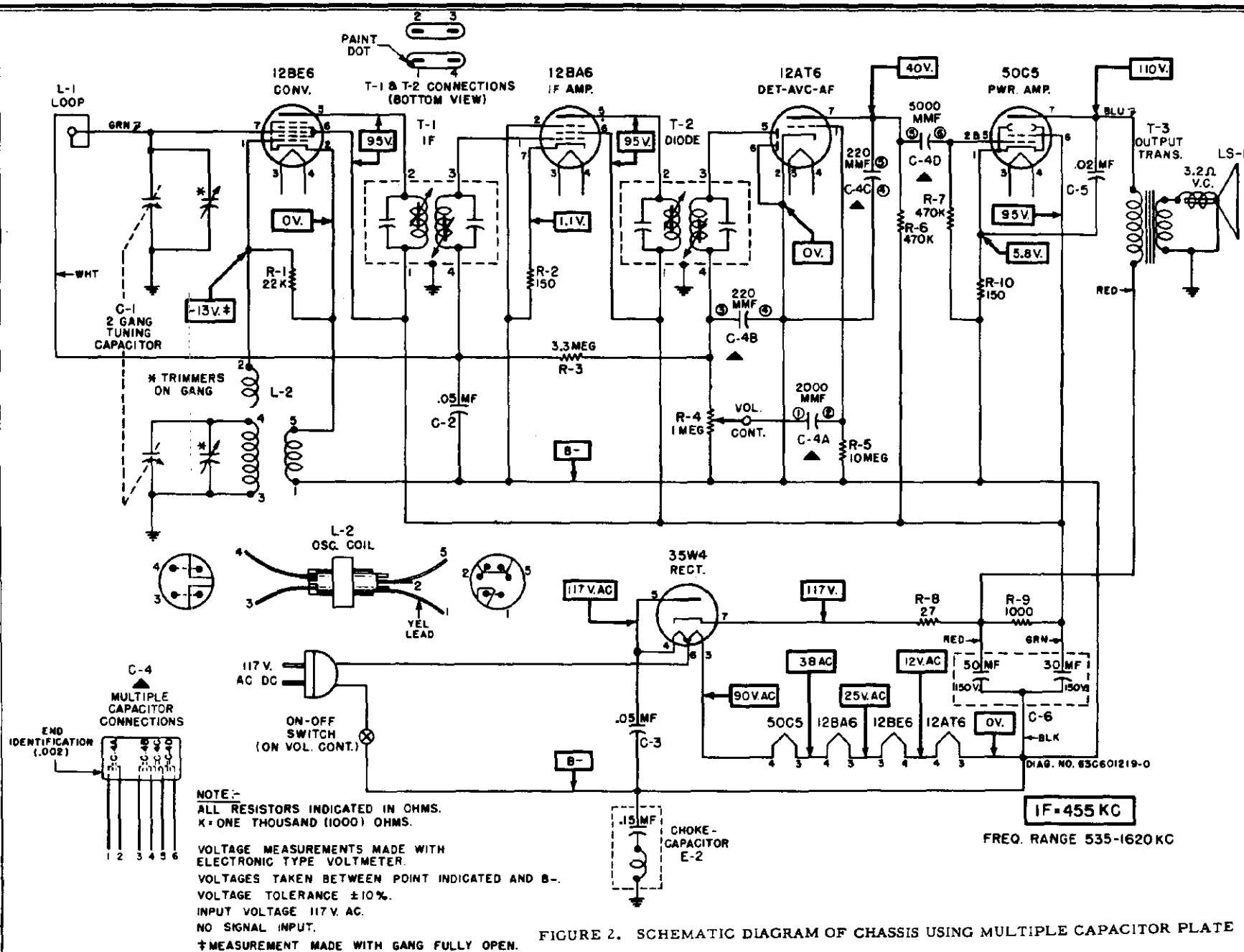
less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.

7. See Figure 1 for adjustment locations and the following chart for procedure.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 7, 12BE6)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	-	Grid of conv. (pin 7, 12BE6)	1620 Kc	Fully open	5 (Osc)	Adjust for maximum.
3.	-	Radiation loop*	1400 Kc	Tune for max	6 (Ant)	Adjust for maximum

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

MODELS 5R11U, 5R12U,
5R13U, 5R14U, 5R15U,
5R16U, Ch. HS-242



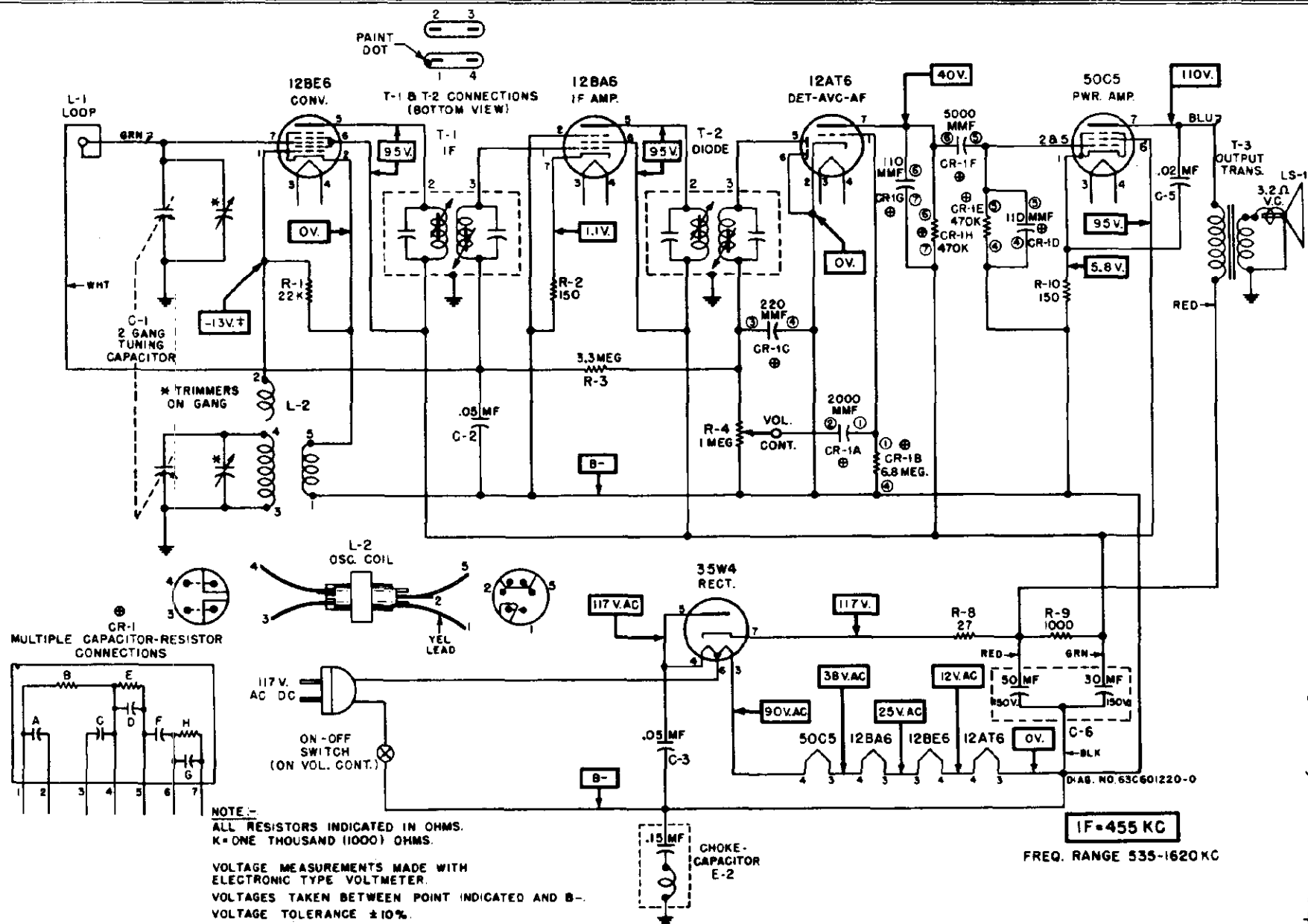


FIGURE 3. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CAPACITOR-RESISTOR PLATE

MODELS 5R11U, 5R12U,
5R13U, 5R14U, 5R15U,
5R16U, Ch. HS-242

INSTALLATION & OPERATING INSTRUCTIONS

POWER SWITCH & VOLUME CONTROL. Operated with small lower knob. NOTE: Reverse the line plug in the electrical outlet if the radio does not operate from DC. When operating from AC, reversing the line cord plug in wall outlet may sometimes improve reception.

TUNING. Tune in station with large upper knob.

ANTENNA. A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

SERVICE NOTES

To remove chassis from cabinet:

1. Pull off the two control knobs from the front of the receiver.
2. Remove the two split plugs which hold the loop to the

cabinet.

3. Remove the two hex head screws at the rear edge of the chassis.
4. Slide the chassis from the cabinet.

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Description	Part No.	Description
CHASSIS PARTS - ELECTRICAL		CHASSIS PARTS - MECHANICAL	
Capacitors		7A478118	Bracket, loop mtg.....
C-1	19B600458 Variable: 2 gang; with pulley....	43A692012	Bushing, strain relief (line cord)....
C-2	8R9821 Paper: .05 mf 200V.....	42A485548	Clip, coil can mtg (for T-1 & T-2)....
C-3	8R9816 Paper: .05 mf 400V.....	30K680352	Cord, line and plug: 6 feet long.....
C-4	21B482847 Ceramic, multiple: 2000 mmf, 220 mmf, 220 mmf, 5000 mmf.....	5A484268	Grommet, rubber (speaker mtg).....
C-5	8R9802 Paper: .02 mf 400V.....	14A478119	Insulator, fibre (loop bracket mtg)...
C-6	23B600855 Electrolytic: 50-30 mf/150V.....	2S7051	Nut, hex: 3/8-32 x 9/16; stl; cad pl (volume control mtg).....
Capacitor-Resistor		5S7771	Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg).....
CR-1	21B601007 Capacitor-Resistor: 7-lead; 2000, 220, 5000, 110, 110mmf, 6.8 meg, 470,000, 470,000 ohms.....	5S7707	Rivet: .122 x 5/32; stl; nkl pl (output trans and shield mtg).....
Choke & Capacitor		5S7703	Rivet: .122 x 7/32; stl; nkl pl (loop bracket and speaker mtg).....
E-1	8A690487 Choke & .15 mf paper capacitor...	3S7247	Screw, machine: 6-32 x 3/16 slotted hex head; locking type; stl; cad pl (gang mtg).....
Coils		26A478117	Shield, electrostatic (on rear of chassis).....
L-1	24C600543 Antenna Loop and Panel Assembly..	9A472534	Socket, tube: 7 prong.....
L-2	24B680364 Oscillator coil.....	41A73996	Spring, tension (electrolytic mtg)....
Speaker		46A478145	Stud, tri-mount (back mtg to chassis).
LS-1	50B690661 Speaker: 4" PM; 3.2 ohm VC....	14A11493	Washer, shoulder: fibre (loop bracket mtg).....
Resistors		CABINET PARTS	
Note: All resistors are insulated carbon type unless otherwise specified		16K600181	Cabinet, table model: molded; walnut-mahogany finish (5R11U).....
R-1	6R6028 22,000 20% 1/2W.....	16B600157	Cabinet, table model: molded; ivory finish (5R12U).....
R-2	6R3992 150 20% 1/2W.....	16K600183	Cabinet, table model: molded, maroon finish (5R13U).....
R-3	6R2118 3.3 meg 20% 1/2W.....	16K600184	Cabinet, table model: molded; gray finish (5R14U).....
R-4	18K600449 Volume control: 1 meg; with switch	16K600185	Cabinet, table model: molded; green finish (5R15U).....
R-5	6R2109 10 meg 20% 1/2W.....	16K600186	Cabinet, table model: molded; yellow finish (5R16U).....
R-6	6R6032 470,000 20% 1/2W.....	36B600485	Knob, tuning: ivory (5R11U, 5R13U, 5R14U, and 5R15U).....
R-7	6R6032 470,000 20% 1/2W.....	36K600486	Knob, tuning: red (5R12U).....
R-8	6R5683 27 10% 1/2W.....	36K600487	Knob, tuning: blue (5R16U).....
R-9	6R3953 1000 20% 1W.....	36B600544	Knob, volume control: walnut (5R11U)...
R-10	6R3992 150 20% 1/2W.....	36K600545	Knob, volume control: ivory (5R12U)...
Transformers		36K600546	Knob, volume control: maroon (5R13U)...
T-1,2	24B485553 IF and Diode, 455 Kc: complete with capacitors, cores, and shield..	36K600547	Knob, volume control: gray (5R14U)...
T-3	25K680345 Output Transformer.....	36K600548	Knob, volume control: green (5R15U)...
		36K600549	Knob, volume control: yellow (5R16U)...
		3S476083	Screw, machine: 6-32 x 5/16; slotted hex head; stl; cad pl; locking type (chassis mtg).....
		38A25507	Plug, split (back mtg to cabinet)....
		11M488253	Tape; aluminum foil: 2 1/2" wide

MODELS 5X11U, 5X12U,
5X13U, Ch. HS-243

GENERAL INFORMATION

TYPE - AC-DC table model superheterodyne receiver with loop antenna.

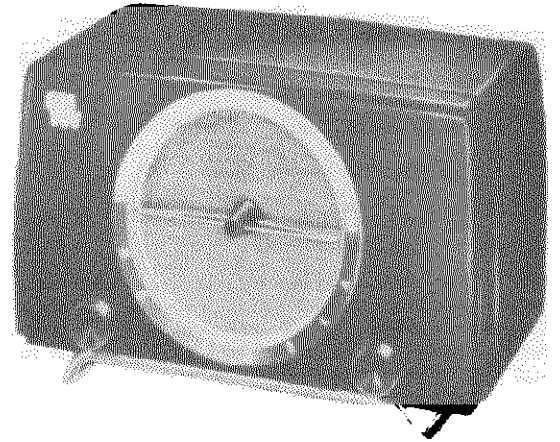
RECEIVER MODELS -

Model	Color
5X11U	Walnut-mahogany
5X12U	Ivory
5X13U	Ebony

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT - 12BE6 - Converter
12BA6 - IF Amplifier
12AT6 - Det, AVC & 1st AF Amp
50C5 - Power Amplifier
35W4 - Rectifier

POWER SUPPLY - 117 volts AC or DC, 35 watts



INSTALLATION & OPERATING INSTRUCTIONS

POWER SWITCH AND VOLUME CONTROL. Operated with the left-hand knob. NOTE: Reverse the line cord plug in the wall outlet if radio does not operate from DC. When operating from AC, reversing the line cord plug in the wall outlet may sometimes improve reception.

TUNING. Tune stations with the right-hand knob.

ANTENNA. A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

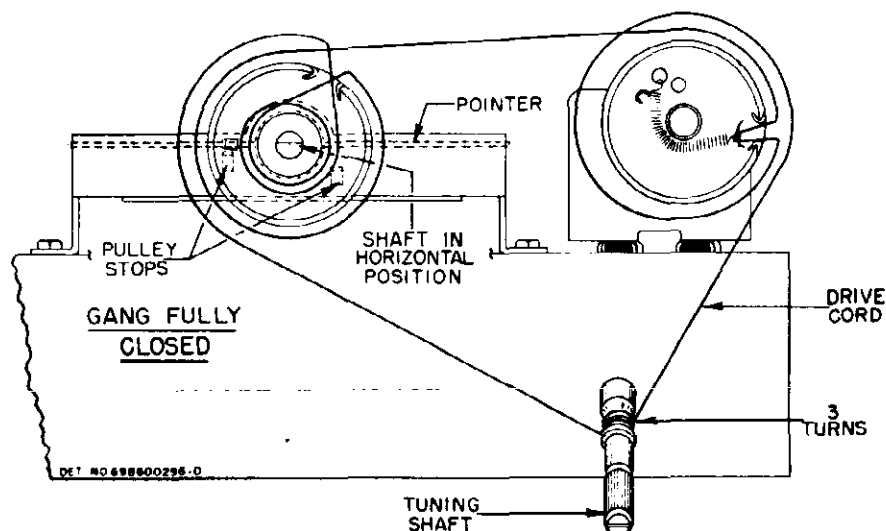


FIGURE 1. STRING DRIVE DETAIL

MODELS 5X11U, 5X12U,
5X13U, Ch. HS-243

SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

To remove the chassis from the cabinet:

1. Pull off the two radio control knobs.

2. Pull off the pointer.
3. Remove the split plugs which hold the loop to the cabinet.
4. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.
5. Slide the radio chassis and loop from the cabinet.

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. (pin 7, 12BE6)	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	-	Grid of conv. (pin 7, 12BE6)	1620 Kc	Fully open	5 (Osc)	Adjust for maximum.
3.	-	Radiation loop*	1400 Kc	Tune for max	6 (Ant)	Adjust for maximum.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

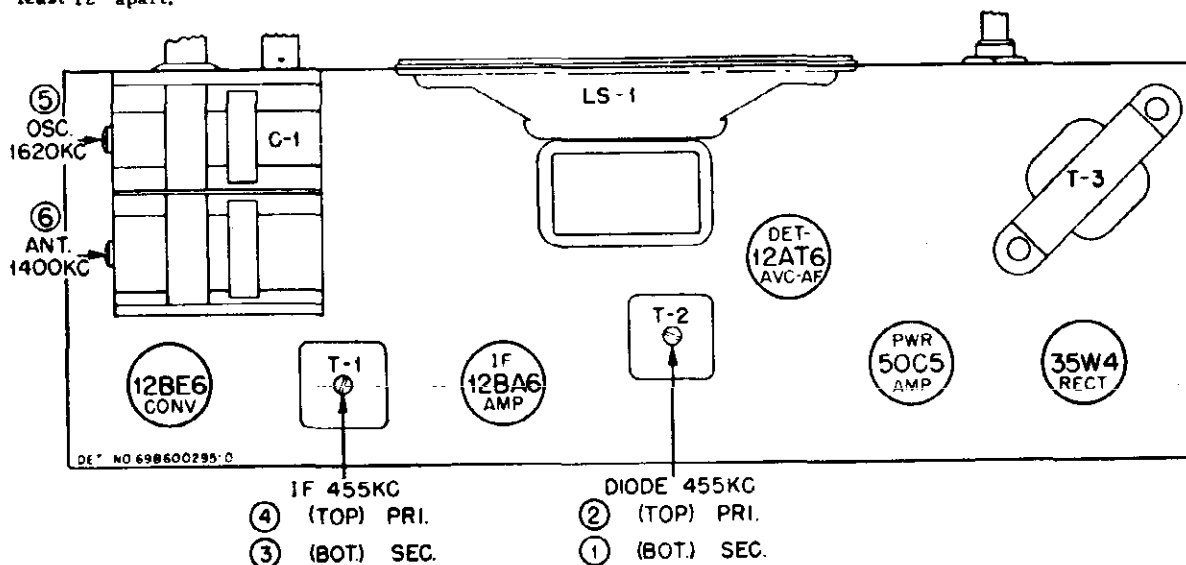


FIGURE 2. TUBE & TRIMMER LOCATIONS

MODELS 5X11U, 5X12U,
5X13U, Ch. 5S-243

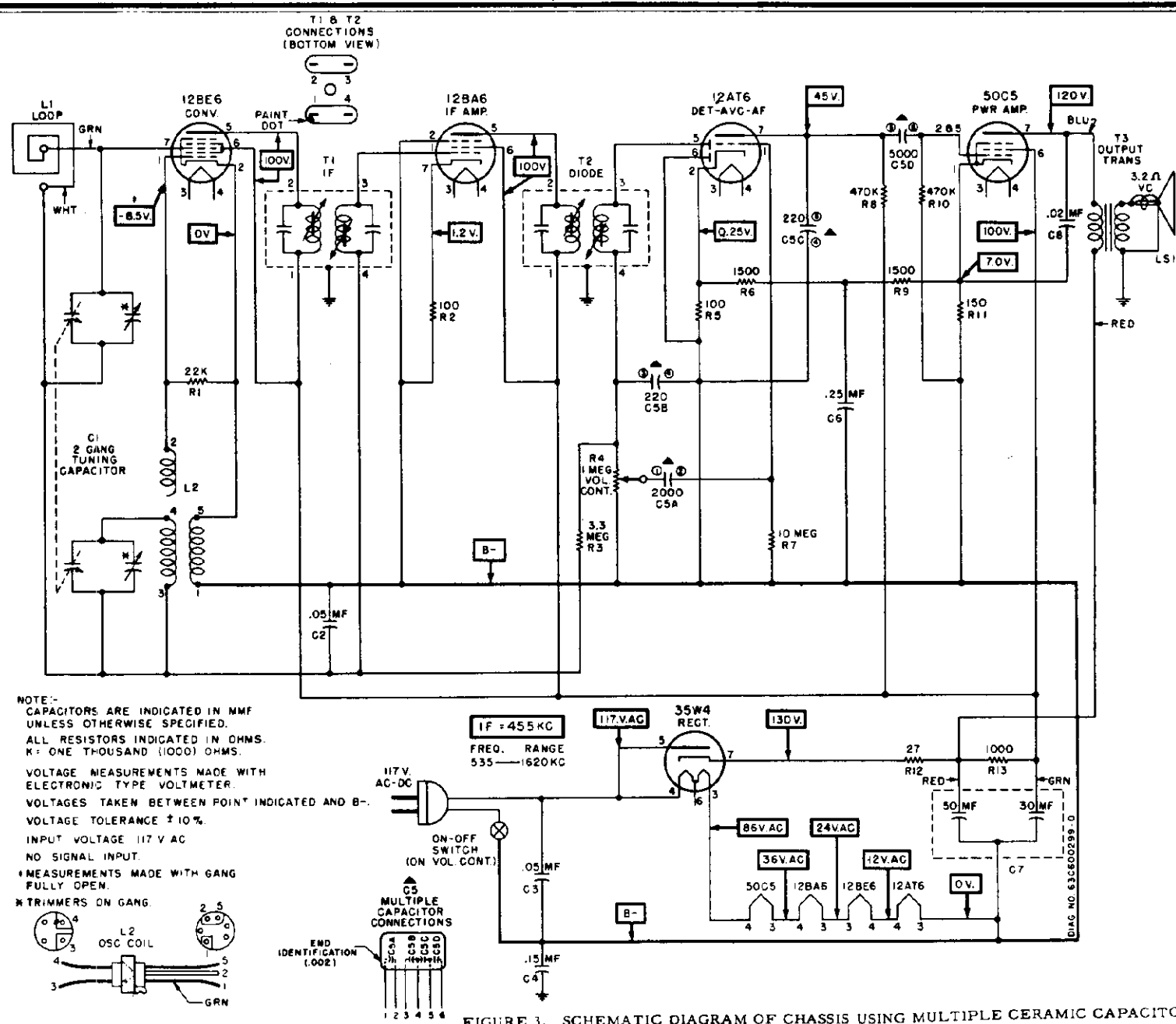
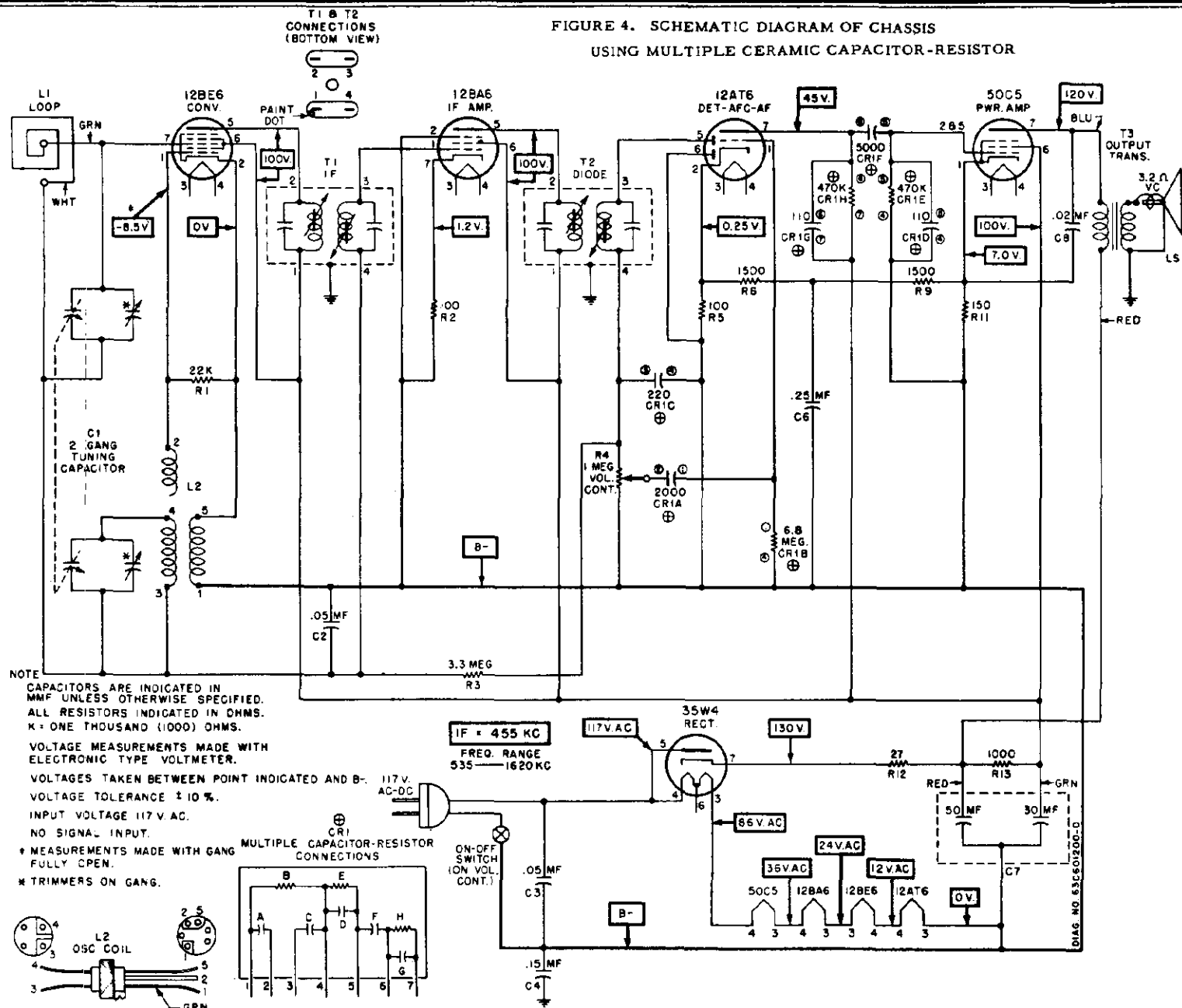


FIGURE 3. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR

MODELS 5X11U, 5X12U,
5X13U, Ch. HS-243

FIGURE 4. SCHEMATIC DIAGRAM OF CHASSIS
USING MULTIPLE CERAMIC CAPACITOR-RESISTOR



MODELS 5X11U, 5X12U,
5X13U, Ch. HS-243

REPLACEMENT PARTS LIST

NOTE: When ordering parts specify model number of set in addition to part number and description of part.

Ref. No.	Part Number	Description	Part Number	Description
CHASSIS PARTS - ELECTRICAL			11M8944	Cord, dial: 18 lb black
<u>Capacitors</u>			30A470651	Cord, line and plug: 6 ft lg
C-1	19B600483	Variable, 2 gang: with pulley	5A19658	Eyelet, spacer (gang mtg)
C-2	8R9821	Paper: .05 mf 200V	5A70404	Grommet, rubber (gang mtg)
C-3	8R9816	Paper: .05 mf 400V	14A482844	Insulator, cord outlet
C-4	8R9843	Paper: .15 mf 200V	29R3010	Lug, soldering
C-5	21B482847	Ceramic, multiple: 2000,220,220, 5000 mmf	2S7051	Nut, hex: Palnut (volume control mta)
C-6	8A470504	Paper: .25 mf 50V	1X600590	Pulley and Bushing Assembly, pointer drive
C-7	23B600855	Electrolytic: 50-30 mf/150V	5S7771	Rivet: .088 x 3/16 stl; nkl pl (tube socket mtg)
C-8	8R9802	Paper: .02 mf 400V	5S7707	Rivet: .122 x 5/32 stl; nkl pl (tube shield mtg, output transformer mtg and tuning shaft bracket mtg).....
<u>Capacitor-Resistor</u>			3S2294	Screw, machine: 6-32 x 1/2; lockscrew; plain hex head; stl; cad pl (gang mtg)
CR-1	21B601007	2000,110,110,5000 mmf; 6.8 meg, 470,000, 470,000 ohms	3S7477	Screw, machine: 8-32 x 1/4; type #1; plain hex head; stl; cad pl (back mtg)
<u>Coils</u>			3S2695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; stl; cad pl (pointer brack- et mtg)
L-1	24C600517	Loop Antenna Assembly: includes back panel	3S3398	Screw, sheet metal: #6 x 3/8 PKZ plain hex head; stl; cad pl (loop bracket mtg)
L-2	24K600812	BC Oscillator	3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (spkr mtg) ..
<u>Speaker</u>			3S7148	Setcrew: 6-32 x 1/8; Allen head; stl; cad pl (pointer drive pulley retainer)
LS-1	50C691401	Speaker, PM: 4"; 3.2 ohm VC ...	47K600506	Shaft, pointer: brass
<u>Resistors</u>			1K600484	Shaft and Pulley Assembly, tuning
Note: All resistors are insulated carbon type unless otherwise specified.			26A481521	Shield, spring (for 12BA6 tube)
R-1	6R6028	22,000 20% 1/2W	9A472534	Socket, tube: 7-prong
R-2	6R6018	100 20% 1/2W	9K580218	Socket, tube: 8-prong
R-3	6R2118	3.3 meg 20% 1/2W	41A73996	Spring, tension (electrolytic mtg) ...
R-4	18K600474	Volume control: 1 meg; includes on-off switch	41A14244	Spring, tension (drive cord)
R-5	6R6326	100 10% 1/2W	4K692188	Washer, "O" (tuning shaft retainer and pointer shaft retainer)
R-6	6R6038	1500 10% 1/2W	4S7E33	Washer, flat: 9/16 x 11/64 x .033 thick; stl; cad pl (loop back mtg)
R-7	6R2109	10 meg 20% 1/2W	4K482859	Washer, insulated shoulder
R-8	6R6032	470,000 20% 1/2W	CABINET PARTS	
R-9	6R6038	1500 10% 1/2W	16E600187	Cabinet, table model: walnut-mahogany finish (5X11U)
R-10	6R6032	470,000 20% 1/2W	16K600191	Cabinet, table model: ivory finish (5X12U)
R-11	6R3992	150 20% 1/2W	16K600189	Cabinet, table model: ebony finish(5X13U)
R-12	6R5683	27 10% 1/2W	13C600416	Bezel, dial (5X11U)
R-13	6R3953	1000 20% 1W	13K600417	Bezel, dial (5X12U)
<u>Transformers</u>			13K600418	Bezel, dial (5X13U)
T-1,2	24B485553	IF and Diode, 455 Kc: complete including padding capacitors and tuning cores	13B600573	Grille, cabinet (5X11U and 5X12U)
T-3	25K485973	Output	13K600575	Grille, cabinet (5X13U)
<u>Part Number</u>			36B600570	Knob, pointer: walnut(5X11U)
<u>Description</u>			36K600571	Knob, pointer: ivory (5X12U)
CHASSIS PARTS - MECHANICAL			36K600572	Knob, pointer: black (5X13U)
7K485971	Bracket, loop back mtg		36B600455	Knob, tuning: walnut (5X11U)
7A600476	Bracket, tuning shaft mtg		36K600456	Knob, tuning: ivory (5X12U)
1X600589	Bracket and Bushing Assembly, pointer.		36K600457	Knob, tuning: black (5X13U)
42A485548	Clip, coil can mtg		38A25507	Plug, split (back mtg)
			52A600451	Pointer, dial: brass (5X11U and 5X12U)
			52K600453	Pointer, dial: steel (5X13U)
			3S3371	Screw, sheet metal: #8 x 3/8 PKZ plain hex head; stl; cad pl (chassis mtg)
			7C600814	Support, cabinet: brass (5X11U, 5X12U)
			7K600816	Support, cabinet: aluminum (5X13U)....

PAGE 21-80 MOTOROLA

MODELS 5X21U, 5X22U,
5X23U, Ch. HS-259

GENERAL INFORMATION

TYPE - A combination standard broadcast and shortwave table model receiver.

RECEIVER MODELS

Model	Color
5X21U	Walnut-Mahogany
5X22U	Ivory
5X23U	Ebony

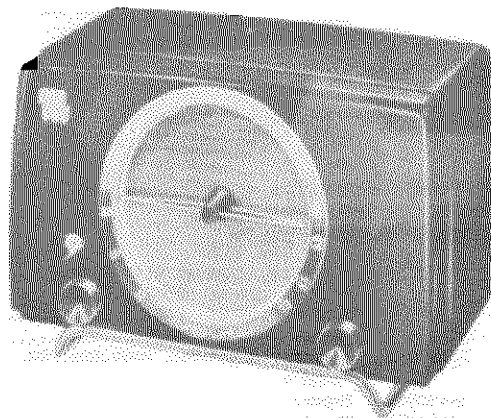
TUBE COMPLEMENT -

12BE6 - Converter
12BA6 - IF Amplifier
12AT6 - Detector, AVC & 1st Audio Amp
50C5 - Power Amplifier
35W4 - Rectifier

POWER SUPPLY - 117V AC/DC 35 watts

TUNING RANGE - Standard Broadcast - 535 to 1620 Kc
Shortwave - 5.85 Mc to 18.1 Mc

IF - 455 Kc



INSTALLATION & OPERATING INSTRUCTIONS

ANTENNAS

For shortwave reception, it is necessary to connect a length of wire (at least 10 feet long) to the screw terminal located on the radio rear panel. A commercial shortwave antenna is recommended for best results.

No outside antenna is normally required for standard broadcast station reception. A loop antenna for receiving broadcast stations is built into the radio. If the radio is located at a considerable distance from broadcast stations, it may be necessary to secure additional signal pick-up by using an external antenna. The shortwave antenna wire may be used for additional pick-up of standard broadcast stations; leave the wire connected to the shortwave terminal screw and wind two turns of the wire in the slots located at the top of the radio rear panel.

CAUTION: Do not connect antenna or chassis to water pipe, radiator or other ground.

CONTROLS

POWER SWITCH & VOLUME CONTROL. The power switch and volume control are combined and operated with the left-hand knob. If the radio does not operate from a DC power line after being turned on for a few minutes, reverse the power cord plug in the power outlet. When operating from AC power lines, reception can sometimes be improved by reversing the power cord in the power outlet.

BANDSWITCH. The small (inner) right-hand knob selects standard broadcast or shortwave reception, as desired. Rotate this knob to the left for standard broadcast or to the right for shortwave reception.

TUNING. The large (outer) right-hand knob is used for tuning both standard broadcast and shortwave stations.

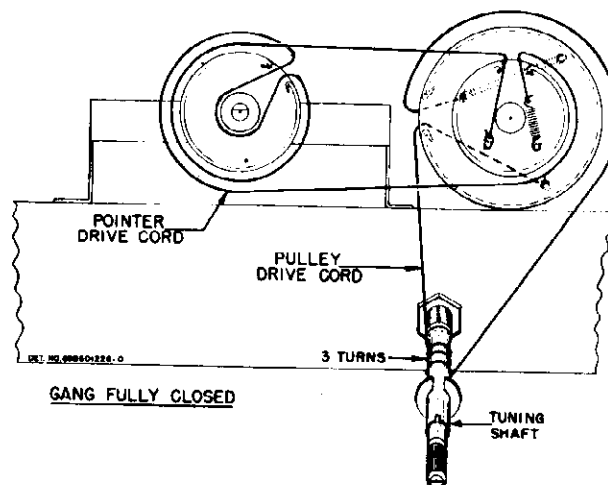


FIGURE 1. STRING DRIVE DETAIL

SERVICE NOTES

TO REMOVE CHASSIS FROM CABINET:

1. Remove the control knobs, pointer knob and pointer; these parts pull off.
2. Remove the two split plugs which hold the top of the

loop panel to the cabinet.

3. Remove the two chassis mounting screws, accessible through the slots in the loop panel and slide the chassis from the cabinet.

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to E through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	BAND SWITCH	GANG SET TO	ADJUST	REMARKS
IF ALIGNMENT							
1.	.1 mf	Rear stator of tuning capacitor	455 Kc	-	Gang opened	1, 2, 3 & 4	Adjust for maximum.
SW BAND RF ALIGNMENT							
2.	400 ohms	SW Ant terminal	18.1 mc	SW	Fully opened	5 & 6	Adjust for maximum.
BC BAND RF ALIGNMENT							
3.	.1 mf	Rear stator of tuning capacitor	1620 Kc	BC	Fully opened	7	Adjust for maximum.
4.	None	Radiation loop*	1400 Kc	BC	Tune for maximum	8	Adjust for maximum.

* Connect generator output to 5" diameter, 3 turn loop and couple to receiver loop. Keep loops at least 12" apart.

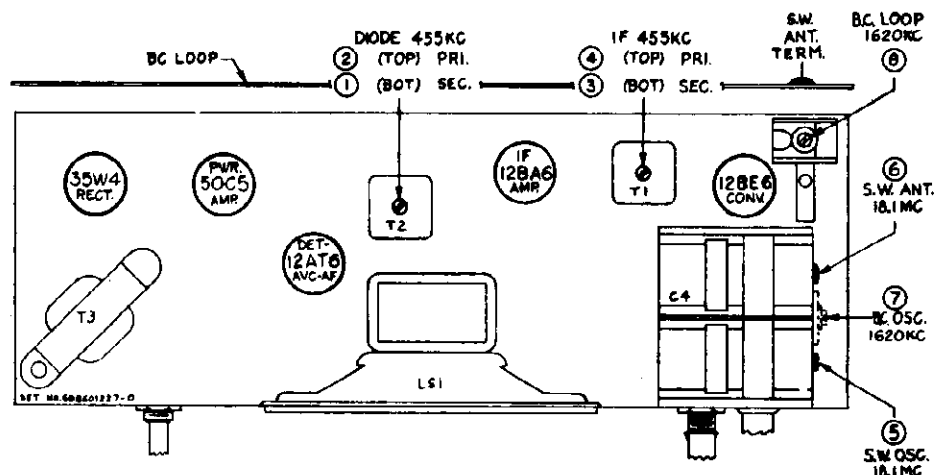


FIGURE 2. TUBE & TRIMMER LOCATIONS

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part No.	Description
-------------	----------	-------------

Capacitors

CHASSIS PARTS - ELECTRICAL

C-1	21K77373	Ceramic:	47 μ f	500V	.....
C-2	21K891154	Mica:	613 μ f	3% 500V	.....

PAGE 21-82 MOTOROLA

MODELS 5X21U, 5X22U,
5X23U, Ch. HS-259

C-3	20A600917	Mica, variable: 3 to 20 mmf; includes bracket
C-4	19B600922	Variable, 2 gang: includes pulley..
C-5	21K77373	Ceramic: 47 mmf 500V
C-6	20A680362	Mica, variable: 10 to 50 mmf
C-7	8R9807	Paper: .1 mf 400V
C-8	8R9821	Paper: .05 mf 200V
C-9	8R9816	Paper: .05 mf 400V
C-10	8R9843	Paper: .15 mf 200V
C-11	21B482847	Ceramic, multiple: .002 mf, 220 mmf, 220 mmf & .005 mf 400V
C-12	8A470504	Paper: .25 mf 50V
C-13	8R9802	Paper: .02 mf 400V
C-14	23K600927	Electrolytic: 40-20-20 mf/150V.....

Capacitor-Resistor

CR-1	21B601007	Capacitor-Resistor: 2000 mmf, 220 mmf, 5000 mmf, 110 mmf, 110 mmf, 6.8 meg, 470,000 ohms & 470,000 ohms
------	-----------	---

Coils

L-1	24K600687	Loop Antenna Assembly: includes back panel
L-2	24B600925	Coil, shortwave antenna
L-3	24B600924	Coil, shortwave oscillator.....
L-4	24A600926	Coil, BC oscillator

Speaker

LS-1	50C691401	Speaker, PM: 4"; 3.2 ohm VC....
------	-----------	---------------------------------

Resistors

Note: All resistors are insulated carbon type unless otherwise specified.

R-1	6R6075	100,000 20% 1/2W
R-2	6R2108	47 20% 1/2W
R-3	6R6028	22,000 20% 1/2W
R-4	6R6018	100 20% 1/2W.....
R-5	6R2118	3.3 meg 20% 1/2W
R-6	18K600474	Volume control: 1 meg; includes on-off switch
R-7	6R6326	100 10% 1/2W
R-8	6R6038	1500 10% 1/2W
R-9	6R2109	10 meg 20% 1/2W
R-10	6R6032	470,000 20% 1/2W
R-11	6R5683	27 10% 1/2W
R-12	6R6032	470,000 20% 1/2W
R-13	6R6038	1500 10% 1/2W
R-14	6R3992	150 20% 1/2W
R-15	6R3953	1000 20% 1W
R-16	6R6290	2200 20% 1/2W

Switch

S-1	40K600919	Switch, band: 2-position
-----	-----------	--------------------------------

Transformers

T-1,2	24B485553	IF and Diode: complete with tuning cores, padding capacitors and shield
T-3	25K485973	Output Transformer

CHASSIS PARTS - MECHANICAL

TK485971	Bracket, loop mtg
1X600589	Bracket and Bushing Assembly, pointer shaft
42A485548	Clip, coil can mtg (for T-1 & T-2)....
11M8944	Cord, dial: 18" black
30A470651	Cord, line and plug; 6 ft long
5A19658	Eyelet, spacer (gang mtg)
5A70404	Grommet, rubber (gang mtg).....

Part

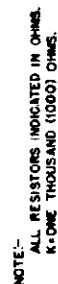
Number

Description

14A482844	Insulator, cord outlet
29R3010	Lug, soldering
2S7051	Nut, hex: Palnut; 3/8-32 x 9/16; stl; cad pl (volume control and bandswitch mtg)
1X600590	Pulley and Bushing Assembly, pointer drive
5S7771	Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg)
5S7706	Rivet: .122 x 1/8; stl; nkl pl (variable capacitor mtg)
5S7707	Rivet: .122 x 5/32; stl; nkl pl (spring tube shield, output transformer and variable capacitor & bracket assembly mtg)
3S2294	Screw, machine: 6-32 x 1/2 plain hex head; locking type; stl; cad pl (gang mtg)
3S7477	Screw, machine: 8-32 x 1/4 plain hex head; stl; cad pl (loop back mtg).....
3S2695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; stl; cad pl (coils and pointer bracket mtg)
3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (speaker mtg)
3S3398	Screw, sheet metal: #6 x 3/8 PKZ plain hex head; stl; cad pl (loop bracket & insulator mtg)
3S7148	Setcrew: 6-32 x 1/8; Allen head; stl; cad pl (pointer pulley assembly retainer)
47K600506	Shaft, pointer: brass
47K600928	Shaft, tuning
26A481521	Shield, spring (for 12AT6 tube).....
9A472534	Socket, tube: 7-prong
9K580218	Socket, tube: 8-prong
41A73996	Spring, tension (electrolytic mtg)....
41A14111	Spring, tension (dial cord -long).....
41A21332	Spring, tension (dial cord -short)....
4K692188	Washer, "C" (pointer shaft retainer)..
4A73639	Washer, "C" (tuning shaft retainer)...
4B7633	Washer, flat: 9/16 x 1 1/4 x .033 thick, stl; cad pl (loop back mtg).....
4K482859	Washer, insulated shoulder (loop bracket & insulator mtg)

CABINET PARTS

13C600935	Bezel, dial (5X21U)
13K600936	Bezel, dial (5X22U)
13K600937	Bezel, dial (5X23U)
16B600187	Cabinet, table model: molded; walnut-mahogany finish (5X21U)
16K600191	Cabinet, table model: molded; ivory finish (5X22U)
16K600189	Cabinet, table model: molded; ebony finish (5X23U)
13B600573	Grille, cabinet (5X21U and 5X22U)
13K600575	Grille, cabinet (5X23U)
36K482767	Knob, band control (5X21U)
36K482788	Knob, band control (5X22U)
36K600939	Knob, band control (5X23U)
36K600570	Knob, pointer retainer (5X21U)
36K600571	Knob, pointer retainer (5X22U)
36K600572	Knob, pointer retainer (5X23U)
36K690668	Knob, tuning control (5X21U)
36K690669	Knob, tuning control (5X22U)
36K600943	Knob, tuning control (5X23U)
36K690664	Knob, volume and on-off control (5X21U)
36K690665	Knob, volume and on-off control (5X22U)
36K600945	Knob, volume and on-off control (5X23U)
38A25507	Plug, split (loop back mtg to cabinet)
52A600451	Pointer, dial (5X21U and 5X22U)
52K600453	Pointer, dial (5X23U)
3S3371	Screw, machine: 8-32 x 3/8 PKZ plain hex head; stl; cad pl (chassis mtg to cabinet)
70C600814	Support, cabinet (5X21U and 5X22U)...
7X600816	Support, cabinet (5X23U)



VOLTAGE READINGS SHOWN WERE MEASURED FROM POINTS INDICATED TO B- WITH A VTVM. NO SIGNAL WAS TUNED IN. INPUT VOLTAGE WAS 117 V. AC. VOLTAGE TOLERANCE, $\pm 10\%$.

FIGURE 3. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR

MODELS 5X21U, 5X22U,
5X23U, Ch. HS-259

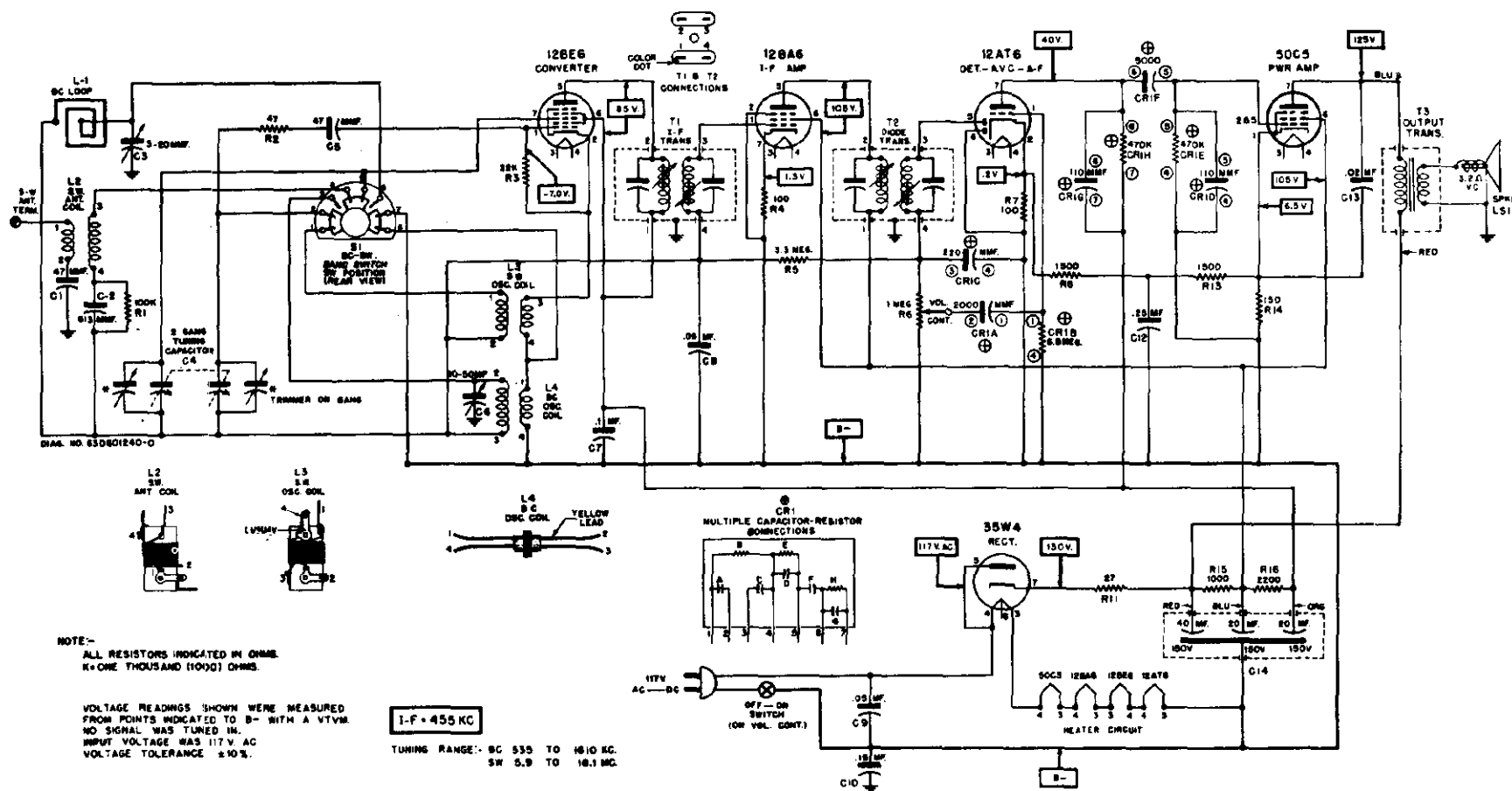


FIGURE 4. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR-RESISTOR

MODELS 6F11, 6F11B,
Ch. HS-264

GENERAL INFORMATION

TYPE - AM Radio-Phonograph Combination

RECEIVER MODELS -

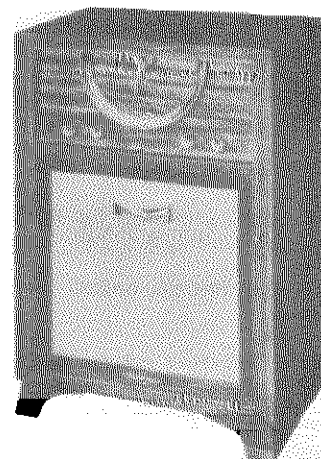
Model	Color
6F11	Red-brown mahogany
6F11B	Blonde

TUBE COMPLEMENT -

TUNING RANGE - 535 to 1620 Kc

IF FREQUENCY - 455 Kc

6BA6	RF Amplifier
6BE6	Converter
6BA6	IF Amplifier
6AV6	Detector & 1st Audio Amp
6K6GT	Power Amplifier
5Y3GT	Rectifier

POWER SUPPLY - 117 volts, 60 cycle AC only; 80 watts,
including phono motorPHONOGRAPH - Model RC-37, three-speed: 33, 45 & 78
RPM. Refer to the RC-37 Service Manual
for record changer service information.

INSTALLATION & OPERATING INSTRUCTIONS

ANTENNA

No outside antenna or ground is normally required for radio reception, as a loop antenna is located inside the cabinet. Two wires from the chassis connect to the loop.

In locations where additional pick-up is desired, an external antenna may be connected to the clip marked "EXT BC ANT" on the loop.

CONTROLS

Refer to Figure 1 for the locations of the radio operating controls.

Power for both the radio and the record changer is controlled by the VOL-ON-OFF knob. The phonograph motor will not operate, however, until the PHONO-RADIO knob is rotated to "PHONO".

FIGURE 1. OPERATING CONTROLS
SERVICE NOTES

TO REMOVE CHASSIS FROM CABINET:

1. Remove the screws from the cabinet back.
2. Disconnect the phono power lead, the phono pick-up lead, the speaker leads, the line cord, and the antenna loop leads.
3. Remove the pointer escutcheon by pulling it downward.
4. Turn the tuning knob counterclockwise until the pointer reaches the extreme low frequency end of the dial scale.
5. From the back of the cabinet, loosen the pointer adjustment setscrew (see Figure 2), and pull the pointer and shaft assembly from the chassis. CAUTION: Do not remove the nut from the front of the pointer, as the detent ball and spring will fall out and may become lost.
6. Pull off the control knobs.
7. Remove the three chassis mounting screws, from

beneath the chassis.

8. Slide the chassis from the cabinet.

TO CALIBRATE DIAL:

1. Turn the tuning knob counterclockwise until the end of its travel is reached.
2. From the back of the cabinet, loosen the pointer adjustment setscrew (see Figure 2). CAUTION: Do not remove the nut from the front of the pointer.
3. Move the pointer until it is in a horizontal position (at the low frequency end of the dial scale).
4. Tighten the adjustment setscrew.

NOTE: If the pointer is moved by hand accidentally, it will be released from a detent in the pointer collar, and no damage to the tuning mechanism will result. To reset the pointer, move it back and forth until it again engages in the detent.

MODELS 6F11, 6F11B,
Ch. HS-264

ALIGNMENT

1. Connect a low range output meter across the speaker voice coil.
2. Connect an AM signal generator as in chart below.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Rotate the PHONO-RADIO switch to the "RADIO" position.
5. Turn the receiver volume control to maximum.
6. Use a small fibre screwdriver for aligning the IF and diode transformers.
7. As stages are brought into alignment, reduce the signal generator output to a level which produces less than 1.27 volts (.5 watt) across the voice coil, to avoid overloading the receiver.
8. See Figure 3 for adjustment locations, and the following chart for procedure.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv V-2 (pin 7, 6BE6)	455 Kc	Fully opened	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv V-2 (pin 7, 6BE6)	1620 Kc	Fully opened	5 (Osc)	Adjust for maximum. *
3.	-	-	-	-	-	Connect BC loop to chassis.
4.	-	Across radiation loop**	1400 Kc	Tune in signal	8 (Ant)	Adjust for maximum.

5. If, after the receiver has been aligned as above, it is found to be badly off calibration, it will be necessary to adjust oscillator core (7) as follows: connect the generator to the grid of the converter tube and, with the gang fully closed, adjust core (7) at 535 kc. It is advisable to repeat the oscillator adjustments at 1620 kc and 535 kc several times until the tuning range is correct. Core (7) has been pre-set at the factory and normally should require no retuning.

* If difficulty is encountered in tuning trimmer (5), adjust trimmer (6) to 1/2 turn from tight.

**Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

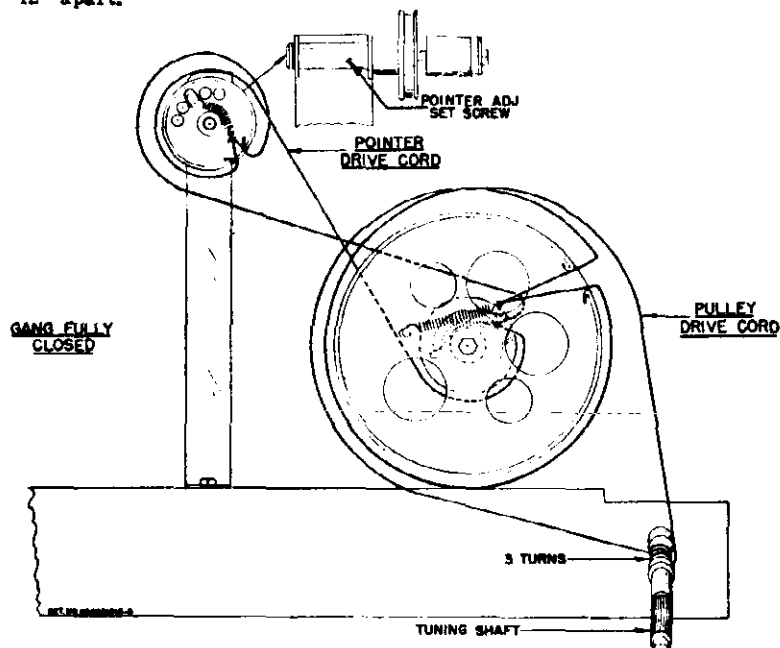
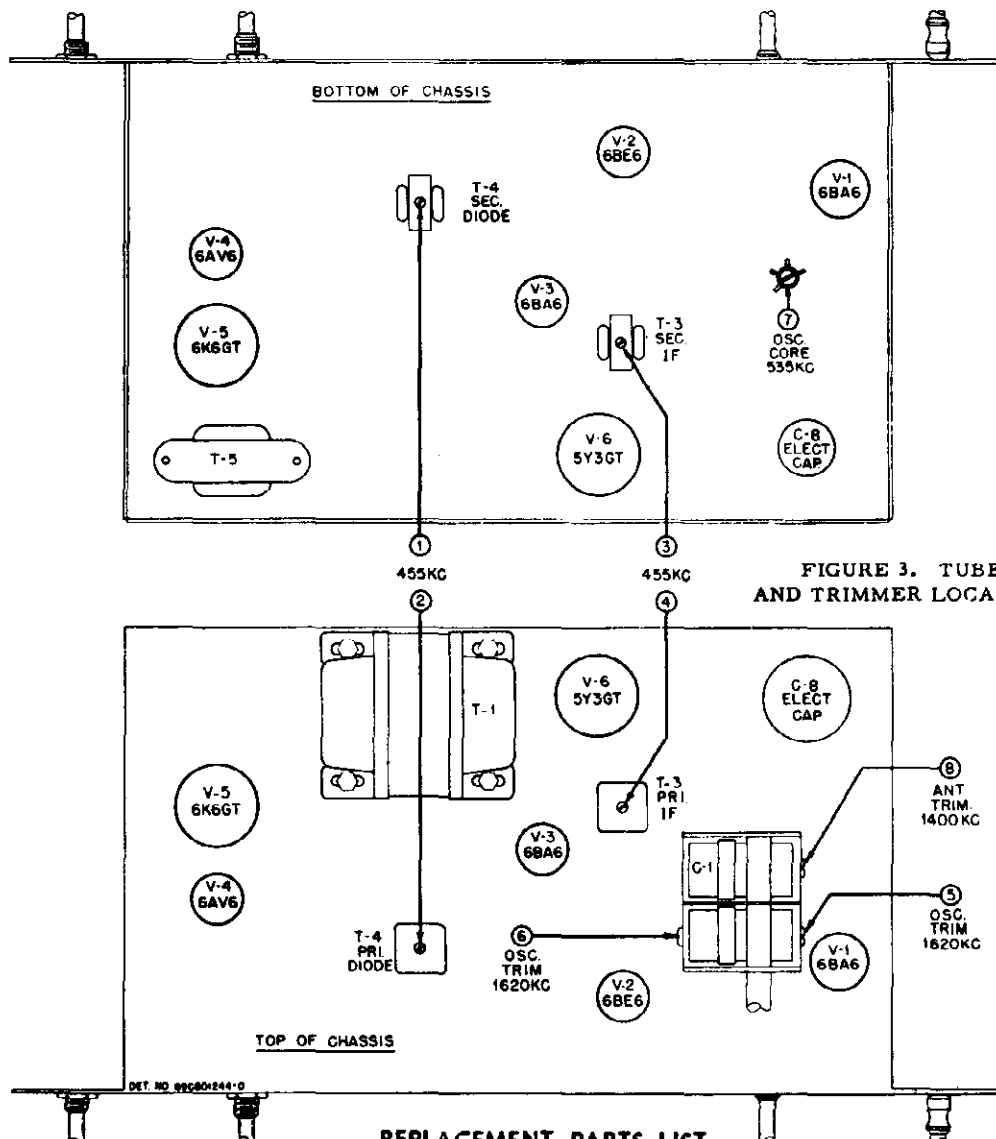


FIGURE 2.
DIAL RESTRAINING DETAIL

MODELS OF11, OF11B,
Ch. RS-264FIGURE 3. TUBE
AND TRIMMER LOCATIONS

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part No.	Description
----------	----------	-------------

CHASSIS PARTS - ELECTRICAL

Capacitors

C-1	19B691877	Variable: 2- gang.....
C-2	21B77286	Ceramic: 100 mmf 500V.....
C-3	8R9816	Paper: .05 mf 400V.....
C-4	21K482726	Ceramic, disc type: 10,000 mmf 450V.....
C-5	21B77286	Ceramic: 100 mmf 500V.....
C-6	21K77373	Ceramic: 47 mmf 500V.....
C-7	21K482726	Ceramic; disc type: 10,000 mmf 450V.....
C-8	23B690975	Electrolytic: 40 mf/300V, 40-40 mf/250V, 40 mf/25V.....
C-9	21K482726	Ceramic; disc type: 10,000 mmf 450V.....
C-10	21K482726	Ceramic, disc type: 10,000 mmf 450V.....
C-11	8R9809	Paper: .01 mf 400V.....
C-12	8R9813	Paper: .005 mf 600V.....

C-13	8R9809	Paper: .01 mf 400V.....
C-14	8R9813	Paper: .005 mf 600V.....
C-15	8R9813	Paper: .005 mf 600V.....
C-16	8R490232	Tubular, molded: .047 mf 400V....
C-17	21B77286	Ceramic: 100 mmf 500V.....
C-18	8R9847	Paper: .002 mf 600V.....

Pilot Light

I-1,2	65X10867	Bulb, pilot light: #44; 6-8V; .25 amp; clear; bayonet base....
-------	----------	--

Coils

L-1	24C690896	Loop Antenna.....
-----	-----------	-------------------

Speaker

LS-1	50C601038	Speaker: 8" PM; 3.2 ohm V.C...
------	-----------	--------------------------------

Resistors

NOTE: All resistors are insulated, carbon type unless otherwise specified.

PAGE 21-88 MOTOROLA

MODELS 6F11, 6F11B,
Ch. HS-264

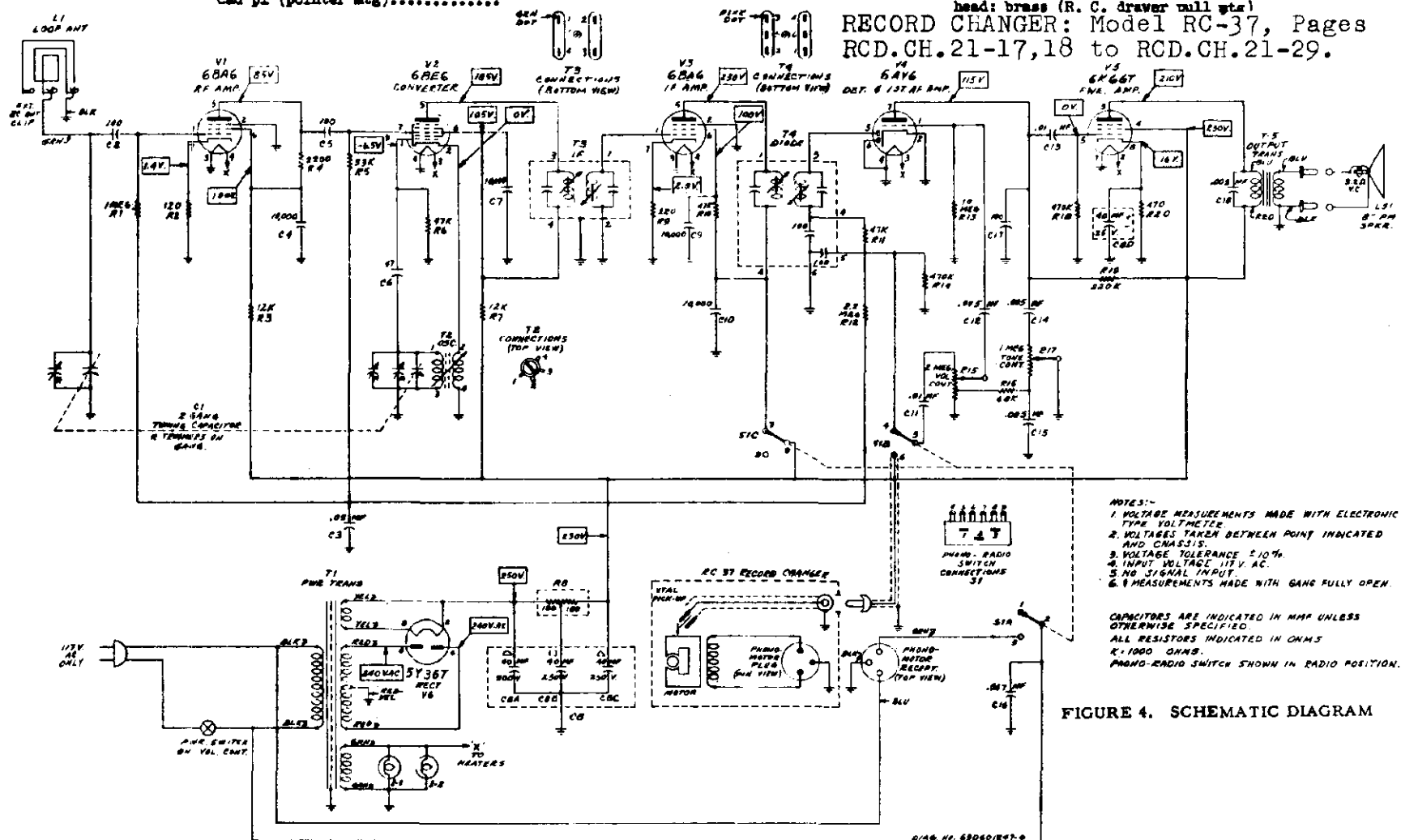
Ref. No.	Part No.	Description	Part No.	Description
R-1	6R6004	1 meg 20% 1/2W.....	382695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (holds gang mtg brkt).....
R-2	6R5551	120 10% 1/2W.....	387506	Screw, sheet metal: #6 x 1/4 PKZ plain hex head; cad pl (holds pointer mtg brkt).....
R-3	6R5766	12,000 10% 2W.....	387454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; cad pl (pilot light brkt mtg).....
R-4	6R6069	2200 10% 1/2W.....	387475	Screw, sheet metal: #8 x 1/4 PKZ slotted acron head; cad pl (power trans mtg).....
R-5	6R6012	33,000 20% 1/2W.....	387103	Set screw: 8-32 x 1/8 allen head; cad pl (pointer mtg).....
R-6	6R6056	47,000 20% 1/2W.....	1K601085	Shaft and Pulleys Assembly, pointer mtg.
R-7	6R5766	12,000 10% 2W.....	1X600489	Shaft, tuning: complete with pulley....
R-8	17A690973	Wire wound: 360 10% 3W; centic tapped.....	15A690616	Shell, receptacle (on phono motor receptacle).....
R-9	6R6270	220 10% 1/2W.....	9K600968	Socket, pilot light.....
R-10	6R6056	47,000 20% 1/2W.....	9K484167	Socket, tube: miniature; 7-prong.....
R-11	6R6056	47,000 20% 1/2W.....	9A76209	Socket, tube: octal.....
R-12	6R3927	2.2 meg 20% 1/2W.....	41A14244	Spring, tension (pointer drive cord).
R-13	6R2109	10 meg 20% 1/2W.....	31K37494	Strip, terminal: 4 insulated lugs, #3 gnd; 3/8" spacing.....
R-14	6R6032	470,000 20% 1/2W.....	31K90046	Strip, terminal: 5 insulated lugs, #4 gnd; 3/8" spacing.....
R-15	18A600974	Volume control: 2 meg; tapped at 600,000 ohms; includes ON-OFF switch.....	29K5405	Terminal pin (on speaker leads).....
R-16	6R6074	68,000 10% 1/2W.....	4A70015	Washer, "C" (tuning shaft mtg).....
R-17	18K77399	Tone Control: 1 meg.....	4A21941	Washer, "C" (holds pointer mtg shaft & pulley).....
R-18	6R6032	470,000 20% 1/2W.....	487555	Washer, flat: 1/4 x .128 x .033 stl; cad pl (output trans mtg).....
R-19	6R6015	220,000 20% 1/2W.....	487582	Washer, flat: 1/2 x .195 x .033 stl; cad pl (pointer & gang drive pulleys mtg).....
R-20	6R5593	470 10% 1W.....	4A691006	Washer, flat: double "D" (pointer & gang drive pulleys mtg).....
Switches			MODEL 6F11 CABINET PARTS	
S-1	40B601065	Switch, PHONO-RADIO.....	43A4326	Ball, steel: 1/8" dia (pointer detent)
Transformers			38K591915	Button, plug (on record changer).....
T-1	25B600684	Power Transformer.....	16F600649	Cabinet, console: red-brown mahogany; complete less pointer escutcheon and dial scale.....
T-2	24K691878	Oscillator Transformer: white & red dot.....	13K600651	Cloth, grille: 17 1/2" x 18 1/4"; mahogany.....
T-3	24B485553	IF Transformer (green dot); 455 Kc; complete with capacitors, cores, and shield.....	15C600874	Cover, cabinet back.....
T-4	24K485555	Diode Transformer (pink dot); 455 Kc; complete with capacitors, cores, and shield.....	34K601066	Dial scale.....
T-5	25B600969	Audio Output Transformer.....	34K600817	Escutcheon, pointer.....
CHASSIS PARTS - MECHANICAL			587870	Eyelet: brass (on R. C. drawer panel-holds extra spindle).....
7C690567	Bracket, gang mtg.....		5A71081	Eyelet, chassis mtg: plain; 9/32" long.....
7A600965	Bracket, pilot light mtg.....		5A600963	Eyelet, chassis mtg: pierced; 1/8" long.....
7B600801	Bracket, pointer mtg.....		5A71092	Grommet, chassis mtg: rubber.....
7A77337	Bracket, tuning shaft.....		36K601052	Knob, control (VOL-ON-OFF): walnut-mahogany.....
43A890397	Bushing, tire cord strain relief (use with 43K890398).....		36K601053	Knob, control (PHONO-RADIO): walnut-mahogany.....
43K890398	Bushing, tire and retainer (use with 43A890397).....		36K601054	Knob, control (TONE): walnut-mahogany.
42A485548	Clip, coil can mtg (IF transformers).		36K601055	Knob, control (TUNING) walnut-mahogany
11K8944	Cord, dial (pointer drive).....		487657	Lockwasher ext: #8; cad pl (sprk mtg).....
30K21859	Cord, line: with plug; 9 ft long.....		287005	Nut, hex: 6-32 x 1/4 stl; cad pl (pointer mtg).....
15A600877	Cover, volume control: with insulator		287003	Nut, hex: 8-32 x 5/16; cad pl (sprk mtg)
1X600495	Lead and Plug Assembly, phono pick-up.		62K70581	Overlay, logotype: "Motorola"; gold lacquer finish.....
489751	Lockwasher int-ext: #8; cad pl pointer & gang drive pulleys mtg).. Nut, hex palmnut: 3/8-32 x 9/16; cad pl (control mtg).....		1X600851	Pointer and Collar Assembly (less shaft and sleeve).....
287051	Plug, phono pick-up.....		55K600653	Pull, record changer drawer: satin brass
28K71775	Pulley, gang drive: 3 1/2" diameter.....		3K600655	Screw, machine: 8-32 x 1/2 cross slot head; statuary bronze finish (R.C. drawer pull mtg).....
49A690559	Pulley, pointer drive: 1 1/4" diameter..		387536	Screw, sheet metal: #6 x 3/8 PKA slotted acron head; antique copper finish (back cover mtg).....
49A690558	Receptacle, phono motor: 3 prong; includes shell.....			
9A600040	Rivet: .088 x 3/16 stl; nkl pl (min socket mtg).....			
587772	Rivet: .122 x 5/32 stl; nkl pl (term strip mtg).....			
587707	Rivet: .122 x 3/16 stl; nkl pl (output trans mtg).....			
587701	Rivet: .122 x 1/4 stl; nkl pl (octal socket mtg).....			
587700	Rivet: .122 x 1/4 stl; nkl pl (octal socket mtg).....			
387326	Screw, machine: 8-32 x 3/16 plain locking hex head; cad pl (gang mtg).. Screw, machine: 8-32 x 1/4 plain hex head; cad pl (pointer & gang drive pulleys mtg).....			
387163				

- 3K653 Screw, speaker mtg: 8-32 x 1 1/4" copper oxide finish.....
 1A690738 Shaft and Sleeve Assembly, pointer: less detent spring and ball, and pointer....
 55K600654 Slide, record changer (on sides of R. C. drawer).....
 28400199 Speed nut: for .050 stud (dial scale mtg).....
 41A690732 Spring, compression (pointer detent)..
 481765 Washer, flat: 1/2 x .147 x .015 stl; cad pl (pointer mtg).....

MODEL 6F11B CABINET PARTS - Same as 6F11 except:

- 16K600650 Cabinet, console: blonde; complete, less pointer excutcheon and dial scale.....
 13K600652 Cloth, grille: 17 1/2" x 18 1/4"; egg shell.....
 36K601058 Knob, control (VOL-ON-OFF): tan.....
 36K601059 Knob, control (PHONO-RADIO): tan.....
 36K601061 Knob, control (TONE): tan.....
 36K601062 Knob, control (TUNING): tan.....
 3K600656 Screw, machine: 8-32 x 1/2 cross slot head: brass (R. C. drawer pull mtg)

RECORD CHANGER: Model RC-37, Pages RCD.CH.21-17,18 to RCD.CH.21-29.



- NOTES:-
 1. VOLTAGE MEASUREMENTS MADE WITH ELECTRONIC TYPE VOLTMETER.
 2. VOLTAGES TAKEN BETWEEN POINT INDICATED AND CHASSIS.
 3. VOLTAGE TOLERANCE $\pm 10\%$.
 4. INPUT VOLTAGE 117 V. AC.
 5. NO SIGNAL INPUT.
 6. MEASUREMENTS MADE WITH GANG FULLY OPEN.

CAPACITORS ARE INDICATED IN MUF UNLESS OTHERWISE SPECIFIED.
 ALL RESISTORS INDICATED IN OHMS
 K=1000 OHMS.
 PHONO-RADIO SWITCH SHOWN IN RADIO POSITION.

FIGURE 4. SCHEMATIC DIAGRAM

MODELS 6L1, 6L2,
Ch. HS-226

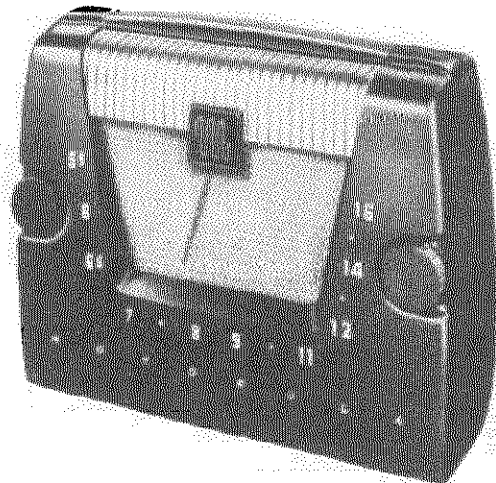
GENERAL INFORMATION

TYPE - Five-tube, three-power (AC/DC, Battery) portable, with a selenium rectifier. A loop antenna is housed in the back cover.

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT - 1U4 - RF Amplifier
1R5 - Converter
1U4 - IF Amplifier
1U5 - Det, AVC & 1st AF Amp
3V4 - Power Amplifier
Rectifier - Selenium type

POWER SUPPLY - Operates from 117 volts AC or DC (15 watts), or self-contained battery pack. Use an Eveready #753 or a General #60A-6F6-5 battery pack.



OPERATING INSTRUCTIONS

CONTROLS. The volume control and power switch are combined and are operated with the left-hand knob. Select stations with the right-hand knob.

TO OPEN BACK COVER. Insert a coin or similar object into the slots on either side of the cabinet, and twist until the two sections of the cabinet separate. To close, merely snap together.

CAUTION: When closing the cover, be careful not to pinch the line cord or other leads.

HOUSE CURRENT OPERATION. The power cord is located inside the cabinet and can be reached by opening the back cover. Pass the cord through the slot in the side of the cabinet before closing the cover. Insert the power plug into any 117 volt AC or DC outlet. If the receiver does not operate from DC power, reverse the line cord plug in the power outlet.

BATTERY OPERATION. Open the back cover and install the battery pack, following the instructions in Figure 1. Insert the line cord plug into the receptacle on the receiver chassis or the receiver will not operate from its battery. If the receiver is to be operated for a long period of time from AC or DC, or is to be placed in storage, remove the battery and store it in a cool place. Replace the battery when low volume or fuzzy tone is noticed. The condition of the battery will not affect

the operation of the receiver from AC or DC. Never leave a low or run-down battery in the receiver because it will leak or swell and damage the receiver.

ANTENNA. A loop antenna is built into the rear cover of this receiver. Because of the slightly directional characteristics of the loop antenna, reception from some stations may be improved by rotating the receiver. In extremely noisy locations, rotate the entire receiver until minimum noise and maximum signal pickup are obtained.

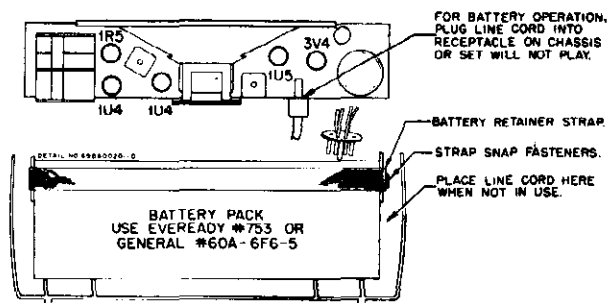


FIGURE 1. BATTERY & TUBE LOCATIONS

ALIGNMENT

NOTE: The receiver may be operated either from a battery or from the commercial power lines during alignment. If AC power is used, it is recommended that an isolation transformer be placed between the power line and the receiver. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

PROCEDURE:-

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator input to keep the output of the receiver at approximately .05 watts (.05 watt = .40 volts on the output meter) to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

MODELS 6L1, 6L2,
Ch. HS-226

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT 1.	.1 mf	Grid of conv. (pin 6, 1R5)	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT 2.	-	-	-	Fully closed	Pointer	Set pointer as shown in Figure 3.
3.	.1 mf	Grid of RF Amp (pin 6, 1U4)	1620 Kc	Fully open	5	Adjust for maximum
4.	.1 mf	"	1400 Kc	Tune for maximum	6	Adjust for maximum
5.	-	Radiation loop*	"	"	7	With chassis installed in cabinet and output meter connected to speaker, open rear cover slightly and adjust for maximum. NOTE: Battery pack should be in cabinet.

*Connect generator output across 5" diameter, 5-turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

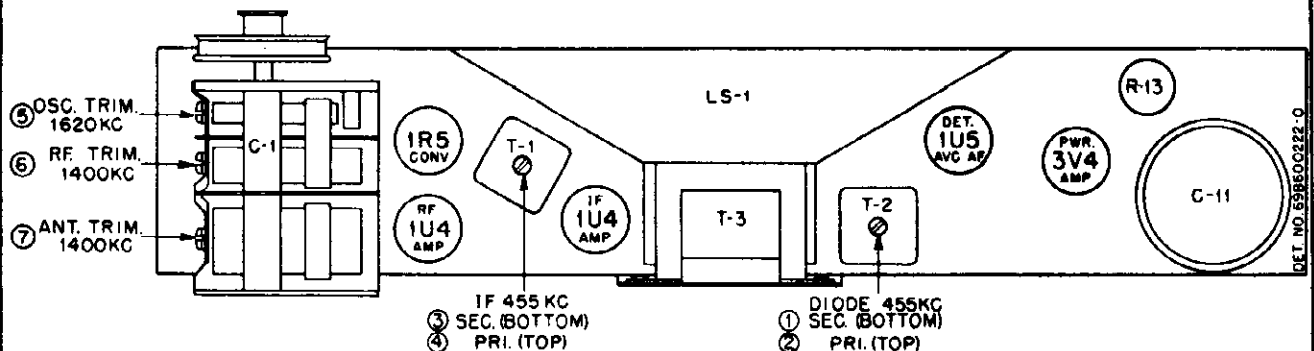


FIGURE 2. TUBE & TRIMMER LOCATIONS

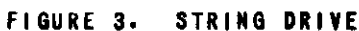
SERVICE NOTES

The chassis of this receiver is isolated from the AC power line circuit by a capacitor to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

The tubes are exposed when the rear cover is opened. It is not necessary to remove the chassis to replace tubes.

To remove the chassis from the cabinet:

1. Open the rear cover and remove the battery pack.
2. Disconnect the two leads from the chassis to the loop antenna.
3. Pull off the two control knobs on the front of the cabinet.
4. Remove the two hex head screws located under the knobs.
5. Slide the chassis out of the cabinet.



REF. NO.	PART NO.	DESCRIPTION
-------------	----------	-------------

CAPACITORS

RECTIFIER

COILS

REF. NO.	PART NO.	DESCRIPTION
-------------	----------	-------------

SPEAKER

RESISTORS

R-1	6R3927	2.2 meg	20%	1/2W	.....
R-2	6R3988	5.6 meg	10%	1/2W	.....
R-3	6R2118	3.3 meg	20%	1/2W	.....
R-4	6R3927	2.2 meg	20%	1/2W	.....
R-5	6R6301	1000	20%	1/2W	.....
R-6	6R6075	100,000	20%	1/2W	.....
R-7	6R6012	33,000	20%	1/2W	.....
R-8	6R5585	8.2 meg	10%	1/2W	.....
R-9	6R6004	1 meg	20%	1/2W	.....
R-10	17A76986	Wire wound: 150	10%	2-1/2W...	
R-11	18K480039	Volume control: 1 meg;		with sw.	
R-12	6R2109	10 meg	20%	1/2W	.....
R-13	17B692047	Wire wound: 2000;		center-tapped	
R-14	6R6269	820	10%	1/2W	.....
R-15	6R2118	3.3 meg	20%	1/2W	.....
R-16	6R6004	1 meg	20%	1/2W	.....
R-17	6R2118	3.3 meg	20%	1/2W	.....
R-18	6R3933	220	20%	1/2W	.....
R-19	6R3949	470	10%	1/2W	.....
R-20	6R6010	330	20%	1/2W	.....

MODELS 6L1, 6L2,
Ch. HS-226

SWITCHES

S-1 40A27114 Slider Switch: 3PDT
S-2 - Power Switch: on volume control.

PART
NUMBER

DESCRIPTION

TRANSFORMERS

T-1,2 24K600013 IF & Diode Transformer, 455 Kc:
includes capacitors; less shield
T-3 25B692076 Output Transformer

47A692106
9A690129
41A14244
35K692125
31K692075

Shaft, tuning
Socket, tube: miniature; 7-prong .
Spring, tension (dial drive)
Strap, battery: with button
Strip, terminal: 1 insulated lug; end mtg;
3/8" spacing
Stud, chassis mtg (on front of
chassis)
Washer, 'C' (on tuning shaft)...
Washer, flat: 9/32 x .120 x .025; brass
(battery strap mtg)
Washer, flat: 3/8 x .144 x .032;
brass (spkr baffle mtg)
Washer, flat: 5/8 x .390 x .020 brass
(vol cont mtg)
Washer, spring (on tuning shaft).

PART
NUMBER

DESCRIPTION

CHASSIS PARTS - MECHANICAL

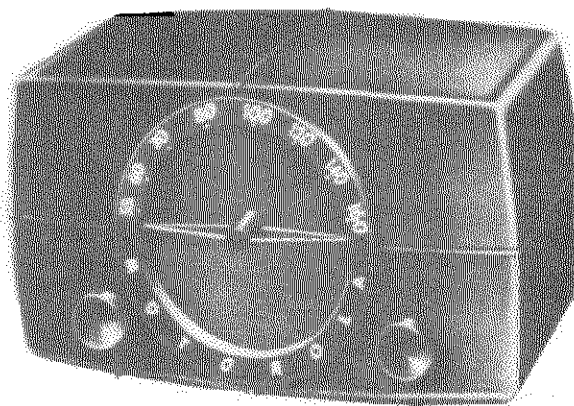
16K692102 Baffle, speaker: includes cloth
1X692121 Bottom Cover Assembly: includes brackets
& battery strap
43A692012 Bushing, line cord strain relief (use
with 43K692013)
1X692118 Cable Assembly, battery: includes 9-
pin plug
42A485548 Clip, coil can mtg (IF coils) ...
11M8944 Cord, dial: 18#; black
30K692049 Cord, line: with plug; 6 ft long
5A19658 Eyelet, spacer (gang mtg)
5A70404 Grommet, rubber (gang mtg)
9A22056 Insulator, electrolytic mtg
4S7666 Lockwasher, external: #6; cad pl.
4S7650 Lockwasher, internal: #6; cad pl.
29R3013 Lug, soldering (on gang mtg screw).
29R5235 Lug, soldering: #6 (on battery strap
bracket)
2S7005 Nut, hex: 6-32 x 1/4 stl; cad pl
(selenium rectifier mtg).....
2S7051 Nut, hex (Palnut): 3/8-32 x 9/16;
cad pl (vol cont mtg)
29K5401 Pin, loop lead
64A692072 Plate, output trans mtg
28K77272 Plug, 9-pin (on battery cable)....
52A692091 Pointer, dial: red
49A21741 Pulley, cord
49A692078 Pulley, pointer drive
1A692119 Pulley Assembly (on gang)
1X692120 Pulley and Plate Assembly: pointer
drive; includes mtg plate and 3
pullies
43K692013 Retainer, strain relief bushing (use
with 43A692012)
5S7771 Rivet: .088 x 3/16 stl; nkl pl (tube
socket mtg)
5S7707 Rivet: .122 x 5/32 stl; nkl pl (ter-
minal strip & output trans mtg).
5S7701 Rivet: .122 x 3/16; stl; nkl pl
(electrolytic insulator mtg) ...
5K74560 Rivet, shoulder (drive cord pulley
mtg)
5A692104 Rivet, shoulder (pointer drive pulley
mtg)
3S7350 Screw, machine: 6-32 x 1/4 slotted
hex head lockscrew; cad pl (spkr
mtg)
3S490354 Screw, machine: 6-32 x 5/8 slotted
hex head; cad pl (gang mtg)
3S2977 Screw, machine: 6-32x1-1/8 pl-hex hd;
stl; cad pl (rec mtg).....
3S2695 Screw, sheet metal: #6 x 3/16 PKZ
plain hex head; cad pl (switch
mtg)
3S7506 Screw, sheet metal: #6 x 1/4 PKZplain
hex head; cad pl (R-13 & T-3
mtg)
3S9700 Setscrew: 6-32 x 3/16 Allen head; cad
pl (gang pulley mtg)

CABINET PARTS

16E691796 Cabinet, front section: green plastic;
less grille, handle and hardware (6L1)
16K600109 Cabinet, front section: brown plastic;
less grille, handle and hardware (6L2)
16D691797 Cabinet, rear section: green plastic;
less antenna loop and hardware (6L1).
16K600110 Cabinet, rear section: brown plastic;
less antenna loop and hardware (6L2).
35A692073 Channel, rubber (inside cabinet front)
42K891863 Clip, cabinet locking (inside cabinet
front)
42A480078 Clip, cabinet locking (inside cabinet
back)
42A600010 Clip, retainer (speaker grille).....
55A692127 Cover, handle mtg (over ends of carry-
ing handle)
13B691958 Grille, speaker: plastic
55A691943 Handle, carrying: black plastic; less
spring (6L1)
55K600111 Handle, carrying: brown plastic; less
spring (6L2)
4A600096 Insulator: fibre (on carrying
handle)
36B691956 Knob, control: green plastic (6L1) ..
36K600112 Knob, control: brown plastic (6L2) ..
13K691929 Medallion (on front of cabinet)
64A692129 Plate, handle mtg: cad pl (under ends
of carrying handle)
64A691941 Plate, medallion (under medallion)...
3S2949 Screw, machine: 6-32 x 5/16 plain hex
head; cad pl (handle mtg).....
3S476083 Screw, machine: 6-32 x 5/16 slotted
locking hex head; cad pl (chassis
mtg)
3S488008 Screw, sheet metal: #4 x 1/4 Phillips
round head; cad pl (cabinet locking
clip mtg)
2S490840 Speednut: for 1/16" stud (medallion
mtg)
2S476112 Speednut: for .156" stud (spkr grille
and ant loop mtg)
41A692126 Spring, handle (inside carrying handle)
41A691939 Spring, hinge (on bottom of cabi-
net)
4K780040 Washer, felt (under knobs)
4S7610 Washer, flat: 3/8 x 5/32 x .015 stl;
cad pl (chassis mtg)
4S490841 Washer, flat: 3/4 x .156 x .032;
pl (handle mtg)



MODELS 6X11U,
6X12U, Ch. HS-245



GENERAL INFORMATION

TYPE - AC-DC operated table model superheterodyne receiver with loop antenna.

RECEIVER MODELS -

Model	Color
6X11U	Walnut
6X12U	Ivory

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT - 12BA6 - RF Amplifier
12BE6 - Converter
12BA6 - IF Amplifier
12AT6 - Det, AVC & 1st AF Amp
35C5 - Power Amplifier
35W4 - Rectifier

POWER SUPPLY - 117 volts AC or DC, 35 watts

INSTALLATION & OPERATING INSTRUCTIONS

POWER SWITCH AND VOLUME CONTROL. Operated with left-hand knob. NOTE: Reverse line plug in electrical outlet if radio does not operate from DC. When operating from AC, reversing the line cord plug in wall outlet, may sometimes improve reception.

TUNING. Tune stations with right-hand knob.

ANTENNA. A built-in loop antenna eliminates the need for an outside antenna in most locations. When receiving a weak station, rotate the receiver slightly for best signal strength. If additional pick-up is necessary, connect an external antenna to the radio by following the instructions printed on the rear panel. CAUTION: Never connect the radio chassis to a water pipe, radiator, or other ground.

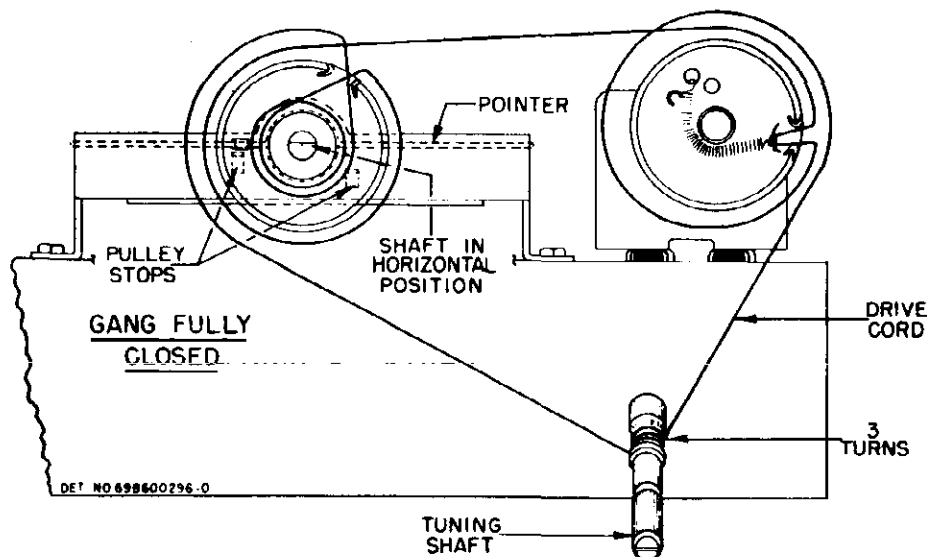


FIGURE 1. STRING DRIVE DETAIL

MODELS 6X11U,
6X12U, Ch. HS-245

SERVICE NOTES*

The chassis of this receiver is isolated from the AC power line circuit by a capacitor to eliminate the shock hazard when handling the receiver. However, as an additional precaution when aligning or servicing the receiver from AC, an isolation transformer should be inserted between the power line and the chassis.

To remove the chassis from the cabinet:

1. Pull off the two radio control knobs.

2. Pull off the pointer.
3. Remove the split plugs which hold the loop to the cabinet.
4. From the back of the cabinet, remove the two hex head screws at the rear edge of the radio chassis.
5. Slide the radio chassis and loop from the cabinet.

ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to B- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Rear stator of tuning capacitor	455 Kc	Fully open	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
WAVETRAPH						
2.	.1 mf	Rear stator of tuning capacitor	455 Kc	Fully open	5 (Wavetrap)	Adjust for minimum.
RF ALIGNMENT						
3.	.1 mf	Rear stator of tuning capacitor	1620 Kc	Fully open	6 (Osc)	Adjust for maximum.
4.	-	Radiation loop*	1400 Kc	Tune for max	7 (Ant)	Adjust for maximum.

*Connect generator output to 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

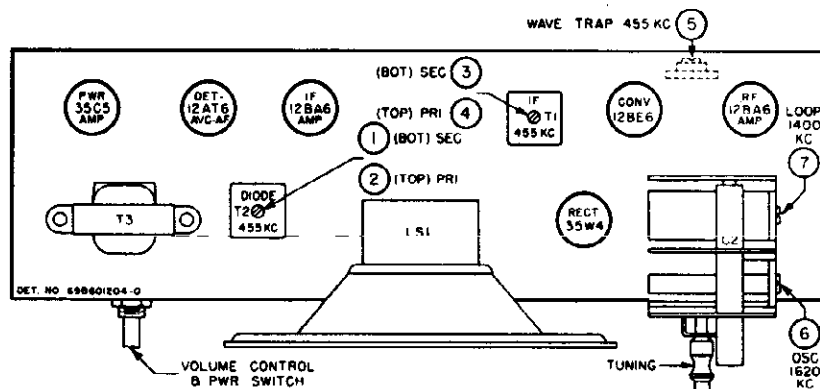
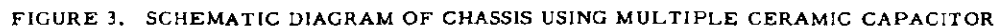
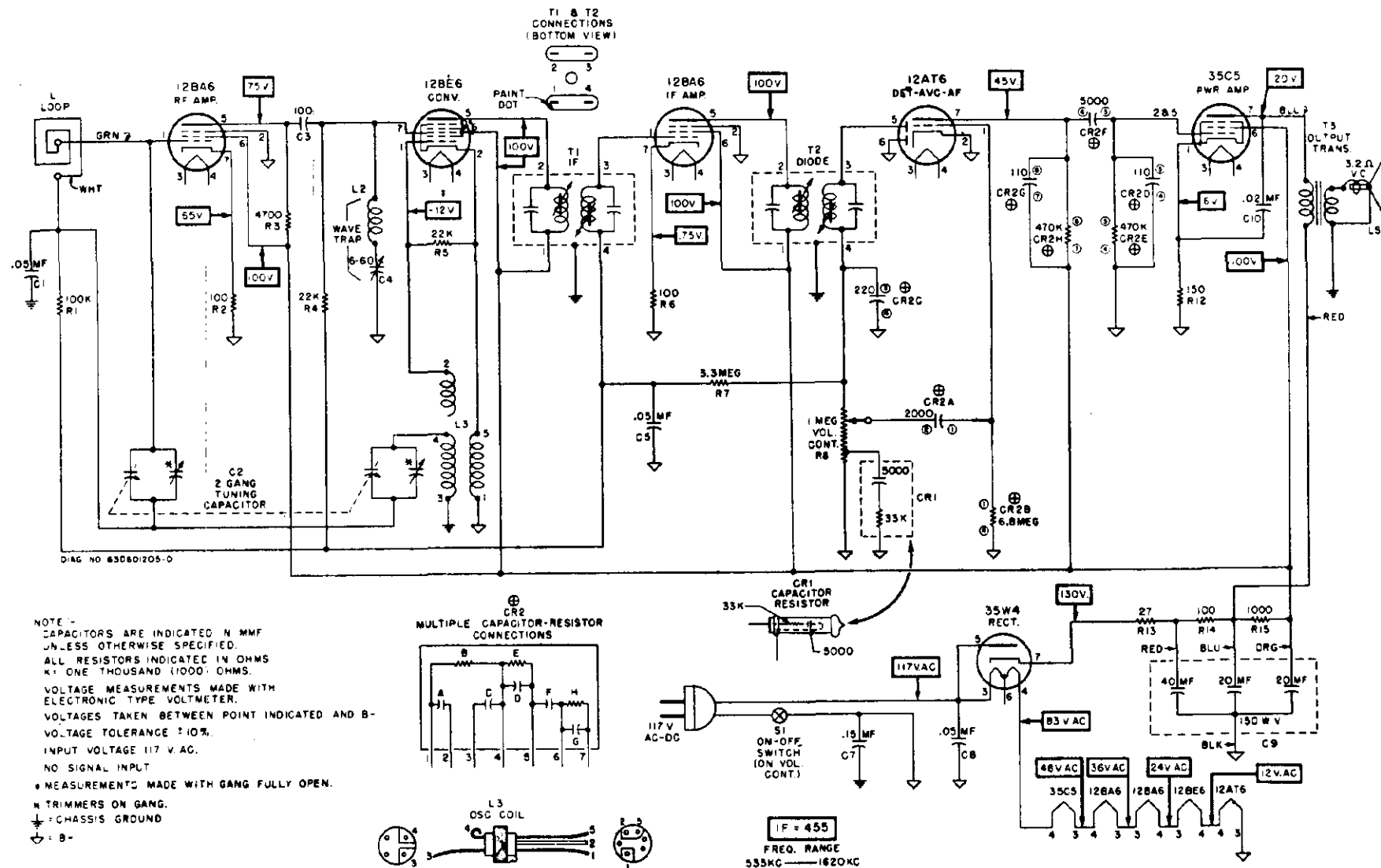


FIGURE 2. TUBE & TRIMMER LOCATIONS



MODELS 6X11U,
6X12U, Ch. HS-245



MODELS 6X11U,
6X12U, Ch. ES-245

REPLACEMENT PARTS LIST

NOTE: When ordering parts specify model number of set in addition to part number and description of part.

Ref. No.	Part Number	Description	Part Number	Description
CHASSIS PARTS - ELECTRICAL			CHASSIS PARTS - MECHANICAL	
<u>Capacitors</u>			26A473002	Base, tube shield mtg
C-1	8R9821	Paper: .05 mf 200V	1X600627	Bracket and Bushing Assembly, pointer shaft
C-2	19B600483	Variable, 2-gang: includes pulley..	7K600579	Bracket, loop mtg
C-3	21R6641	Mica: 100 mmf 500V	7A600476	Bracket, tuning shaft mtg
C-4	20A26941	Mica, variable: 6 mmf-60 mmf; includes bracket	42A485548	Clip, coil can mtg
C-5	8R9821	Paper: .05 mf 200V	42A75825	Clip, electrolytic mtg
C-6	21B482847	Ceramic, multiple: 2000 mmf, 220 mmf, 220 mmf, 5000 mmf	30A470651	Cord, line and plug: 6 ft long
C-7	8R9843	Paper: .15 mf 200V	5A19658	Eyelet, spacer (gang mtg)
C-8	8R9816	Paper: .05 mf 400V	5A70404	Grommet, rubber (gang mtg)
C-9	23K484234	Electrolytic: 40-20-20 mf/150V....	14A482844	Insulator, cord outlet
C-10	8R9802	Paper: .02 mf 400V	29R3010	Lug, soldering
<u>Capacitor-Resistor</u>			287051	Nut, hex: 3/8-32 x 9/16; Palmnut; stl; pl (volume control mtg)
CR-1	21B484227	Capacitor-Resistor: 2 lead; 33,000 ohms, 5000 mmf	1X600590	Pulley and Bushing Assembly, pointer drive
CR-2	21R601007	Capacitor-Resistor: 7 lead; 2000 mmf, 220 mmf, 5000 mmf, 110 mmf, 110 mmf, 6.8 meg, 470,000 ohms, 470,000 ohms	587771	Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg and shield base mtg)...
<u>Coils</u>			587707	Rivet: .125 x 5/32; stl; nkl pl (tuning shaft bracket mtg, output transformer mtg, variable capacitor mtg, electrolytic clip mtg, and tube spring shield mtg)
L-1	24C600539	Loop and Panel Assembly	3S2294	Screw, machine: 6-32 x 1/2; plain hex head; locking type; stl; cad pl (gang mtg)
L-2	24A77336	Wavetrap	3S7477	Screw, machine: 8-32 x 1/4; type #1; plain hex head; stl; cad pl (loop back mtg)
L-3	24K600813	BC Oscillator Coil	3S7316	Screw, machine: 8-32 x 3/8; slotted hex head; locking type; stl; cad pl (speaker mtg)
<u>Speaker</u>			3S2965	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; stl; cad pl (pointer shaft bracket mtg)
LS-1	50K600538	Speaker, FM: 5-1/4"; 3.2 ohm VC.	383398	Screw, sheet metal: #6 x 3/8 PKZ plain hex head; stl; cad pl (loop bracket mtg)
<u>Resistors</u>			3S7148	Set screw: 6-32 x 1/8; Allen head; stl; cad pl (pointer drive pulley & bushing retainer)
Note: All resistors are insulated carbon type unless otherwise specified.			1K600595	Shaft and Pulley Assembly, tuning
R-1	6R6075	100,000 20% 1/2W	47K600509	Shaft, pointer: brass
R-2	6R6018	100 20% 1/2W	26A481521	Shield, spring (for 12B6 tube)
R-3	6R6039	4700 20% 1/2W	26A90301	Shield, tube (for 12A76 tube)
R-4	6R6028	22,000 20% 1/2W	9A472534	Socket, tube: 7-prong
R-5	6R6028	22,000 20% 1/2W	9K580218	Socket, tube: 8-prong
R-6	6R6018	100 20% 1/2W	4K692188	Washer, "C" (tuning shaft retainer and pointer shaft retainer)
R-7	6R2118	3.3 meg 20% 1/2W	4S7614	Washer, flat: 11/16 x 11/64 x .036 thick; stl; cad pl (loop back mtg)
R-8	18K485925	Volume Control: 1 meg	4K682859	Washer, insulated shoulder (loop bracket mtg)
R-9	6R2109	10 meg 20% 1/2W	CABINET PARTS	
R-10	6R6032	470,000 20% 1/2W	16B600169	Cabinet, table model: molded; walnut (6X11U)
R-11	6R6032	470,000 20% 1/2W	16K600175	Cabinet, table model: molded; ivory (6X12U)
R-12	6R3992	150 20% 1/2W	13B600535	Grille, cabinet
R-13	6R5683	27 10% 1/2W	36B600570	Knob, pointer (6X11U)
R-14	6R488025	100 20% 1W	36K600571	Knob, pointer (6X12U)
R-15	6R3953	1000 20% 1W	36B600455	Knob, tuning (6X11U)
<u>Transformers</u>			36K600456	Knob, tuning (6X12U)
T-1,2	24B485553	IF and Diode, 455 Kc: complete; including padding capacitors and tuning cores	38A25507	Plug, split (back mtg)
T-3	25B482858	Output	52A600451	Pointer, dial: brass
			383371	Screw, sheet metal: #8 x 3/8 PKZ plain hex head; stl; cad pl (chassis mtg) ..

MODELS 7F11, 7F11B,
Ch. HS-265

GENERAL INFORMATION

TYPE - AM Radio-Phonograph Combination

RECEIVER MODELS -

Model	Color
7F11	Red-brown mahogany
7F11B	Blonde

TUBE COMPLEMENT -

6BA6	RF Amplifier
6BE6	Converter
6BA6	IF Amplifier
6AV6	Detector & 1st Audio Amp
6V6GT	Power Amplifier
6V6GT	Power Amplifier
7Z4	Rectifier

POWER SUPPLY - 117 volts, 60 cycle AC only; 85 watts including phono motor.

ANTENNA

No outside antenna or ground is normally required for radio reception, as a loop antenna is located inside the cabinet. Two wires from the chassis connect to the loop.

In locations where additional pick-up is desired, an external antenna may be connected to the clip marked "EXT BC ANT" on the loop.

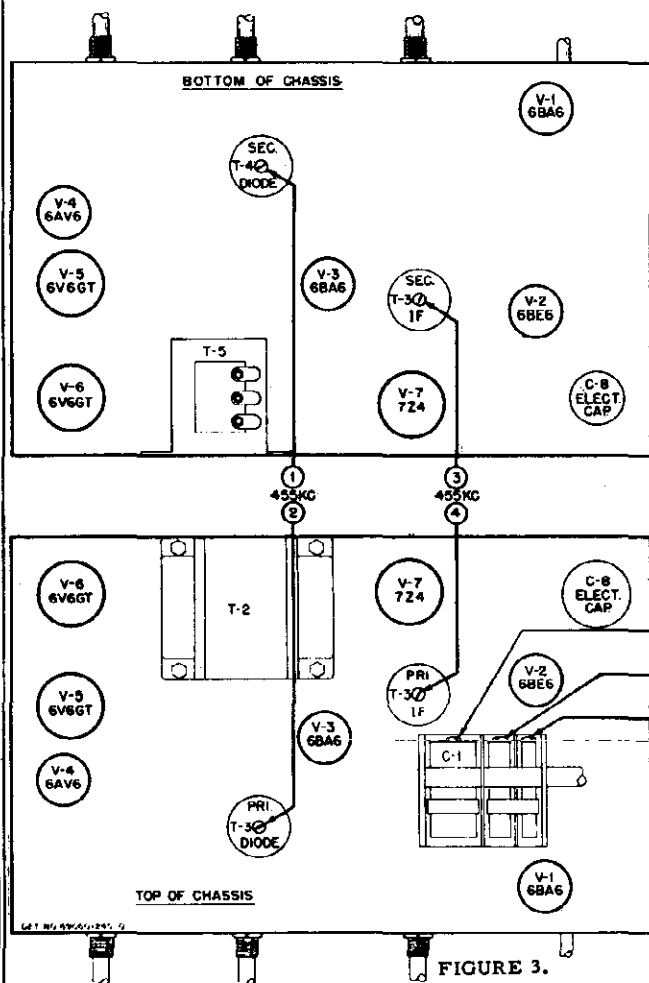


FIGURE 3.
TUBE AND TRIMMER LOCATIONS

INSTALLATION & OPERATING INSTRUCTIONS

CONTROLS

Refer to Figure 1 for the locations of the radio operating controls.

Power for both the radio and the record changer is controlled by the VOL-ON-OFF knob. The phonograph motor will not operate, however, until the PHONO-RADIO knob is rotated to "PHONO".

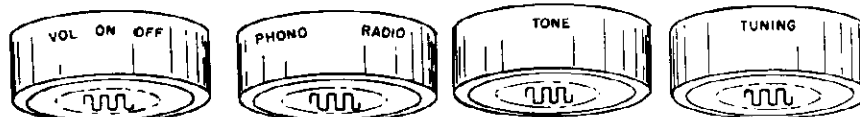


FIGURE 1. OPERATING CONTROLS

TUNING RANGE - 535 to 1620 Kc

IF FREQUENCY - 455 Kc

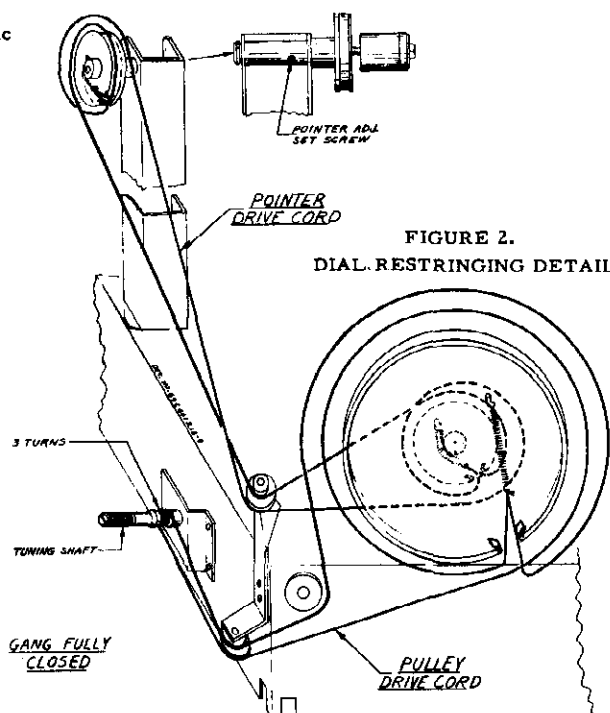
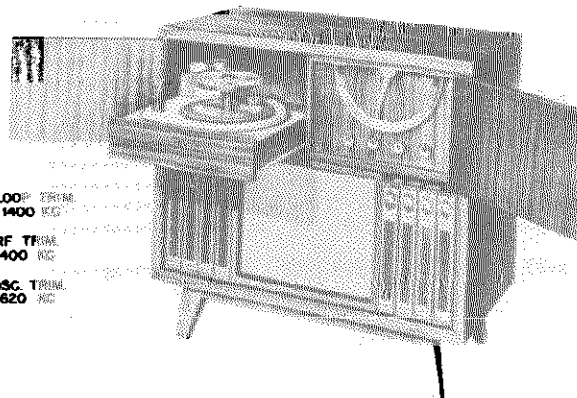


FIGURE 2.
DIAL RESTRINGING DETAIL



PHONOGRAPH - Model RC-37, three-speed: 33, 45 & 78 RPM. Refer to the RC-37 Service Manual for record changer service information.

MODELS 7F11, 7F11B,
Ch. 89-265

SERVICE NOTES

TO REMOVE CHASSIS FROM CABINET:

1. Remove the screws from the cabinet back.
2. Disconnect the phono power lead, the phono pick-up lead, the speaker leads, the line cord, and the antenna loop leads.
3. Remove the pointer escutcheon by pulling it downward.
4. Turn the tuning knob counterclockwise until the pointer reaches the extreme low frequency end of the dial scale.
5. From the back of the cabinet, loosen the pointer adjustment setscrew (see Figure 2), and pull the pointer and shaft assembly from the chassis. CAUTION: Do not remove the nut from the front of the pointer, as the detent ball and spring will fall out and may become lost.
6. Pull off the control knobs.
7. Remove the three chassis mounting screws, from

beneath the chassis.

8. Slide the chassis from the cabinet.

TO CALIBRATE DIAL:

1. Turn the tuning knob counterclockwise until the end of its travel is reached.
2. From the back of the cabinet, loosen the pointer adjustment setscrew (see Figure 2). CAUTION: Do not remove the nut from the front of the pointer.
3. Move the pointer until it is in a horizontal position (at the low frequency end of the dial scale.)
4. Tighten the adjustment setscrew.

NOTE: If the pointer is moved by hand accidentally, it will be released from a detent in the pointer collar, and no damage to the tuning mechanism will result. To reset the pointer, move it back and forth until it again engages in the detent.

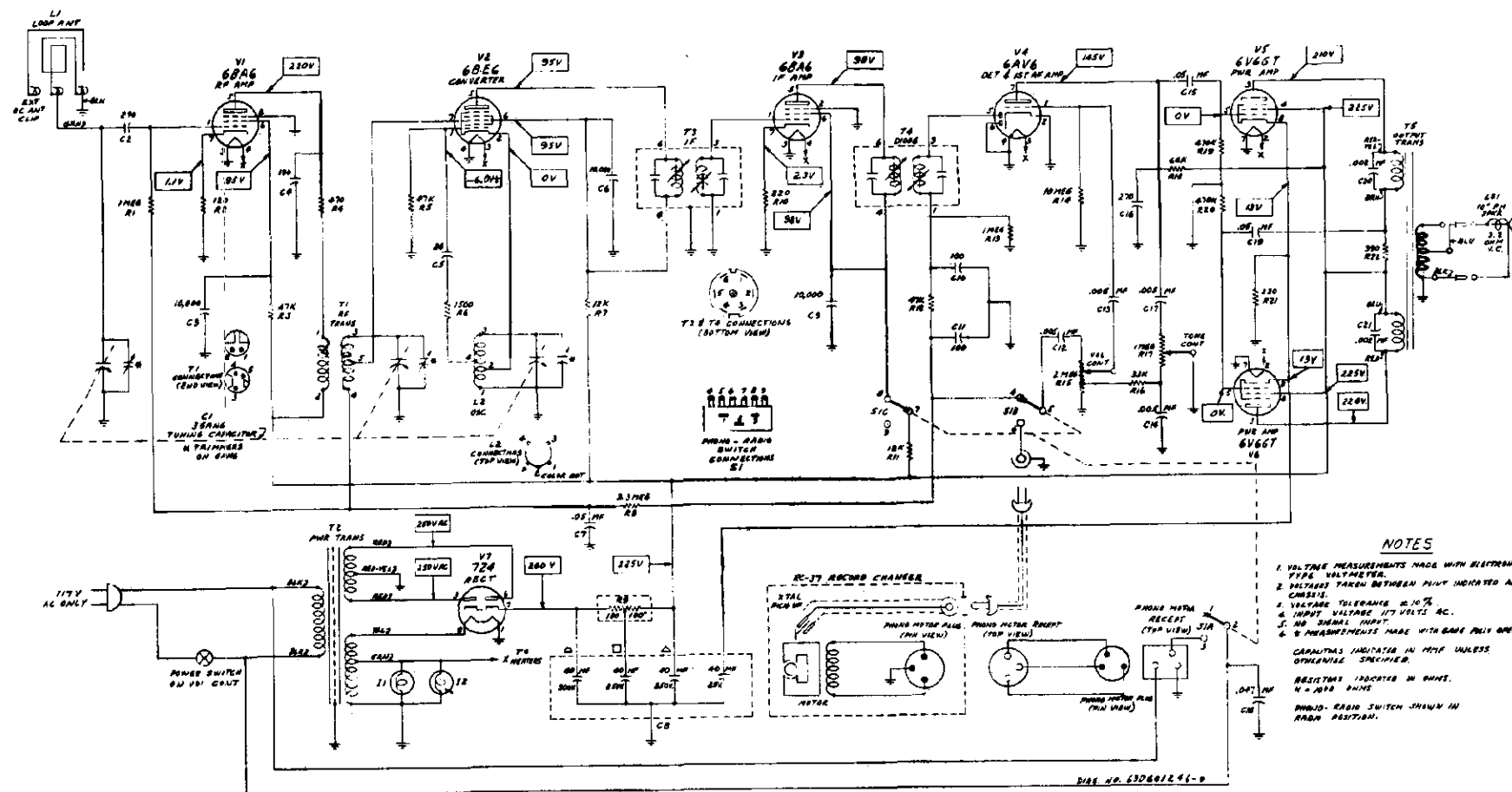
ALIGNMENT

1. Connect a low range output meter across the speaker voice coil.
2. Connect an AM signal generator as in chart below.
3. Set the signal generator for 400 cycle, 30% modulation.
4. Rotate the PHONO-RADIO switch to the "RADIO" position.
5. Turn the receiver volume control to maximum.
6. Use a small fibre screwdriver for aligning the IF and diode transformers.
7. As stages are brought into alignment, reduce the signal generator output to a level which produces less than 1.27 volts (.5 watt) across the voice coil, to avoid overloading the receiver.
8. See Figure 3 for adjustment locations, and the following chart for procedure.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. V-2 (pin 7, 6BE6)	455 Kc	Fully opened	1, 2, 3, & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. V-2 (pin 7, 6BE6)	1620 Kc	Fully opened	5 (Osc)	Adjust for maximum.
3.	.1 mf	Grid of conv. V-2 (pin 7, 6BE6)	1400 Kc	Tune in signal	6 (RF)	Adjust for maximum.
4.	-	-	-	-	-	Connect BC loop to chassis.
5.	-	Across radiation loop*	1400 Kc	Tune in signal	7 (Ant)	Adjust for maximum.

* Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

MODELS 7F11,
7F11B, Ch. HS-265



RECORD CHANGER: Model RC-37, Pages RCD.CH.21-17,18 through RCD.CH.21-29.

FIGURE 4. SCHEMATIC DIAGRAM

MODELS 7F11, 7F11B,
Ch. RS-265

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part No.	Description
CHASSIS PARTS - ELECTRICAL		
Capacitors		
C-1	19B690978	Variable, 3-gang
C-2	21K400037	Ceramic: 270 mmf 500V
C-3	21K482726	Ceramic, disc type: 10,000 mmf. 450V
C-4	21B77286	Ceramic: 100 mmf 500V
C-5	21R28816	Ceramic: 24 mmf 500V
C-6	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-7	8R9816	Paper: .05 mf 400V
C-8	23B690975	Electrolytic: 40 mf/300V; 40-40 mf/ 250V; 40 mf/25V
C-9	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-10	21B77286	Ceramic: 100 mmf 500V
C-11	21B77286	Ceramic: 100 mmf 500V
C-12	8R9813	Paper: .005 mf 600V
C-13	8R9813	Paper: .005 mf 600V
C-14	8R9813	Paper: .005 mf 600V
C-15	8R9816	Paper: .05 mf 400V
C-16	21K400037	Ceramic: 270 mmf 500V
C-17	8R9813	Paper: .005 mf 600V
C-18	8P490232	Tubular, molded: .047 mf 400V
C-19	8R9816	Paper: .05 mf 400V
C-20	8R9824	Paper: .002 mf 400V
C-21	8R9824	Paper: .002 mf 400V

Pilot Light

I-1,2	65X10867	Bulb, pilot light: #44; 6-8V; .25 amp; clear; bayonet base
-------	----------	---

Coils

L-1	24C690896	Loop antenna
L-2	24B690976	Oscillator coil

Speaker

LS-1	50C601037	Speaker: 10" PM; 3.2 ohm VC ...
------	-----------	---------------------------------

ResistorsNote: All resistors are insulated, carbon type
unless otherwise specified.

R-1	6R6004	1 meg 20% 1/2W
R-2	6R5551	120 10% 1/2W
R-3	6R6056	47,000 20% 1/2W
R-4	6R3949	470 20% 1/2W
R-5	6R6056	47,000 20% 1/2W
R-6	6R6038	1500 10% 1/2W
R-7	6R5766	12,000 10% 1/2W
R-8	6R6497	3.3 meg 10% 1/2W
R-9	17A690973	Wire wound: 360 10% 3W; center- tapped
R-10	6R6270	220 10% 1/2W
R-11	6R5766	12,000 10% 2W
R-12	6R6056	47,000 20% 1/2W
R-13	6R6004	1 meg 20% 1/2W
R-14	6R2109	10 meg 20% 1/2W
R-15	18A600974	Volume control: 2 meg; tapped at 600,000 ohms; includes on-off sw
R-16	6R6410	33,000 10% 1/2W
R-17	18K77399	Tone control: 1 meg
R-18	6R6001	68,000 20% 1/2W
R-19	6R6032	470,000 20% 1/2W
R-20	6R6032	470,000 20% 1/2W
R-21	6R6389	220 10% 1W
R-22	6R5598	390 10% 1W

Switch

S-1	40B601065	Switch, PHONO-RADIO
-----	-----------	---------------------------

Ref. No.	Part No.	Description
Transformers		
T-1	24B690899	RF Transformer
T-2	25B691035	Power Transformer
T-3	24B482863	IF Transformer (brown dot): 455 kc; complete with capacitors and cores; less shield
T-4	24B482865	Diode Transformer (red dot): 455 kc; complete with capacitors and cores; less shield
T-5	25B690898	Audio Output Transformer

CHASSIS PARTS - MECHANICAL

7C690567	Bracket, gang mtg
7A600965	Bracket, pilot light mtg
7B600801	Bracket, pointer mtg
1X600827	Bracket & Pulleys Assembly: includes four pulleys and shoulder rivets (cord guides on chassis front)
7A77337	Bracket, tuning shaft
43A890397	Bushing, line cord strain relief (use with 43K890398)
43K890398	Bushing, line cord retainer (use with 43A890397)
42B482867	Clip, spring: blued finish (holds IF transformers)
11M8944	Cord, dial (pointer drive)
30K21859	Cord, line: with plug; 9 ft long
4S9751	Lockwasher, int-ext: #8; cad pl (pointer and gang drive pulley mtg)
2S7051	Nut, hex palnut: 3/8-32 x 9/16; cad pl (control mtg)
49A23960	Pulley, cord: 1/4" groove (on pulley bracket)
49A21741	Pulley, cord: 3/8" groove (on pulley bracket)
49A73807	Pulley, cord: 1/2" groove (on chassis side and on pulley bracket)
49A26433	Pulley, cord: 21/32" groove (on pulley bracket)
49A690559	Pulley, gang drive: 3-1/2" diameter ...
49A690558	Pulley, pointer drive: 1-1/4" diameter ...
9K592170	Receptacle, phono pick-up: 1-prong
9A27674	Receptacle, phono power: 3-prong
5S7771	Rivet: .088 x 3/16 stl; nkl pl (min and midjet tube socket mtg)
5S7707	Rivet: .122 x 5/32 stl; nkl pl (octal tube socket, terminal strip, output trans mtg)
5S7701	Rivet: .122 x 3/16 stl; nkl pl (power receptacle and tuning shaft brkt mtg)
5S7700	Rivet: .122 x 1/4 stl; nkl pl (octal tube socket mtg)
5K71735	Rivet, shoulder (mounts 21/32" and 3/8" pulleys to bracket)
5K13896	Rivet, shoulder (mounts 1/2" and 1/4" pulleys to bracket)
3S7326	Screw, machine: 8-32 x 3/16 plain locking hex head; cad pl (gang mtg)
3S7163	Screw, machine: 8-32 x 1/4 plain hex head; cad pl (pointer & gang drive pulleys mtg)
3S2695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (holds gang mtg brkt)
3S7506	Screw, sheet metal: #6 x 1/4 PKZ plain hex head; cad pl (holds pointer mtg brkt)
3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; cad pl (pilot light brkt mtg)
3S7475	Screw, sheet metal: #8 x 1/4 PKZ slotted acorn head; cad pl (power trans mtg)

PAGE 21-104 MOTOROLA

MODELS 7F11, 7F11B,
Ch. ES-205

Part Number	Description	Part Number	Description
3S7462	Screw, thread cutting: 6-32 x 3/16 plain hex head; cad pl (electrostatic shield mtg)	2S7005	Nut, hex: 6-32 x 1/4 stl; cad pl (pointer mtg).....
3S7103	Setcrew: 8-32 x 1/8 Allen head; cad pl (pointer mtg)	2S7003	Nut, hex: 8-32 x 5/16; cad pl (spkr mtg).....
1K601085	Shaft and Pulley Assembly, pointer mtg....	36K601042	Knob, control (PHONO-RADIO): walnut mahogany.....
1X691134	Shaft, tuning: complete with pulley.....	36K601045	Knob, control (TUNING): walnut-mahogany.....
26K485936	Shield, coil (for IF transformers).....	62K70581	Overlay, logotype: "Motorola"; gold lacquer finish.....
26K690984	Shield, electrostatic (gang shield).....	35K691051	Pad, felt: 1/2" diameter (door stop)
26A692080	Shield, tube (for V-7): includes 41K692081 spring	64K600867	Panel, record changer bottom: chipboard.
9K600968	Socket, pilot light	1X600851	Pointer and Collar Assembly (less shaft and sleeve).....
9K484167	Socket, tube: miniature; 7-prong.....	28A27573	Plug, phono motor: 3-pin; includes shell (on phono motor lead).....
9A76209	Socket, tube: octal	28K71775	Plug, phono pick-up.....
9A690129	Socket, tube: midjet; 7-prong (for V-1)	9A600040	Receptacle, phono motor: 3- prong; includes shell (on phono motor lead)...
9A72519	Socket, tube: octal	3K489169	Screw, machine: 8-32 x 1 cross slot head; statuary bronze finish (door handle mtg).....
41A14244	Spring, tension (pointer drive cord)..	3S7536	Screw, sheet metal: #6 x 3/8 PKA slotted acron head; antique copper finish (back cover mtg).....
41K692081	Spring, tube shield retaining (for V-7 shield)	3S3387	Screw, sheet metal: #6 x 1/2 PKA plain hex head; statuary bronze finish (cable clamp mtg).....
31K37504	Strip, terminal: 1 insulated lug, #1 mtg; 3/8" spacing	3K653	Screw, speaker mtg) 3-32 x 1-1/4"; copper oxide finish.....
31K51511	Strip, terminal: 3 insulated lugs, #3 gnd; 3/8" spacing	3S1334	Screw, wood: #6 x 1 flat head statuary bronze finish (door hinge mtg).....
31K90046	Strip, terminal: 5 insulated lugs, #4 gnd; 3/8" spacing	1A690738	Shaft and Sleeve Assembly, pointer less detent spring and ball, and pointer...
29A76280	Terminal, pin (on speaker leads).....	15A690616	Shell, receptacle (on phono motor receptacle).....
4A70015	Washer, "C" (tuning shaft retainer)	15K74442	Shell, receptacle (on phono motor plug).
4A21941	Washer, "C" (holds pointer mtg shaft & pulley)	55K600171	Slide, record changer: left-hand (on side of RC drawer).....
4S7582	Washer, flat: 1/2 x .195 x .033 stl; cad pl (pointer & gang drive pulleys mtg)	55K600172	Slide, record changer: right-hand (on side of RC drawer).....
4A691006	Washer, flat: double "D" (pointer & gang drive pulleys mtg)	2S400199	Speednut: for .050 stud (dial scale mtg).....
MODEL 7F11 CABINET PARTS		41A690732	Spring, compression (pointer detent)..
43A4326	Ball, steel: 1/8" dia (pointer detent)	55K82160	Strike & nail: statuary bronze finish (door latch - on door).....
38K691915	Button, plug (on record changer).....	4S1765	Washer, flat: 1/2 x .147 x .015 stl; cad pl (pointer mtg).....
16F600641	Cabinet, console: red-brown mahogany; complete, less pointer escutcheon and dial scale.....	4S7629	Washer, flat: 1/2 x 3/16 x .048 stl; cad pl (spkr mtg).....
55K482159	Catch, bullet: statuary bronze finish (door latch on cabinet).....	4S8214	Washer, flat: 7/8 x .203 x .067 stl; cad pl.....
42A470832	Clamp, cable: plastic (holds line cord).....	4A690729	Washer, spring (pointer mtg).....
42K600645	Clip, pointer escutcheon.....	MODEL 7F11B CABINET PARTS - Same as 7F11 except:	
43K600637	Cloth, grille: 13 3/8 x 15 1/2 ; mahogany.....	16K600642	Cabinet, console: blonde; complete less pointer escutcheon and dial scale.....
15D600648	Cover, cabinet back.....	55K482794	Catch, bullet: brass (door latch on cabinet).....
34K601066	Dial, scale.....	43K600638	Cloth, grille: 13 3/8 x 15 1/2; eggshell & brown.....
34K600817	Escutcheon, pointer.....	55K600647	Hinge, door: brushed brass finish (lower hinges).....
5S7870	Eyelet: brass (on R. C. drawer panel- holds extra spindle).....	55K600644	Hinge, door (stop type): brushed brass finish (upper hinges).....
5A71081	Eyelet, chassis mtg: plain; 9/32" long	36K601046	Knob, control (VOL-ON-OFF): tan.....
5A600963	Eyelet, chassis mtg: pierced; 1/8" long.....	36K601048	Knob, control (TONE): tan.....
5A71092	Grommet, chassis mtg: rubber.....	36K601047	Knob, control (PHONO-RADIO): tan.....
55K600643	Handle, door: polished brass.....	36K601051	Knob, control (TUNING): tan.....
55K600646	Hinge, door: bronze finish (lower hinges pair	3K489170	Screw, machine: 8-32 x 1 cross slot head; brass (door handle mtg).....
55K600639	Hinge, door (stop type): bronze finish (upper hinges).....	55K482795	Strike & Nail: brass (door latch on door)
14K791482	Insulator, fibre (clamps phono leads).		
36C601041	Knob control (VOL-ON-OFF): walnut-mahogany.....		
36K601043	Knob, control (TONE): walnut-mahogany		
1X600852	Lead and Plugs Assembly, phono-pick-up (shielded lead with two phono pick-up plugs).....		
4S7657	Lockwasher, ext: #8; cad pl (spkr mtg).....		

MODELS 8FM21,
8FM21B, Ch. HS-247

GENERAL INFORMATION

TYPE - FM-AM Radio Phonograph Combination

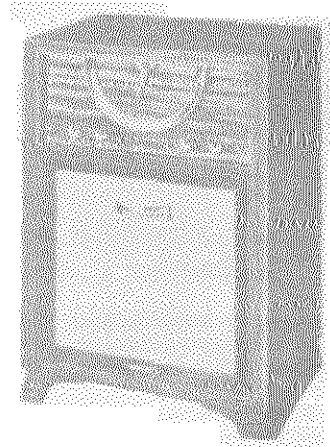
RECEIVER MODELS -	Model	Color
	8FM21	Red-brown mahogany
	8FM21B	Blonde

TUNING RANGE - AM 535 to 1620 Kc AM IF - 455 Kc
 FM 88 to 108 Mc FM IF - 10.7 Mc

TUBE COMPLEMENT - 6BA6 - FM-AM RF Amplifier
 6BA7 - FM-AM Converter
 6BA6 - FM-AM IF Amplifier
 6BA6 - FM IF Amplifier
 6AL5 - FM Ratio Detector
 6AV6 - AM Det & 1st Audio Amp
 6K6GT - Power Amplifier
 5Y3GT - Rectifier

POWER SUPPLY - 117 volts, 60 cycles AC only; 85 watts,
 including phono motor

PHONOGRAPH - Model RC-37, three-speed: 33, 45 & 78
 RPM. Refer to the RC-37 Service Manual
 for record changer service information.



INSTALLATION & OPERATING INSTRUCTIONS

ANTENNAS

No outside antenna or ground is normally required for standard broadcast (AM) reception, as a loop antenna is located inside the cabinet. Antenna connections are shown in Figure 1. In locations where additional pick-up is desired, an external antenna may be connected to the clip marked "EXT BC ANT" on the loop antenna.

An FM antenna, built into the power cord, eliminates the need for an external FM antenna when the receiver is used in normal FM service areas, such as are found in and for a few miles around metropolitan areas. In "fringe" or weak signal areas, improved FM reception can be obtained by using an outside FM antenna. The external antenna should be connected through a 300 ohm twin transmission line to the 1st and 2nd screws on the terminal strip on the chassis, as in Figure 1. The link between the 2nd and 3rd screws should be opened. Orient the antenna to obtain maximum volume of the FM stations.

For best FM reception from the built-in power line cord antenna, it is important to stretch the cord to its full length. Changing the direction or position of the line cord, or reversing the plug in the wall outlet, will often improve reception from weak stations. Connect the link between the 2nd and 3rd screws on the terminal strip on the chassis when the built-in antenna is used.

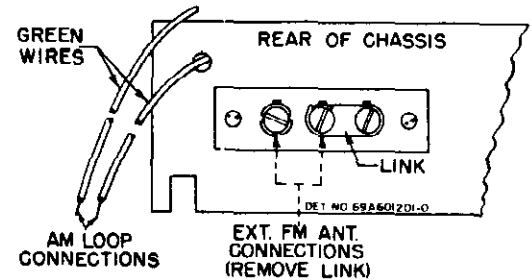


FIGURE 1. ANTENNA CONNECTIONS

CONTROLS

Refer to Figure 2 for the locations of the radio operating controls.

Power for both the radio and the record changer is controlled by the VOL-ON-OFF knob.

The phonograph motor will not operate, however, until the PHONO-TONE-RADIO knob is rotated also to "PHONO".

Tuning of FM stations should be done very carefully, for best sound reproduction, not necessarily for the strongest volume received.



FIGURE 2. OPERATING CONTROLS

MODELS 8FM21,
8FM21B, Ch. HS-247

ALIGNMENT

GENERAL INFORMATION

1. Maximum performance can be obtained only if extreme care is exercised during alignment.
2. Use a small fibre screwdriver for aligning the IF transformers.
3. Refer to Figure 4 for the location of all alignment trimmers and cores.
4. As the stages are brought into alignment, reduce the signal generator output to a low value to avoid overloading the receiver.

ORDER OF ALIGNMENT AND EQUIPMENT REQUIRED

1. AM Broadcast Band IF & RF Alignment
 - a. 455 to 1620 Kc AM signal generator
 - b. Low range output meter.
- 2(A) FM Band IF & RF Alignment (preferred method)
 - a. 10.7 to 108 Mc FM signal generator
 - b. Oscilloscope
- (B) FM Band IF & RF Alignment (alternate method)
 - a. 10.7 to 108 Mc signal generator (unmodulated)
 - b. Low range DC electronic voltmeter

AM BROADCAST BAND - IF & RF ALIGNMENT

1. Connect the AM signal generator as in chart below, with 400 cycle, 30% modulation, the receiver.
2. Connect the output meter across the speaker voice coil. Throughout alignment, reduce the generator output to a level which produces less than 1.27 volts (.5 watt) across the voice coil to avoid overloading the receiver.
3. Set the bandswitch to the AM position.
4. Turn the receiver volume control to maximum.
5. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. V-2 (pin 7, 6BA7)	455 Kc	Fully opened	1, 2, 3 & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. V-2 (pin 7, 6BA7)	1620 Kc	Fully opened	5 (AM Osc)	Adjust for maximum. *
3.	-	-	-	-	-	Connect AM loop to chassis.
4.	-	Across radiation loop**	1400 Kc	Tune in signal	8 (AM Ant)	Adjust for maximum.

5. If, after the receiver has been aligned as above, it is found to be badly off calibration, it will be necessary to adjust oscillator core (7) as follows: connect the generator to the grid of the converter tube and, with the gang fully closed, adjust core (7) at 535 kc. It is advisable to repeat the oscillator adjustments at 1620 kc and 535 kc several times until the tuning range is correct. Core (7) has been pre-set at the factory and normally should require no retuning.

* If difficulty is encountered in tuning trimmer (5), adjust trimmer (6) to 1/2 turn from tight.

** Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

FM BAND - IF & RF ALIGNMENT (PREFERRED METHOD)

1. The following FM alignment procedure, using an FM signal generator and an oscilloscope, is to be preferred because the actual response pattern may be observed on the scope and adjusted for best symmetry and maximum amplitude.
2. Connect the vertical input terminals of the oscilloscope between the chassis and the junction of resistor R-18 (47K) and capacitor C-23 (1000 mmf).
3. Connect the FM signal generator sync voltage output terminals, through a phase shifting network, to the horizontal input terminals of the scope, as in Figure 5. (Other values of resistance and capacitance may be required, depending upon the scope). The phasing control should be adjusted to give only one trace on the scope. NOTE: If the FM generator has a built-in phase control, the phase shifting network is not necessary.
4. Set the bandswitch to the FM position.
5. Throughout alignment, reduce the generator output to keep the signal just above the noise level, to avoid

MODELS 3FM21,
8FM21B, Ch. HS-247

SERVICE NOTES

TO REMOVE CHASSIS FROM CABINET:

1. Remove the screws from the cabinet back.
2. Disconnect the phono power lead, the phono pick-up lead, the speaker leads, the line cord, and the antenna loop leads.
3. Remove the pointer escutcheon by pulling it downward.
4. Turn the tuning knob counterclockwise until the pointer reaches the extreme low frequency end of the dial scale.
5. From the back of the cabinet, loosen the pointer adjustment setscrew (see Figure 3) and pull the pointer and shaft assembly from the chassis. CAUTION: Do not remove the nut from the front of the pointer, as the detent ball and spring will fall out, and may become lost.
6. Pull off the control knobs.
7. Remove the three chassis mounting screws, from

beneath the chassis.

8. Slide the chassis from the cabinet.

TO CALIBRATE DIAL:

1. Turn the tuning knob counterclockwise until the end of its travel is reached.
2. From the back of the cabinet, loosen the pointer adjustment setscrew (see Figure 3). CAUTION: Do not remove the nut from the front of the pointer.
3. Move the pointer until it is in a horizontal position (at the low frequency end of the dial scale).
4. Tighten the adjustment setscrew.

NOTE: If the pointer is moved by hand accidentally, it will be released from a detent in the pointer collar, and no damage to the tuning mechanism will result. To reset the pointer, move it back and forth until it again engages in the detent.

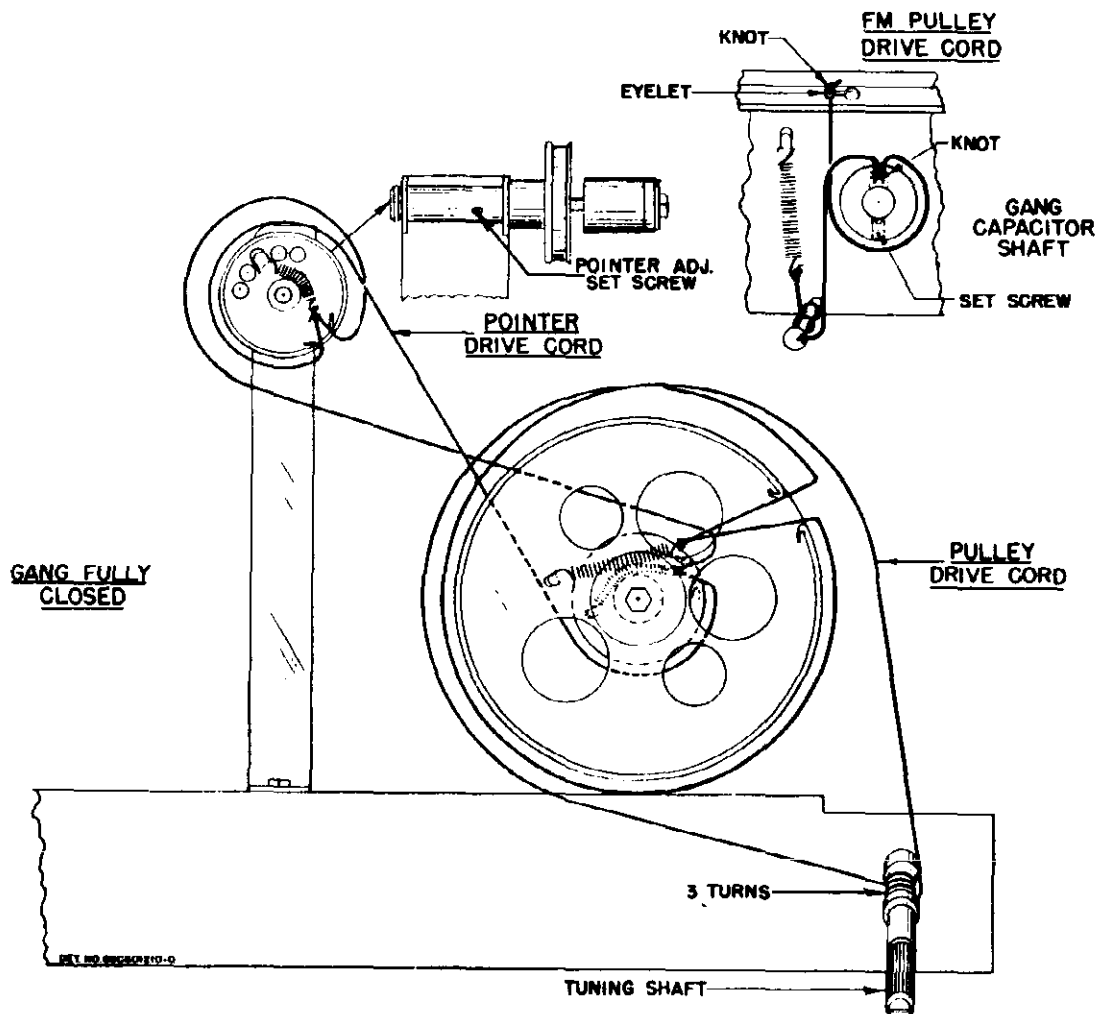


FIGURE 3. POINTER AND DRIVE CORD RESTRINGING DETAIL

MODELS 8FM21,
8FM21B, Ch. HS-247

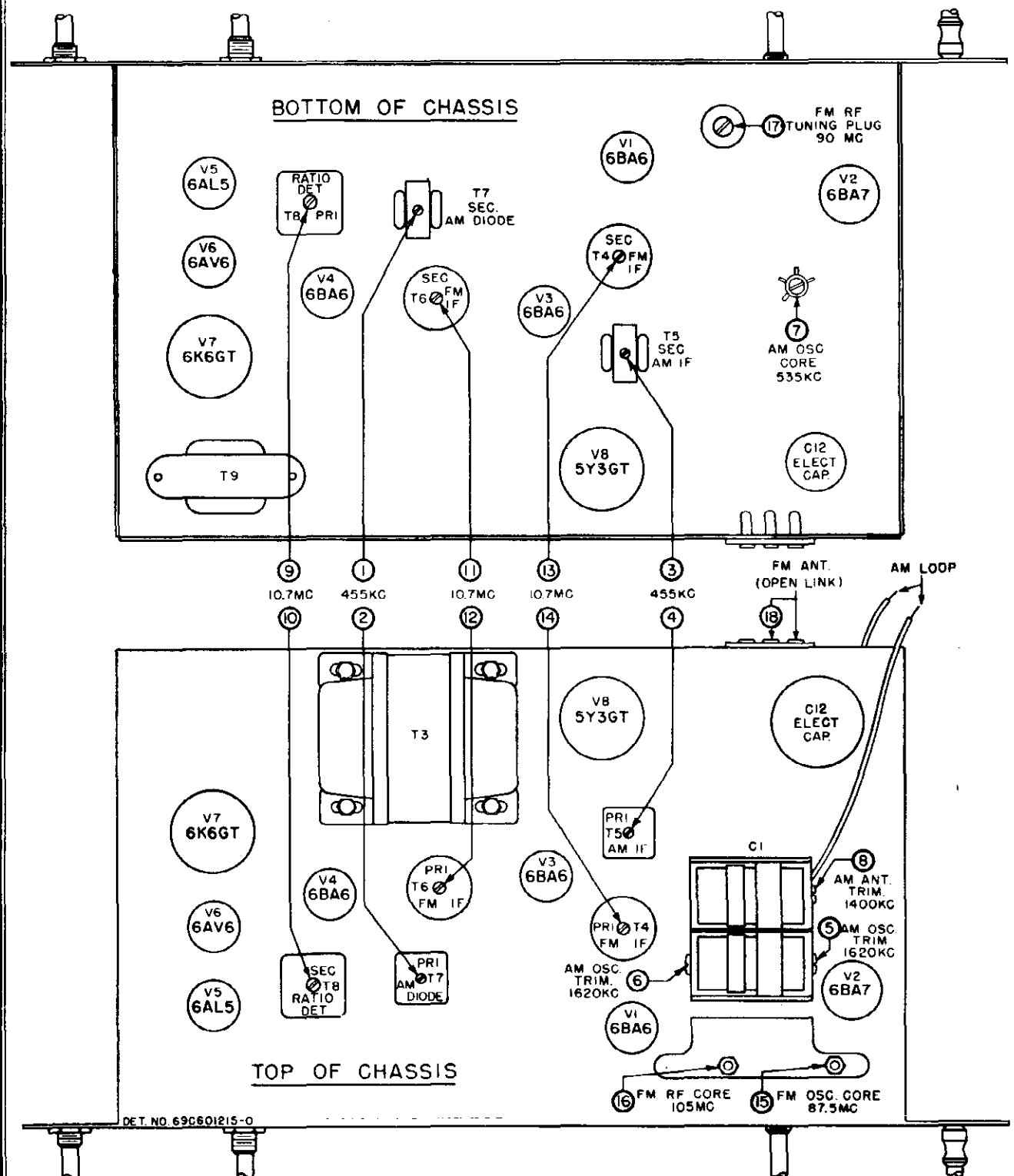


FIGURE 4. TUBE AND TRIMMER LOCATIONS

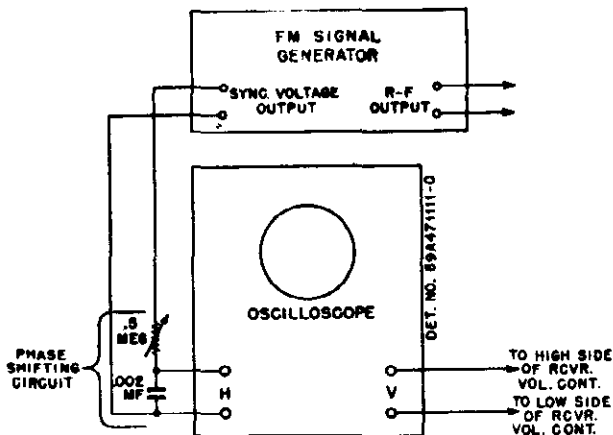
MODELS 8FM21,
8FM21B, Ch. HS-247

FIGURE 5.

FM SIGNAL GENERATOR & OSCILLOSCOPE HOOK-UP

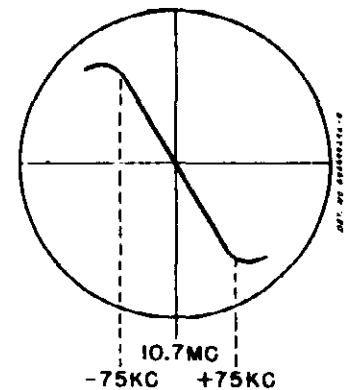


FIGURE 6. RATIO DETECTOR WAVEFORM

overloading the receiver.

6. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 6BA6)	10.7 mc ±100 kc dev	Fully opened	9 (ratio det pri)	Adjust for maximum amplitude of pattern. *
2.	1000 mmf	Grid of 2nd IF Amp V-4 (pin 1, 6BA6)	10.7 mc ±100 kc dev	Fully opened	10 (ratio det sec)	Adjust for symmetrical curve, as shown in Figure 6.
3.	-	-	-	-	-	Repeat steps 1 & 2 for maximum amplitude and best symmetry.
4.	1000 mmf	Grid of 1st IF Amp V-3 (pin 1, 6BA6)	10.7 mc ±100 kc dev	Fully opened	11 & 12 (2nd IF sec & pri)	Adjust for maximum amplitude of pattern. *
5.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc ±100 kc dev	Fully opened	13 & 14 (1st IF sec & pri)	Adjust for maximum amplitude of pattern. *
6.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc ±100 kc dev	Fully opened	11, 12, 13 & 14	Readjust for maximum amplitude and best symmetry.
RF ALIGNMENT						
7.	270 ohms	FM terminal 18 on rear of chassis (open link)	87.5 mc ±22-1/2 kc dev	Fully closed	15 (osc core)	Adjust for maximum amplitude of pattern. *
8.	-	-	-	Fully closed	16 (RF core)	Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise.
9.	270 ohms	FM terminal 18 on rear of chassis	90 mc ±22-1/2 kc dev	Tune in signal	17 (RF tuning plug)	Adjust for maximum amplitude of pattern. *
10.	270 ohms	FM terminal 18 on rear of chassis	105 mc ±22-1/2 kc dev	Tune in signal	16 (RF core)	Adjust for maximum amplitude of pattern. *
11.	-	-	-	-	-	Repeat steps 9 & 10, until no further adjustment is necessary.

* An output meter across the speaker voice coil will also indicate maximum amplitude. It should not be used in place of the scope, however, since it will not show symmetry of the curve.

MODELS 3FM21,
3FM21B, Ch. HS-247

FM BAND - IF & RF ALIGNMENT (ALTERNATE METHOD)

1. The following procedure for FM alignment, with an unmodulated carrier generator and a DC electronic voltmeter, is not as desirable as the preceding method; but it may be used if no FM generator is available.
2. Connect the signal generator as in chart below, with no modulation.
3. Set the bandswitch to the FM position.
4. Except in step 2 below, connect the electronic voltmeter across resistor R-19 (33K) in the ratio detector stage.
5. Throughout alignment reduce the signal generator output to a value which produces no more than a 5 volt rise above no signal voltage, to avoid overloading the receiver.
6. In step 2 below, connect two 100K ohm resistors in series across R-19. Connect the electronic voltmeter between the volume control side of resistor R-18 (47K) and the junction of the two 100K resistors, with the low side of the meter at the 100K resistors.
7. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc	Fully opened	9, 11, 12, 13 & 14 (IF cores)	Adjust for maximum.
2.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc	Fully opened	10 (ratio det sec)	Adjust for zero (connect meter as in step 6 above.)
RF ALIGNMENT						
3.	270 ohms	FM terminal 18 on rear of chassis (open link)	87.5 mc	Fully closed	15 (osc core)	Adjust for maximum.
4.	-	-	-	Fully closed	16 (RF core)	Turn counterclockwise until core is at bottom of pipe, then turn four turns clockwise.
5.	270 ohms	FM terminal 18 on rear of chassis	90 mc	Tune in signal	17 (RF tuning plug)	Adjust for maximum.
6.	270 ohms	FM terminal 18 on rear of chassis	105 mc	Tune in signal	16 (RF core)	Adjust for maximum.
7.	-	-	-	-	-	Repeat steps 5 & 6 until no further adjustment is necessary.

MODELS 8FM21,
3FM21B, Ch. HS-247

RECORD CHANGER: Model RC-37, Pages RCD.CH.21-17,18
through RCD.CH.21-29.

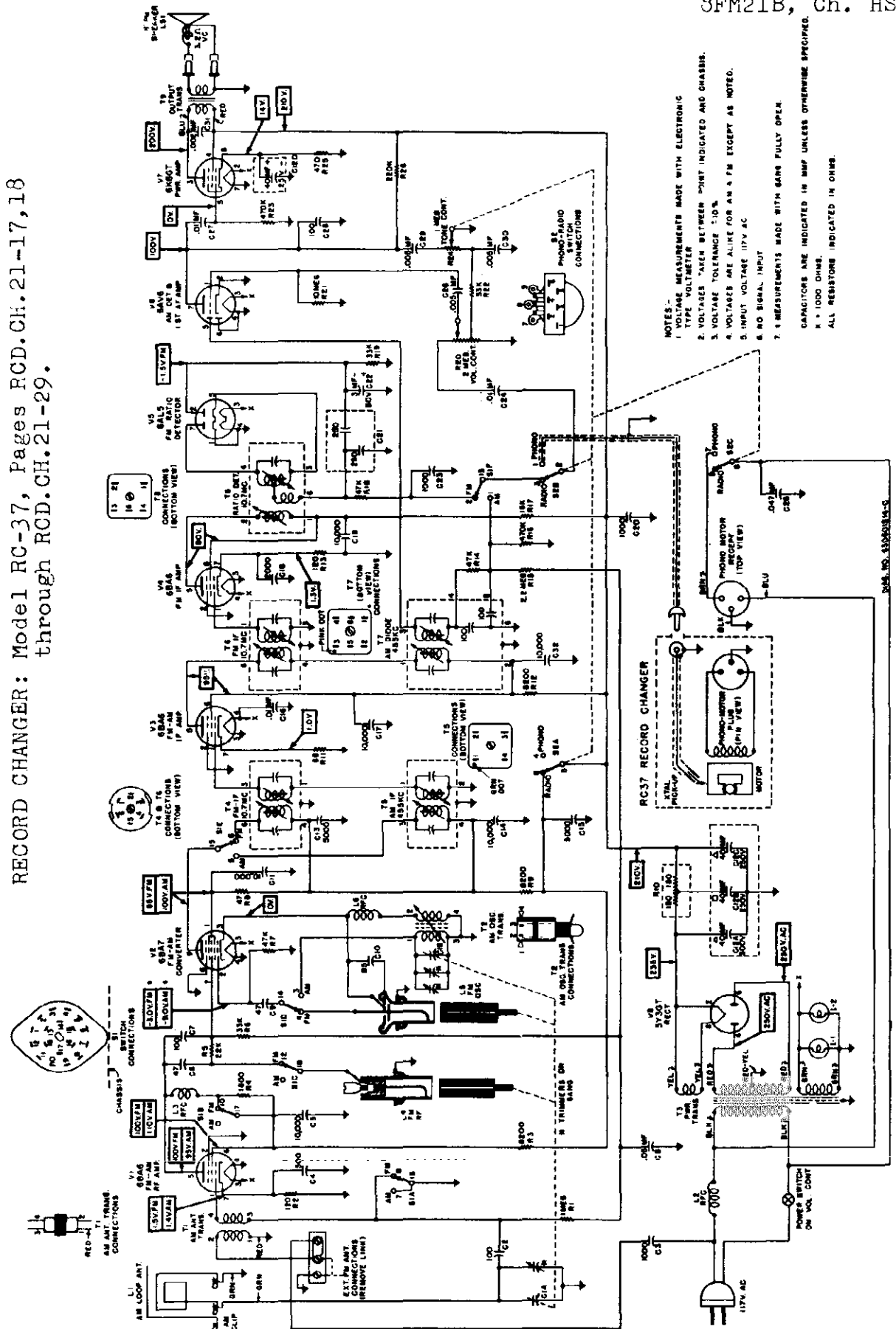


FIGURE 7. SCHEMATIC DIAGRAM

MODELS 6FM21,
6FM21B, Ch. HS-247

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part No.	Description
-------------	----------	-------------

CHASSIS PARTS - ELECTRICAL

Capacitors

C-1	19B691877	Variable, 2-gang
C-2	21B77286	Ceramic, 100 mmf 500V
C-3	21K478410	Ceramic, 1000 mmf 500V
C-4	21K481377	Ceramic, 500 mmf 500V
C-5	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-6	21K77373	Ceramic, 47 mmf 500V
C-7	21B77286	Ceramic, 100 mmf 500V
C-8	8R9816	Paper, .05 mf 400V
C-9	21K77373	Ceramic, 47 mmf 500V
C-10	21A690688	Ceramic, 85 mmf 500V
C-11	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-12	23B690975	Electrolytic: 40 mf/300V, 40-40 mf/ 250V, 40 mf/25V
C-13	21A470789	Ceramic, disc type: 5000 mmf 450V.
C-14	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-15	21A470789	Ceramic, disc type: 5000 mmf 450V..
C-16	8R9809	Paper, .01 mf 400V
C-17	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-18	21K790912	Ceramic, 2000 mmf 500V
C-19	21K482726	Ceramic, disc type: 10,000 mmf 450V
C-20	21K478410	Ceramic, 1000 mmf 500V
C-21	21B484337	Ceramic, dual; 250-250mmf/450V.....
C-22	23K690543	Electrolytic: 3 mf 50V
C-23	21K478410	Ceramic, 1000 mmf 500V
C-24	8R9809	Paper, .01 mf 400V
C-25	8R490232	Tubular, molded: .047 mf 400V.....
C-26	8R9813	Paper, .005 mf 600V
C-27	8R9809	Paper, .01 mf 400V
C-28	21B77286	Ceramic, 100 mmf 500V
C-29	8R9813	Paper, .005 mf 600V
C-30	8R9813	Paper, .005 mf 600V
C-31	8R9847	Paper, .002 mmf 600V
C-32	21K482726	Ceramic, disc type: 10,000 mmf 450V

Pilot Light

I-1,2	65X10867	Bulb, pilot light: #44; 6-8V; .25 amp; clear; bayonet base
-------	----------	---

Coils

L-1	24C690896	AM Loop Antenna
L-2	24A692148	RF Choke
L-3	24A90064	RF Choke
L-4	24C690584	Inductor and Capacitor Assembly: FM RF; less tuning core
L-5	24K600519	Inductor and Capacitor Assembly: FM osc; less tuning core
L-6	24A791081	RF Choke

Speaker

LS-1	50C601038	Speaker: 8" FM; 3.2 ohm VC exch
------	-----------	--

ResistorsNote: All resistors are insulated carbon type unless
otherwise specified.

R-1	6R6004	1 meg 20% 1/2W
R-2	6R5551	120 10% 1/2W
R-3	6R5725	8200 10% 2W
R-4	6R2089	1800 10% 1/2W
R-5	6R6028	22,000 20% 1/2W.....
R-6	6R6410	33,000 10% 1/2W.....
R-7	6R6056	47,000 20% 1/2W

Ref. No.	Part No.	Description
-------------	----------	-------------

R-8	6R2108	47 20% 1/2W
R-9	6R5725	8200 10% 2W
R-10	17A690973	Wire wound: 360 10% 3W; center- tapped
R-11	6R2039	68 10% 1/2W
R-12	6R5725	8200 10% 2W
R-13	6R5551	120 10% 1/2W
R-14	6R6056	47,000 20% 1/2W
R-15	6R3927	2.2 meg 20% 1/2W
R-16	6R6377	470,000 10% 1/2W
R-17	6R5732	15,000 10% 2W
R-18	6R6056	47,000 20% 1/2W
R-19	6R6410	33,000 10% 1/2W.....
R-20	18A600974	Volume control: 2 meg; tapped at 600,000 ohms; includes on-off sw 10 meg 20% 1/2W
R-21	6R2109	10 meg 20% 1/2W
R-22	6R6410	33,000 10% 1/2W
R-23	6R6032	470,000 20% 1/2W
R-24	18B600683	Tone control: 1 meg; with phono- radio switch
R-25	6R5593	470 10% 1W
R-26	6R6015	220,000 20% 1/2W

Switches

S-1	40B690538	Bandswitch, AM-FM
S-2	-	Phono-radio switch (on tone control)

Transformers

T-1	24A690544	FM Antenna Input Transformer
T-2	24K691878	AM Oscillator Transformer: white & red dot
T-3	25B600684	Power Transformer
T-4	24B690540	1st FM IF Transformer (orange dot): 10.7 mc; complete with capacitors and cores; less shield
T-5	24B485553	AM IF Transformer (green dot): 455 kc; complete with capacitors, cores, and shield
T-6	24B690541	2nd FM IF Transformer (yellow dot): 10.7 mc; complete with capacitors and cores; less shield
T-7	24K485555	AM Diode Transformer (pink dot): 455 kc; complete with capacitors, cores, and shield
T-8	24K600893	Ratio Detector Transformer: 10.7 mc; complete with capacitors, cores and shield
T-9	25B600969	Audio Output Transformer

Part Number	Description
----------------	-------------

CHASSIS PARTS - MECHANICAL

1X690717	Bracket Assembly, tuning core mtg: includes shoulder rivet and anti-backlash clip...
7A600965	Bracket, pilot light mtg
7B600801	Bracket, pointer mtg
7C690567	Bracket, tuner mtg (gang mtg)
7A77337	Bracket, tuning shaft
43A890397	Bushing, line cord strain relief (use with 43K890398)
43K890398	Bushing, line cord retainer (use with 43A890397)
42K690561	Clip, anti-backlash: single (on core mtg bracket)
42A690566	Clip, anti-backlash: double (on tuner mtg brkt)

MODELS 8FM21,
8FM21B, CN, AS-247

Part Number	Description	Part Number	Description
42A485548	Clip, coil can mtg (AM IF transformer)	585405	Terminal, pin (on speaker leads)...
42B482867	Clip, spring: blued finish (holds FM IF transformer)	4A70015	Washer, "C" (tuning shaft mtg).....
11M8944	Cord, dial (pointer drive)	4A21941	Washer, "C" (holds pointer mtg shaft & pulley)
11M488137	Cord, dial (core drive)	4A600676	Washer, dog (AM-FM switch mtg).....
30K21859	Cord, line: with plug; 9 ft long	487582	Washer, flat: 1/2 x .195 x .033 stl; cad pl (pointer drive pulley mtg).....
46B692164	Core, iron and screw: green dot (FM osc tuning core)		
46K692165	Core, iron and screw (FM RF tuning core)	MODEL 8FM21 CABINET PARTS	
15A600877	Cover, volume control: with insulator...	43A4326	Ball, steel: 1/8" diameter (pointer detent)
587866	Eyelet: .125 x .091 brass; nkl pl (core drive cord retainer)	38K691915	Button, plug (on record changer).....
1X600495	Lead and Plug Assembly, phono pick-up...	16F600649	Cabinet, console: red-brown mahogany; complete less pointer escutcheon and dial scale
4S9751	Lockwasher, int-ext: #8; cad pl (pointer drive pulley mtg)	13K600651	Cloth, grille: 17-1/2" x 18-1/4"; mahogany
2S7019	Nut, hex: 4-40 x 1/4; cad pl (FM tuning core mtg)	15C600874	Cover, cabinet back
2S7051	Nut, hex palnut: 3/8-32 x 9/16; cad pl (control mtg)	34D600819	Dial scale
35K691846	Pad, rubber: 1-hole (gang mtg).....	34K600817	Escutcheon, pointer
35A691845	Pad, rubber: 2-hole (gang mtg)	587870	Eyelet: brass (on RC drawer panel-holds extra spindle)
28K71775	Plug, phono pick-up	5A71081	Eyelet, chassis mtg: plain; 9/32" long.
1X600828	Pulley Assembly, pointer & gang drive (includes 3-1/2" & 1-1/4" pulleys)...	5A600963	Eyelet, chassis mtg: pierced; 1/8" long
49A690562	Pulley, core drive: brass	5A71092	Grommet, chassis mtg: rubber
9A600040	Receptacle, phono motor: 3-prong; includes shell	36K601052	Knob, control (Vol-On-Off): walnut-mahog.
58B497	Rivet: .088 x 1/8 stl; nkl pl (anti-backlash clip mtg)	36K601056	Knob, control (Phono-Tone-Radio): walnut-mahogany
587771	Rivet: .088 x 3/16 stl; nkl pl (min socket mtg)	36K601057	Knob, control (AM-FM): walnut-mahogany...
587774	Rivet: .088 x 1/4 stl; nkl pl (noval socket mtg)	36K601055	Knob, control (Tuning): walnut-mahogany..
587707	Rivet: .122 x 5/32 stl; nkl pl (term strip mtg)	487657	Lockwasher, ext: #8; cad pl (spkr mtg)
587701	Rivet: .122 x 3/16 stl; nkl pl (ant term strip mtg)	2S7005	Nut, hex: 6-32 x 1/4 stl; cad pl (pointer mtg)
587700	Rivet: .122 x 1/4 stl; nkl pl (octal socket mtg)	2S7003	Nut, hex: 8-32 x 5/16; cad pl (spkr mtg)
5K13896	Rivet, shoulder (on core mtg brkt)....	62K70581	Overlay, logotype: "Motorola"; gold lacquer finish
3S7163	Screw, machine: 8-32 x 1/4 plain hex head; cad pl (pointer drive pulley mtg)...	1X600851	Pointer and Collar Assembly (less shaft and sleeve)
3S7205	Screw, machine: 8-32 x 1/4 slotted locking hex head; cad pl (gang mtg)	55K600653	Pull, record changer drawer: satin brass.
3S2695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (tuner brkt mtg)...	3K600655	Screw, machine: 8-32 x 1/2 cross slot head; statuary bronze finish (RC drawer pull mtg)
3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; cad pl (pwr trans & pointer brkt mtg)	3S7536	Screw, sheet metal: #6 x 3/8 PKA slotted acorn head; antique copper finish (back cover mtg)
3S7103	Setcrew: 8-32 x 1/8 Allen head; cad pl (core drive pulley & pointer mtg).....	3K653	Screw, speaker mtg: 8-32 x 1-1/4"; copper oxide finish
1K601085	Shaft and Pulley Assembly, pointer mtg...	1A690738	Shaft and Sleeve Assembly, pointer: less detent spring and ball, and pointer....
1X500489	Shaft, tuning: complete with pulley.....	55K600654	Slide, record changer (on sides of RC drawer)
15A690616	Shell, receptacle (on phono motor receptacle)	2S400199	Speednut: for .050 stud (dial scale mtg)
26K485936	Shield, coil (for FM IF transformers)....	41A690732	Spring, compression (pointer detent)...
9K600968	Socket, pilot light	4S1765	Washer, flat: 1/2 x .147 x .015 stl; cad pl (pointer mtg)
9K484167	Socket, tube: miniature; 7-prong.....	487629	Washer, flat: 1/2 x 3/16 x .048 stl; cad pl (spkr mtg)
9A485495	Socket, tube: noval; 9-prong	4A690729	Washer, spring (pointer mtg)
9A76209	Socket, tube: octal		
41A690598	Spring, coil: 7 turns; cosmoline dipped (FM RF core mtg)	MODEL 8FM21B CABINET PARTS -Same as 8FM21 except;	
41K691840	Spring, coil: 8 turns; cop pl (FM osc core mtg)	16K600650	Cabinet, console: blonde; complete, less pointer escutcheon and dial scale.....
41A14244	Spring, tension (core & pointer drive cord)	13K600652	Cloth, grille: 17-1/2" x 18-1/4"; eggshell
31K37504	Strip, terminal: 1 insulated lug; #1 mtg. 3/8" spacing	36K601058	Knob, control (Vol-On-Off): tan
31K76184	Strip, terminal: 2 insulated lugs; #1 gnd; 3/8" spacing	36K601063	Knob, control (Phono-Tone-Radio): tan.....
31K26235	Strip, terminal: 3 insulated lugs; #1 gnd; 3/8" spacing	36K601064	Knob, control (AM-FM): tan
31K26658	Strip, terminal: 5 insulated lugs; #3 gnd; 3/8" spacing	36K601062	Knob, control (Tuning): tan
31A470403	Strip, terminal: 3-screw (antenna input).	3K600656	Screw, machine: 8-32 x 1/2 cross slot head; brass (RC drawer pull mtg).....

MODELS 9FM21,
9FM21B, Ch. HS-246

GENERAL INFORMATION

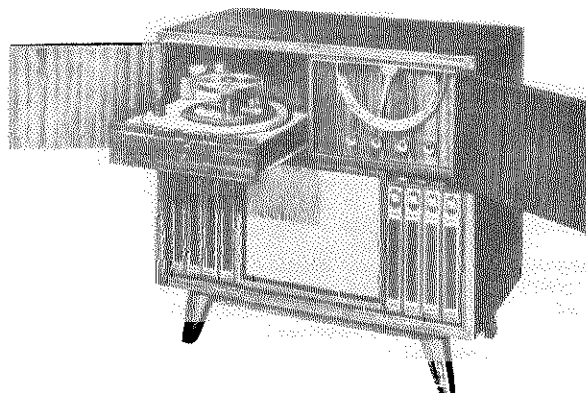
TYPE - FM-AM Radio Phonograph Combination

RECEIVER MODELS-	Model	Color
	9FM21	Red-brown mahogany
	9FM21B	Blonde

TUNING RANGE -AM 535 to 1620 Kc AM IF - 455 Kc
FM 88 to 108 Mc FM IF - 10.7 Mc

TUBE COMPLEMENT	6AU6	FM-AM RF Amplifier
	6BA7	FM-AM Converter
	6BA6	FM-AM IF Amplifier
	6AU6	FM IF Amplifier
	6AL5	FM Ratio Detector
	6AV6	AM Det & 1st Audio Amp
	6V6GT	Power Amplifier
	6V6GT	Power Amplifier
	7Z4	Rectifier

POWER SUPPLY - 117 volts, 60 cycle AC only; 100 watts,
including phono motor



PHONOGRAPH - Model RC-37, three-speed: 33, 45 & 78 RPM. Refer to the RC-37 Service Manual for record changer service information.

INSTALLATION & OPERATING INSTRUCTIONS

ANTENNAS

No outside antenna or ground is normally required for standard broadcast (AM) reception, as a loop antenna is located inside the cabinet. Antenna connections are shown in Figure 1. In locations where additional pick-up is desired, an external antenna may be connected to the clip marked "EXT BC ANT" on the loop antenna.

An FM loop antenna, mounted inside the cabinet, eliminates the need for an external FM antenna when the receiver is used in normal FM service areas such as are found in and for a few miles around metropolitan areas.

In "fringe" or weak signal areas, improved FM reception can be obtained by using an outside FM antenna. The loop connections should be removed from the terminal strip on the rear of the chassis and the outside antenna should be connected, through a 300 ohm twin transmission line, to the terminal strip, as shown in Figure 1. Orient the antenna to obtain maximum volume of the FM stations.

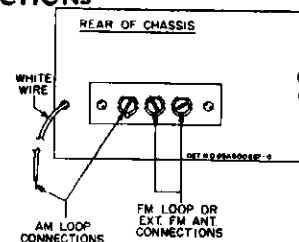


FIGURE 1. ANTENNA CONNECTIONS

CONTROLS

Refer to Figure 2 for the locations of the radio operating controls.

Power for both the radio and the record changer is controlled by the VOL-ON-OFF knob. The phonograph motor will not operate, however, until the PHONO-FM-AM knob is rotated to "PHONO"

Tuning of FM stations should be done very carefully, for best sound reproduction, not necessarily for the strongest volume received.



FIGURE 2. OPERATING CONTROLS

SERVICE NOTES

TO REMOVE CHASSIS FROM CABINET:

1. Remove the screws from the cabinet back.
2. Disconnect the phono power lead, the phono pick-up lead, the speaker leads, the line cord, and the antenna loop leads.
3. Remove the pointer escutcheon by pulling it downward.
4. Turn the tuning knob counterclockwise until the pointer reaches the extreme low frequency end of the dial scale.
5. From the back of the cabinet, loosen the pointer adjustment setscrew (see Figure 3), and pull the pointer shaft assembly from the chassis. CAUTION: Do not remove the nut from the front of the pointer, as the detent ball and spring will fall out and may become lost.
6. Pull off the control knobs.
7. Remove the three chassis mounting screws, from beneath the chassis.
8. Slide the chassis from the cabinet.

MODELS 9FM21,
9FM21B, Ch. HS-246

TO CALIBRATE DIAL:

1. Turn the tuning knob counterclockwise until the end of its travel is reached.
2. From the back of the cabinet, loosen the pointer adjustment setscrew (see Figure 3). **CAUTION: Do not** remove the nut from the front of the pointer.

3. Move the pointer until it is in a horizontal position (at the low frequency end of the dial scale).

4. Tighten the adjustment setscrew.

NOTE: If the pointer is moved by hand accidentally, it will be released from a detent in the pointer collar, and no damage to the tuning mechanism will result. To reset the pointer, move it back and forth until it again engages in the detent.

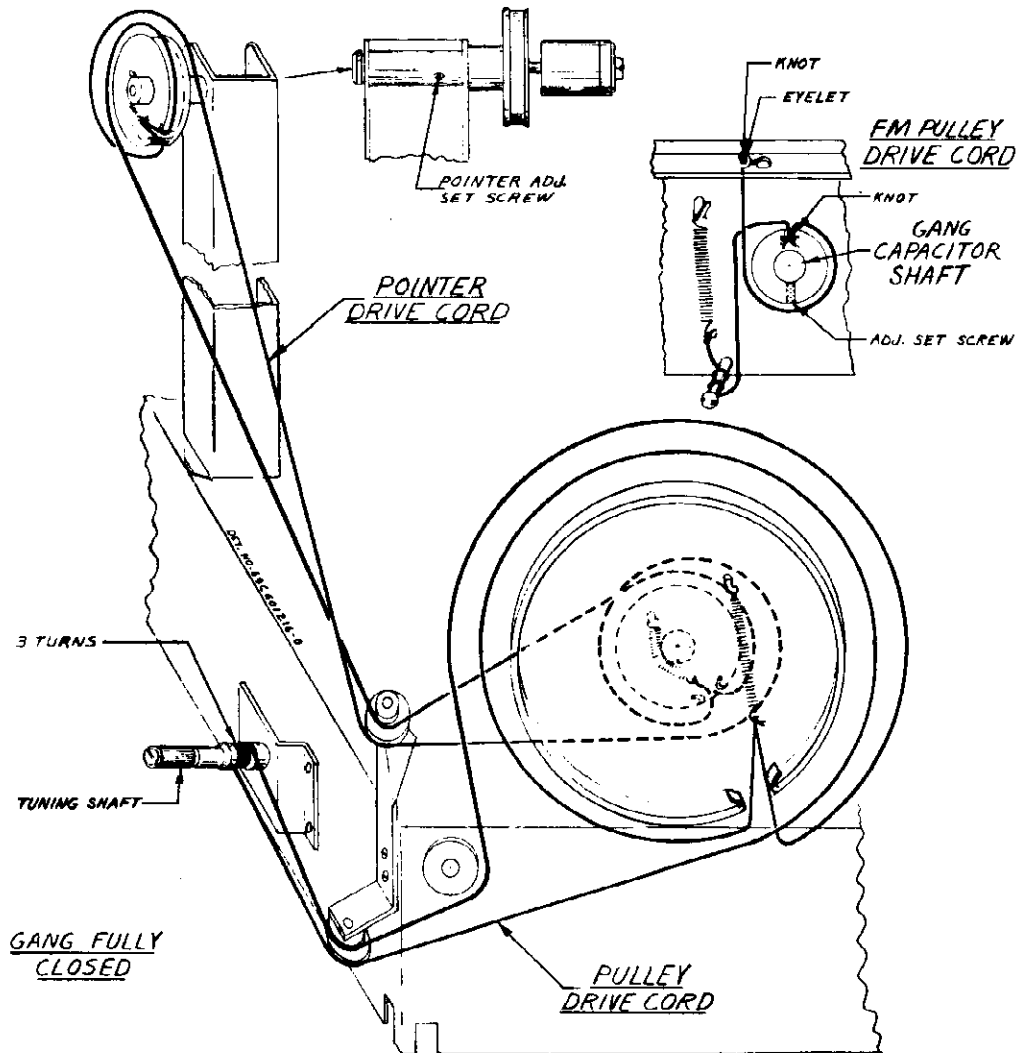


FIGURE 3. POINTER & DRIVE CORD RESTRINGING DETAIL
ALIGNMENT

GENERAL INFORMATION

1. Maximum performance can be obtained only if extreme care is exercised during alignment.
2. Use a small fibre screwdriver for aligning the IF transformers.
3. Refer to Figure 4 for the location of all alignment trimmers and cores.
4. As the stages are brought into alignment, reduce the signal generator output to a low value to avoid overloading the receiver.

MODELS 9FM21,
9FM21B, Ch. HS-246

AM BROADCAST BAND - IF & RF ALIGNMENT

1. Connect the AM signal generator as in chart below, with 400 cycle, 30% modulation.
2. Connect the output meter across the speaker voice coil. Throughout alignment reduce the generator output to a level which produces less than 1.27 volts (.5 watt) across the voice coil, to avoid overloading the receiver.
3. Set the bandswitch to the AM position.
4. Turn the receiver volume control to maximum.
5. Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	Grid of conv. V-2 (pin 7, 6BA7)	455 Kc	Fully opened	1, 2, 3, & 4 (IF cores)	Adjust for maximum.
RF ALIGNMENT						
2.	.1 mf	Grid of conv. V-2 (pin 7, 6BA7)	1620 Kc	Fully opened	5 (AM osc)	Adjust for maximum.
3.	.1 mf	Grid of conv. V-2 (pin 7, 6BA7)	1400 Kc	Tune in signal	6 (AM RF)	Adjust for maximum.
4.	-	-	-	-	-	Connect AM loop to chassis.
5.	-	Across radiation loop*	1400 Kc	Tune in signal	7 (AM ant)	Adjust for maximum.

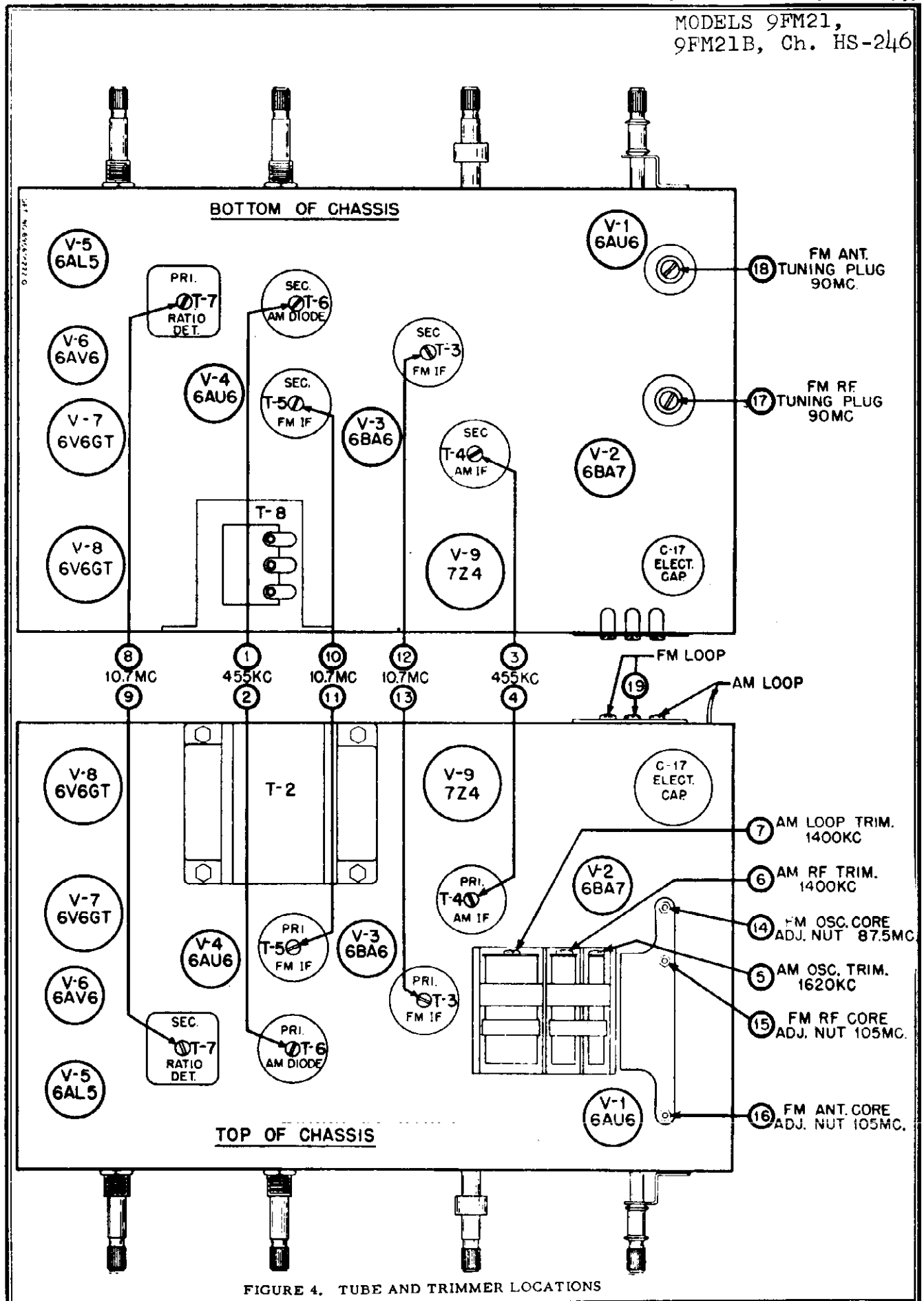
* Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

ORDER OF ALIGNMENT AND EQUIPMENT REQUIRED

1. AM Broadcast Band IF & RF Alignment
 - a. 455 to 1620 Kc AM Signal Generator
 - b. Low range output meter
- 2(A) FM Band IF & RF Alignment (preferred method)
 - a. 10.7 to 108 Mc FM signal generator
 - b. Oscilloscope.
- (B) FM Band IF & RF Alignment (alternate method)
 - a. 10.7 to 108 Mc signal generator (unmodulated)
 - b. Low range DC electronic voltmeter

FM BAND - IF & RF ALIGNMENT (PREFERRED METHOD)

1. The following FM alignment procedure, using an FM signal generator and an oscilloscope, is to be preferred because the actual response pattern may be observed on the scope and adjusted for best symmetry and maximum amplitude.
2. Connect the vertical input terminals of the oscilloscope between the chassis and the junction of resistor R-19 (47K) and capacitor C-24 (1000 mmf).
3. Connect the FM signal generator sync voltage output terminals, through a phase shifting network, to the horizontal input terminals of the scope, as in Figure 5. (Other values of resistance and capacitance may be required, depending upon the scope). The phasing control should be adjusted to give only one trace on the scope. NOTE: If the FM generator has a built-in phase control, the phase shifting network is not necessary.
4. Set the bandswitch to the FM position.
5. Throughout alignment, reduce the generator output

MODELS 9FM21,
9FM21B, Ch. HS-246

MODELS 9FM21,
9FM21B, Ch. HS-246

FM BAND - IF & RF ALIGNMENT (ALTERNATE METHOD)

- The following procedure for FM alignment, with an unmodulated carrier generator and a DC electronic voltmeter, is not as desirable as the preceding method; but it may be used if no FM generator is available.
- Connect the signal generator as in chart below, with no modulation.
- Set the bandswitch to the FM position.
- Except in step 2 below, connect the electronic voltmeter across resistor R-23 (33K) in the ratio detector stage.
- Throughout alignment reduce the signal generator output to a value which produces no more than a 5 volt rise above no signal voltage, to avoid overloading the receiver.
- In step 2 below, connect two 100K ohm resistors in series across R-23. Connect the electronic voltmeter between the volume control side of resistor R-19 (47K) and the junction of the two 100K resistors, with the low side of the meter at the 100K resistors.
- Proceed as shown in the following chart.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SETTING	ADJUST	REMARKS
IF ALIGNMENT						
1.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc	Fully opened	8, 10, 11, 12 & 13 (IF cores)	Adjust for maximum.
2.	1000 mmf	Grid of conv. V-2 (pin 7, 6BA7)	10.7 mc	Fully opened	9 (ratio det sec)	Adjust for zero. (Connect meter as in step 6 above).
RF ALIGNMENT						
3.	270 ohms	FM terminal 19 on rear of chassis	87.5 mc	Fully closed	14 (osc core)	Adjust for maximum.
4.	-	-	-	Fully closed	15 & 16 (RF & ant cores)	Turn counterclockwise until cores are at bottom of pipe, then turn two turns clockwise.
5.	270 ohms	FM terminal 19 on rear of chassis	90 mc	Tune in signal	17 & 18 (RF & ant tuning plugs)	Adjust for maximum.
6.	270 ohms	FM terminal 19 on rear of chassis	105 mc	Tune in signal	15 & 16 (RF & ant cores)	Adjust for maximum.
7.	-	-	-	-	-	Repeat steps 5 & 6 until no further adjustment is necessary.

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

ref. No.	Part No.	Description	
			C-15 8R9809 Paper: .01 mf 400V
			C-16 8R9813 Paper: .005 mf 600V
			C-17 23B690975 Electrolytic: 40 mf/300V, 40-40 mf/250V, 40 mf/25V
CHASSIS PARTS - ELECTRICAL			C-18 21K482726 Ceramic, disc type: 10,000 mmf 450V
Capacitors			C-19 21K77373 Ceramic: 47 mmf 500V
			C-20 21K77373 Ceramic: 47 mmf 500V
			C-21 21K478410 Ceramic: 1000 mmf 500V
			C-22 8R9824 Paper: .002 mf 400V
			C-23 8K470606 Paper: .05 mf 400V
			C-24 21K478410 Ceramic: 1000 mmf 500V
			C-25 21B484337 Ceramic: dual; 250-250 mmf/450V...
			C-26 8K470606 Paper: .05 mf 400V
			C-27 8R9813 Paper: .005 mf 600V
			C-28 8R9813 Paper: .005 mf 600V
			C-29 8R9813 Paper: .005 mf 600V
			C-30 8R9821 Paper: .05 mf 200V
			C-31 23K690543 Electrolytic: 3 mf 50V
			C-32 8R9809 Paper: .01 mf 400V
			C-33 21A470789 Ceramic, disc type: 5000 mmf 450V
			C-34 21K77375 Ceramic: 220 mmf 500V
C-1	19B690978	Variable, 3-gang	
C-2	21K77375	Ceramic: 220 mmf 500V	
C-3	21K70720	Ceramic: 5 mmf 500V	
C-4	21K482726	Ceramic, disc type: 10,000 mmf 450V	
C-5	21B77286	Ceramic: 100 mmf 500V	
C-6	21B77286	Ceramic: 100 mmf 500V	
C-7	21B77286	Ceramic: 100 mmf 500V	
C-8	21R6554	Mica: 100 mmf 10% 500V	
C-9	21K28816	Ceramic: 24 mmf 500V	
C-10	21K478410	Ceramic: 1000 mmf 500V	
C-11	21K691203	Ceramic: 85 mmf 500V	
C-12	8R9821	Paper: .05 mf 200V	
C-13	21B77286	Ceramic: 100 mmf 500V	
C-14	8R9809	Paper: .01 mf 400V	

PAGE 21-120 MOTOROLA

MODELS 9FM21,
9FM21R, Ch. HS-246

Ref. No.	Part No.	Description
Dial Light		
I-1,2	65X10867	Bulb, dial light: #44; 6-8V; .25 amp; clear; bayonet base

Coils		
L-1	24K690985	FM loop antenna: with lead
L-2	24C690896	AM loop antenna
L-3	24C690584	Inductor and Capacitor Assembly: FM antenna: less tuning core.....
L-4	24A484025	RF choke
L-5	24C690584	Inductor and Capacitor Assembly: FM RF; less tuning core
L-6	24K690996	Inductor and Capacitor Assembly: FM oscillator; less tuning core...
L-7	24K780128	RF choke: insulated
L-8	24B690976	AM oscillator coil

Speaker		
IS-1	50C601037	Speaker: 10" FM; 3.2 ohm VC....

Resistors

Note: All resistors are insulated carbon type
unless otherwise specified.

R-1	6R6046	1 meg 10% 1/2W
R-2	6R5551	120 10% 1/2W
R-3	6R6048	47,000 10% 1/2W
R-4	6R3949	470 20% 1/2W
R-5	6R490131	3.3 10% 1/2W
R-6	6R6028	22,000 20% 1/2W
R-7	6R5585	8.2 meg 10% 1/2W
R-8	6R6048	47,000 10% 1/2W
R-9	6R6038	1500 10% 1/2W
R-10	6R5725	8200 10% 2W
R-11	6R6497	3.3 meg 10% 1/2W
R-12	6R2039	68 10% 1/2W.....
R-13	6R5725	8200 10% 2W
R-14	6R6046	1 meg 10% 1/2W
R-15	17A690973	Wirewound: 360 10% 3W; center tapped
R-16	6R6056	47,000 20% 1/2W
R-17	6R3992	150 20% 1/2W
R-18	6R6431	15,000 10% 1W
R-19	6R6056	47,000 20% 1/2W
R-20	6R6032	470,000 20% 1/2W
R-21	6R6032	470,000 20% 1/2W
R-22	6R6389	220 10% 1W
R-23	6R6410	33,000 10% 1/2W
R-24	6R5598	390 10% 1W
R-25	6R6012	33,000 20% 1/2W
R-26	18A600974	Volume control: 2 meg; tapped at 600,000 ohms; includes on-off sw
R-27	18K77399	Tone Control: 1 meg
R-28	6R2109	10 meg 20% 1/2W
R-29	6R6001	68,000 20% 1/2W

Switches

S-1	40B690977	Band Switch: AM-FM-Phono
S-2	-	On-Off Switch (on volume control)...
S-3	40A691922	Phono-Radio-Switch; SPST

Transformers

T-1	24B690899	AM RF Transformer
T-2	25B691035	Power Transformer
T-3	24B690540	1st FM IF Transformer (orange dot); 10.7 mc; complete with capacitor and cores; less shield
T-4	24B482863	AM IF Transformer (brown dot): 455 Kc: complete with capacitors and cores; less shield
T-5	24B690541	2nd FM IF Transformer (yellow dot): 10.7 mc; complete with capacitor and cores; less shield

Part Number	Description
T-6	24B482865 AM Diode Transformer (red dot): 455 Kc: complete with capacitors and cores; less shield.....
T-7	24B690542 Ratio Detector Transformer: 10.7 mc; complete with capacitors, cores and shield
T-8	25B690898 Audio Output Transformer

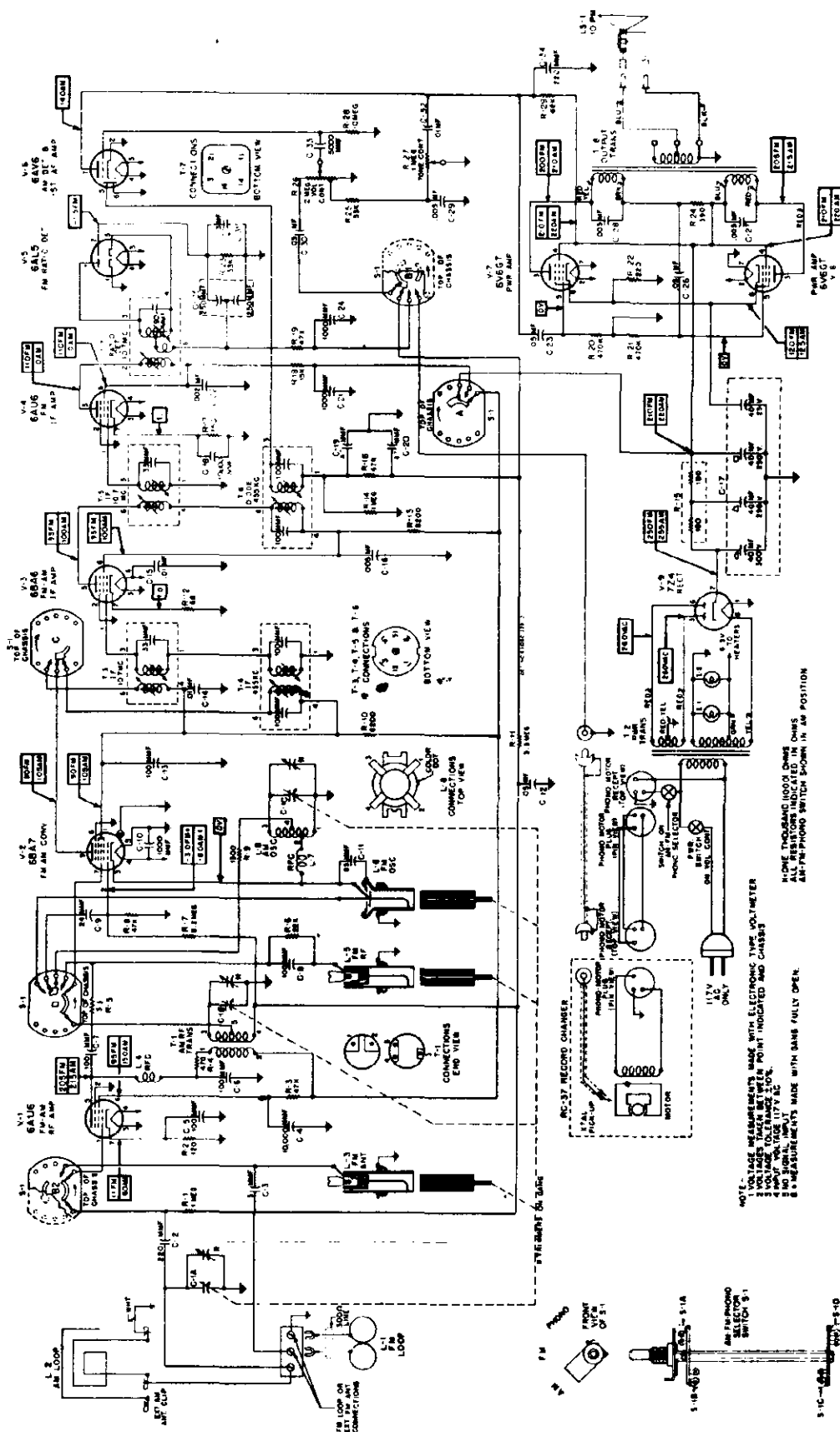
CHASSIS PARTS - MECHANICAL

1X690717	Bracket Assembly, tuning core mtg: in- cludes shoulder rivet and single anti- backlash clip
1X600827	Bracket & Pulleys Assembly: includes four pulleys and shoulder rivets (cord guides on chassis front)
7A600965	Bracket, pilot light mtg
7B600801	Bracket, pointer mtg
7C690567	Bracket, tuner mtg (gang mtg)
7A77337	Bracket, tuning shaft
43K890398	Bushing, line cord retainer (use with 43A890397)
43A890397	Bushing, line cord strain relief (use with 43K890398)
42A690560	Clip, anti-backlash: double (on tuner mounting brkt)
42K690561	Clip, anti-backlash: single (on core mtg brkt)
42B482867	Clip, spring: blued finish (holds IF transformer)
11M488137	Cord, dial (core drive)
11M8944	Cord, dial (pointer drive)
30X21859	Cord, line: with plug: 9 ft long
46B692164	Core, iron and screw: green dot (FM osc tuning core)
46K692165	Core, iron and screw (FM RF and ant tuning core)
58T866	Eyelet: .125 x .091; brass; nkl pl (core drive cord retainer)
1X600081	Link Assembly, bandswitch actuating: complete with bushings; less set screws..
489751	Lockwasher, int-ext: #8; cad pl (pointer drive pulley mtg)
28T019	Nut, hex: 4-40 x 1/4; cad pl (FM tuning core mtg)
28T051	Nut, hex palnut: 3/8-32 x 9/16; cad pl (bandswitch, tone and volume control mtg)
1X600828	Pulley Assembly, pointer & gang drive (includes 3-1/2" & 1-1/4" pulleys)...
49A23960	Pulley, cord: 1/4" groove (on pulley bracket)
49A21741	Pulley, cord: 3/8" groove (on pulley bracket)
49A73807	Pulley, cord: 1/2" groove (on chassis side and on pulley bracket).....
49A26433	Pulley, cord: 21/32" groove (on pulley bracket)
49A690562	Pulley, core drive: brass
9K592170	Receptacle, phono pick-up: 1-prong
9A27674	Receptacle, phono power: 3-prong
588497	Rivet: .088 x 1/8 stl; nkl pl (single anti-backlash clip mtg)
587771	Rivet: .088 x 3/16; stl; nkl pl (min and midget tube socket mtg)
587707	Rivet: .122 x 5/32; stl; nkl pl (octal tube socket, terminal strip, output transformer mtg)
587701	Rivet: .122 x 3/16 stl; nkl pl (power receptacle, ant term strip, and tuning shaft bracket mtg)
587700	Rivet: .122 x 1/4; stl; nkl pl (octal tube socket mtg)
5K13896	Rivet, shoulder (tuning core cord guide and mounts 1/2" and 3/8" pulleys to bracket)
5K71246	Rivet, shoulder (pulley mtg on side of chassis)
5K71735	Rivet, shoulder (mounts 21/32" and 3/8" pulleys to bracket)

MODELS 9FM21,
9FM21B, Ch. HS-246

Part Number	Description	Part Number	Description
3S7462	Screw, machine: 6-32 x 3/16 plain hex head; cad pl (electrostatic shield mtg)	14K791482	Insulator, fibre (clamps phono leads).
3S7326	Screw, machine: 8-32 x 3/16 plain locking hex head; cad pl (gang mtg).....	36K601041	Knob, control (VOL-ON-OFF): walnut-mahogany
3S7163	Screw, machine: 8-32 x 1/4 plain hex head; cad pl (pointer drive pulley mtg)...	36K601043	Knob, control (TONE): walnut-mahogany ...
3S2695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; cad pl (tuner brkt mtg)...	36K601044	Knob, control (PHONO-FM-AM): walnut-mahogany
3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; cad pl (pointer bracket mtg)	36K601045	Knob, control (TUNING): walnut-mahogany..
3S7475	Screw, sheet metal: #8 x 1/4 PKZ slotted acorn head; cad pl (power trans mtg)	1X600852	Lead and Plugs Assembly, phono-pick-up (shielded lead with two phono pick-up plugs)
3S7103	Setscrew: 8-32 x 1/8 Allen head; cad pl (core drive pulley & pointer mtg).....	4S7657	Lockwasher, ext: #8; cad pl (spkr mtg)
3S7113	Setscrew: 8-32 x 1/4 slab head; cad pl (bandswitch link assembly mtg).....	2S7005	Nut, hex: 6-32 x 1/4 stl; cad pl (pointer mtg)
1K601085	Shaft and Pulley Assembly, pointer mtg...	2S7003	Nut, hex: 8-32 x 5/16; cad pl (spkr mtg)
1K691134	Shaft, tuning: complete with pulley.....	62K70581	Overlay, logotype: "Motorola"; gold lacquer finish
26K485936	Shield, coil: for IF transformers.....	35K691051	Pad, felt: 1/2" diameter (door stop)...
26K690984	Shield, electrostatic (gang shield).....	64K600867	Panel, record changer bottom: chipboard.
26K690981	Shield, tube: spring type	1X600851	Pointer and Collar Assembly (less shaft and sleeve)
26A692080	Shield, tube (for V-9): includes 41K692081 spring	28A27573	Plug, phono motor: 3-pin; includes shell (on phono motor lead)
9K600968	Socket, pilot light	28K71775	Plug, phono pick-up
9A72519	Socket, tube: loctal	9A600040	Receptacle, phono motor: 3-prong; includes shell (on phono motor lead)
9A690129	Socket, tube: midget; 7-prong (for V-1)...	3K489169	Screw, machine: 8-32 x 1 cross slot head; statuary bronze finish (door handle mtg)
9K484167	Socket, tube: miniature; 7-prong.....	3S7536	Screw, sheet metal: #6 x 3/8 PKA slotted acorn head; antique copper finish (back cover mtg)
9A485495	Socket, tube: noval; 9-prong	3S3387	Screw, sheet metal: #6 x 1/2 PKA plain hex head; statuary bronze finish (cable clamp mtg)
9A76209	Socket, tube: octal	3K653	Screw, speaker mtg: 8-32 x 1-1/4"; copper oxide finish
41A690598	Spring, coil: 7 turns; cosmoline dipped (FM RF & ant core mtg).....	3S1334	Screw, wood: #6 x 1 flat head; statuary bronze finish (door hinge mtg).....
41K691840	Spring, coil: 8 turns; copper plated (FM osc core mtg)	1A690738	Shaft and Sleeve Assembly, pointer: less detent spring and ball, and pointer....
41A14244	Spring, tension (core & pointer drive cord)	15A690616	Shell, receptacle (on phono motor receptacle)
41K692081	Spring, tube shield retaining (for V-9 shield)	15K74442	Shell, receptacle (on phono motor plug)
31K51251	Strip, terminal: 1 insulated lug, #1 gnd; 3/8" spacing	55K600171	Slide, record changer: left-hand (on side of RC drawer)
31K76184	Strip, terminal: 2 insulated lugs; #1 gnd; 3/8" spacing	55K600172	Slide, record changer: right-hand (on side of RC drawer)
31K471565	Strip, terminal: 3 insulated lugs, #4 gnd; 3/8" spacing	2S400199	Speednut: for .050 stud (dial scale mtg)
31A690974	Strip, terminal: 7 insulated lugs, #4 & 9 gnd; 3/8" spacing	41A690732	Spring, compression (pointer detent)..
31K471498	Strip, terminal: 3-screw (antenna input).	55K482160	Strike & nail: statuary bronze finish (door latch - on door)
29K5412	Terminal, plain pin (on speaker leads)	4S1765	Washer, flat: 1/2 x .147 x .015 stl; pl (pointer mtg)
4A70015	Washer, "C" (tuning shaft retainer)	4S7629	Washer, flat: 1/2 x 3/16 x .048 stl; pl (spkr mtg)
4A21941	Washer, "C" (holds pointer mtg shaft & pulley)	4S8214	Washer, flat: 7/8 x .203 x .067 stl; pl
4S7582	Washer, flat: 1/2 x .195 x .033 stl; cad pl (pointer drive pulley mtg).....	4A690729	Washer, spring (pointer mtg)
MODEL 9FM21 CABINET PARTS			
43A4326	Ball, steel: 1/8" diameter (pointer detent)	MODEL 9FM21B CABINET PARTS - Same as 9FM21 except:	
38K691915	Button, plug (on record changer).....	16K600642	Cabinet, console: blonde; complete, less pointer escutcheon and dial scale.....
16F600641	Cabinet, console: red-brn mahogany; complete, less pointer escutcheon and dial scale	55K482794	Catch, bullet: brass (door latch - on cabinet)
55K482159	Catch, bullet: statuary bronze finish (door latch - on cabinet)	43K600638	Cloth, grille: 13-3/8 x 15-1/2; eggshell & brown
42A470832	Clamp, cable: plastic (holds line cord)..	55K600647	Hinge, door: brushed brass finish (lower hinges)
42K600645	Clip, pointer escutcheon	55K600644	Hinge, door (stop type): brushed brass finish (upper hinges)
43K600637	Cloth, grille: 13-3/8 x 15-1/2; mahogany.	36K601046	Knob, control (VOL-ON-OFF): tan
15D600648	Cover, cabinet back	36K601048	Knob, control (TONE): tan
34D600819	Dial scale	36K601049	Knob, control (PHONO-FM-AM): tan
34K600817	Escutcheon, pointer	36K601051	Knob, control (TUNING): tan
5S7870	Eyelet: brass (on RC drawer panel -holds extra spindle)	3K489170	Screw, machine: 8-32 x 1 cross slot head; brass (door handle mtg)
5A71081	Eyelet, chassis mtg: plain; 9/32" long.	55K482795	Strike & nail: brass (door latch - on door)
5A600963	Eyelet, chassis mtg: pierced; 1/8" lg.		
5A71092	Grommet, chassis mtg: rubber		
55K600643	Handle, door: polished brass		
55K600646	Hinge, door: bronze finish (lower hinges)		
55K600639	Hinge, door (stop type): bronze finish (upper hinges)		

MODELS 9FM21,
9FM21B, Ch. HS-246



RECORD CHANGER: Model RC-37, on Pages RCD.CH.21-17,18
through RCD.CH.21-29.

FIGURE 7. SCHEMATIC DIAGRAM

GENERAL INFORMATION

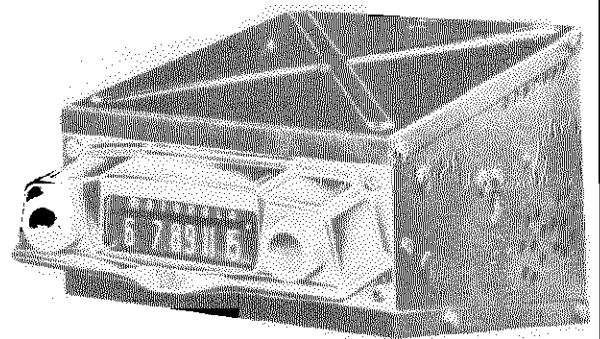
TYPE - Universal automotive type superheterodyne receiver with self-contained speaker. Designed for under-dash mounting.

TUNING RANGE - 535 to 1600 Kc IF - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
 6BE6 - Converter
 6BA6 - IF Amplifier
 6AV6 - Detector-AVC-AF Amplifier
 6AS5 - Power Amplifier
 6X4 - Rectifier

POWER INPUT - 6.3 volts DC at 6 amperes

POWER OUTPUT - 2 watts



REPLACEMENT PARTS LIST

REF.
NO. PART NO. DESCRIPTION

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1	21K591682	Ceramic; 90 mmf 500V
C-2	8A4529	Paper; .006 mf 100V
C-3	20A485652	Trimmer, mica; 50 to 280 mmf 500V
C-4	8K472035	Paper; .1 mf 100V
C-5	8K14791	Paper; .05 mf 400V
C-6	20A481526	Trimmer, mica; 20 to 180 mmf 500V
C-7	21K70720	Molded; 5 mmf 500V
C-8	21K74661	Ceramic; 50 mmf 300V
C-9	20A580113	Trimmer, mica; 240 to 300 mmf 500V
C-10	8K13514	Paper; .05 mf 100V
C-11	8K17028	Paper; .5 mf 100V
C-12	8K592154	Paper; .03 mf 600V
C-13	8K472754	Paper; .01 mf 100V
C-14	8K23690	Paper; .01 mf 400V
C-15	21K6543	Mica; 250 mmf 500V
C-16	8K71909	Paper; .004 mf 400V
C-17	23A591500	Electrolytic; 15-10-20 mfd/ 350-350-25V

FUSE

F-1	65A10266	Fuse; 10 amp
-----	----------	--------------------

VIBRATOR

G-1	48B3333	Vibrator; 4-pin; non-sync.....
-----	---------	--------------------------------

DIAL LIGHT

I-1	65X10867	Bulb; 6.3V; .25A; tubular; bayonet base; #44
-----	----------	---

COILS

L-1	24B580570	Coil, antenna
L-2	24K580571	Coil, RF
L-3	24B592036	Coil, oscillator
L-4	24K580706	Choke, RF
L-5	24A472535	Choke, hash

REF.
NO. PART NO. DESCRIPTION

SPEAKER

LS-1	50B591189 or 50B580759 or 50B590079	Speaker; PM; 5-1/4"; 3.2 ohm voice coil
------	---	--

RESISTORS

Note: All resistors are carbon insulated type unless otherwise specified.

R-1	6R6032	470,000 20% 1/2W
R-2	6R6075	100,000 20% 1/2W
R-3	6R6056	47,000 20% 1/2W
R-4	6R5614	56 10% 1/2W
R-5	6R5614	56 10% 1/2W
R-6	6R6022	330 10% 1/2W
R-7	6R6006	2200 20% 1W N.I.
R-8	18K592021	Volume Control; .5 meg; includes on-off switch
R-9	6R6004	1 meg 20% 1/2W
R-10	6R2122	4.7 meg 20% 1/2W
R-11	6R6032	470,000 20% 1/2W
R-12	6R6015	220,000 20% 1/2W
R-13	6R6390	180 10% 1W
R-14	6R6004	2200 20% 1W N.I.

SPARK PLATE

SP-1	1A485606	Spark Plate Assembly
------	----------	----------------------------

TRANSFORMERS

T-1	24B485553	IF, 455 Kc; complete
T-2	24K485554	Diode; 455 Kc; complete
T-3	25C591740	Power Transformer
T-4	25B70171	Output Transformer

PAGE 21-124 MOTOROLA

MODEL 400

PART NUMBER	DESCRIPTION
CHASSIS PARTS - MECHANICAL	
42A485548	Clip, coil can mtg (T-1 & T-2 mtg)
42A4215	Clip, vibrator grounding
9K14906	Insulator, electrolytic mtg: ar-mite
9K580705	Lead, fuse: complete with 10 amp fuse.
4S7666	Lockwasher, ext: #6; stl; cad pl (power trans mtg)
4S8406	Lockwasher, int: #2; stl; cad pl (pointer plate mtg)
4S7650	Lockwasher, int: #6; stl; cad pl (dial light mtg)
2A78005	Nut, floating: with ear (on tuning shaft)
2A77596	Nut, floating: without ear (on tuning shaft)
2S7005	Nut, hex: 6-32 x 1/4; stl; cad pl (power trans mtg)
2S7051	Nut, hex: 3/8-32 x 9/16; Palnut; stl; cad pl (vol. cont mtg)
1X592056	Plate and Stud Assembly (pointer adj plate)
1X592054	Pointer Plate and Sleeve Assembly...
9A472148	Receptacle, antenna contact
5S7771	Rivet: .088 x 5/16; stl; nkl pl (tube socket mtg)
5S7707	Rivet: .122 x 5/32; stl; nkl pl (output trans mtg)
5S7701	Rivet: .122 x 3/16; stl; nkl pl (vibrator socket, dial light and spark plate assem mtg)
5S7703	Rivet: .122 x 7/32; stl; nkl pl (electrolytic wafer mtg)
3S1921	Screw, machine: 2-56 x 1/8; slotted binder head; stl; cad pl (pointer plate mtg and pointer adjustment screw)
3S7454	Screw, sheet metal: #8 x 1/4; plain hex head; stl; cad pl (tuner mtg)
47K592016	Shaft, drive (tuning shaft)
60K25753	Shield, light
9K580609	Socket, dial light: includes mtg brkt.
9A472534	Socket, tube: miniature
9A70208	Socket, tube: 4 prong (for vibrator) ..
41A77592	Spring, compression (tuning shaft).
41A472659	Spring, torsion (pointer assembly..
46A485622	Stud, drive plate mtg
46A592015	Stud, pointer mtg
9A12705	Wafer, electrolytic mtg: bakelite..
4K24124	Washer, 'C' (drive shaft retainer).
4A11291	Washer, 'C' (pointer mtg and carriage plate stop)
4S488235	Washer, flat: 3/8 x 3/32 x .010; thick; stl; cad pl (pointer plate mtg)
4S1719	Washer, flat: 3/8 x 9/64 x .030; thick; stl; cad pl (pointer mtg)
4K592045	Washer, spring (drive shaft play takeup)
39A26068	Wiper, grounding: spring brass (grounds chassis to top cover)..
HOUSING PARTS	
15K592028	Cover, bottom: less speaker
15K592026	-Cover, top

PART NUMBER	DESCRIPTION
13D592010	Escutcheon, dial
7A485674	Frame, dial scale retainer
36K591957	Knob, control
4S7657	Lockwasher, ext: #8; stl; cad pl (speaker mtg)
2S7003	Nut, hex: 8-32 x 5/16 stl; cad pl (speaker mtg)
2S7988	Speednut (dial scale mtg)
34K591929	Scale, dial: glass
3S8114	Screw, sheet metal: #8 x 1/4 slotted acorn head; antique copper finish (housing screws)
3S490733	Screw, sheet metal: #8 x 1/4 PKZ Phillips binder head; chrome pl (escutcheon mtg)
MOUNTING PARTS AND ACCESSORIES	
7B590654	Bracket, receiver mtg (on escutcheon).
7A72256	Bracket, receiver mtg (on housing)....
7A484424	Bracket and Stud Assembly (receiver mtg)
8A4491	Capacitor, noise suppression (generator cap)
4S7688	Lockwasher, int-ext: 1/4; stl; cad pl (receiver mtg)
2S7022	Nut, hex: 1/4-20 x 7/16; stl; cad pl (receiver mtg)
3S8109	Screw, sheet metal: #8 x 3/8; PKZ; slotted acorn head; stl; cad pl (receiver mtg)
3S7295	Screw, machine: 1/4-20 x 3/4; plain hex head; stl; cad pl (receiver mtg strap)
3S9694	Screw, machine: 1/4-20 x 1-1/2; plain hex head; stl; cad pl (receiver mtg to car firewall)
42A485718	Strap, receiver mtg
6A4141	Suppressor, noise (distributor) ..
TUNER PARTS - MECHANICAL	
Note: Coils and trimmers are included in the Electrical Chassis Parts list. Drive shaft parts are included in the Mechanical Chassis Parts List.	
1X580162	Carriage Plate Assembly: includes bakelite core insulator & slider spring..
46K489214	Core, iron and screw (specify color coding on old core when ordering)...
42A70184	Clip, core adjustment
5K580503	Grommet, rubber (Ant & RF coil mtg)..
5K580504	Grommet, rubber (oscillator coil mtg)
14A485602	Insulator, core: bakelite; 2-11/16 x 1-1/8
5S8497	Rivet: .088 x 1/8; stl; nkl pl (terminal strip and slider mtg)
5S6819	Rivet: .122 x 1/8; stl; nkl pl (shield mtg)
26A580546	Shield, coil
41A485649	Spring, core
41A580079	Spring, slider
31A485605	Strip, terminal: 2 insulated lugs, #2 mtg
4A70956	Washer, core insulator: 1/4 dia; bakelite

ALIGNMENT

Connect a low range output meter across speaker voice coil and set volume control at maximum. For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part

No. 66A76278, is required for adjusting the tuner cores. **IMPORTANT:** Do not push in on the alignment tool when adjusting the tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment. Remove receiver top and bottom covers and the escutcheon and dial scale assembly to expose all adjustments.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SET TO	ADJUST	REMARKS
IF ALIGNMENT 1.	.1 mf	6BE6 Grid (pin #7)	455 Kc	High frequency end (cores out)	1, 2, 3 & 4	Peak for maximum in order indicated. Check by repeating procedure.
RF ALIGNMENT 2.	See Fig. 1.	Antenna receptacle through dummy.	1605 Kc	High frequency end; cores should project 1-1/4" from cans. (Screw out)	5, 6 & 7	Peak for maximum in order indicated.
3.	"	"	1300 Kc	1300 Kc per Fig. 2	8, 9 & 10	"
POINTER ADJUSTMENT 4.	"	"	600 Kc	Tune for maximum	-	Replace dial scale & set pointer to 600 Kc by means of pointer adjustment screw.

5. With receiver installed in car, the antenna fully extended and dial set to approximately 1400 Kc, adjust antenna trimmer (7) for maximum volume of a weak station or noise between stations.

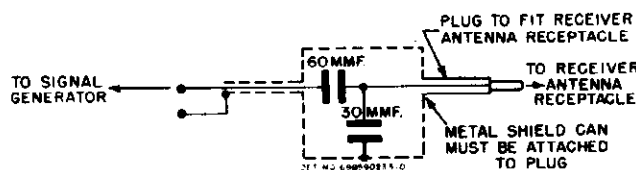


FIGURE 1. DUMMY ANTENNA

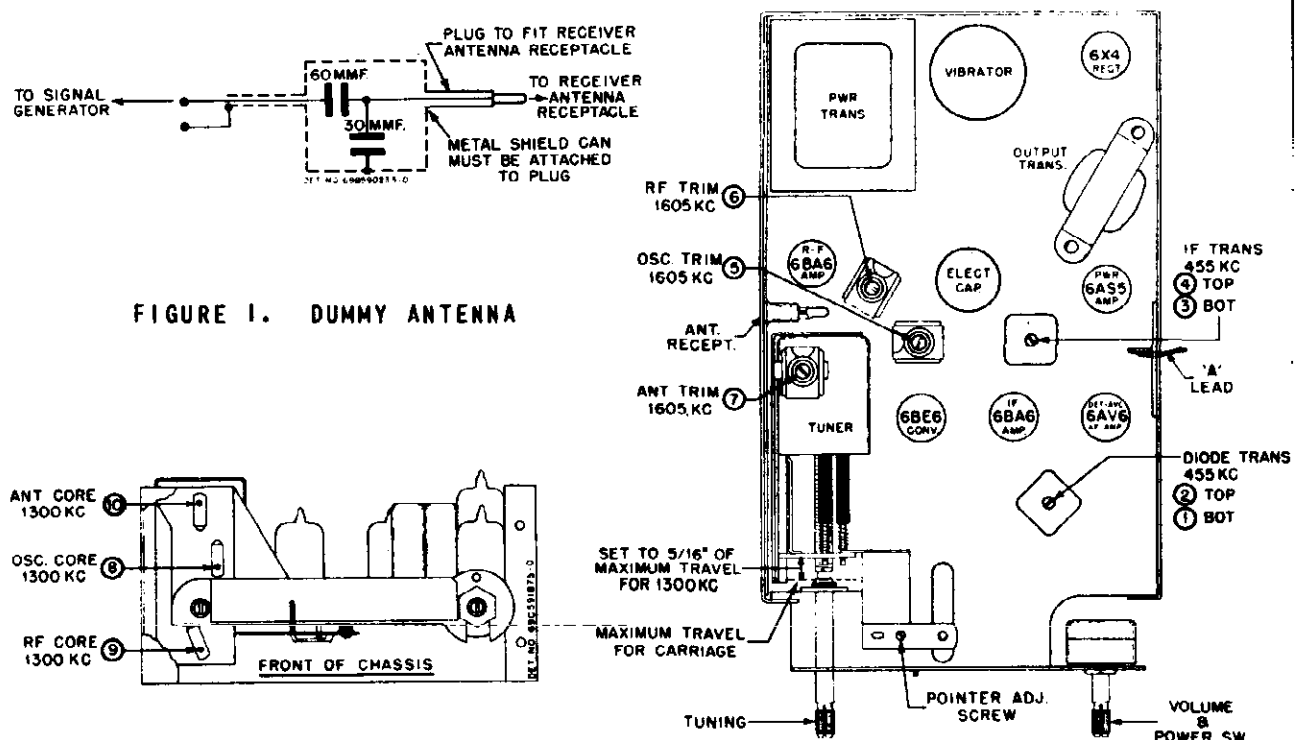


FIGURE 2. TUBE & TRIMMER LOCATIONS

FIGURE 3. SCHEMATIC DIAGRAM

GENERAL INFORMATION

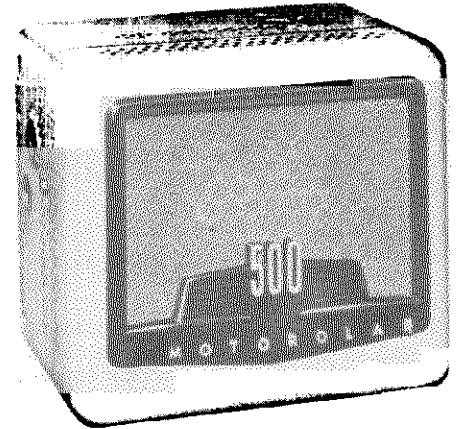
TYPE - Compact automotive type superheterodyne receiver with self-contained speaker. Receiver is designed for installation in any car when used with appropriate Motorola control head.

TUNING RANGE - 535 to 1600 Kc IF - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
6BE6 - Converter
6BA6 - IF Amplifier
6AT6 - Det, AVC & AF Amp
6AQ5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 6.8 amps at 6.3 volts

POWER OUTPUT - 3.5 watts (max)



REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
----------	----------	-------------

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1	21A591682	Ceramic; 90 mmf 500V.....
C-2	8C4529	Paper: .006 mf 100V
C-3	20K592078	Trimmer, variable: 50 to 280 mmf; on same bracket as C-5 and C-8 (sold only as assembly).....
C-4	8R13166	Paper: .1 mf 400V
C-5	20K592078	Trimmer, variable: 20 to 180 mmf; on same bracket as C-3 and C-8 (sold only as assembly).....
C-6	21K70720	Molded: 5 mmf 500V
C-7	21R6513	Mica: 50 mmf 10% 300V
C-8	20K592078	Trimmer, variable: 500 to 580 mmf; on same bracket as C-3 and C-5 (sold only as assembly)
C-9	8K17028	Paper: .5 mf 100V
C-10	8R13514	Paper: .05 mf 100V
C-11	8R13514	Paper: .05 mf 100V
C-12	21B77562	Ceramic; 100 mmf 500V
C-13	21B77562	Ceramic; 100 mmf 500V
C-14	21K70720	Molded: 5 mmf 500V
C-15	8K17028	Paper: .5 mf 100V
C-16	8R490449	Paper: .02 mf 1000V
C-17	21K478410	Ceramic; 1000 mmf 500V
C-18	8R71911	Paper: .03 mf 400V
C-19	8R23690	Paper: .01 mf 400V
C-20	23A485677	Electrolytic: 15-10-20 mf/350-350-25V

REF. NO.	PART NO.	DESCRIPTION
----------	----------	-------------

FUSE

F-1	65A10266	10 Amp (3AG)
-----	----------	--------------------

VIBRATOR

G-1	48B3333	Non-sync; 4-pin
-----	---------	-----------------------

COILS

L-1,2	24B591664	RF & Antenna Coil (specify color of paint dots on old coil when ordering)
L-3	24B592153	Oscillator Coil (specify color of paint dots on old coil when ordering)
L-4,5	24K78026	Choke, RF
L-6	24A472535	Choke, hash

RESISTORS

Note: All resistors are insulated carbon type, 20% unless otherwise specified.

R-1	6R6032	470,000 1/2W
R-2	6R6432	270 10% 1/2W
R-3	6R6075	100,000 1/2W
R-4	6R6056	47,000 1/2W
R-5	6R6090	470 10% 1/2W
R-6	6R6287	6800 1W N.I.
R-7	6R6004	1 meg 1/2W
R-8	1A472531	Volume Control: 500,000 ohms; includes SPST switch

MODEL 500

REF. NO.	PART NO.	DESCRIPTION
R-9	6R6056	47,000 1/2W
R-10	6R6004	1 meg 1/2W
R-11	6R5614	56 10% 1/2W
R-12	6R5614	56 10% 1/2W
R-13	6R5577	2700 10% 1/2W
R-14	6R2118	3.3 meg 1/2W
R-15	6R6032	470,000 1/2W
R-16	6R6015	220,000 1/2W
R-17	6R6336	270 10% 1W
R-18	6R6184	1000 1W N.I.

SPARK PLATE

SP-1 1X592328 Spark Plate Assembly; complete.

TRANSFORMERS

T-1,2 24B485670 Diode or IF, 455 Kc: complete with tuning cores and padding capacitors but less shield...

T-3 25B70171 Output Transformer

T-4 25B472533 Power Transformer

PART
NUMBER

DESCRIPTION

CHASSIS PARTS - MECHANICAL

42A13177 Clip, center post grounding

42A4215 Clip, vibrator grounding

4S7695 Lockwasher, int: #5; stl; cad pl (terminal strip mtg)

4S7671 Lockwasher, split: #8; stl; cad pl (spark plate mtg)

9A472148 Receptacle, antenna

5S7771 Rivet: .088 x 3/16 stl; nkl pl (tube socket mtg)

5S7706 Rivet: .122 x 1/8; stl; nkl pl (sensitivity control and center post ground clip mtg)

5S7707 Rivet: .122 x 5/32; stl; nkl pl (terminal strip and output transformer mtg)

5S7701 Rivet: .122 x 3/16; steel; nkl pl (vibrator grounding clip and output transformer mtg)

3S8140 Screw, sheet metal: #8 x 3/16 PKZ plain hex head; cad pl (tuner mtg)

3S7454 Screw, sheet metal: #8 x 1/4 plain hex head; stl; cad pl (capacitor bracket assembly and spark plate mtg)

3S3397 Screw, sheet metal: #8 x 5/16 PKZ plain hex head; cad pl (power transformer mtg)

26K485936 Shield (for T-1 & T-2)

9A70208 Socket, tube; 4-pin; with grounding lug (vibrator socket)

9A472534 Socket, tube; miniature; 7-prong ..

9K580218 Socket, tube; miniature; 8-prong ..

31C4079 Strip, terminal: 1 insulated lug, end mtg

31A472573 Strip, terminal: 2 insulated lugs, #2 mtg

31K16330 Strip, terminal: 3 insulated lugs, #3 mtg

PART
NUMBER

DESCRIPTION

HOUSING PARTS

42A472033 Clip, chassis retainer

13H592105 Cloth, speaker escutcheon

13C592107 Escutcheon, speaker

1X592332 Housing and Bushing Assembly, rear...

1X592334 Housing, front: includes escutcheon...

3S7456 Screw, sheet metal: #8 x 1/4 PKA slot-
ted acorn head; antique copper finish
(housing screws)

ACCESSORIES

65X4151 Bulb, pilot light: 6-8V; clear
bayonet base

8A4491 Capacitor, generator

9B473111 Lead Assembly, fuse: complete with 10
amp fuse

1X74340 Lead Assembly, dial light: complete
with bulb

4S7653 Lockwasher, int-ext: 5/16; stl; cad
pl (receiver mtg)

4S7657 Lockwasher, ext: #8; stl; cad pl
(speaker mtg)

2S7003 Nut, hex: #8 x 5/16; stl; cad pl
(speaker mtg)

2S2863 Nut, hex: 5/16-18 x 9/16; stl; cad
pl (receiver mtg)

1K75148 Shaft, flexible: with housing 24" long

50B472012 or
50C580519 or
50K591140 Speaker, PM: 5-1/4; 3.2 ohm WC

3A77542 Stud, receiver mtg

6X4141 Suppressor, distributor

TUNER PARTS - MECHANICAL

Note: Electrical parts of the tuner are included in the Electrical Chassis Parts List.

1X592301 Manual Tuner MT-75

1X592099 Base, Sleeve, Shields and Channels
Assembly

1X78034 Carriage Plate, Slug Insulator and Cen-
ter Guide Rod Assembly

42A70184 Clip, core adjustment

46K592080 Core, iron and screw

58K78012 Coupling, manual lead screw

14B78007 Insulator, slug: bakelite

2A77596 Nut, floating: without ear (on manual
lead screw)

2A78005 Nut, floating: with ear (on manual lead
screw)

64A77593 Plate, tuner front

5S7770 Rivet: .088 x 5/32; stl; nkl pl (slug
insulator mtg)

47A78002 Rod, carriage guide

3S7352 Screw, machine: #8-32 x 2 slotted
round head; stl; cad pl (front
plate mtg)

43A70881 Sleeve, coil (iron)

41A77595 Spring, coil slug

41A77592 Spring, compression

42A21577 Washer, 'C': spring (manual lead
screw mtg)

4A70873 Washer, coil spacer

4A74571 Washer, fishpaper

4A70956 Washer, slug insulator

4K485653 Washer, spring (manual lead screw
mtg)

ALIGNMENT

Remove receiver front and rear housings to expose all adjustments.

Connect a 6 volt battery to BAT terminal and chassis.

Connect a low range output meter across speaker voice coil and set volume control at maximum. For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output

meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part No. 66A76278, is required for adjusting the tuner cores. IMPORTANT: Do not push in on the alignment tool when adjusting the tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SET TO	ADJUST	REMARKS
IF ALIGNMENT 1.	.1 mf	6BE6 grid (pin #7) & chassis	455 Kc	High frequency end (cores out)	1, 2 3 & 4	Peak for maximum in order indicated. Check by repeating step.
RF ALIGNMENT 2.	See Fig. 1	Antenna receptacle through dummy	1610 Kc	High frequency end; cores should project 1-1/8" from cans. (Screw out if necessary)	5, 6 & 7	Peak for maximum in order indicated.
3.	"	"	1425 Kc	1425 Kc per Fig. 1	8, 9 & 10	Peak for maximum in order indicated.

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

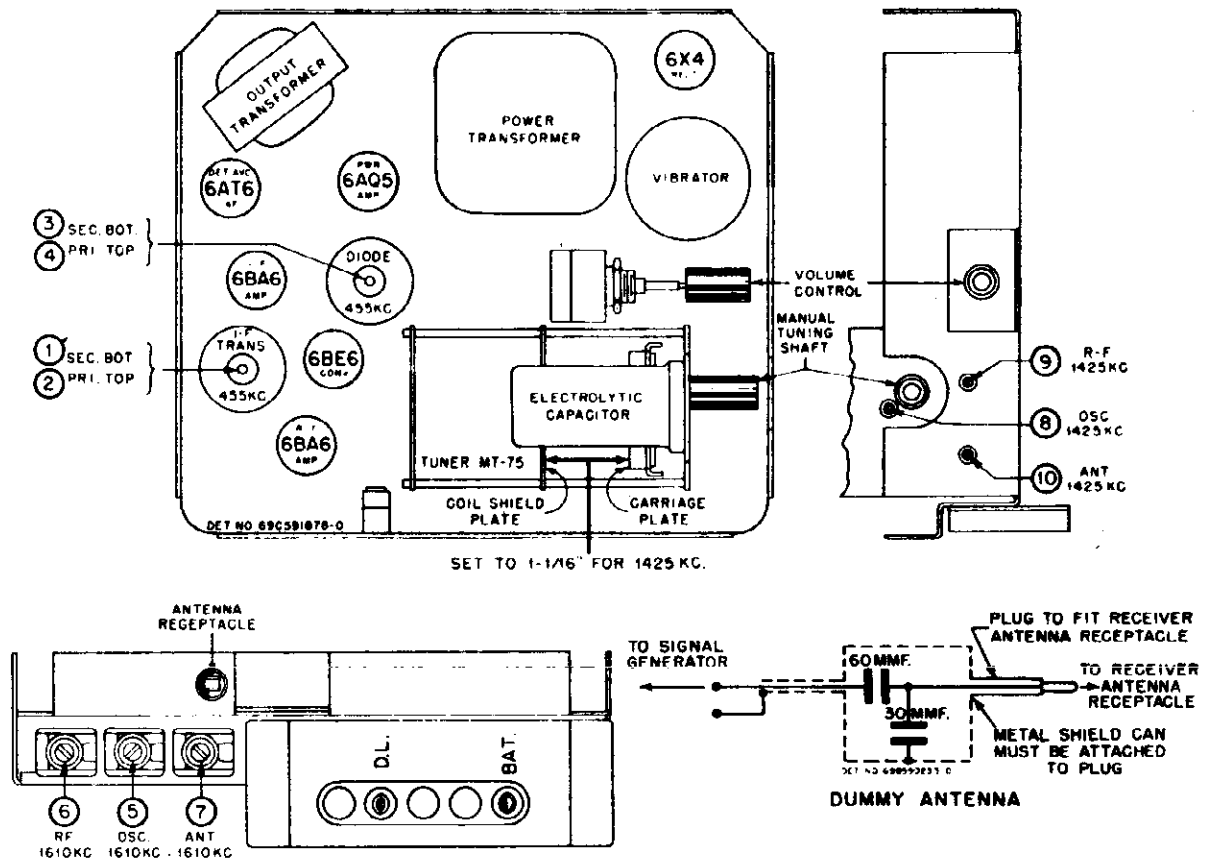


FIGURE 1. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA

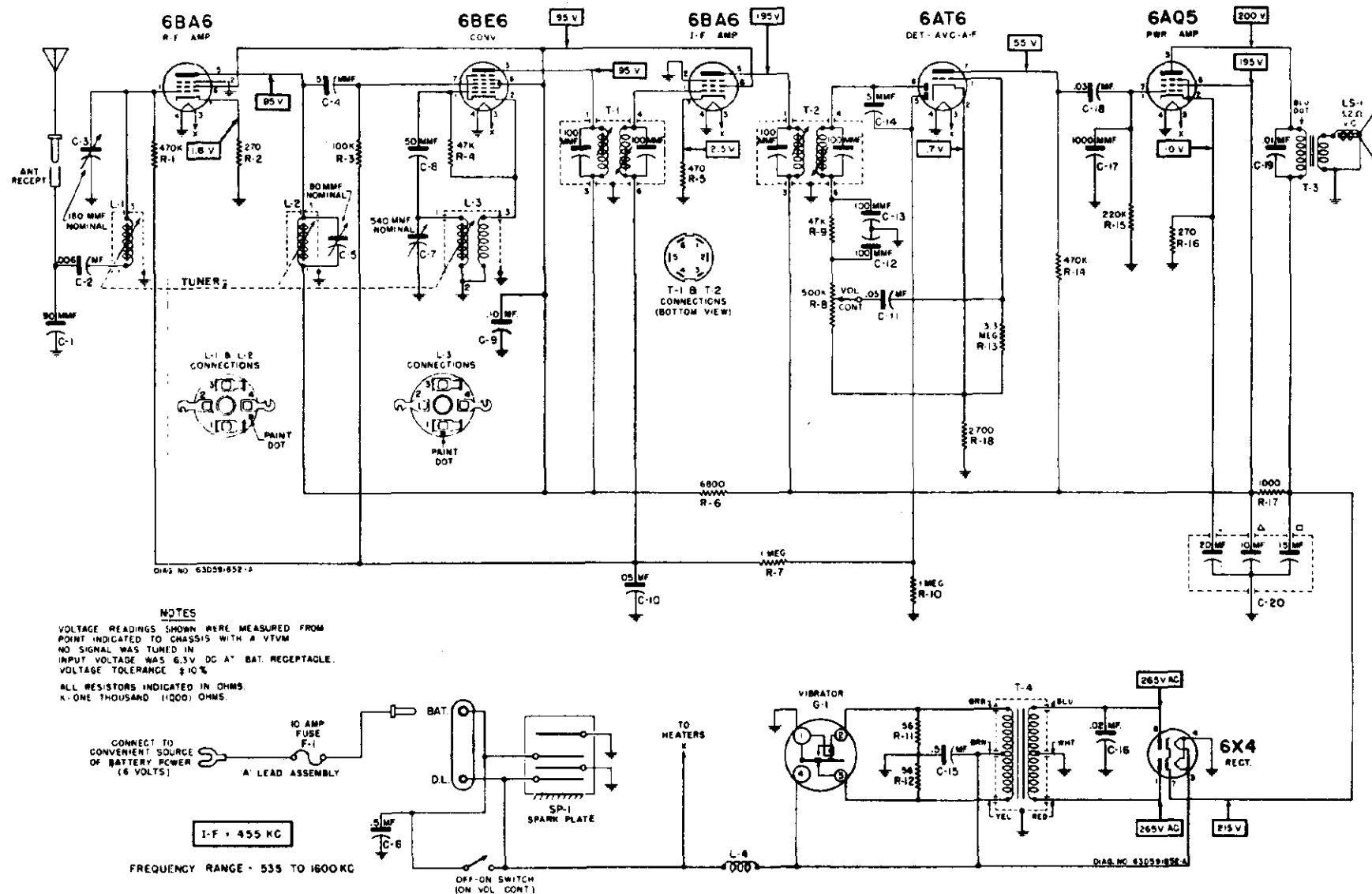


FIGURE 2. SCHEMATIC DIAGRAM

GENERAL INFORMATION

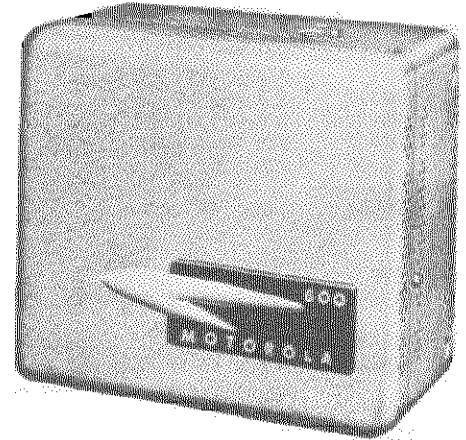
TYPE- Compact automotive type superheterodyne receiver designed for installation in any car when used with appropriate Motorola control head and speaker.

TUNING RANGE - 535 to 1600 Kc IF - 455 Kc

TUBE COMPLEMENT - 6BA6 - RF Amplifier
6BE6 - Converter
6BA6 - IF Amplifier
6AT6 - Det, AVC & AF Amp
6AQ5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 6.8 amps at 6.3 volts

POWER OUTPUT - 3.5 watts (max)



REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
----------	----------	-------------

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1	21A591682	Ceramic; 90 mmf 500V
C-2	8C4529	Paper; .006 mf 100V
C-3	20K592078	Trimmer, variable; 50 to 280 mmf; on same bracket as C-5 and C-8 (sold only as assembly)
C-4	8R13166	Paper; .1 mf 400V
C-5	20K592078	Trimmer, variable; 20 to 180 mmf; on same bracket as C-3 and C-8 (sold only as assembly)
C-6	21K70720	Molded; 5 mmf 500V
C-7	21R6513	Mica; 50 mmf 10% 300V
C-8	20K592078	Trimmer, variable; 500 to 580 mmf; on same bracket as C-3 and C-5 (sold only as assembly)
C-9	8K17028	Paper; .5 mf 100V
C-10	8R13514	Paper; .05 mf 100V
C-11	8R13514	Paper; .05 mf 100V
C-12	21B77562	Ceramic; 100 mmf 500V
C-13	21B77562	Ceramic; 100 mmf 500V
C-14	21K70720	Molded; 5 mmf 500V
C-15	8K17028	Paper; .5 mf 100V
C-16	8R490449	Paper; .02 mf 1000V
C-17	21K478410	Ceramic; 1000 mmf 500V
C-18	8R71911	Paper; .03 mf 400V
C-19	8R23690	Paper; .01 mf 400V
C-20	23A485677	Electrolytic; 15-10-20 mf/350-350-25V

REF. NO.	PART NO.	DESCRIPTION
----------	----------	-------------

FUSE

F-1	65A10266	10 Amp (3AG)
-----	----------	--------------------

VIBRATOR

G-1	48B3333	Non-sync; 4-pin
-----	---------	-----------------------

COILS

L-1,2	24B591664	RF and Antenna Coil (specify color of paint dots on old coil when ordering)
L-3	24B592153	Oscillator Coil (specify color of paint dots on old coil when ordering)
L-4,5	24K78026	Choke, RF
L-6	24A472535	Choke, hash

RESISTORS

Note: All resistors are insulated carbon type, 20% unless otherwise specified.

R-1	6R6032	470,000 1/2W
R-2	6R6432	270 10% 1/2W
R-3	6R6075	100,000 1/2W
R-4	6R6056	47,000 1/2W
R-5	6R6090	470 10% 1/2W
R-6	6R6287	6800 1W N.I.
R-7	6R6004	1 meg 1/2W
R-8	1A472531	Volume Control: 500,000 ohms; includes SPST switch

MODEL 600

PART NUMBER		DESCRIPTION
R-9	6R6056	47,000 1/2W
R-10	6R6004	1 meg 1/2W
R-11	6R5614	56 10% 1/2W
R-12	6R5614	56 10% 1/2W
R-13	6R5577	2700 10% 1/2W
R-14	6R2118	3.3 meg 1/2W
R-15	6R6032	470,000 1/2W
R-16	6R6015	220,000 1/2W
R-17	6R6336	270 10% 1W
R-18	6R6184	1000 1W N.I

SPARK PLATE

SP-1 1X78041 Spark Plate Assembly: complete..

TRANSFORMERS

T-1,2 24B485670 Diode or IF, 455 Kc: complete
with tuning cores and padding
capacitors but less shield ...

T-3 25B70171 Output Transformer

T-4 25B472533 Power Transformer

REF.
NO. PART NO. DESCRIPTION

CHASSIS PARTS - MECHANICAL

42A13177 Clip, center post grounding

42A4215 Clip, vibrator grounding

4S7695 Lockwasher, int: #5; stl; cad pl
(terminal strip mtg)

4S7671 Lockwasher, split: #8; stl; cad pl
(spark plate mtg)

9A472148 Receptacle, antenna

5S7771 Rivet: .088 x 3/16 steel; nkl pl
(tube socket mtg)

5S7706 Rivet: .122 x 1/8; steel; nkl pl
(sensitivity control and center post
ground clip mtg)

5S7707 Rivet: .122 x 5/32; stl; nkl pl
(terminal strip and output trans
mtg)

5S7701 Rivet: .122 x 3/16; stl; nkl pl
(vibrator grounding clip and output
transformer mtg)

3S8140 Screw, sheet metal: #8 x 3/16 PKZ
plain hex head; cad pl (tuner mtg)

3S7454 Screw, sheet metal: #8 x 1/4 plain
hex head; stl; cad pl (capacitor
bracket assembly and spark plate
mtg)

3S3397 Screw, sheet metal: #8 x 5/16 PKZ
plain hex head; cad pl (power
transformer mtg)

26K485936 Shield (for T-1 & T-2)

9A70208 Socket, tube: 4-pin; with grounding
lug (vibrator socket)

9A472534 Socket, tube: miniature; 7-prong...

9K580218 Socket, tube: miniature; 8-prong ..

31C4079 Strip, terminal: 1 insulated lug,
end mtg

31A472573 Strip, terminal: 2 insulated lugs,
#2 mtg

31K16330 Strip, terminal: 3 insulated lugs,
#3 mtg

REF.
NO. PART NO. DESCRIPTION

HOUSING PARTS

42A472033 Clip, chassis retainer

13C592086 Escutcheon, complete

1X592087 Housing and Bushing Assembly, rear ..

1X592088 Housing, front; with escutcheon

3S7456 Screw, sheet metal: #8 x 1/4 PKA
slotted acorn head; antique copper
finish (escutcheon mtg and housing
screws)

ACCESSORIES

65X4151 Bulb, pilot light: 6-8V; clear; bayo-
net base

8A4491 Capacitor, generator

9B473111 Lead Assembly, fuse: complete with
10 amp fuse

1X74340 Lead Assembly, dial light: complete
with bulb

1X76859 Lead Assembly, speaker: 2-conductor,
36" long, with pin terminals on one end

4S7658 Lockwasher, int-ext: 5/16; stl; cad
pl (receiver mtg)

2S2863 Nut, hex: 5/16-18 x 9/16; cad pl
(receiver mtg)

1K75148 Shaft, flexible: with housing; 24"
long

50B592352 Speaker: 6" PM; 3.2 ohm VC; less
speaker lead

3A77542 Stud, receiver mtg

6X4141 Suppressor, distributor

TUNER PARTS - MECHANICAL

Note: Electrical parts of the tuner are included in
the Electrical Chassis Parts List

1X592301 Manual Tuner MT-75

1X592099 Base, Sleeve, Shields and Channels
Assembly

1X78034 Carriage Plate, Slug Insulator and
Center Guide Rod Assembly

42A70184 Clip, core adjustment

46K592080 Core, iron and screw

58K78012 Coupling, manual lead screw

14B78007 Insulator, slug: bakelite

2A77596 Nut, floating: without ear (on manual
lead screw)

2A78005 Nut, floating: with ear (on manual
lead screw)

64A77593 Plate, tuner front

5S7770 Rivet: .088 x 5/32; stl; nkl pl
(slug insulator mtg)

47A78002 Rod, carriage guide

3S7352 Screw, machine: #8-32 x 2 slotted round,
head; stl; cad pl (front plate mtg)

43A70881 Sleeve, coil (iron)

41A77595 Spring, coil slug

41A77592 Spring, compression

42A21577 Washer, 'C': spring (manual lead
screw mtg)

4A70873 Washer, coil spacer

4A74571 Washer, fishpaper

4A70956 Washer, slug insulator

4K485653 Washer, spring (manual lead screw
mtg)

ALIGNMENT

Remove receiver front and rear housings to expose all adjustments.

Connect a 6 volt battery to BAT terminal and chassis.

Connect a low range output meter across speaker voice coil and set volume control at maximum. For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output

meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part No. 66A76278, is required for adjusting the tuner cores. **IMPORTANT:** Do not push in on the alignment tool when adjusting the tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SET TO	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	6BE6 grid (pin #7) & chassis	455 Kc	High frequency end (cores out)	1, 2, 3 & 4	Peak for maximum in order indicated. Check by repeating step.
RF ALIGNMENT						
2.	See Fig. 1	Antenna receptacle through dummy	1610 Kc	High frequency end cores should project 1-1/8" from cans. (Screw out if necessary)	5, 6 & 7	Peak for maximum in order indicated.
3.	"	"	1425 Kc	1425 Kc per Fig. 1	8, 9, & 10	Peak for maximum in order indicated.

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

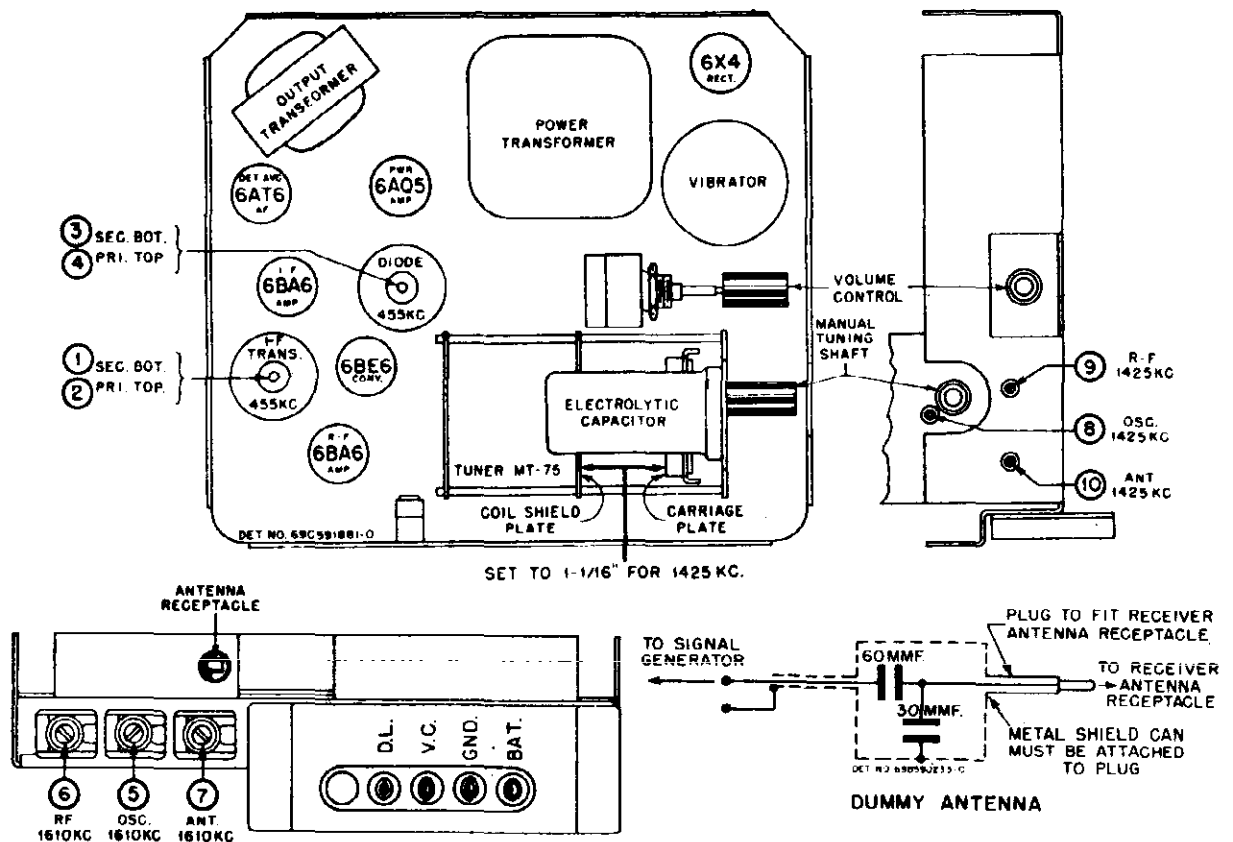


FIGURE 1. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA

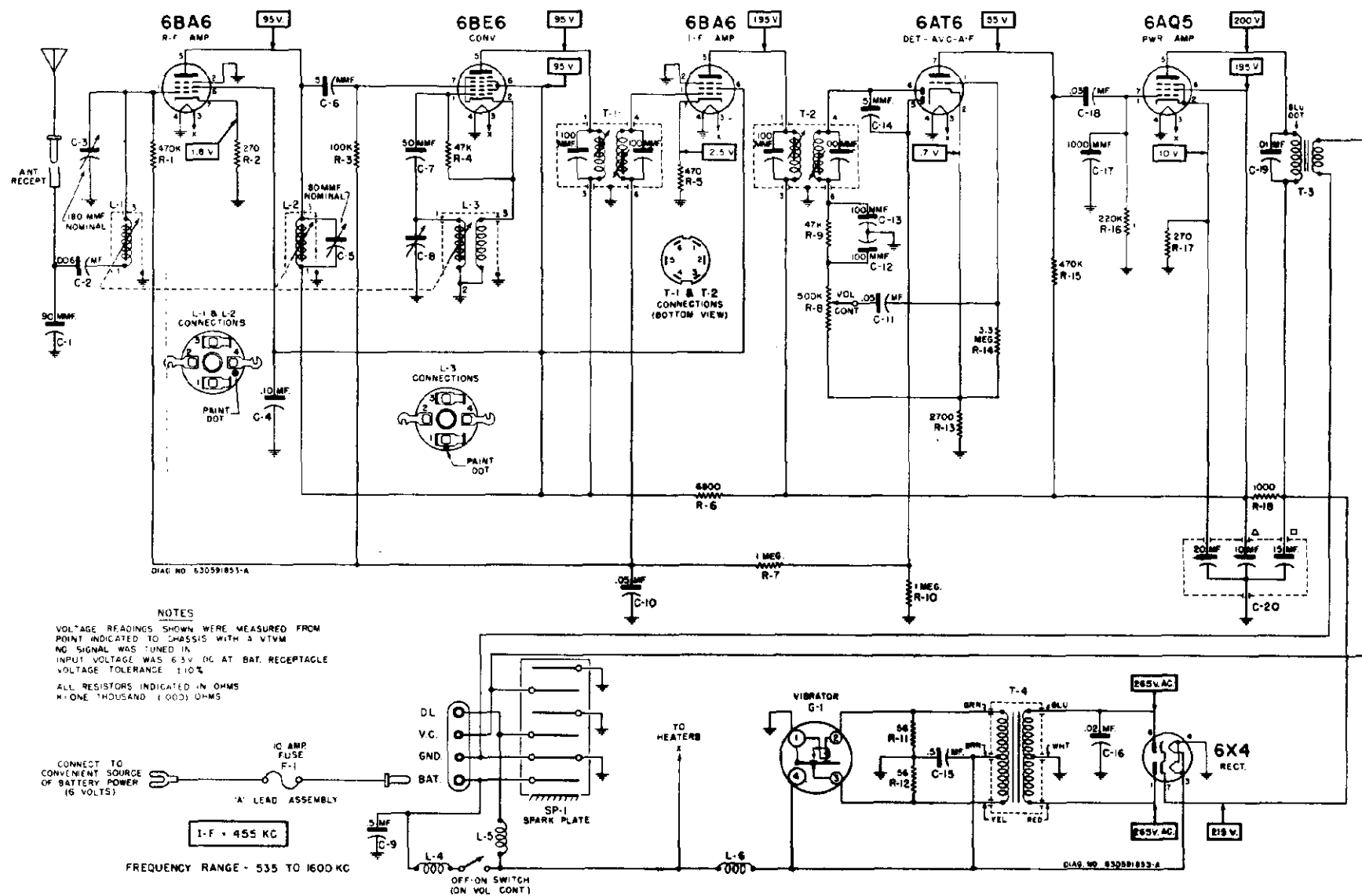
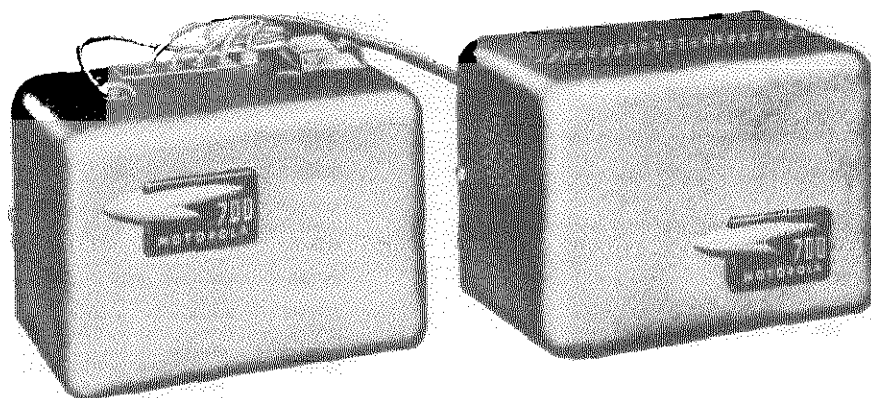


FIGURE 2. SCHEMATIC DIAGRAM



GENERAL INFORMATION

TYPE -

Compact two-piece automotive type superheterodyne receiver. Receiver consists of a tuning unit and audio & power unit which are connected together by means of an interconnecting cable. This receiver is designed for installation in any car by using with appropriate Motorola control head and speaker kit.

TUNING RANGE - 535 to 1600 Kc

IF - 455 Kc

TUBE COMPLEMENT - Tuner Unit

Audio & Power Unit

6BA6 - RF Amplifier
6BE6 - Converter
6BA6 - IF Amplifier
6AT6 - Det-AVC-AF Amp

6AQ5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 7.0 amps at 6.3 volts

POWER OUTPUT - 3.5 watts (max)

REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
TUNER UNIT					
CHASSIS PARTS - ELECTRICAL					
CAPACITORS					
C-1	21K7562	Ceramic: 100 mmf 500V	C-9	8H13166	Paper: .1 mf 400V
C-2	8A4529	Paper: .006 mf 100V	C-10	8A13514	Paper: .05 mf 100V
C-3	20A592135	Variable, trimmer: 50 to 280 mmf; includes bracket	C-11	8A4529	Paper: .006 mf 100V
C-4*	20K481527	Variable, trimmer: 20 to 180 mmf; includes bracket	C-12	21K70720	Molded: 5 mmf 500V
C-5	21K70720	Molded: 5 mmf 500V	C-13	8R472035	Paper: .1 mf 100V
C-6	21K74661	Ceramic: 50 mmf 300V	C-14	21R6638	Mica: 1000 mmf 500V
C-7	21K592327	Ceramic: 500 mmf 5% 500V	C-15	8K17028	Paper: .5 mf 100V
C-8*	20K472612	Variable, trimmer: 50 to 80 mmf; includes bracket	C-16	8K71910	Paper: .006 mf 400V
			PILOT LIGHT		
			I-1	65X4151	Bulb: 6-8V; bayonet base; type #51
			COILS		
			L-1,2*	24B71881	RF & Antenna Coil (specify color of paint dot on old coil when ordering)

*Part of Solenoid Tuner ST-78

MODEL 700

REF. NO.	PART NO.	DESCRIPTION	PART NUMBER	DESCRIPTION
L-3*	24R592153	Oscillator Coil (specify color of paint dot on old coil when ordering)	TUNER UNIT	
L-4,5	24K592269	Choke, RF	CHASSIS PARTS - MECHANICAL	
RESISTORS			7A592127	Bracket, volume control mtg
Note: All resistors are carbon insulated type unless otherwise specified.			42A485548	Clip, coil can mtg
R-1	6R6032	470,000 20% 1/2W	4S7657	Lockwasher, ext: #8; atl; cad pl (tone relay mtg)
R-2	17K484497	Wirewound: 5.6	2S7000	Nut, hex: 8-32 x 5/16; atl; cad pl (tone relay mtg)
	or 6R488139	5.6 10% 1W	1X70646	Receptacle, antenna
R-3	6R6090	470 10% 1/2W	5S7771	Rivet: .088 x 3/16; atl; nkl pl (tube socket mtg)
R-4	6R6075	100,000 20% 1/2W	5S7719	Rivet: .088 x 5/32; atl; nkl pl (terminal strip mtg)
R-5	6R6056	47,000 20% 1/2W	5S7728	Rivet: .122 x 5/16; atl; nkl pl (spark plate mtg)
R-6	6R6090	470 10% 1/2W	3S7152	Screw, machine: 6-32 x 1/4 plain hex head; atl; cad pl (volume control bracket mtg)
R-7	6R6004	1 meg 20% 1/2W	3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; atl; cad pl (capacitor bracket and tuner mtg)
R-8	6R6287	6800 20% 1W N.I.	9A472534	Socket, tube: 7-prong; miniature
R-9	1A472531	Volume Control and Shaft Assembly: .5 meg.	9K580218	Socket, tube: 8-prong; miniature
R-10	6R6056	47,000 20% 1/2W	31A41318	Strip, terminal: 1 insulated lug, #2 mtg
R-11	6R6004	1 meg 20% 1/2W	POWER & AUDIO UNIT	
R-12	6R6290	2200 20% 1/2W	CHASSIS PARTS - MECHANICAL	
R-13	6R3927	2.2 meg 20% 1/2W	1X592233	Cable and Plug Assembly: includes fuse lead, power cable and plug
R-14	6R2109	10 meg 20% 1/2W	42A4215	Clip, vibrator grounding
R-15	6R6056	47,000 20% 1/2W	14A592132	Insulator, connector plug
R-16	6R6032	470,000 20% 1/2W	9K592237	Lead Assembly, fuse: includes 'A' lead and fuse receptacle
SWITCHES			1X76859	Lead Assembly, speaker
S-1*	1B70944	Solenoid Switch	4S7666	Lockwasher, ext: #6; atl; cad pl (power transformer mtg)
S-2*	40R70952	Selector Switch	29R5238	Lug, solder: #6L
S-3*	40A472644	Mute Switch	2S7005	Nut, hex: 6-32 x 1/4; atl; cad pl (power transformer mtg)
S-4	1X592220	Tone Relay MR-7	5S7771	Rivet: .088 x 3/16; atl; nkl pl (tube socket mtg)
SPARK PLATE			5S7706	Rivet: .122 x 1/8; atl; nkl pl (terminal strip mtg)
SP-1	1B592133	Spark Plate Assembly	5S7701	Rivet: .122 x 3/16; atl; nkl pl (vibrator clip mtg)
TRANSFORMERS			28A592119	Plug, connector: 4-pin
T-1	24B485553	IF, 455 Kc: complete with tuning cores and padding capacitors	28K71775	Plug, insulated
T-2	24K485555	Diode, 455 Kc: complete with tuning cores and padding capacitors	9A472534	Socket, tube: miniature; 7-prong
TUNER			9A70208	Socket, tube: 4-pin (for vibrator)
	1X592280	Solenoid Tuner ST-78	31K490143	Strip, terminal: 2 insulated lugs, #2 mtg; 1-1/8" long
POWER & AUDIO UNIT			31A592258	Strip, terminal: 2 insulated lugs, #2 mtg; 1-3/8" long
CHASSIS PARTS - ELECTRICAL			29K5405	Terminal, insulated pin: black (on speaker leads)
CAPACITORS			29K5407	Terminal, insulated pin: white (on spkr leads)...
C-17	8K17028	Paper: .5 mf 100V	HOUSING PARTS	
C-18	8K12840	Paper: .006 mf 1600V	38A71874	Button, push: includes spring clamp
C-19	8R71911	Paper: .03 mf 400V	15C592123	Cover, bottom
C-20	23A473015	Electrolytic: 30-30-20 mf/350-300-25V	13C592121	Escutcheon
C-21	8K71910	Paper: .006 mf 400V	1X592241	Housing and Escutcheon Assembly (Tuner Unit) ..
FUSE			1X592242	Housing and Escutcheon Assembly (Power & Audio)
F-1	65K4637	Fuse: 20 amp	3S488012	Screw, sheet metal: #6 x 1/4; Shakeproof #25; plain hex head; atl; cad pl (escutcheon mtg) ..
VIBRATOR			3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; atl; cad pl (bottom cover mtg)
G-1	48B3333	Vibrator, non-sync: 4-pin	3S8114	Screw, sheet metal: #8 x 1/4 PKZ slotted acorn head; antique copper finish (housing screws)...
COILS			ACCESSORIES	
L-6	24A472535	Choke, hash	8A4491	Capacitor, generator
RESISTORS			4S7653	Lockwasher, int-ext: 5/16; atl; cad pl (receiver mtg)
Note: All resistors are carbon insulated type unless otherwise specified.			2S2863	Nut, hex: 5/16; atl; cad pl (receiver mtg)....
R-17	6R5614	56 10% 1/2W	1K75148	Shaft and Housing Assembly, flexible 24" long
R-18	6R5614	56 10% 1/2W	50R592351	Speaker, PM: 6"; 3.2 ohm VC
R-19	6R3949	470 20% 1/2W	6A4141	Suppressor, distributor
R-20	6R6054	10,000 20% 1/2W		
R-21	6R6015	220,000 20% 1/2W		
R-22	6R6336	270 10% 1W		
R-23	6R6184	1000 20% 1W N.I.		
TRANSFORMERS				
T-3	25K590650	Power Transformer		
T-4	25R70171	Output Transformer		
*Part of Solenoid Tuner ST-78				

Remove tuner unit front housing and bottom cover to expose all alignment adjustments. Connect power and audio unit to tuner unit. Connect a 6 volt battery to 'A' lead and power & audio unit chassis.

Connect a low range output meter across speaker voice coil and set volume control at maximum.

Place tuner in manual position, either by actuating carriage plate manually or by connecting a control head to receiver and pressing 'M' button.

For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part Number 66A76278, is required for adjusting the tuner cores.

IMPORTANT: Do not push in on the alignment tool when adjusting tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SET TO	ADJUST	REMARKS
1.	IF ALIGNMENT .1 mf	6BE6 grid (pin #7) & chassis	455 Kc	High frequency end (cores out)	1, 2, 3 & 4	Peak for maximum in order indicated. Check by repeating step.
2.	RF ALIGNMENT See Fig. 1	Antenna receptacle through dummy	1610 Kc	High frequency end; cores should project 1-1/8" from cans (Screw out if necessary)	5, 6, & 7	Peak for maximum in order indicated.
3.	"	"	1425 Kc	1425 Kc-per Fig. 1	8, 9, & 10	Peak for maximum in order indicated.

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 Kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

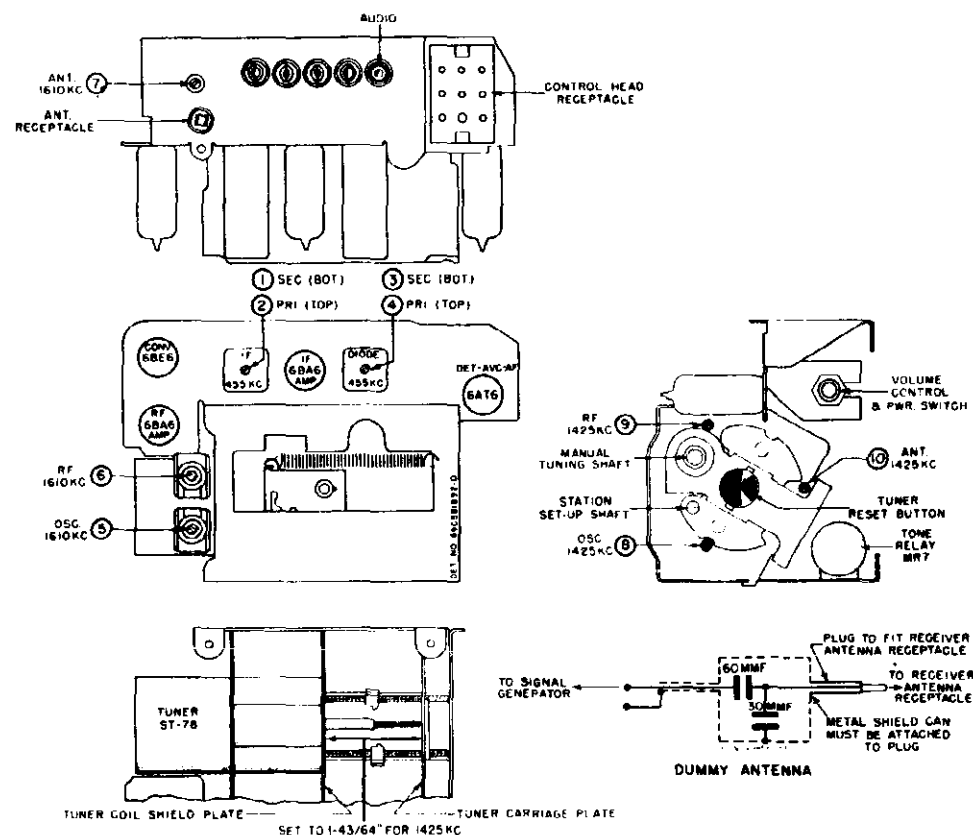


FIGURE 1. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA

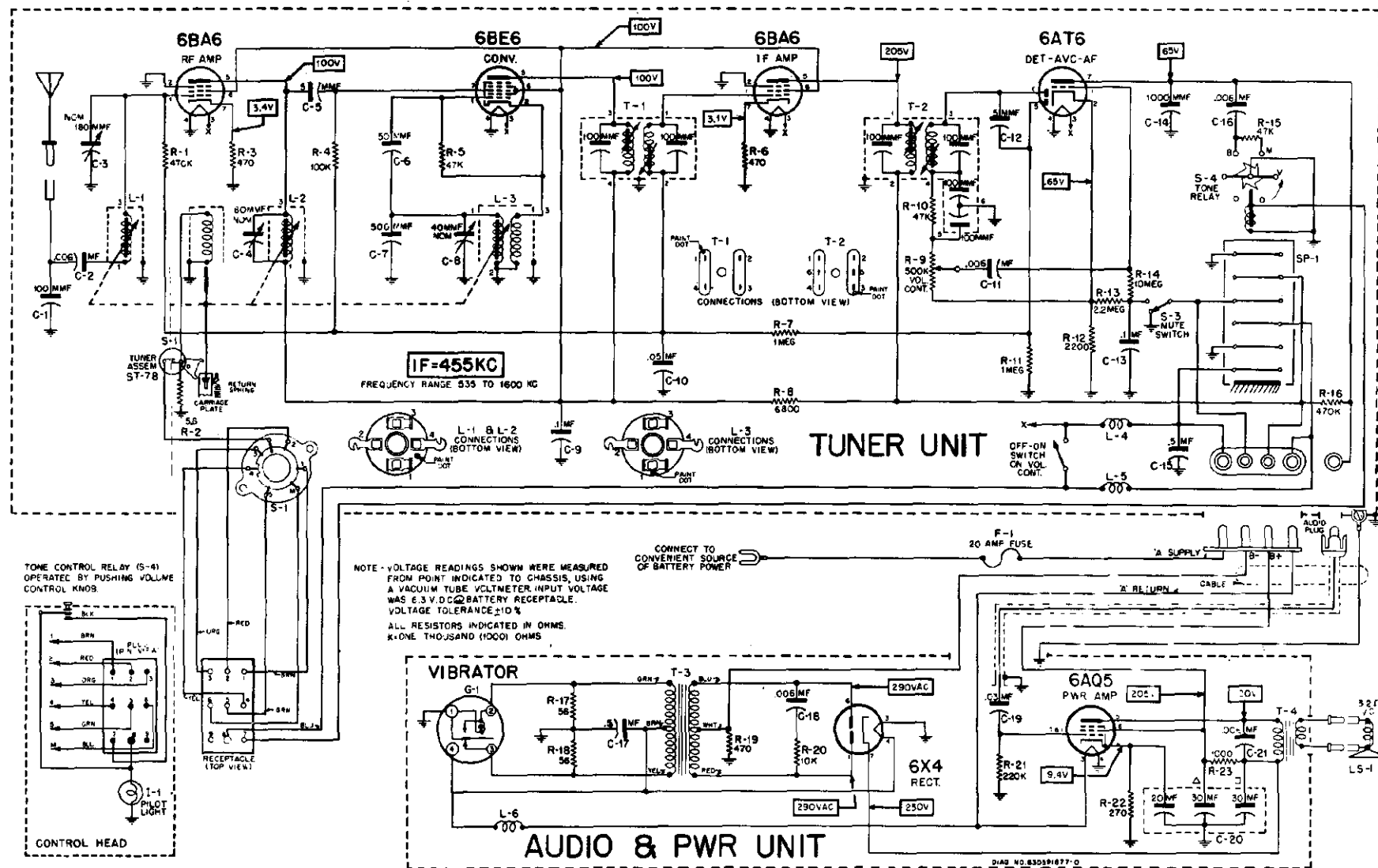
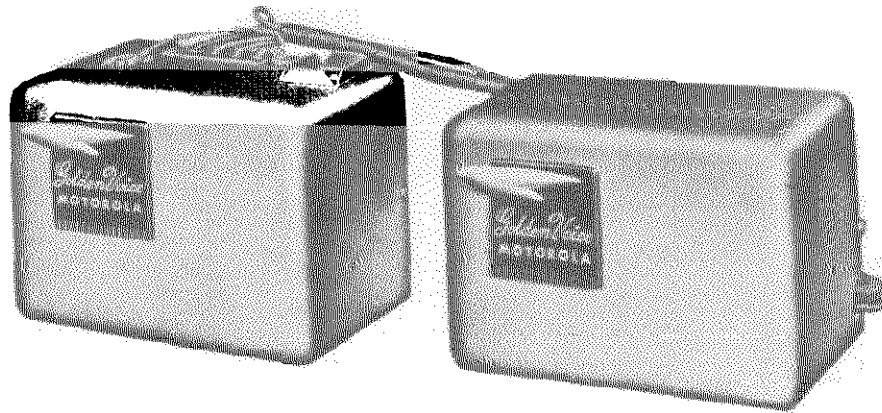


FIGURE 2. SCHEMATIC DIAGRAM



GENERAL INFORMATION

TYPE -

Compact two-piece automotive type superheterodyne receiver. Receiver consists of a tuning unit and audio & power unit which are connected together by means of an interconnecting cable. This receiver is designed for installation in any car by using with appropriate Motorola control head and speaker kit.

TUNING RANGE - 535 to 1600 Kc

IF - 455 Kc

TUBE COMPLEMENT -

Tuner Unit

6BA6 - RF Amplifier
6BE6 - Converter
6BA6 - IF Amplifier
6AT6 - Det-AVC-AF Amp

Audio & Power Unit

6AT6 - Audio Inverter
6AQ5 - Power Amplifier
6AQ5 - Power Amplifier
6X4 - Rectifier

POWER INPUT - 8.2 amps at 6.3 volts POWER OUTPUT - 4.5 watts (max)

REPLACEMENT PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
----------	----------	-------------

TUNER UNIT -

CHASSIS PARTS - ELECTRICAL

CAPACITORS

C-1	21B77562	Ceramic: 100 mmf 500V
C-2	8A4529	Paper: .006 mf 100V
C-3	20A592135	Variable, trimmer: 50 to 280 mmf; includes bracket
C-4*	20K481527	Variable, trimmer: 20 to 180 mmf; includes bracket
C-5	21K70720	Molded: 5 mmf 500V
C-6	21K74661	Ceramic: 50 mmf 300V
C-7	21K592327	Ceramic: 500 mmf 5% 500V
C-8*	20K472612	Variable, trimmer: 50 to 80 mmf; includes bracket
C-9	8R13166	Paper: .1 mf 400V

*Part of Solenoid Tuner ST-78

REF. NO.	PART NO.	DESCRIPTION
----------	----------	-------------

C-10	8A13514	Paper: .05 mf 100V
C-11	8A4529	Paper: .006 mf 100V
C-12	21K70720	Molded: 5 mmf 500V
C-13	8R472035	Paper: .1 mf 100V
C-14	21R6638	Mica: 1000 mmf 500V
C-15	8K17028	Paper: .5 mf 100V
C-16	8K71910	Paper: .006 mf 400V

PILOT LIGHT

I-1	65X4151	Bulb: 6-8V; bayonet base: type #51
-----	---------	------------------------------------

COILS

L-1, 2*	24B71881	RF & Antenna Coil (specify color of paint dot on old coil when ordering)
L-3*	24B592153	Oscillator Coil (specify color of paint dot on old coil when ordering)
L-4, 5	24K592269	Choke, RF

MODEL 300

REF. NO. PART NO. DESCRIPTION

RESISTORS
Note: All resistors are carbon insulated type unless otherwise specified.

R-1 6R6032 470,000 20% 1/2W
R-2 17K484497 Wirewound: 5.6
or 6R488139 5.6 10% 1W
R-3 6R6090 470 10% 1/2W
R-4 6R6075 100,000 20% 1/2W
R-5 6R6056 47,000 20% 1/2W
R-6 6R6090 470 10% 1/2W
R-7 6R6004 1 meg 20% 1/2W
R-8 6R6287 6800 20% 1W N.I.
R-9 1A472531 Volume Control and Shaft Assembly: .5 meg...
R-10 6R6056 47,000 20% 1/2W
R-11 6R6004 1 meg 20% 1/2W
R-12 6R6290 2200 20% 1/2W
R-13 6R3927 2.2 meg 20% 1/2W
R-14 6R2109 10 meg 20% 1/2W
R-15 6R6056 47,000 20% 1/2W
R-16 6R6032 470,000 20% 1/2W

SWITCHES

S-1* 1B70944 Solenoid Switch
S-2* 40B70952 Selector Switch
S-3* 40A472644 Mute Switch
S-4 1X592220 Tone Relay MR-7

SPARK PLATE

SP-1 1B592133 Spark Plate Assembly

TRANSFORMERS

T-1 24B485553 1F, 455 Kc: complete with tuning cores and padding capacitors
T-2 24K485555 Diode, 455 Kc: complete with tuning cores and padding capacitors

TUNER

1X592280 Solenoid Tuner ST-78

POWER & AUDIO UNIT**CHASSIS PARTS - ELECTRICAL****CAPACITORS**

C-17 8K17028 Paper: .5 mf 100V
C-18 8K12840 Paper: .006 mf 1600V
C-19 23A473015 Electrical: 30-30-20 mf/350-300-25V
C-20 8R71911 Paper: .03 mf 400V
C-21 8R71911 Paper: .03 mf 400V
C-22 8R13165 Paper: .003 mf 1000V

FUSE

F-1 65K4637 Fuse, 20 amp

VIBRATOR

G-1 48B3333 Vibrator, non-sync: 4-pin

COILS

L-6 24A472535 Choke, hash

RESISTORS

Note: All resistors are carbon insulated type unless otherwise specified.

R-17 6R5614 56 10% 1/2W
R-18 6R5614 56 10% 1/2W
R-19 6R3949 470 20% 1/2W
R-20 6R6054 10,000 20% 1/2W
R-21 6R6286 1500 20% 1W N.I.
R-22 6R6069 2200 10% 1/2W
R-23 6R6015 220,000 20% 1/2W
R-24 6R6015 220,000 20% 1/2W
R-25 6R6054 10,000 20% 1/2W
R-26 6R6336 270 10% 1W
R-27 6R6015 220,000 20% 1/2W

TRANSFORMERS

T-3 25K590650 Power Transformer
T-4 25K472558 Output Transformer

* Part of Solenoid Tuner ST-78

PART NUMBER DESCRIPTION

TUNER UNIT**CHASSIS PARTS - MECHANICAL**

7A592127 Bracket, volume control mtg
42A485548 Clip, coil can mtg
4S7657 Lockwasher, ext: #8; stl; cad pl (tone relay mtg)
2S7000 Nut, hex: 8-32 x 5/16; stl; cad pl (tone relay mtg)
1X70646 Receptacle, antenna
5S7719 Rivet: .088 x 5/32; stl; nkl pl (terminal strip mtg)
5S7771 Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg)
5S7728 Rivet: .122 x 5/16; stl; nkl pl (spark plate mtg)
3S7152 Screw, machine: 6-32 x 1/4 plain hex head; stl; cad pl (volume control brkt mtg)
3S7454 Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (capacitor brkt & tuner mtg) ...
9A472534 Socket, tube: 7-prong; miniature
9K580218 Socket, tube: 8-prong; miniature
31A41318 Strip, terminal: 1 insulated lug, #2 mtg

POWER & AUDIO UNIT**CHASSIS PARTS - MECHANICAL**

1X592233 Cable and Plug Assembly: includes fuse lead, power cable and plug
42A4215 Clip, vibrator grounding
14A592132 Insulator, connector plug
9K592237 Lead Assembly, fuse: includes 'A' lead and fuse receptacle
1X76859 Lead Assembly, speaker
4S7666 Lockwasher, ext: #6; stl; cad pl (power transformer mtg)
29R5238 Lug, solder: #6L
2S7005 Nut, hex: 6-32 x 1/4; stl; cad pl (power transformer mtg)
5S7771 Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg)
5S7706 Rivet: .122 x 1/8; stl; nkl pl (terminal strip mtg)
5S7701 Rivet: .122 x 3/16; stl; nkl pl (vibrator clip mtg)
28A592119 Plug, connector: 4-pin
28K71775 Plug, insulated
9A472534 Socket, tube: miniature; 7-prong
9A7020R Socket, tube: 4-pin (for vibrator)
31K490143 Strip, terminal: 2 insulated lugs, #2 mtg; 1-1/8" long
31A592258 Strip, terminal: 2 insulated lugs, #2 mtg; 1-3/8" long
29K5405 Terminal, insulated pin: black (on speaker leads).
29K5407 Terminal, insulated pin: white (on speaker leads).

HOUSING PARTS

38A71874 Button, push
15C592123 Cover, bottom
13C592122 Escutcheon (golden voice)
1X592321 Housing and Escutcheon Assembly (Power & Audio)
1X592325 Housing and Escutcheon Assembly (Tuner Unit)...
3S48B012 Screw, sheet metal: #6 x 1/4; Shakeproof #25; plain hex head; stl; cad pl (escutcheon mtg).
3S7454 Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (bottom cover mtg)
3S8114 Screw, sheet metal: #8 x 1/4 PKZ slotted acor head; antique copper finish (housing screws)

ACCESSORIES

8A4491 Capacitor, generator
4S7653 Lockwasher, int-ext: 5/16; stl; cad pl (receiver mtg)
2S2863 Nut, hex: 5/16; stl; cad pl (receiver mtg) ...
1K75148 Shaft and Housing Assembly, flexible 24" long.
50B592351 Speaker, PM: 6"; 3.2 ohm VC
6A4141 Suppressor, distributor

ALIGNMENT

MODEL 300

Remove tuner unit front housing and bottom cover to expose all alignment adjustments. Connect power and audio unit to tuner unit. Connect a 6 volt battery to 'A' lead and power & audio unit chassis.

Connect a low range output meter across speaker voice coil and set volume control at maximum.

Place tuner in manual position, either by actuating carriage plate manually or by connecting a control head to receiver and pressing 'M' button.

For greatest accuracy, keep output of receiver at approximately 1 watt (1 watt = 1.79 volts on output meter) throughout alignment by reducing signal generator output as stages are brought into alignment. Use a small fibre screwdriver when aligning IF and diode transformers. A special tool, Motorola Part Number 66A76278, is required for adjusting the tuner cores.

IMPORTANT: Do not push in on the alignment tool when aligning the tuner cores; the slightest inward pressure may move tuner carriage and result in inaccurate alignment.

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	TUNER SET TO	ADJUST	REMARKS
IF ALIGNMENT						
1.	.1 mf	6BE6 grid (pin #7) & chassis	455 Kc	High frequency end (cores out)	1, 2, 3 & 4	Peak for maximum in order indicated. Check by repeating step.
RF ALIGNMENT						
2.	See Fig. 1	Antenna receptacle through dummy	1610 Kc	High frequency end; cores should project 1-1/8" from cans (Screw out if necessary)	5, 6, & 7	Peak for maximum in order indicated.
3.	"	"	1425 Kc	1425 Kc-per Fig. 1	8, 9, & 10	Peak for maximum in order indicated.

4. When receiver is installed in car, extend antenna fully, set dial to approximately 1400 kc and repeak antenna trimmer (7) for maximum volume of a weak station or noise between stations.

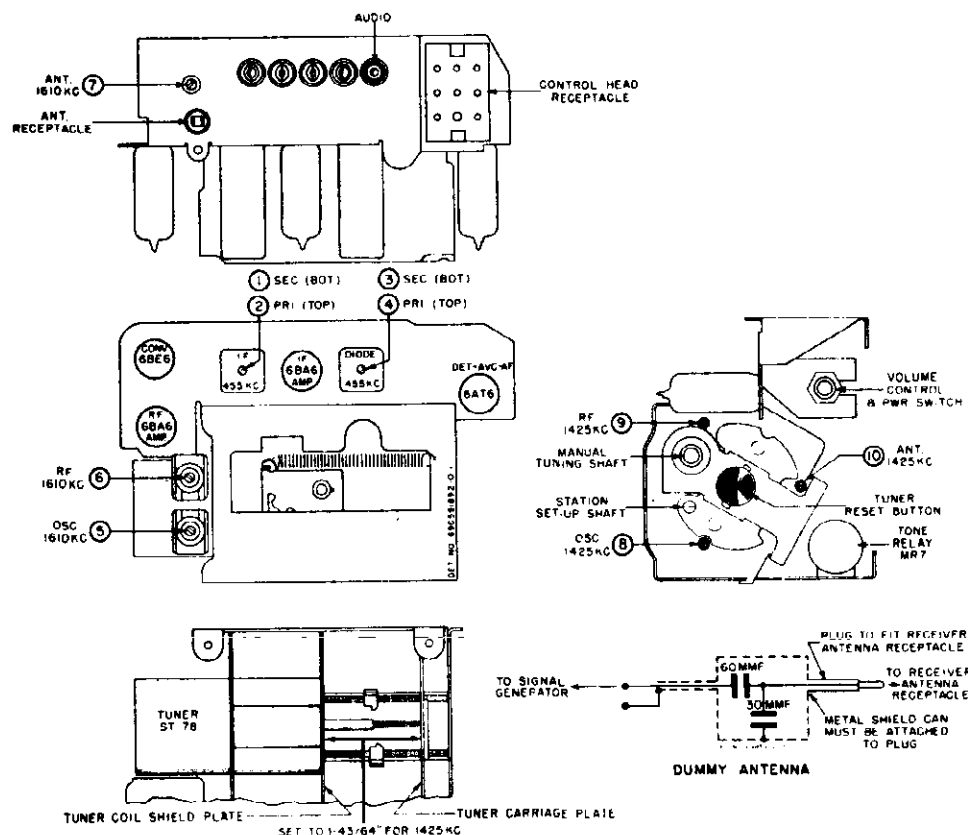
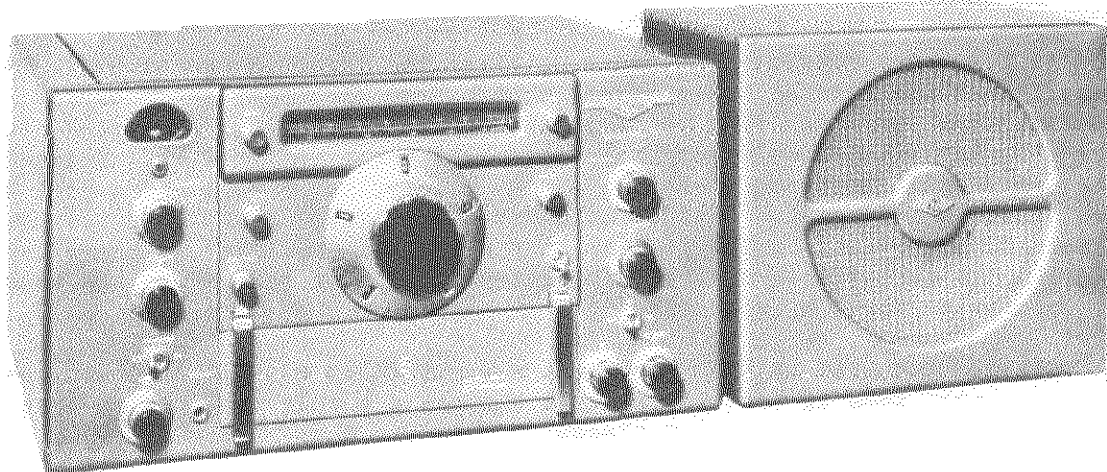


FIGURE 1. TUBE & TRIMMER LOCATIONS AND DUMMY ANTENNA



FIGURE 2. SCHEMATIC DIAGRAM



THE HRO-50 RADIO RECEIVER

SECTION 1. DESCRIPTION

1-1. GENERAL

The HRO-50 is a deluxe Radio Receiver featuring performance and versatility. Fifteen tubes, including a rectifier and a voltage regulator tube, are utilized in a superhetrodyne circuit for the reception of code and phone signals throughout its frequency range of 50 to 430 kilocycles and 480 to 35,000 kilocycles. The HRO type Receivers have long been outstanding and proven performers in Communication and Amateur services. This new series of HRO-50 Receivers feature many desirable innovations emanating from the latest advances in receiver circuitry and mechanical design. It is housed in a new and enlarged cabinet styled in an attractive gray finish with a self-contained power supply adequately isolated from the R.F. circuits. A calibrated, illuminated slide-rule dial provides direct reading in megacycles for each of the General Coverage coil sets as well as an additional band-spread scale for those coil sets incorporating this feature. A front-panel mounted oscillator trimmer control is provided to assure precise calibration. Of course, the dial-driving mechanism still features the micrometer dial. Temperature compensation and voltage regulation of the high-frequency oscillator as well as utilization of ceramic insulation in the coil sets and associated connecting brush blocks provide stable operation and freedom from drift. A single front-panel mounted Control switch selects any one of the four modes of operation, C.W., Phone, Narrow-Band F.M. or Phono. Sockets are mounted on the receiver chassis to accommodate the National Type NFM-50 FM adaptor and the National Type XCU Crystal Calibrator Unit. These accessories may be permanently installed and switched On and Off by means of the front-panel switches. At the rear of the Receiver sockets are available for external use of the National Type SOJ-3 Select-O-Ject and National Type 650S Vibrator Power Supply or battery power supply. The S-Meter circuit is designed so that the operator may adjust the sensitivity of the S-Meter. A push-pull audio system delivers the utmost in audio frequency response and undistorted power output from the built-in output transformer. Other highlights include a six position crystal filter, maximum bandspreading of the amateur bands, a quick-acting bandspread switch, dimmer control for the slide-rule dial and S-Meter lamps.

A standard equipment consists of a Receiver, Loudspeaker and coil sets A, B, C and D. Coil sets Type E, F, G, H, J, AA, AB and AC may be obtained as desired. Accessories available include the National types NFM-50 Narrow-Band F.M. adapter, XCU Crystal Calibrator, SOJ-3 Select-O-Ject and 650-S Vibrator Power Supply.

MODEL HRO-50

1-2. CIRCUIT

For all frequency ranges the circuit utilizes two tuned stages of radio frequency amplification, a tuned mixer stage, a high-frequency oscillator employing a tube separate from the mixer tube, a first intermediate frequency amplifier stage employing a variable-selectivity crystal filter and a conventional second intermediate frequency amplifier both operating at 455 kilocycles, a combined second detector-automatic volume control stage, an S-Meter amplifier, a double-action adjustable threshold double-diode noise limiter, a first audio amplifier, a phase inverter a push-pull audio amplifier and a beat frequency oscillator coupled to the second detector to provide for C.W. reception.

All voltages required by the Receiver are supplied by a built-in power supply. A voltage regulator tube is used to regulate the plate supply to the high-frequency oscillator and the S-Meter amplifier stages.

1-3. ANTENNA INPUT

Antenna input terminals are provided at the rear of the Receiver. The input circuit is suitable for operation with a single-wire antenna, a balanced feed line or a low impedance 72-ohm unbalanced concentric transmission cable. The actual antenna input impedance is between 300 and 600 ohms depending on the frequency of the input signal.

1-4. TUBE COMPLEMENT

The HRO-50 Receiver is supplied complete with tubes which are tested in the Receiver at the time of alignment.

The tubes employed are as follows:

First R.F. Amplifier	6BA6
Second R.F. Amplifier	6BA6
Mixer	6BE6
High-Frequency Oscillator	6C4
First I.F. Amplifier	6K7
Second I.F. Amplifier	6K7
Second Detector - A.V.C.	6H6
Noise Limiter	6H6
S-Meter Amplifier - Phase Inverter	6SN7GT
First A.F. Amplifier	6SJ7
Audio Output (2)	6V6GT
Beat Frequency Oscillator	6J7
Voltage Regulator	OB2
Rectifier	5V4G

1-5. TUNING SYSTEM

The frequency coverage of the HRO-50 is covered in twelve bands as follows:

COIL SET	GENERAL COVERAGE	BANDSPREAD
A	14.0 - 30.0 Mc.	27.0 - 30.0 Mc.
B	7.0 - 14.4 Mc.	14.0 - 14.4 Mc.
C	3.5 - 7.3 Mc.	7.0 - 7.3 Mc.
D	1.7 - 4.0 Mc.	3.5 - 4.0 Mc.
E	900 - 2050 Kc.	
F	480 - 960 Kc.	

G	180	-	430 Kc.	
H	100	-	200 Kc.	
J	50	-	100 Kc.	
AA				27.5 - 30 Mc.
AB	25	-	35 Mc.	
AC				21.0 - 21.5 Mc.

As shown above plug-in coil set types AA, AC, A, B, C and D provide bandsread coverage of the 10-11, 15, 20, 40 and 80 meter amateur bands. The AA, AC, B, C and D bands are spread out so as to cover 400 dial divisions while the A band is spread 430 divisions on the 500 division main tuning dial. This is accomplished by switching a small variable capacitor in series with each section of the main tuning capacitor, thus reducing its effective capacity range. All of the coil sets are factory aligned in the Receiver using accurate crystal-controlled test oscillators thus assuring precise alignment.

The micrometer type dial drives the main tuning capacitor through a worm drive having a reduction ratio of approximately 20 to 1. Backlash is eliminated by the use of a spring-loaded split worm wheel which assures positive drive in either direction at all times. This dial has an effective scale length of approximately twelve feet and is calibrated from zero to 500.

A slide-rule type dial is synchronized with the micrometer dial by means of an anti-backlash gear and an efficient string drive arrangement to the main tuning dial. A dial drum provides a means of mounting eight scales. Each of these scales is calibrated in megacycles for the general coverage and/or bandsread frequencies depending on the coil set. Mounted on the front panel is a band selector switch for ease in rotating the dial drum to select the proper band scale to correspond to the coil set in use. Each scale is clearly marked with the band designation. Two pilot lamps are used, one at each end of the dial scale drum, for illumination. The degree of illumination is controlled by the front-panel mounted Dimmer control.

1-6. CRYSTAL FILTER

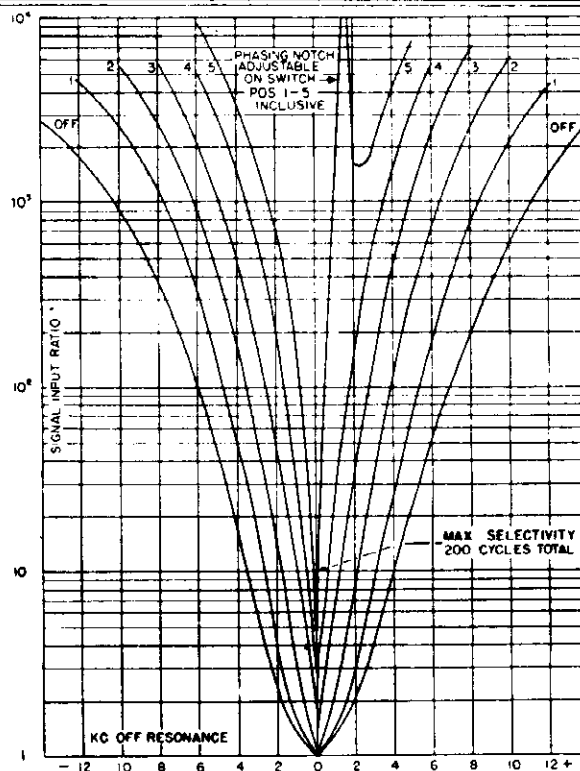
The selectivity characteristics of the HRO-50 are made adjustable by means of a crystal filter. Located in the first intermediate frequency amplifier this crystal filter is designed for extreme flexibility and efficiency of operation. A six-position Selectivity switch and a crystal Phasing control are front-panel mounted for adjustment of the filter. Figure Number 1, shows the selectivity characteristics of the Receiver for each of the six positions of selectivity.

The crystal filter may be used for either C.W. or phone reception; any degree of selectivity from true single-signal to wide band A.M. broadcast reception being available. Operation of the Phasing control provides for efficient suppression of interfering C.W. signals or M.C.W. signals which may produce objectional heterodynes.

1-7. NOISE LIMITER

The noise limiter in the HRO-50 Receiver uses an automatic type double-action circuit resulting in limiting noise pulses on both the positive and negative peaks. It is equally effective on both C.W. and phone reception. The usefulness of this limiter will be most appreciated on the higher frequency bands of the Receiver when automobile ignition noise and other high frequency disturbances are effectually suppressed. A threshold control on the front panel permits adjustment of the level at which limiting action starts.

MODEL HRO-50

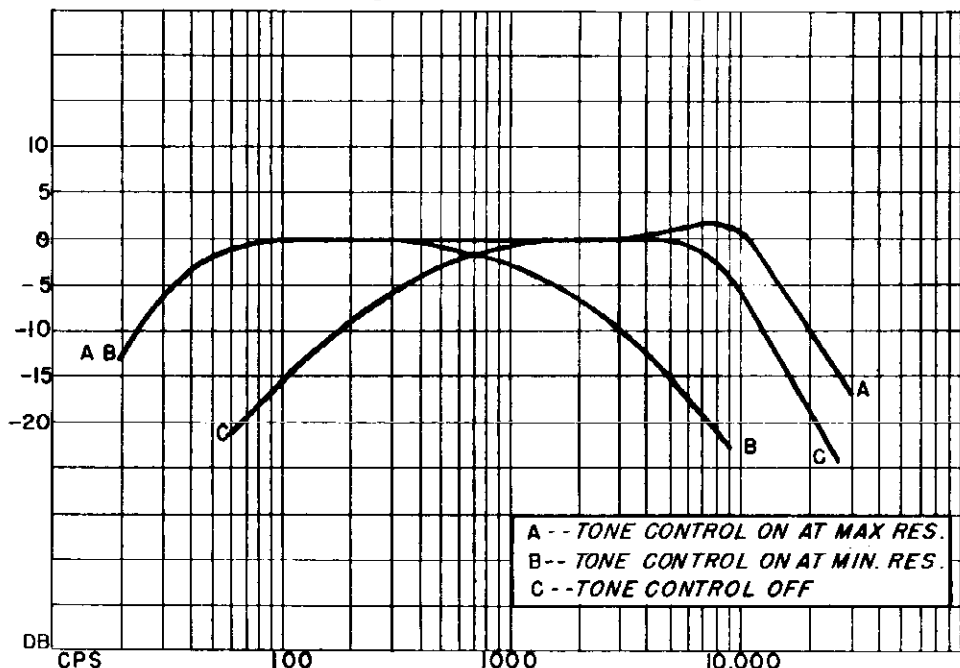


1-8. TONE CONTROL

Figure No. 1. Crystal Filter Selectivity Curves

The Tone control circuit has been especially designed to provide a versatile variance of the frequency characteristics of the audio amplifier output. In the extreme counter-clockwise position the greatest degree of high audio frequency response is obtained. Rotating the control clockwise until the switch mounted on the control just closes provides a comparatively flat response over the entire usable audio frequency range. Further clockwise rotation will result in the high audio frequencies being attenuated as illustrated in Figure Number 2. This control is particularly helpful when receiving weak signals through interference. If a signal is weak and partially obscured by background noise or static, an improvement in signal-to-noise ratio will be obtained by rotating the Tone control in a clockwise position thereby attenuating the higher audio frequencies.

Figure No. 2. Audio Amplifier Response



1-9. TEMPERATURE COMPENSATION

The HRO-50 is compensated for frequency drift due to temperature changes which may detune the Receiver from the desired signal over long or short periods of reception. The most objectionable cause of frequency drift is the change of inductance of the high-frequency oscillator coil as heat from the tubes causes the interior of the Receiver to increase in temperature. This undesirable heating effect in the R.F. coils is minimized by the position of the plug-in coil sets in that they are placed at the bottom of the Receiver underneath the chassis in a separately shielded compartment. A further safeguard against frequency drift is provided for on bandspread operation. The heat which is dissipated in the high-frequency oscillator may change the inter-electrode capacity of the tube and thus cause frequency drift. To offset this effect a small negative temperature coefficient capacitor is placed adjacent to the high-frequency oscillator tube to compensate for any change caused by the internal heating of the tube.

The coil set terminal connecting boards of each shielded coil can as well as their mating brush blocks have been made of ceramic type material. As a result freedom from any possible leakage due to poor insulation assures a low degree of drift. This will be found especially true of the coils operating at the higher frequencies.

1-10. SIGNAL STRENGTH METER

Signal input readings are indicated in S-units from 1 to 9 and in decibels above S-9 from zero to 40 db. on the panel-mounted signal strength meter. A reading of S-9 is obtained with an input signal of approximately 25 microvolts. The meter employs a zero to 1 milliamper movement with its mechanical zero at 40 db. on the dial scale. The S-Meter is connected in series with the plate input of the S-Meter Amplifier tube V-8A and measures the plate current of this tube. With the A.C. supply switch On and the A.V.C. switch set at A.V.C. the S-Meter will read zero in the absence of signal input. A variable resistor is shunted across the meter and with no antenna connected this resistor allows correct adjustment of the pointer to its electrical zero. Any increase in A.V.C. voltage caused by signal input will give a corresponding increase in the meter reading. At the 40 db. meter reading the A.V.C. grid voltage applied reaches the cut-off point of the amplifier tube. Therefore the pointer cannot be harmed by violent contact with the full-scale meter pin. For the purpose of comparing strong signals (which cause the meter to contact the full-scale meter pin) with other stronger and/or weaker signals the sensitivity of the S-Meter may be lowered by retarding the R.F. Gain control. The meter dial lamp illumination is regulated by a Dimmer control mounted on the front panel of the Receiver.

1-11. NARROW-BAND F.M. SOCKET

A standard octal socket, X-1, is mounted inside of the Receiver on the center portion of the power supply compartment chassis. It is designed to mount the National Type NFM-50 Narrow-Band F.M. adaptor. A Control switch is front-panel mounted to provide a means of switching the adaptor into the output of the intermediate amplifier circuit. With the Control switch set at the N.F.M. position the receiver is adjusted for the reception of narrow-band F.M. signals. With the A.V.C. switch set at A.V.C. the S-Meter is operative in the N.F.M. position and the Receiver should be tuned for maximum meter reading to assure efficient operation. Further information concerning the NFM-50 unit is contained in a separate data sheet at the rear of this manual.

MODEL HRO-50

1-12. CRYSTAL CALIBRATOR SOCKET

The Crystal Calibrator socket, X-2, is of the standard octal type mounted on top of the power supply compartment chassis inside of the Receiver. It is designed to accommodate a National Model XCU Crystal Calibrator. The Model XCU is compactly constructed and furnished with a drive screw clamping arrangement to hold it firmly in place. A double-pole, three-position toggle type front-panel mounted Calibrate switch marked 100-Off-1000 provides a means of connecting B-plus to the unit for instantaneous use. At the same time by using this toggle switch a resonant crystal-controlled frequency of either 100 or 1000 kcs. may be selected. The output of this unit is loosely coupled to the first R.F. amplifier stage through the socket wiring. Further information concerning the Model XCU unit is covered by a separate data sheet included at the rear of this manual.

1-13. SELECT-O-JECT SOCKET

The Select-O-Ject socket, X-3, is a standard octal type socket accessible at the rear of the Receiver. It is primarily designed to accommodate a National Model SOJ-3 Select-O-Ject unit. The mating plug attached to the SOJ-3 permits a direct connection into this socket in place of the audio-jumper plug originally plugged into the Select-O-Ject socket. By proper adjustment of the controls any single audio frequency selected in the range of approximately 80 to 10,000 cycles may be boosted or rejected. Detailed instructions for proper operation of the Select-O-Ject are contained with the unit.

For convenience a source of 6.3 V.A.C. filament voltage, a 240 V.D.C. high voltage as well as the 105 V.D.C. regulated voltage is available for operation of external apparatus. The Schematic diagram, Figure Number 13 shows a pin view of the Select-O-Ject socket thus providing the information necessary for making the proper connections. External equipment MUST NOT be utilized if the Narrow-Band F.M. adaptor, Crystal Calibrator and Select-O-Ject units are all operated at the same time. Consideration must also be given to the fact that the 105-volt regulated power supply cannot be switched off by the B+ On-Off switch.

1-14. PHONO INPUT JACK

A Phono jack is mounted at the rear of the Receiver and can be used for connecting auxiliary apparatus, such as a record player pick-up or microphone into the audio system of the Receiver. This input circuit is of high-impedance providing a suitable match for such external equipment into the high-gain first audio amplifier stage. The front-panel mounted Control switch must be set at the Phono position when using the Phono jack. Both the A.F. Gain and Tone controls are operative with this type of operation.

The majority of record player pick-ups are terminated in a single shielded wire. The Phono jack on the HRO-50 is the type that accommodates a standard phono tip plug and if the record player to be used is not fitted with such a plug one can easily be attached. If the output circuit of the record player is of low impedance (less than 100,000 ohms) improved efficiency will be obtained if a suitable resistor, with a value as specified for the particular record player, is connected across the phono tip plug or its mating jack to properly load the record player output circuit.

1-15. AUDIO OUTPUT

The HRO-50 features a push-pull output amplifier using inverse feed-back. See Figure No. 2 for the audio system response characteristic. The matching transformer located inside the Receiver provides two audio output circuits as follows:

(1) The transformer secondary leads are brought to a three-terminal Output board located at the rear of the Receiver, having both 8 and 500-ohm terminals and a common ground terminal. The eight-ohm terminal provides output for the speaker or voice coil. The 500-ohm terminal is available for connection to a 500-ohm line. Approximately 8 watts of undistorted audio output power is available at the output terminal board and a maximum power of 10 watts is obtainable.

(2) A headphones jack is front-panel mounted and is wired so as to silence the Loudspeaker upon insertion of the headphones plug. The headphones output load impedance is not critical and varying types of headphones may be used including crystal types, as no direct current flows through the headphones.

1-16. POWER SUPPLY

The power supply is built in a separate compartment inside of the Receiver cabinet incorporating a heat-resistant shielded barrier isolating it from the R.F. chassis portion. It is designed for operation from a 110/120 or 220/240-volt, 50/60 cycle A.C. supply source. A toggle switch is mounted on top of the chassis for selection of either 110/120 or 220/240-volt operation. Normal power consumption is approximately 115 watts. The built-in power unit supplies all of the voltages required by the heater and B supply circuits, 4.5 amperes at 6.3 volts and 125 milliamperes at 240 volts respectively. In addition this supply is also capable of furnishing all voltages required by the accessories such as the NFM-50, XCU and SOJ-3. A 2-ampere fuse is connected in one side of the A.C. input supply to protect the Receiver circuits against possible voltage surges in the power line or short circuits in the Receiver. It is located at the rear of the Receiver and easily removed for examination or replacement.

A Power Socket, X-4, is provided at the rear of the Receiver so that either a battery or vibrator power supply may be utilized for portable or emergency service. The National Type 650S Vibrator Power Supply is designed to provide efficient operation of the Receiver with the use of a 6-volt storage battery input. Further information concerning the 650S is contained at the rear of this manual on a separate data sheet.

1-17. LOUDSPEAKER

The HRO-50TS or HRO-50RS Loudspeakers in table or rack mounting styles respectively are designed for use with the Receiver. These are both permanent-magnet type Loudspeakers furnished with a shielded connecting cable from the 8-ohm voice coil for connection to the output terminal board located at the rear of the Receiver. If desirable a 500-ohm shielded line may be used from the Receiver output terminals to the speaker and/or externally operated equipment. In event of a dynamic type loudspeaker being used external means for supplying field excitation voltage will be necessary.

A cabinet furnished to match the Receiver design houses the HRO-50TS Loudspeaker for table mounting. The cabinet is lined with sound absorbent material to avoid mechanical resonance.

SECTION 2. INSTALLATION

2-1. GENERAL

All HRO-50 Receivers are supplied with the following eight scales mounted on the slide-rule dial drum, irrespective of the type of coil sets ordered, A, B, C, D,

MODEL HRO-50

E-F, AA, AB and AC. If a coil set or coil sets are ordered with the Receiver and the corresponding scale does not appear on the dial drum it will be found packed with the coil set. The new scale is installed in place of any one of the unused scales previously mounted on the dial drum. Two Phillips head type screws, one at each end of the scale, hold it properly in place. The drum scales for the A, B, C and D coil sets are frequency calibrated in megacycles for both of the available ranges i.e., General Coverage and Bandspread. The E and F coil set ranges are on the same scale, while the remaining scales carry just the one frequency range calibrated in megacycles. Each scale is clearly marked with the band designation.

2-2. LOCATION

The Receiver should not be installed in small, unventilated or warm spaces. Wherever practicable placement should be made to allow freedom of air circulation on all four sides. The Loudspeaker may be located in any desirable position although it is not recommended that it be placed on top of the Receiver as undesirable microphonics may result. The Loudspeaker should not be placed near the antenna terminals.

2-3. ANTENNA RECOMMENDATIONS

The radio frequency input of the Receiver is designed for operation from either a single-wire antenna or other types employing transmission lines having impedances of 70 ohms or more. There is an antenna terminal panel at the rear of the Receiver with three screw-type terminals marked A, A and G respectively. A link is provided on the antenna terminal panel to allow connection of two-wire or single-wire type antennae to the Receiver.

For best impedance matching to the Receiver input circuit an antenna with a 300 to 600 ohm transmission line is recommended. The antenna should be cut to the proper length for the most used frequency. The antenna transmission line feeders should be connected to the two antenna terminals marked A; the grounding link is not used. It must be remembered, however, that an antenna installation of this type will have maximum efficiency over a band of frequencies near that frequency for which it is designed and will be most useful in installations where the Receiver is tuned to one frequency or band of frequencies. For other frequencies, it would be desirable to connect the two transmission line leads together at the antenna terminal at the left of the antenna terminal panel, grounding the other terminal by means of the link. The antenna is thus utilized as a single wire type.

The most practical antenna for use in installations where the Receiver is to be used over a wide range of frequencies is the single-wire type. An antenna length of from 50 to 100 feet is recommended. The antenna lead-in should be connected to the antenna terminal marked A at the left of the antenna terminal panel; the other terminal marked A should be grounded by means of the link.

When a doublet is used, the antenna feeders or balanced transmission line are connected to the two terminals marked A. The grounding link is not used.

The inner conductor of a concentric transmission line should be connected to the terminal marked A at the left of the antenna terminal panel. The outer conductor should be connected to the other terminal marked A and grounded by means of the link to G.

In some cases where a doublet antenna is used with a low impedance concentric or other type transmission line it may be necessary to re-trim the first R.F. amplifier at the high end of each band to provide a better impedance match between antenna and receiver input circuit. Paragraph 4-6 describes this procedure.

In an installation where the Receiver is to be used as the receiving unit in a transmitting station the most efficient operation will result from use of the transmitting antenna as receiving antenna also. This is especially true if the transmitting antenna is of the multi-element, directional type since the same antenna gain is available for both receiving and transmitting - a very desirable condition. For switching the antenna from Receiver to transmitter, an antenna change-over relay should be used. A double-pole, double-throw relay possessing good high-frequency insulation is suitable. A second relay and a three position switch may be used to control the transmitter plate supply and the Receiver B+ circuits. This second relay should be a single-pole single-throw type having one normally open pair of contacts. The schematic diagram of this type of control circuit is shown in Figure 3. With S-1 in the receive position the antenna transmission line is connected to the Receiver by contacts 2, 3, 5 and 6 on relay RY-1; the B+ circuit of the Receiver is completed by the switch. (The B+ switch on the Receiver should be at B+ Off). With the switch in the transmit position RY-1 contacts 1, 3, 4 and 6 are closed transferring the antenna transmission line to the transmitter; contacts 7 and 8 of relay RY-2 close to complete the plate supply circuit to the transmitter. Contacts 7 and 8 of relay RY-2 should be in series with the primary of the transmitter plate supply transformer. Thus, the station is in the receiving condition with switch S-1 in the receive position and in the transmitting condition with S-1 in the transmit position. With S-1 in the mid-position the Receiver B+ circuit and transmitter plate supply circuit are both open thus permitting coil set changing in the Receiver and transmitter. In the mid-position the Receiver B+ circuit is controlled by the B+ switch on the front panel of the Receiver. NOTE

The high-frequency oscillator, C.W. oscillator S-Meter amplifier and the push-pull audio output amplifier are not affected by the external relay connections to the B.S.W. terminal block. Unless the A.C. On-Off switch is set at Off these circuits will obtain an uninterrupted B-plus supply.

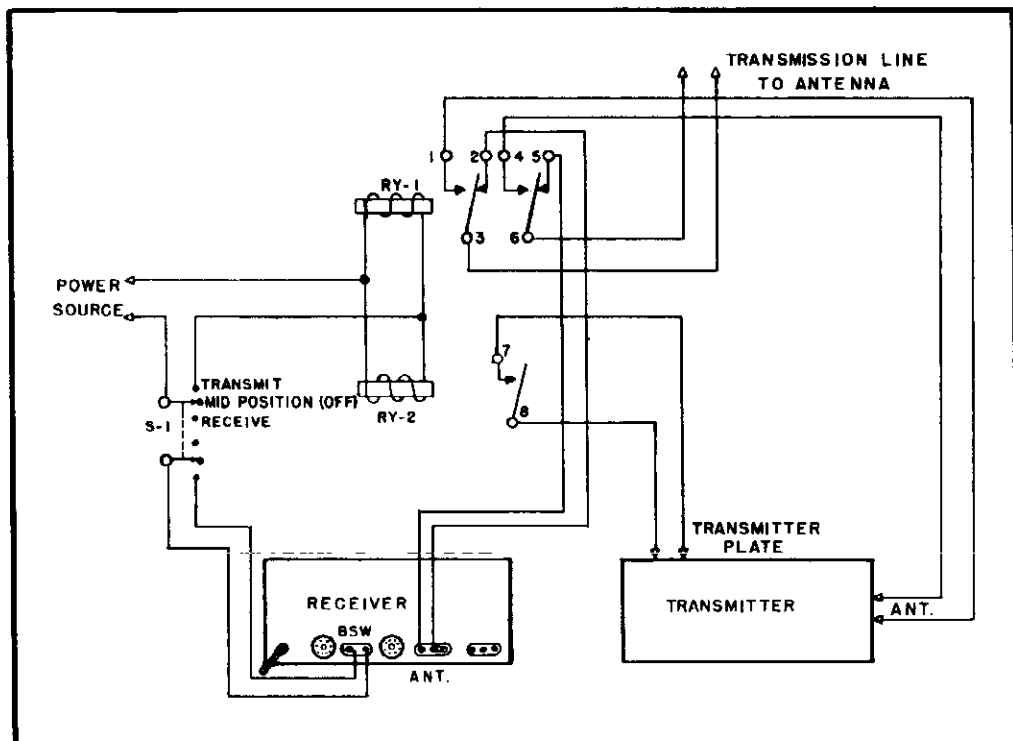


Figure No. 3. Typical Antenna Switching System

MODEL HRO-50

2-4. A.C. OPERATION

After unpacking the HRO-50 Receiver and associated equipment proceed as follows:

- (1) Make sure that all tubes are firmly seated in their sockets, tube clamps are properly in place and all grid clips securely fastened.
- (2) Make sure the plug-in coil set used in the Receiver is firmly in position by pressing down the lever-type handles on the front panel to their maximum vertical position.
- (3) Make sure that the front-panel mounted Control switch is set in the proper position. This switch provides four operating positions, C.W., A.M., N.F.M. or Phono.
- (4) Connect the antenna as recommended in Section 2-2.
- (5) Connect the Loudspeaker cable to the Output terminal board at the rear of the Receiver. This is accomplished by connecting the outer shield lead to the common terminal and the other to the 8-ohm terminal. A 500-ohm terminal is also available on the Output terminal board in cases where a 500-ohm line is utilized for Loudspeaker connection.
- (6) Connect the Receiver A.C. line cord to the proper source of voltage. The Primary switch, S-10, must be set at the position corresponding to the line voltage to be used i.e., 110/120 or 220/240 volts, 50/60 cps.
- (7) Set the controls as recommended in Section 3 for reception of signals.

NOTE

Where the Receiver is located in the R.F. field of a relatively powerful transmitter, it is advisable to provide some means of preventing damage to the Receiver R.F. coil. If a separate receiving antenna is used a means of disconnecting or grounding it during transmission periods should be provided.

2-5. BATTERY OPERATION

The HRO-50 is readily adaptable for emergency, portable operation or operation in localities where a 115 or 230-volt A.C. power source is not available. It may be operated directly from batteries or a National Type 650S Vibrator Power Supply designed for operation from a 6-volt storage battery. The Type 650S power unit draws 9.0 amperes at 6-volts when furnishing power to the Receiver if the Narrow-Band F.M. Adaptor, Crystal Calibrator and Select-O-Ject units are not used. If these plug-in units are utilized typical operating conditions and power consumption data will be found in Section 6.

The Schematic Diagram Figure Number 13 illustrates pin connections of the Receiver Power socket, X-4. This provides the information necessary for wiring the octal type battery plug which is used in place of the regular A.C. jumper plug. To conserve battery power the battery plug must be disconnected when the Receiver is not being used. For stand-by operation in all cases it is recommended that a switch be placed in the battery B-plus lead as the B-plus switch in the Receiver does not open the B-plus circuit supplying the high-frequency oscillator, C.W.

oscillator, S-Meter Amplifier or the push-pull audio output tubes. A suggested refinement is to include a switch in the A-plus input lead so that the tube heaters may be turned off when the Receiver is not in use without the necessity of removing the battery plug from the Power socket.

2-6. ACCESSORY SOCKETS

Three octal type sockets are available for additional accessories as follows:

(1) A N.B.F.M. socket, X-1, is mounted on top of the chassis inside the power supply compartment. A National Type NFM-50 Narrow-Band F.M. adaptor is designed to fit into this socket and is supplied with a mounting bracket and drive screws to hold it firmly in place. The front-panel mounted Control switch, S-7, provides a means of switching the NFM-50 unit into instant service, as required.

(2) A Crystal Calibrator socket, X-2, is top chassis mounted in the power supply compartment. This socket is wired to accommodate a National plug-in Type XCU Crystal Calibrator Unit. A slotted head screw arrangement bolts the unit firmly in place. The front panel Calibrate switch provides a means of applying B-plus to the unit as well as the selection of either a 100 or 1000 kc. marker signal.

(3) A Select-O-Ject socket, X-3, of the standard octal type is mounted so as to be accessible from the rear of the Receiver. This socket is designed primarily for the use of a National Model SOJ-3 Select-O-Ject unit. The SOJ-3 is fitted with an interconnecting cable and plug for direct connection to the Select-O-Ject socket.

Reference to the Schematic Diagram will show the various connections made to the socket if it is desired to use the voltages available for accessories other than the Select-O-Ject. It will be noted that B+ (240 V.D.C. and 105 V.D.C. regulated) and filament voltages are available. There is a definite limitation on the drain permissible at this socket. The total permissible drain (if the NFM-50, XCU and SOJ-3 are not used) is 1.5 amps. at 6.3 V.A.C., 2.5 milliamperes at 240 V.D.C. and 5 milliamperes at 105 V.D.C. If the 105-volt supply is used it must be remembered that it cannot be switched Off by the B+ On-Off switch or external switching devices connected to the B.S.W. panel unless an additional relay is used.

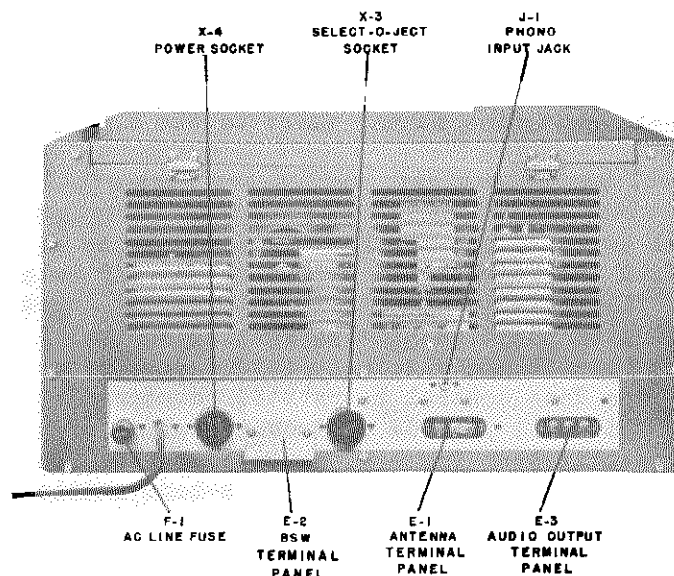


Figure No. 4. Rear View of Receiver

MODEL HRO-50

SECTION 3. OPERATION

3-1. CONTROLS

All controls are identified by front-panel markings for ease of identification. The controls are located in a symmetrical manner and are arranged for ease of operation.

The main tuning HRO type micrometer dial is arranged so that the frequency to which the Receiver tunes increases as the dial reading increases. The slide-rule dial pointer mechanism is synchronized with the main tuning dial using an anti-backlash gear plus an efficient string-drive arrangement to provide an accurate relationship between the main tuning dial and the direct frequency calibrated scales on the slide-rule drum assembly. Front-panel mounted is a Band selector switch for switching the proper scale in place for the coil set to be used.

The R.F. Gain control serves to adjust the amplification of the second R.F. first I.F. and second I.F. amplifier stages. Maximum sensitivity is obtained by rotating the control knob to the extreme clockwise position (10) on its circular scale. At the extreme clockwise position all tubes are operating at maximum gain with minimum bias. As the control is rotated counter-clockwise, increasing bias is applied to the cathodes of the second R.F., first I.F. and second I.F. tubes, thus reducing their amplification.

The A.C. On-Off switch is associated with the A.F. Gain control and A.C. power is turned on as the A.F. Gain control is advanced from A.C. Off to zero on its scale.

The B+ On-Off switch is connected in the positive lead of the power supply circuit and its purpose is to disconnect the B-plus during periods of transmission or WHEN CHANGING COIL SETS. This last function is important. The B+ circuits are completed when the switch is set at On. However, the B-plus circuits of the high-frequency oscillator, S-Meter amplifier, C.W. oscillator and push-pull audio output tubes remain On at all times regardless of the position of the B+ On-Off switch providing the A.C. On-Off switch is set at On.

Connected in parallel with the B+ switch and mounted at the rear of the chassis is a pair of contacts marked B.S.W. intended for use with relay control of the Receiver. The B.S.W. panel is covered by a metal shield to prevent accidental contact with the terminals by the operator. Two slots are provided in this shield to bring out wires to connect to an external switch or relay. Care should be taken that these wires for external connection do not short to the B.S.W. shield.

The Phasing control and Selectivity switch are part of the crystal filter. When the Selectivity switch is set at Off the crystal is switched out of the circuit. With the crystal switched out the Phasing control has no influence on Receiver performance. With the Selectivity switch set at any point between 1 and 5, inclusive, the crystal filter is in operation, selectivity increasing as the switch is progressively advanced in position 5. The Phasing control is then used to balance the crystal bridge circuit and eliminate interfering signals or heterodynes. It is recommended that the Tone control be rotated counter-clockwise until the switch is turned Off. This will provide optimum reception of the high audio frequencies when using the crystal filter for A.M. reception. The resultant boost of the higher frequencies tends to compensate for the side-band cutting action of the crystal filter.

The C.W. oscillator is turned on by setting the front-panel mounted Control

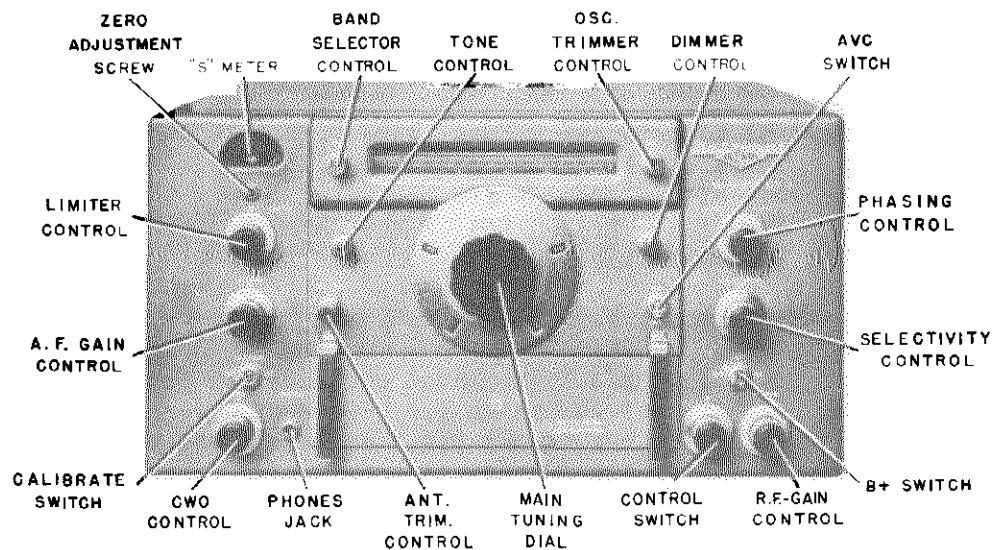


Figure No. 5. Front View of Receiver

switch at the C.W. position. The C.W.O. control provides a vernier tuning adjustment for the C.W. oscillator transformer. This oscillator is used to produce an audible beat note when receiving C.W. signals or to locate the carrier of a weak phone station. With the Control switch set at the C.W. position B-plus is applied to the C.W. oscillator tube providing a constant B-plus supply regardless of the B+ On-Off switch setting or the B.S.W. external control devices. Normally the C.W.O. control is set at zero, however by rotating it either to the right or left of zero the operator can select an audio tone suitable to the ear, or he may set the control for best reception. The C.W. code characters are made audible through the heterodyning action of the C.W. oscillator with that of the incoming signal. Care should be taken to retard the R.F. Gain control to a point where the receiver does not overload.

The Limiter control serves to switch on the limiter and, following this, to adjust the threshold at which limiting action starts. With the Limiter control turned on (at position 0 on the dial scale) limiting action automatically takes place at a relatively high percentage modulation. Rotating the control clockwise progressively lowers the threshold, or percentage modulation, at which limiting action starts until maximum clipping is achieved at 10. This limiter is double-action in that limiting is accomplished by clipping of both positive and negative peaks. Limiting action is equally effective for both phone or C.W. reception.

The Tone control is used to vary the audio frequency characteristic of the audio system. In the extreme counter-clockwise position the greatest degree of high audio frequency response is obtained. Rotating the control clockwise until the switch mounted on the control just closes provides a comparatively flat response over the entire usable audio frequency range. Rotating the control further in a clockwise position will attenuate the high audio frequencies as shown in Figure Number 2. If a signal is weak and partially obscured by background noise or static an improvement in signal-to-noise ratio is possible by the attenuation of the higher audio frequencies. Excessive attenuation of these frequencies, however, may result in an impairment of A.M. speech intelligibility. When receiving C.W. signals it will be possible to advance the Tone control considerably further than is possible in A.M. reception since audio distortion is relatively unimportant.

The A.V.C. switch is a two-position toggle marked A.V.C.-Off. The automatic

MODEL HRO-50

volume control circuits are operative with the toggle switch in the A.V.C. or upper position.

The A.F. Gain control adjusts the volume level of the signal at both the Phones jack and Loudspeaker terminals. Clockwise rotation of this control increases the signal applied to the grid of the first audio amplifier tube. The A.F. Gain control is operative when an audio signal is applied to the Phono input jack with the Control switch set at the Phono position.

A Bandsread switch is mounted on the A, B, C and D coil sets. Inspection of the coil set ceramic terminal panels will show a silver-plated spring metal strip with a slotted center screw. Four silver-plated contacts are provided on the terminal panels; two for each type of reception i.e., General Coverage or Bandsread. The metal strip may be turned either to the right or left thereby selecting the type of reception required. A spring tension detent arrangement provides for proper placement and a firm trouble-free electrical contact in each position. It is only necessary to switch this from the left to the right hand side to change from General Coverage to Bandsread. The lower calibrated scale on the slide rule dial is used when operating in the Bandsread position. A typical coil set showing adjustment locations is illustrated in Figure Number 7 contained in Section 4.

The Ant. Trim. control operates a tuning capacitor which is connected across the first R.F. amplifier section of the main tuning capacitor. This trimmer control is used to tune the first R.F. amplifier stage properly under a wide variety of antenna loading conditions over the entire frequency range of the receiver.

The Dimmer control is a variable resistor actuated by a front-panel mounted dial. It is connected in series with one of the filament supply wires to the S-Meter and slide-rule dial pilot lamps and furnishes a means of varying the degree of illumination as desired by the operator.

The front-panel mounted Osc. trimmer control drives a variable air capacitor connected in parallel with the oscillator main tuning capacitor. Assuming that the Receiver is properly aligned this compensating trimmer may be used for minor calibration adjustments. Calibration can be checked by the use of accurate crystal-controlled test oscillators or by using the National Model XCU Crystal Calibrator. Use of the Osc. trimmer should not be attempted until the Receiver has had a warm-up period of at least five minutes.

A four position Control switch is mounted on the front panel of the Receiver. In the C.W. position the C.W. oscillator is placed in operation. The A.M. position provides normal reception of phone or broadcast signals. In the N.F.M. position the reception of narrow-band F.M. signals is possible provided a National Type NFM-50 adaptor is plugged into the N.B.F.M. socket. With the Control switch in this position the adaptor is connected between the output of the intermediate amplifier and the input of the audio system. When the Control switch is set in the Phono position the Phono jack is connected to the input of the audio amplifier. In the Phono position all of the Receiver circuits except the audio system are rendered inoperative. The A.F. Gain and Tone controls remain operative. If it is so desired the record player may remain connected to the Receiver and normal receiving operation resumed by setting the Control switch to any of the other positions.

3-2. PHONE RECEPTION

After the HRO-50 is properly installed as outlined in Section 2, it is placed in operation by the following adjustments:

1. Set the Control switch at A.M.
2. Set the A.V.C. switch at A.V.C.
3. Set the Selectivity switch at Off.
4. Set the Phasing control at zero.
5. Set the Limiter control at Off.
6. Set the R.F. Gain control at 10.
7. Check the position of the Osc. trimmer control pointer. It is aligned at the factory so that proper calibration is obtained with the pointer in a vertical position with the arrow head pointed to the "S" in the Osc. panel engraving.
8. Turn the A.C.-On-Off switch mounted on the A.F. Gain control to On i.e., zero on the dial scale.
9. Set the Receiver B+ switch at On.
10. Adjust the Band control to select the scale corresponding to the plug-in coil set in use.
11. Turn the A.F. Gain control to the position giving the desired audio volume.
12. Adjust the Ant. Trim. control for a maximum S-Meter reading after the desired station has been selected. Alternately in the absence of a signal the Ant. Trim. control may be set for maximum receiver background noise.
13. Turn the Tone control to a position giving the desired audio output response for the signal tuned in.

The Receiver is now adjusted for the reception of phone signals and will tune to the frequency corresponding to the plug-in coil set in use and the setting of the main tuning dial. If a dual-coverage plug-in coil set is used the position of the Bandsread switch, as previously described in paragraph 1 of this section, will determine the frequency coverage i.e., General Coverage or Bandsread.

The settings given above are of necessity for the reception of signals of average strength. Exceptionally strong or weak signals may require modification of the above settings. Very strong signals may cause overload or distortion in the Receiver with the R.F. Gain control at 10. In this case retarding this control slightly until the overload or distortion disappears is recommended. However, the operator must remember that automatic volume control action will be restricted unless the R.F. Gain control is fully advanced. Audio output should be adjusted entirely by means of the A.F. Gain control.

The A.V.C. - Off switch may be set at the Off position to provide increased sensitivity in some cases. With such a setting the operator must be careful not to advance the R.F. Gain control to a point where I.F. or audio amplifier overload occurs. Such overload is indicated by distortion.

Various types of interference which may be encountered due to adverse receiving conditions can be minimized by utilization of the following controls in the manner described.

Noise Limiter -- When a signal is accompanied by static peaks or noise pulses of high intensity and short duration, the best signal-to-noise ratio will be obtained by turning On the Limiter control. In general, it will be found that turning the Limiter control On to 0 on the dial scale will effectively minimize interference caused by external noise pulses. In cases where the noise pulses are extremely pronounced a higher degree of noise suppression will be realized by advancing the Limiter control to a higher dial setting.

Tone control -- An improvement in signal-to-noise ratio can be realized by setting the Tone control to attenuate the high audio frequencies. When receiving weak

signals which are partially obscured by background noise or static an improvement in reception will be noticed by rotating the Tone control in a clockwise manner. However, too much attenuation of the high audio frequencies may impair the intelligibility of speech.

Selectivity and Phasing -- The selectivity of the Receiver is adjusted by means of the crystal filter Selectivity switch. The normal setting of the Selectivity switch in phone or broadcast reception is at one of the positions affording broad selectivity. Positions marked Off, 1 or 2 are recommended. Selectivity may be progressively increased by turning the Selectivity switch to position 3, 4 or 5. Increasing selectivity will result in the attenuation of the higher audio frequency tones of the signal as well as sharper tuning. If the selectivity is increased too much these higher frequency audio tones will be attenuated to such an extent that phone or broadcast reception may become unintelligible due to excessive side-band cutting. The Phasing control is part of the crystal filter and is used to eliminate or attenuate interfering heterodynes. The Phasing control is inoperative with the Selectivity switch set in the Off position but is operative in all other settings. The normal setting of the Phasing control with the crystal filter On i.e., the Selectivity switch set at 1, 2, 3, 4 or 5 in phone reception is at zero on its scale. If after a desired signal has been tuned in an interfering signal causes a heterodyne or whistle the Phasing control should be adjusted until this interference is reduced to minimum. The setting of the Phasing control should be that which provides a maximum attenuation of the objectionable heterodyne. If the heterodyne is below 1,000 cycles the optimum Phasing control setting will be near either one or the other end of the dial scale, depending upon whether the interfering signal has a higher or lower frequency than the desired signal.

3-3. C.W. RECEPTION

The initial adjustment of the Receiver controls for C.W. reception is the same as given in Section 3-2 except for the following:

1. Set the Control switch at C.W.
2. Set the A.V.C. switch at Off. It is important that the A.V.C. switch is turned Off for C.W. operation since the Receiver will block and become extremely insensitive if this is not done.

For the reception of C.W. signals the action of the crystal filter is similar to that for phone reception except that full use of the sharp selectivity position may be used without the loss of intelligibility experienced in phone reception. When maximum selectivity is used, (Selectivity switch at position 5) care must be exercised since tuning is very critical. When the Receiver is slowly tuned across the carrier of the received signal the beat-note produced will be very sharply peaked in output at a particular audio pitch. This peak in response indicates the correct Receiver dial setting. The setting of the C.W.O. control must be such that the beat-note peak is well within the audible range so that the receiver peak response may be readily observed. A C.W.O. dial setting near zero is recommended. After the Receiver has been correctly tuned, the pitch of the beat-note peak may be adjusted by means of the C.W.O. control to provide an audio tone which is pleasing to copy or coincides with any response peaks in the speaker or headphones. Under these conditions, the Receiver will exhibit pronounced single-signal properties which may be demonstrated by tuning the Receiver to the other side of "zero-beat" so that the pitch is the same as before and observe the marked reduction in output. This dial setting is not recommended for use other than to demonstrate the single-signal properties of the Receiver. With the Receiver tuned to "crystal peak", an interfering signal may be attenuated by proper setting of the Phasing control since

this control has little effect on the desired signal.

Similar to phone reception the Limiter control can be used to great advantage in C.W. reception for the reduction of interference due to external noise pulses. For C.W. reception, however, the Limiter control may be set at a well advanced position on the dial scale as excessive clipping of the modulation peaks will not be experienced as might be the case in phone reception. Also the Tone control may be advanced considerably further for C.W. reception since audio distortion is relatively unimportant.

3-4. N.B.F.M. OPERATION

The HRO-50 Receiver is adaptable for Narrow-Band F.M. reception by utilizing a National Type NFM-50 Narrow-Band F.M. adaptor. Operating instructions as given in paragraph 3-2 of this Section are applicable for the reception of narrow-band F.M. signals except that the Control switch must be set at N.F.M. It is recommended that when the operator is scanning a band for signals that the Control switch is set at A.M. An F.M. signal is indicated by the presence of an audio null in the center of the signal carrier. When an F.M. signal is encountered the Control switch should then be set at N.F.M. and with the A.V.C. switch set at A.V.C. the signal tuned for maximum S-Meter reading.

3-5. MEASUREMENT OF SIGNAL STRENGTH

To measure the strength or intensity of a signal the R.F. Gain control must be advanced to 10, the Control switch set at A.M. and the A.V.C.-Off switch at A.V.C. The crystal filter should be turned Off by means of the Selectivity switch and the Phasing control set at zero. The Ant. Trim. control should be adjusted for a maximum S-Meter Reading after a signal has been tuned in. The Limiter, Tone and A.F. Gain controls do not affect the S-Meter reading.

Tuning the Receiver to a signal will cause the S-Meter to read, indicating the signal input in S-units from 1 to 9 and in decibels above the S-9 level from zero to 40 db. With no R.F. input to the Receiver, or with the antenna disconnected, the S-Meter should read zero plus or minus one-half an S-unit. If it does not the S-Meter circuit compensator requires adjustment. See Section 4-7 for adjustment procedure.

Design of the S-Meter actuating circuit is such that a signal stronger than 40 db. above S-9 cannot cause the meter pointer to come in violent contact with the full-scale meter stop pin thus preventing the possible bending of the meter pointer.

For the purpose of comparing strong signals, which cause the meter pointer to read full scale, with other stronger and/or weaker signals the sensitivity of the S-Meter may be lowered by retarding the R.F. Gain control.

Measurements of the signal strength of C.W. signals cannot be made with the C.W. oscillator in operation.

With the Receiver A.C.-On-Off switch set at Off the meter pointer will return to its mechanical zero located on the right hand or 40 db. end of the meter.

MODEL HRO-50

SECTION 4. ALIGNMENT DATA

4-1. GENERAL

All circuits in the HRO-50 Receiver are carefully aligned before shipment using precision test equipment insuring accurate conformability to the alignment frequency. No realignment of the various adjustments will be required unless the Receiver is tampered with or component parts or tube replacements have been necessary.

A definite need for realignment can be determined by checking the performance of the Receiver against its normal operation as outlined in Section 3. A simple check to assure the need of realignment of the I.F. Amplifier is provided in paragraph 4-2. of this section. In no case should realignment be attempted unless tests indicate that such realignment is necessary. Even then it must be remembered that the HRO-50 is a communications Receiver and should not be serviced or realigned by any individual who does not have a complete understanding of the functioning of the equipment and who has not had previous experience adjusting receivers of this type.

Complete alignment of the Receiver can be divided into three steps as follows:

- (a) Intermediate Frequency Amplifier alignment including crystal filter adjustments.
- (b) General Coverage Alignment
- (c) Bandsread Alignment

All circuits must be tuned in the above order when complete alignment is required. All alignment adjustments and controls are shown on Figure Numbers 6, 7 and 10.

4-2. I.F. AMPLIFIER CHECK

The making of any adjustment indiscriminately is cautioned against and no circuit should be realigned unless tests definitely indicate that realignment is necessary.

The alignment of the intermediate frequency amplifier may be easily checked in the following manner:

1. Adjust the Receiver for normal operation with the antenna disconnected.
2. Connect a pair of headphones to the Phones jack.
3. Set the A.V.C. switch at Off.
4. Set the Control switch at C.W.
5. Set the Phasing control at zero.
6. Set the Selectivity switch at 5.
7. Set the R.F. Gain control at 10.

The setting of the A.F. Gain control does not affect the measurement and may be adjusted to provide sufficient headphone output to make the required observations. Adjust the C.W.O. control until a point is found where the predominant pitch of the background noise is lowest and a distinct crystal ring is heard. Note this setting of the C.W.O. control. Disconnect the crystal filter from the circuit by turning the Selectivity switch to the Off position. Once more adjust the C.W.O. control for the lowest predominant pitch of background noise and note the setting. If the I.F. amplifier is correctly aligned to the crystal filter frequency the

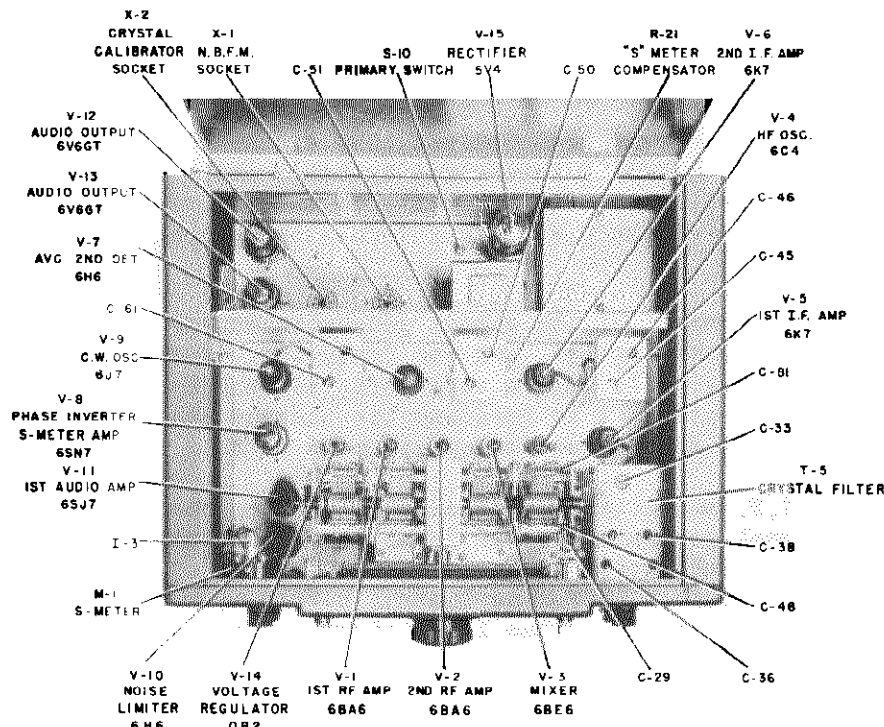


Figure No. 6. Top View of Receiver

setting of the C.W.O. control will be the same for both tests outlined above. If the two settings differ perform the complete I.F. Amplifier alignment procedures in following paragraph 4-3.

4-3. I.F. AMPLIFIER ALIGNMENT

The intermediate frequency of the HRO-50 is 455 kilocycles plus or minus 2 kilocycles. The exact frequency is determined by the quartz crystal resonator, Y-1, used in the crystal filter.

The I.F. transformers, crystal filter and C.W. oscillator transformer are fitted with individual air-type variable trimmer capacitors for alignment purposes. These adjustments are located on Figure Numbers 6 and 10.

The preliminary alignment procedure is as follows:

- (1) Connect the high output lead of an accurately calibrated signal generator to the stator portion of the mixer section of the main tuning capacitor, C-5C, and the grounded lead to any convenient point on the chassis. This is a direct connection.
- (2) Connect an output meter having an 8 or 500 ohm resistive load to the matching output terminals on the Receiver. As an alternative a high-impedance A.C. voltmeter may be connected to the phones jack.
- (3) Set the Control switch at C.W.
- (4) Set the A.V.C. switch at Off.
- (5) Set the Phasing control at zero.
- (6) Set the Selectivity switch at 5.
- (7) Set the A.F. Gain control at 10.
- (8) Set the R.F. Gain control at 9.
- (9) Turn the modulation of the signal generator off to provide a steady

MODEL PRO-50

C.W. test signal tuned to approximately 455 kilocycles.

Adjust the output attenuator of the signal generator to provide a signal of approximately 100 microvolts. The C.W.O. control must be set to provide an audio beat-note at some frequency between 400 and 1000 cycles per second. The presence of this beat note can readily be determined by temporarily connecting headphones or a Loudspeaker to the Receiver. If difficulty is encountered in obtaining such a beat-note an adjustment of the C.W.O. transformer trimmer capacitor, C-61, must be made.

Vary the tuning control of the signal generator very slowly between the frequencies of 453 and 457 kilocycles. At one frequency between these limits the I.F. amplifier of the receiver will show a very definite sharply peaked response, as indicated on the output meter. This frequency is that of the crystal filter crystal, Y-1, and I.F. alignment, as outlined below, is made at this frequency.

While making I.F. amplifier adjustments it will be necessary to retard the attenuator of the signal generator if I.F. amplifier gain increases to a point where overload occurs. Without altering the frequency setting of the signal generator set the Selectivity switch at Off, the Control switch at A.M. and turn the modulation of the signal generator On. The I.F. trimmer capacitors C-33, C-39, C-45, C-46, C-50 and C-51 should at this point each be carefully adjusted to give a maximum reading on the output meter. The order in which these adjustments are performed is not important.

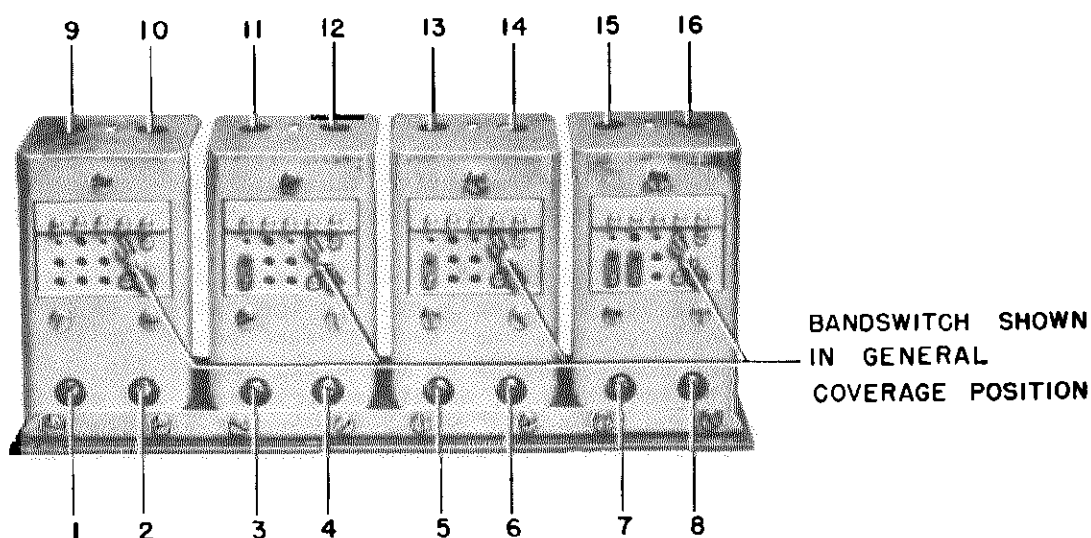
Upon completion of the above adjustments set the Selectivity switch at 1. Set the frequency of the signal generator 2 kilocycles higher and adjust the crystal filter trimmer capacitor, C-33, for a maximum output meter indication. After making this adjustment set the Selectivity control at Off and return the signal generator to the exact crystal frequency (2 kilocycles lower). Tune the Selectivity compensating trimmer capacitor, C-38, for a maximum reading on the output meter.

The Phasing control as set at the factory should need no further attention. When correctly set a predominant decrease in background level will be found with the Selectivity switch at position 5 and the Phasing control set at zero. This same null point should be found by rotating the Phasing control exactly 180 degrees. If not, a slight adjustment of the phase balancing capacitor, C-36, will provide the proper setting.

Turn the modulation of the signal generator Off and set the Control switch at C.W. Rotate the C.W.O. control to its full clockwise position. If in this position the dial control does not coincide with 5 on its scale loosen the dial knob and reset it at 5. Set the C.W.O. control to zero beat with the signal generator signal. If zero beat does not occur at 0 on the control dial carefully readjust the air trimmer capacitor, C-61, of the C.W. oscillator transformer, T-8.

4-4. GENERAL COVERAGE ALIGNMENT

The data given in this section applies to the General Coverage alignment of the H.F. oscillator and H.F. amplifier stages of all coil sets. The original alignment at the National Laboratories is accomplished by the use of precision, crystal-controlled test oscillators. No realignment should be attempted unless a reliable test signal source is available. In the case of General Coverage H.F. oscillator alignment, a test signal source with an accuracy of 1% or better is required. For Bandspread alignment the calibration accuracy demands that the test signal source have the accuracy of precision-calibrated crystals. The entire range



NOTE: INDUCTANCE ADJUSTMENTS AT POSITION NO. 16 ARE AS FOLLOWS:

1. A, B & C COIL SETS---LOOP OF WIRE INSIDE COIL FORM---BENDING THE LOOP ONE WAY OR THE OTHER ADDS OR SUBTRACTS TO THE INDUCTANCE.
2. D COIL SET---ADJUSTABLE DISC INSIDE COIL FORM---MOVING THE DISC TOWARD THE CENTER OF THE COIL DECREASES INDUCTANCE.
3. E, F, G, H & J COIL SETS---A SHORT-CIRCUITED TURN OF WIRE AROUND THE OUTSIDE OF THE COIL---MOVING THIS TURN UP OR DOWN VARIES THE INDUCTANCE.

INDUCTANCE ADJUSTMENT AT POSITION NOS. 9, 11 & 13 OF COIL SETS A, B, C, D, AA, AB & AC IS A LOOP OF WIRE INSIDE COIL FORM---BENDING THE LOOP ONE WAY OR THE OTHER VARIES THE INDUCTANCE.

Figure No. 7. Typical Coil Set Showing Alignment Adjustment Locations

of test frequencies required may be obtained by the use of nine crystals operating at their fundamental and harmonic frequencies. The frequency of these crystals is as follows: 0.05, 0.1, 1.0, 2.0, 3.5, 5.0, 6.8, 7.0, 7.3, 14.4 and 15 megacycles.

The need for realignment of the H.F. oscillator of any band is indicated when the frequency calibration of the Receiver dial is in error by more than 1% at the high frequency end of the band in question. If it is determined that realignment is necessary proceed as follows:

- (1) Connect an output meter to the Receiver as described in paragraph 4-3 of this Section and disconnect the antenna.
- (2) Set the Control switch at A.M.
- (3) Set the A.V.C. switch at Off.
- (4) Set the Selectivity switch at Off.
- (5) Set the R.F. Gain control at 10.
- (6) Set the Bandspread switch in the General Coverage position.
- (7) Set the A.F. Gain control to provide a suitable output level.
- (8) Check the position of the Ant. Trim. and Osc. trimmer controls.

Alignment should be made with both of the pointers on these controls in a vertical position with the arrow-head pointed towards the top of the Receiver.

MODEL HRO-50

The following Alignment Chart gives the step-by-step procedure to follow in effecting the General Coverage alignment of each coil set. It is important that the chart of adjustments is adhered to in the order shown. It will be noted that General Coverage alignment affects Bandsread alignment, but that adjustment of Bandsread alignment does not affect General Coverage.

Particular care must be taken when adjusting the high-frequency oscillator trimmer, C-26, in each coil set. It is imperative that the high-frequency oscillator is set to operate at a frequency above the R.F. amplifier frequency and not below. This can be checked by tuning in the image of the test signal which must appear 910 kilocycles lower on the Receiver dial. If it is found that the image does not appear at this dial setting the H.F. oscillator is incorrectly adjusted and the capacity of the trimmer capacitor, C-26, must be decreased until the image and fundamental signals appear at the proper points on the dial. After the high-frequency oscillator is correctly calibrated the R.F. amplifier trimmers, C-2 and C-15, and the mixer trimmer, C-21, should be adjusted for maximum receiver gain as measured by the output meter. Coil sets A and D do not use a first R.F. amplifier trimmer but are peak-tuned by the use of the Ant. Trim. control over the full frequency range of each coil set. It may be desirable to align the R.F. Amplifier trimmers, C-2 and C-15, and the mixer trimmer, C-21, using Receiver background noise as an indication of maximum gain, rather than the signal source. If this alternate method of alignment is used the point of maximum gain is that setting of the trimmers which provides the loudest Receiver background noise. However, it is possible to align the R.F. amplifier and mixer stages to the image frequency using background noise as an indicator. A check of this possibility is to tune in the image signal — if the image is weaker than the fundamental signal the R.F. amplifier and mixer stages are correctly aligned.

Correction of tracking errors of the R.F. amplifier and mixer stages at the low frequency limit of each coil set is accomplished by the adjustments listed on the Alignment Chart. The actual tracking of these stages may be checked by pressing the outside rotor plates of the main tuning capacitor section toward or away from the stator in a manner assuring that the rotor plates will spring back to their original position. Any change in capacity should decrease the Receiver gain if the stage is tracking properly.

The locations of the adjustments referred to on the General Coverage Chart are shown on Figure Number 7. Each variable on the chart is followed by a number in parenthesis to identify its position on the respective coil set. Schematic diagrams of each of the plug-in coil sets are furnished on Figure Numbers 11 and 12.

GENERAL COVERAGE CHART

Step	Coil Set	Adjust Signal Source and Receiver To:	Adjust to Receive Test Signal	Adjust for Maximum Output
1	A	30.0 Mc.	Trimmer capacitor C-26 (Pos. 8).	Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4).
2	A	14.4 Mc.	Inductance at Pos. No. 16.	Inductance at Pos. Nos. 13, 11, 9.
3	A	30.0 Mc.		Check step 1. Repeat steps 1 and 2 if necessary.

GENERAL COVERAGE CHART (CONT'D)

Step	Coil Set	Adjust Signal Source and Receiver To:	Adjust to Receive Test Signal	Adjust for Maximum Output
1	B	14.4 Mc.	Trimmer capacitor C-26 (Pos. 8).	Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2).
2	B	7.0 Mc.	Inductance at Pos. No. 16.	Inductance at Pos. Nos. 13, 11, 9.
3	B	14.4 Mc.		Check step 1. Repeat steps 1 and 2 if necessary.
1	C	7.3 Mc.	Trimmer capacitor C-26 (Pos. 8).	Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2).
2	C	3.5 Mc.	Inductance at Pos. No. 16.	Inductance at Pos. Nos. 13, 11, 9.
3	C	7.3 Mc.		Check step 1. Repeat steps 1 and 2 if necessary.
1	D	4.0 Mc.	Trimmer capacitor C-26 (Pos. 8).	Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2).
2	D	1.8 Mc.	Inductance at Pos. No. 16.	Inductance at Pos. Nos. 13, 11, 9.
3	D	4.0 Mc.		Check step 1. Repeat steps 1 and 2 if necessary.
1	E	2.0 Mc.	Trimmer capacitor C-26 (Pos. 8).	Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4).
2	E	1.0 Mc.	Padder capacitor C-100 (Pos. 7).	
3	E	1.4 Mc.	Inductance at Pos. No. 16.	
4	E	2.0 Mc.		Check step 1. Repeat steps 1, 2 and 3 if necessary.
1	F	0.9 Mc.	Trimmer capacitor C-26 (Pos. 8).	Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2).

PAGE 21-24 NATIONAL

MODEL, HRO-50

GENERAL COVERAGE CHART (CONT'D)

Step	Coil Set	Adjust Signal Source and Receiver To:	Adjust to Receive Test Signal	Adjust for Maximum Output
2	F	0.5 Mc.	Padder capacitor C-100 (Pos. 7).	
3	F	0.7 Mc.	Inductance at Pos. No. 16.	
4	F	0.9 Mc.		Check step 1. Repeat steps 1, 2 and 3 if necessary.
1	G	400 Kc.	Trimmer capacitor C-26 (Pos. 8).	Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4).
2	G	200 Kc.	Padder capacitor C-100 (Pos. 7).	
3	G	300 Kc.	Inductance at Pos. No. 16.	
4	G	400 Kc.		Check step 1. Repeat steps 1, 2 and 3 if necessary.
1	H	200 Kc.	Trimmer capacitor C-26 (Pos. 8).	Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2).
2	H	100 Kc.	Padder capacitor C-100 (Pos. 7).	
3	H	150 Kc.	Inductance at Pos. No. 16.	
4	H	200 Kc.		Check step 1. Repeat steps 1, 2 and 3 if necessary.
1	J	100 Kc.	Trimmer capacitor C-26 (Pos. 8).	Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2).
2	J	50 Kc.	Padder capacitor C-100 (Pos. 7).	
3	J	75 Kc.	Inductance at Pos. No. 16.	
4	J	100 Kc.		Check step 1. Repeat steps 1, 2 and 3 if necessary.
1	AA	30 Mc.	Trimmer capacitor C-26 (Pos. 7).	Trimmer capacitors C-21 (Pos. 5), C-15 (Pos. 3), C-2 (Pos. 1).

GENERAL COVERAGE CHART (CONT'D)

Step	Coil Set	Adjust Signal Source and Receiver To:	Adjust to Receive Test Signal	Adjust for Maximum Output
2	AA	27.2 Mc.	Padder capacitor C-25 (Pos. 8).	Padder capacitors C-20 (Pos. 6), C-14 (Pos. 4), C-1 (Pos. 2).
3	AA	28 Mc.	Inductance at Pos. No. 16.	Inductance at Pos. Nos. 13, 11, 9.
4	AA	30 Mc.		Check step 1. Repeat steps 1, 2 and 3 if necessary.
1	AB	35 Mc.	Trimmer capacitor C-26 (Pos. 8).	Trimmer capacitors C-21 (Pos. 6), C-15 (Pos. 4), C-2 (Pos. 2).
2	AB	25 Mc.	Padder capacitor C-100 (Pos. 7).	Padder capacitors C-99 (Pos. 5), C-93 (Pos. 3), C-97 (Pos. 1).
3	AB	30 Mc.	Inductance at Pos. No. 16.	Inductance at Pos. Nos. 13, 11, 9.
4	AB	35 Mc.		Check step 1. Repeat steps 1, 2 and 3 if necessary. Check step 1.
1	AC	21.5 Mc.	Trimmer capacitor C-26 (Pos. 7).	Trimmer capacitors C-21 (Pos. 5), C-15 (Pos. 3), C-2 (Pos. 1).
2	AC	21 Mc.	Padder capacitor C-25 (Pos. 8).	Padder capacitors C-20 (Pos. 6), C-14 (Pos. 4), C-1 (Pos. 2).
3	AC	21.3 Mc.	Inductance at Pos. No. 16.	Inductance at Pos. Nos. 13, 11, 9.
4	AC	21.5 Mc.		Check step 1. Repeat steps 1, 2 and 3 if necessary. Check step 1.

MODEL HRO-50

4-5. BANDSPREAD ALIGNMENT

The data given in this section applies to the Bandspread Alignment of the high-frequency oscillator, R.F. amplifier and mixer stages of coil sets A, B, C and D. It is important that no Bandspread adjustments are made until after completion of General Coverage alignment as General Coverage adjustments affect Bandspread alignment.

The need for realignment of the H.F. oscillator of any band is indicated when the frequency calibration of the main tuning dial is in error by more than ± 5 divisions. To effect alignment the Receiver controls are adjusted the same as outlined in Section 4-4, except that the Bandspread switch on each of the plug-in coils must be in the right-hand or Bandspread position.

The procedure in effecting Bandspread alignment is accomplished by adhering to the instructions given in the Bandspread Alignment Chart. The procedure is similar to that for General Coverage except for the method followed in checking tracking errors of the R.F. amplifier and mixer stages at the low-frequency limit of each coil set. To secure an indication of proper tracking check the setting of the Bandspread trimmer capacitors C-3, C-16 and C-22 for the position of maximum Receiver gain. Any change in capacity should decrease the Receiver gain indicating proper tracking. The use of the trimmer capacitors C-3, C-16 and C-22 for a tracking check may destroy their proper settings therefore they must be carefully rechecked at the high-frequency limit of the coil set. The location of the adjustments referred to in this section are shown on Figure Number 7. Each variable on the chart is followed by a number in parenthesis to identify its position on the respective coil set. Schematic diagrams of each of the four combination Bandspread and General Coverage coil sets A, B, C and D are furnished on Figure Number 11.

4-6. FIRST R.F. STAGE ALIGNMENT WITH LOW IMPEDANCE TRANSMISSION LINE

If a low impedance transmission line is to be used with the Receiver, it may be necessary to realign the first R.F. amplifier at the high-frequency end of each band. The tracking of the first R.F. amplifier stage on each of the coil ranges may be checked by rotating the Ant. Trim. control. If two definite peaks in output are observed while rotating the Ant. Trim. control, the first R.F. amplifier stage is tracking correctly and the setting at either peak is correct. The lack of a peak in output or the presence of only one peak indicates the stage is not tracking properly and correction should be made. The General Coverage adjustments affect the Bandspread adjustments and must therefore be performed first. The following procedures should be adhered to:

(a) GENERAL COVERAGE

(1) Set the Bandspread switch on each coil to the left-hand side or General Coverage position. Adjust the Receiver for normal operation as follows: Control switch at A.M., Selectivity switch at Off, Ant. Trim. control pointer set in a vertical position with the arrow head towards the top of the Receiver, A.F. Gain control set at 10 and the R.F. Gain control set to provide a suitable signal level.

(2) Connect the antenna feeders to the Receiver antenna terminals and tune the Receiver to the signal shown in step 1 on the General Coverage Alignment Chart for the coil set to be aligned. Adjust the trimmer capacitor, C-2, for maximum signal output. Coil sets A and D do not use a first R.F. amplifier General Coverage trimmer but are peak-tuned by the Ant. Trim. control over the full frequency range of each coil set.

BANDSPREAD ALIGNMENT CHART

NOTE: Do not effect Bandspread Alignment until after completion of General Coverage.

Set	Coil Set	Adjust Signal Source and Receiver To:	Adjust to Receive Test Signal	Adjust for Maximum Output
1	A	30.0 Mc.	Trimmer capacitor C-27 (Pos. 7).	Trimmer capacitors C-22 (Pos. 5), C-16 (Pos. 3), C-3 (Pos. 1).
2	A	27.2 Mc.	Padder capacitor C-25 (Pos. 15).	Padder capacitors C-20 (Pos. 14), C-14 (Pos. 12), C-1 (Pos. 10).
3	A	30.0 Mc.		Check Step 1. Repeat Step 1 and 2 if necessary. Check Step 1.
1	B	14.4 Mc.	Trimmer capacitor C-27 (Pos. 7).	Trimmer capacitors C-22 (Pos. 5), C-16 (Pos. 3), C-3 (Pos. 1).
2	B	14.0 Mc.	Padder capacitor C-25 (Pos. 15).	Padder capacitors C-20 (Pos. 14), C-14 (Pos. 12), C-1 (Pos. 10).
3	B	14.4 Mc.		Check Step 1. Repeat Steps 1 and 2 if necessary. Check Step 1.
1	C	7.3 Mc.	Trimmer capacitor C-27 (Pos. 7).	Trimmer capacitors C-22 (Pos. 5), C-16 (Pos. 3), C-3 (Pos. 1).
2	C	7.0 Mc.	Padder capacitor C-25 (Pos. 15).	Padder capacitors C-20 (Pos. 14), C-14 (Pos. 12), C-1 (Pos. 10).
3	C	7.3 Mc.		Check Step 1. Repeat Steps 1 and 2 if necessary. Check Step 1.
1	D	4.0 Mc.	Trimmer capacitor C-27 (Pos. 7).	Trimmer capacitors C-22 (Pos. 5), C-16 (Pos. 3), C-3 (Pos. 1).
2	D	3.5 Mc.	Padder capacitor C-25 (Pos. 15).	Padder capacitor C-20 (Pos. 14), C-14 (Pos. 12), C-1 (Pos. 10).
3	D	4.0 Mc.		Check Step 1. Repeat Steps 1 and 2 if necessary. Check Step 1.

MODEL HRO-50

(b) BANDSPREAD

(1) With the Receiver adjusted in the same manner as for General Coverage shift the Bandspread switch on each coil terminal panel to the right-hand side or Bandspread position.

(2) Connect the Antenna feeders to the Receiver antenna terminal and tune the Receiver to the signal shown in Step 1 on the Bandspread Alignment Chart for the coil set being aligned. Adjust the Bandspread trimmer capacitor, C-3, for maximum signal output. If no signal can be received the trimmer may be adjusted for maximum background noise.

4-7. S-METER ADJUSTMENT

The S-Meter balancing resistor, R-21, is used to obtain a zero meter reading in the absence of signal input to the Receiver. To make this adjustment set the controls as follows: set the R.F. Gain control at 0, A.V.C. switch at A.V.C., Control switch at A.M. and the A.C. switch at On. Adjust the S-Meter balancing resistor, R-21, for a zero reading on the S-Meter. This is a screwdriver type adjustment located on the top of the chassis.

SECTION 5. MAINTENANCE

5-1. GENERAL MAINTENANCE DATA

Any repairs in the HRO-50 Receiver which necessitate resoldering of joints must be made with care. A good mechanical connection must be made before the solder is applied.

Failure of a vacuum tube in the receiver may reduce the sensitivity, produce intermittent operation or cause the equipment to be completely inoperative. In such cases, all tubes should be checked either in an analyzer or similar tube testing equipment or by replacement with tubes of proven quality. When any tube is tested, it should be tapped or jarred to make sure that it has no internal loose connection or intermittent short circuit.

Tubes of the same type will vary slightly in their individual characteristics and this fact should be borne in mind when replacements become necessary. The C.W. oscillator, high-frequency oscillator and I.F. tubes should be chosen with care to select a replacement which most nearly approaches the characteristic of the original tube. A replacement high frequency oscillator tube can be readily checked by noting any change in dial calibration, particularly on the amateur bandspread bands. Substitution of new I.F. amplifier tubes may possibly alter overall gain and selectivity characteristics. The necessity for realignment as well as alignment procedure is discussed in Section 4.

In case of breakdown or failure of the Receiver, the fault must first be localized. This can often be accomplished by observation of some peculiar action of one of the controls. Reference to the circuit diagram will aid in checking voltages at the various tube elements. Measurement of voltages in accordance with Section 5-4. will most likely indicate where failure has occurred.

5-2. CIRCUIT FAILURES

All component parts in the HRO-50 Receiver have been selected to assure an ample factor of safety. Failure may occur in individual cases and the most common

cause of failure, excluding tubes, will probably be due to breakdown of a capacitor or resistor.

Bypass or filter capacitors which develop poor connections internally, or which become open-circuited, will cause decreased sensitivity, oscillation or poor stability. The defective unit can be located by temporarily connecting a good capacitor in parallel with each capacitor that is under suspicion.

Failure of any bypass or filter capacitor may seriously overload resistors in associated circuits. Overload of sufficient magnitude to permanently damage a resistor will cause the surface of the resistor to be scorched, making the defective unit easy to locate by visual inspection.

Open or short-circuited resistors can be definitely located by measuring the resistance of each individual resistor. The schematic diagram should be consulted to make sure that any particular resistor under test is not connected in parallel with some other circuit element which might produce a false measurement.

Loose connections which cause intermittent or noisy operation can often be found by tapping, or shaking any component under suspicion with the Receiver adjusted for normal operation.

5-3. STAGE GAIN MEASUREMENTS

The sensitivity measurements listed herein are made with the Receiver set up as specified in Section 3-2 except that the A.F. Gain control is set at 10. Connect an output meter with an impedance to match the Receiver output circuit i.e., 8 or 500 ohms to the output terminal panel in place of the Loudspeaker. It is important that the proper output impedance match be observed.

Connect the high output lead of the signal generator through a 0.01 mf coupling capacitor to the grid cap of each tube as specified in the following table. The ground lead of the generator is connected to any convenient chassis point.

The signal generator, using modulation, is varied between 453 and 457 kilocycles until a pronounced peak reading is obtained on the output meter.

With the generator attenuated to provide a one watt reading on the output meter the signal generator attenuator should read within the limits specified in the following table:

TERMINAL	TEST SIGNAL
Mixer Grid	100 \pm 25 Microvolts
First I.F. Grid	1800 \pm 100 Microvolts
Second I.F. Grid	80,000 \pm 5000 Microvolts

5-4. VOLTAGE TABULATION

All voltage measurements should be made using a high-impedance vacuum tube voltmeter. Readings taken with any other type of instrument will differ somewhat depending upon the input resistance of the meter. Voltmeter resistance should be ten times larger than the resistance of the circuit across which the voltage is measured otherwise the voltmeter will indicate a voltage lower than the actual voltage present. The tube socket voltage tabulations contained in Figure Number 8 were taken using a vacuum tube voltmeter with an input resistance of 11 megohms. All voltages are

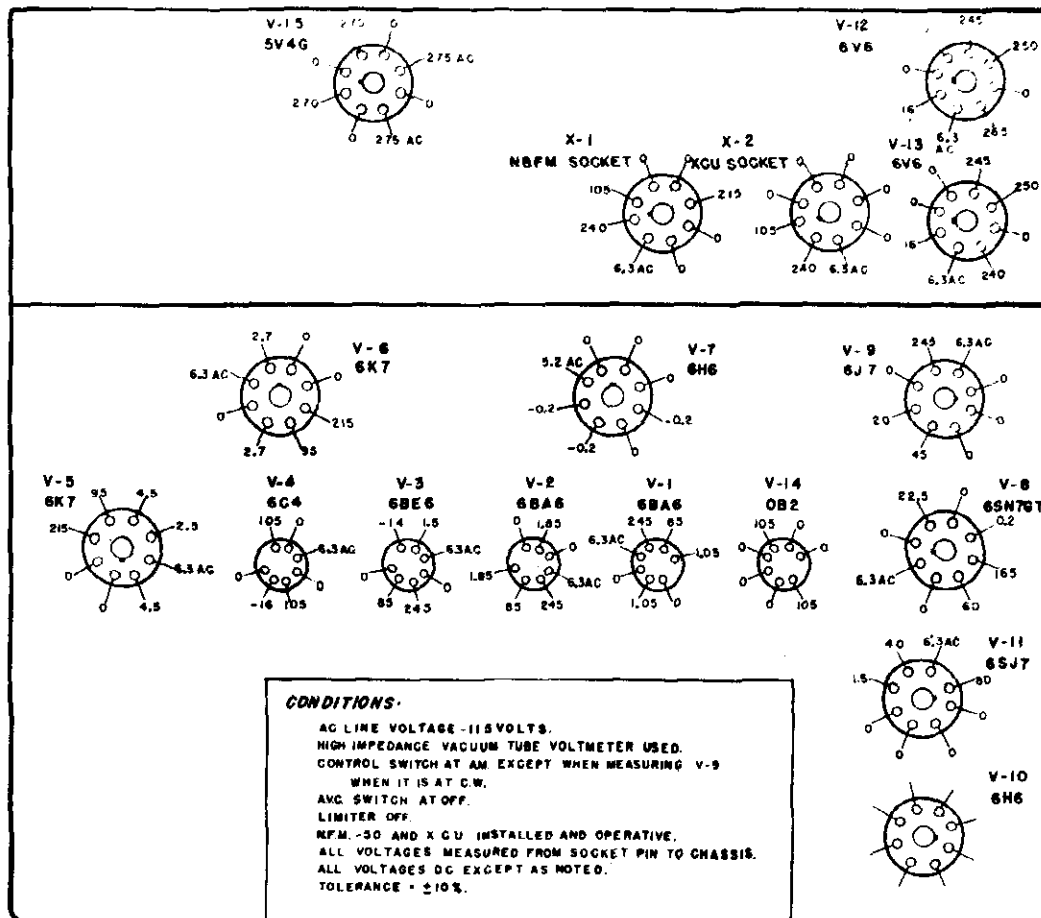


Figure No. 8. Tube Socket Voltages

measured between specified socket terminals and chassis. The control settings to be observed are shown on Figure Number 8.

5-5. MAIN TUNING DIAL

The main tuning dial should normally give no trouble. If, however, the dial should become removed from the Receiver it must NOT be operated until mounted on the capacitor shaft WITH SET-SCREWS TIGHT. This is because the dial is only designed to rotate for ten revolutions (0 to 500) and if turned farther than this the mechanism will be damaged. When mounted on the capacitor, limit stops protect the dial provided the assembly is made properly. The procedure for re-mounting the dial is as follows:

(a) Place the dial on the capacitor shaft, tighten set-screws and turn dial counter-clockwise to fully mesh capacitor rotor plates so that the tips of the rotor plates are flush with the edge of the stator plates.

(b) Loosen set-screws and rotate dial slowly until the dial reading has decreased to zero.

(c) Tighten the set-screws.

(d) Check position of rotor plates at zero. The tips of the rotor plates

must be flush with the edge of the stator plates. A slight adjustment may be necessary and this is done by loosening the set-screws, adjusting the position of the dial and tightening the set-screws again.

If it is necessary to remove the dial at any future time, turn to 250 before removing the dial and do not disturb the setting of either the dial or capacitor until reassembled. If in doubt about the correct position, inspect the springs on the back of the dial. When the dial reads 250 these springs should be straight-up-and-down, they must not be tipped to one side.

It is important that the backplate and dial do not become separated. The backplate is held in place by two springs so that its gear teeth mesh with the dial gear teeth in correct relationship for proper dial operation. If this backplate should be sprung out of place, it may return to an incorrect position and the proper dial numbers will not appear in the windows when the dial is used. To ascertain that the two parts are in correct position, proceed as follows:

(a) Locate small window near outer periphery of dial backplate and also locate dial number window on face of dial which is 180° removed from the small backplate window.

(b) Hold dial so backplate lies flat in palm of left-hand and with right hand rotate dial knob until 250 appears in previously located dial window.

(c) If dial is properly adjusted it will be noted that the pointer at the outer edge of the small window lines up with a marked tooth on the dial itself. It will be found that the dial and backplate can be moved so that the backplate pointer will mesh between teeth at points equi-distant from marked tooth in either direction.

(d) If by checking as in paragraph (c), the dial is found not properly adjusted, it will be necessary to separate the backplate from the dial far enough to bring the two gears out of mesh and then re-mesh the two parts until the proper setting is found. A number of trial settings may be required before the correct mesh is found.

5-6. SLIDE-RULE TUNING DIAL

The slide-rule tuning dial assembly has been adjusted at the factory for accurate synchronization with the micrometer dial. If not tampered with this mechanism will provide complete freedom of mechanical trouble over a long period of continuous use. It is driven by an anti-backlash tuning gear ganged with the main tuning dial. The slide-rule dial pointer is controlled by a string-drive assembly.

If replacement of the string-drive cord is required it will be necessary to remove the Receiver chassis from its cabinet or wraparound. Before removing the micrometer dial reference should be made to Paragraph 5 of this section for proper method of removal. Figure Number 9 illustrates the proper method of replacing the cord. After the cord has been replaced and before the Receiver is returned to its cabinet the micrometer dial should temporarily be replaced (See Paragraph 5-5.) and the slide-rule pointer correctly set in the following manner:

NOTE

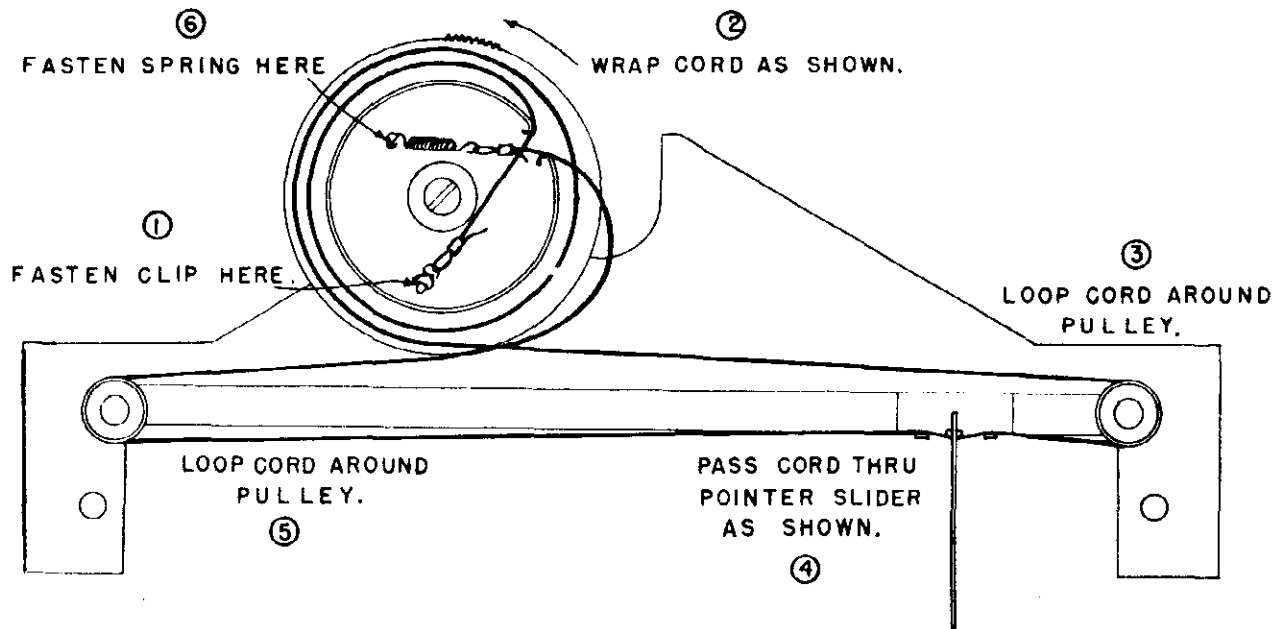
This procedure may also be used if a check is desired to assure that the slide-rule dial pointer is properly synchronized with that of the main tuning dial.

MODEL HRO-50

(a) Check the main tuning dial at zero on its dial scale. The tips of the rotor plates should be flush with the edge of the stator plates.

(b) Set the Band selector control so that the D coil set scale appears.

(c) Set the main tuning dial at 490 on its dial scale. Correct setting of the slide-rule dial pointer is 4 megacycles on the dial scale. Draw the slide-rule pointer along the cord to its proper position being careful not to disturb the setting on the micrometer dial. After the correct setting has been obtained use a small amount of glyptol or household cement to fasten the dial pointer securely in place on the cord.



NOTE: CORD SHOWN EXPOSED FOR CLARITY.
CORD LENGTH 33 7/8" INCLUDING
SPRING AND CLIP.

Figure No. 9. Instructions for Dial Cord Replacement

PARTS LIST

SYMBOL	FUNCTION	DESCRIPTION	NAT. CO. TYPE
CAPACITORS			
C-1	T-1 Bandsread Padder used on A, B, C, D, AA and AC Coil sets	Variable, air dielectric	SA:6592
C-2	T-1 General Coverage Trimmer used on B, C, F, H, J, AA, AB and AC coil sets	Variable, air dielectric	
C-3	T-1 Bandsread Trimmer used on A, B, C and D coil sets	Variable, air dielectric	
C-4	Antenna Trimmer	Variable, air dielectric	
C-5	Main Tuning	Four-section ganged, air dielectric, 225 mmf. max. per section	

PARTS LIST (CONT'D.)

SYMBOL	FUNCTION	DESCRIPTION	NAT. CO. TYPE
CAPACITORS (CONT'D.)			
C-5A	V-1 Tuning	Part of C-5	
C-5B	V-2 Tuning	Part of C-5	
C-5C	V-3 Tuning	Part of C-5	
C-5D	V-4 Tuning	Part of C-5	
C-6	V-1 Grid Filter	Ceramic, .005 mfd., 450 vdcw	K946-1
C-7	V-1 Grid Filter	Ceramic, .005 mfd., 450 vdcw	K946-1
C-8	V-1 Grid Filter	Mica, .01 mfd., 300 vdcw	J666-56
C-9	V-1 Cathode Bypass	Paper, .1 mfd., 400 vdcw	D927-11
C-10	V-1 Screen Bypass	Ceramic, .005 mfd., 450 vdcw	K946-1
C-11	V-1 Screen Bypass	Paper, .1 mfd., 400 vdcw	D827-11
C-12	V-1 Plate Filter	Paper, .1 mfd., 600 vdcw	D827-13
C-13	V-2 Grid Return Bypass	Ceramic, .005 mfd., 450 vdcw	K946-1
C-14	T-2 Bandsread Padder used on A, B, C, D, AA and AC coil sets	Variable, air dielectric	
C-15	T-2 General Coverage Trimmer used on all coil sets	Variable, air dielectric	
C-16	T-2 Bandsread Trimmer used on A, B, C, D coil sets	Variable, air dielectric	
C-17	V-2 Cathode Bypass	Paper, .1 mfd., 400 vdcw	D827-11
C-18	V-2 Screen Bypass	Ceramic, .005 mfd., 450 vdcw	K946-1
C-19	V-2 Plate Filter	Paper, .1 mfd., 600 vdcw	D827-13
C-20	T-3 Bandsread Padder used on A, B, C, D, AA and AC coil sets	Variable, air dielectric	
C-21	T-3 General Coverage Trimmer used on all coil sets	Variable, air dielectric	
C-22	T-3 Bandsread Trimmer used on A, B, C, D coil sets	Variable, air dielectric	
C-23	V-3 Cathode Bypass	Paper, .1 mfd., 400 vdcw	D827-11
C-24	V-3 Screen Bypass	Paper, .1 mfd., 400 vdcw	D827-11
C-25	T-4 Bandsread Padder used on A, B, C, D, AA and AC coil sets	Variable, air dielectric	
C-26	T-4 General Coverage Trimmer used on all coil sets	Variable, air dielectric	
C-27	T-4 Bandsread Trimmer used on A, B, C, D coil sets	Variable, air dielectric	
C-28	T-4 General Coverage Padder		
	A coil set	Mica, .0012 mfd., 300 vdcw	J666-63
	B coil set	Mica, .0026 mfd., 500 vdcw	J666-61
	C coil set	Mica, .0016 mfd., 500 vdcw	J666-21
	D coil set	Mica, .0009 mfd., 500 vdcw	J666-62
	E coil set	Mica, 470 mmf., 500 vdcw	H500-18
	F coil set	Ceramic, 350 mmf., 500 vdcw	D825C-331
	G coil set	Ceramic, 100 mmf., 500 vdcw	D825C-304
	J coil set	Ceramic, 50 mmf., 500 vdcw	D825D-417
	AB coil set	Ceramic, 100 mmf., 500 vdcw	D825C-304
C-29	Calibration Adjustment Trimmer	Variable, air dielectric	
C-30	V-4 Grid	Ceramic, 100 mmf., 500 vdcw	D825D-421
C-31	V-4 Plate	Paper, .1 mfd., 400 vdcw	D827-11
C-32	V-4 to V-3 coupling	Mica, .01 mfd., 300 vdcw	J666-56

MODEL HRO-50

PARTS LIST (CONT'D.)

SYMBOL	FUNCTION	DESCRIPTION	NAT. CO. TYPE
CAPACITORS (CONT'D.)			
C-33	T-5 Primary Trimmer	Variable, air dielectric	
C-34	Bridge Balancing	Ceramic, 62 mmf., 500 vdcw	J695-3
C-35	Bridge Balancing	Ceramic, 47 mmf., 500 vdcw	J695-1
C-36	Phase Balance Adjustment	Mica, variable, 3.5 to 35 mmf.	D832-2
C-37	Phasing	Variable, air dielectric	SA:3655
C-38	Selectivity Compensator	Mica, variable, 3.5 to 35 mmf.	D832-2
C-39	T-5 output adjustment	Variable, air dielectric, 100 mmf.	SA:1841
C-40	Selectivity Adjusting	Ceramic, 5 mmf., 500 vdcw	D825D-401
C-41	Selectivity Adjusting	Ceramic, 10 mmf., 500 vdcw	D825D-426
C-42	Selectivity Adjusting	Ceramic, 10 mmf., 500 vdcw	D825D-426
C-43	V-5 A.V.C. Filter	Paper, .01 mfd., 600 vdcw	D827-7
C-44	V-5 Cathode Bypass	Paper, .1 mfd., 400 vdcw	D827-11
C-45	T-6 Primary Trimmer	Variable, air dielectric	
C-46	T-6 Secondary Trimmer	Variable, air dielectric	
C-47	V-6 A.V.C. Filter	Paper, .01 mfd., 600 vdcw	D827-7
C-48	Fixed, calibration padder	Ceramic, 10 mmf., 500 vdcw	D825D-437
C-49	V-6 Screen Bypass	Paper, .1 mfd., 400 vdcw	D827-11
C-50	T-7 Primary Trimmer	Variable, air dielectric	
C-51	T-7 Secondary Trimmer	Variable, air dielectric	
C-52	V-6 Plate Filter	Paper, .25 mfd., 600 vdcw	D827-19
C-53	V-7 Load	Ceramic, 270 mmf., 500 vdcw	J633-2
C-54	T-7 to V-7 Coupling	Ceramic, 100 mmf., 500 vdcw	D825D-421
C-55	A.V.C. Filter	Paper, .01 mfd., 600 vdcw	D825-7
C-56	V-9 to V-7 Coupling	Ceramic, 3 mmf., 500 vdcw	J695-4
C-57	V-9 Screen Bypass	Mica, .01 mfd., 300 vdcw	J666-56
C-58	C.W. Osc. Tuning	Variable, air dielectric	SA:6580
C-59	T-8 Grid	Mica, .001 mfd., 500 vdcw	J666-14
C-60	T-8 Fixed Tuning	Ceramic, 100 mmf., 500 vdcw	D825C-304
C-61	T-8 Tuning Adjusting	Variable, air dielectric	
C-62	D.C. Blocking	Paper, .01 mfd., 600 vdcw	D827-7
C-63	A.C. Line Bypass	Mica, .01 mfd., 300 vdcw	J666-56
C-64	A.C. Line Bypass	Mica, .01 mfd., 300 vdcw	J666-56
C-65	Power Supply Filter	Electrolytic, 40+40 mfd., 475 vdcw	K945-3
C-65A	Power Supply Input Filter	Part of C-65	
C-65B	Power Supply Output Filter	Part of C-65	
C-66	V-7 to V-10 Coupling	Paper, .01 mfd., 600 vdcw	D827-7
C-67	V-10 Threshold Filter	Paper, .1 mfd., 400 vdcw	D827-11
C-68	V-10 Plate Filter	Paper, .1 mfd., 400 vdcw	D827-11
C-69	V-10 to X-3 Coupling	Paper, .01 mfd., 600 vdcw	D827-7
C-70	Tone Compensator	Electrolytic, 25 mfd., 50 vdcw	E338-4
C-71	V-11 Cathode Bypass	Paper, .5 mfd., 100 vdcw	D827-49
C-72	V-11 Screen Bypass	Paper, .1 mfd., 400 vdcw	D827-11
C-73	V-11 Plate Filter	Paper, .1 mfd., 400 vdcw	D827-11
C-74	Tone	Paper, .01 mfd., 600 vdcw	D827-7
C-75	V-8B to V-11 Coupling	Paper, .01 mfd., 600 vdcw	D827-7
C-76	V-8B Grid Bypass	Ceramic, 100 mmf., 500 vdcw	D825D-421
C-77	V-8B to V-12 Coupling	Paper, .01 mfd., 600 vdcw	D827-7
C-78	V-8B to V-13 Coupling	Paper, .01 mfd., 600 vdcw	D827-7
C-79	V-12 and V-13 Cathode Bypass	Electrolytic, 25 mfd., 50 vdcw	E338-4
C-80	Tone Compensator	Mica, .0024 mfd., 1000 vdcw	J667-68
C-81	Temperature Drift Compensator	Ceramic, 5 mmf., 500 vdcw	H872-3
C-82	T-1 Fixed Bandsread Padder:		
	A coil set	12 mmf., 500 vdcw	D825D-404
	B coil set	5 mmf., 500 vdcw	D825D-401

PARTS LIST (CONT'D.)

SYMBOL	FUNCTION	DESCRIPTION	NAT. CO. TYPE
CAPACITORS (CONT'D.)			
C-83	C coil set	12 mmf., 500 vdcw	D825D-404
	D coil set	25.7 mmf., 500 vdcw	D825D-412
	T-2 Fixed Bandsread Padder	Ceramic, fixed	
	A coil set	21 mmf., 500 vdcw	D825D-410
	B coil set	5 mmf., 500 vdcw	D825D-401
C-84	C coil set	12 mmf., 500 vdcw	D825D-404
	D coil set	25.7 mmf., 500 vdcw	D825D-412
	T-3 Fixed Bandsread Padder	Ceramic, fixed	
	A coil set	21 mmf., 500 vdcw	D825D-410
	B coil set	5 mmf., 500 vdcw	D825D-401
C-85	C coil set	12 mmf., 500 vdcw	D825D-404
	D coil set	25.7 mmf., 500 vdcw	D825D-412
	T-4 Bandsread Padder used on	Ceramic, 10 mmf., 500 vdcw	D825D-402
	A coil set		
	T-4 Fixed Divider used on D	Ceramic, 21 mmf., 500 vdcw	D825D-410
C-86	coil set		
	T-4 Fixed General Coverage	Ceramic, fixed	
	Trimmer		
	B coil set	10 mmf., 500 vdcw	D825D-437
	AA coil set	68 mmf., 500 vdcw	D825D-439
C-87	AB coil set	68 mmf., 500 vdcw	D825D-439
	AC coil set	68 mmf., 500 vdcw	D825D-439
	T-1 Fixed General Coverage		
	Padder		
	A coil set	Mica, 1200 mmf., 500 vdcw	J666-16
C-88	AB coil set	Ceramic, 120 mmf., 500 vdcw	D825C-305
	T-4 Fixed Temperature Compen-	Ceramic, 10 mmf., 500 vdcw	D825D-437
	sator used on B coil set		
	T-2 Primary Trimmer used on	Ceramic, 21 mmf., 500 vdcw	D825D-410
	H coil set		
C-89	T-1 General Coverage Trimmer	Ceramic, fixed,	
	AA coil set	5 mmf., 500 vdcw	D825D-401
	AB coil set	10 mmf., 500 vdcw	D825D-402
	AC coil set	50 mmf., 500 vdcw	D825D-417
	T-2 coupling used on AB coil	Mica, 470 mmf., 500 vdcw	J665-56
C-90	set		
	T-2 General Coverage Padder	Ceramic, 100 mmf., 500 vdcw	D825C-304
	used on AB coil set		
	T-3 Coupling used on AB coil	Mica, 470 mmf., 500 vdcw	J665-56
	set		
C-91	T-3 General Coverage Trimmer	Ceramic, fixed,	
	AB coil set	5 mmf., 500 vdcw	D825D-401
	AC coil set	68 mmf., 500 vdcw	D825D-439
	V-2 Cathode Bypass	Ceramic, .005 mfd., 450 vdcw	K946-1
	T-1 General Coverage Padder	Variable, air dielectric	
C-92	used on AB coil set		
	T-2 General Coverage Padder	Variable, air dielectric	
	used on AB coil set		
	T-3 General Coverage Padder	Variable, air dielectric	
	used on AB coil set		
C-93	T-4 General Coverage Padder	Variable, air dielectric	
	used on E, F, G, H, J and AB		
	coil sets		

PAGE 21-36 NATIONAL

MODEL HRO-50

C-101	T-3 General Coverage Padder used on AB coil set	Ceramic, 100 mmf., 500 vdcw	D825C-304
C-102	T-2 General Coverage Trimmer on AC coil set	Ceramic, 68 mmf., 500 vdcw	D825D-439
C-103	I.F. coupling to X-1	Ceramic, 10 mmf., 500 vdcw	D825D-402

RESISTORS

R-1	V-1 Grid Filter	Fixed, 470,000 ohms, 1/2 W.	J569-57
R-2	V-1 Cathode	Fixed, 100 ohms, 1/2 W.	J569-13
R-3	V-1 and V-2 Screen	Fixed, 2,200 ohms, 1/2 W.	J569-29
R-4	V-2 Grid Filter	Fixed, 470,000 ohms, 1/2 W.	J569-57
R-5	V-2 Cathode	Fixed, 560 ohms, 1/2 W.	J569-22
R-6	RF Gain Control	Variable, W.W., 10,000 ohms	K349-3
R-7	V-3 Injector Grid	Fixed, 22,000 ohms, 1/2 W.	J569-41
R-8	V-3 Cathode	Fixed, 220 ohms, 1/2 W.	J569-17
R-9	V-3 Screen	Fixed, 33,000 ohms, 1 W.	J571-43
R-10	V-4 Grid	Fixed, 22,000 ohms, 1/2 W.	J569-41
R-11	V-4 Plate	Fixed, 22 ohms, 1/2 W.	J569-5
R-12	V-5 Grid Filter	Fixed, 470,000 ohms, 1/2 W.	J569-57
R-13	V-1, V-2, V-4, V-5 Screen Bleeder	Fixed, 27,000 ohms, 2 W.	J572-42
R-14	V-5 Cathode	Fixed, 220 ohms, 1/2 W.	J569-17
R-15	V-5 Cathode	Fixed, 330/1000 ohms, 1/2 W.	
R-16	V-1, V-2, V-4, V-5 Screen Dropping	Fixed, 15,000 ohms, 2 W.	J572-39
R-17	V-5 Plate Filter	Fixed, 2,200 ohms, 1/2 W.	J569-29
R-18	V-6 Grid Filter	Fixed, 470,000 ohms, 1/2 W.	J569-57
R-19	V-6 Cathode	Fixed, 330 ohms, 1/2 W.	J569-19
R-20	V-8A Plate Load	Fixed, 47,000 ohms, 1/2 W.	J569-45
R-21	*S* Meter Zero Adjustment	Variable, W.W., 1000 ohms 1 W.	D831-2
R-22	V-7 Plate Load	Fixed, 1.5 meg., 1/2 W.	J569-63
R-23	AVC Filter	Fixed, 1.5 meg., 1/2 W.	J569-63
R-24	V-9 Plate	Fixed, 220,000 ohms, 1/2 W.	J569-53
R-25	V-9 Screen Filter	Fixed, 100,000 ohms, 1/2 W.	J569-49
R-26	V-9 Screen Bleeder	Fixed, 100,000 ohms, 1/2 W.	J569-49
R-27	V-9 Grid	Fixed, 47,000 ohms, 1/2 W.	J569-45
R-28	Dimmer	Variable, W.W., 25 ohms	K915-13
R-29	V-7 Filament Dropping	Fixed, 4.3 ohms, 1 W.	K098-34
R-30	V-10 Filament Dropping	Fixed, 4.3 ohms, 1 W.	K098-34
R-31	V-14 Dropping	Fixed, 5,000 ohms, 10 W.	E959-10
R-32	V-7 Load	Fixed, 22,000 ohms, 1/2 W.	J569-41
R-33	V-7 Load	Fixed, 470,000 ohms, 1/2 W.	J569-57
R-34	V-10 Plate	Fixed, 220,000 ohms, 1/2 W.	J569-53
R-35	V-10 Cathode	Fixed, 220,000 ohms, 1/2 W.	J569-53
R-36	Limiter Threshold Control	Variable, 500,000 ohms	J681-2
R-37	Limiter Threshold Filter	Fixed, 220,000 ohms, 1/2 W.	J569-53
R-38	Limiter Plate Filter	Fixed, 320,000 ohms, 1/2 W.	J569-60
R-39	V-10 Plate Load	Fixed, 470,000 ohms, 1/2 W.	J569-57
R-40	Audio Gain Control	Variable, 500,000 ohms	K347-1
R-41	Limiter Output Divider	Fixed, 220,000 ohms, 1/2 W.	J569-53
R-42	V-11 Cathode	Fixed, 2200 ohms, 1/2 W.	J569-29
R-43	V-11 Cathode Divider	Fixed, 150 ohms, 1/2 W.	J569-15
R-44	Degeneration Feedback	Fixed, 6800 ohms, 1/2 W.	J569-35
R-45	V-11 Audio Screen	Fixed, 100,000 ohms, 1/2 W.	J569-49
R-46	V-11 Plate Load	Fixed, 100,000 ohms, 1/2 W.	J569-49

PARTS LIST (CONT'D.)

SYMBOL	FUNCTION	DESCRIPTION	NAT. CO. TYPE
RESISTORS (CONT'D.)			
R-47	V-11 Plate Filter	Fixed, 47,000 ohms, 1/2 W.	J569-45
R-48	Tone	Variable, 500,000 ohms	K347-1
R-49	V-8B Grid	Fixed, 220,000 ohms, 1/2 W.	J569-53
R-50	V-8B Cathode Bias	Fixed, 4,700 ohms, 1/2 W.	J569-33
R-51	V-8B Cathode Load	Fixed, 47,000 ohms, 1/2 W.	J569-45
R-52	V-8B Plate Load	Fixed, 47,000 ohms, 1/2 W.	J569-45
R-53	V-13 Grid	Fixed, 220,000 ohms, 1/2 W.	J569-53
R-54	V-12 Grid	Fixed, 220,000 ohms, 1/2 W.	J569-53
R-55	V-12 and V-13 Cathode Bias	Fixed, 220 ohms, 2 W.	J572-17
R-56	Output Load	Fixed, 470 ohms, 2 W.	J572-21
R-57	T-1 Ant. Load A Coil Set Only	Fixed, 22 ohms, 1/2 W.	J569-5
MISCELLANEOUS			
E-1	Antenna Input Terminal	Screw-Type, three terminals	E261-3
E-2	B+ Switch Terminal	Screw-Type, two terminals	E265-19
E-3	Audio Output Terminal	Screw-Type, three terminals	E259-2
F-1	Fuse 3AG	2 Amps. at 250 V.	F135-4
I-1	Dial Lamp	#47	F136-6
I-2	Dial Lamp	#47	F136-6
I-3	"S" Meter Lamp	#47	F136-6
J-1	Phono Jack	Single-Circuit	J993-1
J-2	Phone Jack	Multi-Circuit	F316-1
L-1	Filter Choke	17 Henries	SA:1694
M-1	"S" Meter	0-1 ma.	J984-5
P-1	Select-O-Ject Plug	Octal	SA:6569
P-2	A.C. Jumper Plug	Octal	SA:3731
S-1	T-1 B.S. - G.C. Switch	Two-position	SA:6749
S-2	T-2 B.S. - G.C. Switch	Two-position	SA:6749
S-3	T-3 B.S. - G.C. Switch	Two-position	SA:6749
S-4	T-4 B.S. - G.C. Switch	Two-position	SA:6749
S-5	Selectivity switch	Six-position, double-pole	E195-3
S-6	A.V.C. ON-OFF switch	SPST, toggle	E230-2
S-7	Control switch	Double-wafer, four-position	SA:6564
S-8	Calibrator switch	DPDT, toggle, center position open	F738-1
S-9	A.C. Line switch	Part of R-40	
S-10	T-10 Primary Selector switch	DPDT, toggle	H340-4
S-11	B+ switch	SPST Bat Handle	E230-2
T-1	First R.F. Amplifier transformer		
	A Band	14.0 - 30 Mc.	SA:6654
	B Band	7.0 - 14.4 Mc.	SA:6755
	C Band	3.5 - 7.3 Mc.	SA:6759
	D Band	1.7 - 4.0 Mc.	SA:6635
	E Band	900 - 2050 Kc.	SA:6513
	F Band	480 - 960 Kc.	SA:6660
	G Band	180 - 430 Kc.	SA:6665
	H Band	100 - 200 Kc.	SA:6803
	J Band	50 - 100 Kc.	SA:6808
	AA Band	27 - 30 Mc.	SA:6814
	AB Band	25 - 35 Mc.	SA:6675
	AC Band	21 - 21.5 Mc.	SA:8073

MODEL HRO-50

PARTS LIST (CONT'D.)

SYMBOL	FUNCTION	DESCRIPTION	NAT. CO. TYPE
MISCELLANEOUS (CONT'D.)			
T-2	Second R.F. Amplifier Transformer		
	A Band	14.0 - 30 Mc.	SA:6751
	B Band	7.0 - 14.4 Mc.	SA:6650
	C Band	3.5 - 7.3 Mc.	SA:6641
	D Band	1.7 - 4.0 Mc.	SA:6637
	E Band	900 - 2050 Kc.	SA:6540
	F Band	480 - 960 Kc.	SA:6662
	G Band	180 - 430 Kc.	SA:6667
	H Band	100 - 200 Kc.	SA:6669
	J Band	50 - 100 Kc.	SA:6809
	AA Band	27 - 30 Mc.	SA:6673
	AB Band	25 - 35 Mc.	SA:6818
	AC Band	21 - 21.5 Mc.	SA:8074
T-3	Mixer Transformer		
	A Band	14.0 - 30 Mc.	SA:6752
	B Band	7.0 - 14.4 Mc.	SA:6756
	C Band	3.5 - 7.3 Mc.	SA:6642
	D Band	1.7 - 4.0 Mc.	SA:6638
	E Band	900 - 2050 Kc.	SA:6789
	F Band	480 - 960 Kc.	SA:6794
	G Band	180 - 430 Kc.	SA:6800
	H Band	100 - 200 Kc.	SA:6804
	J Band	50 - 100 Kc.	SA:6810
	AA Band	27 - 30 Mc.	SA:6815
	AB Band	25 - 35 Mc.	SA:6676
	AC Band	21 - 21.5 Mc.	SA:8075
T-4	H.F. oscillator transformer		
	A Band	14.0 - 30 Mc.	SA:6656
	B Band	7.0 - 14.4 Mc.	SA:6678
	C Band	3.5 - 7.3 Mc.	SA:6760
	D Band	1.7 - 4.0 Mc.	SA:6776
	E Band	900 - 2050 Kc.	SA:6631
	F Band	480 - 960 Kc.	SA:6795
	G Band	180 - 430 Kc.	SA:6785
	H Band	100 - 200 Kc.	SA:6805
	J Band	50 - 100 Kc.	SA:6811
	AA Band	27 - 30 Mc.	SA:6816
	AB Band	25 - 35 Mc.	SA:6819
	AC Band	21 - 21.5 Mc.	SA:8076
T-5	Crystal Filter	455 Kc.	SA:3654
T-6	2nd. I.F. Amp. transformer	455 Kc.	SA:2492
T-7	Detector Input transformer	455 Kc.	SA:416
T-8	C.W. Osc. transformer	455 Kc.	SA:3361
T-9	Audio Output transformer	Pri. 10,000 ohms/Sec. 8/600 ohms, 10 watts	P187-1
T-10	Power transformer	115/230 volt primary	P188-1
V-1	First R.F. Amplifier	6BA6	
V-2	Second R.F. Amplifier	6BA6	
V-3	Mixer	6BE6	
V-4	H.F. Oscillator	6C4	
V-5	First I.F. Amplifier	6K7	
V-6	Second I.F. Amplifier	6K7	

V-7	Second Detector and A.V.C.	6H6
V-8A	"S" Meter Amplifier	1/2 6SN7GT
V-8B	Phase Inverter	1/2 6SN7GT
V-9	C.W. Oscillator	6J7
V-10	Noise Limiter	6H6
V-11	Audio Amplifier	6SJ7
V-12	Audio Output	6V6GT
V-13	Audio Output	6V6GT
V-14	Voltage Regulator	OB2
V-15	Rectifier	5V4G
X-1	Accessory Connector Socket	Octal
X-2	Crystal Calibrator Socket	Octal
X-3	Select-O-Ject Socket	Octal
Y-1	Crystal Resonator	Quartz, 455 Kc.

J665-2
J665-2
J665-2
B979-1

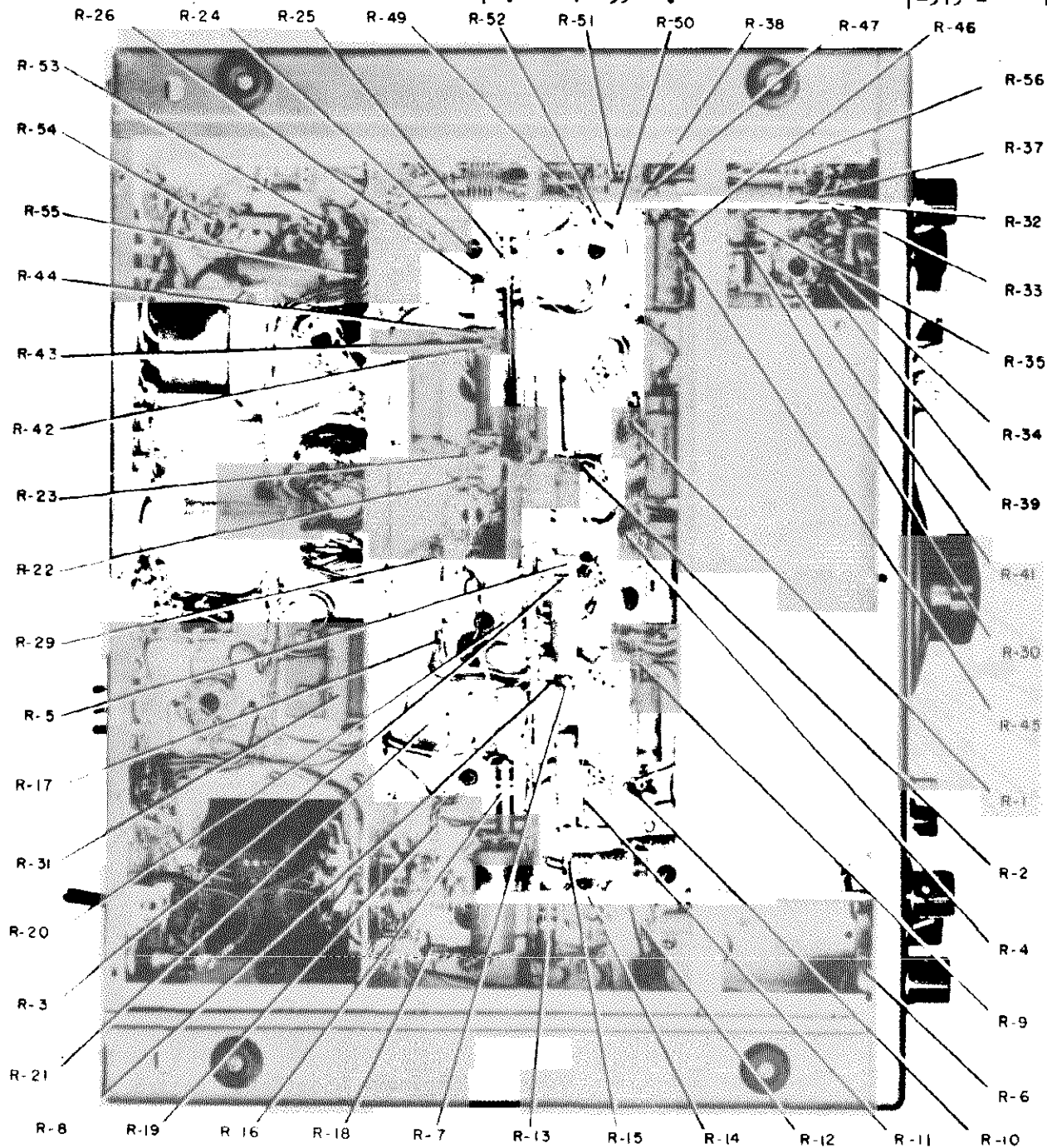


Figure No. 10A. Resistor Locations, Bottom View of Receiver

MODEL HRO-50

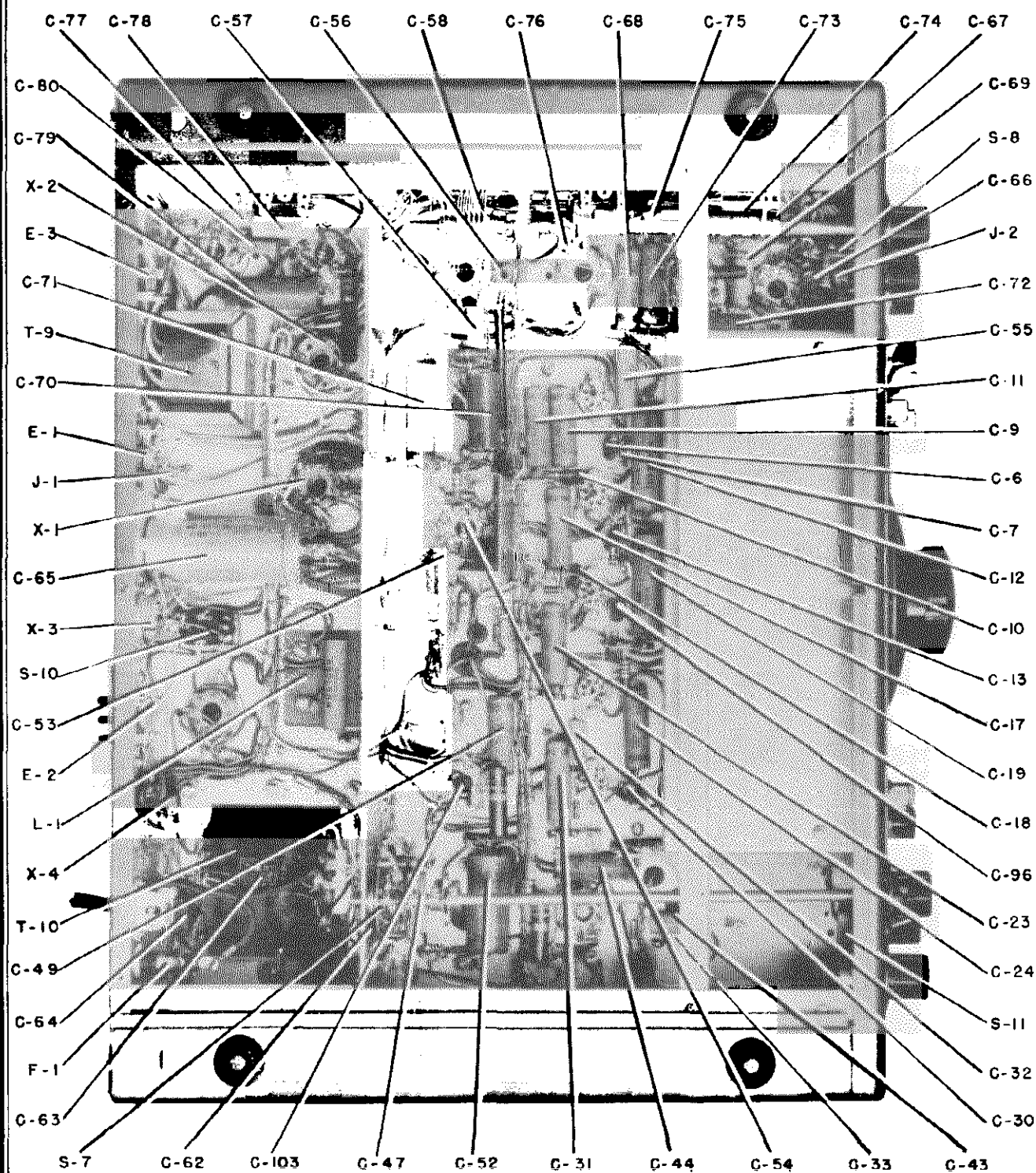


Figure No. 10B. Capacitor and Miscellaneous Component Locations, Bottom View of Receiver

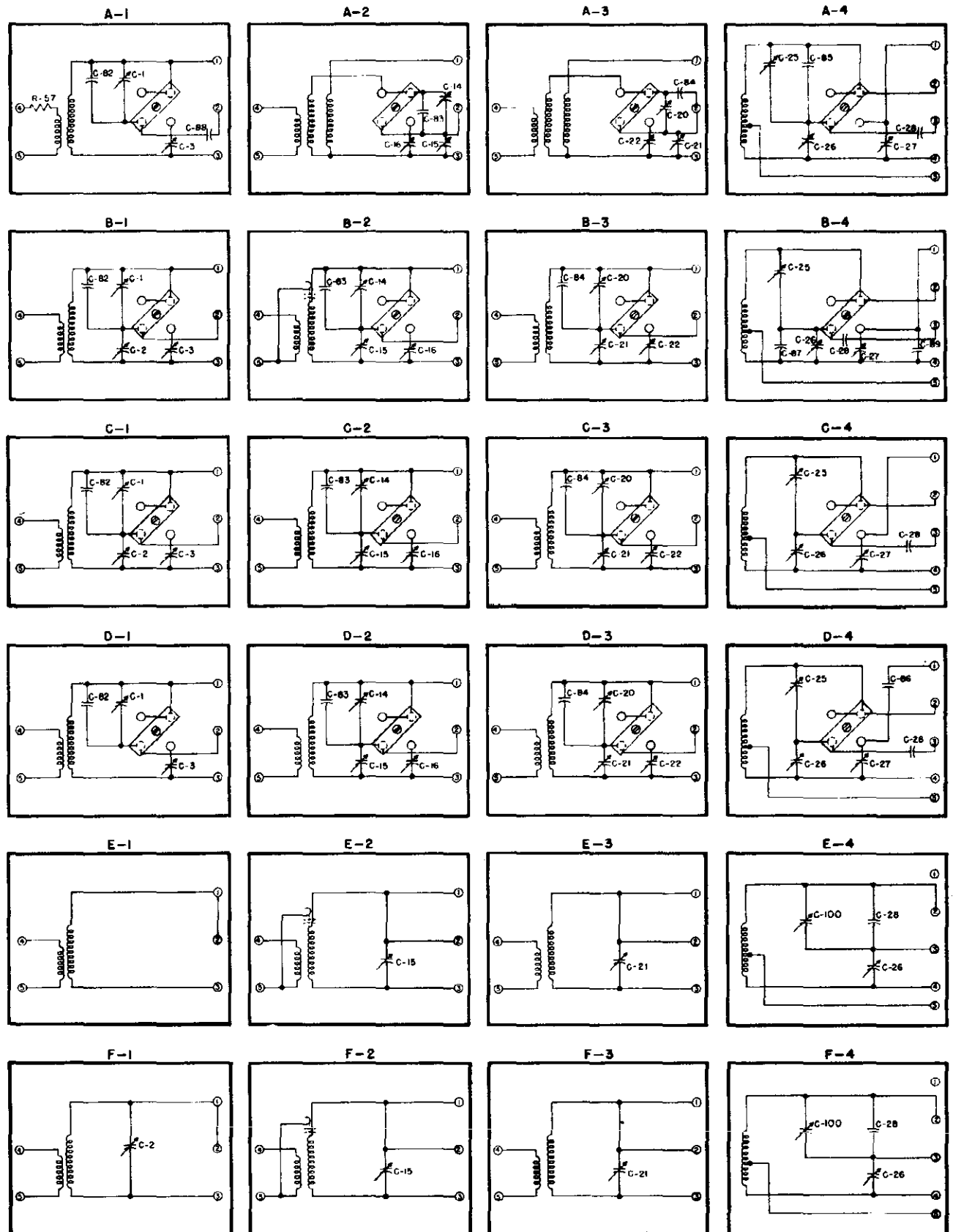
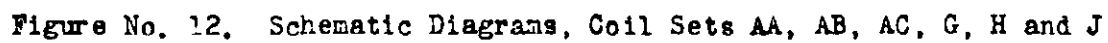


Figure No. 11. Schematic Diagrams, Coil Sets A, B, C, D, E and F



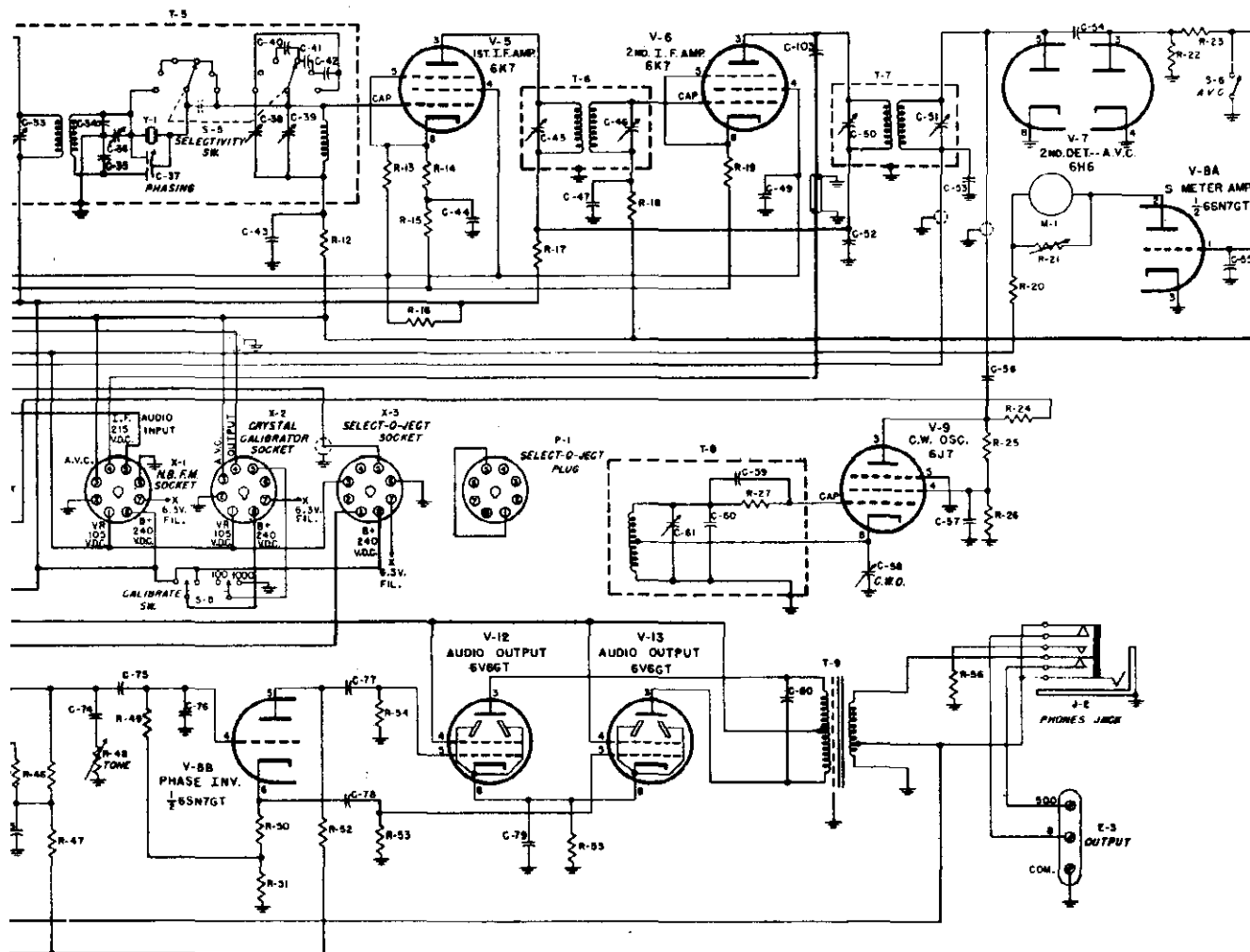


Figure No. 13. Schematic Diagram, HRO-50 Radio Receiver



GENERAL

The type XCU Crystal Calibrator Unit is designed expressly for use within the HRO-50 Receiver. It utilizes an electron-coupled oscillator circuit controlled by a dual-dimension crystal (Bliley type SMC-100). This type of crystal provides two crystal-controlled marker frequencies of 100 kilocycles and 1 megacycle. When plugged into the Crystal Calibrator Socket, X-2, the XCU output is loosely coupled to the first R.F. amplifier input circuit. Selection of either the 100 kilocycle or 1000 kilocycle crystal-controlled signal is made possible by the front-panel mounted Calibrate switch on the Receiver.

INSTALLATION

The XCU calibrator is installed in the HRO-50 Receiver by plugging the unit into the Crystal Calibrator Socket, X-2, on top of the chassis. A slotted-head screw mounted through the top of the unit is provided to bolt the unit to the chassis.

A trimmer capacitor, C-1, is connected across the crystal to permit adjustment of the frequency of the 100 kilocycle output marker when the unit is operated at locations where the temperature is vastly removed from that of normal room temperature. This capacitor should never require adjustment unless such abnormal temperatures are experienced. To make the adjustment proceed as follows:

- (1) Plug in a coil set suitable for the reception of WWV on one of the various frequencies utilized by this standard frequency station.
- (2) Adjust the Receiver for normal C.W. operation as explained in Section 3-3.
- (3) Set the front-panel mounted Calibrate switch at the 100 kilocycle position.
- (4) Tune in the signal from WWV.
- (5) Adjust the trimmer capacitor, C-1, located at the top of the calibrator unit so that the 100 kilocycle marker signal harmonic is zero beat with the signal received from WWV.

OPERATION

The XCU Crystal Calibrator provides a means of checking the accuracy of the frequency calibration of the Receiver. The front-panel mounted Calibrate switch marked 100-Off-1000 connects B-plus to the Calibrator for instantaneous service. At the same time this switch selects either the 100 or 1000 kilocycle marker signal. To check calibration accuracy tune in the desired marker signal with the Control switch set at C.W. and zero beat the Receiver with the harmonic marker. If the micrometer dial and the slide-rule dial do not read accurately correction should be made by adjusting the front-panel mounted Osc. trimmer control. Only a slight adjustment of the Osc. trimmer control should be necessary. If calibration is way off the plug-in coil set probably requires realignment and reference should be made to Section 4.

PARTS LIST

SYMBOL	FUNCTION	DESCRIPTION	NAT. CO. TYPE
C-1	100 Kc. Tuning	Ceramic, variable, 6 - 20 mmf.	E311-2
C-2	B+ Filter	Paper, .1 mfd. +30%-10% 400 vdcw	D827-11
C-3	Cathode by-pass	Paper, .1 mfd. +30%-10% 400 vdcw	D827-11
C-4	Output Coupling	Ceramic, 10 mmf. \pm .5 mmf. 500 vdcw	H872-1
L-1	100 Kc. inductor	5 mh. type R-100	SA:4373
L-2	1000 Kc. inductor	.5 mh. type R-50	SA:2514
P-1	Plug	Octal	K783-1
R-1	Grid	Fixed, 4.7 megohms, 1/2 W.	J569-69

MODEL HRO-50

R-2	Cathode	Fixed, 150 ohms, 1/2 W.	J569-15
R-3	Screen dropping	Fixed, 2200 ohms, 1 W.	J571-41
R-4	Plate	Fixed, 470,000 ohms, 1 W.	J571-57
V-1	Oscillator tube	6AK6	
Y-1	Crystal Resonator	Quartz, 100 - 1000 Kc.	P206-1

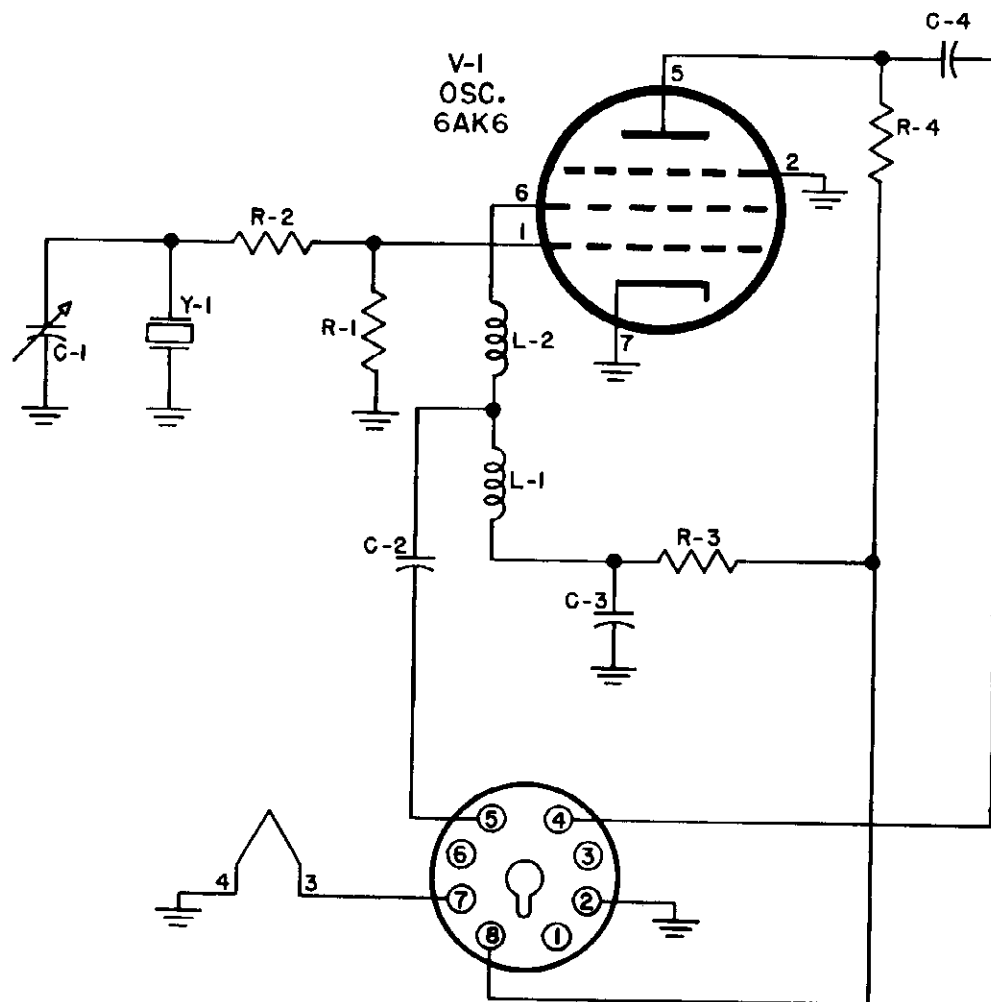


Figure No. 14. Schematic Diagram, XCU Calibrator

INSTRUCTIONS
for the
NATIONAL NFM-50
NARROW-BAND F.M. ADAPTOR

INSTALLATION

The NFM-50 is installed in the HRO-50 Receiver by plugging the adaptor unit into the N.B.F.M. Socket X-1 on the top of the chassis. A mounting bracket is furnished to hold the adaptor unit securely in position.

The adaptor unit is aligned at National Company laboratories and realignment is not necessary. It is necessary to realign the primary trimmer capacitor C-50 in the second detector transformer, T-7, on the HRO-50. See Figure No. 6 in this Instruction Book for the location of this adjustment. Realignment of this capacitor is effected as follows:

1. Install the NFM-50.
2. Adjust the receiver controls for normal A.M. operation.
3. Disconnect the antenna.
4. Trim the capacitor, C-50, for maximum receiver background noise using an insulated alignment tool.

ALIGNMENT

The NFM-50 is carefully aligned before shipment and no realignment is required unless the adaptor is accidentally misaligned. The necessity of realignment can be determined by the A.M. rejection capabilities of the adaptor unit. Proper alignment will be indicated when the maximum A.M. rejection occurs at the center of the A.M. carrier. Maximum S-meter reading will indicate the center of the carrier.

The equipment required for alignment is a high-impedance vacuum tube voltmeter and an A.M. signal generator. The signal generator used should have an output reasonably free of any frequency modulation. The use of a broadcast station as a signal source, in place of a signal generator, would provide a test signal meeting the above requirement. In any case, the signal strength of the test signal should be of the order to provide an S-meter reading of from 2 to 5 S-units when the HRO-50 is correctly tuned to the test signal.

The preliminary alignment procedure is as follows:

1. Connect the high-impedance voltmeter between the test point jack, J-1, and chassis. The polarity of the voltage will depend on the alignment of the adaptor, connect the voltmeter to obtain an up-scale reading.
2. Connect a signal source to the antenna terminals, A and A, at the rear of the HRO-50. If a signal generator is used make the connection through a 300 ohm dummy load and select a frequency in the standard broadcast band.
3. Set the Control switch at N.F.M.
4. Set the Selectivity switch at Off.
5. Set the Limiter control at Off.
6. Plug in the E coil set, 900 to 2,050 Kc. If this coil set is not available use the D coil set, 1.7 to 4.0 Mc.
7. Set the B plus switch at On.
8. Set the A.V.C.-Off switch at A.V.C.
9. Turn the R.F. Gain control to 10.
10. Adjust the A.F. Gain control for the desired volume.
11. Tune the test signal by adjustment of the Main Tuning knob. The correct tuning point is the setting that produces maximum S-meter reading.

Alignment is effected as follows:

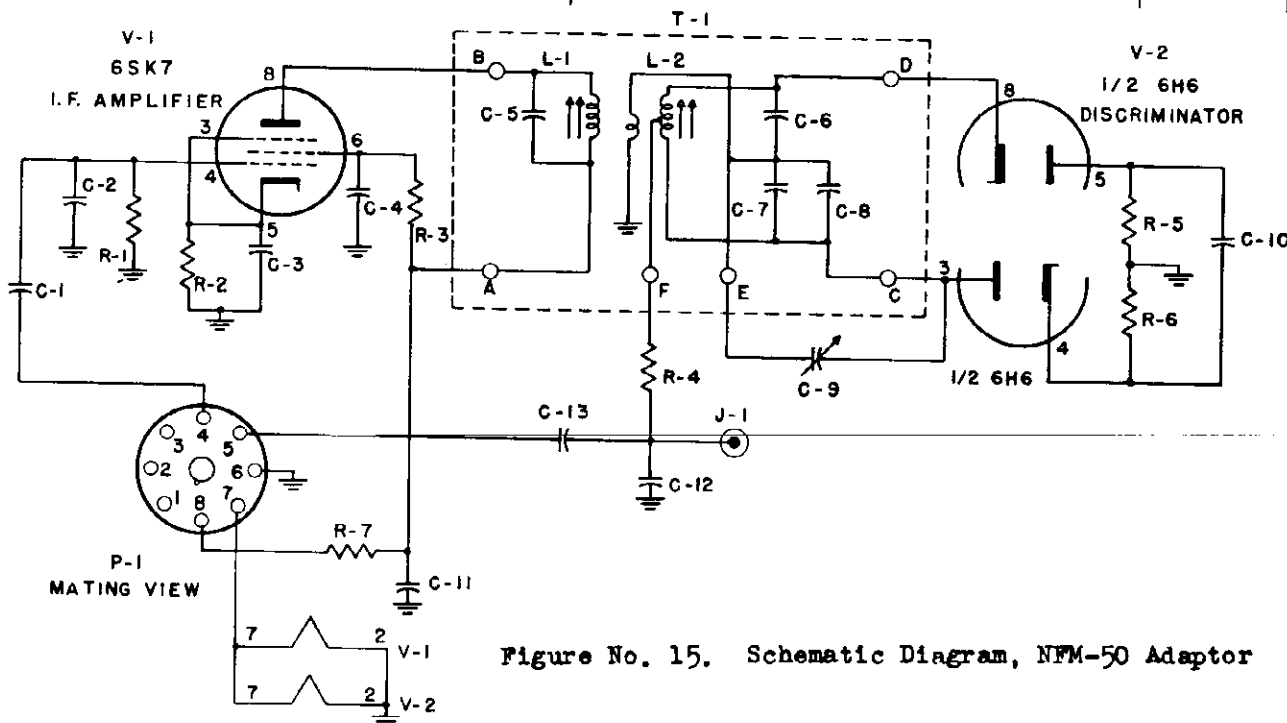
1. Detune both primary, L-1, and secondary L-2, I.F. trimmers by rotating the screw adjustments until they are withdrawn from the shield can as far as possible. The adjustment with the dot of red paint opposite it is the primary trimmer L-1.
2. Tune the primary trimmer, L-1, for maximum reading on the voltmeter. If two peaks in output are observed, the correct peak will be the first one encountered when rotating the screw adjustment into the shield can.
3. Tune the secondary trimmer, L-2, for a zero reading on the voltmeter. It will be noted that there is a crossover in the polarity of the test voltage at this point.
4. Adjust the capacitor, C-9, for a null in the audio output. This capacitor is accessible after removal of the button plug on the side of the adaptor unit.

MODEL HRO-50

5. Adjustment of capacitor, C-9, may affect the zero voltage reading obtained by adjustment of the secondary trimmer, L-2. Retrim L-2 and C-9, as necessary, until both a zero voltage reading on the voltmeter and a null in the audio output are obtained.

PARTS LIST

SYMBOL NO.	FUNCTION	DESCRIPTION	NAT. CO. TYPE
C-1	I.F. Amp. Coupling	Ceramic, 10 Mmf, 500 vdcw	D325D-402
C-2	Input Divider	Ceramic, 38.5 Mmf, 500 vdcw	D825D-414
C-3	I.F. Amp. Cathode Bypass	Mica, 0.01 Mfd, 300 vdcw	J666-56
C-4	I.F. Amp. Screen Bypass	Mica, 0.001 Mfd, 300 vdcw	J665-71
C-5	T-1 Primary Tuning	Mica, 100 Mmf, 500 vdcw	H500-7
C-6	T-1 Secondary Tuning	Mica, 180 Mmf, 500 vdcw	H500-3
C-7	T-1 Secondary Tuning	Mica, 180 Mmf, 500 vdcw	H500-3
C-8	T-1 Secondary Tuning	Ceramic, 38.5 Mmf, 500 vdcw	D825D-414
C-9	T-1 Sec. Balance Adj.	Ceramic, Var., 7-35 Mmf.	E311-4
C-10	Disc. Cathode Filter	Elect. 1 Mfd, 450 vdcw	E338-10
C-11	B Supply Bypass	Mica, 0.01 Mfd, 300 vdcw	J666-56
C-12	R.F. Filter	Mica, 470 Mmf, 500 vdcw	J665-56
C-13	Audio Coupling	Mica, 0.01 Mfd, 300 vdcw	J666-56
R-1	I.F. Amp. Grid Leak	Fixed, 1 Megohm, 1/2 W.	K379-61
R-2	I.F. Amp. Cathode Bias	Fixed, 1,000 Ohms, 1/2 W.	K379-25
R-3	I.F. Amp. Screen Dropping	Fixed, 47,000 Ohms, 1/2 W.	K379-45
R-4	R.F. Filter	Fixed, 47,000 Ohms, 1/2 W.	K379-45
R-5	Diode Load	Fixed, 15,000 Ohms, 1/2 W.	K379-39
R-6	Diode Load	Fixed, 15,000 Ohms, 1/2 W.	K379-39
R-7	Decoupling	Fixed, 4,700 Ohms, 1/2 W.	J569-33
J-1	Test Point	Tip Jack, Bakelite	K421-1
L-1	T-1 Primary Inductor	Adjustable Iron-Core	SA:4892
L-2	T-1 Secondary Inductor	Adjustable Iron-Core	SA:4891
P-1	Adaptor Unit Plug	8 Prong Octal	K783-1
T-1	Discriminator Transformer	Ratio Type 455 Kc.	SA:4890
V-1	I.F. Amplifier	6SK7	
V-2	Discriminator	6H6	



INSTRUCTIONS
FOR THE
NATIONAL TYPE 650S
VIBRATOR POWER SUPPLY

GENERAL

The National Type 650S Table Model Vibrator Power Unit has been designed to furnish complete operating voltages for the HRO-50 Receiver. The unit operates from a 6-volt D.C. supply and provides approximately 150 volts D.C. at 70 milliamperes in normal operation. Output voltages for both A and B supply are available at a four prong socket for convenient connection to the Receiver.

The 650S consists of a vibrator unit utilizing an OZ4A type rectifier tube and a vibrator in a circuit employing efficient R.F. filtering of vibrator hash. Further filtering of the low frequency or audio hum component in the output is accomplished by using the regular filter system in the Receiver.

INSTALLATION

The 650S unit is supplied with a battery connecting cable as well as an inter-connecting cable to facilitate connection to the Receiver.

Battery clips are provided on the battery connecting cable, W-1, for convenient connection to a 6-volt storage battery or similar source of power. The inter-connecting cable, W-2, is terminated at one end in a four-prong plug to mate with the socket, X-1, of the 650S. The other end utilizes an octal plug to mate with the power socket, X-1, at the rear of the HRO-50 Receiver. The Receiver A.C. jumper plug, P-1, used for A.C. operation must be removed from the power socket. Figure Number 16 shows the Schematic Wiring Diagram.

The 650S Vibrapack Unit has been completely tested and adjusted at the factory to provide efficient and economical service when used with the HRO-50 Receiver. An adjustment control switch has been furnished for increasing the B-plus output. This is a screw driver control available through an entry hole provided at the rear of the 650S. The control switch has four steps from approximately 150 volts of filtered D.C. at 70 milliamperes in the extreme counterclockwise position (step 1) to approximately 210 volts at 90 milliamperes in the fully clockwise position (step 4). It is recommended that the Receiver be operated at the lower B voltage of step 1. The total battery drain is approximately 10.5 amperes when furnishing power to the Receiver if the NFM-50, XCU and SOJ-3 units are used. If the Receiver is used without these accessories the total drain is approximately 9 amperes. The V.R. tube does not light under these conditions but the Receiver will operate normally and operation from a storage battery becomes practical. In step 4 the V.R. tube will light and full Receiver output will be obtained but the drain on the storage battery will be approximately 15 amperes when all accessories are utilized. Without these accessories the total Receiver drain from the battery will be approximately 13.3 amperes.

The two intermediate control switch steps 2 and 3 should not be used as the voltage obtained is approximately the value required to fire the V.R. tube in the receiver. Under this condition the V.R. tube may fire on and off sporadically resulting in erratic operation of the receiver.

PARTS LIST

SYMBOL	FUNCTION	DESCRIPTION	NAT. CO. TYPE
C-1	Filter Capacitor	Elec. 500 mfd. 15 vdcw	E338-7
E-1	Vibrapack Unit	6 V.D.C. Mallory Type VP554	
F-1	Fuse	3 AG 20 Ampere 25 volt	SA:869
L-1	6-volt Line Filter	16 microhenries, iron core	E230-2
S-1	6-volt Line Switch	Toggle S.P.S.T.	
V-1	Rectifier Tube	Type 0Z4A	SA:1999
W-1	6-volt Line Connector	Two Contact	
W-2	Interconnecting Cable	One end terminated in four prong plug; other in an octal plug	
Y-1	Vibrator	6 V.D.C. Mallory Type 8250	
X-1	Output Socket	Four Prong Female	

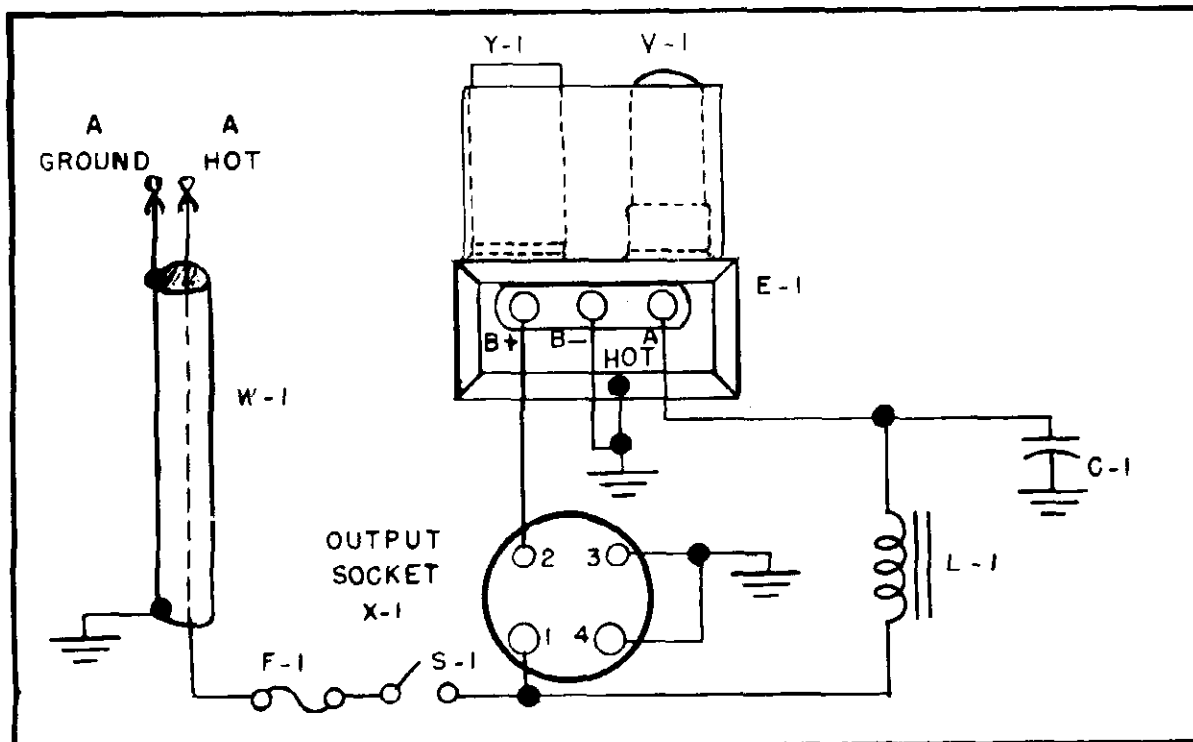


Figure No. 16. Schematic Diagram, 650S Vibrator Power Supply



SPECIFICATIONS

OVERALL DIMENSIONS:

Height	35"
Width	29"
Depth	18"
Shipping Weight	100 Lbs.

ELECTRICAL RATING:

Line Voltage	110-120 volts, 50-60 C.P.S.
Power Consumption	57 watts @ 115 VAC

TUNING FREQUENCY RANGE:

340 to 1620 KC

INTERMEDIATE FREQUENCY:

455 KC

ELECTRICAL POWER OUTPUT:

Maximum	3.2 watts
Undistorted	1.7 watts

LOUDSPEAKER:

Type	Permanent Magnet
Outside Cone Diameter	10"
Voice Coil Impedance	3.2 ohms @ 400 C.P.S.
Magnet Rating	3.16 Ozs. Alnico V

TUBES:

Tube	Function
6SK7	R-F Amplifier
6SA7	Frequency Converter
6SK7	I-F Amplifier
6SQ7	2nd Detector—1st Audio Amplifier
6K6-GT	Power Amplifier
5Y3-GT	Rectifier

SPECIAL SERVICING INFORMATION

D. C. RESISTANCE MEASUREMENTS:

Due to a variation of winding methods, the D. C. resistance on all coils is subject to a 20% tolerance.

1st I-F Coil:

Primary	17 ohms
Secondary	14.5 ohms

2nd I-F Coil:

Primary	17 ohms
Secondary	14.5 ohms*

Oscillator Coil:

Primary	1 ohms
Secondary	6 ohms

R-F Coil:

Primary	58 ohms
Secondary	4.2 ohms

*Because of the 47K resistor in series with the secondary of the 2nd I-F, the reading shown can only be obtained by removing the coil from the can.

STAGE GAIN MEASUREMENTS:

Measurements taken with Volume and Tone Controls maximum...
 Selector Switch in Radio position... AVC shorted to ground.
 Standard Output 50 milliwatts
 Dummy Antenna 200 Mmf.
 Antenna to R-F Grid—6X at 100 KC
 R-F Grid to Converter Grid—7X at 1000 KC
 Converter Grid to 1st I-F Grid—46X at 455 KC
 1st I-F Grid to 2nd Detector—62X at 455 KC
 Overall Audio Gain—320X at 500 milliwatts, 400 cycles.

OSCILLATOR CATHODE VOLTAGES:

Measured at 117 volts AC line with an AC vacuum tube voltmeter input loading above 10 megohms.

1500 KC — 2.25 VAC
1000 KC — 2.15 VAC
800 KC — 2.3 VAC
600 KC — 2.5 VAC

SOCKET VOLTAGES

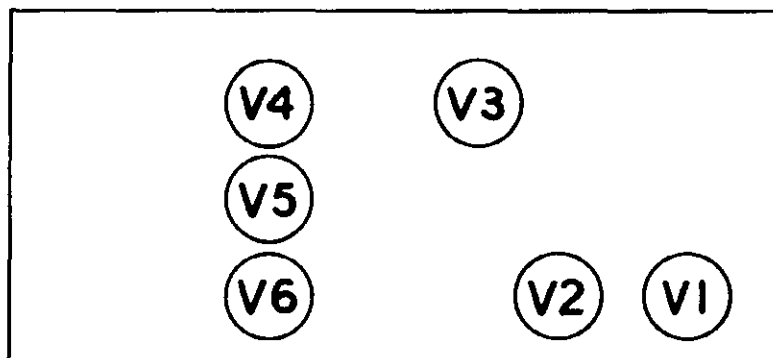


Figure 2
Tube Location Chart

The socket voltages shown were measured under the following conditions:

1. D.C. voltages measured from socket contacts to chassis with a D.C. vacuum tube voltmeter.
2. A.C. voltages measured with a 1,000 ohms per volt A.C. meter.
3. Volume and Tone Controls maximum.
4. Selector Switch in Radio position; no signal.
5. All voltages are positive D.C. unless otherwise noted.
6. Voltage readings subject to a 10% variation.

V-1—6SK7—R-F Amplifier:

Pin	Element	Voltage
1	Shield	0
2	Heater	0
3	Grid 3	0
4	Grid 1	-7
5	Cathode . . . . .	.5
6	Grid 2	74
7	Heater	6.0 VAC
8	Plate	190

V-2—6SA7—Frequency Converter:

Pin	Element	Voltage
1	Grid 5	0
2	Heater	0
3	Plate	195
4	Grids 2 & 4	74
5	Grid 1	-6.4
6	Cathode	0
7	Heater	6.0 VAC
8	Grid 3	-8

V-3—6SK7—I-F Amplifier:

Pin	Element	Voltage
1	Shield	0
2	Heater	6.0 VAC
3	Grid 3	0
4	Grid 1	-7
5	Cathode	2.2
6	Grid 2	74
7	Heater	0
8	Plate	195

V-4—6SQ7—2nd Detector, 1st Audio Amplifier:

Pin	Element	Voltage
1	No Connection	0
2	Grid	-.5
3	Cathode	0
4	Diode Plate	-1
5	Diode Plate	-1
6	Plate Triode	105
7	Heater	0
8	Heater	6.0 VAC

V-5—6K6-GT—Power Amplifier:

Pin	Element	Voltage
1	No Connection	0
2	Heater	0
3	Plate	240
4	Grid 2	200
5	Grid 1	-13
6	No Connection	0
7	Heater	6.0 VAC
8	Cathode	0

V-6—5Y3-GT—Rectifier:

Pin	Element	Voltage
1	No Connection	0
2	Heater	260 (5.0 VAC to pin 8)
3	No Connection	0
4	Plate	265 VAC to Pow. Trans. Center Tap
5	No Connection	0
6	Plate	265 VAC to Pow. Trans. Center Tap
7	No Connection	0
8	Heater	260 (5.0 VAC to pin 2)

ALIGNMENT PROCEDURE

Alignment procedure consists of the steps outlined in the Alignment Chart. Make certain each step is done with a minimum input signal.

Connect output meter to speaker voice coil.

ALIGNMENT CHART

STEP	CONNECT TEST OSC. TO	TEST OSC. SETTING	POINTER SETTING	ADJUST FOR MAX OUTPUT
1	Mixer grid & Ground	455 KC	540 KC	Trimmers A, B, C & D
2	R-F Grid & Ground	1500 KC	1500 KC	Trimmer G
3	R-F Grid & Ground	600 KC	600 KC	Padder E
4	R-F Grid & Ground	1500 KC	1500 KC	Trimmers F & H
5	Repeat Steps 2, 3 & 4			
6	Check Stationizing. Slide pointer on string if stations are uniformly off in one direction.			

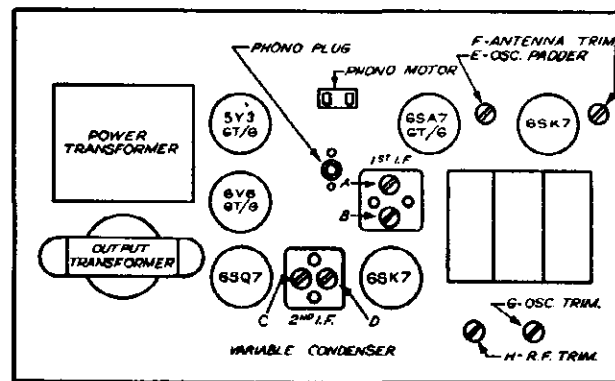
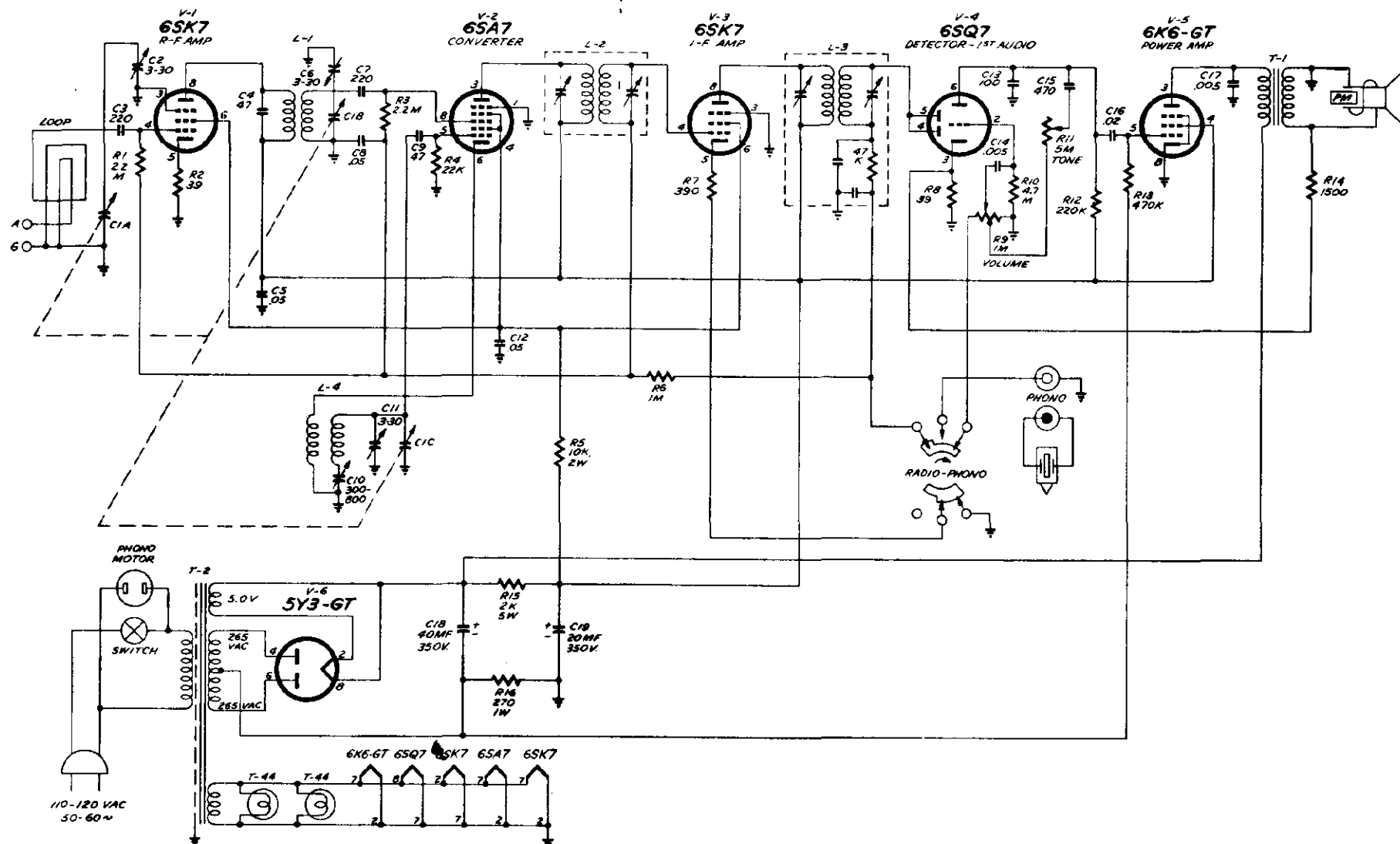


Figure 3
Trimmer Location

TABLE OF REPLACEABLE PARTS

REF. SYMBOL	DESCRIPTION	PB PART NO.	REF. SYMBOL	DESCRIPTION	PB PART NO.
CAPACITOR, TUBULAR,					
C-15, 17	.005 Mfd. 600 volt	23004	R-12	220,000 ohms	73153
C-16	.02 Mfd. 600 volt	23007	R-13	470,000 ohms	73157
C-5, 12	.05 Mfd. 600 volt	23010	R-6	1 megohm	73161
C-8	.05 Mfd. 200 volt	23017	R-1, 3	2.2 megohms	73165
CAPACITOR, TRIMMER,					
C-6, 11	Dual—3-30 Mmf.	23400	R-10	4.7 megohms	73169
C-10	300-800 Mmf.	23402	RESISTORS, 1 WATT, 10%,		
C-2	3-30 Mmf.	23406	R-16	270 ohms	73218
CAPACITOR, VARIABLE,			R-5	RESISTORS, 2 WATT, 10%,	73437
C-1A, B, C	3-gang	23521		10,000 ohms	
CAPACITOR, ELECTROLYTIC,			R-15	RESISTORS, WIRE WOUND,	73631
C-18	40 Mfd. 350 volt	24063	T-2	TRANSFORMERS,	
C-19	20 Mfd. 350 volt	24064		Power, 500 volt center tap @ .070 amperes	89010D
CONTROLS,			T-1	Output, 8,500 to 3.2 ohms	89427
R-9	Volume, 1 megohm—tapped	25010C	MISC. PARTS		
R-11	Tone, 5 megohms	25506C	Cabinet (Specify Finish)		
COILS,			Card, AC		
L-2	1st I-F—455 KC	29004E	Dial		
L-3	2nd I-F—455 KC	29007	Knobs		
L-1	R-F	29102F	Lamp, dial—T-44		
L-4	Oscillator	29205C	Record Changer V-M 950		
RESISTORS, 1/2 WATT, 10%,			Plug—Antenna & Speaker		
R-2, 8	39 ohms	73008	Dial Pointer		
R-7	390 ohms	73020	Socket, Tube, Std. Octal		
R-14	1,500 ohms	73027	Socket, Speaker		
R-4	22,000 ohms	73041	Socket, AC		
			Socket, Dial Light		
			Speaker, 10" PM		
			Switch—Ph Rad		

Figure 4
Schematic Diagram



SPECIFICATIONS

CABINET

Model 50-920	Molded plastic, mahogany and gray, wide-angle dial
Model 50-921	Molded plastic, ivory, wide-angle dial
Model 50-922	Molded plastic, maroon, wide-angle dial

CIRCUIT 6-tube superheterodyne

FREQUENCY RANGE 540—1620 kc.

AUDIO OUTPUT 1.2 watts

OPERATING VOLTAGE 105—120 volts, a.c. or d.c.

POWER CONSUMPTION 30 watts

AERIAL Built-in, high-impedance loop; provision for connection of external aerial

INTERMEDIATE FREQUENCY 455 kc.

PHILCO TUBES (6) 7B7 r-f ampl., 7A8 converter,
7B7 i-f ampl., 14B6 det.—1st audio—a.v.c., 50L6GT
output, 35Z5GT rectifier

ALIGNMENT PROCEDURE

DIAL POINTER: Turn tuning condenser to full-mesh position. Adjust pointer so that center of pointer carriage coincides with first scribe line from the left.

OUTPUT METER: Connect across speaker voice coil.

SIGNAL GENERATOR: Connect as indicated in chart
Use modulated output.

OUTPUT LEVEL: During alignment, attenuate signal-generator output to maintain an output-meter indication of 1.25 volts.

VOLUME CONTROL: Set to maximum.

NOTE: Run 1 sets have an i.f. of 265 kc. Otherwise alignment is as indicated.

CRITICAL DRESS: The green lead from the osc. section of C1 to C5 must be dressed away from the chassis, with all excess under the chassis.

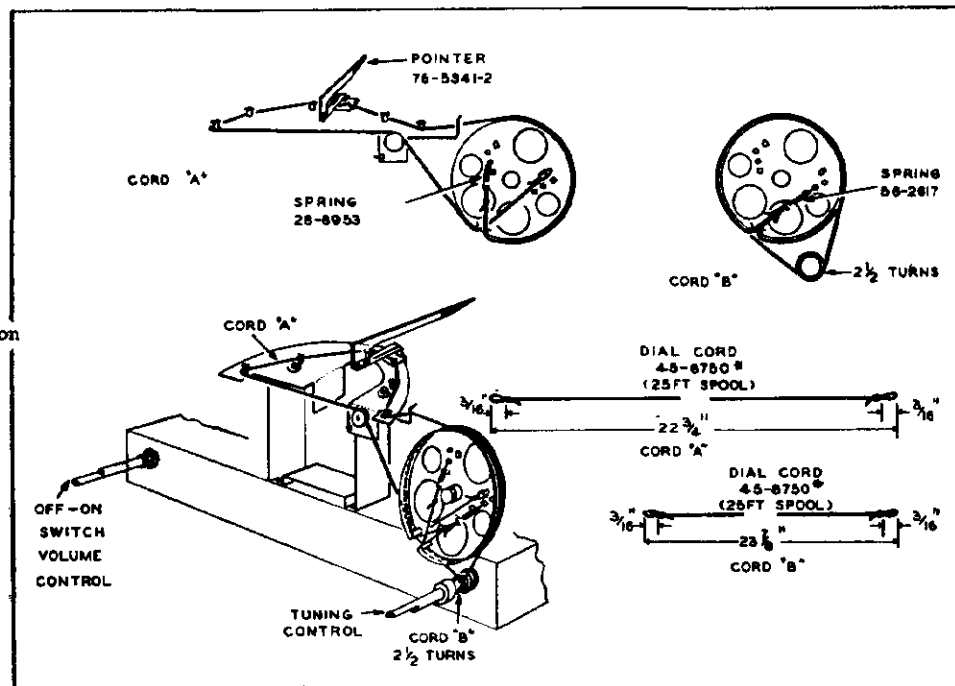


Figure 1. Dial-Cord Installation Details

TP9-636A

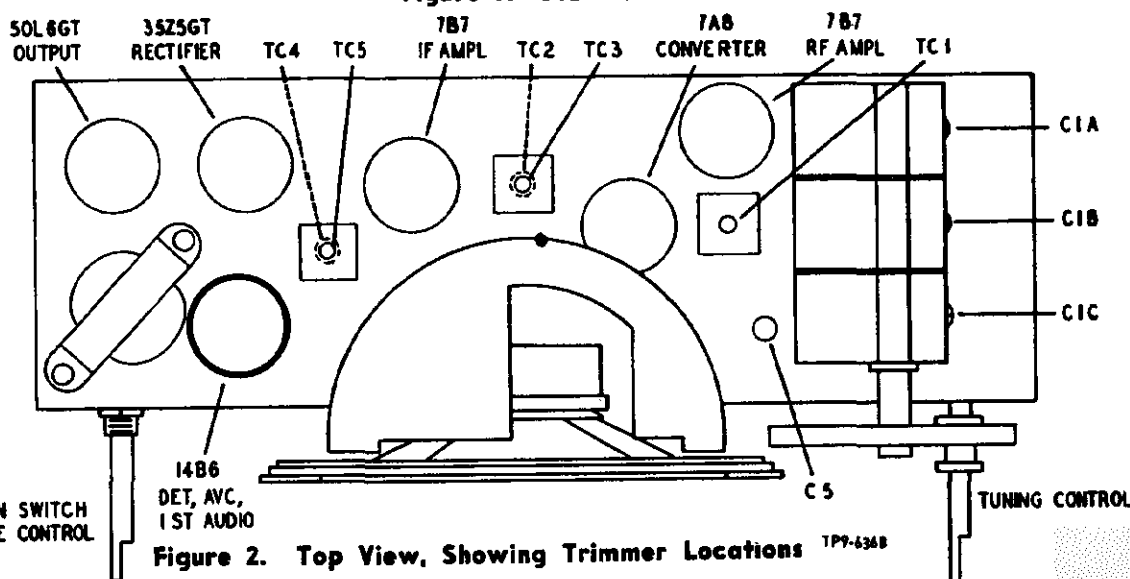


Figure 2. Top View, Showing Trimmer Locations

TP9-636B

MODELS 50-920,
50-921, 50-922

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .1- μ f. condenser to stator of r-f section of gang. Ground lead to B.	455 kc.	Gang fully meshed.	Adjust, in order given, for maximum output.	TC5—2nd i-f sec. TC4—2nd i-f pri. TC3—1st i-f sec. TC2—1st i-f pri.
2	Radiating loop. (See note below.)			Preset 1/2 turn from tight.	C5—osc. series
3	Same as step 2.	1620 kc.	1620 kc.	Adjust for maximum.	C18—osc. shunt
4	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum.	C1C—r-f C1A—aerial
5	Same as step 2.	580 kc.	580 kc.	Adjust for maximum while rocking tuning control.	C5—osc. series TC1—r-f core
6	Repeat steps 3 and 4.				

RADIATING LOOP: Make up a 6–8 turn, 6-inch-diameter loop from insulated wire; connect to signal-generator leads and place near radio loop aerial. The loop aerial must be connected to the radio.

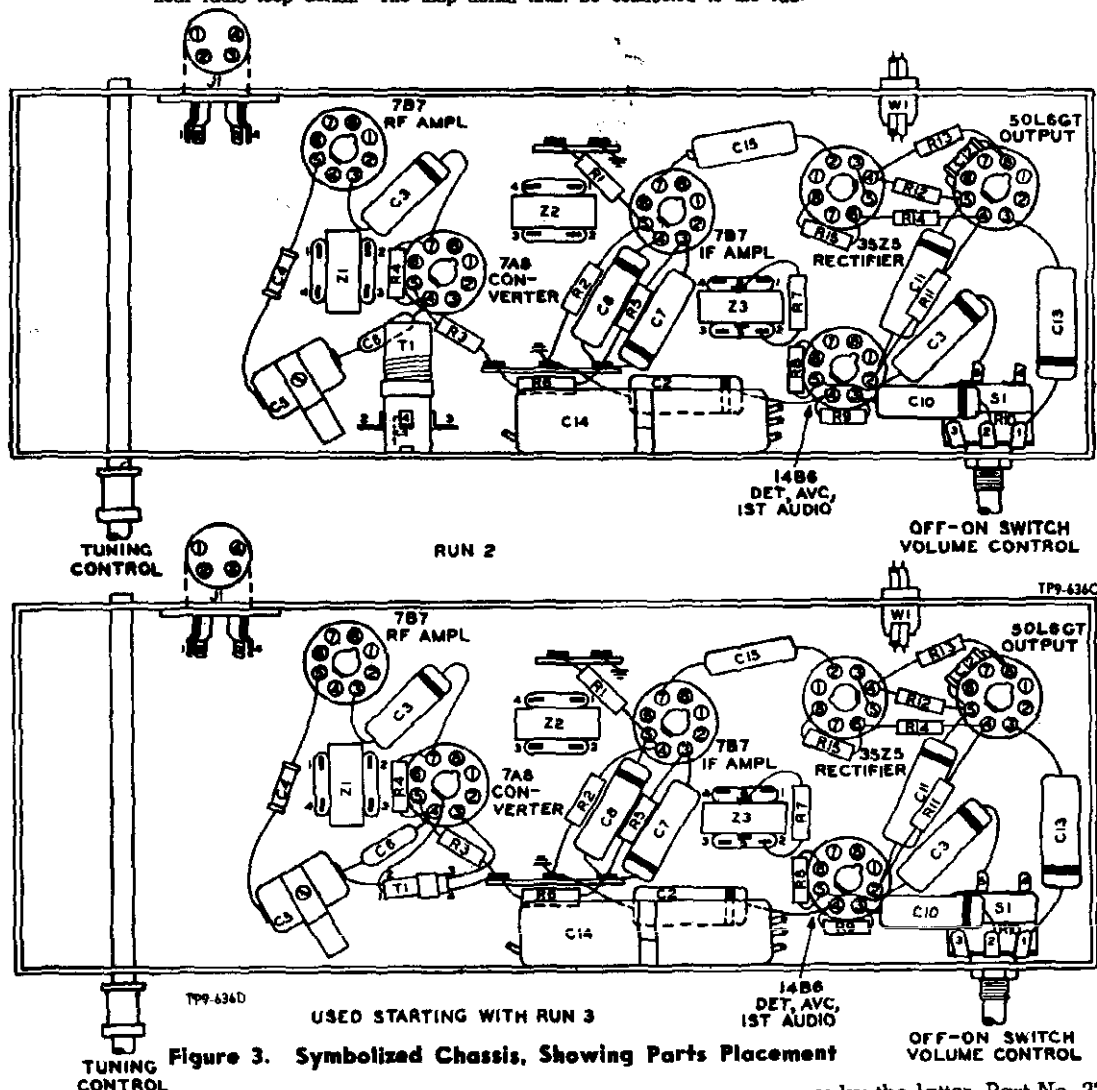


Figure 3. Symbolized Chassis, Showing Parts Placement

PRODUCTION CHANGES

Run 2: I.F. changed from 265 kc. to 455 kc.

Run 3: Oscillator coil, T1, changed from Part No. 32-4190-6 to Part No. 32-4263-3. This change was

to save space only; the latter, Part No. 32-4263-3, should be ordered in either case.

Run 4: Condenser C4 changed in value from 20 μ f. Part No. 30-1224-56, to 13 μ f., Part No. 30-1224-68, to insure proper padding at 1620 kc.

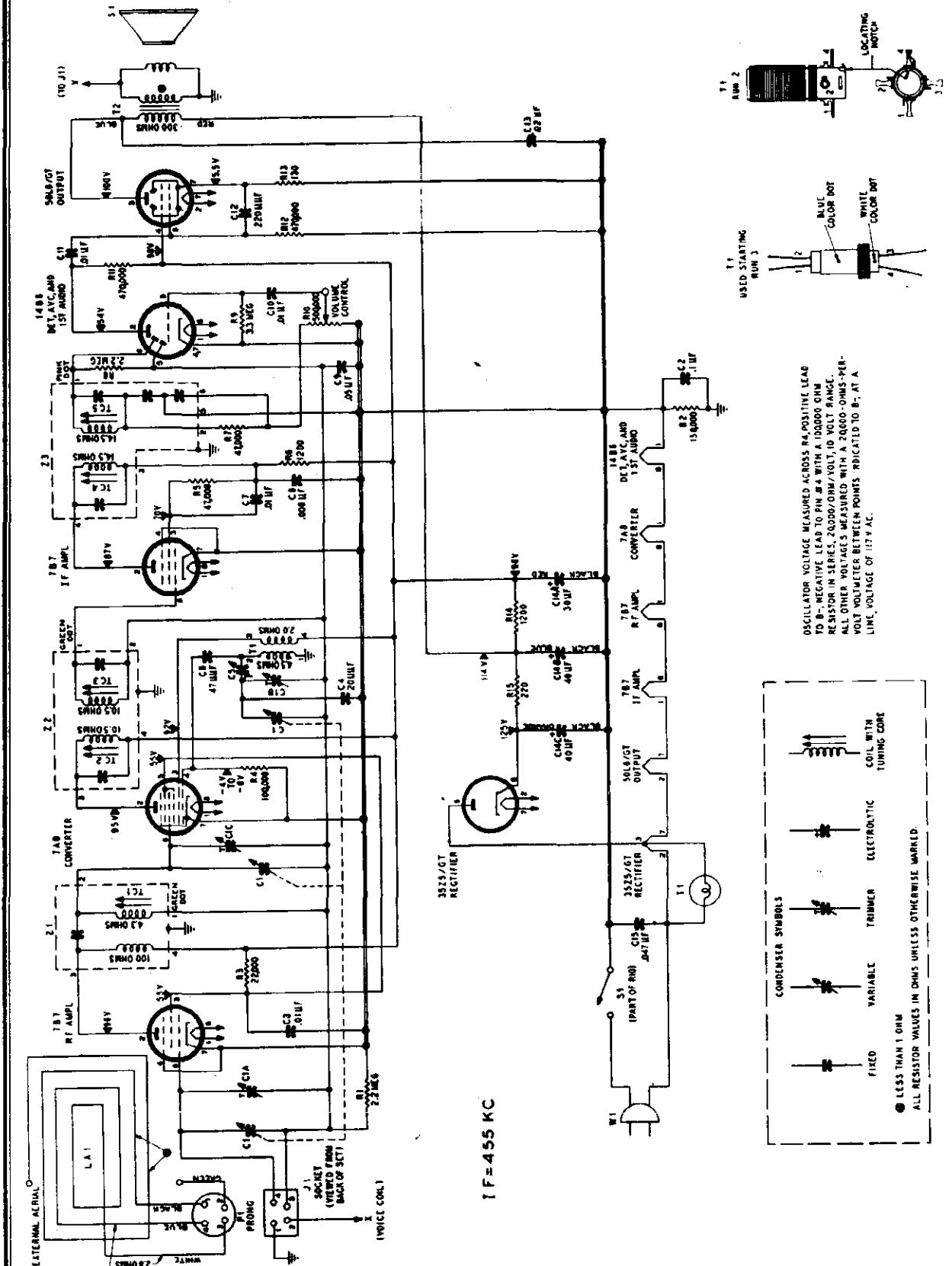


Figure 4. Philco Radio Models 50-920, 50-921, and 50-922, Schematic Diagram

MODELS 50-920,
50-921, 50-922

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Reference Symbol	Description	Service Part No.
C1	Condenser, tuning, 3-section	31-2748-1
C1A	Condenser, trimmer, aerial	Part of C1
C1B	Condenser, trimmer, osc.	Part of C1
C1C	Condenser, trimmer, r-f	Part of C1
C2	Condenser, by-pass, .1 μ f.	61-0113*
C3	Condenser, screen by-pass, .01 μ f.	61-0120*
C4	Condenser, fixed trimmer, temperature comp., 20 μ f.	30-1224-56
C5	Condenser, padder, osc. series	31-8473-17
C6	Condenser, d-c blocking, 47 μ f.	30-1227-5
C7	Condenser, screen by-pass, .01 μ f.	61-0120*
C8	Condenser, neutralization, .006 μ f.	45-3500-7*
C9	Condenser, a-v-c filter, .05 μ f.	61-0122*
C10	Condenser, d-c blocking, .01 μ f.	61-0120*
C11	Condenser, d-c blocking, .01 μ f.	61-0120*
C12	Condenser, by-pass, 220 μ f.	62-122001001
C13	Condenser, tone compensation, .02 μ f.	61-0108*
C14	Condenser, electrolytic, 3-section	30-2575-27
C14A	Condenser, filter, 30 μ f., 150v	Part of C14
C14B	Condenser, filter, 40 μ f., 150v	Part of C14
C14C	Condenser, filter, 40 μ f., 150v	Part of C14
C15	Condenser, line by-pass, .047 μ f.	30-4668-45
I1	Pilot lamp, 6-8v	34-2876
J1	Jack, aerial input	27-8214-1
LA1	Loop aerial, 50-920	30-4052-39
LA1	Loop aerial, 50-921 or 50-922	32-4052-40
LS1	Speaker, p-m, 4 in. by 6 in., oval	36-1833
P1	Loop-aerial plug	27-4788
R1	Resistor, a-v-c load, 2.2 megohms	66-5228340*
R2	Resistor, leakage, 150,000 ohms	66-4158340*
R3	Resistor, dropping, 22,000 ohms	66-3228340*
R4	Resistor, grid return, 100,000 ohms	66-4108340*
R5	Resistor, screen dropping, 47,000 ohms	66-3478340*
R6	Resistor, decoupling, 1200 ohms	66-2128340*
R7	Resistor, i-f filter, 47,000 ohms	66-3478340*
R8	Resistor, diode load, 2.2 megohms	66-5228340*
R9	Resistor, grid return, 3.3 megohms	66-5338340*
R10	Volume control, 500,000 ohms, with off-on switch	33-5566-13
R11	Resistor, plate load, 470,000 ohms	66-4478340*
R12	Resistor, grid return, 470,000 ohms	66-4478340*
R13	Resistor, cathode bias, 130 ohms	66-1128340*
R14	Resistor, filter, 1200 ohms, 1 watt	66-2124340*
R15	Resistor, filter, 220 ohms, 2 watts	66-1225340*
S1	Switch, off-on	Part of R10
T1	Transformer, oscillator	32-4263-3
T2	Transformer, output	32-8310-3
W1	Line cord	L-2183
Z1	Transformer, r-f	32-4399-2A
Z2	Transformer, 1st i-f	32-4160A
Z3	Transformer, 2nd i-f	32-4240-3A

MISCELLANEOUS

Description	Service Part No.
Cabinet, 50-920 (mahogany)	10770
Cabinet, 50-920 (gray)	10770-1
Back	318-3020
Fastener, back (4)	W-2235FA9
Backplate, ornamental, mahogany cabinet	56-7426FCP
Backplate, ornamental, gray cabinet	56-7426-1FCP
Fastener, backplate mtg.	W-2235-1FA9
Baffle, cardboard	54-7938
Fastener, baffle mtg. (4)	W-2235-2FA9
Bezel, metal	56-7427
Speed nut, bezel mtg. (2)	1W60196FE7
Dial scale, mahogany cabinet	54-5070
Dial scale, gray cabinet	54-5070-2
Knob, mahogany cabinet (2)	54-4718-4
Knob, gray cabinet (2)	54-4718-7
Pointer	76-5341-1
Cabinet, 50-921	76-5378
Back	318-3021
Fastener, back (4)	W-2235FA9
Backplate, ornamental	56-7434
Fastener, backplate mtg.	W-2235-1FA9
Baffle, cardboard	54-7922
Fastener, baffle mtg. (4)	W-2235-2FA9
Dial scale	54-5071
Clip, dial mtg.	56-7808FE11
Knob (2)	54-4718-5
Pointer	76-5341-2
Cabinet, 50-922	10772
Back	318-3022
Fastener, back (4)	W-2235FA9
Backplate, ornamental	56-7435
Fastener, backplate mtg.	W-2235-1FA9
Baffle, cardboard	54-7918
Fastener, baffle mtg. (4)	W-2235-2FA9
Bezel, metal	56-7436
Speed nut, bezel mtg.	1W60196FE7
Dial scale	54-5072
Clip, dial mtg. (2)	56-7572FE11
Knob	54-4718-3
Pointer	76-5341
Backplate, pulley and clip assembly	76-5233
Clamp, electrolytic mtg.	56-1466FA5
Dial cord, 25-foot spool	45-8750*
Spring, gang drive	56-2617
Spring, pointer drive	28-8953
Drive shaft	76-3671-5
Bushing, drive shaft	27-9437
Spring, hairpin, drive shaft	57-1468FA3
Panel, wiring, external aerial	38-9837
Panel, wiring, 4-lug	38-9161-1
Plug, aerial, 4-pin	27-4788
Rubber mount, gang mtg. (4)	27-4771-1
Shield, tube, 14B6	56-1586
Socket, Loktal	27-8177
Socket, octal	27-8174
Socket assembly, pilot lamp	27-8233-18

SPECIFICATIONS

CABINET

Model 50-925, Code 123 Plastic, brown finish

Model 50-926 Wood, mahogany with brown leatherette, and blonde with green leatherette

CIRCUIT

6-tube superheterodyne plus selenium rectifier

FREQUENCY RANGES

Broadcast 540—1620 kc.

FM 88—108 mc.

AUDIO OUTPUT

1 watt

OPERATING VOLTAGE

105—120 volts, a.c. or d.c.

POWER CONSUMPTION

35 watts

AERIAL

Built-in, high-impedance loop for AM, line cord for FM; provision for connection of external aeriels

INTERMEDIATE FREQUENCIES

AM 455 kc.

FM 9.1 mc.

PHILCO TUBES (6)

12BA6 FM r-f ampl., 12AT7 osc.-mixer, 12BA6 1st i-f ampl., 12BA6 2nd i-f ampl., 19C8 AM-FM det.-1st audio-a.v.c., 50C5 output, plus selenium rectifier

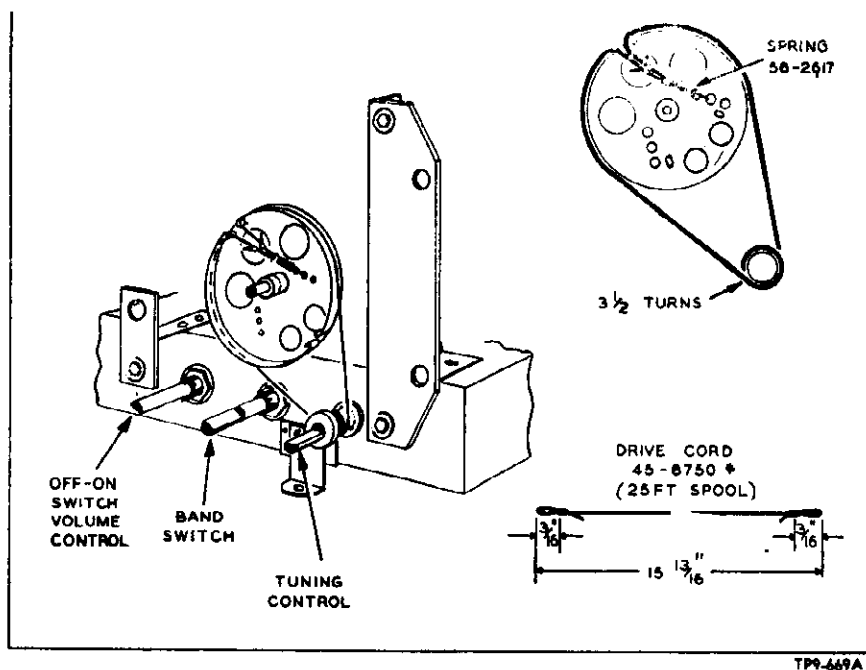


Figure 1. Dial-Cord Installation Details

AM ALIGNMENT PROCEDURE

Make alignment with loop aerial connected to radio. The AM alignment should be completed before the FM alignment is made.

DIAL POINTER — With tuning-condenser plates fully meshed, adjust pointer to coincide with index mark at low-frequency end of scale.

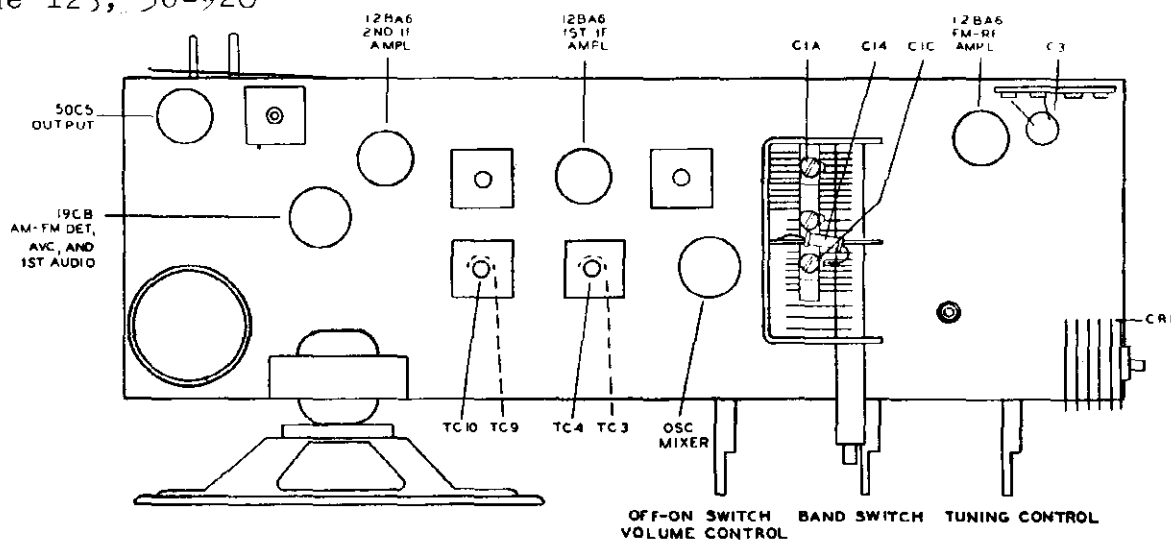
RADIO CONTROLS — Set volume control to maximum, set band switch for broadcast reception, and set tuning control as indicated in chart.

OUTPUT METER — Connect across voice-coil terminals.

SIGNAL GENERATOR — Use AM r-f signal generator, with modulated output. Connect generator and set frequency as indicated in chart.

OUTPUT LEVEL — During alignment, signal-generator output must be attenuated to hold output-meter reading below 1.25 volts.

MODELS 50-925
Code 123, 50-926

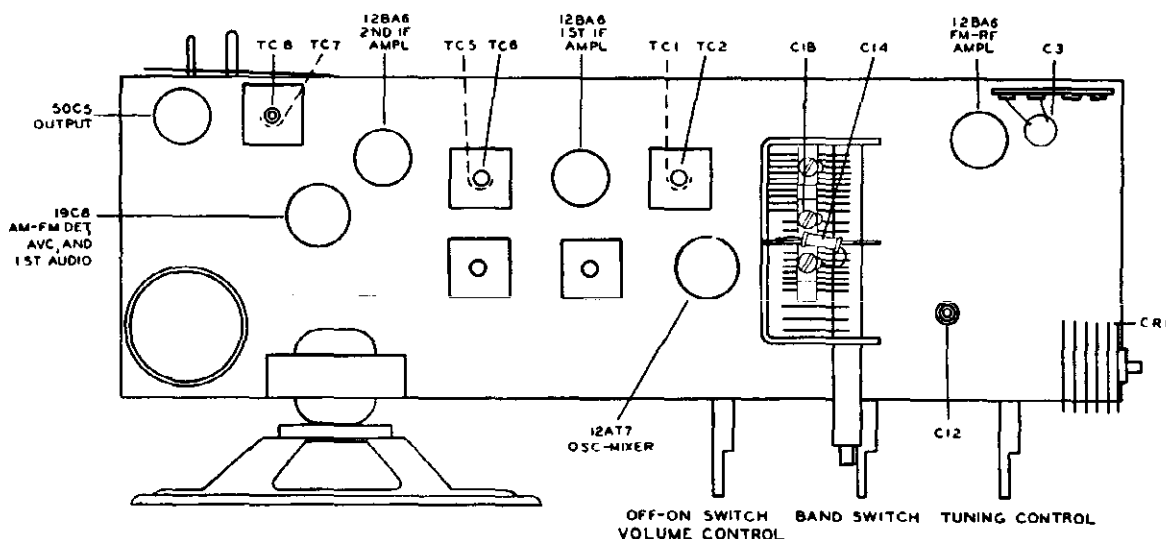


TP9-669C

Figure 2. Top View, Showing AM Trimmer Locations
AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to chassis. Output lead through a .1- μ f. condenser to mixer grid (pin 7) of 12AT7.	455 kc.	540 kc. (gang fully meshed)	Adjust for maximum output.	TC10—2nd AM i-f sec. TC9—2nd AM i-f pri. TC4—1st AM i-f sec. TC3—1st AM i-f pri.
2	Radiating loop. (See note below.)	1600 kc.	1600 kc.	Adjust for maximum output.	C1C—osc. trimmer
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output.	C1A—aerial trimmer

RADIATING LOOP: Make up a six-to-eight-turn, 6-inch-diameter loop from insulated wire; connect to generator terminals, and place near radio loop aerial. Radio loop aerial must be connected.



TP9-669D

Figure 3. Top View, Showing FM Trimmer Locations

FM ALIGNMENT PROCEDURE

Make AM alignment first.

RADIO CONTROLS — Set volume control to maximum, set band switch for FM reception, and set tuning control as indicated in chart.

OUTPUT METER — Connect across voice-coil terminals. (This meter is used only for step 3.)

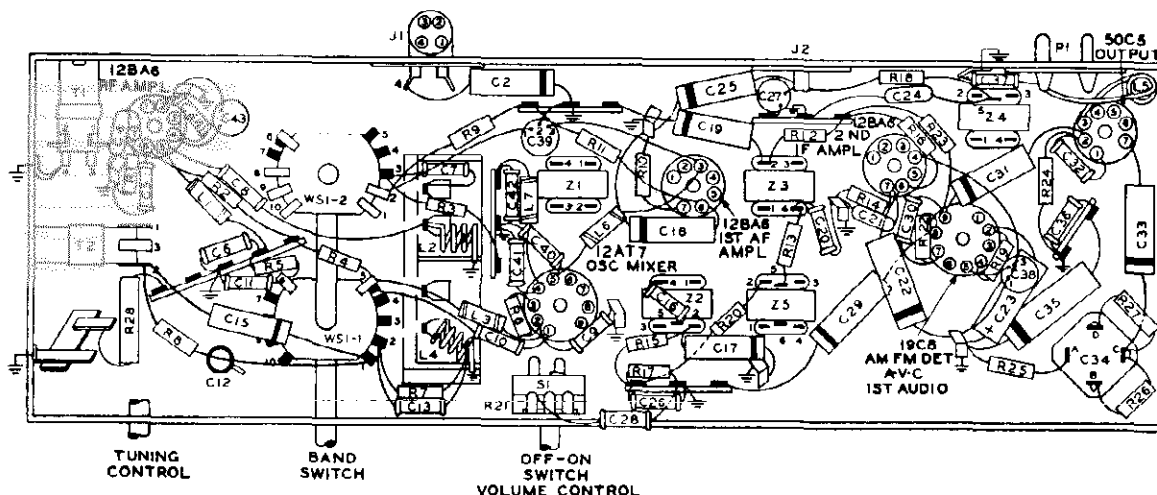
D-C VOLTMETER — Connect negative lead of d-c voltmeter (resistance of at least 20,000 ohms per volt) to pin 2 of 19C8 tube, and positive lead to chassis. Use 0–10-volt range.

SIGNAL GENERATOR — Use AM r-f signal generator, with modulated output. Connect ground lead to chassis. Connect output lead and set frequency as indicated in chart. Generator must have sufficient output to give reading of approximately 8.5 volts on d-c voltmeter; during alignment, generator output must be attenuated to hold meter reading at this value.

NOTE: Before starting FM alignment, allow radio and signal generator to warm up for 15 minutes.

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .1- μ f. condenser to control grid (pin 1) of 12BA6 1st i-f ampl.	9.1 mc.	88 mc.	Adjust tuning cores for maximum reading on d-c voltmeter. Attenuate signal generator to maintain a reading of approximately 10 volts. Repeat adjustments until no further improvement is noted. After this step, do not disturb these tuning cores except as directed in step 3.	TC8—discriminator sec. TC7—discriminator pri. TC6—FM 2nd i-f sec. TC5—FM 2nd i-f pri.
2	Through a .1- μ f. condenser to mixer grid (pin 7) of 12AT7.	9.1 mc.	88 mc.	Adjust tuning cores for maximum reading on d-c voltmeter. Repeat adjustments until no further improvement is noted. Do not disturb these tuning cores after this step.	TC2—FM 1st i-f sec. TC1—FM 1st i-f pri.
3	Same as step 1.	9.1 mc.	88 mc.	Adjust tuning core for minimum reading on output meter. This adjustment is critical; repeat to make certain it is correct.	TC8—discriminator sec.
4	To terminal 1 of J1.	105 mc.	105 mc.	Adjust trimmer for maximum reading on d-c voltmeter.	C12—FM osc.
5	Same as step 4.	105 mc.	105 mc.	Same as step 4.	C1B—FM r-f
6	Same as step 4.	92 mc.	92 mc.	Adjust coil for maximum reading on d-c voltmeter.	L4—osc. (tracking)
7	Same as step 4.	92 mc.	92 mc.	Same as step 6.	L2—FM r-f (tracking)
8	Same as step 4.	105 mc.	105 mc.	Same as step 4.	C12—FM osc.
9	Repeat steps 4 through 8 until no further improvement is noted.				



CRITICAL LEAD DRESS
FM IF REGENERATION WILL RESULT UNLESS
(1) THE RED B+ LEAD BETWEEN LUG 3 OF Z4 AND LUG 3 OF Z5 IS DRESSED AROUND THE GRID SIDE OF THE LAST 12BA6, AND BETWEEN THE GROUND LEAD AND THE TUBE, AND
(2) THE RED LEAD BETWEEN PIN 6 OF THE LAST 12BA6 AND LUG 4 OF Z5 IS DRESSED AWAY FROM Z3 AND HORIZONTAL TO THE CHASSIS (NOT DRESSED DOWN TO THE CHASSIS)

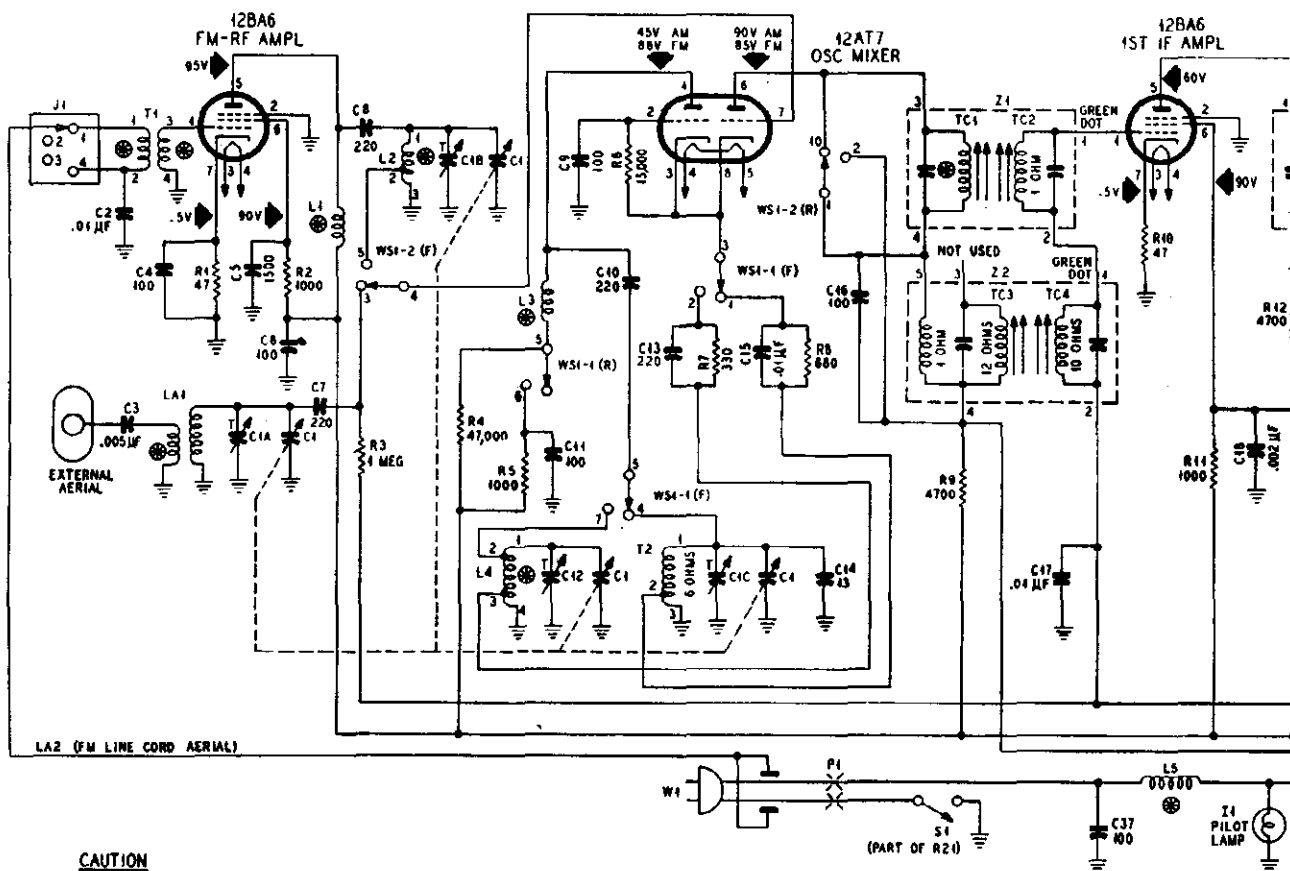
Figure 4. Symbolized Chassis, Showing Parts Placement

MODELS 50-925
Code 123, 50-926

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, tuning, 4-section (2 for AM, 2 for FM)	31-2733-4	C34D	Condenser, filter, 40 μ f., 150v	Part of C34
C1A	Condenser, trimmer, AM aerial	Part of C1	C35	Condenser, line by-pass, .04 μ f.	45-3500-2*
C1B	Condenser, trimmer, FM r-f	Part of C1	C36	Condenser, line by-pass, 100 μ f.	62-110009001*
C1C	Condenser, trimmer, AM oscillator	Part of C1	C37	Condenser, line by-pass, 100 μ f.	62-110009001*
C2	Condenser, aerial isolating, .01 μ f.	61-0120*	C38	Condenser, ceramic button, 2-section	30-1239
C3	Condenser, aerial isolating, ceramic button, .005 μ f.	30-1238-1	C38A	Condenser, filament by-pass, .004 μ f.	Part of C38
C4	Condenser, cathode by-pass, 100 μ f.	60-10105407*	C38B	Condenser, filament by-pass, .004 μ f.	Part of C38
C5	Condenser, screen by-pass, 1500 μ f.	62-215001011*	C39	Condenser, ceramic button, 2-section	30-1239
C6	Condenser, r-f by-pass, 100 μ f.	62-110009001*	C39A	Condenser, filament by-pass, .004 μ f.	Part of C39
C7	Condenser, d-c blocking, 220 μ f.	62-122001001*	C39B	Condenser, r-f by-pass, .004 μ f.	Part of C39
C8	Condenser, d-c blocking, 220 μ f.	62-122001001*	C40	Condenser, filament by-pass, 100 μ f.	62-110009001*
C9	Condenser, by-pass, 100 μ f.	62-110009001*	C41	Condenser, filament by-pass, 100 μ f.	62-110009001*
C10	Condenser, d-c blocking, 220 μ f.	62-122001001*	C42	Condenser, filament by-pass, 100 μ f.	62-110009001*
C11	Condenser, r-f by-pass, 100 μ f.	62-110009001*	C43	Condenser, filament by-pass, ceramic button, .005 μ f.	30-1238-1
C12	Condenser, trimmer, FM oscillator	31-8511	C44	Condenser, filament by-pass, 100 μ f.	62-110009001*
C13	Condenser, cathode by-pass, FM, 220 μ f.	62-122001001*	CR1	Selenium rectifier, 150 ma.	34-8003-2
C14	Condenser, fixed trimmer, AM oscillator, 13 μ f.	30-1224-42	I1	Pilot lamp, 110-125v, 7 w	34-2605
C15	Condenser, cathode by-pass, AM, .01 μ f.	61-0120*	J1	Jack, FM aerial	27-6214-8
C16	Condenser, fixed trimmer, i-f, 100 μ f.	62-110009001*	J2	Jack, FM test	27-6180
C17	Condenser, a-v-c filter, .01 μ f.	61-0120*	L1	Coil, FM plate load	32-4061-2
C18	Condenser, screen by-pass, .002 μ f.	61-0062*	L2	Coil, FM r-f	32-4392-3
C19	Condenser, coupling (in FM position, neutralization), .01 μ f.	61-0120*	L3	Coil, r-f isolating	32-4061-2
C20	Condenser, by-pass, 100 μ f.	62-110009001*	L4	Coil, FM oscillator	32-4391-3
C21	Condenser, cathode by-pass, molded, .01 μ f.	30-1226-10	L5	Coil, line choke	32-4089-3
C22	Condenser, screen by-pass, .002 μ f.	61-0062*	L6	Coil, filament choke	32-4061-2
C23	Condenser, electrolytic, FM-detector filter, 2 μ f., 50v	30-2417-7	L7	Coil, filament choke	32-4061-2
C24	Condenser, de-emphasis, molded, .01 μ f.	30-1226-10	LA1	Loop aerial, 50-925, Code 123	32-4052-48
C25	Condenser, de-emphasis, molded, .0022 μ f.	45-3505-54	LA1	Loop aerial, 50-926	32-4052-47
C26	Condenser, by-pass, 100 μ f.	62-110009001*	LA2	Aerial-wire-and-plug assembly, FM	41-3791-1
C27	Condenser, d-c blocking, ceramic button, .005 μ f.	30-1238-1	LS1	Speaker, 5-inch, p.m., with output transformer, 50-925, Code 123	36-1614-4
C28	Condenser, i-f by-pass, 100 μ f.	62-110009001*	LS1	Speaker, 5-inch, p.m., with output transformer, 50-926	36-1625-12
C29	Condenser, d-c blocking, .02 μ f.	61-0108*	P1	Plug, line input	27-4785-7
C30	Condenser, plate by-pass, 680 μ f.	62-168001001	R1	Resistor, cathode bias, 47 ohms	66-0478340*
C31	Condenser, d-c blocking, .006 μ f.	45-3500-7*	R2	Resistor, screen dropping, 1000 ohms	66-2108340*
C32	Condenser, by-pass, 100 μ f.	62-110009001*	R3	Resistor, grid return, 1 megohm	66-5108340*
C33	Condenser, tone compensation, .02 μ f.	61-0108*	R4	Resistor, plate dropping, 47,000 ohms	66-3478340*
C34	Condenser, electrolytic, 4-section	30-2570-46	R5	Resistor, plate dropping, 1000 ohms	66-2108340*
C34A	Condenser, cathode by-pass, 25 μ f., 25v	Part of C34	R6	Resistor, grid return, 15,000 ohms	66-3159340*
C34B	Condenser, filter, 40 μ f., 150v	Part of C34	R7	Resistor, cathode bias, 330 ohms	66-1338340*
C34C	Condenser, filter, 70 μ f., 150v	Part of C34	R8	Resistor, cathode bias, 680 ohms	66-1688340*
			R9	Resistor, plate dropping, 4700 ohms	66-2478340*
			R10	Resistor, cathode bias, 47 ohms	66-0478340*
			R11	Resistor, screen dropping, 1000 ohms	66-2108340*
			R12	Resistor, plate dropping, 4700 ohms	66-2478340*
			R13	Resistor, grid return, 4700 ohms	66-2478340*
			R14	Resistor, cathode bias, 47 ohms	66-0478340*
			R15	Resistor, a-v-c filter, 1 megohm	66-5108340*



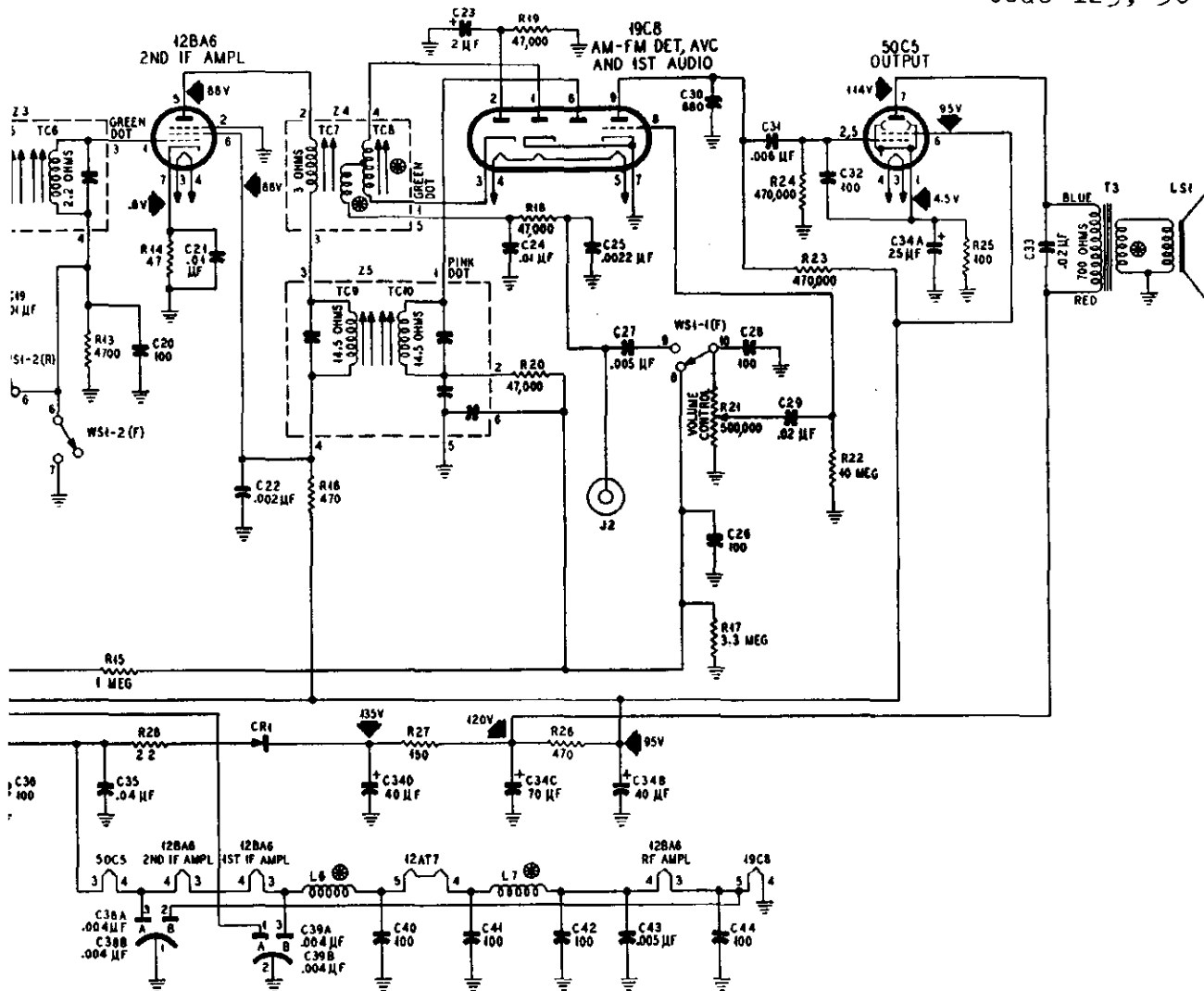
Reference Symbol	Description	Service Part No.
R16	Resistor, decoupling, 470 ohms	66-1478340*
R17	Resistor, a-v-c load, 3.3 megohms	66-5338340*
R18	Resistor, de-emphasis filter, 47,000 ohms	66-3478340*
R19	Resistor, FM-detector load, 47,000 ohms	66-3478340*
R20	Resistor, i-f filter, 47,000 ohms	66-3478340*
R21	Volume control, 500,000 ohms	33-5566-8
R22	Resistor, grid return, 10 megohms	66-6108340*
R23	Resistor, plate load, 470,000 ohms	66-4478340*
R24	Resistor, grid return, 470,000 ohms	66-4478340*
R25	Resistor, cathode bias, 100 ohms	66-1108340*
R26	Resistor, filter, 470 ohms, 1 w	66-1474340*
R27	Resistor, filter, 150 ohms, 1 w	66-1154340*
R28	Resistor, current limiting, 22 ohms, 2 w	66-0225360*
S1	Switch, off-on	Part of R21
T1	Transformer, FM aerial	32-4390
T2	Transformer, BC oscillator	32-4153-7
T3	Transformer, output	Part of LS1
W1	Line cord	L-2183*
WS	Switch, band	42-1896-1
Z1	Transformer, 1st FM i-f	32-4372-A
Z2	Transformer, 1st AM i-f	32-4258-2-A
Z3	Transformer, 2nd FM i-f	32-4372-2-A
Z4	Transformer, FM discriminator	32-4310
Z5	Transformer, 2nd AM i-f	32-4240-A

MISCELLANEOUS

Description	Service Part No.
Cabinet (50-825, Code 123)	10714-4
Back	54-7819
Baffle-and-cloth assembly	40-7535-1
Speed nut, baffle mounting (4 required)	1W60210FE7
Knob, FM-AM	54-4527-21

IF (AM) = 455 KC
IF (FM) = 9.1 MC

Knob, tuning	54-4527-1
Knob, volume-on-off	54-4527
Pointer	54-4704
Scale	54-5011-2
Window, acetate	54-4595-2
Clip, window mounting (6 required)	56-7181FE7
Cabinet (50-926 mahogany)	10786
Cabinet (50-926 blonde)	10786-1
Back	54-8028
Baffle-and-cloth assembly, masonite	40-7844
Foot, front, brass (2 required)	56-7778
Foot, rear, felt (2 required)	W2190
Jewel, telltale	54-4304-3
Knob (3 required)	54-4874-2
Pointer	54-4758
Scale	54-5080
Window	54-8034
Bracket-and-clip assembly, pilot-lamp mounting	76-511
Clip, pilot-lamp mounting	58-3545F7
Drive Cord	45-87
Spring, gang drive	56-26
Drive-shaft assembly	76-4034
Pilot-lamp shield	56-8331F7
Spring, shield mounting	28-2488F7
Pilot-lamp-socket assembly	27-6233
Shield, rectifier	54-78
Socket, female, a-c interlock	27-6200
Socket, 7-pin miniature (two 12BA6 i-f amplifiers)	27-6201
Socket, 7-pin miniature (50C5)	27-6203

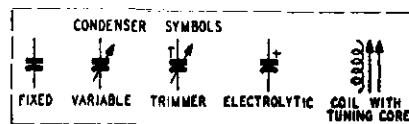
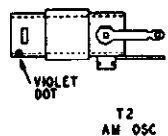
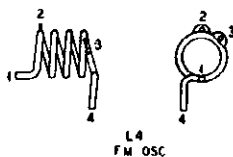
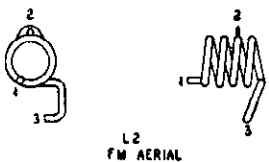
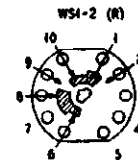
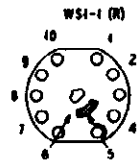
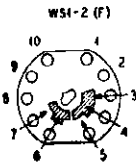
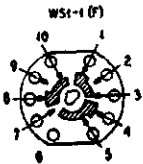


Socket, 7-pin miniature, low-loss (12BA6 r-f amplifier) 27-6203-1

Socket, 9-pin miniature (19C8) 27-6203-5

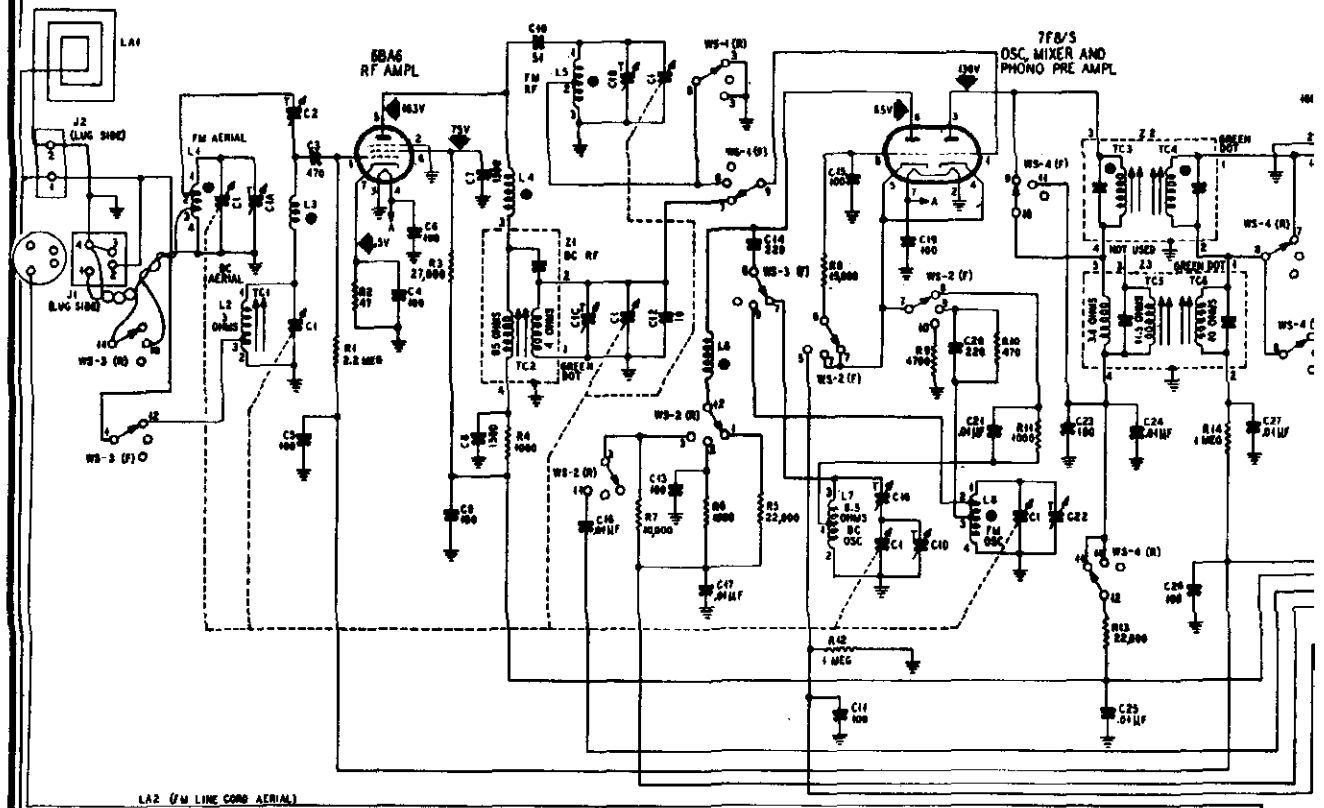
Socket, 9-pin miniature, low-loss (12AT7) 27-6203-6

WS1 2 POSITION WAFER SWITCH SHOWN IN BROADCAST POSITION
SECTIONS OF SWITCH NUMBERED WS1-1 AND WS1-2 FROM FRONT TO REAR
(F) INDICATES FRONT CONTACTS LOOKING FROM KNOB END
(R) INDICATES REAR CONTACTS LOOKING THROUGH FROM KNOB END

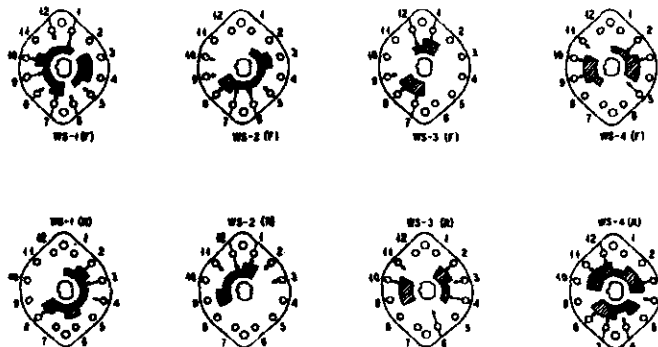


ALL RESISTOR VALUES IN OHMS AND ALL CONDENSER VALUES IN μ F UNLESS MARKED OTHERWISE
VOLTAGE READINGS WERE MEASURED WITH A 20,000-OHMS-PER-VOLT METER FROM POINTS INDICATED TO GROUND, AT A LINE VOLTAGE OF 117VAC
⊙ INDICATES LESS THAN 1 OHM

MODELS 50-1721,
50-1723, 50-1724



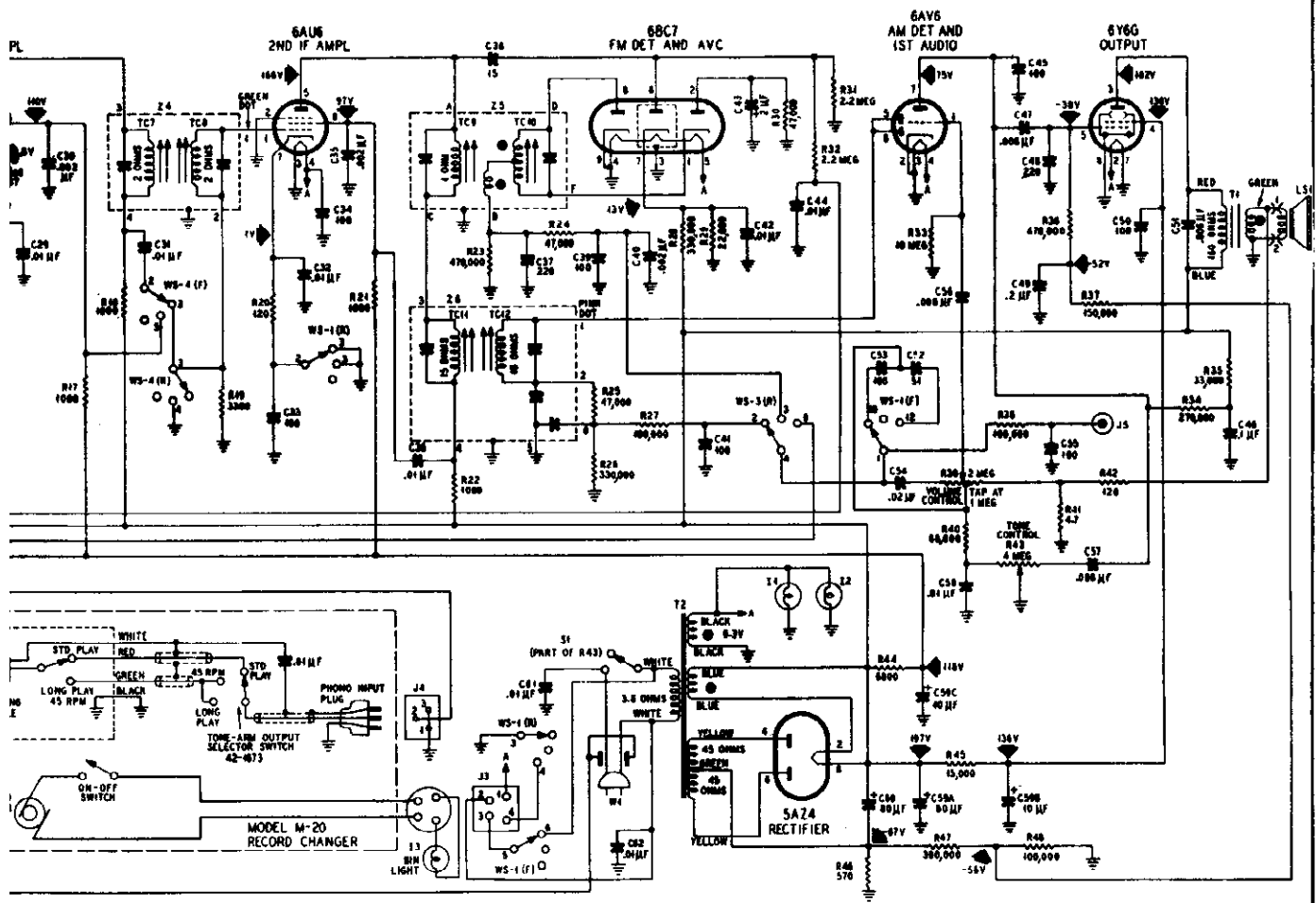
IF (AM) = 455 KC
IF (FM) = 9.4 MC



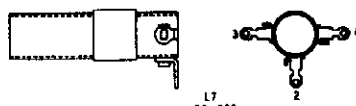
4 SECTION WIPER SWITCH SHOWN IN BROADCAST POSITION
FROM FRONT WITH CHASSIS INVERTED
SECTIONS OF SWITCHES NUMBERED WS-1, WS-2, WS-3 AT
FRONT TO REAR
(F) INDICATES FRONT CONTACTS, LOOKING FROM FRONT
(R) INDICATES REAR CONTACTS, LOOKING THROUGH FROM



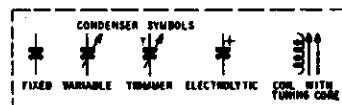
Figure 4. Philco Radio-Phonograph Models



L2
BC AERIAL



L7
BC OSC



ALL RESISTOR VALUES IN OHMS AND ALL CONDENSER VALUES IN μ F UNLESS MARKED OTHERWISE
VOLTAGES WERE MEASURED FROM POINTS INDICATED TO GROUND WITH A 20,000-OHMS-PER-VOLT METER AT A LINE VOLTAGE OF 117VAC
● INDICATES LESS THAN 1 OHM

721, 50-1723, and 50-1724, Schematic Diagram

RECORD CHANGER: Model M-20, on pages RCD.CH.20-1 through RCD.CH.20-16.

SPECIFICATIONS

CABINET	
Model 50-1721	Wood console, mahogany finish
Model 50-1723	Wood console, mahogany finish
Model 50-1724	French provincial, mahogany finish, leather top
CIRCUIT	
8-tube superheterodyne	
FREQUENCY RANGES	
Standard broadcast	540—1630 kc.
FM	88—108 mc.
AUDIO OUTPUT	
5 watts	
OPERATING VOLTAGE	
117 volts, 60 cycles, a.c.	
POWER CONSUMPTION	
Radio	110 watts
Phonograph	125 watts
AERIALS	
Built-in broadcast loop; FM line-cord aerial; provision for connection of external aerials	
INTERMEDIATE FREQUENCIES	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (8)	
6BA6 r-f ampl., 7F8/3 osc.-mixer-phono preampl., 6BA6 1st i-f ampl., 6AU6 2nd i-f ampl., 6BC7 FM det.-a.v.c., 6AV6 AM det.-1st audio, 6Y6G output, 5A24 rectifier	
RECORD PLAYER	
Philco Model M-20 All-Speed Automatic Record Changer (For service information, refer to Service Manual PR-1731.)	

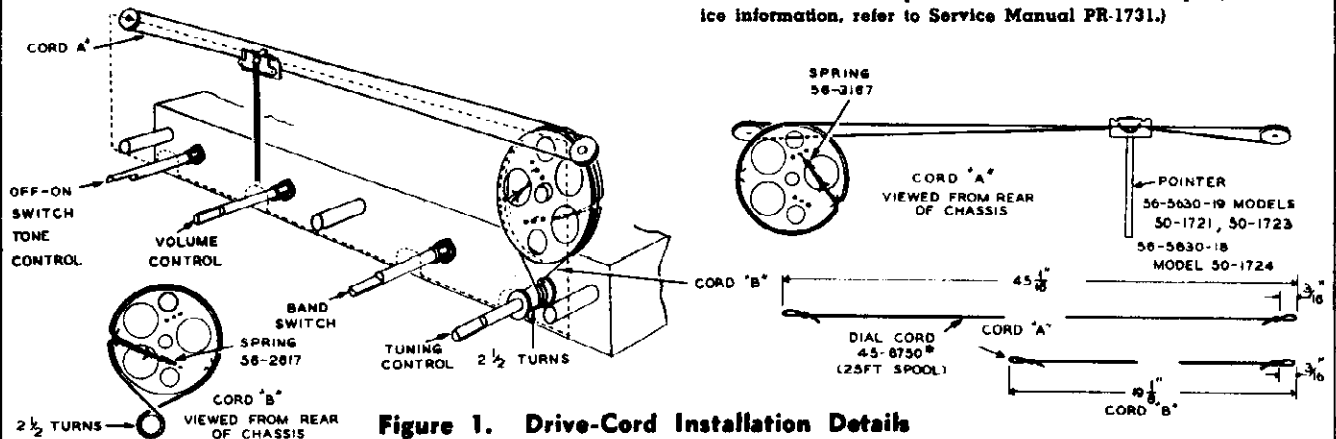


Figure 1. Drive-Cord Installation Details

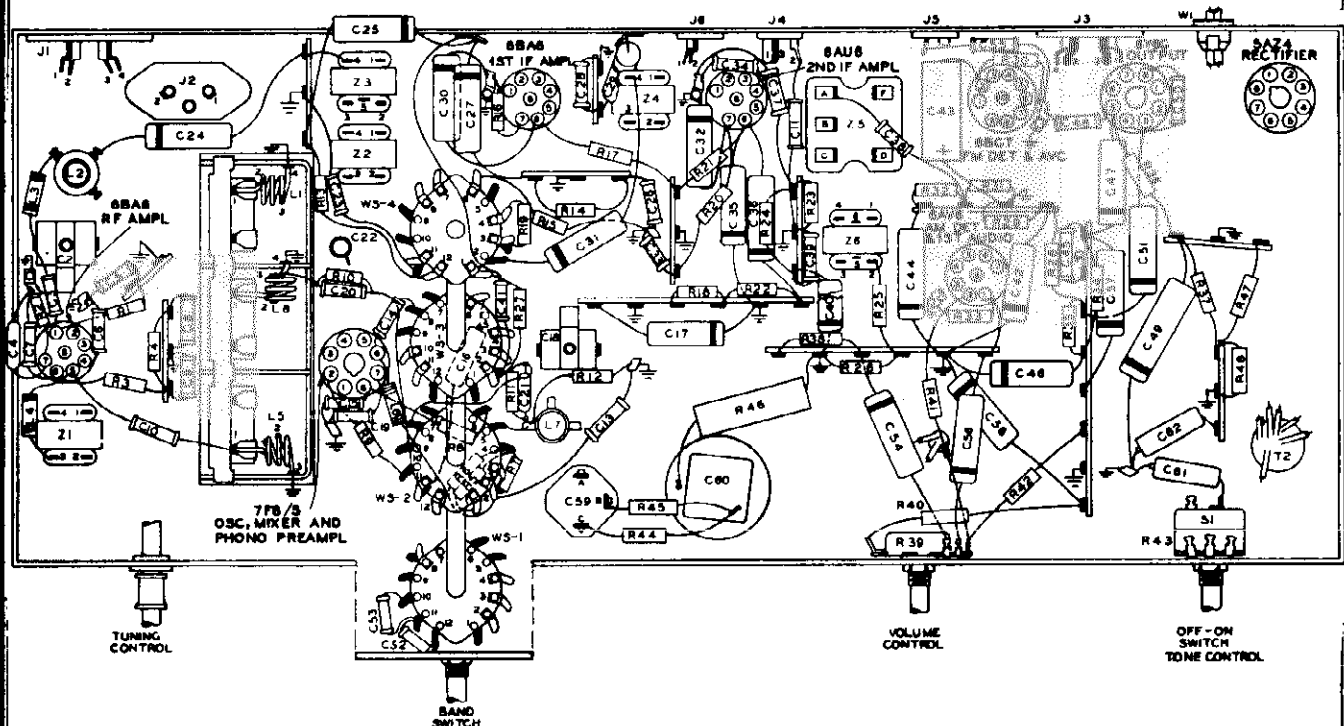


Figure 2. Symbolized Chassis, Showing Parts Placement

MODELS 50-1721,
50-1723, 50-1724

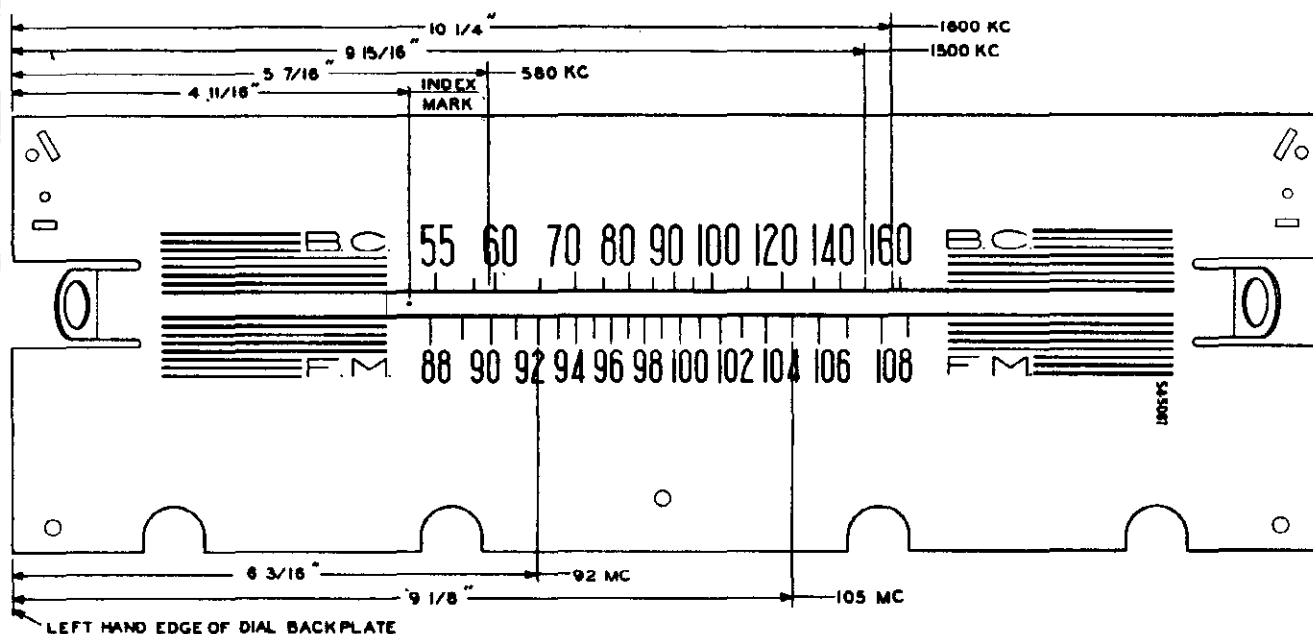


Figure 3. Dial-Backplate Calibration Measurements

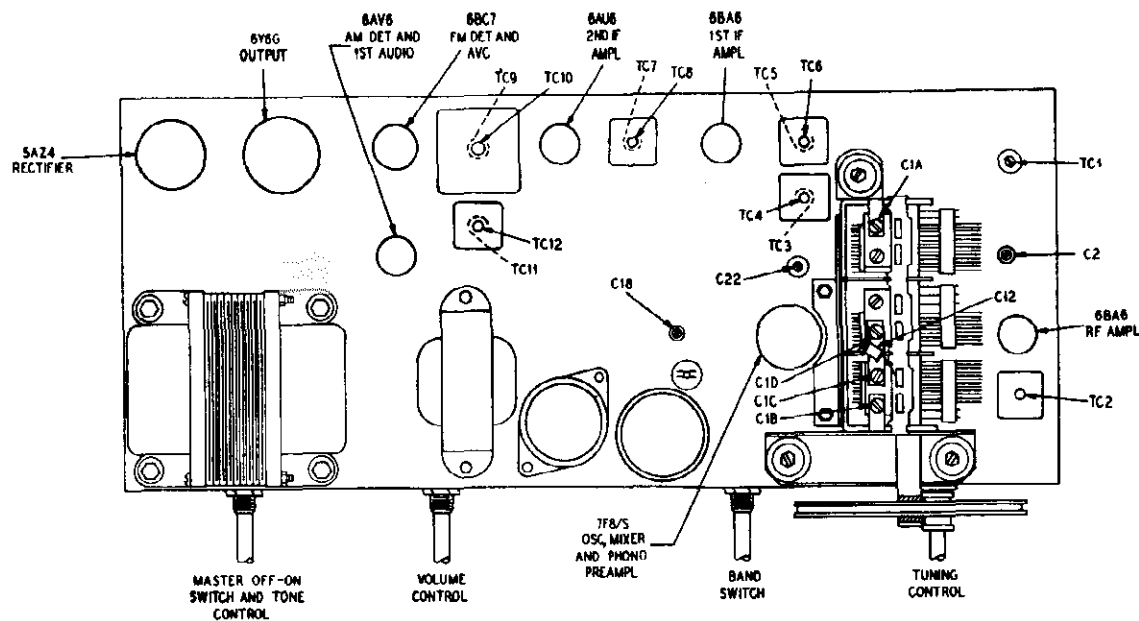


Figure 5. Top View, Showing Trimmer Locations

AM ALIGNMENT PROCEDURE

Make alignment with loop aerial connected to radio. The AM alignment should be made before the FM alignment.

DIAL POINTER: Calibration and pointer-index measurements are shown in figure 5. With tuning gang fully meshed, set pointer to index mark.

OUTPUT METER: Connect across speaker voice-coil terminals.

SIGNAL GENERATOR: Connect AM r-f signal generator as indicated in chart. Use modulated output.

RADIO CONTROLS: Set volume control to maximum, tone control counterclockwise, and band switch to broadcast position.

OUTPUT LEVEL: During alignment, adjust signal-generator output to hold output-meter indication below 1.25 volts.

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .1- μ f. condenser to mixer grid, pin 1, of 7F8/S.	455 kc.	Gang fully meshed.	Adjust, in order given, for maximum output.	TC12—2nd AM i-f sec. TC11—2nd AM i-f pri. TC6—1st AM i-f sec. TC5—1st AM i-f pri.
2	Radiating loop. (See note below.)	1600 kc.	1600 kc.	Adjust for maximum.	C1D—AM osc. shunt
3	Same as step 2.	580 kc.	580 kc.	Adjust, in order given, for maximum while rocking tuning control.	C18—AM osc. series TC2—AM r-f tuning core TC1—AM ant. tuning core
4	Same as step 2.	1500 kc.	1500 kc.	Adjust, in order given, for maximum.	C1C—AM r-f shunt C2—AM r-f shunt
5	Repeat steps 2, 3, and 4 until no further increase is obtained.				

Radiating Loop: Make up a 6-to-8 turn, 6-inch-diameter loop using insulated wire; connect to signal generator leads, and place near radio loop aerial.

FM ALIGNMENT PROCEDURE

Make the AM alignment first.

RADIO CONTROLS: Set volume control to maximum, tone control counterclockwise, and band switch to FM position. Allow radio and signal generator to warm up for at least 15 minutes before making alignment.

SIGNAL GENERATOR: Use a signal generator capable of delivering a 9.1-mc. FM signal with a deviation of ± 80 kc., and modulated AM signals of 92 mc., 105 mc., and 108 mc. Philco Model 7008 Precision Visual Alignment Generator fulfills these requirements. **NOTE:** Model 7008 must be well bonded to radio chassis.

OSCILLOSCOPE: Connect to FM TEST jack. Model 7008 is suggested.

OUTPUT METER: Connect across speaker voice-coil terminals.

R-F COIL NOTE: Check resonance of circuits containing coils L1, L5, and L8 by inserting each end of a tuning wand, such as Philco Part No. 45-8885, into coil. If signal strength increases when powdered-iron end is inserted, compress turns slightly. If signal strength increases when brass end is inserted, spread turns slightly. If signal strength decreases when each end is inserted, no adjustment is necessary. Do not spread or compress turns excessively; only a small change is required at these high frequencies.

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .1- μ f. condenser to pin 1 of 6AU6*.	9.1 mc. ± 80 kc. deviation.	Gang fully meshed.	Adjust TC4B for correct crossover. Adjust TC4A for maximum and equal peaks. Repeat.	TC4B—FM det. sec. TC4A—FM det. pri.
2	1- μ f. condenser to pin 1 of 6BA6*.	9.1 mc. ± 80 kc. deviation.	Gang fully meshed.	Adjust, in order given, for maximum and equal peaks. Repeat.	TC3B—FM 2nd i-f sec. TC3A—FM 2nd i-f pri.
3	Through a .1- μ f. condenser to pin 1 of 7F8/S*.	9.1 mc. ± 80 kc. deviation.	Gang fully meshed.	Adjust, in order given, for maximum and equal peaks. Repeat.	TC1B—FM 1st i-f sec. TC1A—FM 1st i-f pri.
4	Through a 300-ohm dummy aerial to FM aerial socket.	108 mc.	108 mc.	Adjust trimmer for maximum reading on output meter.	C22—FM osc.
5	Same as step 4.	105 mc.	105 mc.	Adjust for maximum while rocking gang.	C1B—FM r-f C1A—FM aerial
6	Same as step 4.	92 mc.	92 mc.	Adjust coils, in order given, for proper resonance (see R-F COIL NOTE).	L8—FM osc. coil L5—FM r-f coil L1—FM aerial coil

*CAUTION: Do not overload! When aligning the i-f stages, the curve will be distorted or destroyed if too great a signal is used. To check, attenuate the signal input. If the curve changes in form, rather than merely decreasing in amplitude, the stage is overloaded.

MODELS 50-1721,
50-1723, 50-1724

REPLACEMENT PARTS LIST

NOTE

Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical to those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the instrument will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, tuning gang, 6 sections	31-2750	C45	Condenser, plate by-pass, 100 μ f.	62-110009001*
C1A	Condenser, trimmer, FM aerial	Part of C1	C46	Condenser, plate by-pass, .1 μ f.	61-0113*
C1B	Condenser, trimmer, FM r-f	Part of C1	C47	Condenser, d-c blocking, .006 μ f.	45-3500-7*
C1C	Condenser, trimmer, AM r-f	Part of C1	C48	Condenser, grid by-pass, 220 μ f.	62-122001001
C1D	Condenser, trimmer, AM osc.	Part of C1	C49	Condenser, bias filter, 2 μ f.	45-3500-3*
C2	Condenser, series padder, AM aerial	31-8473-8	C50	Condenser, screen by-pass, 100 μ f.	62-110009001*
C3	Condenser, d-c blocking, 470 μ f.	62-147001001*	C51	Condenser, tone compensation, .006 μ f.	45-3500-7*
C4	Condenser, cathode by-pass, 100 μ f.	60-10105407*	C52	Condenser, phono tone compensation, 51 μ f.	62-051008001
C5	Condenser, a-v-c by-pass, 100 μ f.	62-110009001*	C53	Condenser, AM tone compensation, 100 μ f.	61-110008001*
C6	Condenser, filament by-pass, 100 μ f.	62-110009001*	C54	Condenser, d-c blocking, .02 μ f.	61-0108*
C7	Condenser, screen by-pass, 1500 μ f.	62-215001011*	C55	Condenser, i-f by-pass, 100 μ f.	61-110009001*
C8	Condenser, plate decoupling, 1500 μ f.	62-215001011*	C56	Condenser, d-c blocking, .006 μ f.	45-3500-7*
C9	Condenser, r-f by-pass, 100 μ f.	62-110009001*	C57	Condenser, hi-cut, .006 μ f.	45-3500-7*
C10	Condenser, d-c blocking, 51 μ f.	62-051008001*	C58	Condenser, bass boost, .01 μ f.	61-0120*
C11	Condenser, tone compensation, phono, 100 μ f.	62-110009001*	C59	Condenser, electrolytic, 3 sections	30-2570-45
C12	Condenser, fixed trimmer, 10 μ f.	62-010009001	C59A	Condenser, filter, 60 μ f., 400v	Part of C59
C13	Condenser, FM plate by-pass, 100 μ f.	62-110009001*	C59B	Condenser, filter, 10 μ f., 400v	Part of C59
C14	Condenser, d-c blocking, 220 μ f.	62-122001001	C59C	Condenser, filter, 10 μ f., 400v	Part of C59
C15	Condenser, oscillator grid, 100 μ f.	62-110009001*	C60	Condenser, electrolytic, filter, 80 μ f., 400v	30-2568-35
C16	Condenser, d-c blocking, phono coupling, .01 μ f.	61-0120*	C61	Condenser, line filter, .01 μ f.	45-3505-41
C17	Condenser, by-pass, .01 μ f.	61-0120*	C62	Condenser, line filter, .01 μ f.	45-3505-41
C18	Condenser, series padder, broadcast	31-8473-7	I1	Lamp, pilot, 6.3v	34-2064
C19	Condenser, filament by-pass, 100 μ f.	62-110009001*	I2	Lamp, pilot, 6.3v	34-2064
C20	Condenser, d-c blocking, 220 μ f.	62-122001001	I3	Lamp, bin light, 6.3v	34-2064
C21	Condenser, d-c blocking, .01 μ f.	61-0120*	J1	Socket, FM aerial	27-6214-1
C22	Condenser, FM trimmer	31-6511	J2	Socket, AM aerial	27-6214-14
C23	Condenser, r-f by-pass, 100 μ f.	62-110009001*	J3	Socket, phono power	27-6182
C24	Condenser, plate decoupling, .01 μ f.	61-0120*	J4	Socket, phono input	27-6126
C25	Condenser, by-pass, .01 μ f.	61-0120*	J5	Socket, audio test	27-6180
C26	Condenser, a-v-c by-pass, 100 μ f.	62-110009001*	J6	Socket, speaker	27-6214-12
C27	Condenser, a-v-c decoupling, .01 μ f.	61-0120*	L1	Coil, FM aerial	32-4415
C28	Condenser, filament by-pass, 100 μ f.	62-110009001*	L2	Coil, bc. aerial	32-4413
C29	Condenser, filament by-pass, .01 μ f.	61-0120*	L3	Coil, r-f isolating	32-4061-2
C30	Condenser, screen by-pass, .002 μ f.	61-0062*	L4	Coil, r-f isolating	32-4061-2
C31	Condenser, plate decoupling, .01 μ f.	61-0120*	L5	Coil, FM r-f	32-4416
C32	Condenser, cathode by-pass, .01 μ f.	61-0120*	L6	Coil, r-f isolating	32-4061-2
C33	Condenser, r-f by-pass, 100 μ f.	62-110009001*	L7	Coil, bc. oscillator	32-4153-8
C34	Condenser, filament by-pass, 100 μ f.	62-110009001*	L8	Coil, FM oscillator	32-4414
C35	Condenser, screen by-pass, .002 μ f.	61-0062*	LA1	Loop aerial, bc., 50-1721	76-4337-7
C36	Condenser, neutralizing, .01 μ f.	61-0120*	LA1	Loop aerial, bc., 50-1723	76-4337-5
C37	Condenser, i-f by-pass, 220 μ f.	62-122001001*	LA1	Loop aerial, bc., 50-1724	76-4337-8
C38	Condenser, d-c blocking, a-v-c rectifier coupling, 15 μ f.	62-015009001	LA2	Aerial wire and plug assembly, FM	41-3791-1
C39	Condenser, i-f by-pass, 100 μ f.	62-110009001*	LS1	Speaker, 10", p.m.	36-1610-8
C40	Condenser, de-emphasis, .002 μ f.	61-0062*	R1	Resistor, grid return, 2.2 megohms	66-5228340*
C41	Condenser, i-f by-pass, 100 μ f.	62-110009001*	R2	Resistor, cathode bias, 47 ohms	66-0478340*
C42	Condenser, by-pass, .01 μ f.	61-0120*	R3	Resistor, screen dropping, 27,000 ohms, 1 watt	66-3274340*
C43	Condenser, electrolytic, diode load filter, 2 μ f.	30-2417-7	R4	Resistor, plate decoupling, 1000 ohms	66-2108340*
C44	Condenser, a-v-c filter, .01 μ f.	61-0120*			

REPLACEMENT PARTS LIST (Cont.)

Reference Symbol	Description	Service Part No.
R5	Resistor, plate load, bc., 22,000 ohms	66-3228340*
R6	Resistor, plate load, FM, 1000 ohms	66-2108340*
R7	Resistor, plate load, phono, 10,000 ohms	66-3108340*
R8	Resistor, grid return, 15,000 ohms	66-3158340*
R9	Resistor, cathode bias, phono, 4700 ohms	66-2478340*
R10	Resistor, parasitic suppressor, 470 ohms	66-1478340*
R11	Resistor, parasitic suppressor, 1000 ohms	66-2108340*
R12	Resistor, crystal load, 1 megohm	66-5108340*
R13	Resistor, plate dropping, 22,000 ohms	66-3228340*
R14	Resistor, grid return, 1 megohm	66-5108340*
R15	Resistor, grid return, FM, 1 megohm	66-5108340*
R16	Resistor, cathode bias, 47 ohms	66-0478340*
R17	Resistor, screen decoupling, 1000 ohms	66-2108340*
R18	Resistor, plate decoupling, 1000 ohms	66-2108340*
R19	Resistor, grid return, 3300 ohms	66-2338340*
R20	Resistor, cathode bias, 120 ohms	66-1128340*
R21	Resistor, screen decoupling, 1000 ohms	66-2108340*
R22	Resistor, plate decoupling, 1000 ohms	66-2108340*
R23	Resistor, diode return, 470,000 ohms	66-4478340*
R24	Resistor, i-f filter, 47,000 ohms	66-3478340*
R25	Resistor, i-f filter, 47,000 ohms	66-3478340*
R26	Resistor, diode return, 330,000 ohms	66-4338340*
R27	Resistor, isolating, 100,000 ohms	66-4108340*
R28	Resistor, voltage divider, 330,000 ohms	66-4338340*
R29	Resistor, voltage divider, 22,000 ohms	66-3228340*
R30	Resistor, FM diode load, 47,000 ohms	66-3478340*
R31	Resistor, a-v-c load, 2.2 megohms	66-5228340*
R32	Resistor, a-v-c filter, 2.2 megohms	66-5228340*
R33	Resistor, grid return, 10 megohms	66-6108340*
R34	Resistor, plate load, 270,000 ohms	66-4278340*
R35	Resistor, plate decoupling, 33,000 ohms	66-3338340*
R36	Resistor, grid return, 470,000 ohms	66-4478340*
R37	Resistor, bias filter, 150,000 ohms	66-4158340*
R38	Resistor, isolating, 100,000 ohms	66-4108340*
R39	Volume control, 2 megohms (center tapped)	33-5535-27
R40	Resistor, tone compensation, 68,000 ohms	66-3688340*
R41	Resistor, voltage divider, inverse feedback, 4.7 ohms	66-9478340*
R42	Resistor, inverse feedback, 120 ohms	66-1128340*
R43	Tone control, 4 megohms	33-5566-12
R44	Resistor, filter, 6800 ohms, 1 watt	66-2684340*
R45	Resistor, filter, 15,000 ohms, 2 watts	66-3155340*
R46	Resistor, bias, 570 ohms, 9 watts	33-1935-88
R47	Resistor, bias dropping, 390,000 ohms	66-4398340*
R48	Resistor, bias bleeder, 100,000 ohms	66-4108340*
S1	Switch, power off-on	Part of R43
T1	Transformer, output	32-8407
T2	Transformer, power	32-8406
W1	Line cord	L-2183*
WS	Water switch	42-1910
Z1	Transformer, bc. r-f	32-4399-3A
Z2	Transformer, 1st FM i-f	32-4372A
Z3	Transformer, 1st AM i-f	32-4258-2A
Z4	Transformer, 2nd FM i-f	32-4372-2A
Z5	Transformer, 3rd FM i-f	32-4417
Z6	Transformer, 2nd AM i-f	32-4240A

MISCELLANEOUS

(Parts common to all models)

Description	Service Part No.
Bin mechanism, l.h.	76-3223-5
Bin mechanism, r.h.	76-3223-6
Frame assembly	76-4104
Sleeve, changer mounting (3 required)	54-7798
Spring, changer mounting, upper, heavier (3 required)	56-7059FA9
Spring, changer mounting, lower, lighter (3 required)	56-7059-1F747
Spring, bin mechanism	56-4978
Bullet catch	45-6002
Cable, bin light and phono power	41-3944-3

MISCELLANEOUS (Cont.)

(Parts common to all models)

Description	Service Part No.
Cable, speaker	41-3943-4
Clip, bin light mounting	56-3545-6FA3
Clip, pilot-lamp mounting (2 required)	56-3545FA3
Coil mount, bc. oscillator	56-3752-3FA1
Dial backplate assembly	76-5161
Drive cord (25-ft. spool)	45-8750*
Spring, gang drive	56-2617
Spring, pointer drive	56-3167
Dome (4 required)	45-6190
Drive shaft	76-5139
Bushing, front, brown bakelite	54-7872
Bushing, rear, black bakelite	27-8437
Spring, hairpin, small, bushing to shaft (2 required)	57-1460FA1
Spring, hairpin, large, bushing to chassis	57-0985FA1
Fish paper	27-9111
Gang Mounting	
Bracket, copper, ground	56-7357
Mount, rubber	54-4651-1
Plate, ground bracket (to chassis)	56-7362FA3
Shield, ground bracket (against gang)	56-7439FA3
Knob (4 required)	54-4718-6
Light shield, bin light	56-8307-7FA3
Pilot-lamp assembly, l.h., 14 1/4" lead length	27-6233-22
Pilot-lamp assembly, r.h., 25" lead length	27-6233-33
Scale strap (2 required)	56-2234-2
Scale strap	56-4758FE11
Screw, back mounting (15 required)	1W25345FE11
Socket, Loktal, 5A24	27-6207
Socket, Loktal, 7F8/S	27-6207-1
Socket, 7-pin miniature	27-6203
Socket, 7-pin miniature, 6BA6 r-f ampl.	27-6203-1
Socket, 9-pin miniature	27-6203-5
Socket, octal	27-6174
Strike plate (4 required)	45-8003

(Parts not common to all models)

Cabinet, Model 50-1721	10751-3
Back	54-7814
Baffle, wood	219-186
Bezel and scale	54-4751-1
Dial scale	54-5088
Door pull	56-8493
Drop door	45-6507
Hinge (2 required)	45-8036
Instrument panel	45-6566
Pointer	56-5630-19
Cabinet, Model 50-1723	10724-3
Back	54-7688
Baffle, wood	219-128
Baffle-and-cloth assembly	40-7548-1
Bezel and scale	54-4751-1
Doors, matched set of 2	45-1864
Door pull (2 required)	56-7128
Hinge, butt, phono drop door (2 required)	56-7127
Hinge, knife, bottom of record storage door	56-5713-3
Hinge, knife, top of record storage door	56-5713-1
Instrument panel	45-6566
Pointer	56-5630-19
Cabinet, Model 50-1724	10781
Back	54-7998
Baffle, wood	219-202
Baffle-and-cloth assembly	40-7831
Bezel	56-5855
Dial scale	54-5088
Doors, matched set of 2	45-6561
Door pull (2 required)	56-7741
Instrument panel	45-6561
Hinge, knife (2 pairs required)	56-7011
Pointer	56-5630-11

SPECIFICATIONS

CABINET	Wood table model, mahogany finish
CIRCUIT	5-tube superheterodyne
FREQUENCY RANGE	540—1820 kc.
AUDIO OUTPUT	1.2 watts
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	
Radio	30 watts
Phonograph	45 watts
AERIAL	Built-in high-impedance loop; connector for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (5)	7A8 converter, 12BA6 i-f ampl., 14BE det.-a.v.c.-1st audio ampl., 50L6GT output, 35Z5GT rectifier
PHONOGRAPH	Philco Model M-20 All-Speed Automatic Record Changer. (For service information, refer to Service Manual PR-1731.)

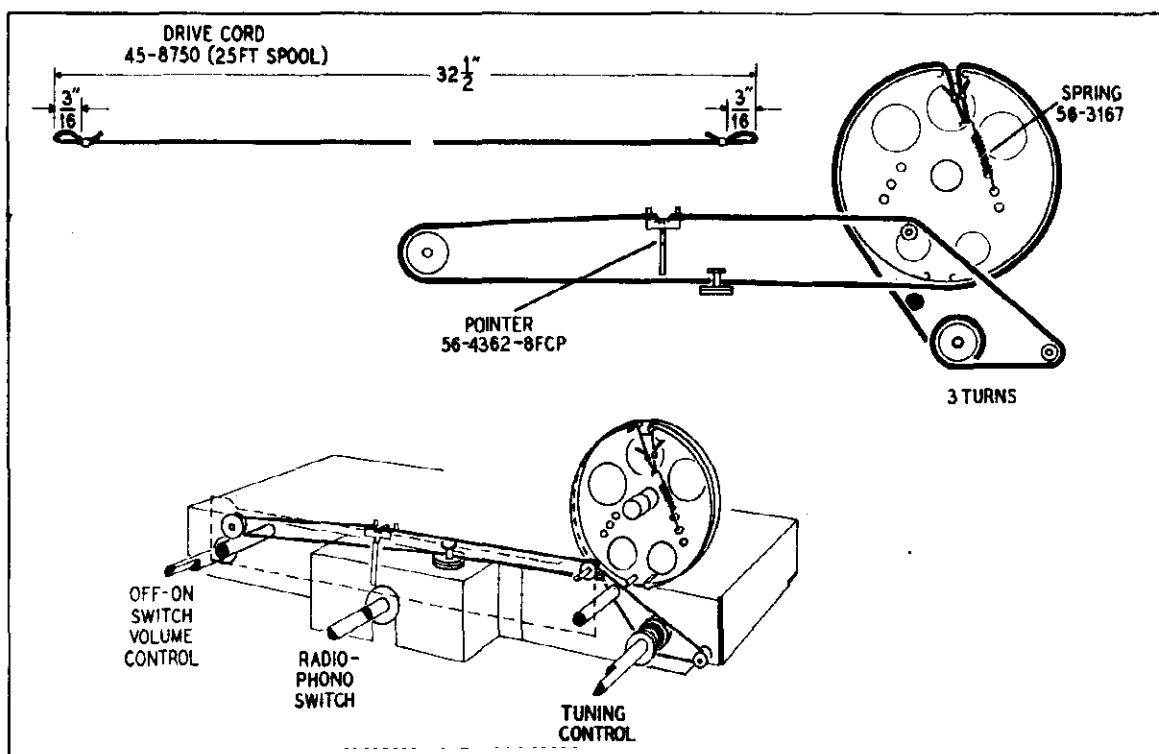


Figure 1. Drive-Cord Installation Details

TPO-206

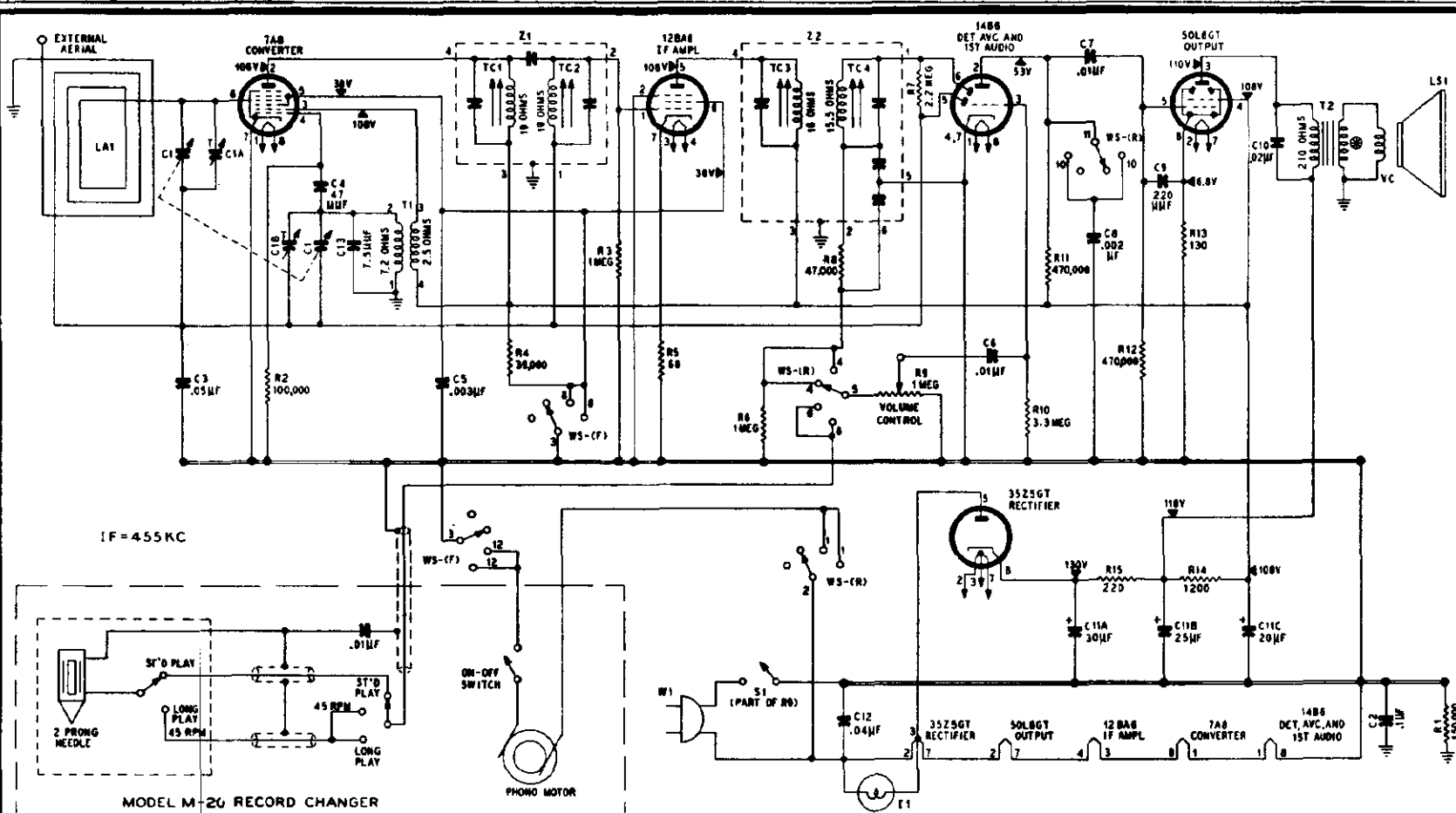


Figure 2. Symbolized Chassis, Showing Parts Placement

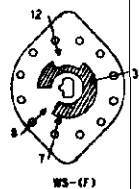
Reference Symbol	Description	Reference Service	Description	Reference Service	
C1	Condenser, tuning, 2-section	31-2751-4	T1	Transformer, oscillator	32-4263
C1A	Condenser, aerial trimmer	Part of C1	T2	Transformer, output	32-8384
C1B	Condenser, oscillator trimmer	Part of C1	W1	Line cord	L-2183*
C2	Condenser, by-pass, .1 µf.	61-0113*	WS	Switch, radio-phonc	42-1922
C3	Condenser, α-v-c filter, .05 µf.	61-0122*	Z1	Transformer, 1st i-f	32-4160-6A
C4	Condenser, d-c blocking, 47 µuf.	62-051009001*	Z2	Transformer, 2nd i-f	32-42402A
C5	Condenser, screen by-pass, .003 µf.	61-0109*			
C6	Condenser, d-c blocking, .01 µf.	61-0120*			
C7	Condenser, d-c blocking, .01 µf.	61-0120*			
C8	Condenser, tone compensation, hi-cut, .002 µf.	61-0062*			
C9	Condenser, grid by-pass, 220 µuf.	62-122001001*			
C10	Condenser, tone compensation, .02 µf.	61-0108*			
C11	Condenser, electrolytic, 3-section	30-2573			
C11A	Condenser, filter, 30 µf., 150v	Part of C11			
C11B	Condenser, filter, 25 µf., 150v	Part of C11			
C11C	Condenser, filter, 20 µf., 150v	Part of C11			
C12	Condenser, line by-pass, .04 µf.	45-3500*			
C13	Condenser, temperature compensating, 7.5 µuf.	30-1224-8			
I1	Pilot lamp, 6-8 volts, brown bead	34-2068			
LA1	Loop-aerial assembly	76-2127-10			
LS1	Speaker, 5-¼", round, p-m	36-1629-6			
R1	Resistor, leakage, 150,000 ohms	66-4158340*			
R2	Resistor, grid return, 100,000 ohms	66-4108340*			
R3	Resistor, α-v-c load, 1 megohm	66-5108340*			
R4	Resistor, dropping, 39,000 ohms	66-3398340*			
R5	Resistor, cathode bias, 68 ohms	66-0688340*			
R6	Resisor, diode return, 1 megohm	66-5109340*			
R7	Resistor, diode load, 2.2 megohms	66-5228340*			
R8	Resistor, i-f filter, 47,000 ohms	66-3478340*			
R9	Volume control (with off-on switch) 1 megohm	33-5538-37			
R10	Resistor, grid return, 3.3 megohms	66-5338340*			
R11	Resistor, plate load, 470,000 ohms	66-4478340*			
R12	Resistor, grid return, 470,000 ohms	66-4478340*			
R13	Resistor, cathode bias, 130 ohms	66-1128740*			
R14	Resistor, filter, 1200 ohms	66-2128340*			
R15	Resistor, filter, 220 ohms, 2 watts	66-1225340*			
S1	Switch, off-on	Part of R9			

MISCELLANEOUS

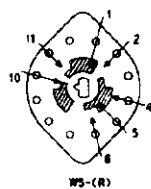
Description	Service Part No.
Cabinet	10797
Baffle-and-cloth assembly	40-7883
Bottom	54-8074
Butt hinge (2)	56-6434
Foot (4)	56-7778
Gasket, speaker	54-8089
Washer, fibre, speaker mounting (3)	27-7467
Glass dial scale	54-5086
Strap, scale mounting (2)	56-5155FA3
Knob, volume and tuning	54-4527-26
Knob, radio-phonc switch	54-4527-27
Lid support	56-7947
Sleeve, changer mounting (3)	54-7798
Speed nut, changer mounting (3)	W-2554FCP
Spring, changer mounting, heavy (3)	56-7059FA9
Spring, changer mounting, light (3)	56-7059-1FJ47
Dial-Backplate Assembly	76-5705
Drive cord, 25-foot spool	45-8750*
Pointer	56-4362-8FCP
Spring, drive	56-3167
Pilot-lamp assembly	76-1179-7
Pilot-lamp bracket-and-clip assembly	76-5708
Pulley-and-shaft assembly	76-3671-1
Bushing	27-9437
Fastener, hairpin	57-1468FA1
Rubber mount, gang mounting (3)	27-4771-1
Socket, Loktal (2)	27-6177
Socket, miniature	27-6203
Socket, octal (2)	27-6174
Switch cable, shield, and guide assembly	76-5707
Terminal panel, aerial	38-9161-9



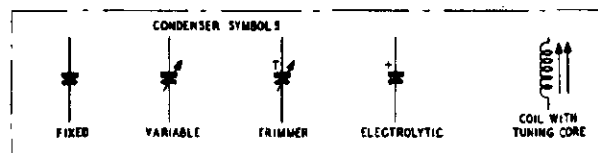
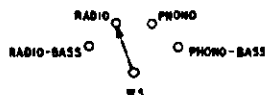
RECORD CHANGER: Model M-20, on pages RCD.CH.20-1 through RCD.CH.20-16.



WS-(F)
WATER SWITCH SHOWN (IN RADIO POSITION) WITH CHASSIS INVERTED
(F) INDICATES FRONT CONTACTS LOOKING FROM FRONT



WS-(R)
(R) INDICATES REAR CONTACTS LOOKING THROUGH FROM FRONT



ALL RESISTOR VALUES IN OHMS UNLESS OTHERWISE MARKED

VOLTAGES MEASURED WITH 20,000-OHMS-PER-VOLT VOLTMETER FROM POINTS INDICATED TO B MINUS AT A LINE VOLTAGE OF 117V AC

⊗ LESS THAN 1 OHM

Figure 3. Philco Radio-Phonograph Model 50-1424, Schematic Diagram

TP0-208

ALIGNMENT PROCEDURE

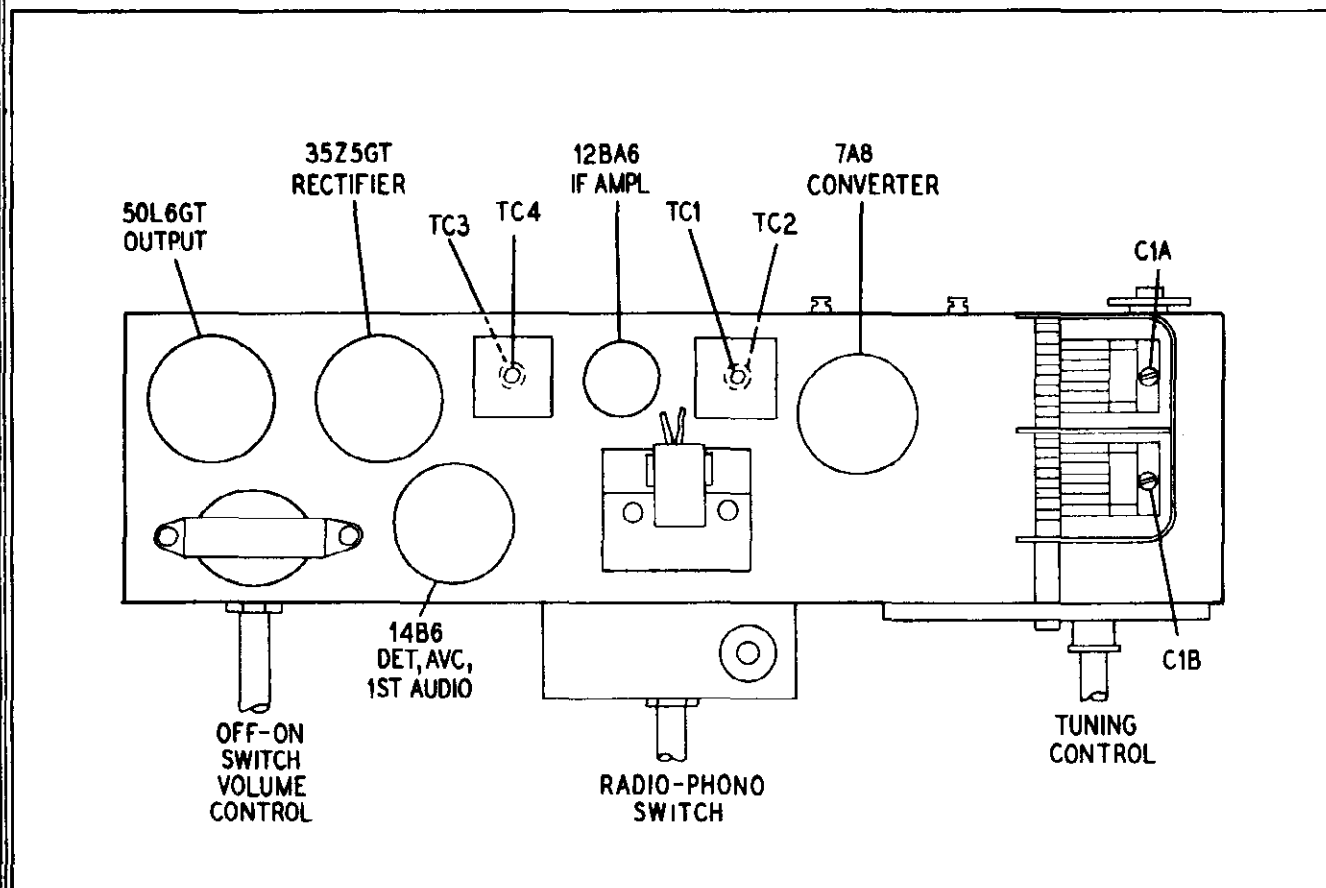
DIAL POINTER—Turn tuning condenser to full-mesh position. Set dial pointer to the index mark, located to the left of "55".

CONTROLS—Turn on power, and set volume control to maximum.

OUTPUT METER—Connect across voice-coil terminals.

SIGNAL GENERATOR—Connect as indicated in chart.

OUTPUT LEVEL—During alignment, adjust signal-generator output to hold output-meter indication below 1.25 volts.



TP0-209

Figure 4. Top View, Showing Trimmer Locations

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B-: output lead through .1- μ f. condenser to pin 6 of 7A8 tube.	455 kc.	540 kc. (gang fully meshed).	Adjust tuning cores, in order given, for maximum output.	TC4—2nd i-f sec. TC3—2nd i-f pri. TC2—1st i-f sec. TC1—1st i-f pri.
2	Radiating loop (see note below).	1800 kc.	1800 kc.	Adjust for maximum.	C1B—osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum.	C1A—aerial

RADIATING LOOP: Make up a 6-to-8 turn, 6-inch-diameter loop from insulated wire; connect to signal-generator output leads, and place near radio loop aerial.

MODEL 50-1718

SPECIFICATIONS

CABINET	Wood console, mahogany finish
CIRCUIT	6-tube superheterodyne (with t-r-f stage)
FREQUENCY RANGE	540—1620 kc.
AUDIO OUTPUT	3 watts
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	
Radio	50 watts
Phonograph	85 watts, total
INTERMEDIATE FREQUENCY	455 kc.
AERIAL	Built-in low-impedance loop; provision for external aerial
PHILCO TUBES (6)	7B7 r-f ampl., 7B7 i-f ampl., 7A8 converter, 14B6 det.-a.v.c.-1st audio ampl., 35L6GT output, 50Y6GT rectifier
PHONOGRAPH	Philco Model M-20 All-Speed Automatic Record Changer. (For service information, refer to Service Manual PR-1731.)

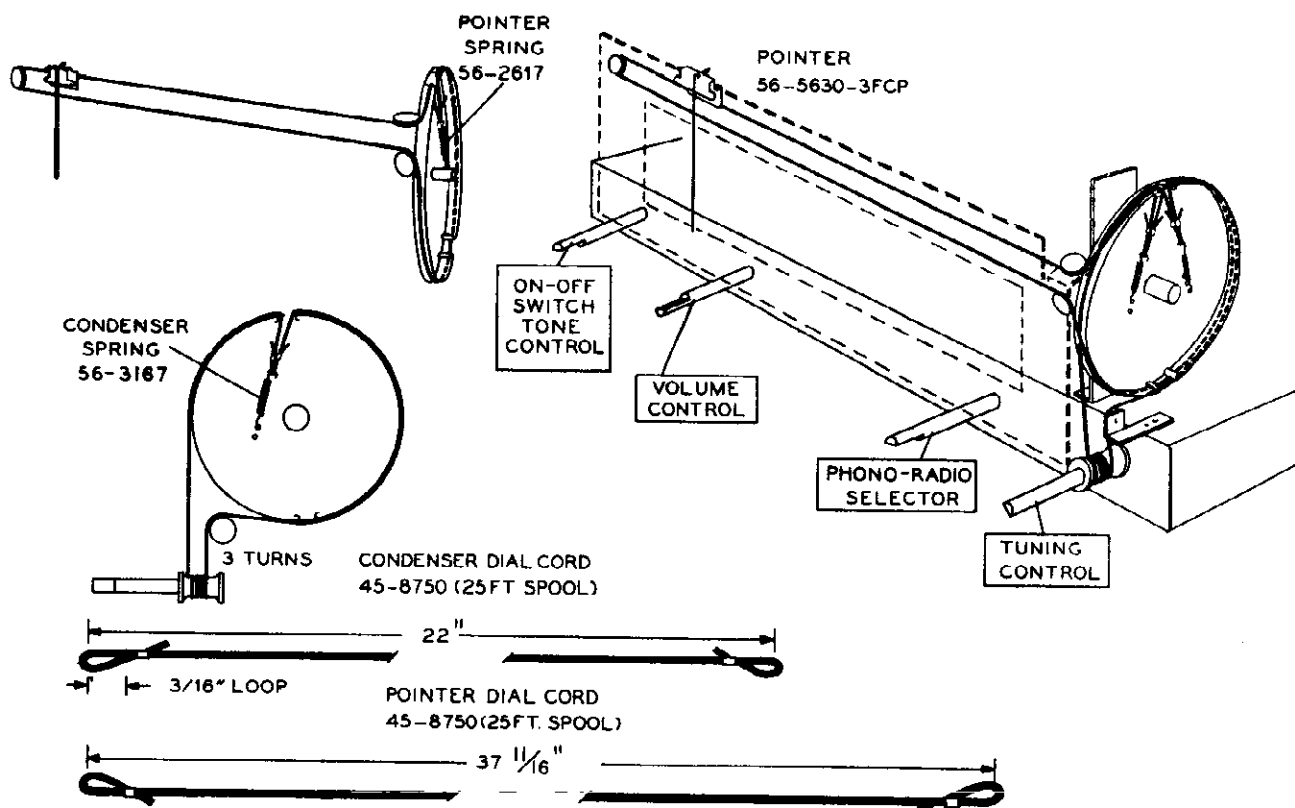


Figure 1. Drive-Cord Installation Details

TP0-210

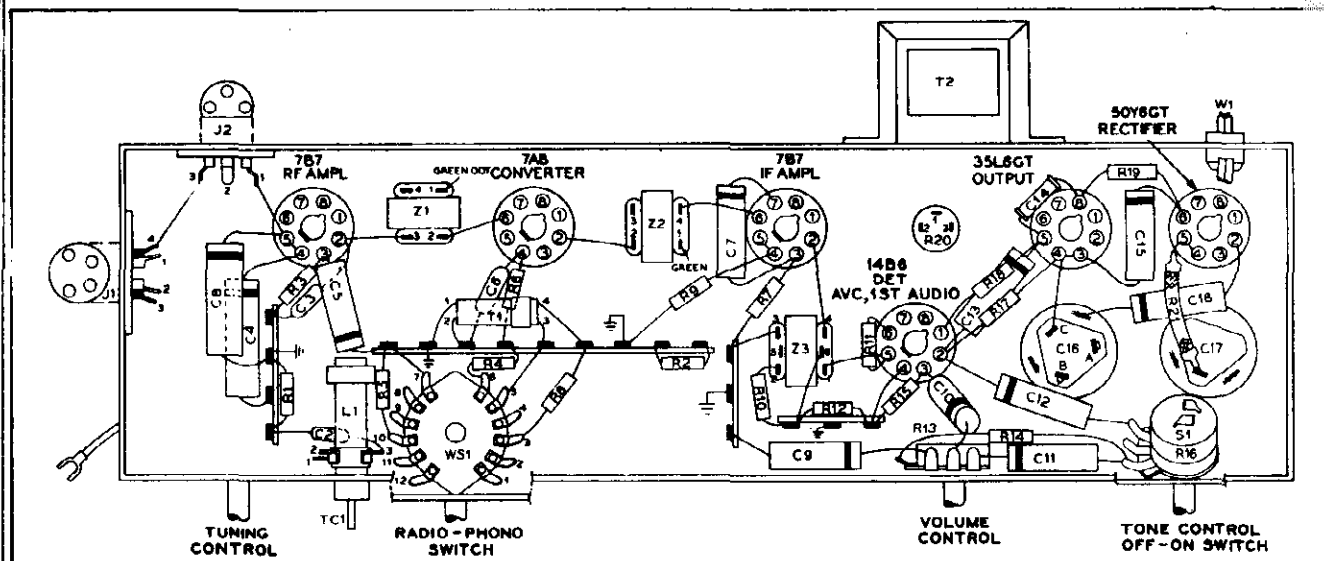


Figure 2. Symbolized Chassis, Showing Parts Placement

TPO-211

REPLACEMENT PARTS LIST

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, tuning gang, 3-section	31-2748-2	R9	Resistor, leakage, 150,000 ohms	66-4158340*
C1A	Condenser, aerial trimmer	Part of C1	R10	Resistor, i-f filter, 47,000 ohms	66-3478340*
C1B	Condenser, r-f trimmer	Part of C1	R11	Resistor, a-v-c diode load, 2.2 megohms	66-5228340*
C1C	Condenser, oscillator trimmer	Part of C1	R12	Resistor, diode load, 470,000 ohms	66-4478340*
C2	Condenser, aerial (external) coupling, 4.7 μ f.	30-1221-5*	R13	Volume control, 2 megohms, tapped at 1 megohm	33-5535-2*
C3	Condenser, fixed trimmer, 15 μ f.	60-00155407*	R14	Resistor, tone compensation, 68,000 ohms	66-3688340*
C4	Condenser, a-v-c filter, .05 μ f.	61-0122*	R15	Resistor, grid return, 10 megohms	66-6108340*
C5	Condenser, screen by-pass, .01 μ f.	61-0120*	R16	Tone control (with off-on switch), 5 megohms	33-5566-1*
C6	Condenser, d-c blocking, 47 μ f.	60-00475417*	R17	Resistor, plate load, 470,000 ohms	66-4478340*
C7	Condenser, screen by-pass, .05 μ f.	61-0122*	R18	Resistor, grid return, 470,000 ohms	66-4478340*
C8	Condenser, by-pass, B- to ground, .1 μ f.	61-0113*	R19	Resistor, cathode bias, 150 ohms	66-1154340*
C9	Condenser, d-c blocking, .006 μ f.	45-3500-7*	R20	Resistor, 2-section, wire-wound	33-3445-1
C10	Condenser, d-c blocking, .01 μ f.	61-0120*	R20A	Resistor, filter, 200 ohms 2 watts	Part of R20
C11	Condenser, tone compensation, .006 μ f.	45-3500-7*	R20B	Resistor, filter, 9200 ohms, 4 watts	Part of R20
C12	Condenser, tone compensation, high cut, .004 μ f.	61-0179*	R21	Resistor, current limiting, 25 ohms	33-13334-*
C13	Condenser, d-c blocking, .01 μ f.	61-0120*	S1	Switch, off-on	Part of R11
C14	Condenser, grid by-pass, 220 μ f.	62-122001001*	T1	Transformer, oscillator	32-426*
C15	Condenser, tone compensation, .01 μ f.	61-0120*	T2	Transformer, output	32-8242-3*
C16	Condenser, electrolytic, 3-section	30-2568-38	W1	Line cord	L-2183
C16A	Condenser, filter, 75 μ f., 250v	Part of C16	WS1	Switch, wafer, radio-phonograph	42-192
C16B	Condenser, filter, 40 μ f., 250v	Part of C16	Z1	Transformer, r-f	32-4399-2*
C16C	Condenser, filter, 10 μ f., 250v	Part of C16	Z2	Transformer, 1st i-f	32-4160*
C17	Condenser, electrolytic, voltage doubler, 20 μ f., 150v	30-2568-22	Z3	Transformer, 2nd i-f	32-4240*
C18	Condenser, line by-pass, .05 μ f.	61-0122*			
C19	Condenser, d-c blocking, phono coupling, .01 μ f.	61-0120*			
I1	Pilot lamp, 110 volts, 7 watts	34-2605			
J1	Socket, aerial input and speaker	27-6214-1			
J2	Socket, phono input	27-6126*			
L1	Coil, aerial	32-4413-1			
LA1	Loop aerial	32-4394-8			
LS1	Speaker, 8-inch, p-m	36-1626-1			
P1	Cable-and-plug assembly, speaker and loop	41-3948-1			
R1	Resistor, aerial isolating, 150,000 ohms	66-4158340*			
R2	Resistor, a-v-c filter, 2.2 megohms	66-5228340*			
R3	Resistor, screen dropping, 120,000 ohms	66-4128340*			
R4	Resistor, cathode bias (phono), 3900 ohms	66-2398340*			
R5	Resistor, grid return, 120,000 ohms	66-4128340*			
R6	Resistor, grid return (phono), 1 megohm	66-5108340*			
R7	Resistor, dropping, 22,000 ohms	66-3228340*			
R8	Resistor, plate load (phono), 120,000 ohms	66-4128340*			

MISCELLANEOUS

Description	Service Part No.
Aerial lead assembly	78-1472-1
Cabinet	10713-*
Back	54-760*
Baffle and cloth	40-7512*
Baffle, wood	219-11*
Bezel and scale	54-508*
Bin mechanism, l.h.	76-3223-1
Bin mechanism, r.h.	76-3223-4
Dome (4)	45-619*
Door pull	56-724*
Frame, changer mounting	76-410*
Hinge (2)	56-576*
Dial Backplate Assembly	76-572*
Bracket-and-pulley assembly	76-400*
Bumper, rubber (2)	54-418*
Diffusing panel	54-7606*

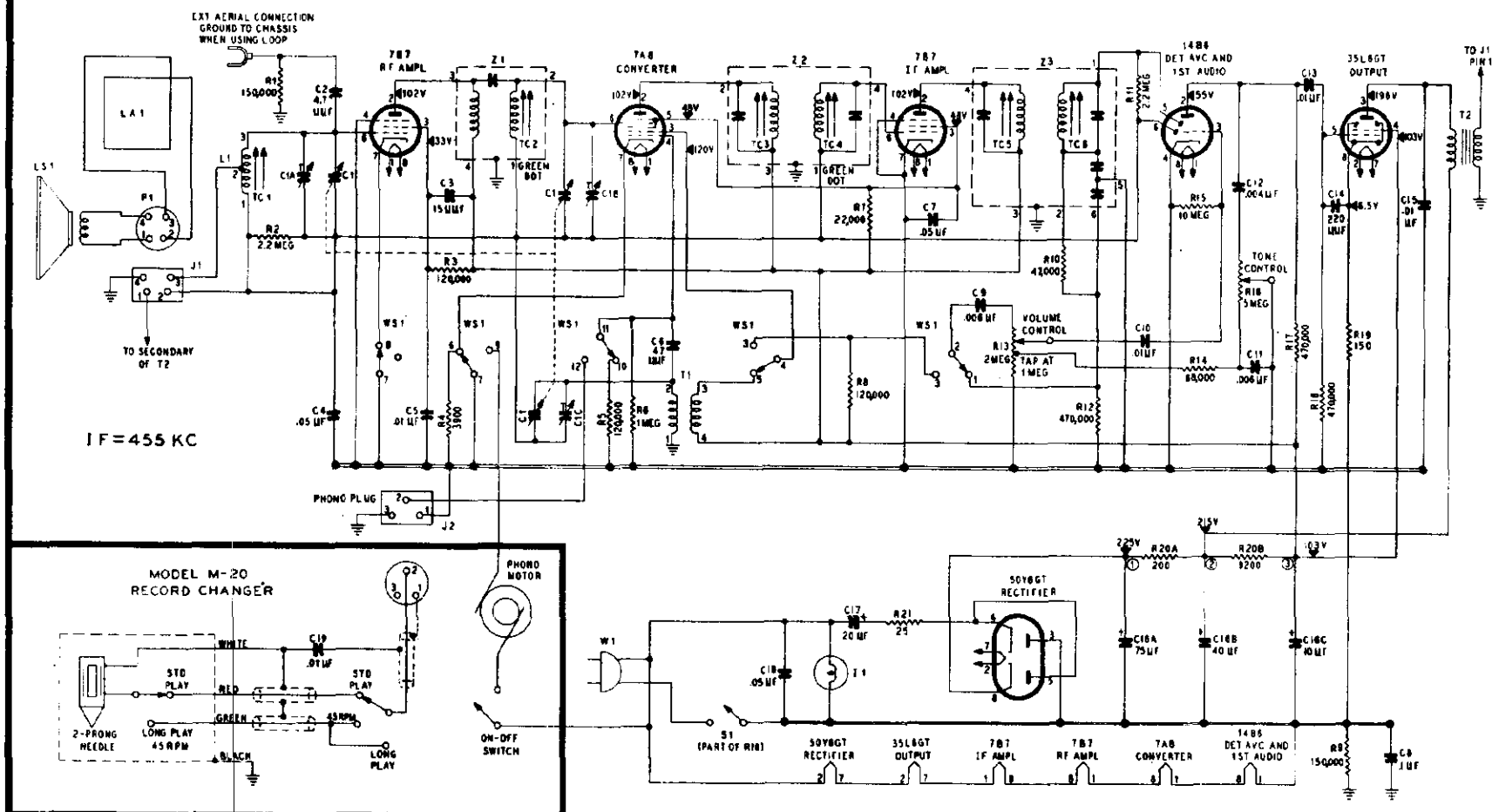
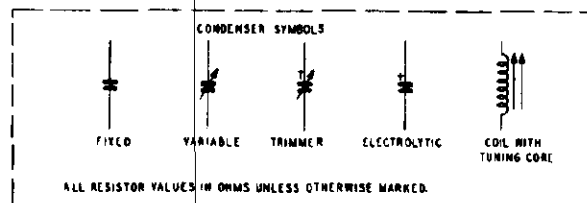


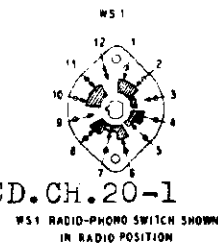
Figure 3. Philco Radio-Phonograph Model 50-1718, Schematic Diagram

TPO-212



VOLTAGES MEASURED WITH A 20,000-OHMS-PER-VOLT
VOLTMETER FROM POINTS INDICATED TO B MINUS AT
A LINE VOLTAGE OF 117 V AC

RECORD CHANGER: Model M-20, on pages RCD.CH.20-1 through RCD.CH.20-16. WS1 RADIO-PHONO SWITCH IN RADIO POSITION



ALIGNMENT PROCEDURE

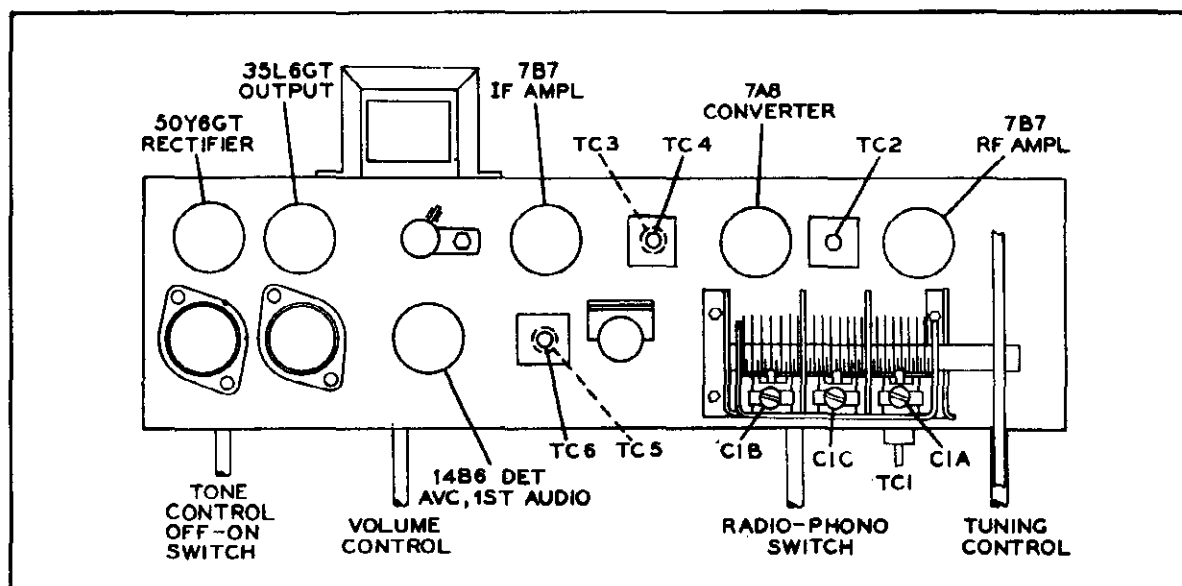
DIAL POINTER—With tuning gang fully meshed, set pointer to coincide with the first scribe mark from the left on the dial backplate.

RADIO CONTROLS—Set volume control to maximum, tone control fully counterclockwise, and RADIO-PHONO switch to RADIO position.

OUTPUT METER—Connect across voice-coil terminals.

SIGNAL GENERATOR—Connect ground lead to B-. Connect output lead as indicated in chart. Use modulated output.

OUTPUT LEVEL—During alignment, attenuate input signal to maintain an output-meter indication of 1.25 volts.



TP0-213

Figure 4. Top View, Showing Trimmer Locations

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .1-uf. condenser to r-f-ampl. section of C1.	455 kc.	Gang fully meshed.	Adjust, in order given, for maximum output.	TC8—2nd i-f sec. TC5—2nd i-f pri. TC4—1st i-f sec. TC3—1st i-f pri.
2	Radiating loop (see note below).	1620 kc.	1620 kc.	Adjust for maximum.	C1C—osc. trimmer
3	Same as Step 2.	1500 kc.	1500 kc.	Adjust for maximum.	C1B—r-f trimmer C1A—ant. trimmer
4	Same as Step 2.	580 kc.	580 kc.	Adjust for maximum while rocking tuning control.	TC2—r-f core TC1—ant. core*

RADIATING LOOP: Make up a 6-to-8-turn, 6-inch diameter loop of insulated wire; connect to signal-generator output leads, and place near radio loop.

* The aerial tuning core, TC1, should not be adjusted unless the coil has been replaced.

REPLACEMENT PARTS LIST (Continued)

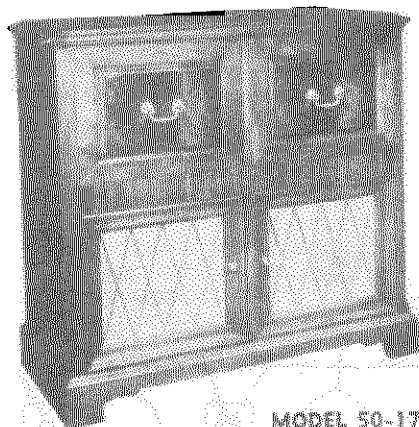
MISCELLANEOUS (Continued)

Description	Service Part No.
Fastener, snap	28-4342FA3
Spring (2)	56-3841
Drive cord, 25-foot spool	45-8750
Pointer	56-5630-3FCP
Spring, pointer drive	56-2817
Fish paper	27-9111
Knob (1)	54-4718-12
Knob (3)	54-4718-6
Mount, rubber, gang mounting (4)	27-4771-1
Pilot-lamp bracket-and-clip assembly	76-5722
Pilot-lamp-socket assembly	27-6233-53
Shaft-and-pulley assembly, drive	76-3959-3

MISCELLANEOUS (Continued)

Description	Service Part No.
Bushing	27-843
Spring, hairpin (2)	57-1488FA1
Spring, hairpin	57-0985FA1
Sleeve, changer mounting (3)	54-7791
Socket, Loktal (4)	27-820
Socket, octal (2)	27-617
Speed nut, changer mounting (3)	W-2554FC1
Spring, changer mounting, heavy (3)	56-7059FA1
Spring, changer mounting, light (3)	56-7059-1FJ4
Spring, gang drive	56-316
Wafer, electrolytic mtg. (2)	27-9501

MODEL 50-1727



MODEL 50-1727

SPECIFICATIONS

CABINET	Wood console, mahogany finish, Georgian style	AERIALS	Low-impedance broadcast loop; FM line-cord aerial; provision for external aerial
CIRCUIT	11-tube superheterodyne	INTERMEDIATE FREQUENCIES	
FREQUENCY RANGES		AM	455 kc.
Broadcast	540—1620 kc.	FM	9.1 mc.
FM	88—108 mc.	PHONOGRAPH	Philco Automatic Record Changer, Model M-20 (for service information, refer to service manual PR-1731).
AUDIO OUTPUT	10 watts	PHILCO TUBES (11)	6AU6, 7F8, 6BJ6(2), 6T8, 7A4, 6V6GT(2), 7E7, 7F7, 5U4G
PUSH BUTTONS	Six: Five for broadcast stations, one for power on-off		
OPERATING VOLTAGE	105—125 volts, 60 cycles, a.c.		
POWER CONSUMPTION			
Radio	110 watts		
Phonograph	125 watts		

TP-6098

CIRCUIT DESCRIPTION

Philco Radio-Phonograph Model 50-1727 consists of an 11-tube superheterodyne and a Model M-20 Philco Automatic Record Changer.

A low-impedance loop aerial within the cabinet normally provides adequate signal pickup on the standard broadcast band. In most localities, the built-in FM line-cord aerial provides satisfactory FM reception. In areas where FM signals are weak, an outdoor dipole aerial, such as Philco Part No. 45-1462, will provide additional pickup. To increase the pickup on both bands, use the Philco Aerial Coupler, Part No. 76-2353-1, with the outdoor dipole aerial. For increased signal pickup on the standard broadcast band only, use the coupler with an external aerial of the single-wire type, such as Philco Part No. 45-1494.

The r-f stage (FM only), the converter, and the 1st i-f amplifier are mounted on a separate chassis for

improved operation at high frequencies. A 6AU6 high-frequency pentode is used as the FM r-f amplifier. A 7F8 high-frequency dual triode is employed as the converter. There are two transformer-coupled i-f stages using 6BJ6 high-frequency pentodes. Each i-f stage has a double set of transformers; one is tuned to 9.1 mc., the FM intermediate frequency, and the other is tuned to 455 kc., the AM intermediate frequency. The use of individual transformers for FM and AM gives better stability and allows more complete shielding. In FM operation, the primary and secondary of the first AM i-f transformer are shorted out, to attenuate undesirable beat frequencies; switching of other windings is unnecessary.

The multi-purpose 6T8 provides AM and FM detection and functions as the first audio amplifier. Two diodes of this tube operate in a ratio detector circuit.

The other diode acts as the AM detector and also supplies the a-v-c voltage. The triode section is the first audio amplifier for both radio and phono operation.

A 7A4 triode operates as a plate-and-cathode-loaded phase inverter, driving a pair of 6V6GT's in the push-pull output stage. Tone fidelity is obtained by the use of inverse feedback in the audio system. This feedback voltage is taken from the secondary of the output transformer and returned to the low side of the volume control.

Selective tone compensation is provided by a continuously variable bass booster and a five-step treble switch that ranges from Scratch Eliminator "on" through maximum high-cut to Hi Fidelity.

The Philco Electronic Scratch Eliminator, for phono operation, may be switched on or off, as required. In this circuit, the reactance tube (pentode section of a 7E7) functions as a variable shunt capacitance at the phono-input circuit; at low signal levels, this tube bypasses a controlled portion of the higher audio frequencies to ground. The grid bias of the reactance tube controls its effective capacitance, which becomes maximum with low bias and minimum with high bias. This control bias is developed by the audio signal itself; a proportionate amount of the signal is taken from the pickup output, amplified by each triode section of the 7E7, and rectified by the diode section of the 7E7.

PHILCO TROUBLE SHOOTING PROCEDURE

For rapid trouble shooting, the radio circuit is divided into four sections, as follows:

- Section 1—the power supply
- Section 2—the audio circuits
- Section 3—the i-f, detector, and a-v-c circuits
- Section 4—the r-f and converter circuits

Test points are specified for each section, and are indicated in the sectionalized schematic diagram. The trouble-shooting procedure given for each section includes a simplified test chart and a bottom view of the chassis showing the locations of the test points and the components of that section.

In each chart, the first step is a master check for determining whether trouble exists in that section without going through the entire test procedure.

Failure to obtain the "NORMAL INDICATION" in any given step indicates trouble within the circuit under test.

After isolating the trouble to a single stage, the defect is located by: first, testing the tube; second, measuring tube electrode voltages; third, measuring circuit resistances; fourth, substituting condensers. The trouble revealed should be corrected before testing further.

IMPORTANT!

To avoid altering FM operation, special care should be used in replacing any part. Replacement parts should be placed in the same physical positions as the original parts; connections should be of the same length, and should be soldered to the same points. The placement or length of leads should not be changed.

PRELIMINARY CHECKS

To avoid possible damage to the radio, the following preliminary checks should be made before it is turned on:

1. Inspect both the top and the bottom of the chassis. Make sure that all tubes are secure in the proper sockets, and look for any broken or shorted connections, burned resistors, or other obvious indications of trouble.

2. Measure the resistance between B+ (pin 2 of the 5U4G rectifier tube) and the radio chassis. When the ohmmeter test leads are connected in the proper polarity, the highest resistance reading will be obtained. If the reading is lower than 1400 ohms, check condensers C102, C103B, C318, C314, and C406 for leakage or shorts.

The resistance value given is much lower than normal, and is not intended as a quality check of these condensers; the value given is the lowest at which the rectifier will operate safely while the voltage checks of Section 1 (power supply) are performed.

TROUBLE SHOOTING

Section 1.

POWER SUPPLY

CAUTION: Do not turn on the power with the speaker disconnected, as this may cause damage to the set.

For the tests in this section, use a d-c voltmeter, connecting the leads between the chassis, test point C, and the test points indicated in the chart. The voltage readings given were taken with a 20,000-ohms-per-volt meter at a line voltage of 117 volts, a.c.

Turn on the power, and set the volume control to

minimum. Turn the bass control fully counterclockwise, and set the treble selector switch to the left-hand TREBLE position. Set the band switch to the broadcast position.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 2 (audio circuits); if not, isolate and correct the trouble in this section.

STEP	TEST POINT	NORMAL INDICATION	ABNORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	230v		Trouble in this section. Isolate by the following tests.
2	B	300v	No voltage Low voltage High voltage	Defective: 5U4G. Open: T100, PB100, W100. Shorted: C100, C101, C307*. Leaky: C102. Open: T200*, R103. Shorted: L100.
3	A	230v	No voltage Low voltage High voltage	Open: R100. Shorted: C103A, C303* Leaky: C103A, C303*. Increased resistance: R100. Open: T200*.
4	D	-16v	No voltage Low voltage High voltage	Open: R101. Shorted: C210*. Leaky: C210*. Open: R102.

Listening Test: Abnormal hum and instability may be caused by open C102, C103A, or C103B.

* This part, located in another section, may cause abnormal indication in this section.

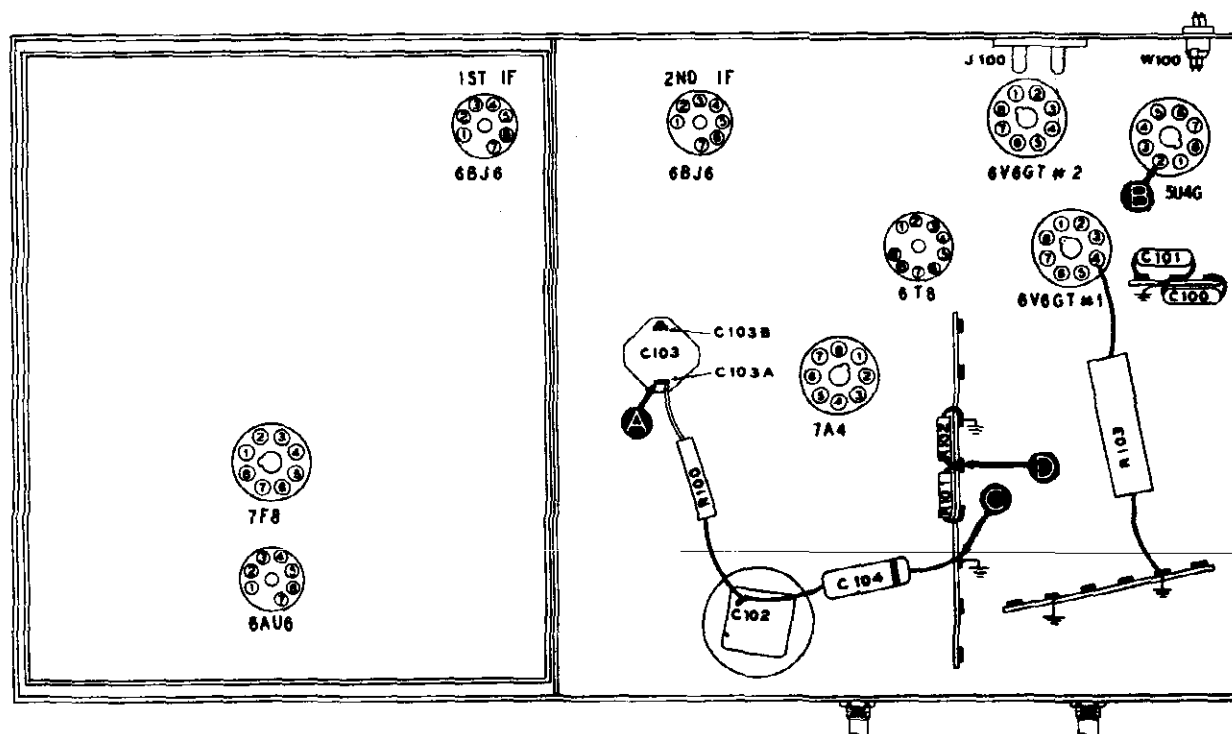


FIGURE 1. BOTTOM VIEW, SHOWING SECTION 1 TEST POINTS

TP-7673A-1

TROUBLE SHOOTING

Section 2.

AUDIO CIRCUITS

AUDIO-AMPLIFIER TESTS

For the tests in this section, use an audio-frequency signal generator. Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and turn the bass control fully counterclockwise. Set the treble

selector switch to the second TREBLE position. Set the band switch to the broadcast position unless otherwise noted in the chart.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for the scratch-eliminator circuits; if not, isolate and correct the trouble in the audio-amplifier circuits.

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak signal input.	Trouble in audio-amplifier circuits. Isolate by the following tests.
2	B (Remove 7A4)	Clear output with strong input.	Defective: 6V6GT (#1), LS200. Open: C208, R213, T200. Shorted or leaky: C208, C210, C211.
3	D (7A4 removed)	Clear output with strong input.	Defective: 6V6GT (#2). Open: C209, R214. Shorted or leaky: C209.
4	E (Replace 7A4)	Loud, clear output with moderate input.	Defective: 7A4. Open: R209, R210, R211, R212. Shorted or leaky: C207.
5 (a)	F	Loud, clear output with weak input.	Defective: 6T8. Open: R208, C207, R207. Shorted or leaky: C206, C215, C320*.
5 (b)	F	Loud, clear output with weak input, for all 5 positions of treble selector switch.	Open: C212, C213, C214, C215, R215, R216, R217, WS2. Shorted or leaky: C212, C213, C214.
6 (a)	A	Loud, clear output with weak input.	Open: C203, C205, R204, R200 (rotate through range).
6 (b)	A	Loud, clear output with weak input, for any position of bass control.	Open: R203, R202, C202. Shorted: C202.
7	G (Band switch in Phono position)	Loud, clear output with weak input.	Open: WS1-3 (F), R220. Shorted: shield cable.
Listening Test: Abnormal hum and distortion may be caused by leaky C207, C208, C209, or by open C206 or C210.			

* This part, located in another section, may cause abnormal indication in this section.

SCRATCH-ELIMINATOR TESTS

Set the bass control fully counterclockwise. Turn the treble selector switch to the high-fidelity position, maximum clockwise. Set the band switch to the phono position. For all steps except 1(b), set the volume control to maximum; for this step, adjust the volume control as directed in the chart.

Turn the scratch eliminator on or off as indicated in the chart. (The scratch eliminator is on when the treble selector switch is in the counterclockwise position.)

Connect an output meter across the primary of the output transformer, T200.

IMPORTANT! For all steps except step 4, use the 0—10-volt output-meter range; for step 4 only, use

the 0—50-volt range. If the proper ranges are not used, erroneous readings will result.

Connect the ground lead of an audio signal generator to the chassis, test point C, and connect the output lead through a .1-mf. condenser to the test points indicated in the chart. Set the generator for 5000 cycles. Adjust the generator output as directed in the chart.

If normal operation is indicated by the tests in step 1, (a) and (b), proceed with the tests for Section 3 (i-f, detector, and a-v-c circuits); if not, isolate and correct the trouble in the scratch-eliminator circuits.

NOTE: For steps 2, 3, and 4, connect the positive lead of a 20,000-ohms-per-volt, d-c voltmeter to the chassis, test point C; connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the "VOLTMETER" test points indicated in the chart.

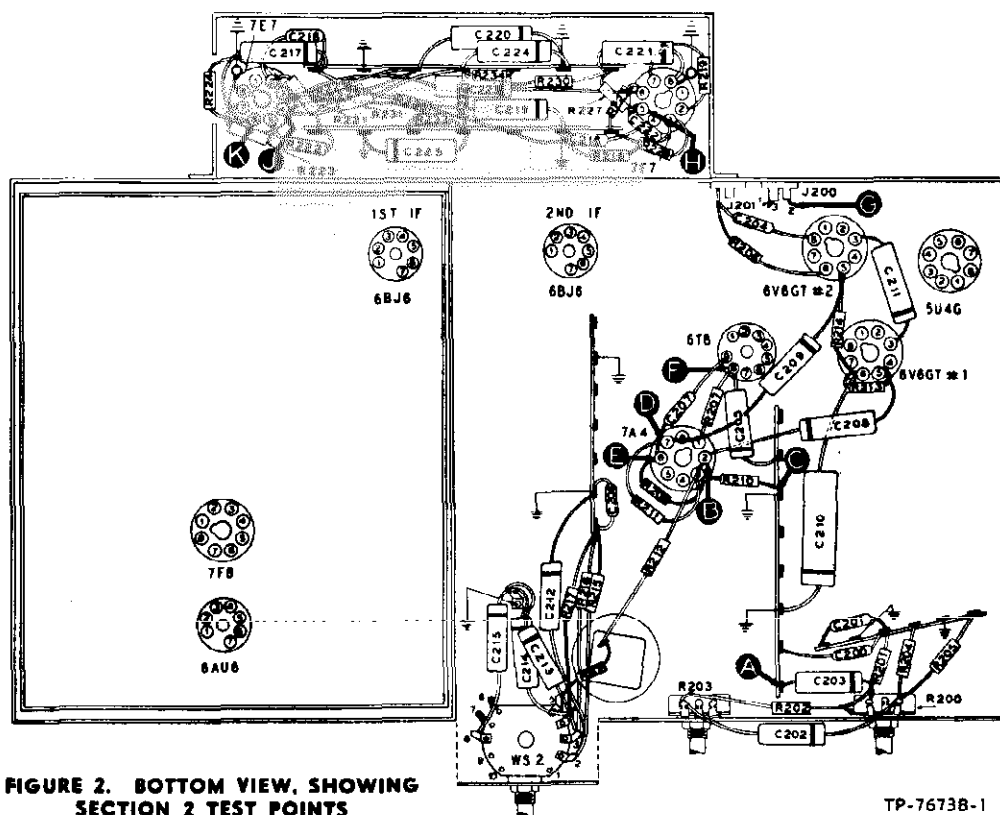
TROUBLE SHOOTING

Section 2.

AUDIO CIRCUITS (Cont.)

SCRATCH-ELIMINATOR TESTS

STEP	TEST POINT	SIGNAL GEN. OUTPUT	VOLT-METER	SPECIAL INSTRUCTIONS	POSSIBLE CAUSE OF ABNORMAL INDICATION
1 (a)	G	Adjust for 10v output-meter reading, with scratch eliminator off.		Turn scratch eliminator on; output voltage should drop to . 8.5v (approx.).	
1 (b)	G	Same as for 1 (a).		Reduce volume control to obtain output-meter reading of 1v. Increase generator output for output-meter reading of 10v. Turn scratch eliminator on; output voltage should not drop below 8.8v (approx.).	Trouble in scratch-eliminator circuits. Isolate by the following tests.
2	H	See SPECIAL INSTRUCTIONS.	J	With scratch eliminator on, increase generator output for voltmeter reading of 8.8v, negative; failure to obtain this value indicates trouble.	Defective: 7F7, 7E7 (diode section), WS1-4 (R). Open: R229, R227, R231, R234, C223, WS2 (F).
3	H	Same setting which produced 8.8v reading in step 2, with scratch eliminator on.	K	With scratch eliminator on, voltage at point K should be 2v, negative.	Open: R226, R225, R224. Shorted: C219, C220, C217.
4	G	Same as step 2.	J	With scratch eliminator on, voltage at point J should be approx. 28v negative.	Defective: 7F7. Open: C216, C222, R218, R219, R228. Shorted or leaky: C222.
5	G	Adjust for 10v output-meter reading, with scratch eliminator off.		Turn scratch eliminator on; output voltage should drop to 6.5v (approx.).	Defective: 7E7 (pentode section). Open: R221, R222, R223, C218, C217. Shorted: C218, C217.



TROUBLE SHOOTING

Section 3.

I-F, DETECTOR, AND A-V-C CIRCUITS

AM TESTS

For the tests in this section, use an r-f signal generator, with modulated output, set at 455 kc. Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and turn the bass control fully counterclockwise. Set the treble selector switch to the second TREBLE position. Set the band switch to the broadcast position, and rotate the tuning control until the tuning condenser is fully meshed.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the FM tests; if not, isolate and correct the trouble in the AM circuits.

To provide a complete i-f-amplifier check, test point A for this section is placed at the grid of the mixer in Section 4; therefore, the effectiveness of step 1 as a master check is dependent upon the condition of certain parts in the mixer circuit. These parts are listed below under "POSSIBLE CAUSE OF ABNORMAL INDICATION."

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak signal input.	Trouble in AM i-f circuits. Isolate by the following tests.
2	B	Loud, clear output with strong input.	Defective: 6BJ6 (2nd i-f ampl.), 6T8. Misaligned: Z305. Open: R310, R311, R312, R313, R314, L304A, L305B, L302B, L303B, WS1-5. Shorted: L303B, L305A, L305B. Shorted or leaky: C316, C315, C317, C318, C305A, C305B, C305C, C305D.
3	D	Loud, clear output with moderate input.	Defective: 6BJ6 (1st i-f ampl.). Misaligned: Z303. Open: L300B, L301C, L302A, L302B, R303, R309, R305, R307, R308. Shorted: L303A. Shorted or leaky: C313, C312, C310, C314, C301B, C303A.
4	A	Loud, clear output with weak input.	Defective: 7F8*. Misaligned: Z301. Open: R405*, R300, R301, L300A, L301A, L301B. Shorted: L301A, L301B, L301C, WS1-5. Shorted or leaky: C410*, C411*, C409*. C301A, C301B, C306.
Listening Test: Abnormal hum may be caused by open: C306, C310, C312, C313, C314, C316, C317, C318.			

* This part, located in another section, may cause abnormal indication in this section.

FM CIRCUITS

Set the band switch to FM position, and follow the instructions preliminary to the AM tests with these exceptions; set the signal-generator frequency to 9.1 mc., and detune to one side or the other until a satisfactory test signal is obtained.

The most satisfactory check on the operation of the discriminator circuit is the ability of the circuit to take

proper alignment. See ALIGNMENT OF FM CIRCUITS.

If the "NORMAL INDICATION" is obtained in step 1, proceed with the tests for Section 4 (r-f and converter circuits); if not, isolate and correct the trouble in the FM circuits.

Usually, if a part is found to operate satisfactorily for AM it will also operate satisfactorily for FM.

TROUBLE SHOOTING

Section 3. I-F, DETECTOR, AND A-V-C CIRCUITS (Cont.)

FM TESTS

STEP	TEST POINT	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	A	Loud, clear speaker output with weak signal input.	Trouble in FM i-f circuits. Isolate by the following tests.
2	B	Loud, clear output with strong input.	Open: WS1-5, L304B, L304C, R315, C318, R316, R317, WS1-3, Shorted or leaky: C322, C323, C304A, C304B, C319, C321. Shorted: L304A, L304B. Misaligned: Z304.
3	D	Loud, clear output with moderate input.	Misaligned: Z302. Shorted: L302A, L302B, C302A, C302B. Open: R304, WS1-5.
4	A	Loud, clear output with weak input.	Misaligned: Z300. Shorted: L300A, L300B, C300A, C300B, C307, WS1-2. Open: WS1-2, WS1-5.

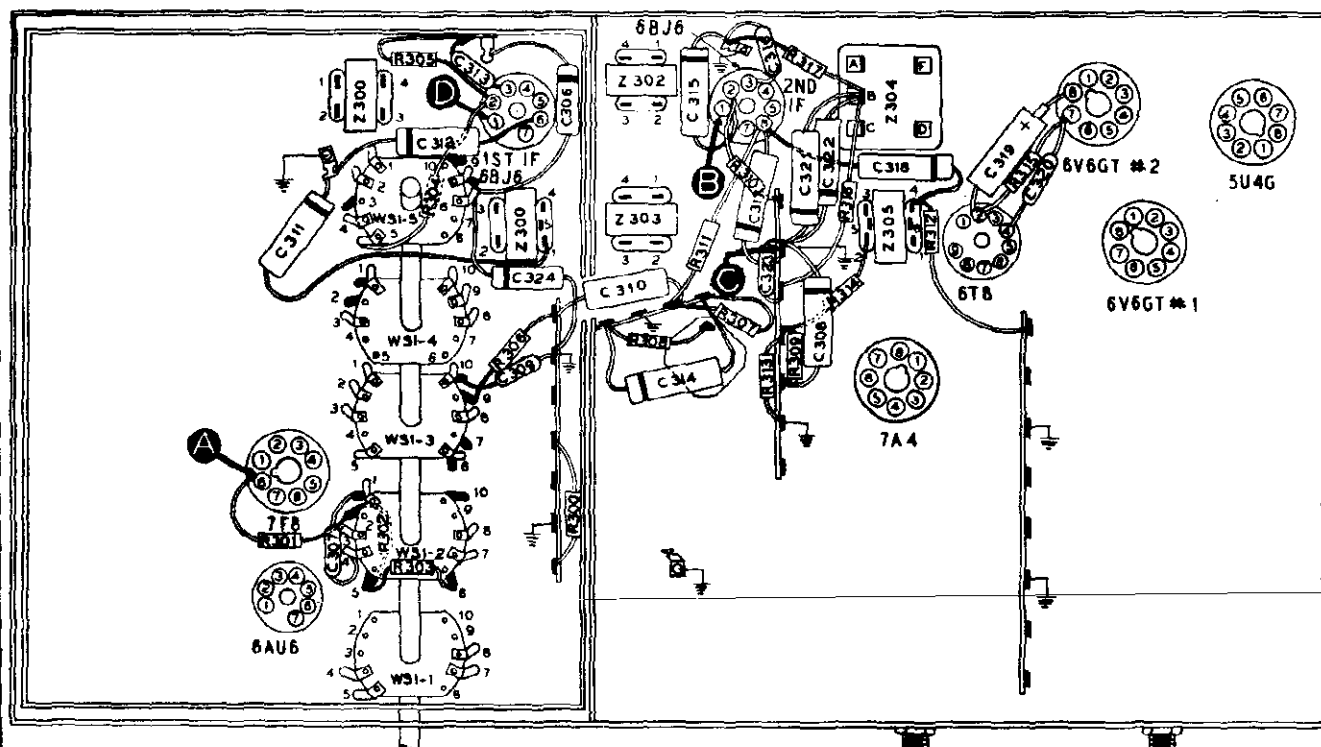


FIGURE 3. BOTTOM VIEW, SHOWING SECTION 3 TEST POINTS

TP-7673C-1

TROUBLE SHOOTING

Section 4.

R-F AND CONVERTER CIRCUITS

For the tests in this section, with the exception of the oscillator test, use an r-f signal generator with modulated output. Connect the generator ground lead to the chassis, test point C; connect the output lead through a .1-mf. condenser to the test points indicated in the chart.

Set the volume control to maximum, and turn the bass control fully counterclockwise. Set the treble selector switch to the second TREBLE position. Set the band switch, tuning control, and signal-generator frequency as indicated in the chart.

If the "NORMAL INDICATION" is not obtained in step 1 of each chart, isolate and correct the trouble in this section. If the trouble is not revealed by the

tests for this section, check the alignment.

OSCILLATOR TESTS: For the oscillator tests (steps 2 and 4 of the AM test chart, and step 2 of the FM test chart), connect the positive lead of a high-resistance voltmeter to the oscillator cathode, pin 4 of the 7F8 tube (test point D). Connect the prod end of the negative lead through a 100,000-ohm isolating resistor to the oscillator grid, pin 1 of the 7F8 tube (test point B). Use a suitable meter range, such as 0—10 volts. Proper operation of the oscillator is indicated by negative voltages of approximately the values given in the chart (measured with 20,000-ohms-per-volt meter) throughout the tuning ranges of the broadcast and FM bands.

AM TESTS

STEP	TEST POINT	SIGNAL GEN. FREQ.	BAND SWITCH	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1 (a) 1 (b)	A A	1000 kc. Tune to frequency of each push-button.	BC Push-button	Tune to signal. Depress each button, in order.	Loud, clear speaker output with weak signal input.	Trouble in AM r-f circuits. Isolate by the following tests.
2 (Osc. Test.)	B to D		BC	Tune through range.	Negative 2—5 volts.	Defective: 7F8. Open: R404, T401, L405, C412, L404, R306*. WS1-3, WS1-4. Shorted: C412, C400, C417B, C407.
3	A	1000 kc.	BC	Tune to signal.	Loud, clear output with weak input.	Open: T400, WS1-2, C413. Shorted: C400, C417A.
4 (Osc. Test.)	B to D		Push-button	Depress each button, in order.	Negative 2—5 volts.	Open: L406, PB400, R406, WS1-3, WS1-4. Shorted: C414, C415.
5	A	Tune to frequency of each push-button.	Push-button	Depress each button, in order.	Loud, clear output with weak input.	Open: WS1-2, PB400. Shorted: C416.

Listening Test: Distortion may be caused by open R301*, R302*, or R309* Hum and distortion may be caused by open C308* or C310*.

* This part, located in another section, may cause abnormal indication in this section.

FM TESTS

STEP	TEST POINT	SIGNAL GEN. FREQ.	BAND SWITCH	RADIO TUNING	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	E	95 mc.	FM	Tune to signal.	Loud, clear speaker output with weak signal input.	Trouble in FM r-f circuits. Isolate by the following tests.
2 (Osc. Test.)	B to D		FM	Tune through range.	Negative 1—1.5 volts.	Defective: 7F8. Open: L402, WS1-3, WS1-4. Shorted: C400, C400C, C309*. Shorted or leaky: C407, C409.
3	E	95 mc.	FM	Tune to signal.	Loud, clear output with weak input.	Defective: 6AU6. Open: L400, C401, R406, R401, R402, R403, L403, C405, L401. Shorted: C400, C400A, L400, L401, WS1-2, C400B. Shorted or leaky: C402, C404, C403, C405, C406.

Listening Test: Hum and distortion may be caused by open C402, C406, C408, C409.

* This part, located in another section, may cause abnormal indication in this section.

TROUBLE SHOOTING

Section 4. R-F AND CONVERTER CIRCUITS (Cont.)

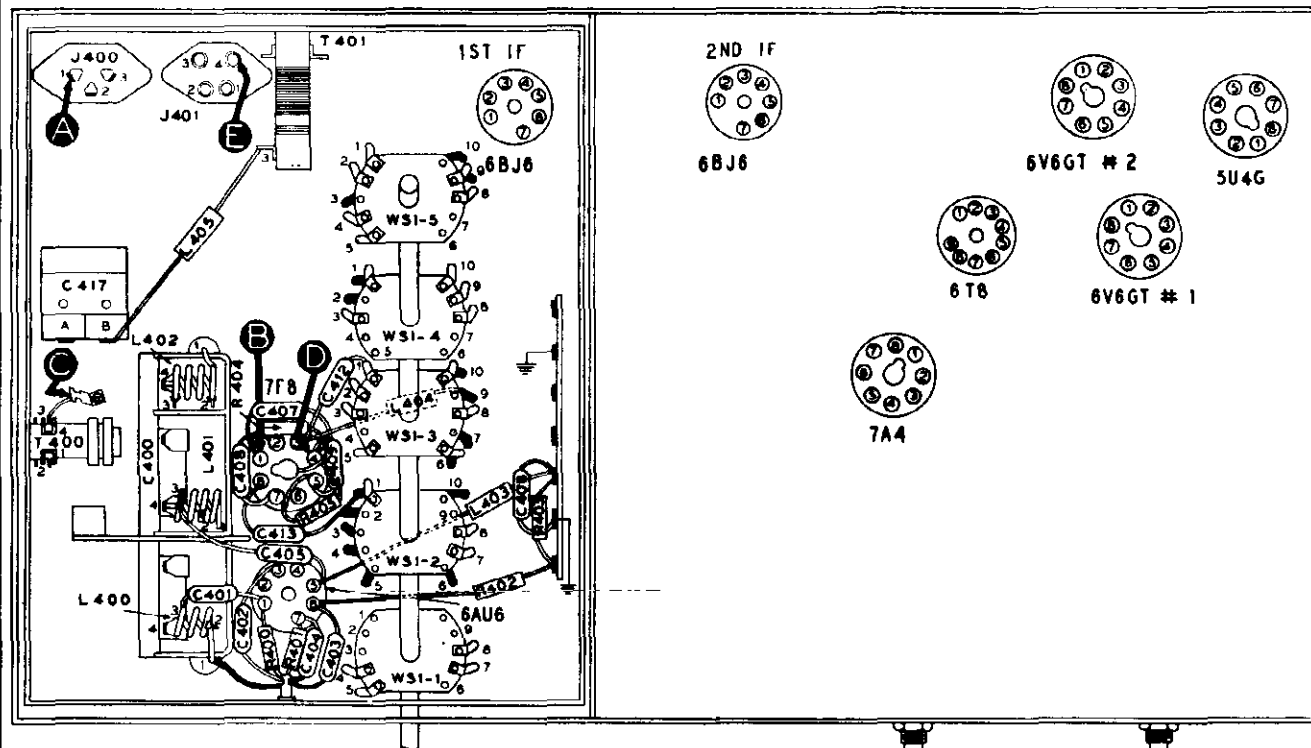
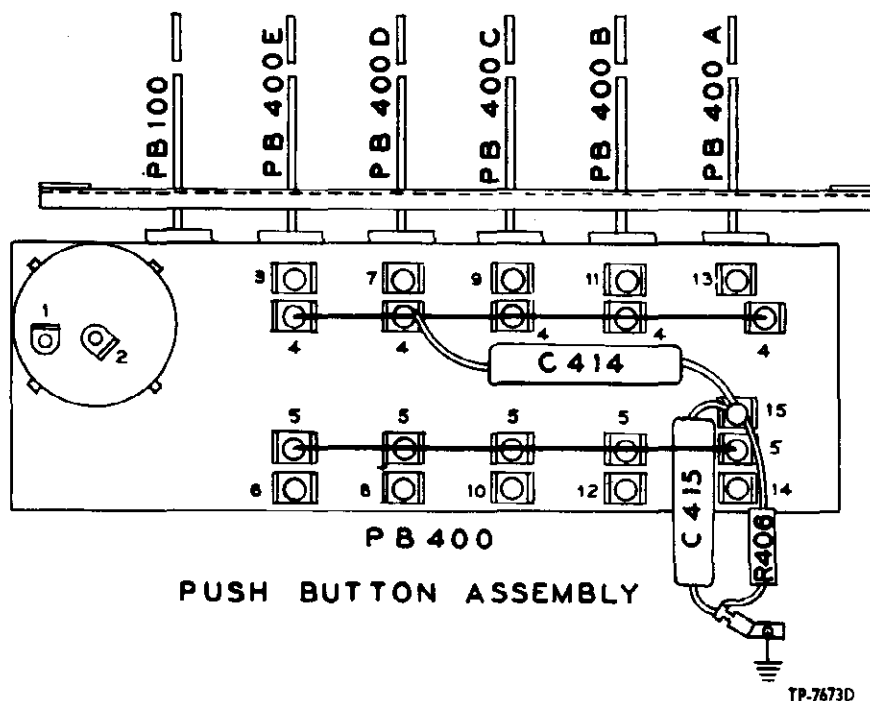


FIGURE 4. BOTTOM VIEW, SHOWING SECTION 4 TEST POINTS

TP-7673E-1

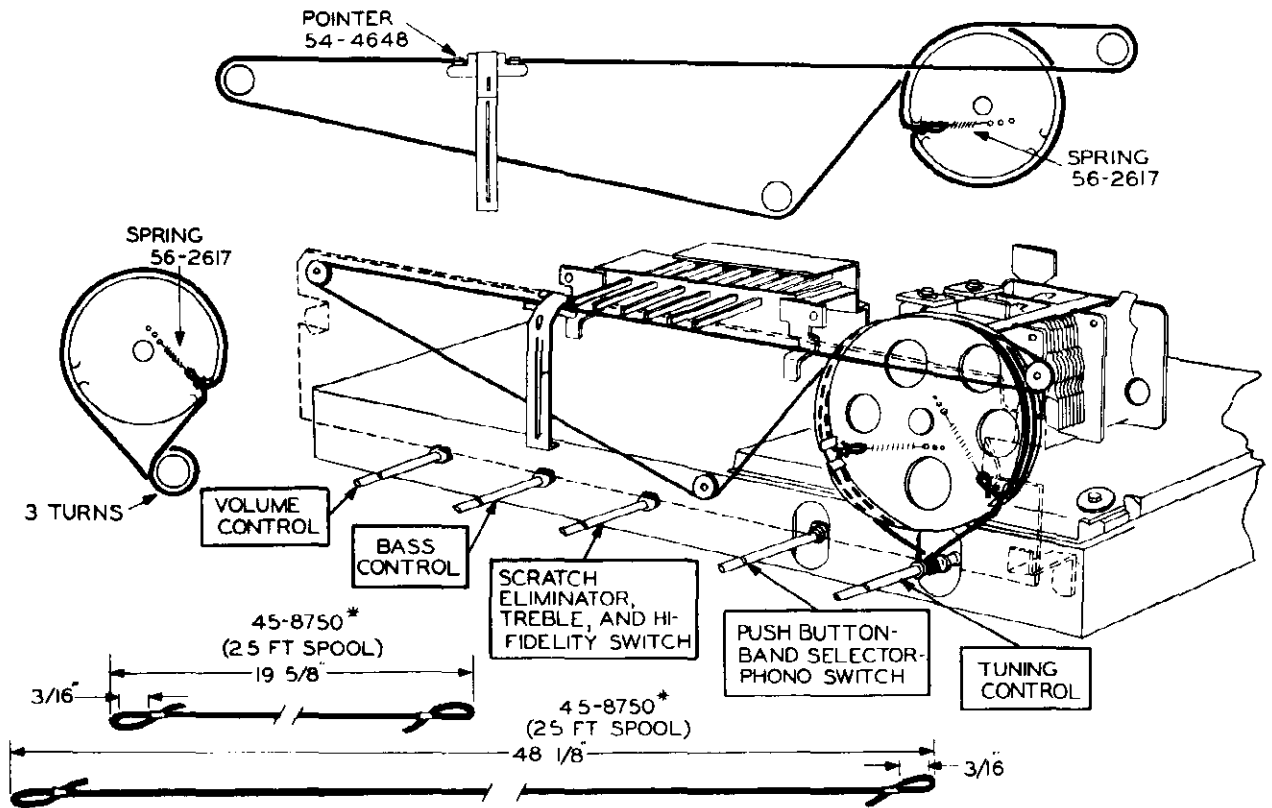


FIGURE 5. DRIVE-CORD INSTALLATION DETAILS

TP-1673F

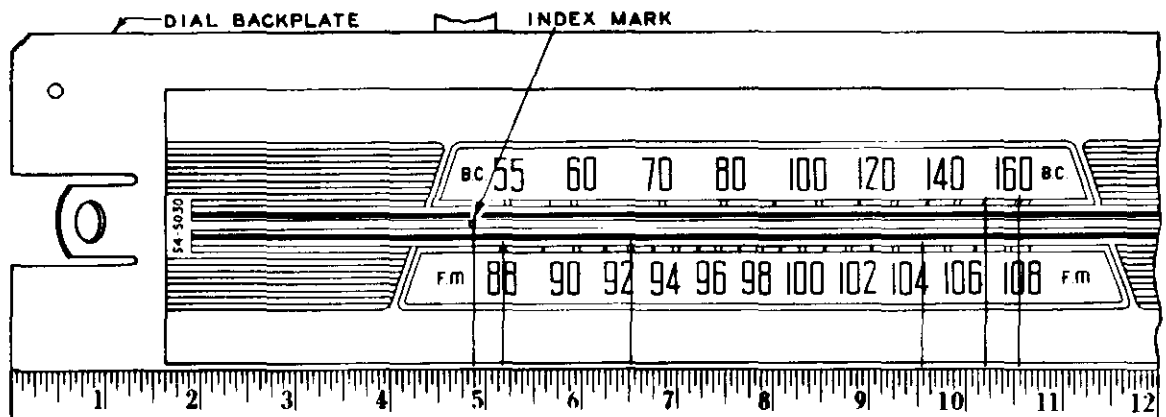


FIGURE 6. DIAL-BACKPLATE CALIBRATION MEASUREMENTS

TP-7088

CALIBRATING DIAL BACKPLATE

When the radio chassis has been removed from the cabinet, dial calibration and alignment points may be marked on the dial backplate below the pointer.

The method of measuring for these points is illustrated in figure 6. Hold a ruler against the scale backplate, with the start of the ruler at the left-hand edge of the backplate, and mark pencil dots at the proper points for the required frequency settings. When the ruler is correctly placed, the index mark is approxi-

mately 4-7/8" from the reference point indicated in figure 6.

With the tuning gang fully meshed, the pointer should be adjusted on the dial drive cord to coincide with the index mark.

After the chassis is installed in the cabinet, the tuning condenser should be fully meshed, and the dial pointer should be moved to coincide with the index mark on the dial.

ALIGNMENT PROCEDURE

CAUTION: Do not turn on the power with the speaker disconnected, or the radio may be damaged.

ALIGNMENT OF AM CIRCUITS

When the complete AM and FM alignment is to be made, the AM alignment should be made first; however, if AM alignment is not required, the FM alignment alone may be made.

DIAL POINTER: With the tuning condensers fully meshed, the dial pointer must coincide with the index mark at the low-frequency end of the dial. See "CALIBRATING DIAL BACKPLATE" for the method of measuring the backplate for index and calibration points.

CONTROLS: Set the volume control to maximum, and the bass control fully counterclockwise. Set the treble selector switch fully clockwise. Set the band switch to the broadcast position. Set the signal-generator dial and radio dial as indicated in the chart.

OUTPUT METER: Connect between the No. 3 terminal (voice-coil connection) of the loop aerial socket, J400, and the chassis. See figure 8.

AM SIGNAL GENERATOR: Connect the ground lead to the chassis, and the output lead as indicated in the chart. Use modulated output.

OUTPUT LEVEL: During alignment, the signal-generator output must be attenuated to hold the radio output below 1.5 volts, as read on the output meter.

ALIGNMENT OF FM CIRCUITS

BEFORE STARTING ALIGNMENT, ALLOW THE RADIO AND SIGNAL GENERATOR TO WARM UP FOR 15 MINUTES.

CONTROLS: Set the volume control to maximum, and the bass control fully counterclockwise. Set the treble selector switch fully clockwise. Set the band switch to the FM position. Set the signal-generator dial and radio dial as indicated in the chart.

OUTPUT METER: Connect between the No. 3 terminal (voice-coil connection) of the loop aerial socket, J400, and the chassis. See figure 8.

AM SIGNAL GENERATOR: Connect the ground lead to the chassis; connect the output lead through a .1-mf. condenser to the points specified in the chart. Use modulated output.

OUTPUT LEVEL: During alignment, the signal-generator output must be attenuated to hold the radio output below 1.5 volts, as read on the output meter.

LOCATIONS OF COILS: For the locations of coils L400, L401, and L402 (steps 8, 9, and 10), refer to figure 4.

Note 1. Check the tracking of oscillator and r-f circuits with a tuning wand. If placing the brass end in or near the coil increases the output-meter reading, spread the turns; if the powdered-iron end increases the output reading, compress the turns. If both ends cause a decrease in the output, the coil is correctly tuned. Do not change the coils excessively, since only a small adjustment is required at these frequencies.

Note 2. Make two simple dipole aerials to feed the signals from the signal generator to the radio. Each dipole aerial may consist of two 30-inch lengths of rubber-covered wire. Connect one dipole aerial to terminals 3 and 4 on the FM aerial socket, J401, of the radio. See figure 8. Connect the other dipole aerial to the output leads of the signal generator. Place the two dipoles several feet apart.

Note 3. The use of a signal generator for steps 5 through 11 is recommended only if the available generator is sufficiently accurate to insure correct frequency settings. Otherwise, an alternative procedure employing FM broadcast-station signals is recommended. For the adjustments at the high-frequency end of the band, use the station nearest 105 mc.; for the adjustments at the low-frequency end of the band, use the station nearest 88 mc. or 92 mc., as indicated. If the radio is greatly misaligned, it may be necessary to adjust the trimmers and coils for maximum noise at each end of the band before station signals can be heard.



©John F. Rider



SECTIONALIZED SCHEMATIC DIAGRAM, SHOWING TEST POINTS

AM ALI

STEP	SIGNAL GENERATOR		RADIO	
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS
1	Through .1-mf. condenser to pin 8 of 7F8 tube.	455 kc.	Gang fully closed.	Adjust each trimmer, in order given, for maxiz output. Do not repeat adjustments.
2	Loosely coupled with radiating loop. See note below.	1800 kc.	1800 kc.	Adjust for maximum output.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output.
4	Repeat steps 2 and 3 until no further increase in output is obtained.			

RADIATING LOOP: Make up a six-to-eight turn, 8-inch-diameter loop, using insulated wire; connect to signal generator leads and place near radio loop. Radio loop must be connected to set during alignment.

FM ALI

STEP	SIGNAL GENERATOR		RADIO	
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS
1	Through .1-mf. condenser to pin 1 of 6B76 2nd i-f ampl.	9.1 mc.	88 mc.	Adjust trimmers, in order given, for maximum put.
2	Through .1-mf. condenser to pin 1 of 6B76 1st i-f ampl.	9.1 mc.	88 mc.	Same as step 1.
3	Through .1-mf. condenser to pin 8 of 7F8 converter.	9.1 mc.	88 mc.	Same as step 1.
4	To FM aerial terminal (terminal 4 of J401).	105 mc.	105 mc.	Adjust for maximum.
5	Same as step 4.	92 mc.	92 mc.	Adjust L402 for maximum (see Note 1).
6	Same as step 4.	105 mc.	105 mc.	Adjust for maximum while rocking tuning contr
7	Same as step 4.	105 mc.	105 mc.	Adjust for maximum.
8	Dipole radiator (see Note 3).	92 mc.	92 mc.	Adjust L401 for maximum while rocking tuning trol (see Note 1).
9	Same as step 8.	92 mc.	92 mc.	Adjust L400 for maximum (see Note 1).
10	Repeat steps 5 through 10 until no further increase is obtained.			

SETTING THE PUSH BUTTONS

1. Connect the output meter between the No. 3 pin of the aerial input jack, J400, and the chassis. See figure 8.

2. Turn the volume control to maximum, and the bass control fully counterclockwise. Turn the treble selector switch fully clockwise. Set the band switch to the push-button position.

3. Couple the loop aerial (see R. AM ALIGNMENT).

4. Turn on the warm up for 15 r justments.

5. Starting with set the signal generation on), push th and adjust the as and aerial trimmer chassis) for maxiz meter.

MENT CHART

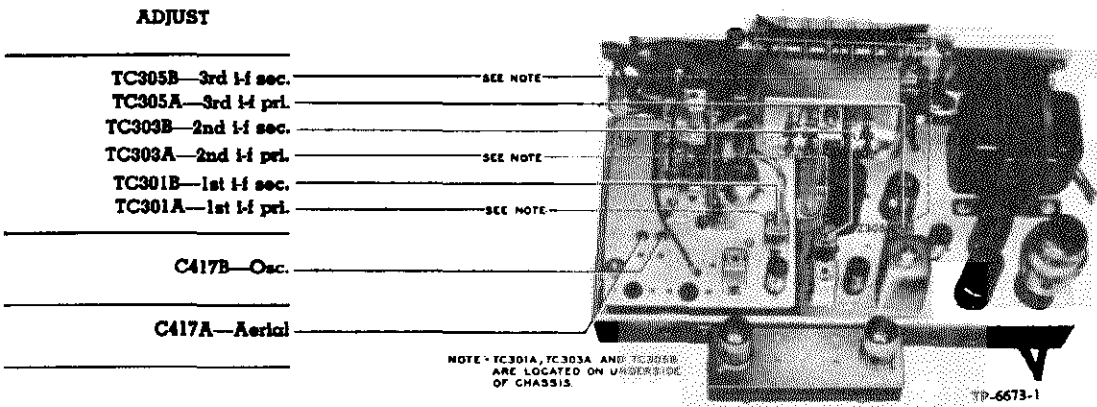


FIGURE 7. TOP VIEW, SHOWING AM TRIMMER LOCATIONS

MENT CHART

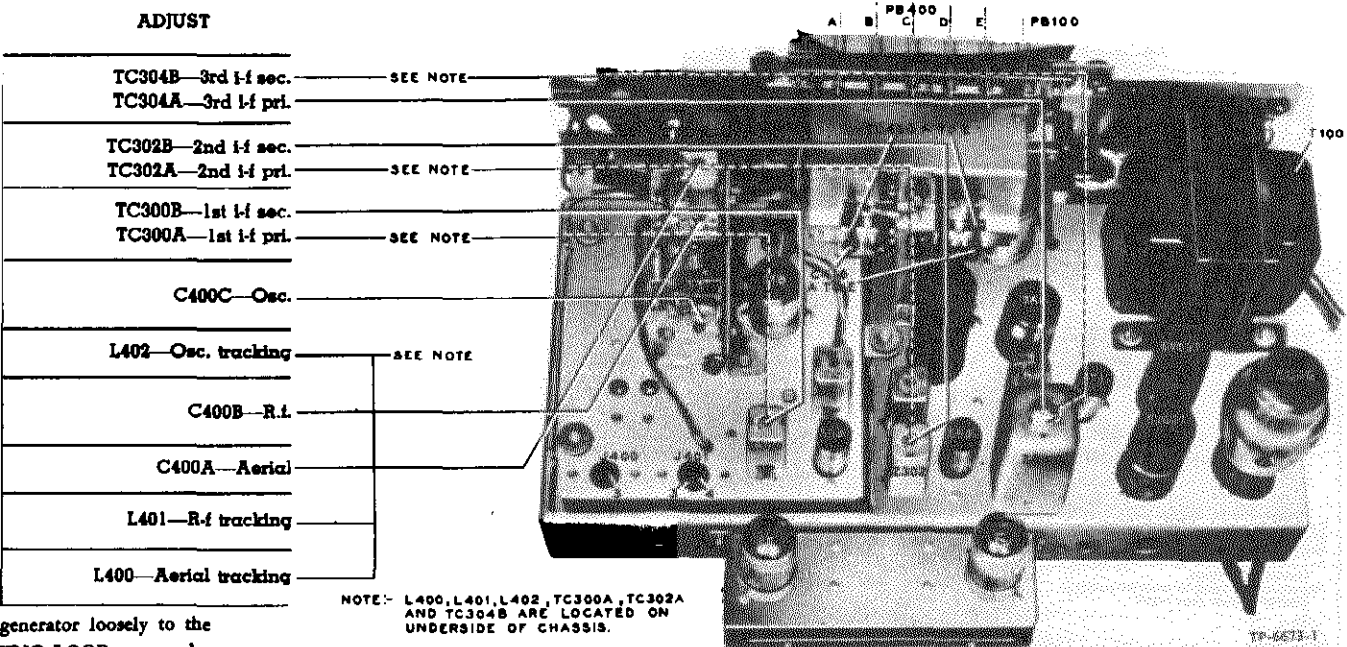


FIGURE 8. TOP VIEW, SHOWING FM TRIMMER LOCATIONS

generator loosely to the
TUNING LOOP note under
RT).

, and allow the radio to
before starting the ad-

owes frequency desired,
the frequency (modula-
on-selector push button,
oscillator tuning core
user (marked on rear of
adication on the output

6. Reset the signal-generator frequency, and repeat the procedure for each remaining station-selector push button.
7. Turn off the signal generator, and make a final adjustment of all tuning cores and trimmer condensers while listening to the stations for which the adjustments are being made.

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory assemblies; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

SECTION 1 POWER SUPPLY

Reference Symbol	Description	Service Part No.
C100	Condenser, line filter, .01 mf.	60-0120*
C101	Condenser, line filter, .01 mf.	60-0120*
C102	Condenser, electrolytic, filter, 40 mf., 450v	30-2568-20
C103	Condenser, electrolytic, 2-section	30-2556
C103A	Condenser, filter, 10 mf., 450v	Part of C103
C103B	Condenser, filter, 25 mf., 450v	Part of C103
C104	Condenser, filter, .01 mf.	61-0120*
L100	Field coil, filter choke	Part of L5200
I100	Lamp, bin light, 6.3-volt	34-2040
I101	Lamp, jewel light, 6.3-volt	34-2040
I102	Lamp, pilot light, 6.3-volt	34-2040
I103	Lamp, pilot light, 6.3-volt	34-2040
J100	Socket, phono power	27-6200
PB100	Switch, power off-on	Part of 42-1881†
R100	Resistor, filter, 10,000 ohms, 10w	33-1336-21
R101	Resistor, bias divider, 1.2 megohms	66-5123340*
R102	Resistor, bias divider, 330,000 ohms	66-4333340*
R103	Resistor, bleeder, 18,000 ohms, 10 watts	33-1335-85
T100	Transformer, power	32-8378
W100	Line cord and plug	L-2183*
WS1-1(R)	Switch-wafer section	Part of 42-1877‡

SECTION 2 AUDIO CIRCUITS

C200	Condenser, AM tone compensation, 100 mmf.	62-110009001
C201	Condenser, AM tone compensation, 100 mmf.	62-110009001
C202	Condenser, bass tone compensation, .006 mf.	45-3500-7*
C203	Condenser, d-c blocking, .006 mf.	45-3500-7*
C204	Condenser, r-f by-pass, 100 mmf.	62-110009001
C205	Condenser, d-c blocking, .006 mf.	45-3500-7*
C206	Condenser, r-f by-pass, 100 mmf.	62-110009001
C207	Condenser, d-c blocking, 470 mmf.	60-10515307*
C208	Condenser, d-c blocking, .006 mf.	45-3500-7*
C209	Condenser, d-c blocking, .006 mf.	45-3500-7*
C210	Condenser, bias filter, .5 mf.	45-3500-10*
C211	Condenser, tone compensation, .003 mf.	61-0117*
C212	Condenser, tone compensation, .006 mf.	45-3500-7*
C213	Condenser, tone compensation, .003 mf.	61-0117*
C214	Condenser, tone compensation, .001 mf.	45-3500-5*
C215	Condenser, tone compensation, .0015 mf.	45-3500-6*
C216	Condenser, high-pass filter, 150 mmf.	60-10155407*
C217	Condenser, d-c blocking, .001 mf.	45-3500-5*
C218	Condenser, reactance feedback, 220 mmf.	60-10205307*
C219	Condenser, bias filter, .01 mf.	61-0120*

†42-1881 Push-button switch assembly

SECTION 2 (Continued) AUDIO CIRCUITS

C220	Condenser, bias filter, .03 mf.	45-3500-1*
C221	Condenser, bias filter, .01 mf.	61-0120*
C222	Condenser, d-c blocking, 330 mmf.	60-10335407*
C223	Condenser, d-c blocking, .002 mf.	61-0062*
C224	Condenser, bias filter, .02 mf.	61-0108*
C225	Condenser, bias filter, .03 mf.	45-3500-1*
J200	Socket, phono input	27-6126
J201	Socket, FM test	27-6180
LS200	Speaker, electrodynamic, 12" (including L100)	36-1630
R200	Volume control, 2 megohms, tap at 1 megohm	33-5535-19
R201	Resistor, bass boost, 220,000 ohms	66-4223340*
R202	Resistor, tone compensation, 68,000 ohms	66-3683340*
R203	Tone control, bass, 1 megohm	33-5539-52
R204	Resistor, voltage divider, inverse feedback, 4.7 ohms	66-9473340*
R205	Resistor, voltage divider, inverse feedback, 100 ohms	66-1103340*
R206	Resistor, isolating, 100,000-ohms	66-4103340*
R207	Resistor, grid return, 10 megohms	66-6103340*
R208	Resistor, plate load, 220,000 ohms	66-4223340*
R209	Resistor, grid return, 1 megohm	66-5103340*
R210	Resistor, cathode bias, 47,000 ohms	66-3473340*
R211	Resistor, cathode load, 4700 ohms	66-2473340*
R212	Resistor, plate load, 56,000 ohms	66-3563340*
R213	Resistor, grid return, 330,000 ohms	66-4333340*
R214	Resistor, grid return, 330,000 ohms	66-4333340*
R215	Resistor, tone compensation, 4.7 megohms	66-5473340*
R216	Resistor, tone compensation, 4.7 megohms	66-5473340*
R217	Resistor, tone compensation, 4.7 megohms	66-5473340*
R218	Resistor, grid return, 1 megohm	66-5103340*
R219	Resistor, cathode bias, 2200 ohms	66-2223340*
R220	Resistor, low-pass filter, 100,000 ohms	66-4103340*
R221	Resistor, plate load, 27,000 ohms	66-3273340*
R222	Resistor, screen voltage divider, 33,000 ohms	66-3333340*
R223	Resistor, screen voltage divider, 33,000 ohms	66-3333340*
R224	Resistor, grid return, 1 megohm	66-5103340*
R225	Resistor, bias filter, 680,000 ohms	66-4683340*
R226	Resistor, bias filter, 220,000 ohms	66-4223340*
R227	Resistor, grid return, 560,000 ohms	66-4563340*
R228	Resistor, plate load, 220,000 ohms	66-4223340*
R229	Resistor, plate load, 33,000 ohms	66-3333340*
R230	Resistor, bias filter, 220,000 ohms	66-4223340*
R231	Resistor, diode load, 560,000 ohms	66-4563340*

‡42-1877 Band switch, 5-section

MODEL 50-1727

REPLACEMENT PARTS LIST

SECTION 2 (Continued) AUDIO CIRCUITS

Reference Symbol	Description	Service Part No.
R232	Resistor, bias filter, 1.5 megohms	66-5153340*
R233	Resistor, bias filter, 3.3 megohms	66-5333340*
R234	Resistor, diode load, 120,000 ohms	66-4123340*
T200	Transformer, output	32-8379
WS1-1(R)	Switch-wafer section	Part of 42-1877‡
WS1-3(F)	Switch-wafer section	Part of 42-1877‡
WS1-4(R)	Switch-wafer section	Part of 42-1877‡
WS2	Switch, wafer, scratch eliminator off-on and fidelity (treble selector) switch	42-1876

SECTION 3 I-F, DETECTOR, AND A-V-C CIRCUITS

C300A	Condenser, fixed trimmer, pri., 1st FM i-f	Part of Z300
C300B	Condenser, fixed trimmer, sec., 1st FM i-f	Part of Z300
C301A	Condenser, fixed trimmer, pri., 1st AM i-f	Part of Z301
C301B	Condenser, fixed trimmer, sec., 1st AM i-f	Part of Z301
C302A	Condenser, fixed trimmer, pri., 2nd FM i-f	Part of Z302
C302B	Condenser, fixed trimmer, sec., 2nd FM i-f	Part of Z302
C303A	Condenser, fixed trimmer, pri., 2nd AM i-f	Part of Z303
C303B	Condenser, fixed trimmer, sec., 2nd AM i-f	Part of Z303
C304A	Condenser, fixed trimmer, pri., 3rd FM i-f	Part of Z304
C304B	Condenser, fixed trimmer, sec., 3rd FM i-f	Part of Z304
C305A	Condenser, fixed trimmer, pri., 3rd AM i-f	Part of Z305
C305B	Condenser, fixed trimmer, sec., 3rd AM i-f	Part of Z305
C305C	Condenser, r-f by-pass	Part of Z305
C305D	Condenser, r-f by-pass	Part of Z305
C306	Condenser, plate decoupling, .01 mf.	61-0120*
C307	Condenser, r-f by-pass, 100 mmf.	62-110009001
C308	Condenser (special), a-v-c filter, .01 mf.	30-4641
C309	Condenser, r-f by-pass, 1500 mmf.	62-215001011
C310	Condenser, (special), r-f by-pass, .01 mf.	30-4641
C311	Condenser, r-f by-pass, .01 mf.	61-0120*
C312	Condenser, screen by-pass, .003 mf.	61-0109*
C313	Condenser, filament by-pass, 100 mmf.	62-110009001
C314	Condenser, plate by-pass, .01 mf.	61-0120*
C315	Condenser, cathode by-pass, .05 mf.	61-0170*
C316	Condenser, filament by-pass, 100 mmf.	62-110009001
C317	Condenser, screen by-pass, .003 mf.	61-0109*
C318	Condenser, plate by-pass, .01 mf.	61-0120*
C319	Condenser, electrolytic, diode-load filter, 2 mf., 50v	30-2417-7
C320	Condenser, filament by-pass, 100 mmf.	62-110009001
C321	Condenser, de-emphasis, .04 mf.	45-3500-2
C322	Condenser, de-emphasis, .008 mf.	30-4112*
C323	Condenser, r-f by-pass, 100 mmf.	62-110009001
C324	Condenser, plate decoupling, .01 mf.	61-0120*
L300A	Coil, primary winding, 1st FM i-f	Part of Z300

(SECTION 3 (Continued)) I-F, DETECTOR, AND A-V-C CIRCUITS

Reference Symbol	Description	Service Part No.
L300B	Coil, secondary winding, 1st FM i-f	Part of Z300
L301A	Coil, primary winding, 1st AM i-f	Part of Z301
L301B	Coil, tertiary winding, 1st AM i-f	Part of Z301
L301C	Coil, secondary winding, 1st AM i-f	Part of Z301
L302A	Coil, primary winding, 2nd FM i-f	Part of Z302
L302B	Coil, secondary winding, 2nd FM i-f	Part of Z302
L303A	Coil, primary winding, 2nd AM i-f	Part of Z303
L303B	Coil, secondary winding, 2nd AM i-f	Part of Z303
L304A	Coil, primary winding, 3rd FM i-f	Part of Z304
L304B	Coil, secondary winding, 3rd FM i-f	Part of Z304
L304C	Coil, tertiary winding, 3rd FM i-f	Part of Z304
L305A	Coil, primary winding, 3rd AM i-f	Part of Z305
L305B	Coil, secondary winding, 3rd AM i-f	Part of Z305
R300	Resistor, plate dropping, 47,000 ohms	66-3473340*
R301	Resistor, grid return, 2.2 megohms	66-5223340*
R302	Resistor, a-v-c voltage divider, 470,000 ohms	66-4473340*
R303	Resistor, grid return, 2.2 megohms	66-5223340*
R304	Resistor, cathode bias (FM), 100 ohms	66-1103340*
R305	Resistor, cathode bias, 390 ohms	66-1393340*
R306	Resistor, plate dropping, 27,000 ohms	66-3273340*
R307	Resistor, screen dropping, 33,000 ohms	66-3333340*
R308	Resistor, plate decoupling, 1000 ohms	66-2103340*
R309	Resistor, a-v-c filter, 3.3 megohms	66-5333340*
R310	Resistor, cathode bias, 82 ohms	66-0823340*
R311	Resistor, screen dropping, 33,000 ohms	66-3333340*
R312	Resistor, plate decoupling, 1000 ohms	66-2103340*
R313	Resistor, diode load, 330,000 ohms	66-4333340*
R314	Resistor, i-f filter, 47,000 ohms	66-3473340*
R315	Resistor, FM diode load, 47,000 ohms	66-3473340*
R316	Resistor, isolating, 100,000 ohms	66-4103340*
R317	Resistor, FM detector load, 6.8 megohms	66-5683340*
TC300A	Tuning core, pri., 1st FM i-f	Part of Z300
TC300B	Tuning core, sec., 1st FM i-f	Part of Z300
TC301A	Tuning core, pri., 1st AM i-f	Part of Z301
TC301B	Tuning core, sec., 1st AM i-f	Part of Z301
TC302A	Tuning core, pri., 2nd FM i-f	Part of Z302
TC302B	Tuning core, sec., 2nd FM i-f	Part of Z302
TC303A	Tuning core, pri., 2nd AM i-f	Part of Z303
TC303B	Tuning core, sec., 2nd AM i-f	Part of Z303
TC304A	Tuning core, pri., 3rd FM i-f	Part of Z304
TC304B	Tuning core, sec., 3rd FM i-f	Part of Z304
TC305A	Tuning core, pri., 3rd AM i-f	Part of Z305
TC305B	Tuning core, sec., 3rd AM i-f	Part of Z305
WS1-2(F)	Switch-wafer section	Part of 42-1877‡
WS1-3(F)	Switch-wafer section	Part of 42-1877‡
WS1-3(R)	Switch-wafer section	Part of 42-1877‡
WS1-5(F)	Switch-wafer section	Part of 42-1877‡
WS1-5(R)	Switch-wafer section	Part of 42-1877‡
Z300	Transformer, 1st FM i-f	32-4257A
Z301	Transformer, 1st AM i-f	32-4258A
Z302	Transformer, 2nd FM i-f	32-4257-1A
Z303	Transformer, 2nd AM i-f	32-4160-3A
Z304	Transformer, 3rd FM i-f	32-4261-1
Z305	Transformer, 3rd AM i-f	32-4240-2A

‡42-1877 Band switch, 5-section

REPLACEMENT PARTS LIST

SECTION 4 R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
C400	Condenser, tuning gang (AM, 2-section; FM, 3-section)	31-2724-8
C400A	Condenser, trimmer, FM aerial	Part of C400
C400B	Condenser, trimmer, FM r.f.	Part of C400
C400C	Condenser, trimmer, FM osc.	Part of C400
C401	Condenser, d-c blocking, 33 mmf.	30-1224
C402	Condenser, filament by-pass, 100 mmf.	62-110009001
C403	Condenser, screen by-pass, 100 mmf.	62-110009001
C404	Condenser, cathode by-pass, 100 mmf.	62-110009001
C405	Condenser, d-c blocking, 33 mmf.	30-1224
C406	Condenser, r-f by-pass, 1500 mmf.	62-215001011
C407	Condenser, oscillator grid, 100 mmf.	62-110009001
C408	Condenser, filament by-pass, 100 mmf.	62-110009001
C409	Condenser, d-c blocking, 750 mmf.	60-10755301
C412	Condenser, d-c blocking, 220 mmf.	62-122001001
C413	Condenser, d-c blocking, 220 mmf.	62-122001001
C414	Condenser, ceramic, r-f voltage divider, 285 mmf.	30-1224-14
C415	Condenser, ceramic, r-f voltage divider, 485 mmf.	30-1224-15
C416	Condenser, aerial trimmer assembly, push-button (including C416A to C416E)	31-6479-3
C417	Condenser, trimmer assembly, 2-section	31-6476-8
C417A	Condenser, trimmer, Bc. aerial	Part of C417
C417B	Condenser, trimmer, Bc. oscillator	Part of C417
J400	Socket, loop aerial	27-8214-6
J401	Socket, FM dipole	27-6214-1
LA400	Loop aerial, Bc.	76-4337-1
L400	Coil, FM aerial	32-4158-1
L401	Coil, FM r-f	32-4159-1
L402	Coil, FM oscillator	32-4018-5
L403	Coil, r-f choke, FM plate load	32-4061-2
L404	Coil, r-f choke	32-4061-2
L405	Coil, r-f choke	32-4061-2
L406	Coil, oscillator assembly, push-button	
L406A	Coil, oscillator, 900—1600 kc.	32-3779
L406B	Coil, oscillator, 850—1500 kc.	32-3779
L406C	Coil, oscillator, 650—1300 kc.	32-4059-3
L406D	Coil, oscillator, 600—1200 kc.	32-4059-3
L406E	Coil, oscillator, 540—1000 kc.	32-4059-3
P400	Plug, wire, and lug assembly, FM aerial	41-3791-1
PB400A to PB400E	Push-button switch assembly	42-1881
R400	Resistor, grid return, 1 megohm	66-5103340*
R401	Resistor, cathode bias, 82 ohms	66-0823340*
R402	Resistor, screen dropping, 56,000 ohms	66-3563340*
R403	Resistor, plate decoupling, 1000 ohms	66-2103340*
R404	Resistor, grid return, 15,000 ohms	66-3153340*
R405	Resistor, cathode bias, 2200 ohms	66-2223340*
R406	Resistor, cathode bias, 1000 ohms	66-2103340*
T400	Transformer, Bc. aerial	32-4048-3
T401	Transformer, Bc. oscillator	32-4221-3
TC400A to TC400E	Tuning cores, push-button oscillator	Part of Z400
	†42-1877 Band switch, 5-section	

SECTION 4 (Continued) R-F AND CONVERTER CIRCUITS

Reference Symbol	Description	Service Part No.
WS1-2(F)	Switch-wafer section	Part of 42-1877†
WS1-2(R)	Switch-wafer section	Part of 42-1877†
WS1-3(R)	Switch-wafer section	Part of 42-1877†
WS1-4(F)	Switch-wafer section	Part of 42-1877†
WS1-4(R)	Switch-wafer section	Part of 42-1877†

MISCELLANEOUS

Description	Service Part No.
Cabinet and Cabinet Hardware	
Back assembly, wood	76-4344
Back, cabinet, masonite	54-7702
Baffle and cloth, speaker	40-7575
Baffle (cardboard) and cloth assembly, dummy	40-7575-1
Baffle, speaker	219138
Bezel	56-6375
Bin mechanism, R.H.	76-3223-6
Bin mechanism, L.H.	76-3223-5
Spring (2) bin mechanism, phono mtg.	56-4978
Bullet catch (2)	45-6002
Strike plate (2), bullet catch	45-6003
Cabinet	10731
Dome	45-6042
Door, record album	45-6473
Doors, matched set	45-6472
Door pull (2)	56-5398-1
Frame assembly, changer mounting	76-4104
Grommet (3) changer mtg.	54-4313
Spring (6) changer mtg.	56-3045FA15
Hinge, phono door	56-5713-3
Hinge, phono door	56-5713-4
Hinge, knife (stop), top, radio door	56-5713
Hinge, knife (stop), bottom, radio door	56-5713-2
Hinge, knife, R.H., top, record door	45-6449
Hinge, knife, L.H., bottom, record door	45-6449-1
Instrument panel	45-6474
Knob, door	56-5282-1
Metal grille (2)	56-6370
Cable-and-plug assembly, speaker	41-3896
Dial Scale Parts and Hardware	
Cord, drive (25-ft. spool)	45-8750*
Dial backplate-and-pulley assembly	76-4309
Knob (5)	54-4486
Pointer	54-4648
Carriage, pointer	56-6408
Spring (2), gang and pointer	56-2617
Push-button knob (6)	54-4292
Cap, plastic (6), push-button knob	54-4294
Tab kit	40-7593
Scale-and-backplate assembly	76-4298
Scale strap (2), end, scale mounting	56-2234-2
Scale strap, middle, scale mtg.	56-4756
Jewel	54-4304
Jewel-and-bin-lamp assembly	41-3896
Pilot-lamp-socket assembly, L.H.	27-6233-22
Pilot-lamp-socket assembly, R.H.	27-6233-25
Shaft assembly, tuning	76-4245
Socket, Loktal, 7A4	27-6177
Socket, Loktal, 7F8 (r-f section, mica-filled bakelite)	27-6213
Socket, Loktal, 7E7, 7F7	27-6138
Socket, miniature, 6BA6 (2)	27-6226
Socket, miniature, 6AU6 (r-f section, mica-filled bakelite)	27-6203-1
Socket, miniature 6T8	27-6203-5
Socket, octal (3)	27-6174
Spring, changer mounting (3)	56-7059FA9
Spring, changer mounting (3)	56-7059-1FJ47

MODELS 51-530, 51-530-I,
51-532, 51-532-E, 51-532-I,
51-534, 51-534-I

SPECIFICATIONS

CABINET

Model 51-530	molded plastic, mottled mahog- any
Model 51-530-I	molded plastic, ivory
Model 51-532	molded plastic, mottled mahog- any
Model 51-532-E	molded plastic, ebony
Model 51-532-I	molded plastic, ivory
Model 51-534	molded plastic, mottled mahog- any
Model 51-534-I	molded plastic, ivory

CIRCUIT	5-tube superheterodyne
FREQUENCY RANGE	540—1630 kc.
AUDIO OUTPUT	1.2 watts
OPERATING VOLTAGE	105—125 volts, a.c. or d.c.
POWER CONSUMPTION	30 watts
AERIAL	high impedance loop: connector for external aerial
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES	7A8, 12BA6, 14B6, 50L6GT, 35Z5GT

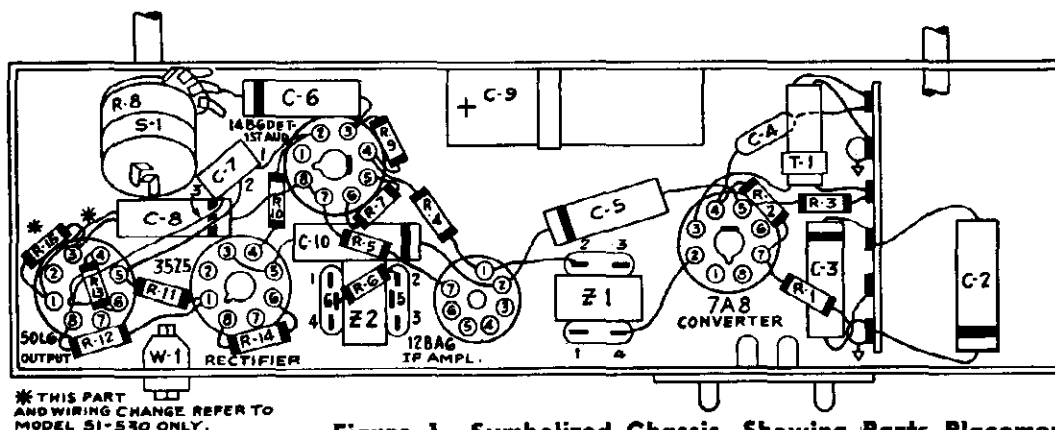


Figure 1. Symbolized Chassis, Showing Parts Placement

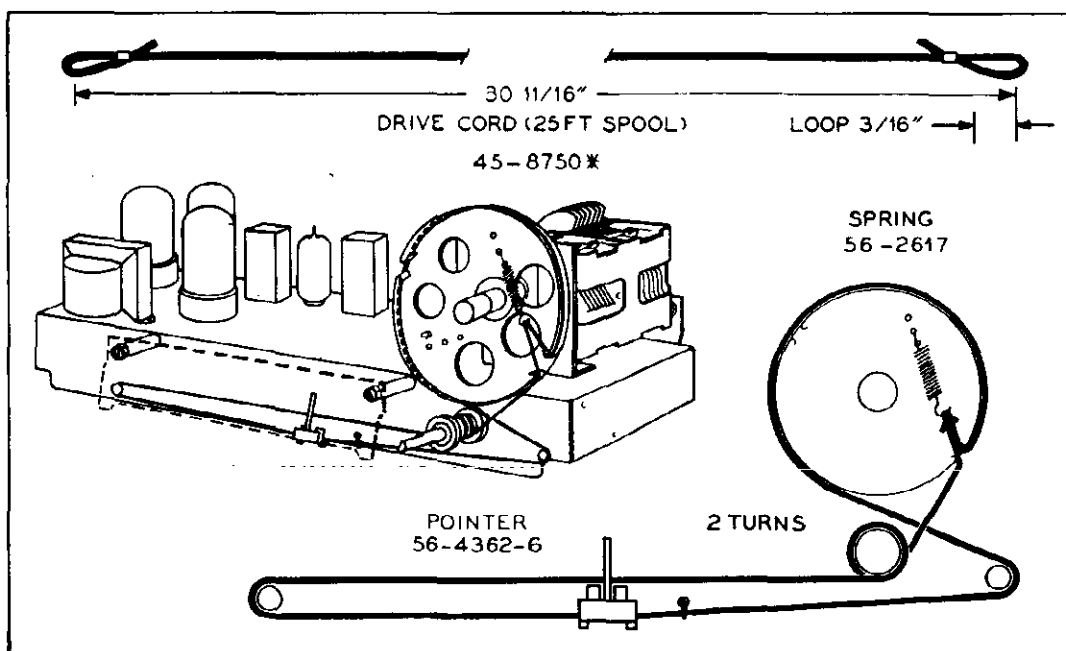


Figure 2. Drive-Cord Installation Details, Model 51-530

MODELS 51-530, 51-530-I,
51-532, 51-532-E, 51-532-
51-534, 51-534-I

ALIGNMENT PROCEDURE

CONTROLS: Turn on radio and set volume control to maximum.

DIAL POINTER: Turn tuning condenser to full-mesh position. Set dial pointer to index mark, located to left of "55."

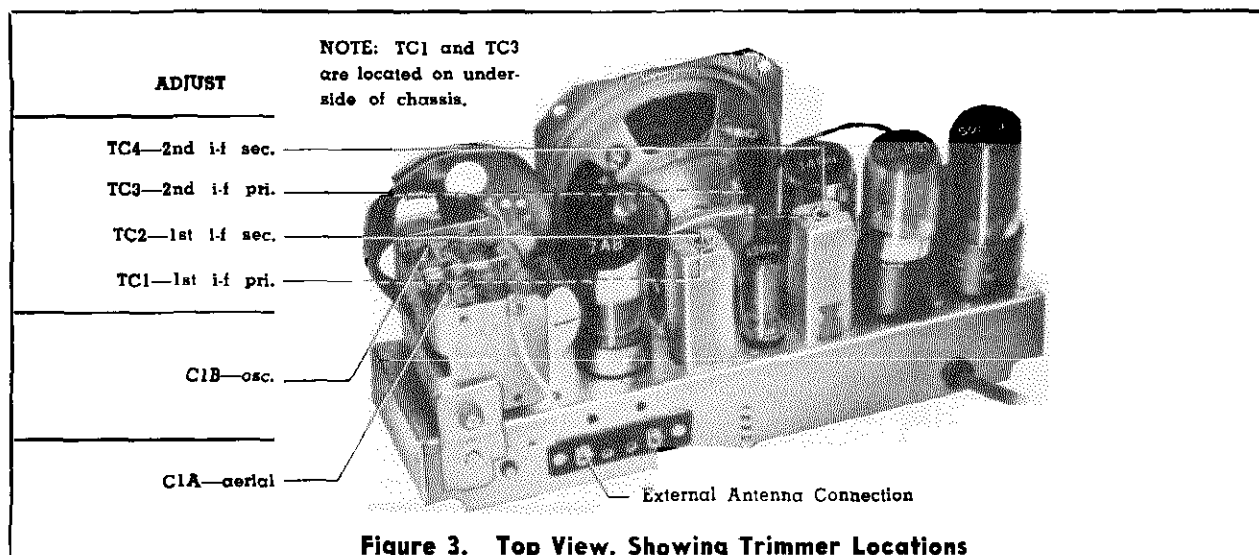
OUTPUT METER: Connect across voice-coil terminals.

SIGNAL GENERATOR: Connect as indicated in chart. Use modulated output.

OUTPUT LEVEL: During alignment, attenuate signal generator output to maintain output-meter indication below 1.25 volts.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B—: output lead through .1- μ f. condenser to pin 6 of 7A8 converter	455 kc.	540 kc. (gang fully meshed)	Adjust tuning cores, in order given for maximum output.	TC4—2nd i-f sec. TC3—2nd i-f pri. TC2—1st i-f sec. TC1—1st i-f pri.
2	Radiating loop; see note below.	1600 kc.	1600 kc.	Adjust trimmer for maximum output.	C1B—osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust trimmer for maximum output.	C1A—aerial

RADIATING LOOP: Make up a 6—8 turn, 6-inch-diameter loop from insulated wire; connect to signal-generator leads and place near radio loop antenna.



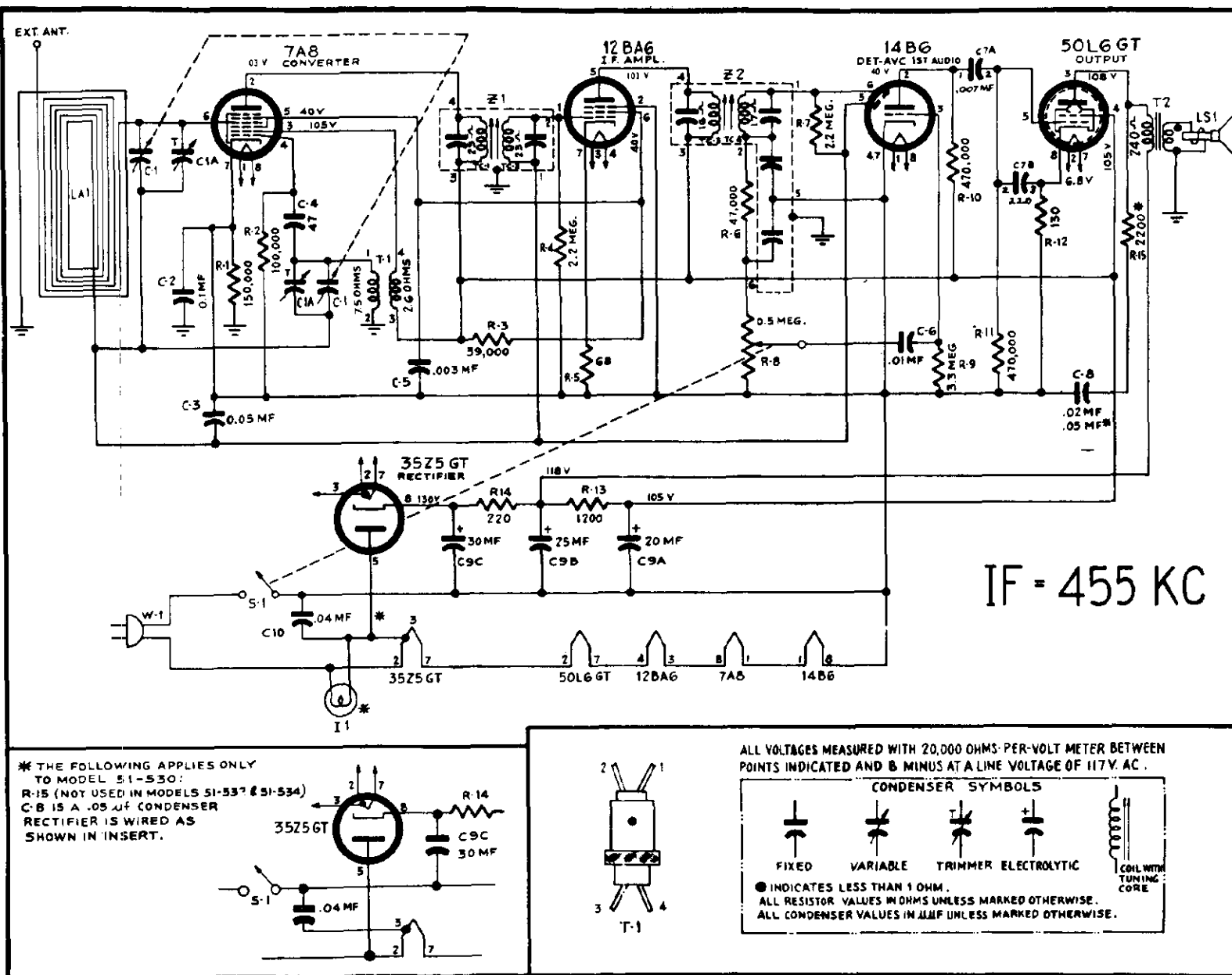


Figure 4. Philco Models 51-530, 51-532, 51-534 Schematic Diagram

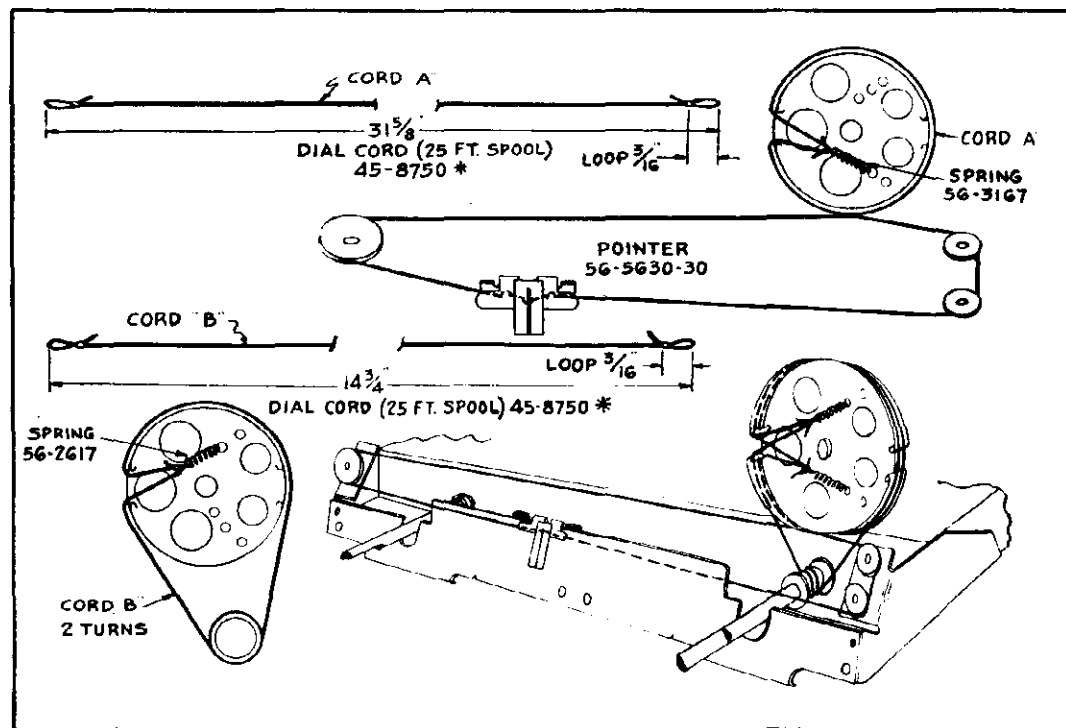


Figure 5. Drive-Cord Installation Details, Model 51-532

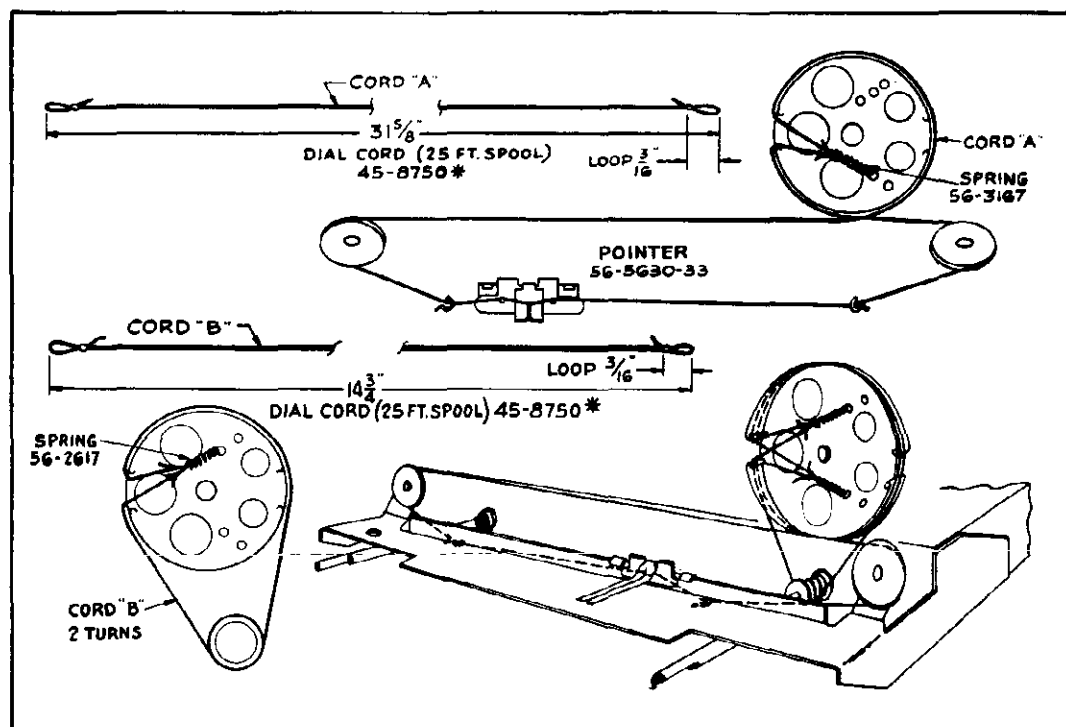


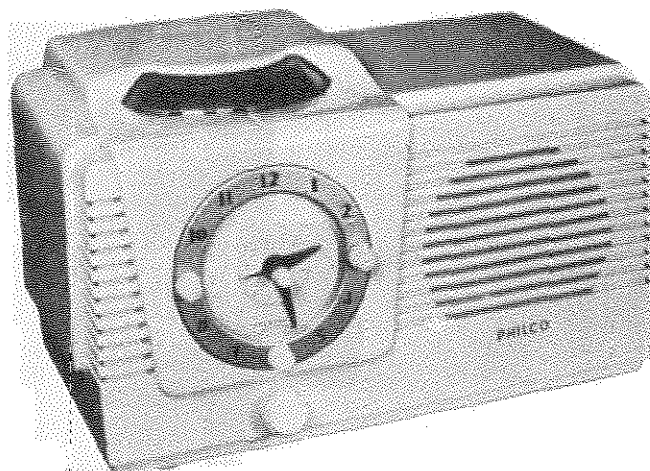
Figure 6. Drive-Cord Installation Details, Model 51-534

MODELS 51-530, 51-530-I,
51-532, 51-532-E, 51-532-I,
51-534, 51-534-I

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts. Also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Reference Symbol	Description	Service Part No.	MISCELLANEOUS	Service Part No.
C1	Condenser, tuning gang		MODEL 51-530	
	Model 51-530	31-2751-6	Cabinet, mottled mahogany	10750
	Models 51-532 and 51-534	31-2751	Cabinet, ivory	10750-1
C2	Condenser, i-f by-pass, .1 μ f.	61-0113*	Back	54-7777
C3	Condenser, a-v-c by-pass, .05 μ f.	61-0122*	Fastener, back mounting (4)	W2235-2FA9
C4	Condenser, d-c blocking, 47 μ f.	60-00475417*	Knob (2)	54-4527-11
C5	Condenser, screen by-pass, .003 μ f.	61-0108*	Dial backplate assembly	76-4658
C6	Condenser, d-c blocking, .01 μ f.	61-0120*	Pointer	58-4362-6
C7	Condenser, dual ceramic	30-1239-4	Pulley and shaft assembly	76-3671-3
C7A	Condenser, d-c blocking, .007 μ f.	Part of C7	MODEL 51-532	
C7B	Condenser, grid by-pass, 220 μ f.	Part of C7	Cabinet, mahogany	10769-3
C8	Condenser, tone compensation,		Dial scale	54-5069-1
	Model 51-530, .05 μ f.	61-0122*	Knob (2)	54-4718-2
	Models 51-532 and 51-534, .02 μ f.	61-0108*	Cabinet, ebony	10769-4
C9	Condenser, electrolytic, 3-section	30-2573	Dial scale	54-5069-2
C9A	Condenser, filter, 20 μ f., 150v	Part of C9	Knob (2)	54-4718-2
C9B	Condenser, filter, 25 μ f., 150v	Part of C9	Cabinet, ivory	10769-5
C9C	Condenser, filter, 30 μ f., 150v	Part of C9	Dial scale	54-5069-3
C10	Condenser, line by-pass, .04 μ f.	45-3500-2*	Knob (2)	54-4718-22
I1	Pilot lamp—Models 51-532 and 51-534 only	34-2068	Back	54-7911
LA1	Loop antenna		Fastener, back mounting (4)	W2235FA9
	Model 51-530	32-4052-33	Baffle, speaker	54-7761
	Model 51-532	32-4052-38	Backplate, bracket and pulley assembly	76-6235
	Model 51-534	32-4052-51	Fastener, pilot lamp shield mounting (2)	W2235-1FA9
LS1	Speaker, 4" p.m.		Grille, plastic	54-4728-2
	Models 51-530 and 51-532	36-1627-5	Speed clip, grille mounting (4)	1W56920FE7
	Model 51-534	36-1625-3	Pointer	56-5630-30
R1	Resistor, leakage, 150,000 ohms	66-4158340*	Spring, pointer drive	56-3167
R2	Resistor, grid return, 100,000 ohms	66-4108340*	Pulley and shaft assembly	76-3671-2
R3	Resistor, screen dropping, 39,000 ohms	66-3398340*	Scale strap, dial mounting	
R4	Resistor, grid return, 2.2 megohms	66-5228340*	LH	56-7373
R5	Resistor, cathode bias, 68 ohms	66-0888340*	RH	56-7373-1
R6	Resistor, i-f filter, 47,000 ohms	66-3478340*	Socket assembly, pilot lamp	27-6233-18
R7	Resistor, diode load, 2.2 megohms	66-5228340*	MODEL 51-534	
R8	Volume control, 500,000 ohms		Cabinet, mahogany	10836
	Model 51-530	33-5538-7	Cabinet, ivory	10836-1
	Model 51-532	33-5566-4	Back	54-8249
	Model 51-534	33-5566-30	Fastener, back mounting (4)	W2235FA9
R9	Resistor, grid return, 3.3 megohms	66-5338340*	Clips, baffle mounting	1W56920FE7
R10	Resistor, plate load, 470,000 ohms	66-4478340*	Dial scale	54-5104
R11	Resistor, grid return, 470,000 ohms	66-4478340*	Screw, scale mounting (2)	1W14504FA1
R12	Resistor, cathode bias, 130 ohms	66-1128340*	Knob (2)	54-4718-3
R13	Resistor, filter, 1200 ohms	66-2128340*	Backplate, bracket and pulley assembly	76-6317
R14	Resistor, filter, 220 ohms, 1 watt	66-1224340*	Fastener, pilot lamp shield mounting (2)	W2235-1FA9
S1	Switch, off-on	Part of R8	Pointer	56-5630-33
T1	Transformer, oscillator	32-4263	Spring, pointer drive	56-3167
T2	Transformer, output	32-8384	Pulley and shaft assembly	76-3671-8
W1	Line cord	L-2183*	Socket assembly, pilot lamp	27-6233-18
Z1	Transformer, 1st i-f	32-4160-5A	PARTS COMMON TO ALL MODELS	
Z2	Transformer, 2nd i-f	32-4240-2A	Bushing, pulley and shaft	27-9437
			Clamp, electrolytic mounting	56-1466
			Drive cord, 25 foot spool	45-8750*
			Fastener, hairpin, pulley and shaft	57-1468FA3
			Screw and washer combination, set mounting (3)	1W37654FA3
			Socket, octal (2)	27-6269
			Socket, miniature	27-6265
			Socket, octal (2)	27-8174
			Spring, gang drive	56-2617



SPECIFICATIONS

CABINET

Model 51-537Molded Phenolic, brown

Model 51-537-IMolded Phenolic, Ivory

FREQUENCY RANGE540—1600 kc.

AUDIO OUTPUT1 watt

OPERATING VOLTAGE117 volts, a.c.

POWER CONSUMPTION30 watts

AERIALHigh-impedance loop, connector for external aerial

INTERMEDIATE FREQUENCY455 kc.

PHILCO TUBES (5)7A8, 14A7, 14B6, 50L6GT, 35Y4

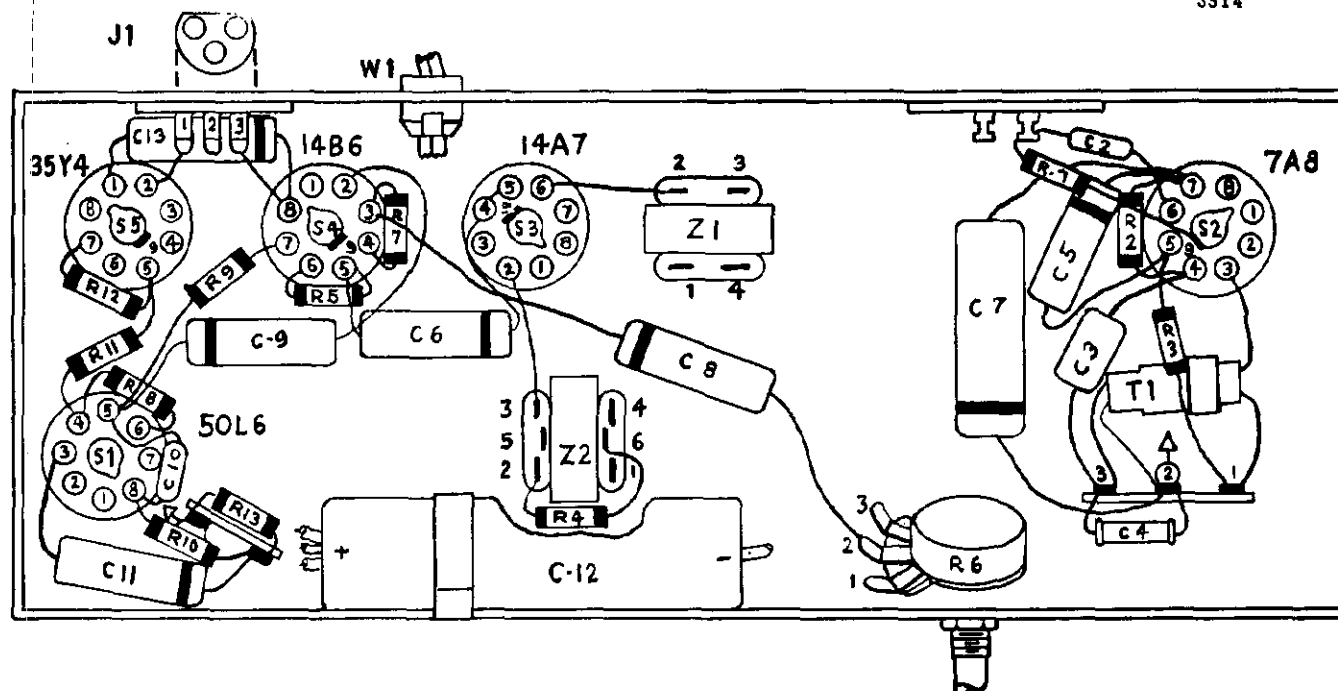


Figure 1 Base View Showing Symbolized Chassis

MODELS 51-537,
51-537-I

ALIGNMENT PROCEDURE

RADIO CONTROLS — Set volume control to maximum. Set tuning control as indicated in chart.

OUTPUT METER — connect across voice-coil terminals.

SIGNAL GENERATOR — Connect generator and set frequency as indicated in chart. Use modulated output.

OUTPUT LEVEL — During alignment, adjust signal-generator output to hold output-meter reading below 1.25 volts.

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Connect ground lead to B-; output lead through .1- μ f. condenser to grid (pin 6) of 7A8.	455 kc.	Tuning condenser fully meshed.	Adjust tuning cores, in order given, for maximum output.	TC4—2nd i-f sec. TC3—2nd i-f pri. TC2—1st i-f sec. TC1—1st i-f pri.
2	Radiating loop (see note below).	1600 kc.	1600 kc.	Adjust trimmer for maximum output.	C1B—Osc.
3	Same as step 2.	1500 kc.	1500 kc.	Adjust trimmer for maximum output.	C1A—Aerial

RADIATING LOOP: Make up a 6—8 turn, 6-inch-diameter loop, from insulated wire; connect to signal-generator leads and place near radio loop aerial.

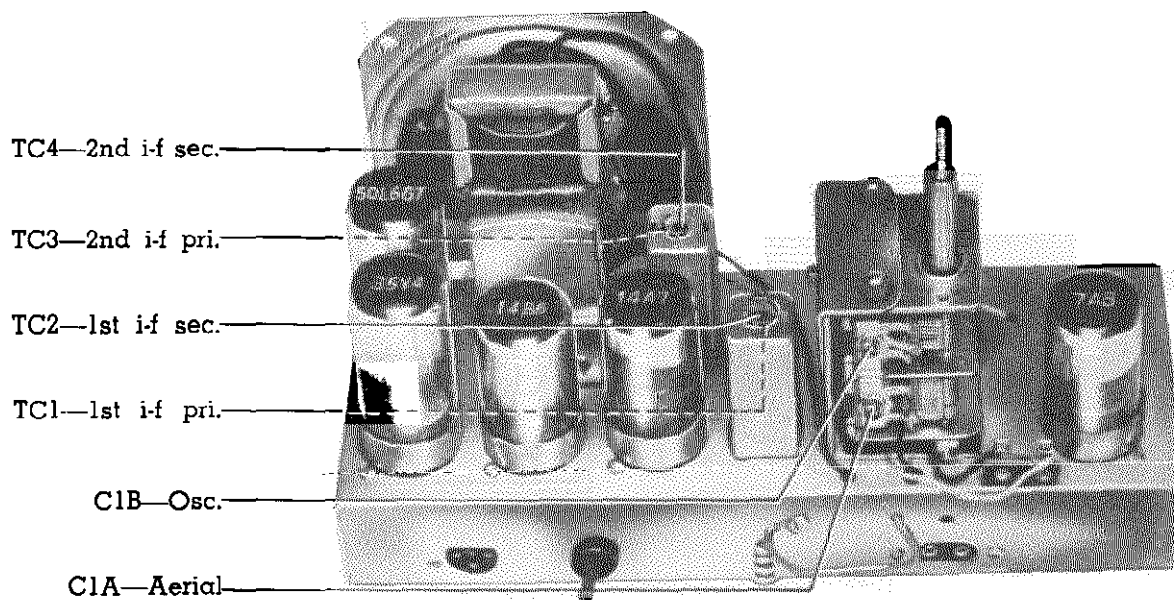


Figure 2. Top View, Showing Trimmer Location

NOTE: TC1 and TC3 are located on underside of chassis.

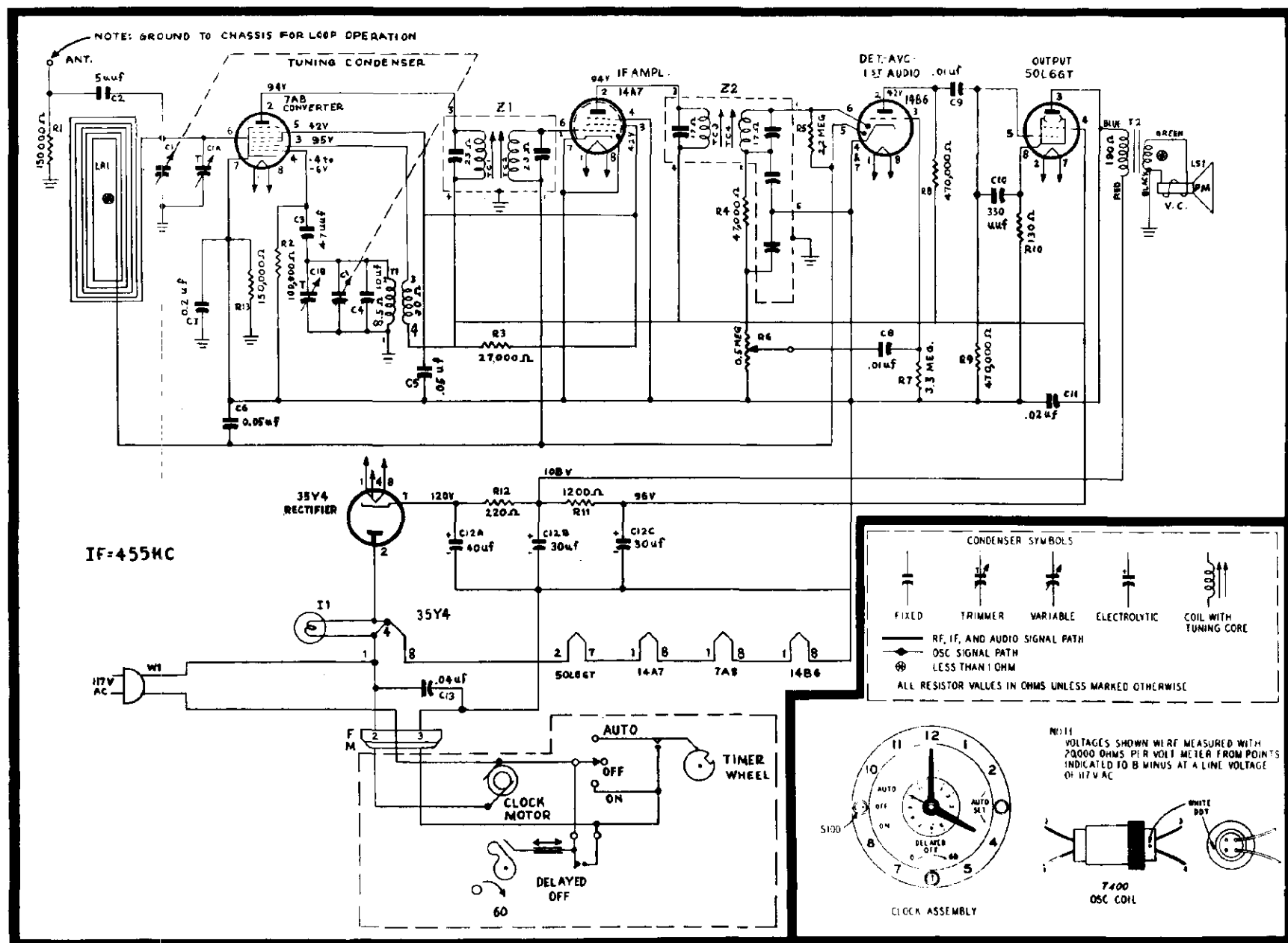


Figure 3. Philco Radio-Clock Models 51-537 and 51-537-I

MODELS 51-537,
51-537-I

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Reference Symbol	Description	Service Part No.	MISCELLANEOUS	
			Description	Service Part No.
C1	Condenser, tuning gang, 2-section	31-2751-5	Cabinet	
C1A	Condenser, trimmer, aerial	Part of C1	Model 51-537	10745
C1B	Condenser, trimmer, oscillator	Part of C1	Model 51-537-I	10745-1
C2	Condenser, aerial coupling, 5 μ f.	30-1230	Back	54-7631
C3	Condenser, d-c blocking, 47 μ f.	60-00475417*	Fastener (4), back mounting	W2235-2FA9
C4	Condenser, temperature compensating, 7.5 μ f.	30-1224-65	Baffle and cloth assembly	
C5	Condenser, screen by-pass, .05 μ f.	61-0122*	Model 51-537	40-7730
C6	Condenser, a-v-c by-pass, .05 μ f.	61-0122*	Model 51-537-I	40-7730-1
C7	Condenser, by-pass, .2 μ f.	45-3500-3*	Jewel	54-4304
C8	Condenser, d-c blocking, .01 μ f.	61-0120*	Knobs	
C9	Condenser, d-c blocking, .01 μ f.	61-0120*	Model 51-537 Volume control	27-4820
C10	Condenser, parasitic suppressor, 330 μ f.	62-133001001*	"AUTO-OFF-ON" and "DELAYED OFF"	54-4736
C11	Condenser, tone compensation, .02 μ f.	61-0108*	"AUTO SET"	54-4736-2
C12	Condenser, electrolytic, 3-section	30-2575-27	"TIME SET"	54-4736-4
C12A	Condenser, filter, 30 μ f., 150 wvdc	Part of C12	Model 51-537-I Volume control	54-4118
C12B	Condenser, filter, 25 μ f., 150 wvdc	Part of C12	"AUTO-OFF-ON" and "DELAYED OFF"	54-4736-1
C12C	Condenser, filter, 20 μ f., 150 wvdc	Part of C12	"AUTO SET"	54-4736-3
C13	Condenser, line filter, .04 μ f.	45-3500-2*	"TIME SET"	54-4736-4
I1	Pilot lamp	34-2068	Clamp, electrolytic mounting	56-1466
J1	Socket, clock motor and switch	27-6126	Clip, pilot lamp mounting	56-3545-6FA3
LA1	Loop aerial	32-4052-32	Clock and cable assembly	
LS1	Speaker, p-m	36-1627	Model 51-537, 60v	76-4840
R1	Resistor, isolating, 150,000 ohms	66-4158340*	50v	76-5117
R2	Resistor, grid return, 100,000 ohms	66-4108340*	Model 51-537-I, 80v	76-4840
R3	Resistor, screen dropping, 27,000 ohms	66-3278340*	50v	76-5118
R4	Resistor, i-f filter, 47,000 ohms	66-3478340*	Clock cover	56-6710
R5	Resistor, diode load, 2.2 megohms	66-5228340*	Dial scale, tuning knob	54-5055-2
R6	Volume control, 500,000 ohms	33-5565-6	Leak assembly, aerial	76-1472
R7	Resistor, grid return, 3.3 megohms	66-5338340*	Mounts, rubber, gang mounting (3)	27-4771-1
R8	Resistor, plate load, 470,000 ohms	66-4478340*	Pilot lamp assembly	27-6233-6
R9	Resistor, grid return, 470,000 ohms	66-4478340*	Shield, pilot lamp	56-6307-4FA3
R10	Resistor, cathode bias, 130 ohms	66-1128340*	Socket, Loktal (4)	27-6207
R11	Resistor, filter, 1200 ohms	66-2128340*	Socket, octal	27-6174
R12	Resistor, filter, 220 ohms, 1 watt	66-1224340*		
R13	Resistor, leakage, 150,000 ohms	66-4158340*		
S1	Switch, AUTO-OFF-ON	Part of clock assembly		
T1	Transformer, oscillator	32-4263		
T2	Transformer, output	Part of LS1		
W1	Line cord	L-2183*		
Z1	Transformer, 1st IF	32-4160-6A		
Z2	Transformer, 2nd IF	32-4240A		

SPECIFICATIONS

CABINET	Plastic, portable
CIRCUIT	Four-tube superheterodyne plus selenium rectifier
FREQUENCY RANGE	540—1620 kc.
AUDIO OUTPUT	
A-C Operation	150 mw.
Battery Operation	150 mw.
OPERATING VOLTAGE	117 volts, a.c./d.c., or 1.5-volt "A" and 90-volt "B" battery
POWER CONSUMPTION	
A-C Operation	11 watts
Battery Operation	13 ma. from 90-volt "B" 250 ma. from 1.5-volt "A"
AERIAL	Built-in high-impedance loop; provision for connecting external aerial.
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (4)	1R5 converter, 1U4 i-f ampl., 1U5 det.-a.v.c., 1st audio, 3V4 output
BATTERY TYPE	P-364

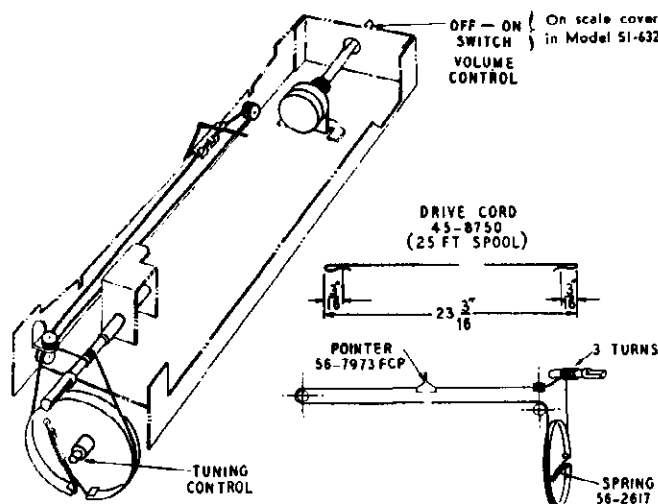


Figure 1. Drive-Cord Installation Details

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through .1-μf. condenser to antenna section of tuning condenser.	455 kc.	Tuning gang fully meshed	Adjust, in order given, for maximum output.	TC4—2nd i-f sec. TC3—1st i-f sec. TC2—1st i-f pri.
2	Radiating loop. See note below.	1620 kc.	1620 kc.	Adjust for maximum output.	C1B—osc. trimmer C1A—aerial trimmer
3	Same as step 2.	535 kc.	Tuning gang fully meshed	Adjust for maximum output; then repeat steps 2 and 3 until no further increase in output is obtained. This step SHOULD NOT be necessary unless the oscillator transformer has been replaced.	TC1—osc. core

RADIATING LOOP: Make up a six-to-eight turn, 6-inch-diameter loop, using insulated wire; connect to signal-generator leads, and place near radio loop aerial.

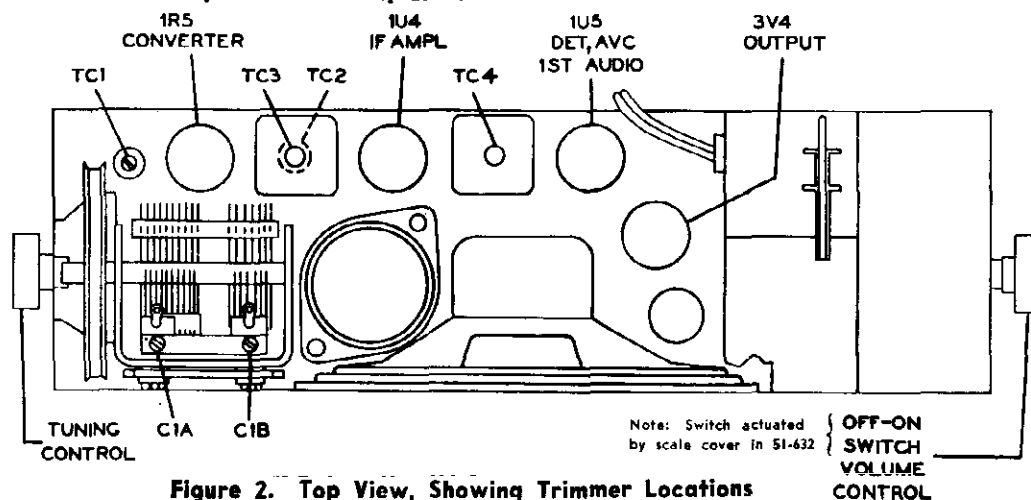


Figure 2. Top View, Showing Trimmer Locations
ALIGNMENT PROCEDURE

DIAL POINTER—With tuning-condenser plates fully meshed, set pointer to coincide with first index hole above pointer.

OUTPUT METER—Connect across speaker voice coil terminals.

SIGNAL GENERATOR—Connect signal generator as indicated in chart. Use modulated output.

RADIO CONTROLS—Set volume control to maximum. Set tuning control and signal-generator frequency as indicated in chart.

MODELS 51-629,
51-632

OUTPUT LEVEL—During alignment, signal-generator output must be attenuated to maintain output-meter reading below .5 volt.

NOTE: While the radio is being aligned, the batteries (if used) should be in the same position with respect to the chassis and loop as they are in the cabinet.

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, tuning gang, 2-section		R15	Resistor, filter, 820 ohms	66-1828340*
	Model 51-629	31-2735-3	R16	Resistor, current limiting, 120 ohms	33-1334-14
	Model 51-632	31-2735-2	R17	Resistor, bias, 1500 ohms	66-2158340*
C1A	Condenser, trimmer, antenna	Part of C1	R18	Resistor, bias, 330 ohms	66-1338340*
C1B	Condenser, trimmer, oscillator	Part of C1	S1	Switch, off-on	
C2	Condenser, neutralizing, 1.5 μ f.	30-1221-3		Model 51-629	Part of R8
C3	Condenser, a-v-c by-pass, .05 μ f.	61-0122*		Model 51-632	42-1941
C4	Condenser, i-f by-pass, .1 μ f.	61-0113*	T1	Transformer, oscillator	32-4453
C5	Condenser, d-c blocking, 47 μ f.	62-051009001*	T2	Transformer, output	32-8434
C6	Condenser, dual ceramic	30-1239	W1	Line cord	41-3821-6*
C6A	Condenser, osc. B+ by-pass, .004 μ f.	Part of C6	WS	Water switch, voltage change-over	42-1925
C6B	Condenser, grid by-pass, .004 μ f.	Part of C6	Z1	Transformer, 1st i-f	32-4160-4A
C7	Condenser, temperature compensation, 7.5 μ f.	30-1224-65	Z2	Transformer, 2nd i-f	32-4454-1A
C8	Condenser, filament by-pass, .22 μ f.	45-3505-49			
C9	Condenser, neutralizing, 2.2 μ f.	30-1221-4			
C10	Condenser, ceramic, 4-section	30-1237			
C10A	Condenser, d-c blocking, .001 μ f.	Part of C10			
C10B	Condenser, screen by-pass, .01 μ f.	Part of C10			
C10C	Condenser, d-c blocking, .002 μ f.	Part of C10			
C10D	Condenser, grid by-pass, 220 μ f.	Part of C10			
C11	Condenser, tone compensation, .004 μ f.	61-0179*			
C12	Condenser, electrolytic, filament by-pass, 50 μ f., 25v	30-2417-12			
C13	Condenser, electrolytic, 3-section	30-2568-39			
C13A	Condenser, filter, 40 μ f., 150v	Part of C13			
C13B	Condenser, filter, 10 μ f., 150v	Part of C13			
C13C	Condenser, filter, 50 μ f., 150v	Part of C13			
C14	Condenser, line by-pass, .047 μ f.	45-3505-45*			
CR1	Selenium rectifier, 75 ma. at 117 volts	34-8003-1*			
LA1	Loop aerial				
	Model 51-629 (flat loop)	32-4052-52			
	Model 51-632 (Magna core)	32-4455-1			
LS1	Speaker, 4-inch p-m	33-1627-11			
R1	Resistor, grid return, 3.3 megohms	66-5338340*			
R2	Resistor, grid return, 100,000 ohms	66-4108340*			
R3	Resistor, bias, 680 ohms	66-1688340*			
R4	Resistor, leakage, 150,000 ohms	66-4158340*			
R5	Resistor, oscillator dropping, 22,000 ohms	66-3228340*			
R6	Resistor, grid return, 3.3 megohms	66-5338340*			
R7	Resistor, a-v-c filter, 2.2 megohms	66-5228340*			
R8	Volume control, 1 megohm				
	Model 51-629 (with "off-on" switch)	33-5566-21			
	Model 51-632 (control only)	33-5565-23			
R9	Resistor, grid return, 4.7 megohms	66-5478340*			
R10	Resistor, screen dropping, 4.7 megohms	66-5478340*			
R11	Resistor, plate load, 1 megohm	66-5108340*			
R12	Resistor, grid return, 2.2 megohms	66-5228340*			
R13	Resistor, bias, 820 ohms	66-1828340*			
R14	Resistor, filament dropping and filter, 2100 ohms (center-tapped)	33-3445			

MISCELLANEOUS

Description	Service Part No.
Cabinet (Maroon), 51-629	10816
Back, maroon	54-4810
Cabinet (Green), 51-629	10816-1
Back, green	54-4810-1
Clip, back (2)	56-3807
Fastener, back (2)	1W60660FE7
Handle and bracket assembly	76-6198
Hinge (2)	56-7968
Knob (2)	76-6206
Pointer	56-7973-1FCP
Scale, dial	54-5098
Clip (2), scale mounting	56-8449FA3
Cabinet (Maroon), 51-632	10815
Back	54-4806
Baffle and cloth assembly	40-7924
Clip, back (2)	56-3807-3
Cover and lid assembly	76-6146
Fastener, back (2)	1W60660FE7
Handle	76-6177
Hinge (2)	56-7968
Knob and escutcheon assembly (2)	76-6210
Pointer	56-7973-1FCP
Scale, dial	54-5097
Cable and plug, battery	41-3477-2
Insulator, electrolytic-condenser mounting	27-9508
Mount, rubber, tuning gang (3)	27-4099-3
Spring, drive cord	56-2617
Socket, tube, 1R5 and 1U4 (2)	27-6203
Socket, tube, 1U5 and 3V4 (2)	27-6203-12
Tube shield, 1U5	56-3978-1FA3
Tuning shaft	56-7906FA42
Retaining ring	1W60978FA3

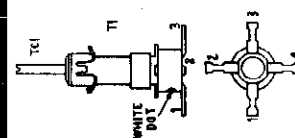


Figure 3. Philco Radio Models 51-629 and 51-632, Schematic Diagram

MODEL 51-631

SPECIFICATIONS

CABINET	Plastic, personal portable
CIRCUIT	Four-tube superheterodyne plus selenium rectifier
FREQUENCY RANGE	540—1620 kc.
AUDIO OUTPUT	
A-C Operation	150 mw.
Battery Operation	75 mw.
OPERATING VOLTAGE	117 volts, a.c./d.c., or 1.5-volt "A" battery and 67.5-volt "B" battery
POWER CONSUMPTION	
A-C Operation	11 watts
Battery Operation	9.5 ma. from 67.5-volt "B" battery 250 ma. from 1.5-volt "A" battery
AERIAL	Built-in high-impedance loop with iron core; provision for connecting external aerial.
INTERMEDIATE FREQUENCY	455 kc.
PHILCO TUBES (4)	1R5 converter, 1U4 i-f ampl., 1U5 det.-a.v.c.-1st audio, 3V4 output

ALIGNMENT PROCEDURE

RADIO CONTROLS—Set volume control to maximum. Set tuning control and signal-generator frequency as indicated in chart.

OUTPUT LEVEL—During alignment, signal-generator output must be attenuated to maintain output-meter reading below .5 volt.

NOTE: While the radio is being aligned, the batteries (if used) should be in the same position with respect to the chassis and loop as they are in the cabinet.

DIAL POINTER—With tuning-condenser plates fully meshed, set pointer to coincide with first index hole above pointer.

OUTPUT METER—Connect across speaker voice coil terminals.

SIGNAL GENERATOR—Connect signal generator as indicated in chart. Use modulated output.

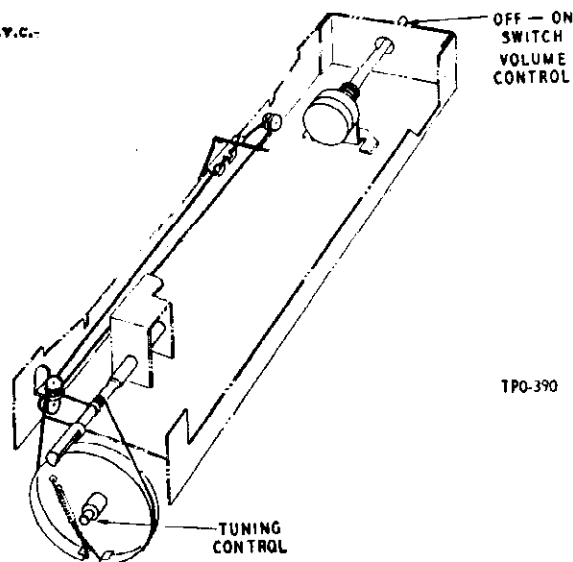
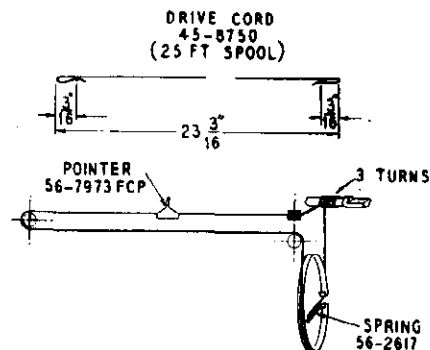


Figure 1. Drive-Cord Installation Details

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through .1-uf. condenser to antenna section of tuning condenser.	455 kc.	Tuning gang fully meshed	Adjust, in order given, for maximum output.	TC5—2nd i-f sec. TC4—2nd i-f pri. TC3—1st i-f sec. TC2—1st i-f pri.
2	Radiating loop. See note below.	1620 kc.	1620 kc.	Adjust for maximum output.	C1B—osc. trimmer C1A—aerial trimmer
3	Same as step 2.	535 kc.	Tuning gang fully meshed	Adjust for maximum output; then repeat steps 2 and 3 until no further increase in output is obtained. This step SHOULD NOT be necessary unless the oscillator transformer has been replaced.	TC1—osc. core

RADIATING LOOP: Make up a six-to-eight turn, 6-inch-diameter loop, using insulated wire; connect to signal-generator leads, and place near radio loop aerial.

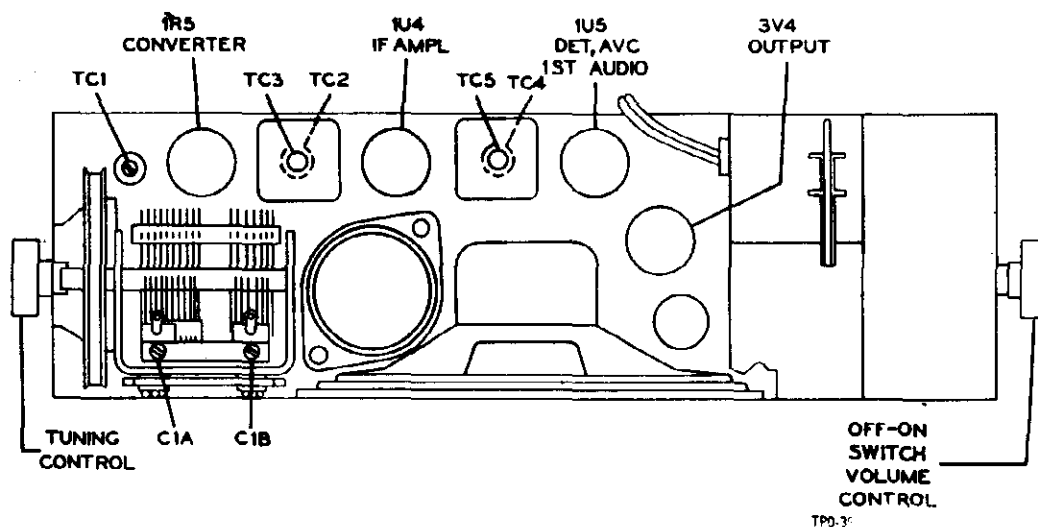


Figure 2. Top View, Showing Trimmer Locations
REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, tuning gang, 2-section	31-2735-2	R11	Resistor, plate load, 1 megohm	66-5108340*
C1A	Condenser, trimmer, antenna	Part of C1	R12	Resistor, grid return, 2.2 megohms	66-5228340*
C1B	Condenser, trimmer, oscillator	Part of C1	R13	Resistor, bias, 820 ohms	66-1828340*
C2	Condenser, neutralizing, 1.5 μ f.	30-1221-3	R14	Resistor, filament dropping and filter, 2100 ohms (center-tapped)	33-3445
C3	Condenser, a-v-c by-pass, .05 μ f.	61-0122*	R15	Resistor, filter, 820 ohms	66-1828340*
C4	Condenser, i-f by-pass, .1 μ f.	61-0113*	R16	Resistor, current limiting, 120 ohms	33-1334-14
C5	Condenser, d-c blocking, 47 μ f.	62-051009001*	R17	Resistor, bias, 1500 ohms	66-2158340*
C6	Condenser, dual ceramic	30-1239	R18	Resistor, bias, 330 ohms	66-1338340*
C6A	Condenser, osc. B+ by-pass, .004 μ f.	Part of C6	S1	Switch, off-on	Part of R8
C6B	Condenser, grid by-pass, .004 μ f.	Part of C6	T1	Transformer, oscillator	32-4453
C7	Condenser, temperature compensation, 7.5 μ f.	30-1224-85	T2	Transformer, output	32-8434
C8	Condenser, filament by-pass, .22 μ f.	45-3505-49	W1	Line cord	4-3821-6*
C9	Condenser, neutralizing, 2.2 μ f.	30-1221-4	W3	Water switch, voltage change-over	42-1925
C10	Condenser, ceramic, 4-section	30-1237	Z1	Transformer, 1st i-f	32-4180-4A
C10A	Condenser, d-c blocking, .001 μ f.	Part of C10	Z2	Transformer, 2nd i-f	32-4454-1A
C10B	Condenser, screen by-pass, .01 μ f.	Part of C10			
C10C	Condenser, d-c blocking, .002 μ f.	Part of C10			
C10D	Condenser, grid by-pass, 220 μ f.	Part of C10			
C11	Condenser, tone compensation, .004 μ f.	61-0179*			
C12	Condenser, electrolytic, filament by-pass, 50 μ f., 25v	30-2417-12			
C13	Condenser, electrolytic, 3-section	30-2568-39			
C13A	Condenser, filter, 40 μ f., 150v	Part of C13			
C13B	Condenser, filter, 10 μ f., 150v	Part of C13			
C13C	Condenser, filter, 50 μ f., 150v	Part of C13			
C14	Condenser, line by-pass, .047 μ f.	45-3505-45*			
CR1	Selenium rectifier, 75 ma. at 117 volts	34-8003-1*			
LA1	Loop aerial	32-4455			
LS1	Speaker, 4-inch p-m	36-1637			
R1	Resistor, grid return, 3.3 megohms	66-5338340*			
R2	Resistor, grid return, 100,000 ohms	66-4108340*			
R3	Resistor, bias, 680 ohms	66-1688340*			
R4	Resistor, leakage, 150,000 ohms	66-4158340*			
R5	Resistor, oscillator dropping, 22,000 ohms	66-3228340*			
R6	Resistor, grid return, 3.3 megohms	66-5338340*			
R7	Resistor, a-v-c filter, 2.2 megohms	66-5228340*			
R8	Volume control (with off-on switch) 1 megohm	33-5566-21			
R9	Resistor, grid return, 4.7 megohms	66-5478340*			
R10	Resistor, screen dropping, 4.7 megohms	66-5478340*			

MISCELLANEOUS

Description	Service Part No.
Cabinet	10799
Baffle and cloth assembly	40-7884
Fastener (4)	W2235-7FA9
Battery holder and loop assembly	76-5740
Battery cradle and rivet assembly	76-5815
Handle	56-7940FCP
Bushing (2)	54-4776
Hinge (l.h.)	56-7915
Hinge (r.h.)	56-7915-1
Screw (2)	W2537-15FA1
Knob (2)	54-4773
Pointer	56-7973FCP
Scale	54-5087
Cable and connector assembly, battery	41-3988
Insulator, electrolytic-condenser mounting	27-9509
Mount, rubber, tuning gang (3)	27-4098 3
Spring, drive cord	56-2817
Socket, tube, 1R5 and 1U4 (2)	27-6203
Socket, tube, 1U5 and 3V4 (2)	27-6203-12
Tube shield, 1U5	56-3978-1FA3
Tuning shaft	56-7906FA42

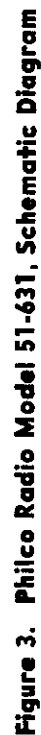


Figure 3. Philco Radio Model 51-631, Schematic Diagram

MODELS 51-930,
51-931, 51-932

SPECIFICATIONS

CABINET

Model 51-930	Molded plastic, mahogany and gray, wide-angle dial
Model 51-931	Molded plastic, ivory, wide-angle dial
Model 51-932	Molded plastic, maroon, wide-angle dial

CIRCUIT 6-tube superheterodyne

FREQUENCY RANGE 540—1620 kc.

AUDIO OUTPUT 1 watt

OPERATING VOLTAGE 105—120 volts, a.c. or d.c.

POWER CONSUMPTION 30 watts

AERIAL Built-in, high-impedance loop; provision for connection of external aerial

INTERMEDIATE FREQUENCY 455 kc.

PHILCO TUBES (6) 7B7 r-f ampl., 7A8 converter,
7B7 i-f ampl., 14B6 det.—1st audio—
a.v.c., 35L6GT output, 35Z5GT rectifier

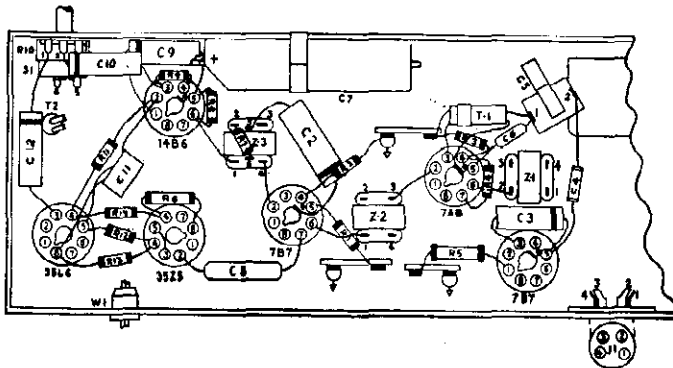


Figure 1. Symbolized Chassis, Showing Parts Placement

ALIGNMENT PROCEDURE

DIAL POINTER: Turn tuning condenser to full-mesh position. Adjust pointer so that center of pointer carriage coincides with first scribe line from the left.

OUTPUT LEVEL: During alignment, attenuate signal-generator output to maintain an output-meter indication of 1.25 volts.

OUTPUT METER: Connect across speaker voice coil.

SIGNAL GENERATOR: Connect as indicated in chart. Use modulated output.

VOLUME CONTROL: Set to maximum.

CRITICAL DRESS: The green lead from the osc. section of C1 to C5 must be dressed away from the chassis, with all excess under the chassis.

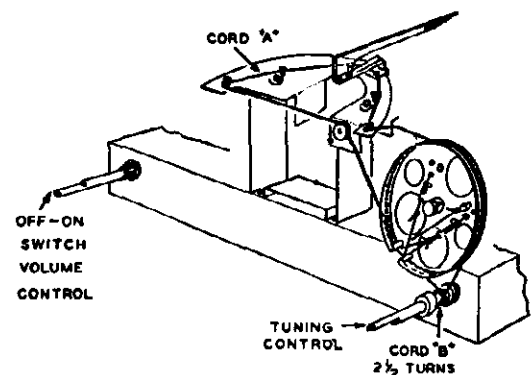
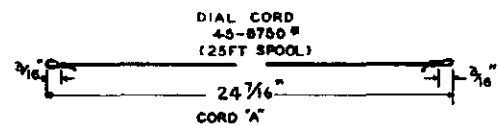
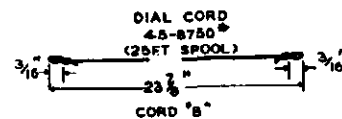
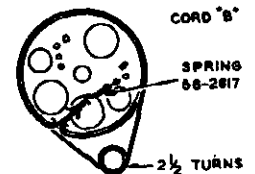
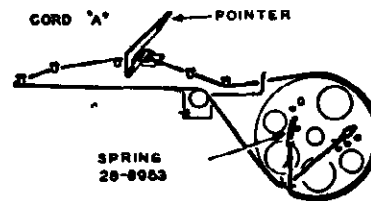


Figure 2. Dial-Cord Installation Details

MODELS 51-930,
51-931. 51-932

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .1- μ f. condenser to stator of r-f section of gang. Ground lead to B-.	455 kc.	Gang fully meshed	Adjust, in order given, for maximum output.	TC5—2nd i-f sec. TC4—2nd i-f pri. TC3—1st i-f sec. TC2—1st i-f pri.
2	Radiating loop. (See note below.)			Preset 1/2 turn from tight.	C5—osc. series
3	Same as step 2.	1620 kc.	1620 kc.	Adjust for maximum.	C1B—osc. shunt
4	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum.	C1C—r-f C1A—aerial
5	Same as step 2.	580 kc.	580 kc.	Adjust for maximum while rocking tuning control.	C5—osc. series TC1—r-f core
6	Repeat steps 3 and 4.				

RADIATING LOOP:

Make up a 6—8 turn, 6 inch-diameter loop from insulated wire; connect to signal-generator leads and place near radio loop aerial. The loop aerial must be connected to the radio.

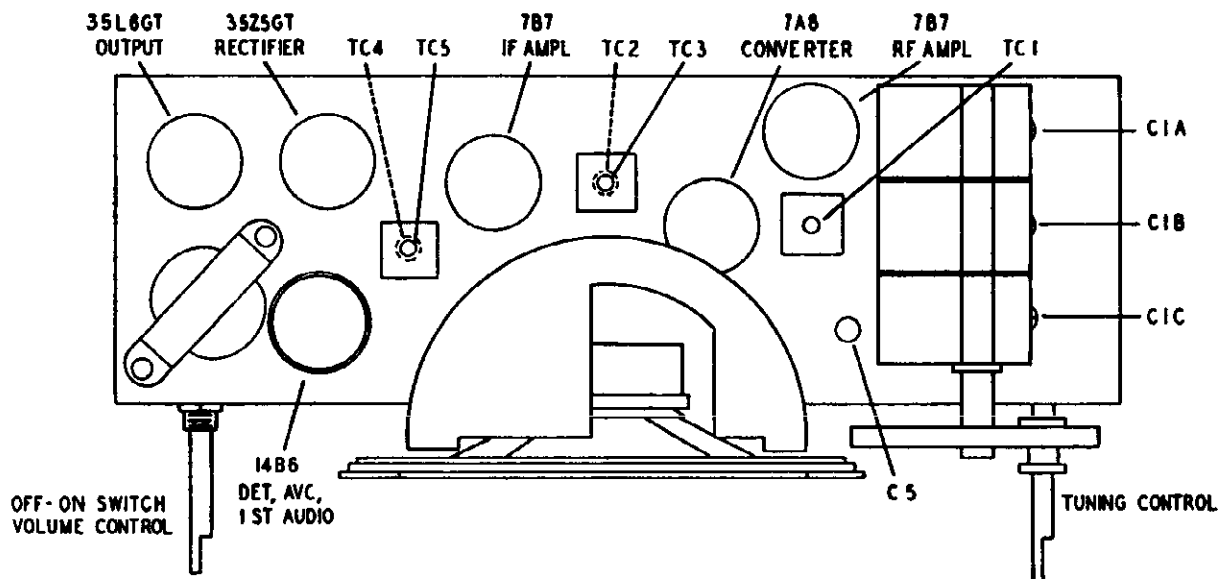


Figure 3. Top View, Showing Trimmer Locations

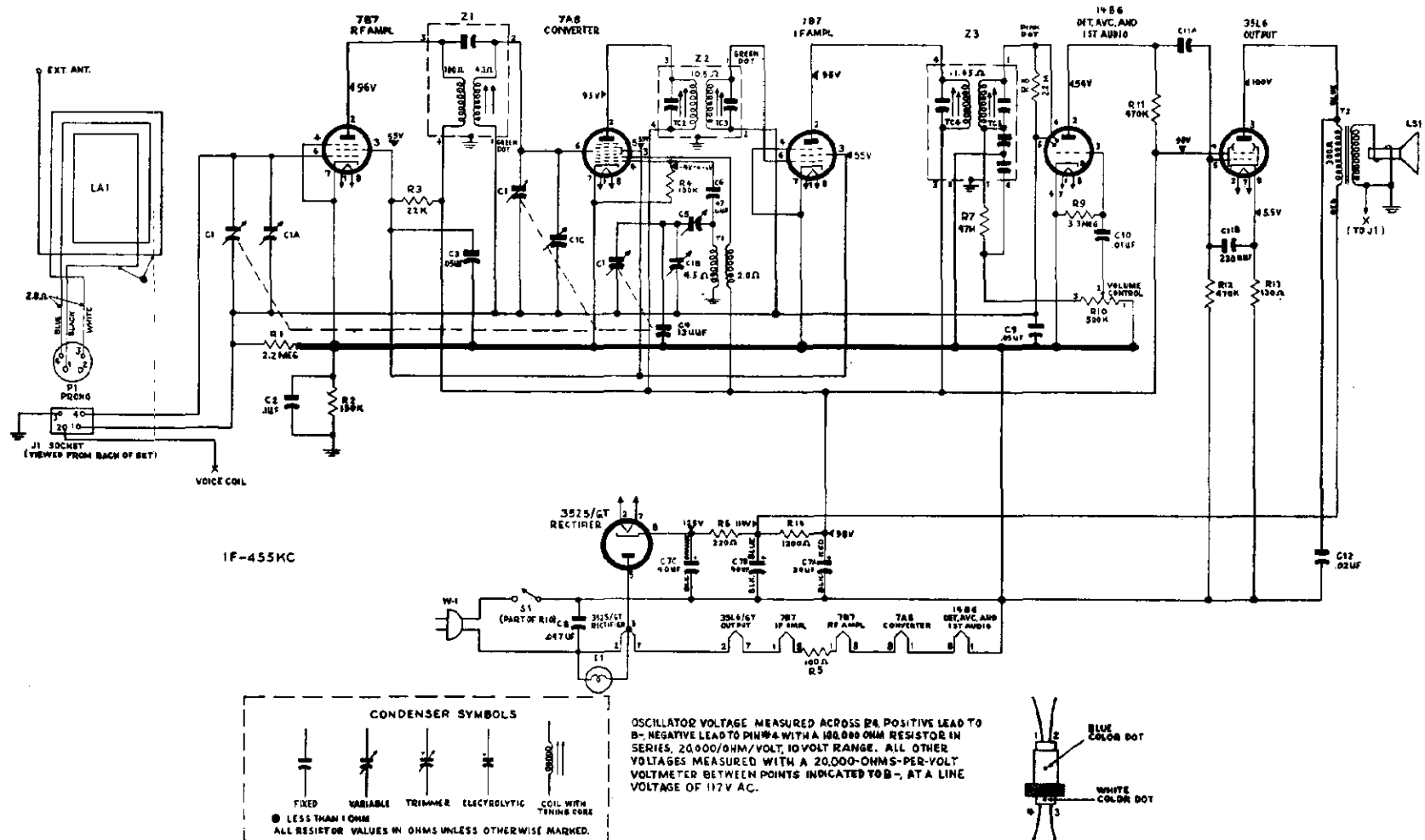


Figure 4. Philco Radio Models 51-930, 51-931, and 51-932, Schematic Diagram

MODELS 51-930,
51-931, 51-932

REPLACEMENT PARTS LIST

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Reference Symbol	Description	Service Part No.	MISCELLANEOUS	Service Part No.
C1	Condenser, tuning, 3-section	31-2748-1	Cabinet, 50-930 (mahogany)	10770-2
C1A	Condenser, trimmer, aerial	Part of C1	Cabinet, 50-930 (gray)	10770-3
C1B	Condenser, trimmer, osc.	Part of C1	Back	318-3020
C1C	Condenser, trimmer, r-f	Part of C1	Fastener, back (4)	W-2235FA9
C2	Condenser, by-pass, .1 μ f.	61-0113*	Backplate, ornamental, mahogany cabinet	56-7426FCP
C3	Condenser, by-pass, .05 μ f.	61-0122*	Backplate, ornamental, gray cabinet	56-7426-1FCP
C4	Condenser, fixed trimmer, temperature comp., 13 μ f.	30-1224-68	Fastener, backplate mtg.	W-2235-1FA9
C5	Condenser, padder, osc. series	31-6473-17	Baffle and cloth assy.	40-7892
C6	Condenser, d-c blocking, 47 μ f.	60-00475417	Fastener, baffle mtg. (4)	W-2235-2FA9
C7	Condenser, electrolytic, 3-section	30-2575-27	Bezel, metal	56-7427
C7A	Condenser, filter, 30 μ f., 150v	Part of C7	Speed nut, bezel mtg. (2)	1W60196FE7
C7B	Condenser, filter, 40 μ f., 150v	Part of C7	Dial scale, mahogany cabinet	54-5070-3
C7C	Condenser, filter, 40 μ f., 150v	Part of C7	Dial scale, gray cabinet	54-5070-4
C8	Condenser, line by-pass, .047 μ f.	45-3505-45	Clip, scale mtg.	36-7886FE9
C9	Condenser, a-v-c filter, .05 μ f.	61-0122*	Knob, mahogany cabinet (2)	54-4718-4
C10	Condenser, d-c blocking, .01 μ f.	61-0120*	Knob, gray cabinet (2)	54-4718-7
C11	Condenser, dual ceramic	30-1238-4	Pointer	76-5341-1
C11A	Condenser, d-c blocking, .007 μ f.	Part of C11	Cabinet, 50-931	76-5378
C11B	Condenser, by-pass, 220 μ f.	Part of C11	Back	318-3021
C12	Condenser, tone compensation, .02 μ f.	61-0108*	Fastener, back (4)	W-2235FA9
I1	Pilot lamp, 6--8v	34-2676	Backplate, ornamental	56-7434-1
J1	Jack, aerial input	27-6214-1	Fastener, backplate mtg.	W-2235-1FA9
LA1	Loop aerial, 50-930	32-4052-39	Baffle, cardboard	54-7922
LA1	Loop aerial, 50-931 or 50-932	32-4052-40	Fastener, baffle mtg. (4)	W-2235-2FA9
LS1	Speaker, p-m, 4 in. x 6 in., oval	36-1633-3	Dial scale	54-5071
P1	Loop-aerial plug	27-4788	Clip, dial mtg.	56-7808FE11
R1	Resistor, a-v-c load, 2.2 megohms	66-5228340*	Knob (2)	54-4718-5
R2	Resistor, leakage, 150,000 ohms	66-4158340*	Pointer	76-5341-4
R3	Resistor, dropping, 22,000 ohms	66-3228340*	Cabinet, 50-932	10772
R4	Resistor, grid return, 100,000 ohms	66-4108340*	Back	318-3022
R5	Resistor, filament dropping, 100 ohms	33-1343-3	Fastener, back (4)	W-2235FA9
R6	Resistor, filter, 220 ohms, 1w	66-1224340*	Backplate, ornamental	56-7435
R7	Resistor, i-f filter, 47,000 ohms	66-3478340*	Fastener, backplate mtg.	W-2235-1FA9
R8	Resistor, diode load, 2.2 megohms	66-5228340*	Baffle, cardboard	54-7919
R9	Resistor, grid return, 3.3 megohms	66-5338340*	Fastener, baffle mtg. (4)	W-2235-2FA9
R10	Volume control, 500,000 ohms, with off-on switch	33-5586-13	Bezel, metal	56-7436
R11	Resistor, plate load, 470,000 ohms	66-4478340*	Speed nut, bezel mtg.	1W60196FE7
R12	Resistor, grid return, 470,000 ohms	66-4478340*	Dial scale	54-5072
R13	Resistor, cathode bias, 130 ohms	66-1128340*	Clip, dial mtg. (2)	56-7572FE11
R14	Resistor, filter, 1200 ohms, 1 watt	66-2124340*	Knob	54-4718-3
S1	Switch, off-on	Part of R10	Pointer	76-5341-3
T1	Transformer, oscillator	32-4263-3	Backplate, pulley-and-clip assembly	76-5233
T2	Transformer, output	32-8310-3	Clamp, electrolytic mtg.	56-1468FA5
W1	Line cord	L-2183*	Dial cord, 25-foot spool	45-8750*
Z1	Transformer, r-f	32-4399-2A	Spring, gang drive	56-2817
Z2	Transformer, 1st i-f	32-4160A	Spring, pointer drive	28-8953
Z3	Transformer, 2nd i-f	32-4240-3A	Drive shaft	76-3671-6
			Bushing, drive shaft	27-9437
			Spring, hairpin, drive shaft (2)	57-1468FA3
			Panel, wiring, external aerial	38-9837
			Panel, wiring, 4-lug	38-9161-1
			Plug, aerial, 4-pin	27-4788
			Rubber mount, gang mtg. (4)	27-4771-1
			Shield, tube, 14B6	56-1568
			Socket, Loktal	27-6207
			Socket, octal	27-6174
			Socket assembly, pilot lamp	27-6233-8

SPECIFICATIONS

CABINET	Plastic table model
CIRCUIT	Six-tube superheterodyne plus selenium rectifier
FREQUENCY RANGES	
Broadcast	540—1630 kc.
FM	88—108 mc.
AUDIO OUTPUT	1 watt
OPERATING VOLTAGE	105—125 volts, a.c./d.c.
POWER CONSUMPTION	35 watts
AERIAL	Built-in high-impedance loop for AM, line cord for FM; provision for connecting external aerial.
INTERMEDIATE FREQUENCY	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (6)	12AU6 r-f ampl., 12AT7 converter, 12BA6 1st i-f ampl., 12AU6 2nd i-f ampl., 19C8 det.-a.v.c.—1st audio, 50C5 output

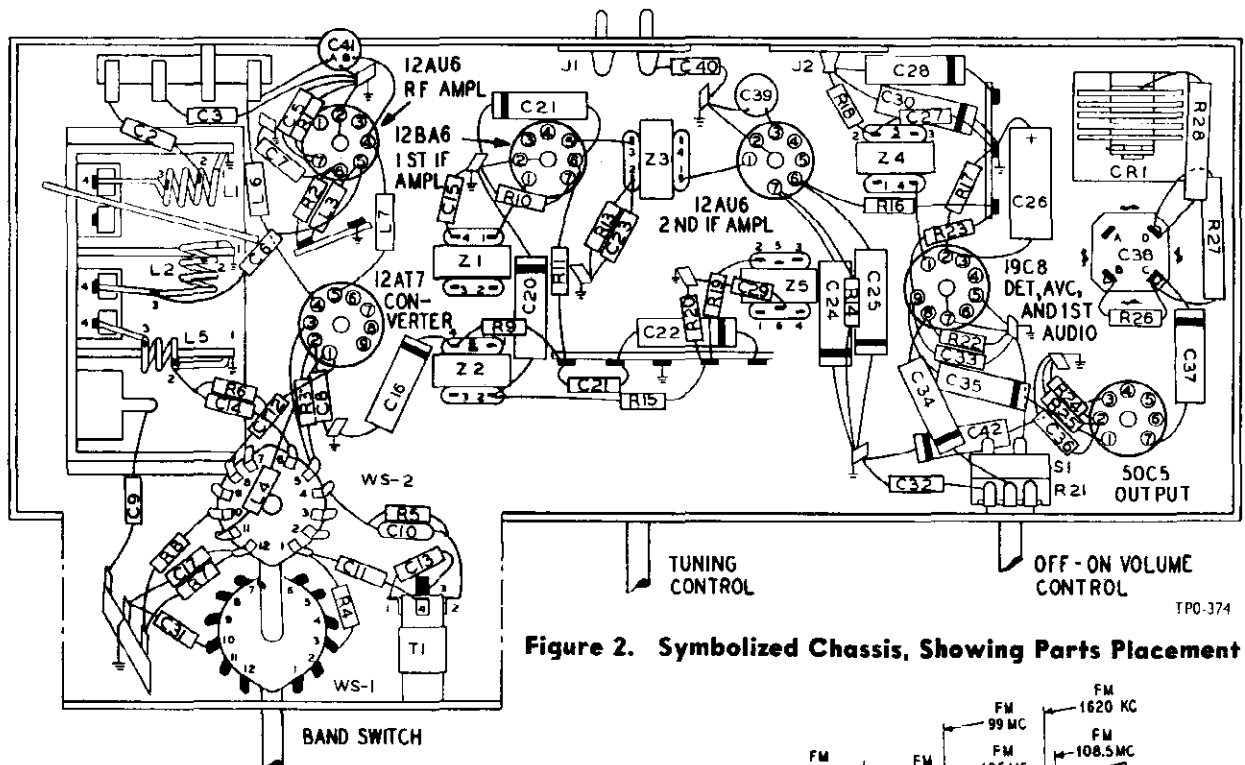


Figure 2. Symbolized Chassis, Showing Parts Placement

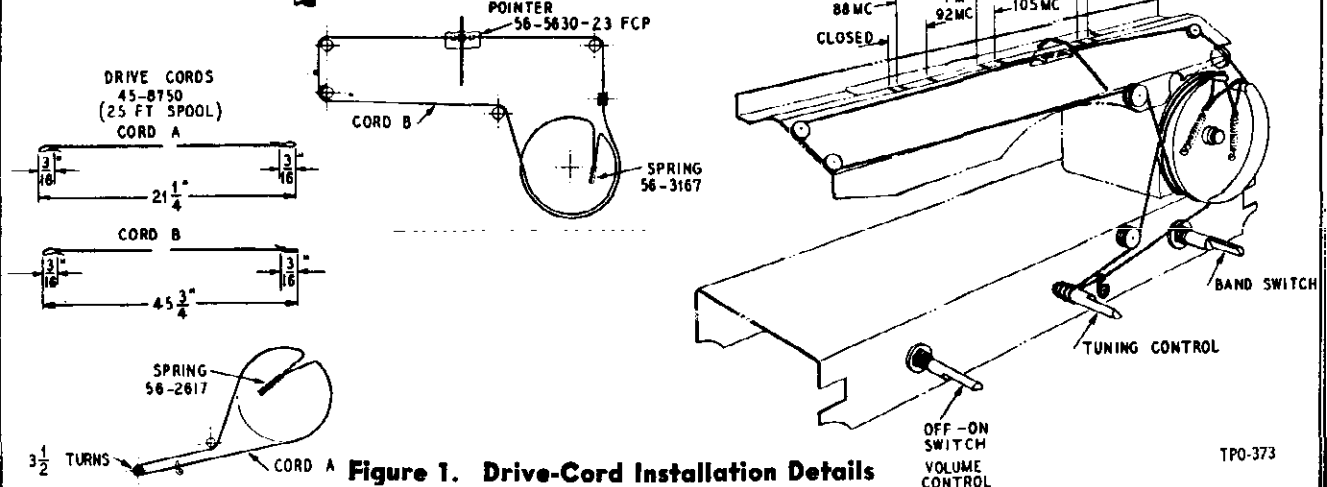


Figure 1. Drive-Cord Installation Details

AM ALIGNMENT PROCEDURE

Make alignment with loop aerial connected to radio. The AM alignment should be completed before the FM alignment is made.

DIAL POINTER—With tuning-condenser plates fully meshed, adjust pointer to coincide with index mark at low-frequency end of dial backplate.

RADIO CONTROLS—Set volume control to maximum, set band switch for broadcast reception, and set tuning control as indicated in chart.

OUTPUT METER—Connect across voice-coil terminals.

SIGNAL GENERATOR—Use AM r-f signal generator, with modulated output. Connect generator and set frequency as indicated in chart.

OUTPUT LEVEL—During alignment, signal-generator output must be attenuated to hold output-meter reading below 1.25 volts.

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to chassis. Output lead through a .1- μ f. condenser to mixer grid (pin 7) of 12AT7.	455 kc.	540 kc. (gang fully meshed)	Adjust for maximum output.	TC10—2nd AM i-f sec. TC9—2nd AM i-f pri. TC4—1st AM i-f sec. TC3—1st AM i-f pri.
2	Radiating loop. See note below.	1620 kc.	1600 kc.	Adjust for maximum output.	C1C—osc. trimmer
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output.	C1A—aerial trimmer

RADIATING LOOP: Make up a six-to-eight-turn, 6-inch-diameter loop from insulated wire; connect to generator terminals, and place near radio loop aerial. Radio loop aerial must be connected.

FM ALIGNMENT PROCEDURE

Make AM alignment first.

RADIO CONTROLS—Set volume control to maximum, set band switch for FM reception, and set tuning control as indicated in chart.

OUTPUT METER—Connect across voice-coil terminals. (This meter is used only for step 3).

D-C VOLTMETER—Connect negative lead of d-c voltmeter (resistance of at least 20,000 ohms per volt) to pin 2 of 19C8 tube, and positive lead to chassis. Use 0–10-volt range.

SIGNAL GENERATOR—Use AM r-f signal generator, with modulated output. Connect ground lead to chassis. Connect output lead and set frequency as indicated in chart. Generator must have sufficient output to give reading of approximately 8.5 volts on d-c voltmeter; during alignment, generator output must be attenuated to hold meter reading at this value.

NOTE: Before starting FM alignment, allow radio and signal generator to warm up for 15 minutes.

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .1- μ f. condenser to control grid (pin 1) of 12BA6 1st i-f ampl.	9.1 mc.	88 mc.	Adjust tuning cores for maximum reading on d-c voltmeter. Attenuate signal generator to maintain a reading of approximately 10 volts. Repeat adjustments until no further improvement is noted. After this step, do not disturb these tuning cores except as directed in step 3.	TC8—discriminator sec. TC7—discriminator pri. TC6—FM 2nd i-f sec. TC5—FM 2nd i-f pri.

MODEL 51-934

FM ALIGNMENT CHART (Cont.)

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
2	Through a .1- μ f. condenser to mixer grid (pin 7) of 12AT7.	9.1 mc.	88 mc.	Adjust tuning cores for maximum reading on d-c voltmeter. Repeat adjustments until no further improvement is noted. Do not disturb these tuning cores after this step.	TC2—FM 1st i-f sec. TC1—FM 1st i-f pri.
3	Same as step 1.	9.1 mc.	88 mc.	Adjust tuning core for minimum reading on output meter. This adjustment is critical: repeat to make certain it is correct.	TC8—discriminator sec.
4	To terminal 1 of TB1.	105 mc.	105 mc.	Adjust trimmer for maximum reading on d-c voltmeter.	C18—FM osc.
5	Same as step 4.	105 mc.	105 mc.	Same as step 4.	C18—FM osc. C1B—FM r-f C1D—FM aerial.
6	Same as step 4.	92 mc.	92 mc.	Adjust coil for maximum reading on d-c voltmeter.	L5—osc. (tracking)
7	Same as step 4.	92 mc.	92 mc.	Same as step 6.	L2—FM r-f (tracking) L1—FM aerial. (tracking)
8	Same as step 4.	105 mc.	105 mc.	Same as step 4.	C18—FM osc.
9	Repeat steps 4 through 8 until no further improvement is noted.				

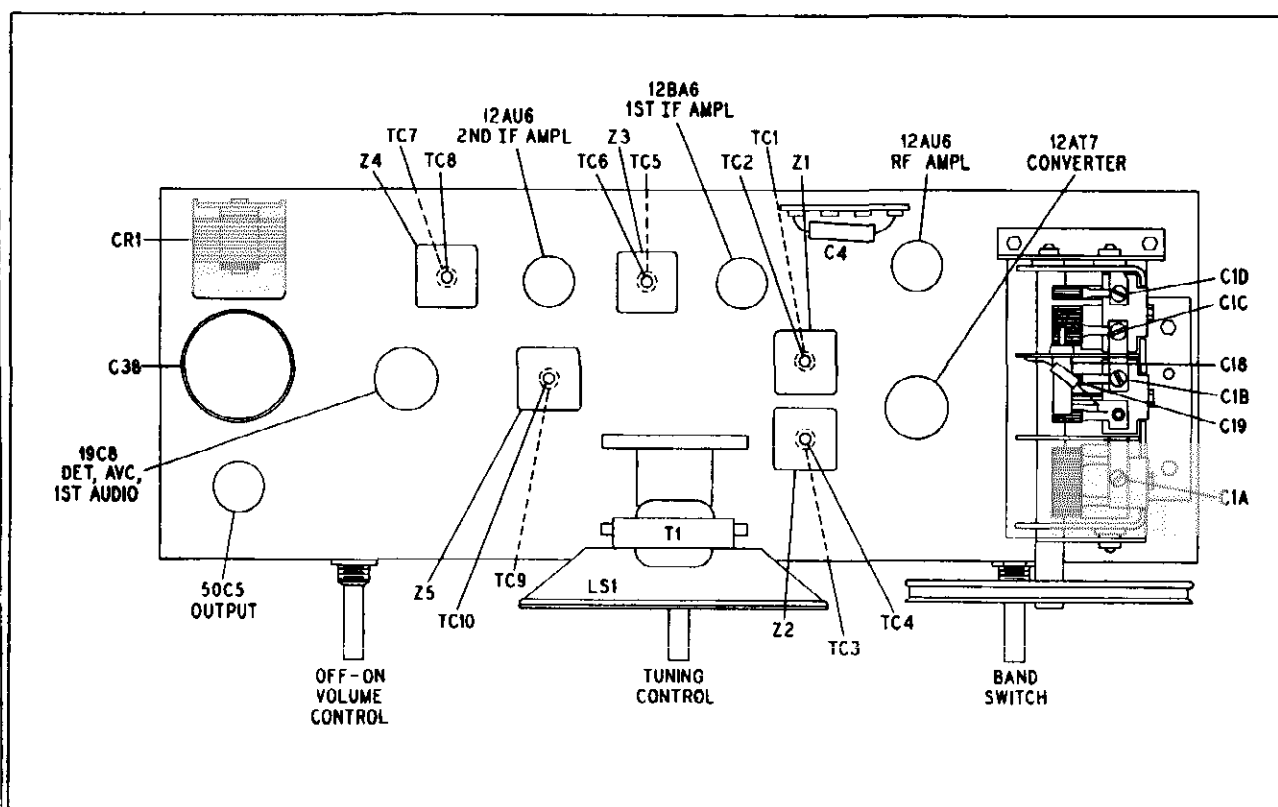


Figure 4. Top View, Showing Trimmer Locations

TPO-376

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Reference Symbol	Description	Service Part No.	LA2	Line cord aerial, FM	Part of W1
			LS1	Speaker, 4" p-m, including output transformer	32-1614-6
C1	Condenser, tuning gang, 5-section	31-2756	R1	Resistor, cathode bias, 120 ohms	66-1128340*
C1A	Condenser, trimmer, BC aerial	Part of C1	R2	Resistor, screen decoupling, 470 ohms	66-1478340*
C1B	Condenser, trimmer, FM r-f	Part of C1	R3	Resistor, grid return, 15,000 ohms	66-3158340*
C1C	Condenser, trimmer, BC oscillator	Part of C1	R4	Resistor, grid return, 1 megohm	66-5108340*
C1D	Condenser, trimmer, FM aerial	Part of C1	R5	Resistor, parasitic suppressor, 680 ohms	66-1688340*
C2	Condenser, aerial isolating, 100 μ f.	62-110009001*	R6	Resistor, parasitic suppressor, 470 ohms	66-1478340*
C3	Condenser, aerial isolating, 100 μ f.	62-110009001*	R7	Resistor, plate dropping, FM, 1000 ohms	66-2108340*
C4	Condenser, aerial isolating, .01 μ f.	45-3505-41	R8	Resistor, plate dropping, AM, 47,000 ohms	66-3478340*
C5	Condenser, cathode by-pass, 100 μ f.	62-110009001*	R9	Resistor, plate dropping, 4700 ohms	66-2478340*
C6	Condenser, d-c blocking, 220 μ f.	62-122001001	R10	Resistor, cathode bias, 47 ohms	66-0478340*
C7	Condenser, screen by-pass, 1500 μ f.	62-215001011*	R11	Resistor, screen decoupling, 1000 ohms	66-2108340*
C8	Condenser, oscillator grid, 100 μ f.	62-110009001*	R12	Resistor, plate decoupling, 2200 ohms	66-2228340*
C9	Condenser, d-c blocking, 220 μ f.	62-122001001	R13	Resistor, grid return, 1 megohm	66-5108340*
C10	Condenser, d-c blocking, .01 μ f.	30-1226-10	R14	Resistor, cathode bias, 120 ohms	66-1128340*
C11	Condenser, neutralizing, 6.5 μ f.	30-1224-6	R15	Resistor, a-v-c filter, 1 megohm	66-5108340*
C12	Condenser, d-c blocking, 220 μ f.	62-122001001	R16	Resistor, decoupling, 470 ohms	66-1478340*
C13	Condenser, fixed trimmer, temperature compensating, 7.5 μ f.	30-1224-8	R17	Resistor, FM diode load, 47,000 ohms	66-3478340*
C14	Condenser, d-c blocking, 220 μ f.	62-122001001*	R18	Resistor, de-emphasis, 47,000 ohms	66-3478340*
C15	Condenser, r-f by-pass, 100 μ f.	62-110009001*	R19	Resistor, i-f filter, 47,000 ohms	66-3478340*
C16	Condenser, plate decoupling, .01 μ f.	30-4572	R20	Resistor, a-v-c load, 3.3 megohms	66-5338340*
C17	Condenser, r-f by-pass, 100 μ f.	62-110009001*	R21	Volume control (with off-on switch), 500,000 ohms	33-5568-20
C18	Condenser, trimmer, FM oscillator	31-6511	R22	Resistor, grid return, 10 megohms	66-6108340*
C19	Condenser, fixed trimmer, temperature compensating, 7.5 μ f.	30-1224-8	R23	Resistor, plate load, 470,000 ohms	66-4478340*
C20	Condenser, a-v-c decoupling, .01 μ f.	30-4572	R24	Resistor, grid return, 470,000 ohms	66-4478340*
C21	Condenser, screen by-pass, .002 μ f.	61-0082*	R25	Resistor, cathode bias, 150 ohms	66-1158340*
C22	Condenser, neutralizing, .006 μ f.	45-3500-7*	R26	Resistor, filter, 470 ohms, 1 watt	66-1474340*
C23	Condenser, i-f by-pass, 100 μ f.	62-110009001*	R27	Resistor, filter, 150 ohms, 2 watts	66-1185340*
C24	Condenser, cathode by-pass, .01 μ f.	30-4572	R28	Resistor, current limiting, 22 ohms, 2 watt	66-0225360
C25	Condenser, screen by-pass, .002 μ f.	61-0082*	S1	Switch, off-on	Part of R21
C26	Condenser, electrolytic diode load filter, 2 μ f., 50v	30-2417-7	T1	Transformer, AM oscillator	32-4458
C27	Condenser, i-f by-pass, 330 μ f.	62-133001001	T2	Transformer, output	Part of LS1
C28	Condenser, d-c blocking, .006 μ f.	45-3500-7*	W1	Line cord	41-3791-2
C29	Condenser, i-f by-pass, 100 μ f.	62-110009001*	W2	Cable, FM aerial, 72-ohm twin lead	41-3987
C30	Condenser, de-emphasis, .004 μ f.	61-0179*	WS	Switch, band, 2-wafer	42-1924
C31	Condenser, i-f by-pass, 100 μ f.	62-110009001*	Z1	Transformer, FM, 1st i-f	32-4372A
C32	Condenser, i-f by-pass, 100 μ f.	62-110009001*	Z2	Transformer, AM, 1st i-f	32-4258-3A
C33	Condenser, plate by-pass, 680 μ f.	62-168001001	Z3	Transformer, FM, 2nd i-f	32-4372-2A
C34	Condenser, d-c blocking, .02 μ f.	61-0108*	Z4	Transformer, FM, 3rd i-f	32-4310-1A
C35	Condenser, d-c blocking, .006 μ f.	61-0105*	Z5	Transformers, AM, 2nd i-f	32-4240A
C36	Condenser, grid by-pass, 100 μ f.	62-110009001*			
C37	Condenser, tone compensation, .006 μ f.	61-0105*			
C38	Condenser, electrolytic, 4-section	30-2570-46			
C38A	Condenser, cathode by-pass, 25 μ f., 25v	Part of C38			
C38B	Condenser, filter, 40 μ f., 150v	Part of C38			
C38C	Condenser, filter, 70 μ f., 150v	Part of C38			
C38D	Condenser, filter, 40 μ f., 150v	Part of C38			
C39	Condenser, filament by-pass, .005 μ f.	30-1238-1			
C40	Condenser, line by-pass, 100 μ f.	62-110009001*			
C41	Condenser, ceramic, 2-section	30-1239			
C41A	Condenser, filament by-pass, .004 μ f.	Part of C41			
C41B	Condenser, filament by-pass, .004 μ f.	Part of C41			
C42	Condenser, line by-pass, .04 μ f.	45-3500			
CR1	Selenium rectifier, 100 ma., 117v	34-9003-1			
I1	Pilot lamp, frosted, 117v, 7 watts	34-2605			
J1	Jack, male, a-c	27-4785-13			
J2	Socket, FM test	27-6180			
L1	Coil, FM aerial	32-4415-1			
L2	Coil, FM r-f	32-4416-1			
L3	Choke, r-f, 3.3 μ h.	32-4422-10			
L4	Choke, r-f, 3.3 μ h.	32-4422-10			
L5	Coil, FM oscillator	32-4414-1			
L6	Choke, filament, 2.2 μ h.	32-4422-8			
L7	Choke, filament, 2.2 μ h.	32-4422-8			
LA1	Loop aerial, AM	52-4052-49			

MISCELLANEOUS

Cabinet	10796
Back, flange, and socket assembly	76-5738
Fastener, back mtg. (4)	W-2235FA9
Baffle	54-8069
Fastener, baffle mtg. (2)	W-2235-2FA9
Dial Scale	54-5089
Clip, scale mtg. (4)	56-7808FE11
Knob, FM-AM	54-4774-2
Knob, tuning	54-4774
Knob, volume-off-on	54-4774-1
Dial Backplate Assembly	76-5733
Drive cord, 25-foot spool	45-8750*
Pointer	56-5630-23FCP
Shaft, drive	56-7931FA11
Spring, gang drive	56-2617
Spring, pointer drive	56-3167
Rubber mounts, gang (5)	27-4771-1
Rubber mounts, speaker (2)	54-4651-1
Socket, 12BA6, 12AU6 (i-f ampl.), 50C5	27-6203
Socket, 12AU6 (r-f ampl.)	27-6203-1
Socket, 12AT7	27-6203-6
Socket, 19C8	27-6203-5
Spacer, "T", speaker mtg. (2)	1W29155FA3
Washer, speaker mtg. (2)	1W52224FA3

MODELS 51-1730,
51-1730(L)

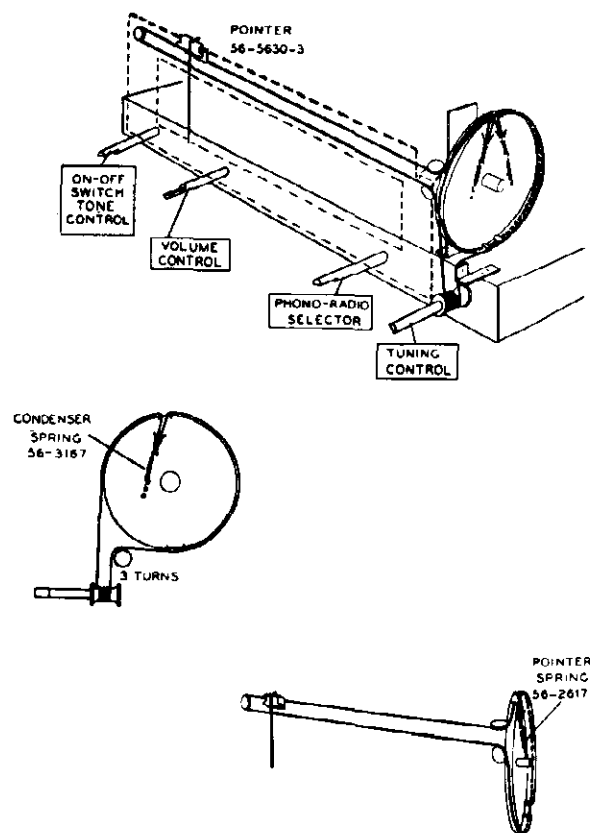


Figure 1. Drive-Cord Installation Details

SPECIFICATIONS

CABINET	Wood console, mahogany or white oak finish
CIRCUIT	8-tube superheterodyne (with t-r-f stage)
FREQUENCY RANGE	540—1620 kc.
AUDIO OUTPUT	3 watts
OPERATING VOLTAGE	105—120 volts, 60 cycles, a.c.
POWER CONSUMPTION	
Radio	50 watts
Phonograph	65 watts, total
INTERMEDIATE FREQUENCY	455 kc.
AERIAL	Built-in low-impedance loop; provision for external aerial
PHILCO TUBES (6)	7B7 r-f ampl., 7B7 i-f ampl., 7A8 converter, 7B6 det.-a.v.c.-1st audio ampl., 6W6GT output, 7X6 rectifier
PHONOGRAPH	Philco Model M-22 All-Speed Automatic Record Changer. (For service information, refer to Service Manual PR-1864.)

ALIGNMENT PROCEDURE

SIGNAL GENERATOR—Connect ground lead to B-. Connect output lead as indicated in chart. Use modulated output.

OUTPUT LEVEL—During alignment, attenuate input signal to maintain an output-meter indication of 1.25 volts.

DIAL POINTER—With tuning gang fully meshed, set pointer to coincide with the first scribe mark from the left on the dial backplate.

RADIO CONTROLS—Set volume control to maximum, tone control fully counterclockwise, and RADIO-PHONO switch to RADIO position.

OUTPUT METER—Connect across voice-coil terminals.

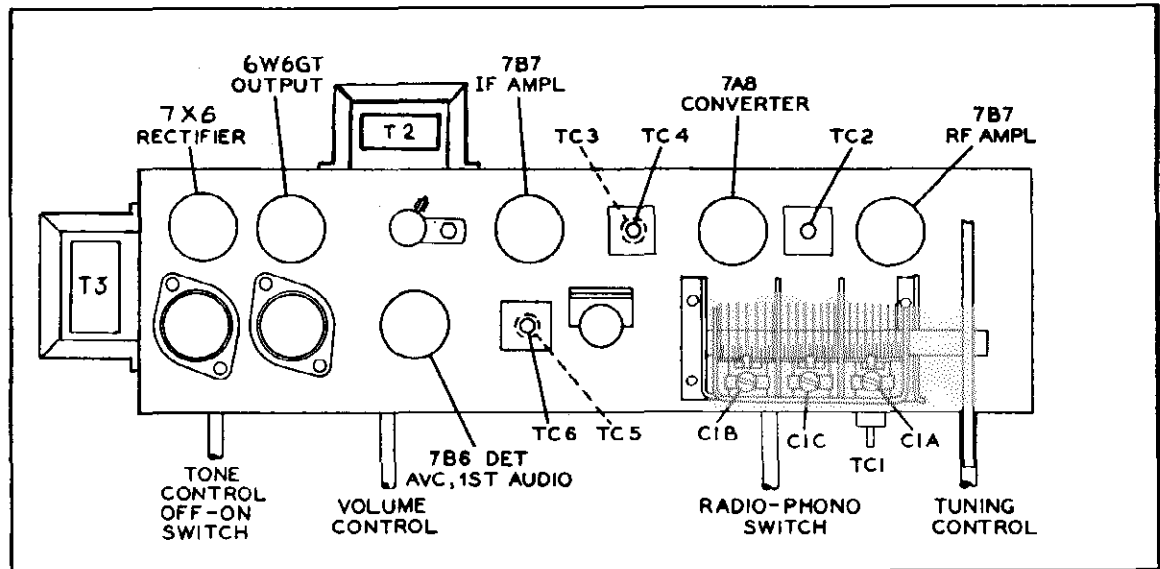


Figure 2. Top View, Showing Trimmer Locations

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .1- μ f. condenser to r-f ampl. section of C1.	455 kc.	Gang fully meshed.	Adjust, in order given, for maximum output.	TC3—2nd i.f. sec. TC5—2nd i.f. pri. TC4—1st i.f. sec. TC3—1st i.f. pri.
2	Radiating loop (see note below).	1620 kc.	1620 kc.	Adjust for maximum.	C1C—osc. trimmer
3	Same as Step 2.	1500 kc.	1500 kc.	Adjust for maximum.	C1B—r-f trimmer C1A—ant. trimmer
4	Same as Step 2.	580 kc.	580 kc.	Adjust for maximum while rocking tuning control.	TC2—r-f core TC1 ant. core*

RADIATING LOOP: Make up a 6-to-8 turn, 6-inch diameter loop of insulated wire; connect to signal-generator output leads, and place near radio loop.

* The aerial tuning core, TC1, should NOT be adjusted unless the coil has been replaced.

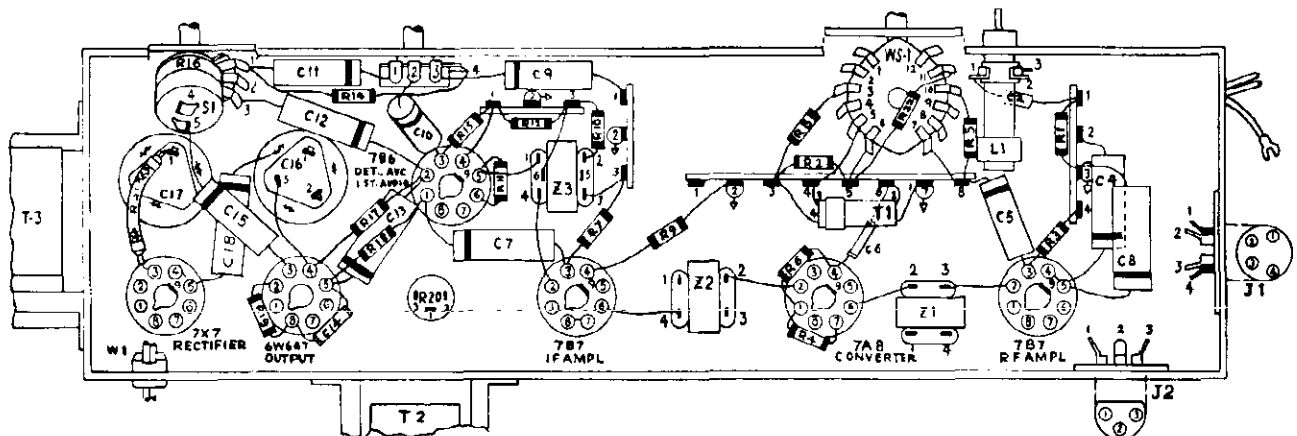


Figure 3. Symbolized Chassis, Showing Parts Placement

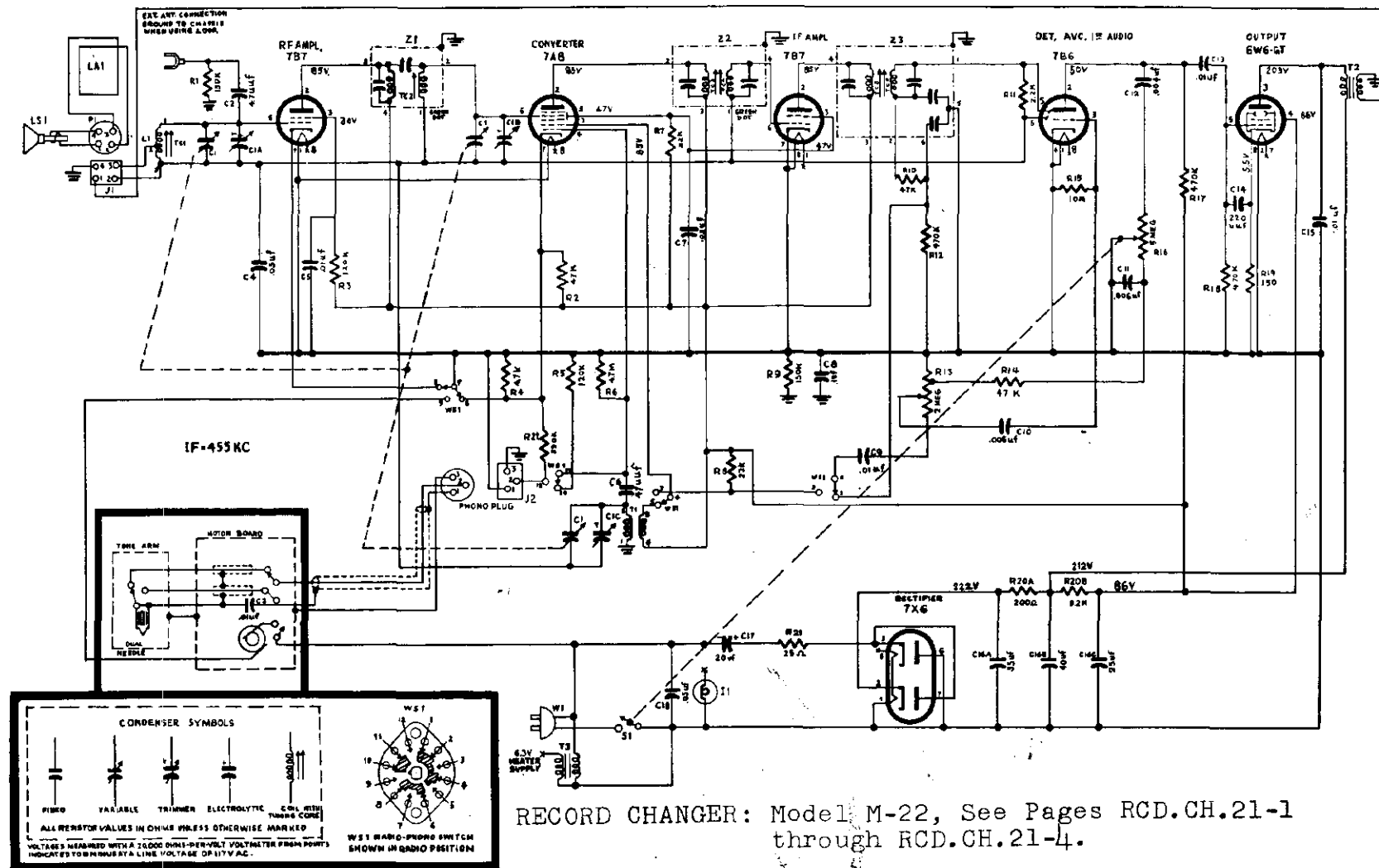


Figure 4. Philco Radio-Phonograph Models 51-1730 and 51-1730 (L), Schematic Diagram

NOTE: Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

[illegible]

MODELS 51-1731,
51-1732

SPECIFICATIONS

CABINET	Wood console, mahogany finish
CIRCUIT	8-tube superheterodyne
FREQUENCY RANGES	
Standard broadcast	540-1630 kc.
FM	88-108 mc.
AUDIO OUTPUT	
Model 51-1731	3.0 watts
Model 51-1732	5.0 watts
OPERATING VOLTAGE	117 volts, 60 cycles, a.c.
POWER CONSUMPTION	
Radio	110 watts
Phonograph	125 watts
AERIALS	Built-in broadcast loop; FM line-cord aerial; provision for connection of external aerials.
INTERMEDIATE FREQUENCIES	
AM	455 kc.
FM	9.1 mc.
PHILCO TUBES (7)	6AU6 r-f ampl., 7F8/S osc.-mixer-phono preamp., 6BA6 1st i-f ampl., 6AU6 2nd i-f ampl., 6V8 det.-a.v.c.-1st audio, 6W6GT (51-1731) or 6Y6GT (51-1732) output, 5A24 rectifier.
RECORD PLAYER	Philco Model M-22 All-Speed Automatic Record Changer (for service information, refer to Service Manual PR-1864).

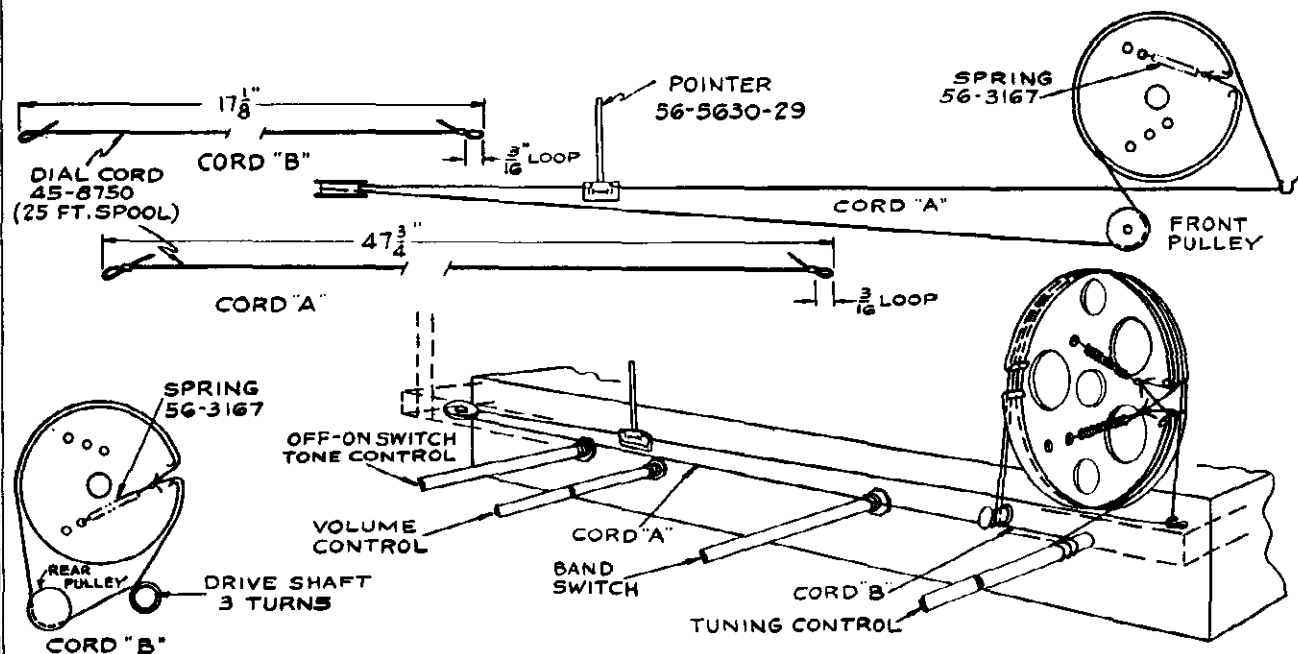


Figure 1. Drive-Cord Installation Details

AM ALIGNMENT PROCEDURE

Make alignment with loop aerial connected to radio. The AM alignment should be made before the FM alignment.

DIAL POINTER: Calibration and pointer-index measurements are shown in figure 3. With tuning gang fully meshed, set pointer to index mark.

OUTPUT METER: Connect across speaker voice-coil terminals.

SIGNAL GENERATOR: Connect AM r-f signal generator as indicated in chart. Generator ground lead to chassis. Use modulated output.

RADIO CONTROLS: Set volume control to maximum, tone control counterclockwise, and band switch to broadcast position.

OUTPUT LEVEL: During alignment, adjust signal-generator output to hold output meter indication below 1.25 volts.

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST TRIMMER
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .01- μ f. condenser to mixer grid, pin 1. of 7F8/S.	455 kc.	Gang fully meshed.	Adjust, in order given, for maximum output.	TC11—2nd AM i-f sec. TC10—2nd AM i-f pri. TC5—1st AM i-f sec. TC4—1st AM i-f pri.
2	Radiating loop. (See Note below.)	1600 kc.	1600 kc.	Adjust for maximum output.	C1D—AM osc. shunt
3	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output.	C1B—AM ant. shunt
4	Same as step 2.	580 kc.	580 kc.	Adjust for maximum output. This should not be necessary unless T1 (aerial transformer) has been replaced.	TC1—AM ant. tuning core

RADIATING LOOP: Make up a 6-to-8 turn, 6-inch-diameter loop, using insulated wire; connect to signal generator leads and place near radio loop aerial.

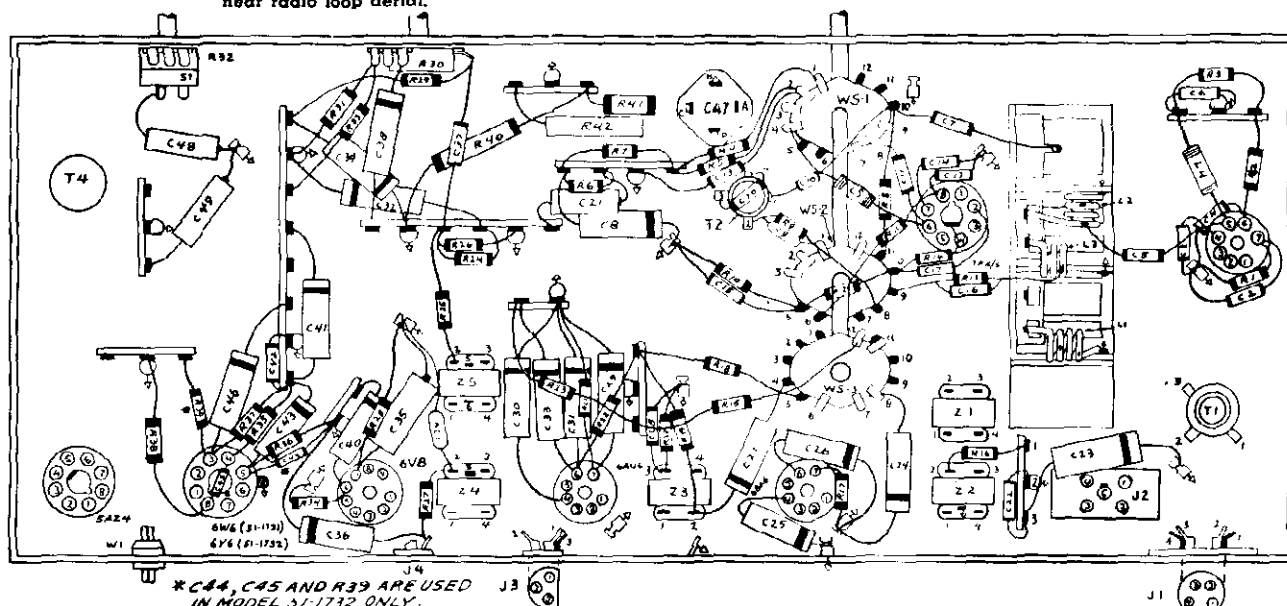
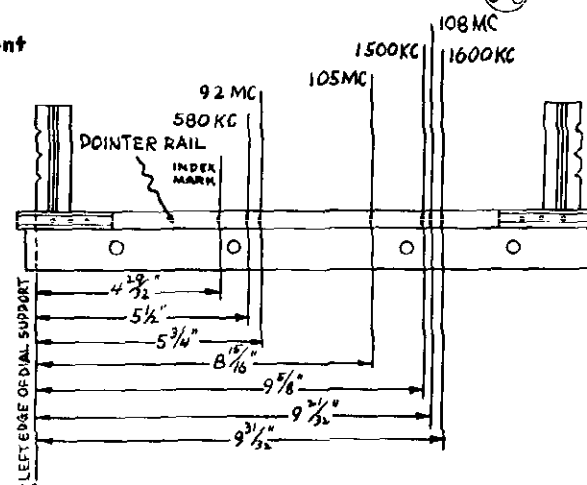


Figure 2. Symbolized Chassis, Showing Parts Placement

Figure 3. Dial-Backplate Calibration Measurements



MODELS 51-1731,
51-1732

FM ALIGNMENT PROCEDURE

Make the AM alignment first.

RADIO CONTROLS: Set volume control to maximum, tone control counterclockwise, and band switch to FM position. Allow radio and signal generator to warm up for at least 15 minutes before making alignment.

SIGNAL GENERATOR: Use a signal generator capable of delivering a 9.1-mc. FM signal with a deviation of ± 80 kc., and modulated AM signals of 92 mc., 105 mc., and 108 mc. Philco Model 7008 Precision Visual Alignment Generator fulfills these requirements. **NOTE:** The signal generator must be well bonded to radio chassis.

OSCILLOSCOPE: Connect to FM Test jack. Model 7008 is suggested.

OUTPUT METER: Connect across speaker voice-coil terminals.

R-F COIL NOTE: Check resonance of circuits containing coils L1, L2, and L3 by inserting each end of a tuning wand, such as Philco Part No. 45-8885, into coil. If signal strength increases when powdered-iron end is inserted, compress turns slightly. If signal strength increases when brass end is inserted, spread turns slightly. If signal strength decreases when each end is inserted, no adjustment is necessary. Do no spread or compress turns excessively; only a small change is required at these high frequencies.

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST TRIMMER
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .01- μ f. condenser to pin 1 of 6AU6 1F amplifier.*	9.1 mc. ± 80 kc. deviation.	Gang fully meshed.	Adjust TC9 for correct crossover. Adjust TC8 for maximum and equal peaks. Repeat.	TC9—FM det. sec. TC8—FM det. pri.
2	.01- μ f. condenser to pin 1 of 6BA6.*	9.1 mc. ± 80 kc. deviation.	Gang fully meshed.	Adjust, in order given, for maximum and equal peaks. Repeat.	TC7—FM 2nd i-f sec. TC6—FM 2nd i-f pri.
3	.01- μ f. condenser to pin 1 of 7F8/S.*	9.1 mc. ± 80 kc. deviation.	Gang fully meshed.	Adjust, in order given, for maximum and equal peaks. Repeat.	TC3—FM 1st i-f sec. TC2—FM 1st i-f pri.
4	Through a 300 ohm dummy aerial to FM aerial socket, J1.	108 mc.	108 mc.	Adjust trimmer for maximum reading on output meter.	C18—FM osc.
5	Same as step 4.	105 mc.	105 mc.	Adjust for maximum output while rocking gang.	C1C—FM r-f C1A—FM aerial
6	Same as step 4.	92 mc.	92 mc.	Adjust coils, in order given, for proper resonance (see R-F COIL NOTE).	L3—FM osc. coil L2—FM r-f coil L1—FM aerial coil

*CAUTION: Do not overload! When aligning the i-f stages, the curve will be distorted or destroyed if too great a signal is used. To check, attenuate the signal input. If the curve changes in form, rather than merely decreasing in amplitude, the stage is overloaded.

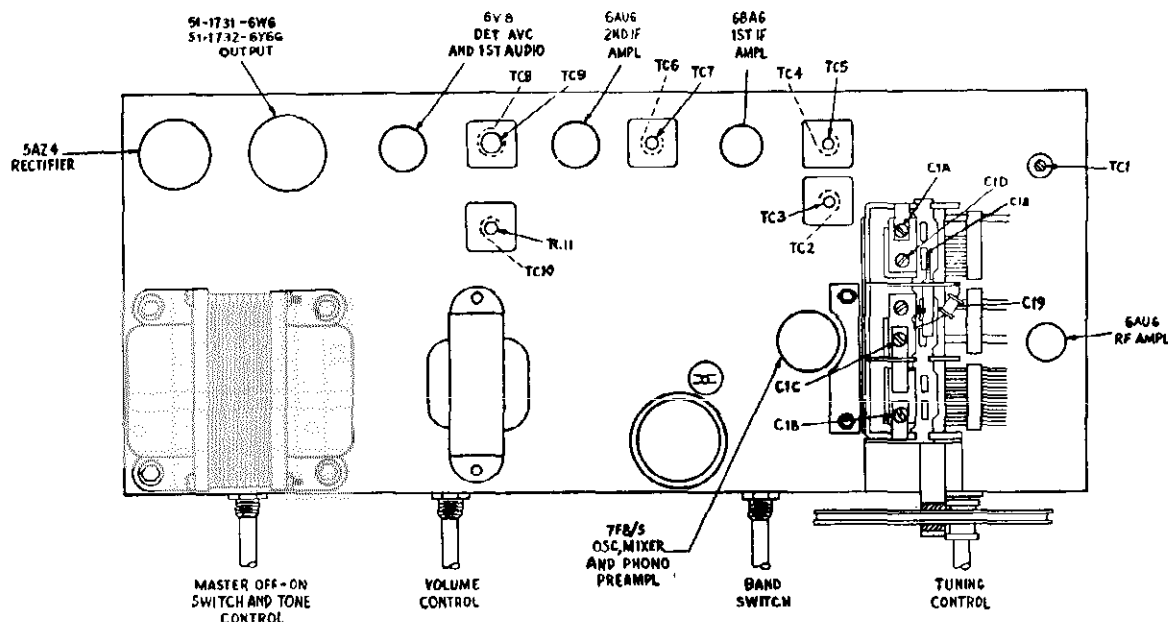


Figure 5. Top View, Showing Trimmer Locations

REPLACEMENT PARTS LIST

NOTE: Part numbers identified by an asterisk (*) are general replacement items. These numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the radio will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, tuning gang, five section	31-2756-2	C46	Condenser, tone compensation, .006 μ f.	45-3500-7*
C2	Condenser, cathode by-pass, 100 μ f.	62-110001001	C47	Condenser, electrolytic, 4 section, Model 51-1731	30-2570-63
C3	Condenser, filament by-pass, 100 μ f.	62-110001001		Model 51-1732	30-2570-64
C4	Condenser, screen by-pass, 1500 μ f.	62-215001001	C47A	Condenser, cathode by-pass, 10 μ f., 25wv	Part of C47
C5	Condenser, d-c blocking, 220 μ f.	62-122001001	C47B	Condenser, filter, 40 μ f., Model 51-1731—300wv	Part of C47
C6	Condenser, plate decoupling, 100 μ f.	62-110001001		Model 51-1732—350wv	Part of C47
C7	Condenser, d-c blocking, 220 μ f.	62-122001001	C47C	Condenser, filter, 60 μ f., Model 51-1731—350wv	Part of C47
C8	Condenser, plate decoupling (Phono), .05 μ f.	61-0122*		Model 51-1732 400wv	Part of C47
C9	Condenser, d-c blocking, .01 μ f. mica	30-1226-10	C47D	Condenser, filter, 40 μ f., Model 51-1731—350wv	Part of C47
C10	Condenser, neutralization, 3.3 μ f.	30-1224-59		Model 51-1732—400wv	Part of C47
C11	Condenser, d-c blocking, 220 μ f.	62-122001001	C48	Condenser, line filter, .01 μ f.	45-3505-41*
C12	Condenser, grid by-pass, 100 μ f.	62-110001001	C49	Condenser, line filter, .01 μ f.	45-3505-41*
C13	Condenser, plate decoupling (FM), 100 μ f.	62-110001001	I1	Pilot lamp	34-2065
C14	Condenser, filament by-pass, 100 μ f.	62-110001001	J1	Socket, FM antenna	27-6214-1
C15	Condenser, grid by-pass (Phono), 1500 μ f.	62-215001001	J2	Socket, AM antenna	27-6252-9
C16	Condenser, d-c blocking, 47 μ f.	62-051009001*	J3	Socket, phono input	27-6126
C17	Condenser, cathode by-pass, 100 μ f.	62-110001001	J4	Jack, FM test	27-6180
C18	Condenser, trimmer (FM)	31-8511-10	L1	Coil, FM aerial	32-4489
C19	Condenser, temperature compensating, 4.7 μ f.	30-1224-29	L2	Coil, FM r-f	32-4490
C20	Condenser, temperature compensating, 7.5 μ f.	30-1224-65	L3	Coil, FM oscillator	32-4488
C21	Condenser, d-c blocking, phono coupling, .001 μ f.	45-3505-55*	L4	Choke, plate load	32-4422-10
C22	Condenser, plate decoupling, 100 μ f.	62-110001001	L5	Choke, plate load	32-4422-10
C23	Condenser, plate decoupling, .01 μ f.	61-0120*	LA1	Loop aerial, Model 51-1731	32-4394-10
C24	Condenser, a-v-c by-pass, .01 μ f.	61-0120*		Model 51-1732	32-4394-11
C25	Condenser, filament by-pass, .01 μ f.	61-0120*	LA2	Aerial, FM line cord	41-3791-1
C26	Condenser, screen by-pass, .002 μ f.	61-0062*	LS1	Speaker, Model 51-1731	36-1626-5
C27	Condenser, plate decoupling, .006 μ f.	45-3500-7*		Model 51-1732	36-1610-6
C28	Condenser, by-pass, 100 μ f.	62-110001001	R1	Resistor, cathode bias, 120 ohms	66-1128340*
C29	Condenser, cathode by-pass, .01 μ f.	61-0120*	R2	Resistor, screen dropping, 27,000 ohms	66-3278340*
C30	Condenser, filament by-pass, .01 μ f.	61-0120*	R3	Resistor, plate decoupling, 1000 ohms	66-2108340*
C31	Condenser, screen by-pass, .002 μ f.	61-0062*	R4	Resistor, plate dropping (AM), Model 51-1731—22,000 ohms	66-3228340*
C33	Condenser, plate decoupling, .01 μ f.	61-0120*		Model 51-1732—47,000 ohms	66-3478340*
C34	Condenser, i-f filter, 150 μ f.	60-10155407	R5	Resistor, plate dropping (FM), Model 51-1731—1000 ohms	66-2108340*
C35	Condenser, electrolytic, diode load filter, 2 μ f., 50v	30-2417-7		Model 51-1732—10,000 ohms	66-3108340*
C36	Condenser, de-emphasis, .002 μ f.	61-0062*	R6	Resistor, plate load (Phono), 27,000 ohms	66-3278340*
C37	Condenser, tone compensation, 100 μ f.	62-110001001	R7	Resistor, plate decoupling (Phono), 33,000 ohms	66-3338340*
C38	Condenser, d-c blocking, .02 μ f.	61-0108*	R8	Resistor, grid return, 1 megohm	66-5108340*
C39	Condenser, tone compensation, Model 51-1731—.02 μ f.	61-0108*	R9	Resistor, parasitic suppressor, Model 51-1731—680 ohms	66-1688340*
	Model 51-1732—.03 μ f.	30-4517		Model 51-1732—1000 ohms	66-2108340*
C40	Condenser, d-c blocking, .006 μ f.	45-3500-7*	R10	Resistor, grid return, 1 megohm	66-5108340*
C41	Condenser, tone control, hi-cut, .006 μ f.	45-3500-7*	R11	Resistor, grid return, 15,000 ohms	66-3158340*
C42	Condenser, plate by-pass, 100 μ f.	62-110001001	R12	Resistor, grid return, 330,000 ohms	66-4338340*
C43	Condenser, d-c blocking, .006 μ f.	45-3500-7*	R13	Resistor, parasitic suppressor, Model 51-1731—330 ohms	66-1338340*
C44	Condenser, grid by-pass, parasitic suppression, 51 μ f., Model 51-1732 only	62-051009001		Model 51-1732—470 ohms	66-1478340*
C45	Condenser, screen by-pass, parasitic suppression, 51 μ f., Model 51-1732 only	62-051009001			

MODELS 51-1731,
51-1732

REPLACEMENT PARTS LIST (Cont.)

Reference Symbol	Description	Service Part No.	MISCELLANEOUS	Service Part No.
R14	Resistor, cathode bias (phono), 6800 ohms	66-2688340*	Cabinet, Model 51-1731	10822
R15	Resistor, plate dropping, Model 51-1731—22,000 ohms	66-3228340*	Dial scale	54-5101
	Model 51-1732—33,000 ohms	66-3338340*	Domes (4)	45-6190
R16	Resistor, grid return, 1 megohm	66-5108340*	Door pull	76-6241
R17	Resistor, cathode bias, 47 ohms	66-0478340*	Knife hinge (2)	45-6036
R18	Resistor, screen dropping, Model 51-1731 22,000 ohms	66-3228340*	Lid support	76-6275
	Model 51-1732—10,000 ohms	66-3108340*	Spring	56-8510
R19	Resistor, plate decoupling, 2200 ohms	66-2228340*	Tapped stud (2)	56-8296
R20	Resistor, grid return, 1 megohm	66-5108340*	Cabinet, Model 51-1732	10824
R21	Resistor, cathode bias, 120 ohms	66-1128340*	Bullet catch (2)	45-6002
R22	Resistor, screen dropping, 15,000 ohms	66-3158340*	Dial scale	54-5102
R23	Resistor, plate decoupling, 1000 ohms	66-2108340*	Domes (4)	3363-2
R24	Resistor, a-v-c filter, 3.3 megohms	66-5338340*	Doors, matched set of 2	45-6821
R25	Resistor, i-f filter, 47,000 ohms	66-3478340*	Door pull (2)	56-7062
R26	Resistor, a-v-c voltage divider, 470,000 ohms	66-4478340*	Knife hinge, left hand (2)	56-8479
R27	Resistor, de-emphasis, 47,000 ohms	66-3478340*	Knife hinge, right hand (2)	56-8479-1
R28	Resistor, diode load (FM), 47,000 ohms	66-3478340*	Strike plate (2)	45-6003
R29	Resistor, base boost, Model 51-1731—27,000 ohms	66-3278340*	Cable and plug assembly, speaker and loop	41-3948-4
	Model 51-1732—18,000 ohms	66-3188340*	Changer mounting parts	
R30	Volume control	33-5535-27	Bumper (2)	55-0890
R31	Resistor, feed-back voltage divider, 4.7 ohms	66-9478340*	Clip, bottom mounting (4)	W2235-1FA9
R32	Tone control, 4 megohms	33-5566-12	Drive screws (8)	1W18432FA1
R33	Resistor, inverse feedback, 120 ohms	66-1128340*	Frame	76-8257
R34	Resistor, grid return, 10 megohms	66-6108340*	Knob, pull	56-8496FCP
R35	Resistor, plate load, 470,000 ohms	66-4478340*	Screw, knob mounting	1W10078FA3
R36	Resistor, grid return, 470,000 ohms	66-4478340*	Rail assembly, LH	76-8258
R37	Resistor, inverse feedback, 2.7 megohms	66-5278340*	Rail assembly, RH	76-8259
R38	Resistor, cathode bias, Model 51-1731—120 ohms, 1w	66-1124340*	Sleeve, rubber (3)	54-7798
	Model 51-1732—180 ohms, 1w	66-1184340*	Speed nut (3)	W-2554FCP
R39	Resistor, parasitic suppressor, 10 ohms, Model 51-1732 only	66-0108340*	Spring, changer mounting (3), top (heavy)	56-7059FA9
R40	Resistor, bleeder, Model 51-1731—22,000 ohms	66-3225340*	Spring, changer mounting (3), bottom (light)	56-7059-1FCP
	Model 51-1732—120,000 ohms	66-4125340*	Clip, pilot lamp socket mounting	56-3545FA3
R41	Resistor, filter, Model 51-1731—3300 ohms, 2w	66-2335340*	Diffusing panel	54-8171-1
	Model 51-1732—2500 ohms, 2w	33-1335-93	Spring, diffusing panel mounting	56-3587-1
R42	Resistor, filter, 330 ohms, 7w	33-1335-90	Drive cord, 25 foot spool	45-8750
S1	Switch, off-on	Part of R32	Frame assembly, changer mounting	76-8264
T1	Transformer, aerial, AM	32-4413-1	Knob (3)	54-4718-6
T2	Transformer, oscillator, AM, Model 51-1731	32-4458-2	Knob, with brown dot	54-4718-12
	Model 51-1732	32-4458-3	Pointer	56-5630-29
T3	Transformer, output, Model 51-1731	32-8460-1	Spring, gang and pointer drive (2)	56-3167
	Model 51-1732	32-8407	Pointer rail assembly, backplate	76-6195
T4	Transformer, power, Model 51-1731	32-8459	Rubber band, scale mounting (2)	54-4480
	Model 51-1732	32-8462	Rubber mounts, gang (5)	27-4771-1
W1	Line cord	L-2183*	Scale strap	56-4756FE11
WS	Water switch	42-1942	Scale straps (2)	56-2234-2
Z1	Transformer, 1st FM	32-4372A	Socket, Loktal, 5A24	27-6207
Z2	Transformer, 1st AM	32-4258-3A	Socket, Loktal, 7F8	27-6207-1
Z3	Transformer, 2nd FM	32-4372-2A	Socket, 7-pin miniature (3)	27-6265-1
Z4	Transformer, 3rd FM	32-4310-3A	Socket, 9-pin miniature	27-6203-5
Z5	Transformer, 2nd AM	32-4240-3A	Socket, octal	27-6174
			Socket, pilot lamp	27-8233-18
			Speaker bolts (4)	W700-2
			Tuning shaft	56-8429
			Bushing	27-9437
			Spring, hairpin	57-1468FA3
			Washer, fibre, speaker mounting (4)	27-7467

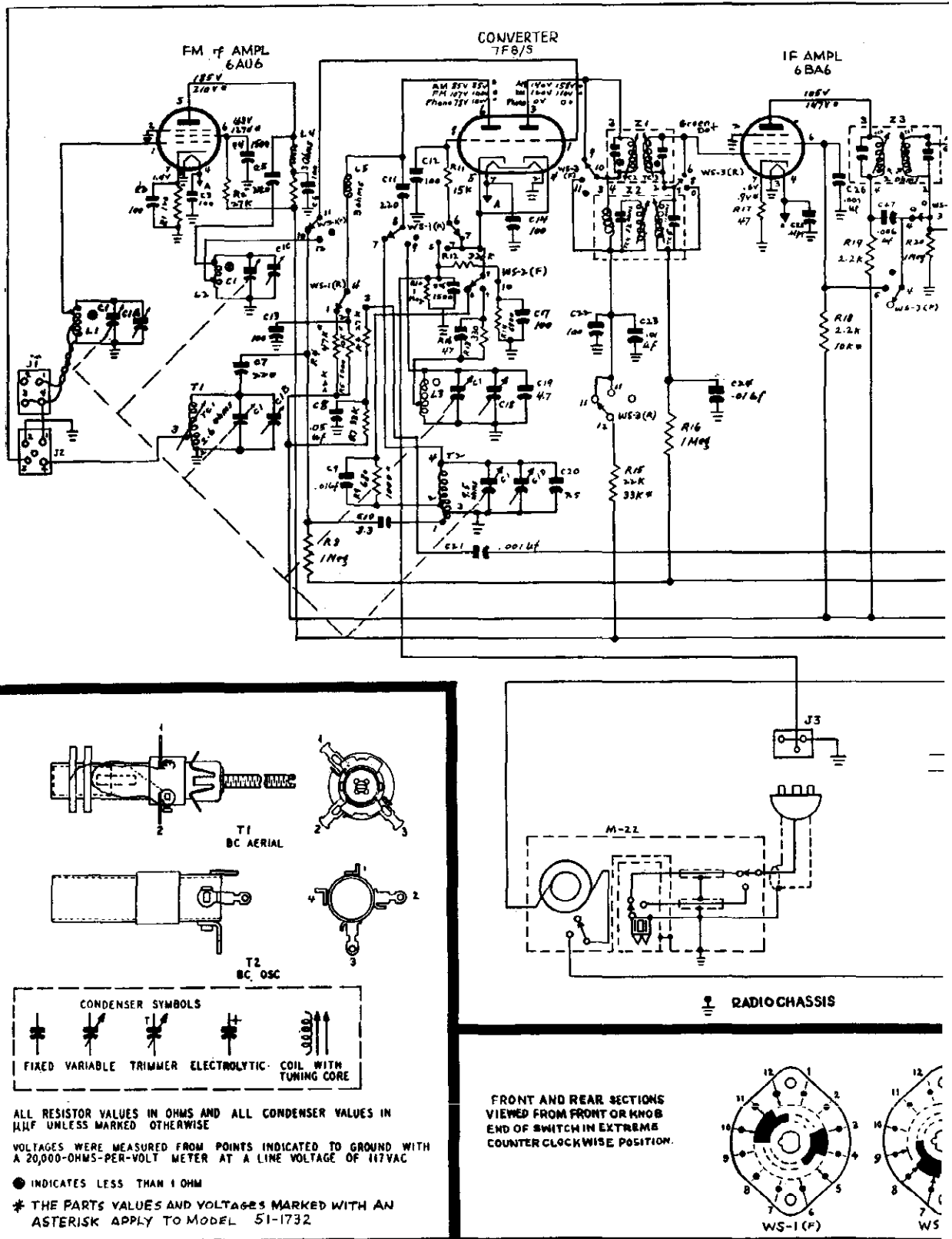
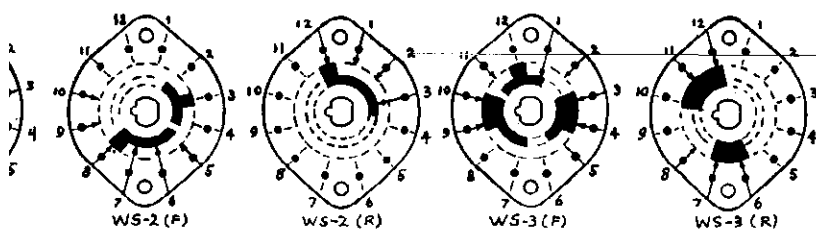
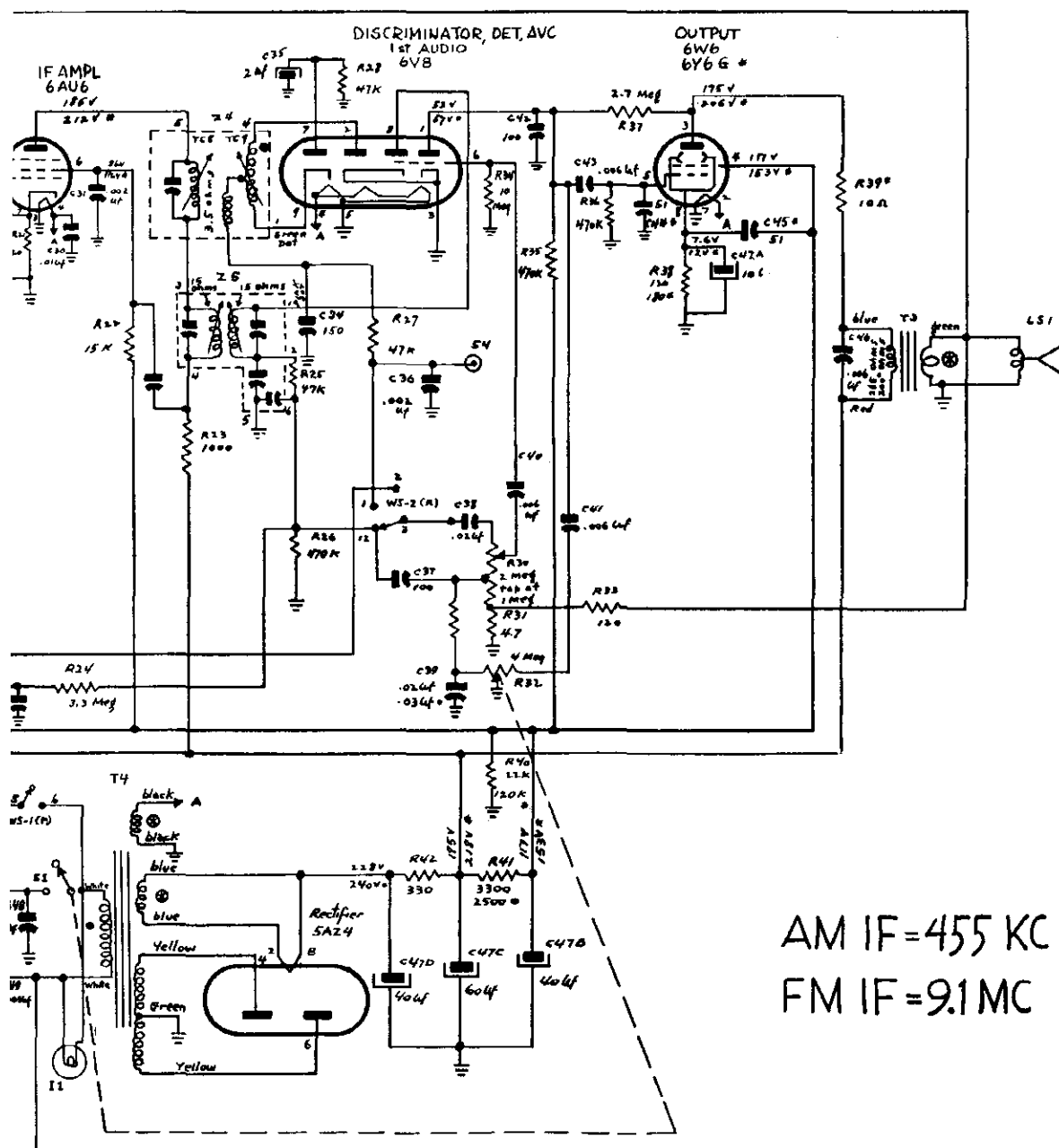


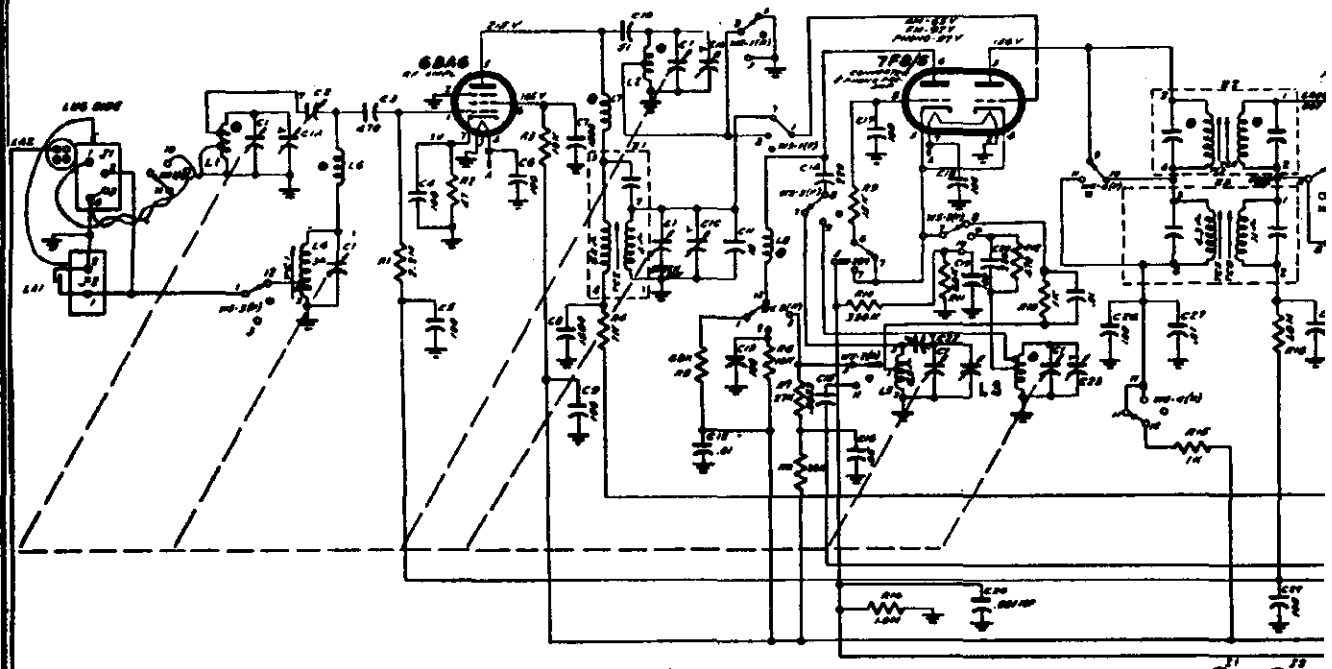
Figure 4. Philco Radio-Phonograph Mode



-1731 and 51-1732, Schematic Diagram

RECORD CHANGER: Model M-22, on Pages RCD.CH.21-1
through RCD.CH.21-4.

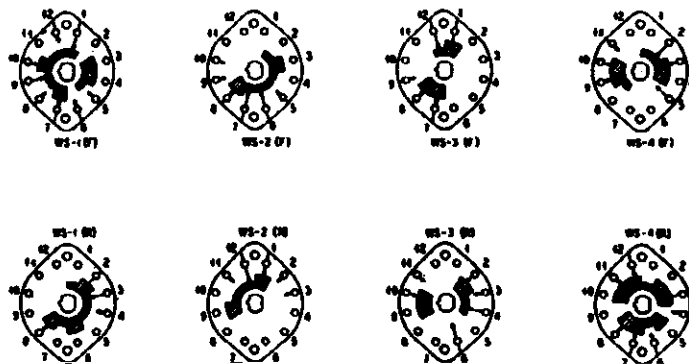
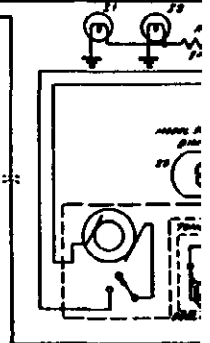
MODELS 51-1733,
51-1733(L), 51-1734



AM IF = 455 KC
FM IF = 9.1 MC

RECORD CHANGERS:

For Models 51-1733 and 51-1733(L), Model M-22,
on pages RCD.CH.21-1 through RCD.CH.21-4;
For Model 51-1734, Model M-20 on pages
RCD.CH.20-1 through RCD.CH.20-16.



4 SECTION UPPER SWITCH SHOWN IN BROADCAST POSITION A
FROM FRONT WITH CHASSIS INVERTED
SECTIONS OF SWITCHES NUMBERED WS-1, WS-2, WS-3 AND
FRONT TO REAR
(F) INDICATES FRONT CONTACTS, LOOKING FROM FRONT
(R) INDICATES REAR CONTACTS, LOOKING THROUGH FROM I



Figure 4. Philco Radio-Phonograph Models

MODELS 51-1733,
51-1733(L), 51-1734

SPECIFICATIONS

CABINET	Model 51-1733	Wood console, mahogany finish	AUDIO OUTPUT	5 watts
	Model 51-1733(L)	Wood console, light oak finish	OPERATING VOLTAGE	117 volts, 60 cycles, a.c.
	Model 51-1734	Mahogany finish	POWER CONSUMPTION	
CIRCUIT		8-tube superheterodyne	Radio	95 watts
			Phonograph	110 watts
FREQUENCY RANGES	Standard broadcast	540—1630 kc.		
	FM	88—108 mc.		
AERIALS		Built-in broadcast loop; FM line-cord aerial; provision for connection of external aerials		
INTERMEDIATE FREQUENCIES	AM	455 kc.		
	FM	9.1 mc.		
PHILCO TUBES (8)		6BA6 r-f ampl., 7F8/S osc.-mixer-phonopreampl., 6BA6 1st i-f ampl., 6AU6 2nd i-f ampl., 6BC7 FM det.-a.v.c., 6AV6 AM det.-1st audio, 6Y6G output, 5AZ4 rectifier		
RECORD PLAYER		Models 51-1733 and 51-1733(L). Philco Model M-22 All-Speed Automatic Record Changer (For service information, refer to Service Manual PR-1864).		
		Model 51-1734. Philco Model M-20 All-Speed Automatic Record Changer (for service information, refer to Service Manual PR-1731).		

SPRING 56-2617

Figure 1. Drive-Cord Installation Details

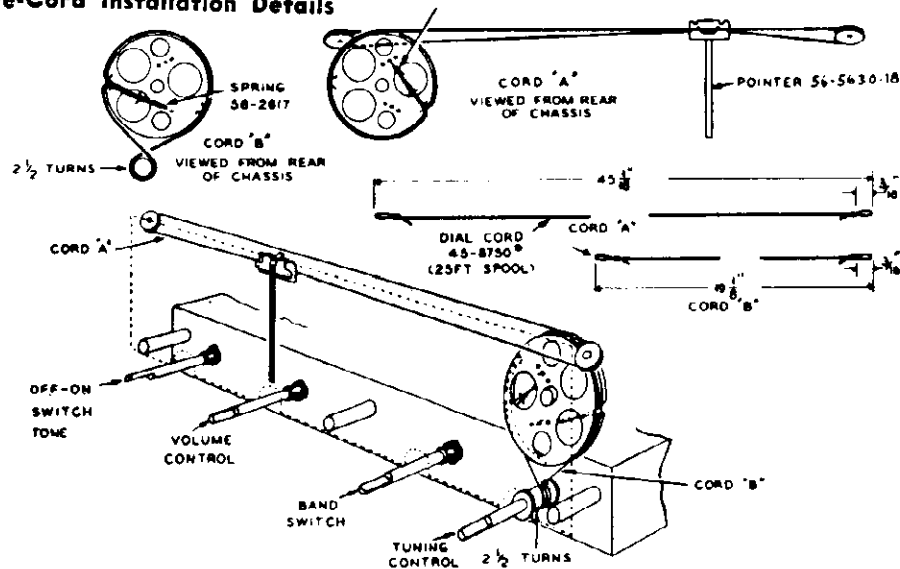
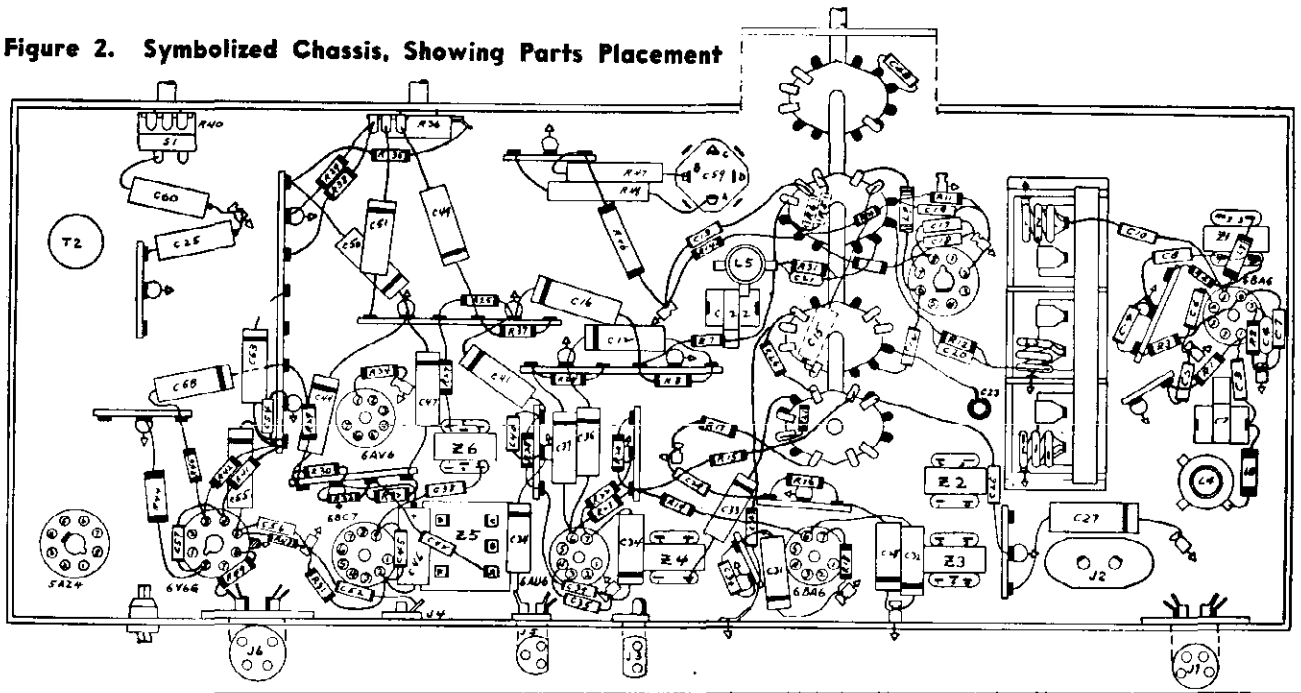


Figure 2. Symbolized Chassis, Showing Parts Placement



MODELS 51-1733,
51-1733(L), 51-1734

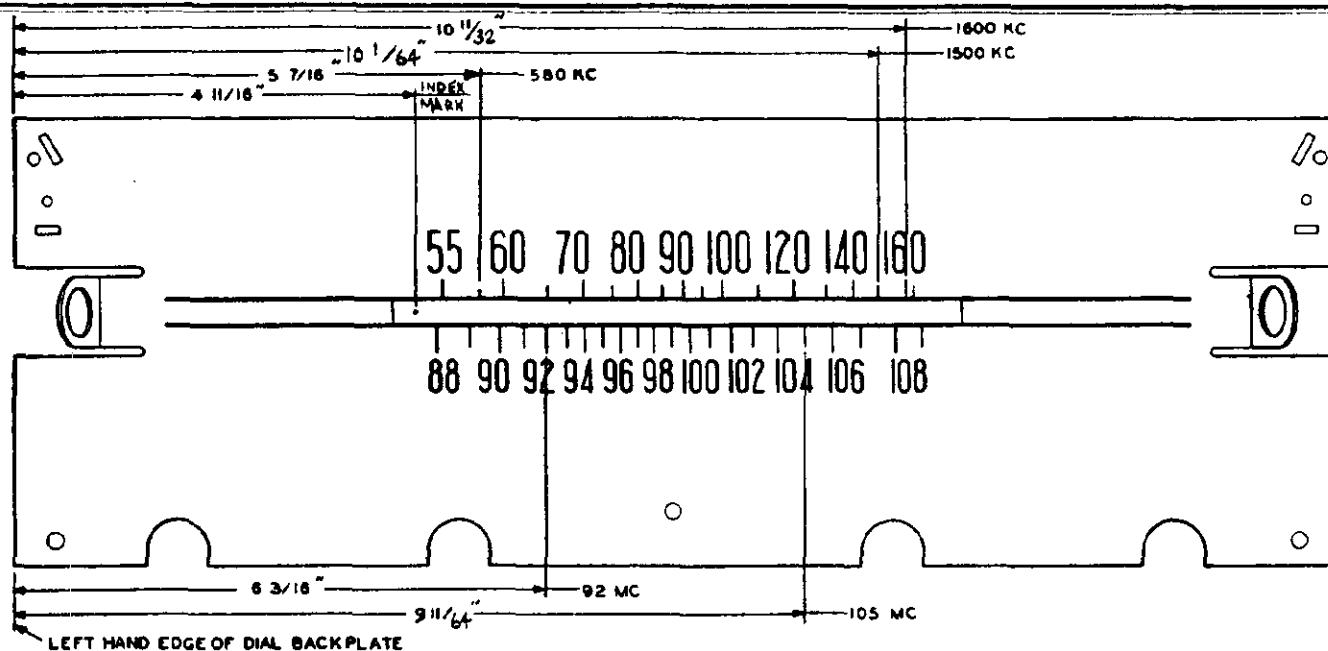


Figure 3. Dial-Backplate Calibration Measurements

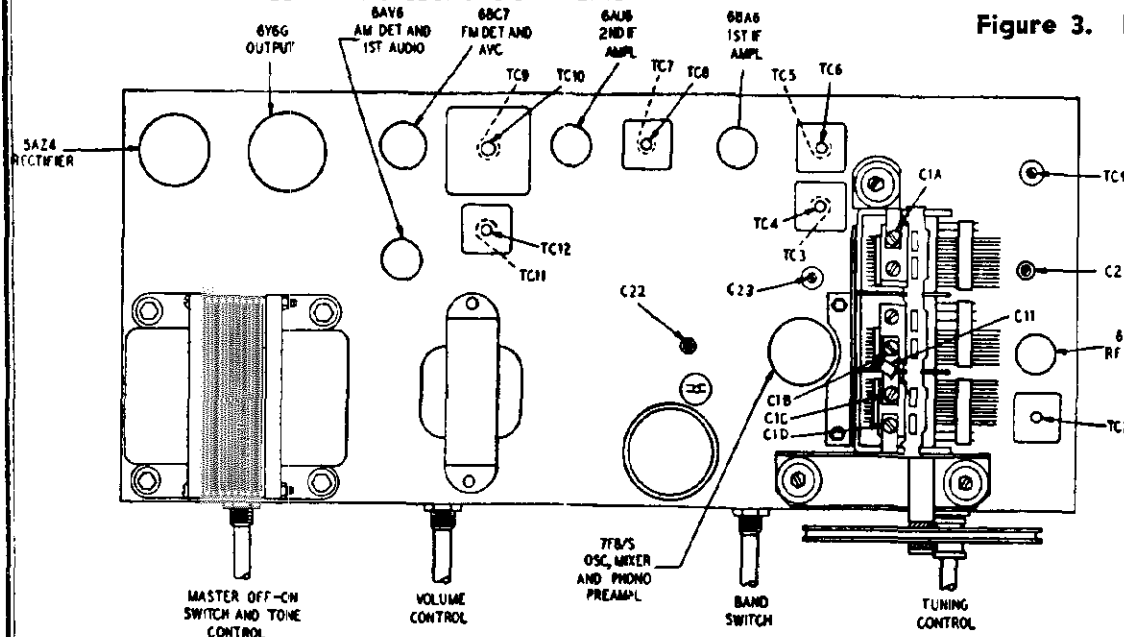


Figure 5. Top View, Showing Trimmer Locations

AM ALIGNMENT PROCEDURE

Make alignment with loop aerial connected to radio. The AM alignment should be made before the FM alignment.

DIAL POINTER: Calibration and pointer-index measurements are shown in figure 5. With tuning gang fully meshed, set pointer to index mark.

OUTPUT METER: Connect across speaker voice-coil terminals.

SIGNAL GENERATOR: Connect AM r-f signal generator as indicated in chart. Use modulated output.

RADIO CONTROLS: Set volume control to maximum, tone control counterclockwise, and band switch to broadcast position.

OUTPUT LEVEL: During alignment, adjust signal-generator output to hold output-meter indicator below 1.25 volts.

MODELS 51-1733,
51-1733(L), 51-1734

AM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .1- μ f. condenser to mixer grid, pin 1, of 7F8/S.	455 kc.	Gang fully meshed	Adjust, in order given, for maximum output.	TC12—2nd AM i-f sec. TC11—2nd AM i-f pri. TC6—1st AM i-f sec. TC5—1st AM i-f pri.
2	Radiating loop. (See note below.)	1600 kc.	1600 kc.	Adjust for maximum.	C1B—AM osc. shunt
3	Same as step 2.	580 kc.	580 kc.	Adjust, in order given, for maximum while rocking tuning control.	C22—AM osc. series TC2—AM r-f tuning core TC1—AM ant. tuning core
4	Same as step 2.	1500 kc.	1500 kc.	Adjust, in order given, for maximum.	C1C—AM r-f shunt C2—AM ant. shunt
5	Repeat steps 2, 3, and 4 until no further increase is obtained.				

Radiating Loop: Make up a 6-to-8 turn, 8-inch-diameter loop, using insulated wire; connect to signal generator leads, and place near radio loop aerial.

FM ALIGNMENT PROCEDURE

Make the AM alignment first.

RADIO CONTROLS: Set volume control to maximum, tone control counterclockwise, and band switch to FM position. Allow radio and signal generator to warm up for at least 15 minutes before making alignment.

SIGNAL GENERATOR: Use a signal generator capable of delivering a 9.1-mc. FM signal with a deviation of ± 80 kc., and modulated AM signals of 92 mc., 105 mc., and 108 mc. Philco Model 7008 Precision Visual Alignment Generator fulfills these requirements. NOTE: Model 7008 must be well bonded to radio chassis.

OSCILLOSCOPE: Connect to FM TEST jack. Model 7008 is suggested.

OUTPUT METER: Connect across speaker voice-coil terminals.

R-F COIL NOTE: Check resonance of circuits containing coils L1, L2, and L3 by inserting each end of a tuning wand, such as Philco Part No. 45-8885, into coil. If signal strength increases when powdered-iron end is inserted, compress turns slightly. If signal strength increases when brass end is inserted, spread turns slightly. If signal strength decreases when each end is inserted, no adjustment is necessary. Do not spread or compress turns excessively; only a small change is required at these high frequencies.

FM ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .1- μ f. condenser to pin 1 of 6AU6*.	9.1 mc. ± 80 kc. deviation.	Gang fully meshed.	Adjust TC10 for correct crossover. Adjust TC 9 for maximum and equal peaks. Repeat.	TC10—FM det. sec. TC9—FM det. pri.
2	1- μ f. condenser to pin 1 of 6BA6*.	9.1 mc. ± 80 kc. deviation.	Gang fully meshed.	Adjust, in order given, for maximum and equal peaks. Repeat.	TC8—FM 2nd i-f sec. TC7—FM 2nd i-f pri.
3	Through a .1- μ f. condenser to pin 1 of 7F8/S*.	9.1 mc. ± 80 kc. deviation.	Gang fully meshed.	Adjust, in order given, for maximum and equal peaks. Repeat.	TC4—FM 1st i-f sec. TC3—FM 1st i-f pri.
4	Through a 300-ohm dummy aerial to FM aerial socket.	108 mc.	108 mc.	Adjust trimmer for maximum reading on output meter.	C23—FM osc.
5	Same as step 4.	105 mc.	105 mc.	Adjust for maximum while rocking gang.	C1D—FM r-f C1A—FM aerial
6	Same as step 4.	92 mc.	92 mc.	Adjust coils, in order given, for proper resonance (see R-F COIL NOTE).	L3—FM osc. coil L2—FM r-f coil L1—FM aerial coil

*CAUTION: Do not overload! When aligning the i-f stages, the curve will be distorted or destroyed if too great a signal is used. To check, attenuate the signal input. If the curve changes in form, rather than merely decreasing in multitude, the stage is overloaded.

MODELS 51-1733,
51-1733(L), 51-1734

REPLACEMENT PARTS LIST

NOTE

Part numbers marked with an asterisk (*) are general replacement items. These numbers may not be identical to those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that the operation of the instrument will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

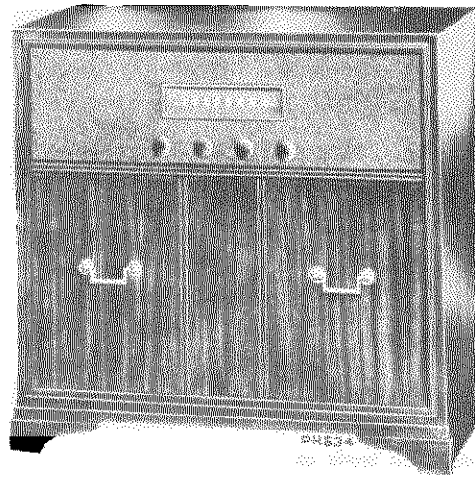
Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, 8-gang tuning	31-2750	C46	Condenser, electrolytic, diode load filter, 2 μ f.	30-2417-7
C2	Condenser, trimmer, ant. shunt	31-6473-6	C47	Condenser, a-v-c filter, .01 μ f.	61-0120*
C3	Condenser, d-c blocking, 470 μ f.	62-147001001	C48	Condenser, tone compensation, 100 μ f.	62-110001001
C4	Condenser, cathode by-pass, 100 μ f.	60-10105017	C49	Condenser, d-c blocking, .02 μ f.	61-0108*
C5	Condenser, a-v-c filter, 100 μ f.	62-110001001	C50	Condenser, bass boost, .03 μ f.	30-4517
C6	Condenser, filament by-pass, 100 μ f.	62-110001001	C51	Condenser, d-c blocking, .006 μ f.	45-3500-7*
C7	Condenser, screen by-pass, 1500 μ f.	62-215001001	C52	Condenser, i-f by-pass, 100 μ f.	62-110001001
C8	Condenser, plate decoupling, 1500 μ f.	62-215001001	C53	Condenser, treble out, .006 μ f.	45-3500-7*
C9	Condenser, by-pass, 100 μ f.	62-110001001	C54	Condenser, plate by-pass, 100 μ f.	62-110001001
C10	Condenser, d-c blocking, 51 μ f.	62-051009001	C55	Condenser, d-c blocking, .006 μ f.	45-3500-7*
C11	Condenser, temperature compensating, 10 μ f.	62-010009001	C56	Condenser, grid by-pass, 220 μ f.	62-122001001
C12	Condenser, by-pass, .01 μ f.	61-0120*	C57	Condenser, neutralization, 100 μ f.	62-110001001
C13	Condenser, plate decoupling, 100 μ f.	62-110001001	C58	Condenser, tone compensation, .006 μ f.	45-3500-7*
C14	Condenser, d-c blocking, 220 μ f.	62-122001001	C59	Condenser, electrolytic, 4-section	30-2570-64
C15	Condenser, d-c blocking, phono coupling, .0033 μ f.	45-3505-55*	C59A	Condenser, filter, 40 μ f., 400 wv.	Part of C59
C16	Condenser, plate decoupling, .05 μ f.	61-0122*	C59B	Condenser, filter, 60 μ f., 400 wv.	Part of C59
C17	Condenser, grid by-pass, 100 μ f.	62-110001001	C59C	Condenser, filter, 40 μ f., 350 wv.	Part of C59
C18	Condenser, filament by-pass, 100 μ f.	62-110001001	C59D	Condenser, cathode by-pass, 10 μ f., 25 wv.	Part of C59
C19	Condenser, cathode by-pass, 100 μ f.	62-110001001	C60	Condenser, line by-pass, .01 μ f.	45-3505-41*
C20	Condenser, d-c blocking, 220 μ f.	62-122001001	I1	Pilot lamp	34-2064
C21	Condenser, d-c blocking, .01 μ f.	30-1226-10	I2	Pilot lamp	34-2064
C22	Condenser, osc. series padder	31-6473-7	I3	Bin lamp, model 51-1734 only	34-2064
C23	Condenser, trimmer, FM osc.	31-6511	J1	Socket, FM aerial	27-6214-1
C24	Condenser, phono tone compensation, .001 μ f.	45-3500-5*	J2	Socket, AM aerial	27-6214-14
C25	Condenser, line by-pass, .01 μ f.	45-3505-41*	J3	Socket, speaker	27-6214-12
C26	Condenser, plate decoupling, 100 μ f.	62-110001001	J4	Socket, FM test	27-6180
C27	Condenser, plate decoupling, .01 μ f.	61-0120*	J5	Socket, phono input	27-6126*
C28	Condenser, a-v-c decoupling, .01 μ f.	61-0120*	J6	Socket, phono power	27-6182
C29	Condenser, a-v-c filter, 100 μ f.	62-110001001	L1	Coil, FM aerial	32-4415
C30	Condenser, filament by-pass, 100 μ f.	62-110001001	L2	Coil, FM r-f	32-4416
C31	Condenser, filament by-pass, .01 μ f.	61-0120*	L3	Coil, FM osc.	32-4414
C32	Condenser, screen by-pass, .002 μ f.	61-0062*	L4	Coil, AM aerial	32-4413
C33	Condenser, plate decoupling, .01 μ f.	61-0120*	L5	Coil, AM osc.	32-4153-6
C34	Condenser, cathode by-pass, .01 μ f.	61-0120*	L6	Choke, aerial isolating	32-4061-2
C35	Condenser, filament by-pass, 100 μ f.	62-110001001	L7	Choke, plate load	32-4061-2
C36	Condenser, screen by-pass, .002 μ f.	61-0062*	L8	Choke, plate load	32-4061-2
C37	Condenser, neutralization, .01 μ f.	61-0120*	LA1	Loop aerial, AM	
C38	Condenser, plate decoupling, 100 μ f.	62-110001001	LA2	Line cord aerial FM	41-3791-1
C39	Condenser, i-f filter, 220 μ f.	62-122001001	LS1	Speaker	
C40	Condenser, i-f filter, 100 μ f.	62-110001001		Model 51-1733	36-1610-6
C41	Condenser, de-emphasis, .002 μ f.	61-0062*		Model 51-1734	36-1610-7
C42	Condenser, d-c blocking, a-v-c rectifier coupling, 15 μ f.	62-015400021*	R1	Resistor, grid return, 2.2 megohms	66-5228340*
C43	Condenser, i-f filter, 100 μ f.	62-110001001	R2	Resistor, cathode bias, 47 ohms	66-0478340*
C44	Condenser, by-pass, .01 μ f.	61-0120*	R3	Resistor, screen dropping, 10,000 ohms	66-3108340*
C45	Condenser, by-pass, 100 μ f.	62-110001001	R4	Resistor, plate isolating, 10,000 ohms	66-2108340*
			R5	Resistor, plate load, 68,000 ohms	66-3688340*

MODELS 51-1733,
51-1733(L), 51-1734

REPLACEMENT PARTS LIST (Cont.)

			MISCELLANEOUS	
Reference Symbol	Description	Service Part No.	Description	Service Part No.
R6	Resistor, plate load, 10,000 ohms	66-3108340*	Cabinet, Model 51-1733	10825
R7	Resistor, plate load, 27,000 ohms	66-3278340*	Cabinet, Model 51-1733 (L)	10825-1
R8	Resistor, plate isolating, 33,000 ohms	66-3338340*	Bullet catch (2)	45-6002
R9	Resistor, grid return, 15,000 ohms	66-3158340*	Changer mounting frame	76-6264
R10	Resistor, grid return (phono), 330,000 ohms	66-4338340*	Dial scale	54-5103-1
R11	Resistor, cathode bias, 6800 ohms	66-2688340*	Dome (4)	45-6190
R12	Resistor, parasitic suppressor, 470 ohms	66-1478340*	Doors, matched set, Model 51-1733	45-6822
R13	Resistor, parasitic suppressor, 1000 ohms	66-2108340*	Model 51-1733 (L)	45-6623
R14	Resistor, crystal load, 1 megohm	66-5108340*	Door pull	56-7998
R15	Resistor, plate isolating, 1000 ohms	66-2108340*	Door pull plate	56-7999
R16	Resistor, a-v-c isolating, 1 megohm	66-5108340*	Knife hinge (LH) (2), Model 51-1733	56-8479
R17	Resistor, grid return, 1 megohm	66-5108340*	Model 51-1733 (L)	56-8479-2
R18	Resistor, cathode bias, 47 ohms	66-0478340*	Knife hinge (RH) (2), Model 51-1733	56-8479-1
R19	Resistor, screen dropping, 10,000 ohms	66-3108340*	Model 51-1733 (L)	56-8479-3
R20	Resistor, plate isolating, 1000 ohms	66-2108340*	Phono power cable and plug assembly	41-3944-5
R21	Resistor, grid return, 3300 ohms	66-2338340*	Strike plate, Model 51-1733	45-6003
R22	Resistor, cathode bias, 120 ohms	66-1128340*	Model 51-1733 (L)	45-6003-1
R23	Resistor, screen dropping, 22,000 ohms	66-3228340*	Cabinet, Model 51-1734	10847
R24	Resistor, plate isolating, 1000 ohms	66-2108340*	Bezel	56-5855FCP
R25	Resistor, diode load, 470,000 ohms	66-4478340*	Bin light and phono power socket and cable assembly	41-3944-6
R26	Resistor, audio filter, 100,000 ohms	66-4108340*	Clip, bin light mounting	56-3545-6
R27	Resistor, i-f filter, 47,000 ohms	66-3478340*	Dial scale	54-5108
R28	Resistor, i-f filter, 47,000 ohms	66-3478340*	(Parts common to all models)	
R29	Resistor, voltage divider, 330,000 ohms	66-4338340*	Changer mounting parts	
R30	Resistor, voltage divider, 22,000 ohms	66-3228340*	Bumper (2)	55-0890
R31	Resistor, FM diode load, 47,000 ohms	66-3478340*	Clip, bottom mounting (4)	W2235-1FA9
R32	Resistor, a-v-c load, 2.2 megohms	66-5228340*	Drive screws (8)	IW19432FA1
R33	Resistor, a-v-c filter, 2.2 megohms	66-5228340*	Frame, Model 51-1733	76-6257
R34	Resistor, grid return, 10 megohms	66-6108340*	Model 51-1734	76-6296
R35	Resistor, bass boost, 27,000 ohms	66-3278340*	Knob, pull	56-8496FCP
R36	Volume control	33-5535-27	Screw, knob mounting	IW10078FA3
R37	Resistor, isolating, 100,000 ohms	66-4108340*	Rail assembly, (LH), Model 51-1733	76-6258
R38	Resistor, feedback, 120 ohms	66-1128340*	Model 51-1734	76-6258-1
R39	Resistor, voltage divider, feedback, 4.7 ohms	66-9478340*	Rail Assembly, (RH), Model 51-1733	76-6259
R40	Tone control, 4 megohms with switch	33-5566-12	Model 51-1734	76-6259-1
R41	Resistor, plate load, 270,000 ohms	66-4278340*	Sleeve, rubber (3)	54-7798
R42	Resistor, inverse feedback, 2.7 megohms	66-5278340*	Speed nut (3)	W-2354FCP
R43	Resistor, grid return, 470,000 ohms	66-4478340*	Spring, changer mounting (3) top (heavy)	56-7059FA9
R44	Resistor, cathode bias, 180 ohms, 1 watt	66-1184340*	Spring, changer mounting (3) bottom (light)	56-7059-1FCP
R45	Resistor, parasitic suppressor, 10 ohms	66-0108340*	Dial backplate assembly	76-6311
R46	Resistor, bleeder, 120,000 ohms, 2 watts	65-4125340*	Pilot lamp socket assembly (2)	27-6233-33
R47	Resistor, filter, 2200 ohms, 2 watts	33-1335-97	Drive shaft assembly	76-5139-1
R48	Resistor, filter, 330 ohms, 7 watts	33-1335-90	Bushing, drive shaft	27-9437
R49	Resistor, pilot lamp dropping, 1 ohm	66-9108340*	Dial cord, 25 foot spool	45-8750*
S1	Switch, on-off	Part of R40	Spring, drive cords (2)	56-2617
T1	Transformer, output	32-8407	Spring, hairpin, drive shaft retainer	57-1468FA3
T2	Transformer, power	32-8406	Knob (3)	54-4718-6
W1	Line cord	1-2183*	Knob, band switch	54-4718-12
WS	Water switch	42-1910	Pointer	56-5630-18
Z1	Transformer, AM i-f	32-4399-3A	Scale strap	56-4756FE11
Z2	Transformer, 1st FM i-f	32-4372A	Scale strap (2)	56-2234-2
Z3	Transformer, 1st AM i-f	32-4258-3A	Socket, Loktal, 5A24	27-6207
Z4	Transformer, 2nd FM i-f	32-4372-2A	Socket, Loktal, 7F8/s	27-6207-1
Z5	Transformer, 3rd FM i-f	32-4417	Socket, miniature, 7 pin (4)	27-6265-1
Z6	Transformer, 2nd AM i-f	32-4240-3A	Socket, miniature, 9 pin	27-6203-5
			Socket, octal	27-6174
			Speaker bolts (4)	W-7002
			Washer, fibre, speaker mounting (4)	27-7487

MODEL A55,
Ch. RC-1087



Specifications

Tuning Range	540-1600 kc	Tuning Drive Ratio	12½:1 (6¼ turns of knob)
Intermediate Frequency	455 kc	Dial Lamps (2)	Type No. 1490, 3.2 volts, .16 amp.
Tube Complement		Power Output	
(1) RCA 12SA7	Converter	Maximum 1.5 watts	Undistorted 1 watt
(2) RCA 12BA6	I.F. Amplifier	Weight	67 lbs.
(3) RCA 12SQ7	Det.—AVC.—A.F. Amp.	Cabinet Dimensions	
(4) RCA 50L6GT	Output	Height 29½"	Width 30¾" Depth 17"
(5) RCA 35Z5GT	Rectifier	Record Players (2)	
Power Supply Rating	115 volts, 60 cycles, 50 watts	RP 168	45 RPM
Loudspeaker		Record capacity	up to ten RCA 7 in fine groove
Type 92586-2	8 in. P.M.	960282-1	78 or 33 1/3 RPM
Voice coil impedance	3.2 ohms at 400 cycles	Record capacity	up to ten 12 in. or twelve 10 in.

Alignment Procedure

Output Meter Alignment.—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

Signal Generator.—For all alignment operations, connect the low side of the signal generator to the receiver chassis and keep the output as low as possible to avoid AVC action.

It may be desirable to use an isolation transformer (117v./117v.) for the receiver if the signal generator is also a.c. operated.

* Alternate loading involves the use of a 22,000 ohm resistor to load the plate winding while the grid winding of the SAME TRANSFORMER is being peaked. Then the grid winding is loaded with the resistor while the plate winding is peaked. Only one winding is loaded at any one time. Remove the 22,000 ohm resistor after T2 and T1 have been aligned.

NOTE: If "alternate loading" is not used during I-F alignment, it may result in non-symmetrical response. This is due to the characteristics of the I-F transformers used in this chassis.

Alignment Tabulation

Steps	Connect high side of sig. gen. to—	Adjust sig. gen. to—	Turn radio dial to—	Adjust for max. output—
1	Converter grid (pin #8 of 12SA7) thru a .1 mf. capacitor	455 kc	Quiet point near 1600 kc	T2 top & bottom 2nd I.F.
2				T1 top & bottom 1st I.F.
3	Repeat Steps 1 and 2 using alternate loading*			
4	Short wire placed near loop for radiated signal	1620 kc	Gang fully open	C6 (osc.)
5		1400 kc	1400 kc signal	C3 (ant.)
6		600 kc	600 kc signal	L 2 (osc.) (rock gang)
7	Repeat Steps 4, 5 and 6			

PAGE 21-2 RADIO CORPORATION OF AMERICA

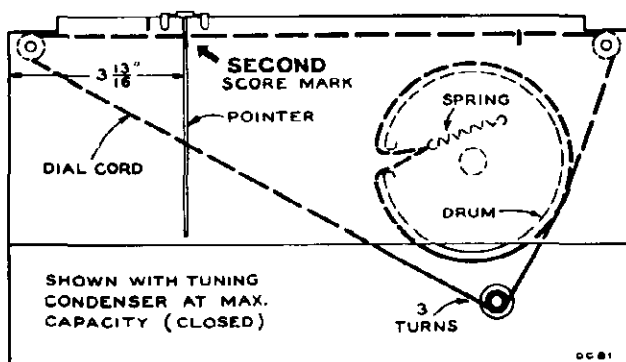
MODEL A55,
Ch. RC-1087

Dial Pointer Position

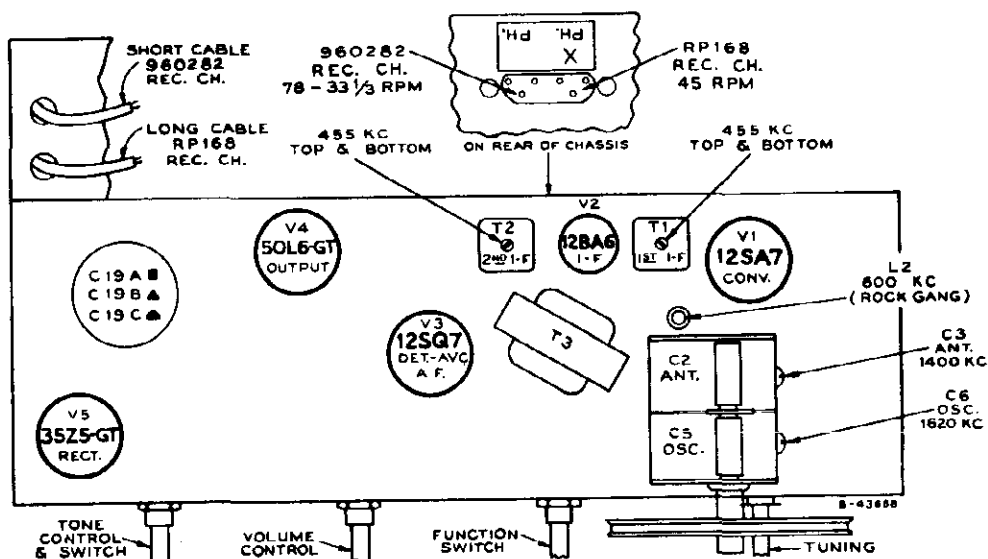
With the tuning condenser fully meshed, set the dial pointer to the SECOND score mark from the left hand edge of the dial back plate.

Lead Dress

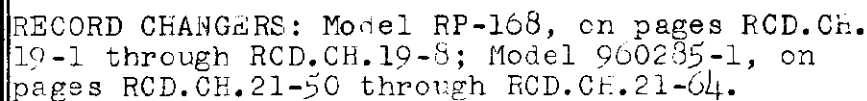
1. Dress all heater leads down to chassis and as far as possible from all audio grid and plate winding.
2. Dress power cord to side apron and away from tone control.
3. Dress capacitor C22 down to chassis and keep leads as short as possible.
4. Dress pilot light leads and phono. power cables to side apron and away from tone control.
5. Dress phono. A.C. leads on function switch away from all other terminals and run leads directly through to front apron.
6. Dress output transformer leads down to chassis.
7. Dress C20 away from chassis and wire with as short leads as possible.
8. Dress excess loop leads away from tubes and clear of gang condenser.
9. Dress lead from tone control to S-1 terminal #7 along chassis base and front apron.



Dial-Indicator and Drive Mechanism



Tube and Trimmer Locations



SCHEMATIC DIAGRAM

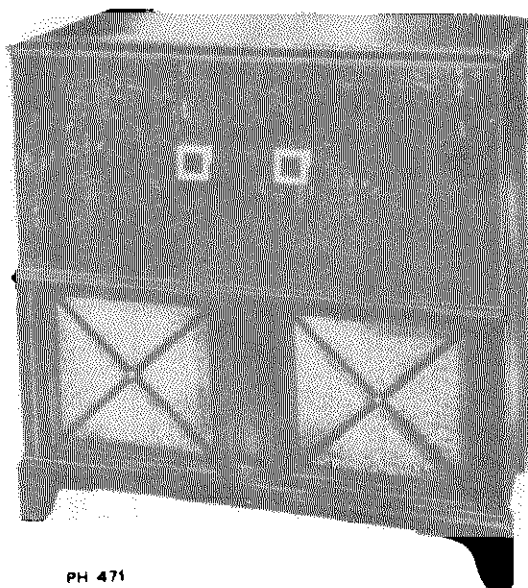
MODEL A55,
Ch. RC-1087

Replacement Parts

STOCK NO.	DESCRIPTION	STOCK NO.	DESCRIPTION
CHASSIS ASSEMBLIES RC 1087		74762	Switch—Function switch .....S1
74763	Capacitor—Variable tuning capacitor, C2, C3, C5, C6	74918	Transformer—First I.F. transformer .....T1
71924	Capacitor—Ceramic, 56 mmf. ....C4	73037	Transformer—Second I.F. transformer .....T2
39630	Capacitor—Mica, 120 mmf. ....C15, C18	74677	Transformer—Output transformer .....T3
74678	Capacitor—Electrolytic, comprising 2 sections of 120 mfd., 150 volts and 1 section of 40 mfd., 25 volts .....C19A, C19B, C19C	33726	Washer—"C" washer for tuning knob shaft
70603	Capacitor—Tubular, paper, .003 mfd., 400 volts ....C20	SPEAKER ASSEMBLIES 92586-2 RL 105C2	
70604	Capacitor—Tubular, paper, .0035 mfd., 400 volts ....C7	74758	Cone—Cone and voice coil assembly
73920	Capacitor—Tubular, paper, .005 mfd., 400 volts ....C17	74679	Speaker—8" P.M. speaker complete with cone and voice coil
70608	Capacitor—Tubular, paper, .007 mfd., 400 volts .....C12, C21	NOTE:—If stamping on speaker in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.	
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts, .....C16, C22	MISCELLANEOUS	
70572	Capacitor—Tubular, paper, .015 mfd., 400 volts ....C10	74205	Bezel—Dial bezel less dial
70611	Capacitor—Tubular, paper, .02 mfd., 400 volts ....C11	70608	Capacitor—Tubular, paper, .007 mfd., 400 volts ....C102
73553	Capacitor—Tubular, paper, .05 mfd., 400 volts, .....C9, C14, C23, C24, C25	74298	Clamp—Dial clamp (2 req'd)
73935	Clip—Mounting clip for I.F. transformer	X3115	Cloth—Grille cloth for mahogany or walnut instruments
74448	Coil—Oscillator coil .....L1, L2	X3116	Cloth—Grille cloth for oak instruments
30868	Connector 2 contact female connector for motor cable .....J3, J4	74192	Connector—3 contact male connector for pickup cables .....P1, P2
71596	Control—Volume control .....R18	74581	Cover—Mounting screw cover—use with #74582 screw (3 req'd)
74761	Control—Tone control and power switch .....R15, S2	71910	Decal—Trade mark decal
71457	Cord—Power cord and plug	74771	Decal Control panel function decal for mahogany or walnut instruments
†72953	Cord—Drive cord (approx. 48" overall length required.)	74772	Decal—Control panel function decal for oak instruments
74838	Grommet—Power cord strain relief (1 set)	74769	Dial—Glass dial scale
72283	Grommet—Rubber grommet to mount tuning capacitor.	74206	Grommet—Rubber grommet to mount 960282 record changer
74765	Indicator—Station selector indicator	74931	Knob—Tuning control, volume control or tone control and power switch knob maroon—for mahogany or walnut instruments
71116	Lamp—Dial lamp—Type #1490	72824	Knob—Tuning control, volume control, function switch or tone control and power switch knob—brown—for oak instruments
74766	Loop—Antenna loop assembly	74934	Knob—Function switch knob—maroon—for mahogany or walnut instruments
72776	Pin—Contact pin for speaker lead	74208	Nut—Tee nut to mount RP168 record changer (3 req'd)
75047	Plate—Dial back plate complete with two (2) pulleys less dial	74770	Pull—Door pull
18469	Plate—Bakelite mounting plate for electrolytic capacitor	Resistor Fixed, composition: 18,000 ohms, ±10%, ½ watt .....R102	
74767	Receptacle—Dual phono input receptacle .....J1, J2	74582	Screw—#8-32 x 1½" special head screw to mount RP168 record changer (3 req'd)
74768	Resistor—Wire wound, 33 ohms, 1 watt .....R20	74269	Screw—#8-32 x ¾" trimit head screw for door pull
Resistors—Fixed, composition:—		74422	Spring—Conical spring to mount RP168 record changer—upper—L.H.—(2 req'd)
100 ohms, ±20%, ½ watt .....R1		74421	Spring—Conical spring to mount RP168 record changer—upper—R.H.—(1 req'd)
150 ohms, ±10%, ½ watt .....R12		74423	Spring—Conical spring to mount RP168 record changer—lower—(3 req'd)
270 ohms, ±10%, ½ watt .....R5		30900	Spring—Retaining spring for knobs
1000 ohms, ±10%, 1 watt .....R11		75040	Spring—Mounting spring for 960282 record changer
15,000 ohms, ±10%, ½ watt .....R16			
22,000 ohms, ±10%, ½ watt .....R2			
27,000 ohms, ±10%, ½ watt .....R17			
33,000 ohms, ±10%, ½ watt .....R9			
47,000 ohms, ±10%, ½ watt .....R4			
56,000 ohms, ±10%, ½ watt .....R7			
220,000 ohms, ±10%, ½ watt .....R13, R19			
470,000 ohms, ±10%, ½ watt .....R6, R10			
3.3 megohm, ±20%, ½ watt .....R8			
10 megohm, ±20%, ½ watt .....R14			
74764	Shaft—Tuning knob shaft		
73117	Socket—Tube socket, miniature for 12BA6		
31251	Socket—Tube socket, octal waver		
74014	Socket—Dial lamp socket		
74038	Spring—Drive cord tension spring		

†Stock No. 72953 is a reel containing 250 feet of cord.

MODELS A78,
9W78, Ch. RC-1084A



PH 471

Specifications

Tuning Ranges

Standard Broadcast (AM) 540-1,600 kc.
Frequency Modulation (FM) 88-108 mc.

Intermediate Frequency.....AM—455 kc.. FM—10.7 mc.

Tube Complement

(1) 6J6..... Mixer and Oscillator
(2) 6BA6..... I. F. Amplifier
(3) 6AU6..... Driver
(4) 6AL5..... Ratio Detector
(5) 6AV6..... AM Det.—AVC—A. F. Amp.
(6) 6V6GT..... Output
(7) 6X5GT..... Rectifier

Power Supply Rating..... 115 volts, 60 cycles, 70 watts

Loudspeaker

Type 92569-9 12 in. P.M.
Voice coil impedance at 400 cycles 3.2 ohms

Tuning Drive Ratio 18:1 (9 turns of knob)

Pilot Lamps (3) Type No. 51, 6-8 volts, 0.2 amp.

Power Output

Maximum 5 watts
Undistorted 2 watts

Antennas:

This receiver has built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception.

Under average conditions the (FM) antenna will provide satisfactory reception. However, provision is made for the use of external antennas if desired—connect as indicated below:

FM Antenna: Connect the transmission line from an external FM dipole antenna to "FM" and "G" terminals. Remove the internal FM antenna wire from terminal "FM."

Record Player (2)

RP168 45 RPM
RP178 78 RPM

For information on 45 RPM changer refer to RCA Victor RP168 Series Service Data 3rd Ed.

For information on 78 RPM changer refer to RCA Victor RP178 Series Service Data.

Circuit Description

The chassis used in these receivers have a 6J6 tube (V1) (twin triode), one section of which is used as mixer and the other section as oscillator. The FM antenna coil and the FM oscillator coil are placed in such position as to provide coupling between them. A section of the AM oscillator coil is connected in series with the mixer grid input when the range switch is in AM position.

Dual I-F transformers are used, each transformer containing both AM and FM windings. The I-F amplifier is V2 (6BA6).

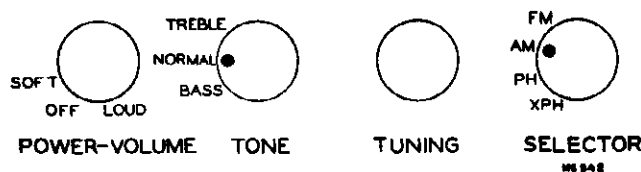
The range switch has four functions:

- (1) Selection of AM, FM ranges or Phono.
- (2) Selection of AVC supply voltages to be applied to the controlled tubes. Simple AVC is applied to the grids of V1 and V2 on AM. Delayed AVC is used on FM and is applied only to the grid of V2.
- (3) Controls application of B+ voltage to the plate circuits of V1 (disconnected for PHONO operation).
- (4) Controls audio input to volume control.

The driver V3 (6AU6) and ratio detector V4 (6AL5) circuits are similar to those used in other RCA Victor AM-FM receivers.

The audio voltage controlled by the volume control is amplified by V5 (6AV6) and V6 (6V6GT).

The rectifier V7 is type 6X5GT.



87 88 90 94 98 102 106 108

55 60 70 80 100 120 140 160

R C A V I C T O R

Dial Scale Actual Size

MODELS A78,
9W78, Ch. RC-1084A

Alignment Procedure

CORRECT ALIGNMENT OF THE FM BAND
REQUIRES THAT THE AM BAND BE
ALIGNED FIRST

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Signal Generator:

For all alignment operations connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

Oscilloscope Alignment:

The FM I. F. alignment may be checked using a sweep generator and an oscilloscope. Shunt terminals B and C of T4 with a 1200 ohm resistor. Connect the high side of the oscilloscope to term. C of T4 in series with a diode probe. Apply the output of the sweep generator (10.7 mc with ± 250 kc sweep) to pin No. 1 of V2 (6BA6) in series with .01 mf. low side of the oscilloscope and sweep generator to chassis. This will show the response of T3.

To check the combined response of T2 and T3; connect the sweep generator to the antenna terminal board—high side to "FM" term. in series with 300 ohms and low side to "G" terminal. Oscilloscope connections as previously connected.

To check the ratio detector response; remove the 1200 ohm resistor previously used, connect the high side of the oscilloscope direct to term. No. 9 of S1. low side to chassis. Apply the output of the sweep generator to pin No. 1 of V3 (6AU6) in series with .01 mf. Note: It is difficult to observe marker signals in this step—center frequency and sweep width should be previously observed.

Critical Lead Dress

- Short leads on C7.
- Dress R27 away from switch and Pin 5 of V1.
- Ground lead on Pin 2 of V2 & V3 should be down against chassis. Its length is critical.
- A.V.C. lead from R26 to switch should be dressed against chassis and on front apron side of output transformer.
- C43 should have short leads and color code end of capacitor should go to coil. Capacitor is to be cemented down with polystyrene cement the same time L2 is.
- High side loop lead should be dressed away from tubes.
- Lead from Pin 2 and V1 to terminal A of first dual I.F. transformer should be dressed against chassis.
- Wire C40 directly between gang condenser and Pin 1 of V1.
- Keep all the F.M. leads as short as possible.
- Dress lead from Pin 5 of V2 to terminal A of T3 down against chassis.
- Dress resistor R15 near chassis base.
- Dress all A.C. leads away from volume control.
- Run lead from F.M. Terminal on the antenna terminal board to L2 tap around the can of T2 and away from V2.
- The taps on L1 & L2 are critical.
- The lead from R32 to terminal 10 of S1 should be dressed away from the output transformer, T5.
- Dress C25 and C26 against chassis with the shortest lead length possible.
- Coupling between pins 5 & 6 of V1, and the components attached, should be kept to a minimum.
- Coupling between L1 & L2 should be adjusted to give the proper oscillator injection voltage to the mixer grid.

AM Alignment

RANGE SWITCH IN BC POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1				AM windings,† T3 bottom core (sec.), T3 top core (pri.).
2	C3 in series with .01 mfd.	455 kc.	Quiet point at low freq. end.	AM windings,† T2 top core (sec.), T2 bottom core (pri.).
3	"A" terminal of terminal board at rear of chassis in series with 220 mmf.	1400 kc.	1400 kc.	C13 osc. C4 ant.
4		600 kc.	600 kc.	L4 osc. (Rock gang.)
5	Repeat Steps 3 and 4.			

† Use alternate loading.

Alternate loading involves the use of a 47,000 ohm resistor to load the AM plate winding while the AM grid winding of the SAME TRANSFORMER is being peaked. Then the grid winding is loaded with the resistor while the plate winding is peaked. Only one winding is loaded at any one time. Remove the 47,000 ohm resistor after T3 and T2 have been aligned.

Oscillator frequency is above signal frequency on both AM and FM.

FM Alignment

RANGE SWITCH IN FM POSITION—VOLUME CONTROL
MAXIMUM

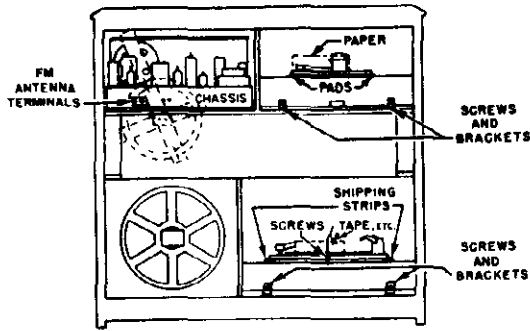
Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mfd. capacitor C33 and the common lead to chassis. Turn gang condenser to max. capacity (fully meshed).			
2	Pin 1 of 6AU6 in series with .01 mfd.	10.7 mc. modulated 30% 400 cycles AM (Approx. .05 volt).		T4 top core for max. d-c voltage across C33. T4 bottom core for min. audio output.*
3		10.7 mc. Adjust to provide 2 to 5 volts indication on VoltOhmyst during alignment.	Max. capacity (fully meshed)	FM windings,†† T3 top core (sec.), T3 bottom core (pri.).
4	FM ant. term in series with a 300 ohm resistor. (Remove ant. lead from "FM" term.)			FM windings,†† T2 top core (sec.), T2 bottom core (pri.).
5		106 mc.	106 mc.	L2 osc.** C2 ant. Set C2 at max. capacity while adjusting L2.
6		90 mc.	90 mc.	L1 ant.** (Rock gang.)
7	Repeat Steps 5 and 6 until further adjustment does not improve calibration.			

* Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

†† Align T3 and T2 by means of alternate loading as explained under AM alignment. Use a 680 ohm resistor instead of a 47,000 ohm resistor and load the FM windings.

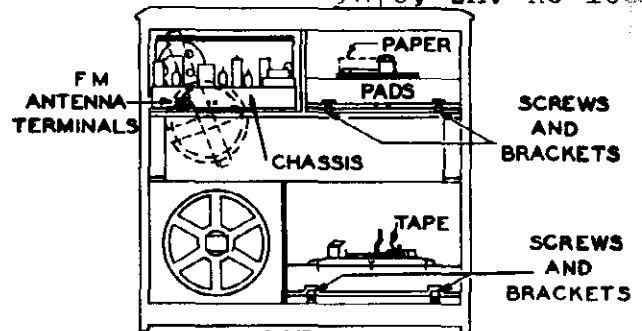
** L1 and L2 are adjustable by increasing or decreasing the spacing between turns.

MODELS A78,
9W78, Ch. RC-108LA

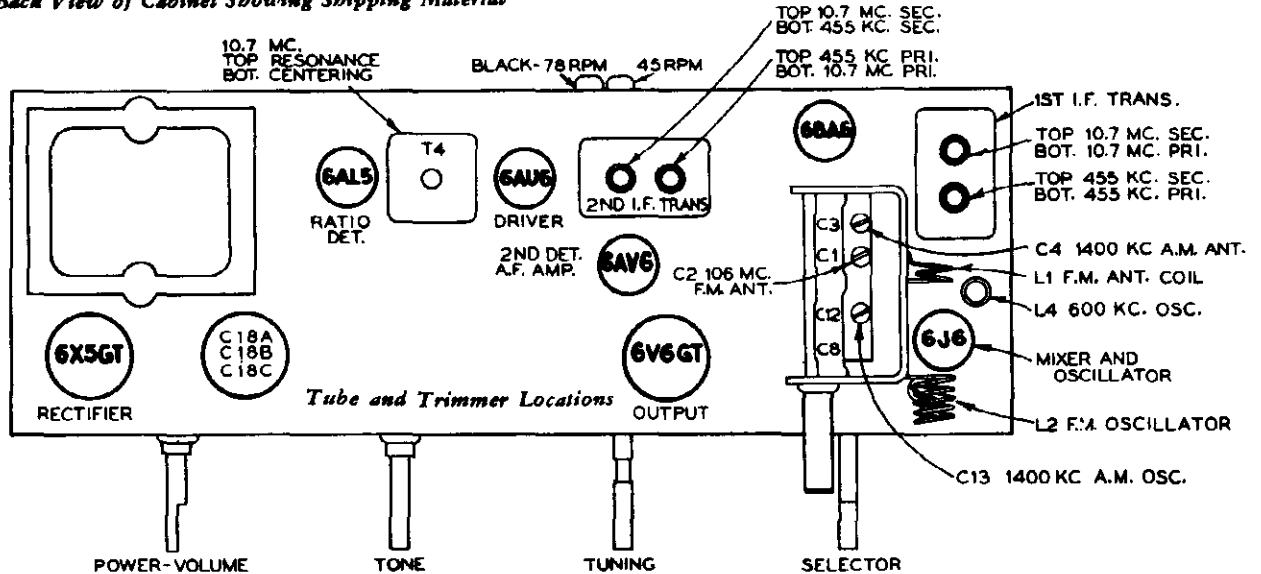


MODEL A78 only

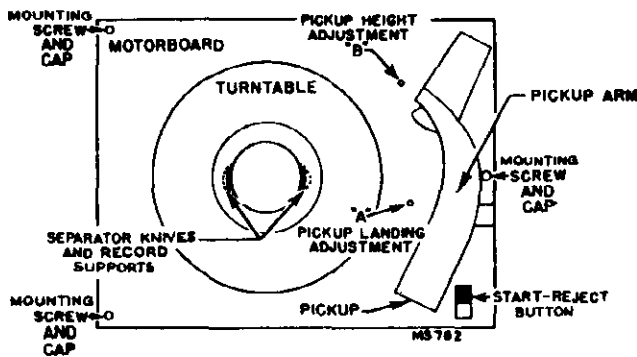
Back View of Cabinet Showing Shipping Material



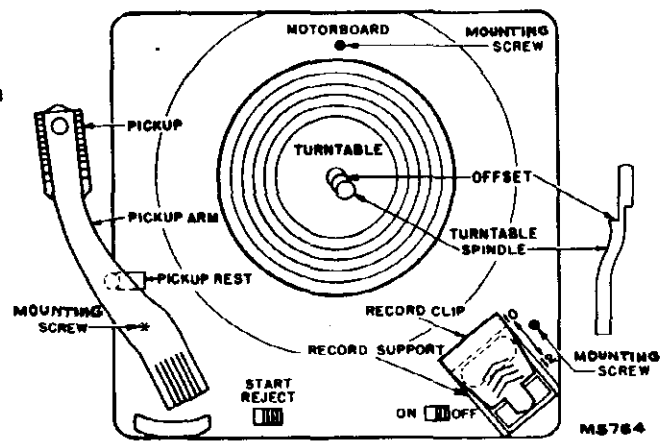
Back View of Cabinet Showing Shipping Material



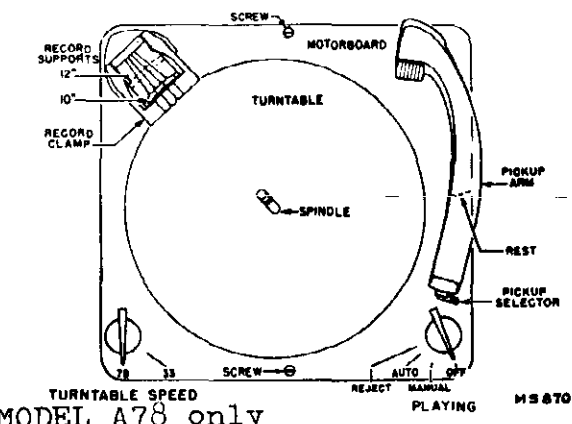
Tube and Trimmer Locations



Top View—RP-168A-1 Record Changer

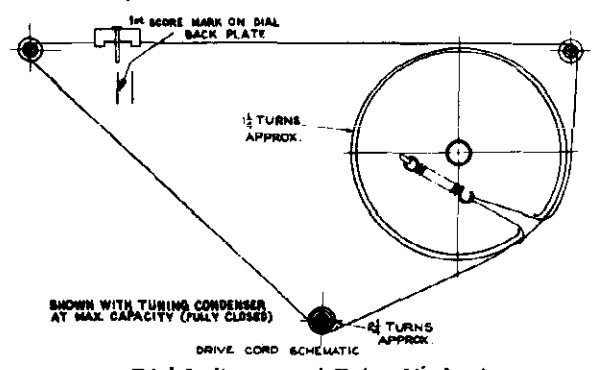


Top View—RP-178 Record Changer



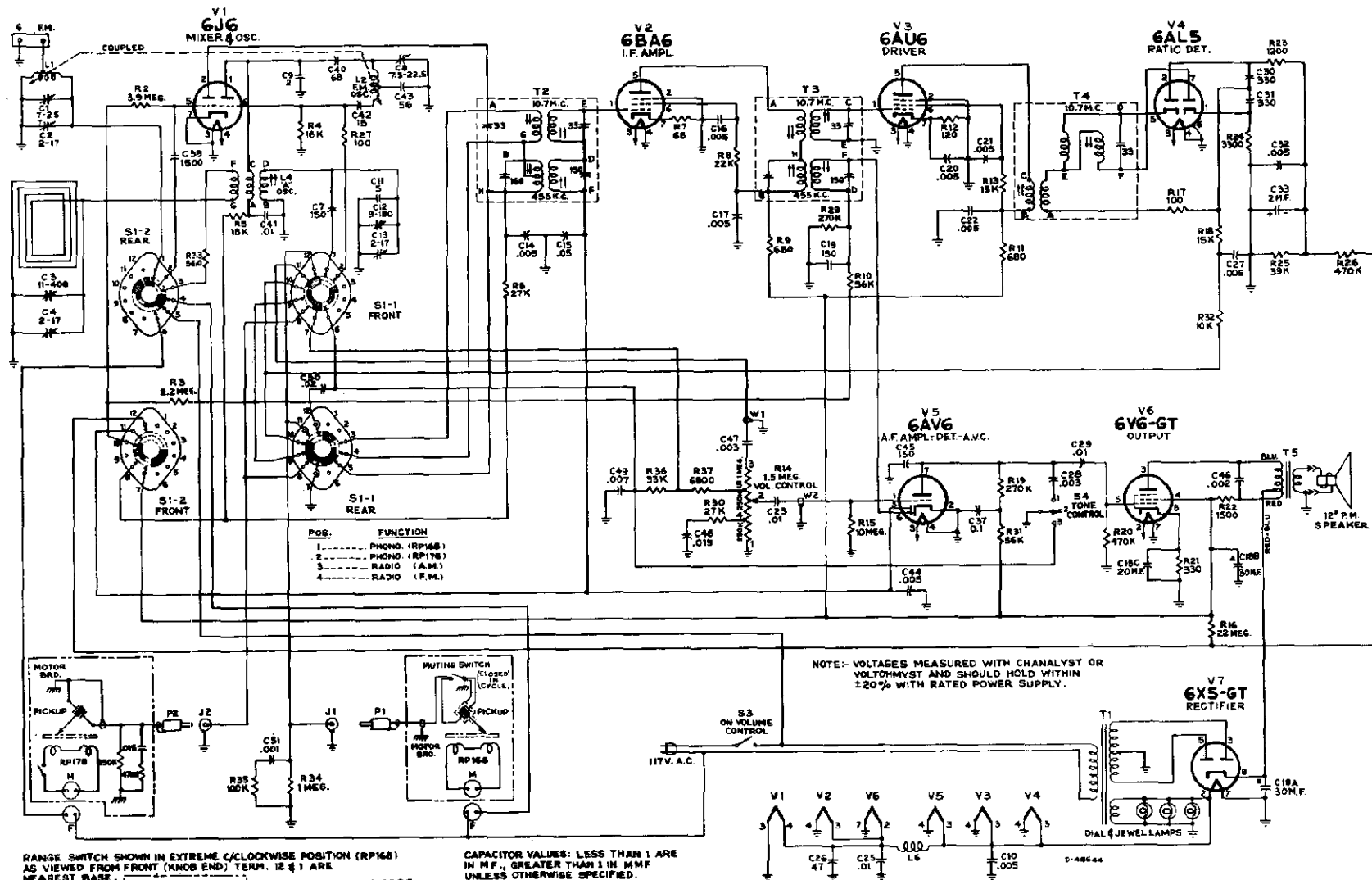
MODEL A78 only

Top View—RP-178 Record Changer



Dial Indicator and Drive Mechanism

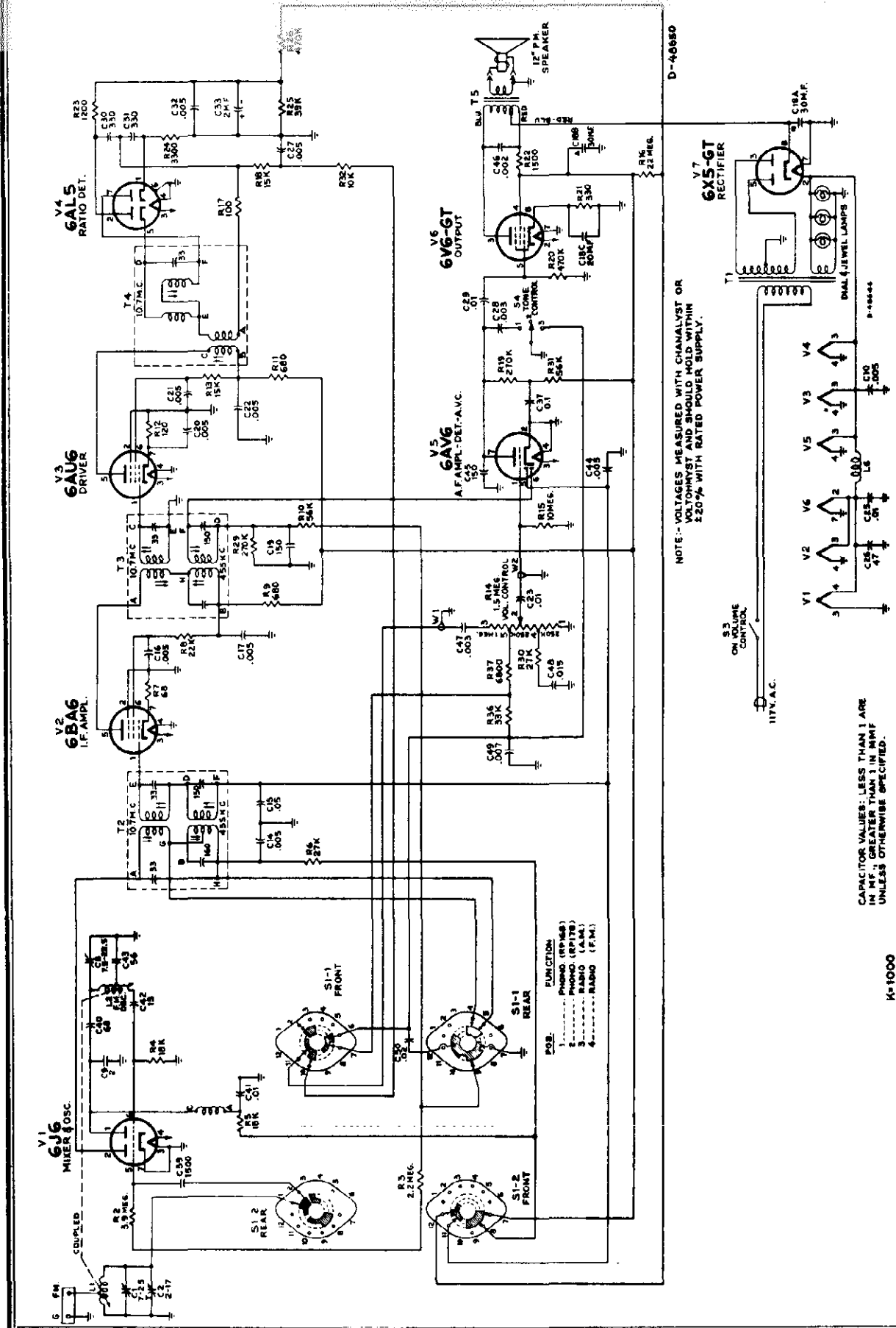
RECORD CHANGER: Model RP-168, on pages RCD.CH.19-1 through RCD.CH.19-8.



Complete Schematic Diagram

RECORD CHANGER: Model RP-178, on pages RCD.CH.18-14 through RCD.CH.18-23.

MODEL 5N78
CH. RC-1001A



NOTE: VOLTAGES MEASURED WITH CHANNELYST OR VOLTOHMYST AND SHOULD HOLD WITHIN 220% WITH RATED POWER SUPPLY.

CAPACITOR VALUES: LESS THAN 1 ARE IN MF., GREATER THAN 1 IN MMF. UNLESS OTHERWISE SPECIFIED.

K=1000

Simplified Schematic Diagram
"FM" Band

PAGE 21-12 RADIO CORPORATION OF AMERICA

MODELS A78,
9W78, Ch. RC-1084A

Replacement Parts

STOCK NO.	DESCRIPTION	STOCK NO.	DESCRIPTION
CHASSIS ASSEMBLIES RC1084A			
73893	Board—"F. M." terminal board	31251	Socket—Tube socket, octal, wafer, for V6 and V7
73889	Capacitor—Variable tuning capacitor (C1, C2, C3, C4, C8, C12, C13)	31364	Socket—Lamp socket
73866	Capacitor—Ceramic, 2 mmf. (C9)	74038	Spring—Drive cord tension spring
93056	Capacitor—Ceramic, 5 mmf. (C11)	74202	Support—Polystyrene coil support complete with bracket
39044	Capacitor—Ceramic, 15 mmf. (C42)	73891	Switch—Tone control switch (S4)
73372	Capacitor—Electrolytic comprising 1 section of 30 mfd., 350 volts, 1 section of 30 mfd., 300 volts and 1 section of 20 mfd., 25 volts (C18A, C18B, C18C)	74913	Switch—Selector switch (S1)
39042	Capacitor—Ceramic, 47 mmf. (C26)	73415	Transformer—Output transformer (T5)
73867	Capacitor—Ceramic, 56 mmf. (C43)	73743	Transformer—Ratio detector transformer (T4)
33379	Capacitor—Ceramic, 68 mmf. (C40)	70127	Transformer—Power transformer 117v/60c (T1)
48125	Capacitor—Ceramic, 150 mmf. (C7, C19, C45)	73745	Transformer—First I. F. transformer—dual (T2)
39640	Capacitor—Mica, 330 mmf. (C30, C31)	74019	Transformer—Second I. F. transformer—dual (T3)
73748	Capacitor—Ceramic, 1500 mmf. (C39)	33726	Washer—"C" washer for tuning shaft
73473	Capacitor—Ceramic, 5,000 mmf. (C44, C10)	73333	Washer—Insulating washer (extruded) for mounting output transformer (2 required)
73747	Capacitor—Electrolytic, 2mfd., 50 volts (C33)	73332	Washer—Insulating washer (flat) for mounting output transformer (2 required)
73186	Capacitor—Tubular, paper, .001 mfd., 400 volts (C51)	SPEAKER ASSEMBLY 92569-9 RMA 274 RL 111-14	
71927	Capacitor—Tubular, paper, .002 mfd., 400 volts (C46)	13867	Cap—Dust cap
72573	Capacitor—Tubular, paper, .003 mfd., 400 volts (C28, C47)	74901	Cone and voice coil assembly
71926	Capacitor—Tubular, paper, .005 mfd., 200 volts (C20, C27, C32)	74974	Speaker—12" P. M. speaker (3.16 oz.) complete with cone and voice coil (3.2 ohms)
71553	Capacitor—Tubular, paper, .005 mfd., 400 volts (C14, C16, C17, C21, C22)	NOTE: If stamping on speaker does not agree with above number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.	
70608	Capacitor—Tubular, paper, .007 mfd., 400 volts (C49)	MISCELLANEOUS	
71923	Capacitor—Tubular, paper, .01 mfd., 200 volts (C23, C25)	72555	Antenna—F. M. antenna
71925	Capacitor—Tubular, paper, .01 mfd., 400 volts (C23, C41)	74205	Bezel—Dial scale bezel less dial
72120	Capacitor—Tubular, paper, .015 mfd., 200 volts (C48)	74579	Bumper—Rubber bumper (black) for RP168 changer drawer (2 required) for mahogany or walnut instruments
71928	Capacitor—Tubular, paper, .02 mfd., 200 volts (C50)	74580	Bumper—Rubber bumper (white) for RP168 changer drawer (2 required) for oak instruments
72596	Capacitor—Tubular, paper, .05 mfd., 200 volts (C15)	71589	Bracket—Pilot lamp bracket
70617	Capacitor—Tubular, paper, 0.1 mfd., 400 volts (C37)	72437	Cable—Shielded pickup cable for RP168 changer
73744	Coil—Oscillator coil—A. M. (L4)	74296	Cable—Shielded pickup cable for RP 178 changer
71942	Coil—Filament choke coil (L6)	13103	Cap—Pilot lamp cap
73918	Coil—Antenna coil—F. M. (L1)	72120	Capacitor—Tubular, paper, .015 mfd., 200 volts for RP 178 changer
73916	Coil—Oscillator coil—F. M. (L2)	71892	Catch—Bullet catch and strike for doors
30868	Connector—2 contact female connector for motor cable	74298	Clamp—Dial clamp
70342	Control—Volume control and power switch (B14, S3)	X3046	Cloth—Grille cloth for mahogany or walnut instruments
72953	Cord—Drive cord (approx. 48" overall)	X3047	Cloth—Grille cloth for oak instruments
74839	Fastener—Push fastener to mount R. F. shelf (4 required)	30868	Connector—2 contact female connector for motor cable (RP 178 changer)
16058	Grommet—Rubber grommet to mount R. F. shelf (4 required)	30870	Connector—2 contact male connector for motor cable (RP 178 changer)
73895	Indicator—Station selector indicator	74581	Cover—Mounting screw cover for RP168 changer (3 required)
11765	Lamp—Dial lamp—Mazda 51	74273	Decal—Trade mark decal (Victrola)
74297	Plate—Dial back plate complete with 2 pulleys less dial	71768	Decal—Trade mark decal (RCA Victor)
33514	Receptacle—Phono input socket—dual	74915	Decal—Control function decal for mahogany or walnut instruments
52436	Resistor—Wire wound, 1500 ohms, 4 watts (R22)	74916	Decal—Control function decal for oak instruments
	Resistor—Fixed, composition:—	74203	Dial—Glass dial scale
	68 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R7)	74836	Grommet—Power and strain relief
	100 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R17, R27)	72856	Grommet—Rubber grommet for mounting RP 178 changer (3 required)
	120 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R12)	74308	Hinge—Cabinet door hinge (1 set)
	330 ohms, $\pm 10\%$, 1 watt (R21)	74931	Knob—Volume control or tuning control—knob—maroon—for walnut or mahogany instruments
	560 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R33)	74934	Knob—Tune control switch or selector switch—knob—maroon—for walnut or mahogany instruments
	680 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R9, R11)	72824	Knob—Control knob—brown—for oak instruments
	1200 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R23)	73996	Loop—Antenna loop complete
	3300 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R24)	74730	Nail—Decorative nail for grille
	6800 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R37)	74209	Nut—Tee nut for mounting RP 168 changer (3 required)
	10,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R32)	73109	Nut—Tee nut for mounting RP 178 changer (3 required)
	15,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R13, R18)	74914	Pull—Door pull
	18,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R4)		Resistor—Fixed, composition:—
	18,000 ohms, $\pm 10\%$, 1 watt (R5)		4700 ohms, $\pm 10\%$, $\frac{1}{2}$ watt for RP 178 changer
	22,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R8)		150,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt for RP 178 changer
	27,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R6, R30)	74582	Screw—#8-32 x $\frac{1}{4}$ " special screw for mounting RP 168 changer (3 required)
	33,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R36)	73110	Screw— $\frac{1}{4}$ -20 x $\frac{1}{4}$ " fillister head screw for mounting RP 178 changer (3 required)
	39,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R25)	74835	Slide—Slide mechanism for RP 168 changer
	56,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R31)	74736	Slide—Slide mechanism for RP 178 changer
	56,000 ohms, $\pm 10\%$, 1 watt (R16)	74421	Spring—Conical spring for mounting RP 168 changer (upper—R. H.)
	100,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R35)	74422	Spring—Conical spring for mounting RP 168 changer (upper—L. H.) (2 required)
	270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R19, R29)	30900	Spring—Retaining spring for knobs
	470,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R20, R26)	74423	Spring—Conical spring for mounting RP 168 changer (lower) (3 required)
	1 megohm, $\pm 10\%$, $\frac{1}{2}$ watt (R34)	72936	Stop—Door stop
	2.2 megohms, $\pm 20\%$, $\frac{1}{2}$ watt (R3)		
	3.9 megohms, $\pm 10\%$, $\frac{1}{2}$ watt (R2)		
	10 megohms, $\pm 20\%$, $\frac{1}{2}$ watt (R15)		
	22 megohms, $\pm 20\%$, $\frac{1}{2}$ watt (R16)		
73894	Shaft—Tuning shaft		
72516	Socket—Tube socket, 7 contact, miniature, for V4 and V5		
73606	Socket—Tube socket, 7 contact, miniature, for V1, V2, and V3		

MODEL A-82,
Ch. RC-1094


PH570

Tuning Range	540-1600 kc
Intermediate Frequency	455 kc
Tube Complement	
1. RCA-6BA6	R.F. Amplifier
2. RCA-6BE6	Converter
3. RCA-6BA6	I.F. Amplifier
4. RCA-6AV6	Det.—1st Audio—A.V.C.
5. RCA-6C4	Phase inverter
6. RCA-6V6GT	Output
7. RCA-6V6GT	Output
8. RCA-5Y3GT	Rectifier
Dial Lamps (2)	Type No. 51, 6-8 volts, 0.2 amps.
Jewel Lamp	Type No. 51, 6-8 volts, 0.2 amps.
Tuning Drive Ratio	9:1 (4½ turns of knob)
Power Supply Rating	115 volts, 60 cycles, 105 watts
Loudspeaker (92569-9)	
Size and type	12 in. P.M.
Voice coil impedance	3.2 ohms at 400 cycles
Power Output	
Undistorted	9.5 watts
Power Output Maximum	10.5 watts
Cabinet Dimensions	
Height 32½ in.	Width 30¼ in. Depth 19¼ in.
Record Changer	
(RP168) or (RP190-2)	
Turntable Speed	45 r.p.m.
Record Capacity	up to 10 RCA 7-in. fine groove records
Pickup	Crystal (medium output)
Record Changer (960282-4) or (960282-5)	
Turntable Speed	78/33½ r.p.m.
Record Capacity	Twelve 10-in. or Ten 12-in.
Pickup	Crystal

For record changer information refer to the following RCA Service Data.

RP168 Series 4th edition first printing

RP190 Series 1st edition first printing

960282 Second edition first printing

Either roll-out is limited in travel by a stop pin at the back end of each slide. To remove roll-out carriage first remove the retaining spring and then the stop pins. Removing the connecting cable permits the roll-out to slide out from the front of the cabinet.

Misalignment of the ball bearings in the carriage slides may cause the roll-out to have excessive drag. If this condition should exist exert a slight additional force in sliding the roll-out to its limit. This should automatically correct the condition.

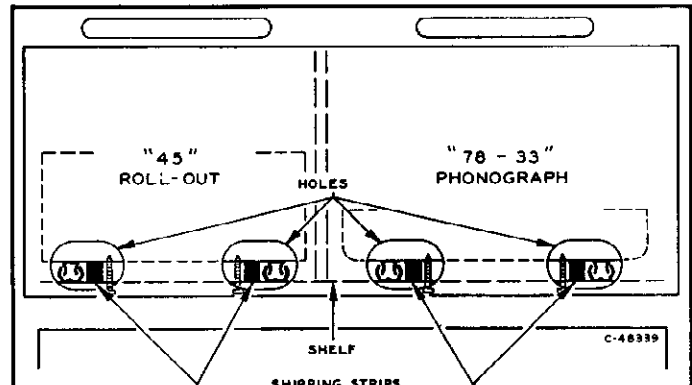


Fig. 1—Rear View of Cabinet

Before attempting to operate mechanism remove shipping bolts and strips. Slide shipping strips out through the elongated holes which have been cut in the cabinet back cover.

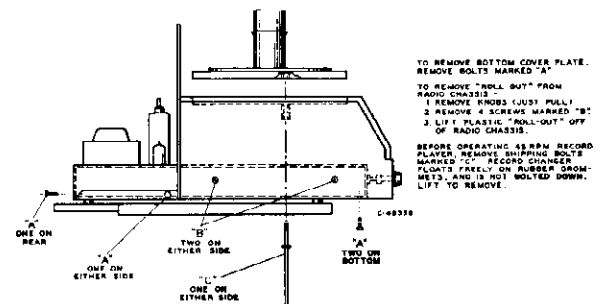


Fig. 2—Roll-out Assembly

Note: It is not necessary to remove the "roll-out" from the radio chassis when aligning the set. Having the "roll-out" fast to the chassis keeps the dial scale in place for dial calibration reference. Simply remove bottom cover as shown in Figure 2.

PAGE 21-14 RADIO CORPORATION OF AMERICA

MODEL A-82,
Ch. RC-1094

CRITICAL LEAD DRESS

1. Dress all A.C. leads at function switch away from audio terminals.
2. Dress phono and A.M. audio leads to function switch away from A.C. leads.
3. Dress all A.C. leads at volume control away from audio leads.
4. Dress R16 down next to chassis.
5. Dress R14 away from A.C. terminals on V.C.
6. Dress lead from top of V.C. to S1 front, terminal 7 down to chassis along front apron.
7. Dress C17 down to chassis and away from components to Pin 1 of V4.

Socket Voltages

Voltages measured with Chanalyst or VoltOhmyst and should hold within $\pm 20\%$ with rated line voltage. Tuning condenser closed—no signal input Volume Control Min.

Tube	Terminal	Voltage	
		Phono	A.M.
V1 6BA6 R.F. Amp.	Plate 5	—	212
	Screen 6	—	100
	Cathode 7	—	1.23
	Grid 1	—	-.28
V2 6BE6 Converter	Plate 5	—	238
	Screen 6	—	88
	Grid 7	—	-.25
	Cathode 2	—	-7.2
V3 6BA6 I.F. Amp.	Plate 5	—	238
	Screen 6	—	125
	Cathode 7	—	4.2
	Grid 1	—	-.28
V4 6AV6 Det. A.F. Amp.	Plate 7	105	96
	Grid 1	-.9	-.93
V5 6C4 Inverter	Plate 1-5	122	99
	Grid 6	-18.9	-18.5
	Cathode 7	-12.2	-13
V6 6V6GT Output	Plate 3	299	305
	Screen 4	292	238
	Grid 5	-18.9	-18.5
	Cathode 8	-18.9	-18.4
V7 6V6GT Output	Plate 3	299	305
	Screen 4	292	238
	Grid 5	-18.9	-18.5
	Cathode 8	-18.9	-18.4
V8 5Y3GT Rectifier	Cathode 8	309	310
Total Current V8		69 ma.	66 ma.

Alignment Procedure

Output Meter Alignment.—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

Signal Generator.—For all alignment operations, connect the low side of the signal generator to the receiver chassis and keep the output as low as possible to avoid AVC action.

Dial Pointer Adjustment.—Rotate tuning condenser until the plates are fully closed. Adjust indicator pointer to the score mark at the left hand end of the dial.

Steps	Connect the high side of the test oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for maximum output
1	Converter grid in series with a .01 mfd. cap. to Pin #7 of V2	455 kc	Min. cap.	Top and bottom of T1 and T2
2	Short piece of wire placed near loop for radiated signal	1620 kc	1620 kc	OSC-C1-2T
3		1400 kc	1400 kc	RF C1-1T ANT C1-3T
4		600 kc	600 kc	OSC coil L3 RF coil L2 Adj. simultaneously while rocking gang
5	Repeat steps 2, 3 and 4 for greatest sensitivity			

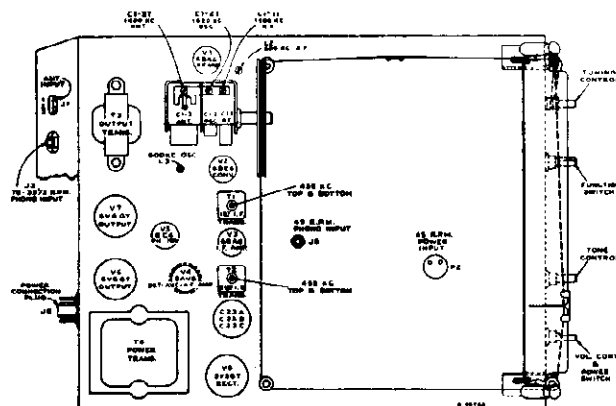
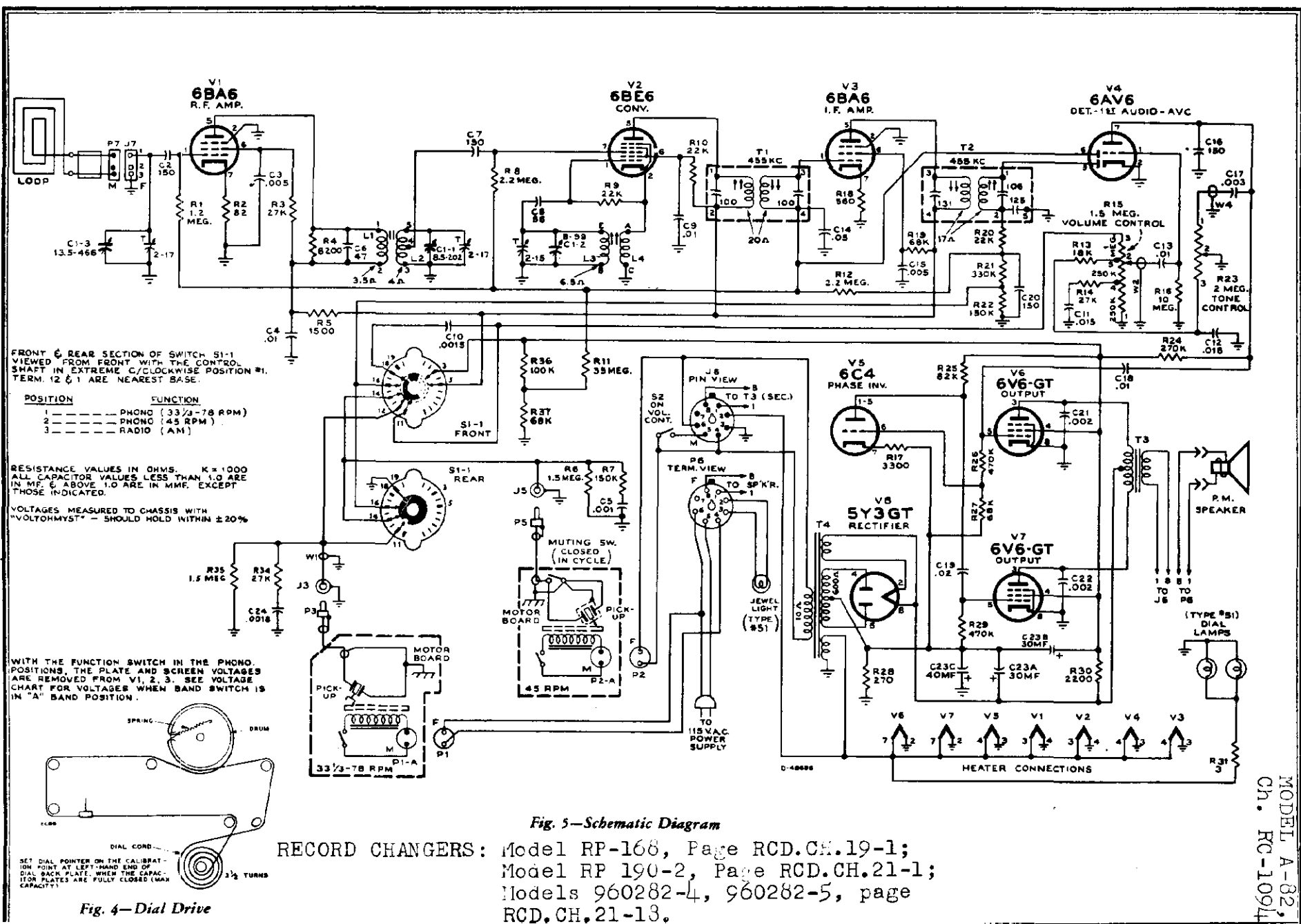


Fig. 3—Chassis Top View

REPLACEMENT PARTS

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	Chassis Assemblies RC 1094		
75541	Bracket—Pulley bracket complete with drive cord pulley	73803	Capacitor—Tubular, paper, .002 mfd., 1000 volts (C21, C22)
75595	Capacitor—Variable tuning capacitor, complete with drive drum (C1-1, C1-2, C1-3)	70603	Capacitor—Tubular, paper, .003 mfd., 400 volts (C17)
39042	Capacitor—Ceramic, 47 mmf. (C6)	73920	Capacitor—Tubular, paper, .005 mfd., 400 volts (C3, C15)
71924	Capacitor—Ceramic, 56 mmf. (C8)	73561	Capacitor—Tubular, paper, .01 mfd., 400 volts (C4, C9, C13, C18)
39632	Capacitor—Mica, 150 mmf. (C2, C7, C16, C20)	73797	Capacitor—Tubular, paper, .015 mfd., 400 volts (C11)
73801	Capacitor—Tubular, paper, .001 mfd., 400 volts (C5)	58476	Capacitor—Tubular, paper, oil impregnated, .018 mfd., 400 volts (C12)
71394	Capacitor—Tubular, paper, .0015 mfd., 600 volts (C10)	73562	Capacitor—Tubular, paper, .02 mfd., 400 volts (C19)
73851	Capacitor—Tubular, paper, oil impregnated, .0018 mfd., 1600 volts (C24)		



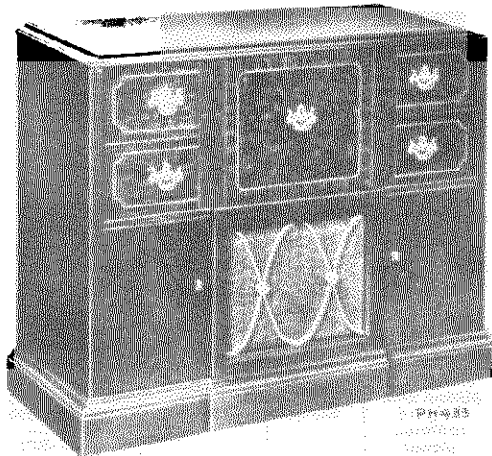
MODEL A-82,
Ch. RC-1094

REPLACEMENT PARTS (continued)

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
73553	Capacitor—Tubular, paper, .05 mfd., 400 volts (C14)	75683	Frame—Moulded frame (light brown) for mounting radio chassis and 45 RPM changer for oak instruments
72052	Capacitor—Electrolytic comprising 1 section of 30 mfd., 450 volts, 1 section of 30 mfd., 350 volts and 1 section of 40 mfd., 25 volts (C23A, C23B, C23C)	75551	Handle—Metal pullout handle for mounting frame
73935	Clip—Mounting clip for i-f transformer	75555	Screw—#8-32 x 3/4" cross recessed pan head machine screw to mount radio chassis (4 req'd)
75627	Clip—Clip for main cable—on rear of chassis	SPEAKER ASSEMBLY	
75596	Coil—R-F coil complete with adjusting screws (L1, L2)	92569-9 RMA 274	
73516	Coil—Oscillator coil complete with adjustable core (L3, L4)	RL 111-14	
35787	Connector—Single contact female connector for 33 1/2 RPM changer input (J5)	13867	Cap—Dust cap
75542	Connector—8 contact male connector for power input cable (J6)	74901	Cone—Cone and voice coil assembly
75543	Connector—2 contact female connector for 45 RPM motor cable (P2)	74974	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms)
74879	Connector—2 contact (polarized) female connector for antenna leads (J7)	NOTE: If stamping on speaker does not agree with above number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.	
33742	Connector—Single contact female connector for 45 RPM changer input (J3)	MISCELLANEOUS	
75537	Control—Volume control and power switch (R15, S2)	75706	Antenna—Antenna loop complete less cable
75538	Control—Tone control (R23)	75898	Back—Back cover—maroon—for 33 1/2 RPM changer compartment for mahogany or walnut instruments (assembled to rollout)
72953	Cord—Drive cord (approx. 60' over-all length required)	75899	Back—Back cover—light brown—for 33 1/2 RPM changer compartment for oak instruments (assembled to rollout)
75547	Grommet—Rubber grommet to mount slides to bottom—rear (2 req'd)	75900	Back—Back cover—maroon—for radio—45 RPM changer compartment for mahogany or walnut instruments (assembled to rollout)
75548	Grommet—Rubber grommet to mount slides to bottom—front (2 req'd)	75901	Back—Back cover—light brown—for radio—45 RPM changer compartment for oak instruments (assembled to rollout)
11765	Lamp—Dial lamp—Mazda #51	75694	Bracket—Stop bracket less rubber bumper for rollout compartments
75544	Nut—Rivnut to fasten screw for mounting chassis (4 req'd)	71599	Bracket—Pilot lamp bracket
75535	Plate—Dial back plate complete with three (3) pulleys	75696	Bumper—Rubber bumper for rollout compartment stop bracket
18469	Plate—Bakelite mounting plate for electrolytic capacitor	74296	Cable—Shielded pickup cable complete with pin plug for 33 1/2 RPM changer (P3)
75536	Pointer—Station selector pointer	72437	Cable—Shielded pickup cable complete with pin plug for instruments using RP190-2 changer
72602	Pulley—Drive cord pulley	13103	Cap—Pilot lamp cap
72323	Resistor—Wire wound, 3 ohms, 1/2 watt (R31)	71892	Catch—Bullet catch and strike for cabinet doors
73637	Resistor—Wire wound, 2200 ohms, 5 watts (R30)	X3144	Cloth—Grille cloth for mahogany or walnut instruments
	Resistor—Fixed, composition:—	X3093	Cloth—Grille cloth for oak instruments
	82 ohms, ±10%, 1/2 watt (R2)	74882	Connector—2 contact (polarized) male connector for antenna loop cable (P7)
	270 ohms, ±10%, 2 watts (R28)	75709	Connector—8 contact female connector for main cable less shell (P6)
	560 ohms, ±10%, 1/2 watt (R18)	30868	Connector—2 contact female connector for 33 1/2 RPM changer motor cable (P1)
	1500 ohms, ±20%, 1/2 watt (R5)	75474	Connector—Single contact male connector for speaker (2 req'd)
	3300 ohms, ±5%, 1/2 watt (R17)	30870	Connector—2 contact male connector for motor leads for instruments using RP190-2 changer
	8200 ohms, ±10%, 1/2 watt (R4)	71984	Decal—Trade mark decal (RCA Victor)
	18,000 ohms, ±10%, 1/2 watt (R13)	74273	Decal—Trade mark decal (Victrola)
	22,000 ohms, ±10%, 1/2 watt (R9, R20)	74838	Grommet—Power cord strain relief (1 set)
	22,000 ohms, ±10%, 2 watts (R10)	37396	Grommet—Rubber grommet for speaker mounting
	27,000 ohms, ±10%, 1/2 watt (R14, R34)	75697	Grommet—Rubber grommet to mount 45 RPM changer
	27,000 ohms, ±10%, 1 watt (R3)	75551	Handle—Metal pullout handle for 33 1/2 RPM changer compartment
	68,000 ohms, ±10%, 1/2 watt (R19, R27, R37)	74308	Hinge—Cabinet door hinge (1 set)
	82,000 ohms, ±10%, 1/2 watt (R25)	75712	Knob—Tuning control, tone control or volume control and power switch knob—maroon—for mahogany or walnut instruments
	100,000 ohms, ±10%, 1/2 watt (R36)	75713	Knob—Tuning control, tone control or volume control and power switch knob—tan—for oak instruments
	150,000 ohms, ±10%, 1/2 watt (R7, R22)	75714	Knob—Function switch knob—maroon—for mahogany or walnut instruments
	270,000 ohms, ±10%, 1/2 watt (R24)	75715	Knob—Function switch knob—tan—for oak instruments
	330,000 ohms, ±10%, 1/2 watt (R21)	11765	Lamp—Pilot lamp—Mazda #51
	470,000 ohms, ±10%, 1/2 watt (R26, R29)	73634	Nut—Speed nut for speaker mounting screws
	1.5 megohm, ±10%, 1/2 watt (R6, R35)	74276	Pull—Door pull
	2.2 megohm, ±20%, 1/2 watt (R1, R8, R12)	75907	Screw—#10-32 x 5 1/4" cross recessed round head (special shipping screws) screw to mount 45 RPM changer
	10 megohm, ±20%, 1/2 watt (R16)	74113	Screw—#8-32 x 1" trimit head screw for door pull
	33 megohm, ±20%, 1/2 watt (R11)	75708	Shell—Shell for 8 contact female connector
75540	Shaft—Tuning knob shaft	75546	Slide—Slide mechanism complete for 33 1/2 RPM changer mounting frame
73584	Shield—Tube shield	31364	Socket—Pilot lamp socket and lead
75546	Slide—Slide mechanism complete for radio chassis bottom	74734	Spring—Retaining spring for knobs
31251	Socket—Tube socket, octal, wafer	75902	Spring—Suspension spring for main cable
73117	Socket—Tube socket, 7 pin, miniature	72936	Stop—Cabinet door stop
31364	Socket—Dial lamp socket		
74038	Spring—Drive cord spring		
75597	Switch—Function switch (S1-1)		
75486	Transformer—First I-F transformer complete with adjustable cores (T1)		
75487	Transformer—Second I-F transformer complete with adjustable cores (T2)		
73636	Transformer—Output transformer (T3)		
75566	Transformer—Power transformer 117 volts, 60 cycle (T4)		
33726	Washer—"C" washer for tuning knob shaft		
RADIO ROLLOUT CARRIAGE			
75598	Decal—Function decal for controls		
75550	Dial—Polystyrene dial scale		
75549	Frame—Moulded frame (maroon) for mounting radio chassis and 45 RPM changer for mahogany and walnut instruments		

†Stock No. 72953 is a reel containing 250 feet of cord.

MODEL A106,
Ch. RC-622



Antennas

This receiver has built-in antenna for standard broadcast (AM) and frequency modulation (FM) reception.

Provision is made for the use of an external antenna for FM reception if desired. To use external FM antenna — remove the built-in FM antenna lead from the "FM" terminals of the antenna terminal board. Connect the transmission line of an external FM dipole antenna to these two "FM" terminals.

FOR RECORD CHANGER SERVICE INFORMATION REFER TO RP-168 SERIES SERVICE DATA FOR 45 R.P.M. AND MODEL 960285-1 SERVICE DATA for 78/33 $\frac{1}{3}$ R.P.M.

Tuning Range

Standard Broadcast (AM) 540-1,600 kc.
Frequency Modulation (FM) 88-108 mc.
Intermediate Frequencies AM—455 kc., FM—10.7 mc.

Tube Complement

(1) RCA 6BJ6 R-F Amplifier
(2) RCA 6J6 Mixer and Oscillator
(3) RCA 6BA6 I-F Amplifier
(4) RCA 6AU6 Driver
(5) RCA 6AL5 Ratio Detector
(6) RCA 6AV6 AM Det.—AVC A-F Amplifier
(7) RCA 6AV6 Ph. Inv.
(8) RCA 6V6GT Output
(9) RCA 6V6GT Output
(10) RCA 6X5GT Rectifier

Dial Lamps (2) Type No. 51, 6-8 volts, 0.2 amp.
Jewel Lamp Type No. 51, 6-8 volts, 0.2 amp.

Tuning Drive Ratio 18:1 (9 turns of knob)

Power Supply Rating 115 volts, 60 cycles, 90 watts

Loudspeaker (92569-6W)

Size and type 12 in. PM
Voice coil impedance 3.2 ohms at 400 cycles

RECORD CHANGERS: For Model RP-168, See Pages RCD.CH.19-1 to RCD.CH.19-8. For Model 960285-1, See Pages RCD.CH.21-50 to RCD.CH.21-64.

Power Output

(Radio) Undistorted 5 watts Maximum 6.4 watts
(Phono.) Undistorted 8 watts Maximum 9 watts

Cabinet Dimensions

Height 31 $\frac{1}{2}$ in. Width 39 $\frac{3}{4}$ in. Depth 17 $\frac{1}{2}$ in.

Record Changer (RP-168)

Turntable speed 45 r.p.m.
Record capacity Up to 10 RCA 7-in. fine groove records
Pickup Crystal (medium output)

Record Changer (960285-1)

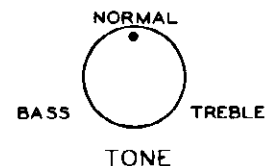
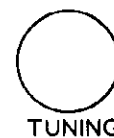
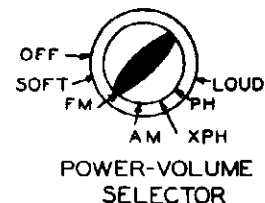
Turntable speed 78/33 $\frac{1}{3}$ r.p.m.
Record capacity Twelve 10-in., ten 12-in. or ten intermix
Pickup Crystal

Circuit Description

This instrument has a ten-tube (including rectifier) chassis which is very similar to those used in other RCA Victor radio-phonograph combinations designed for AM-FM reception.

The selector switch has five functions:

- (1) Selection of tuning range.
- (2) Selection and distribution of a.v.c. voltages.
- (3) Application of B+ voltage to tubes V1, V2, V3 and V4.
- (4) Selection of audio input applied to the volume control.
- (5) Application of a.c. power to the record changer motors.



Operating Controls

CRITICAL LEAD DRESS

Note: The leads listed may not be critical in all receivers. However, by dressing the leads as specified, unusual difficulties will be minimized.

1. The plate lead of the second IF transformer should be dressed down against the chassis to obtain max. capacity between the lead and chassis. This lead is specified to be two inches long.

MODEL A106, Ch. RC-622

2. The "A" band RF transformer plate, and grid leads should be dressed so as to minimize coupling to the RF amplifier grid circuit, and kept close to chassis when possible.
3. The 2.2 meg. grid resistors connecting to the RF and mixer grids should have a minimum practicable amount of lead extending on the grid end. The leads should be cut off short on the grid end and long on the A.V.C. end.
4. The unshielded plate lead from the function switch to the 1st IF transformer should be dressed away from the switch waver audio lugs as much as possible.
5. The ground strap between the RF shelf and chassis should be well soldered and kept as short as practicable. FM instability may be caused by having this ground strap too long, particularly when no input is connected to the FM antenna terminal.
6. The lead from the 2nd IF to the grid of the 6BA6 1st IF amplifier should be kept short, and dressed against the chassis as much as practicable.
7. The lead from the 2nd IF to the AM detector diode should be dressed to minimize coupling to the 6AV6 1st AF grid and kept close to chassis.
8. Leads from the volume control taps should be kept clear of all filament and output plate wires as in the wiring sample.
9. The loop cable when connected to the AM sec. gang stator should be dressed to have minimum capacity coupling to the stator lug on the RF section of gang condenser.
10. The oscillator coupling condenser C10 should be dressed to have minimum capacity to the mixer grid, Pin No. 5 on V2.
11. The shielding on the shielded lead from the volume control to the function switch should have the minimum practicable exposed wire at the function switch end.

Alignment Procedure

CORRECT ALIGNMENT OF THE FM BAND REQUIRES THAT THE AM BAND BE ALIGNED FIRST

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Signal Generator:

For all alignment operations connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

Oscilloscope Alignment:

The FM I-F alignment may be checked using a sweep generator and an oscilloscope. Shunt terminals B and C of T4 with a 1200 ohm resistor. Connect the high side of an oscilloscope to terminal C of T4 in series with a diode probe. Apply the output of the sweep generator (10.7 mc. with ± 250 kc. sweep) to pin No. 1 of V3 (6BA6) in series with .01 mf. Low side of the oscilloscope and sweep generator to chassis. This will show the response of T3.

To check the combined response of T2 and T3: connect the sweep generator to the FM antenna terminals (remove FM antenna lead) in series with 300 ohms. Note: One FM terminal is grounded—it may be necessary to reverse the sweep generator connections. Oscilloscope connections remain as connected.

To check the ratio detector response: connect the high side of the oscilloscope direct to terminal No. 9 of S1, low side to chassis. Apply the output of the sweep generator to pin No. 1 of V4 (6AU6) in series with .01 mf. Driver plate circuit connected for normal operation (1200 ohm resistor removed). Note: It is difficult to observe marker signals in this step—center frequency and sweep width should be previously observed.

AM Alignment

RANGE SWITCH IN BC POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 5 of V2 in series with .01 mfd.	455 kc.	Quiet point at low freq. end.	AM windings.† T3 bottom core (sec.). T3 top core (pri.).
2				AM windings.† T2 top core (sec.). T2 bottom core (pri.).
3	Short wire placed near loop for radiated signal	1400 kc.	1400 kc.	C1-2T (osc.). C1-3T (ant.). C1-4T (rf.).
4		600 kc.	600 kc.	L8 (osc.) with 10,000 ohms resistor from RF stator to gnd (rocking gang)
5				L5 (RF) with the 10,000 ohms removed.
6	Repeat steps 3, 4 and 5 until no improvement in sensitivity is obtained.			

† Use alternate loading.

Alternate loading involves the use of a 47,000 ohm resistor to load the AM plate winding while the AM grid winding of the SAME TRANSFORMER is being peaked. Then the grid winding is loaded with the resistor while the plate winding is peaked. Only one winding is loaded at any one time. Remove the 47,000 ohm resistor after T3 and T2 have been aligned.

Oscillator frequency is above signal frequency on both AM and FM.

FM Alignment

RANGE SWITCH IN FM POSITION—VOLUME CONTROL MAXIMUM

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mfd. capacitor C42 and the common lead to chassis. Turn gang condenser to max. capacity (fully meshed). Volume Control max.			
2	Pin 1 of V4 6AU6 in series with 470 ohm resistor.	10.7 mc. modulated 30% 400 cycles AM (Approx. .05 volt).	Max. capacity (fully meshed).	T4 top core for max. d-c voltage across C42. T4 bottom core for min. audio output.*
3		10.7 mc. Adjust to provide about 4 volts indication on VoltOhmyst during alignment.		FM windings.†† T3 top core (sec.). T3 bottom core (pri.).
4				FM windings.†† T2 top core (sec.). T2 bottom core (pri.).
5	High and low side of signal gen. through two 120 ohm resistors. To ant. terminals.	90 mc.	90 mc.‡	L9 (osc.).**
6		106 mc.	106 mc.	C1-6T (ant.). C1-3T (rf.).
7		90 mc.	90 mc.	L1 (ant.).** L3 (rf.).**
8	Repeat steps 6 and 7 until no improvement in sensitivity is obtained.			

* Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

†† Align T3 and T2 by means of alternate loading as explained under AM alignment. Use a 680 ohm resistor instead of a 47,000 ohm resistor and load the FM windings.

** L1, L3 and L9 are adjustable by increasing or decreasing the spacing between turns.

‡ After dial pointer has been set accurately on calibration point for "A" band (see dial indicator and drive drawing) tune receiver to 90 mc. on FM using dial scale as reference or use dial scale drawing



Voltages measured with Chanalyst or VoltOhmyst and should hold within $\pm 20\%$ with rated line voltage. Tuning condenser closed—no signal input.

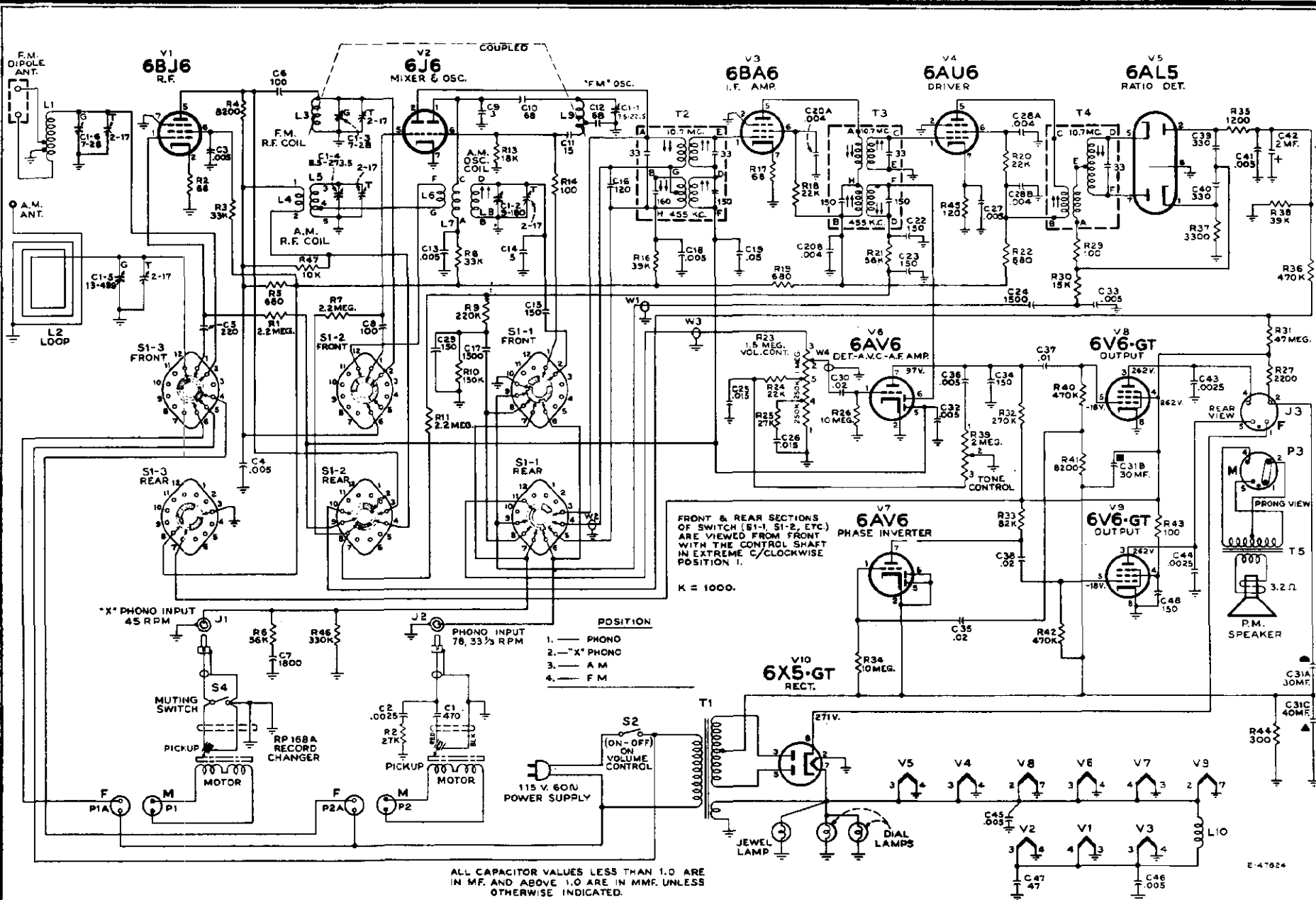
SCHEMATIC OF TURBINE ENGINE

ENGINE WITH TURBINE COMPELLER AT MAX. CAPACITY (FULLY CLOSED)

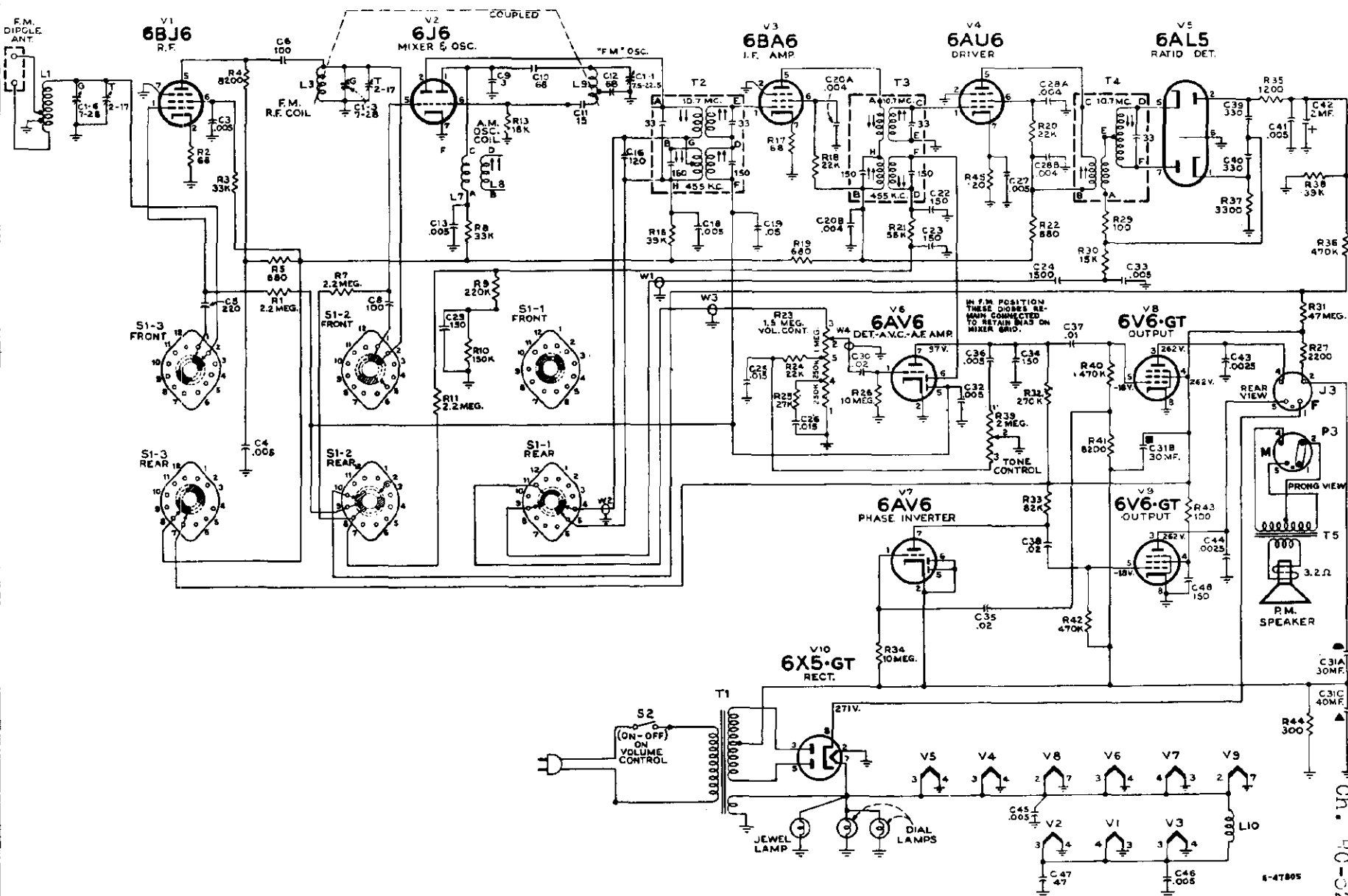
**CABLE SHOWN IN EXTREME
COUNTER CLOCKWISE POSITION**



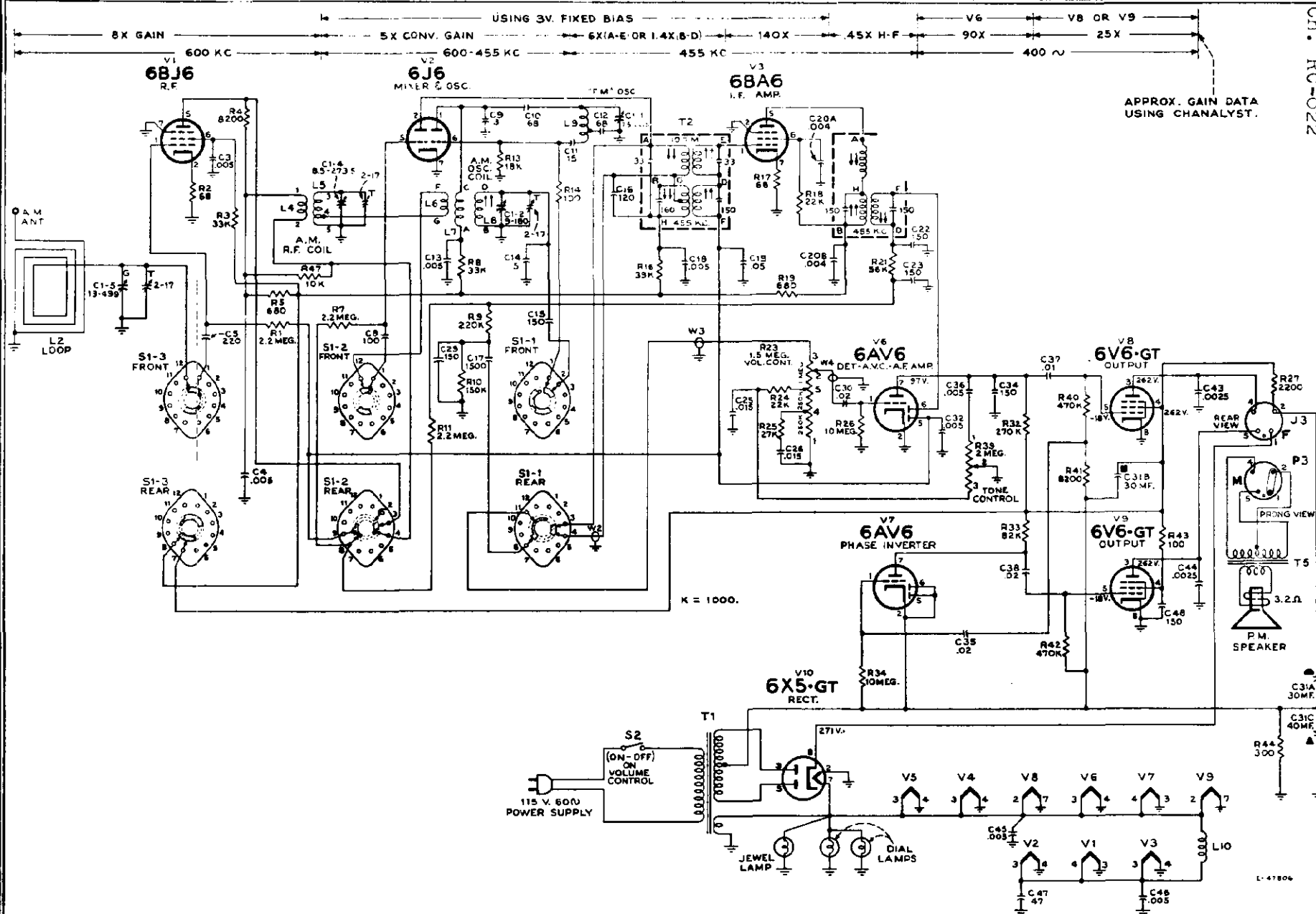
Tube	Terminal	Phono	A.M.	F.M.
V1 6BJ6	2	—	11.1	11.4
V2 6J6	7	—	6.8	6.6
V3 6BA6	7	—	13.1	13.7
V4 6AU6	7	—	8.2	8.1
V5 6AL5	1 & 5	—	—	—
V6 6AV6	2	0.68	.44	.43
V7 6AV6	2	1.7	1.4	1.35
V8 6V6GT	8	33	11.2	11
V9 6V6GT	8	33	11	11
V10 6X5GT	8	66	63	63



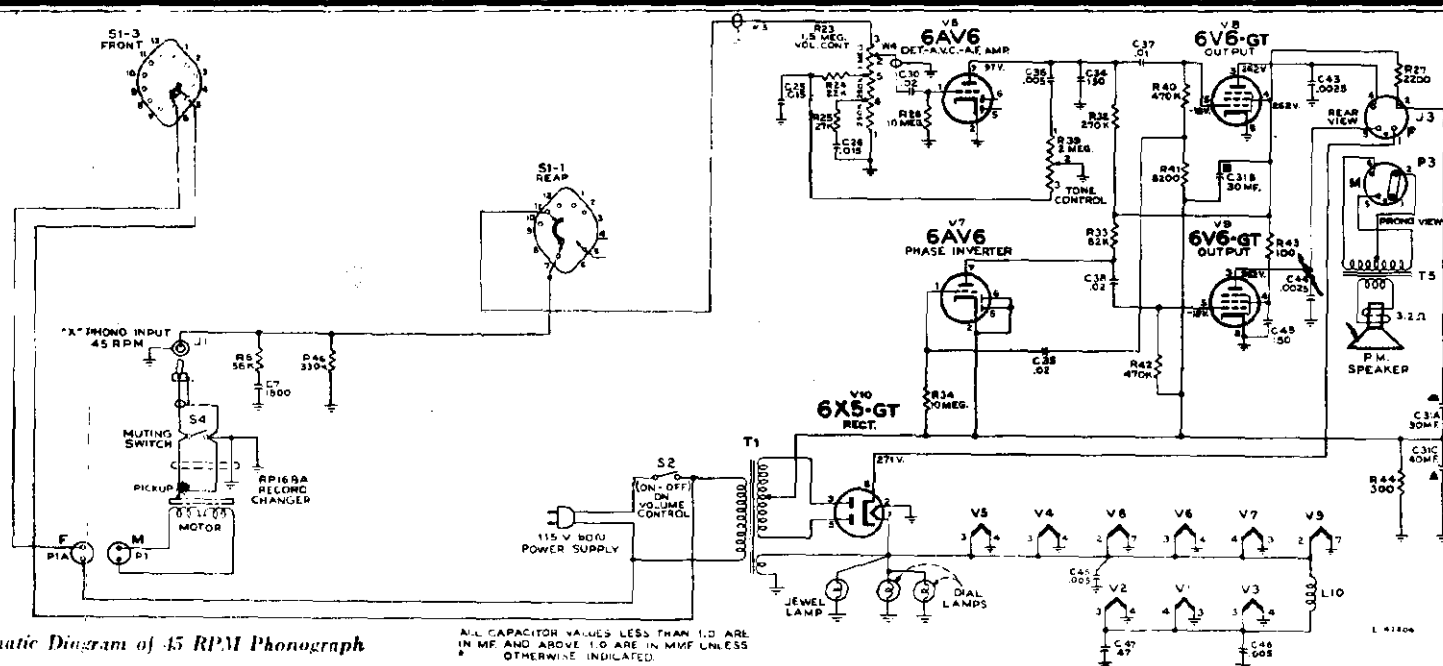
Complete Schematic Diagram



MODEL A100,
Ch. RC-022



Simplified Schematic Diagram "AM" Position



Simplified Schematic Diagram of 45 RPM Phonograph

SHIPPING SCREWS

The radio chassis of these instruments is secured to the cabinet with shipping screws (painted red) which, together with spacing strips, should be **REMOVED** at the time of installation.

The record changers are each mounted with three screws which should be **LOOSENED** at the time of installation.

On the RP-168 record changer decorative caps cover the mounting screws. Remove the caps for access to the screws.

RP-168 RECORD CHANGER

Pickup Landing Adjustment "A"

The pickup point should land half-way between the outer edge of the record and the first music groove.

If the pickup lands inside the starting grooves—turn screw "A" slightly clockwise. If pickup lands outside the starting grooves—turn screw "A" slightly counterclockwise.

Pickup Height Adjustment "B"

During cycle the pickup arm must rise high enough to clear a stack of ten records on the turntable, but not high enough to cause the top of the arm to touch records resting on the record supports.

If pickup does not clear a stack of ten records—turn screw "B" slightly clockwise. If pickup arm touches records on record supports—turn screw "B" slightly counterclockwise.

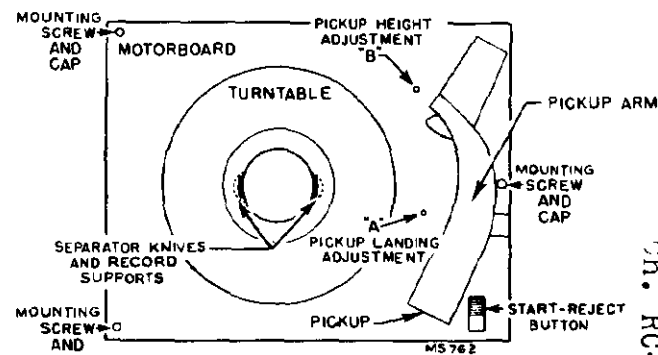
Record Separators

During service, the position of the star wheel on the underside of the record changer may be accidentally shifted; this may cause the separator knives to be extended when they should be concealed.

If the separator knives are thus extended—turn the power on so that the turntable is revolving, push the "start-reject" knob and allow the mechanism to complete a change cycle. If the knives remain extended—while the turntable is still revolving, gently press fingers against the extended knives until they disappear inside the center post—DO THIS ONLY WHILE MECHANISM IS OUT OF CYCLE.

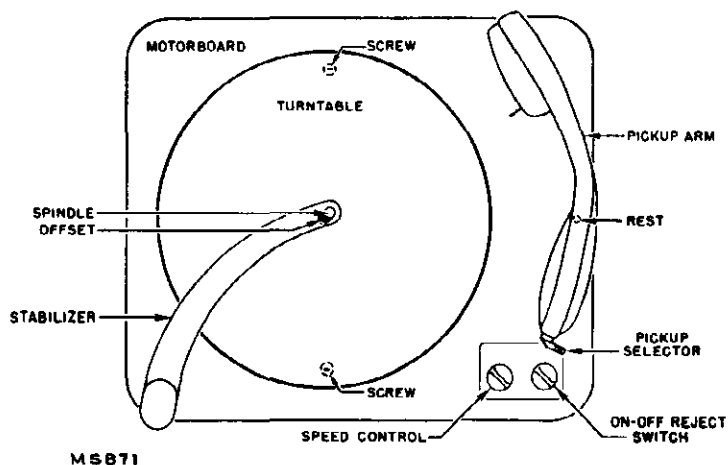
CARE OF SAPPHIRE

The sapphire point on the pickup is protected with a permanent metal guard. Lint may collect to clog the opening in the guard at the sapphire point and cause poor record reproduction. Occasional cleaning may be necessary; brush carefully with a small soft brush.

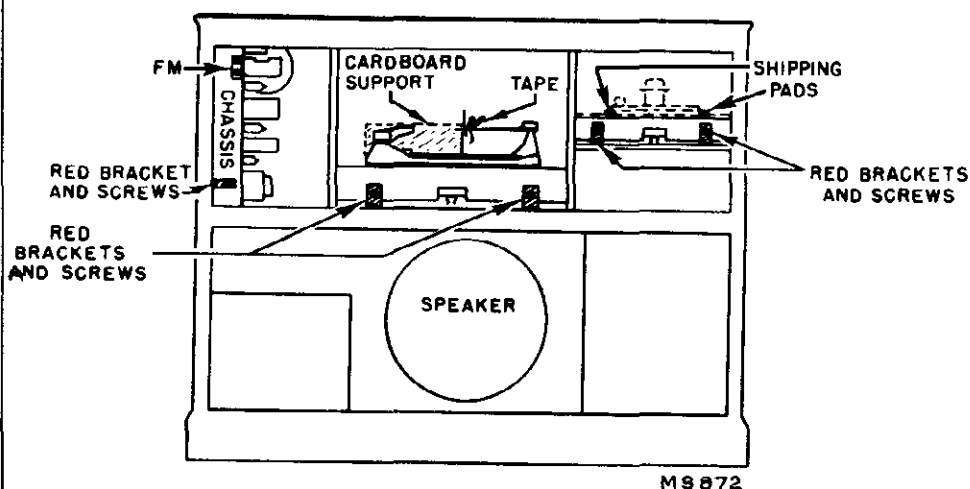


Top View—RP-168 Record Changer

MODEL A106,
Ch. RC-622



Top View—960285-1 Record Changer



Rear View Showing Location of Various Units

NOTE: When instrument is used in steel constructed building or in very poor signal areas an outside antenna can be attached to terminal in middle of loop antenna. This applies to "A" band operation.

Dial Scale
(Actual Size)

AM	FM
55	88
60	90
70	92
80	96
100	100
120	104
140	107
160	108

933773

RCA VICTOR

ALL CAPACITOR VALUES LESS THAN 1.0 ARE IN MF. AND ABOVE 1.0 ARE IN MMF. UNLESS OTHERWISE INDICATED.

E-4762B

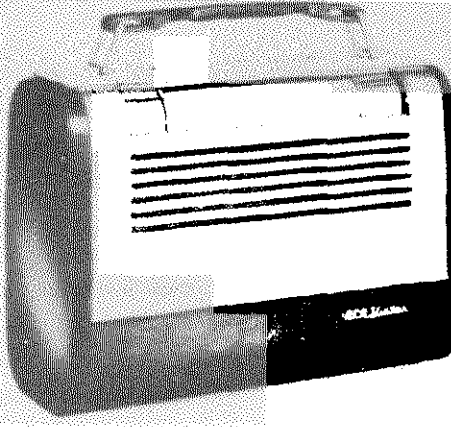
STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 622		
*74848	Board—"F.M." terminal board	*74841	Coil—R.F. coil—A.M.—complete with adjustable core and stud (L4, L5)
*74641	Cable—Flexible cable to operate volume control	*74815	Coil—R.F. coil—F.M. (L3)
*74849	Capacitor—Variable tuning capacitor (C1-1, 1-2, 1-3, 1-4, 1-5, 1-6)	*74816	Coil—Antenna coil—F.M. (L1)
73747	Capacitor—Electrolytic, 2 mmf., 50 volts (C42)	*73817	Coil—Oscillator coil—F.M. (L9)
*74733	Capacitor—Ceramic, 3 mmf. (C9)	71942	Coil—Filament choke coil (L10)
93056	Capacitor—Ceramic, 5 mmf. (C14)	5040	Connector—4 contact female connector for speaker cable (P3)
39044	Capacitor—Ceramic, 15 mmf. (C11)	30868	Connector—2 contact female connector for motor cables (P2A)
39042	Capacitor—Ceramic, 47 mmf. (C47)	*74837	Control—Tone control (R39)
33379	Capacitor—Ceramic, 68 mmf. (C10, C12)	74639	Control—Volume control and power switch (R23, S2)
39396	Capacitor—Ceramic, 100 mmf. (C6, C8)	72953	Cord—Drive cord (approx. 58" overall length)
71614	Capacitor—Ceramic, 120 mmf. (C16)	*74839	Fastener—Push fastener to hold R.F. shelf assembly (4 required)
44704	Capacitor—Ceramic, 150 mmf. (C15, C22, C23, C34, C48)	*74838	Grommet—Power cord strain relief grommet (1 set)
48125	Capacitor—Ceramic, 150 mmf. (C29)	16058	Grommet—Rubber grommet for mounting R.F. shelf assembly (4 required)
71920	Capacitor—Ceramic, 220 mmf. (C5)	72069	Grommet—Rubber grommet for rear mounting feet (2 required)
39640	Capacitor—Mica, 330 mmf. (C39, C40)	*73895	Indicator—Station selector indicator
74093	Capacitor—Ceramic, 1,500 mmf. (C17, C24)	74645	Nut—8-32 hex retainer nut between R.F. shelf and volume control knob
*74850	Capacitor—Ceramic, 1,800 mmf. (C7)	74297	Plate—Dial back plate complete with two (2) drive cord pulleys less dial
74009	Capacitor—Ceramic, dual, 4,000 mmf. (C20A, C20B, C28A, C28B)	18469	Plate—Bakelite mounting plate for electrolytic
73473	Capacitor—Ceramic, 5,000 mmf. (C3, C4, C13, C18, C32, C46)	74640	Pulley—Pulley and hub assembly for volume control
72052	Capacitor—Electrolytic, comprising 1 section of 30 mfd, 450 volts, 1 section of 30 mfd, 350 volts and 1 section of 40 mfd, 25 volts (C31A, C31B, C31C)	33514	Receptacle—Phono input receptacle
71926	Capacitor—Tubular, paper, .005 mfd, 200 volts (C27, C33, C41, C45)	73637	Resistor—Wire wound, 2,200 ohms, 5 watt (R27)
71553	Capacitor—Tubular, paper, .005 mfd, 400 volts (C36)		Resistor—Fixed, composition:
70644	Capacitor—Tubular, paper, .0025 mfd, 1,000 volts (C43, C44)		68 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R2, R17)
71925	Capacitor—Tubular, paper, .01 mfd, 400 volts (C37)		100 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R29)
71928	Capacitor—Tubular, paper, .02 mfd, 200 volts (C30, C35)		100 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R14, R43)
73638	Capacitor—Tubular, paper, .02 mfd, 400 volts (C38)		120 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R45)
73553	Capacitor—Tubular, paper, .05 mfd, 400 volts (C19)		300 ohms, $\pm 5\%$, 2 watt (R44)
72120	Capacitor—Tubular, paper, .015 mfd, 200 volts (C25, C26)		680 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R19)
73744	Coil—Oscillator coil—A.M. (L6, L7, L8)		680 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R5, R22)
			1,200 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R35)
			3,300 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R37)
			8,200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R41)
			8,200 ohms, $\pm 10\%$, 1 watt (R4)
			10,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R47)

PAGE 21-26 RADIO CORPORATION OF AMERICA

MODEL A100,
Ch. RC-622

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	15,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R30)	71892	Catch—Bullet catch and strike for doors (3 required)
	18,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R13)	73897	Clamp—Dial clamp (2 required)
	22,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R18, R20, R24)	X3057	Cloth—Grille cloth for mahogany or walnut instruments
	27,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R25)	X1649	Cloth—Grille cloth for blonde instruments
	33,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3, R8)	30968	Connector—2 contact female connector for motor cables
	39,000 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R38)	30870	Connector—2 contact male connector for motor cables
	39,000 ohms, $\pm 10\%$, 1 watt (R16)	74581	Cover—Mounting screw cover for 45 RPM changer (3 required)
	56,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R6, R21)	74853	Decal—Control function decal for mahogany or walnut instruments
	82,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R33)	74854	Decal—Control function decal for blonde instruments
	150,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R10)	74273	Decal—Trade mark decal (Victrola)
	220,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R9)	71984	Decal—Trade mark decal (RCA Victor)
	270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R32)	74842	Dial—Glass dial scale
	330,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R46)	74851	Grille—Metal grille
	470,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R36, R40, R42)	11889	Grommet—Rubber grommet for front apron of chassis
	2.2 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R1, R7, R11)	74838	Grommet—Power cord strain relief grommet (1 set)
	10 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R26, R34)	36610	Hinge—Door hinge (1 set) for radio compartment or R.H. record storage compartment
	47 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R31)	36817	Hinge—Door hinge (1 set) for L.H. record storage compartment
73894	Shaft—Tuning knob shaft	71821	Knob—Tuning control knob—maroon—for mahogany or walnut instruments
73584	Shield—Tube shield for V1	72824	Knob—Tuning control or tone control knob—brown—for blonde instruments
74646	Sleeve—Sleeve and pulley assembly for volume control knob	71822	Knob—Tone control knob—maroon—for mahogany or walnut instruments
74179	Socket—Tube socket, 7 pin, miniature for V1, V2, V3, V4	73995	Knob—Volume control knob—brown—for blonde instruments
73117	Socket—Tube socket, 7 pin, miniature for V5, V6, V7	73994	Knob—Volume control knob—maroon—for mahogany or walnut instruments
31251	Socket—Tube socket, octal, wafer for V8, V9, V10	73230	Knob—Selector switch knob—maroon—for mahogany or walnut instruments
31364	Socket—Lamp socket	73231	Knob—Selector switch knob—brown—for blonde instruments
74038	Spring—Drive cord spring	11765	Lamp—Dial or pilot lamp—Mazda 51
*74847	Support—Polystyrene support for F.M. oscillator coil complete with mounting bracket	74843	Loop—Antenna loop complete
*74840	Switch—Selector switch (S1)	74208	Nut—Tee nut to mount 45 RPM changer (3 required)
73743	Transformer—Ratio detector transformer (T4)	74852	Pull—Door pull for record changer drawers or radio compartment (5 required)
73745	Transformer—First I.F. transformer—dual (T2)	74451	Pull—Door pull for record storage compartments
74019	Transformer—Second I.F. transformer—dual (T3)		Resistor—Fixed, composition, 27,000 ohms (on 78, 33 $\frac{1}{3}$ RPM record changer), $\pm 10\%$, $\frac{1}{2}$ watt
73601	Transformer—Power transformer—117 volt, 60 cycle (T1)	74582	Screw—No. 8-32 x $1\frac{1}{4}$ " special head screw to mount 45 RPM changer (3 required)
33726	Washer—"C" washer for tuning shaft	74279	Screw—No. 8-32 x $\frac{3}{8}$ " trimit head screw for pull No. 74451
	SPEAKER ASSEMBLIES	74269	Screw—No. 8-32 x $\frac{3}{4}$ " trimit head screw for pull No. 74852
	92569-6W	74835	Slide—Slide mechanism for 45 RPM changer drawer
	RL111-13	74736	Slide—Slide mechanism for 33/78 RPM changer drawer
	RMA 274	30900	Spring—Retaining spring for knobs No. 71821, 71822 and 71824
13867	Cap—Dust cap	72845	Spring—Retaining spring for knobs No. 73994 and 73995
74901	Cone—Cone and voice coil assembly	74421	Spring—Conical spring to mount 45 RPM changer—upper—R.H. (1 required)
5039	Connector—4 contact male connector for speaker	74422	Spring—Conical spring to mount 45 RPM changer—upper—L.H. (2 required)
74753	Speaker—12" P.M. speaker complete with cone and voice coil less plug and transformer	74423	Spring—Conical spring to mount 45 RPM changer—lower (3 required)
73636	Transformer—Output transformer	72936	Stop—Door stop for record storage compartments (2 required)
	NOTE: If stamping on speaker in instruments does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.	75146	Washer—"C" washer to mount 33/78 RPM changer (2 required)
	MISCELLANEOUS		
74844	Antenna—F.M. antenna		
74205	Bezel—Dial scale bezel less dial		
71599	Bracket—Pilot lamp bracket		
74296	Cable—Shielded pickup cable complete with pin plug for 33/78 RPM changer		
71105	Cable—Shielded, pickup cable complete with pin plug for 45 RPM changer		
13103	Cap—Pilot lamp cap		
39644	Capacitor—Mica, 470 mmf. (on 78/33 $\frac{1}{3}$ RPM record changer)		
70602	Capacitor—Tubular, paper, .0025 mfd (on 78/33 $\frac{1}{3}$ RPM record changer), 400 volts		

MODEL BX6,
Ch. RC-1082

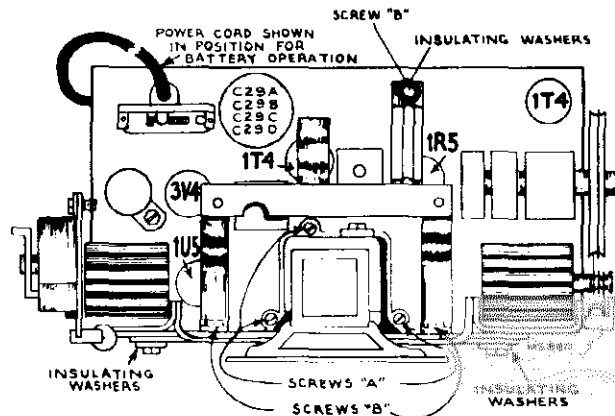


Model BX6

Specifications

Tuning Range	540-1,600 kc
Intermediate Frequency	455 kc
Power Supply Rating	
Power Line Operation	
115 volts, d. c. or 50 to 60 cycles a. c.	15 watts
or	
Battery Operated	using RCA VS 019 Battery
(Average battery life—125 hrs. intermittent service)	
Battery current	"A" 50 ma., "B" 13 ma.
Tube Complement	
(1) RCA 1T4	R.F. Amplifier
(2) RCA 1R5	Converter
(3) RCA 1T4	I.F. Amplifier
(4) RCA 1U5	2nd Det.—AVC—1st A.F.
(5) RCA 3V4	Output

A selenium rectifier is used.



Chassis Assembly

To Remove Back Cover:

Push the wire latch on the bottom of the case to the right. Open the back about 3" and remove by easily lifting and sliding the top edge of the cover out of the case.

To Replace Back Cover:

Insert the top edge of the back cover into the case. Hold the top edge in position with one hand and press the bottom edge in place with the other hand until it is latched.

Weight (Approx.)

Without battery7 lbs. With battery10½ lbs.

Power Output

Undistorted150 watt

Maximum325 watt

Loudspeaker4 in. P.M.

Voice coil impedance3.2 ohms at 400 cycles

Cabinet Dimensions

Height10 in. Width13 in. Depth5½ in.

CAUTION.—

1. Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.
2. When cleaning the aluminum portion of the case use soap and water or cleaning fluid. Do not use abrasive cleansers.

To Remove Chassis:

1. Loosen battery clamps, pull out battery and disconnect battery plug.
2. Unsolder the two loop antenna leads.
3. Remove the two large screws (under handle) in the top of the case (do not loosen small screws).
4. Lay receiver on table with face down.
5. Remove the two screws holding chassis to case sides.
6. The chassis may now be lifted from the case.

To Remove Speaker:

1. Remove chassis from case as described above.
2. Unsolder output transformer leads from speaker.
3. Un-hook dial cord tension spring.
4. Remove the two screws "B" holding dial bracket to chassis support bracket.
5. Remove the four screws holding dial bracket to chassis base.
6. Tilt dial bracket forward and remove three screws "A" holding speaker bracket to chassis base.

Insulating Washers:

The mounting bracket and dial frame are insulated from the chassis with insulating washers. This serves to insulate the case from the chassis. In servicing make certain that these washers are in place and properly positioned.

MODEL BX6,
Ch. RC-1082

Alignment Procedure

Output Meter Alignment.—If this method is used, connect the meter across the voice coil and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis and keep the oscillator output as low as possible to avoid AVC action.

Battery operation of the receiver is preferable during alignment; on AC operation an isolation transformer (117v./117v.) may be necessary for the receiver if the test oscillator is also AC operated.

Calibration Scale.—The calibrated dial scale is attached to the chassis. It can be used directly as a reference for alignment.

With the gang at full mesh set the dial pointer so that the pointer is $\frac{1}{4}$ " to the left of the 55 calibration on the dial scale.

Alignment Tabulation

Step	Connect High Side of Sig. Gen. to—	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output
1	Pin #6 of 1T4 I.F. Amplifier thru .005 mf.	455 kc	Quiet point near 1600 kc	2nd I.F. Trans. T2 Top & Bottom
2	Pin #6 of 1R5 Converter thru .005 mf.			1st I.F. Trans. T1 Top & Bottom
3	Replace bottom cover. Install chassis in case, connect loop and battery. Place "Dummy" back cover on case.			
4	Short wire placed near loop for radiated signal	1600 kc	1600 kc	C11 (osc.)
5		1400 kc	1400 kc	C10 (r.f.) C1 (loop)
6		600 kc	600 kc	L4 (osc.) L3 (r.f.) Alternately while rocking gang
7	Repeat steps 4, 5, and 6			

* A "dummy" back cover is one having holes provided to permit alignment with the cover in place. The battery and back cover affect loop alignment. The battery should be in place. If a "dummy" back cover is not available, an improvised cover should be made of sheet aluminum. It should not make contact with any metal portion of the case or chassis.

Critical Lead Dress

1. Dress all filament leads next to chassis.
2. Keep the leads short on the end of the three components, (R1, R2, C2) which connect to the grid terminal (#6) of the r.f. socket.
3. Dress tuning condenser leads direct and avoid excess lead length.
4. Dress loop leads away from tuning drum and battery.
5. Dress r.f. plate lead against chassis base.
6. Dress a.v.c. lead against chassis base.
7. Dress +B lead to output transformer against chassis base.
8. Dress 1st a.f. plate resistor (R13) up and away from other wiring.
9. Dress all leads away from the ballast resistor.
10. Dress ON-OFF switch leads clear of switch actuating lever and shutter.
11. Dress 1st a.f. grid resistor (R11) close to chassis.
12. Dress capacitor C4 in air between end apron and r.f. coil and away from selenium rectifier, with foil end to tuning condenser frame.

Power Line Operation.—

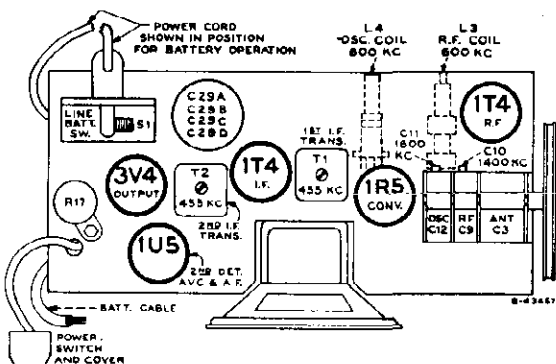
A power cord is stored in the fiber tube which is clamped above the chassis inside the cabinet. To open the cabinet, push the wire latch on the bottom of the case to the right, and lift the back cover up and off. Then pull the power cord plug out of the socket on the top of the chassis as shown, and take out and unroll the power cord. A slot in the bottom of the cabinet allows the closing of the cabinet with the power cord passing through. Replace the back cover with the cord extending through the slot and insert the plug into a convenient electrical outlet.

When returning to battery operation, be sure to replace the power plug in its socket inside the case with the cord stored in the fiber tube.

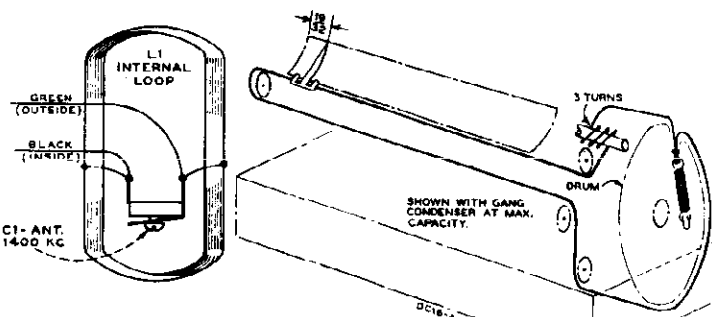
NOTE: If reception is not obtained on DC, reverse plug in outlet receptacle. This may also reduce hum on AC operation.

To Replace Top Cover:

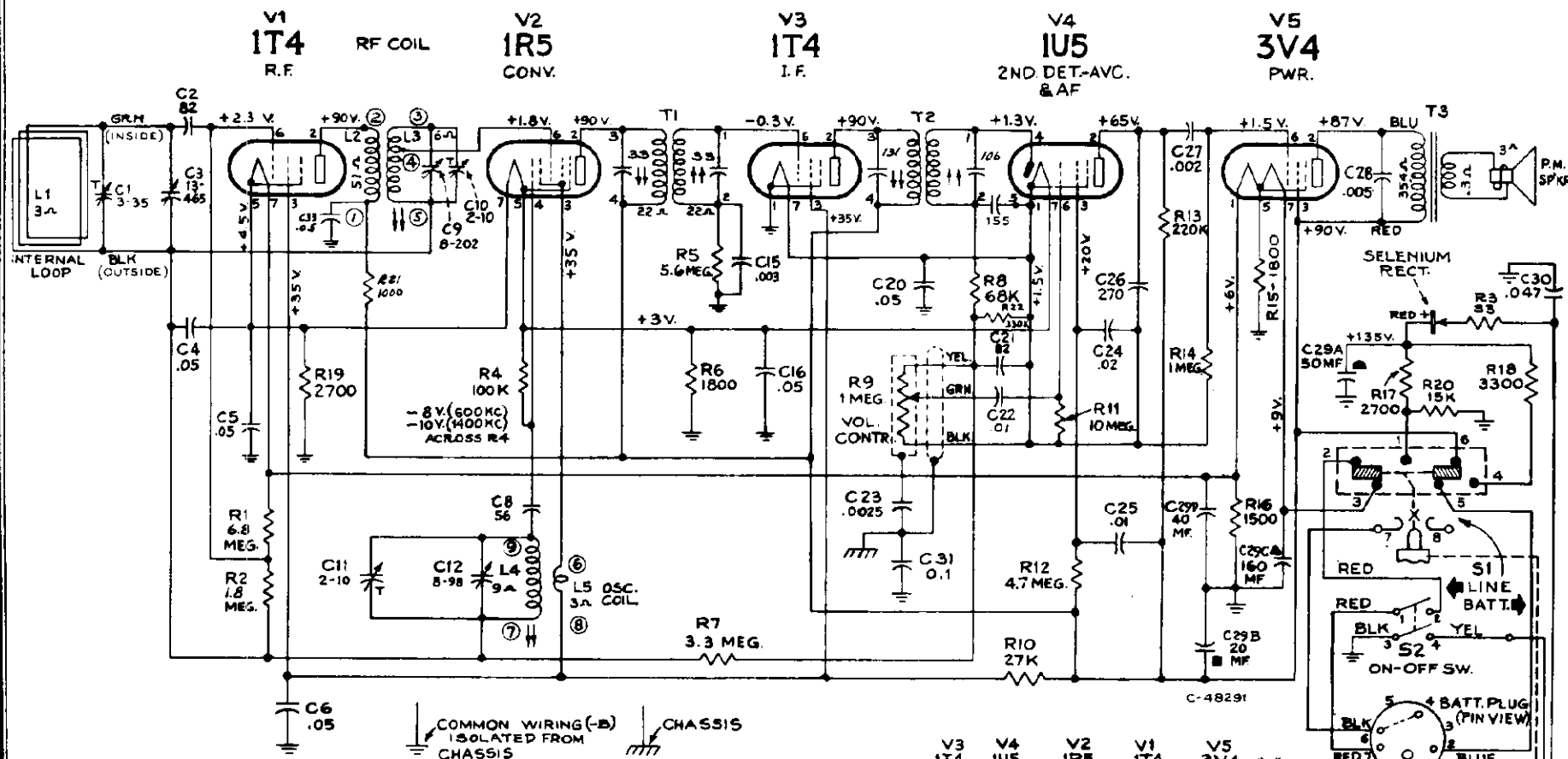
Assemble handle to cover and case front but do not tighten screws (small). Replace and tighten chassis mounting screws (large). Tighten the screws holding handle to top cover and case front.



Tube and Trimmer Locations

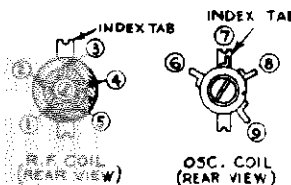


Dial-Indicator and Drive Mechanism



K=1000

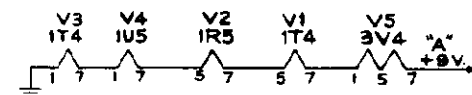
ALL CAPACITOR VALUES LESS THAN 1.0 ARE IN MF. & ABOVE 1.0 ARE IN MMF. EXCEPT THOSE INDICATED.



TUBE CURRENTS (MA) BATTERY OPERATION

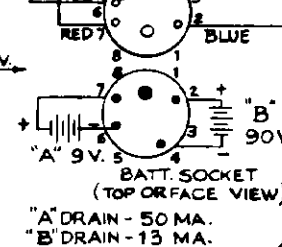
	PLATE	S. GRID
V1	.52	.18
V2	.65	1.2
V3	1.07	.49
V4	.08	.013
V5	5.8	1.35

CURRENTS SLIGHTLY HIGHER ON A.C. OPERATION



VOLTAGES MEASURED TO RECEIVER GROUND (-B) WITH CHANALYST OR VOLTOHMIST, AND SHOULD HOLD WITHIN $\pm 20\%$ WITH RATED BATTERY SUPPLY.

SWITCH "S1" ACTUATED BY LINE PLUG



POLARIZED LINE CORD TO S1 OR 115 V. SUPPLY

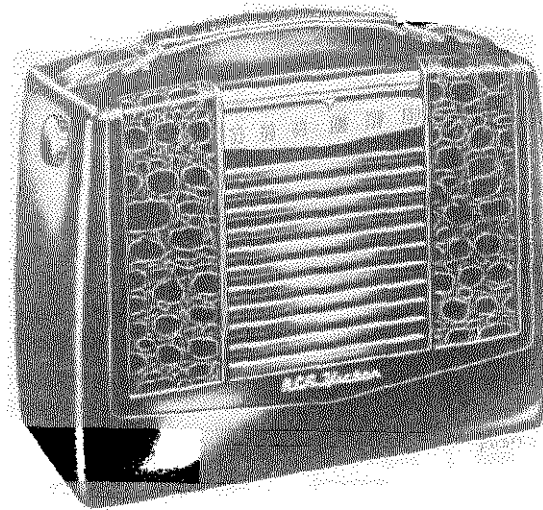
MODEL BX6,
 Ch. RC-1082

MODEL BX6,
Ch. RC-1082

Replacement Parts

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
CHASSIS ASSEMBLIES RC 1082			
71044	Bracket—Power switch bracket complete with actuating lever less switch	73122	Shaft—Tuning knob shaft
71056	Bracket—Drive cord pulley bracket complete with pulley (volume control side)	74996	Shield—End shield for dial—L.H.
74995	Bracket—Drive cord pulley bracket complete with 2 pulleys	74997	Shield—End shield for dial—R.H.
74991	Capacitor—Variable tuning capacitor complete with drum .....C3, C9, C10, C11, C12	73117	Socket—Tube socket
71924	Capacitor—Ceramic, 56 mmf. ....C8	74038	Spring—Drive cord spring
71514	Capacitor—Ceramic, 82 mmf. ....C2, C21	30900	Spring—Retaining spring for knob
73922	Capacitor—Ceramic, 270 mmf. ....C26	71039	Switch—"Line-Battery" change switch .....S1
73113	Capacitor—Electrolytic, comprising 1 section of 50 mfd., 150 volts, 1 section of 20 mfd., 150 volts, 1 section of 160 mfd., 25 volts and 1 section of 40 mfd., 25 volts .....C29A, C29B, C29C, C29D	71045	Switch—Power switch less cover and actuating lever .....S2
73750	Capacitor—Tubular, paper, .002 mfd., 200 volts .....C27	73129	Transformer—First I.F. transformer .....T1
70602	Capacitor—Tubular, paper, .0025 mfd., 400 volts .....C23	73037	Transformer—Second I.F. transformer .....T2
73961	Capacitor—Tubular, paper, .003 mfd., 200 volts .....C15	71047	Transformer—Output transformer .....T3
71553	Capacitor—Tubular, paper, .005 mfd., 400 volts .....C28	73332	Washer—Insulating washer (flat) for mounting base holder bracket (1 req'd) and dial support to chassis (4 req'd)
71923	Capacitor—Tubular, paper, .01 mfd., 200 volts .....C22, C25	73333	Washer—Insulating washer (extruded) for mounting base holder bracket (1 req'd) and dial support to chassis (4 req'd)
71928	Capacitor—Tubular, paper, .02 mfd., 200 volts .....C24	71081	Washer—Spring washer to hold removable drive cord pulley
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts .....C30	SPEAKER ASSEMBLIES 92577-3W	
71551	Capacitor—Tubular, paper, .05 mfd., 200 volts .....C5, C16, C20	71059	Gasket—Speaker gasket (black tubing)
73553	Capacitor—Tubular, paper, .05 mfd., 400 volts .....C4, C6, C33	73123	Speaker—4" P.M. speaker complete with cone and voice coil
70617	Capacitor—Tubular, paper, 0.1 mfd., 400 volts .....C31	MISCELLANEOUS	
73935	Clip—Mounting clip for I.F. transformer	71074	Arm—Shutter arm lever
73114	Coil—Oscillator coil complete with adjustable core .....L4, L5	74999	Back—Case back complete with latch
74992	Coil—R.F. coil complete with adjustable core .....L2, L3	71073	Bracket—Bearing bracket for shutter arm lever
71041	Connector—4 contact male connector for battery cable	71070	Bracket—Mounting bracket for #71069 adjustable capacitor
71057	Control—Volume control .....R9	71069	Capacitor—Adjustable trimmer capacitor 3-35 mmf. C1
72953	Cord—Drive cord (approx. 38" overall length required)	75001	Clip—Clip to hold battery (2 req'd)
70022	Cord—Power cord	75005	Clip—"C" clip (threaded) for battery holder clip (2 req'd)
74998	Dial—Dial scale and window assembly	75009	Clip—Clip to hold chassis to case (end plates) (2 req'd)
74838	Grommet—Power cord strain relief grommets (1 set)	75010	Clip—"C" clip and screw for fastening case front (4 req'd)
72283	Grommet—Rubber grommet to mount tuning capacitor	71080	Clip—Case side spring clip and screw (2 req'd)
71031	Holder—Power cord holder (fibre tube)	75013	Clip—Spring clip with tab for fastening case front to case sides (4 req'd)
73111	Indicator—Station selector indicator	75011	Emblem—"RCA Victor" emblem
74994	Knob—Tuning or volume control knob (roller type)	75006	Front—Case front complete with insulating strip and support feet—less shutter
18469	Plate—Bakelite mounting plate for electrolytic capacitor	75016	Handle—Carrying handle—less links
72602	Pulley—Drive cord pulley (removable)	75004	Latch—Spring latch for back cover
74322	Rectifier—Selenium rectifier	75018	Link—Carrying handle link—less mounting plate
73237	Resistor—Wire wound, fuse type, 33 ohms, 150 MA .....R3	71079	Loop—Antenna loop .....L1
74993	Resistor—Molded ceramic, 2700 ohms, 10 watts .....R17	75003	Nut—Speed nut to mount carrying handle
	Resistor Fixed, composition:	75015	Pin—Pivot pin (stud) for case shutter
	1000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt .....R21	75000	Plate—Case top plate—less handle
	1500 ohms, $\pm 10\%$, $\frac{1}{2}$ watt .....R16	75017	Plate—Mounting plate for carrying handle (2 req'd)
	1800 ohms, $\pm 10\%$, $\frac{1}{2}$ watt .....R6, R15	75002	Screw—#4 x $\frac{3}{8}$ " round head cross recessed self-tapping screw to mount carrying handle
	2700 ohms, $\pm 10\%$, $\frac{1}{2}$ watt .....R19	71066	Screw—#8-32 x $\frac{5}{8}$ " cross recessed binder head screw to hold chassis to top plate (2 req'd)
	3300 ohms, $\pm 10\%$, 1 watt .....R18	75014	Screw—#4 x $\frac{1}{4}$ " pan head screw for #75013 spring clip (4 req'd) or capacitor bracket (2 req'd)
	15,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt .....R20	71071	Shutter—Case shutter
	27,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt .....R10	75012	Side—Case side only—less pivot pin
	68,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt .....R9	71072	Spring—Case shutter compression spring
	100,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt .....R4	75007	Strip—Case front insulating strip complete with latch plate
	220,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt .....R13	75008	Support—Moulded support foot for case (2 req'd)
	330,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt .....R22	74353	Washer—Spring washer for shutter shafts
	1 megohm, $\pm 20\%$, $\frac{1}{2}$ watt .....R14		
	1.8 megohm, $\pm 10\%$, $\frac{1}{2}$ watt .....R2		
	3.3 megohm, $\pm 10\%$, $\frac{1}{2}$ watt .....R7		
	4.7 megohm, $\pm 20\%$, $\frac{1}{2}$ watt .....R12		
	5.6 megohm, $\pm 10\%$, $\frac{1}{2}$ watt .....R5		
	6.8 megohm, $\pm 10\%$, $\frac{1}{2}$ watt .....R1		
	10 megohm, $\pm 20\%$, $\frac{1}{2}$ watt .....R11		

†Stock No. 72953 is a reel containing 250 feet of cord.



Specifications

Tuning Range540-1600 kc.

Intermediate Frequency455 kc.

Tube Complement

- | | |
|-------------|------------------------|
| (1) RCA 1R5 | Converter |
| (2) RCA 1T4 | I. F. Amplifier |
| (3) RCA 1U5 | Det.—A.V.C.—A. F. Amp. |
| (4) RCA 3V4 | Output |

A selenium rectifier is used

Power Supply Rating

Power Line Operation

115 volts, d. c. or 50 to 60 cycles a. c.18 watts
or

Battery OperatedVS 050 Battery
(Average life—100 hrs. intermittent service)

Loudspeaker (92577-3)

Size and type4 in. P.M. dynamic

Voice coil impedance3.2 ohms at 400 cycles

Tuning Drive Ratio8:1 (4 turns of knob)

Power Output

Undistorted—170 milliwatts Maximum—350 milliwatts
(Output is slightly lower on battery operation)

Cabinet Dimensions

Height 8¼ in. Width 10¼ in. Depth 5 in.

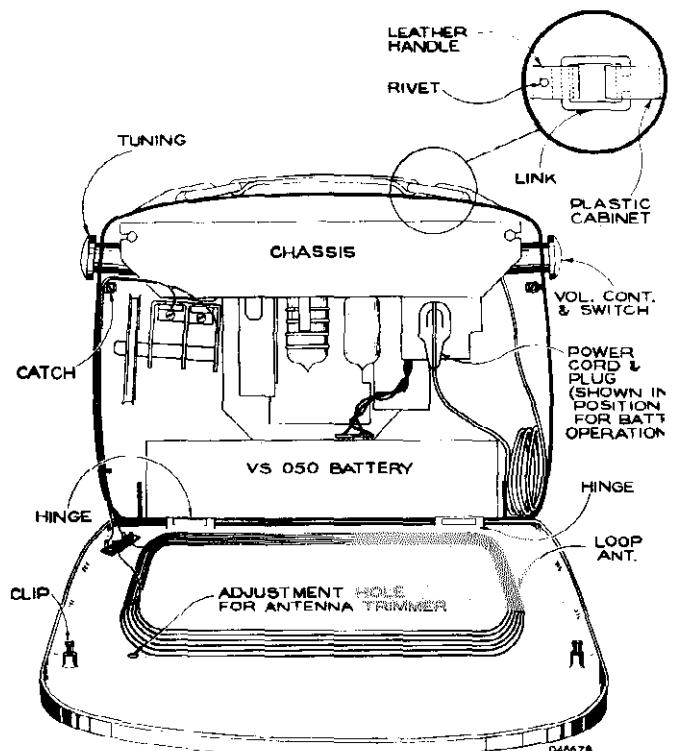
Weight (Approx.)

5 lb. less battery 8 lb. 2 oz. with battery

AC-DC Operation

A power cord is stored inside the cabinet. To open the cabinet, pull backwards on the top of the cabinet back. It is secured by means of two spring clips and catches on the inside of the cabinet. Remove the plug of the power cord from its socket on the chassis and insert the plug into a convenient electrical power outlet. A notch in the right side of the cabinet allows the back to be closed with the cord passing through.

- Notes:**
1. Maximum performance is obtained with the battery in place. Receiver sensitivity will be lowered if the battery is not in place during AC-DC operation since the battery affects the loop inductance.
 2. If reception is not obtained on DC, reverse plug in power outlet. On AC operation, reversal of the plug may reduce hum.



To Remove Carrying Handle

1. Remove rivets from handle.
2. Turn link and slip out of handle and cabinet.

Cabinet Back and Hinges

The cabinet back and hinges may be readily detached from the cabinet. See back page for detailed instructions on their removal.

Battery Operation

Replace the power cord plug in the socket provided on the back of the chassis. Coil up the power cord and place it alongside of the battery. Make certain that it will not interfere with the tuning condenser.

Note: Make certain that the plug is fully inserted (base of plug touching chassis) to assure proper operation of the Batt-Line switch.

MODEL BX55,
Ch. RC-1088'

Alignment Procedure

Signal Generator.—For all alignment operations, connect the low side of the signal generator to the receiver chassis and keep the output as low as possible to avoid AVC action.

Battery operation of the receiver is preferable during alignment; on a. c. operation an isolation transformer (117v./117v.) may be necessary for the receiver if the signal generator is also a. c. operated.

Note: Battery must be in place for ant. alignment (step 6).

Dial Pointer Position.—With the tuning condenser fully meshed the center of the dial pointer should be in line with the score mark on the chassis.

Alignment Tabulation

Step	Connect high side of signal generator to—	Signal generator output	Dial pointer setting	Adjust for maximum output—
1	Disconnect loop — remove chassis — remove bottom plate, connect a 10,000 ohm resistor from C1-1 stator terminal to tuning condenser frame.			
2	Grid of 1T4 (pin No. 6) thru .01 mf. capacitor	455 kc	Quiet point near 1600 kc	T2 (top) 2nd. I-F trans.
3	Stator term. of C1-1 thru .01 mf. capacitor			T1 (top & bottom) 1st. I-F trans.
4	Remove the 10,000 ohm resistor. Replace bottom cover and install chassis in cabinet. Re-connect loop.			
5	Short wire placed near receiver (for radiated signal)	1620 kc	Tuning condenser fully open	C1-2 trimmer (osc.)
6		1300 kc	1300 kc signal	†C1-1 trimmer (ant.)

† With back closed. Trimmer is accessible thru hole in back.

NOTE:

The magnetite cores of T2 and T1 may not have visible adjusting screws. The cores have screw driver slots to permit adjustment (use non-metallic screwdriver).

Critical Lead Dress

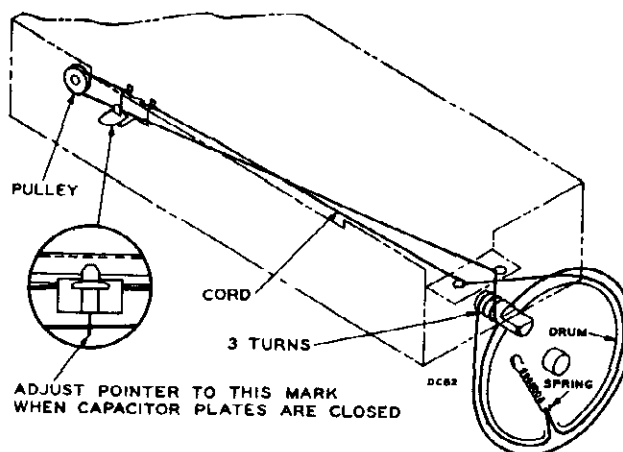
1. Dress antenna loop leads away from adjusting screws on tuning condenser.
2. Dress all capacitors against chassis base.
3. Dress oscillator coil away from chassis and bottom cover.
4. Dress output transformer primary leads against chassis.
5. Dress all leads and components away from selenium rectifier.
6. Dress loop antenna leads into recesses provided in the side of the cabinet. Leave slack at hinged edge of cabinet.

Note: This instrument is designed to be operated with a battery in position inside the cabinet. Reception will be below normal unless the battery is in its normal location.

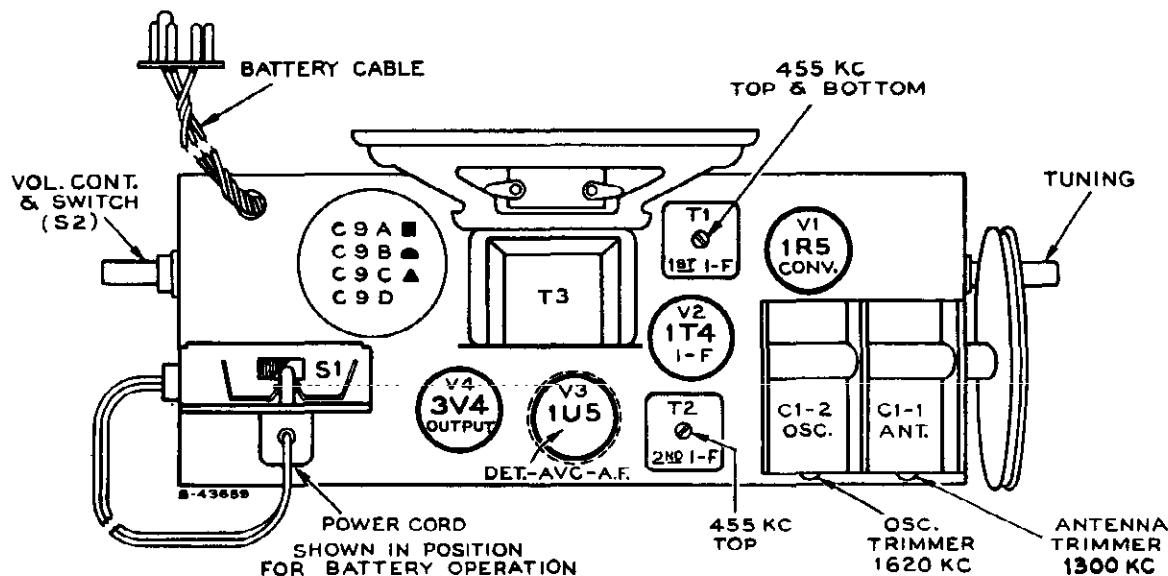
The position of the battery pack affects the loop inductance. Therefore, when the battery is removed, the loop inductance will change (increase) and the sensitivity will be slightly worse because of improper electrical tracking of the loop circuit with the heterodyne oscillator of the receiver.

CAUTION.—

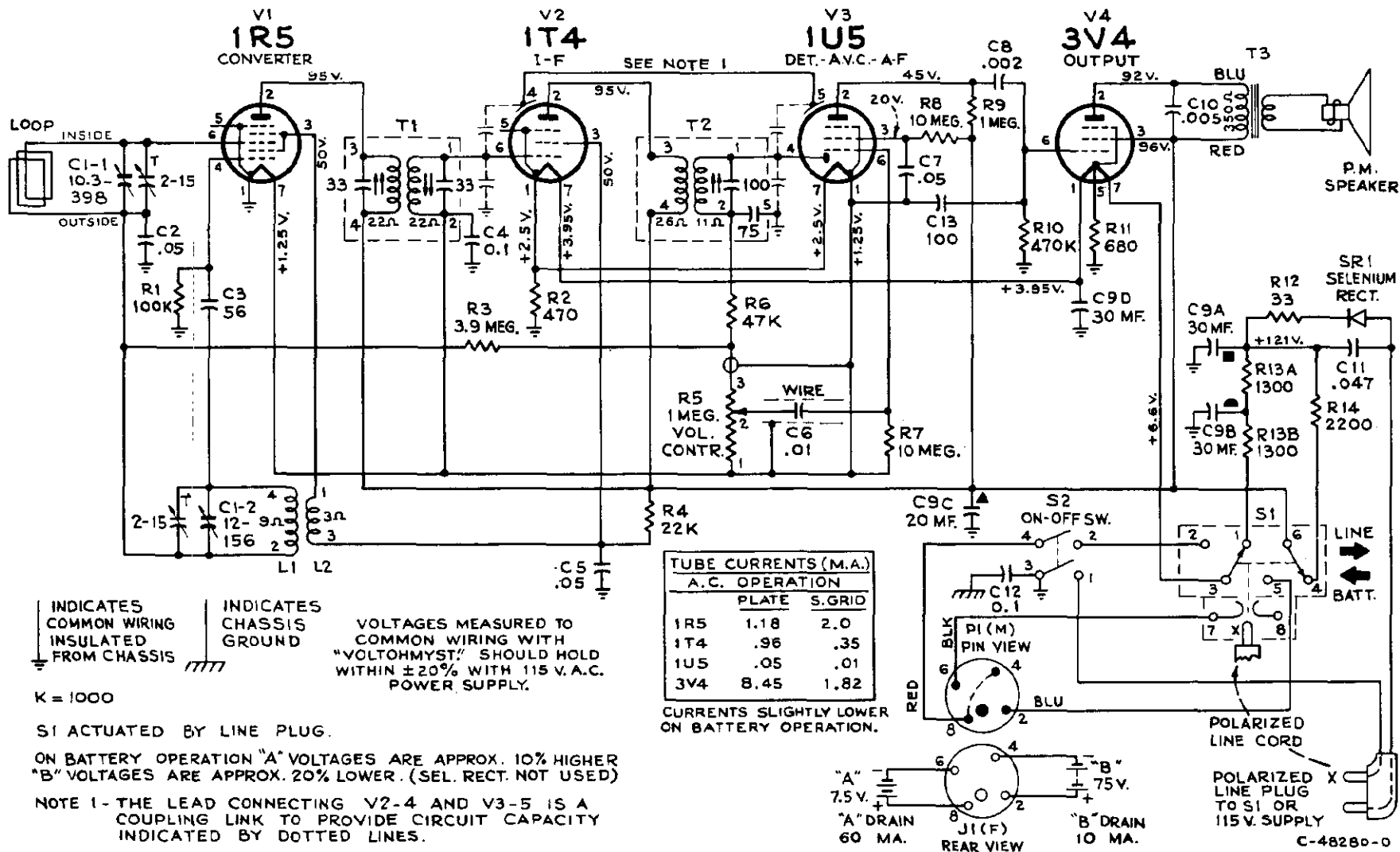
Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.



Dial Indicator and Drive Mechanism



Tube and Trimmer Locations



SCHEMATIC DIAGRAM

PAGE 21-34 RADIO CORPORATION OF AMERICA

MODEL BX55,
Ch. RC-1088

Replacement Parts

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES		
	RC 1088		
74778	Capacitor—Variable tuning capacitor .....C1-1.C1-2	74773	3.9 megohm, $\pm 10\%$, $\frac{1}{2}$ watt .....R3
39622	Capacitor—Mica, 56 mmf. ....C3		10 megohm, $\pm 20\%$, $\frac{1}{2}$ watt .....R7, R8
39628	Capacitor—mica, 100 mmf. ....C13	74773	Shaft—Tuning knob shaft
74774	Capacitor—Electrolytic, comprising 2 sections of 30 mfd., 150 volts, 1 section of 20 mfd., 150 volts and 1 section of 30 mfd., 25 volts.....C9A, C9B, C9C, C9D	73103	Shield—Tube shield for 1U5 tube
72315	Capacitor—Tubular, paper, .002 mfd., 200 volts .....C8	73117	Socket—Tube socket, miniature
73920	Capacitor—Tubular, paper, .005 mfd., 400 volts .....C10	74038	Spring—Drive cord tension spring
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts .....C6	71039	Switch—"Line Battery" change switch .....S1
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts .....C11	73129	Transformer—First I.F. transformer .....T1
73553	Capacitor—Tubular, paper, .05 mfd., 400 volts .....C2, C5, C7	74775	Transformer—Second I.F. transformer .....T2
70617	Capacitor—Tubular, paper, 0.1 mfd., 400 volts .....C4, C12	74779	Transformer—Output transformer .....T3
73935	Clip—Mounting clip for I.F. transformer	33726	Washer—"C" washer for tuning knob shaft
74780	Coil—Oscillator coil .....L1, L2		SPEAKER ASSEMBLY
73275	Connector—5 contact male connector for battery cable .....P1		92577-3
73125	Control—Volume control and power switch .....R5, S2	74165	Speaker—4" P.M. speaker complete with cone and voice coil
71457	Cord—Power cord and plug		MISCELLANEOUS
72953	Cord—Drive cord (approx. 40" overall length req'd)	75048	Back Cabinet back complete with loop
72283	Grommet—Rubber grommet to mount tuning capacitor (3 required)	74787	Board—Terminal board—2 contact
74838	Grommet—Power cord strain relief grommet (1 set)	Y2220	Case—Cabinet front less back, emblem, handle, and dial
74776	Indicator—Station selector indicator	74339	Catch—Cabinet back catch (part of cabinet front)
18469	Plate—Mounting plate for electrolytic capacitor	74734	Clip—Spring clip for knob
72602	Pulley—Drive cord pulley	74792	Clip—Striking clip for catch (part of cabinet back) (2 required)
74322	Rectifier—Selenium rectifier .....SR1	74784	Dial—Metal dial scale
73237	Resistor—Wire wound (fuse type) 33 ohms .....R12	74782	Emblem—"RCA Victor" emblem
74777	Resistor—Voltage divider, dual, 1300 ohms, 3.5 watts .....R13A, R13B	74785	Handle—Carrying handle
	Resistor—Fixed, composition:—	74790	Hinge—Cabinet hinge (2 required)
	470 ohms, $\pm 20\%$, $\frac{1}{2}$ watt .....R2	74666	Knob—Tuning or volume control and power switch knob
	680 ohms, $\pm 20\%$, $\frac{1}{2}$ watt .....R11	74786	Link—Link for carrying handle (2 required)
	2200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt .....R14	74789	Loop—Antenna loop winding
	22,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt .....R4	74788	Nut—Speed nut to mount terminal board
	47,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt .....R6	73203	Nut—Speed nut to fasten dial (2 required) or decorative plate (2 required) to cabinet
	100,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt .....R1	75448	Rivet—Bevel pointed rivet for handle (2 required)
	470,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt .....R10	75435	Screen—Crimoline screen for speaker grille
	1 megohm, $\pm 20\%$, $\frac{1}{2}$ watt .....R9	74783	Plate—Decorative plate (satin finish) for cabinet (above dial)
		74301	Screw—No. 8-32 x $\frac{3}{8}$ " pan head cross recessed screw for chassis mounting (2 required)
		74791	Screw—No. 4 x $\frac{5}{16}$ " pan head cross recessed screw to fasten catch to cabinet front.

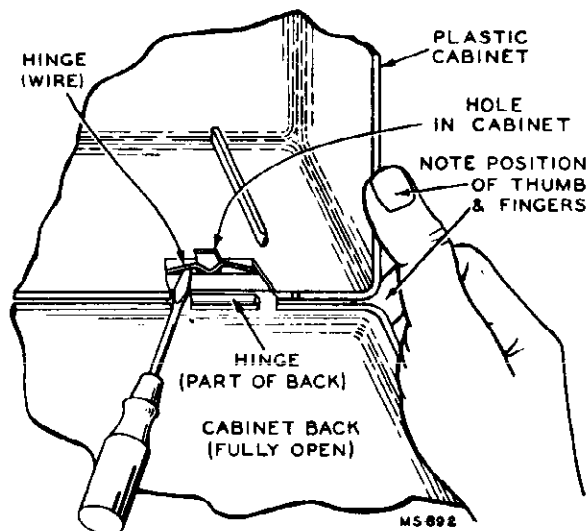
† Stock No. 72953 is a reel which contains 250 ft. of cord.

To Remove Cabinet Back

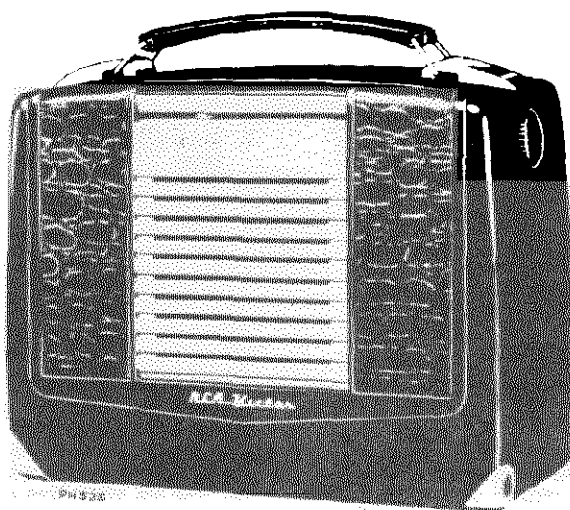
Disconnect the loop antenna leads. With the back fully open, grip the cabinet as illustrated. Insert a screwdriver under one hinge and pry the center of the hinge out of the opening in the cabinet while maintaining pressure on the back with the fingers and on the cabinet with the thumb. Repeat this procedure with the other hinge. Pull the back straight to the rear using both hands.

To Remove Hinges

Remove back from cabinet as described above. Spread the hinge apart to remove it from the cabinet back.



Removal of Cabinet Back

MODEL BX57,
Ch. RC-1088A

Specifications

Tuning Range 540-1600 kc.

Intermediate Frequency 455 kc.

Tube Complement

(1) RCA 1R5 Converter

(2) RCA 1U4 I. F. Amplifier

(3) RCA 1U5 Det.—A.V.C.—A. F. Amp.

(4) RCA 3V4 Output

A selenium rectifier is used

Power Supply Rating

Power Line Operation

115 volts, d. c. or 50 to 60 cycles a. c. 18 watts
or

Battery Operated VS 050 Battery
(Average battery life—100 hrs. intermittent service)

Loudspeaker (92577-3)

Size and type 4 in. P.M. dynamic

Voice coil impedance 3.2 ohms at 400 cycles

Tuning Drive Ratio 8:1 (4 turns of knob)

Power Output

Undistorted—170 milliwatts **Maximum**—350 milliwatts
(Output is slightly lower on battery operation)

Cabinet Dimensions

Height 8 1/4 in. **Width** 10 3/4 in. **Depth** 5 in.

Weight (Approx.)

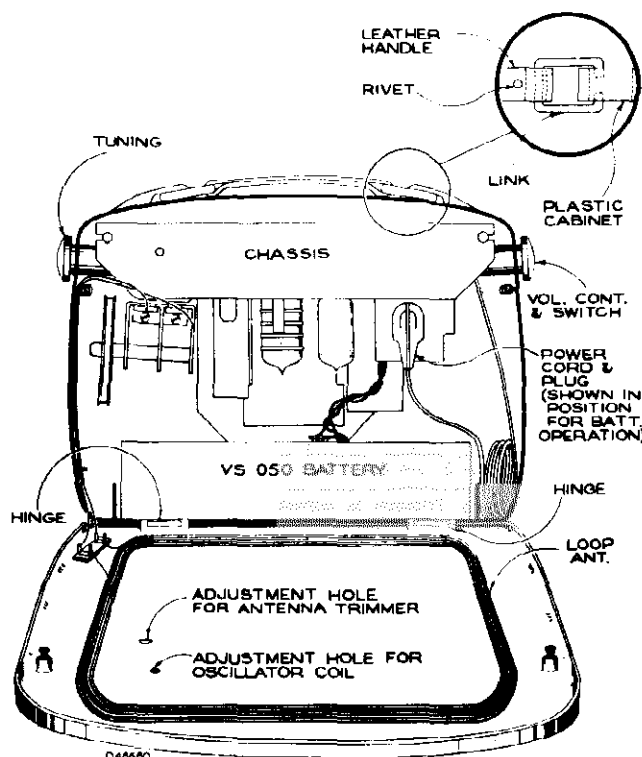
5 lb. less battery 8 lb. 2 oz. with battery

AC-DC Operation

A power cord is stored inside the cabinet. To open the cabinet, pull backwards on the top of the cabinet back. It is secured by means of two spring clips and catches on the inside of the cabinet. Remove the plug of the power cord from its socket on the chassis and insert the plug into a convenient electrical power outlet. A notch in the right side of the cabinet allows the back to be closed with the cord passing through.

Notes: 1. Maximum performance is obtained with the battery in place. Receiver sensitivity will be lowered if the battery is not in place during AC-DC operation since the battery affects the loop inductance.

2. If reception is not obtained on DC, reverse plug in power outlet. On AC operation, reversal of the plug may reduce hum.



To Remove Carrying Handle

1. Remove rivets from handle.
2. Turn link and slip out of handle and cabinet.

Cabinet Back and Hinges

The cabinet back and hinges may be readily detached from the cabinet. See back page for detailed instructions on their removal.

Battery Operation

Replace the power cord plug in the socket provided on the back of the chassis. Coil up the power cord and place it alongside of the battery. Make certain that it will not interfere with the tuning condenser.

Note: Make certain that the plug is fully inserted (base of plug touching chassis) to assure proper operation of the Batt-Line switch.

MODEL BX57,
Ch. RC-1088A

Alignment Procedure

Signal Generator—For all alignment operations, connect the low side of the signal generator to the receiver chassis and keep the output as low as possible to avoid AVC action.

Battery operation of the receiver is preferable during alignment; on a. c. operation an isolation transformer (117v./117v.) may be necessary for the receiver if the signal generator is also a. c. operated.

Note: Battery must be in place for ant. alignment (step 6).

Dial Pointer Position—With the tuning condenser fully meshed the center of the dial pointer should be in line with the score mark on the chassis.

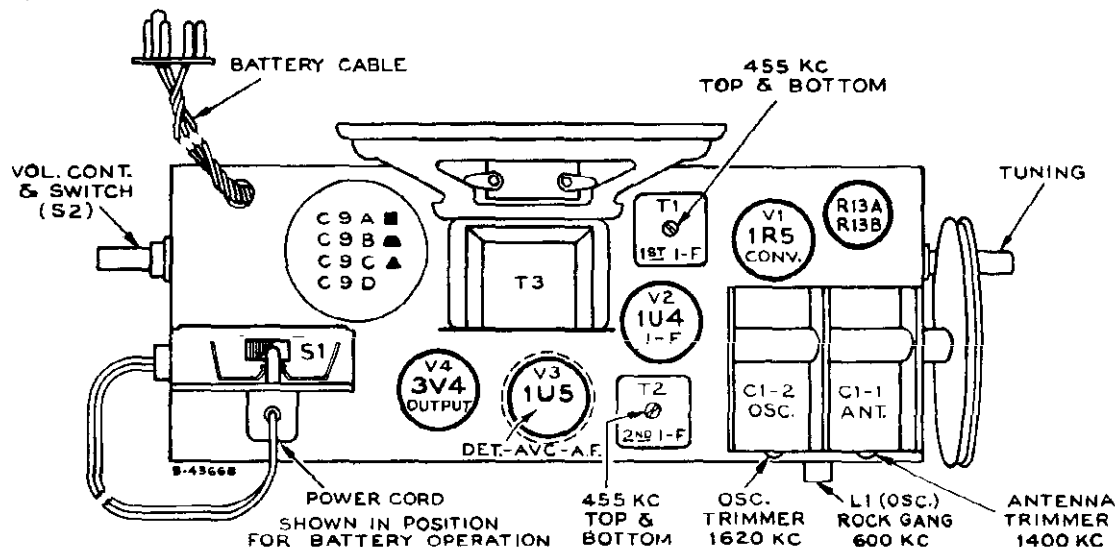
Alignment Tabulation

Step	Connect high side of signal generator to—	Signal generator output	Dial pointer setting	Adjust for maximum output—
1	Disconnect loop — remove chassis — remove bottom plate, connect a 10,000 ohm resistor from C1-1 stator terminal to tuning condenser frame.			
2	Grid of 1U4 (pin No. 6) thru .01 mf. capacitor	455 kc	Quiet point near 1600 kc	T2 (top & bottom) 2nd. I-F trans.
3	Stator term. of C1-1 thru .01 mf. capacitor			T1 (top & bottom) 1st. I-F trans.
4	Remove the 10,000 ohm resistor. Replace bottom cover and install chassis in cabinet. Re-connect loop.			
5	Short wire placed near receiver (for radiated signal)	1620 kc	Tuning condenser fully open	C1-2 trimmer (osc.)
6		1400 kc	1400 kc signal	†C1-1 trimmer (ant.)
7		600 kc	600 kc signal	†L1 (osc.) rock gang
8	Repeat steps 5 and 6.			

† With back closed. Trimmer is accessible thru hole in back.

NOTE:

The magnetite cores of T2 and T1 may not have visible adjusting screws. The cores have screwdriver slots to permit adjustment (use non-metallic screwdriver).



Tube and Trimmer Locations

Critical Lead Dress

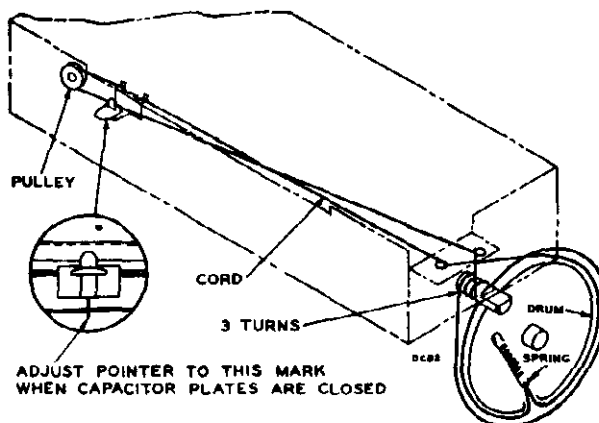
1. Dress antenna loop leads away from adjusting screws on tuning condenser.
2. Dress all capacitors against chassis base.
3. Dress oscillator coil away from chassis and bottom cover.
4. Dress output transformer primary leads against chassis.
5. Dress all leads and components away from selenium rectifier.
6. Dress the 4 mmf. capacitor (C15) down against the .003 mf. capacitor (C14).
7. Capacitor C15 must be connected to the plate terminal of the 1U4 socket with as short lead as possible.
8. Dress loop antenna leads into recesses provided in the side of the cabinet. Leave slack at hinged edge of cabinet.

Note: This instrument is designed to be operated with a battery in position inside the cabinet. Reception will be below normal unless the battery is in its normal location.

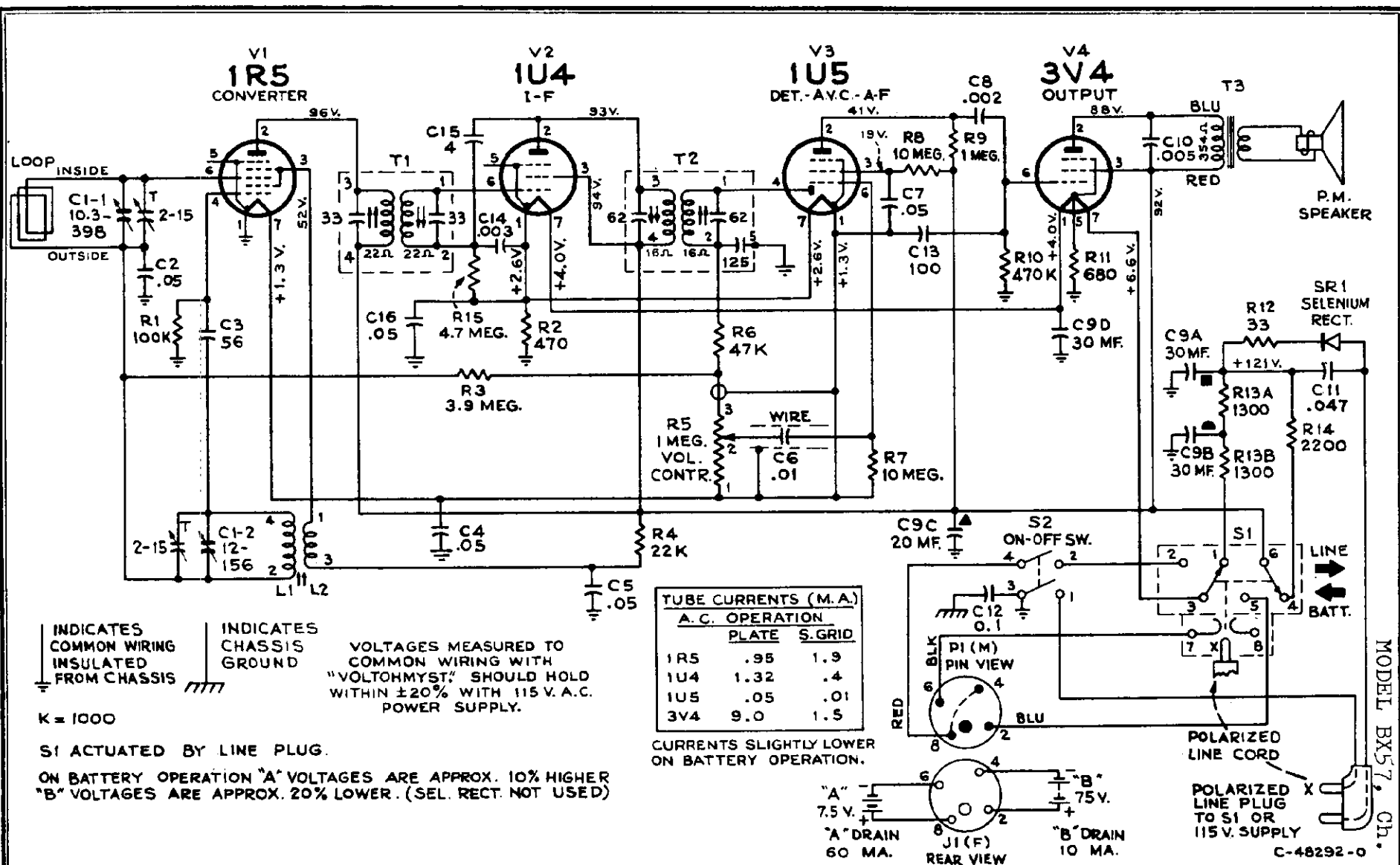
The position of the battery pack affects the loop inductance. Therefore, when the battery is removed, the loop inductance will change (increase) and the sensitivity will be slightly worse because of improper electrical tracking of the loop circuit with the heterodyne oscillator of the receiver.

CAUTION.—

Do not remove any tubes from the chassis with the set operating and the plug connected to the power line. Damage to tubes may result.



Dial Indicator and Drive Mechanism



SCHEMATIC DIAGRAM

MODEL BX57,
Ch. RC-1088A

Replacement Parts

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
CHASSIS ASSEMBLIES RC 1088A			
75149	Capacitor—Variable tuning capacitor .....C1-1, C1-2	74773	Shaft—Tuning knob shaft
73153	Capacitor—Ceramic, 4 mmf. ....C15	73103	Shield—Tube shield for 1U5 tube
39622	Capacitor—Mica, 56 mmf. ....C3	73117	Socket—Tube socket, miniature
39628	Capacitor—Mica, 100 mmf. ....C13	74038	Spring—Drive cord tension spring
74774	Capacitor—Electrolytic, comprising 2 sections of 30 mfd., 150 volts, 1 section of 20 mfd., 150 volts and 1 section of 30 mfd., 25 volts C9A, C9B, C9C, C9D	71039	Switch—"Line-Battery" change switch .....S1
72315	Capacitor—Tubular, paper, .002 mfd., 200 volts ....C8	73129	Transformer—First I.F. transformer .....T1
73961	Capacitor—Tubular, paper, .003 mfd., 200 volts ....C14	73130	Transformer—Second I.F. transformer .....T2
73920	Capacitor—Tubular, paper, .005 mfd., 400 volts ....C10	71047	Transformer—Output transformer .....T3
73561	Capacitor—Tubular, paper, .01 mfd., 400 volts ....C6	33726	Washer—"C" washer for tuning knob shaft
75071	Capacitor—Tubular, moulded paper, .047 mfd., 400 volts .....C11	SPEAKER ASSEMBLIES 92577-3	
73553	Capacitor—Tubular, paper, .05 mfd., 400 volts C2, C4 C5, C7, C16	74165	Speaker—4" P.M. speaker complete with cone and voice coil
70617	Capacitor—Tubular, paper, 0.1 mfd., 400 volts ....C12	MISCELLANEOUS	
73935	Clip—Mounting clip for I.F. transformer	75080	Back—Cabinet back complete with loop
74405	Coil—Oscillator coil .....L1, L2	74787	Board—Terminal board—2 contact
73275	Connector—5 contact male connector for battery cable	Y2227	Cabinet—Cabinet front including corners and link caps—less dial and plate
73125	Control—Volume control and power switch ....R5, S2	75156	Cap—Carrying handle link cap (2 required)
71457	Cord—Power cord and plug	74339	Catch—Cabinet back catch (part of cabinet front)
†72953	Cord—Drive cord (approx. 40" overall length req'd)	74734	Clip—Spring clip for knob
72283	Grommet—Rubber grommet to mount tuning capacitor	74792	Clip—Striking clip for catch (part of cabinet back) (2 required)
74838	Grommet—Power cord strain relief grommet (1 set)	75153	Cover—Cabinet corner cover—L.H.
74776	Indicator—Station selector indicator	75154	Cover—Cabinet corner cover—R.H.
18469	Plate—Mounting plate for electrolytic capacitor	75157	Dial—Metal dial scale and bezel
72602	Pulley—Drive cord pulley	74782	Emblem—"RCA Victor" emblem
74322	Rectifier—Selenium rectifier .....SR1	75150	Handle—Carrying handle
73237	Resistor—Wire wound (fuse type) 33 ohms ....R12	74790	Hinge—Cabinet hinge (2 required)
75148	Resistor—Ceramic, 2600 ohms, tapped at 1300 ohms, 10 watts .....R13	74781	Knob—Tuning or volume control and power switch knob
Resistors—Fixed, composition:-		75151	Link—Link for carrying handle (2 required)
470 ohms, ±20%, ½ watt .....R2		75152	Loop—Antenna loop winding
680 ohms, ±20%, ½ watt .....R11		74788	Nut—Speed nut to mount terminal board
2200 ohms, ±10%, ½ watt .....R14		73203	Nut—Speed nut to fasten dial, corner covers, decorative plate or link caps
22,000 ohms, ±20%, ½ watt .....R4		74783	Plate—Decorative plate (satin finish) for cabinet (above dial)
47,000 ohms, ±20%, ½ watt .....R6		75448	Rivet—Bevel pointed rivet for handle (2 required)
100,000 ohms, ±20%, ½ watt .....R1		75435	Screen—Crimoline screen for speaker grille
470,000 ohms, ±20%, ½ watt .....R10		74301	Screw—No. 8-32 x ¾" pan head cross recessed screw for chassis mounting (2 required)
1 megohm, ±20%, ½ watt .....R9		74791	Screw—No. 4 x 5/16" pan head cross recessed screw to fasten catch to cabinet front
3.9 megohm, ±10%, ½ watt .....R3			
4.7 megohm, ±20%, ½ watt .....R15			
10 megohm, ±20%, ½ watt .....R7, R8			

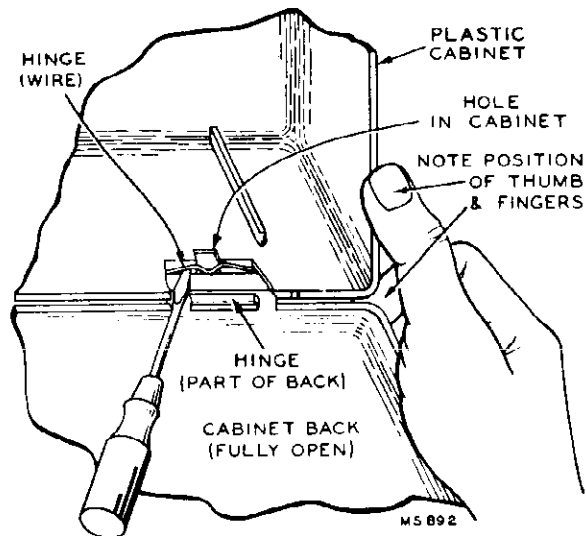
† Stock No. 72953 is a reel which contains 250 ft. of cord.

To Remove Cabinet Back

Disconnect the loop antenna leads. With the back fully open, grip the cabinet as illustrated. Insert a screwdriver under one hinge and pry the center of the hinge out of the opening in the cabinet while maintaining pressure on the back with the fingers and on the cabinet with the thumb. Repeat this procedure with the other hinge. Pull the back straight to the rear using both hands.

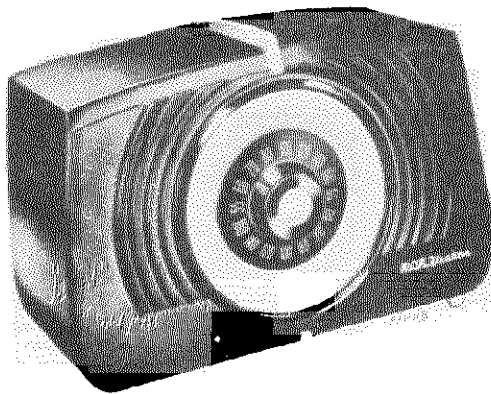
To Remove Hinges

Remove back from cabinet as described above. Spread the hinge apart to remove it from the cabinet back.



Removal of Cabinet Back

MODELS X551, Ch. RC-1089B;
X552, Ch. RC-1089C



X551
Maroon

X552
Ivory

Specifications

Tuning Range.....	540-1600 kc	Dial Lamps (2).....	type 47, 6-8 volts, .15 amp.
Intermediate Frequency.....	455 kc	Power Output	
Tube Complement		Undistorted.....	1.25 watts
(1) RCA 12BE6.....	Converter	Maximum.....	1.5 watts
(2) RCA 12BA6.....	I-F Amplifier	Loudspeaker (92577-1 or 92577-7)	
(3) RCA 12AV6.....	Det.—A.V.C.—A-F Amp.	Size and type.....	4 in. PM
(4) RCA 50L6GT.....	Output	Voice coil impedance.....	3.2 ohms at 400 cycles
(5) RCA 35W4.....	Rectifier	Cabinet Dimensions	
Power Supply Rating		Height.....	8 ⁵ / ₈ "
115 volts a.c., 50 to 60 cycles or d.c.....	30 watts	Width.....	12 ¹ / ₄ "
		Depth.....	6"
		Weight.....	6 lbs.

Replacement Parts

Stock No.	DESCRIPTION	Stock No.	DESCRIPTION
	CHASSIS ASSEMBLIES		
	RC 1089B—Model X551	73584	Shield—Tube shield
	RC 1089C—Model X552	73117	Socket—Tube socket, 7 pin, miniature
75481	Back—Back cover and loop assembly (maroon) (Model X551)	70827	Socket—Tube socket, octal
75604	Back—Back cover and loop assembly (ivory) (Model X552)	74697	Socket—Pilot lamp socket
75658	Bracket—Lamp bracket	75486	Transformer—First I-F transformer complete with adjustable cores.....T1
75484	Capacitor—Variable tuning capacitor.....C1-1, C1-2	75487	Transformer—Second I-F transformer complete with adjustable cores.....T2
39624	Capacitor—Mica, 68 mmf.....C2	75488	Transformer—Output transformer.....T3
39632	Capacitor—Mica, 150 mmf.....C12		SPEAKER ASSEMBLIES
39642	Capacitor—Mica, 390 mmf.....C6		92577-1 or 92577-7
73500	Capacitor—Electrolytic comprising 1 section of 50 mfd., 150 volts and 1 section of 30 mfd., 150 volts.....C9A, C9B	74165	Speaker—4" P.M. speaker complete with cone and voice coil
73920	Capacitor—Tubular, paper, .005 mfd., 400 volts.....C4, C7		MISCELLANEOUS
73562	Capacitor—Tubular, paper, .02 mfd., 400 volts.....C5	Y2231	Cabinet—Plastic cabinet—maroon—complete with grille screen, dial markings, top and bottom decorative strips, feet and "Phono" decal (Model X551)
70613	Capacitor—Tubular, paper, .03 mfd., 400 volts.....C8	Y2261	Cabinet—Plastic cabinet—ivory—complete with grille screen, dial markings, top and bottom decorative strips, feet and "Phono" decal (Model X552)
73553	Capacitor—Tubular, paper, .05 mfd., 400 volts.....C3, C11		
73551	Capacitor—Tubular, paper, 0.1 mfd., 400 volts.....C10	75659	Cap—Pilot lamp cap
73935	Clip—Mounting clip for i-f transformer	75492	Decal—"Phono" decal
75485	Coil—Oscillator coil complete with adjustable core.....L1, L2	74782	Emblem—"RCA Victor" emblem
75482	Connector—Phono input connector less mounting bracket.....J1	75495	Foot—Cabinet foot—(2 req'd)
75483	Control—Volume control and power switch.....R5, S1	75493	Knob—Tuning control knob—maroon—(Model X551)
70392	Cord—Power cord and plug	75494	Knob—Volume control and power switch knob—maroon (Model X551)
72283	Grommet—Rubber grommet for variable tuning capacitor (3 req'd)	75605	Knob—Volume control and power switch knob—ivory (Model X552)
74838	Grommet—Power cord strain relief grommets (1 set)	75606	Knob—Tuning control knob—ivory—(Model X552)
	Resistor—Fixed, composition:—	31480	Lamp—Pilot lamp—Mazda 47
	47 ohms, ± 20%, ½ watt.....R13	74336	Nut—Spring nut to attach top decorative strip to cabinet (2 req'd) or bottom decorative strip to cabinet (1 req'd)
	100 ohms, ± 20%, ½ watt.....R3	74340	Nut—Speed nut to attach foot
	150 ohms, ± 20%, ½ watt.....R9	75489	Screen—Grille screen
	1200 ohms, ± 10%, 1 watt.....R10	74734	Spring—Retaining spring for knob
	22,000 ohms, ± 20%, ½ watt.....R1	75490	Strip—Decorative strip (gold) for cabinet top
	47,000 ohms, ± 20%, ½ watt.....R12	75491	Strip—Decorative strip (gold) for cabinet front bottom
	220,000 ohms, ± 20%, ½ watt.....R7		
	470,000 ohms, ± 20%, ½ watt.....R8		
	1 megohm, ± 20%, ½ watt.....R2		
	3.3 megohm, ± 20%, ½ watt.....R4		
	4.7 megohm, ± 20%, ½ watt.....R6		

MODELS X551, Ch. RC-1089B;
X552, Ch. RC-1089C

Alignment Procedure

Test-Oscillator—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the oscillator output as low as possible to avoid a-v-c action. On a.c. operation an isolation transformer (115 v./115 v.) may be necessary for the receiver if the test oscillator is also a.c. operated.

Lead Dress

1. Dress all capacitors down against chassis.
2. Connect outside foil of all capacitors as indicated in schematic diagram.
3. Locate C9 in its mounting clip so that it butts against chassis.
4. Dress power cord leads away from R11.

Attachment of Record Player

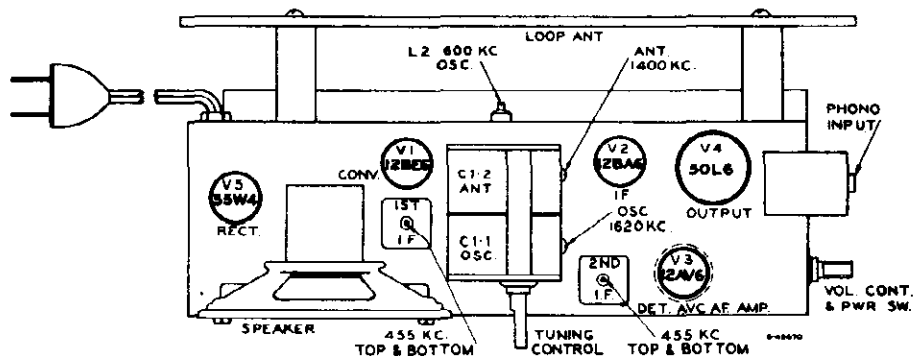
The audio output cable of the record player should be terminated with a pin plug.

Plug the cable into the receptacle which is accessible through the side of the cabinet.

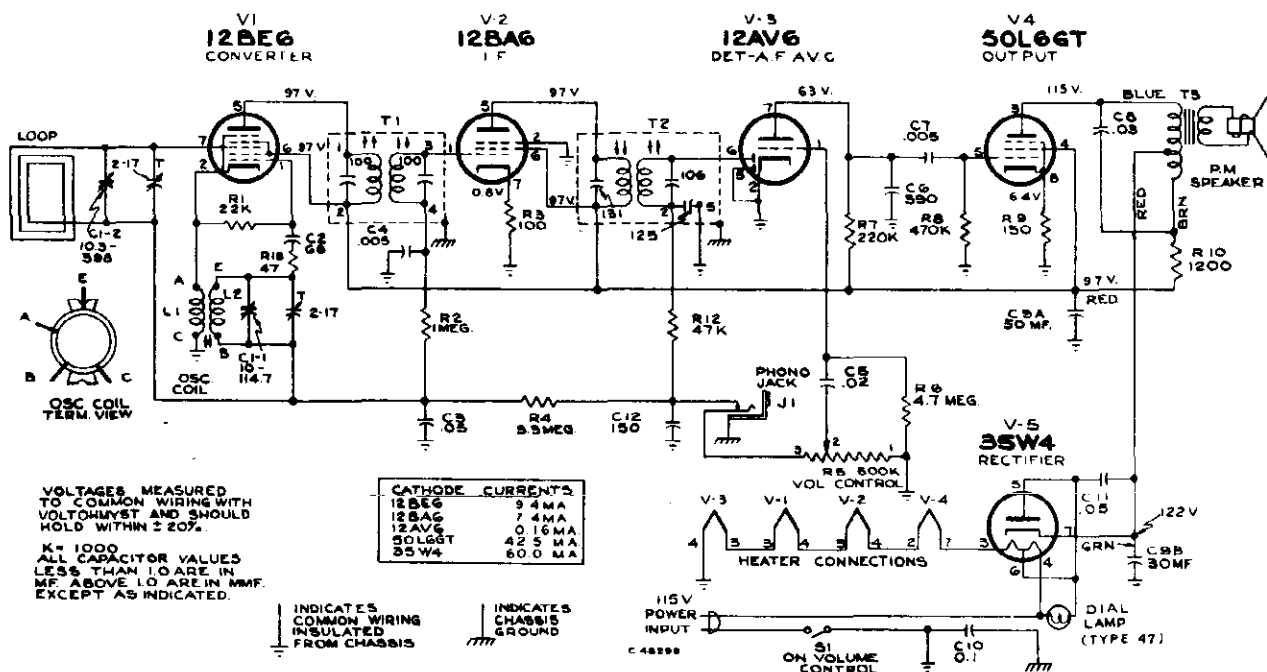
Insertion of the cable plug into the receptacle removes radio signal from the volume control. The record player cable must be removed from the receptacle to permit radio operation.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12BA6 1-F grid through .01 mfd. capacitor	455 kc	Quiet-point 1600 kc end of dial	T2 (top and bottom) 2nd I-F trans.
2	Stator of C1-2 through .01 mfd.			T1 (top and bottom) 1st I-F trans.
3		1620 kc	Min. cap.	osc. trimmer
4		1400 kc	1400 kc signal	ant. trimmer
5		600 kc	600 kc signal	L2 (osc.) Rock gang
6		Repeat steps 3, 4 and 5.		

POWER SUPPLY POLARITY.—For operation on d.c., the power plug must be inserted in the outlet for correct polarity. If the set does not function, reverse the plug. On a.c., reversal of the plug may reduce hum.

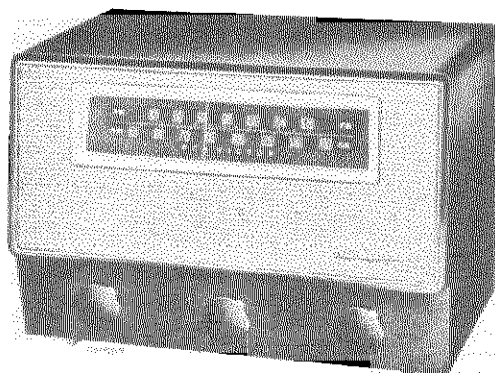


Tube and Trimmer Locations



Schematic Circuit Diagram

MODEL X711,
Ch. RC-1070A



Controls

Specifications

Tuning Ranges

Standard Broadcast (AM) 540-1,600 kc.
Frequency Modulation (FM) 88-108 mc.

Intermediate Frequencies AM—455 kc., FM—10.7 mc.

Tube Complement

(1) RCA 19J6 Mixer and Oscillator
(2) RCA 6BJ6 I. F. Amplifier
(3) RCA 12AU6 Driver
(4) RCA 12AL5 Ratio Detector
(5) RCA 6AQ6 AM Det.—A. F. Amp.
(6) RCA 35C5 Output
(7) RCA 35W4 Rectifier

Dial Lamp Type No. 47, 6-8 volts, 0.15 amp.

Loudspeaker

Type 92572-4W 5 inch P.M.
Voice coil impedance 3.2 ohms at 400 cycles

Tuning Drive Ratio 11½:1 (5¾ turns of knob)

Power Supply Rating

115 volts d.c. or 50 to 60 cycles a.c. 30 watts

Power Output

Maximum 1.65 watts
Undistorted 1.0 watt

Cabinet Dimensions

Height.....8¾ in. Width.....12⅞ in. Depth.....7⅞ in.

Power Supply:

This instrument will operate on 115 volts d.c. or 50 to 60 cycles a.c.

If the receiver does not operate on d.c., reverse the power cord. On a.c., reversal of the cord may reduce hum or improve FM reception.

Antennas:

These receivers have built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception.

Under average conditions these antennas will provide satisfactory reception—however provision is made for the use of an external antenna for FM reception if desired.

To use external FM antenna:

1. Remove the wire from under the No. 2 terminal screw of the antenna terminal board. The bare end of this wire should be taped to prevent contact with the antenna terminal screws.
2. Connect the transmission line from an external FM dipole antenna to the No. 1 and No. 2 terminals of the antenna terminal board.

To use built-in FM antenna:

1. The wire extending thru the back of the cabinet must be connected to No. 2 terminal of the antenna terminal board.
2. The power cord should be fully extended and must not be coiled or hanked up.
3. Reversal of the line cord plug may improve reception.

DO NOT USE EXTERNAL GROUND.

CAUTION:

THE CHASSIS IS CONNECTED TO ONE SIDE OF THE POWER SUPPLY. Use caution to prevent contact with pipes, radiators, etc., when servicing with chassis removed from cabinet.

Control Knobs:

DO NOT ATTEMPT TO REMOVE THE CONTROL KNOBS FROM THE CABINET. The knobs have spring retainers on the inside of the cabinet to prevent their removal. The retainers are accessible only after the chassis has been removed from the cabinet.

Removal of Chassis:

1. Remove the four screws at the corners of the back cover—pull back cover off carefully—the power cord plug and socket at the bottom right-hand corner will pull apart but the antenna leads remain connected.
2. Unhook the dial cord from the pointer.
3. Remove the four screws which hold the chassis to the cabinet (two at sides of chassis base and two on dial cord pulley brackets above the chassis base).
4. Pull the chassis to the rear—the knobs will be retained with the cabinet.

If removal of the chassis is not necessary when servicing, the back cover may be placed on the supports molded into the upper part of the cabinet.

MODEL X711, Ch. RC-1070A

Alignment Procedure

CORRECT ALIGNMENT OF THE FM BAND REQUIRES THAT THE AM BAND BE ALIGNED FIRST

Output Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Signal Generator:

For all alignment operations except as stated in the tabulation connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

CAUTION:

The chassis is connected to one side of the power supply. On a-c operation it is recommended that an isolation transformer (115 v./115 v.) be used for the receiver when servicing.

Oscilloscope Alignment:

The FM I. F. alignment may be checked using a sweep generator and an oscilloscope. Shunt terminals B and C of T3 with a 1,200 ohm resistor. Connect the high side of the oscilloscope to terminal C of T3 in series with a diode probe. Apply the output of the sweep generator (10.7 mc with ± 250 kc. sweep) to pin No. 1 of V2 (6BJ6) in series with .01 mf. Low side of the oscilloscope and sweep generator to chassis. This will show the response of T2.

To check the combined response of T1 and T2; connect the sweep generator to the antenna terminal board—high side to No. 2 terminal in series with 300 ohms and low side to No. 1 terminal. Oscilloscope connections as previously connected.

To check the ratio detector response; connect the high side of the oscilloscope direct to terminal No. 5 of S1-1 rear, low side to chassis, apply the output of the sweep generator to pin No. 1 of V3 (12AU6) in series with .01 mf. Driver plate circuit connected for normal operation (1200 ohm resistor removed). Note: It is difficult to observe marker signals in this step—center frequency and sweep width should be previously observed.

Alignment Indicator:

The dial and dial back plate are not attached to the chassis. During alignment a substitute frequency indication must be used. We suggest attaching a paper clip to the dial drive cord so that its movement may be measured—refer to the "Dial Scale" illustration on page 5.

CRITICAL LEAD DRESS

1. All connections in the mixer-oscillator circuit are extremely critical both in regard to lead length and lead dress. Do not disturb unless necessary—make careful notation before servicing if it becomes necessary to disturb this wiring.
2. The ground lead from pin No. 2 of V3 (12AU6 Driver) is critical in length and must be dressed down against chassis.
3. Dress audio coupling capacitor C23 away from output transformer.
4. Dress diode filter unit away from alignment hole in T-2.
5. Dress grid lead of V3 (pin 1 of 12AU6) against chassis apron.
6. Dress plate lead of V1 (pin No. 2 of 19J6) against chassis.
7. Dress loop antenna leads so as to prevent contact with external antenna terminal board.
8. All ground connections to chassis should be restored to the original places of connection if disturbed.
9. Dress capacitor C13 down close to range switch so as to clear the projection on the bottom of the cabinet.
10. The FM ant. and osc. coils must be cemented to the coil support to prevent microphonic howl on FM. Amphenol No. 912 cement is recommended for this purpose. Amphenol No. 916 solvent is recommended as solvent if it becomes necessary to loosen the windings.

AM Alignment

RANGE SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	AM ant. section (C3) of tuning cond. in series with .01 mfd.	455 kc.	Quiet point at low freq. end.	AM windings,† T2 bottom core (sec.), T2 top core (pri.).
2				AM windings,† T1 top core (sec.), T1 bottom core (pri.).
3	Short wire placed near loop antenna for radiated signal.	1620 kc.	Extreme high frequency end.	C12 osc.
4		1400 kc.	1400 kc.	C4 ant.
5		800 kc.	800 kc.	L4 osc. (Rock gang.)
6	Repeat Steps 3, 4 and 5.			

†Use alternate loading.

Alternate loading involves the use of a 10,000 ohm resistor to load the AM plate winding while the AM grid winding of the SAME TRANSFORMER is being peaked. Then the grid winding is loaded with the resistor while the plate winding is peaked. Only one winding is loaded at any one time. Remove the 10,000 ohm resistor after T2 and T1 have been aligned.

Oscillator frequency is above signal frequency on both AM and FM.

FM Alignment

RANGE SWITCH IN FM POSITION—VOLUME CONTROL MAXIMUM

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mfd. capacitor C32 and the common lead to chassis. Adjust sig. gen. output to provide approx.—3 v. indication during alignment.			
2	Pin 1 of 12AU6 in series with .01 mfd.	10.7 mc. modulated 30% 400 cycles AM.	Max. capacity (fully meshed).	T3 top core for max. d-c voltage across C32. T3 bottom core for min. audio output.*
3	No. 2 ant. term in series with a 300 ohm resistor. Connect low side to No. 1 terminal. (Remove ant. lead from No. 2 term.)			FM Windings,†† T2 top core (sec.). T2 bottom core (pri.).
4				FM Windings,†† T1 top core (sec.). T1 bottom core (pri.).
5				L1 osc.** C15 ant.
6		90 mc.	90 mc.	L5 ant.** (Rock gang.)
7	Repeat Steps 5 and 6 until further adjustment does not improve calibration.			

* Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

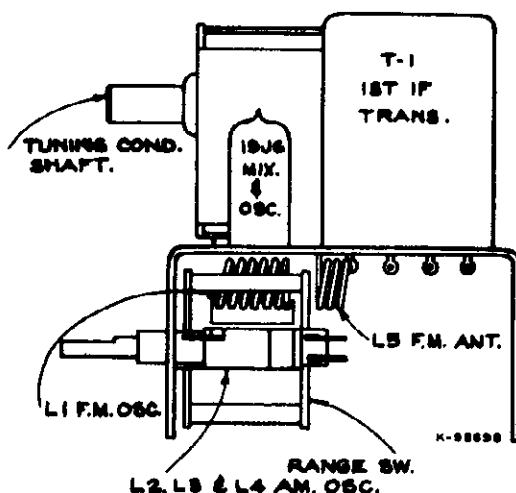
†† Align T2 and T1 by means of alternate loading as explained under AM alignment. Use a 680 ohm resistor instead of a 10,000 ohm resistor and load the FM windings.

** L1 and L5 are adjustable by increasing or decreasing the spacing between turns.

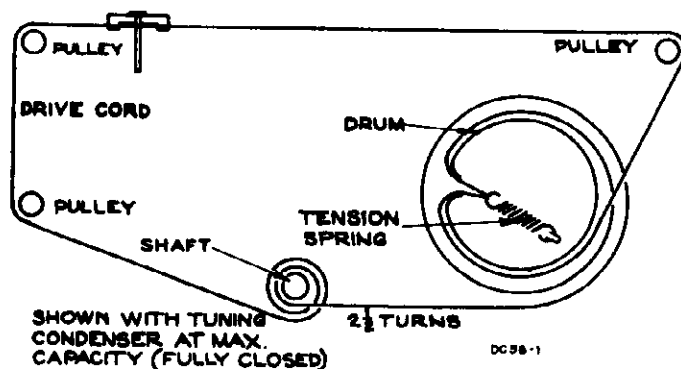


The dial scale drawing shown is a full size reproduction. It can be used as a reference in alignment procedure.



MODEL X711,
Ch. RC-1070A


Ant. and Osc. Coil Locations (Side View)



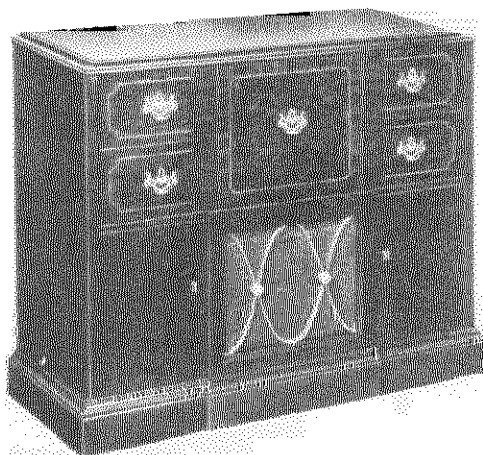
Dial Indicator and Drive Mechanism

Replacement Parts

Stock No.	DESCRIPTION	Stock No.	DESCRIPTION
CHASSIS ASSEMBLIES RC 1070A			
73973	Capacitor—Variable tuning capacitor (C3, C4, C7, C11, C12, C14 C15)		39,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R18, R27)
73966	Capacitor—Ceramic, 2 mmf. (C5)		680,000 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R14)
39044	Capacitor—Ceramic, 15 mmf. (C9)		820,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R20)
73967	Capacitor—Ceramic, 56 mmf. (C8)		1 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R10, R25)
73499	Capacitor—Ceramic, 56 mmf. (C25, C37)		2.2 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R4, R24)
75612	Capacitor—Ceramic, 68 mmf. (C6)		3.9 megohm, $\pm 10\%$, $\frac{1}{2}$ watt (R1)
39628	Capacitor—Mica, 100 mmf. (C20)		10 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R13)
44202	Capacitor—Ceramic, 150 mmf. (C13)		22 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R19)
75792	Capacitor—Ceramic, 330 mmf. (C10)	73978	Shaft—Tuning knob shaft
39640	Capacitor—Mica, 330 mmf. (C16, C27, C28)	74179	Socket—Tube socket, 7 pin, miniature for V1
71501	Capacitor—Ceramic, 1500 mmf. (C2)	73117	Socket—Tube socket, 7 pin, miniature for V2, V3, V4, V5, V6, V7
74009	Capacitor—Ceramic, dual 4000 mmf. (C19A, C19B, C24A, C24B, C34A, C34B)	75790	Socket—Phono input socket and terminal board assembly (J1)
73473	Capacitor—Ceramic, 5000 mmf. (C1, C18, C31)	74014	Socket—Dial lamp socket
73747	Capacitor—Electrolytic, 2 mfd, 50 volts (C32)	74038	Spring—Drive cord spring
73975	Capacitor—Electrolytic, comprising 1 section of 80 mfd, 150 volts, 1 section of 40 mfd, 150 volts and 1 section of 20 mfd, 25 volts (C35A, C35B, C35C)	73979	Support—Dial drive cord pulley support complete with two (2) pulleys—L. H.
73186	Capacitor—Tubular, paper, .001 mfd, 400 volts (C26)	73980	Support—Dial drive cord pulley support complete with pulley—R. H.
73750	Capacitor—Tubular, paper, .002 mfd, 200 volts (C29)	75789	Switch—Range switch (S1-1)
71926	Capacitor—Tubular, paper, .005 mfd, 200 volts (C22)	73745	Transformer—First I-F transformer—dual (T1)
71923	Capacitor—Tubular, paper, .01 mfd, 200 volts (C23, C36, C38)	73974	Transformer—Second I-F transformer—dual (T2)
74010	Capacitor—Tubular, paper, .02 mfd, 400 volts (C33)	73743	Transformer—Ratio detector transformer (T3)
73553	Capacitor—Tubular, paper, .05 mfd, 400 volts (C17, C30)	78976	Transformer—Output transformer (T4)
73551	Capacitor—Tubular, paper, .01 mfd, 400 volts (C21)	33726	Washer—"C" washer for tuning knob shaft
73744	Coil—Oscillator coil—A-M (L2, L3, L4)	75791	Washer—Insulating washer (shoulder type) for mounting phono input socket and terminal board assembly (2 req'd)
74012	Coil—Oscillator coil—F-M (L1)	73332	Washer—Insulating washer (flat) for mounting phono input socket and terminal board assembly (2 req'd)
74013	Coil—Antenna coil—F-M (L5)	SPEAKER ASSEMBLIES 92572-4	
	Coil—Line choke coil (#18 gauge solid wire, $\frac{1}{32}$ " plastic insulation, standard hook-up wire, 10 turns, close wind) (L6, L7)	73900	Speaker—5" speaker complete with cone and voice coil
73981	Connector—2 contact male connector for power input	MISCELLANEOUS	
38406	Control—Volume control and power switch (R9, S2)	75793	Back—Cabinet back complete with power cord, connector and loop
†72953	Cord—Drive cord (approx. 50" overall length required)	75797	Bezel—Cabinet bezel and grille cloth assembly less "RCA Victor" emblem
74011	Filter—Diode filter comprising 2 sections of 200 mmf. and 1 section of 47,000 ohms (DF-1)	Y2275	Cabinet—Maroon plastic cabinet
72283	Grommet—Rubber grommet for mounting tuning capacitor (4 req'd)	75795	Dial—Polystyrene dial scale
	Resistors—Fixed, composition:—	74782	Emblem—"RCA Victor" emblem
	82 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R5)	75794	Knob—Range switch knob—maroon
	100 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R15)	75885	Knob—Tuning control or volume control knob—maroon
	100 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R3)	31480	Lamp—Dial lamp—Mazda #47
	180 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R21)	72765	Nut—Speed nut for mounting dial
	330 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R11)	73989	Plate—Dial back plate
	680 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R6, R12)	73991	Pointer—Station selector pointer
	1000 ohms, $\pm 10\%$, 1 watt (R22)	73992	Retainer—Knob retainer (knob to cabinet)
	1200 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R16)	14270	Spring—Retaining spring for knobs (knob to shaft)
	3300 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R17)		
	18,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R2, R7, R8, R28)		
	39,000 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R23)		

† Stock No. 72953 is a reel containing 250 feet of cord.

MODEL 9W106,
Ch. RC-622



Antennas

This receiver has built-in antenna for standard broadcast (AM) and frequency modulation (FM) reception.

Provision is made for the use of an external antenna for FM reception if desired. To use external FM antenna — remove the built-in FM antenna lead from the "FM" terminals of the antenna terminal board. Connect the transmission line of an external FM dipole antenna to these two "FM" terminals.

FOR RECORD CHANGER SERVICE INFORMATION REFER TO RP-168 SERIES SERVICE DATA AND RP-178 SERIES SERVICE DATA.

Tuning Range

Standard Broadcast (AM) 540-1,600 kc.
Frequency Modulation (FM)..... 88-108 mc.
Intermediate Frequencies..... AM—455 kc., FM—10.7 mc.

Tube Complement

(1) RCA 6BJ6..... R-F Amplifier
(2) RCA 6J6..... Mixer and Oscillator
(3) RCA 6BA6..... I-F Amplifier
(4) RCA 6AU6..... Driver
(5) RCA 6AL5..... Ratio Detector
(6) RCA 6AV6..... AM Det.—AVC—A-F Amplifier
(7) RCA 6AV6..... Ph. Inv.
(8) RCA 6V6GT..... Output
(9) RCA 6V6GT..... Output
(10) RCA 6X5GT..... Rectifier

Dial Lamps (2)..... Type No. 51, 6-8 volts, 0.2 amp.
Jewel Lamp..... Type No. 51, 6-8 volts, 0.2 amp.

Tuning Drive Ratio..... 18:1 (9 turns of knob)

Power Supply Rating..... 115 volts, 60 cycles, 90 watts

Loudspeaker (92569-SW)

Size and type..... 12 in. PM
Voice coil impedance..... 3.2 ohms at 400 cycles

Power Output

(Radio) Undistorted 5 watts..... Maximum 6.4 watts
(Phono.) Undistorted 8 watts..... Maximum 9 watts

Cabinet Dimensions

Height 31½ in. Width 39½ in. Depth 17½ in.

Record Changer (RP-168)

Turntable speed..... 45 r.p.m.
Record capacity..... Up to 10 fine groove records
Pickup..... Crystal (medium output)

Record Changer (RP-178)

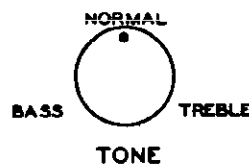
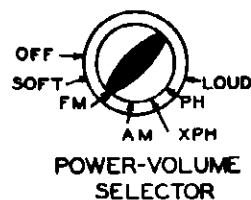
Turntable speed..... 78 r.p.m.
Record capacity..... Twelve 10-in. or ten 12-in.
Pickup..... Crystal (standard output)

Circuit Description

This instrument has a ten-tube (including rectifier) chassis which is very similar to those used in other RCA Victor radio-phonograph combinations designed for AM-FM reception.

The selector switch has five functions:

- (1) Selection of tuning range.
- (2) Selection and distribution of a.v.c. voltages.
- (3) Application of B+ voltage to tubes V1, V2, V3 and V4.
- (4) Selection of audio input applied to the volume control.
- (5) Application of a.c. power to the record changer motors.



ME-236

Operating Controls

MODEL 9W106
Ch. RC-022**CRITICAL LEAD DRESS**

Model 9W106 — RC022

Note: The leads listed may not be critical in all receivers. However, by dressing the leads as specified, unusual difficulties will be minimized.

1. The plate lead of the second IF transformer should be dressed down against the chassis to obtain max. capacity between the lead and chassis. This lead is specified to be two inches long.
2. The "A" band RF transformer plate, and grid leads should be dressed so as to minimize coupling to the RF amplifier grid circuit, and kept close to chassis when possible.
3. The 2.2 meg. grid resistors connecting to the RF and mixer grids should have a minimum practicable amount of lead extending on the grid end. The leads should be cut off short on the grid end and long on the A.V.C. end.
4. The unshielded plate lead from the function switch to the 1st IF transformer should be dressed away from the switch wafers audio lugs as much as possible.
5. The ground strap between the RF shelf and chassis should be well soldered and kept as short as practicable. FM instability may be caused by having this ground strap too long, particularly when no input is connected to the FM antenna terminal.
6. The lead from the 2nd IF to the grid of the 6BA6 1st IF amplifier should be kept short, and dressed against the chassis as much as practicable.
7. The lead from the 2nd IF to the AM detector diode should be dressed to minimize coupling to the 6AV6 1st AF grid and kept close to chassis.
8. Leads from the volume control taps should be kept clear of all filament and output plate wires as in the wiring sample.
9. The loop cable when connected to the AM sec. gang stator should be dressed to have minimum capacity coupling to the stator lug on the RF section of gang condenser.
10. The oscillator coupling condenser C10 should be dressed to have minimum capacity to the mixer grid, Pin No. 5 on V2.
11. The shielding on the shielded lead from the volume control to the function switch should have the minimum practicable exposed wire at the function switch end.

Alignment Procedure

CORRECT ALIGNMENT OF THE FM BAND REQUIRES THAT THE AM BAND BE ALIGNED FIRST

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Signal Generator:

For all alignment operations connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

Oscilloscope Alignment:

The FM I-F alignment may be checked using a sweep generator and an oscilloscope. Shunt terminals B and C of T4 with a 1200 ohm resistor. Connect the high side of an oscilloscope to terminal C of T4 in series with a diode probe. Apply the output of the sweep generator (10.7 mc. with ± 250 kc. sweep) to pin No. 1 of V3 (6BA6) in series with .01 mf. Low side of the oscilloscope and sweep generator to chassis. This will show the response of T3.

To check the combined response of T2 and T3: connect the sweep generator to the FM antenna terminals (remove FM antenna lead) in series with 300 ohms. Note: One FM terminal is grounded—it may be necessary to reverse the sweep generator connections. Oscilloscope connections remain as connected.

To check the ratio detector response: connect the high side of the oscilloscope direct to terminal No. 9 of S1, low side to

chassis. Apply the output of the sweep generator to pin No. 1 of V4 (6AU6) in series with .01 mf. Driver plate circuit connected for normal operation (1200 ohm resistor removed). Note: It is difficult to observe marker signals in this step—center frequency and sweep width should be previously observed.

AM Alignment**RANGE SWITCH IN BC POSITION**

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 5 of V2 in series with .01 mfd.	455 kc.	Quiet point at low freq. end.	AM windings.† T3 bottom core (sec.). T3 top core (pri.).
2				AM windings.† T2 top core (sec.). T2 bottom core (pri.).
3	Short wire placed near loop for radiated signal	1400 kc.	1400 kc.	C1-2T (osc.). C1-3T (ant.). C1-4T (rf.).
4		600 kc.	600 kc.	L8 (osc.) with 10,000 ohms resistor from RF stator to gnd. (rocking gang)
5				L5 (RF) with the 10,000 ohms removed.
6	Repeat steps 3, 4 and 5 until no improvement in sensitivity is obtained.			

† Use alternate loading.

Alternate loading involves the use of a 47,000 ohm resistor to load the AM plate winding while the AM grid winding of the SAME TRANSFORMER is being peaked. Then the grid winding is loaded with the resistor while the plate winding is peaked. Only one winding is loaded at any one time. Remove the 47,000 ohm resistor after T3 and T2 have been aligned.

Oscillator frequency is above signal frequency on both AM and FM.

FM Alignment**RANGE SWITCH IN FM POSITION—VOLUME
CONTROL MAXIMUM**

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mid. capacitor C42 and the common lead to chassis. Turn gang condenser to max. capacity (fully meshed). Volume Control max.			
2	Pin 1 of V4 6AU6 in series with 470 ohm resistor.	10.7 mc. modulated 30% 400 cycles AM (Approx. .05 volt).	Max. capacity (fully meshed).	T4 top core for max. d-c voltage across C42. T4 bottom core for min. audio output.*
3		10.7 mc. Adjust to provide about 4 volts indication on VoltOhmyst during alignment.		FM windings.†† T3 top core (sec.). T3 bottom core (pri.).
4				FM windings.†† T2 top core (sec.). T2 bottom core (pri.).
5	High and low side of signal gen. through two 120 ohm resistors. To ant. terminals.	90 mc.	90 mc.‡	L9 (osc.).**
6		105 mc.	105 mc.	C1-6T (ant.). C1-3T (rf.).
7		90 mc.	90 mc.	L1 (ant.).** L3 (rf.).**
8	Repeat steps 6 and 7 until no improvement in sensitivity is obtained.			

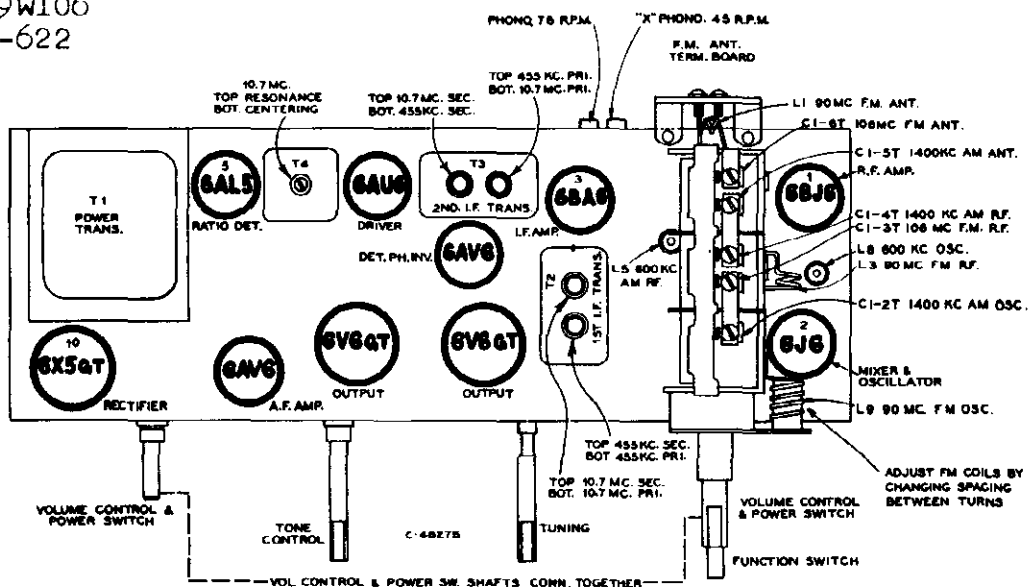
* Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

†† Align T3 and T2 by means of alternate loading as explained under AM alignment. Use a 680 ohm resistor instead of a 47,000 ohm resistor and load the FM windings.

** L1, L3 and L9 are adjustable by increasing or decreasing the spacing between turns.

‡ After dial pointer has been set accurately on calibration point for "A" band (see dial indicator and drive drawing) tune receiver to 90 mc. on FM using dial scale as reference or use dial scale drawing on page 8.

MODEL 9W106
Ch. RC-622

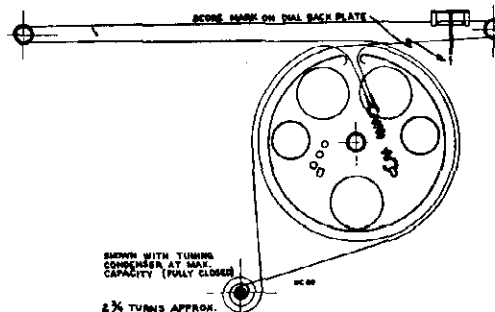


Tube and Trimmer Locations

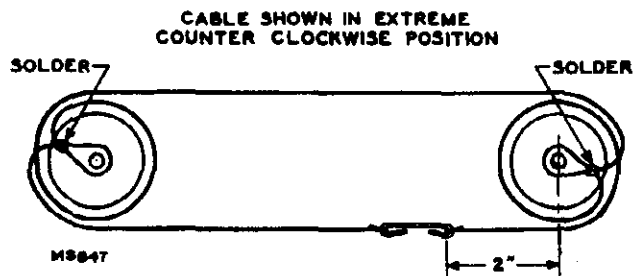
Socket Voltages

Voltages measured with Chanalyst or VoltOhmyst and should hold within $\pm 20\%$ with rated line voltage. Tuning condenser closed—no signal input.

Tube	Terminal	Voltage		
		Phono	A.M.	F.M.
V1 6BJ6 R.F. Amp.	Plate 5	—	185	110
	Screen 6	—	120	100
	Cathode 2	—	0.8	0.8
	Grid 1	-0.9	-0.0	-0.6
V2 6J6 Mixer and Osc.	Plate 1	—	73	80
	Grid 6	-1.07	-2	-3.4
	Plate 2	—	56	58
	Grid 5	-0.54	-5.4	-3.6
V3 6BA8 L.F. Amp.	Plate 5	—	180	178
	Screen 6	—	115	111
	Cathode 7	—	0.9	0.9
	Grid 1	-0.95	-1.1	-0.75
V4 6AU6 Driver	Plate 5	—	174	175
	Screen 6	—	126	175
	Cathode 7	—	0.9	0.9
V5 6AL5 Ratio Det.	—	—	—	—
V6 6AV6 A.F. Amp.	Plate 7	97	85	80
	Grid 1	-72	-75	-0.75
V7 6AV6 Inverter	Plate 7	140	110	110
	Grid 1	-18.7	-17.8	-17.3
	Cathode 2	-18	-17	-16.6
V8 6V6GT Output	Plate 3	262	270	270
	Screen 4	262	190	190
	Grid 5	-18	-17	-16
V9 6V6GT Output	Plate 3	262	270	270
	Screen 4	262	190	190
	Grid 5	-18	-17	-16
V10 6X5GT Rectifier	Cathode 8	271	275	275



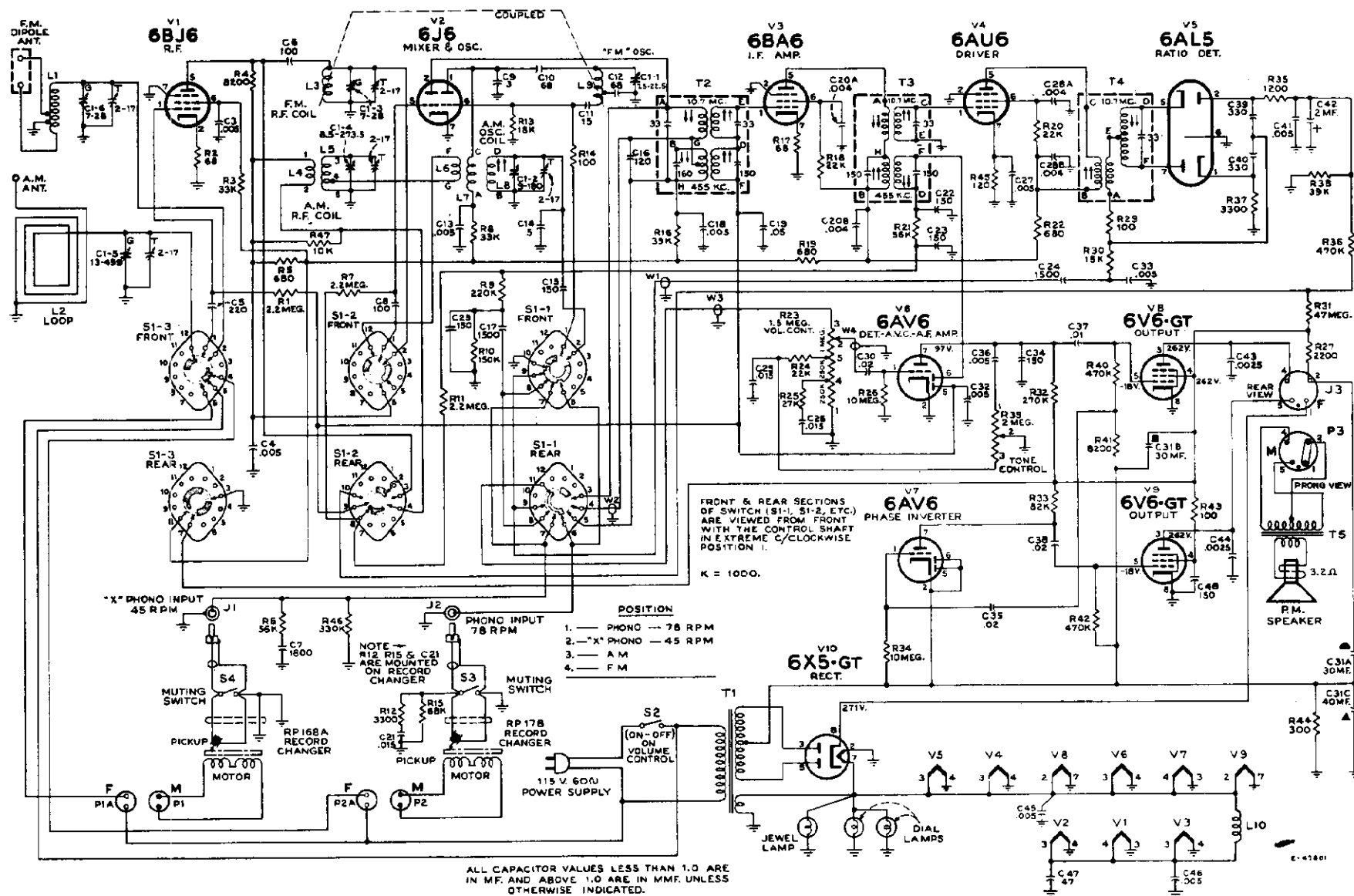
Dial Indicator and Drive Mechanism



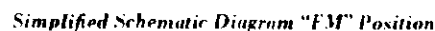
Volume Control Drive Mechanism

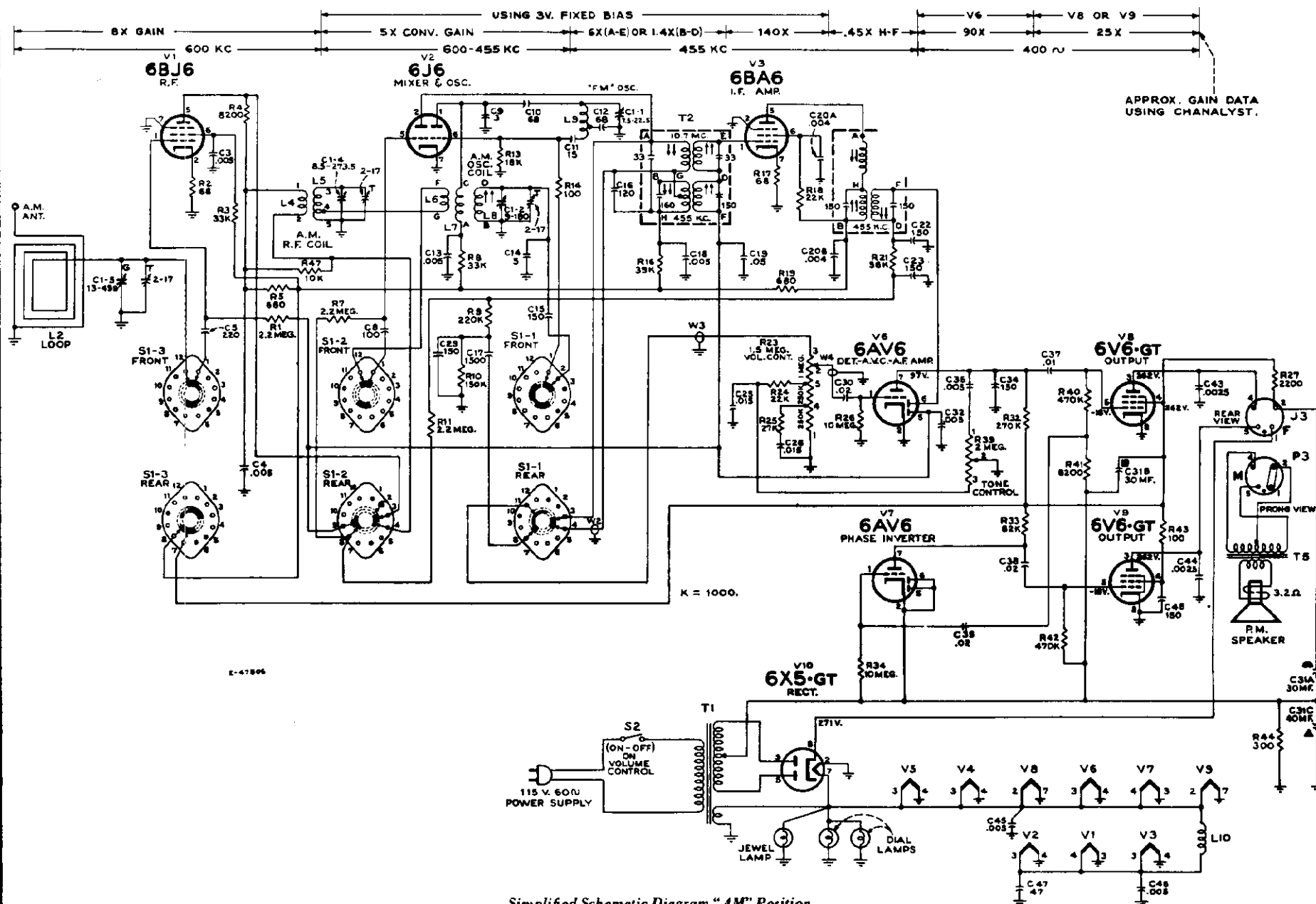
Cathode Currents (MA)

Tube	Terminal	Phono	A.M.	F.M.
V1 6BJ6	2	—	11.1	11.4
V2 6J6	7	—	6.8	8.6
V3 6BA8	7	—	13.1	13.7
V4 6AU6	7	—	8.2	8.1
V5 6AL5	1 & 5	—	—	—
V6 6AV6	2	0.68	.44	.43
V7 6AV6	2	1.7	1.4	1.35
V8 6V6GT	8	33	11.2	11
V9 6V6GT	8	33	11	11
V10 6X5GT	8	66	63	63



Complete Schematic Diagram

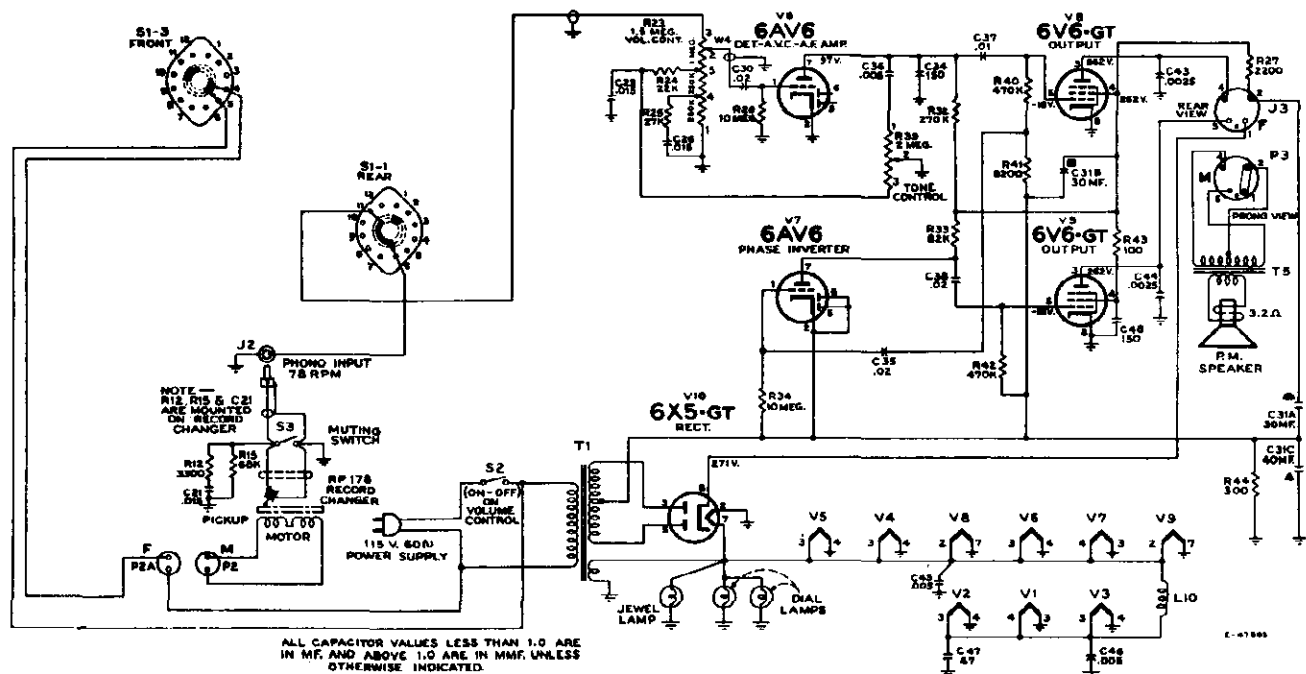




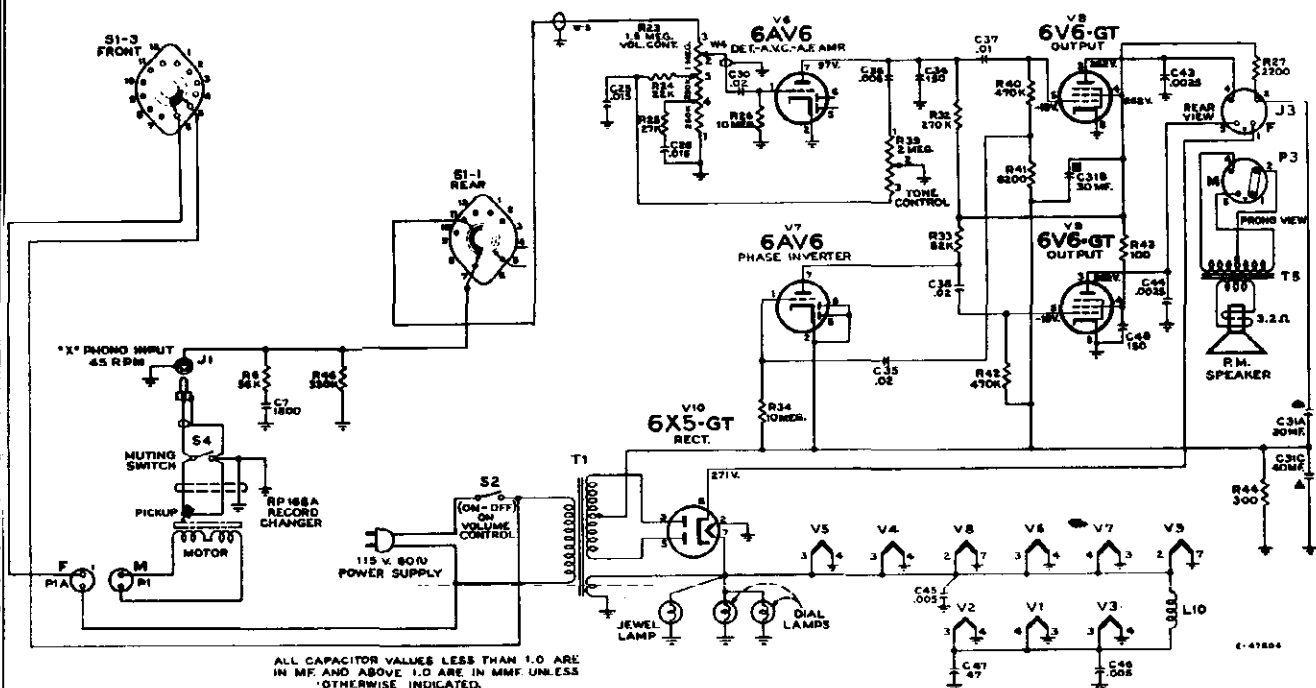
Simplified Schematic Diagram "AM" Position

MODEL 9W106,
Ch. RC-622

RECORD CHANGER: Model RP-178, on Pages RCD.CH.18-1
through RCD.CH.18-13.



Simplified Schematic Diagram of 78 RPM Phonograph



Simplified Schematic Diagram of 45 RPM Phonograph

RECORD CHANGER: Model RP-168, on Pages RCD.CH.19-1
through RCD.CH.19-8.

MODEL 9W106,
Ch. RC-622

SHIPPING SCREWS

The radio chassis of these instruments is secured to the cabinet with shipping screws (painted red) which, together with spacing strips, should be REMOVED at the time of installation.

The record changers are each mounted with three screws which should be LOOSENED at the time of installation.

On the RP-168A-1 record changer decorative caps cover the mounting screws. Unscrew the caps for access to the screws.

RP-168 RECORD CHANGER

Pickup Landing Adjustment "A"

The pickup point should land half-way between the outer edge of the record and the first music groove.

If the pickup lands inside the starting grooves turn screw "A" slightly clockwise. If pickup lands outside the starting grooves—turn screw "A" slightly counterclockwise.

Pickup Height Adjustment "B"

During cycle the pickup arm must rise high enough to clear a stack of eight records on the turntable, but not high enough to cause the top of the arm to touch records resting on the record supports.

If pickup does not clear a stack of eight records—turn screw "B" slightly clockwise. If pickup arm touches records on record supports—turn screw "B" slightly counterclockwise.

Record Separators

During service work the position of the star wheel on the underside of the record changer may be accidentally shifted; this may cause the record separator knives to be extended when in the out of cycle position.

If the separator knives are thus extended—turn the power on so that the turntable is revolving, gently press fingers against the extended knives until they disappear inside the center post—DO THIS ONLY WHILE MECHANISM IS OUT OF CYCLE.

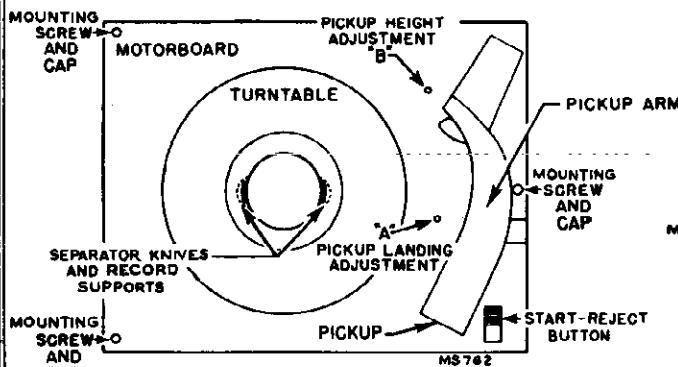
CARE OF SAPPHIRE

The sapphire point on the pickup is protected with a permanent metal guard. Lint may collect to clog the opening in the guard at the sapphire point and cause poor record reproduction. Occasional cleaning may be necessary; brush carefully with a small soft brush.

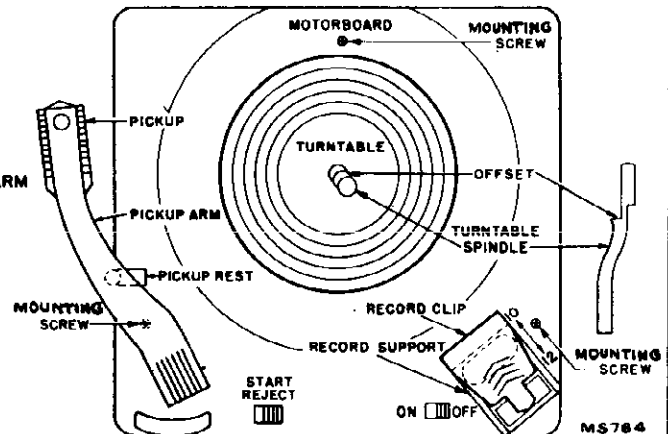
AM	FM
55	88
60	90
70	92
80	96
100	100
120	104
140	107
160	108

RCA VICTOR

Dial Scale (Actual Size)

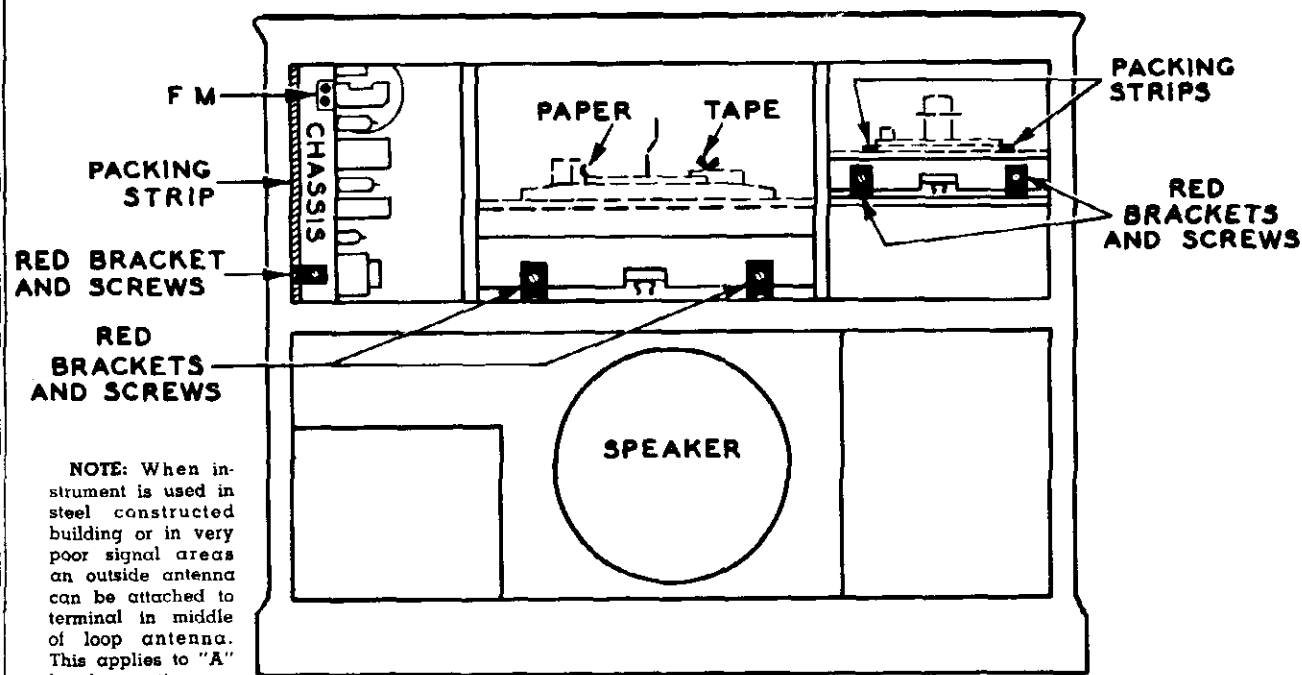


Top View—RP-168 Record Changer



Top View—RP-178 Record Changer

MODEL 9W106,
Ch. RC-622



Rear View Showing Location of Various Units

MS-839

REPLACEMENT PARTS

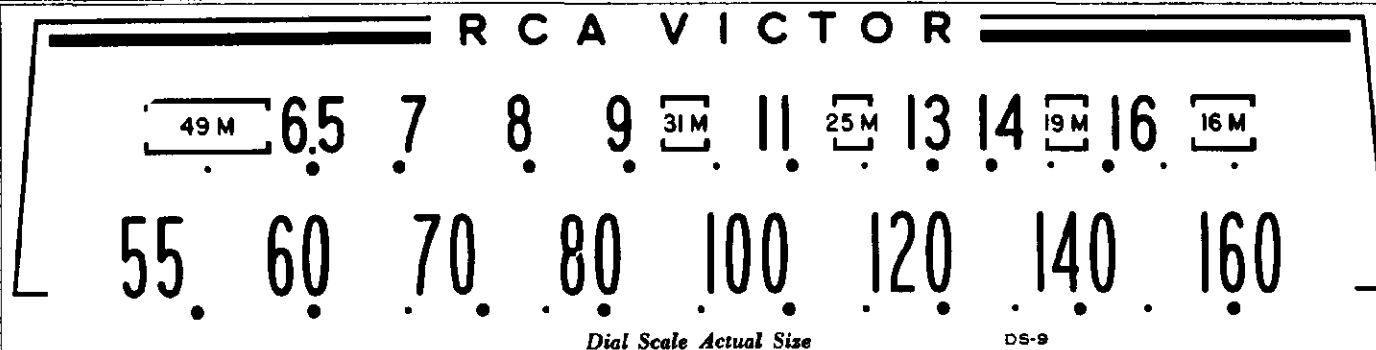
STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 622		
*74848	Board—"F.M." terminal board	*74841	Coil—R.F. coil—A.M.—complete with adjustable core and stud (L4, L5)
*74641	Cable—Flexible cable to operate volume control	*74815	Coil—R.F. coil—F.M. (L3)
*74849	Capacitor—Variable tuning capacitor (C1-1, 1-2, 1-3, 1-4, 1-5, 1-6)	*74816	Coil—Antenna coil—F.M. (L1)
73747	Capacitor—Electrolytic, 2 mmf., 50 volts (C42)	*73817	Coil—Oscillator coil—F.M. (L9)
*74733	Capacitor—Ceramic, 3 mmf. (C9)	71942	Coil—Filament choke coil (L10)
93056	Capacitor—Ceramic, 5 mmf. (C14)	5040	Connector—4 contact female connector for speaker cable (P3)
39044	Capacitor—Ceramic, 15 mmf. (C11)	30868	Connector—2 contact female connector for motor cables (P2A)
39042	Capacitor—Ceramic, 47 mmf. (C47)	*74837	Control—Tone control (R39)
33379	Capacitor—Ceramic, 68 mmf. (C10, C12)	74639	Control—Volume control and power switch (R23, S2)
39396	Capacitor—Ceramic, 100 mmf. (C6, C8)	72953	Cord—Drive cord (approx. 58" overall length)
71614	Capacitor—Ceramic, 120 mmf. (C16)	*74839	Fastener—Push fastener to hold R.F. shelf assembly (4 required)
44704	Capacitor—Ceramic, 150 mmf. (C15, C22, C23, C34, C48)	*74838	Grommet—Power cord strain relief grommet (1 set)
48125	Capacitor—Ceramic, 150 mmf. (C29)	16058	Grommet—Rubber grommet for mounting R.F. shelf assembly (4 required)
71920	Capacitor—Ceramic, 220 mmf. (C5)	72069	Grommet—Rubber grommet for rear mounting feet (2 required)
39640	Capacitor—Mica, 330 mmf. (C39, C40)	*73895	Indicator—Station selector indicator
74093	Capacitor—Ceramic, 1,500 mmf. (C17, C24)	74645	Nut—8-32 hex retainer nut between R.F. shelf and volume control knob
*74850	Capacitor—Ceramic, 1,800 mmf. (C7)	74297	Plate—Dial back plate complete with two (2) drive cord pulleys less dial
74009	Capacitor—Ceramic, dual, 4,000 mmf. (C20A, C20B, C28A, C28B)	18469	Plate—Bakelite mounting plate for electrolytic
73473	Capacitor—Ceramic, 5,000 mmf. (C3, C4, C13, C18, C32, C46)	74640	Pulley—Pulley and hub assembly for volume control
72052	Capacitor—Electrolytic, comprising 1 section of 30 mfd, 450 volts, 1 section of 30 mfd, 350 volts and 1 section of 40 mfd, 25 volts (C31A, C31B, C31C)	33514	Receptacle—Phono input receptacle
71926	Capacitor—Tubular, paper, .005 mfd, 200 volts (C27, C33, C41, C45)	73637	Resistor—Wire wound, 2,200 ohms, 5 watt (R27)
71553	Capacitor—Tubular, paper, .005 mfd, 400 volts (C36)		Resistor—Fixed, composition:
70644	Capacitor—Tubular, paper, .0025 mfd, 1,000 volts (C43, C44)		66 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R2, R17)
71925	Capacitor—Tubular, paper, .01 mfd, 400 volts (C37)		100 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R29)
71928	Capacitor—Tubular, paper, .02 mfd, 200 volts (C30, C35)		100 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R14, R43)
73638	Capacitor—Tubular, paper, .02 mfd, 400 volts (C38)		120 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R45)
73553	Capacitor—Tubular, paper, .05 mfd, 400 volts (C19)		300 ohms, $\pm 5\%$, 2 watt (R44)
72120	Capacitor—Tubular, paper, .015 mfd, 200 volts (C25, C26)		680 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R19)
73744	Coil—Oscillator coil—A.M. (L6, L7, L8)		680 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R5, R22)
			1,200 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R35)
			3,300 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R37)
			8,200 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R41)
			8,200 ohms, $\pm 10\%$, 1 watt (R4)
			10,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R47)

REPLACEMENT PARTS — Continued

MODEL 9W106,
Ch. RC-622

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
	15,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R30)	11889	Grommet—Rubber grommet for front apron of chassis (2 required)
	18,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R13)	72856	Grommet—Rubber grommet to mount 78 RPM changer (3 required)
	22,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R18, R20, R24)	74838	Grommet—Strain relief grommet (1 set)
	27,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R25)	36610	Hinge—Door hinge (1 set) for radio compartment door or R.H. record storage compartment door
	33,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3, R8)	36817	Hinge—L.H. record storage compartment door hinge (1 set)
	39,000 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R38)	71821	Knob—Tuning control knob—maroon—for mahogany or walnut instruments
	39,000 ohms, $\pm 10\%$, 1 watt (R16)	72824	Knob—Tuning control knob—brown—for blonde instruments
	56,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R6, R21)	71822	Knob—Tone control knob—maroon—for mahogany or walnut instruments
	82,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R33)	72824	Knob—Tone control knob—brown—for blonde instruments
	150,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R10)	73994	Knob—Volume control knob—maroon—for mahogany or walnut instruments
	220,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R9)	73995	Knob—Volume control knob—brown—for blonde instruments
	270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R32)	73230	Knob—Selector switch knob—maroon—for mahogany or walnut instruments
	330,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R46)	73231	Knob—Selector switch knob—brown—for blonde instruments
	470,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R36, R40, R42)	11765	Lamp—Dial or pilot lamp—Mazda 51
	2.2 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R1, R7, R11)	*74843	Loop—Antenna loop complete (L2)
	10 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R26, R34)	73109	Nut—Tee nut to mount 78 RPM changer (3 required)
	47 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R31)	74208	Nut—Tee nut to mount 45 RPM changer (3 required)
73894	Shaft—Tuning knob shaft	*74852	Pull—Door pull for record changer drawers or radio compartment door (5 required)
73584	Shield—Tube shield for V1	74451	Pull—Door pull for record storage compartment doors (2 required)
74646	Sleeve—Sleeve and pulley assembly for volume control knob		Resistor—Fixed, composition:
74179	Socket—Tube socket, 7 pin, miniature for V1, V2, V3, V4		3,300 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R12)
73117	Socket—Tube socket, 7 pin, miniature for V5, V6, V7	73110	Screw—No. $\frac{1}{4}$ -20 x $1\frac{1}{4}$ " fillister head screw to mount 78 RPM changer (3 required)
31251	Socket—Tube socket, octal, wafer for V8, V9, V10	74582	Screw—No. 8-32 x $1\frac{1}{4}$ " special head screw to mount 45 RPM changer (3 required)
31364	Socket—Lamp socket	74269	Screw—No. 8-32 x $\frac{3}{4}$ " trimit head screw for door pull No. 74852
74038	Spring—Drive cord spring	74279	Screw—No. 8-32 x $\frac{3}{8}$ " trimit head screw for door pull No. 74451
*74847	Support—Polystyrene support for F.M. oscillator coil complete with mounting bracket	74835	Slide—Slide mechanism for 45 RPM changer drawer
*74840	Switch—Selector switch (S1)	74736	Slide—Slide mechanism for 78 RPM changer drawer
73743	Transformer—Ratio detector transformer (T4)	30900	Spring—Retaining spring for knobs No. 71821, 71822 and 72824
73745	Transformer—First I.F. transformer—dual (T2)	72845	Spring—Retaining spring for knobs No. 73994 and 73995
74019	Transformer—Second I.F. transformer—dual (T3)	14270	Spring—Retaining spring for knobs No. 73230 and 73231
73601	Transformer—Power transformer—117 volt, 60 cycle (T1)	74421	Spring—Conical spring to mount 45 RPM changer—upper—R.H. (1 required)
33726	Washer—"C" washer for tuning shaft	74222	Spring—Conical spring to mount 45 RPM changer—upper—L.H. (2 required)
	SPEAKER ASSEMBLY	74423	Spring—Conical spring to mount 45 RPM changer—lower (3 required)
	92569-6W	72936	Stop—Door stop for record storage compartment doors (2 required)
13867	Cap—Dust cap	X3048	Doors—Set of doors (2) for Model "X" changer compartment and radio compartment for Model 9W106—mahogany
73934	Cone—Cone and voice coil assembly	X3049	Doors—Set of doors (2) for Model "X" changer compartment and radio compartment for Model 9W106—walnut
5039	Connector—4 contact male connector for speaker	X3050	Doors—Set of doors (2) for Model "X" changer compartment and radio compartment for Model 9W106—toasted mahogany
74753	Speaker—12" P.M. (6.8 oz.) speaker complete with cone and voice coil (3.2 ohm), less output transformer and plug	X3054	Doors—Set of doors (2) for record storage compartment for Model 9W106—mahogany
71145	Suspension—Metal cone suspension	X3055	Doors—Set of doors (2) for record storage compartment for Model 9W106—walnut
73636	Transformer—Output transformer	X3056	Doors—Set of doors (2) for record storage compartment for Model 9W106—toasted mahogany
	NOTE: If stamping in instruments does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.	X3051	Panel—Center drawer panel for Model 9W106—mahogany
	MISCELLANEOUS	X3052	Panel—Center drawer panel for Model 9W106—walnut
*74844	Antenna—F.M. antenna	X3053	Panel—Center drawer panel for Model 9W106—toasted mahogany
74205	Bezel—Dial scale bezel less dial		
71599	Bracket—Pilot lamp bracket		
74296	Cable—Shielded pickup cable complete with pin plug		
13103	Cap—Pilot lamp jewel		
72120	Capacitor—Tubular, .015 mfd (C21)		
71892	Catch—Bullet catch and strike for cabinet doors (3 required)		
73897	Clamp—Dial clamp (2 required)		
X3057	Cloth—Grille cloth for mahogany or walnut instruments		
X1649	Cloth—Grille cloth for blonde instruments		
30870	Connector—2 contact female connector for motor cables		
30868	Connector—2 contact male connector for motor cables		
74581	Cover—Mounting screw cover (plug-in type) for 45 RPM changer (3 required)		
*74853	Decal—Control panel decal for mahogany or walnut instruments		
*74854	Decal—Control panel decal for blonde instruments		
74273	Decal—Trade mark decal (Victrola)		
71984	Decal—Trade mark decal (RCA Victor)		
*74842	Dial—Glass dial scale		
*74851	Grille—Metal grille		

MODELS 9X651, Ch. RC-1085; 9X652, Ch. RC-1085A



Alignment Procedure

Test Oscillator.—Connect high side of test oscillator as shown in chart. Connect low side to chassis. Keep the output low to avoid A.V.C. action.

Note.—If the test oscillator is A.C. operated it may be necessary to use an isolation transformer (115v./115 v.) for the receiver during alignment, and the low side of the test oscillator connected to common wiring. Reverse line plug if hum is excessive.

Output Meter.—Connect meter across speaker voice coil. Turn volume control to maximum.

Dial Pointer Adjustment.—Rotate tuning condenser to maximum capacity position (plates fully meshed). Adjust dial to position indicated in drawing.

With the dial adjusted as described above mark the dial pan assembly with a pencil to provide a tuning indicator during alignment.

Specifications

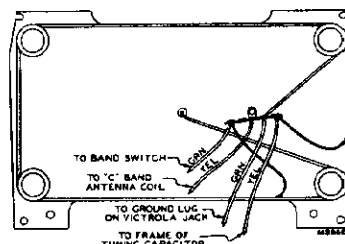
Tuning Ranges

Standard Broadcast ("A" Band)... 540-1600 kc
Short Wave ("C" Band)..... 5.9-17.9 mc

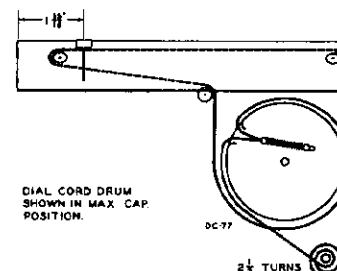
Intermediate Frequency..... 455 kc

Tube Complement

- (1) RCA 12BA6 R. F. Amplifier
- (2) RCA 12BE6 Converter
- (3) RCA 12BA6 I. F. Amplifier
- (4) RCA 12SQ7 Det. - A.F. - A.V.C.
- (5) RCA 35L6GT Output



Loop Antenna



Dial Drive Mechanism

Cathode Currents

	"A" Band	"C" Band
(1) 12BA6	9.7 ma	9.6 ma
(2) 12BE6	7.8 ma	8.1 ma
(3) 12BA6	8.7 ma	8.4 ma
(4) 12SQ7	0.15 ma	0.15 ma
(5) 35LL	37 ma	37 ma
(6) 35Z5	65 ma	65 ma

(6) RCA 35Z5 Rectifier

Dial Lamp Type 51, 6.3 volts, 0.25 amp.

Power Supply Rating

115 volts, D.C. or 50 to 60 cycles, A.C..... 35 watts

Loudspeaker

Type 92572-4 5 in. P.M.
V. C. Impedance..... 3.2 ohms at 400 cycles

Power Output

Undistorted 0.8 watts
Maximum 1.2 watts

Tuning Drive Ratio 11:1 (5½ turns of knob)

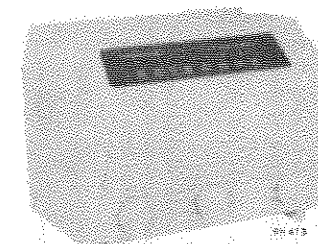
NOTE: If reception is not obtained on DC, reverse plug in outlet receptacle. This may also reduce hum on AC operation.

To Remove Chassis from Cabinet

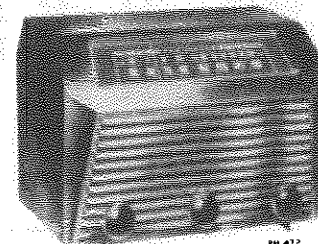
1. Remove knobs (just pull).
2. Remove four screws holding back.
3. Remove two screws in both ends of rear apron and slide chassis out.

Critical Lead Dress

1. Dress all heater leads and pilot lights leads down to chassis and away from all audio grid and plate wiring.
2. Dress lead from ant. section of gang to pin 1 of V1 direct and as short as possible but position for low capacity to chassis.
3. Dress lead from ant. section of gang to S1-1 rear contact #3 direct and as short as possible but position for low capacity to chassis.
4. Leads to loop antenna are long and draped to permit tube servicing by lowering loop back. They should be evenly spaced to maintain low capacity and dressed to prevent touching gang plates.
5. All R.F. leads to coils should be short and direct. Dress other leads and components away from coils.



9X652—(Ivory Plastic)



9X651—(Brown Plastic)

MODELS 9X651, Ch. RC-1085; 9X652, Ch. RC-1085A

1005, 9X052, CH. RC-1005

Steps	Connect the High Side of The Test Osc. to—	Tune Test Osc. to—	Range Switch to—	Turn Radio Dial to—	Adjust for maximum output
1	Pin No. 1 of 12BA6 I.F. amp. tube in series with 0.1 mfd.	455 kc.	"A"	Quiet Point near 1600 kc.	Top and bottom T2 2nd I.F. Trans.
2	Pin No. 7 of 12BE6 Converter tube in series with 0.1 mfd.				Top and bottom T1 1st I.F. Trans.
3	Pin No. 1 of 12BA6 R.F. tube in series with 0.1 mfd.				L2 wave trap for minimum output.
4	(Radiated signal) short piece of wire placed near ant.	1630 kc.	"A"	1630 kc. (Cap. min.)	C-13 "A" Osc.
5		1500 kc.		1500 kc.	C-2 "A" ant.
6		600 kc.		600 kc.	L6 "A" Osc. Rocking gang.
7	Repeat steps 4, 5 and 6.				
8	Center terminal on loop antenna Term. board through 47 mfd. Low side to loop primary terminal	18.2 mc.	"C"	18.2 mc. (Min. cap.)	C-12* "C" Osc.
9		15.2 mc.		15.2 mc.	C-3**† "C" Ant.
10		6.1 mc.		6.1 mc.	L-5†† "C" Osc. L-1 "C" Ant.
11	Repeat steps 8, 9 and 10 as necessary.				

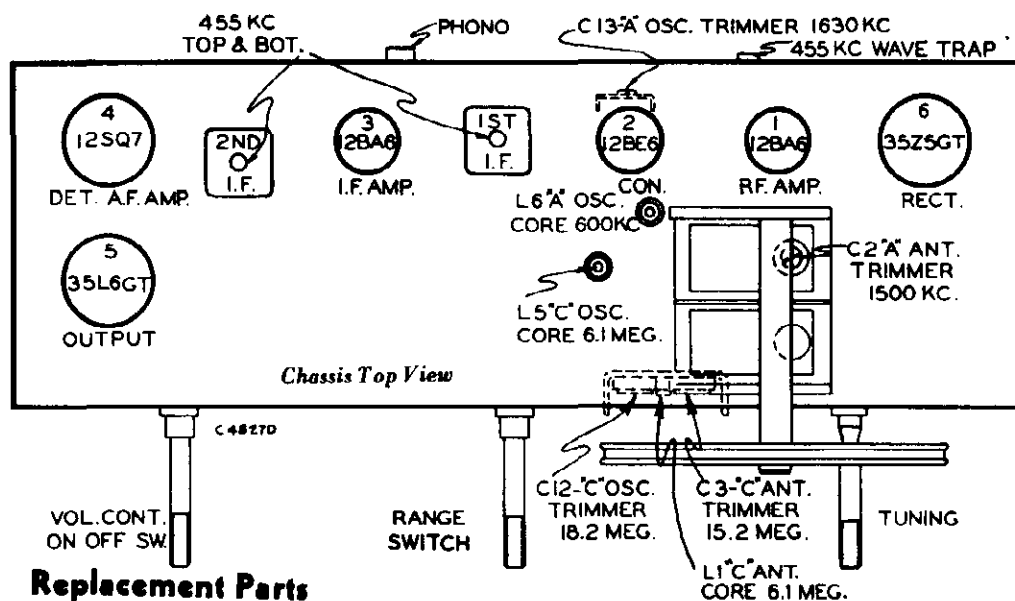
*Two peaks should be found, use one having lowest capacity.

**Two peaks should be found, use one having highest capacity.

Note: Check for image frequencies.

†Radio dial tuned to 15.2 mc. as in step 9, tune test osc. to 16.11 mc. where a weaker signal should be heard.

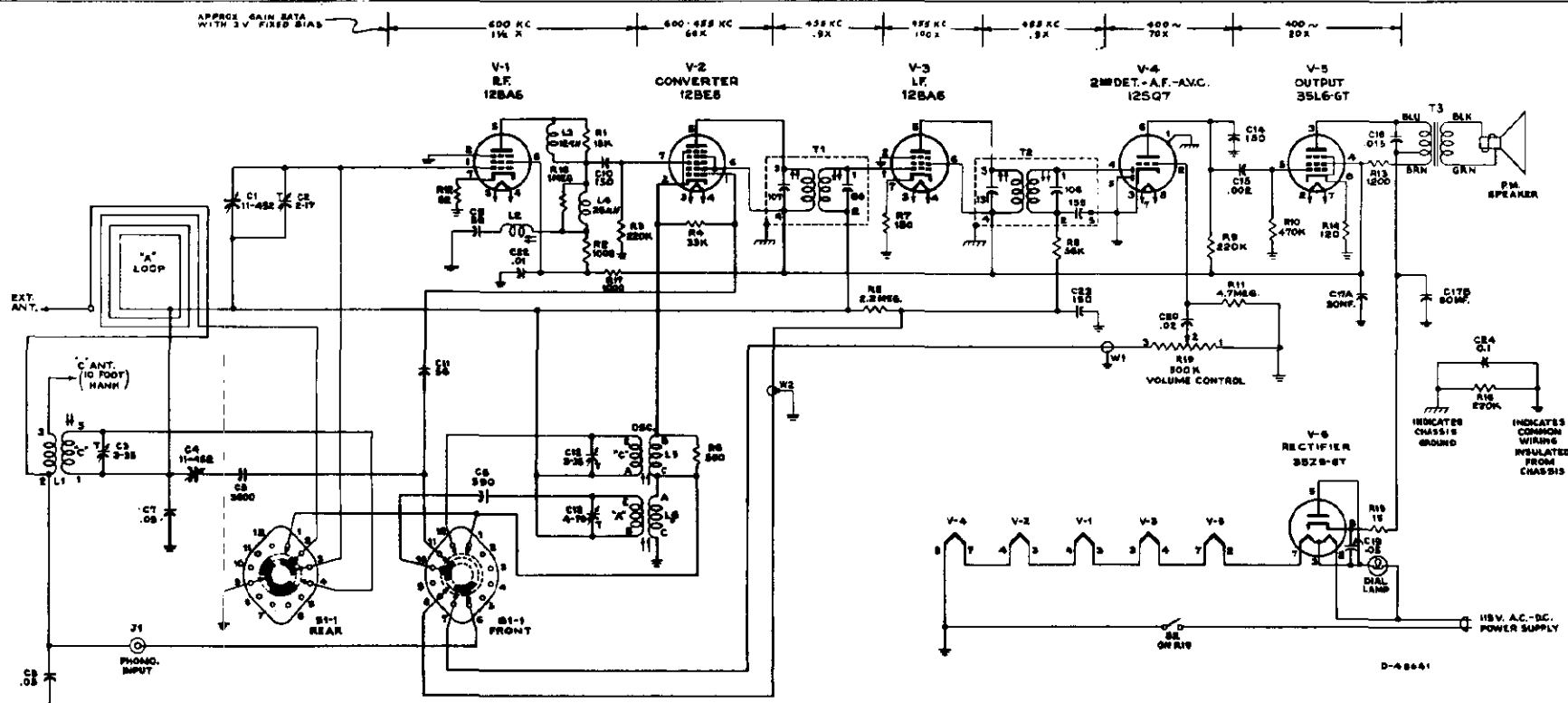
††Radio dial tuned to 6.1 mc. as in step 10, tune test osc. to 7.01 mc. where a weaker signal should be heard.



Replacement Parts

Stock No.	DESCRIPTION	
CHASSIS ASSEMBLIES		
RC 1085-9X651		
RC 1085A-9X652		
71042	Button—Plugbutton for trimmer adjustment hole	73935
74924	Capacitor—Mica trimmer, dual, 3-35 mmf. (C3, C12)	Clip—Mounting clip for I.F. transformer
74923	Capacitor—Mica trimmer, 4-70 mmf. (C13)	74925
74917	Capacitor—Variable tuning capacitor (C1, C2, C4)	Coil—Oscillator coil—"A" band complete with adjustable core and stud (L6)
71924	Capacitor—Ceramic, 56 mmf. (C9, C11)	74926
73501	Capacitor—Ceramic, 150 mmf. (C10, C14, C23)	Coil—Oscillator coil—"C" band complete with adjustable core and stud (L5)
74929	Capacitor—Mica, 590 mmf. (C6)	74927
39665	Capacitor—Mica, 3600 mmf. (C5)	Coil—Antenna coil—"C" band (L1)
72312	Capacitor—Electrolytic, comprising 1 section of 30 mfd, 15 volts, and 1 section of 80 mfd, 150 volts. (C17A, C17B)	74928
72315	Capacitor—Tubular, paper, .002 mfd, 200 volts (C15)	Coil—Series wave trap coil (455KC) complete with adjustable core and stud (L2)
73561	Capacitor—Tubular, paper, .01 mfd, 400 volts (C22)	74930
70572	Capacitor—Tubular, paper, .015 mfd, 400 volts (C16)	Coil—Peaking coil (12 mh) (L3, R1)
71928	Capacitor—Tubular, paper, .02 mfd, 200 volts (C20)	72618
73553	Capacitor—Tubular, paper, .05 mfd, 400 volts (C7, C8, C19)	Coil—Peaking coil (20 mh) (L4, R18)
70617	Capacitor—Tubular, paper, 0.1 mfd, 400 volts (C24)	38410
		Control—Volume control and power switch (R19, S2)
		72953
		Cord—Drive cord (approx. 48" overall)
		33139
		Grommet—Rubber grommet for chassis base
		72283
		Grommet—Rubber grommet for mounting tuning capacitor (3 req'd)
		74638
		Grommet—Power cord strain relief grommet (1 set)
		74696
		Indicator—Station selector indicator
		70980
		Lead—Antenna lead—part of loop and back cover
		74919
		Loop—Back cover and loop assembly complete with antenna lead for Model 9X651
		74920
		Loop—Back cover and loop assembly complete with antenna lead for Model 9X652
		74690
		Plate—Dial back plate complete with 4 drive cord pulleys less dial
		35787
		Receptacle—Phono input jack (J1)
		Resistor—Fixed, composition:
		15 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R15)

MODELS 9X651, Ch. RC-1085; 9X652, Ch. RC-1085A



ALL CAPACITANCE VALUES LESS THAN 1.0 ARE IN MF. AND ABOVE 1.0 ARE IN MMF. EXCEPT THOSE INDICATED.

Schematic Diagram

Stock No.	DESCRIPTION
74922	82 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R-12) 120 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R14) 180 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R7) 560 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R5) 1000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R2, R17) 1200 ohms, $\pm 10\%$, 1 watt (R13) 33,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R4) 56,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R8) 220,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R3, R9, R16) 470,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R10) 2.2 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R5) 4.7 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R11) Shaft—Tuning knob shaft and pulley

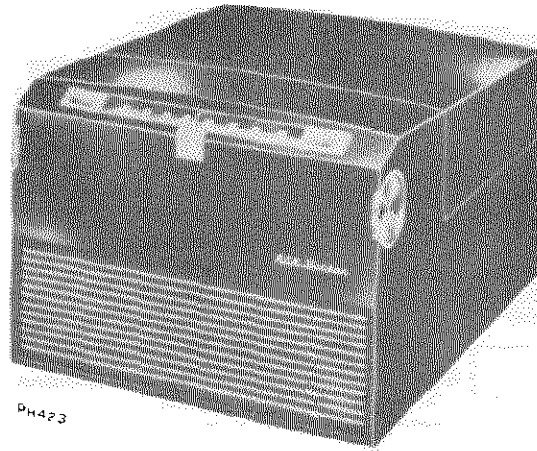
73117	Socket—Tube socket, 7 contact, miniature
54414	Socket—Tube socket, octal, saddle mounted
74697	Socket—Dial lamp socket and lead
74038	Spring—Drive cord tension spring
74921	Switch—Selector switch (S1)
73976	Transformer—Output transformer (T3)
74918	Transformer—First I.F. transformer (T1)
73037	Transformer—Second I.F. transformer (T2)
35969	Washer—"C" washer for tuning shaft

SPEAKER ASSEMBLIES 92572-4

73900	Speaker—5" P.M. speaker complete with cone and voice coil NOTE:—If stamping in instrument does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
-------	---

MISCELLANEOUS

Y2174	Cabinet—Brown plastic cabinet for Model 9X651
Y2175	Cabinet—Ivory plastic cabinet for Model 9X652
74699	Clamp—Dial clamps (1 set)
74933	Decal—Selector switch function decal
74932	Dial—Polystyrene dial scale
74931	Knob—Volume control or tuning control knob—maroon—for Model 9X651
72645	Knob—Volume control or tuning control knob—ivory—for Model 9X652
74934	Knob—Selector switch knob—maroon—for Model 9X651
74935	Knob—Selector switch knob—ivory—for Model 9X652
11765	Lamp—Dial lamp—Mazda 51
30900	Spring—Retaining spring for knobs



Specifications

Tuning Range.....540-1600 kc

Intermediate Frequency.....455 kc

Tube Complement

1. RCA-12BE6.....Converter
2. RCA-12BA6.....I-F Amplifier
3. RCA-12AV6.....Det., AVC., A-F Amplifier
4. RCA-50L6GT.....Output
5. RCA-35W4.....Rectifier

Power Supply Rating...115 volts, 60 cycles a.c., 60 watts

Dial Lamps (2).....Mazda type 1490, 3.2 volts, 0.16 amp.

Loudspeaker (92588-1)

Size and type.....5" x 7" P.M.

Voice coil impedance.....3.2 ohms at 400 cycles

Power Output

Undistorted.....1 watt

Maximum.....1.5 watt

Cabinet Dimensions

Height 7 $\frac{3}{4}$ " Width 12 $\frac{1}{4}$ " Depth 14 $\frac{1}{4}$ "

Tuning Drive Ratio.....7 $\frac{1}{2}$:1 (3 $\frac{3}{4}$ turns of knob)

Record Changer (RP 190-1)

Turntable speed.....45 r.p.m.

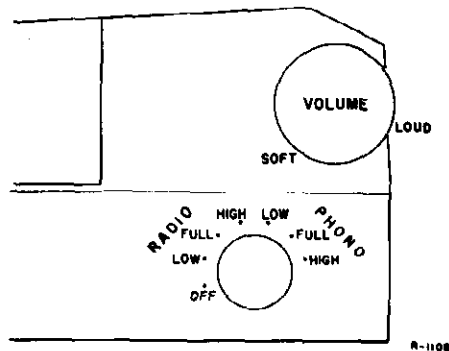
Records used.....RCA—7 in. fine groove

Record capacity.....Up to 12 record

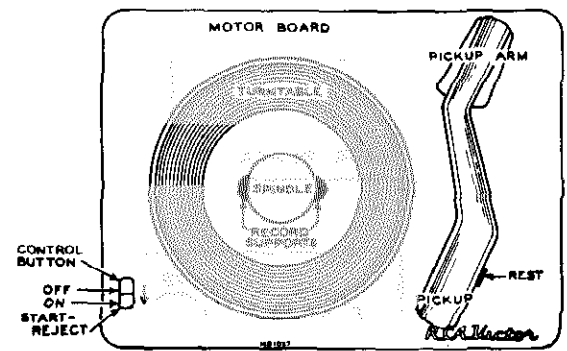
Pickup (Stock No. 75476).....Crystal (medium output)

FOR RECORD CHANGER SERVICE INFORMATION

—REFER TO RP 190 SERIES SERVICE DATA



Controls—End View



Record Changer—Top View

Care of Stylus

The record changer stylus is protected by a permanent metal guard. LINT MAY COLLECT TO CLOG THE OPENING IN THE GUARD AT THE STYLUS POINT AND CAUSE POOR RECORD REPRODUCTION. This may require occasional cleaning of the guard opening—clean by carefully brushing with a small soft brush.

Service Hints

The tubes and the dial lamps are accessible by removing the panel in the front of the record changer compartment.

The chassis metal mounting plate should be flush against the front of the cabinet.

The position of the speaker is adjustable. When correctly positioned, it should set firmly against the front of the cabinet but with no undue strain on the speaker.

MODEL 9Y510,
Ch. RC-1077A

Alignment Procedure

Output Meter—Connect meter across speaker voice coil. Turn volume control to maximum.

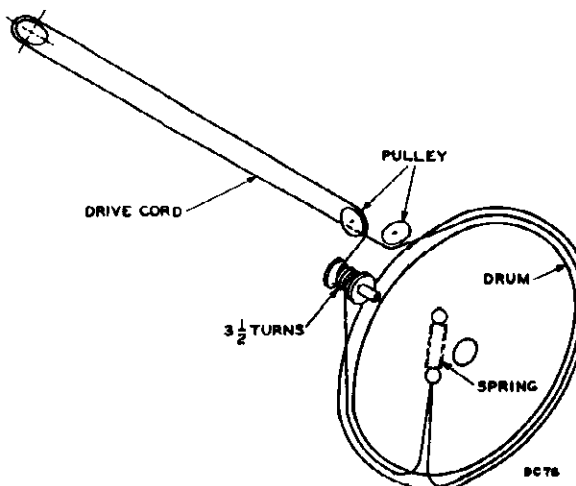
Test Oscillator—Connect low side of test oscillator to common wiring in series with a .1 mf. capacitor. If the test oscillator is a.c. operated it may be necessary to use an isolation transformer for the receiver during alignment and the low side of the test oscillator connected directly to common wiring at the electrolytic capacitor. Keep the oscillator output low to prevent a-v-c action.

Dial Pointer Adjustment—Rotate tuning condenser until the plates are fully open. Adjust indicator pointer to 1630 kc (extreme high frequency end of the scale).

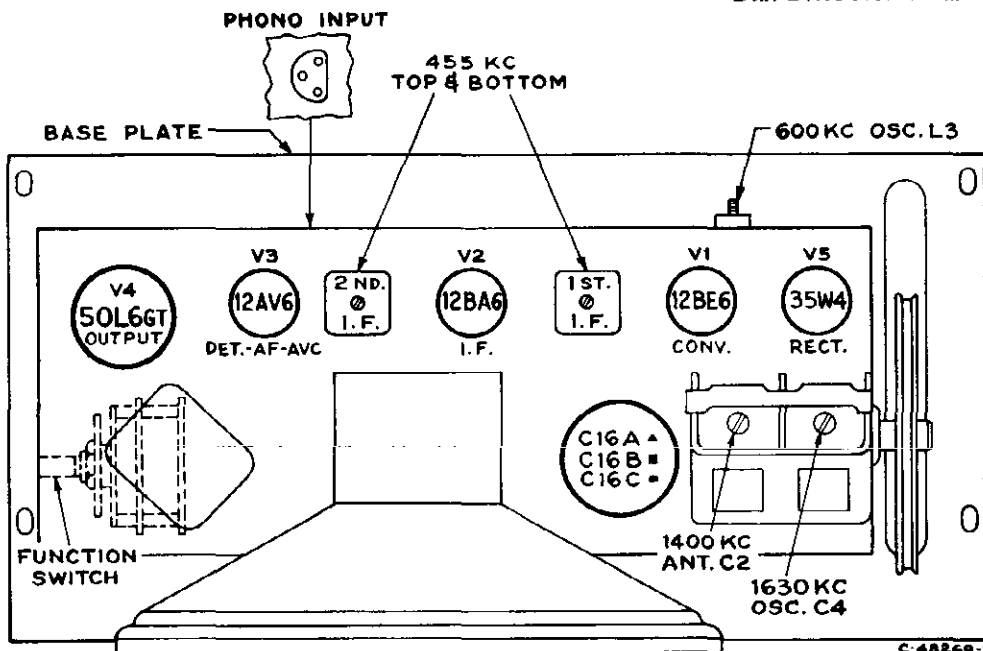
Steps	Connect the high side of test to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	I.F. grid, in series with .1 mfd.	455 kc	Quiet point 1,600 kc end of dial	Pri. & Sec. 2nd I.F. transformer
2	Converter grid in series with .1 mfd.			Pri. & Sec. 1st I.F. transformer
NOTE — ANTENNA LOOP AND RECORD CHANGER MUST BE IN CABINET FOR THE FOLLOWING				
3	Short wire placed near loop for radiated signal	1,630 kc	Extreme R. H. end (gang open)	1,630 KC trimmer (osc.)
4		1,400 kc	1,400 kc	1,400 KC trimmer (ant.)
5		600 kc	600 kc	Osc. Coil L3 Rock gang
6	Repeat steps 3, 4, & 5 if necessary			

LEAD DRESS

1. Dress all heater leads and pilot light leads down to chassis and as far as possible from all audio grid and plate wiring.
2. Dress all exposed leads away from each other and away from chassis to prevent short circuits.
3. Dress lead from R.F. section of gang to V1 pin 7 direct but away from chassis base to reduce capacity, also away from fuse resistor.
4. Dress lead from oscillator section of gang to oscillator coil direct but away from chassis base to reduce capacity.
5. Connect capacitor C20 with short leads between gang frame and mounting bracket.
6. Dress output transformer leads down to base.
7. Dress loop antenna leads away from gang plates and tubes.
8. Dress 33 ohm limiting resistor away from chassis.

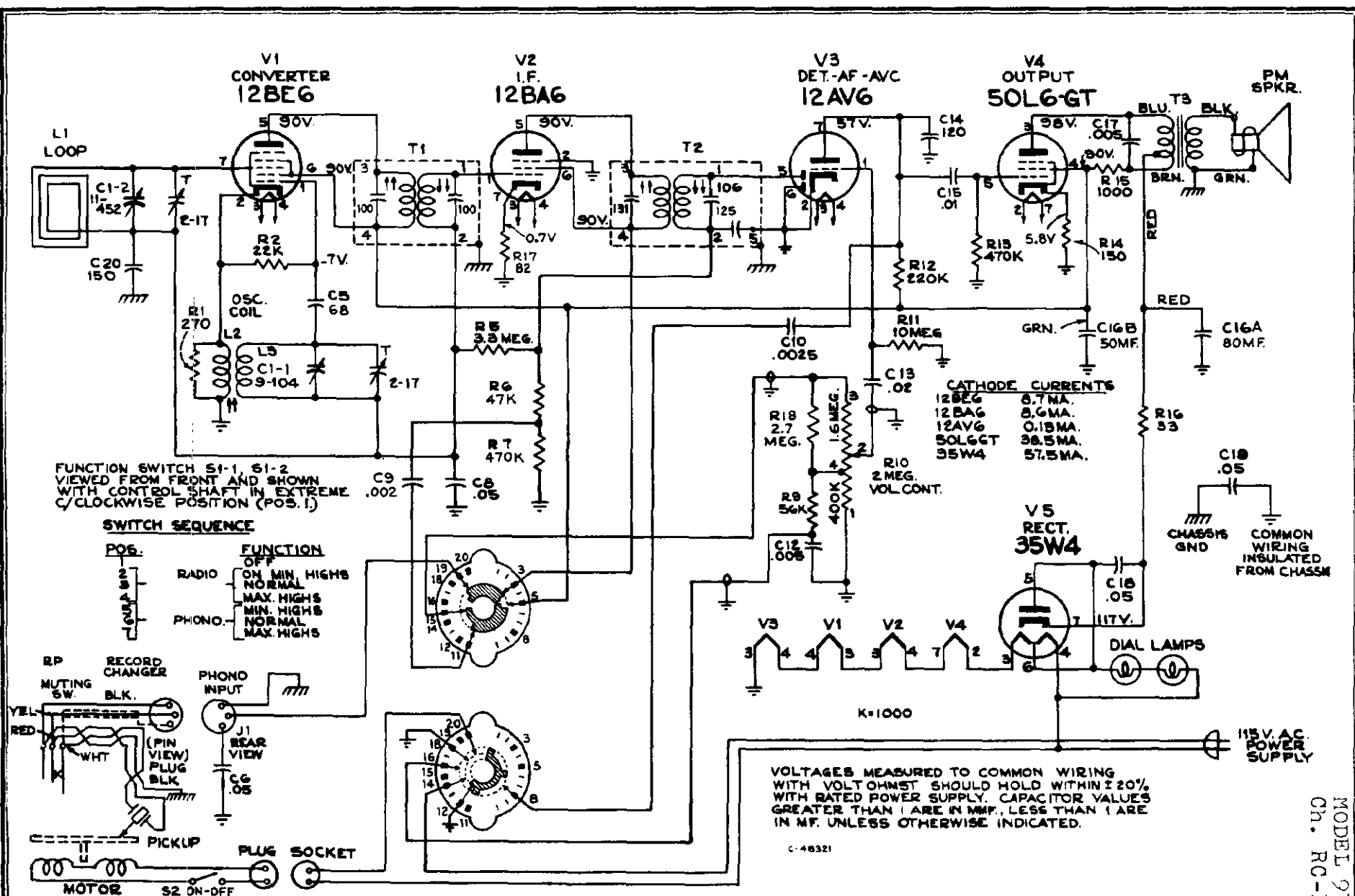


Dial Drive Mechanism



C-48269-1

Tube and Trimmer Locations



RECORD CHANGER: Model RP 190-1, Pages RCD.CH.21-1 through RCD.CH.21-11.

Schematic Diagram

PAGE 21-62 RADIO CORPORATION OF AMERICA

MODEL 9Y510,
Ch. RC-1077A

Replacement Parts

STOCK NO.	DESCRIPTION	STOCK NO.	DESCRIPTION
CHASSIS ASSEMBLIES RC 1077A			
75909	Antenna—Antenna loop assembly..... L1	75910	Switch—Function switch..... SI-1
74705	Bracket—Drive cord pulley bracket (R.H.) complete with two (2) pulleys less long bracket.	74654	Transformer—Output transformer..... T3
74704	Capacitor—Variable tuning capacitor—less bracket..... C1-1, C1-2	75486	Transformer—First I.F. transformer complete with adjustable cores..... T1
39624	Capacitor—Mica, 68 mmf..... C5	75487	Transformer—Second I.F. transformer complete with adjustable cores..... T2
39630	Capacitor—Mica, 120 mmf..... C14	33726	Washer—"C" washer for tuning knob shaft
39632	Capacitor—Mica, 150 mmf..... C20	SPEAKER ASSEMBLIES 92585-1	
73803	Capacitor—Tubular, paper, .002 mfd, 400 volts..... C9	74706	Speaker—5" x 7" P.M. speaker complete with cone and voice coil
73599	Capacitor—Tubular, paper, .0025 mfd, 400 volts..... C10	MISCELLANEOUS	
73920	Capacitor—Tubular, paper, .005 mfd, 400 volts..... C12, C17	Y2292	Cabinet—Plastic cabinet—maroon—less lid, lid support, metal grille and hinge assemblies
73561	Capacitor—Tubular, paper, .01 mfd., 200 volts..... C15	74713	Clamp—Dial clamp (2 req'd)
73562	Capacitor—Tubular, paper, .02 mfd., 400 volts..... C13	73508	Clip—Spring clip for knob #74710
73553	Capacitor—Tubular, paper, .05 mfd., 400 volts, C6, C8, C18, C19	75912	Clip—Spring clip for radio compartment back panel
75911	Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts and 1 section of 50 mfd, 150 volts..... C16A, C16B	30870	Connector—2 contact male connector for motor cable
73935	Clip—Mounting clip for I.F. transformer	74192	Connector—3 contact male connector for phono cable
74448	Coil—Oscillator coil..... L2	74682	Decal—Function switch decal
36422	Connector—3 contact female connector for phono input cable, J1	74273	Decal—Trade mark decal (Victrola)
30868	Connector—2 contact female connector for motor cable, P3	74722	Dial—Polystyrene dial scale
74702	Control—Volume control..... R10	74782	Emblem—"RCA Victor" emblem
†72953	Cord—Drive cord (approx. 49" over-all length required)	33317	Fastener—Push fastener for antenna loop mounting bracket
70392	Cord—Power cord and plug	72894	Foot—Rubber foot (4 req'd)
74454	Gasket—Rubber gasket between speaker and cabinet	74707	Grille—Metal grille
74838	Grommet—Strain relief grommet (1 set)	75697	Grommet—Rubber grommet for mounting record changer
72283	Grommet—Rubber grommet to mount tuning capacitor	75915	Hinge—Cabinet lid hinge (2 req'd)
72602	Pulley—Drive cord pulley	74709	Indicator—Station selector indicator
72313	Resistor—Fuse type, 33 ohms..... R16	74710	Knob—Volume control or tuning knob
	Resistor—Fixed, composition:	74711	Knob—Function switch knob
	82 ohms, ±10%, ½ watt..... R17	71116	Lamp—Dial lamp—Type 1490
	150 ohms, ±10%, ½ watt..... R14	75914	Lid—Cabinet lid only
	270 ohms, ±10%, ½ watt..... R1	74717	Mask—End mask for dial (2 req'd)
	1000 ohms, ±10%, 1 watt..... R15	74708	Motif—Decorative motif for front of cabinet
	22,000 ohms, ±20%, ½ watt..... R2	74788	Nut—Speed nut for radio compartment back panel clips
	47,000 ohms, ±20%, ½ watt..... R6	72768	Nut—Speed nut to fasten decorative motif
	56,000 ohms, ±10%, ½ watt..... R9	74715	Panel—Radio compartment back panel
	220,000 ohms, ±20%, ½ watt..... R12	74721	Plate—Dial back plate—less dial
	470,000 ohms, ±20%, ½ watt..... R7, R13	73728	Screen—Ventilation screen
	2.7 megohms, ±10%, ½ watt..... R18	74716	Screw—#6-32 x ¼" cross recessed oval head machine screw for radio compartment back panel (3 req'd)
	3.3 megohms, ±20%, ½ watt..... R5	75913	Screw—#10-32 x ¾" cross recessed round head machine screw for mounting record changer
	10 megohms, ±20%, ½ watt..... R11	14270	Spring—Retaining spring for knob #74711
74701	Shaft—Tuning knob shaft and pulley	71824	Stud—Cabinet lid hinge stud and screw (2 req'd)
73584	Shield—Tube shield for 12AV6	74714	Support—Lid support
70827	Socket—Tube socket, octal, wafer		
73117	Socket—Tube socket, 7 pin, miniature		
72998	Socket—Dial lamp socket and lead		
74038	Spring—Drive cord spring		

† Stock No. 72953 is a reel containing 250 feet of cord.

MODEL A-91,
Ch. RC-1095



FOR RECORD CHANGER SERVICE INFORMATION REFER TO RP-168 SERIES SERVICE DATA OR RP-190 SERIES SERVICE DATA FOR 45 R.P.M. AND MODEL 960284 SERVICE DATA FOR 78/33 $\frac{1}{2}$ R.P.M. on Pages RCD.CH.19-1, RCD.CH.21-1, and RCD.CH.21-34 respectively.

Specifications

Tuning Range

Standard Broadcast (AM) 540-1,600 kc.
Frequency Modulation (FM) 88-108 mc.
Intermediate Frequencies AM—455 kc., FM—10.7 mc.

Tube Complement

- | | |
|---------------------|---------------------------|
| (1) RCA 6J6 | Mixer and Oscillator |
| (2) RCA 6BA6 | I-F Amplifier |
| (3) RCA 6AU6 | Driver |
| (4) RCA 6AL5 | Ratio Detector |
| (5) RCA 6AV6 | AM Det.—AVC—A-F Amplifier |
| (6) RCA 6C4 | Ph. Inv. |
| (7) RCA 6V6GT | Output |
| (8) RCA 6V6GT | Output |
| (9) RCA 5Y3GT | Rectifier |

Dial Lamps (2) Type No. 51, 6-8 volts, 0.2 amp.
Jewel Lamp Type No. 51, 6-8 volts, 0.2 amp.

Tuning Drive Ratio 10:1 (5 turns of knob)

Power Supply Rating 115 volts, 60 cycles, 110 watts

Loudspeaker (92569-12W)

Size and type 12 in. PM
Voice coil impedance 3.2 ohms at 400 cycles

Power Output

(Radio) Undistorted 8 watts Maximum 9 watts
(Phono) Undistorted 10 watts Maximum 11 watts

Weight 90 lbs.

Cabinet Dimensions

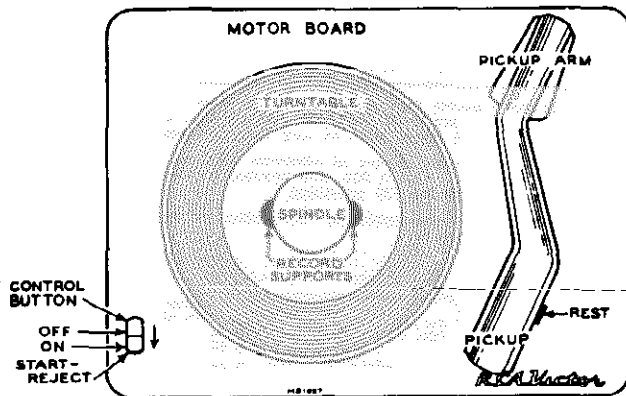
Height 32 in. Width 32 in. Depth 19 $\frac{3}{4}$ in.

Record Changer (RP 168 or RP 190-2)

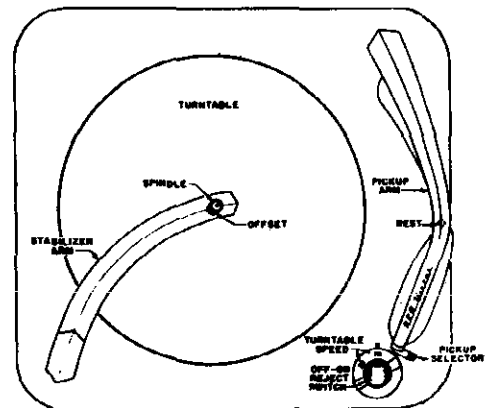
Turntable speed 45 r.p.m.
Pickup { (RP 168—Stock No. 74625) } Crystal
 { (RP 190—Stock No. 75575) }

Record Changer (960284-1 or -2)

Turntable speed 78 or 33 $\frac{1}{2}$ r.p.m.
Pickup (Stock No. 75475) Crystal



Top View—RP190 Record Changer



Top View—960284 Record Changer

MODEL A-91,
Ch. RC-1095

ALIGNMENT PROCEDURE—CIRCUIT DESCRIPTION—LEAD DRESS

Alignment Procedure

CORRECT ALIGNMENT OF THE FM BAND
REQUIRES THAT THE AM BAND BE
ALIGNED FIRST

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Signal Generator:

For all alignment operations connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

Circuit Description

This instrument has a nine-tube (including rectifier) chassis which is very similar to those used in other RCA Victor radio-phonograph combinations designed for AM-FM reception.

The selector switch has five functions:

- (1) Selection of tuning range.
- (2) Selection and distribution of a-v-c voltages.
- (3) Application of B+ voltage to tubes V1, V2, and V3.
In "Phono 78/33" and "Phono 45" positions the B+ voltage is removed from tubes V1, V2 and V3.
- (4) Selection of audio input applied to the volume control.
- (5) Change in output tube bias.

In Radio positions R6 is in parallel with R42.

This receiver has built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception.

Provision is made for the use of external antennas if desired.

Critical Lead Dress

Note: The leads listed may not be critical in all receivers. However, by dressing the leads as specified, unusual difficulties will be minimized.

1. The 2.2 meg mixer grid resistor (R10) should have a minimum practicable amount of lead extending on the grid end.
2. The first A.M. and first F.M. I.F. plate leads should be dressed away from the range switch wafer.
3. The ground strap between the R.F. shelf and the main chassis should be well soldered and kept as short as practicable.
4. Arrange wiring to prevent the filament wire between the mixer (6J6) and 1st I.F. (6BA6) tubes from passing near either the mixer grid, or the A.V.C. wiring.
5. Dress filament wires away from all audio coupling condensers.
6. Dress A.C. power switch wires away from the audio coupling condenser (C20) which is wired to the volume control.
7. Dress the mixer grid coupling condenser (C7) away from the lugs on the front range switch wafer.
8. The 1st I.F. tube A.V.C. by-pass condenser (C16) should ground at the same point as the cathode neutralizing loop.
9. The driver tube plate and screen by-pass condensers (C27, C28) should ground at the same point as the neutralizing loop.
10. The mixer plate by-pass condenser (C15) should ground as close to the R.F. shelf ground strap as practicable.
11. The shielded audio leads connecting to the front function switch wafer should have a minimum of exposed lead on the function switch end.

AM Alignment

FUNCTION SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Stator of C1-4 in series with .01 mf.	455 kc.	Quiet point at low freq. end.	† Bottom (sec.) & top (pri.) cores of T4 † Top (sec.) & bottom (pri.) cores of T2
2	AM ant. terminal in series with 200 mmf.	1620 kc.	Extreme high freq. end.	C1-2 trimmer (osc.)
3		1400 kc.	1400 kc. signal	C1-4 trimmer (ant.)
4		600 kc.	600 kc. signal	L5 (osc.) Rock Gang
5	Repeat steps 2, 3 and 4			

† First peak T2 and T4 then starting with T4, use alternate loading. Connect a 47,000-ohm resistor across the primary to load the plate winding while the grid winding of the same transformer is being peaked. Then load the grid winding with the 47,000-ohm resistor while the plate winding is being peaked.

FM Alignment

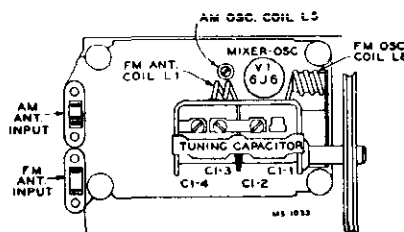
FUNCTION SWITCH IN FM POSITION—VOLUME
CONTROL MAXIMUM

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mfd. capacitor C40 and the common lead to chassis. Adjust sig. gen. output to provide approx. —3 v. indication during alignment			
2	Pin #1 of 6 AU6 (V3) in series with .01 mf.	10.7 mc. AM modulated	—	Top of driver trans. T5 for max. d.c. voltage
3				† Bottom of driver trans. T5 for min. audio output
4	Repeat steps 2 and 3			
5	To FM antenna terminals thru 120 ohms in each side of line	10.7 mc.	low frequency end	* Top (sec.) and bottom (pri.) cores of T3 * Top (sec.) and bottom (pri.) cores of T1
6		90 mc.	90 mc.	** L8 (osc.)
7		106 mc.	106 mc.	C1-3 trimmer (ant.)
8		90 mc.	90 mc. signal	** L1 (ant.) Rock Gang
9	Repeat steps 7 and 8			

† Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

* Align T3 and T1 by means of alternate loading as explained under AM alignment. Use a 680 ohm resistor instead of a 47,000 ohm resistor and load the FM windings.

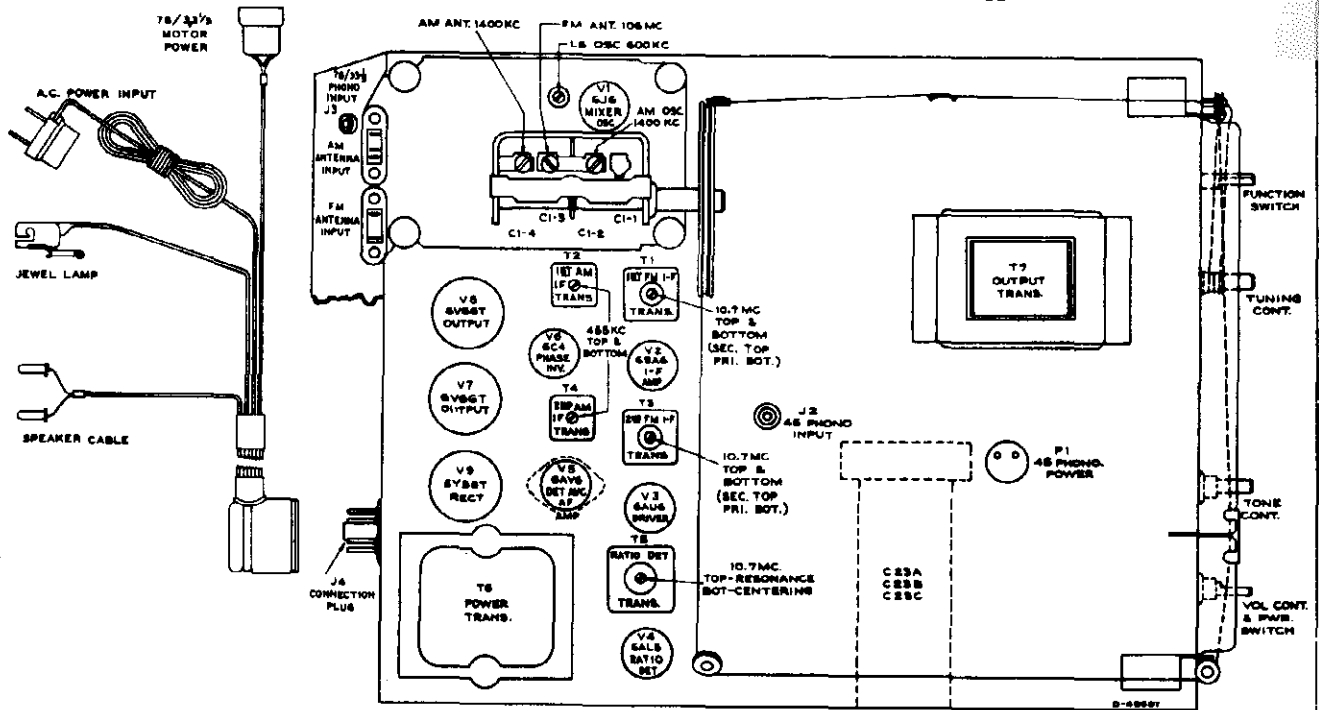
** L1 and L8 are adjustable by increasing or decreasing the spacing between turns.



F. M. Coil Locations

MODEL A-91,
Ch. RC-1095

TUBE AND TRIMMER LOCATIONS—VOLTAGE DATA

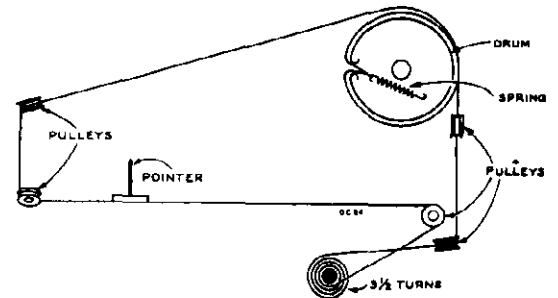


Tube and Trimmer Locations

Socket Voltages

Voltages measured to chassis with VoltOhmyst with no signal input and should hold within $\pm 10\%$ with 117-volt power supply.

Tube	Terminal	Voltage		
		Phono	A.M.	F.M.
V1 6J6 Mixer and Oscillator	Plate 2	—	58	53
	Grid 5	—	-1.5	-1.3
	Plate 1	—	35	29
	Grid 6	—	-2.2	-2.0
V2 6BA6 I.F. Amp.	Plate 5	—	197	193
	Screen 6	—	112	104
	Cathode 7	—	0.67	0.77
	Grid 1	—	-1.2	-0.35
V3 6AU6 Driver	Plate 5	—	193	189
	Screen 8	—	125	123
	Cathode 7	—	1.1	1.1
V4 6AL5 Ratio Del.	—	—	—	—
V5 6AV6 A.F. Amp.	Plate 7	112	95	95
	Grid 1	-0.7	-0.7	-0.7
V6 6C4 Ph. Inv.	Plate 1-5	125	90	90
	Cathode 7	-12.2	-11	-11
	Grid 6	-19.2	-15.6	-15.6
V7 6V6GT or V8 Output	Plate 3	305	295	295
	Screen 4	299	214	212
	Grid 5	-19.2	-15.4	-15.4
V9 5Y3GT Rectifier	Filament 2	314	301	301



Dial Cord and Drive Assembly

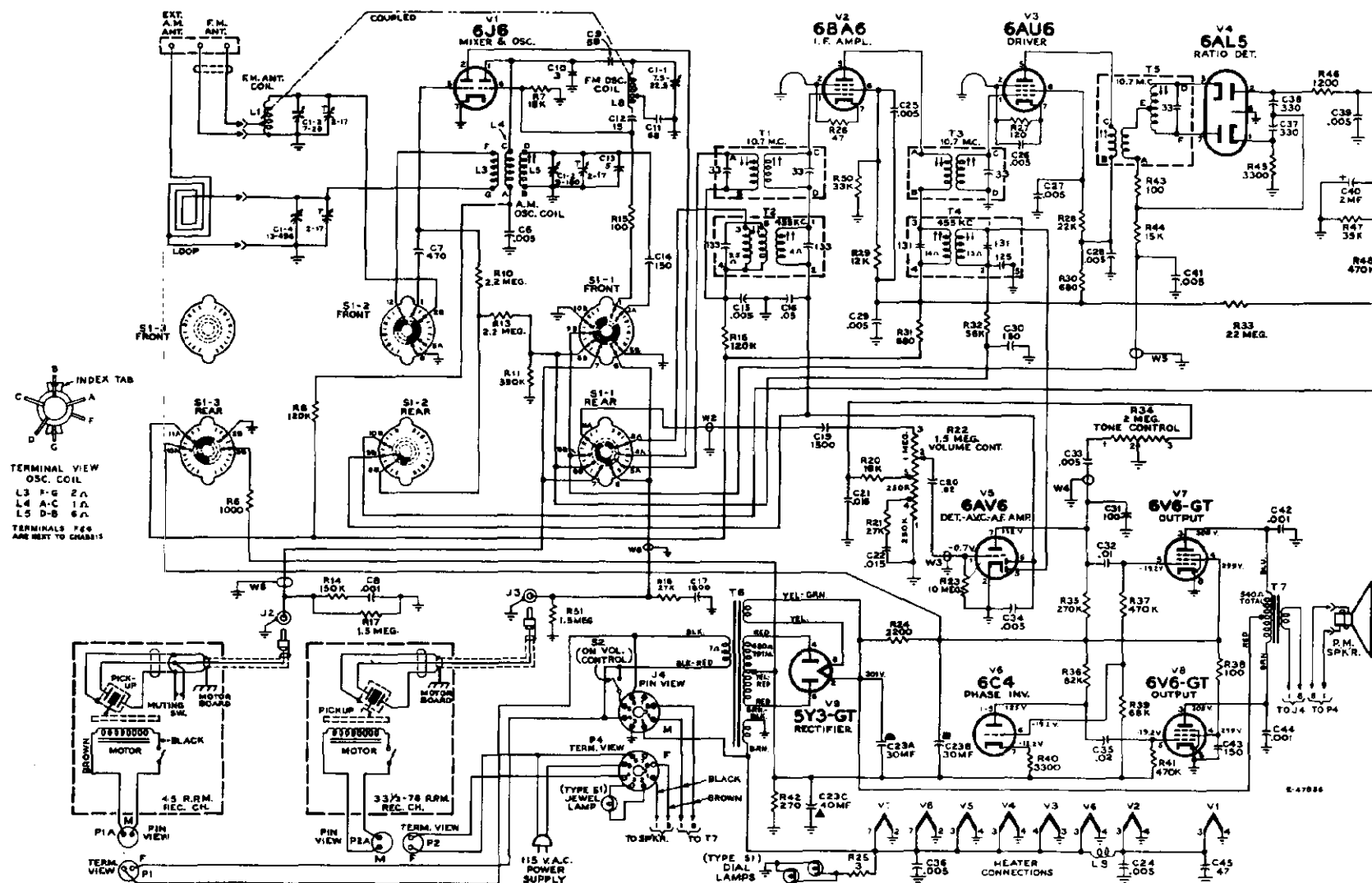
Cathode Currents (Ma.)

Tube	Terminal	Phono	A.M.	F.M.
V1 6J6	7	—	2.8	2.8
V2 6BA6	7	—	16.6	16.5
V3 6AU6	7	—	9.4	9.3
V4 6AL5	1 & 5	—	—	—
V5 6AV6	2	0.6	0.5	0.5
V6 6C4	7	2.2	1.5	1.5
V7 6V6GT	8	35.6	18.8	18.5
V8 6V6GT	8	35.6	18.6	18.5
V9 5Y3GT	2	74.2	72.5	71.7

MODEL A-91,
Ch. RC-1095

COMPLETE SCHEMATIC DIAGRAM

The cathode neutralizing loops of V2 (6BA6) and V3 (6AU6) are insulated wires approx. 2 in. long. Do not alter length.



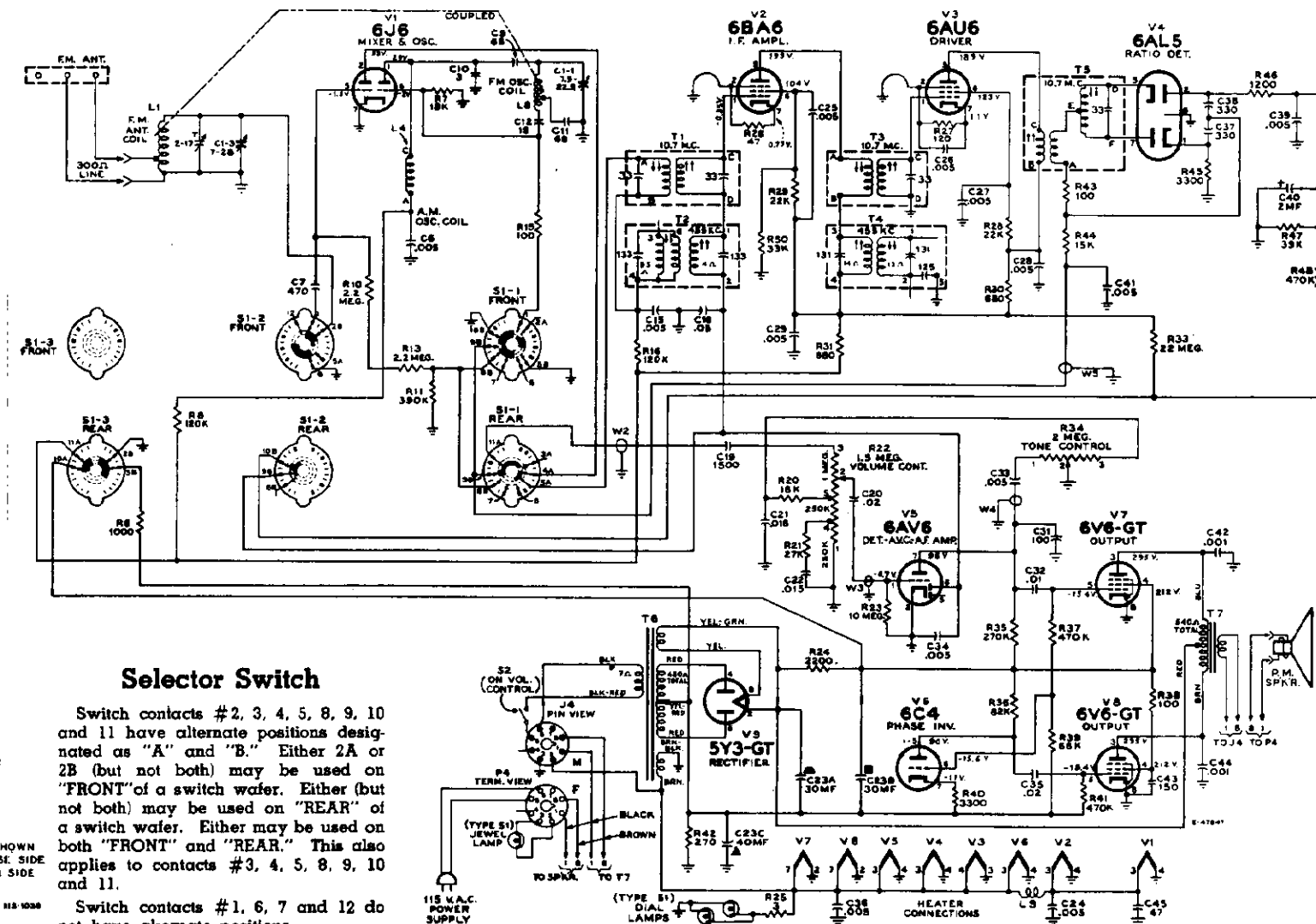
FUNCTION SWITCH VIEWED FROM FRONT AND SHOWN IN "PHONO 78/33" POSITION (MAX. C/CLOCKWISE)

VOLTAGES MEASURED TO CHASSIS WITH VOLTOHMYST AND NO SIGNAL INPUT AND SHOULD HOLD WITHIN $\pm 20\%$ WITH 117 VOLT POWER SUPPLY

RESISTANCE VALUES IN OHMS, K = 1000

CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED

SIMPLIFIED SCHEMATIC DIAGRAM—"FM"



FUNCTION SWITCH VIEWED FROM FRONT AND SHOWN IN "FM" POSITION (MAX. CLOCKWISE)

VOLTAGES MEASURED TO CHASSIS WITH VOLTOHMYST AND NO SIGNAL INPUT AND SHOULD HOLD WITHIN $\pm 20\%$ WITH 117 VOLT POWER SUPPLY

RESISTANCE VALUES IN OHMS, K = 1000

CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED

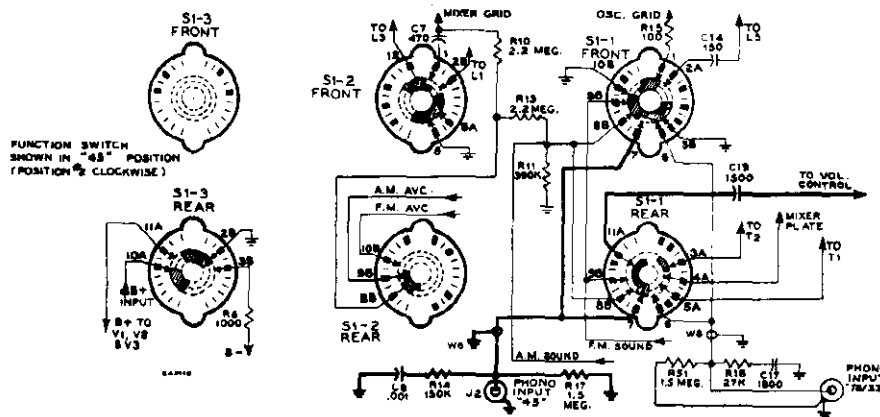
Simplified Schematic Diagram "FM"

CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED

Simplified Schematic Diagram—"AM"

MODEL A-91,
Ch. RC-1095

PHONO SWITCH POSITIONS—MISC. SERVICE DATA

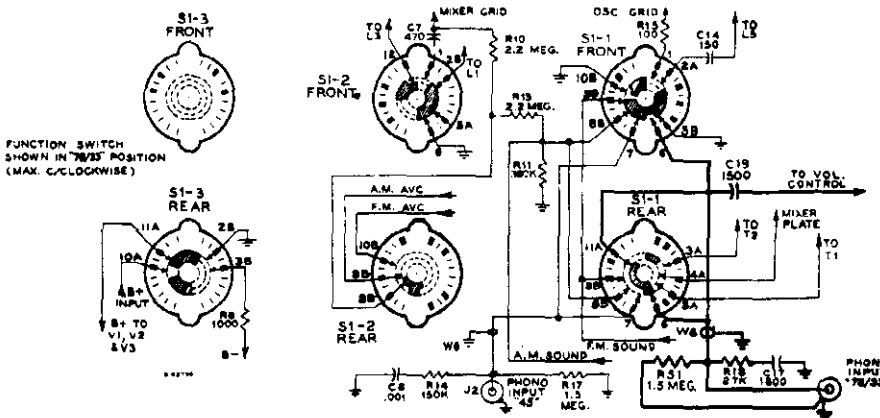


Switch Position Schematic Diagram—"Phono 45"

In "45" and "78/33" position the B+ supply voltage is disconnected in S1-3 which renders the mixer-oscillator, I F. amplifier and driver tubes inoperative.

The bias resistor R6 (in parallel with R42 in AM and FM positions) is also disconnected in S1-3.

This results in higher grid, plate and screen voltages on the output tubes.



Switch Position Schematic Diagram—"Phono 78/33"

Record Changer Mounting

Each record changer is mounted in a roll-out carriage. The changer mechanisms are mounted on rubber grommets (45 r.p.m.) or springs (78/33 r.p.m.) and should be free floating.

Two shipping screws hold the 45 r.p.m. changer to its roll-out carriage. They are accessible from the under-side of the carriage and should be REMOVED at time of installation.

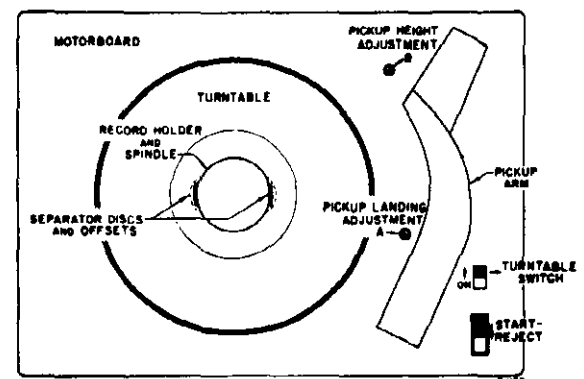
Two shipping screws hold the 78/33 r.p.m. changer to its roll-out carriage. They are accessible after the turntable is lifted off and should be LOOSENED at time of installation.

Roll-out Carriage Removal

Each roll-out carriage has two stop pins, (one at the back end of each slide) held in place by a retaining spring. To remove roll-out carriage, it is first necessary to pull the retaining springs out of the slides with a pair of long nose pliers, the stop pins are then easily removed. The roll-out carriage may then be removed from the front of the cabinet after disconnecting its connecting cables.

Roll-out Carriage Travel

The roll-out carriages have a normal movement limitation of approximately 10 inches. If a carriage does not have this amount of movement, it may be due to an obstruction or from slippage or creeping of the balls of the slide mechanism. Travel restriction due to slippage or creeping of balls in the slide mechanism can be corrected by exerting slightly greater pull until the normal travel limitation is reached. The carriage should then operate to its full travel with normal pull.



Top View—RP 168 Record Changer

Adjustments

1. PICKUP LANDING—Turn screw "A" slightly to right (clockwise) if landing is on music grooves, or to left if too near edge of record.

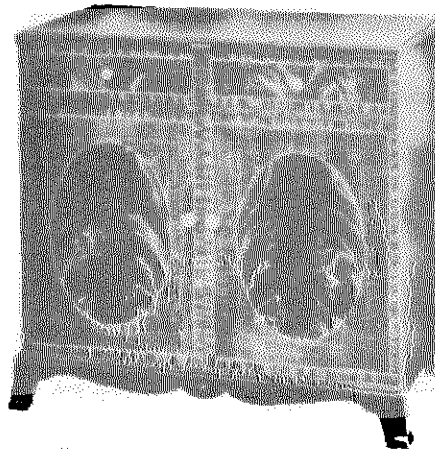
2. PICKUP HEIGHT—Turn screw "B" slightly to right (clockwise) if for change cycle pickup does not lift up from as many as ten records on turntable, or to left if when lifting, pickup hits records on spindle. Correct height is 3/4" from turntable to pickup point at maximum.

MODEL A-91,
Ch. RC-1095

Replacement Parts

STOCK NO.	DESCRIPTION	STOCK NO.	DESCRIPTION
CHASSIS ASSEMBLIES RC 1095			
75599	Capacitor—Variable tuning capacitor complete with drive drum (C1-1, C1-2, C1-3, C1-4)	75600	Switch—Function switch (S1-1, S1-2, S1-3)
74733	Capacitor—Ceramic, 3 mmf. (C10)	75557	Transformer—Output transformer (T7)
75613	Capacitor—Ceramic, 5 mmf. (C13)	73743	Transformer—Radio detector transformer (T5)
39044	Capacitor—Ceramic, 15 mmf. (C12)	75558	Transformer—First I-F transformer (A-M) complete with adjustable cores (T2)
75609	Capacitor—Ceramic, 47 mmf. (C45)	73037	Transformer—Second I-F transformer (A-M) complete with adjustable cores (T4)
75612	Capacitor—Ceramic, 68 mmf. (C9, C11)	75559	Transformer—First I-F transformer (F-M) complete with adjustable cores (T1)
75437	Capacitor—Ceramic, 100 mmf. (C31)	75560	Transformer—Second I-F transformer (F-M) complete with adjustable cores (T3)
75614	Capacitor—Ceramic, 150 mmf. (C14, C30, C43)	75566	Transformer—Power transformer, 117 volt, 60 cycle (T6)
39640	Capacitor—Mica, 330 mmf. (C37, C38)	33726	Washer—"C" washer for tuning knob shaft
39644	Capacitor—Mica, 470 mmf. (C7)	RADIO ROLLOUT CARRIAGE	
75610	Capacitor—Ceramic, 1500 mmf. (C19)	75601	Decal—Function decal for controls
74850	Capacitor—Ceramic, 1800 mmf. (C17)	75572	Dial—Polystyrene dial scale
73473	Capacitor—Ceramic, 5000 mmf. (C6, C15, C24, C25, C27, C28, C29, C34, C36)	75549	Frame—Moulded frame (maroon) for mounting radio chassis and 45 RPM record changer—for mahogany or walnut instruments
73801	Capacitor—Tubular, paper, .001 mfd, 400 volts (C8)	75683	Frame—Moulded frame (light brown) for mounting radio chassis and 45 RPM record changer—for oak instruments
70642	Capacitor—Tubular, paper, .001 mfd, 1000 volts (C42, C44)	75551	Handle—Metal pullout handle for mounting frame
71926	Capacitor—Tubular, paper, .005 mfd, 200 volts (C26, C39, C41)	75555	Screw—#8-32 x 3/8" cross recessed pan head machine screw to mount radio chassis (4 req'd)
73920	Capacitor—Tubular, paper, .005 mfd, 400 volts (C33)	SPEAKER ASSEMBLY	
71925	Capacitor—Tubular, paper, .01 mfd, 400 volts (C32)	Stamped 92589-12W	
58476	Capacitor—Tubular, paper, oil impregnated, .018 mfd, 400 volts (C21)	RMA 274	
72120	Capacitor—Tubular, paper, .015 mfd, 200 volts (C22)	RL 111-A1	
74010	Capacitor—Tubular, paper, .02 mfd, 400 volts (C20, C35)	13867	Cap—Dust cap
73553	Capacitor—Tubular, paper, .05 mfd, 400 volts (C16)	75582	Cone—Cone and voice coil assembly (3.2 ohms)
73747	Capacitor—Electrolytic, 2 mfd, 500 volts (C40)	75681	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms)
72052	Capacitor—Electrolytic, comprising 1 section of 30 mfd, 450 volts, 1 section of 30 mfd, 350 volts and 1 section of 40 mfd, 25 volts (C23A, C23B, C23C)	NOTE: If stamping on speaker does not agree with above number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.	
73935	Clip—Mounting clip for A-M, I-F transformers	MISCELLANEOUS	
75627	Clip—Clip for main cable—on rear of chassis	71864	Antenna—F-M antenna
75569	Coil—Oscillator coil (A.M.) complete with adjustable screws	75705	Antenna—Antenna loop complete less cable
75617	Coil—Antenna coil—F-M (L1)	75898	Back—Back cover—maroon—for 33 1/2 RPM record changer compartment—for mahogany or walnut instruments (assembled to rollout)
71942	Coil—Filament choke coil (L3)	75899	Back—Back cover—light brown—for 33 1/2 RPM record changer compartment—for oak instruments (assembled to rollout)
74817	Coil—Oscillator coil—F-M (L2)	75900	Back—Back cover—Maroon—for radio—45 RPM record changer compartment—for mahogany or walnut instruments (assembled to rollout)
35787	Connector—Single contact female connector for pickup cables (J2, J3)	75901	Back—Back cover—light brown—for radio—45 RPM record changer compartment—for oak instruments (assembled to rollout)
74879	Connector—2 contact female connector for antenna leads	73680	Board—"A-F-N" terminal board
75542	Connector—8 contact male connector for power input cable (J4)	75694	Bracket—Stop bracket less rubber bumper for record changer rollouts
75543	Connector—2 contact female connector for 45 RPM motor cable (P1)	71599	Bracket—Pilot lamp bracket
70342	Control—Volume control and power switch (R22, R2)	75696	Bumper—Rubber bumper for record changer rollout stop bracket
75538	Control—Tone control (R34)	74296	Cable—Shielded pickup cable complete with pin plug for 33 1/2 RPM record changer
72953	Cord—Drive cord (approx. 66" overall length required)	72437	Cable—Shielded pickup cable complete with pin plug for 45 RPM record changer
75564	Coupling—Spring coupling for function switch extension shaft	13103	Cap—Pilot lamp cap
75556	Cover—Insulating cover for electrolytic capacitor #72052	71892	Catch—Bullet catch and strike for cabinet doors
74839	Fastener—Push fastener for mounting R-F shelf (4 required)	X3093	Cloth—Grille cloth for oak instruments
16058	Grommet—Rubber grommet for mounting R-F shelf (4 req'd)	X3189	Cloth—Grille cloth for mahogany or walnut instruments
75547	Grommet—Rubber grommet to mount slide mechanism to bottom—rear (2 req'd)	74892	Connector—2 contact (polarized) male connector for antenna loop cable
75548	Grommet—Rubber grommet to mount slide mechanism to bottom—front (2 req'd)	74752	Connector—2 contact male connector for FM antenna cable
11765	Lamp—Dial lamp—Mazda #51	75709	Connector—8 contact female connector for main cable
75544	Nut—Rivnut to fasten screw for mounting chassis (4 req'd)	75474	Connector—Single contact male connector for speaker (2 req'd)
18463	Plate—Bakelite mounting plate for electrolytic capacitor #72052	30868	Connector—2 contact female connector for 33 1/2 RPM record changer motor leads
75535	Plate—Dial back plate complete with three (3) pulleys	74273	Decal—Trade mark decal (Victrola)
75536	Pointer—Station selector pointer	71986	Decal—Trade mark decal (RCA Victor)
72602	Pulley—Drive cord pulley	74939	Grommet—Power cord strain relief (1 set)
72323	Resistor—Wire wound, 3 ohms, 1/2 watt (R25)	37396	Grommet—Rubber grommet for mounting speaker
73637	Resistor—Wire wound, 2200 ohms, 5 watts (R24)	75697	Grommet—Rubber grommet for mounting 45 RPM record changer
	Resistor—Fixed, composition:—	75551	Handle—Metal pullout handle for 33 1/2 RPM record changer compartment
	47 ohms, ±10%, 1/2 watt (R26)	74308	Hinge—Cabinet door hinge (1 set)
	100 ohms, ±10%, 1/2 watt (R15, R38, R43)	75712	Knob—Tuning control, tone control or volume control and power switch knob—maroon—for mahogany or walnut instruments
	120 ohms, ±10%, 1/2 watt (R27)	75713	Knob—Tuning control, tone control or volume control and power switch knob—for oak instruments
	270 ohms, ±5%, 2 watts (R42)	75714	Knob—Function switch knob—maroon—for mahogany or walnut instruments
	680 ohms, ±20%, 1/2 watt (R30)	75715	Knob—Function switch knob—tan—for oak instruments
	680 ohms, ±20%, 1 watt (R31)	11765	Lamp—Pilot lamp—Mazda #51
	1000 ohms, ±5%, 1/2 watt (R6)	75917	Nail—Rosette head nail for grille (3 req'd)
	1200 ohms, ±5%, 1/2 watt (R46)	75984	Nut—Speed nut for 33 1/2 RPM record changer mounting screw
	3300 ohms, ±5%, 1/2 watt (R40, R45)	73634	Nut—Speed nut for speaker mounting screws
	12,000 ohms, ±10%, 1 watt (R29)	75916	Pull—Door pull
	15,000 ohms, ±10%, 1/2 watt (R44)	75907	Screw—#10-32 x 5/4" cross recessed round head special screw for mounting 45 RPM frame
	18,000 ohms, ±10%, 1/2 watt (R7, R20)	75883	Screw—#10-24 x 2 1/4" round head machine screw for mounting 33 1/2 RPM record changer
	22,000 ohms, ±10%, 1/2 watt (R28)	74279	Screw—#8-32 x 7/8" trimit head screw for door pull
	27,000 ohms, ±10%, 1/2 watt (R18, R21)	75708	Shell—Shell for 8 contact female connector #75709
	33,000 ohms, ±10%, 1/2 watt (R50)	75546	Slide—Slide mechanism for 33 1/2 RPM record mounting frame
	39,000 ohms, ±5%, 1/2 watt (R47)	31384	Socket—Pilot lamp socket and lead
	56,000 ohms, ±10%, 1/2 watt (R32)	74734	Spring—Retaining spring for knobs
	68,000 ohms, ±10%, 1/2 watt (R39)	75902	Spring—Suspension spring for main cable
	82,000 ohms, ±10%, 1/2 watt (R36)	72936	Stop—Cabinet door stop
	120,000 ohms, ±10%, 1/2 watt (R8, R16)		
	150,000 ohms, ±10%, 1/2 watt (R14)		
	270,000 ohms, ±10%, 1/2 watt (R35)		
	390,000 ohms, ±10%, 1/2 watt (R11)		
	470,000 ohms, ±10%, 1/2 watt (R37, R41, R48)		
	1.5 megohm, ±10%, 1/2 watt (R17, R51)		
	2.2 megohm, ±20%, 1/2 watt (R10, R13)		
	10 megohm, ±20%, 1/2 watt (R23)		
	22 megohm, ±20%, 1/2 watt (R33)		
75540	Shaft—Tuning knob shaft		
75565	Shaft—Extension shaft for function switch		
73584	Shield—Tube shield for V5		
75546	Slide—Slide mechanism complete for radio chassis bottom		
31251	Socket—Tube socket, octal, wafer		
73117	Socket—Tube socket, 7 pin, miniature		
74179	Socket—Tube socket, 7 pin, miniature for 6J6 tube only		
31364	Socket—Dial lamp socket		
75563	Spring—Retaining spring for function switch extension shaft		
74038	Spring—Drive cord spring		
74847	Support—Polystyrene support for F-M oscillator coil complete with mounting bracket		

* Stock No. 72953 is a reel containing 250 feet of cord.



FOR RECORD CHANGER SERVICE INFORMATION REFER TO RP-168 SERIES SERVICE DATA OR RP-190 SERIES SERVICE DATA FOR 45 R.P.M. AND MODEL 960284 SERVICE DATA FOR 78/33 $\frac{1}{2}$ R.P.M. on Pages RCD.CH.19-1, RCD.CH.21-1, and RCD.CH.21-34 respectively. **Specifications**

Tuning Range

Standard Broadcast (AM) 540-1,600 kc.
Frequency Modulation (FM) 88-108 mc.
Intermediate Frequencies AM—455 kc., FM—10.7 mc.

Tube Complement

(1) RCA 6CB6..... R-F Amplifier
(2) RCA 6J6..... Mixer and Oscillator
(3) RCA 6BA6..... I-F Amplifier
(4) RCA 6AU6..... Driver
(5) RCA 6AL5..... Ratio Detector
(6) RCA 6AV6..... AM Det.—AVC—A-F Amplifier
(7) RCA 6C4..... Ph. Inv.
(8) RCA 6V6GT..... Output
(9) RCA 6V6GT..... Output
(10) RCA 5Y3GT..... Rectifier

Dial Lamps (2).....Type No. 51, 6-8 volts, 0.2 amp.
Jewel LampType No. 51, 6-8 volts, 0.2 amp.

Tuning Drive Ratio10:1 (5 turns of knob)

Power Supply Rating 115 volts, 60 cycles, 115 watts

Loudspeaker (92589-12W)

Size and type 12 in. PA
Voice coil impedance 3.2 ohms at 400 cycle

Power Output

(Radio) Undistorted 8 watts.....Maximum 9 watt
(Phono.) Undistorted 10 watts..... Maximum 11 watt

Weight97 lbs

Cabinet Dimensions

Height 32 $\frac{1}{4}$ in. Width 34 $\frac{1}{2}$ in. Depth 19 $\frac{3}{4}$ in.

Record Changer (RP-168 or RP-190-2)

Turntable speed 45 r.p.m.

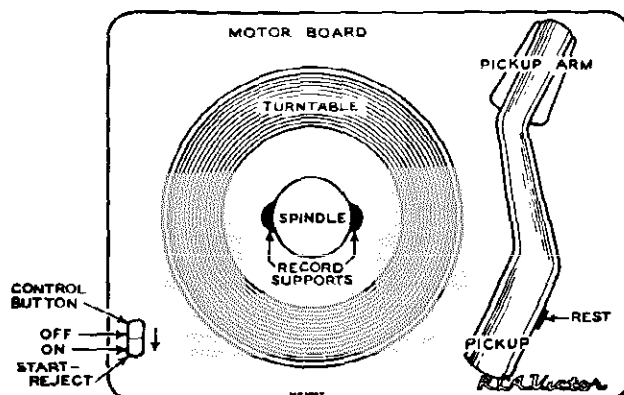
Pickup (RP-168—Stock No. 74625) (RP-190—Stock No. 75575)

.....Cryst

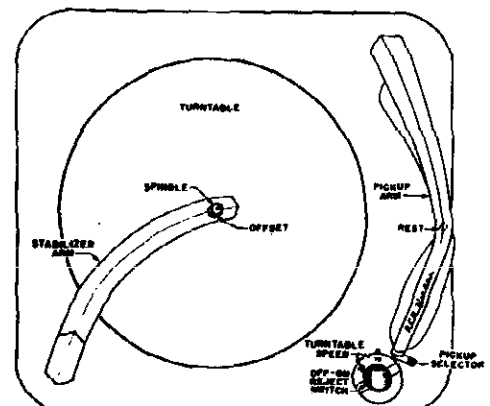
Record Changer 960284-1 or -2)

Turntable speed78 or 33 $\frac{1}{2}$ r.p.m.

Pickup (Stock No. 75475) Cryst



Top View—RP-190 Record Changer



Top View—960284 Record Changer

MODEL A-108,
Ch. RC-1096

ALIGNMENT PROCEDURE—CIRCUIT DESCRIPTION—LEAD DRESS

Alignment Procedure CORRECT ALIGNMENT OF THE FM BAND REQUIRES THAT THE AM BAND BE ALIGNED FIRST

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil.

The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Signal Generator:

For all alignment operations connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

Circuit Description

This instrument has a ten-tube (including rectifier) chassis which is very similar to those used in other RCA Victor radio-phonograph combinations designed for AM-FM reception.

The selector switch has five functions:

- (1) Selection of tuning range.
- (2) Selection and distribution of a-v-c voltages.
- (3) Application of B+ voltage to tubes.
- In "Phono 78/33" and "Phono 45" positions the B+ voltage is removed from tubes V1, V2, V3 and V4.
- (4) Selection of audio input applied to the volume control.
- (5) Change in output tube bias.

In Radio positions R6 is in parallel with R42.

This receiver has built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception.

Provision is made for the use of external antennas if desired.

Critical Lead Dress

Note: The leads listed may not be critical in all receivers. However, by dressing the leads as specified, unusual difficulties will be minimized.

1. The 2.2 meg mixer grid resistor (R10) should have a minimum practicable amount of lead extending on the grid end.
2. The first A.M. and first F.M. I.F. plate leads should be dressed away from the range switch wafer.
3. The ground strap between the R.F. shell and the main chassis should be well soldered and kept as short as practicable.
4. Arrange wiring to prevent the filament wire between the mixer (6J6) and 1st I.F. (6BA6) tubes from passing near either the mixer grid, or the A.V.C. wiring.
5. Dress filament wires away from all audio coupling condensers.
6. Dress A.C. power switch wires away from the audio coupling condenser (C20) which is wired to the volume control.
7. Dress the mixer grid coupling condenser (C7) away from the lugs on the front range switch wafer.
8. The 1st I.F. tube A.V.C. by-pass condenser (C16) should ground at the same point as the cathode neutralizing loop.
9. The driver tube plate and screen by-pass condensers (C27, C28) should ground at the same point as the neutralizing loop.
10. The mixer plate by-pass condenser (C15) should ground as close to the R.F. shelf ground strap as practicable.
11. The shielded audio leads connecting to the front function switch wafer should have a minimum of exposed lead on the function switch end.

AM Alignment

FUNCTION SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Stator of C1-4	455 KC	Quiet point at low freq. end.	† Bottom (sec.) & top (pri.) cores of T4 † Top (sec.) & bottom (pri.) cores of T2
2	AM ant. terminal thru 200 mmf.	1620 KC	Extreme high frequency end.	C1-2 trimmer (osc.)
3		1400 KC	1400 KC Signal	C1-4 trimmer (r. l.) C1-5 trimmer (ant.)
4		600 KC	600 KC Signal	† L5 (osc.) L7 (r. l.)
5	Repeat steps 2, 3 and 4			

† First peak T2 and T4 then starting with T4, use alternate loading. Connect a 47,000-ohm resistor across the primary to load the plate winding while the grid winding of the same transformer is being peaked. Then load the grid winding with the 47,000-ohm resistor while the plate winding is being peaked.

† With a 10,000-ohm resistor shunted across C1-4, peak the oscillator core L5, simultaneously "rocking" the gang condenser for maximum output. Then, remove the 10,000-ohm shunt resistor and peak L7 for maximum output.

FM Alignment

FUNCTION SWITCH IN FM POSITION—VOLUME CONTROL MAXIMUM

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mfd. capacitor C40 and the common lead to chassis. Adjust sig. gen. output to provide approx. —3 v. indication during alignment.			
2	Pin #1 of 6AU6 (V4) in series with .01 mf.	10.7 mc AM modulated	—	Top of driver trans. T5 for max. d-c voltage
3				† Bottom of driver trans. T5 for min. audio output
4	Repeat steps 2 and 3			
5	Thru 470 ohms to C1-3. Connect gnd. end of cable close to V2 cathode ground on r-f shelf	10.7 mc	88 mc	• Top (sec.) & bottom (pri.) cores of T3 • Top (sec.) & bottom (pri.) cores of T3
6	To FM antenna terminals thru 120 ohms in each side of line	90 mc	90 mc	L8 (osc.)
7		106 mc	106 mc Signal	C1-6 trimmer (ant.) and C1-3 trimmer (r. l.)
8		90 mc	90 mc Signal	L1 (ant.) and L2 (r. l.)
9	Repeat steps 6, 7 and 8			
10	Connect a sweep generator to the antenna terminals thru 120 ohms in each side of line. Connect an oscilloscope to junction of R44 and C41 to check response and linearity of FM band. Peak to peak separation should not be less than 160 kc.			

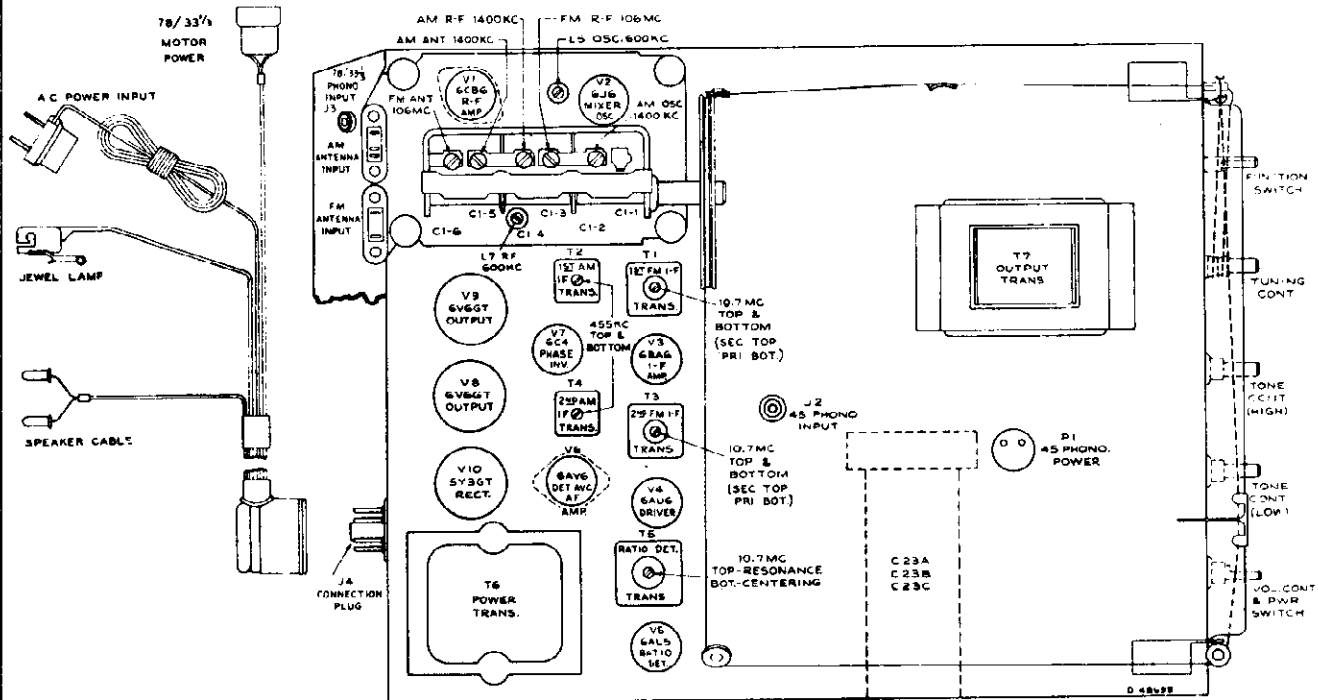
† Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

* Use a 680 ohm resistor to load the plate winding while the grid winding of the same trans. is being peaked. Then the grid winding is loaded with the 680 ohm resistor while the plate winding is being peaked. When windings are loaded, it is necessary to increase the 10.7 mc input to maintain the —3 volts indication.

L8, L1 and L2 are adjustable by increasing or decreasing the spacing between turns. Oscillator signal tracks above signal frequency.

MODEL A-108,
Ch. RC-1096

TUBE AND TRIMMER LOCATIONS—VOLTAGE DATA



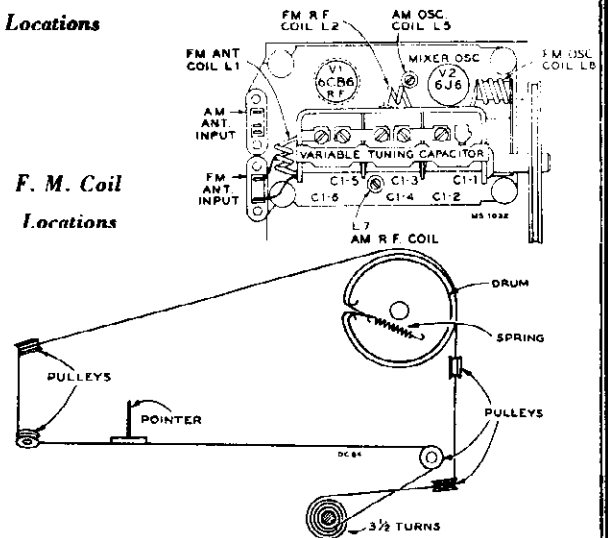
Tube and Trimmer Locations

Socket Voltages

Voltages measured with Chanalyst or VoltOhmyst and should hold within $\pm 20\%$ with rated line voltage. Tuning condenser closed—no signal input.

Tube	Terminal	Voltage			
		Phono	A.M.	F.M.	
V1 6CB6 R.F. Amp.	Plate	5	203	132	
	Screen	6	48	39	
	Cathode	2	0.2	0.2	
	Grid	1	-1.1	-0.9	
V2 6J6 Mixer and Osc.	Plate	2	55	51	
	Grid	5	-1.4	-1.2	
	Plate	1	33	27	
	Grid	6	-2.1	-1.9	
V3 6BA6 I.F. Amp.	Plate	5	192	198	
	Screen	6	106	101	
	Cathode	7	0.9		
	Grid	1	-1.1	-0.35	
V4 6AU6 Driver	Plate	5	186	180	
	Screen	6	122	120	
	Cathode	7	1.05	1.07	
V5 6AL5 Ratio Det.	—	—	—	—	
V6 6AV6 A.F. Amp.	Plate	7	112	94	
	Grid	1	-0.7	-0.7	
V7 6C4 Ph. Inverter	Plate	1-5	125	87	
	Grid	6	-19.2	-16	
	Cathode	7	-11.1	-11.4	
V8 6V6GT or Output V9	Plate	3	305	295	
	Screen	4	299	208	
	Grid	5	-19.2	-16	
V10 5Y3GT Rectifier	Filament	2	314	313	

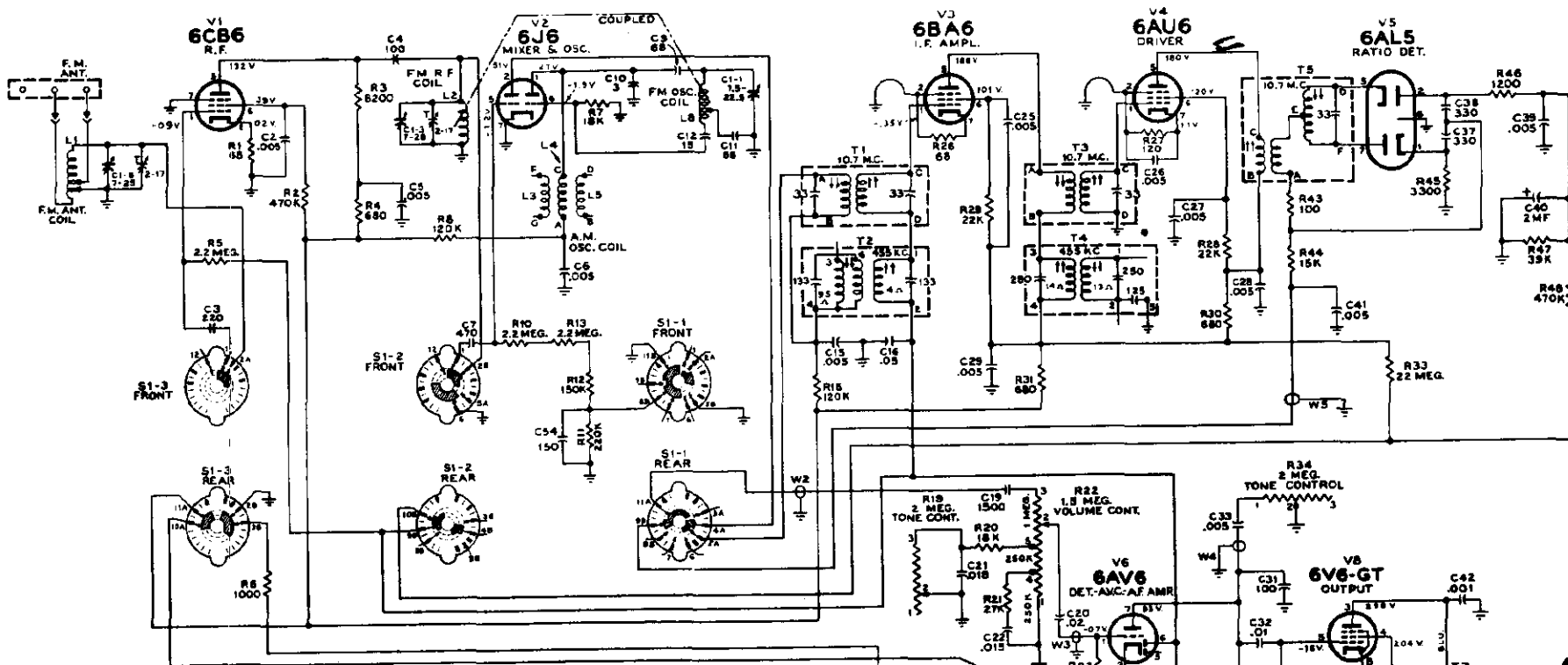
F. M. Coil
Locations



Dial Cord and Drive Assembly

Cathode Currents (Ma.)

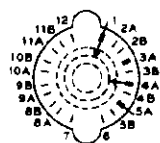
Tube	Terminal	Phono	A.M.	F.M.
V1 6CB6	2	—	3	3
V2 6J6	7	—	2.6	2.6
V3 6BA6	7	—	13.2	14.7
V4 6AU6	7	—	9.3	9
V5 6AL5	1 & 5	—	—	—
V6 6AV6	2	0.8	0.5	0.5
V7 6C4	7	2.2	1.5	1.5
V8 6V6GT	8	35.6	17.8	17.7
V9 6V6GT	8	35.6	17.8	17.7
10 5Y3GT	2	74.2	73.6	74.2



SIMPLIFIED SCHEMATIC DIAGRAM—"FM"

Selector Switch

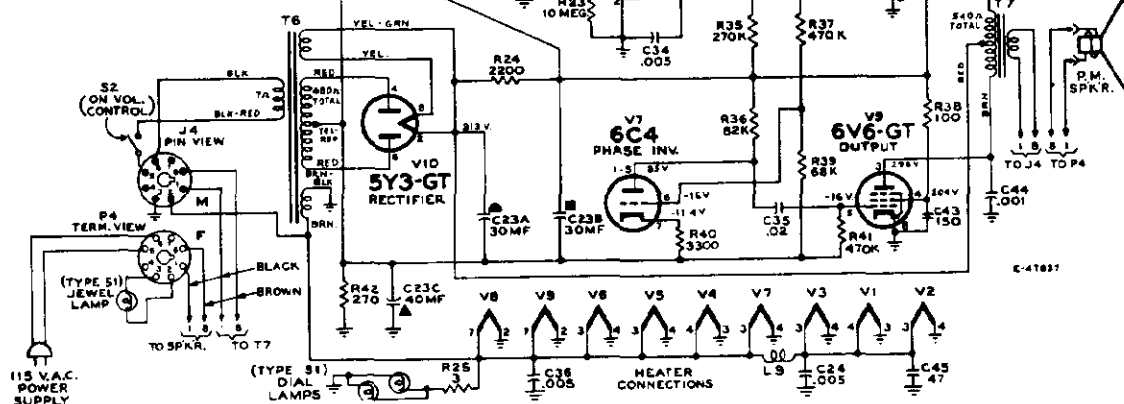
SELECTOR SWITCH



- CONTACT ON SIDE SHOWN
- CONTACT ON REVERSE SIDE
- NO CONTACT EITHER SIDE
- UNUSED CONTACT
- DUMMY TERMINAL

Switch contacts #2, 3, 4, 5, 8, 9, 10 and 11 have alternate positions designated as "A" and "B." Either 2A or 2B (but not both) may be used on "FRONT" of a switch wafer. Either (but not both) may be used on "REAR" of a switch wafer. Either may be used on both "FRONT" and "REAR." This also applies to contacts #3, 4, 5, 8, 9, 10 and 11.

Switch contacts #1, 6, 7 and 12 do not have alternate positions.



Function switch viewed from front and shown in "FM" position (max. clockwise).

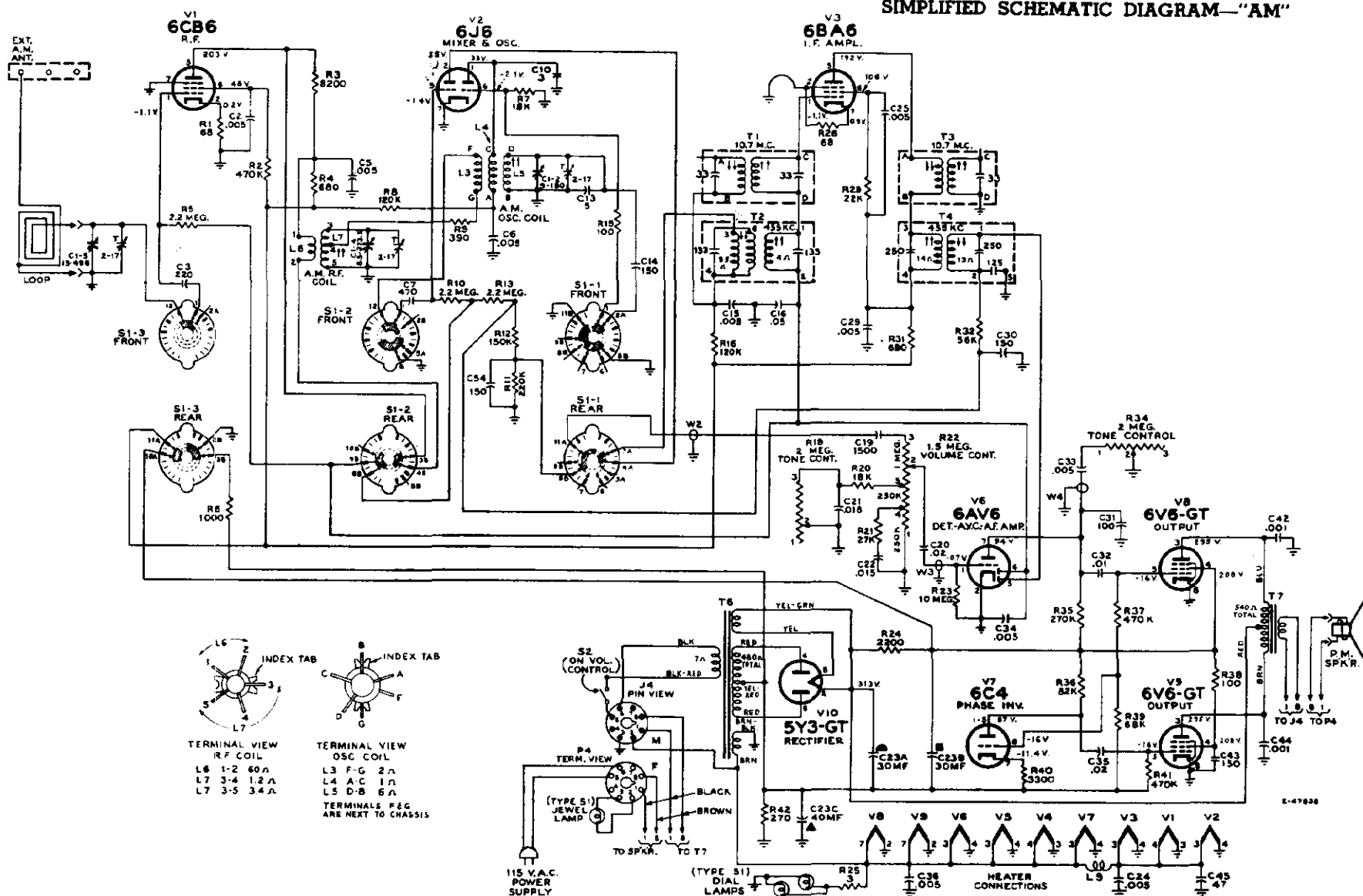
CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED.

RESISTANCE VALUES IN OHMS. K = 1000.

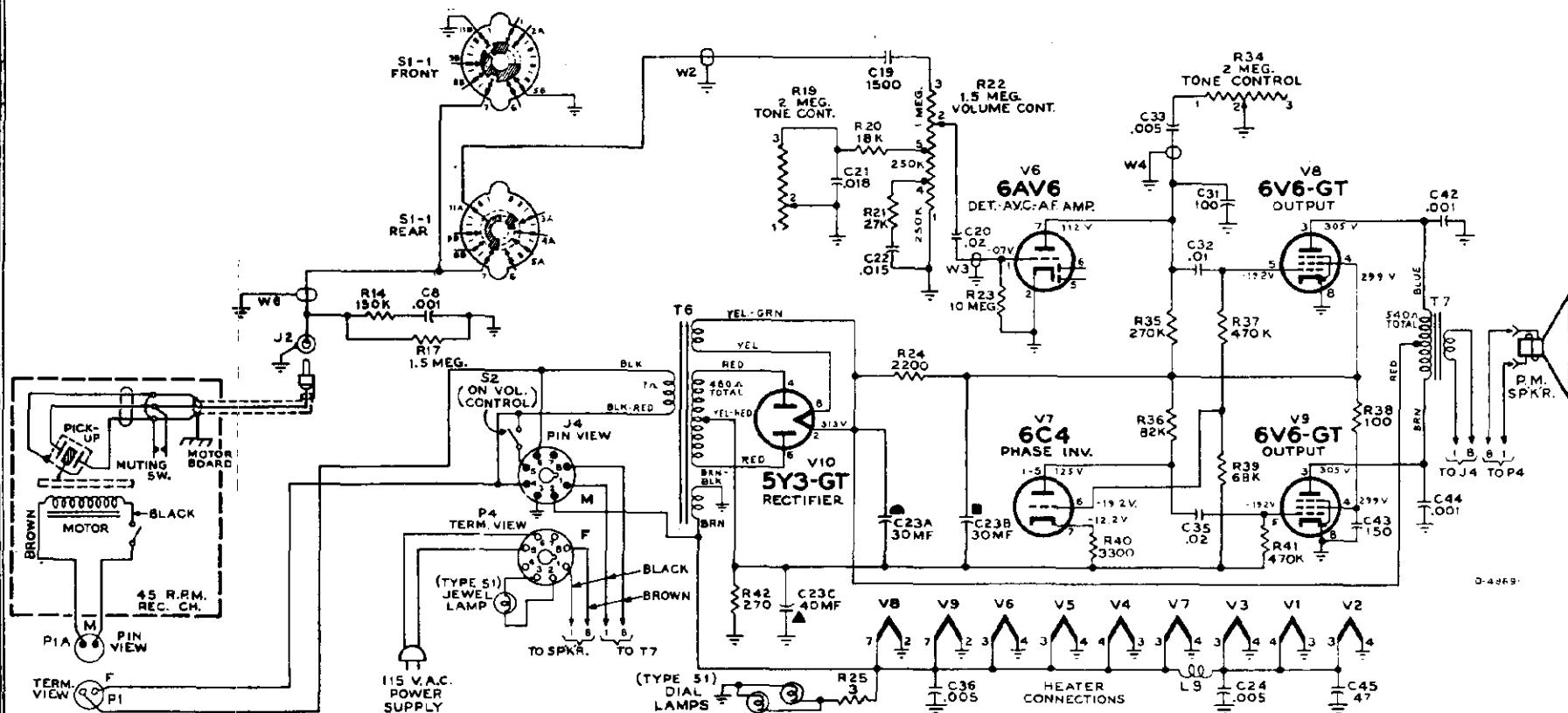
VOLTAGES MEASURED TO CHASSIS WITH VOLTORMYST WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN $\pm 20\%$ WITH 117-VOLT POWER SUPPLY.

MODEL A-108,
Ch. RC-1096

SIMPLIFIED SCHEMATIC DIAGRAM—"AM"



SIMPLIFIED SCHEMATIC DIAGRAM—"45"



Note:

When the function switch is in "Phono 45" or "Phono 78/33" position the B+ supply voltage to tubes V1, V2, V3 and V4 is disconnected at switch section S1-3 rear. This results in higher plate and screen voltages on V6, V7, V8 and V9.

The bias resistor R6 (in parallel with R42 in AM and FM positions) is also disconnected at S1-3 rear. This results in higher grid bias voltage on V8 and V9.

FUNCTION SWITCH VIEWED FROM FRONT AND SHOWN IN "PHONO 45" POSITION (#2 CLOCKWISE).

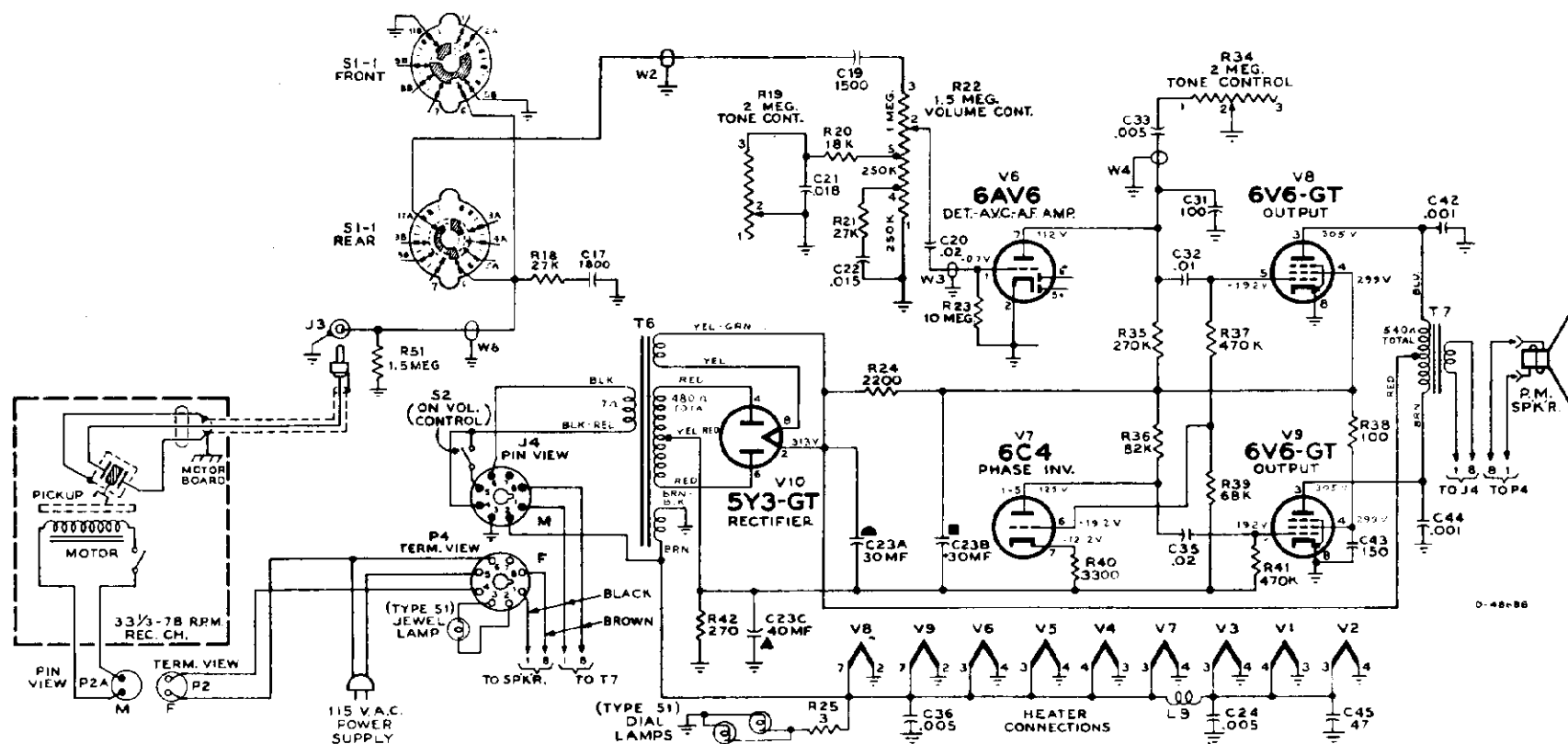
CAPACITOR VALUES LESS THAN 1 ARE IN MF. VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED.

RESISTANCE VALUES IN OHMS. K = 1000.

VOLTAGES MEASURED TO CHASSIS WITH VOLTOHMYST WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN $\pm 20\%$ WITH 117-VOLT POWER SUPPLY.

Simplified Schematic Diagram—"Phono 45"

SIMPLIFIED SCHEMATIC DIAGRAM—"78/33"



Note:

When the function switch is in "Phono 45" or "Phono 78/33" position the B+ supply voltage to tubes V1, V2, V3 and V4 is disconnected at switch section S1-3 rear. This results in higher plate and screen voltages on V6, V7, V8 and V9.

The bias resistor R6 (in parallel with R42 in AM and FM positions) is also disconnected at S1-3 rear. This results in higher grid bias voltage on V8 and V9.

FUNCTION SWITCH VIEWED FROM FRONT AND SHOWN IN "PHONO 78/33" POSITION (MAX. C/CLOCKWISE).

CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED.

RESISTANCE VALUES IN OHMS. K = 1000.

VOLTAGES MEASURED TO CHASSIS WITH VOLTOHMYST WITH NO SIGNAL INPUT AND SHOULD HOLD WITHIN $\pm 20\%$ WITH 117-VOLT POWER SUPPLY.

Simplified Schematic Diagram—"Phono 78/33"

MODEL A-108,
Ch. RC-1096

MISC. SERVICE INFORMATION—REPLACEMENT PARTS

Record Changer Mounting

Each record changer is mounted in a roll-out carriage. The changer mechanisms are mounted on rubber grommets (45 r.p.m.) or springs (78/33 r.p.m.) and should be free floating.

Two shipping screws hold the 45 r.p.m. changer to its roll-out carriage. They are accessible from the under-side of the carriage and should be REMOVED at time of installation.

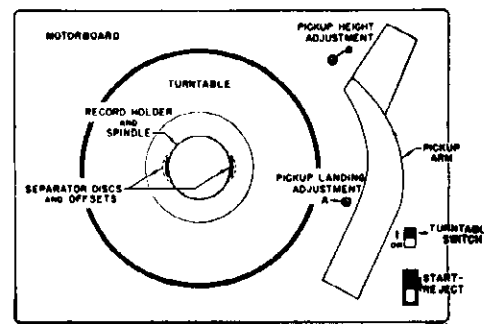
Two shipping screws hold the 78/33 r.p.m. changer to its roll-out carriage. They are accessible after the turntable is lifted off and should be LOOSENEED at time of installation.

Roll-out Carriage Removal

Each roll-out carriage has two stop pins, (one at the back end of each slide) held in place by retaining spring. To remove roll-out carriage, it is first necessary to pull the retaining springs out of the slides with a pair of long nose pliers, the stop pins are then easily removed. The roll-out carriage may then be removed from the front of the cabinet after disconnecting its connecting cables.

Roll-out Carriage Travel

The roll-out carriages have a normal movement limitation of approximately 10 inches. If they do not have this amount of movement, it may be due to an obstruction or from slippage or creeping of the balls of the slide mechanism. Travel restriction due to slippage or creeping of balls in the slide mechanism can be corrected by exerting slightly greater pull until the normal travel limitation is reached. The carriage should then operate to its full travel with normal pull.



Top View—RP 168 Record Changer

Adjustments

1. PICKUP LANDING—Turn screw "A" slightly to right (clockwise) if landing is on music grooves, or to left if too near edge of record.

2. PICKUP HEIGHT—Turn screw "B" slightly to right (clockwise) if for change cycle pickup does not lift up from as many as ten records on turntable, or to left if when lifting, pickup hits records on spindle. Correct height is $\frac{3}{4}$ " from turntable to pickup point at maximum.

Replacement Parts

STOCK NO.	DESCRIPTION	STOCK NO.	DESCRIPTION
	CHASSIS ASSEMBLIES RC 1096		
75567	Capacitor—Variable tuning capacitor complete with drive drum (C1-1, C1-2, C1-3, C1-4, C1-5, C1-6)	75542	Connector—8 contact male connector for power input cable (J4)
74733	Capacitor—Ceramic, 3 mmf. (C10)	75543	Connector—2 contact female connector for 45 RPM motor cable (P1)
75613	Capacitor—Ceramic, 5 mmf. (C13)	74879	Connector—2 contact female connector for antenna leads
39044	Capacitor—Ceramic, 15 mmf. (C12)	75537	Control—Volume control and power switch (R22, S2)
75609	Capacitor—Ceramic, 47 mmf. (C45)	75561	Control—Tone control—L.F. (R19)
75612	Capacitor—Ceramic, 68 mmf. (C9, C11)	75562	Control—Tone control—H.F. (R34)
39396	Capacitor—Ceramic, 100 mmf. (C4)	72953	Cord—Drive cord (approx. 66" overall length required)
75437	Capacitor—Ceramic, 100 mmf. (C31)	75564	Coupling—Spring coupling for function switch extension shaft
75614	Capacitor—Ceramic, 150 mmf. (C14, C30, C43, C54)	75558	Cover—Insulating cover for electrolytic capacitor #72052
75611	Capacitor—Ceramic, 220 mmf. (C3)	74839	Fastener—Push fastener for mounting R.F. shelf (4 req'd)
39640	Capacitor—Mica, 330 mmf. (C37, C38)	16058	Grommet—Rubber grommet for mounting R.F. shelf (4 req'd)
39644	Capacitor—Mica, 470 mmf. (C7)	75547	Grommet—Rubber grommet to mount slide mechanism to bottom—rear (2 req'd)
75610	Capacitor—Ceramic, 1500 mmf. (C19)	75548	Grommet—Rubber grommet to mount slide mechanism to bottom—front (2 req'd)
74850	Capacitor—Ceramic, 1800 mmf. (C17)	11765	Lamp—Dial lamp—Mazda 51
73473	Capacitor—Ceramic, 5000 mmf. (C2, C5, C6, C15, C24, C25, C27, C28, C29, C34, C36)	75544	Nut—Rivnut to fasten screw for mounting chassis (4 req'd)
73801	Capacitor—Tubular, paper, .001 mfd, 400 volts (C8)	18469	Plate—Bakelite mounting plate for electrolytic capacitor #72052
70642	Capacitor—Tubular, paper, .001 mfd, 1000 volts (C42, C44)	75535	Plate—Dial back plate complete with three (3) pulleys
71926	Capacitor—Tubular, paper, .005 mfd, 200 volts (C26, C39, C41)	75536	Pointer—Station selector indicator
73920	Capacitor—Tubular, paper, .005 mfd, 400 volts (C39)	72602	Pulley—Drive cord pulley
71925	Capacitor—Tubular, paper, .01 mfd, 400 volts (C32)	72323	Resistor—Wire wound, 3 ohms, $\frac{1}{2}$ watt (R25)
72120	Capacitor—Tubular, paper, .015 mfd, 200 volts (C22)	73637	Resistor—Wire wound, 2200 ohms, 5 watts (R24)
58476	Capacitor—Tubular, paper, oil impregnated, .018 mfd, 400 volts (C21)		Resistor—Fixed, composition:—
74010	Capacitor—Tubular, paper, .02 mfd, 400 volts (C20, C35)		68 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R1, R26)
73553	Capacitor—Tubular, paper, .05 mfd, 400 volts (C18)		100 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R15, R38, R43)
73747	Capacitor—Electrolytic 2 mfd, 50 volts (C40)		120 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R27)
72052	Capacitor—Electrolytic comprising 1 section of 30 mfd, 450 volts, 1 section of 30 mfd, 350 volts and 1 section of 40 mfd, 25 volts (C23A, C23B, C23C)		270 ohms, $\pm 5\%$, 2 watts (R42)
73935	Clip—Mounting clip for A-M, I-F transformers		390 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R9)
75627	Clip—Clip for main cable—on rear of chassis		680 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R4)
75569	Coil—Oscillator coil (A-M) complete with adjustable core (L3, L4, L5)		680 ohms, $\pm 20\%$, $\frac{1}{2}$ watt (R30, R31)
75570	Coil—R.F. coil complete with adjustable core (L6, L7)		1000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R6)
71942	Coil—Filament choke coil (L9)		1200 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R46)
75615	Coil—Antenna coil—F-M (L1)		3300 ohms, $\pm 5\%$, $\frac{1}{2}$ watt (R40, R45)
74815	Coil—R.F. coil—F-M (L2)		8200 ohms, $\pm 10\%$, 1 watt (R3)
74817	Coil—Oscillator coil—F-M (L8)		15,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R44)
35787	Connector—Single contact female connector for phono cables (J2, J3)		18,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R7, R20)
			22,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R28, R29)
			27,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R18, R21)

† Stock No. 72953 is a reel containing 250 feet of cord.

STOCK NO.	DESCRIPTION	STOCK NO.	DESCRIPTION
	39,000 ohms, ±5%, ½ watt (R47)		MISCELLANEOUS
	56,000 ohms, ±10%, ½ watt (R32)	71864	Antenna—F-M antenna
	68,000 ohms, ±10%, ½ watt (R39)	75705	Antenna—Antenna loop complete less cable
	82,000 ohms, ±10%, ½ watt (R36)	75898	Back—Back cover—maroon—for 33⅓/78 RPM record changer compartment—for mahogany or walnut instruments (assembled to rollout)
	120,000 ohms, ±10%, ½ watt (R8, R16)	75899	Back—Back cover—light brown—for 33⅓/78 RPM record changer compartment—for oak instruments (assembled to rollout)
	150,000 ohms, ±10%, ½ watt (R12, R14)	75903	Back—Back cover—maroon—for radio—45 RPM record changer compartment—for mahogany or walnut instruments (assembled to rollout)
	220,000 ohms, ±20%, ½ watt (R11)	75904	Back—Back cover—light brown—for radio—45 RPM record changer compartment—for oak instruments (assembled to rollout)
	270,000 ohms, ±10%, ½ watt (R35)		Board—"A-F-M" terminal board
	470,000 ohms, ±10%, ½ watt (R2, R37, R41, R48)	73680	Bracket—Stop bracket (less rubber bumper) for rollouts
	1.5 megohm, ±10%, ½ watt (R17, R51)	75694	Bracket—Pilot lamp bracket
	2.2 megohm, ±20%, ½ watt (R5, R10, R13)	75696	Bumper—Rubber bumper for record changer rollout stop bracket
	10 megohm, ±20%, ½ watt (R23)	75819	Button—Rosette button for speaker grille
	22 megohm, ±20%, ½ watt (R33)	74296	Cable—Shielded pickup cable complete with pin plug for 33⅓/78 RPM record changer
75540	Shaft—Tuning knob shaft	72437	Cable—Shielded pickup cable complete with pin plug for 45 RPM record changer
75565	Shaft—Extension shaft for function switch	13103	Cap—Pilot lamp cap
73594	Shield—Tube shield for V1 and V6	71892	Catch—Bullet catch and strike for cabinet door
75546	Slide—Slide mechanism complete for radio chassis bottom	X3144	Cloth—Grille cloth for mahogany or walnut instruments
31251	Socket—Tube socket, octal, water	X3089	Cloth—Grille cloth for oak instruments
73117	Socket—Tube socket, 7 pin, miniature	74892	Connector—2 contact (polarized) male connector for antenna loop cable
74178	Socket—Tube socket, 7 pin, miniature for 6CB6 and 6J6 tubes only.	74752	Connector—2 contact male connector for FM antenna terminal board cable
31364	Socket—Dial lamp socket	75709	Connector—8 contact female connector for main cable (less shell) (P4)
75563	Spring—Retaining spring for function switch extension shaft	30868	Connector—2 contact female connector for 33⅓/78 RPM record changer motor cable (P2)
74038	Spring—Drive cord spring	75474	Connector—Single contact male connector for speaker cable (2 req'd)
74847	Support—Polystyrene support for F-M oscillator coil complete with mounting bracket	71894	Decal—Trade mark decal (RCA Victor)
75602	Switch—Function switch (S1-1, S1-2, S1-3)	74273	Decal—Trade mark decal (Victrola)
75557	Transformer—Output transformer (T7)	74838	Grommet—Power cord strain relief (1 set)
73743	Transformer—Ratio detector transformer (T5)	37396	Grommet—Rubber grommet for mounting speaker
75558	Transformer—First I-F transformer (A-M) complete with adjustable cores (T2)	75697	Grommet—Rubber grommet for mounting 45 RPM changer
73037	Transformer—Second I-F transformer (A-M) complete with adjustable cores (T4)	75551	Handle—Metal pullout handle for 33⅓/78 RPM record changer mounting frame
75559	Transformer—First I-F transformer (F-M) complete with adjustable cores (T1)	74308	Hinge—Cabinet door hinge (1 set)
75560	Transformer—Second I-F transformer (F-M) complete with adjustable cores (T3)	75712	Knob—Tuning control, tone control or volume control and power switch knob—maroon—for mahogany or walnut instruments
75566	Transformer—Power transformer, 117 volts, 60 cycle (T6)	75713	Knob—Tuning control, tone control or volume control and power switch knob—tan—for oak instruments
33726	Washer—"C" washer for tuning knob shaft	75714	Knob—Function switch knob—maroon—for mahogany or walnut instruments
	RADIO ROLLOUT CARRIAGE	75715	Knob—Function switch knob—tan—for oak instruments
75603	Decal—Function decal for controls	11765	Lamp—Pilot lamp—Mazda #51
75572	Dial—Polystyrene dial scale	75894	Nut—Speed nut for 33⅓/78 RPM record changer mounting screw
75571	Frame—Moulded frame (maroon) for mounting radio chassis and 45 RPM record changer—for mahogany or walnut instruments	73634	Nut—Speed nut for speaker mounting screw
75684	Frame—Moulded frame (light brown) for mounting radio chassis and 45 RPM record changer—for oak instruments	75438	Pull—Door pull for upper part of door
75531	Handle—Metal pullout handle for mounting frame	75918	Pull—Door pull for center of door
75555	Screw—#8-32 x ¾" cross recessed pan head machine screw to mount radio chassis (4 req'd)	75907	Screw—#10-32 x 5¼" cross recessed round head special screw to mount 45 RPM record changer
	SPEAKER ASSEMBLY	75883	Screw—#10-24 x ½" round head machine screw for mounting 33⅓/78 RPM record changer
	Stamped 92588--12W RMA 274	75626	Screw—#8-32 x 1¼" trimit head screw for door pull
	RL 111-A1	75708	Shell—Shell for 8 contact female connector #75708
13887	Cap—Dust cap	75546	Slide—Slide mechanism for 33⅓/78 RPM record changer mounting frame
75682	Cone—Cone and voice coil assembly (3.2 ohms)	31364	Socket—Pilot lamp socket and lead
75681	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms)	74734	Spring—Retaining spring for knobs
	NOTE:—If stamping on speaker does not agree with above number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.	75902	Spring—Suspension spring for main cable
		72936	Stop—Cabinet door stop

MODEL 45-W-9,
Ch. RC-1095-A



PH571

FOR RECORD CHANGER SERVICE INFORMATION REFER
TO RP 190 SERIES SERVICE DATA. on Pages RCD.CH.21-1 through RCD.CH.21-11.

Specifications

Tuning Range

Standard Broadcast (AM) 540-1,600 kc.
Frequency Modulation (FM) 88-108 mc.
Intermediate Frequencies AM—455 kc., FM—10.7 mc.

Tube Complement

- (1) RCA 6J8 Mixer and Oscillator
- (2) RCA 6BA6 I-F Amplifier
- (3) RCA 6AU6 Driver
- (4) RCA 6AL5 Ratio Detector
- (5) RCA 6AV6 AM Det.—AVC—A-F Amplifier
- (6) RCA 6C4 Ph. Inv.
- (7) RCA 6V6GT Output
- (8) RCA 6V6GT Output
- (9) RCA 5Y3GT Rectifier

Dial Lamps (2) Type No. 51, 6-8 volts, 0.2 amp.
Jewel Lamp Type No. 51, 6-8 volts, 0.2 amp.

Tuning Drive Ratio 10:1 (5 turns of knob)

Power Supply Rating 115 volts, 60 cycles, 95 watts

Loudspeaker (92569-12W)

Size and type 12 in. PM
Voice coil impedance 3.2 ohms at 400 cycles

Power Output

(Radio) Undistorted 8 watts Maximum 9 watts
(Phono) Undistorted 10 watts Maximum 11 watts

Cabinet Dimensions

Height 32 in. Width 29 1/4 in. Depth 19 1/4 in.
Weight 90 lbs.

Record Changer (RP 190-2)

Turntable speed 45 r.p.m.
Record capacity 12 RCA 7-in. fine groove records
Pickup (Stock No. 75575) Crystal (medium output)

Circuit Description

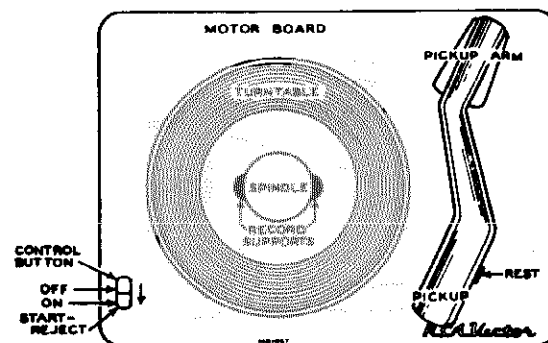
This instrument has a nine-tube (including rectifier) chassis which is very similar to those used in other RCA Victor radio-phonograph combinations designed for AM-FM reception.

The selector switch has five functions:

- (1) Selection of tuning range.
- (2) Selection and distribution of a.v.c. voltages.
- (3) Application of B+ voltage to tubes V1, V2 and V3.
In "Phono" and "Aux." positions, the B+ voltage is removed from tubes V1, V2 and V3.
- (4) Selection of audio input applied to the volume control.
- (5) Change in output tube bias.

In "Radio" positions, R6 is in parallel with R42.

This receiver has built-in antennas for standard broadcast (AM) and frequency modulation (FM) reception. Provision is made for the use of external antennas if desired.



Top View—RP 190 Record Changer

MODEL 45-W-9,
Ch. RC-1095-A

ALIGNMENT PROCEDURE — LEAD DRESS

Alignment Procedure

CORRECT ALIGNMENT OF THE FM BAND REQUIRES THAT THE AM BAND BE ALIGNED FIRST

Alignment Indicators:

An RCA VoltOhmyst or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate minimum audio output during FM Ratio Detector alignment. Connect the output meter across the speaker voice coil.

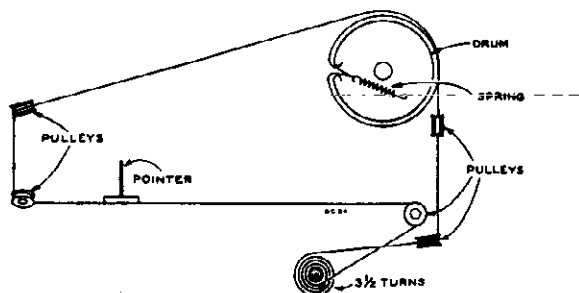
The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure a-v-c voltage.

When audio output is being measured the volume control should be turned to maximum.

Critical Lead Dress

The items listed below may not appear to be critical in all receivers. However, by dressing the leads as specified it is believed that difficulties will be minimized.

1. The 2.2 meg mixer grid (R10) resistor should have a minimum practicable amount of lead extending on the grid end.
2. The first A.M. and first F.M. I.F. plate leads should be dressed away from the range switch wafer.
3. The ground strap between the R.F. shelf and the main chassis should be well soldered and kept as short as practicable.
4. Arrange wiring to prevent the filament wire between the mixer (6J6) and 1st I.F. (6BA6) tubes from passing near either the mixer grid, or the A.V.C. wiring.
5. Dress filament wires away from the 1st audio (6AV6) and inverter (6C4) tube audio coupling condensers.
6. Dress A.C. power switch wires away from the audio coupling condenser (C20) which is wired to the volume control.
7. Dress the mixer grid coupling condenser (C7) away from the lugs on the front range switch wafer.
8. The 1st I.F. tube A.V.C. by-pass condenser (C16) should ground at the same point as the cathode neutralizing loop.
9. The driver tube plate and screen by-pass condensers (C28, C27) should ground at the same point as the neutralizing loop.
10. The mixer plate by-pass condenser (C15) should ground as close to the R.F. shelf ground strap as practicable.
11. The shielded audio leads connecting to the front function switch wafer should have a minimum of exposed lead on the function switch end.



Dial Indicator and Drive Mechanism

Signal Generator:

For all alignment operations connect the low side of the signal generator to the receiver chassis. The output should be adjusted to provide accurate resonance indication at all times. If output measurement is used for AM alignment the output of the signal generator should be kept as low as possible to avoid a-v-c action.

AM Alignment

FUNCTION SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to	Adjust for max. output
1	Stator of C1-4 in series with .01 mf.	455 kc	Quiet point at low freq. end.	†Bottom (sec.) and top (pri.) cores of T4. †Top (sec.) and bottom (pri.) cores of T2.
2	AM ant. terminal through 200 mmf.	1620 kc	Extreme high frequency end.	C1-2 trimmer (osc.).
3		1400 kc.	1400 kc signal.	C1-4 trimmer (ant.).
4		600 kc.	600 kc. signal.	L5 (osc.). Rock gang.
5	Repeat steps 2, 3 and 4.			

†First peak T2 and T4 then starting with T4, use alternate loading. Connect a 47,000-ohm resistor across the primary to load the plate winding while the grid winding of the same transformer is being peaked. Then load the grid winding with the 47,000-ohm resistor while the plate winding is being peaked.

FM Alignment

RANGE SWITCH IN FM POSITION — VOLUME CONTROL MAXIMUM

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Connect the d-c probe of a VoltOhmyst to the negative lead of the 2 mfd. capacitor C40 and the common lead to chassis. Adjust sig. gen. output to provide approx. —3 v. indication during alignment.			
2	Pin No. 1 of 6AU6 (V3) in series with .01 mf.	10.7 mc. AM modulated.	—	Top of driver trans. T3 for max. d.c. voltage.
3				†Bottom of driver trans. T5 for min. audio output.
4	Repeat steps 2 and 3.			
5	To FM antenna terminals thru 120 ohms in each side of line.	10.7 mc.	Low frequency end.	*Top (sec.) and bottom (pri.) cores of T3. *Top (sec.) and bottom (pri.) cores of T1.
6		90 mc.	90 mc.	**L8 (osc.).
7		106 mc.	106 mc.	C1-3 trimmer (ant.).
8		90 mc.	90 mc. signal.	**L1 (ant.). Rock gang.
9	Repeat steps 7 and 8.			

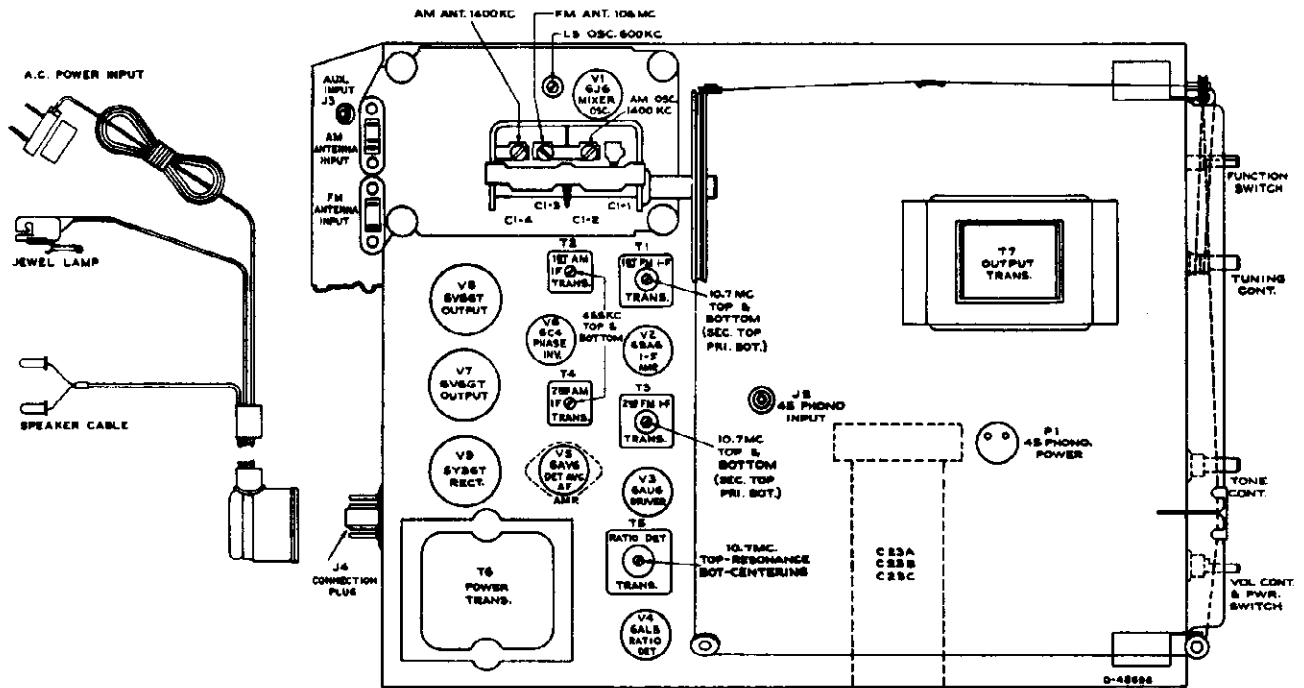
†Two or more points may be found which lower the audio output. At the correct point the minimum audio output is approached rapidly and is much lower than at any incorrect point.

*Align T3 and T1 by means of alternate loading as explained under AM alignment. Use a 680-ohm resistor instead of a 47,000-ohm resistor and load the FM windings.

**L1 and L8 are adjustable by increasing or decreasing the spacing between turns.

MODEL 45-W-9,
Ch. RC-1095-A

TUBE AND TRIMMER LOCATIONS—VOLTAGE DATA

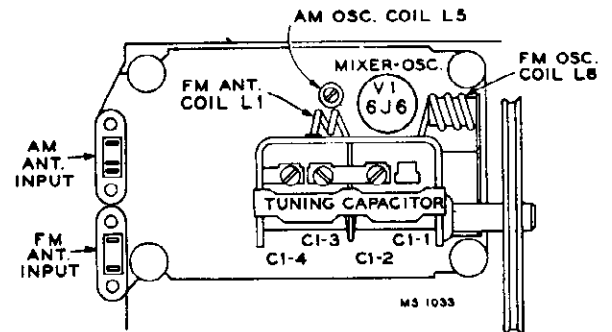


Tube and Trimmer Locations

Socket Voltages

Voltages measured to chassis with VoltOhmyst with no signal input and should hold within $\pm 10\%$ with 117 volt power supply.

Tube	Terminal	Voltage		
		Phono	AM	FM
V1 6J6 Mixer and Oscillator	Plate 2	—	58	53
	Grid 5	—	-1.5	-1.3
	Plate 1	—	35	29
	Grid 6	—	-2.2	-2.0
V2 6BA6 I.F. Amp.	Plate 5	—	197	193
	Screen 6	—	112	104
	Cathode 7	—	0.67	0.77
	Grid 1	—	-1.2	-0.35
V3 6AU6 Driver	Plate 5	—	193	189
	Screen 6	—	125	123
	Cathode 7	—	1.1	1.1
V4 6AL5 Ratio Det.	—	—	—	—
V5 6AV6 A. F. Amp.	Plate 7	112	95	95
	Grid 1	-0.7	-0.7	—
V6 6C4 Ph. Inv.	Plate 1-5	125	90	90
	Cathode 7	-12.2	-11	-11
	Grid 6	-19.2	-15.6	-15.6
V7 6V6GT or Output V8	Plate 3	305	295	295
	Screen 4	299	214	212
	Grid 5	-19.2	-15.4	-15.4
V9 5Y3GT Rectifier	Filament 2	314	301	301



FM Coil Locations

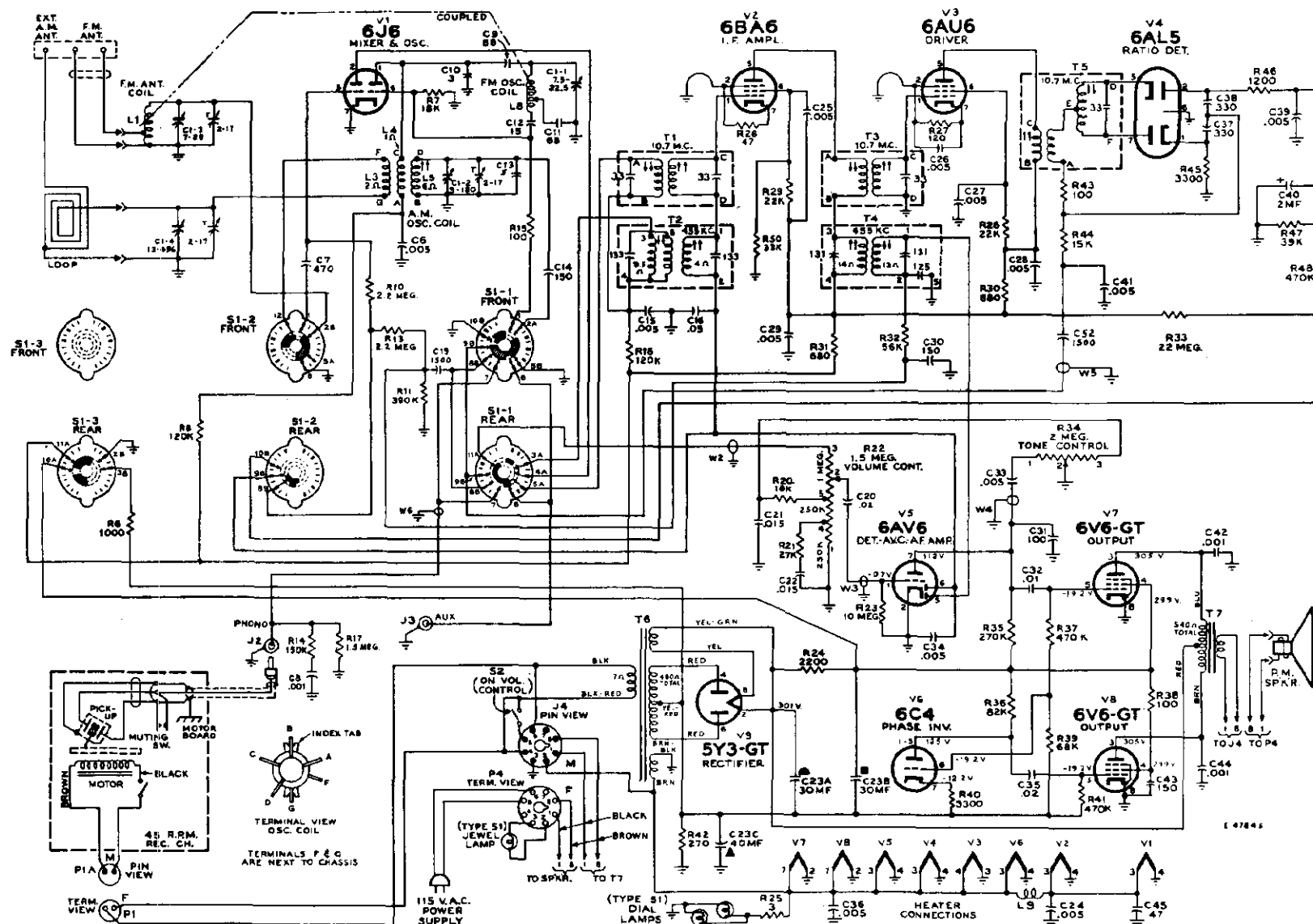
Cathode Currents (Ma.)

Tube	Terminal	Phono	AM	FM
V1 6J6	7	—	2.8	2.8
V2 6BA6	7	—	16.6	16.5
V3 6AU6	7	—	9.4	9.3
V4 6AL5	1 & 5	—	—	—
V5 6AV6	2	0.8	0.5	0.5
V6 6C4	7	2.2	1.5	1.5
V7 6V6GT	8	35.6	18.6	18.5
V8 6V6GT	8	35.6	18.6	18.5
V9 5Y3GT	2	74.2	72.5	71.7

MODEL 45-W-9;
Ch. RC-1095-A

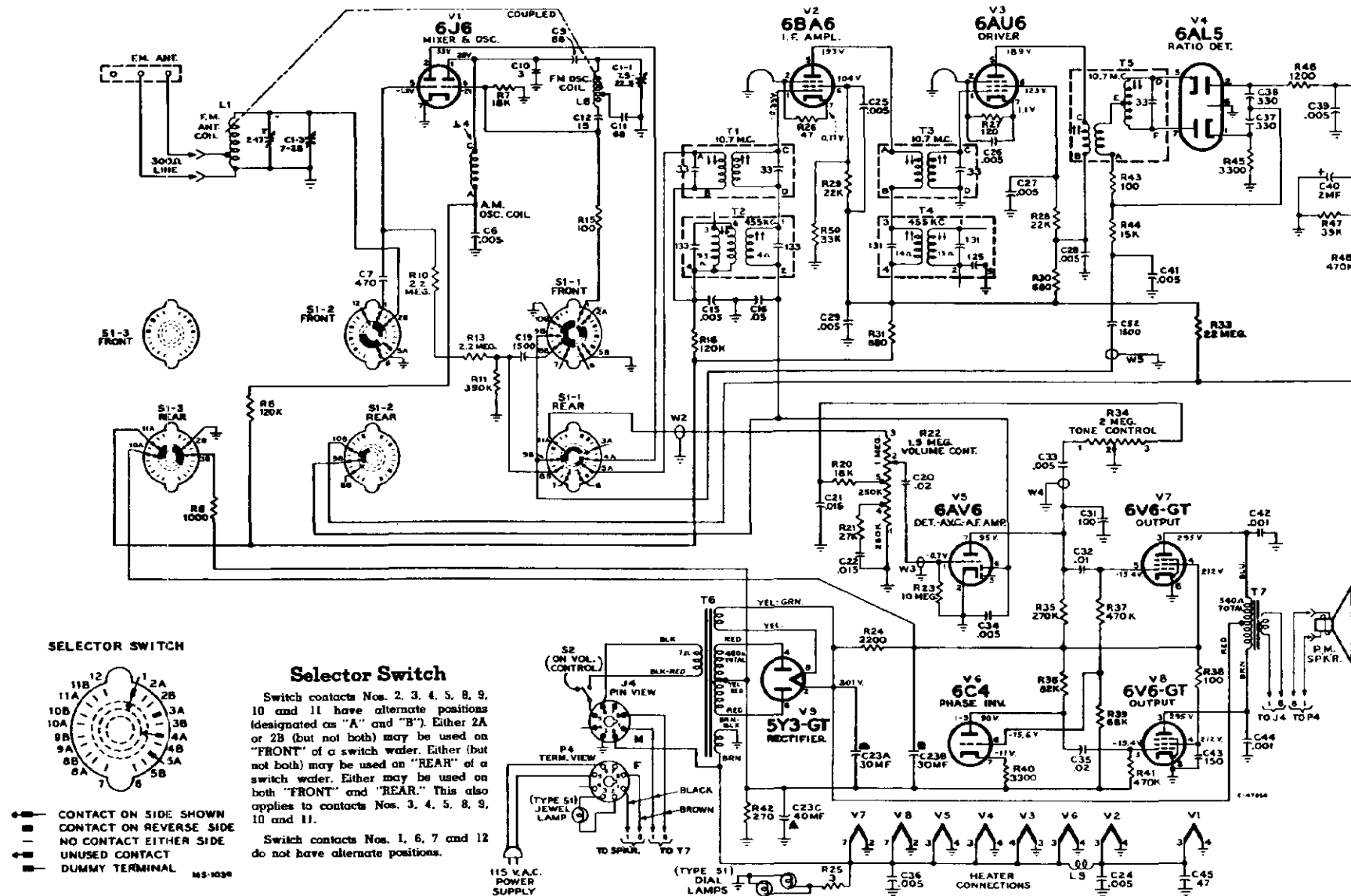
COMPLETE SCHEMATIC DIAGRAM

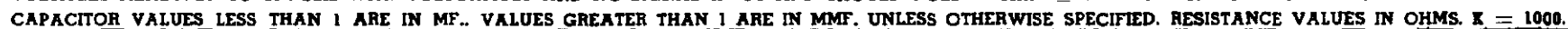
The cathode neutralizing loops of V2 (6BA6) and V3 (6AU6) are insulated wires approx. 2 in. long. Do not alter length.

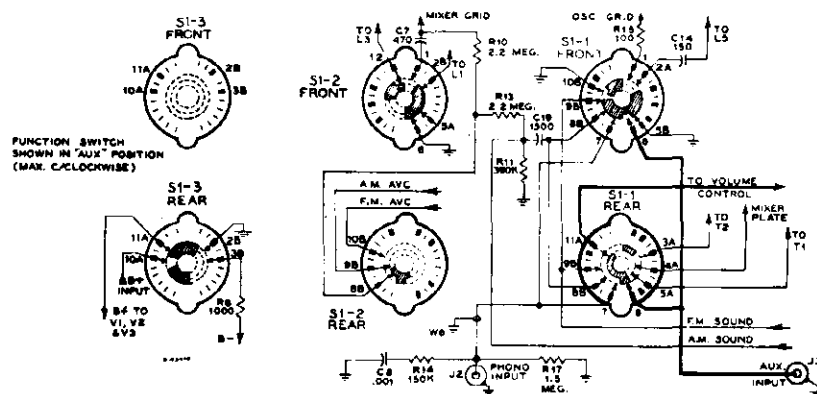


FUNCTION SWITCH VIEWED FROM FRONT AND SHOWN IN "AUX" POSITION (MAX. COUNTERCLOCKWISE).
VOLTAGES MEASURED TO CHASSIS WITH VOLTOHMIST AND NO SIGNAL INPUT AND SHOULD HOLD WITHIN $\pm 10\%$ WITH 117 VOLT POWER SUPPLY.
CAPACITOR VALUES LESS THAN 1 ARE IN MF., VALUES GREATER THAN 1 ARE IN MMF. UNLESS OTHERWISE SPECIFIED. RESISTANCE VALUES IN OHMS. K — 1000.

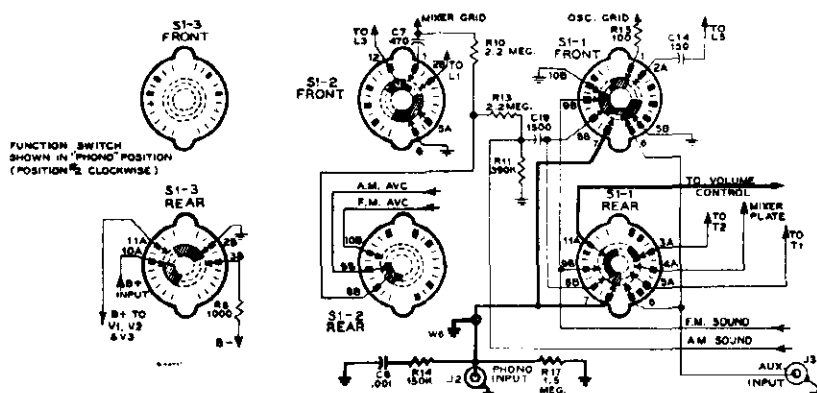
SIMPLIFIED SCHEMATIC DIAGRAM — "FM"





MODEL 45-W-9,
Ch. RC-1095-A**"AUX" AND "PHONO" SWITCH POSITIONS — REPLACEMENT PARTS**

Switch Position Schematic Diagram—"Aux"



Switch Position Schematic Diagram—"Phono"

In "Aux" and "Phono" positions the B+ supply voltage is disconnected in S1-3 which renders the mixer-oscillator, I.F. amplifier and driver tubes inoperative.

Record Changer Mounting

Two shipping screws hold the 45 r.p.m. changer to its roll-out carriage. They are accessible from the underside of the carriage and should be REMOVED at time of installation.

The record changer is mounted with rubber grommets in the carriage and should be free floating.

Roll-out Carriage Removal

The roll-out carriage has two stop pins (one at the back end of each slide), held in place by a retaining spring. To remove roll-out carriage, it is first necessary to pull the retaining springs out of the slides with a pair of long nose pliers, the stop pins are then easily removed. The roll-out carriage may then be removed from the front of the cabinet after disconnecting its connecting cables.

Roll-out Carriage Travel

The radio 45 r.p.m. carriage has a normal movement limitation of approximately 10 in. If the carriage does not have this amount of movement, it may be due to an obstruction or from slippage or creeping of the balls of the slide mechanism. Travel restriction due to slippage or creeping of balls in the slide mechanism can be corrected by exerting slightly greater pull until the normal travel limitation is reached. The carriage should then operate to its full travel with normal pull.

REPLACEMENT PARTS

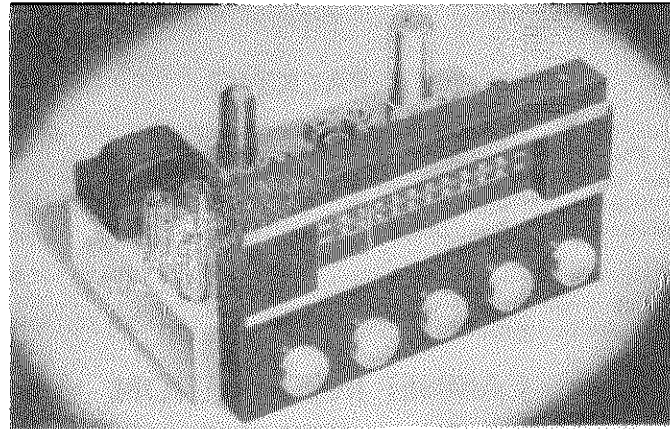
STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
CHASSIS ASSEMBLIES RC 1095A			
75599	Capacitor—Variable tuning capacitor (C1-1, C1-2, C1-3, C1-4)	75627	Clip—Clip for main cable on rear of chassis
74733	Capacitor—Ceramic, 3 mmf. (C10)	73935	Clip—Mounting clip for A-M I-F transformers
75613	Capacitor—Ceramic, 5 mmf. (C13)	75569	Coil—Oscillator coil (A-M) complete with adjustable core (L3, L4, L5)
39044	Capacitor—Ceramic, 15 mmf. (C12)	71942	Coil—Filament choke coil (L9)
75609	Capacitor—Ceramic, 47 mmf. (C45)	74817	Coil—Oscillator coil—F-M (L8)
75612	Capacitor—Ceramic, 68 mmf. (C9, C11)	75617	Coil—Antenna coil—F-M (L1)
75437	Capacitor—Ceramic, 100 mmf. (C31)	35787	Connector—Single contact female connector for pick-up cables (J2, J3)
75614	Capacitor—Ceramic, 150 mmf. (C14, C30, C43)	75542	Connector—8 contact male connector for power input cable (J4)
39640	Capacitor—Mica, 330 mmf. (C37, C38)	75543	Connector—2 contact female connector for record changer motor cable (P1)
39644	Capacitor—Mica, 470 mmf. (C7)	74879	Connector—2 contact female connector for antenna leads
75610	Capacitor—Ceramic, 1,500 mmf. (C19, C52)	75537	Control—Volume control and power switch (R22, S2)
73473	Capacitor—Ceramic, 5,000 mmf. (C6, C15, C24, C25, C27, C28, C29, C34, C36)	75538	Control—Tone control (R34)
73801	Capacitor—Tubular, paper, .001 mfd, 400 volts (C8)	+72953	Cord—Drive cord (approximately 66" overall length required)
70642	Capacitor—Tubular, paper, .001 mfd, 1,000 volts (C42, C44)	75564	Coupling—Spring coupling for function switch extension shaft
72490	Capacitor—Tubular, paper, .005 mfd, 200 volts (C26, C39, C41)	75556	Cover—Insulating cover for electrolytic capacitor No. 72052
73920	Capacitor—Tubular, paper, .005 mfd, 400 volts (C33)	74839	Fastener—Push fastener for mounting R.F. shelf (4 required)
71925	Capacitor—Tubular, paper, .01 mfd, 400 volts (C32)	16058	Grommet—Rubber grommet for mounting R.F. shelf (4 required)
72120	Capacitor—Tubular, paper, .015 mfd, 200 volts (C21, C22)	75547	Grommet—Rubber grommet to mount slide mechanism to bottom—rear (2 required)
71928	Capacitor—Tubular, paper, .02 mfd, 100 volts (C20)	75546	Grommet—Rubber grommet to mount slide mechanism to bottom—front (2 required)
73638	Capacitor—Tubular, paper, .02 mfd, 400 volts (C35)	11765	Lamp—Dial lamp—Mazda No. 51
73553	Capacitor—Tubular, paper, .05 mfd, 200 volts (C16)		
73747	Capacitor—Electrolytic, 2 mfd, 50 volts (C40)		
72052	Capacitor—Electrolytic, comprising 1 section of 30 mfd, 450 volts, 1 section of 30 mfd, 350 volts and 1 section of 40 mfd, 25 volts (C23A, C23B, C23C)		

*Stock No. 72953 is a reel containing 250 feet of cord

MODEL 75-W-9,
Ch. RC-1095-A

REPLACEMENT PARTS — Continued

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
75544	Nut—Rivnut to fasten screw for mounting chassis (4 required)	75683	Frame—Moulded frame (light brown) for mounting radio chassis and 45 RPM record changer—for oak instruments
18469	Plate—Bakelite mounting plate for electrolytic capacitor No. 72052	75551	Handle—Metal pullout handle for mounting frame
75535	Plate—Dial back plate complete with three (3) pulleys	75555	Screw—No. 8-32 x 3/8" cross recessed pan head machine screw to mount radio chassis
75536	Pointer—Station selector pointer	SPEAKER ASSEMBLY Stamped 92569-12W RMA 274 RL 111-A1	
72602	Pulley—Drive cord pulley		
72323	Resistor—Wire wound, 3 ohms, 1/2 watt (R25)	13867	Cap—Dust cap
73637	Resistor—Wire wound, 2,200 ohms, 5 watts (R24)	75682	Cone—Cone and voice coil assembly (3.2 ohms)
	Resistor—Fixed, composition:	75681	Speaker—12" P.M. speaker complete with cone and voice coil (3.2 ohms)
	47 ohms, ±10%, 1/2 watt (R26)	NOTE: If stamping on speaker does not agree with above number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.	
	100 ohms, ±10%, 1/2 watt (R15, R38, R43)		
	120 ohms, ±10%, 1/2 watt (R27)	MISCELLANEOUS	
	270 ohms, ±5%, 2 watts (R42)		
	680 ohms, ±20%, 1/2 watt (R30)	71864	Antenna—F-M antenna
	680 ohms, ±20%, 1 watt (R31)	75705	Antenna—Antenna loop complete, less cable
	1,000 ohms, ±10%, 1/2 watt (R6)	75900	Back—Back cover—maroon—for radio-phono compartment—for mahogany or walnut instruments (assembled to rollout)
	1,200 ohms, ±5%, 1/2 watt (R46)	75901	Back—Back cover—light brown—for radio-phono compartment—for oak instruments (assembled to rollout)
	3,300 ohms, ±5%, 1/2 watt (R40, R45)	73680	Board—"A-F-M" terminal board
	12,000 ohms, ±10%, 1 watt (R29)	75694	Bracket—Stop bracket less rubber bumper for radio-phono compartment rollout
	15,000 ohms, ±10%, 1/2 watt (R44)	71599	Bracket—Pilot lamp bracket
	18,000 ohms, ±10%, 1/2 watt (R7, R20)	75696	Bumper—Rubber bumper for rollout stop bracket
	22,000 ohms, ±10%, 1/2 watt (R28)	72437	Cable—Shielded pickup cable complete with pin plug
	27,000 ohms, ±10%, 1/2 watt (R21)	13103	Cap—Pilot lamp cap
	33,000 ohms, ±10%, 1/2 watt (R50)	71892	Catch—Bullet catch and strike for cabinet doors
	39,000 ohms, ±5%, 1/2 watt (R47)	X3144	Cloth—Grille cloth for mahogany or walnut instruments
	56,000 ohms, ±10%, 1/2 watt (R32)	X3089	Cloth—Grille cloth for oak instruments
	68,000 ohms, ±10%, 1/2 watt (R39)	74882	Connector—2 contact (polarized) male connector for AM loop cable
	82,000 ohms, ±10%, 1/2 watt (R36)	74752	Connector—2 contact male connector for FM antenna terminal board cable
	120,000 ohms, ±10%, 1/2 watt (R8, R16)	75709	Connector—8 contact female connector for main cable (less shell) (P4)
	150,000 ohms, ±10%, 1/2 watt (R14)	75474	Connector—Single contact male connector for speaker (2 required)
	270,000 ohms, ±10%, 1/2 watt (R35)	30870	Connector—2 contact male connector for motor cable (P1A)
	390,000 ohms, ±10%, 1/2 watt (R11)	71984	Decal—Trade mark decal (RCA Victor)
	470,000 ohms, ±10%, 1/2 watt (R37, R41, R48)	74273	Decal—Trade mark decal (Victrola)
	1.5 megohm, ±10%, 1/2 watt (R17)	37396	Grommet—Rubber grommet for mounting speaker
	2.2 megohm, ±20%, 1/2 watt (R10, R13)	74838	Grommet—Power cord strain relief (1 set)
	10 megohm, ±20%, 1/2 watt (R23)	75697	Grommet—Rubber grommet to mount record changer
	22 megohm, ±20%, 1/2 watt (R33)	74308	Hinge—Cabinet door hinge (1 set)
75540	Shaft—Tuning knob shaft	75712	Knob—Tuning control, tone control or volume control and power switch knob—maroon—for mahogany or walnut instruments
75565	Shaft—Extension shaft for function switch	75713	Knob—Tuning control, tone control or volume control and power switch knob—tan—for oak instruments
73584	Shield—Tube shield for V5	75714	Knob—Function switch knob—maroon—for mahogany or walnut instruments
75546	Slide—Slide mechanism complete for radio chassis bottom	75715	Knob—Function switch knob—tan—for oak instruments
31251	Socket—Tube socket, octal, water	11765	Lamp—Pilot lamp—Mazda No. 51
73117	Socket—Tube socket, 7 pin, miniature	73634	Nut—Speed nut for speaker mounting screws
74179	Socket—Tube socket, 7 pin, miniature for 6J6 tube only	75908	Pull—Door pull
31364	Socket—Dial lamp socket	75907	Screw—No. 10-32 x 5 1/4" cross recessed round head screw (special) to mount rollout frame
75563	Spring—Retaining spring for function switch extension shaft	75920	Screw—No. 10-24 x 1" trimit head screw for door pull
74038	Spring—Drive cord spring	75708	Shell—Shell for 8 contact connector No. 75709
74847	Support—Polystyrene support for F-M oscillator coil complete with mounting bracket	31364	Socket—Pilot lamp socket and lead
75600	Switch—Function switch (S1-1, S1-2, S1-3)	74734	Spring—Retaining spring for knobs
75557	Transformer—Output transformer (T7)	75902	Spring—Suspension spring for main cable
73743	Transformer—Ratio detector transformer (T5)	72936	Stop—Cabinet door stop
75558	Transformer—First I-F transformer (A-M) complete with adjustable cores (T2)		
73037	Transformer—Second I-F transformer (A-M) complete with adjustable cores (T4)		
75559	Transformer—First I-F transformer (F-M) complete with adjustable cores (T1)		
75560	Transformer—Second I-F transformer (F-M) complete with adjustable cores (T3)		
75566	Transformer—Power transformer, 117 volts, 60 cycle (T6)		
33726	Washer—"C" washer for tuning knob shaft		
RADIO ROLLOUT CARRIAGE			
75895	Decal—Function decal for controls		
75572	Dial—Polystyrene dial scale		
75549	Frame—Moulded frame (maroon) for mounting radio chassis and 45 RPM record changer—for mahogany or walnut instruments		



ELECTRICAL SPECIFICATIONS

TUBE COMPLEMENT: 11 tubes plus rectifier—6AB4 FM RF preamp., 6CB6 RF amp., 12AT7 mixer, 12AT7 osc. and AFC., (2) 6CB6 IF amp., (2) 9001 limiters, 6AL5 FM det., 6AV6 AM det. and phono. pre-amp., 12AU7 audio amp., 6X5GT rectifier.

CONTROLS: Bass, Off-On-Volume, FM-AM-PH-TV selector, Tuning, Treble.

ANTENNA: FM—300 ohm or 72 ohm input. Built-in antenna also provided. AM—high or low impedance transformer input. Low-noise loop also provided.

SENSITIVITY: FM—5 microvolts for 30 db. quieting. AM—5 microvolts for 0.25 volts output at either detector or audio amplifier.

FM DRIFT: Negligible with Automatic Frequency Control. Without AFC, ± 20 kc. after 10 sec. warmup.

OUTPUT: Capability up to 3 volts at less than 1% distortion at 5000 ohms impedance. For use with either high or low gain amplifiers with input impedance of 25,000 ohms or higher. Connection direct from detector also provided.

TONE COMPENSATION: Bass variable up to 12 db. boost or 10 db. cut at 70 cps. Treble variable up to 9 db. boost or 15 db. cut at 10,000 cps.

PHONO PRE-AMPLIFIER: 24 db. gain plus 10 db. bass compensation.

INTERMEDIATE FREQUENCIES: FM—10.7 mc.; AM—455 kc.

BANDWIDTH: FM—190 kc.; AM—8.5 kc.

AM INTERSTATION WHISTLE FILTER: 25 db. rejection at 10 kc., 1 db. at 7 kc.

POWER CONSUMPTION: 105-125 volts, 60 cps., 55 watts.

SHIPPING WEIGHT: 16 lbs.

DIMENSIONS: 13½" x 9½" x 7" high.

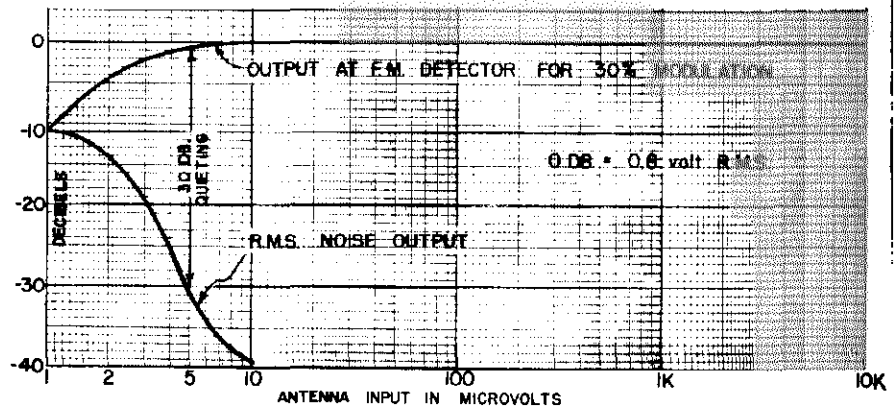


Fig. 1. FM Limiting Characteristic

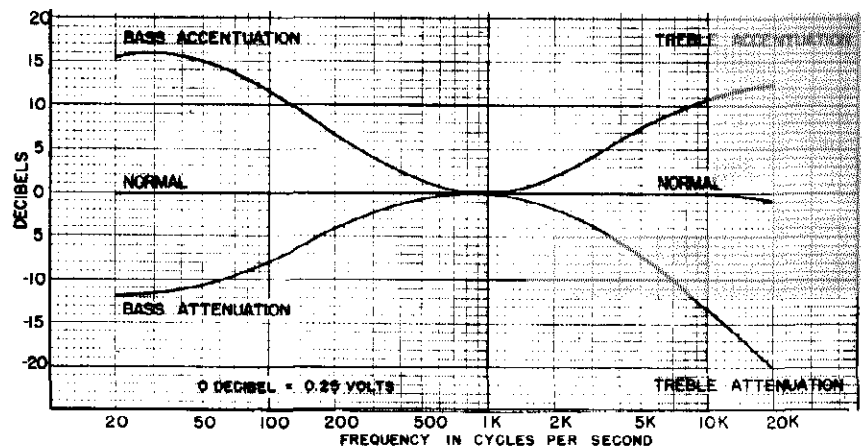


Fig. 2. Audio Characteristic

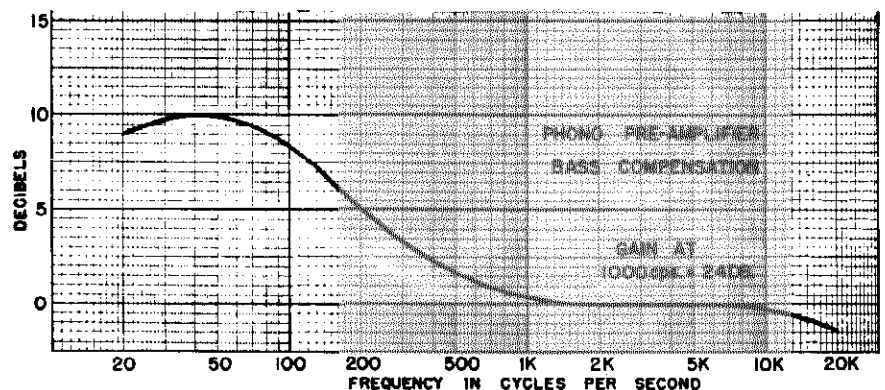


Fig. 3. Phono Pre-amplifier Characteristic

MODEL RC10,
Tuner

UNPACKING

These instructions cover the operation and installation of the Craftsmen RC10 FM-AM Tuner. The entire manual should be read before installing the unit, since much general information is included that will be of value in making any custom-built installation.

As soon as the tuner has been unpacked, examine it for any apparent damage which might have occurred in shipment. Should any sign of damage be found, file a claim

immediately with the carrier stating the extent of the damage.

Included with the RC10 tuner chassis should be the following:

- 1 3B023 Brass escutcheon
- 1 7X403 AM low-impedance antenna
- 1 7X604 Shielded audio cable

CABINET INSTALLATION

GENERAL - Considerable thought should be given in respect to the installation of the chassis in order to obtain maximum benefit from the operating ease the chassis offers. The dial and controls should be positioned for easy access and reading which, in many cases, can be improved with a sloping front panel. If the mounting board cannot be readily tilted, wooden spacers can be inserted under the front mounting holes to provide the necessary inclination. Position the knobs sufficiently above any front projection to provide ample finger clearance for adjusting the knobs.

"chimney effect" can be utilized advantageously in wall or bookcase installations by providing ports near the bottom and top of the enclosure to effect a flow of air past the chassis.

ASSEMBLY - The front panel cutouts should be made first by using the full-scale template provided. Note that this template is laid out symmetrically about the center knob and above the bottom mounting surface of the rubber shock mounts. Locate and drill the mounting holes

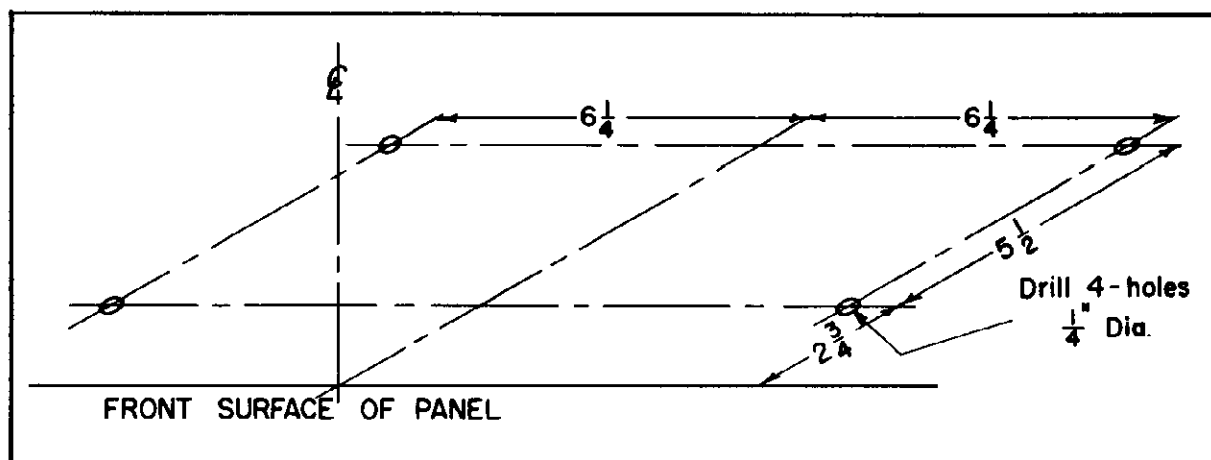


Fig. 4. Mounting Hole Layout

The types and orientation of the tubes used in the tuner permit satisfactory operation regardless of mounting position.

Other considerations in layout are accessibility to the rear for interconnections, sufficient clearance from any metal for the AM loop to insure good pickup, and ample air space above the tubes to prevent any deterioration to a finished wooden cabinet top from tube heat. Where the spacing is necessarily close, this effect may be alleviated with a thin sheet of bright metal tacked beneath the vulnerable surface.

VENTILATION - Considerable ventilation must be provided to carry off the heat dissipated by the receiver. A

as shown in Figure 4. Insert the studs on the rear of the dial escutcheon into the two 3/16-in. diameter holes in the panel and secure the escutcheon with the two #6-32 nuts provided.

Remove the five press-fit knobs (use a steady outward pull on the knob) and the four mounting screws and washers found in the chassis mounts. Locate the chassis so that a 1/16-in. clearance exists between the inward flange of the escutcheon and the dial glass. Replace the four washers and screws and finally press the five knobs on their shafts, noting that the lettering uppermost on the channel knob indicates the channel selected for use.

ELECTRICAL CONNECTIONS

AUDIO SYSTEM - A 5000-ohm audio output socket, furnishing up to 3 volts at less than 1% distortion from 20 to 20,000 cps., (refer to Figure 2) and the associated shielded audio cable have been provided to connect the RC10 into new or existing audio systems. Any audio amplifier, such as the Craftsmen RC2 Hi-Fi Amplifier, with an input impedance of 25,000 ohms or greater can be

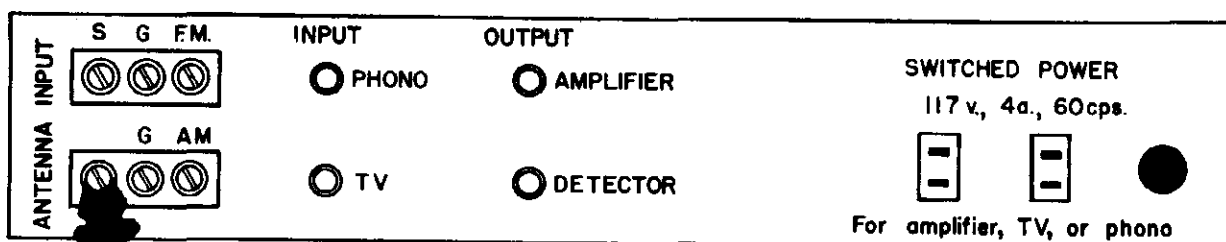
operated from this output. At the 5000 ohm level as much as 30 feet of cable can be used for inter-connection without undue loss of high-frequency response. The audio amplifier power line cord should be plugged into the AC outlet on the rear of the chassis so that the amplifier can be turned on simultaneously with the FM-AM tuner.

A connection directly to the FM and AM detectors is available at the receptacle labeled Detector Output. This output bypasses the entire RC10 audio system including the tone and volume controls and is useful for feeding recording amplifiers which have preset tone compensation while using the Amplifier Output for monitoring purposes. An audio amplifier with self-contained controls can also be fed from the Detector Output and the Phono or Television inputs will operate thru the band switch even with the tuner power OFF.

Extreme care should be taken with connections to the Detector Output receptacle. Only low capacity cable should be used to prevent loss in high-frequency response.

input, and an input marked "S" connected internally through a switch to either the FM or AM input.

For reception in local or urban localities, loop the flexible ribbon lead (furnished) around the cabinet interior and connect to terminals marked "S" and "G". Finally connect the shorting link between the blank terminal and "G". This ribbon lead forms a low-noise, low-impedance AM loop antenna and should be formed into the largest one or two turn loop practical in the available cabinet space. This loop also provides FM reception since terminal "S" is internally switched to the FM input.



Jumper used
with AM Loop

Fig. 5. Rear View

PHONO - Either a reluctance or crystal type phono cartridge may be connected into the Phono input receptacle. For use with a crystal cartridge the pre-amplifier selector switch lever located on top of chassis should be thrown toward the gang - in which position the phono pre-amplifier is bypassed and not in the circuit. When using a reluctance type cartridge (GE, Pickering), throw the switch knob away from the gang to add 24db. gain and bass compensation as shown in Figure 3.

Installations remote from stations might require outside antennas of a more elaborate nature. Connect exterior FM antennas to terminals "FM" and "G", or if to be used as an AM aerial as well, then connect to "S" and "G". Long-line AM aerials can be connected directly to the high-impedance input "AM" (link disconnected) or if brought down through a low-impedance line, to "AM" with the link in place.

Finally for installations including television, it is usually convenient to use the TV antenna to feed the FM

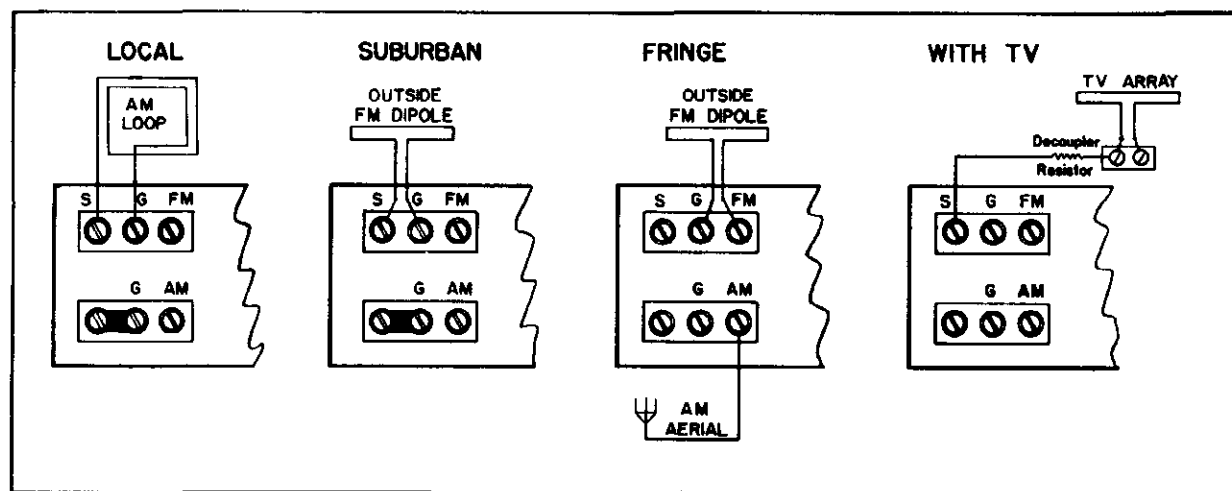


Fig. 6. Antenna Arrangements

ANTENNA - Several antenna arrangements are possible for use with the RC10 as shown in Figure 6 and the best arrangement will depend on the particular installation. The various antenna arrangements make use of AM inputs at either high-impedance (shorting link removed) or low-impedance (shorting link in place), a single-ended FM and AM signals as well. This can be done by coupling

lightly (through a 1000-ohm resistor) from terminal "S" to one side of the TV antenna terminals.

TELEVISION - Complete suggested interconnections for installations including television are shown in Figure 7. In general, it is desirable not to operate a television unit while attempting either FM or AM reception because of the various types of interference that may be encountered.



SERVICE INSTRUCTIONS

ALIGNMENT PROCEDURE To set pointer, completely mesh tuning capacitor and align pointer with last reference mark at low frequency end of dial. Volume control should be in maximum clockwise position. Output of signal generator should be no higher than necessary to obtain an output reading. Low side of signal generator and indicating meter should be connected directly to chassis at all times. Use an insulated screw driver with 1/16" thick blade for adjusting IF transformers.

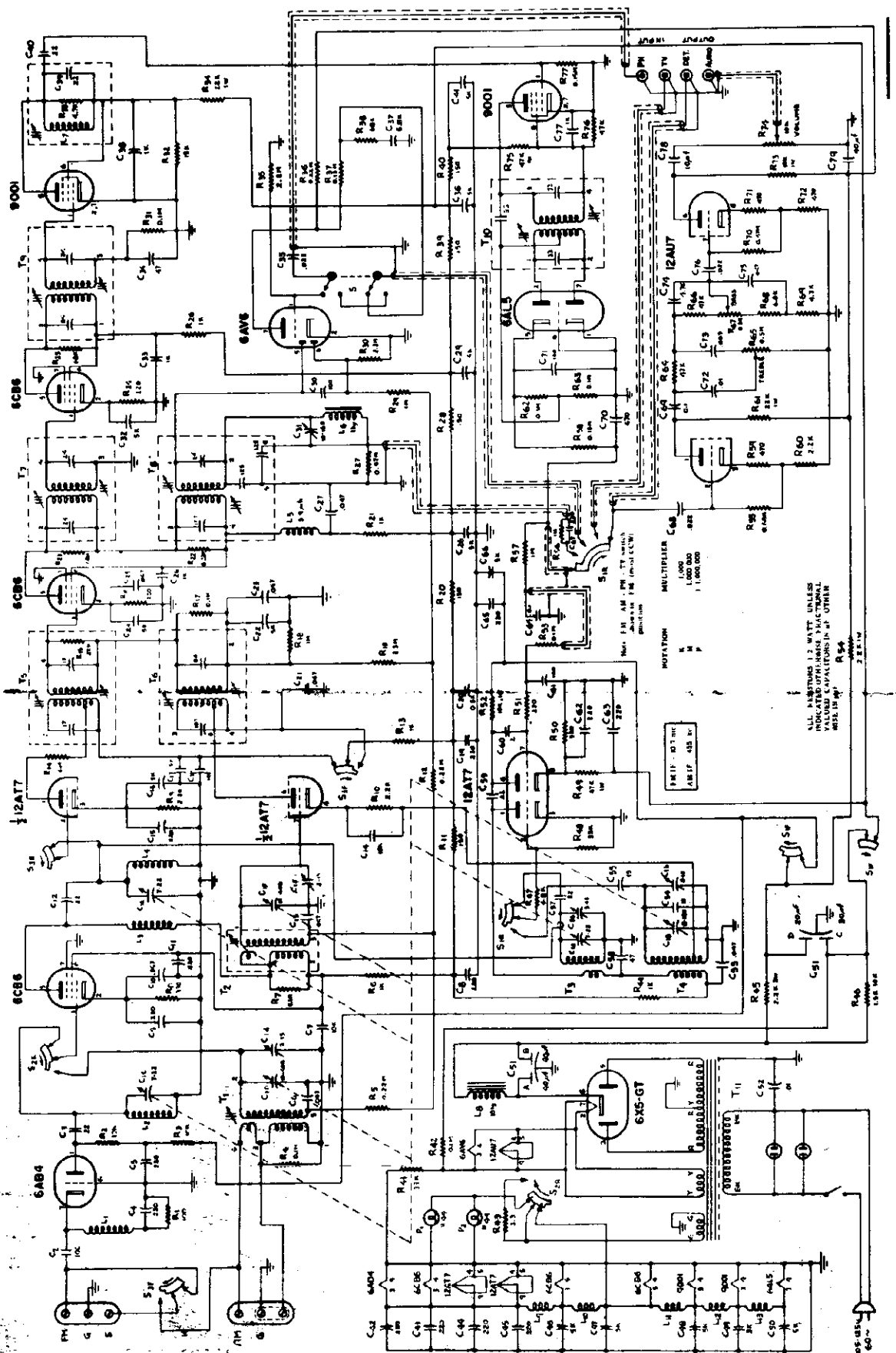
	SIGNAL GENERATOR			Dial Setting	Indicating Meter	Adjust	Indication	
	Coupling	Freq.	Modulation					
AM Alignment	1	.01 pf to pin 7 of 12AT7	455 kc	400 cps AM	Point of no interference	AC voltmeter at Audio output	1, 2, 3, & 4	Maximum deflection
	2	220 pf to AM ant. input	1500 kc	400 cps AM	1500 kc	Same as above	5	Maximum deflection
	3	Same as above	800 kc	400 cps AM	Tune for maximum response	Same as above	6 & 7	Maximum deflection
	4	Same as above	1400 kc	400 cps AM	Tune for maximum response	Same as above	8 & 9	Maximum deflection
	5	Repeat Steps 3 & 4						
	6	Same as above	1400 kc	10 kc AM	Tune for maximum response	Same as above	10	Null
FM Alignment	7	.01 pf to pin 2 of 12AT7	10.7 mc	None	Point of no interference	Neg. DC VTVM across R31	11, 12, 13, 14, 15, & 16	Maximum deflection
	8	Same as above	10.7 mc	None	Same as above	Neg. DC VTVM at junction R62 & R63	17 & 18	Maximum deflection
	9	Same as above	10.7 mc	None	Same as above	Zero center scale DC VTVM at Det. Output	19	Zero volts between positive & negative reading
	10	270 μ Carbon to FM ant. input	106 mc	400 cps FM + 25 kc	106 mc	AC voltmeter at Audio output	20	Maximum deflection
	11	Same as above	98 mc	Same as above	Tune for maximum response	Same as above	Contract or extend coil spring 21, 22, & 23	Maximum deflection
	12	Same as above	98 mc	400 cps FM + 250 kc	98 mc	Vertical input oscilloscope at Det. Output		Check symmetry of 'S' shape

TUBE	FUNCTION	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
6AB4	FM RF Preamp.	95	0	6.3*	0	0	0	0.5	--	--
6CB6	RF Amp.	0	2.5	0	6.3*	137	137	0	--	--
12AT7	Mixer	145	0	2.8	0	0	0	-1.0	0	6.3*
12AT7	Osc. & AFC	137	-2.0	0	0	0	156	0	2.1	6.3*
6CB6	1st IF Amp.	-0.2	1.9	6.3*	0	140	140	0	--	--
6CB6	2nd IF Amp.	0	2.0	6.3*	0	142	142	0	--	--
9001	1st Limiter	-0.4	0	6.3*	0	40	40	0	--	--
9001	2nd Limiter	-0.6	0	6.3*	0	36	36	0	--	--
6AL5	FM Det.	0	-2.0	6.3*	0	0	0	-1.8	--	--
6AU6	AM Det. & Phono Amp.	-0.83	0	55	55	-0.5	-0.7	77	--	--
12AU7	Audio Amp.	85	7.2	10	55	5	115	2.3	5.2	55
6X5GT	Rectifier	--	55	207*	--	207*	--	55	235	--

VOLTAGE READINGS

*AC Voltages measured at 1,000 ohms per volt.
 DC Voltages measured with vacuum-tube voltmeter.
 Socket connections are shown as bottom views.
 Measured values are from socket pin to common negative.
 Line voltage maintained at 117 volts for voltage readings.
 Measurements are with no signal applied and bandswitch in FM position.

MODEL RC10,
Tuner



ALL RESISTORS 1/2 WATT UNLESS
INDICATED OTHERWISE. FRACTIONAL
VALUES OF RESISTORS AND CAPACITORS IN OTHER
CIRCUITS ARE AS SHOWN.

NOTES: 1. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

2. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

3. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

4. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

5. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

6. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

7. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

8. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

9. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

10. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

11. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

12. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

13. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

14. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

15. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

16. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

17. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

18. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

19. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

20. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

21. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

22. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

23. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

24. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

25. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

26. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

27. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

28. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

29. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

30. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

31. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

32. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

33. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

34. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

35. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

36. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

37. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

38. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

39. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

40. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

41. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

42. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

43. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

44. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

45. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

46. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

47. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

48. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

49. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

50. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

51. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

52. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

53. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

54. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

55. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

56. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

57. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

58. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

59. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

60. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

61. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

62. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

63. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

64. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

65. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

66. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

67. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

68. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

69. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

70. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

71. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

72. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

73. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

74. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

75. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

76. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

77. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

78. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

79. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

80. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

81. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

82. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

83. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

84. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

85. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

86. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

87. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

88. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

89. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

90. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

91. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

92. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

93. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

94. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

95. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

96. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

97. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

98. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

99. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

100. IN AM, PM, AND FM MODES,
ADJUST THE TUNING COILS
FOR MAXIMUM SIGNAL.

REPLACEMENT PARTS LIST

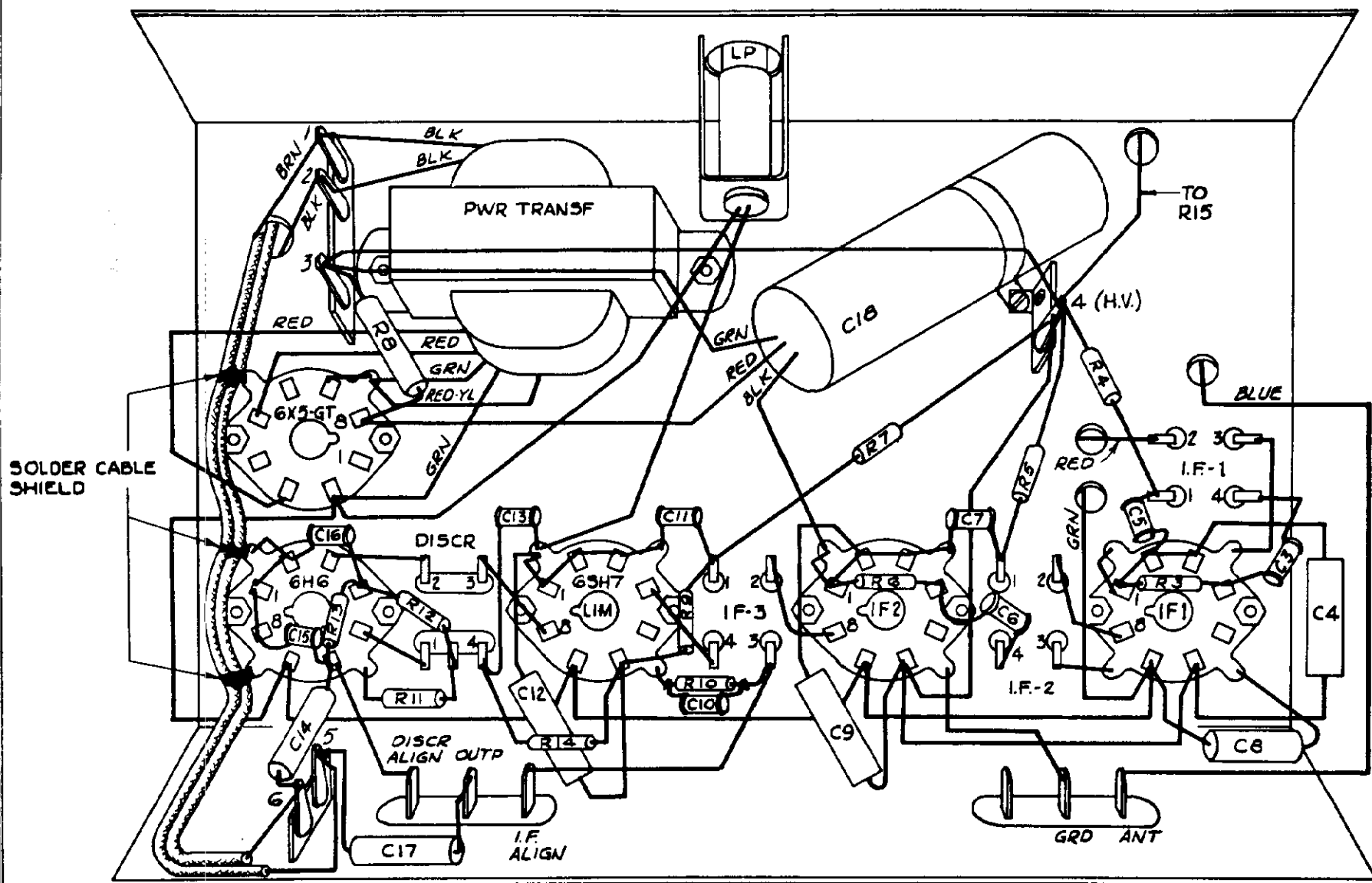
Part No.	Ref. No.	Description	Part No.	Ref. No.	Description
CAPACITOR, Ganged Tuning			COILS & CHOKES		
17S007	C1A	7-22 μ f, FM Osc. Tuning	5X017	L7	FM Limiter Coil
	C1B	8-180 μ f, AM Osc. Tuning	5A209	L4	FM Conv. Coil
	C1C	7-22 μ f, FM RF Tuning	5A210	L2	FM RF Coil
	C1D	10-408 μ f, AM RF Tuning	5S402	L3, L5	3.5 μ h Choke
	C1E	7-22 μ f, FM Conv. Tuning	5X406	L9, L10, L11, L12, L13	1.0 μ h Choke
	C1b	2-15 μ f, AM Osc. Mica Trimmer	5X409	L1	0.2 μ h Choke
	C1d	2-15 μ f, AM RF Mica Trimmer	19S405	L8	10 h, Filter Choke
	C1f	2-15 μ f, AM Conv. Mica Trimmer	19S406	L6	1 h, 10 kc Filter
CAPACITORS, Ceramic			RESISTORS		
17X401	C56	3-13 μ f, 500v, Trimmer	23Z030	R47	6.8 ohm, 1/2w, Carbon
18X612	C60	2 μ f, 500v, Tubular	23Z081	R14	68 ohm, 1/2w, Carbon
18X601	C54	10 μ f, 500v, Tubular	23Z002	R1	100 ohm, 1/2w, Carbon
18X602	C55	15 μ f, 500v, Tubular	23Z012	R11, R20, R28, R39, R40	150 ohm, 1/2w, Carbon
18X603	C3, C12, C39, C40, C57, C59	22 μ f, 500v, Tubular	23Z022	R16, R24, R51	220 ohm, 1/2w, Carbon
18X604	C34, C58	47 μ f, 500v, Tubular	23Z032	R8, R50	330 ohm, 1/2w, Carbon
18X605	C2, C18, C30, C61, C71	100 μ f, 500v, Tubular	23Z042	R59, R71, R72	470 ohm, 1/2w, Carbon
18X606	C70	470 μ f, 500v, Tubular	23Z003	R6, R13, R21, R26, R44	1 K ohm, 1/2w, Carbon
18X614	C26, C33, C38, C77	1000 μ f, 500v, Tubular	23Z023	R9, R10, R60	2.2 K ohm, 1/2w, Carbon
18X620	C4, C5, C8, C9, C11, C15, C19, C42, C43, C44, C45, C62, C63, C65, C67	220 μ f, 500v, Tubular	23Z043	R33, R69	4.7 K ohm, 1/2w, Carbon
18X701	C16, C17, C20, C22, C24, C28, C29, C32, C36, C41, C46, C47, C48, C49, C50, C68, C7, C14	5000 μ f, 500v, Disc	23Z033	R68	6.8 K ohm, 1/2w, Carbon
18X704		10,000 μ f, 500v, Disc	23Z004	R2, R3	10 K ohm, 1/2w, Carbon
CAPACITORS, Mica			23Z014	R32	15 K ohm, 1/2w, Carbon
17X205	C31	10-160 μ f, 300v Trimmer	23Z024	R15	22 K ohm, 1/2w, Carbon
18X407	C74	.0047 μ f, 300v Molded	23Z034	R41, R48	33 K ohm, 1/2w, Carbon
18X412	C37	.0068 μ f, 300v Molded	23Z044	R64, R65, R76	47 K ohm, 1/2w, Carbon
18X414	C73	.0033 μ f, 300v Molded	23Z064	R23, R25, R38	68 K ohm, 1/2w, Carbon
CAPACITORS, Paper			23Z005	R4, R7, R17, R31, R42, R53, R62, R63, R37, R58, R77	0.1 M ohm, 1/2w, Carbon
18Z214	C35, C68, C76	.022 μ f, 400v Tubular	23Z015	R37, R58, R77	0.15 M ohm, 1/2w, Carbon
18Z234	C72	.01 μ f, 400v Tubular	23Z025	R5, R12, R22, R36	0.22 M ohm, 1/2w, Carbon
18Z236	C52	.01 μ f, 600v Molded	23Z045	R27, R70	0.47 M ohm, 1/2w, Carbon
18Z254	C6, C10, C13, C21, C23, C25, C27, C53	.047 μ f, 400v Tubular	23Z085	R55	0.38 M ohm, 1/2w, Carbon
18Z264	C64, C69	0.1 μ f, 400v Tubular	23Z006	R18, R29, R56, R57	1 M ohm, 1/2w, Carbon
18X308	C75	.047 μ f \pm 10% 400v Tubular	23Z026	R30, R35	2.2 M ohm, 1/2w, Carbon
CAPACITORS, Electrolytic			23Z036	R19	3.3 M ohm, 1/2w, Carbon
18S022	C51A	40 μ f, 300v, Twist Mount	23Z123	R54	2.2 K ohm, 1w, Carbon
	C51B	40 μ f, 300v	23Z104	R52, R73	10 K ohm, 1w, Carbon
	C51C	30 μ f, 300v	23Z124	R34, R61	22 K ohm, 1w, Carbon
	C51D	20 μ f, 300v	23Z144	R49, R75	47 K ohm, 1w, Carbon
18X023	C78	10 μ f, 250v, Tubular	23Z223	R45	2.2 K ohm, 2w, Carbon
18X027	C79	40 μ f, 250v, Tubular	23X504	R15	3.3 ohm, 1/2w, Wire Wound
PILOT LIGHTS			23X311	R46	1.5 K ohm, 10w, Wire Wound
15X003	P1, P2	#44 Pilot Light	23S715	R67	0.5 M ohm, 1/4w, Carbon Pot.
			23S716	R74	10 K ohm, 1/4w, Carbon Pot. & S
			23S717	R65	0.5 M ohm, 1/4w, Carbon Pot.
			SWITCHES		
			4S003	S1, 2, 3	4 Pos., 3 section Band Switch
			4S007	S	DPDT Slide Switch
			TRANSFORMERS		
			5X005	T10	10.7 mc FM Discriminator
			5X013	T5	10.7 mc FM Converter
			5X014	T7, T9	10.7 mc FM IF
			5X015	T6	455 kc AM Converter
			5X016	T8	455 kc AM IF
			5A208	T3	FM Osc.
			5A218	T4	AM Osc.
			5A219	T2	AM RF
			5A220	T1	Power Transformer

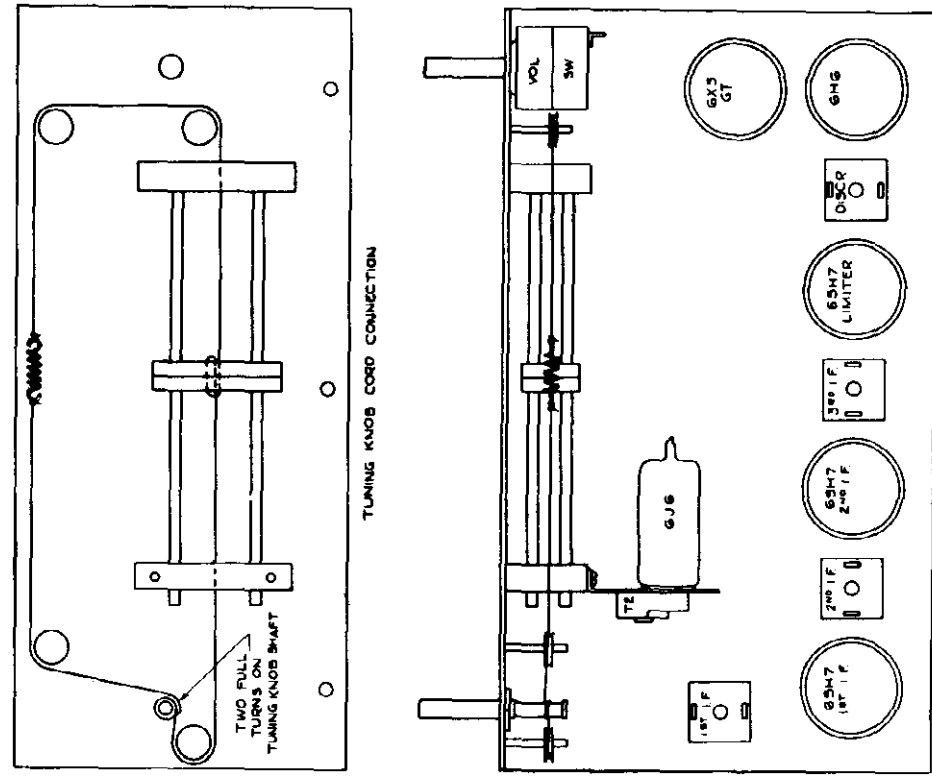
METER METHOD OF ALIGNMENT

EQUIPMENT: A STANDARD SIGNAL GENERATOR CAPABLE OF FREQUENCIES ILLUSTRATED BELOW AND A VACUUM TUBE VOLTMETER (VTVM) AS AN OUTPUT INDICATOR. IF NO VTVM IS AVAILABLE USE AS HIGH A RESISTANCE PER VOLT DC VOLTMETER (PREFERABLY 20,000 OHMS PER VOLT METER). THE LOW SIDE OF THE SIGNAL GENERATORS AND METER SHOULD BE CONNECTED FOR ALL ALIGNMENTS TO CHASSIS GROUND OR PIN 2 OF THE TERMINAL STRIP.

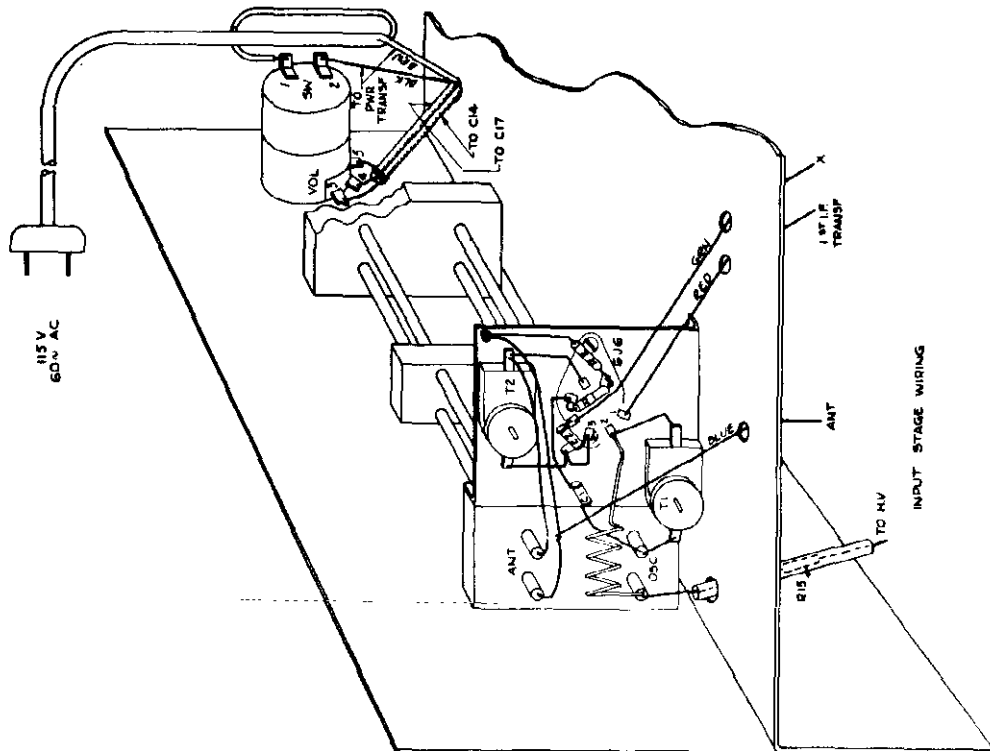
STEPS	TUNER DIAL SETTING	SIGNAL GENERATOR FREQUENCY	CONNECT SIGNAL GENERATOR	DUMMY ANTENNA	METER CONNECTION	ADJUST TRIMMERS OR COILS IN ORDER SHOWN	REMARKS
A	HIGH FREQ. END OF BAND	10.7 MC UNMODULATED	PIN 4 GRID OF 6SH7 2ND IF AMPLIFIER	0.02MF	TO PIN 3 OF TERMINAL STRIP	S5, S6	MAXIMUM DEFLEC- TION OF METERS
B	"	"	PIN 4 GRID OF 6SH7 1ST IF	"	"	S3, S4	" " "
C	"	"	PIN 6 RF GRID OF 6J6 CONVER- TER TUBE	"	"	S1, S2	" " "
D	98 MC	98 MC UNMODULATED	PIN 1 OF TERM- INAL STRIP	500 OHM CARBON RESISTOR	"	T1, T2	MAXIMUM DEFLEC- TION ON METER HOOK DIAL WHILE TUNING T2 FOR MAXIMUM
E	105 MC	105 MC UNMODULATED	"	"	"	T1	MAXIMUM DEFLEC- TION ON METER
F	TUNE DIAL FOR MAXIMUM METER DEFLECTION	90 MC UNMODULATED	"	"	"	OSC.COIL	IF DIAL READING IS TOO LOW ACCORD- ING TO THE FREQ. OF THE GENERATOR EXPAND OSC.COIL SLIGHTLY; IF DIAL READING IS HIGH, COMPRESS COIL. IN EITHER CASE IT IS FOR MAX. DEFLEC- TION. REPEAT STEP E & F FOR BEST PO- SIBLE INDICATION.
G	REPEAT STEP D FOR FINAL ADJUSTMENTS OF R-F AND OSCILLATOR SECTIONS						
H	HIGH FREQ. END OF BAND	10.7 MC UNMODULATED	PIN 4 GRID OF 6SH7 LIMITER	0.02MF	TO JUNCTION OF T11 & R12 DISCRIMINA- TOR LEAD RE- SISTORS	S8	MAXIMUM DEFLEC- TION ON METER.
I	"	"	"	"	TO PIN 6 OF TERMINAL STRIP	S7	ZERO DEFLECTION (ZERO READING) ON METER

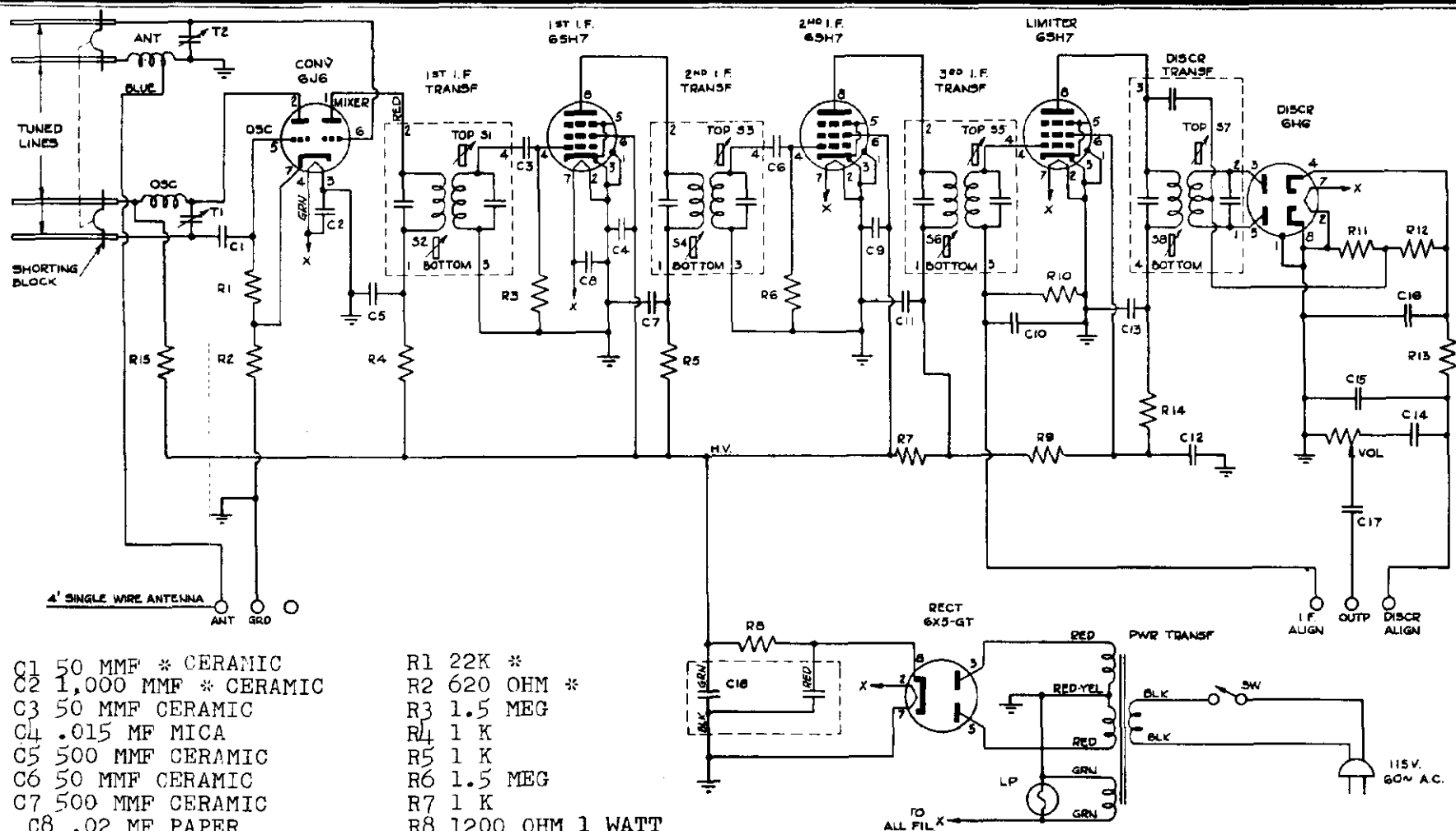
* VARY SIGNAL GENERATOR BY A SIMILAR AMOUNT ON EITHER SIDE OF THE 10.7 MC SIGNAL AND OBSERVE METER. THE READINGS SHOULD BE THE SAME BUT OF OPPOSITE POLARITY. IF THEY ARE NOT, REPEAT STEPS H AND I IN THE ORDER INDICATED.





TOP VIEW

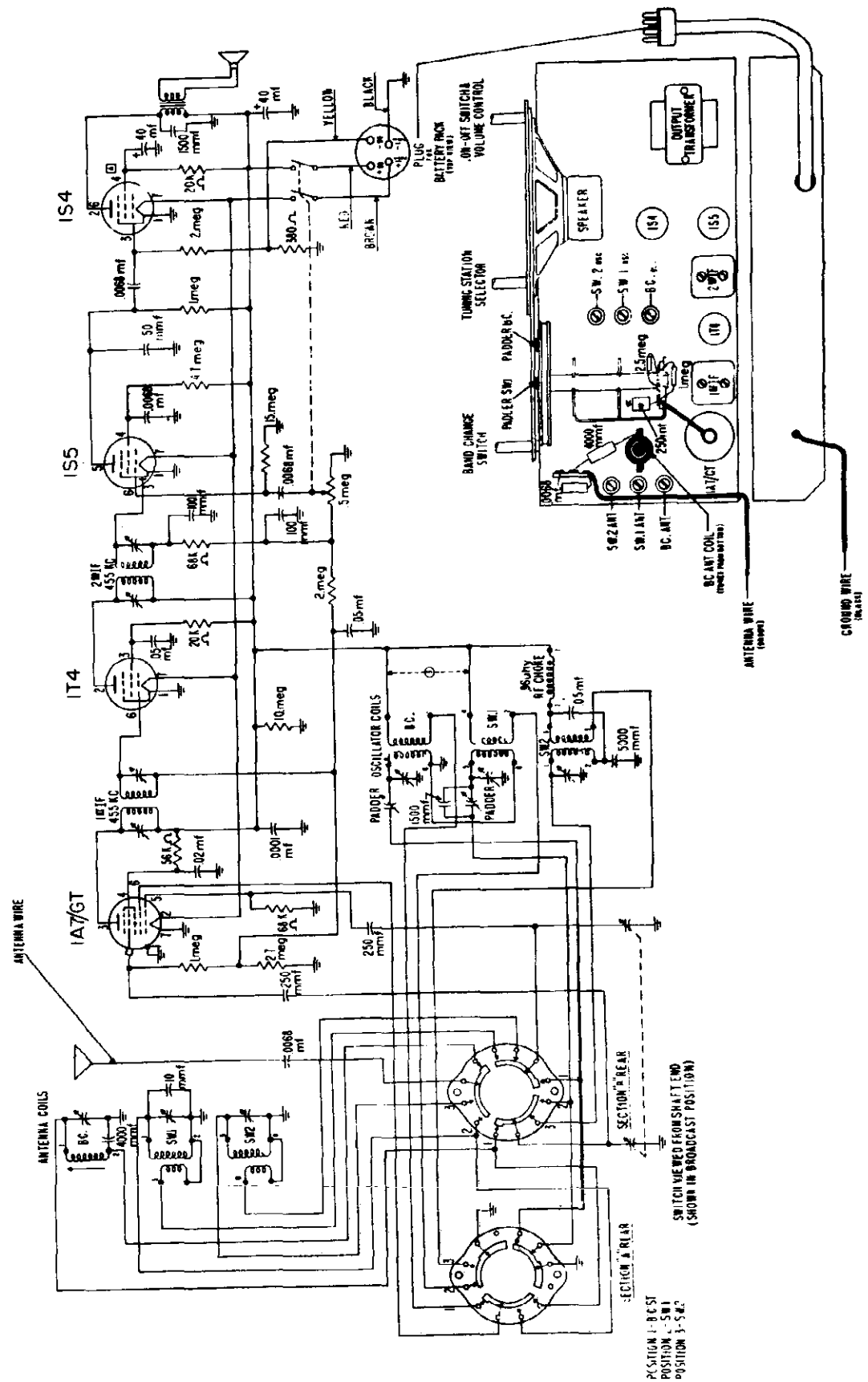




C1 50 MMF * CERAMIC
 C2 1,000 MMF * CERAMIC
 C3 50 MMF CERAMIC
 C4 .015 MF MICA
 C5 500 MMF CERAMIC
 C6 50 MMF CERAMIC
 C7 500 MMF CERAMIC
 C8 .02 MF PAPER
 C9 .015 MF MICA
 C10 50 MMF CERAMIC
 C11 500 MMF CERAMIC
 C12 .015 MF MICA
 C13 500 MMF CERAMIC
 C14 .02 MF PAPER
 C15 500 MMF CERAMIC
 C16 50 MMF CERAMIC
 C17 .02 MF PAPER
 C18 50 X 30 MFD 150 V

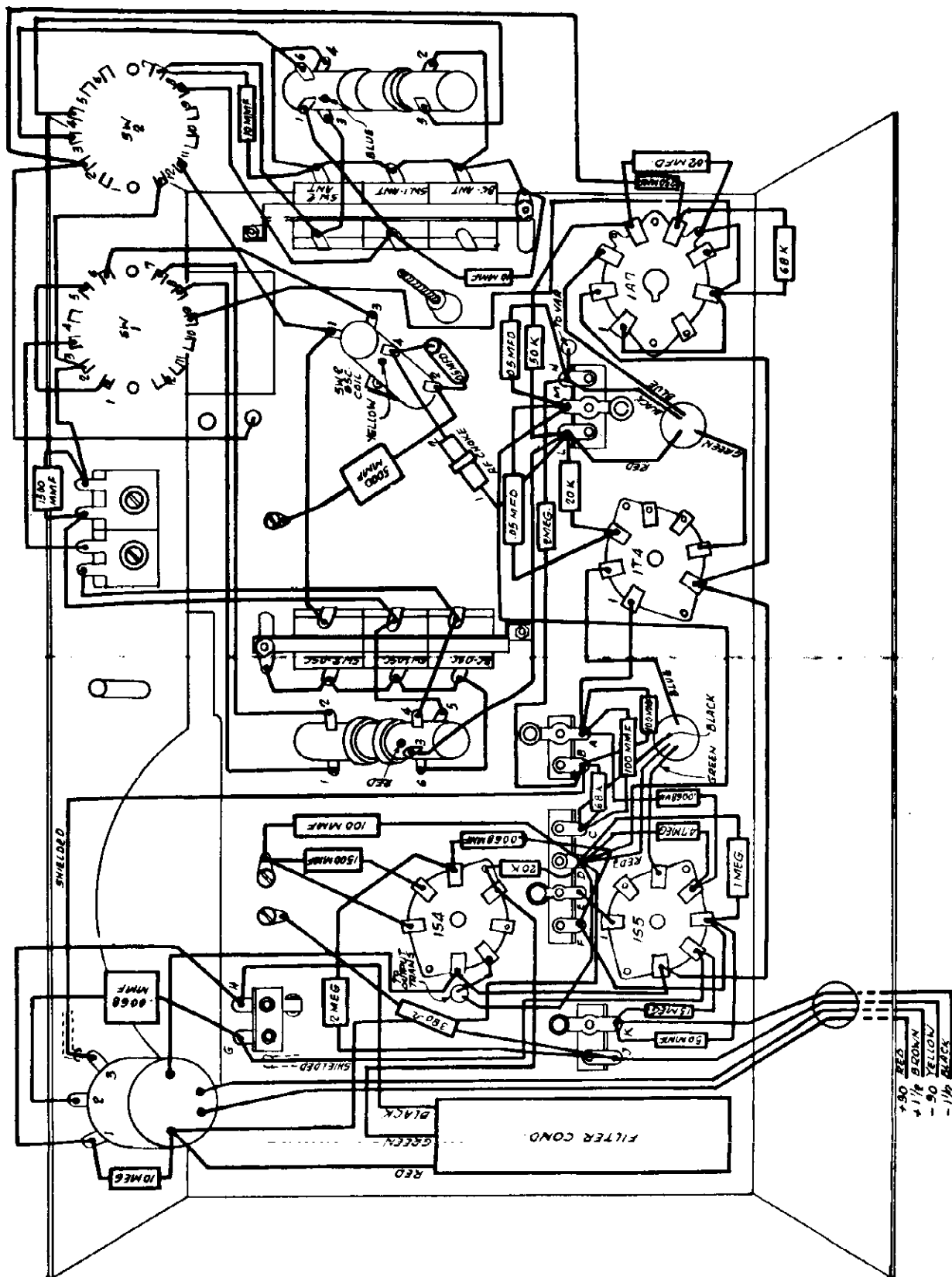
R1 22K *
 R2 620 OHM *
 R3 1.5 MEG
 R4 1 K
 R5 1 K
 R6 1.5 MEG
 R7 1 K
 R8 1200 OHM 1 WATT
 R9 20 K
 R10 51 K
 R11 150 K
 R12 150 K
 R13 51 K
 R14 1 K
 R15 3 K *

* ON PRE-ASSEMBLED INPUT STAGE.



PAGE 21-6 RADIO KITS

MODEL 4T3X



SPECIFICATIONS

MODEL 120: IS A 5-TUBE SUPERHETRODYNE RECEIVER DESIGNED FOR USE ON AC OR DC POWER-LINES. IT HAS THREE TUNING RANGES.

MODEL 120L: FOR USE ON POWER LINES OF 100-125 VOLTS DC OR AC, 50-100 CYCLES.

MODEL 120R: FOR USE ON POWER LINES OF 135-275 VOLTS DC OR AC, 50-100 CYCLES.

TUNING RANGES:

MW, 166.7 - 560 M (1800-535 kc/s) LOCAL
MW, 166.7 - 560 M (1800-535 kc/s) DISTANT
2nd SW 166.7 - 50 M (6.0-1.8 Mc/s)
1st SW 50 - 16.6 M (18.0-6.0 Mc/s)

INTERMEDIATE FREQUENCY: 455 kc/s.

AUDIO OUTPUT: 1 WATT (D. 10%).

VOLTAGES: THE MODEL 120R MUST BE ADAPTED TO THE LINE VOLTAGE BY INSERTING THE CORRECT BALLAST RESISTOR INTO THE BALLAST SOCKET AS FOLLOWS:

ON POWER LINES OF 135 - 165 VOLTS, USE 150 V.
BALLAST RESISTOR (G8.323.00)

ON POWER LINES OF 185 - 230 VOLTS, USE 200 V.
BALLAST RESISTOR (G8.323.01)

ON POWER LINES OF 225 - 275 VOLTS, USE 250 V.
BALLAST RESISTOR (G8.323.02)

BEFORE INSERTING BALLAST RESISTOR INTO SOCKET, THE LEADS BETWEEN PINS 4 AND 1 AND 5 AND 8 OF BALLAST SOCKET MUST BE REMOVED.

(FOR THE POSITION OF THE BALLAST SOCKET, SEE LABEL UNDERNEATH THE CABINET)

TUBES: CONVERTER - 14Q7, I.F. AMPLIFIER - 14A7, SECOND DETECTOR AND FIRST AUDIO - 14B6, AUDIO OUTPUT - 50A5, RECTIFIER - 35Y4.

LOUDSPEAKER: PERMANENT MAGNET DYNAMIC: DIAMETER 15 CENTIMETERS (6 INCHES).

ANTENNA AND GROUND: FOR BEST RESULTS, AN OUTSIDE ANTENNA IS NECESSARY. A SECURE GROUND CONNECTION SHOULD BE MADE TO A GROUNDING PLATE BURIED IN DAMP GROUND, OR TO A COLD WATER PIPE.

PHONOGRAPH CONNECTION: A PHONOGRAPH JACK IS PROVIDED ON THE REAR OF THE CHASSIS.

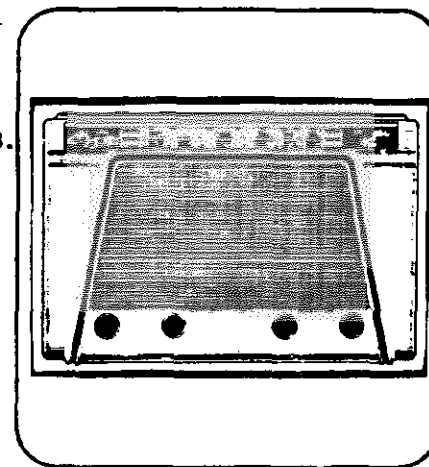
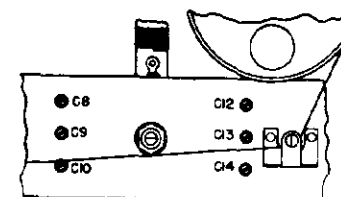
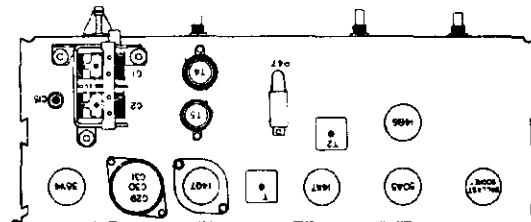
POWER CONSUMPTION: APPROX. 35 WATTS AT 117 VOLTS.

CABINET DIMENSIONS:

WIDTH - 38.7 cm (15-1/4")
HEIGHT - 25.2 cm (9-15/16")
DEPTH - 19.0 cm (7-1/2")

WEIGHT: APPROXIMATELY 5 KGS. (11 POUNDS)

CAUTION: THE POSSIBILITY OF ACCIDENTAL ELECTRICAL SHOCK HAS BEEN REDUCED BY ELIMINATING A DIRECT CONNECTION BETWEEN THE LINE AND THE CHASSIS. USE A LINE SEPARATING TRANSFORMER WHILE WORKING ON THE RECEIVER ESPECIALLY IF THE LINE VOLTAGE IS 150 VOLTS OR HIGHER.



PAGE 21-8 RADIO KITS

MODEL 120
120L, 120R

ALIGNMENT OF RECEIVER

Equipment Required

SIGNAL GENERATOR: CAPABLE OF SUPPLYING MODULATED FREQUENCIES BETWEEN 455 kc/s AND 20 Mc/s.

OUTPUT INDICATOR: A HIGH RESISTANCE A.C. VOLTMETER OR A POWER OUTPUT METER OR ANY OUTPUT INDICATING DEVICE.

Preliminary

REMOVE THE CHASSIS FROM THE CABINET BY UNSCREWING THE FOUR SCREWS, TWO OF WHICH ARE ON THE REAR CHASSIS APRON AND TWO ON THE DIAL POINTER SUPPORT BRACKET. THE TWO LEADS THAT CONNECT THE LOUDSPEAKER TO THE CHASSIS ARE LONG ENOUGH TO PERMIT REMOVAL OF THE CHASSIS WITHOUT DISTURBING THE SPEAKER.

Equipment Connections

OUTPUT INDICATOR: IF A POWER OUTPUT METER IS USED, ADJUST IT FOR FOUR OHMS IMPEDANCE AND CONNECT IT ACROSS SPEAKER VOICE COIL. IF AN A.C. VOLTMETER IS USED IT MAY BE CONNECTED ACROSS THE VOICE COIL, BUT A MORE SATISFACTORY INDICATION WILL BE OBTAINED IF IT IS CONNECTED BETWEEN THE PLATE PRONG OF THE OUTPUT TUBE AND THE CHASSIS, BEING SURE TO USE A .05 mfd. CAPACITOR IN SERIES WITH THE LEAD WHICH IS CONNECTED TO THE PLATE PRONG. REGULATE THE OUTPUT ATTENUATOR OF THE SIGNAL GENERATOR UNTIL A MID-SCALE READING IS OBTAINED ON A LOW SCALE OF THE OUTPUT METER. KEEP THE RECEIVER VOLUME CONTROL IN MAXIMUM OUTPUT POSITION. WHEN OUTPUT INDICATION INCREASES REGULATE SIGNAL GENERATOR ATTENUATOR TO RESTORE THE ORIGINAL INDICATION. THIS REDUCES A.V.C. ACTION AND PERMITS MORE ACCURATE ADJUSTMENTS.

SIGNAL GENERATOR: WHEN ADJUSTING THE I.F. SLUGS, CONNECT THE SIGNAL GENERATOR GROUND LEAD TO "B-". FOR ALL OTHER ADJUSTMENTS CONNECT THIS LEAD TO THE GROUND WIRE (BLACK) IN REAR OF CHASSIS. USE A NON-METALLIC TOOL FOR THE ADJUSTMENT OF THE I.F. SLUGS. ALWAYS BE SURE TO USE THE SPECIFIED CAPACITOR OR RESISTOR IN SERIES WITH THE SIGNAL GENERATOR OUTPUT LEAD.

Alignment Procedure

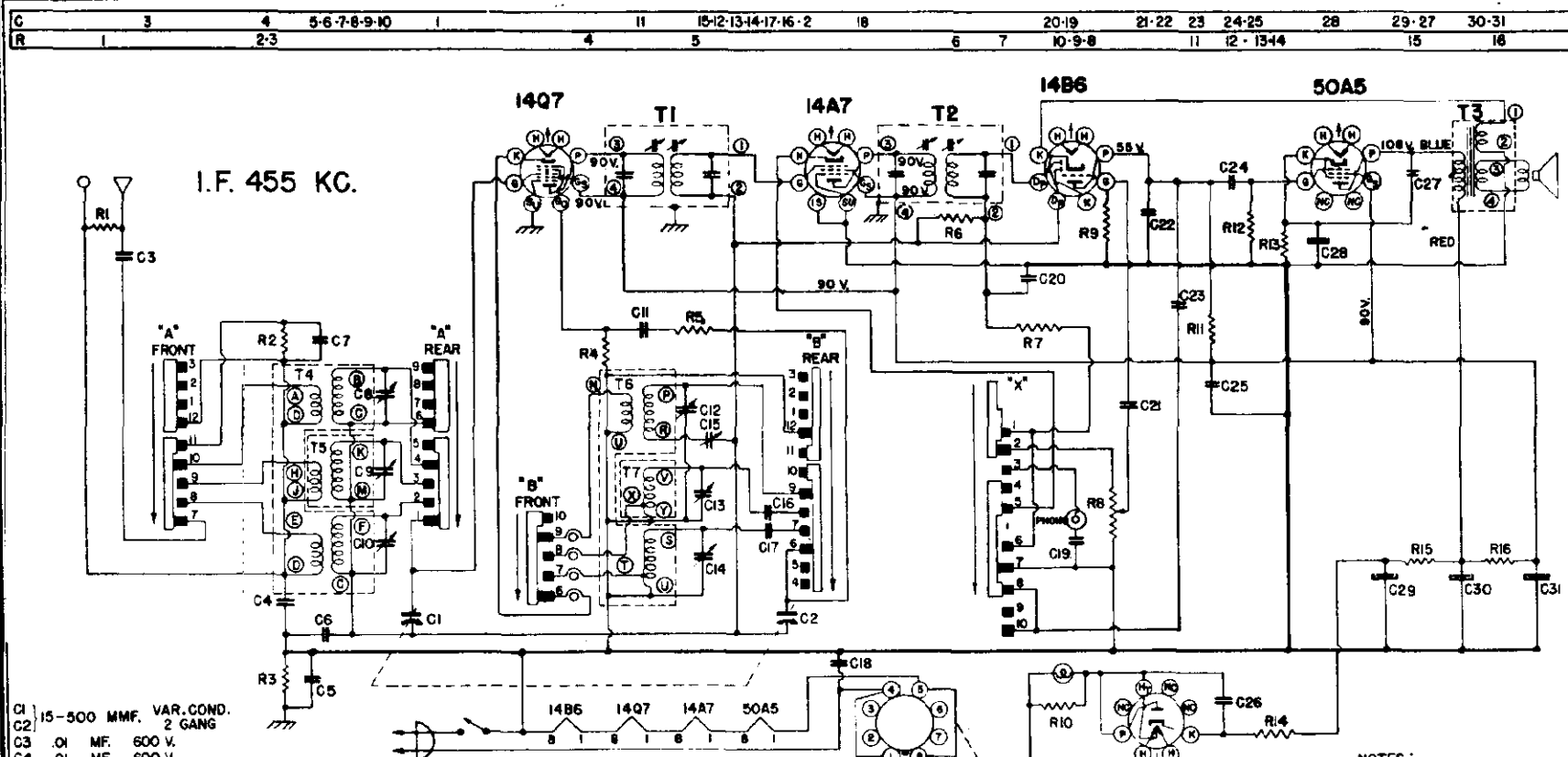
SIGNAL GENERATOR			RECEIVER			
OPERATION STEP	OUTPUT CONNECTION TO RECEIVER	FREQUENCY	RANGE SWITCH	TUNING CAPACITOR	SEE NOTES	ADJUST IN STATED ORDER
1	TO 14Q7 CONTROL GRID THROUGH .1 MFD CAPACITOR	455 kc/s	M.W.	MAX. CAP.	"A"	ADJUST I.F. TRANSFORMER SLUGS TO MAXIMUM OUTPUT
2	TO ANTENNA CONTACT THROUGH 200 MFD CAPACITOR - MICA	1810 kc/s	M.W.	MIN. CAP.		C12 FOR MAXIMUM OUTPUT
3	TO ANTENNA CONTACT THROUGH 200 MFD CAPACITOR - MICA	1500 kc/s	M.W.	1500 kc/s	"B"	C8 FOR MAXIMUM OUTPUT
4	TO ANTENNA CONTACT THROUGH 200 MFD CAPACITOR - MICA	600 kc/s	M.W.	600 kc/s	"B"	PADDER C13 FOR MAXIMUM OUTPUT WHILE ROCKING GANG, REPEAT C12,C8,C13
5	THROUGH 400 OHM CARBON RESISTOR TO ANTENNA LEAD	6.1 Mc/s	2nd S.W.	MIN. CAP.	"C"	C19 FOR MAXIMUM OUTPUT
6	THROUGH 400 OHM CARBON RESISTOR TO ANTENNA LEAD	5.0 Mc/s	2nd S.W.	5.0 Mc/s	"B" & "D"	C9 FOR MAXIMUM OUTPUT
7	THROUGH 400 OHM CARBON RESISTOR TO ANTENNA LEAD	18.1 Mc/s	1st S.W.	MIN. CAP.	"C"	C15 FOR MAXIMUM OUTPUT
8	THROUGH 400 OHM CARBON RESISTOR TO ANTENNA LEAD	17.0 Mc/s	1st S.W.	17.0 Mc/s	"B"	C10 FOR MAXIMUM OUTPUT
9	CHECK TRACKING AT 6.5 Mc/s					

NOTE A: SIGNAL GENERATOR GROUND LEAD TO "B-" AS EXPLAINED ABOVE.

NOTE B: TUNE GANG TO SIGNAL GENERATOR.

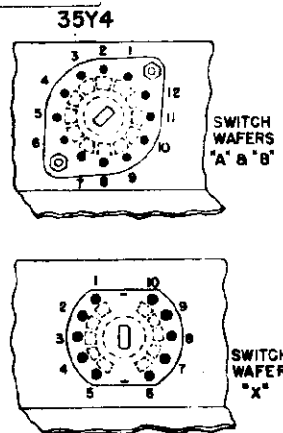
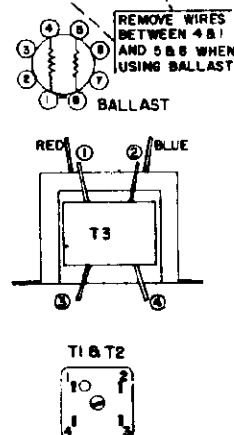
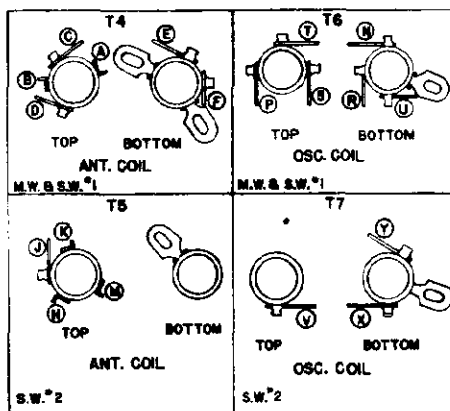
NOTE C: ADJUST OSCILLATOR TRIMMER TO MAXIMUM CAPACITY POSITION (CLOCKWISE). TURN SCREW COUNTER-CLOCKWISE UNTIL SECOND PEAK IS OBTAINED. THIS WILL BE THE SMALLER CAPACITANCE POSITION.

NOTE D: CHECK TRACKING AT 2 Mc/s.

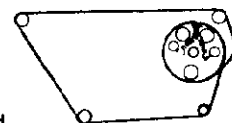


- C1 15-500 MMF. VAR. COND. 2 GANG
 C2 .01 MF. 600 V.
 C3 .01 MF. 600 V.
 C4 .1 MF. 400 V.
 C5 .047 MF. 600 V.
 C6 .0047 MF. 400 V.
 C7 5-35 MMF.
 C8 5-35 MMF. TRIMMER
 C9 5-35 MMF. TRIMMER
 C10 5-35 MMF.
 C11 50 MMF. PADDER
 C12 5-35 MMF.
 C13 5-35 MMF. TRIMMER
 C14 5-35 MMF.
 C15 350-650 MMF.
 C16 .0023 MF. MICA
 C17 .005 MF. MICA
 C18 .022 MF. 600 V.
 C19 .047 MF. 600 V.
 C20 100 MMF. MICA
 C21 .0022 MF. 600 V.
 C22 250 MMF. MICA
 C23 .0047 MF. 400 V.
 C24 .01 MF. 600 V.
 C25 .1 MF. 400 V.
 C26 500 MMF. CERAMIC
 C27 .01 MF. 600 V.
 C28 25 V.
 C29 40 MF. 150 V.
 C30 40 MF. 150 V.
 C31 40 MF. 150 V.

- R1 47 K .5 W.
 R2 47 .5 W.
 R3 330 K .5 W.
 R4 22 K .5 W.
 R5 47 .5 W.
 R6 2.2 MEG .5 W.
 R7 47 K .5 W.
 R8 500 K VOL. CONT.
 R9 10 MEG .5 W.
 R10 330 .5 W.
 R11 330 K .5 W.
 R12 470 K .5 W.
 R13 150 .5 W.
 R14 22 .5 W.
 R15 100 .5 W.
 R16 1000 .5 W.



NOTES:
 RANGE SWITCH SHOWN IN EXTREME
 CLOCKWISE (UP) POSITION.
 TONESWITCH SHOWN IN EXTREME
 COUNTERCLOCKWISE (UP) POSITION.
 TONE CONTROL SWITCH
 RADIO - LOW (SHOWN)
 RADIO - HIGH
 PHONO - LOW
 PHONO - HIGH

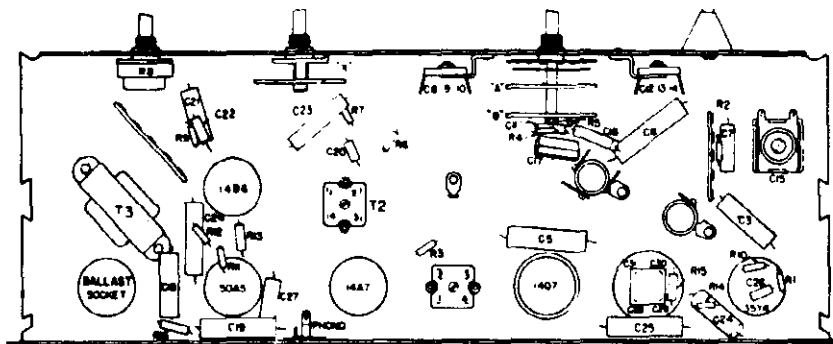


DRIVE CORD TO
HAVE 3 TURNS
AROUND TUNING
SHAFT.

PAGE 21-10 RADIO KITS

MODEL 120
120L, 120R

LOCATION OF PARTS



REPLACEMENT PARTS

WHEN ORDERING ALWAYS GIVE DESCRIPTION OF PART, CODE NUMBER AND MODEL NUMBER OF RECEIVER.

CAPACITORS

C1-C2	2 GANG VARIABLE CONDENSER	G9.117.27	L1
C3-C4	.01 Mfd. 600 V	G8.396.39	L2
C24-C27			
C5-C25	.1 Mfd. 600 V	G8.396.30	L3
C6-C19	.047 Mfd. 600 V	G8.396.43	L4
C7-C23	.0047 Mfd. 600 V	G8.396.22	L5
C8	5-35 Mmfd. ANT. TRIMMER	G8.393.26	L6
C9	5-35 Mmfd. ANT. TRIMMER		
C10	5-35 Mmfd. ANT. TRIMMER		
C11	50 Mmfd. MICA	G8.451.06	L7
C12	5-35 Mmfd. OSC. TRIMMER	G8.393.25	L8
C13	5-35 Mmfd. OSC. TRIMMER		
C14	5-35 Mmfd. OSC. TRIMMER		
C15	350-850 Mmfd. PADDER	G8.394.35	L9
C16	.0023 Mfd. MICA	G8.450.30	L10
C17	.005 Mfd. MICA	G8.450.27	
C18	.022 Mfd. 600 V	G8.396.41	
C20	100 Mmfd. CERAMIC	G8.395.13	
C21	.0022 Mfd. 600 V	G8.396.35	
C22	250 Mmfd. CERAMIC	G8.395.09	
C26	500 Mmfd. CERAMIC	G8.395.12	
C28	25 Mfd. 25 V		
C29	40 Mfd. 150 V		
C30	40 Mfd. 150 V		
C31	40 Mfd. 150 V	G8.386.35	

COILS AND TRANSFORMERS

ANTENNA COIL ASSEMBLY (SW BAND #2)	G9.136.24
ANTENNA COIL ASSEMBLY (MW / SW Band #1)	G9.136.17
OSC. COIL ASSEMBLY (SW BAND #2)	G9.139.19
OSC. COIL ASSEMBLY (MW / SW BAND #1)	G9.139.27
1st I.F. ASSEMBLY	G9.142.67
2nd I.F. ASSEMBLY	G9.142.68
OUTPUT TRANSFORMER	G9.142.58

MISCELLANEOUS PARTS

R1-R7	47KK 1/2 W	G8.314.21	BACK COVER	G8.516.41
R2-R5	47 1/2 W	G8.314.04	CABINET	G9.000.28
R3-R11	330 K 1/2 W	G8.314.26	DIAL GLASS	G5.926.13
R4	22 K 1/2 W	G8.314.41	DIAL LAMP #47	G8.002.08
R6	2.2 MEG 1/2 W	G8.314.31	DIAL LIGHT SOCKET	G8.001.31
R8	500 K VOLUME CONTROL	G8.600.43	DIAL POINTER	G5.926.06
R9	10 MEG 1/2 W	G8.314.35	DIAL DIFFUSION SCREEN	G5.925.26
R10	330 .5 W	G8.314.09	DIAL DIFFUSION SPRING	G5.600.02
R12	470 K 1/2 W	G8.314.27	DIAL POINTER DRIVE CORD	G8.104.10
R13	150 1 W	G8.317.15	DIAL DRIVE CORD SPRING	G5.600.03
R14	22 1 W	G8.314.02	KNOB, WITH DOT	G5.483.41
R15	100 1 W	G8.319.06	KNOB, PLAIN	G5.483.42
R16	1000 1 W	G8.319.12	LINE CORD	W7.052.60
150 V	BALLAST RESISTOR	G8.323.00	LOCTAL SOCKET	G8.550.95
200 V	BALLAST RESISTOR	G8.323.01	OCTAL SOCKET	G8.532.07
250 V	BALLAST RESISTOR	G8.323.02	PHONOGRAPH CONNECTOR	G8.532.13
			SPEAKER	G9.107.36
			SPEAKER BAFFLE ASSEMBLY	G9.117.71
			SPEAKER GRILLE CLOTH	G9.109.28
			TONE CONTROL AND PHONO SWITCH	G8.703.22
			WAVERANGE SWITCH	G8.703.21

Battery Operation

For operation on batteries it is necessary that the line cord plug be inserted into the changeover plate (see Fig. 2). The receiver may now be turned on by rotating the on-off switch to right and advancing volume control knob. (See Fig. 1).

Electric Operation

To operate this set on AC, open the rear of the case by pulling it back at the top. Then remove the plug from the plate where it has been inserted, (See Fig. 2) and pull the cord all the way out of the case. Close the rear of the case, making sure that the cord runs out through the slot at the side. Pulling out the plug from the changeover plate disconnects the batteries automatically and connects the receiver for power line operation.

Electric Operation 110-125 Volts AC-DC

For operation on the above voltage and current, the line switch **MUST BE IN THE CORRECT POSITION 110-125V. AC-DC**. Pin plug must always be in the **BLACK** socket. (See Fig. 2).

Electric Operation 210-230 Volts AC

For operation on the above voltage and current, the line switch **MUST BE IN THE 210-230V. AC POSITION**, and the pin plug must always be in the **BLACK** socket. (See Fig. 2).

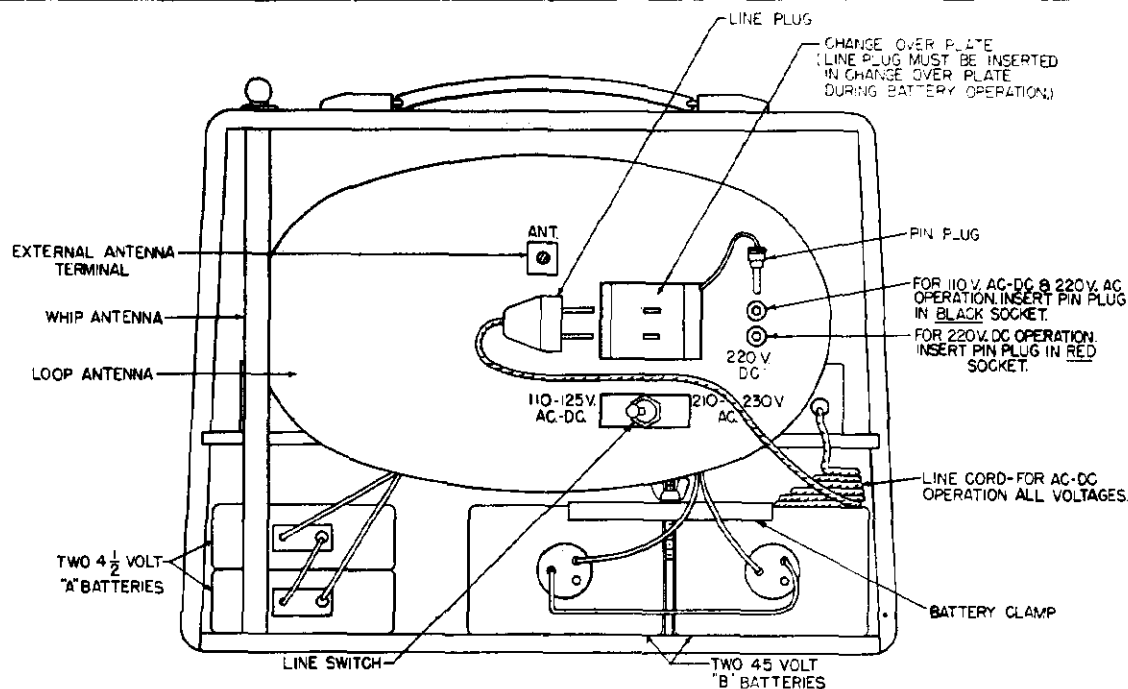


FIG. 2



USE BATTERY POWER WHENEVER POSSIBLE.

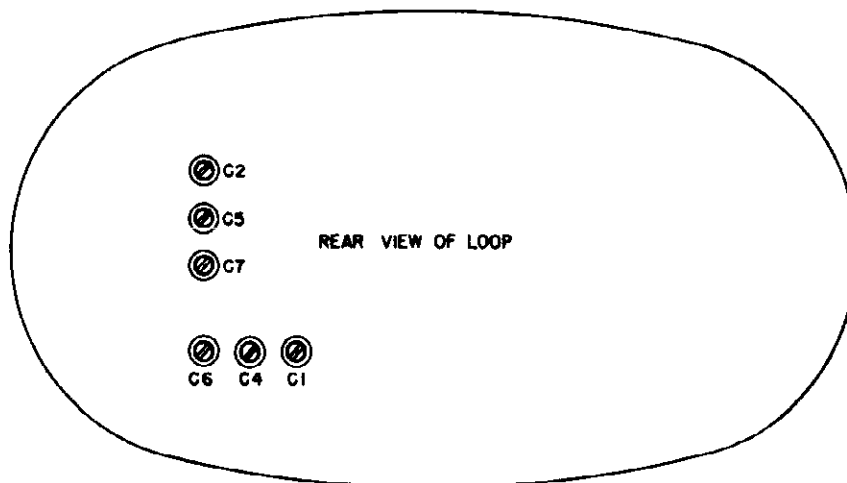
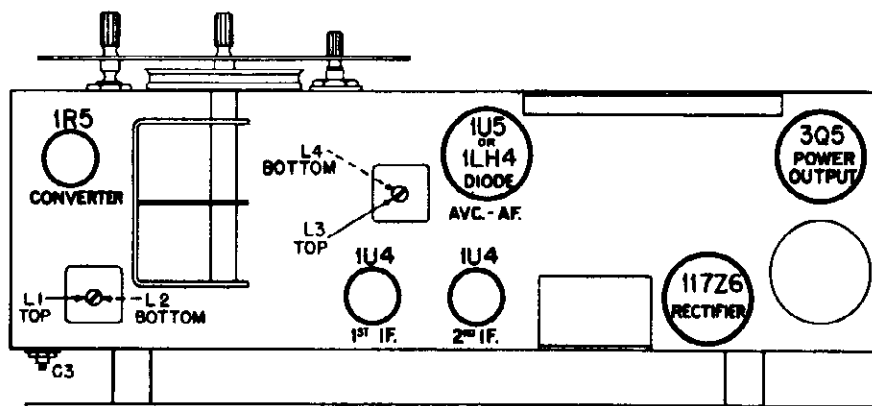
SET VOLUME CONTROL AT MAXIMUM VOLUME AND OUTPUT FROM SIGNAL GENERATOR NO. HIGHER THAN NECESSARY TO OBTAIN OUTPUT READING.

TUNING RANGE:- **BROADCAST** 535 - 1650 KC **TROPIC** 2.1 - 6.5 MC **INTERNATIONAL** 6.4 - 18.3 MC

USE INSULATED ALIGNMENT SCREWDRIVER FOR ADJUSTING.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	BAND SWITCH POSITION	SIGNAL GEN. FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1 MFD	RF SECTION OF VARIABLE CONDENSER	BC	455 KC	1650 KC	ACROSS VOICE COIL	L1, L2, L3, L4	ADJUST FOR MAXIMUM
200 MMFD	ANTENNA TERMINAL	BC	1650 KC	FULLY OPEN	" "	C1	" " "
200 MMFD	" "	BC	1500 KC	1500 KC	" "	C2	" " "
200 MMFD	" "	BC	600 KC	600 KC	" "	C3	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT RECORD C1 & C2 ADJUSTMENTS AS GIVEN
400 ~	" "	TROPIC	6.5 MC	FULLY OPEN	" "	C4	* ADJUST FOR MAXIMUM
400 ~	" "	TROPIC	6.0 MC	6.0 MC	" "	C5	* ROCK GANG & ADJUST FOR MAXIMUM OUTPUT
400 ~	" "	INTERNATIONAL	16.3 MC	FULLY OPEN	" "	C6	* ADJUST FOR MAXIMUM
400 ~	" "	INTERNATIONAL	17 MC	17 MC	" "	C7	* ROCK GANG & ADJUST FOR MAXIMUM OUTPUT

* IF TWO PEAKS CAN BE OBTAINED, USE ONE WITH TRIMMER SCREW FURTHER QUT.







81, 82, 83, 84 ARE PART OF BAND SWITCH N° 95-118
BAND SWITCH SHOWN BC POSITION -

MODELS 2000,
4963

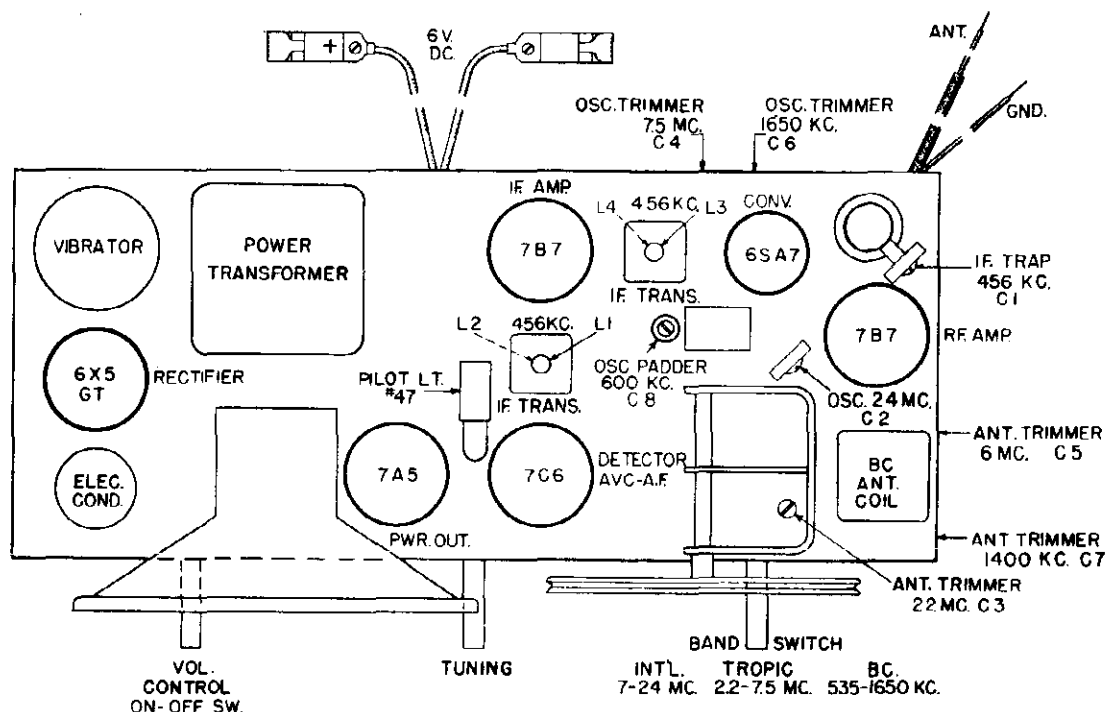
ALIGNMENT INSTRUCTIONS

SET VOLUME CONTROL AT MAXIMUM VOLUME AND OUTPUT FROM SIGNAL GENERATOR
NO HIGHER THAN IS NECESSARY TO OBTAIN OUTPUT READING

TUNING RANGE

BROADCAST 540-1650 KC, INTERNATIONAL- 7-24 MC, TROPIC 2.3-7.4 MC

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING ON	BAND SWITCH POSITION	SIGNAL GEN'R FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 MFD	PIN*6 ON 7B7 (RF) SOCKET	BC	456 KC	FULL OPEN	ACROSS VOICE COIL	L1, L2, L3, L4,	ADJUST FOR MAXIMUM OUTPUT
2	.1 MFD	PIN*6 ON 7B7 (RF) SOCKET	BC	456 KC	FULL OPEN	ACROSS VOICE COIL	C1	ADJUST FOR MINIMUM OUTPUT
3	200 OHMS	ANTENNA LEAD	INTERNATIONAL	24 MC	FULL OPEN	ACROSS VOICE COIL	* C2	ADJUST FOR MAXIMUM OUTPUT
4	200 OHMS	ANTENNA LEAD	INTERNATIONAL	20 MC	APPROX. 20 MC	ACROSS VOICE COIL	C3	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT C3 ADJUSTMENT
5	200 OHMS	ANTENNA LEAD	TROPIC	7.4 MC	FULL OPEN	ACROSS VOICE COIL	+ C4	ADJUST FOR MAXIMUM OUTPUT
6	200 OHMS	ANTENNA LEAD	TROPIC	6 MC	APPROX. 6 MC	ACROSS VOICE COIL	C5	ADJUST FOR MAXIMUM OUTPUT
7	50 MMFD	ANTENNA LEAD	BC	1650 KC	FULL OPEN	ACROSS VOICE COIL	C6	ADJUST FOR MAXIMUM OUTPUT
8	50 MMFD	ANTENNA LEAD	BC	1400 KC	APPROX. 1400 KC	ACROSS VOICE COIL	C7	ADJUST FOR MAXIMUM OUTPUT
9	50 MMFD	ANTENNA LEAD	BC	600 KC	600 KC	ACROSS VOICE COIL	C8	ROCK GANG & ADJUST FOR MAXIMUM OUTPUT

* IF TWO PEAKS CAN BE OBTAINED, USE ONE WITH TRIMMER SCREW FURTHER IN.
+ IF TWO PEAKS CAN BE OBTAINED, USE ONE WITH TRIMMER SCREW FURTHER OUT.2000
4963

TUBE LAYOUT

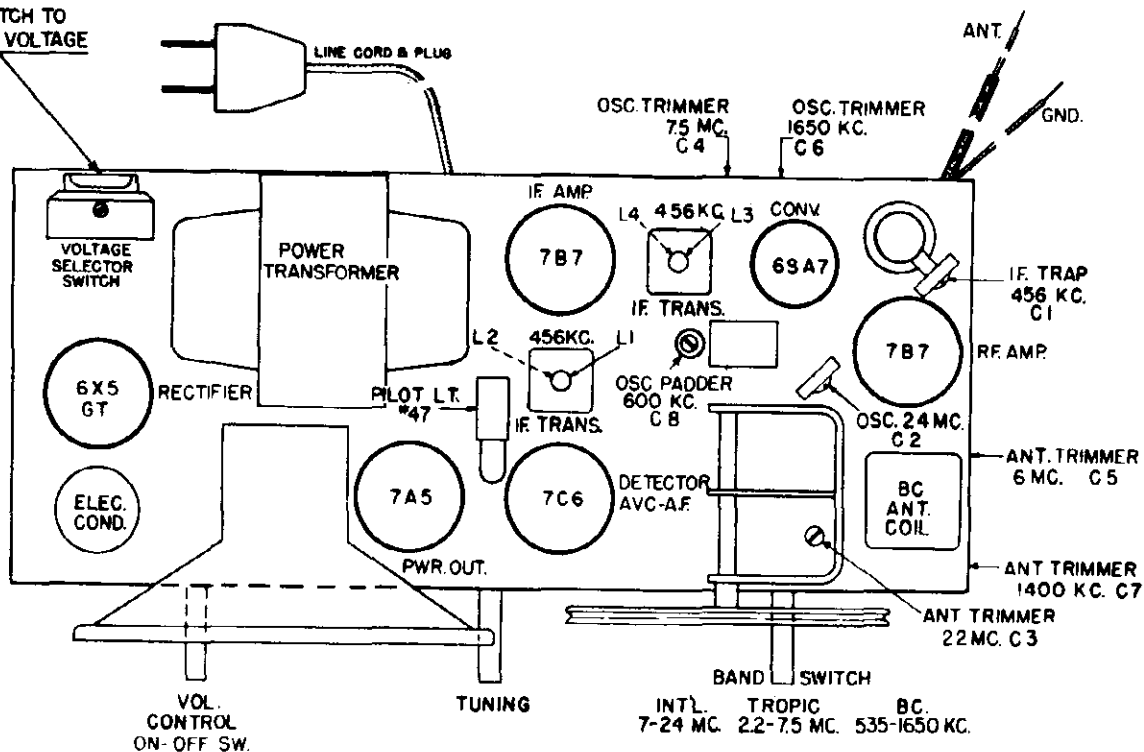
MODEL 2000

PAGE 21-6 REGAL

MODELS 2000,
4963

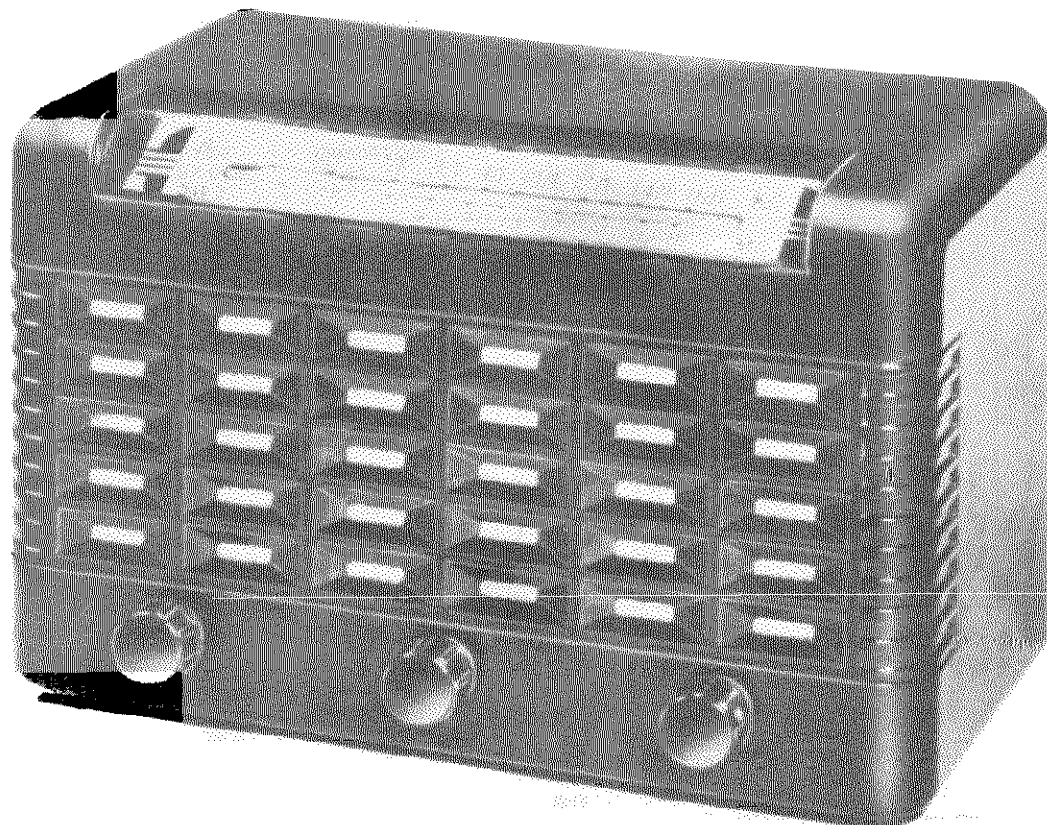
NOTE:

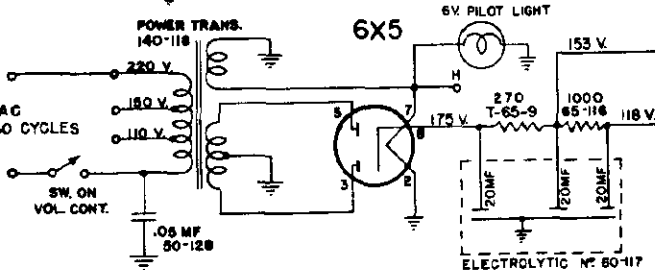
SET THIS SWITCH TO
PROPER LINE VOLTAGE



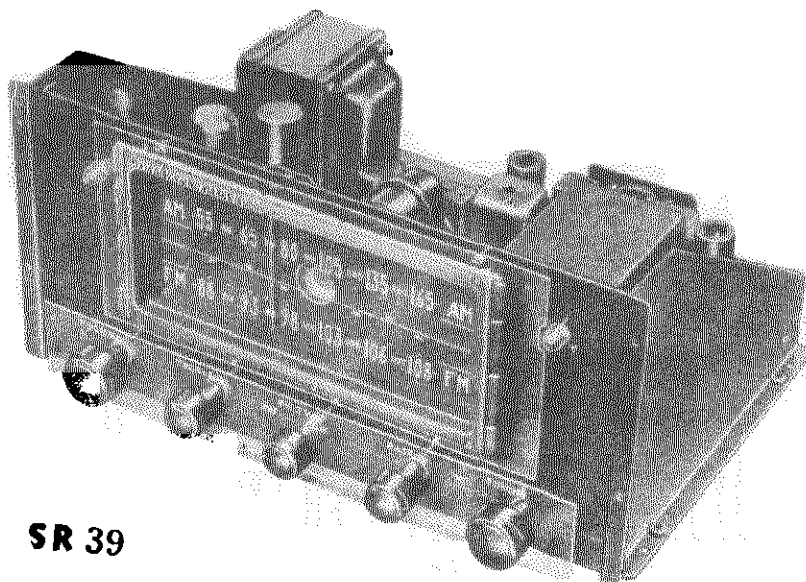
TUBE LAYOUT

MODEL 4963





REGAL PAGE 21-7
MODEL 4963



SR 39

A bandpass pre-stage tuned Radio Frequency section and one stage I.F. at 455 KC terminating in a tuned Infinite Impedance detector for those who insist on the best in a Standard Broadcast Receiver.

A Frequency Modulation Tuner employing a tuned R.F. Pre-stage for added sensitivity, a stable drift-free Triode Oscillator, two stages permeability tuned I.F. at 10.7 for superior F.M. performance and fully balanced static free Ratio Detector with 70% A.M. absorption.

Input jacks for phono pickups, either crystal pickup or properly compensated pre-amp for Variable Reluctance type pickup and a jack for aural television on Selector Control Switch.

A new SR circuit for smooth electro-acoustical control of bass and treble emphasis allowing the controls of the audio amplifier to be pre-set.

Physical dimensions:- 14" wide, 7" high and 10" from es-outcheon to back.

F.M. Sensitivity:- 10 microvolts.

Average output:- .4 volts.

Tubes: 3 6BA6; 1 each 6BE6; 6C4; 6AL5; 6SN7GT; 6SA7; 6SK7; 6SP7; 6X5 and 6X5.

Power Consumption:- 68 watts, 110-125 volts, 50-60 cycles.

ANTENNA REQUIREMENTS.

For best non-directional standard AM broadcast results a single wire five to ten feet in length connected to antenna terminal "A" will be sufficient. Additional selectivity to this efficient input circuit would tend to restrict the wide band reception capabilities of the detector.

For best F.M. results a 100 M.C. dipole should be installed well above surrounding obstructions. The twisted 300 ohm line from the dipole should be connected to antenna terminals "D" and "G". ("G" also grounds unit.)

A console type folded dipole is supplied with the tuner and will prove a satisfactory substitute in most cases where an external dipole is impractical.

INPUT JACKS.

All phono or TV audio signals as well as the AM and FM radio are subject to the volume and tone controls of the tuner.

The jack marked "MAG" is the input for a properly compensated pre amplifier when using the variable reluctance cartridge.

XTAL is the phono input for a standard crystal pickup.

The TV jack makes it possible to channel the audio of a television tuner thru the radio's amplifier and speaker.

The OUTPUT jack should be connected to the high impedance input control (250,000 to 500,000 ohms) of a quality audio amplifier. Use the prepared shielded lead supplied with the tuner. Choose a speaker capable of wide range reproduction.

A.C. POWER. SR39 is completely powerized for 110-125 volts 50-60 cycles. The power switch (on the Volume Control) also controls the A.C. receptacle on the back of the chassis for convenience in amplifier installation.

CAUTION
VENTILATION IS EXTREMELY IMPORTANT. No multi-tube unit should be housed in an insufficiently ventilated cabinet. Damage to the unit and the cabinet will result.

USE ONLY 1 AMP. FUSE.

GENERAL FEATURES

The Model 310 is a combination designed for the reception of radio broadcast programs and for the reproduction of phonograph records, television sound or other external sound. The receiver includes the following separate pieces of equipment: (1) chassis, (2) record changer, and (3) high fidelity speaker.

TECHNICAL DATA

<u>Power Input</u>	105 Watts at 117 Volts, 50-60 cycles. (Phono motor 60 cycles, 25 watts additional.)
<u>Tubes</u>	Total 12 including two rectifiers.
<u>Circuits</u>	Superheterodyne with RF amplifier stage (three gang tuning condenser) on all bands. Three stage FM-IF amplification (10.7 mc). One stage AM-IF (455 kc). Ratio detector on FM. Drift compensation on RF section. Push-pull output with 6 db inverse feedback. Sound input for phono and for TV or other external sound.
<u>Tuning Range</u>	AM - 535 - 1620 kc. FM - 87.5 - 108.5 mc.
<u>Output</u>	10 watts (2-6V6GT tubes in push-pull). Less than 5% distortion at full output.
<u>Sensitivity</u>	AM 12 microvolts FM 17 microvolts (Carrier modulated 30% at 400 cycles. Output 500 milliwatts with 10 db signal to noise ratio.)
<u>Fidelity</u>	Overall 30 to 20,000 cps plus or minus 1 db. Separate bass and treble control. Phono input equalized for elimination of objectionable scratch level. AM and FM audio equalized to BC standards.
<u>Speaker</u>	Hi-fidelity 12 inch PM. 8 ohm voice coil.

TUBE REPLACEMENT

The Model 310 has the following tube complement:

Symbol	Tube	Application	Symbol	Tube	Application
V1	6BA6	RF Amplifier	V7	6AL5	Ratio Detector, FM
V2	6BE6	Conv. & AM Osc.	V8	6SQ7	1st Audio Amplifier
V3	6C4	FM Oscillator	V9	6SN7	2nd Audio Amplifier
V4	6BA6	IF Amp., FM-AM	V10	6V6GT	Audio Power Output
V5	6AU6	IF Amp., FM & 2nd Detector, AM	V11	6V6GT	Audio Power Output
V6	6AU6	IF Amp., FM	V12	5Y3GT	Rectifier

MODEL 310

FUSE REPLACEMENT

A fuse is provided for protection of the receiver against excessive power line voltages, and against failure of any component in the receiver which would cause heavy current drain and fire hazard. This fuse is accessible at the rear panel of the tuner chassis. CAUTION: Always replace the fuse with one of the same rating in the event the fuse is blown. If the fuse continues to blow after replacement trouble is indicated and the equipment should be removed from the cabinet for examination.

ALIGNMENT PROCEDURETest Equipment

1. Voltohmmyst for DC measurements.
2. AM signal generator for 455 KC, 1500 KC, 600 KC, 10.7 MC, 89 MC and 107 MC.
3. AC voltmeter such as the Ballantine voltmeter.
4. An aligning tool is included with each receiver and is taped on the 1st FM-IF transformer can. Additional aligning tools may be had by ordering under part number 94V4707.

In order to reduce instability due to ground currents it is advisable to have a metal sheet covering the test bench and to place all generators and the receivers to be tested on this metal plate.

Alignment Procedure

The alignment is preferably performed in the following order: See Figure 1 for location of adjustments on chassis.

1. AM-IF
2. AM-RF
3. FM-IF
4. FM-RF

AM-IF Alignment

A signal generator capable of modulation and accurately set to 455 KC should be attached through a .01 MFD capacitor to the lug on the service selector switch which connects to the middle AM section of the gang condenser. A good ground point for the generator is the rear support bracket of the switch.

The AC voltmeter is placed across the secondary of the audio output transformer, which is loaded with a 8 ohm 10 watt resistor connected in place of the speaker voice coil. In the event this resistor is not available the speaker may be used if the noise can be tolerated. The volume, bass and treble controls must be full on, the service selector switch in the AM position, and the tuning dial in any convenient position that does not interfere with the AM-IF output signal.

Apply sufficient input signal at 455 KC, 30% AM modulated at 400 cycles to give an indication of about 2 volts rms AC on the AC voltmeter across the secondary of the output transformer. With the use of an aligning tool the primary and secondary of the two AM-IF transformers are peaked for a maximum indication on the output voltmeter. As the receiver approaches correct alignment, reduce the input signal level so that the output never exceeds 3-4 volts AC. It is good practice to recheck the peaking of the transformers a second time, especially if the set was badly out of alignment. The normal AM-IF sensitivity is such that when 100 uV are applied with the signal generator, the output voltmeter will read 2 volts minimum.

AM-RF Alignment

Apply the signal generator to the lug on the service selector switch that supports the loop lead (loop not connected). The AC voltmeter remains attached as for the IF alignment. The operating controls also remain as for the IF adjustment of the receiver. Set the signal generator and receiver dials on 600 KC at 30% modulation with 400 cycles and adjust the AM oscillator core (top adjustment on the 1 1/8" square can toward rear of chassis) for a maximum indication on the output voltmeter. Keep the generator input low enough to prevent the voltmeter from reading above 3-4 volts AC at all times.

The AM converter transformer (top of 1 1/8" square can toward front of chassis) is now adjusted for a maximum output indication on the voltmeter.

The generator and receiver dials are now set at 1500 KC and the oscillator and converter gang condenser trimmers (front holes in the gang cover) are adjusted for a maximum output on AC output voltmeter.

The above procedures are repeated until the 1500 KC and 600 KC points on the generator and the receiver dials coincide without further adjustment of the cores or trimmer condensers.

A sensitivity of 10 uV or less at 400 cycles 30% modulation for a 3 volt AC output and a 10 db or greater signal to noise ratio is normal for this input point.

The loop is then attached to the receiver and the generator is applied to the loop tap which is available on the antenna strip at rear of the receiver. The generator and the receiver dials are set to 1500 F and the antenna trimmer capacitor on the 1st AM section of the gang condenser is adjusted for maximum output on the AC output voltmeter.

A sensitivity of 1 uV at 400 cycles 30% modulation for a 2 volt AC output with a 10 db signal to noise ratio or better at 1500 KC and 600 KC is normal for the receiver at this input point.

FM-IF Alignment

Place the service selector switch in the FM position. Apply a signal generator unmodulated, and set accurately to 10.7 megacycles, to the grid tap on the FM converter coil. The rear mounting bracket of the service selector switch provides a convenient ground point for the generator.

MODEL 310

A DC voltohmyst voltmeter is connected from ground to the negative side of the 5 MFD electrolytic capacitor (C-37) which is across the two 8200 ohm load resistors (R-30, R-31) of the ratio detector.

Enough signal at 10.7 MC is then applied to the receiver to give an indication on the voltohmyst above the residual voltage already present. Always keep the input level of the signal generator low enough to produce not more than negative 5 volts DC on the voltohmyst.

The following FM-IF transformer cores are then adjusted in the following order for a maximum indication on the DC voltmeter:

1. Primary of ratio detector (bottom of large can).
2. Primary and secondary of 3rd FM-IF transformer.
3. Primary and secondary of 2nd FM-IF transformer.
4. Primary and secondary of 1st FM-IF transformer.

If the receiver was badly mis-aligned it is advisable to repeat the above procedure for better alignment.

The voltohmyst is then connected to the audio output of the ratio detector which is the junction of the 47,000 ohm $\frac{1}{2}$ watt resistor (R-27) and the 1500 MMFD capacitor (C-36) and ground.

By tuning the secondary of the ratio detector (top of large can) it is possible to produce both positive and negative swings of the DC voltmeter from a zero position. The proper tuned position is the zero position of the voltmeter between the positive and negative swings.

In order to check the relative sensitivity of the FM-IF system move the voltohmyst back to the first position from the negative side of the 5 MFD capacitor to ground. A normal sensitivity is indicated when it is necessary to apply between 300 and 700 uV for a negative 5 volts DC on the voltohmyst.

FM-RF Alignment

Connect a signal generator unmodulated and accurately set on 89 MC to the FM antenna terminals of the receiver through a resistor of 200 ohm to 270 ohm in the hot lead of the generator to match the 300 ohm input of the FM antenna coil. The DC voltmeter is connected as it was for the FM-IF alignment, between the negative side of the 5 MFD capacitor (C-37) and ground.

Set the tuning dial of the radio to 89 MC and adjust the FM oscillator core for a maximum DC output on the voltohmyst. Adjust the input level of the signal generator so as to produce a negative 3 to 5 volts DC on the voltmeter. The correct oscillator core position is when the core is just entering the coil from the bottom of the coil. The 2nd harmonic of the oscillator is used to produce the IF frequency. By compression or expansion of the converter and antenna FM coils it is possible to bring their circuits into alignment with the oscillator at 89 MC.

As the set becomes more accurately aligned it may be necessary to reduce the input of the signal generator to maintain an output below a negative 5 volts DC.

Now reset the signal generator and the receiver dials to 107 MC and adjust the oscillator tubular trimmer and the compression trimmers on the FM converter and antenna sections of the gang condenser for a maximum indication on the output DC voltmeter.

Again reset the generator and receiver dials back to 89 MC and repeat the operations performed formerly at this frequency setting. This realigning at the high and low ends of the FM band is necessary until it is noticed that at both 89 MC and 107 MC the receiver has been aligned to the generator frequency without adjustment of either the core of the oscillator or the oscillator trimmer to bring them into alignment.

The converter and antenna coils have been properly aligned when either compression or expansion of the turns will give no increase in the output DC voltage at 89 MC and the converter and oscillator trimmer condenser adjustment will also give no increase in DC output voltage at 107 MC.

VOLTAGE TABLE									
Tube	Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V1	6BA6	0	0	AC 6.5	0	115	115	0	-
V2	6BE6	-7 to -10	.9	AC 6.5	0	125	100	0	-
V3	6C4	120	0	AC 5.4	0	0	-7 to -10	0	-
V4	6BA6	0	0	AC 6.5	0	120	110	1.3	-
V5	6AU6	0	0	AC 6.5	0	110	110	1.2	-
V6	6AU6	0	0	AC 6.5	0	110	110	1.3	-
V7	6AL5	0	0	AC 6.5	0	.6	0	-.6	-
V8	6SQ7	0	-.8	0	0	0	20	AC 6.8	0
V9	6SN7	0	75	2.8	5.2	110	20	AC 6.3	0
V10	6V6G	0	0	260	270	0	105	AC 6.3	0
V11	6V6G	0	0	260	270	0	20	AC 6.3	0
V12	5Y3	0	300	0	AC 320	0	AC 320	0	300

Voltage readings made with Voltomyst. Line voltage adjusted to 117 V AC. All voltages measured between indicated pin and chassis frame. Unless noted all voltages are DC and positive to frame.

No signal input.
 Voltages taken with the service selector switch in the FM position.
 Volume control in the counterclockwise position.
 Tone controls clockwise.

MODEL 310

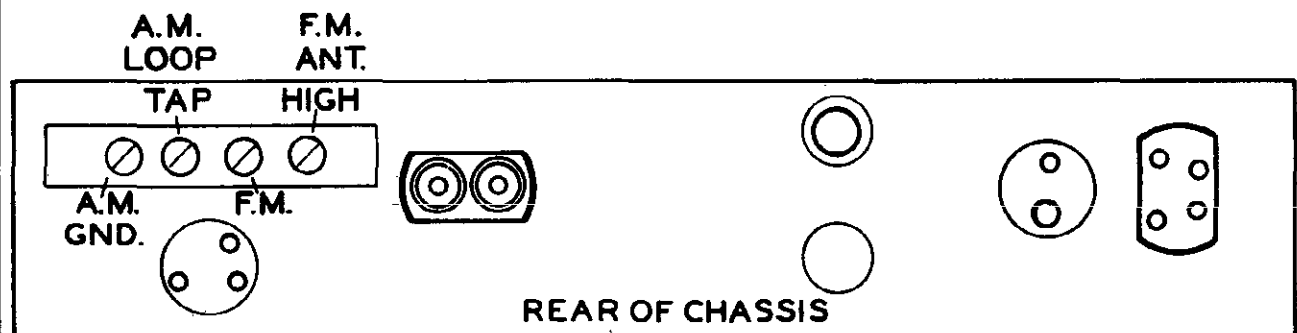
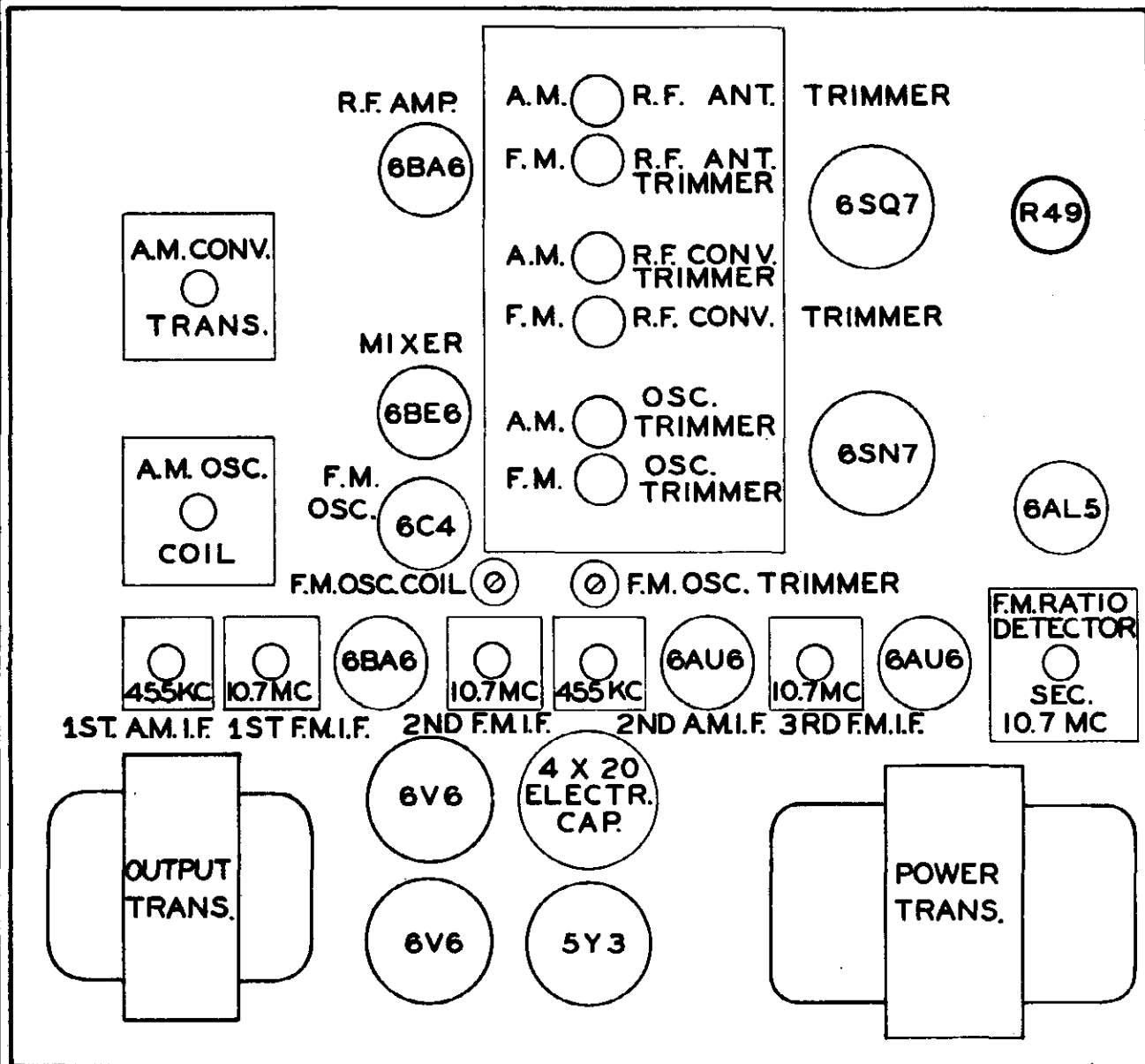


Figure 1 Model 310 Receiver Assembly

RESISTANCE TABLE

Tube	Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V1	6BA6	700 K	0	0	0	inf.	inf.	82	-
V2	6BE6	22 K	82	0	0	inf.	inf.	27	-
V3	6C4	inf.	inf.	3	0	inf.	47 K	0	-
V4	6BA6	200 K	0	0	0	inf.	inf.	82	-
V5	6AU6	60 K	0	0	0	inf.	inf.	220	-
V6	6AU6	0	0	0	0	inf.	inf.	220	-
V7	6AL5	inf.	inf.	0	0	10 K	0	10 K	-
V8	6SQ7	0	4.7 M	0	0	0	inf.	0	0
V9	6SN7	17 K	inf.	2.2 K	500 K	inf.	12 K	0	0
V10	6V6G	inf.	.2	inf.	inf.	220 K	10 K	0	250
V11	6V6G	inf.	0	inf.	inf.	220 K	10 K	0	250
V12	5Y3	inf.	inf.	inf.	75	inf.	80	inf.	inf.

Resistance readings taken with voltohmmyst connected between pin indicated and chassis frame. Values given are in ohms except where K indicates times 1000 and M indicates times 1 megohm.

All controls to the counterclockwise or off position.
Range switch in FM position.

Parts List By Symbol Designation

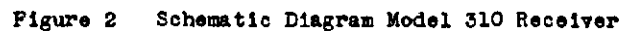
Symbol Desig.	Function	Description	Part No.
(C1 C2 C3 C4	Main tuning capacitor	Capacitor, variable, 3 gang AM-FM	15U4569
C5	Grid coupling	Capacitor, ceramic 1500 MMFD 350 V	15L3459
C6	Cathode bypass, RF	Capacitor, ceramic 5000 MMFD Hi-Kap, 500 V	15L3462
C7	Cathode bypass, IF	Same as C5	
C8	Screen bypass, RF	Same as C5	
C9	Screen bypass, Conv.	Same as C5	
C10	Screen bypass, IF	Same as C5	
C11	Heater bypass, RF	Same as C5	
C12	Heater bypass, IF	Same as C5	
C13	Heater bypass, IF	Same as C5	
C14	Heater bypass, IF	Same as C5	
C15	Heater bypass, ratio detector	Same as C5	
C16	Grid decoupling, RF	Capacitor, paper, .05 MFD 600 V, miniature tubular	15L3467
C17	Coupling, cathode follower	Capacitor, paper, .05 MFD 200 V, miniature tubular	15S4221
C18	Grid decoupling, Conv.	Capacitor, electrolytic, 25 MF 50 V, tubular	15B638
C19	Cathode bypass, audio	Capacitor, silver ceramic, 25 MMFD 10% 500 V NPO	15D3165
C20	RF coupling, FM	Capacitor, ceramic 51 MMFD 5% 500 V	15L3458
C21	Grid coupling oscillator	Same as C17	
C22	Grid coupling, audio	Same as C5	
C23	Plate bypass, Conv.	Capacitor, compensator, silver ceramic, 4 MMFD plus or minus .25 MMFD Hi-Q, temp coeff., insulated N-750	15V4678
C24	Drift compensation	Same as C21	
C25	Grid oscillator, FM	Same as C4	
C26	Plate decoupling oscillator, FM	Same as C5	
C27	Plate bypass oscillator, FM	Same as C5	
C28	Plate decoupling, IF	Capacitor, ceramic, 100 MMFD 10% 500 V	15L3460
C29	Grid capacitor, AM detector	Capacitor, silver ceramic, 2x100 MMFD 20% 500 V 3 wire leads	15D2923
(C30 C31	Grid filter, AM Detector	Capacitor, paper, .1 MFD 200 V, miniature tubular	15S4298
C32	Bypass, AGC	Capacitor, mica, 390 MMFD 10% 500 V	15B799
C33	Diode load	Same as C33	
C34	Diode load	Same as C33	
C35	Ratio detector decoupling	Same as C33	

Parts List By Symbol Designation			
Symbol Desig.	Function	Description	Part No.
C36	Audio filter, ratio detector	Same as C4	
C37	Ratio detector	Capacitor, electrolytic, 5 MFD 150 V, tubular	15V4599
C38	Screen bypass	Same as C17	
C39	IF grid bypass	Same as C5	
C40	Trimmer, FM oscillator	Capacitor, trimmer, .5-5 MMFD	15V4602
C41	Coupling, Audio Amp.	Capacitor, paper, .01 MFD 200 V, miniature tubular	15L3463
C42	Coupling, Audio Grid	Capacitor, paper, .1 MFD 600 V, miniature tubular	15L3468
C43	RF filter, Audio Amp.	Same as C29	
C44	Bypass, treble control	Same as C41	
C45	Bypass, treble control	Capacitor, paper, .005 MFD 20% 600 V	15H2603
C46	Bypass, bass control	Capacitor, paper, .02 MFD 200 V, tubular miniature	15U4580
C47	Bypass, bass control	Same as C45	
C48	Cathode bypass, audio	Capacitor, electrolytic, 25 MFD 25 V, tubular	15B795
C49	Plate coupling, audio	Same as C17	
C50	Coupling, audio amp.	Same as C46	
C51	Filter, high voltage rectifier	Capacitor, electrolytic, 4x20 MFD 450 V	15L3588
C52			
C53			
C54			
C55	Plate decoupling, 1st audio	Same as C42	
E1	Dial light	Lamp, 6-8 V .150 A #47 brown	49A168
E2	Dial light	Same as E1	
E3	Overload protection	Fuse, 3 amp, 3 AG	37A162
E4	Main tuning knob	Knob, station selector, 1 7/8" dia., brass	47V4603
E5	Control knob	Knob, 1 1/8" dia. black bakelite, push-on type	47V4604
E6	Align IF	Aligning tool	94V4707
J1	Loop connection to receiver	Receptacle, 3 contact	67U4716
J2	Television sound connection	Receptacle, dual, insulated	67V4657
J3	Phono pickup connection		
J4	Phono motor power	Receptacle, 4 contact	67B645
J5	Speaker connection	Receptacle, 2 contact	67V4673

Parts List By Symbol Designation			
Symbol Desig.	Function	Description	Part No.
L1	AM signal intercept	Loop	1V4594
L2	FM antenna tuning	Coil	20V4625
L3	Coupling, RF stage	Choke	17V4668
L4	Tuning, FM-RF	Coil	20V4626
L5	Oscillator, AM	Coil	20V4621
L6	Oscillator, FM	Coil	20V4627
L7	Filter choke, RF-IF	Choke	17L3378
L8	Filter choke, RF-IF	Same as L7	
L9	Filter choke, RF-IF	Same as L7	
L10	Heater FM oscillator	Choke	17V4683
LS1	Loudspeaker	Speaker 12" PM - 8 ohm voice coil	85U4709
P1	Loop to receiver	Plug, 3 contact	65U4714
R1	Grid coupling, RF	Resistor, composition, .47 meg 10% 1/2 watt	70L3404
R2	Grid decoupling, RF	Resistor, composition, .1 meg 10% 1/2 watt	70L3401
R3	Cathode bias, RF	Resistor, composition, 82 ohms 5% 1/2 watt	70L3391
R4	Cathode bias, Conv.	Same as R3	
R5	Cathode bias, IF	Same as R3	
R6	Cathode bias, IF	Resistor, composition, 220 ohms 10% 1/2 watt	70V4783
R7	Cathode bias, IF	Same as R6	
R8	Screen decoupling, RF	Resistor, composition, 1000 ohms 10% 1/2 watt	70L3393
R9	Screen decoupling, IF	Same as R8	
R10	Screen decoupling, Conv.	Resistor, composition, 3300 ohms 10% 1/2 watt	70L3394
R11	Screen decoupling, IF	Same as R10	
R12	Screen decoupling, IF	Same as R10	
R13	Grid decoupling, Conv.	Same as R2	
R14	Oscillator grid, Conv.	Resistor, composition, 22,000 ohms 10% 1/2 watt	70L3397
R15	Plate decoupling, Conv.	Same as R8	
R16	Oscillator grid, FM	Resistor, composition, 47,000 ohms 10% 1/2 watt	70L3399
R17	Grid loading FM-IF	Same as R14	
R18	Grid decoupling, FM-IF	Same as R2	
R19	Grid decoupling, FM-IF	Resistor, composition, .22 meg 10% 1/2 watt	70L3403
R20	Grid decoupling	Same as R14	
R21	Grid decoupling	Same as R16	

Parts List By Symbol Designation			
Symbol Desig.	Function	Description	Part No.
R22	Grid	Resistor, composition, 27 ohms 10% $\frac{1}{2}$ watt	70V4692
R23	Decoupling, AGC circuit	Resistor, composition, 1 meg 20% $\frac{1}{2}$ watt	70L3406
R24	Plate coupling, FM oscillator	Same as R8	
R25	Plate decoupling, 1st audio	Same as R2	
R26	Decoupling, ratio detector	Resistor, composition, 47 ohms 10% $\frac{1}{2}$ watt	70L3429
R27	De-emphasis, FM detector	Same as R16	
R28	Diode load, ratio detector	Resistor, composition, 1500 ohms 10% $\frac{1}{2}$ watt	70L3525
R29	Diode load, ratio detector	Same as R28	
R30	Audio load, ratio detector	Resistor, composition, 8200 ohms 10% $\frac{1}{2}$ watt	70L3525
R31	Audio load, ratio detector	Same as R30	
R32	Volume control	Potentiometer, volume, $\frac{1}{2}$ meg	70V4583
R33	Grid loading, audio amp.	Resistor, composition, 4.7 meg 20% $\frac{1}{2}$ watt	70L3530
R34	Plate load, audio amp.	Same as R2	
R35	Tone control network	Same as R16	
R36	Treble control	Potentiometer, treble, $\frac{1}{2}$ meg	70V4584
R37	Bass control	Potentiometer, bass off-on, $\frac{1}{2}$ meg	70V4585
R38	Bass control network	Same as R14	
R39	Grid load, audio amp.	Same as R2	
R40	Cathode bias, audio amp.	Resistor, composition, 2200 ohms 10% $\frac{1}{2}$ watt	70L3432
R41	Cathode follower	Resistor, composition, 56 ohms 10% $\frac{1}{2}$ watt	70V4628
R42	Cathode follower decoupling	Resistor, composition, 560 ohms 10% $\frac{1}{2}$ watt	70L3527
R43	Cathode circuit	Resistor, composition, 10,000 ohms 10% $\frac{1}{2}$ watt	70L3396
R44	Cathode bias, Audio Amp.	Same as R28	
R45	Plate coupling, audio amp.	Same as R16	
R46	Grid	Same as R19	
R47	Cathode bias, audio	Resistor, 220 ohms 10% 5 watt, Candohm	70U4717
R48	Filter	Same as R47	
R49	Filter	Resistor, wirewound, 2500 ohms 10% 15 watt	70U4718
R50	Grid	Same as R19	
R51	Grid	Same as R19	

Parts List By Symbol Designation			
Symbol Desig.	Function	Description	Part No.
SW1	AM, FM, Phono, TV switching	Switch, range, 4 position	89V4630
T1	Interstage coupling, Conv.	Coil	20V4620
T2	Interstage coupling, FM	Coil	20V4623
T3	Interstage coupling, AM	Coil	20V4622
T4	Interstage coupling, FM	Same as T2	
T5	Interstage coupling, AM	Same as T3	
T6	Interstage coupling, FM	Same as T2	
T7	Ratio detector transformer	Coil	20V4624
T8	Power	Transformer	91U4576
T9	Output	Transformer	91U4577
V1	RF Amplifier	Tube - 6BA6	92G2871
V2	Converter and Oscillator	Tube - 6BE6	92V4631
V3	FM Oscillator	Tube - 6C4	92B597
V4	IF Amplifier, FM-AM	Same as V1	
V5	IF Amplifier, FM & 2nd Detector, AM	Tube - 6AU6	92C2659
V6	IF Amplifier, FM	Same as V5	
V7	Ratio detector, FM	Tube - 6AL5	92G2870
V8	1st Audio Amplifier	Tube - 6SQ7	92V4632
V9	2nd Audio Amplifier	Tube - 6SN7	92A230
V10	Audio Power Output	Tube - 6V6GT	92E1061
V11	Audio Power Output	Same as V10	
V12	Rectifier	Tube - 5Y3GT	92G480
X1	Socket for V1	Socket, 7 contact, miniature type	82B663
X2	Socket for V2	Socket, 7 contact, miniature, mica filled, top mounting	82V4636
X3	Socket for V3	Same as X2	
X4	Socket for V4	Same as X1	
X5	Socket for V5	Same as X1	
X6	Socket for V6	Same as X1	
X7	Socket for V7	Same as X1	
X8	Socket for V8	Socket, 8 contact octal, black bakelite type MIP-8	82S4412
X9	Socket for V9	Same as X8	
X10	Socket for V10	Same as X8	
X11	Socket for V11	Same as X8	
X12	Socket for V12	Same as X8	



DATE	5-25-50
PART NO.	2U4719A

MODELS 510; 510K;
Kenilworth; 510S;
Sheffield

GENERAL FEATURES

The Model 510 is a combination designed for the reception of radio broadcast programs and for the reproduction of phonograph records, television sound or other external sound. The receiver includes the following separate pieces of equipment: (1) radio-phono chassis, (2) power amplifier, (3) record changer, and (4) coaxial high fidelity speaker.

TECHNICAL DATA

<u>Power Input</u>	140-150 Watts at 117 Volts, 50-60 cycles. (Phono motor 60 cycles, 25 watts additional.)
<u>Tubes</u>	Total 14 including two rectifiers.
<u>Circuits</u>	Superheterodyne with RF amplifier stage (three gang tuning condenser) on all bands. Three stage FM IF amplification (10.7 mc). One stage AM IF (455 kc). Ratio detector on FM. Drift compensation on RF section. Push-pull output with 6 db inverse feedback. Separate B plus supplies for power amplifier and tuner sections for reduction of temperatures and to prevent damage to components through surges. Sound input for phono and for TV or other external sound.
<u>Tuning Range</u>	AM - 535 - 1620 kc. FM - 87.5 - 108.5 mc.
<u>Output</u>	20 watts (2-6L6 tubes in push-pull). Less than 5% distortion at full output.
<u>Sensitivity</u>	AM 12 microvolts FM 17 microvolts (Carrier modulated 30% at 400 cycles. Output 500 milliwatts with 10 db signal to noise ratio.)
<u>Fidelity</u>	Overall 30 to 20,000 cps plus or minus 1 db. Separate bass and treble control. Phono input equalized for elimination of objectionable scratch level. AM and FM audio equalized to BC standards.
<u>Speaker</u>	Hi-fidelity 12 inch coaxial PM. 8 ohm voice coil.

TUBE REPLACEMENT

The Model 510 has the following tube complement:

Symbol	Tube	Application	Symbol	Tube	Application
V1	6BA6	RF Amplifier	V8	6SQ7	1st Audio Amplifier
V2	6BE6	Conv. & AM Osc.	V9	6SN7	2nd Audio Amplifier
V3	6C4	FM Oscillator	V10	6SN7	3rd Audio Amplifier
V4	6BA6	IF Amp., FM-AM	V11	6L6G	Audio Power Output
V5	6AU6	IF Amp., FM & 2nd Detector, AM	V12	6L6G	Audio Power Output
V6	6AU6	IF Amp., FM	V13	5Y3GT	Rectifier
V7	6AL5	Ratio Detector, FM	V14	25Z6GT	Rectifier

MODELS 510; 510K,
Kenilworth; 510S,
Sheffield

FUSE REPLACEMENT

A fuse is provided for protection of the receiver against excessive power line voltages, and against failure of any component in the receiver which would cause heavy current drain and fire hazard. This fuse is accessible at the rear panel of the tuner chassis. CAUTION: Always replace the fuse with one of the same rating in the event the fuse is blown. If the fuse continues to blow after replacement trouble is indicated and the equipment should be removed from the cabinet for examination.

ALIGNMENT PROCEDURE

Test Equipment

1. Voltohmmyst for DC measurements.
2. AM signal generator for 455 KC, 1500 KC, 600 KC, 10.7 MC, 89 MC and 107 MC.
3. AC voltmeter such as the Ballantine voltmeter.
4. An aligning tool is included with each receiver and is taped on the 1st FM-IF transformer can. Additional aligning tools may be had by ordering under part number 94V4707.

In order to reduce instability due to ground currents it is advisable to have a metal sheet covering the test bench and to place all generators and the receivers to be tested on this metal plate.

Alignment Procedure

The alignment is preferably performed in the following order: See Figure 1 for location of adjustments on chassis.

1. AM-IF
2. AM-RF
3. FM-IF
4. FM-RF

AM-IF Alignment

A signal generator capable of modulation and accurately set to 455 KC should be attached through a .01 MFD capacitor to the lug on the service selector switch which connects to the middle AM section of the gang condenser. A good ground point for the generator is the rear support bracket of the switch.

The AC voltmeter is placed across the secondary of the audio output transformer, which is loaded with a 8 ohm 10 watt resistor connected in place of the speaker voice coil. In the event this resistor is not available the speaker may be used if the noise can be tolerated. The volume, bass and treble controls must be full on, the service selector switch in the AM position, and the tuning dial in any convenient position that does not interfere with the AM-IF output signal. Apply sufficient input signal at 455 KC, 30% AM modulated at 400 cycles to give an indication of about 2 volts rms AC on the AC voltmeter across the secondary of the output transformer. With the use of an aligning tool the primary and secondary of the two AM-IF transformers are peaked for a maximum indication on the output voltmeter. As the receiver approaches correct alignment, reduce the input signal level so that the output never exceeds 3-4 volts AC. It is good prac-

MODELS 510; 510K;
Kenilworth; 510S;
Sheffield

tice to recheck the peaking of the transformers a second time, especially if the set was badly out of alignment. The normal AM-IF sensitivity is such that when 100 uV are applied with the signal generator, the output voltmeter will read 2 volts minimum.

AM-RF Alignment

Apply the signal generator to the lug on the service selector switch that supports the loop lead (loop not connected). The AC voltmeter remains attached as for the IF alignment. The operating controls also remain as for the IF adjustment of the receiver. Set the signal generator and receiver dials on 600 KC at 30% modulation with 400 cycles and adjust the AM oscillator core (top adjustment on the 1 1/8" square can toward rear of chassis) for a maximum indication on the output voltmeter. Keep the generator input low enough to prevent the voltmeter from reading above 3-4 volts AC at all times.

The AM converter transformer (top of 1 1/8" square can toward front of chassis) is now adjusted for a maximum output indication on the voltmeter.

The generator and receiver dials are now set at 1500 KC and the oscillator and converter gang condenser trimmers (front holes in the gang cover) are adjusted for a maximum output on AC output voltmeter.

The above procedures are repeated until the 1500 KC and 600 KC points on the generator and the receiver dials coincide without further adjustment of the cores or trimmer condensers.

A sensitivity of 10 uV or less at 400 cycles 30% modulation for a 3 volt AC output and a 10 db or greater signal to noise ratio is normal for this input point.

The loop is then attached to the receiver and the generator is applied to the loop tap which is available on the antenna strip at rear of the receiver. The generator and the receiver dials are set to 1500 KC and the antenna trimmer capacitor on the 1st AM section of the gang condenser is adjusted for maximum output on the AC output voltmeter.

A sensitivity of 1 uV at 400 cycles 30% modulation for a 2 volt AC output with a 10 db signal to noise ratio or better at 1500 KC and 600 KC is normal for the receiver at this input point.

FM-IF Alignment

Place the service selector switch in the FM position. Apply a signal generator unmodulated, and set accurately to 10.7 megacycles, to the grid tap on the FM converter coil. The rear mounting bracket of the service selector switch provides a convenient ground point for the generator.

A DC voltohmmyst voltmeter is connected from ground to the negative side of the 5 MFD electrolytic capacitor (C-37) which is across the two 8200 ohm load resistors (R-30, R-31) of the ratio detector.

Enough signal at 10.7 MC is then applied to the receiver to give an indication on the voltohmmyst above the residual voltage already present. Always keep the input level of the signal generator low enough to produce not more than negative 5 volts DC on the voltohmmyst.

The following FM-IF transformer cores are then adjusted in the following order for a maximum indication on the DC voltmeter:

1. Primary of ratio detector (bottom of large can).

PAGE 21-14 SCOTT RADIO LABORATORIES

MODELS 510; 510K, Kenilworth;
510S, Sheffield

2. Primary and secondary of 3rd FM-IF transformer.
3. Primary and secondary of 2nd FM-IF transformer.
4. Primary and secondary of 1st FM-IF transformer.

If the receiver was badly mis-aligned it is advisable to repeat the above procedure for better alignment.

The voltohmyst is then connected to the audio output of the ratio detector which is the junction of the 47,000 ohm $\frac{1}{2}$ watt resistor (R-27) and the 1500 MMFD capacitor (C-36) and ground.

By tuning the secondary of the ratio detector (top of large can) it is possible to produce both positive and negative swings of the DC voltmeter from a zero position. The proper tuned position is the zero position of the voltmeter between the positive and negative swings.

In order to check the relative sensitivity of the FM-IF system move the voltohmyst back to the first position from the negative side of the 5 MFD capacitor to ground. A normal sensitivity is indicated when it is necessary to apply between 300 and 700 uV for a negative 5 volts DC on the voltohmyst.

FM-RF Alignment

Connect a signal generator unmodulated and accurately set on 89 MC to the FM antenna terminals of the receiver through a resistor of 200 ohm to 270 ohm in the hot lead of the generator to match the 300 ohm input of the FM antenna coil. The DC voltmeter is connected as it was for the FM-IF alignment, between the negative side of the 5 MFD capacitor (C-37) and ground.

Set the tuning dial of the radio to 89 MC and adjust the FM oscillator core for a maximum DC output on the voltohmyst. Adjust the input level of the signal generator so as to produce a negative 3 to 5 volts DC on the voltmeter. The correct oscillator core position is when the core is just entering the coil from the bottom of the coil. The 2nd harmonic of the oscillator is used to produce the IF frequency. By compression or expansion of the converter and antenna FM coils it is possible to bring their circuits into alignment with the oscillator at 89 MC.

As the set becomes more accurately aligned it may be necessary to reduce the input of the signal generator to maintain an output below a negative 5 volts DC.

Now reset the signal generator and the receiver dials to 107 MC and adjust the oscillator tubular trimmer and the compression trimmers on the FM converter and antenna sections of the gang condenser for a maximum indication on the output DC voltmeter.

Again reset the generator and receiver dials back to 89 MC and repeat the operations performed formerly at this frequency setting. This realigning at the high and low ends of the FM band is necessary until it is noticed that at both 89 MC and 107 MC the receiver has been aligned to the generator frequency without adjustment of either the core of the oscillator or the oscillator trimmer to bring them into alignment.

MODELS 510; 510K;
Kenilworth; 510S.
Sheffield

The converter and antenna coils have been properly aligned when either compression or expansion of the turns will give no increase in the output DC voltage at 89 MC and the converter and oscillator trimmer condenser adjustment will also give no increase in DC output voltage at 107 MC.

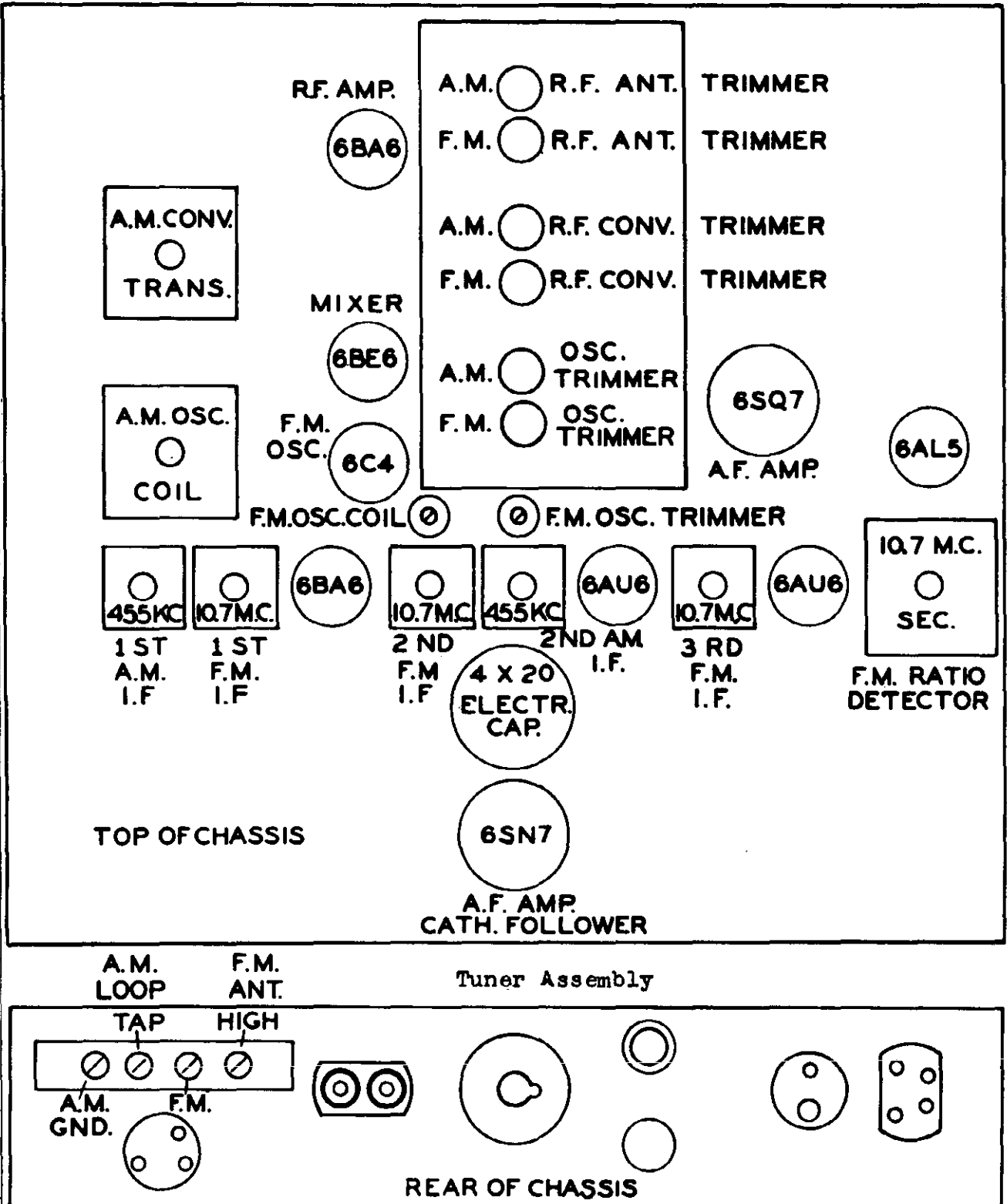


FIG. 1

MODELS 510; 510K, Kenilworth; 510S, Sheffield

VOLTAGE TABLE

Tube	Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V1	6BA6	0	0	AC 6.5	0	120	120	1.5	-
V2	6BE6	-7 to -10	.9	AC 6.5	0	125	110	0	-
V3	6C4	130	0	AC 6.5	0	130	-7 to -10	0	-
V4	6BA6	0	0	AC 6.5	0	120	120	1.5	-
V5	6AU6	0	0	AC 6.5	0	110	110	.7 to .9	-
V6	6AU6	0	0	AC 6.5	0	110	110	.7 to .9	-
V7	6AL5	0	0	AC 6.5	0	.6	0	-.6	-
V8	6SQ7	0	-.8	0	0	0	90	AC 6.8	0
V9	6SN7	0	150	6	40	270	55	AC 6.8	0
V10	6SN7	66	210	78	66	210	78	0	AC 6.8
V11	6L6G	0	AC 6.8	360	275	0	73	0	15
V12	6L6G	0	AC 6.8	360	275	0	73	0	15
V13	5Y3	0	400	0	390	0	390	0	400
V14	25Z6	0	0	AC 170	200	AC 170	0	0	200

Voltage readings made with Voltchmyst. Line voltage adjusted to 117 V AC. All voltages measured between indicated pin and chassis frame. Unless noted all voltages are DC and positive to frame.

No signal input.

Voltages taken with the service selector switch in the FM position. Volume control in the counterclockwise position. Tone controls clockwise.

RESISTANCE TABLE

Tube	Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V1	6BA6	700 K	0	0	0	inf.	inf.	82	-
V2	6BE6	22 K	82	0	0	inf.	inf.	27	-
V3	6C4	inf.	inf.	0	0	inf.	47 K	0	-
V4	6BA6	200 K	0	0	0	inf.	inf.	82	-
V5	6AU6	60 K	0	0	0	inf.	inf.	82	-
V6	6AU6	0	0	0	0	inf.	inf.	82	-
V7	6AL5	inf.	inf.	0	0	10 K	0	10 K	-
V8	6SQ7	0	4.7 M	0	0	0	inf.	0	0
V9	6SN7	19 K	inf.	2.2 K	500 K	inf.	12 K	0	0
V10	6SN7	230 K	inf.	11 K	230 K	inf.	11 K	0	0
V11	6L6G	inf.	.2	inf.	inf.	470 K	10 K	0	170
V12	6L6G	inf.	.2	inf.	inf.	470 K	10 K	0	170
V13	5Y3	inf.	inf.	inf.	5	inf.	5	inf.	inf.
V14	25Z6	inf.	inf.	2	inf.	2	inf.	inf.	inf.

Resistance readings taken with voltchmyst connected between pin indicated and chassis frame. Values given are in ohms except where K indicates times 1000 and M indicates times 1 megohm.

All controls to the counterclockwise or off position. Range switch in FM position.

Parts List By Symbol Designation			
Symbol Desig.	Function	Description	Part No.
(C1 C2 C3 C4	Main tuning capacitor	Capacitor, variable, 3 gang AM-FM	15U4569
C5	Grid coupling	Capacitor, ceramic 1500 MMFD 350 V	15L3459
C6	Cathode bypass, RF	Capacitor, ceramic 5000 MMFD Hi-Kap, 500 V	15L3462
C7	Cathode bypass, IF	Same as C5	
C8	Screen bypass, RF	Same as C5	
C9	Screen bypass, Conv.	Same as C5	
C10	Screen bypass, IF	Same as C5	
C11	Heater bypass, RF	Same as C5	
C12	Heater bypass, IF	Same as C5	
C13	Heater bypass, IF	Same as C5	
C14	Heater bypass, IF	Same as C5	
C15	Heater bypass, ratio detector	Same as C5	
C16	Grid decoupling, RF	Capacitor, paper, .05 MFD 200 V, miniature tubular	15S4221
C17	Grid decoupling, RF	Same as C17	
C18	Grid decoupling, Conv.	Same as C17	
C19	AGC bypass, AM	Capacitor, silver ceramic, 25 MMFD 10% 500 V NPO	15D3165
C20	RF coupling, FM	Capacitor, ceramic 51 MMFD 5% 500 V	15L3458
C21	Grid coupling oscillator	Capacitor, paper, .05 MFD 400 V, miniature tubular	15L3466
C22	Plate bypass, Conv.	Same as C5	
C23	Plate bypass, Conv.	Capacitor, compensator, silver ceramic, 4 MMFD plus or minus .25 MMFD Hi-Q, temp coeff. insulated N-750	15V4678
C24	Drift compensation	Same as C21	
C25	Grid oscillator, FM	Same as C4	
C26	Plate decoupling oscillator, FM	Same as C5	
C27	Plate bypass oscillator, FM	Same as C22	
C28	Plate decoupling, IF	Capacitor, ceramic, 100 MMFD 10% 500 V	15L3460
C29	Grid capacitor, AM detector	Capacitor, silver ceramic, 2x100 MMFD 20% 500 V 3 wire leads	15D2923
(C30 C31	Grid filter, AM detector	Capacitor, paper, .1 MFD 200 V, miniature tubular	15S4298
C32	Bypass, AGC	Capacitor, mica, 390 MMFD 10% 500 V	15B799
C33	Diode load	Same as C33	
C34	Diode load	Same as C33	
C35	Ratio detector decoupling	Same as C33	

Parts List By Symbol Designation			
Symbol Desig.	Function	Description	Part No.
C36	Audio filter, ratio detector	Same as C4	
C37	Ratio detector	Capacitor, electrolytic, 5 MFD 150 V, tubular	15V4599
(C38 C39 C40	Filter, low frequency	Capacitor, electrolytic, 10/10/10/40, 450 V	15L3539
C41	Coupling, Audio Amp.	Capacitor, paper, .01 MFD 200 V, miniature tubular	15L3563
C42	Coupling, Audio Grid	Capacitor, paper, .1 MFD 400 V, miniature tubular	15V4685
C43	RF filter, Audio Amp.	Same as C29	
C44	Bypass, treble control	Same as C41	
C45	Bypass, treble control	Capacitor, paper, .005 MFD 20% 600 V	15H2603
C46	Bypass, bass control	Same as C40	
C47	Bypass, bass control	Same as C45	
C48	Cathode bypass, audio	Capacitor, electrolytic, 25 MFD 25 V, tubular	15B795
C49	Plate coupling, audio	Capacitor, paper, .05 MFD 600 V, miniature tubular	15L3467
C50	Coupling, Audio Amp.	Capacitor, paper, .02 MFD 200 V, tubular miniature	15U4580
C51	Coupling, cathode follower	Same as C22	
C60	Trimmer, FM oscillator	Capacitor, trimmer, .5-5 MMFD	15V4602
C61	IF grid bypass	Same as C5	
C62	Screen bypass	Same as C22	
(C52 C53	Filter, low voltage rectifier	Capacitor, electrolytic, 2 x 60 MFD 200 V	15L3438
(C54 C55 C56	Filter, high voltage rectifier	Capacitor, electrolytic, 4x20 MFD 450 V	15L3588
C57	Grid coupling, power amplifier	Same as C49	
C58	Grid coupling, power amplifier	Same as C49	
C59	Cathode bypass, power amplifier	Capacitor, electrolytic, 25 MF 50 V, tubular	15B638
E1	Dial light	Lamp, 6-8 V .150 A #47 brown	49A168
E2	Dial light	Same as E1	
E3	Overload protection	Fuse, 3 amp, 3 AG	37A162
E4	Main tuning knob	Knob, station selector, 1 7/8" dia., brass	47V4603

MODELS 510; 510K, Kenil-
worth; 510S, Sheffield

Parts List By Symbol Designation

Symbol Desig.	Function	Description	Part No.
E5	Control knob	Knob, 1 1/8" dia. black bakelite, push-on type	47V4604
E6	Align IF	Aligning tool	94V4707
J1	Loop connection to receiver	Receptacle, 3 contact	67L3560
(J2)	Television sound connection	Receptacle, dual, insulated	67V4657
(J3)	Phono pickup connection		
J4	Power cable connection	Receptacle, 12 contact	82S4305
J5	Phono motor power	Receptacle, 4 contact	67B645
J6	Speaker connection	Receptacle, 2 contact	67V4673
L1	AM signal intercept	Loop	1V4594
L2	FM antenna tuning	Coil	20V4625
L3	Coupling, RF stage	Choke	17V4668
L4	Tuning, FM-RF	Coil	20V4626
L5	Oscillator, AM	Coil	20V4621
L6	Oscillator, FM	Coil	20V4627
L7	Filter choke, RF-IF	Choke	17L3378
L8	Filter choke, RF-IF	Same as L7	
L9	Filter choke, RF-IF	Same as L7	
L10	Filter choke, hum	Choke	17L3312
LS1	Loudspeaker	Speaker, 12" coaxial, Jensen K210, 8 ohm voice coil	85V4593
P1	Loop to receiver	Plug, 3 contact	65L3559
P2	Amplifier to tuner	Plug, 12 contact	65S4301
R1	Grid coupling, RF	Resistor, composition, .47 meg 10% 1/2 watt	70L3404
R2	Grid decoupling, RF	Resistor, composition, .1 meg 10% 1/2 watt	70L3401
R3	Cathode bias, RF	Resistor, composition, 82 ohms 5% 1/2 watt	70L3391
R4	Cathode bias, Conv.	Same as R3	
R5	Cathode bias, IF	Same as R3	
R6	Cathode bias, IF	Same as R3	
R7	Cathode bias, IF	Same as R3	

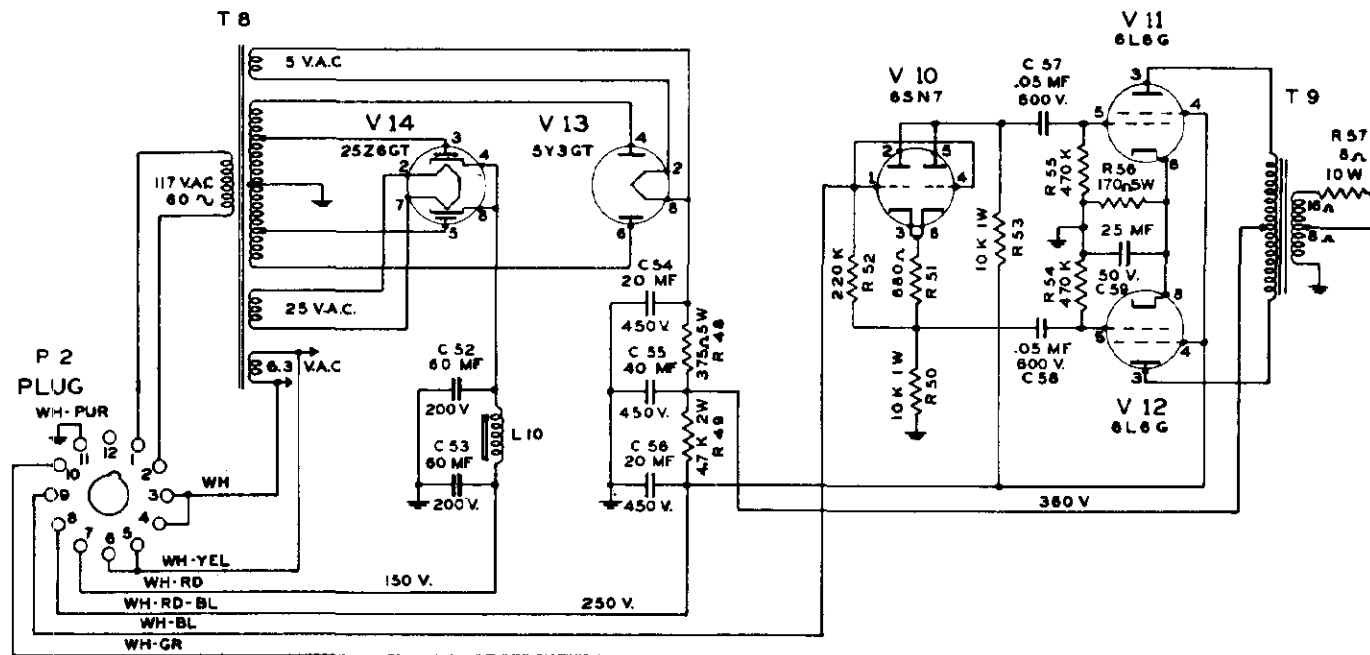
Parts List By Symbol Designation

Symbol Desig.	Function	Description	Part No.
R8	Screen decoupling, RF	Resistor, composition, 1000 ohms 10% 1/2 watt	70L3393
R9	Screen decoupling, IF	Same as R8	
R10	Screen decoupling, Conv.	Resistor, composition, 3300 ohms 10% 1/2 watt	70L3394
R11	Screen decoupling, IF	Same as R10	
R12	Screen decoupling, IF	Same as R10	
R13	Grid decoupling, Conv.	Same as R2	
R14	Oscillator grid, Conv.	Resistor, composition, 22,000 ohms 10% 1/2 watt	70L3397
R15	Plate decoupling, Conv.	Same as R8	
R16	Oscillator grid, FM	Resistor, composition, 47,000 ohms 10% 1/2 watt	70L3399
R17	Grid loading, FM-IF	Same as R14	
R18	Grid decoupling, FM-IF	Same as R2	
R19	Grid decoupling, FM-IF	Resistor, composition, .22 meg 10% 1/2 watt	70L3403
R20	Grid decoupling	Same as R14	
R21	Grid decoupling	Same as R16	
R22	Grid loading, FM-IF	Same as R14	
R23	Decoupling, AGC circuit	Resistor, composition, 1 meg 20% 1/2 watt	70L3406
R24	Plate coupling, FM oscillator	Same as R8	
R25	Grid loading, FM-IF	Same as R14	
R26	Decoupling, ratio detector	Resistor, composition, 47 ohms 10% 1/2 watt	70L3429
R27	De-emphasis, FM detector	Same as R16	
R28	Diode load, ratio detector	Resistor, composition, 1500 ohms 10% 1/2 watt	70L3525
R29	Diode load, ratio detector	Same as R28	
R30	Audio load, ratio detector	Resistor, composition, 8200 ohms 10% 1/2 watt	70L3523
R31	Audio load, ratio detector	Same as R30	
R32	Volume control	Potentiometer, volume, 1/2 meg	70V4583
R33	Grid loading, audio amp.	Resistor, composition, 4.7 meg 20% 1/2 watt	70L3530
R34	Plate load, audio amp.	Same as R2	
R35	Tone control network	Same as R16	
R36	Treble control	Potentiometer, treble, 1/2 meg	70V4584
R37	Bass control	Potentiometer, bass off-on, 1/2 meg	70V4585
R38	Bass control network	Same as R14	
R39	Grid load, audio amp.	Same as R2	
R40	Cathode bias, audio amp.	Resistor, composition, 2200 ohms 10% 1/2 watt	70L3432

Parts List By Symbol Designation			
Symbol Desig.	Function	Description	Part No.
R41	Cathode follower	Resistor, composition, 56 ohms 10% $\frac{1}{2}$ watt	70V4628
R42	Cathode follower decoupling	Resistor, composition, 560 ohms 10% $\frac{1}{2}$ watt	70L3527
R43	Cathode circuit	Resistor, composition, 10,000 ohms 10% $\frac{1}{2}$ watt	70L3396
R44	Cathode bias, Audio Amp.	Resistor, composition, 1800 ohms 10% $\frac{1}{2}$ watt	70V4700
R45	Plate coupling, Audio Amp.	Same as R16	
R46	Plate decoupling, Audio Amp.	Same as R8	
R47	Power filter	Resistor, 750 ohms 10% 5 watt, Candohm	70V4662
R58	Grid resistor	Resistor, composition, 27 ohms 10% $\frac{1}{2}$ watt	70V4692
R59	Grid loading	Same as R1	
R48	Filter	Resistor, 375 ohms 10% 5 watt, Candohm	70V4589
R49	Filter	Resistor, composition, 5900 ohms 10% 2 watt	70V4693
R50	Cathode coupling	Resistor, composition, 10,000 ohms 10% 1 watt	70L3427
R51	Cathode bias	Resistor, composition, 680 ohms 10% $\frac{1}{2}$ watt	70V4691
R52	Grid	Same as R19	
R53	Plate coupling	Same as R50	
R54	Grid	Same as R1	
R55	Grid	Same as R1	
R56	Cathode bias	Resistor, 187 ohms 10% 5 watt, Candohm	70V4588
R57	Used on two tap transformer only	Resistor, wirewound, 10 ohms 10 watt 10%	70E2630
SW1	AM, FM, Phono, TV switching	Switch, range, 4 position	89V4630
T1	Interstage coupling, Conv.	Coil	20V4620
T2	Interstage coupling, FM	Coil	20V4623
T3	Interstage coupling, AM	Coil	20V4622
T4	Interstage coupling, FM	Same as T2	
T5	Interstage coupling, AM	Same as T3	

Parts List By Symbol Designation			
Symbol Desig.	Function	Description	Part No.
T6	Interstage coupling, FM	Same as T2	
T7	Ratio detector transformer	Coil	20V4624
T8	Power	Transformer	91V4666
T9	Output	Transformer	91V4667
V1	RF amplifier	Tube - 6BA6	92G2871
V2	Converter and Oscillator, AM	Tube - 6BE6	92V4631
V3	FM oscillator	Tube - 6C4	92B597
V4	IF amplifier, FM-AM	Same as V1	
V5	IF amplifier, FM-AM Detector	Tube - 6AU6	92C2659
V6	IF amplifier, FM	Same as V5	
V7	Ratio detector	Tube - 6AL5	92G2870
V8	Audio amplifier	Tube - 6SQ7	92V4632
V9	Audio amplifier and cathode follower	Tube - 6SN7	92A230
V10	Driver for power stage	Same as V9	
V11	Audio power amplifier	Tube - 6L6G	92A233
V12	Audio power amplifier	Same as V11	
V13	High voltage rectifier	Tube - 5Y3	92B480
V14	Low voltage rectifier	Tube - 25Z60T	92E1419
X1	Socket for V1	Socket, 7 contact, miniature type	82B663
X2	Socket for V2	Socket, 7 contact, miniature, mica filled, top mounting	82V4636
X3	Socket for V3	Same as X2	
X4	Socket for V4	Same as X1	
X5	Socket for V5	Same as X1	
X6	Socket for V6	Same as X1	
X7	Socket for V7	Same as X1	
X8	Socket for V8	Socket, 8 contact octal, black bakelite type MIP-8	82S4412
X9	Socket for V9	Same as X8	
X10	Socket for V10	Socket, 8 contact octal, bakelite	82E1522
X11	Socket for V11	Same as X10	
X12	Socket for V12	Same as X10	
X13	Socket for V13	Same as X10	
X14	Socket for V14	Same as X10	

T 8



DATE	2/15/50
PART NO.	2 V 4 5 9 8 A

Figure 2 Schematic Diagram Model 510 Amplifier

MODELS 510; 510K,
Kenilworth; 510S,
Sheffield

TUNER CHASSIS

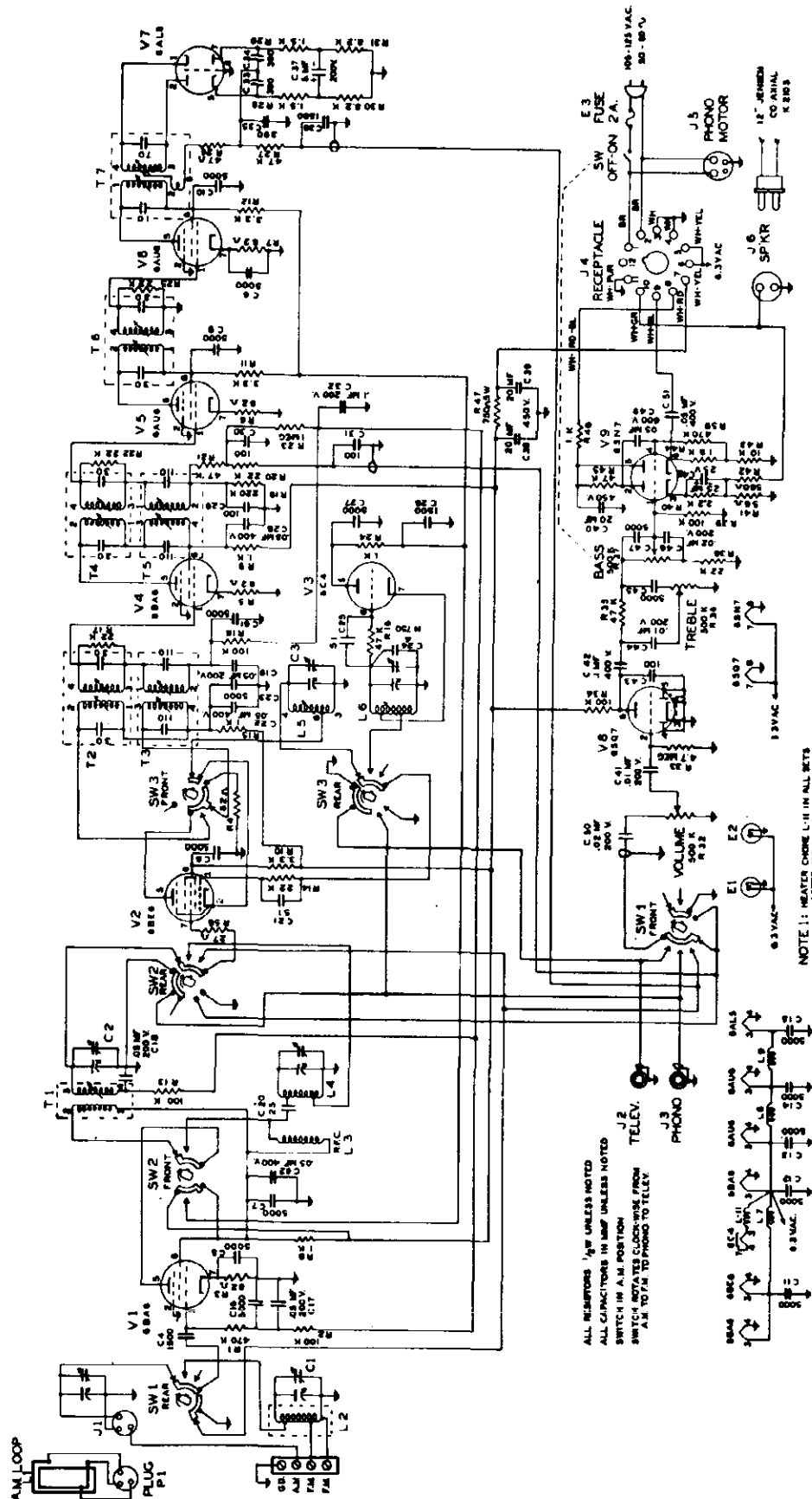


Figure 3 Schematic Diagram Model 510 Tuner

ALIGNMENT PROCEDURE**PRELIMINARY:**

Output meter connection ----- Across loudspeaker voice coil
 Output meter reading to indicate 500 milliwatts (Standard Output) ----- 1.26 volts
 Dummy antenna to be in series with signal generator output ----- See chart below
 Connection of generator ground lead ----- Floating ground
 Generator modulation ----- 30% 400 cycles
 Position of Volume Control ----- Fully clockwise

SPECIFICATIONS

Position of Variable	Generator Frequency	Dummy Antenna	Generator Output Connection	Trimmers Adjusted	Trimmer Function	Approximate Sensitivity
Open	455 Kc	.05 uf	12SA7 Grid (Stator of C-1)	A1 A2	IF	4000 uv.
1400 Kc	1400 Kc		Antenna Lug with hank removed	**A3	Oscillator	500 uv.

Power Output
 Undistorted 8 watt
 Maximum 2 watt
 Speaker Voice Coil Impedance 3.2 ohms

** Since the antenna section of the variable has no trimmer, the rotor of the variable should be rocked back and forth on both sides of 1400 Kc while adjusting the oscillator trimmer for maximum output. This is to obtain the combination of rotor and trimmer setting to give perfect tracking of the two sections of the variable condenser and consequently give maximum output. Check sensitivity at 600 Kc. If weak, adjust antenna section plates for maximum output at 600 Kc. Tracking of the condenser at points other than 1400 Kc is accomplished by bending the outside plates on the variable condenser rotor, which are cut for this purpose. When bending plates to track the condenser at any given frequency, keep in mind the fact that this will effect the tracking at all frequencies below that point. A tuning wand is very helpful in checking the tracking of this condenser, to indicate whether more or less capacity is needed.

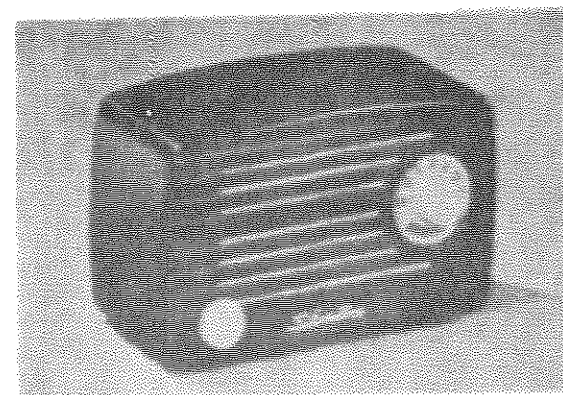
The alignment procedure should be repeated stage by stage in the original order for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.

Power Supply
 105-125 Volts 30 Watts
 Frequency Range
 Broadcast

540 - 1600 Kc

REPAIR PART LIST

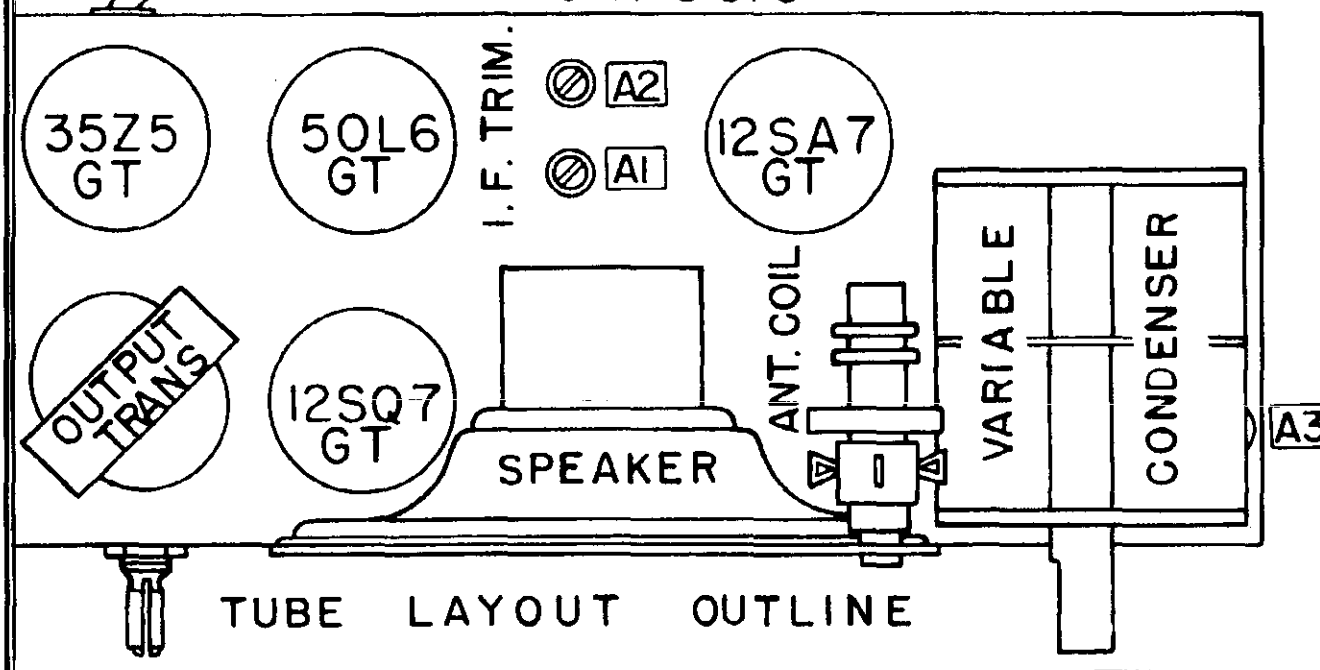
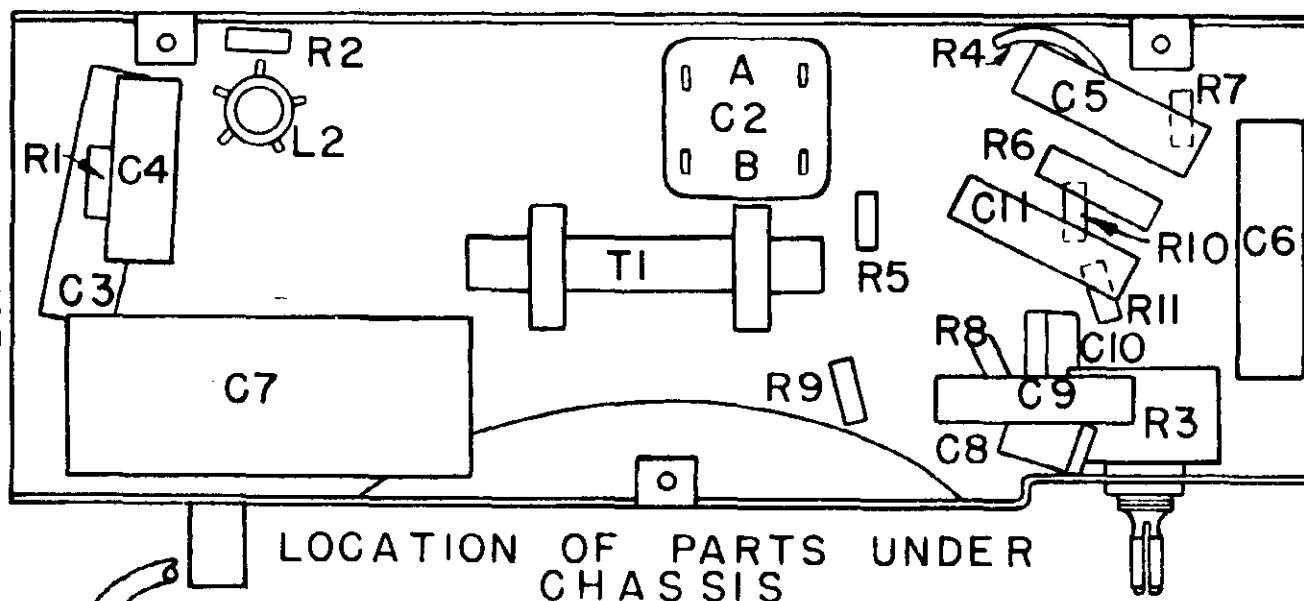
Schematic Location	Part No.	Description
	N22934-1	Cabinet, Brown, (Cat. No. 1)
	N22934-2	Cabinet, Ivory, (Cat. No. 2).
	N22990-1	Cloth, Grille, White, (Cat. No. 1)
	N22990-2	Cloth, Grille, Maroon, (Cat. No. 2)
L1	N22864	Coil, Antenna
L2	N22865	Coil, Oscillator
C1A, C1B	N22919	Condenser, Variable, 2 Gang
C2A, C2B	N21042	Condenser, Trimmers, I.F. Trans.
C3, C6		Condenser, .05 mfd., 400 volt
C4		Condenser, .05 mfd., 200 volt
C5		Condenser, .01 mfd., 400 volt
C7	N22876	Condenser, Electrolytic, 40-20 uf., 150 volt 20 uf., 25 volt
C8, C10		Condenser, .0001 mfd., 500 volt, mica
C9, C11		Condenser, .002 mfd., 600 volt.
P	N20257-1	Cord, Power with Plug
	N22974-1	Knob, Volume, Ivory, (Cat. No. 1)
	N22975-1	Knob, Tuning, Ivory, (Cat. No. 1).
	N22974-2	Knob, Volume, Maroon, (Cat. No. 2)



PAGE 21-2 SEARS, ROEBUCK

MODELS 1, 2,
Ch. 132.878

Schematic Location	Part No.	Description
	N22975-2	Knob, Tuning, Maroon, (Cat. No. 2)
	N22978	Leaflet, Instruction
R1		Resistor, 330,000 ohms, 1/4 watt
R2		Resistor, 22,000 ohms, 1/4 watt
R3	N21630	Resistor, 2 Megohm, Volume Control & Switch
R4	N19177	Resistor, 47 ohm, 1 watt wire wound
R5		Resistor, 120 ohm, 1/4 watt
R6		Resistor, 2200 ohm, 1 watt
R7		Resistor, 15 ohm, 1/4 watt
R8		Resistor, 4.7 megohm, 1/4 watt
R9		Resistor, 15 megohm, 1/4 watt
R10		Resistor, 470,000 ohm, 1/4 watt
R11		Resistor, 1 megohm, 1/4 watt
SPK	N22875	Speaker, 4" P.M.
T1	N22863	Transformer, I.F.
T2	N22878	Transformer, Output
	N18136	Wire, Antenna

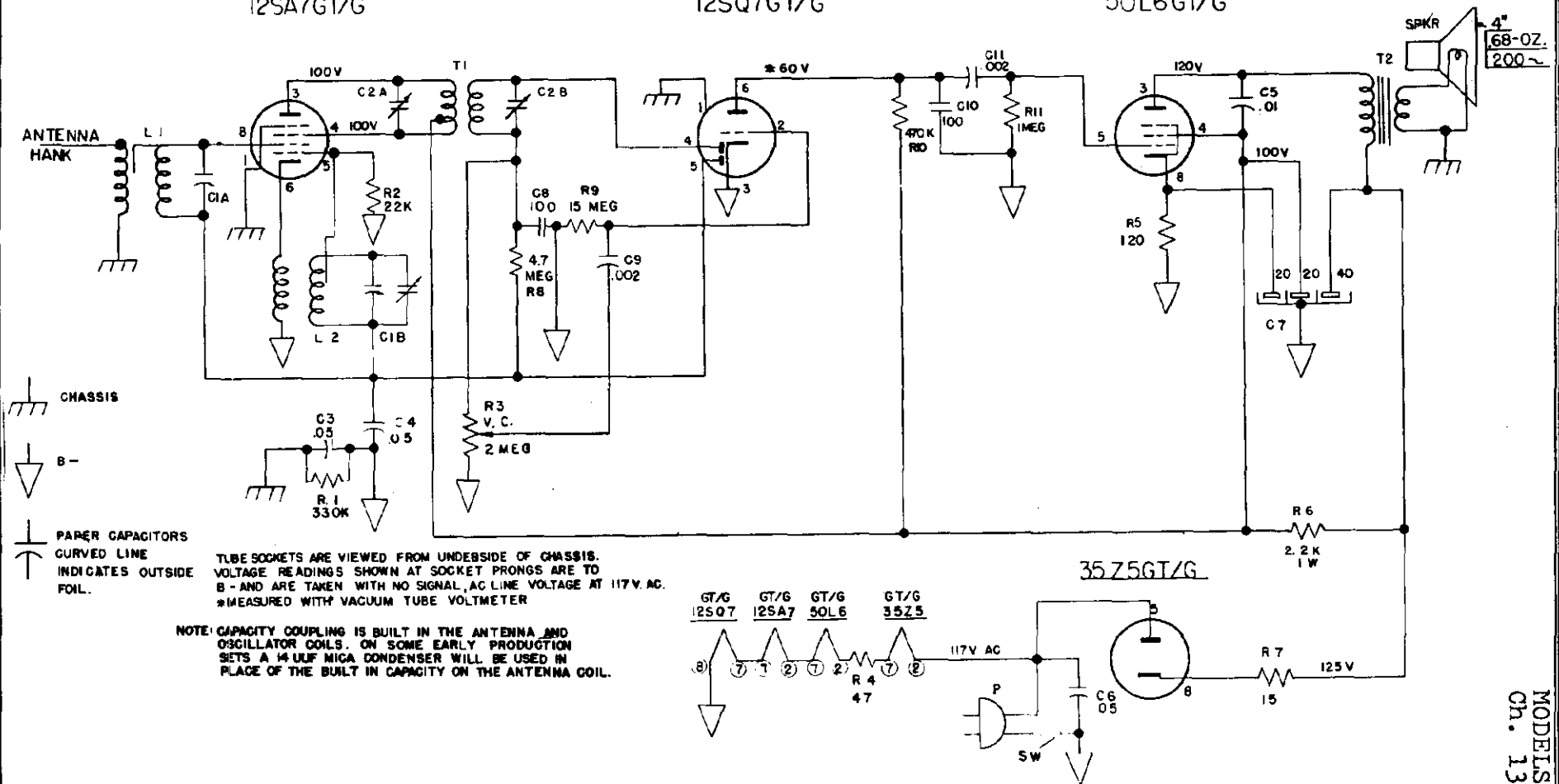


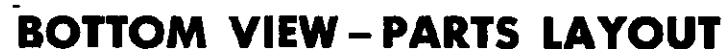
SCHEMATIC CIRCUIT DIAGRAM

12SA7GT/G

12SQ7GT/G

50L6GT/G





PARTS LIST

SCHEMATIC LOCATION	PART NO.	DESCRIPTION
R1	517	Resistor 22,000 Ohm. 1/2 Watt
R2	615	Resistor 2.2 Meg Ohm. 1/2 Watt
R4	520	Resistor 47 Ohm. 1/2 Watt
R6	401	Control, Volume, 500,000 Ohm. with Switch
R7	516	Resistor, 1 Meg Ohm. 1/2 Watt
R9	408	Control, Tone, 500,000 Ohm.
R11	502	Resistor 510,000 Ohm. 1/2 Watt
R12	505	Resistor 150 Ohm. 1/2 Watt
R13	607	Resistor 1000 Ohm. 1 Watt
R14	622	Resistor 270 Ohm. 1 Watt
R15	534	Resistor 30 Ohm. 1/2 Watt
C1, C2, C3, C4	1004A	Tuning Gang and Trimmer Assembly
C5, C6, C7, C8		Trimmer Condensers in I. F. Cans
C9, C22	804	Capacitor .1 Mfd. 200 V.
C13	817	Capacitor 250 Mmfd. Ceramic
C14	902	Capacitor .01 Mfd. 400 V.
C16, C18	1010	Capacitor Filter 40, 40, 20 Mfd. 150 Volts
C19, C20		20 Mfd. 25 Volts
C21	903A	Capacitor .05 Mfd. 400 V.
C23	906	Capacitor 5000 Mmfd. Ceramic
R3, C10	811	Capristor 100 Mmfd. 50,000 Ohm.
C11		100 Mmfd. Dual Shunt
R5, C12	813	Capristor .01 Mfd. 5 Meg Ohm. Common Terminal
R10, C15	814A	Capristor .01 Mfd. 100,000 Ohm.
T2	1512A	Loop Antenna
T3, T4	1402	Transformers I. F. #118
S2	1892A	Switch, Radio-Phono
PL1	307A	Plug, Loop Antenna
PL2	307C	Plug, Motor A. C.
PL3	305	Plug, Pick up
RE1	106A	Receptacle, Loop Antenna
RE2	107A	Receptacle, A. C.
RE3	104	Receptacle, Pick up
X1	2530	Pick up, Ceramic Cartridge and Plastic Arm
LS1, T1	2607	Speaker, 5" P.M. with 2500 Ohm. Output Transformer
	2108A	Portable Carrying Case
	2411A	Knob, Volume
	2411B	Knob, Tuning
	2411C	Knob, Tone
	1736A	Dial Pointer
	2307	Dial Bezel
	1722B	Dial

Diagram of the rear panel of the radio receiver. It features a power switch labeled "POWER" with "ON" and "OFF" positions, a "METER A.C." input, a "125A7" vacuum tube socket, a "50L6" vacuum tube socket, a "12SQ7" vacuum tube socket, a "125A7" vacuum tube socket, and an "ANTENNA DISC" connector. A "35Z5" vacuum tube socket is also shown. A power cord is plugged into the "125A7" socket.

The following equipment is required for aligning: A signal generator which will provide an accurately calibrated signal at the indicated test frequencies; an output indicating meter; a non-metallic screwdriver.

Test loop coupled loosely to receiver by spacing - receiver loop in same position as it will be with chassis in cabinet.

SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	REMARKS	ADJUST FOR MAXIMUM OUTPUT
LOOP	455 KC	Low End of Band	Across Voice Coil	Short out osc. tuning gang section C-2; compress C-3	C-8, C-7, C-6, C-5
LOOP	1620 KC	High End of Band	"	Remove short across C-2	C-4
LOOP	1400 KC	Point of Maximum Output	"	Set pointer to 140 on dial	C-3
LOOP	600 KC	Point of Maximum Output	"	Knife C-1 plates for maximum output	
LOOP	1400 KC	1400	"	Recheck alignment.	C-3 if necessary

MODELS 51, 53,

Ch. 132.887

Specifications

Power Supply
105-120 volts 60 cycle AC, 65 watts
Frequency Range
Broadcast - 1600 - 540 Kc

Power Output
Undistorted .8 watt
Maximum 1.5 watt
Speaker Voice Coil Impedance 3.2 ohms

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
L1	N23159	Antenna Loop Assembly
	N22953	Bracket, Antenna Loop Mtg.
	N23207	Bracket, Var. Con. Mtg.
	N23427	Bracket, Dial Scale Mtg.
	N19361	Clip, Hairpin
L2	N23163	Coil, R.F.
L3	N23751	Coil, Oscillator
C1A, C1B, C1C	N23743	Condenser, Variable, 3 Gang
C2, C5, C13		Condenser, .05 mfd., 400 volt
C3		Condenser, .05 mfd., 200 volt
C4		Condenser, .00005 mfd., 500 volt, mica
C6, C8		Condenser, .0002 mfd., 350 volt, Ceramic
C7, C9		Condenser, .01 mfd., 400 volt
C11		Condenser, .02 mfd., 400 volt
C12A, C12B	N22111	Condenser, Electrolytic, 50-50 mfd., 150 volt
	N19132	Cord, Dial Drive
	N20138-15	Cord, Power with Plug
	N23434	Cover, Rear Cabinet
	N23573	Cover, Record Changer, Bottom
	N23402	Escutcheon, Dial with Crystal
	N23450-13	Knob, On-Off-Volume
	N23450-18	Knob, Radio-Phono
	N23450-1A	Knob, Tuning

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
	N23534	Lamp, Dial, Mazda, No. 47
	N22956-1	Leaflet, Instruction
		Pointer, Dial
R1, R9		Resistor, 330,000 ohms, 1/2 watt
R2		Resistor, 1000 ohms, 1/2 watt
R3		Resistor, 22,000 ohms, 1/2 watt
R4		Resistor, 6.8 megohm, 1/2 watt
R5		Resistor, 1 megohm, 1/2 watt
R6		Resistor, 15 ohm, 1/2 watt
R7	N22963	Resistor, Volume Control & Switch, 500,000 ohms
R8		Resistor, 3.3 megohm, 1/2 watt
R10		Resistor, 470,000 ohms, 1/2 watt
R11, R13		Resistor, 150 ohm, 1/2 watt
R12		Resistor, 1200 ohms, 2 watt
	N23430	Scale, Dial
	N22957	Shaft, Tuning
	N23537-1	Socket, Dial-lite with leads
	N19551	Socket, Phono Motor
	N19552	Socket, Phono input
	N23406	Speaker, 6" P.M.
	N19133	Spring, Dial Cord
SPKR		Transformer, 1st I.F.
T1	N23161	Transformer, 2nd I.F.
T2	N23162	Transformer, Output
T3	N23407	Weight, Cabinet
	N22763	

On some of the first sets manufactured variable condenser N23155 (with a single spaced oscillator section) and oscillator coil N23160 were used. If either the oscillator coil or the variable condenser is replaced with the part listed here, the other part should also be replaced for correct tracking. N23155 and N23160 should be used together, and N23743 and N23751 should be used together.

TECHNICAL INFORMATION

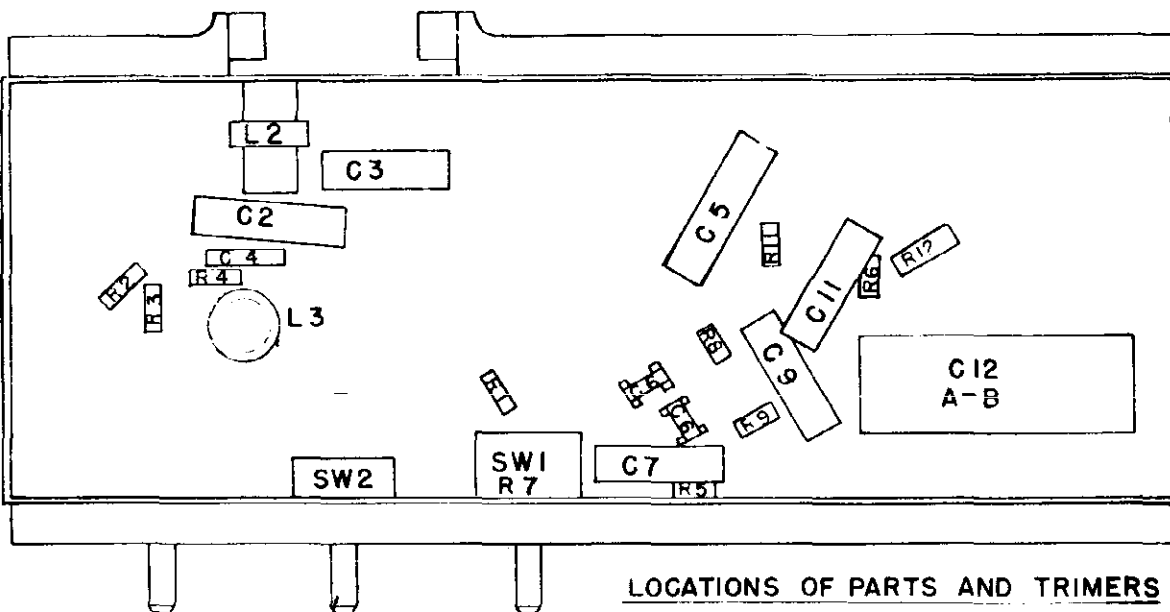
Tuning range 540 Kc. to 1600 Kc. Intermediate frequency - 455 Kc. I-f and r-f measurements made at .5 watt output - approximately 1.26 volts on a rectifier type voltmeter connected across the voice coil.

Approximate inputs for a .5 watt output: I-f 200 uv. R-f with standard loop: at 600 Kc. 500 uv/m; at 1000 Kc. 400 uv/m; at 1400 Kc. 400 uv/m. R-f at external antenna connection: at 600 Kc. 250 uv; at 1000 Kc. 200 uv; at 1400 Kc. 200 uv.

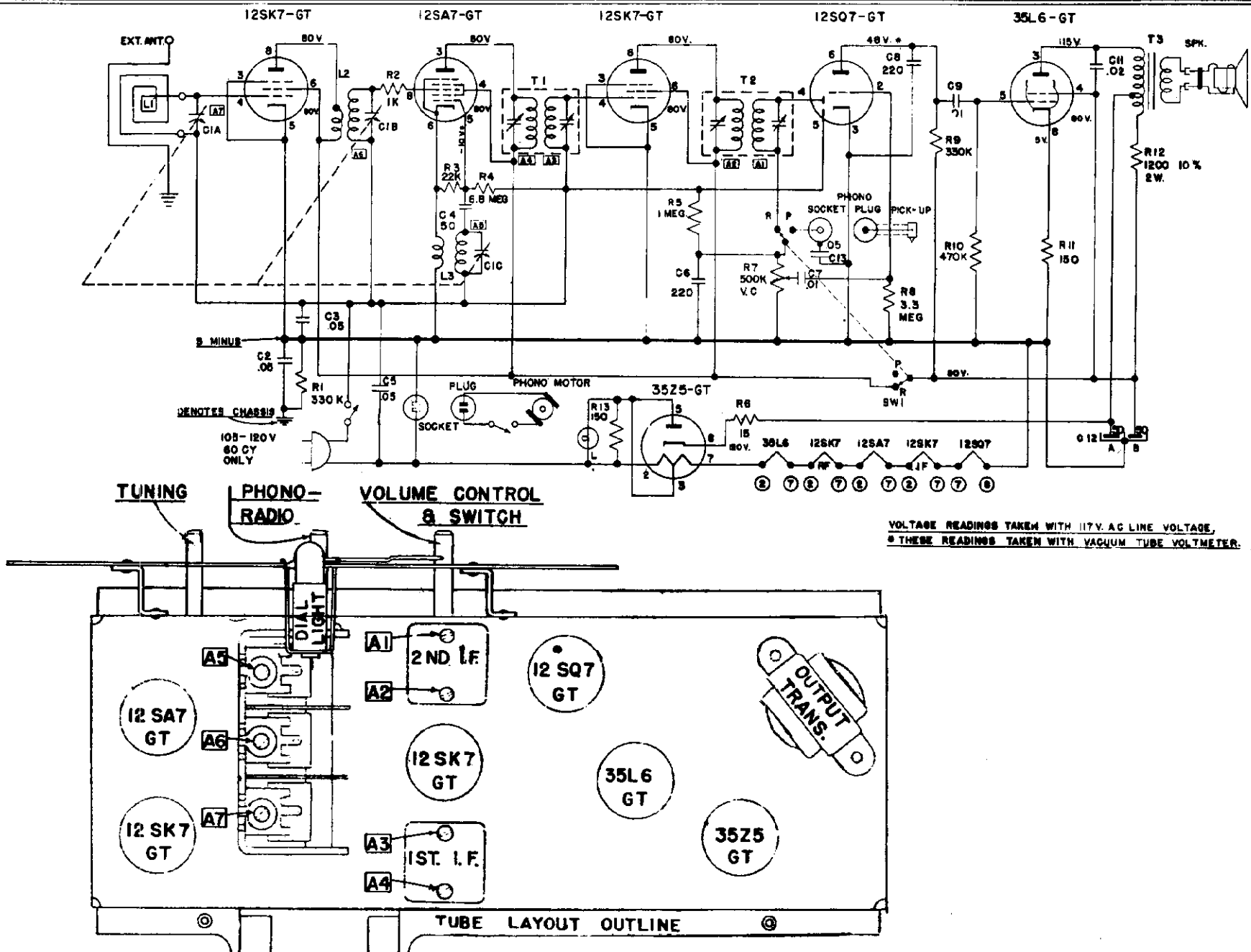
ALIGNMENT DATA

With variable condenser closed, set the pointer horizontally to the left.

Position of Variable	Generator Frequency	Dummy Ant.	Generator Connection (High)	Generator Connection (Low)	Adjust Trimmers (in order shown)	Trimmer Function
Open	455 Kc	.05 mfd.	Mixer Grid	Float.Gnd.	A1, A2, A3, A4	I.F.
1400 Kc	1400 Kc	50 mmfd.	Ext.Ant.Conn.	Float.Gnd.	A5, A6, A7	Osc.R.F.Ant.
600 Kc	600 Kc	50 mmfd.	Ext.Ant.Conn.	Float.Gnd.	Check Point	



LOCATIONS OF PARTS AND TRIMERS
UNDER CHASSIS



MODELS 54, 56,
Ch. 132.888

Specifications

Power Supply
105-120 volt 60 cycle AC, 65 watts

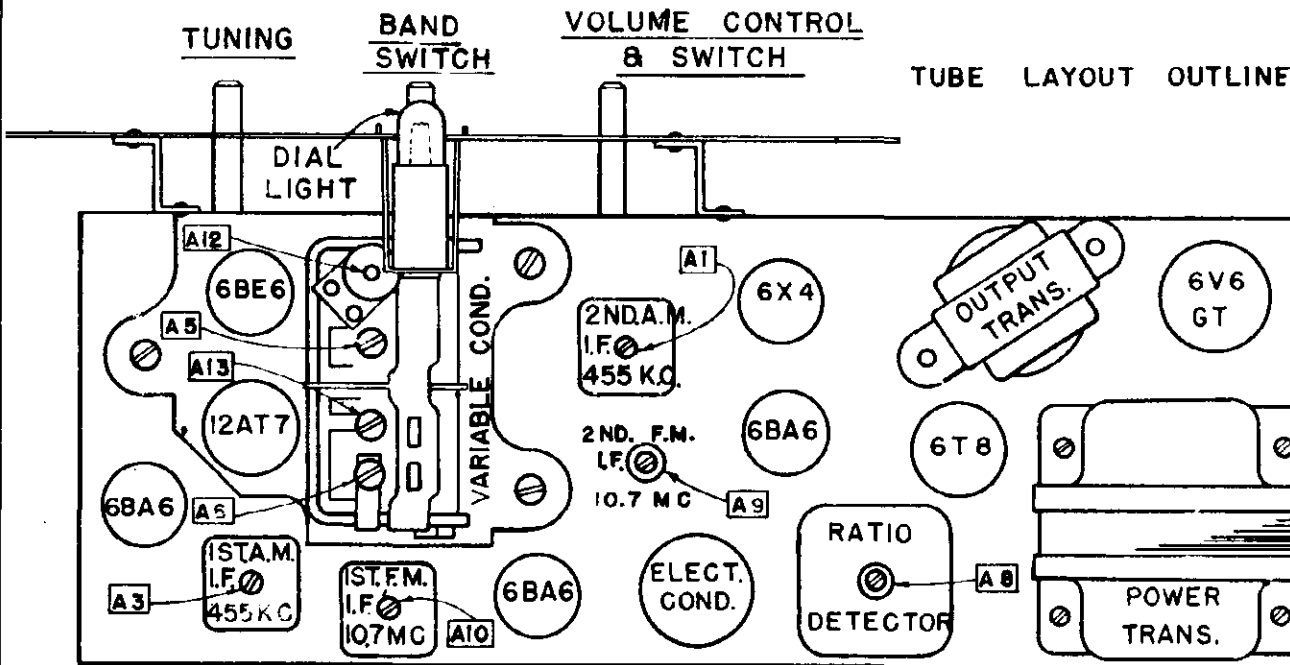
Frequency Range
Broadcast - 1600 - 540 Kc
FM - 108 - 88 Mc

Power Output
Undistorted 1.5
Maximum 2.5

Speaker Voice Coil Impedance 3.2

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
L3	N22524	Antenna Loop Assy.
L4	N22525-1	Choke, High Frequency, 1.5 oh
L5	N22525-1	Choke, High Frequency, 7.5 oh
L6	N22525-1	Choke, High Frequency, 3 oh
L7	N22525-1	Choke, R.F., Iron core, 14 oh
L8	N22525-1	Coil, R.F., FM
L9	N22525-1	Coil, Oscillator, FM
L10	N22525-1	Coil, Oscillator, AM
L11	N22525-1	Condenser, Variable
L12	N22525-1	Condenser, Opa. Temp. Cor. 5-25 uuf
L13	N22525-1	Condenser, Ceramic, 47 uuf, 350 v.
L14	N22525-1	Condenser, Mica, 5K uuf, 350 v.
L15	N22525-1	Condenser, Disc, 10 K uuf, 350 v.
L16	N22525-1	Condenser, Ceramic, 100 uuf, 350 v.
L17	N22525-1	Condenser, Ceramic, 1K uuf, 350 v.
L18	N22525-1	Condenser, Ceramic, 1.5 uuf, 350 v.
L19	N22525-1	Condenser, Ceramic, 50 uuf, 500 v.
L20	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L21	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L22	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L23	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L24	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L25	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L26	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L27	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L28	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L29	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L30	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L31	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L32	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L33	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L34	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L35	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L36	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L37	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L38	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L39	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L40	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L41	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L42	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L43	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L44	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L45	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L46	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L47	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L48	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L49	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L50	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L51	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L52	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L53	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L54	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L55	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L56	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L57	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L58	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L59	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L60	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L61	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L62	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L63	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L64	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L65	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L66	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L67	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L68	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L69	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L70	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L71	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L72	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L73	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L74	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L75	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L76	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L77	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L78	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L79	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L80	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L81	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L82	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L83	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L84	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L85	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L86	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L87	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L88	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L89	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L90	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L91	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L92	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L93	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L94	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L95	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L96	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L97	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L98	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L99	N22525-1	Condenser, P.T., .03 uuf, 400 v.
L100	N22525-1	Condenser, P.T., .03 uuf, 400 v.

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
R1, R11, R15	N23524	Lamp, Dial, Mazda No. 47
R2	N22956-1	Leaflet, Instruction
R3		Pointer, Dial
R4, R6		Resistor, 68 ohms, 1/4 watt
R5		Resistor, 27K ohms, 1 watt
R7, R8, R13,		Resistor, 47 ohms, 1/4 watt
R17, R30		Resistor, 22K ohms, 1/4 watt
R9		Resistor, 2200 ohms, 1/4 watt
R10, R20		Resistor, 1K ohms, 1/4 watt
R12		Resistor, 8.2K ohms, 1 watt
R14, R22		Resistor, 1 megohm, 1/4 watt
R16		Resistor, 10K ohms, 1 watt
R18		Resistor, 100K ohms, 1/4 watt
R19		Resistor, 3.3K ohms, 1 watt
R21		Resistor, 180 ohms, 1/4 watt
R23		Resistor, 39K ohms, 1/4 watt
R25		Resistor, 220K ohms, 1/4 watt
R26		Resistor, 15K ohms, 1/4 watt
R27A, R27B	N22624	Resistor, 10 megohms, 1/4 watt
R28		Resistor, 330K ohms, 1/4 watt
R29		Resistor, 2 x 500 ohms, 5 watts
		Resistor, 470 K ohms, 1/4 watt
		Resistor, 270 ohms, 1 watt
	N23429	Scale, Dial
	N22957	Shart, Tuning
	N23537-1	Socket, Dial-Lite with Leads
	N19551	Socket, AC Phono Motor
	N19552	Socket, Phono Input
	N23406	Speaker, 6" P.M.
	N19133	Spring, Dial Cord
	N22334-1	Suppressor Assy. Parasitic-AM
	N22335-1	Suppressor Assy. Parasitic-FM
	N23435	Switch, Band, FM-AM-Phono
	N22352-1	Transformer, I.F., AM, 145 Kc.
	N22590	Transformer, 1st I.F., FM, 10.7 Mc.
	N22967	Transformer, 2nd I.F., FM, 10.7 Mc.
	N23669	Transformer, Output
	N22959	Transformer, Power
	N22592	Transformer, Ratio Detector
	N22763	Weight, Cabinet



TECHNICAL INFORMATION

AM Tuning range—540 Kc. to 1600 Kc. Immediate Frequency—455 Kc. I.F. and R.F. measurements made at 500 milliwatts output—approximately 1.27 volts on a receiver type voltmeter connected across speaker voice coil. Approximate input for 500 MW output: I.F. 300 uv, R.F. with standard loop: at 60 Kc. 1200 uv/m; at 1000 Kc. uv/m; at 1400 Kc. 800 uv/m.

FM Tuning range—88 megacycles to 108 megacycles. Intermediate frequency 10.7 megacycles. I.F. and R.F. measurements made at 500 milliwatts output—approximately 1.27 volts on a rectifier type voltmeter connected across speaker voice coil. Approximate input for 500 MW output: I.F. 300 uv, R.F. "Absolute Measurements": 91 megacycles 125 uv; 105 megacycles, 100 uv.

ALIGNMENT PROCEDURE

Output meter connection Across speaker voice coil.
Output meter reading to indicate 500 MW 1.27 volts.
Generator Modulation 30%, 400 cycles
Position of volume control Fully clockwise.

Set dial pointer Horizontal, variable condenser closed.
Set band switch To left for AM alignment, center for FM alignment

FM ALIGNMENT

Detector and I.F. alignment using Signal Generator and Oscilloscope.

1. Connect FM Generator, High side, to grid (pin 1) of 6BA6 2nd I.F. tube through .005 mfd. dummy.
2. Set generator frequency to 10.7 Mc. modulated either 60 cycles or 400 cycles, 250 Kc sweep (125 Kc. deviation).
3. Connect vertical input of scope across volume control of receiver (grounded terminal to chassis, ungrounded terminal to high side of control).
4. Set scope switch for internal synchronization and set horizontal oscillator to 2X frequency of modulating voltage of generator. (120 or 800 cycles)
5. Turn variable condenser fully open, and band switch to right (FM).
6. Adjust frequency vernier of horizontal oscillator on scope until the pattern becomes stationary.
7. Adjust ratio detector primary slug No. A7 for maximum vertical sweep of the scope pattern.
8. Adjust ratio detector secondary slug No. A8 to center the cross over point of the pattern. Pattern should look like Fig. 1 with the same amount of curve on both ends, and the cross over point in the center.
9. Connect generator, high side, to center antenna screw terminal on rear of chassis.
10. Adjust I.F. slugs A9, A10 and A11 for the greatest vertical sweep of the pattern, consistent with linearity. If the I.F. slugs are adjusted for maximum sweep of the pattern, the pattern may become non-linear. Therefore, adjustment should be made for the greatest sweep which can be obtained and still have all four ends of the "X" pattern similar in size and shape.
11. Check the alignment of the I.F. and detector circuits by varying the signal generator frequency above and below the center frequency of 10.7 Mc. If the receiver is perfectly aligned, two smaller "X" patterns of similar size and shape will result, one on either side of the center frequency. See Figure 2.

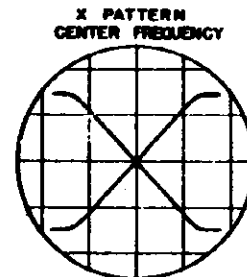


FIG. 1

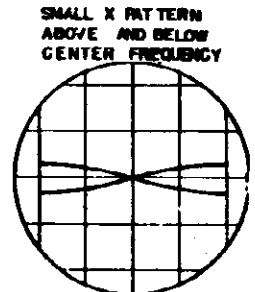
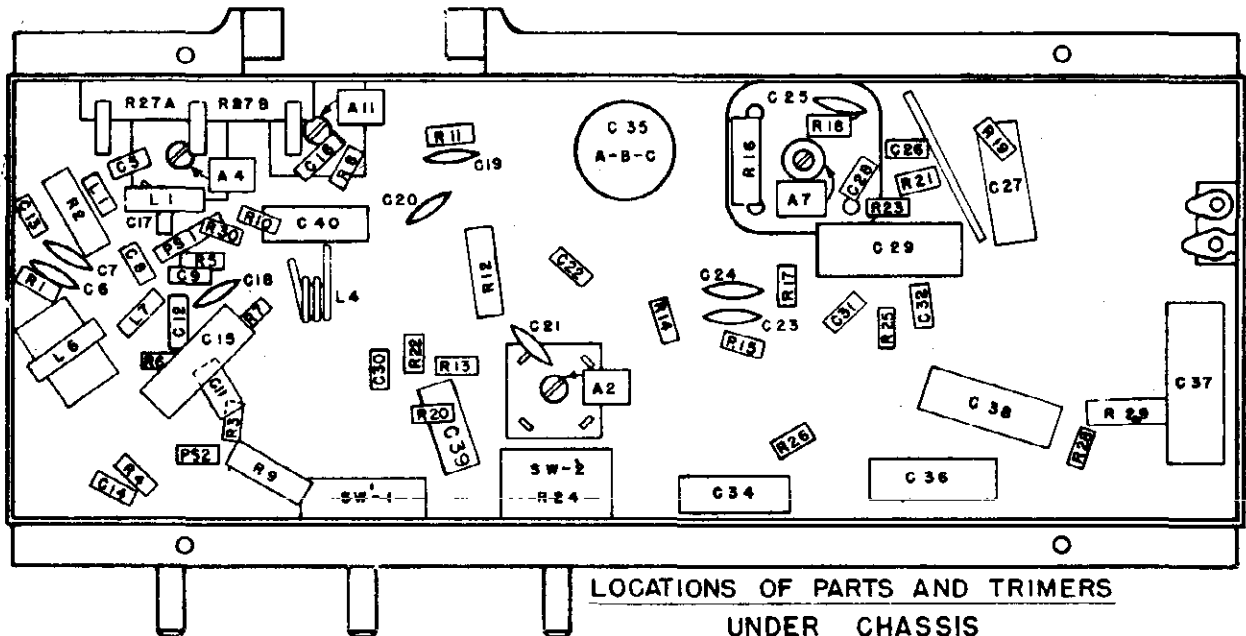


FIG. 2

Position of Variable	Generator Frequency	Dummy Ant.	RF Generator Connection High Side Ant. (FM) Terminal	Generator Connection Ground Lead Ground (G) Terminal	Adjust Trimmers In Order Shown	Trimmer Function
Fully open	108.5 Mc.	*300 ohm	Ant. (FM) Terminal	Ground (G) Terminal	A12	Oscillator
Fully Closed	87.5 Mc.	*300 ohm	Ant. (FM) Terminal	Ground (G) Terminal	Check Point	Oscillator
105 Mc.	105 Mc.	*300 ohm	Ant. (FM) Terminal	Ground (G) Terminal	A13	R.F.
91 Mc.	91 Mc.	*300 ohm	Ant. (FM) Terminal	Ground (G) Terminal	Check Point	R.F.

For R.F. alignment use FM generator signal modulated with 400 cycles 45 Kc. sweep (22.5 Kc.) deviation).

*The 300 ohm dummy should be made up to two 150 ohm resistors, one placed in each lead at the receiver antenna terminals.

LOCATIONS OF PARTS AND TRIMERS
UNDER CHASSIS

AM ALIGNMENT

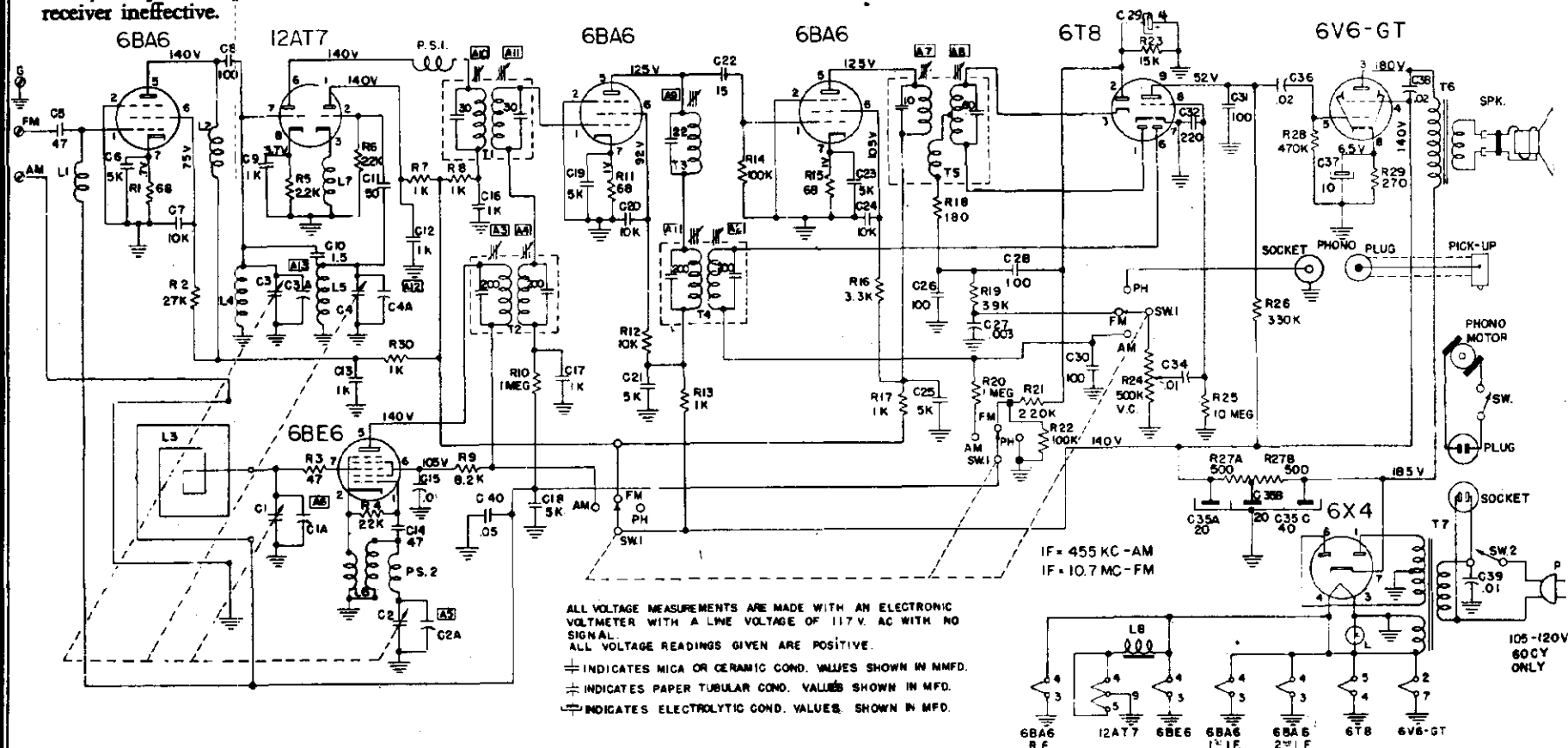
Position of Variable	Generator Frequency	Dummy Ant.	Generator Connection (high)	Generator Connection Ground Lead	Adjust Trimmers In Order Shown For Max. Output	Trimmer Function
Open	455 Kc	.05 mfd.	Mixer Grid	Chassis	A1, A2, A3, A4,	I. F.
Open	1650 Kc		*Test Loop	Test Loop	A5	Oscillator
1400 Kc	1400 Kc		*Test Loop	Test Loop	A6	Antenna
**600 Kc	600 Kc		*Test Loop	Test Loop	Check Point	Antenna

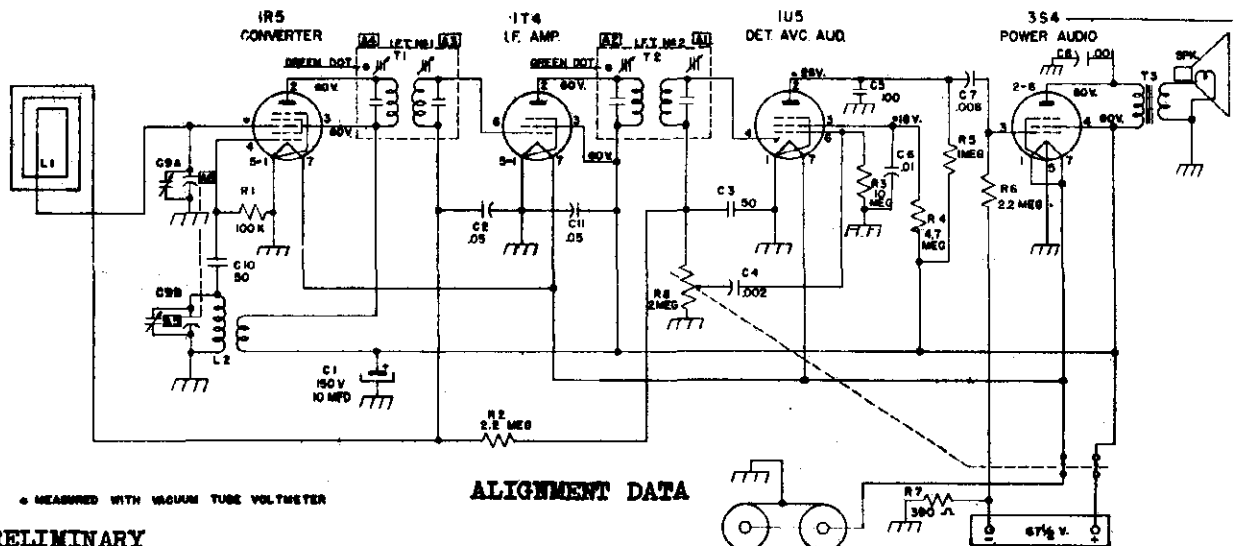
* Connect generator lead to Standard Hazeltine Test Loop, Model 1150, placed two feet from the set loop, or three turns of wire about six inches in diameter, placed about one foot from the set loop. Or the generator can be connected with the high side lead to the AM antenna screw terminal and the ground lead to the chassis.

**With a generator signal of 600 Kc, tune the set to the point where maximum output is obtained, which should be approximately 600 Kc on the dial. Adjust antenna section plates of variable for maximum output.

The alignment procedure should be repeated in the original order for greatest accuracy

Always keep the output from the signal generator at its lowest possible value to make the A. V. C. action of the receiver ineffective.



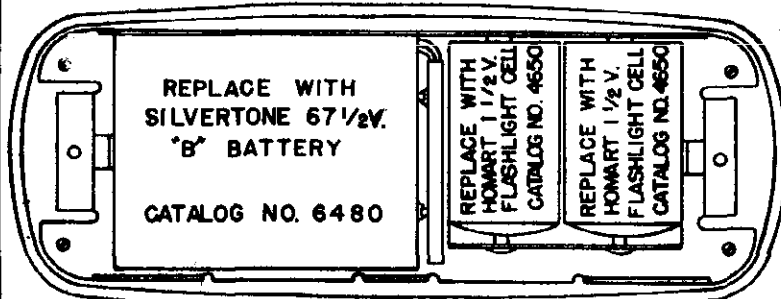
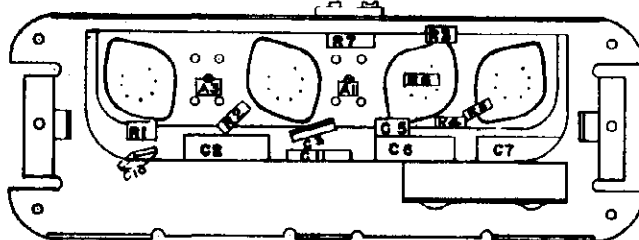
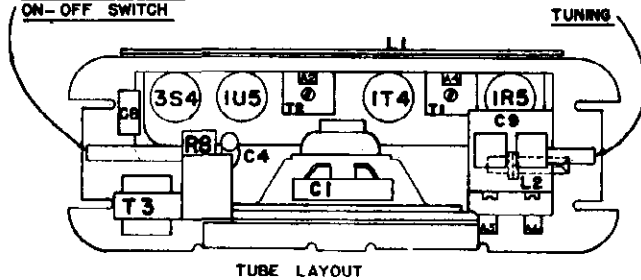
MODEL 210,
Ch. 132.880**PRELIMINARY**

Output meter reading to indicate .05 watt across voice coil 0.4 V
 Generator ground lead connected to metal chassis
 Generator modulation 30%, 400 cycles
 Position of Volume control fully on

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Adjust Trimmers (In order shown)	Trimmer Function
Open	455 KC	.05 MFD	Mixer Grid	A1, A2, A3, A4	I.F.
Open	1650 KC		Test Loop	A5	Osc.
1400 KC	1400 KC		Test Loop	R6	Ant.
600 KC	600 KC		Test Loop	Check Point	

VOLUME CONTROL

ON-OFF SWITCH

**Specifications**

Power Supply - 1 1/2 V. A Battery
67 1/2 V. B Battery

Frequency Range
Broadcast - 540 - 1600 KC
FM

Power Output
Undistorted
Maximum

65 mw
150 mw

Speaker Voice Coil Impedance 3.2 ohms

Schematic Location	Part No.	Description
C7		Condenser, .006 mfd., 600 volt
C8		Condenser, .001 mfd., 600 volt
C9A, B	N22966	Condenser, Variable
	N23137	Insulator, Battery Clip
	N23181	Knob, Tuning
	N23182	Knob, On-Off-Volume
	N23187	Leaflet, Instruction
R1		Resistor, 100,000 ohms, 1/2 watt
R2, R6		Resistor, 2.2 megohm, 1/2 watt
R3		Resistor, 10 megohm, 1/2 watt
R4		Resistor, 4.7 megohm, 1/2 watt
R5		Resistor, 1 megohm, 1/2 watt
R7		Resistor, 390 ohm, 1/2 watt
R8	N23138	Resistor, Volume Control & Switch
SPK	N22972	Speaker, 1" P.M.
T1, T2	N21797-1	Transformer, I.F.
T3	N23180	Transformer, Output
L1	N23111	Antenna Loop Assembly
	N23675	Cabinet Assembly
	N23179	Cabinet, Green Plastic
	N23170-1	Cloth, Grille
	N23260	Handle, Green Plastic
	N21842-1	Cable, "B" Battery & Terminal Strip, "A" Battery
	N23136	Clip, Oscillator Assy.
	N23139	Coil, Oscillator Assy.
C1	N21811	Condenser, Electrolytic, 10 mfd., 150 volt
C2, C11		Condenser, .05 mfd., 200 volt
C3, C10		Condenser, .00005 mfd., 500 volt, mica
C4		Condenser, .002 mfd., 600 volt
C5		Condenser, .0001 mfd., 500 volt, mica
C6		Condenser, .01 mfd., 200 volt

MODEL 220,
Ch. 528.173

SPECIFICATIONS

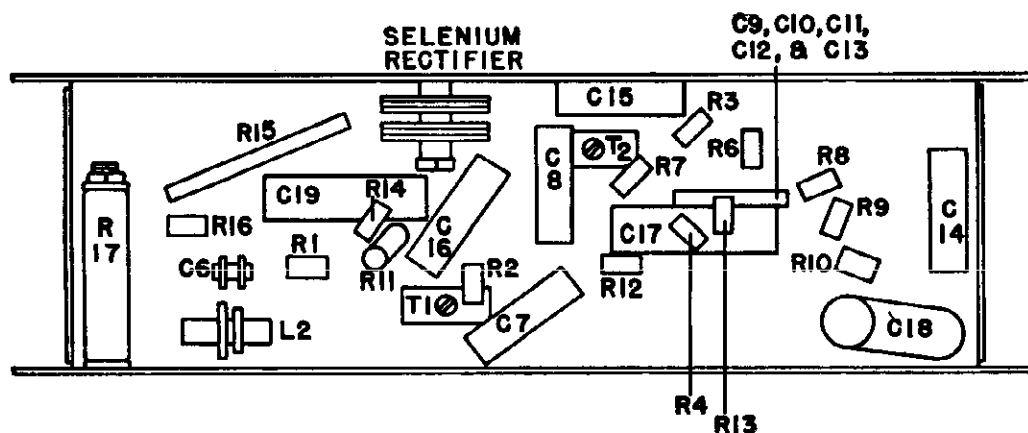
Power Supply:117 Volts, DC or 50-60 Cycles AC, 11 Watts or Catalog No. 6407 Battery Pack.

Power Output:

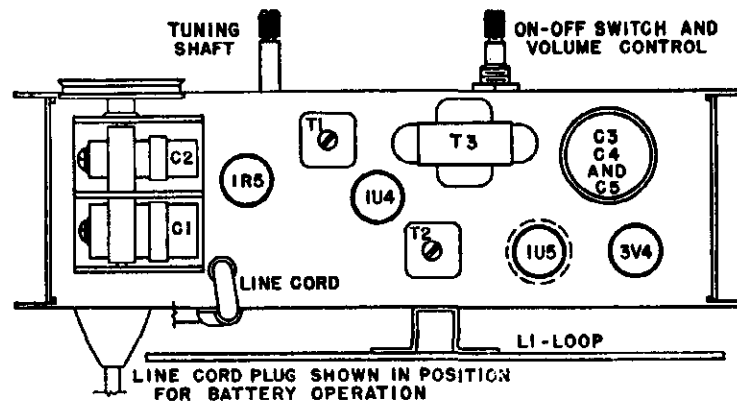
Undistorted0.15 Watt Frequency Range:

Maximum0.30 Watt Broadcast540-1625 KC

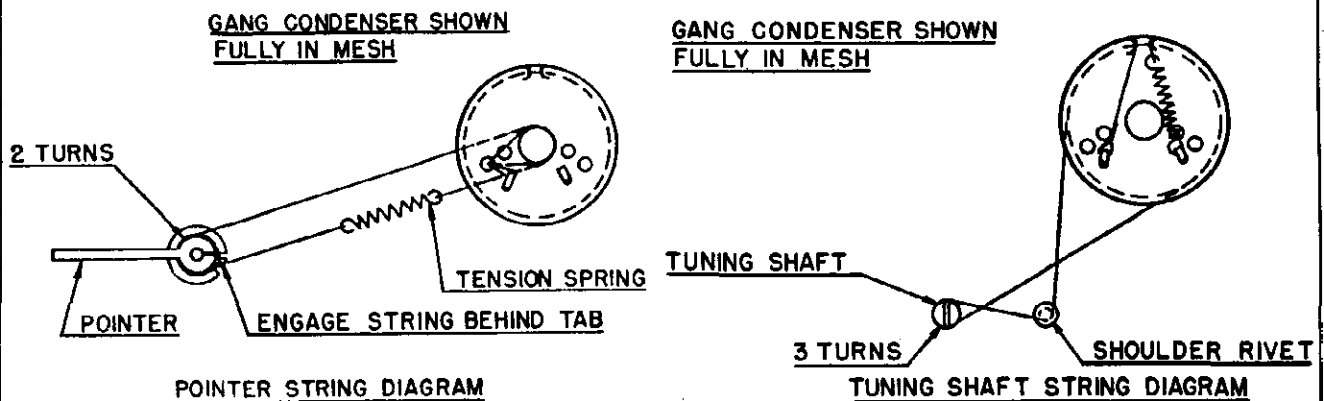
Schematic Location	Part Number	DESCRIPTION	Schematic Location	Part Number	DESCRIPTION
CHASSIS PARTS					
C1, C2 C3, C4, C5 C6 C7, C14 C8, C15 C9, C10, C11, C12, C13 C16 C17 C18, C19	T72-50	Bushing, pointer drive.....	R14	T60-756	Resistor, 1200 ohm, 1/2 w., 10%
	T72-51	Bushing, tuning shaft.....	R15	T60-725	Resistor, 160 ohm, 3 w. 5%
	T84-437	Cable assembly, battery.....	R16	T60-675	Resistor, 1000 ohm, 1/2 w.
	T19-210	Capacitor, variable (2 gang).....	R17	T60-757	Resistor, 2000 ohm, 10 w. 5%
	T18-296	Capacitor, electrolytic.....		T83-661	Retainer, tube shield.....
	T15-229	Capacitor, 47 mmfd., ceramic.....		T75-81	Shaft, pointer drive.....
	T16-153	Capacitor, .005 mfd., 600 v.....		T75-82	Shaft, condenser drive.....
	T16-152	Capacitor, .05 mfd. 200 v.....		T71-42	Shield, tube.....
	T17-103	Capacitor, ceramic unit.....		T68-39	Socket, miniature wafer.....
				T77-151	Spacer, variable condenser.....
	T16-156	Capacitor, .01 mfd. 400 v.....		T70-103	Spring, pointer drive.....
	T16-157	Capacitor, .1 mfd. 200 v.....		T70-135	Spring, condenser drive.....
	T16-197	Capacitor, .05 mfd. 400 v.....		T79-381	Speaker, 4" x 6" P.M.....
	T83-421	Clip, I.F. transformer mounting.....	S2	T69-186	Switch, Batt./AC/DC.....
	T10-554	Coil, oscillator.....	T1, T2	T10-508	Transformer, I.F.....
	T24-188	Control, volume and switch.....	T3	T80-245	Transformer, output.....
	T23-162	Cord, power, AC/DC.....		T86-51	Washer, "C", pointer shaft.....
	T21-158	Cover, bottom.....		T86-112	Washer, "C", tuning shaft.....
	T47-108	Grommet, variable condenser.....		T86-136	Washer, compression, tuning shaft.....
	T76-13	Insulator, electrolytic.....			
L2 R5, S1	T82-67	Loop, antenna.....	CABINET PARTS		
	T58-80	Pointer.....		T42-467	Cabinet (front case only, less escutcheon and hardware).....
	T31-160	Plate, dial backing.....		T22-155	Clip (cabinet).....
	T83-642	Rectifier, selenium.....		T64-9	Clip (back cover).....
R1 R2, R6 R3, R8 R4 R7 R9 R10 R11	T60-727	Resistor, 100,000 ohm, 1/2 w.....		T42-467	Cover, back (less hardware).....
	T60-728	Resistor, 10 meg., 1/2 w.....		T53-3	Cover, handle.....
	T60-726	Resistor, 2.2 meg., 1/2 w.....		T49-4	End caps, handle.....
	T60-730	Resistor, 47,000 ohm, 1/2 w.....		T40-160	Escutcheon.....
R12 R13	T60-669	Resistor, 4.7 meg., 1/2 w.....		T52-308	Knob.....
	T60-770	Resistor, 470 ohm, 1/2 w. 10%.....		T97-112	Screw, self-tapping.....
	T60-708	Resistor, 680 ohm, 1/2 w. 10%.....		T70-163	Spring, hinge.....
	T60-760	Resistor, 10,000 ohm, 1/2 w. 10%.....		T53-2	Strap, handle.....
	T60-753	Resistor, 220 ohm, 1/2 w. 10%.....			
	T60-668	Resistor, 1 meg., 1/2 w.....			



LOCATION OF PARTS UNDER CHASSIS

MODEL 220,
Ch. 528.173

LOCATION OF PARTS ON TOP OF CHASSIS



STRING AND POINTER HOOKUP

ALIGNMENT PROCEDURE

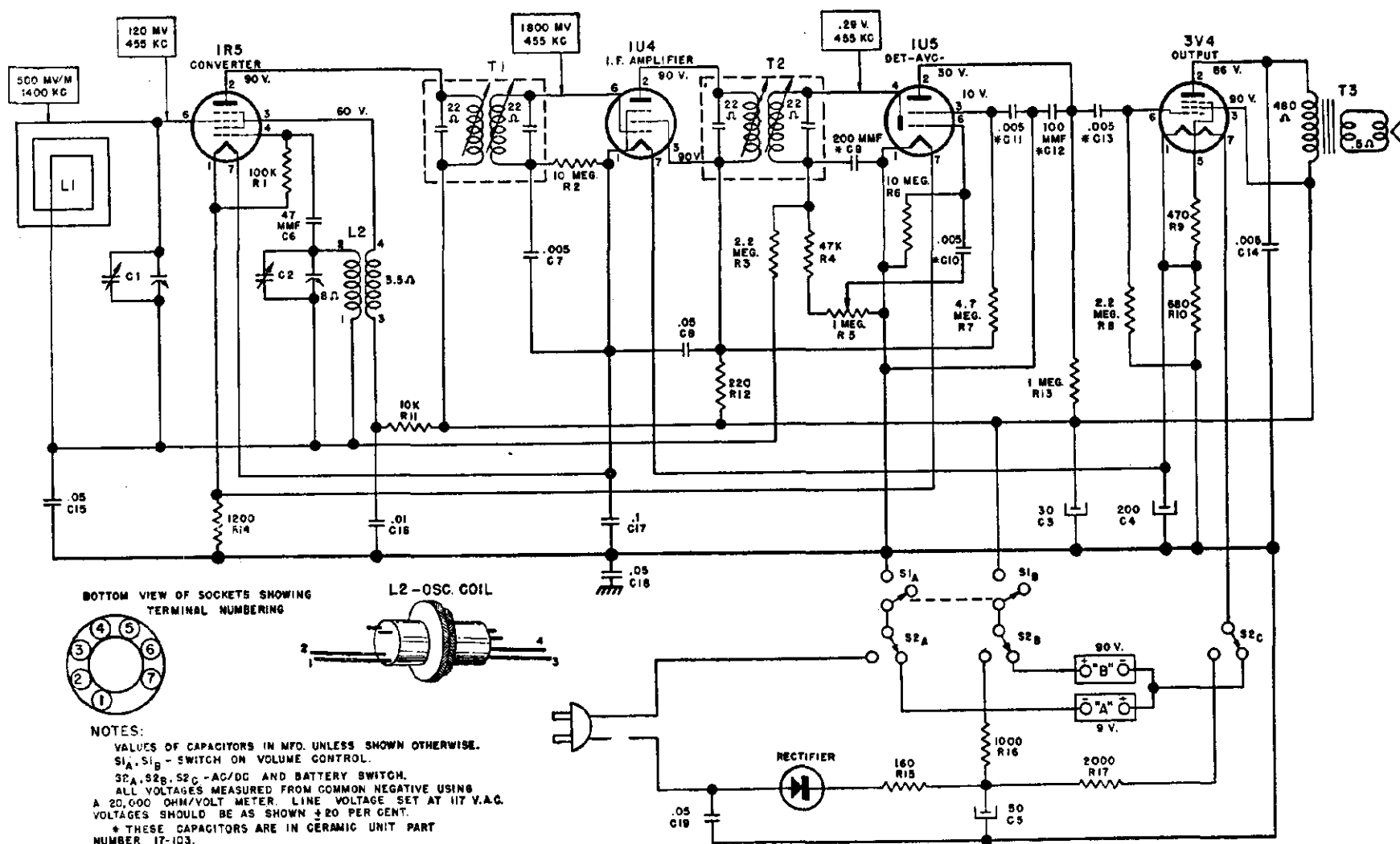
Output meter reading to indicate 0.05 watt across voice coil 0.4 v.
 Generator ground lead connected..... To B- through 0.1 mfd. capacitor
 Generator modulation 30%, 400 cycles
 Position of volume control..... Fully on
 Position of pointer with tuner fully closed..... Pointer should be horizontal, pointing to left (9 o'clock).

Position of Tuner	Generator Freq.	Dummy Antenna	Generator Connection	Adjustments (in order shown)	Function	Max. Microvolts Input to produce .05 w. output
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1U4 I-F Amp.	T2 (top and bottom)	LF.	5000
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1R5 Conv.	T1 (top and bottom)	I.F.	250
Min. Cap.	1625 kc	0.1 mfd.	Stator ant. tuner	C2	Osc.	
1400 kc	1400 kc		Hazeltine Test Loop	C1	Loop	100

ALIGNMENT NOTES:

1. It is recommended that this set be connected to an isolation transformer when aligning on AC.
2. The alignment must be done in the order given above.
3. While making the above adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

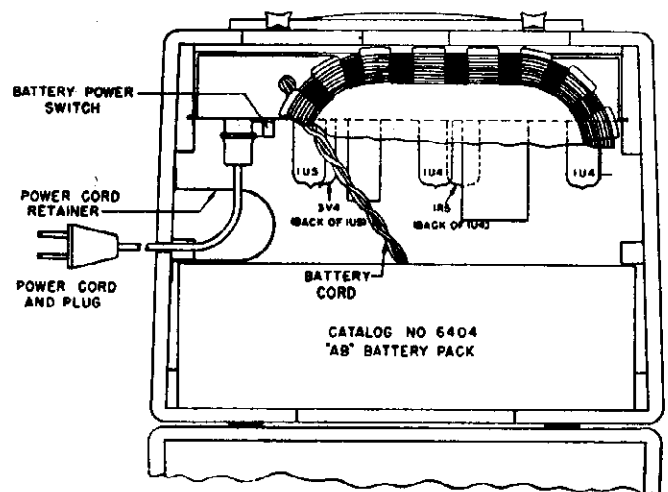
MODEL 220,
Ch. 528.173



SCHEMATIC DIAGRAM

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION	SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
	T84-391	Cable, assembly, battery	R8	T60-676	Resistor, 30,000 ohm, 1/2 w.
	T83-421	Clip, I.F. transformer mounting	R9	T60-770	Resistor, 470 ohm, 1/2 w. 10%
C1, C2, C3	T18-296	Capacitor, electrolytic	R10, R19	T60-726	Resistor, 2.2 meg., 1/2 w.
C4, C5, C6	T19-208	Capacitor, variable (3 gang)	R12, R15	T60-729	Resistor, 1500 ohm, 1/2 w. 10%
C8, C11	T16-153	Capacitor, .005 mfd. 600 v.	R13	T60-708	Resistor, 680 ohm, 1/2 w. 10%
C9, C10, C20, C21, C22	T17-103	Capacitor, ceramic unit	R14	T60-796	Resistor, 110 ohm, 3 w. 10%
C12, C17	T16-152	Capacitor, .05 mfd. 200 v.	R16	T60-757	Resistor, 2000 ohm, 10 w. 5%
C13	T15-186	Capacitor, 10 mmfd. mica	R18	T60-668	Resistor, 1 meg., 1/2 w.
C14	T16-150	Capacitor, .02 mfd. 400 v.		T75-69	Shaft, tuning
C15, C16	T16-157	Capacitor, .1 mfd. 200 v.		T68-39	Socket, miniature, wafer
C18, C19	T16-179	Capacitor, .05 mfd. 400 v.		T79-380	Speaker, 5" P.M.
L3	T10-553	Coil, oscillator		T70-122	Spring, dial cord
R11, S1	T24-186	Control, volume, with switch	S2	T69-173	Switch, AC/DC/Battery
	T84-77	Cord, power, AC/DC	T1, T2	T10-508	Transformer, 1st and 2nd I.F.
	T51-105	Cord, pointer travel, 29"	T3	T80-228	Transformer, output
	T47-103	Grommet, variable condenser	L2	T10-535	Transformer, R.F.
	T76-13	Insulator, electrolytic		T86-51	Washer, "C", tuning shaft
	T52-196	Knob, AC/DC/Battery switch		T86-80	Washer, compression, tuning shaft
	T82-66	Loop, antenna			
	T45-121	Plug, AC/DC			
	T58-78	Pointer			
	T39-265	Pulley, dial cord			
	T83-642	Rectifier, selenium			
	T60-744	Resistor, 22,000 ohm, 1/2 w. 10%			
	T60-669	Resistor, 4.7 meg., 1/2 w.			
	T60-728	Resistor, 10 meg., 1/2 w.			
	T60-730	Resistor, 47,000 ohm, 1/2 w.			
	T60-704	Resistor, 330 ohm, 1/2 w. 10%			
	T60-727	Resistor, 100,000 ohm, 1/2 w.			

PART NUMBER	DESCRIPTION
T44-12	Baffle
T42-466	Cabinet
T67-549	Dial scale
T40-158	Escutcheon
T98-14	Grille cloth
T52-306	Knob



MODEL 225,
Ch. 528.171

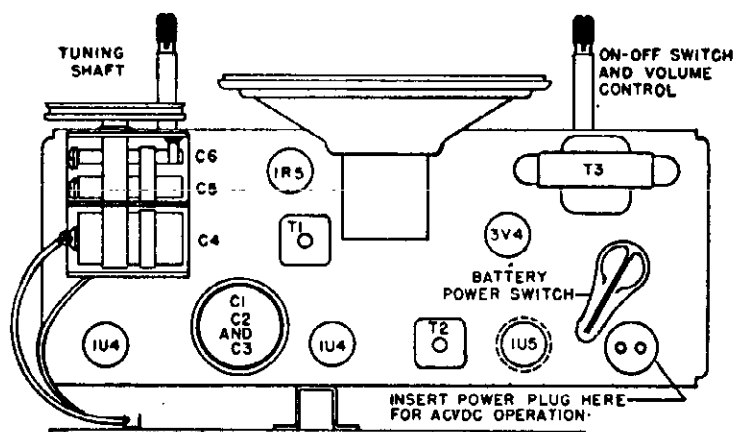
ALIGNMENT PROCEDURE

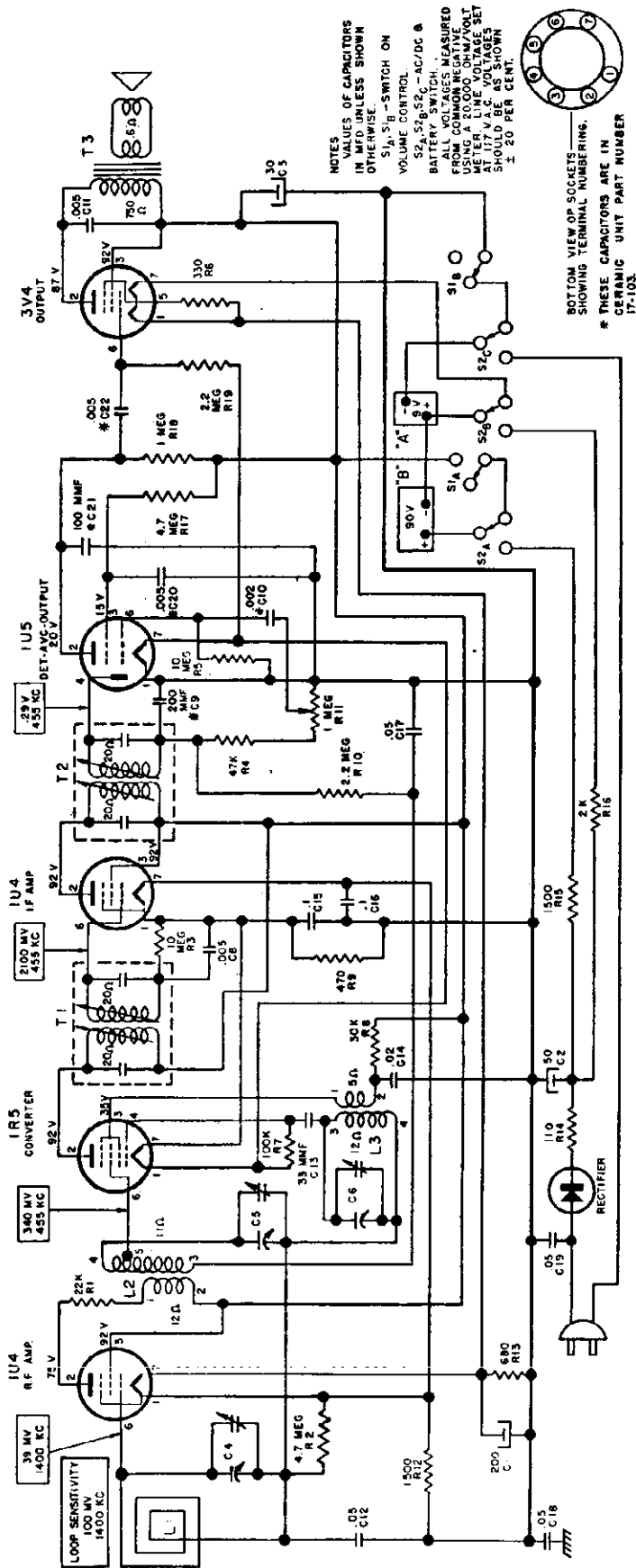
Output meter reading to indicate 0.05 watt across voice coil 0.4 v.
 Generator ground lead connected.....To B- through 0.1 mfd. capacitor
 Generator modulation30%, 400 cycles
 Position of volume control.....Fully on
 Position of pointer with tuner fully closed.....Center of pointer lined up with extreme
 right dot on dial backing plate.
 (Chassis right side up.)

Position of Tuner	Generator Freq.	Dummy Antenna	Generator Connection	Adjustments (in order shown)	Function	Max. Microvolts Input to produce .05 w. output
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1U4 I-F Amp.	T2 (top and bottom)	I.F.	5000
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1R5 Conv.	T1 (top and bottom)	I.F.	250
Min. Cap.	1610 kc	0.1 mfd.	Stator ant. tuner	C6	Osc.	
1400 kc	1400 kc	0.1 mfd.	Stator ant. tuner	C5	R.F.	30
1400 kc	1400 kc		Hazeltine Test Loop	C4	Loop	100

ALIGNMENT NOTES:

1. It is recommended that this set be connected to an isolation transformer when aligning on AC.
2. The alignment must be done in the order given above.
3. While making the above adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.



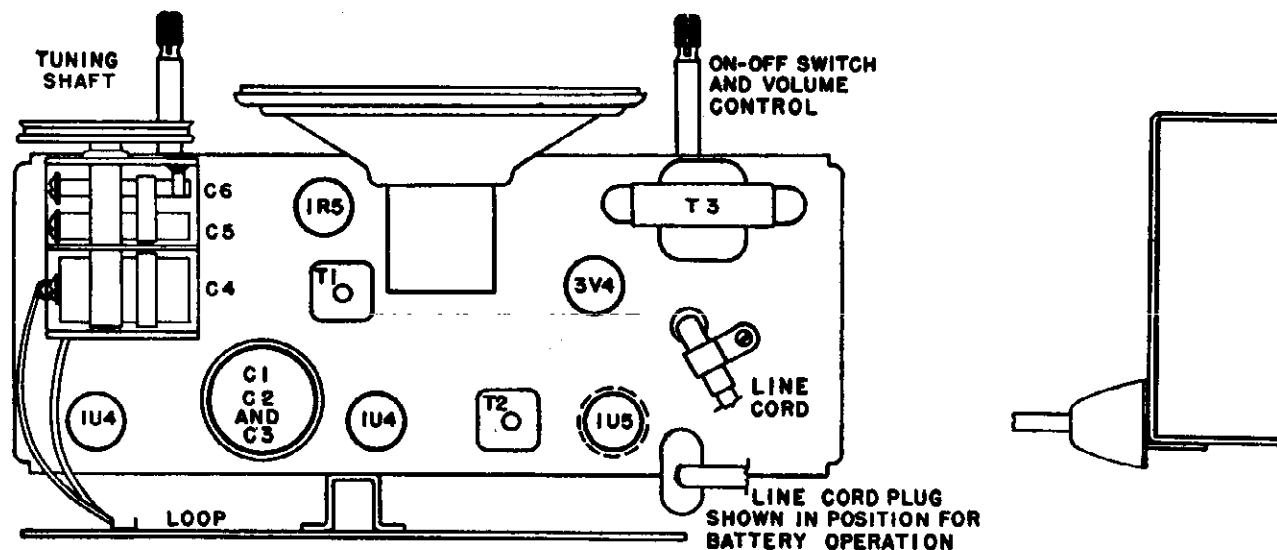


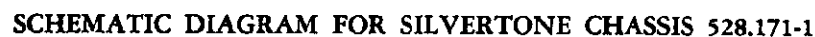
SCHEMATIC DIAGRAM FOR SILVERTONE CHASSIS 528.171

Output meter reading to indicate 0.05 watt across voice coil	0.4 v.
Generator ground lead connected.....	To B- through 0.1 mfd. capacitor
Generator modulation	30%, 400 cycles
Position of volume control.....	Fully on
Position of pointer with tuner fully closed.....	Center of pointer lined up with extreme right dot on dial backing plate. (Chassis right side up.)

Position of Tuner	Generator Freq.	Dummy Antenna	Generator Connection	Adjustments (in order shown)	Function	Max. Microvolts Input to produce .05 w. output
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1U4 I-F Amp.	T2 (top and bottom)	I.F.	5000
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1R5 Conv.	T1 (top and bottom)	I.F.	250
Min. Cap.	1625 kc	0.1 mfd.	Stator ant. tuner	C6	Osc.	
1400 kc	1400 kc	0.1 mfd.	Stator ant. tuner	C5	R.F.	30
1400 kc	1400 kc		Hazeltine Test Loop	C4	Loop	100

1. It is recommended that this set be connected to an isolation transformer when aligning on AC.
2. The alignment must be done in the order given above.
3. While making the above adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.





MODEL 225,
Ch. 528.171-1

MODEL 225,
Ch. 528.171-1

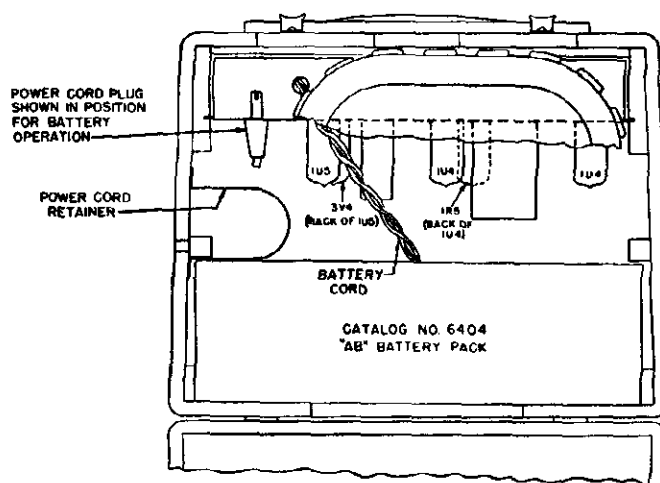
PARTS LIST

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
	T84-391	Cable, assembly, battery
	T83-421	Clip, I.F. transformer mounting
C1, C2, C3	T18-296	Capacitor, electrolytic
C4, C5, C6	T19-208	Capacitor, variable (3 gang)
C8, C11	T16-153	Capacitor, .005 mfd. 600 v.
C9, C10, C20, C21, C22	T17-103	Capacitor, ceramic unit
C12, C17	T16-152	Capacitor, .05 mfd. 200 v.
C13	T15-186	Capacitor, 10 mmfd. mica
C14	T16-150	Capacitor, .02 mfd. 400 v.
C15, C16	T16-157	Capacitor, .1 mfd. 200 v.
C18, C19	T16-179	Capacitor, .05 mfd. 400 v.
L3	T10-553	Coil, oscillator
R11, S1	T24-186	Control, volume, with switch
	T23-151	Cord, power, AC/DC
	T51-105	Cord, pointer travel, 29"
	T47-108	Grommet, variable condenser
	T76-13	Insulator, electrolytic
L1	T82-66	Loop, antenna
	T58-78	Pointer
	T39-265	Pulley, dial cord
	T83-642	Rectifier, selenium
R1	T60-744	Resistor, 22,000 ohm, ½ w. 10%
R2, R17	T60-669	Resistor, 4.7 meg., ½ w.
R3, R5	T60-728	Resistor, 10 meg., ½ w.
R4	T60-730	Resistor, 47,000 ohm, ½ w.
R6	T60-704	Resistor, 330 ohm, ½ w. 10%
R7	T60-727	Resistor, 100,000 ohm, ½ w.

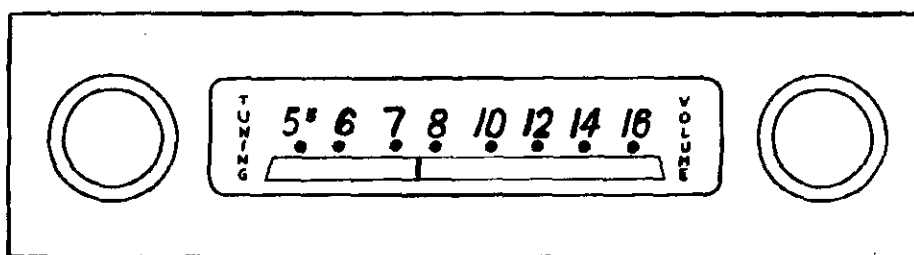
SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
R8	T60-745	Resistor, 27,000 ohm, ½ w.
R9	T60-770	Resistor, 470 ohm, ½ w. 10%
R10	T60-726	Resistor, 2.2 meg., ½ w.
R12, R15	T60-729	Resistor, 1500 ohm, ½ w. 10%
R13	T60-708	Resistor, 680 ohm, ½ w. 10%
R14	T60-796	Resistor, 110 ohm, 3 w. 10%
R16	T60-757	Resistor, 2000 ohm, 10 w. 5%
R18	T60-668	Resistor, 1 meg., ½ w.
R19	T60-799	Resistor, 820,000 ohm, ½ w.
	T75-69	Shaft, tuning
	T68-39	Socket, miniature, wafer
	T79-380	Speaker, 5" P.M.
	T70-122	Spring, dial cord
S2	T69-186	Switch, AC/DC/Battery
T1, T2	T10-508	Transformer, 1st and 2nd I.F.
T3	T80-228	Transformer, output
L2	T10-535	Transformer, R.F.
	T86-51	Washer, "C", tuning shaft
	T86-80	Washer, compression, tuning shaft

CABINET

PART NUMBER	DESCRIPTION
T44-12	Baffle
T42-466	Cabinet
T67-549	Dial scale
T40-158	Escutcheon
T98-14	Grille cloth
T52-306	Knob



OPERATION



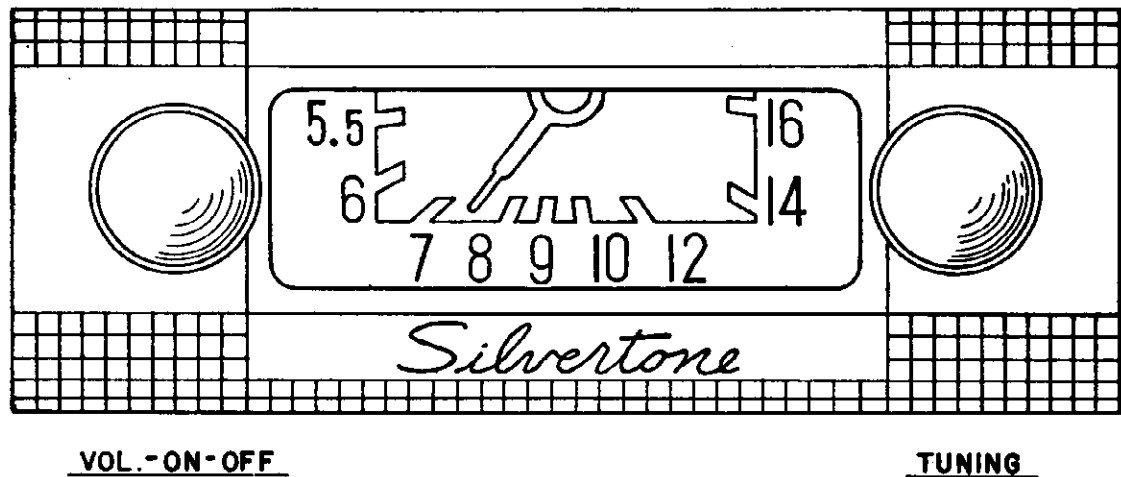


Fig. 1. Front View

DESCRIPTION

Your new automobile receiver is a 5-tube (plus rectifier) superheterodyne, designed to operate from the 6 volt storage battery in your car. It is a universal type of receiver for mounting underneath the dash panel. It has a self-contained PM speaker, and covers the frequency range 540 to 1600 K.C. Two simple controls are provided for operating the receiver. (see fig. 1).

Special care has been taken in the design of this receiver to insure the finest in sensitivity and selectivity, thereby insuring good reception of even distant or weak stations. The unit is simple to install, the antenna input circuit adjustable to permit the use of any two or three section whip or "fish pole" antenna.

OPERATION

To turn the receiver on, rotate the volume control and switch knob (left hand knob) to the right about half its range. After allowing about 30 seconds for the tubes to warm up, the desired station may be tuned by rotating the tuning control (right hand knob) to the desired frequency. The dial scale is calibrated in kilocycles minus the final two zeros. After the station has been properly tuned, the volume may be adjusted by means of the volume control knob. To increase the volume, turn the control to the right; to decrease the volume, turn it to the left. Turning this control to the left as far as it will go, turns the radio off.

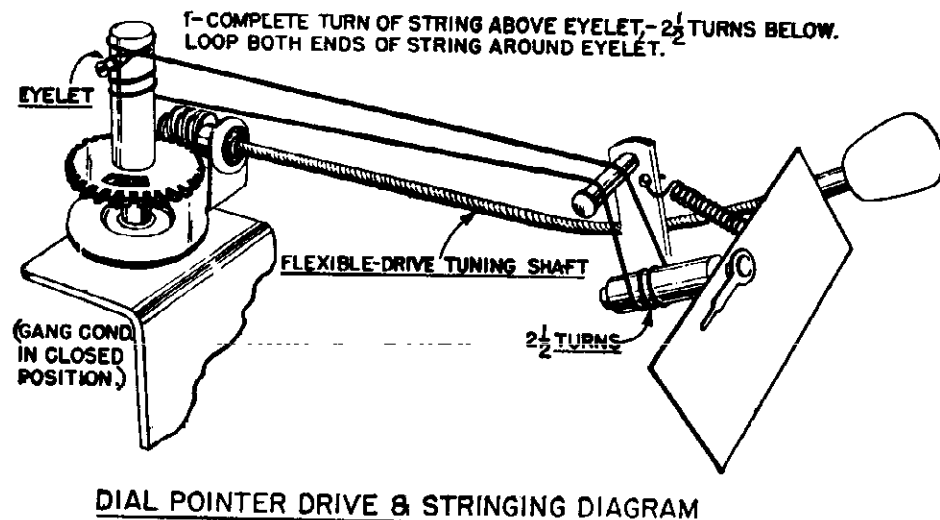


Fig. 2.

MODEL 6293,
Ch. 528.6293

INSTALLATION

This radio comes to you complete with all hardware necessary for mounting, and also with a distributor suppressor, ammeter condenser and generator condenser. By referring to Figures 1, 3 and 9, and following the instructions outlined below, you will find that it is very simple to install.

First determine where the receiver is to be mounted by holding it with the hands in the approximate location in the car. Using the front mounting bracket as a template, mark and drill two $\frac{3}{8}$ " holes in the instrument panel flange. Now secure the mounting bracket to the radio receiver with the screws provided, and then mount the front of the radio to the instrument panel, using the bolts, lock washers and nuts provided for this purpose. The back of the radio is supported by means of the rear mounting strap. The mounting strap should be formed by bending to the correct angles, as illustrated in Figure 3, so that it can then be fastened to the fire wall. After marking and center-punching the fire wall at the correct location, drill with a $\frac{3}{8}$ " drill. The mounting strap is then secured to the radio and fastened to the fire wall of the car with the $\frac{1}{4}$ " bolt, lock washer and nut furnished with the receiver.

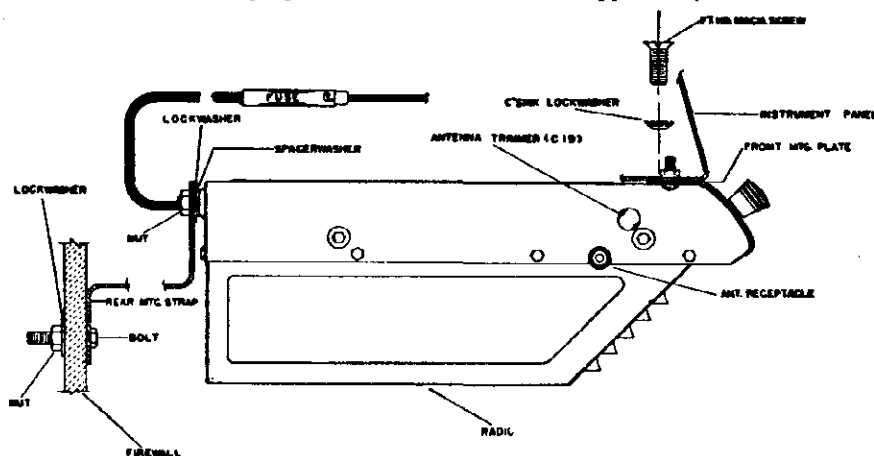


Fig. 3. Side View, Showing Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the jack into the antenna receptacle provided on the side of the radio. Connect the battery cable to the hot side of the ammeter behind the instrument panel. The fuse should then be inserted into the cable receptor.

FINAL ADJUSTMENTS

The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type.

To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 1400 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 3) and adjust the trimmer for maximum volume by turning the screw to the left or right with a small screw driver.

ACCESSORIES FURNISHED FOR INSTALLATION

All of the parts that are needed for installing this receiver are furnished in the Mounting Parts Kit, part No. S-84-192, and the Suppression and Misc. Parts Kit, part No. S84-232, as listed below. Also supplied are the rear mounting strap, part No. B31-134, and the front mounting plate, part No. A31-147.

S84-192 MOUNTING PARTS KIT

- | | |
|----------------------------------|-------------------------------|
| 1 $\frac{1}{4}$ " Bolt | 2 External Tooth Lock Washers |
| 2 $\frac{1}{4}$ " Lock Washers | 2 Internal Tooth Lock Washers |
| 2 $\frac{1}{4}$ " Hexagon Nuts | 2 10-32 Hexagon Nuts |
| 2 10-32 x $\frac{5}{8}$ " Screws | 1 Washer-Spacer |
| 2 10-32 x $\frac{3}{8}$ " Screws | |

S84-232 SUPPRESSION KIT & MISC. PARTS

- | | |
|----------------------------|--|
| 1 S84-233 "A" lead assem. | 1 S84-193 Suppression Kit consisting of: |
| 1 A43-10 Fuse | 2 .5 MFD Condensers |
| 1 A81-13 Sleeve (for fuse) | 1 Distributor Suppressor |
| | 20" Wire Braid |

ELIMINATING MOTOR NOISE

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all three mounting points. A good electrical contact at these points will aid materially in eliminating motor noise.

GENERATOR CONDENSER

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Remove from distributor cap the high tension lead from coil to distributor. Cut the lead two inches from the end, and screw the distributor resistor on to the coil lead, then screw the short length into the resistor and plug the cable into the distributor cap.

AMMETER CONDENSER

A .5 MFD bypass condenser is furnished for attaching to the ammeter. This should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby. In most cases the use of this condenser, the distributor suppressor, and the generator condenser, will eliminate all objectionable ignition interference.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to try another by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

HIGH AND LOW TENSION LEADS

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These leads will very often pick up motor noise and feed it into the

receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension leads. Shield and ground these leads.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead from the coil to the distributor.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

BONDING OF FIRE WALL RODS AND TUBES

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

MODEL 6293,
Ch. 528.6293

ELECTRICAL SPECIFICATIONS

Power Supply.....6.3 volts DC
Current6.2 amp. average
Frequency Range.....540 to 1600 KC
I. F. Frequency.....455 KC
Speaker.....4" P.M.
Power Output.....1.75 watts, undistorted
3 watts, maximum
Sensitivity.....1 microvolt average for 1 watt output
Selectivity...40 KC broad at 1000 times signal, at 1000 KC

The tube compliment of this receiver is as follows:

- 1—6SK7GT—R. F. Amplifier.
- 1—6SA7GT—Converter.
- 1—6SK7GT—I.F. Amplifier.
- 1—6SQ7—Detector—AVC—1st audio.
- 1—6V6GT—Power output.
- 1—6X5GT—Rectifier.

SERVICE NOTES

Voltages taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 ohms per volt. These voltages are clearly shown on the schematic diagram (Fig. 7).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "ALIGNMENT PROCEDURE". After realignment has been completed repeat the procedure as a final check.

INSTRUCTIONS FOR REMOVING CHASSIS FROM THE CASE

The bottom cover (the one with the speaker louvers) can be removed to permit servicing of major components, such as tubes and vibrator, by removing the eight (8) screws holding it to the top cover. There are three (3) screws on each side, one (1) in the rear, and one (1) in the front.

CAUTION: Before attempting to remove the top cover, to service condensers, resistors, etc., the screw connecting the spark plate to the "A" terminal (inside case) must be removed. This is a round head screw, and is located on the rear of the case, close to the mounting stud bolt. It is recessed in a 1/2 inch hole in the case itself, thereby permitting contact with the spark plate.

After removing the spark plate screw, remove the two knobs by pulling forward and remove the eight (8) screws securing the cover to the chassis. Lift the chassis at the rear, at the same time moving it away from the front of the case so that the volume and tuning shafts will clear the holes in the cover.

NOTE: When reinstalling the chassis into the case, be sure the screw connecting the spark plate to the "A" terminal (inside case) is tightened very securely, otherwise the receiver will not operate properly.

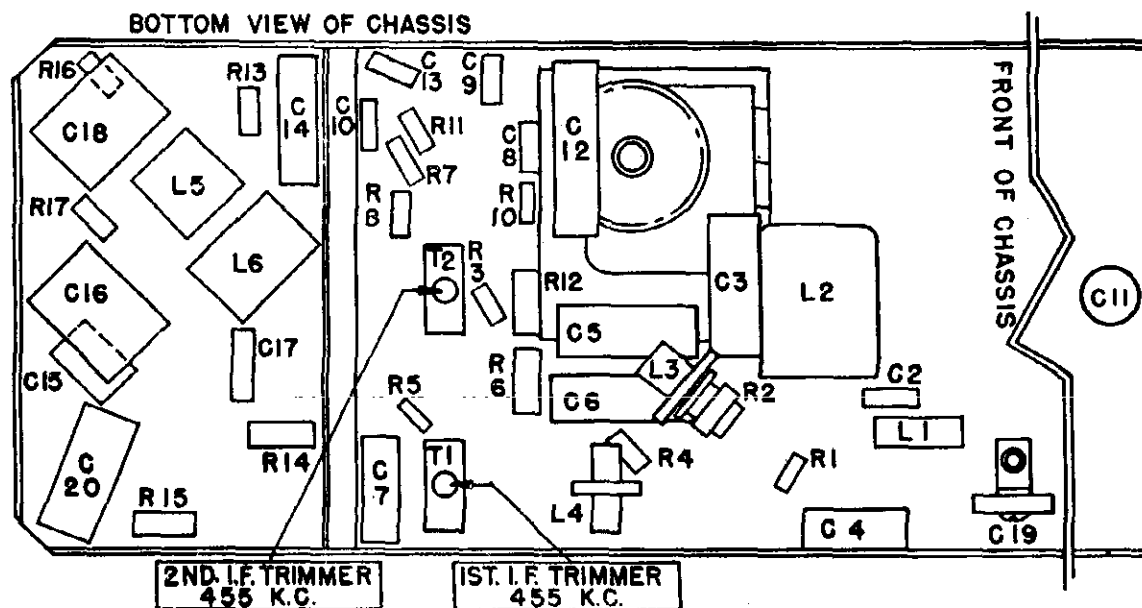


Fig. 4. Bottom View

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (0.04 volt for 0.05 watt output.)

Dummy antennas—.1 MFD., 75 MMFD.

For alignment points refer to Figures 5 and 6.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T2	Maximum	Output I.F.
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T1	Maximum	Input I.F.
Fully Open	1600 KC	75 MMFD.	Ant. lead	C1C	Maximum	Oscillator
Tune in signal from generator	1400 KC	75 MMFD.	Ant. lead	C1B	Maximum	R.F.
Tune in signal from generator	1400 KC	75 MMFD.	Ant. lead	C19	Maximum	Antenna

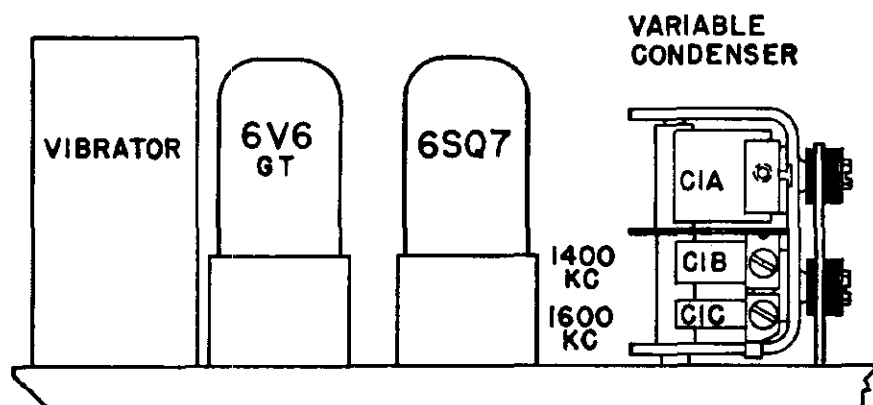


Fig. 5. Trimmer Locations

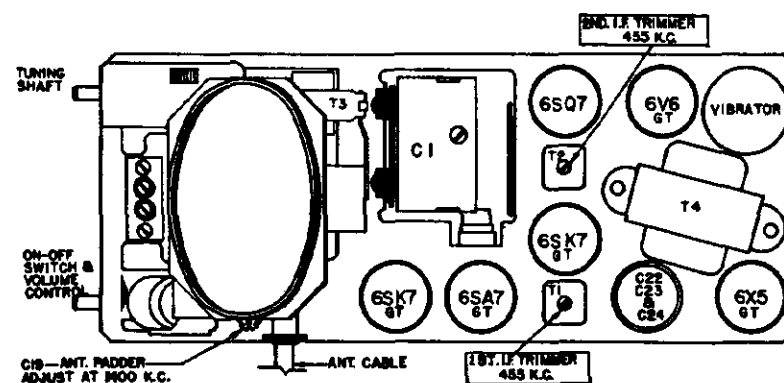


Fig. 6. Tube and Trimmer Locations

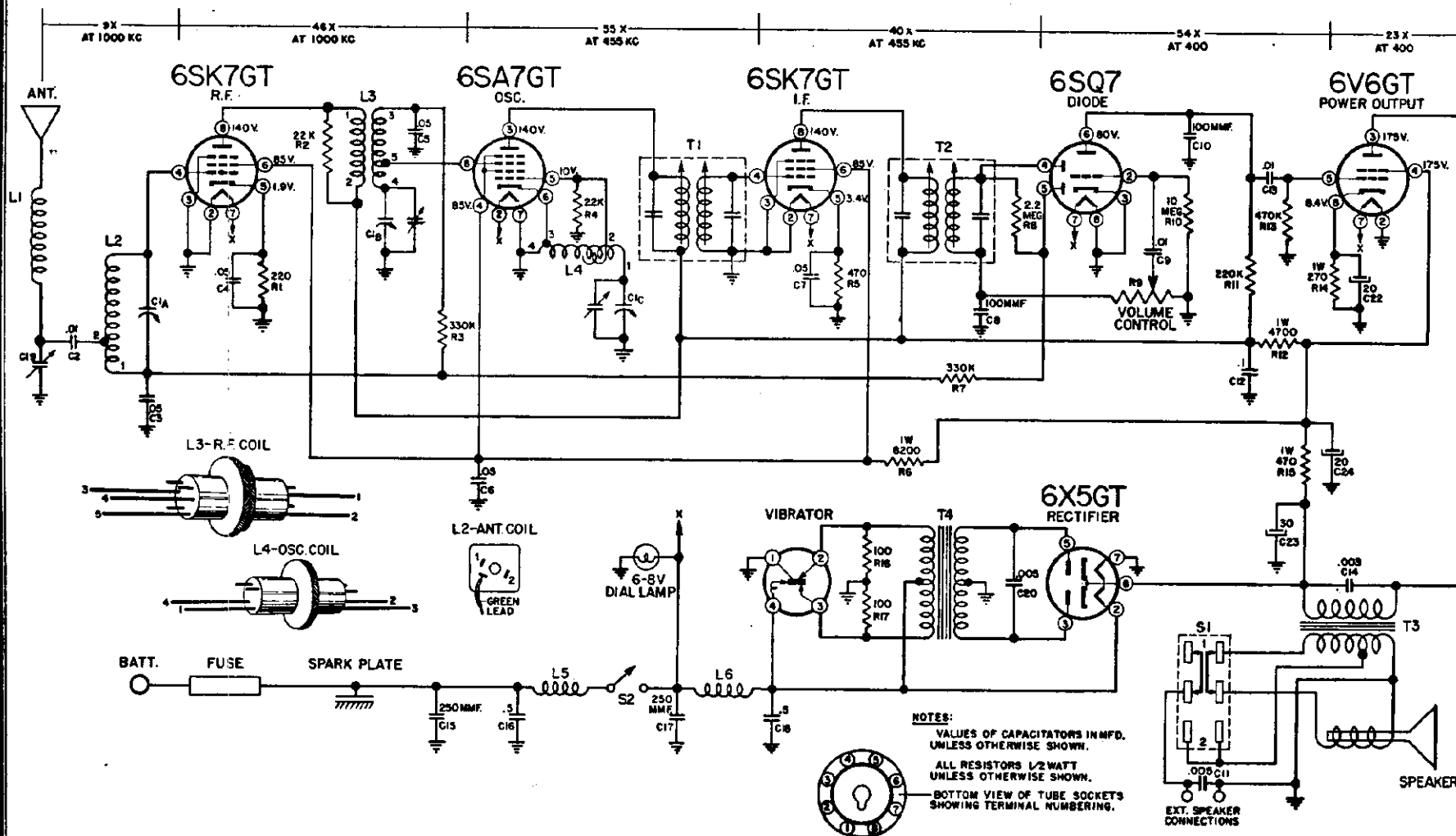


Fig. 7. Schematic Diagram

INSTRUCTIONS FOR INSTALLATION OF REAR SEAT SPEAKER

Your Silvertone Auto Radio, Chassis Number 528.6293 includes a special feature which makes it simple and easy to install an additional speaker in the rear of the car. A speaker with the proper voice coil impedance (3.2 ohms) for such an installation is available at the Sears store where you bought your Silvertone Auto Radio.

The terminal strip in the illustration below is accessible through an opening in the case. The two wire leads from

the rear seat speaker should be connected to these terminals. This completes the electrical installation of the speaker. The switch at the right is for operation of the rear seat speaker. In position 1, only the speaker in the case is connected; in position 2, both speakers are connected.

IMPORTANT: When there is no rear seat speaker installation, ALWAYS keep the switch in position 1.

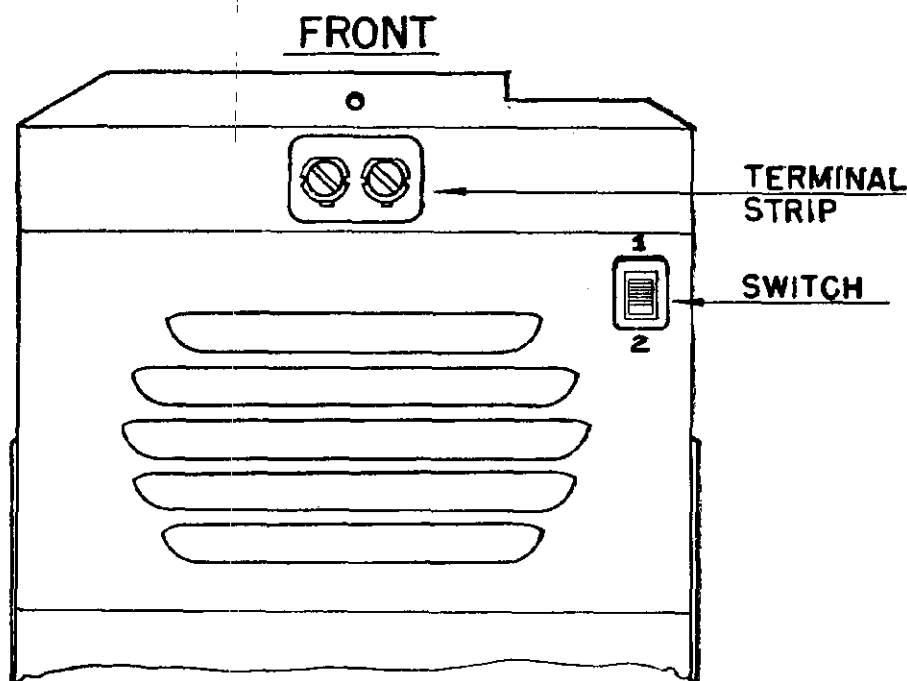


Fig. 8. Bottom View of Case

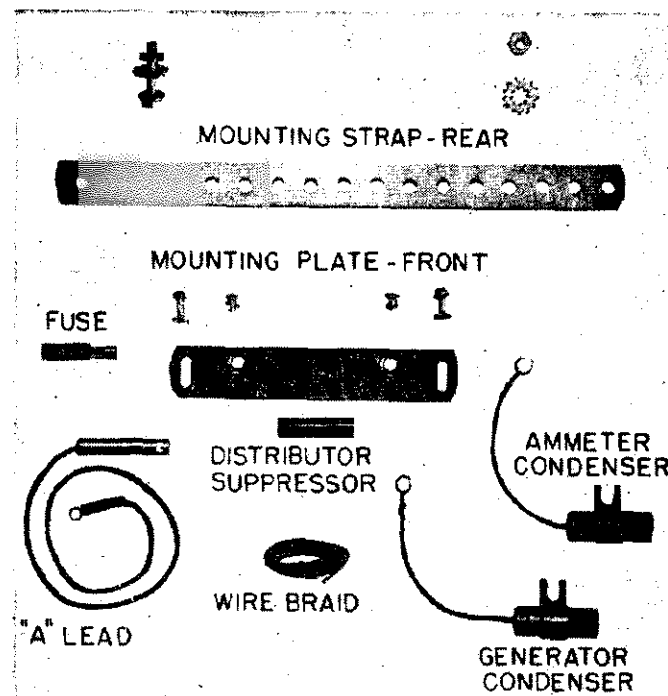


Fig. 9. Mounting Parts

MODEL 6293,
Ch. 528.6293

REPAIR PARTS LIST

Schematic Location	Part No.	Description
C1A, C1B, C1C	B19-203	Capacitor—variable, worm drive
C2, C9, C13	A16-201	Capacitor—.01 mfd.—600 v.
C3, C5, C6	A16-189	Capacitor—.05 mfd.—400 v.
C4, C7	A16-197	Capacitor—.05 mfd.—200 v.
C8, C10	A15-196	Capacitor—mica—100 mmfd.
C11	A16-177	Capacitor—ceramic—.005 mfd.
C12	A16-187	Capacitor—.1 mfd.—400 v.
C14	A16-200	Capacitor—.003 mfd.—600 v.
C15, C17	A15-176	Capacitor—mica—250 mmfd.
C16	A16-184	Capacitor—.5 mfd.—100 v.
C18	A16-202	Capacitor—.5 mfd.—100 v.
C19	A20-145	Capacitor—ceramic—antenna trimmer
C20	A16-185	Capacitor—.005 mfd.—1600 v.
	A18-289	Capacitor—electrolytic
C22		20 mfd.—25 v.
C23		30 mfd.—350 v.
C24		20 mfd.—350 v.
	A83-421	Clip—I.F. transformer mounting
L1	A10-527	Coil—Antenna loading
L2	B10-525	Coil—Antenna
L3	B10-528	Coil—R. F.
L4	B10-526	Coil—Oscillator
L5	A33-229	Coil—"A" line choke
L6	A33-234	Coil—Vibrator hash choke
R9, S2	A24-177	Control—ON-OFF and VOLUME
	A51-105	Cord—Pointer travel, 17"
	B67-541	Dial—Station
	A47-112	Grommet—Speaker and variable capacitor mounting
	A47-114	Grommet—Fibre—Flexible shaft bearing
	S84-233	Kit—"A" lead assembly
	S84-192	Kit—Mounting parts
	S84-193	Kit—Suppression, assembly
	A52-293	Knob—Volume and tuning
	A89-10	Lamp—Dial—G. E. No. 422
	A31-147	Plate—Mounting, front
	A58-76	Pointer—Dial
	A87-38	Receptacle—Antenna cable
R1	A60-753	Resistor—220 ohm— $\frac{1}{2}$ w.
R2, R4	A60-744	Resistor—22,000 ohm— $\frac{1}{2}$ w.
R3, R7	A60-661	Resistor—330,000 ohm— $\frac{1}{2}$ w.
R5	A60-722	Resistor—470 ohm— $\frac{1}{2}$ w.
R6	A60-766	Resistor—8200 ohm—1 w.
R8	A60-726	Resistor—2.2 megohm— $\frac{1}{2}$ w.
R10	A60-728	Resistor—10 megohm— $\frac{1}{2}$ w.
R11	A60-667	Resistor—220,000 ohm— $\frac{1}{2}$ w.
R12	A60-765	Resistor—4700 ohm—1 w.
R13	A60-731	Resistor—470,000 ohm— $\frac{1}{2}$ w.
R14	A60-754	Resistor—270 ohm—1 w.
R15	A60-694	Resistor—470 ohm— $\frac{1}{2}$ w.
R16, R17	A60-752	Resistor—100 ohm— $\frac{1}{2}$ w.
	B75-72	Shaft—Tuning drive—flexible
	B79-373	Speaker—4" P.M.
	B31-134	Strap—Mounting, rear
S1	A69-185	Switch—Rear seat speaker
T1	A10-521	Transformer—I.F. No. 1
T2	A10-529	Transformer—I.F. No. 2
T3	B80-249	Transformer—Output (part of speaker)
T4	B80-243	Transformer—Power
	A34-105	Vibrator—Mallory No. 659

IMPORTANT: All tubular condensers must be high temperature (85°C.) wax type.

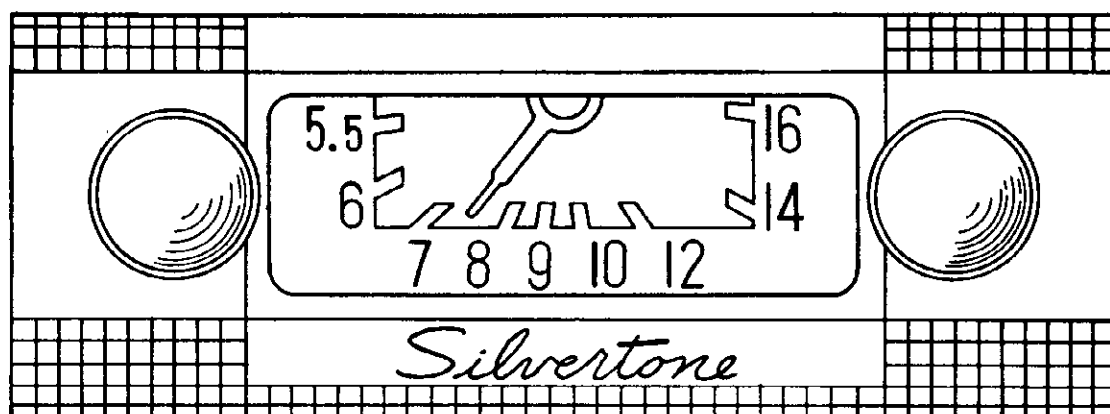
MODEL 6293,
Ch. 528.6293-2VOL. - ON-OFFTUNING

Fig. 1 Front View

DESCRIPTION

Your new automobile receiver is a 5-tube (plus rectifier) superheterodyne, designed to operate from the 6 volt storage battery in your car. It is a universal type of receiver for mounting underneath the dash panel. It has a self-contained PM speaker, and covers the frequency range 540 to 1600 K.C. Two simple controls are provided for operating the receiver. (see fig. 1).

Special care has been taken in the design of this receiver to insure the finest in sensitivity and selectivity, thereby insuring good reception of even distant or weak stations. The unit is simple to install, the antenna input circuit adjustable to permit the use of any two or three section whip or "fish pole" antenna.

OPERATION

To turn the receiver on, rotate the volume control and switch knob (left hand knob) to the right about half its range. After allowing about 30 seconds for the tubes to warm up, the desired station may be tuned by rotating the tuning control (right hand knob) to the desired frequency. The dial scale is calibrated in kilocycles minus the final two zeros. After the station has been properly tuned, the volume may be adjusted by means of the volume control knob. To increase the volume, turn the control to the right; to decrease the volume, turn it to the left. Turning this control to the left as far as it will go, turns the radio off.

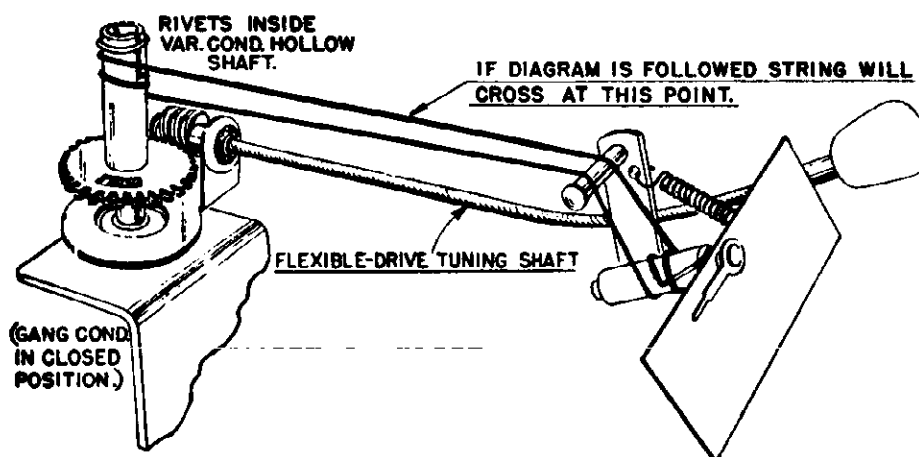
DIAL POINTER DRIVE & STRINGING DIAGRAM

Fig. 2

MODEL 6293,
Ch. 528.6293-2

INSTALLATION

This radio comes to you complete with all hardware necessary for mounting, and also with a distributor suppressor, ammeter condenser and generator condenser. By referring to Figures 1 and 2, and following the instructions outlined below, you will find that it is very simple to install.

First determine where the receiver is to be mounted by holding it with the hands in the approximate location in the car. Using the front mounting bracket as a template, mark and drill two 7/32" holes in the instrument panel flange. Now secure the mounting bracket to the radio receiver with the screws provided, and then mount the front of the radio to the instrument panel, using the bolts, lock washers and nuts provided for this purpose. The back of the radio is supported by means of the rear mounting strap. The mounting strap should be formed by bending to the correct angles, as illustrated in Figure 3, so that it can then be fastened to the fire wall. After marking and center-punching the fire wall at the correct location, drill with a 3/8" drill. The mounting strap is then secured to the radio and fastened to the fire wall of the car with the 1/4" bolt, lock washer and nut furnished with the receiver.

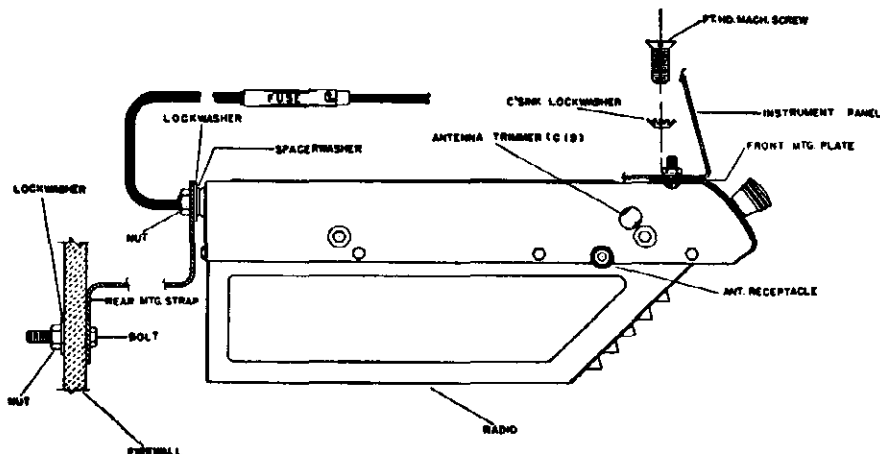


Fig. 2 Side View, Showing Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the jack into the socket provided on the side of the radio. Connect the battery cable to the hot side of the ammeter behind the instrument panel. The fuse should then be inserted into the cable receptor.

FINAL ADJUSTMENTS

The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type.

To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 1100 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 2) and adjust the trimmer for maximum volume. A small screw driver will be needed for this purpose.

ACCESSORIES FURNISHED FOR INSTALLATION

All of the parts that are needed for installing this receiver are furnished in the Mounting Parts Kit, part No. S84-192, and the Suppression and Misc. Parts Kit, part No. S84-232 as listed below. Also supplied are the rear mounting strap, part No. B31-134, and the front mounting plate, part No. A31-147.

S84-192 MOUNTING PARTS KIT

- | | |
|-----------------------|-------------------------------|
| 1 1/4" Bolt | 2 External Tooth Lock Washers |
| 2 1/4" Lock Washers | 2 Internal Tooth Lock Washers |
| 2 1/4" Hexagon Nuts | 2 10-32 Hexagon Nuts |
| 2 10-32 x 5/8" Screws | 1 Washer-Spacer |
| 2 10-32 x 3/8" Screws | |

S84-232 SUPPRESSION KIT & MISC. PARTS

- | | |
|----------------------------|--|
| 1 S84-233 "A" lead assem. | 1 S84-193 Suppression Kit consisting of: |
| 1 A43-10 Fuse | 2 .5 MFD Condensers |
| 1 A81-13 Sleeve (for fuse) | 1 Distributor Suppressor |
| | 20" Wire Braid |

ELIMINATING MOTOR NOISE

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all three mounting points. A good electrical contact at these points will aid materially in eliminating motor noise. (The following steps may not be necessary in all cases. Install your radio and operate it before making changes.)

GENERATOR CONDENSER

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Remove from distributor cap the high tension lead from coil to distributor. Cut the lead two inches from the end, and screw the distributor resistor on to the coil lead, then screw the short length into the resistor and plug the cable into the distributor cap.

AMMETER CONDENSER

A .5 MFD bypass condenser is furnished for attaching to the ammeter. This should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby. In most cases the use of this condenser, the distributor suppressor, and the generator condenser, will eliminate all objectionable ignition interference.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to try another by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

HIGH AND LOW TENSION WIRES

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These wires will very often pick up motor noise and feed it into the

receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension leads. Shield and ground these leads.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead from the coil to the distributor.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

BONDING OF FIRE WALL RODS AND TUBES

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

MODEL 6293,
Ch. 528.6293-2

ELECTRICAL SPECIFICATIONS

Power Supply.....6.3 volts DC
Current.....6.2 amp. average
Frequency Range.....540 to 1600 KC
I. F. Frequency.....455 KC
Speaker.....4" P. M.
Power Output.....1.75 watts, undistorted
3 watts, maximum
Sensitivity.....3 microvolt average for 1 watt output
Selectivity...40 KC broad at 1000 times signal, at 1000 KC

This receiver contains the following:

- 1—6SK7GT—R. F. Amplifier.
- 1—6SA7GT—Converter.
- 1—6SK7GT—I.F. Amplifier.
- 1—6SQ7—Detector—AVC—1st audio.
- 1—6V6GT—Power output.

A 6X5GT Rectifier is used.

SERVICE NOTES

Voltages taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes and the rectifier in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 ohms per volt. These voltages are clearly shown on the voltage diagram (Fig. 7).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "ALIGNMENT PROCEDURE". After realignment has been completed repeat the procedure as a final check.

INSTRUCTIONS FOR REMOVING CHASSIS FROM THE CASE

The bottom cover (the one with the speaker louvers) can be removed to permit servicing of major components, such as tubes and vibrator, by removing the eight (8) screws holding it to the top cover. There are three (3) screws on each side, one (1) in the rear, and one (1) in the front.

CAUTION: Before attempting to remove the top cover, to service condensers, resistors, etc., the screw connecting the spark plate to the "A" terminal (inside case) must be removed. This is a round head screw, and is located on the rear of the case, close to the mounting stud bolt. It is recessed in a 1/2 inch hole in the case itself, thereby permitting contact with the spark plate.

After removing the spark plate screw, remove the two knobs by pulling forward and remove the eight (8) screws securing the cover to the chassis. Lift the chassis at the rear, at the same time moving it away from the front of the case so that the volume and tuning shafts will clear the holes in the cover.

NOTE: When reinstalling the chassis into the case, be sure the screw connecting the spark plate to the "A" terminal (inside case) is tightened very securely, otherwise the receiver will not operate properly.

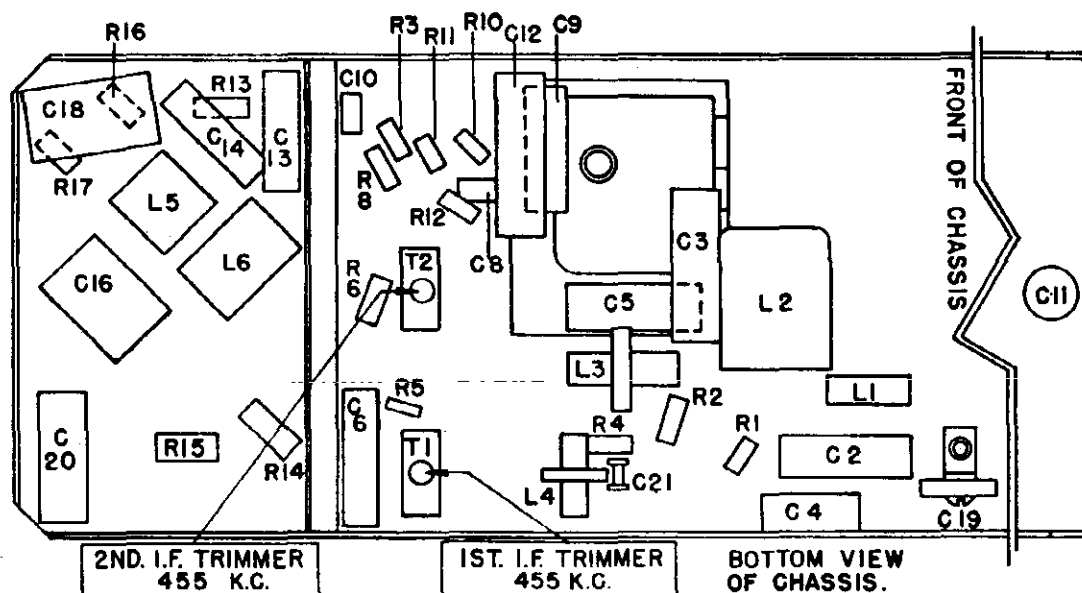


Fig. 4. Bottom View

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 75 MMFD.

For alignment points refer to Figures 5 and 6.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T2	Maximum	Output I.F.
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T1	Maximum	Input I.F.
Fully Open	1600 KC	75 MMFD.	Ant. lead	C1C	Maximum	Oscillator
Tune in signal from generator	1400 KC	75 MMFD.	Ant. lead	C1B	Maximum	R.F.
Tune in signal from generator	1400 KC	75 MMFD.	Ant. lead	C19	Maximum	Antenna

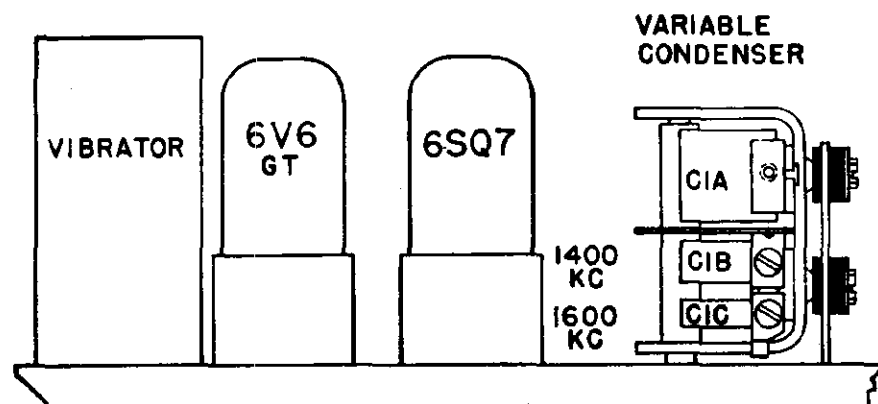


Fig. 5. Trimmer Locations

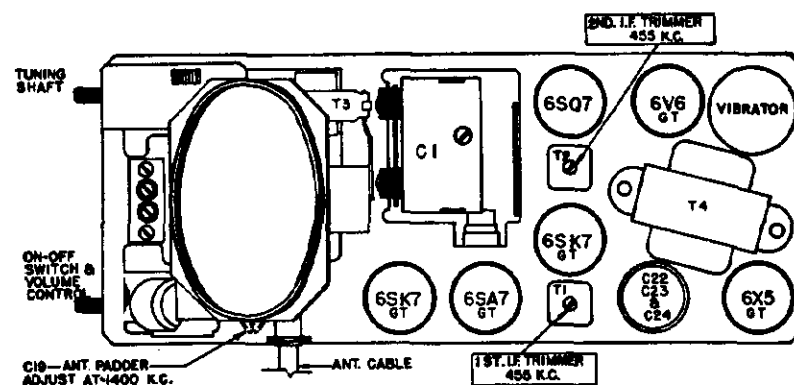


Fig. 6. Tube, Rectifier and Trimmer Locations

MODEL 6293,
Ch. 528.6293-2

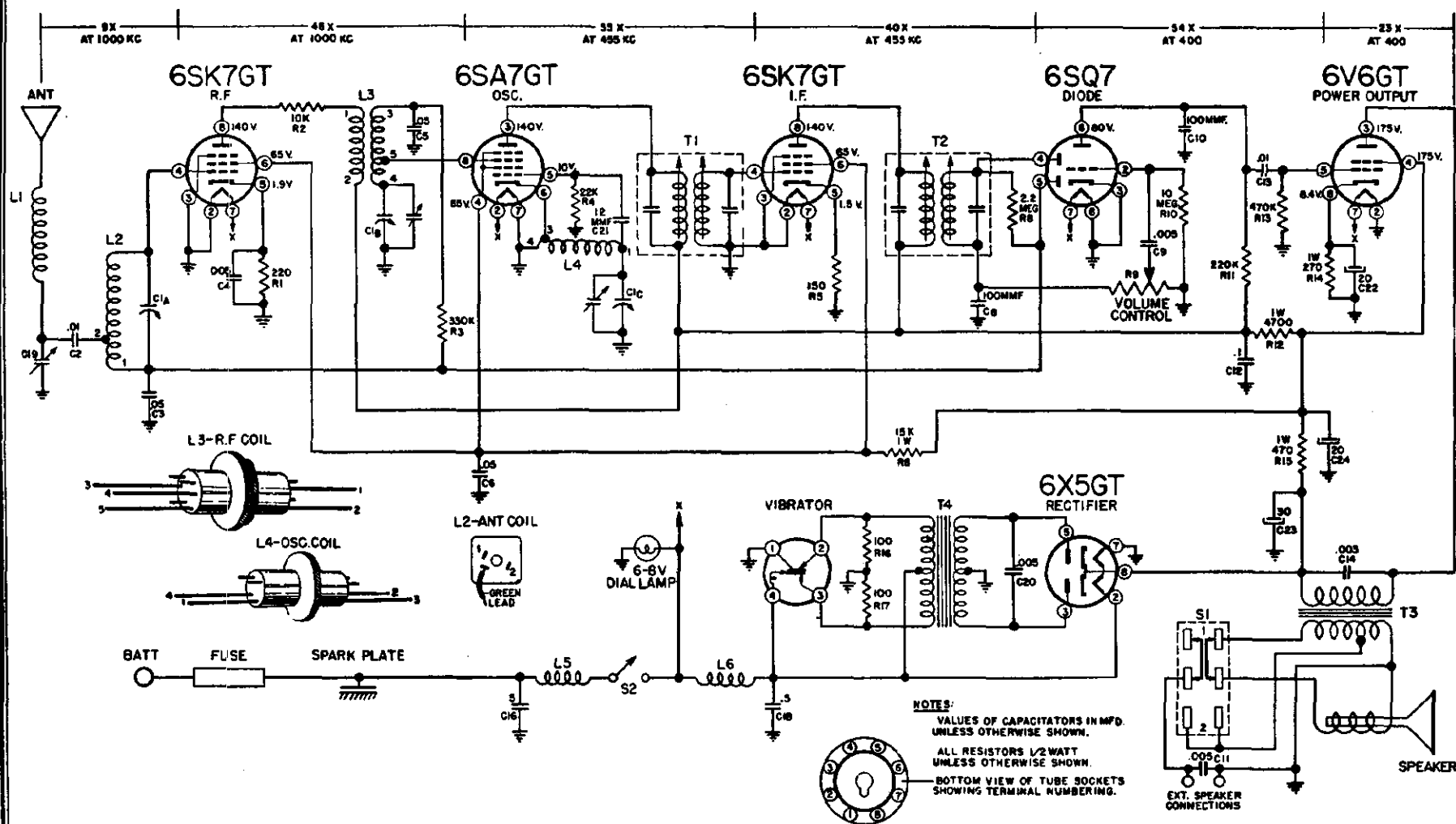


Fig. 7. Schematic Diagram

INSTRUCTIONS FOR INSTALLATION OF REAR SEAT SPEAKER

Your Silvertone Auto Radio, Chassis No. 528.6293-2 includes a special feature which makes it simple and easy to install an additional speaker in the rear of the car. A speaker with the proper voice coil impedance (3.2 ohms) for such an installation is available at the Sears store where you bought your Silvertone Auto Radio.

The terminal strip in the illustration below is accessible through an opening in the case. The two wire leads from

the rear seat speaker should be connected to these terminals. This completes the electrical installation of the speaker. The switch at the right is for operation of the rear seat speaker. In position 1, only the speaker in the case is connected; in position 2, both speakers are connected.

IMPORTANT: When there is no rear seat speaker installation, ALWAYS keep the switch in position 1.

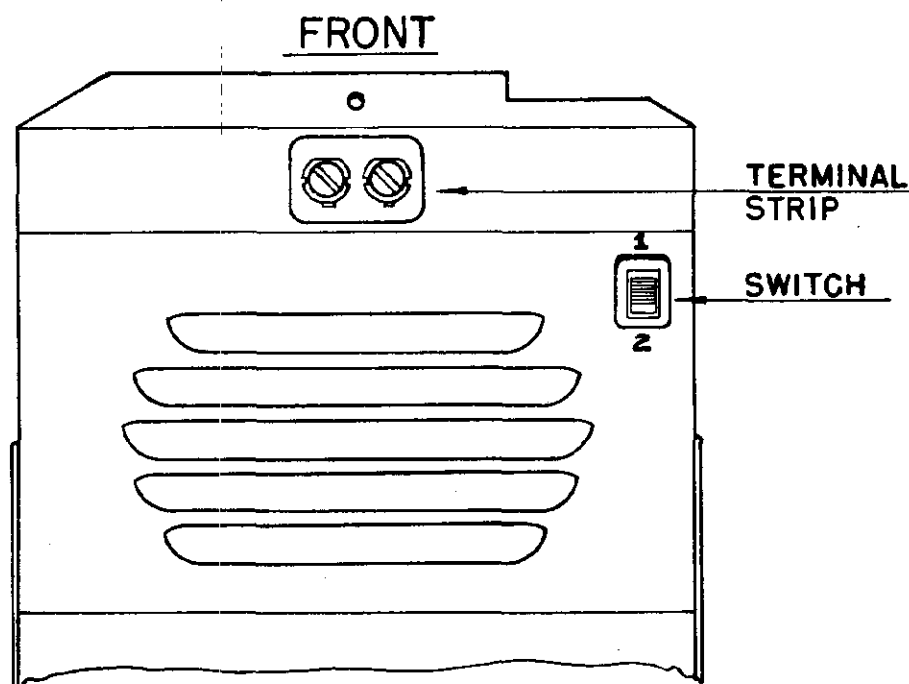


Fig. 8. Bottom View of Case

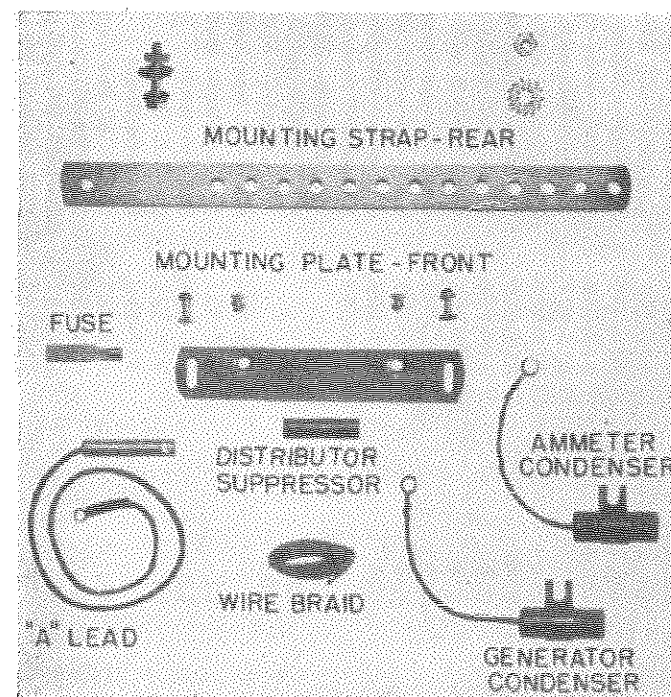


Fig. 9. Mounting Parts

MODEL 6293,
Ch. 528.6293-2

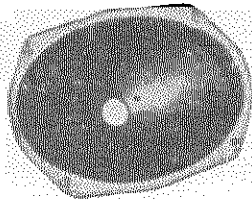
REPAIR PARTS LIST

Schematic Location	Part No.	Description
C1A, C1B, C1C	B19-205	Capacitor—variable—worm drive
C2, C13	A16-201	Capacitor—.01 mfd.—600 v.
C3, C5, C6	A16-189	Capacitor—.05 mfd.—400 v.
C4, C9	A16-190	Capacitor—.005mfd.—600 v.
C8, C10	A15-196	Capacitor—mica—100 mmfd.
C11	A16-177	Capacitor—ceramic—.005 mfd.
C12	A16-187	Capacitor—.1 mfd.—400 v.
C14	A16-200	Capacitor—.003 mfd.—600 v.
C16	A16-184	Capacitor—.5 mfd.—100 v.
C18	A16-202	Capacitor—.5 mfd.—100 v.
C19	A20-145	Capacitor—ceramic—antenna trimmer
C20	A16-185	Capacitor—.005 mfd.—1600 v.
C21	A15-205	Capacitor—ceramic—12 MMFD. (temp. comp.)
	A18-289	Capacitor—electrolytic
C22		20 mfd.—25 v.
C23		30 mfd.—350 v.
C24		20 mfd.—350 v.
	A83-421	Clip—I.F. transformer mounting
L1	A10-527	Coil—Antenna loading
L2	B10-525	Coil—Antenna
L3	B10-535	Coil—R. F.
L4	B10-536	Coil—Oscillator
L5	A33-229	Coil—"A" line choke
L6	A33-234	Coil—Vibrator hash choke
R9, S2	A24-182	Control—ON-OFF and VOLUME, 500,000 ohm
	A51-105	Cord—Pointer travel, 17"
	B67-541	Dial—Station
	A47-112	Grommet—Speaker and variable capacitor mounting
	A47-114	Grommet—Fibre—Flexible shaft bearing
	S84-233	Kit—"A" lead assembly
	S84-192	Kit—Mounting parts
	S84-193	Kit—Suppression, assembly
	A52-294	Knob—Volume and tuning
	A89-10	Lamp—Dial—G.E. No. 422
	A31-147	Plate—Mounting, front
	A58-76	Pointer—Dial
	A87-38	Receptacle—Antenna cable
R1	A60-753	Resistor—220 ohm—1/2 watt
R2	A60-760	Resistor—10,000 ohm—1/2 watt
R3	A60-661	Resistor—330,000 ohm—1/2 watt
R4	A60-744	Resistor—22,000 ohm—1/2 watt
R5	A60-767	Resistor—150 ohm—1/2 watt
R6	A60-716	Resistor—15,000 ohm—1 watt
R8	A60-726	Resistor—2.2 megohm—1/2 watt
R10	A60-728	Resistor—10 megohm—1/2 watt
R11	A60-667	Resistor—220,000 ohm—1/2 watt
R12	A60-765	Resistor—4700 ohm—1 watt
R13	A60-731	Resistor—470,000 ohm—1/2 watt
R14	A60-754	Resistor—270 ohm—1 watt
R15	A60-694	Resistor—470 ohm—1 watt
R16, R17	A60-752	Resistor—100 ohm—1/2 watt
	A75-74	Shaft—Pointer
	B75-73	Shaft—Tuning drive—flexible
	B79-373	Speaker—4" P.M.
	B31-134	Strap—Mounting, rear
S1	A69-185	Switch—Rear seat speaker
T1	A10-521	Transformer—I.F. No. 1
T2	A10-529	Transformer—I.F. No. 2
T3	B80-249	Transformer—Output (part of speaker)
T4	B80-243	Transformer—Power
	A34-105	Vibrator—Mallory No. 659

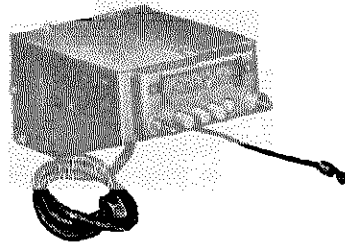
IMPORTANT: All tubular condensers must be high temperature (85°C.) wax type.

MODEL 6295,
Ch. 528.6295

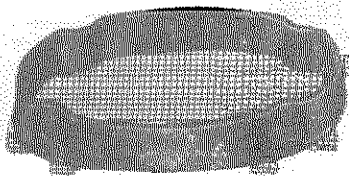
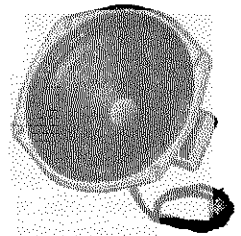
6"X9" OVAL SPEAKER



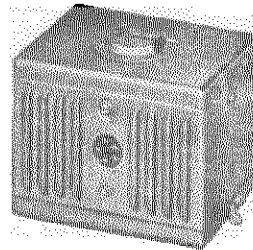
CONTROL UNIT



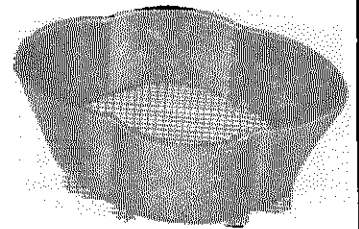
7" ROUND SPEAKER



6" X 9" RUBBER BAFFLE & SCREEN



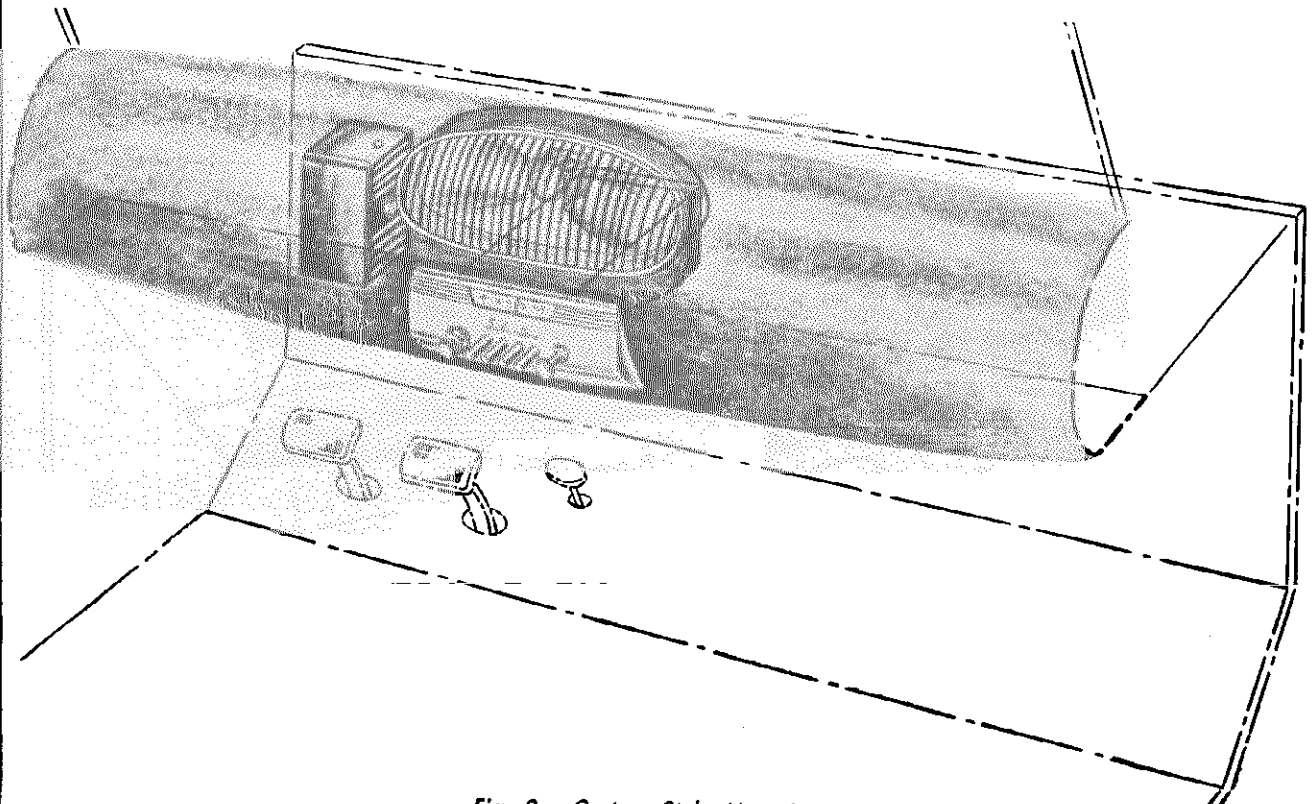
POWER UNIT



7" RUBBER BAFFLE & SCREEN

Fig. 1. Parts in Master Package

Only one of the speakers illustrated is supplied with each radio; the type of speaker you receive will be determined by the make of car for which the radio is ordered.

*Fig. 2. Custom Style Mounting*

MODEL 6295,
Ch. 528.6295

DESCRIPTION

Your SILVERTONE radio is a newly designed DE LUXE PUSHBUTTON TUNING AUTOMOBILE RECEIVER of advance superheterodyne circuit design, for operation on the six volt storage battery in your car. It covers the frequency range from 540 KC to 1600 KC. In addition to PUSHBUTTON TUNING it features BASS-COMPENSATED VOLUME CONTROL supplemented by a MANUAL TONE CONTROL. It consists of three principal parts—the Control Unit, the Power Unit and the Speaker (See Fig. 1)—and is supplied with mounting parts to accommodate either custom installation in the instrument panel or underdash mounting. (See Figs. 2 and 3.)

Special care has been taken in the design of this receiver to insure the finest in sensitivity and selectivity, thereby insuring good reception of even distant or very weak stations. It is simple to install. The antenna input circuit is adjustable to permit the use of any two, three or four section telescopic, whip or "fishpole" type antenna.

Each complete radio, with accessories, is made up in two separate packages, one carton containing the Escutcheon Kit and speaker mounting hardware, the other carton containing the Control Unit, the Power Unit and either a 7" round speaker or a 6"x9" oval speaker, depending on the make and model of the car for which the radio was ordered. This second carton will be stamped with the letter "A" to indicate that it contains a 7" round speaker, or the letter "B" to indicate the 6"x9" oval speaker.

Control Unit Escutcheon Kits (instrument panel matching or universal) are supplied as a separate item, thus permitting you to transfer the radio from one car to another with only the small expense of replacing the Escutcheon Kit and speaker if you desire to match the instrument panel of your new or different car. Instrument panel matching Escutcheon Kits for most popular late model cars are available at your nearest Sears retail store or Mail Order House. If your Silvertone radio is equipped with a universal underdash tuning panel it may be transferred as is to a different car without changing the Escutcheon Kit. However, if you wish to change from an underdash mounting to a custom style instrument panel mounting, this can be accomplished by discarding the universal Escutcheon Kit and replacing it with an instrument panel matching Escutcheon Kit and 6"x9" oval speaker, if necessary), as outlined above.

INSTALLATION

THE SPEAKER

The speakers (7" round or 6"x9" oval) are supplied with sponge rubber baffles for mounting on flat or curved instrument panels. The rubber baffle for the 7" round speaker has flared sides so that it will cover an oval opening in the car's speaker grill as well as a round opening.

Speaker mounting hardware is supplied with each Escutcheon Kit for mounting the speaker in your car. This includes a "U-shaped" bracket for mounting the round speaker in cars on which it is not possible to mount the speaker on existing bolts.

SPECIFIC INSTRUCTIONS PERTAINING TO THE MOUNTING OF THE SPEAKER AND CONTROL UNIT IN THE CAR FOR WHICH YOU ORDERED YOUR RADIO ARE CONTAINED IN THE LEAFLET PACKED IN THE ESCUTCHEON KIT.

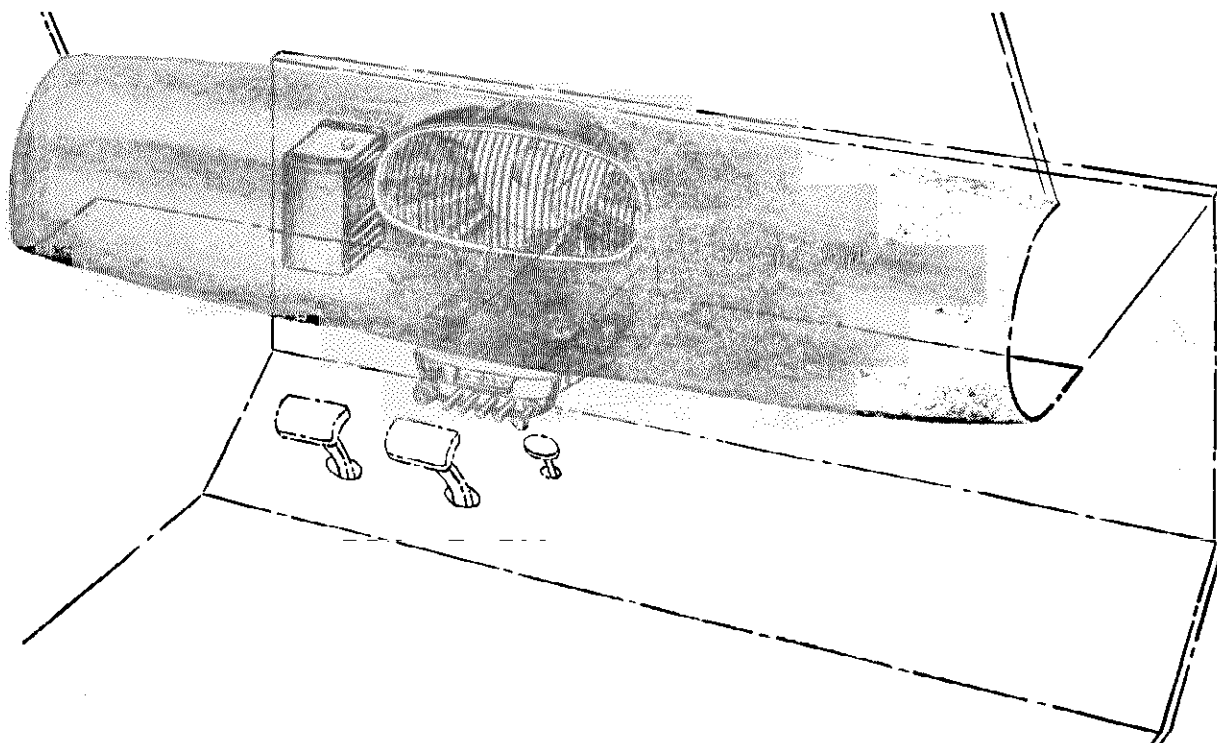


Fig. 3. Underdash Mounting

MOUNTING THE POWER UNIT

The power unit mounts on the firewall (see Fig. 3). Determine a suitable position for mounting it by holding the case in your hands against the firewall. When a suitable position has been determined, then check the underhood side of the wall, to make sure there is no obstruction to prevent drilling a hole and inserting the mounting bolt. Having located a suitable position that will permit drilling, mark and drill a 5/16" hole. Insert the 1/4 inch diameter by 3 inch long, carriage type mounting bolt into the hole from the underdash side and attach the lockwasher and nut on the underhood side, but do not tighten. Now holding the case in a vertical position (with wingnut on the bottom), bring the case up to the bolt and slide the channel in the mounting plate down over the head of the bolt. The lockwasher and nut on the underhood side should then be tightened down securely.

If, because of limited space, you find it necessary to mount the power unit in a horizontal or angle position, this type of mounting is entirely satisfactory and has no ill effect on the operation of the radio.

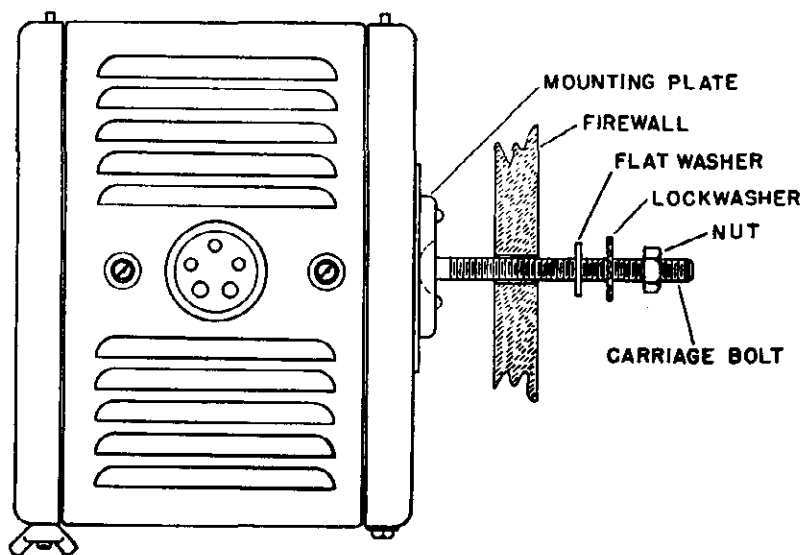


Fig. 3. Power Unit Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the plug into the antenna receptacle on the side of the control unit (see Fig. 4). Plug the speaker and power cables into the sockets provided on the sides of the Power Unit. Connect the "A" lead to the battery side of the ammeter behind the instrument panel. The fuse should then be inserted into the holder in the "A" lead. These connections are illustrated in Fig. 4.

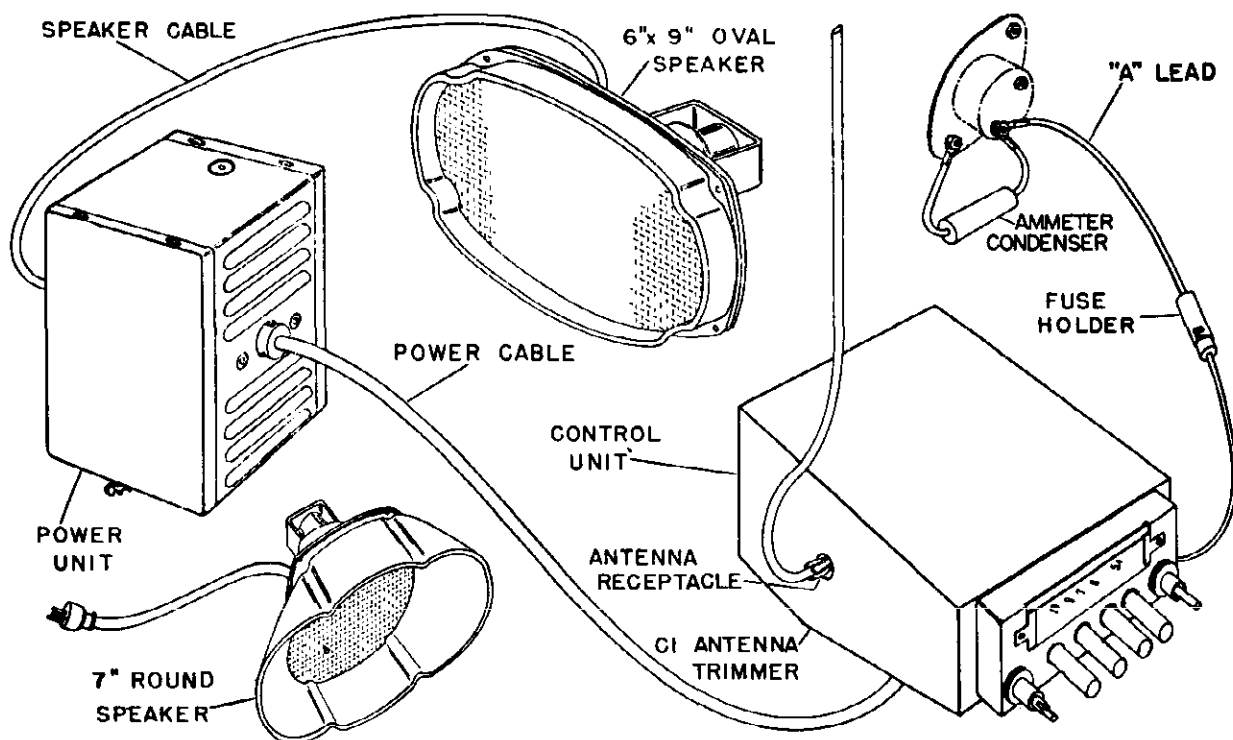


Fig. 4. Connecting the Radio

MODEL 6295,
Ch. 528.6295

CONTROLS

There are six operating controls on the front of the Control Unit, (see Fig. 5). The two outside knobs are dual purpose controls, the other four are PUSHBUTTON STATION SELECTORS. The left-hand control consists of two knobs mounted on concentric shafts; the front knob (round) is the ON-OFF-SWITCH and VOLUME CONTROL; the rear knob (with four points) is the MANUAL TONE CONTROL. The knob on the right is the MANUAL TUNING CONTROL and it also serves as a fifth PUSHBUTTON STATION SELECTOR. The use of these controls is explained below.

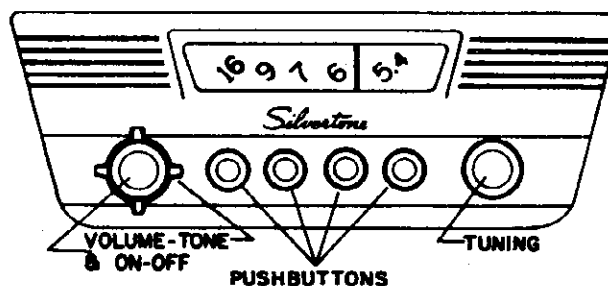


Fig. 5. Control Unit Panel

THE ON-OFF-SWITCH AND VOLUME CONTROL

When the outer left knob is turned all the way to the left the receiver is switched off and there is no drain from the car's battery. Rotating the knob part of a turn toward the right switches the receiver on and illuminates the dial. Further rotation of the knob increases the volume. After a station has been tuned in properly the volume control knob should be adjusted to give the desired volume.

MANUAL TUNING

Use the right-hand knob to tune in stations manually. To select a station, push in the knob and tune the radio by turning the knob until the desired station is heard. The dial pointer will indicate the frequency to which you are tuned.

The dial is marked in Kilocycles minus the final two zeroes. Always tune carefully for the clearest sound and minimum background noise.

PUSHBUTTON TUNING

Adjusting the pushbutton station selectors is simple and quick. No tools are required and a button may be set up for a new station in a few seconds. Each button can be tuned to any station in the broadcast band; thus you can arrange the tuning in any order to suit your convenience.

Before making the following adjustments, turn the radio on and let it warm up for 15 minutes.

Choose the PUSHBUTTON STATION SELECTOR you wish to adjust, and push the button all the way in; it will lock in this position. Now tune in the station to which you wish to pre-tune by turning the button to right or left until the desired station is heard. The dial pointer will indicate the frequency to which you are tuned, but to insure the accuracy of the setting, keep the volume control turned low and adjust the button for sharpest tuning. This will be indicated when the sound is clearest and noise at a minimum. The button is now properly adjusted and should not be turned again until it is desired to set it for a different station.

Follow the above procedure to adjust the remaining PUSHBUTTON STATION SELECTORS.

As was mentioned under the heading **CONTROLS**, the MANUAL TUNING CONTROL has been designed to serve as a fifth PUSHBUTTON STATION SELECTOR. If you wish to use this control as a PUSHBUTTON STATION SELEC-

S84-382 SUPPRESSION KIT AND MISCELLANEOUS PARTS

- | | |
|--------------------------------|---|
| 1 S84-233—"A" lead assembly | 20" wire braid |
| 1 A43-10—Fuse | 1 bolt— $\frac{1}{4}$ " diameter by 3" long |
| 1 A81-13—Sleeve (for fuse) | 1 lockwasher |
| 2 A16-183—.5 MFD condensers | 1 flat washer |
| 1 A96-4—Distributor Suppressor | 1 nut |

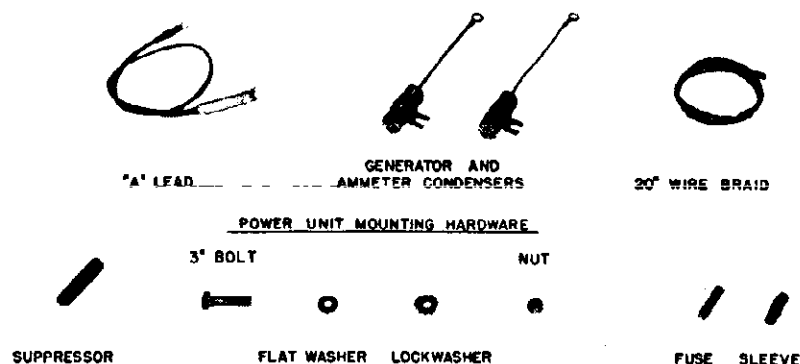


Fig. 6. Suppression Kit and Miscellaneous Parts

TOR, simply follow the procedure given above for adjusting the other PUSHBUTTON STATION SELECTORS. However, remember that if you use this control for MANUAL TUNING at any time, it will have to be re-set to the desired station if you wish to use it again as a PUSHBUTTON STATION SELECTOR.

THE TONE CONTROL

The inner left knob (with four points) is the TONE CONTROL, which permits you to select the most pleasing tonal range. When it is turned all the way to the right (clockwise) the tone is treble or brilliant. This position is best for the most distinct reproduction, especially of speech. Turning the knob to the left (counterclockwise) makes the tone more mellow. This is often desirable for certain types of music and is also useful to lessen the effects of static and electrical noise. Turn the knob to the position that gives the tone most pleasing to you.

MATCHING THE ANTENNA

An adjusting screw for matching the receiver to the particular antenna used is accessible through a hole in the bottom side of the Control Unit. (See Fig. 4.) Set the dial pointer between 1400 KC and 1500 KC, where no station is heard with the volume control fully on. Then use a small screw driver to turn the adjusting screw to the point giving the most hiss or noise. The set is now ready for operation.

ELIMINATING MOTOR NOISE

Every precaution was taken in the design of this radio to eliminate motor noise interference. However, in the remote instance that it may be found desirable to take further steps, the following notes are added for your guidance.

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all mounting points. A good electrical contact at these points will aid materially in eliminating motor noise.

GENERATOR CONDENSER

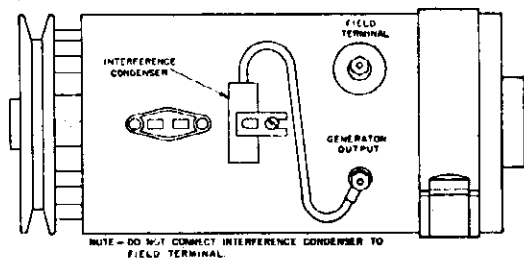


Fig. 7

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Remove from distributor cap the high tension lead from coil to distributor. Cut the lead two inches from the end, and screw the distributor resistor on to the coil lead, then screw the short length into the resistor and plug the cable into the distributor cap.

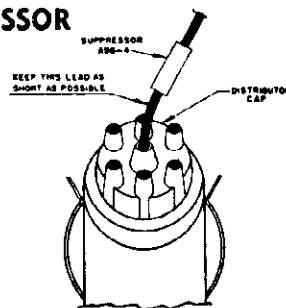


Fig. 8

AMMETER CONDENSER

A .5 MFD bypass condenser is furnished for attaching to the ammeter. This should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby. In most cases the use of this condenser, the distributor suppressor, and the generator condenser, will eliminate all objectionable ignition interference.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to try another by-pass condenser from ground to the suspected accessory until the source of

the interference is found. The condenser then should be permanently mounted in this location.

HIGH AND LOW TENSION LEADS

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These leads will very often pick up motor noise and feed it into the receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension leads. Shield and ground these leads.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead from the coil to the distributor.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

BONDING OF STEERING COLUMN TO BODY

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

MODEL 6295,
Ch. 528.6295

ELECTRICAL SPECIFICATIONS

Power Supply.....6.3 volts DC
Current.....6.5 amp. average
Frequency Range.....540 to 1600 KC
I. F. Frequency.....262 KC
Speaker.....7" round or 6"x9" oval
Power Output.....3 watts, undistorted
5.5 watts, maximum
Sensitivity.....3 microvolt average for 1 watt output
Selectivity...40 KC broad at 1000 times signal, at 1000 KC

The set contains the following:

1—6BA6—R. F. Amplifier.
1—6BE6—Converter.
1—6BA6—I. F. Amplifier.
1—6AT6—Detector—AVC—1st audio.
1—6V6GT—Power output.
1—6X5GT—Rectifier.

SERVICE NOTES

Voltages taken from the different points of the circuit to chassis are measured with the volume and tone controls in maximum position, all tubes and the rectifier in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 ohm per volt. These voltages are clearly shown on the schematic diagram (Figs. 11 and 12). All voltages should be measured with an input voltage of 6.3 volts DC.

The tubes and rectifier are accessible for servicing without removing the chassis. Loosen the wing-nut on the cover of the power supply case and lift off the cover. On the RF Tuning Unit, loosen the wing nuts on the two stud bolts protruding from the side of the case at the top, rear, and remove the plate over the tubes. CAUTION: Be sure to replace the tubes and the rectifier in the proper sockets. Refer to Tube and Rectifier Location Pictorials, Fig. 10 and 14.

WARNING: The dash pot (brass cylinder on the mechanical tuner) should never be oiled. If it is ever necessary to make adjustments on the mechanical tuner, the dash pot may be cleaned with ordinary cleaning solvents.

ALIGNING INSTRUCTIONS

Never attempt any adjustments on this receiver unless it becomes necessary to replace the coils or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, the rectifier, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "ALIGNMENT PROCEDURE." After realignment has been completed repeat the procedure as a final check.

INSTRUCTIONS FOR REMOVING THE CHASSIS FROM THE CASE

RF TUNING UNIT: Remove the knobs and nuts from the two control shafts. Take out the six self-tapping screws around the back edge of the case and remove the back cover. Remove the plate over the tubes (see service notes). Loosen the screw securing the cable clamp, slip the cable out from under the clamp and out of the notch. Remove the lead from the plug-in terminal on the spark plate attached to the inside top of case. Slide the "A" lead out of the notch. Now tilt the front of the case up so that the chassis can slide out. Grasp the chassis at the rear with the fingers against the chassis plate and with the thumb hooked over the IF transformer. Pull the chassis straight back, being careful that the pointer bracket does not get caught against the spark plate components. Handle the chassis carefully and set down gently so that the mechanical tuning parts may not be damaged or the settings of the coil cores upset by jarring.

POWER SUPPLY: Loosen the wing-nut and lift the top cover off. Remove the 6-32x1/2 screw securing the high voltage cable socket to the case. Remove the four screws (one on each side) near the bottom outside of the case. Now take the case in one hand and grasp the output transformer with the other hand and lift the chassis straight up.

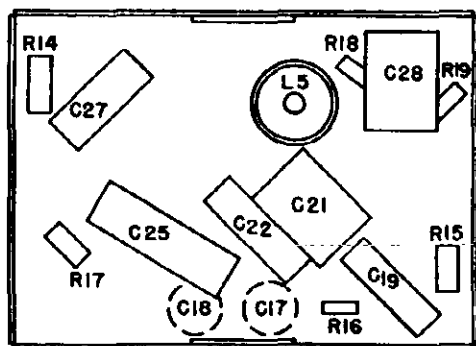


Fig. 9. Power Unit—Bottom View

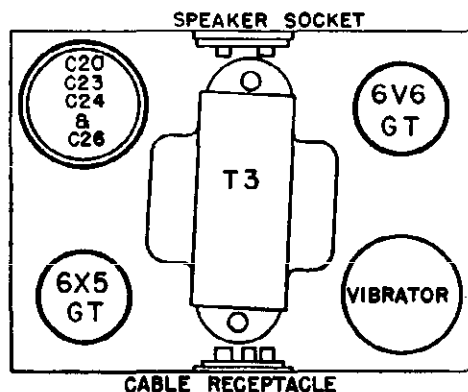


Fig. 10. Power Unit—Top View

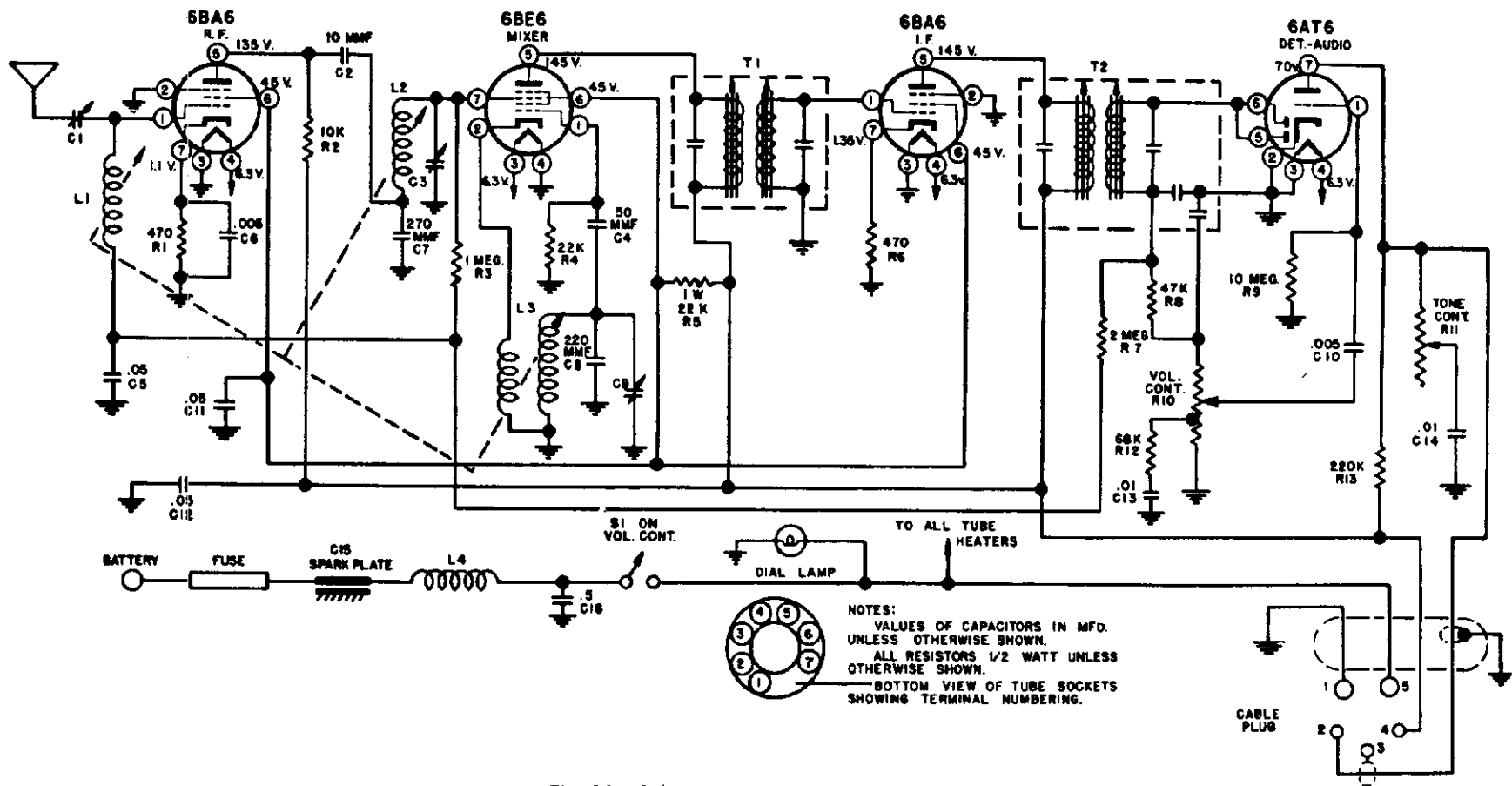


Fig. 11. Schematic Diagram—Control Unit

MODEL 6295,
Ch. 528.6295

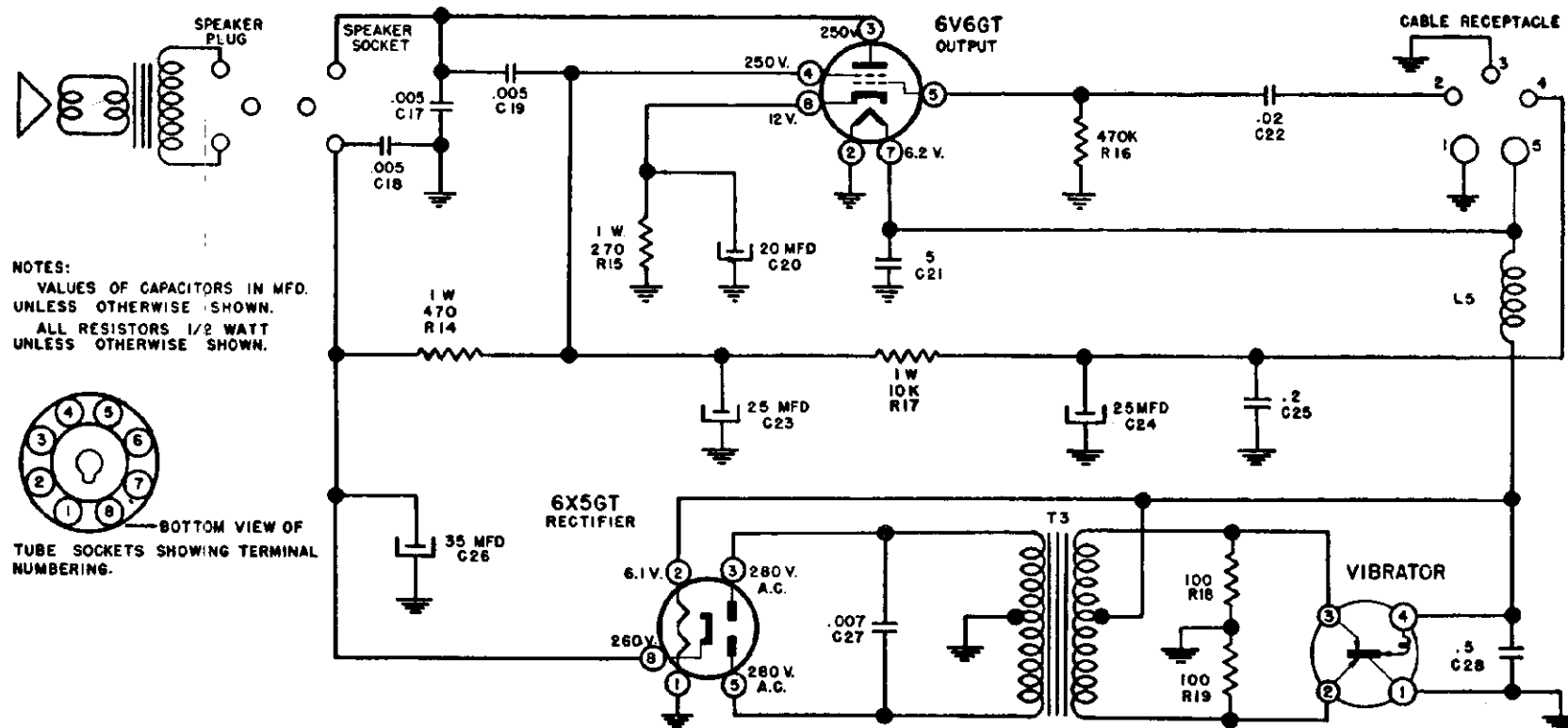


Fig. 12. Schematic Diagram—Power Unit

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 75 MMFD., 30 MMFD.

For alignment points refer to Figures 13 and 14.

Slug Position	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Out	262 KC	.1 MFD.	6BE6 Grid	T2	Maximum	Output I.F.
Fully Out	262 KC	.1 MFD.	6BE6 Grid	T1	Maximum	Input I.F.
Fully Out	1610 KC	*	Ant. lead	C9	Maximum	Oscillator
Tune in signal from generator	1400 KC	*	Ant. lead	C3	Maximum	R.F.
Tune in signal from generator	1400 KC	*	Ant. lead	C1	Maximum	Antenna

*30 MMFD across input terminals and 75 MMFD in series with "hot" side of signal generator leads.

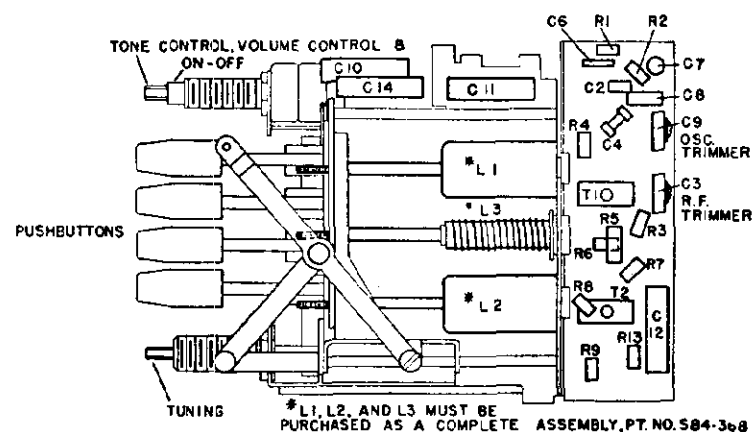


Fig. 13. Control Unit—Bottom View

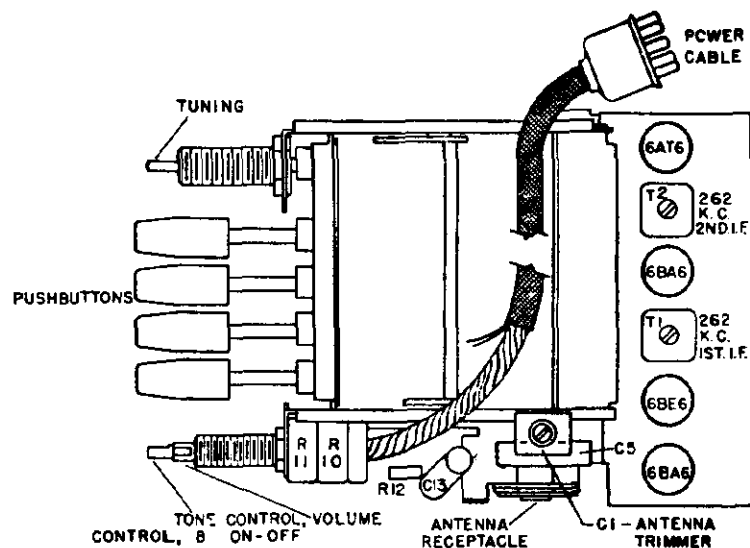


Fig. 14. Control Unit—Top View

MODEL 6295, Ch. 528.6295

Schematic Location	Part No.	Description
C1	A20-148	Capacitor—antenna trimmer
C2	A15-197	Capacitor—ceramic—10 mmfd.
C3, C9	A20-147	Capacitor—dual trimmer—R.F. and Oscillator
C4	A15-194	Capacitor—ceramic—50 mmfd.
C5	A16-197	Capacitor—.05 mfd.—200 v.
C6, C17, C18	A16-177	Capacitor—ceramic—.005 mfd.
C7	A15-215	Capacitor—ceramic—270 mmfd.
C8	A15-218	Capacitor—silver mica—220 mmfd.
C10, C19	A16-190	Capacitor—.005 mfd.—600 v.
C11, C12	A16-189	Capacitor—.05 mfd.—400 v.
C13, C14	A16-192	Capacitor—.01 mfd.—400 v.
C15		Capacitor—spark plate
C16, C21, C28	A16-184	Capacitor—.5 mfd.—100 v.
	A18-294	Capacitor—electrolytic
C20		20 mfd.—25 v.
C23, C24		25 mfd.—350 v.
C26		35 mfd.—400 v.
C22	A16-206	Capacitor—.02 mfd.—600 v.
C25	A16-188	Capacitor—.2 mfd.—400 v.
C27	A16-207	Capacitor—.007 mfd.—1600 v.—oil filled
	B23-157	Cable—power
L1, L2, L3	S84-368	Coil—assembly—including carriage and slugs, etc.
L4	A33-229	Coil—"A" line choke
L5	A33-228	Coil—vibrator hash choke
	A83-421	Clip—I.F. transformer mounting
R10, R11, S1	A24-183	Control—dual—ON-OFF-VOLUME and TONE
	B67-547	Dial scale
	A43-10	Fuse—15 amp.—3AG
	A47-115	Grommet—rubber—power cable
	S84-233	Kit—"A" lead assembly
	B52-296	Knob—Tuning
	B52-297	Knob—Volume
	B52-298	Knob—Tone
	A89-7	Lamp—pilot—No. 47 Bayonet
R1, R6	A60-770	Resistor—470 ohm— $\frac{1}{2}$ watt
R2	A60-760	Resistor—10K ohm— $\frac{1}{2}$ watt
R3	A60-668	Resistor—1 megohm— $\frac{1}{2}$ watt
R4	A60-744	Resistor—22K ohm— $\frac{1}{2}$ watt
R5	A60-773	Resistor—22K ohm—1 watt
R7	A60-726	Resistor—2.2 megohm— $\frac{1}{2}$ watt
R8	A60-730	Resistor—47K ohm— $\frac{1}{2}$ watt
R9	A60-728	Resistor—10 megohm— $\frac{1}{2}$ watt
R12	A60-775	Resistor—68K ohm— $\frac{1}{2}$ watt
R13	A60-672	Resistor—220K ohm— $\frac{1}{2}$ watt
R14	A60-694	Resistor—470 ohm—1 watt
R15	A60-754	Resistor—270 ohm—1 watt
R16	A60-731	Resistor—470K ohm— $\frac{1}{2}$ watt
R17	A60-698	Resistor—10K ohm—1 watt
R18, R19	A60-752	Resistor—100 ohm— $\frac{1}{2}$ watt
	A83-646	Retainer—dial scale—left
	A83-647	Retainer—dial scale—right
	C79-375	*Speaker—7" round
	C79-376	*Speaker—6"x9" oval
	S84-383	Transformer—output—with cable and plug
T1	A10-537	Transformer—I.F. No. 1
T2	A10-540	Transformer—I.F. No. 2
T3	C80-250	Transformer—power
	A34-105	Vibrator—Mallory No. 659

*When ordering a replacement speaker, order the same type, 7" round or 6"x9" oval, as the old one that was installed in your car.

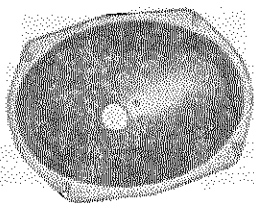
Mechanical Tuner Parts

A56-141	Pusher nut—manual tuning
A56-142	Pusher nut—pushbutton tuning
A75-75	Pusher rod—manual tuning
S84-355	Pushbutton and rod assembly

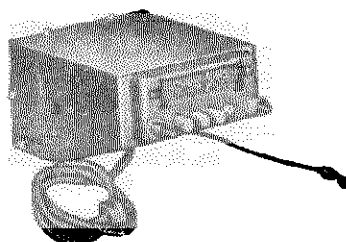
IMPORTANT: All tubular condensers must be high temperature (85°C.) wax type.

MODEL 6295-1,
Ch. 528.6295-1

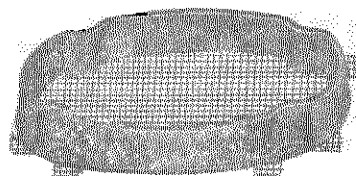
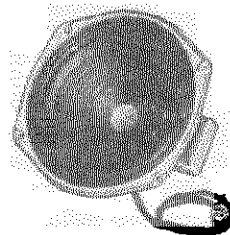
6"X9" OVAL SPEAKER



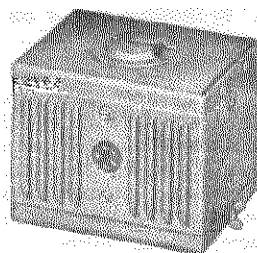
CONTROL UNIT



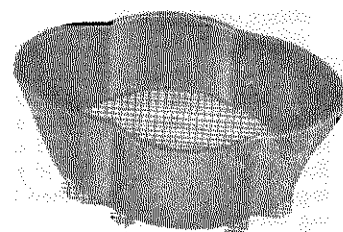
7" ROUND SPEAKER



6" X 9" RUBBER BAFFLE & SCREEN



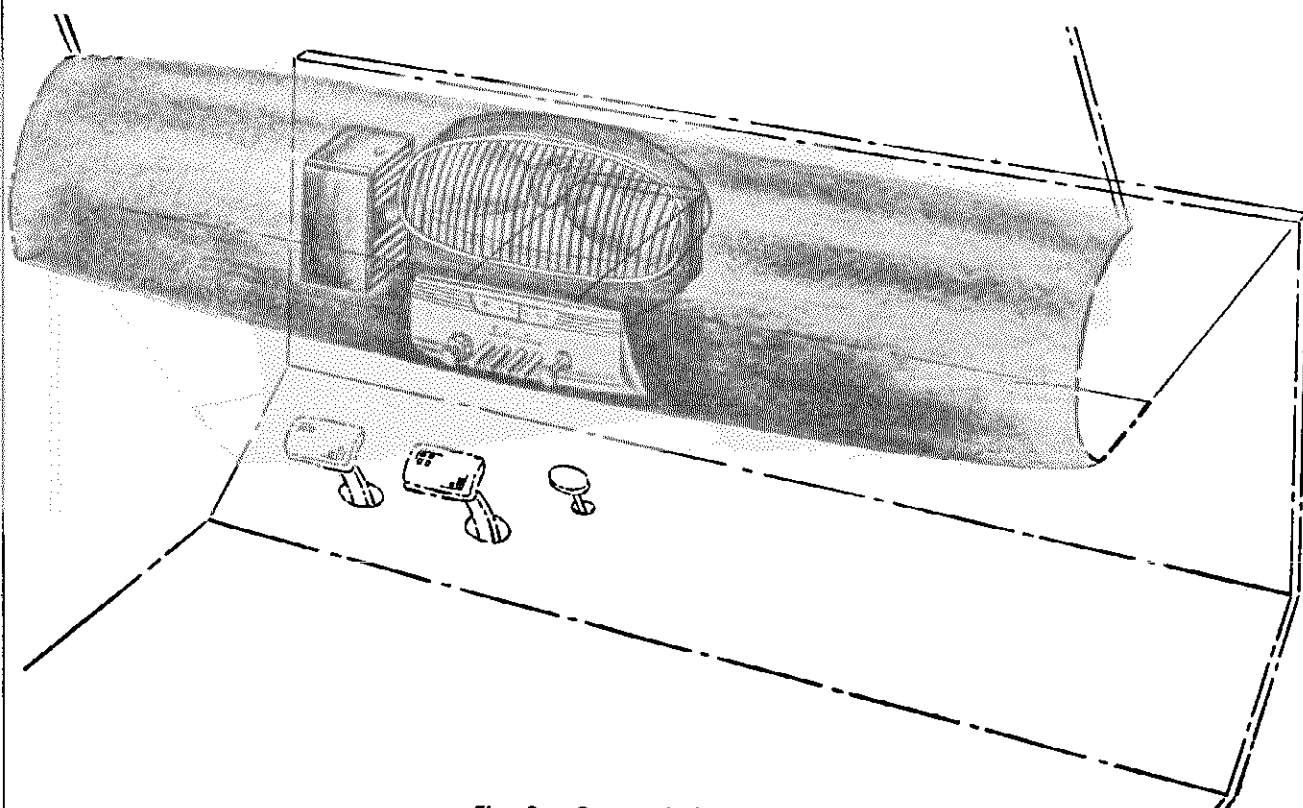
POWER UNIT



7" RUBBER BAFFLE & SCREEN

Fig. 1. Parts in Master Package

Only one of the speakers illustrated is supplied with each radio; the type of speaker you receive will be determined by the make of car for which the radio is ordered.

*Fig. 2. Custom Style Mounting*

MODEL 6295-1,
Ch. 528.6295-1

DESCRIPTION

Your SILVERTONE radio is a newly designed DE LUXE PUSHBUTTON TUNING AUTOMOBILE RECEIVER of advance superheterodyne circuit design, for operation on the six volt storage battery in your car. It covers the frequency range from 540 KC to 1600 KC. In addition to PUSHBUTTON TUNING it features BASS-COMPENSATED VOLUME CONTROL supplemented by a MANUAL TONE CONTROL. It consists of three principal parts—the Control Unit, the Power Unit and the Speaker (See Fig. 1)—and is supplied with mounting parts to accommodate either custom installation in the instrument panel or underdash mounting. (See Figs. 2 and 3.)

Special care has been taken in the design of this receiver to insure the finest in sensitivity and selectivity, thereby insuring good reception of even distant or very weak stations. It is simple to install. The antenna input circuit is adjustable to permit the use of any two, three or four section telescopic, whip or "fishpole" type antenna.

Each complete radio, with accessories, is made up in two separate packages, one carton containing the Escutcheon Kit and speaker mounting hardware, the other carton containing the Control Unit, the Power Unit and either a 7" round speaker or a 6"x9" oval speaker, depending on the make and model of the car for which the radio was ordered. This second carton will be stamped with the letter "A" to indicate that it contains a 7" round speaker, or the letter "B" to indicate the 6"x9" oval speaker.

Control Unit Escutcheon Kits (instrument panel matching or universal) are supplied as a separate item, thus permitting you to transfer the radio from one car to another with only the small expense of replacing the Escutcheon Kit and speaker if you desire to match the instrument panel of your new or different car. Instrument panel matching Escutcheon Kits for most popular late model cars are available at your nearest Sears retail store or Mail Order House. If your Silvertone radio is equipped with a universal underdash tuning panel it may be transferred as is to a different car without changing the Escutcheon Kit. However, if you wish to change from an underdash mounting to a custom style instrument panel mounting, this can be accomplished by discarding the universal Escutcheon Kit and replacing it with an instrument panel matching Escutcheon Kit (and 6"x9" oval speaker, if necessary), as outlined above.

INSTALLATION

THE SPEAKER

The speakers (7" round or 6"x9" oval) are supplied with sponge rubber baffles for mounting on flat or curved instrument panels. The rubber baffle for the 7" round speaker has flared sides so that it will cover an oval opening in the car's speaker grill as well as a round opening.

Speaker mounting hardware is supplied with each Escutcheon Kit for mounting the speaker in your car. This includes a "U-shaped" bracket for mounting the round speaker in cars on which it is not possible to mount the speaker on existing bolts.

SPECIFIC INSTRUCTIONS PERTAINING TO THE MOUNTING OF THE SPEAKER AND CONTROL UNIT IN THE CAR FOR WHICH YOU ORDERED YOUR RADIO ARE CONTAINED IN THE LEAFLET PACKED IN THE ESCUTCHEON KIT.

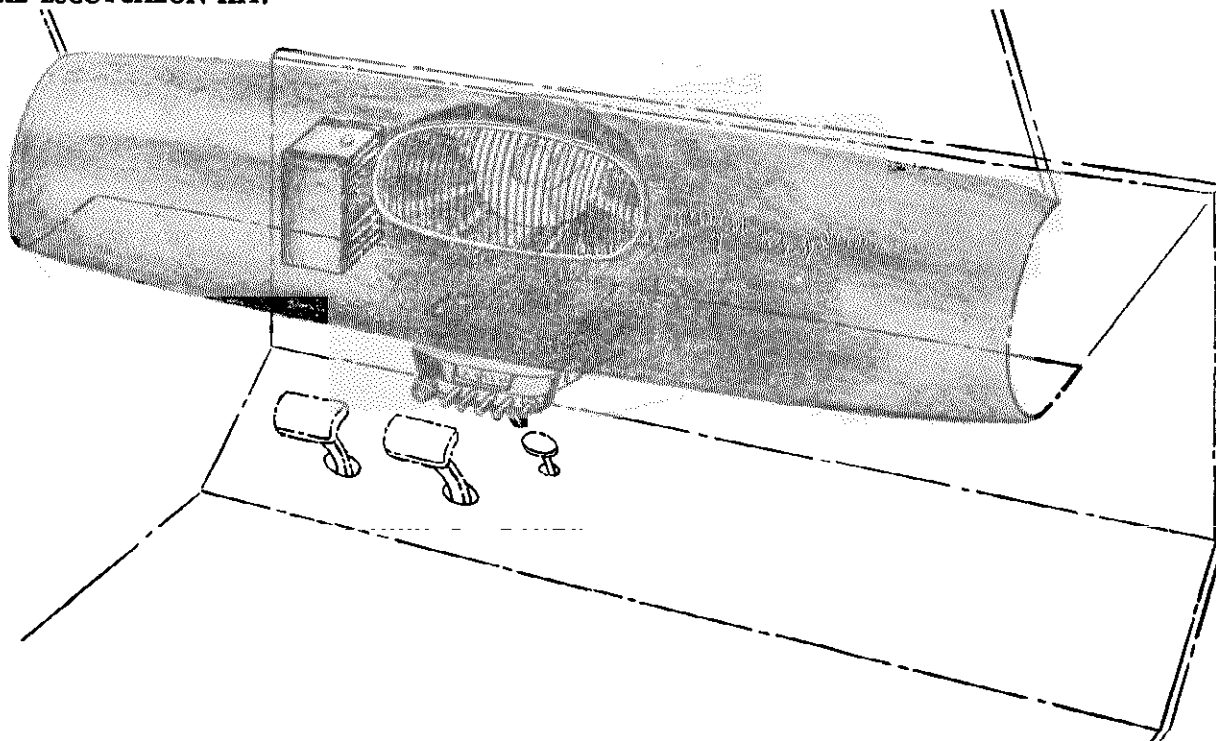


Fig. 3. Underdash Mounting

MOUNTING THE POWER UNIT

The power unit mounts on the firewall (see Fig. 3). Determine a suitable position for mounting it by holding the case in your hands against the firewall. When a suitable position has been determined, then check the underhood side of the wall, to make sure there is no obstruction to prevent drilling a hole and inserting the mounting bolt. Having located a suitable position that will permit drilling, mark and drill a $\frac{5}{16}$ " hole. Insert the $\frac{1}{4}$ inch diameter by 3 inch long, carriage type mounting bolt into the hole from the underdash side and attach the lockwasher and nut on the underhood side, but do not tighten. Now holding the case in a vertical position (with wingnut on the bottom), bring the case up to the bolt and slide the channel in the mounting plate down over the head of the bolt. The lockwasher and nut on the underhood side should then be tightened down securely.

If, because of limited space, you find it necessary to mount the power unit in a horizontal or angle position, this type of mounting is entirely satisfactory and has no ill effect on the operation of the radio.

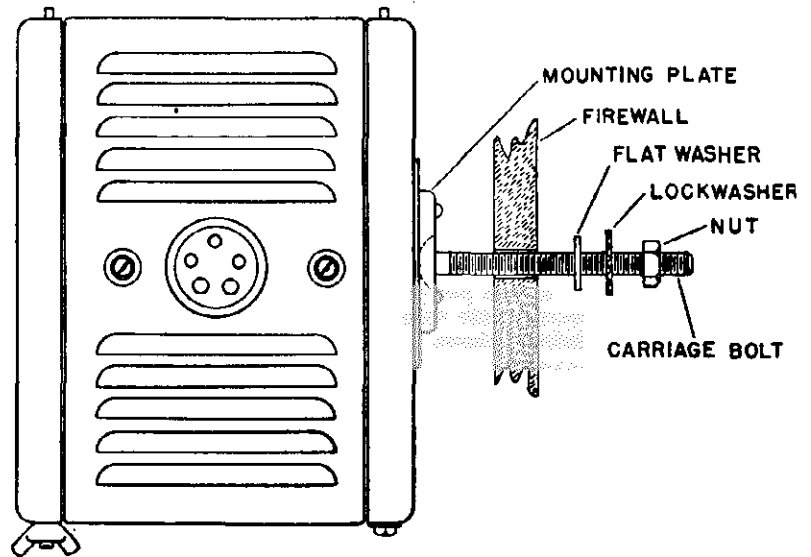


Fig. 3. Power Unit Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the plug into the antenna receptacle on the side of the control unit (see Fig. 4). Plug the speaker and power cables into the sockets provided on the sides of the Power Unit. Connect the "A" lead to the battery side of the ammeter behind the instrument panel. The fuse should then be inserted into the holder in the "A" lead. These connections are illustrated in Fig. 4.

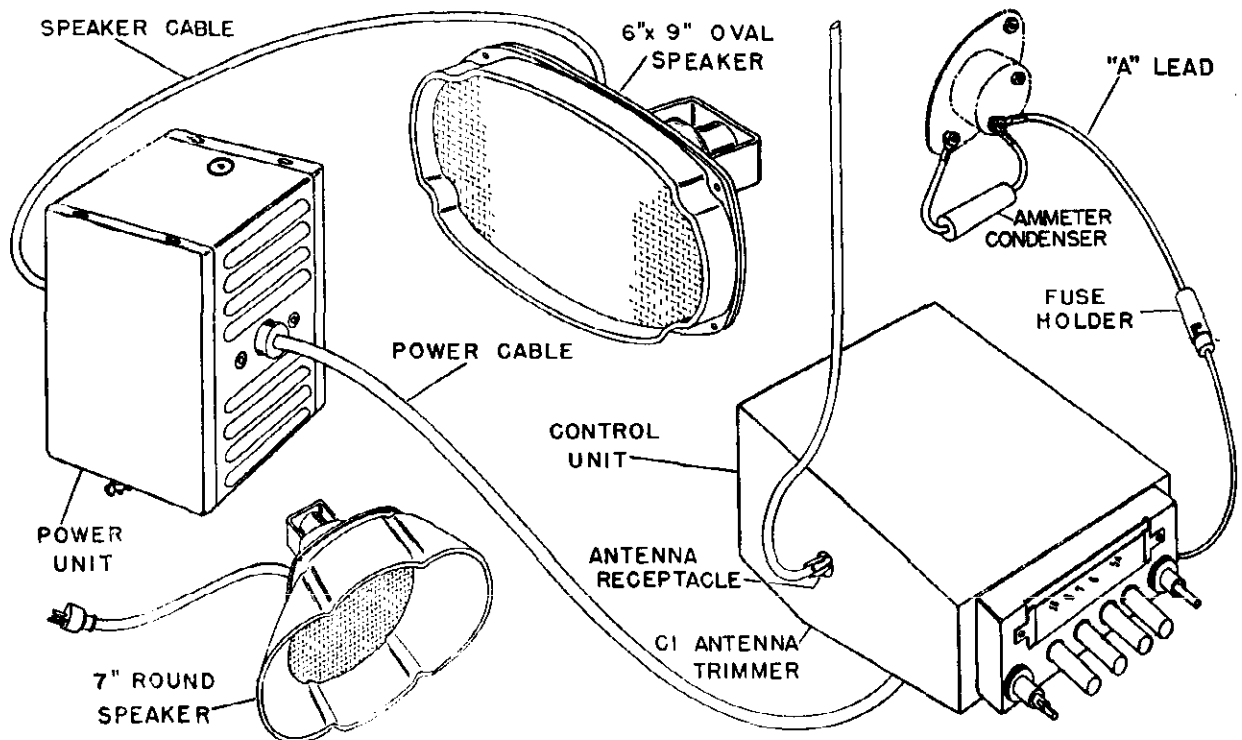


Fig. 4. Connecting the Radio

MODEL 6295-1,
Ch. 528.6295-1

CONTROLS

There are six operating controls on the front of the Control Unit, (see Fig. 5). The two outside knobs are dual purpose controls, the other four are PUSHBUTTON STATION SELECTORS. The left-hand control consists of two knobs mounted on concentric shafts; the front knob (round) is the ON-OFF-SWITCH and VOLUME CONTROL; the rear knob (with four points) is the MANUAL TONE CONTROL. The knob on the right is the MANUAL TUNING CONTROL and it also serves as a fifth PUSHBUTTON STATION SELECTOR. The use of these controls is explained below.

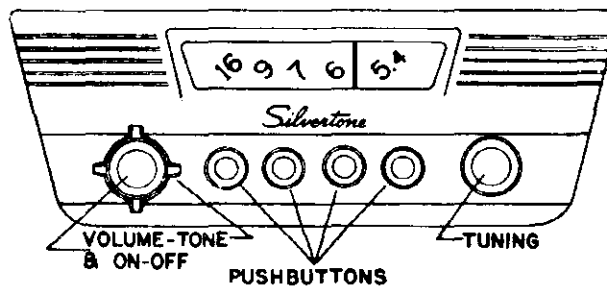


Fig. 5. Control Unit Panel

THE ON-OFF-SWITCH AND VOLUME CONTROL

When the outer left knob is turned all the way to the left the receiver is switched off and there is no drain from the car's battery. Rotating the knob part of a turn toward the right switches the receiver on and illuminates the dial. Further rotation of the knob increases the volume. After a station has been tuned in properly the volume control knob should be adjusted to give the desired volume.

MANUAL TUNING

Use the right-hand knob to tune in stations manually. To select a station, push in the knob and tune the radio by turning the knob until the desired station is heard. The dial pointer will indicate the frequency to which you are tuned.

The dial is marked in Kilocycles minus the final two zeroes. Always tune carefully for the clearest sound and minimum background noise.

PUSHBUTTON TUNING

Adjusting the pushbutton station selectors is simple and quick. No tools are required and a button may be set up for a new station in a few seconds. Each button can be tuned to any station in the broadcast band; thus you can arrange the tuning in any order to suit your convenience.

Before making the following adjustments, turn the radio on and let it warm up for 15 minutes.

Choose the PUSHBUTTON STATION SELECTOR you wish to adjust, and push the button all the way in; it will lock in this position. Now tune in the station to which you wish to pre-tune by turning the button to right or left until the desired station is heard. The dial pointer will indicate the frequency to which you are tuned, but to insure the accuracy of the setting, keep the volume control turned low and adjust the button for sharpest tuning. This will be indicated when the sound is clearest and noise at a minimum. The button is now properly adjusted and should not be turned again until it is desired to set it for a different station.

Follow the above procedure to adjust the remaining PUSHBUTTON STATION SELECTORS.

As was mentioned under the heading **CONTROLS**, the MANUAL TUNING CONTROL has been designed to serve as a fifth PUSHBUTTON STATION SELECTOR. If you wish to use this control as a PUSHBUTTON STATION SELECTOR, simply follow the procedure given above for adjusting the other PUSHBUTTON STATION SELECTORS. However, remember that if you use this control for MANUAL TUNING at any time, it will have to be re-set to the desired station if you wish to use it again as a PUSHBUTTON STATION SELECTOR.

584--382 SUPPRESSION KIT AND MISCELLANEOUS PARTS

- | | |
|--------------------------------|---|
| 1 S84-233—"A" lead assembly | 20" wire braid |
| 1 A43-10—Fuse | 1 bolt— $\frac{1}{4}$ " diameter by 3" long |
| 1 A81-13—Sleeve (for fuse) | 1 lockwasher |
| 2 A16-183—.5 MFD condensers | 1 flat washer |
| 1 A96-4—Distributor Suppressor | 1 nut |

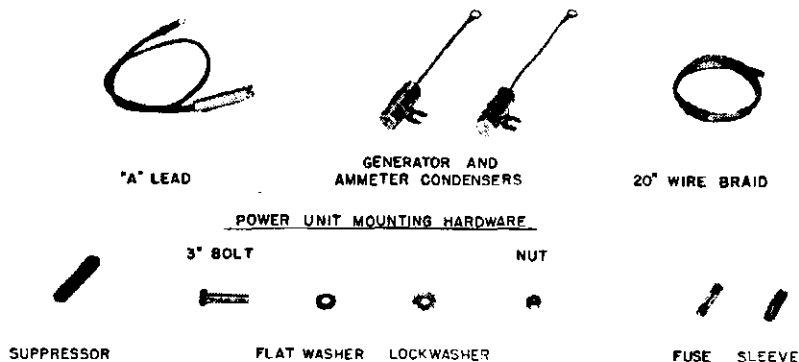


Fig. 6. Suppression Kit and Miscellaneous Parts

THE TONE CONTROL

The inner left knob (with four points) is the TONE CONTROL, which permits you to select the most pleasing tonal range. When it is turned all the way to the right (clockwise) the tone is treble or brilliant. This position is best for the most distinct reproduction, especially of speech. Turning the knob to the left (counterclockwise) makes the tone more mellow. This is often desirable for certain types of music and is also useful to lessen the effects of static and electrical noise. Turn the knob to the position that gives the tone most pleasing to you.

MATCHING THE ANTENNA

An adjusting screw for matching the receiver to the particular antenna used is accessible through a hole in the bottom side of the Control Unit. (See Fig. 4.) Set the dial pointer between 1400 KC and 1500 KC, where no station is heard with the volume control fully on. Then use a small screw driver to turn the adjusting screw to the point giving the most hiss or noise. The set is now ready for operation.

ELIMINATING MOTOR NOISE

Every precaution was taken in the design of this radio to eliminate motor noise interference. However, in the remote instance that it may be found desirable to take further steps, the following notes are added for your guidance.

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all mounting points. A good electrical contact at these points will aid materially in eliminating motor noise.

GENERATOR CONDENSER

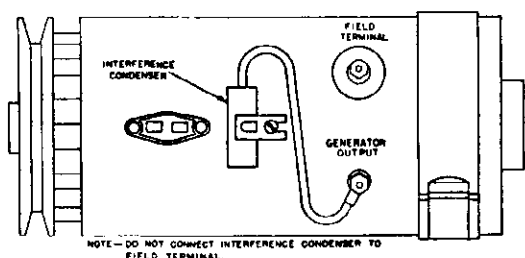


Fig. 7

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Remove from distributor cap the high tension lead from coil to distributor. Cut the lead two inches from the end, and screw the distributor resistor on to the coil lead, then screw the short length into the resistor and plug the cable into the distributor cap.

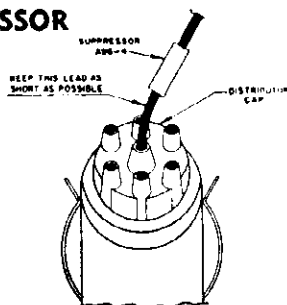


Fig. 8

AMMETER CONDENSER

A .5 MFD bypass condenser is furnished for attaching to the ammeter. This should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby. In most cases the use of this condenser, the distributor suppressor, and the generator condenser, will eliminate all objectionable ignition interference.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to try another by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

HIGH AND LOW TENSION LEADS

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These leads will very often pick up motor noise and feed it into the receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension leads. Shield and ground these leads.

GROUNDING THE POWER CABLE

In some cases motor noise is reduced by grounding the power cable to the power unit case. See Fig. 4. Loosen one of the two screws located on either side of the power cable socket on the power unit. Cut a six inch length off the wire braid supplied in the Suppression Kit. Fasten one end under the screw and tighten down the screw again. Wrap the remainder of the braid around the cable and solder or tape it securely in place.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead from the coil to the distributor.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

BONDING OF STEERING COLUMN TO BODY

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

MODEL 6295-1,
Ch. 528.6295-1

ELECTRICAL SPECIFICATIONS

Power Supply.....6.3 volts DC
Current.....6.5 amp. average
Frequency Range.....540 to 1600 KC
I. F. Frequency.....262 KC
Speaker.....7" round or 6"x9" oval
Power Output.....2.5 watts, undistorted
5 watts, maximum
Sensitivity.....3 microvolt average for 1 watt output
Selectivity...40 KC broad at 1000 times signal, at 1000 KC

The set contains the following:

1—6BA6—R. F. Amplifier.
1—6BE6—Converter.
1—6BA6—I. F. Amplifier.
1—6AT6—Detector—AVC—1st audio.
1—6V6GT—Power output.

1—6X5GT—Rectifier.

SERVICE NOTES

Voltages taken from the different points of the circuit to chassis are measured with the volume and tone controls in maximum position, all tubes and the rectifier in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 ohm per volt. These voltages are clearly shown on the schematic diagram (Figs. 11 and 12). All voltages should be measured with an input voltage of 6.3 volts DC.

The tubes and rectifier are accessible for servicing without removing the chassis. Loosen the wing-nut on the cover of the power supply case and lift off the cover. On the RF Tuning Unit, loosen the wing nuts on the two stud bolts protruding from the side of the case at the top, rear, and remove the plate over the tubes. CAUTION: Be sure to replace the tubes and the rectifier in the proper sockets. Refer to Tube and Rectifier Location Pictorials, Fig. 10 and 14.

WARNING: The dash pot (brass cylinder on the mechanical tuner) should never be oiled. If it is ever necessary to make adjustments on the mechanical tuner, the dash pot may be cleaned with ordinary cleaning solvents.

ALIGNING INSTRUCTIONS

Never attempt any adjustments on this receiver unless it becomes necessary to replace the coils or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, the rectifier, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "ALIGNMENT PROCEDURE." After realignment has been completed repeat the procedure as a final check.

INSTRUCTIONS FOR REMOVING THE CHASSIS FROM THE CASE

RF TUNING UNIT: Remove the knobs and nuts from the two control shafts. Take out the six self-tapping screws around the back edge of the case and remove the back cover. Remove the plate over the tubes (see service notes). Loosen the screw securing the cable clamp, slip the cable out from under the clamp and out of the notch. Remove the lead from the plug-in terminal on the spark plate attached to the inside top of case. Slide the "A" lead out of the notch. Now tilt the front of the case up so that the chassis can slide out. Grasp the chassis at the rear with the fingers against the chassis plate and with the thumb hooked over the IF transformer. Pull the chassis straight back, being careful that the pointer bracket does not get caught against the spark plate components. Handle the chassis carefully and set down gently so that the mechanical tuning parts may not be damaged or the settings of the coil cores upset by jarring.

POWER SUPPLY: Loosen the wing-nut and lift the top cover off. Remove the 6-32x1/2 screw securing the high voltage cable socket to the case. Remove the four screws (one on each side) near the bottom outside of the case. Now take the case in one hand and grasp the output transformer with the other hand and lift the chassis straight up.

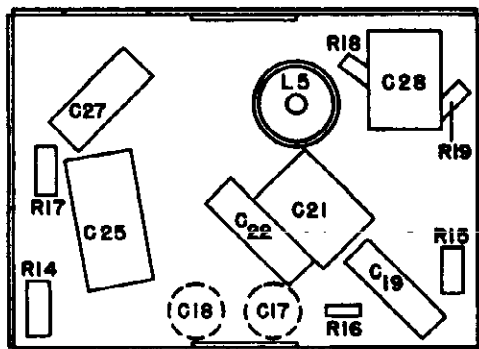


Fig. 9. Power Unit—Bottom View

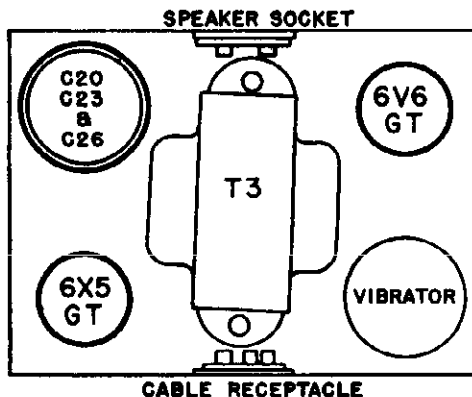


Fig. 10. Power Unit—Top View

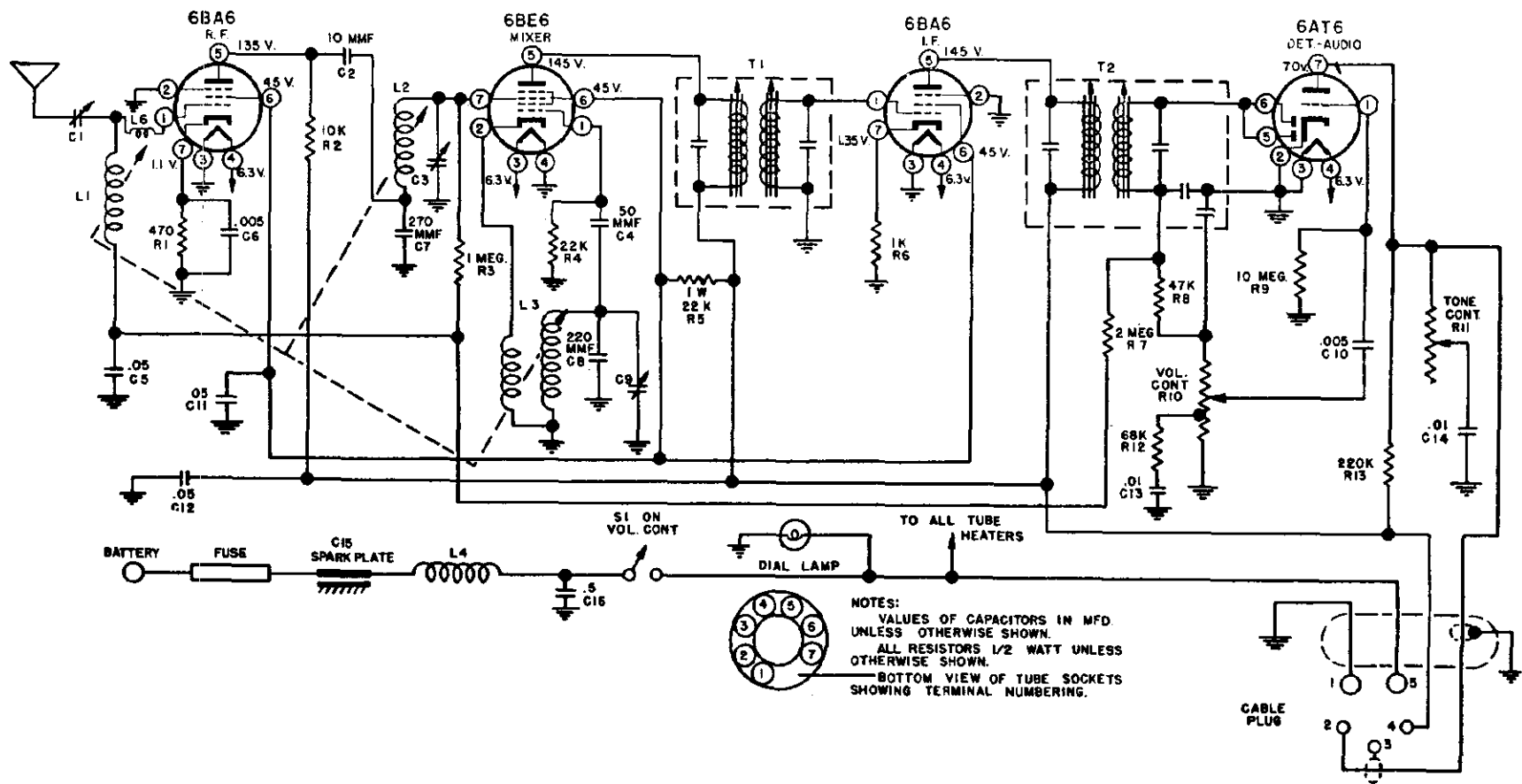


Fig. 11. Schematic Diagram—Control Unit

MODEL 6295-1,
Ch. 528.6295-1

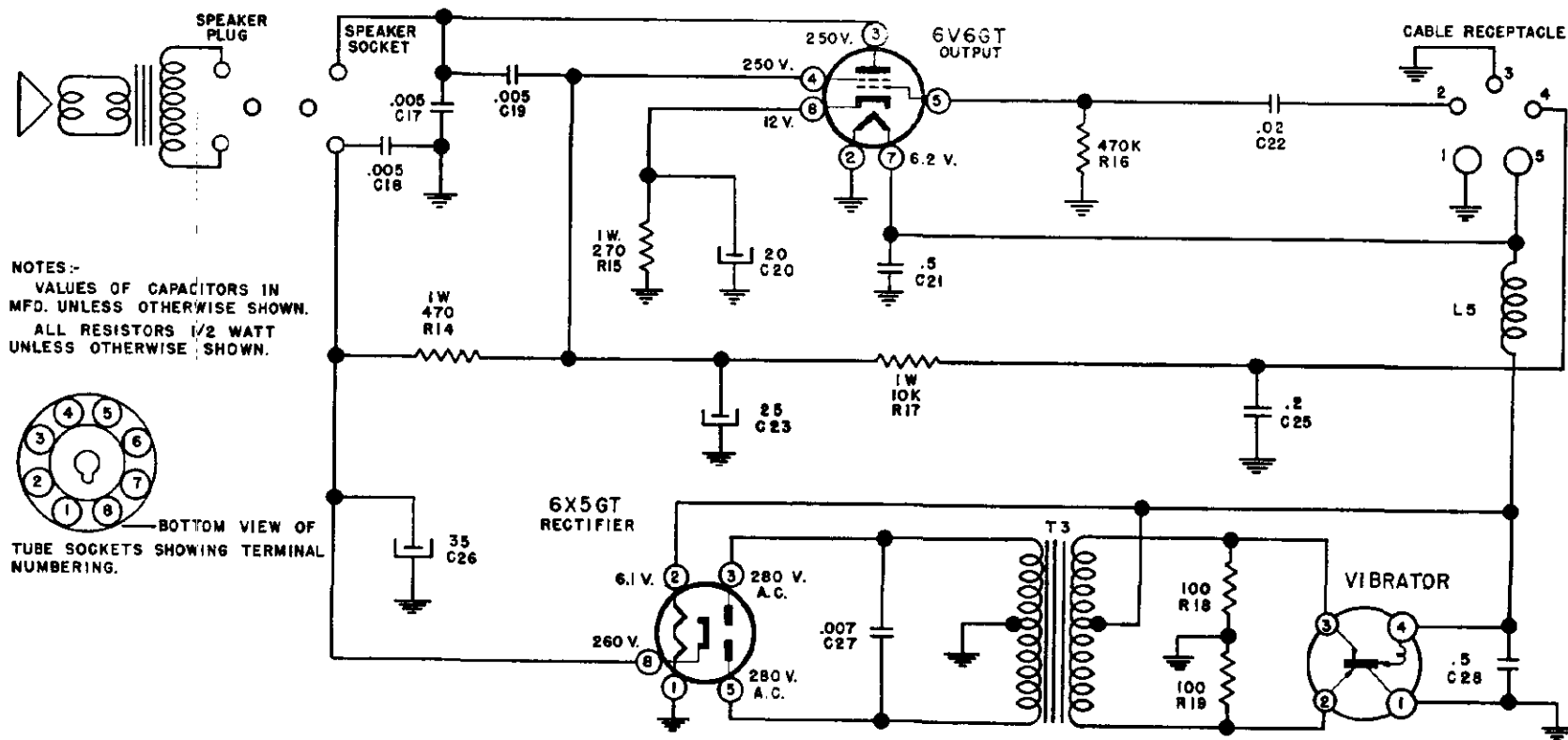


Fig. 12. Schematic Diagram—Power Unit

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30 %.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 75 MMFD., 30 MMFD.

For alignment points refer to Figures 13 and 14.

Slug Position	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Out	262 KC	.1 MFD.	6BE6 Grid	T2	Maximum	Output I.F.
Fully Out	262 KC	.1 MFD.	6BE6 Grid	T1	Maximum	Input I.F.
Fully Out	1610 KC	*	Ant. lead	C9	Maximum	Oscillator
Tune in signal from generator	1400 KC	*	Ant. lead	C3	Maximum	R.F.
Tune in signal from generator	1400 KC	*	Ant. lead	C1	Maximum	Antenna

*30 MMFD across input terminals and 75 MMFD in series with "hot" side of signal generator leads.

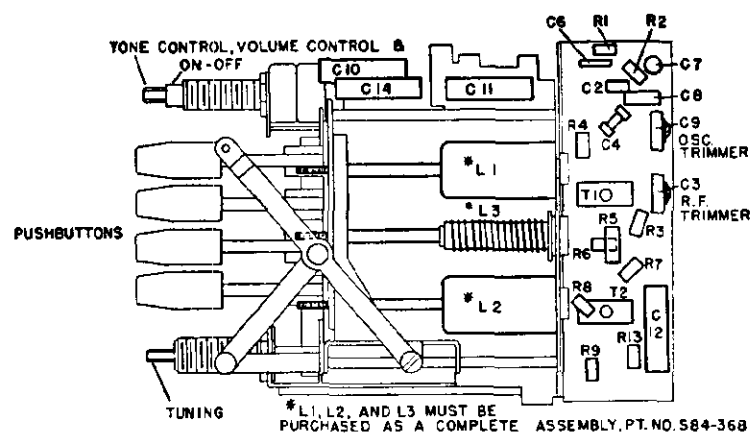


Fig. 13. Control Unit—Bottom View

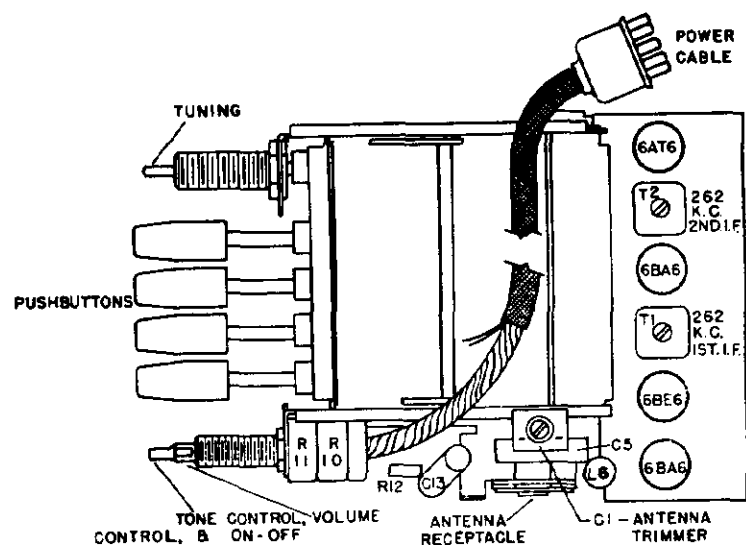


Fig. 14. Control Unit—Top View

MODEL 6295-1,
Ch. 528.6295-1

PARTS LIST

Schematic Location	Part No.	Description
C1	A20-148	Capacitor—antenna trimmer
C2	A15-197	Capacitor—ceramic—10 mmfd.
C3, C9	A20-147	Capacitor—dual trimmer—R.F. and Oscillator
C4	A15-194	Capacitor—ceramic—50 mmfd.
C5	A16-197	Capacitor—.05 mfd.—200 v.
C6, C17, C18	A16-177	Capacitor—ceramic—.005 mfd.
C7	A15-215	Capacitor—ceramic—270 mmfd.
C8	A15-218	Capacitor—silver mica—220 mmfd.
C10, C19	A16-190	Capacitor—.005 mfd.—600 v.
C11, C12	A16-189	Capacitor—.05 mfd.—400 v.
C13, C14	A16-192	Capacitor—.01 mfd.—400 v.
C15		Capacitor—spark plate
C16, C21, C28	A16-184	Capacitor—.5 mfd.—100 v.
	A18-300	Capacitor—electrolytic
C20		20 mfd.—25 v.
C23		25 mfd.—350 v.
C26		35 mfd.—400 v.
C22	A16-206	Capacitor—.02 mfd.—600 v.
C25	A16-188	Capacitor—.2 mfd.—400 v.
C27	A16-207	Capacitor—.007 mfd.—1600 v.—oil filled
	B23-157	Cable—power
L1, L2, L3	S84-368	Coil—assembly—including carriage and slugs, etc.
L4	A33-229	Coil—"A" line choke
L5	A33-228	Coil—vibrator hash choke
L6	A10-527	Coil—antenna loading
	A83-421	Clip—I.F. transformer mounting
R10, R11, S1	A24-183	Control—dual—ON-OFF-VOLUME and TONE
	A43-10	Fuse—15 amp.—3AG
	A47-115	Grommet—rubber—power cable
	S84-233	Kit—"A" lead assembly
	B52-296	Knob—Tuning
	B52-297	Knob—Volume
	B52-298	Knob—Tone
	A89-7	Lamp—pilot—No. 47 Bayonet
R1	A60-770	Resistor—470 ohm— $\frac{1}{2}$ watt
R2	A60-760	Resistor—10K ohm— $\frac{1}{2}$ watt
R3	A60-668	Resistor—1 megohm— $\frac{1}{2}$ watt
R4	A60-744	Resistor—22K ohm— $\frac{1}{2}$ watt
R5	A60-773	Resistor—22K ohm—1 watt
R6	A60-675	Resistor—1000 ohm— $\frac{1}{2}$ watt
R7	A60-726	Resistor—2.2 megohm— $\frac{1}{2}$ watt
R8	A60-730	Resistor—47K ohm— $\frac{1}{2}$ watt
R9	A60-728	Resistor—10 megohm— $\frac{1}{2}$ watt
R12	A60-775	Resistor—68K ohm— $\frac{1}{2}$ watt
R13	A60-672	Resistor—220K ohm— $\frac{1}{2}$ watt
R14	A60-694	Resistor—470 ohm—1 watt
R15	A60-754	Resistor—270 ohm—1 watt
R16	A60-731	Resistor—470K ohm— $\frac{1}{2}$ watt
R17	A60-698	Resistor—10K ohm—1 watt
R18, R19	A60-752	Resistor—100 ohm— $\frac{1}{2}$ watt
	A83-646	Retainer—dial scale—left
	A83-647	Retainer—dial scale—right
	C79-387	*Speaker—7" round
	C79-386	*Speaker—6"x9" oval
	S84-383	Transformer—output—with cable and plug
T1	A10-537	Transformer—I.F. No. 1
T2	A10-540	Transformer—I.F. No. 2
T3	C80-258	Transformer—power
	A34-105	Vibrator—Mallory No. 659

Mechanical Tuner Parts

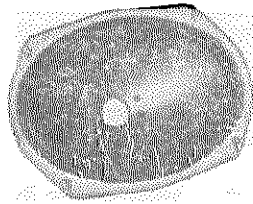
A56-141	Pusher nut—manual tuning
A56-142	Pusher nut—pushbutton tuning
A75-75	Pusher rod—manual tuning
S84-355	Pushbutton and rod assembly

IMPORTANT: All tubular condensers must be high temperature (85°C.) wax type.

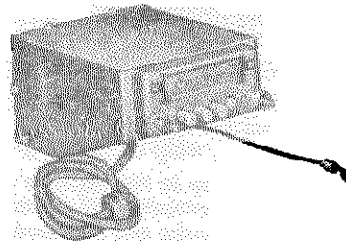
*When ordering a replacement speaker, order the same type, 7" round or 6"x9" oval, as the old one that was installed in your car.

MODEL 6295-2,
Ch. 528.6295-2

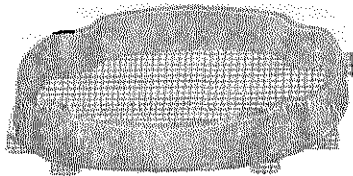
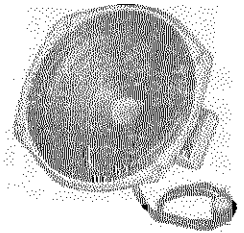
6"X9" OVAL SPEAKER



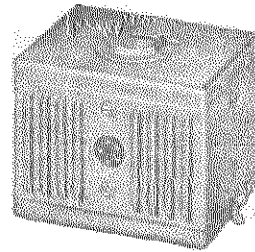
CONTROL UNIT



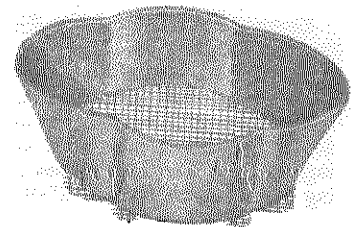
7" ROUND SPEAKER



6" X 9" RUBBER BAFFLE & SCREEN



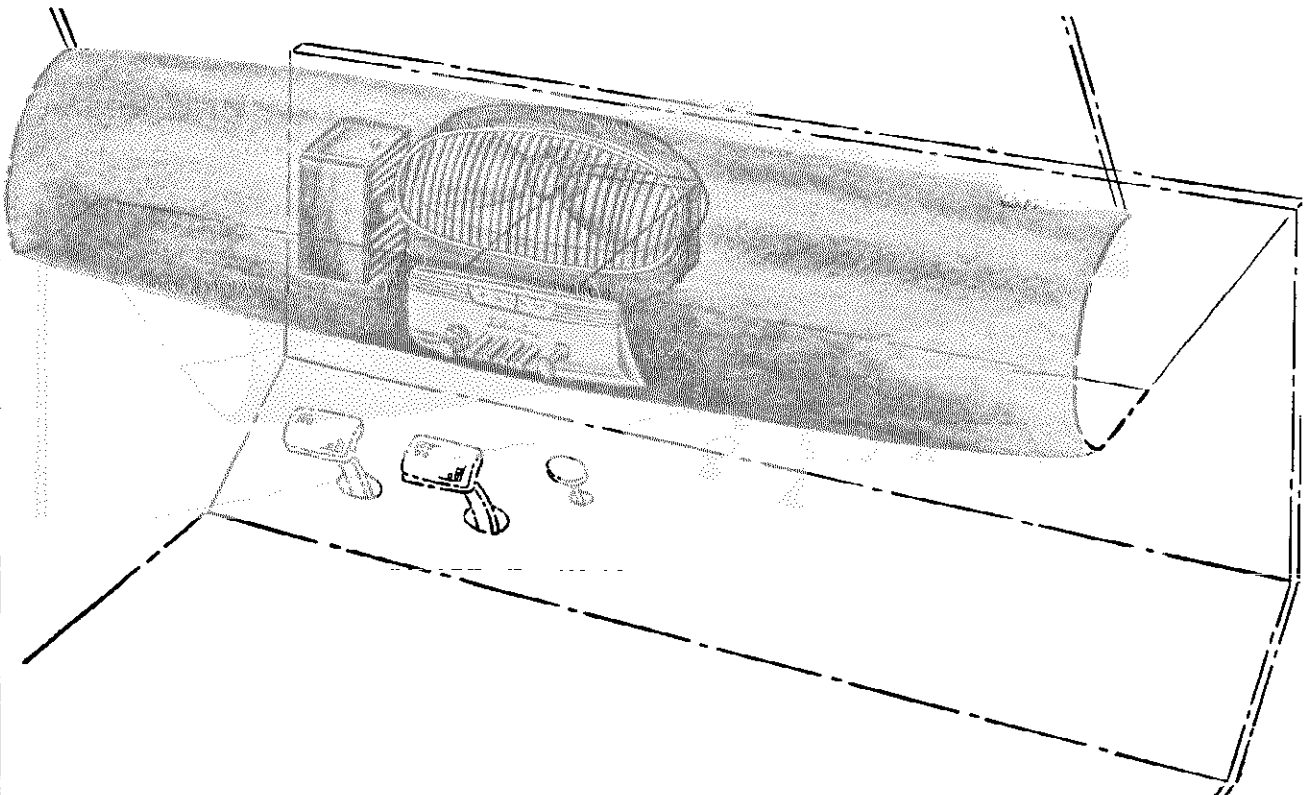
POWER UNIT



7" RUBBER BAFFLE & SCREEN

Fig. 1. Parts in Master Package

Only one of the speakers illustrated is supplied with each radio; the type of speaker you receive will be determined by the make of car for which the radio is ordered.

*Fig. 2. Custom Style Mounting*

MODEL 6295-2,
Ch. 528.6295-2

DESCRIPTION

Your SILVERTONE radio is a newly designed DE LUXE PUSHBUTTON TUNING AUTOMOBILE RECEIVER of advance superheterodyne circuit design, for operation on the six volt storage battery in your car. It covers the frequency range from 540 KC to 1600 KC. In addition to PUSHBUTTON TUNING it features BASS-COMPENSATED VOLUME CONTROL supplemented by a MANUAL TONE CONTROL. It consists of three principal parts—the Control Unit, the Power Unit and the Speaker (See Fig. 1)—and is supplied with mounting parts to accommodate either custom installation in the instrument panel or underdash mounting. (See Figs. 2 and 3.)

Special care has been taken in the design of this receiver to insure the finest in sensitivity and selectivity, thereby insuring good reception of even distant or very weak stations. It is simple to install. The antenna input circuit is adjustable to permit the use of any two, three or four section telescopic, whip or "fishpole" type antenna.

Each complete radio, with accessories, is made up in two separate packages, one carton containing the Escutcheon Kit and speaker mounting hardware, the other carton containing the Control Unit, the Power Unit and either a 7" round speaker or a 6"x9" oval speaker, depending on the make and model of the car for which the radio was ordered. This second carton will be stamped with the letter "A" to indicate that it contains a 7" round speaker, or the letter "B" to indicate the 6"x9" oval speaker.

Control Unit Escutcheon Kits (instrument panel matching or universal) are supplied as a separate item, thus permitting you to transfer the radio from one car to another with only the small expense of replacing the Escutcheon Kit and speaker if you desire to match the instrument panel of your new or different car. Instrument panel matching Escutcheon Kits for most popular late model cars are available at your nearest Sears retail store or Mail Order House. If your Silvertone radio is equipped with a universal underdash tuning panel it may be transferred as is to a different car without changing the Escutcheon Kit. However, if you wish to change from an underdash mounting to a custom style instrument panel mounting, this can be accomplished by discarding the universal Escutcheon Kit and replacing it with an instrument panel matching Escutcheon Kit (and 6"x9" oval speaker, if necessary), as outlined above.

INSTALLATION

THE SPEAKER

The speakers (7" round or 6"x9" oval) are supplied with sponge rubber baffles for mounting on flat or curved instrument panels. The rubber baffle for the 7" round speaker has flared sides so that it will cover an oval opening in the car's speaker grill as well as a round opening.

Speaker mounting hardware is supplied with each Escutcheon Kit for mounting the speaker in your car. This includes a "U-shaped" bracket for mounting the round speaker in cars on which it is not possible to mount the speaker on existing bolts.

SPECIFIC INSTRUCTIONS PERTAINING TO THE MOUNTING OF THE SPEAKER AND CONTROL UNIT IN THE CAR FOR WHICH YOU ORDERED YOUR RADIO ARE CONTAINED IN THE LEAFLET PACKED IN THE ESCUTCHEON KIT.

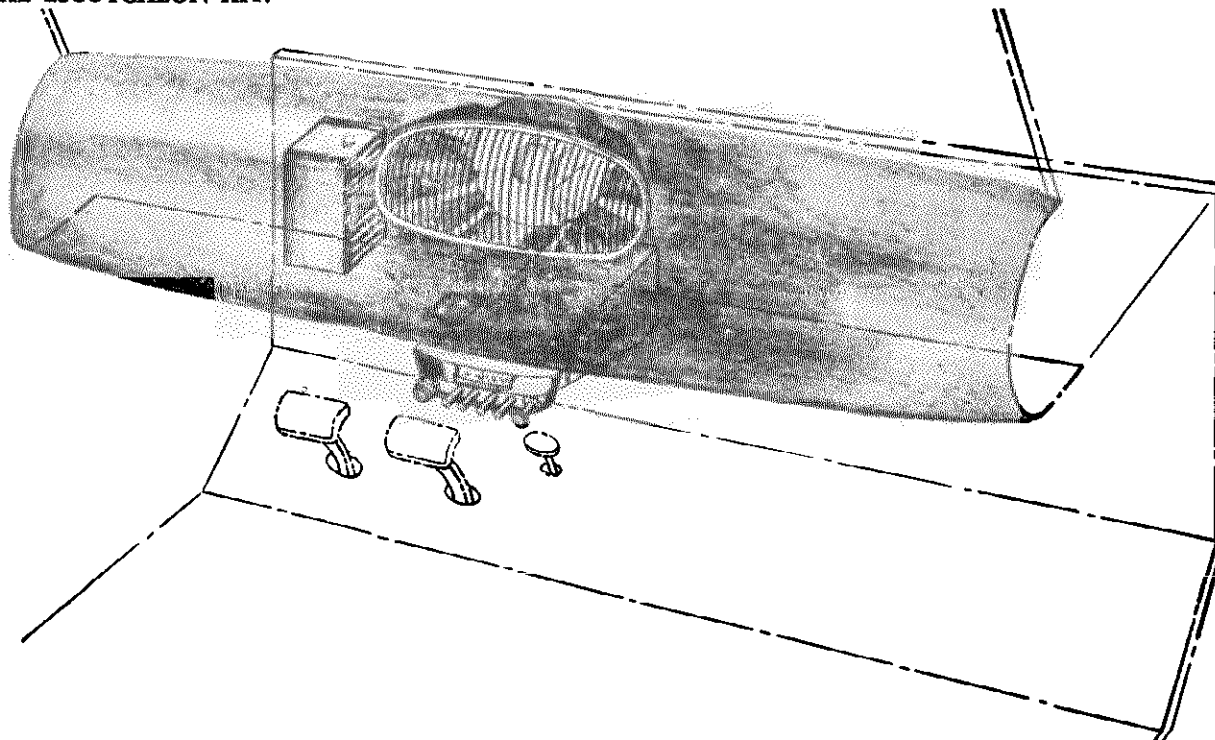


Fig. 3. Underdash Mounting

MOUNTING THE POWER UNIT

The power unit mounts on the firewall (see Fig. 3). Determine a suitable position for mounting it by holding the case in your hands against the firewall. When a suitable position has been determined, then check the underhood side of the wall, to make sure there is no obstruction to prevent drilling a hole and inserting the mounting bolt. Having located a suitable position that will permit drilling, mark and drill a $\frac{5}{16}$ " hole. Insert the $\frac{1}{4}$ inch diameter by 3 inch long, carriage type mounting bolt into the hole from the underdash side and attach the lockwasher and nut on the underhood side, but do not tighten. Now holding the case in a vertical position (with wingnut on the bottom), bring the case up to the bolt and slide the channel in the mounting plate down over the head of the bolt. The lockwasher and nut on the underhood side should then be tightened down securely.

If, because of limited space, you find it necessary to mount the power unit in a horizontal or angle position, this type of mounting is entirely satisfactory and has no ill effect on the operation of the radio.

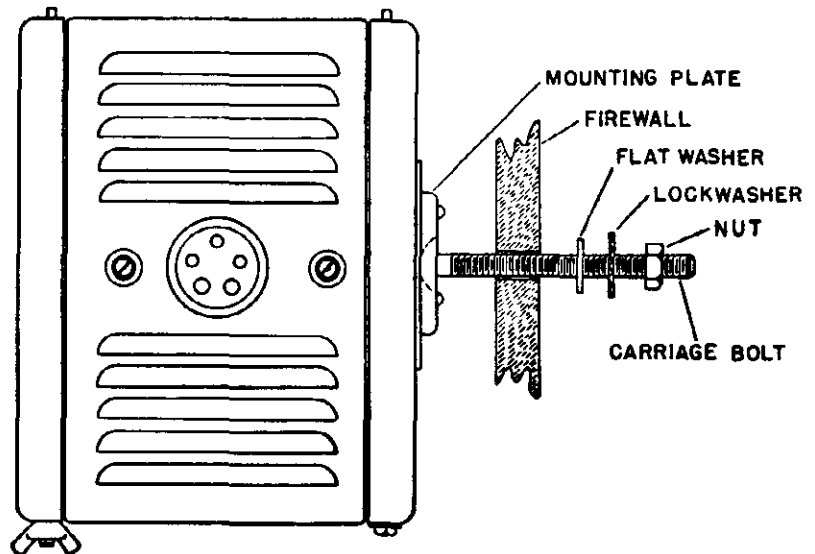


Fig. 3. Power Unit Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the plug into the antenna receptacle on the side of the control unit (see Fig. 4). Plug the speaker and power cables into the sockets provided on the sides of the Power Unit. **IMPORTANT: LOOSEN SCREW "A" (SEE FIG. 4) ON POWER UNIT CASE. WRAP THE PIGTAIL OF BRAID ON THE POWER SUPPLY CABLE AROUND THE SCREW AND TIGHTEN DOWN THE SCREW AGAIN. BE SURE THAT THE PIGTAIL IS SECURELY HELD BY THE SCREW.** Connect the "A" lead to the battery side of the ammeter behind the instrument panel. The fuse should then be inserted into the holder in the "A" lead. These connections are illustrated in Fig. 4.

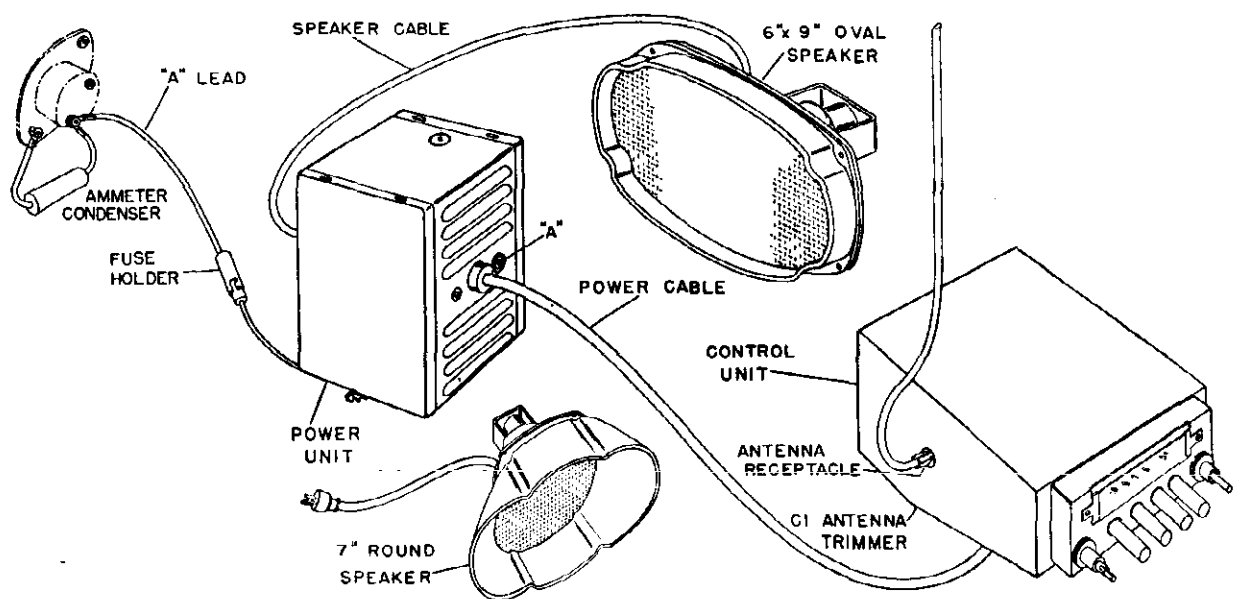


Fig. 4. Connecting the Radio

MODEL 6295-2,
Ch. 528.6295-2

CONTROLS

There are six operating controls on the front of the Control Unit, (see Fig. 5). The two outside knobs are dual purpose controls, the other four are PUSHBUTTON STATION SELECTORS. The left-hand control consists of two knobs mounted on concentric shafts; the front knob (round) is the ON-OFF-SWITCH and VOLUME CONTROL; the rear knob (with four points) is the MANUAL TONE CONTROL. The knob on the right is the MANUAL TUNING CONTROL and it also serves as a fifth PUSHBUTTON STATION SELECTOR. The use of these controls is explained below.

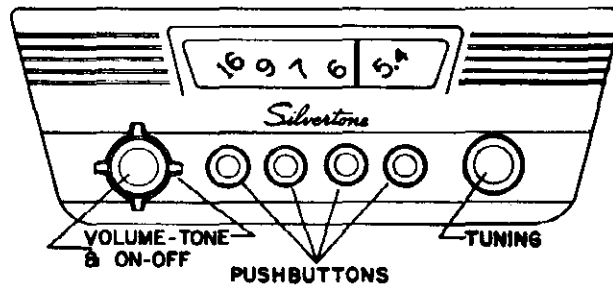


Fig. 5. Control Unit Panel

THE ON-OFF-SWITCH AND VOLUME CONTROL

When the outer left knob is turned all the way to the left the receiver is switched off and there is no drain from the car's battery. Rotating the knob part of a turn toward the right switches the receiver on and illuminates the dial. Further rotation of the knob increases the volume. After a station has been tuned in properly the volume control knob should be adjusted to give the desired volume.

MANUAL TUNING

Use the right-hand knob to tune in stations manually. To select a station, push in the knob and tune the radio by turning the knob until the desired station is heard. The dial pointer will indicate the frequency to which you are tuned.

The dial is marked in Kilocycles minus the final two zeroes. Always tune carefully for the clearest sound and minimum background noise.

PUSHBUTTON TUNING

Adjusting the pushbutton station selectors is simple and quick. No tools are required and a button may be set up for a new station in a few seconds. Each button can be tuned to any station in the broadcast band; thus you can arrange the tuning in any order to suit your convenience.

Before making the following adjustments, turn the radio on and let it warm up for 15 minutes.

Choose the PUSHBUTTON STATION SELECTOR you wish to adjust, and push the button all the way in; it will lock in this position. Now tune in the station to which you wish to pre-tune by turning the button to right or left until the desired station is heard. The dial pointer will indicate the frequency to which you are tuned, but to insure the accuracy of the setting, keep the volume control turned low and adjust the button for sharpest tuning. This will be indicated when the sound is clearest and noise at a minimum. The button is now properly adjusted and should not be turned again until it is desired to set it for a different station.

Follow the above procedure to adjust the remaining PUSHBUTTON STATION SELECTORS.

As was mentioned under the heading *CONTROLS*, the MANUAL TUNING CONTROL has been designed to serve as a fifth PUSHBUTTON STATION SELECTOR. If you wish to use this control as a PUSHBUTTON STATION SELECTOR, simply follow the procedure given above for adjusting the other PUSHBUTTON STATION SELECTORS. However, remember that if you use this control for MANUAL TUNING at any time, it will have to be re-set to the desired station if you wish to use it again as a PUSHBUTTON STATION SELECTOR.

S84-382 SUPPRESSION KIT AND MISCELLANEOUS PARTS

- | | |
|--------------------------------|---|
| 1 S84-233—"A" lead assembly | 20" wire braid |
| 1 A43-10—Fuse | 1 bolt— $\frac{1}{4}$ " diameter by 3" long |
| 1 A81-13—Sleeve (for fuse) | 1 lockwasher |
| 2 A16-183—.5 MFD condensers | 1 flat washer |
| 1 A96-4—Distributor Suppressor | 1 nut |

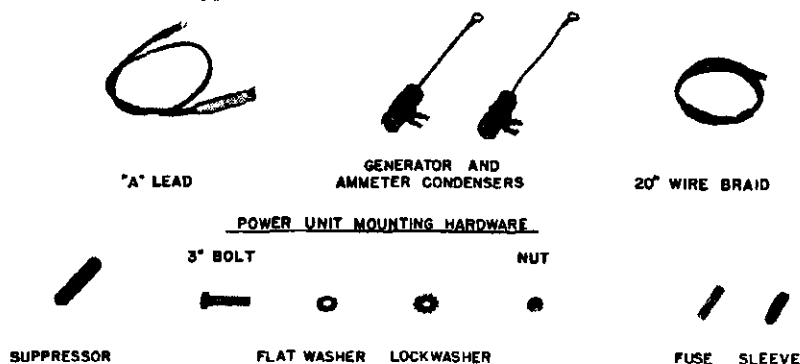


Fig. 6. Suppression Kit and Miscellaneous Parts

THE TONE CONTROL

The inner left knob (with four points) is the **TONE CONTROL**, which permits you to select the most pleasing tonal range. When it is turned all the way to the right (clockwise) the tone is treble or brilliant. This position is best for the most distinct reproduction, especially of speech. Turning the knob to the left (counterclockwise) makes the tone more mellow. This is often desirable for certain types of music and is also useful to lessen the effects of static and electrical noise. Turn the knob to the position that gives the tone most pleasing to you.

MATCHING THE ANTENNA

An adjusting screw for matching the receiver to the particular antenna used is accessible through a hole in the bottom side of the Control Unit. (See Fig. 4.) Set the dial pointer between 1400 KC and 1500 KC, where no station is heard with the volume control fully on. Then use a small screw driver to turn the adjusting screw to the point giving the most hiss or noise. The set is now ready for operation.

ELIMINATING MOTOR NOISE

Every precaution was taken in the design of this radio to eliminate motor noise interference. However, in the remote instance that it may be found desirable to take further steps, the following notes are added for your guidance. It may not be necessary to use all of the following suggestions to correct a noise condition in any one car. We recommend using these helpful hints in the manner of a process of elimination, using only those methods that correct your condition.

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all mounting points. A good electrical contact at these points will aid materially in eliminating motor noise.

GENERATOR CONDENSER

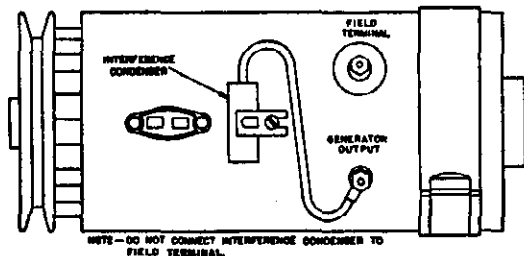


Fig. 7

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser **IS NOT** fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Remove from distributor cap the high tension lead from coil to distributor. Cut the lead two inches from the end, and screw the distributor resistor on to the coil lead, then screw the short length into the resistor and plug the cable into the distributor cap.

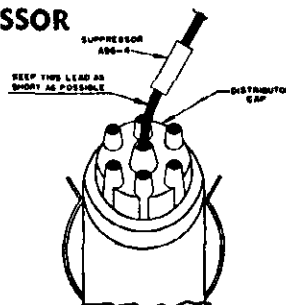


Fig. 8

AMMETER CONDENSER

A .5 MFD bypass condenser is furnished for attaching to the ammeter. This should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby. In most cases the use of this condenser, the distributor suppressor, and the generator condenser, will eliminate all objectionable ignition interference.

VOLTAGE REGULATOR

It is normal to connect a .5 mfd condenser from the battery terminal on the voltage regulator to ground; however, in a number of cars the voltage regulator is mounted on rubber grommets. In such instances, the condenser should be grounded directly to the case of the regulator, rather than to some other ground point. Do not use a larger condenser than .5 mfd or else it will affect the timing of the regulator rendering it less useful.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to try another by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

HIGH AND LOW TENSION LEADS

Considerable ignition interference is experienced from leads in cables that run along the inside of the fire wall near the auto radio. For example, the battery lead to the low voltage side of the ignition coil on a 1950 Model Oldsmobile '88' runs through the fire wall and along the inside past the auto radio to a point beyond the steering column. This lead has heavy radiation. It can be disconnected at the ignition coil and pulled through the fire wall and pushed back through the fire wall at a point to the left of the steering column and run along the outside to its original point of connection on the ignition coil. Such types of leads should be watched for in all installations. They should be rerouted, if possible, or shielded with braid material. It is advisable in extreme cases to bond all leads by wrapping braid around them, and grounding the braid at the closest point. In wrapping a braid around a lead, do not remove the insulation from the leads as this is a radiation type of shield. Keep all ground leads as short as possible, or they will pick up interference.

Bunch up any excess length of the shielded power cable, wrap it with braid and ground it to the closest ground point.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead from the coil to the distributor.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

MODEL 6295-2,
Ch. 528.6295-2

Bonding of Ungrounded Engine and Body Parts

The best rule is to keep the ignition interference underneath the hood as much as possible. This is best accomplished by using filters and suppressors on all points that would produce radiation as well as effectively bonding the hood, motor block, and any engine and body parts that are isolated from each other. It would be advisable to check

all bolt-on fenders on which antennas are mounted, in that these fenders frequently are not sufficiently well grounded to the rest of the car. Use bonding braid wherever necessary to ground such fenders. Use wide bonding braid and keep all such braid as short as possible. Bonding all cables and tubes that go through the fire wall is necessary in some cases.

ELECTRICAL SPECIFICATIONS

Power Supply.....6.3 volts DC
Current.....6.5 amp. average
Frequency Range.....540 to 1600 KC
I. F. Frequency.....262 KC
Speaker.....7" round or 6"x9" oval
Power Output.....2.5 watts, undistorted
5 watts, maximum
Sensitivity.....3 microvolt average for 1 watt output
Selectivity...40 KC broad at 1000 times signal, at 1000 KC

The set contains the following:

- 1—6BA6—R. F. Amplifier.
- 1—6BE6—Converter.
- 1—6BA6—I. F. Amplifier.
- 1—6AT6—Detector—AVC—1st audio.
- 1—6V6GT—Power output.

1—6X5GT—Rectifier.

SERVICE NOTES

Voltages taken from the different points of the circuit to chassis are measured with the volume and tone controls in maximum position, all tubes and the rectifier in their sockets, no signal applied, and with a voltmeter having a resistance of 20,000 ohm per volt. These voltages are clearly shown on the schematic diagram (Figs. 11 and 12). All voltages should be measured with an input voltage of 6.3 volts DC.

The tubes and rectifier are accessible for servicing without removing the chassis. Loosen the wing-nut on the cover of the power supply case and lift off the cover. On the RF Tuning Unit, loosen the wing nuts on the two stud bolts protruding from the side of the case at the top, rear, and remove the plate over the tubes. CAUTION: Be sure to replace the tubes and the rectifier in the proper sockets. Refer to Tube and Rectifier Location Pictorials, Fig. 10 and 14.

WARNING: The dash pot (brass cylinder on the mechanical tuner) should never be oiled. If it is ever necessary to make adjustments on the mechanical tuner, the dash pot may be cleaned with ordinary cleaning solvents.

ALIGNING INSTRUCTIONS

Never attempt any adjustments on this receiver unless it becomes necessary to replace the coils or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, the rectifier, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "ALIGNMENT PROCEDURE." After realignment has been completed repeat the procedure as a final check.

INSTRUCTIONS FOR REMOVING THE CHASSIS FROM THE CASE

RF TUNING UNIT: Remove the knobs and nuts from the two control shafts. Take out the six self-tapping screws around the back edge of the case and remove the back cover. Remove the plate over the tubes (see service notes). Loosen the screw securing the cable clamp, slip the cable out from under the clamp and out of the notch. Remove the lead from the plug-in terminal on the spark plate attached to the inside top of case. Slide the "A" lead out of the notch. Now tilt the front of the case up so that the chassis can slide out. Grasp the chassis at the rear with the fingers against the chassis plate and with the thumb hooked over the IF transformer. Pull the chassis straight back, being careful that the pointer bracket does not get caught against the spark plate components. Handle the chassis carefully and set down gently so that the mechanical tuning parts may not be damaged or the settings of the coil cores upset by jarring.

POWER SUPPLY: Loosen the wing-nut and lift the top cover off. Remove the 6-32x1/2 screw securing the high voltage cable socket to the case. Remove the four screws (one on each side) near the bottom outside of the case. Now take the case in one hand and grasp the output transformer with the other hand and lift the chassis straight up.

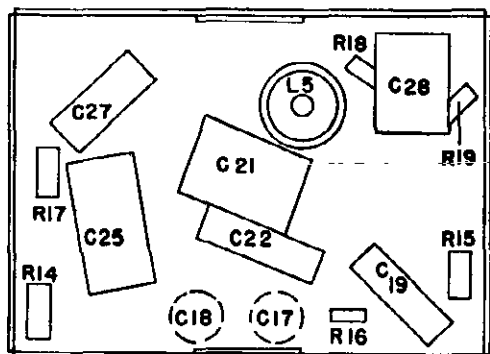


Fig. 9. Power Unit—Bottom View

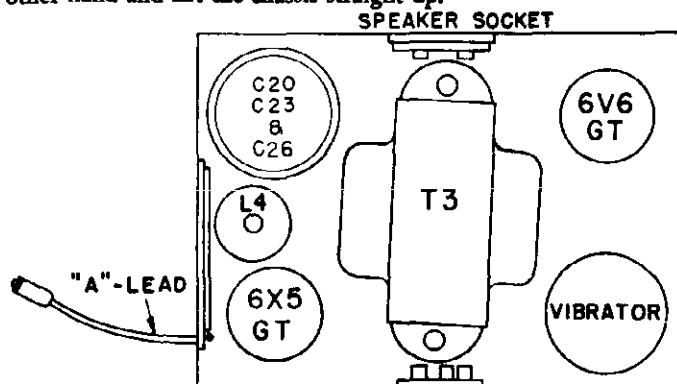


Fig. 10. Power Unit—Top View

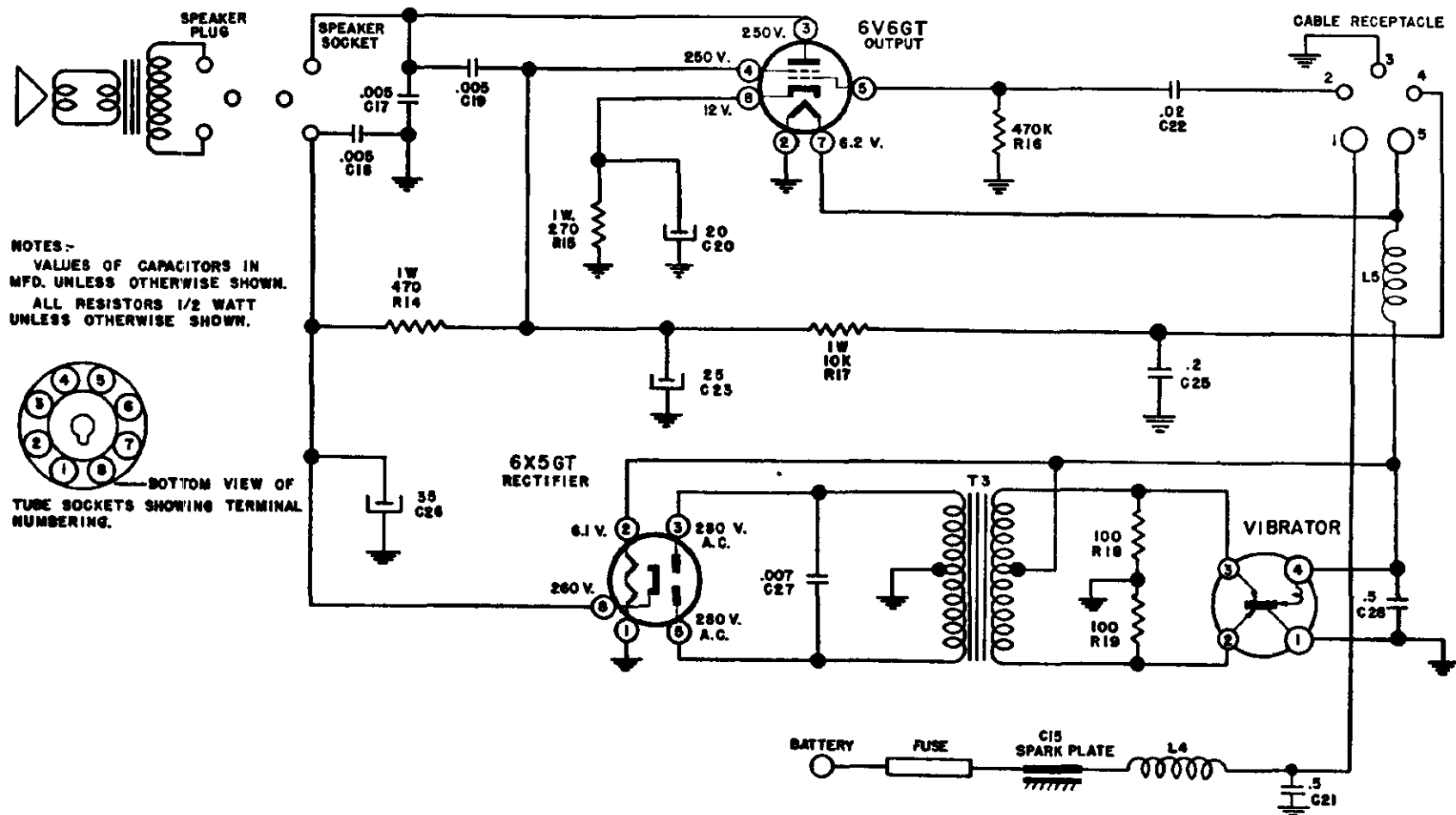


Fig. 12. Schematic Diagram—Power Unit

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 75 MMFD., 30 MMFD.

For alignment points refer to Figures 13 and 14.

Slug Position	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Out	262 KC	.1 MFD.	6BE6 Grid	T2	Maximum	Output I.F.
Fully Out	262 KC	.1 MFD.	6BE6 Grid	T1	Maximum	Input I.F.
Fully Out	1610 KC	*	Ant. lead	C9	Maximum	Oscillator
Tune in signal from generator	1400 KC	*	Ant. lead	C3	Maximum	R.F.
Tune in signal from generator	1400 KC	*	Ant. lead	C1	Maximum	Antenna

*30 MMFD across input terminals and 75 MMFD in series with "hot" side of signal generator leads.

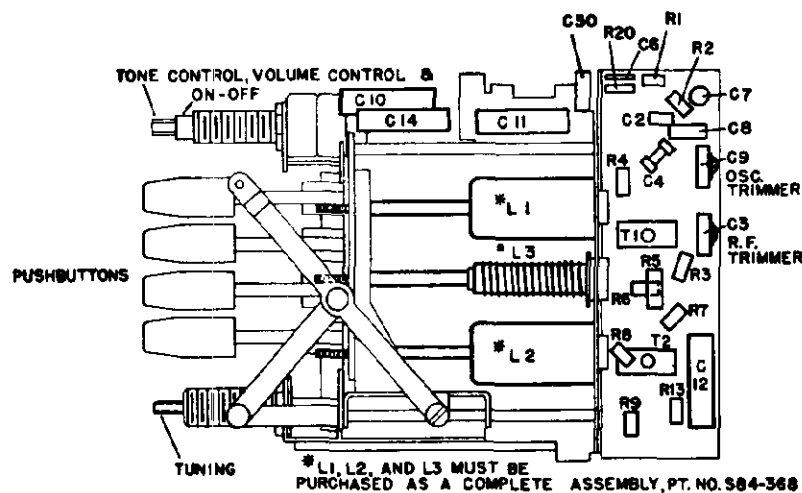


Fig. 13. Control Unit—Bottom View

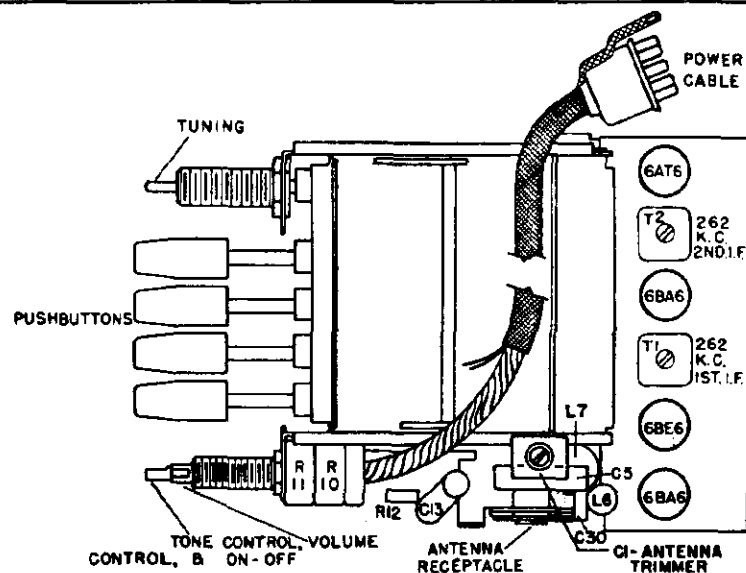


Fig. 14. Control Unit—Top View

MODEL 6295-2,
Ch. 528.6295-2

PARTS LIST

Schematic Location	Part No.	Description
C1	A20-148	Capacitor—antenna trimmer
C2	A15-197	Capacitor—ceramic—10 mmfd.
C3, C9	A20-147	Capacitor—dual trimmer—R.F. and Oscillator
C4	A15-194	Capacitor—ceramic—50 mmfd.
C5	A16-197	Capacitor—.05 mfd.—200 v.
C6, C17, C18	A16-177	Capacitor—ceramic—.005 mfd.
C7	A15-215	Capacitor—ceramic—270 mmfd.
C8	A15-218	Capacitor—silver mica—220 mmfd.
C10, C19	A16-190	Capacitor—.005 mfd.—600 v.
C11, C12	A16-189	Capacitor—.05 mfd.—400 v.
C13, C14	A16-192	Capacitor—.01 mfd.—400 v.
C15		Capacitor—spark plate
C21, C28	A16-184	Capacitor—.5 mfd.—100 v.
	A18-300	Capacitor—electrolytic
C20		20 mfd.—25 v.
C23		25 mfd.—350 v.
C26		35 mfd.—400 v.
C22	A16-206	Capacitor—.02 mfd.—600 v.
C25	A16-188	Capacitor—.2 mfd.—400 v.
C27	A16-207	Capacitor—.007 mfd.—1600 v.—oil filled
C29	A15-211	Capacitor—ceramic—.01 mfd.
C30	A15-188	Capacitor—mica—100 mmfd.
	B23-157	Cable—power
L1, L2, L3	S84-470	Coil—assembly—including carriage and slugs, etc.
L4	A33-234	Coil—"A" line choke
L5	A33-228	Coil—vibrator hash choke
L6	A10-527	Coil—antenna loading
L7	A10-504	Coil—antenna loading
	A83-421	Clip—I.F. transformer mounting
R10, R11, S1	A24-183	Control—dual—ON-OFF-VOLUME and TONE
	B67-547	Dial scale
	A43-10	Fuse—15 amp.—3AG
	A47-115	Grommet—rubber—power cable
	S84-233	Kit—"A" lead assembly
	B52-296	Knob—Tuning
	B52-297	Knob—Volume
	B52-298	Knob—Tone
	A89-7	Lamp—pilot—No. 47 Bayonet
R1	A60-770	Resistor—470 ohm— $\frac{1}{2}$ watt
R2	A60-760	Resistor—10K ohm— $\frac{1}{2}$ watt
R3	A60-668	Resistor—1 megohm— $\frac{1}{2}$ watt
R4	A60-744	Resistor—22K ohm— $\frac{1}{2}$ watt
R5	A60-773	Resistor—22K ohm—1 watt
R6	A60-753	Resistor—220 ohm— $\frac{1}{2}$ watt
R7, R20	A60-726	Resistor—2.2 megohm— $\frac{1}{2}$ watt
R8	A60-730	Resistor—47K ohm— $\frac{1}{2}$ watt
R9	A60-728	Resistor—10 megohm— $\frac{1}{2}$ watt
R12	A60-775	Resistor—68K ohm— $\frac{1}{2}$ watt
R13	A60-672	Resistor—220K ohm— $\frac{1}{2}$ watt
R14	A60-694	Resistor—470 ohm—1 watt
R15	A60-754	Resistor—270 ohm—1 watt
R16	A60-731	Resistor—470K ohm— $\frac{1}{2}$ watt
R17	A60-698	Resistor—10K ohm—1 watt
R18, R19	A60-752	Resistor—100 ohm— $\frac{1}{2}$ watt
	A83-646	Retainer—dial scale—left
	A83-647	Retainer—dial scale—right
	C79-387	*Speaker—7" round
	C79-386	*Speaker—6"x9" oval
	S84-383	Transformer—output—with cable and plug
T1	A10-537	Transformer—I.F. No. 1
T2	A10-540	Transformer—I.F. No. 2
T3	C80-258	Transformer—power
	A34-105	Vibrator—Mallory No. 659

A60-775 Res.—68K— $\frac{1}{2}$ watt

Mechanical Tuner Parts

A56-141	Pusher nut—manual tuning
A56-152	Pusher nut—pushbutton tuning
A75-75	Pusher rod—manual tuning
S84-355	Pushbutton and rod assembly

IMPORTANT: All tubular condensers must be high temperature (85°C.) wax type.

*When ordering a replacement speaker, order the same type, 7" round or 6"x9" oval, as the old one that was installed in your car.

DESCRIPTION

Your new automobile receiver is a 5-tube (plus rectifier) superheterodyne, designed to operate from the 6 volt storage battery in your car. It is a universal type of receiver for mounting underneath the dash panel. It has a self-contained PM speaker, and covers the frequency range 540 to 1600 K.C. Two simple controls are provided for operating the receiver. (see fig. 1).

Special care has been taken in the design of this receiver to insure the finest in sensitivity and selectivity, thereby insuring good reception of even distant or weak stations. The unit is simple to install, the antenna input circuit adjustable to permit the use of any two or three section whip or "fish pole" antenna.

OPERATION

To turn the receiver on, rotate the volume control and switch knob (left hand knob) to the right about half its range. After allowing about 30 seconds for the tubes to warm up, the desired station may be tuned by rotating the tuning control (right hand knob) to the desired frequency. The dial scale is calibrated in kilocycles minus the final two zeros. After the station has been properly tuned, the volume may be adjusted by means of the volume control knob. To increase the volume, turn the control to the right; to decrease the volume, turn it to the left. Turning this control to the left as far as it will go, turns the radio off.

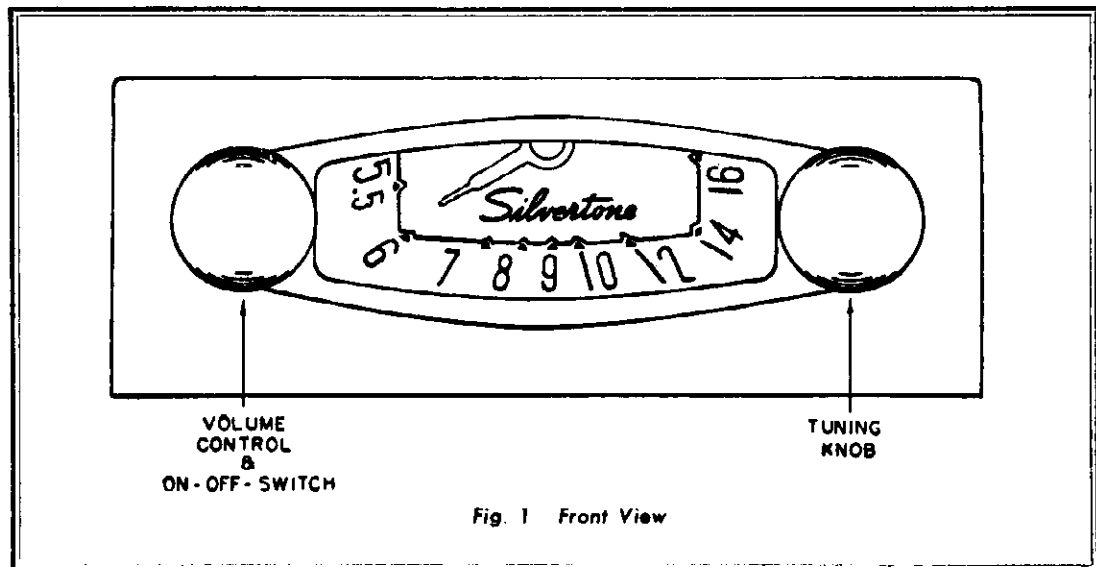


Fig. 1 Front View

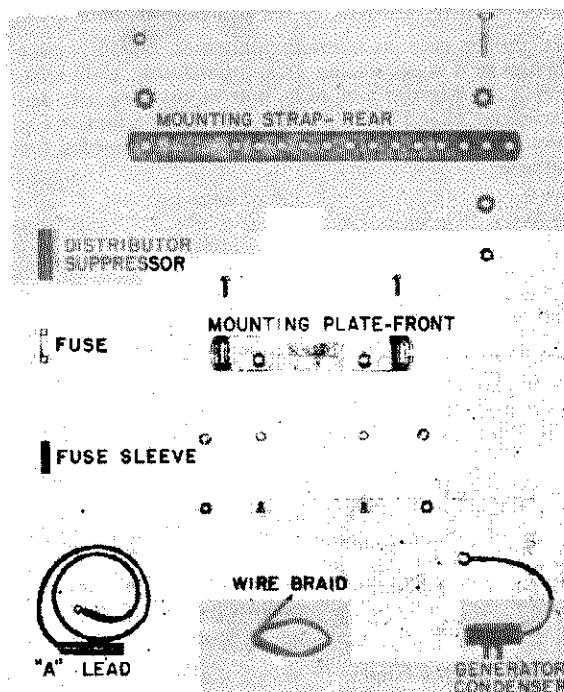


Fig. 2

DIAL POINTER ADJUSTMENT

If it should become necessary to readjust the dial pointer for correct calibration, this may be easily done without removing the radio from the car by proceeding as follows:

- A. Turn tuning knob to the right (clockwise) as far as it will go.
- B. Remove snap button located on the right side of the case (viewed from the front), in the extreme upper front corner.
- C. Insert screwdriver through hole in case and move dial pointer directly over white dot at high end of dial (1600KC).
- D. Tune receiver to station of known frequency in the center of the dial and readjust pointer for more accurate indication, if necessary.
- E. Replace snap button into hole in case.

CAUTION: Be careful not to scratch or damage dial scale or dial pointer when making this adjustment

MODEL 6297-1,
Ch. 528.6297-1

INSTALLATION

This radio comes to you complete with all hardware necessary for mounting, and also with a distributor suppressor, and generator condenser. By referring to Figures 2 and 3, and following the instructions outlined below, you will find that it is very simple to install.

First determine where the receiver is to be mounted by holding it with the hands in the approximate location in the car. Using the front mounting bracket as a template, mark and drill two $7/32$ " holes in the instrument panel flange. Now secure the mounting bracket to the radio receiver with the screws provided, and then mount the front of the radio to the instrument panel, using the bolts, lock washers and nuts provided for this purpose. The back of the radio is supported by means of the rear mounting strap. The mounting strap should be formed by bending to the correct angles, as illustrated in Figure 3, so that it can then be fastened to the fire wall. After marking and center-punching the fire wall at the correct location, drill with a $3/8$ " drill. The mounting strap is then secured to the radio and fastened to the fire wall of the car with the $1/4$ " bolt, lock washer and nut furnished with the receiver.

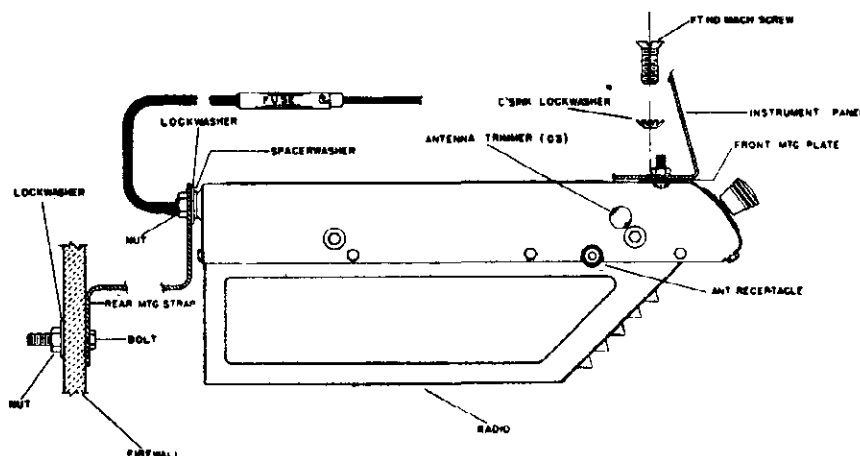


Fig. 3 Side View, Showing Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the jack into the socket provided on the side of the radio. Connect the battery cable to the hot side of the ammeter behind the instrument panel. The fuse should then be inserted into the cable receptor.

FINAL ADJUSTMENTS

The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type.

To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 1100 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 3) and adjust the trimmer for maximum volume. A small screw driver will be needed for this purpose.

ACCESSORIES FURNISHED FOR INSTALLATION

All of the parts that are needed for installing this receiver are furnished in the Mounting Parts Kit, part No. S84-192, and the Suppression and Misc. Parts Kit, part No. S84-407, as listed below. Also supplied are the rear mounting strap, part No. B31-134, and the front mounting plate, part No. A31-138.

S84-192 MOUNTING PARTS KIT

- | | |
|--------------------------|-------------------------------|
| 1 $1/4$ " Bolt | 2 External Tooth Lock Washers |
| 2 $1/4$ " Lock Washers | 2 Internal Tooth Lock Washers |
| 2 $1/4$ " Hexagon Nuts | 2 10-32 Hexagon Nuts |
| 2 10-32 x $5/8$ " Screws | 1 Washer-Spacer |
| 2 10-32 x $3/8$ " Screws | |

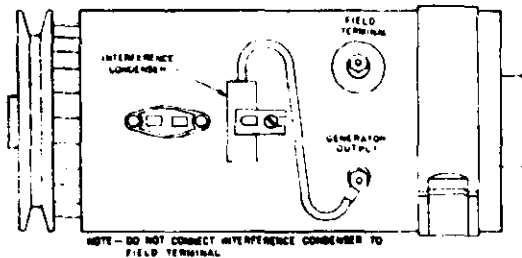
S84-407 SUPPRESSION KIT & MISC. PARTS

- | | |
|----------------------------|--|
| 1 S84-233 "A" lead assem. | 1 S84-322 Suppression Kit consisting of: |
| 1 A43-10 Fuse | 1 .5 MFD Condenser |
| 2 A52-300 Control Knobs | 1 Distributor Suppressor |
| 1 A81-13 Sleeve (for fuse) | 20" Wire Braid |

ELIMINATING MOTOR NOISE

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all three mounting points. A good electrical contact at these points will aid materially in eliminating motor noise.

GENERATOR CONDENSER



The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Remove from distributor cap the high tension lead from coil to distributor. Cut the lead two inches from the end, and screw the distributor resistor on to the coil lead, then screw the short length into the resistor and plug the cable into the distributor cap.



NOTE

In most cases the use of the generator condenser and the distributor suppressor will eliminate all objectionable ignition interference. However, if further reduction of noise is found to be desirable, it is suggested that a .5 MFD. condenser, (similar to the one used on the generator), be connected from either side of the ammeter to a good ground.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to try another by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

HIGH AND LOW TENSION LEADS

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These wires will very often pick up motor noise and feed it into the receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension leads. Shield and ground these leads.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead from the coil to the distributor.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

BONDING OF STEERING COLUMN TO BODY

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

Power Supply.....	6.3 volts DC
Current	6.2 amp. average
Frequency Range.....	540 to 1600 KC
I. F. Frequency.....	455 KC
Speaker.....	4" P. M.
Power Output.....	1.2 watts, undistorted 2.5 watts, maximum
Sensitivity.....	10 microvolt average for 1 watt output
Selectivity.....	50 KC broad at 1000 times signal, at 1000 KC

1—6SK7GT—R. F. Amplifier.
1—6SA7GT—Converter.
1—6SK7GT—I.F. Amplifier.
1—6SQ7—Detector—AVC—1st audio.
1—6V6GT—Power output.

A 6X5GT Rectifier is used

Voltages taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes and the rectifier in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 ohms per volt. These voltages are clearly shown on the voltage diagram (Fig. 4).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, rectifier, condensers, resistors, etc., are normal before proceeding with realignment.

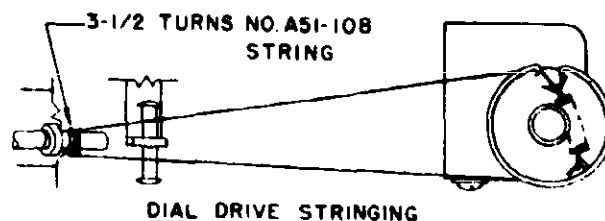
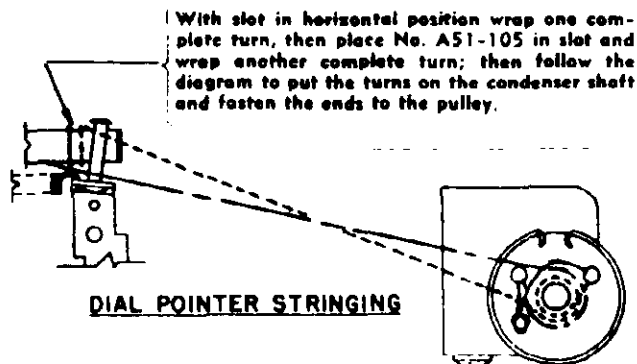
If realignment is necessary follow the instructions given under the heading "ALIGNMENT PROCEDURE". After realignment has been completed repeat the procedure as a final check.

The bottom cover (the one with the speaker louvers) can be removed to permit servicing of major components, such as tubes, rectifier and vibrator, by removing the eight (8) screws holding it to the top cover. There are three (3) screws on each side, one (1) in the rear, and one (1) in the front.

CAUTION: Before attempting to remove the top cover, to service condensers, resistors, etc., the screw connecting the spark plate to the "A" terminal (inside case) must be removed. This is a round head screw, and is located on the rear of the case, close to the mounting stud bolt. It is recessed in a 1/2 inch hole in the case itself, thereby permitting contact with the spark plate.

After removing the spark plate screw, remove the two knobs by pulling forward and remove the eight (8) screws securing the cover to the chassis. Lift the chassis at the rear, at the same time moving it away from the front of the case so that the volume and tuning shafts will clear the holes in the cover.

NOTE: When reinstalling the chassis into the case, be sure the screw connecting the spark plate to the "A" terminal (inside case) is tightened very securely, otherwise the receiver will not operate properly.



ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 75 MMFD.

For alignment points refer to Figures 5 and 6.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T2	Maximum	Output I.F.
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T1	Maximum	Input I.F.
Fully Open	1600 KC	75 MMFD.	Ant. lead	C1B	Maximum	Oscillator
Tune in signal from generator	1400 KC	75 MMFD	Ant. lead	C1A	Maximum	Antenna

NOTE: The antenna trimmer condenser, C3, (see Fig. 3) should be adjusted after the radio is installed in the car. Tune the receiver to a weak station at about 1100 KC and adjust this trimmer for maximum volume.

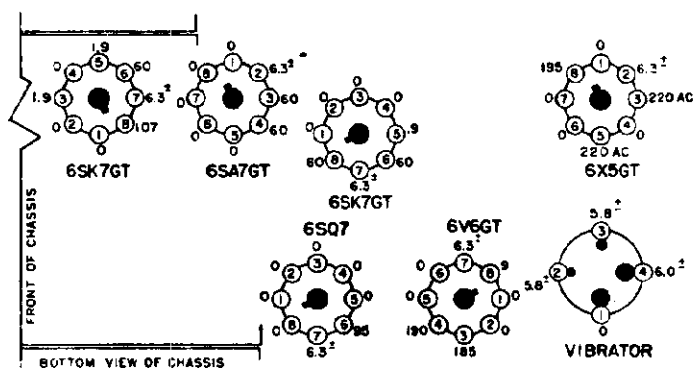


Fig.4. Socket Voltages

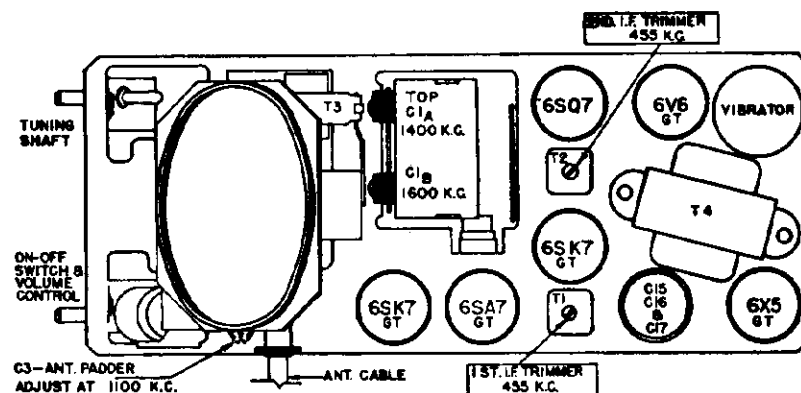


Fig. 5. Tube, Rectifier and Trimmer Locations

MODEL 6297-1,
Ch. 528.6297-1

PARTS LIST

Schematic Diagram Reference	Part No.	Description
CONDENSERS		
C1A, C1B	B19-201	Variable condenser
C2, C14	A16-192	.01 MFD 400 volt condenser
C3	A20-145	Trimmer condenser
C4	A16-189	.05 MFD 400 volt condenser
C5	A15-196	100 MMFD ceramic condenser
C7	A15-204	50 MMFD ceramic condenser
C8	A15-205	12 MMFD ceramic condenser, temp. comp.
C9	A16-187	.1 MFD 400 volt condenser
C10	A15-176	250 MMFD mica condenser
C11	A16-190	.005 MFD 600 volt condenser
C12	A16-195	.001 MFD ceramic condenser
C13	A16-193	.05 MFD 600 volt condenser
C15	A18-289	20 MFD 25 volt electrolytic condenser
C16		20 MFD 350 volt electrolytic condenser
C17		30 MFD 350 volt electrolytic condenser
C19, C20	A16-184	.5 MFD 100 volt condenser
C21	A16-185	.005 MFD 1600 volt oil filled condenser

RESISTORS		
R1, R3	A60-659	22K ohm ½ watt 20% resistor
R2	A60-685	47K ohm ½ watt 20% resistor
R4	A60-769	7.5K ohm 2 watt 10% resistor
R5	A60-726	2.2 megohm ½ watt 20% resistor
R6	A24-177	Volume control, 500,000 ohm, with switch
R7	A60-728	10 megohm ½ watt 20% resistor
R8, R15	A60-758	560 ohm ½ watt 10% resistor
R9	A60-667	220K ohm ½ watt 20% resistor
R10	A60-731	470K ohm ½ watt 20% resistor
R11	A60-771	270 ohm ½ watt 10% resistor
R12	A60-770	470 ohm ½ watt 10% resistor
R13, R14	A60-752	100 ohm ½ watt 10% resistor

COILS AND TRANSFORMERS

L1	A10-527	Antenna Loading Coil
L2	B10-511	Antenna Coil
L4	A10-512	Oscillator Coil
L5	A33-229	Choke, "A" Line
L6	A33-228	Choke, vibrator hash
T1	A10-508	1st I.F. Transformer
T2	A10-509	2nd I.F. Transformer
T3	B80-242	Output Transformer (Part of Speaker, not furnished separately)
T4	B80-243	Power transformer

DIAL PARTS

A11-303	Bracket, Dial Scale
B11-328	Bracket, String Guide
A72-29	Bushing, Tuning Shaft Bearing
A70-130	Clip, Spring, for Tuning Shaft
A58-55	Dial Pointer
B67-545	Dial Scale
A28-101	Gasket for Speaker
A52-300	Knob
A11-329	Link, String Guide
A89-10	Pilot Light, No. 47 Bayonet
A65-37	Rivet, Shoulder, for Dial Pointer Stringing
A65-42	Rivet, Shoulder, for String Guide Brkt. and Link
A65-12	Rivet, Shoulder, for Dial Drive Stringing
A75-70	Shaft, tuning
A75-74	Shaft, for Dial Pointer
A70-132	Spring, for Pilot Light Socket
A70-135	Spring, Dial Drive String Tension
A70-142	Spring, Pointer Drive String Tension
A51-105	String, Pointer Travel, 17"
A51-108	String, Condenser Drive, 19"

S84-233
A83-421
A83-517
A43-10
A47-112
B31-134
A31-138
S84-192
A87-38
B79-379
S84-322
A34-105
A83-519

MISCELLANEOUS

"A" lead assembly
Clip, I.F. Transformer Mounting
Clip, Oscillator Coil Mounting
Fuse, 15 Amp.
Grommet, rubber, (Spkr. & Gang mounting)
Mounting strap, rear
Mounting Plate, Front
Mounting parts kit
Receptacle, Antenna Cable
Speaker, 4" P.M. (includes Output Transformer)
Suppression Kit Assembly
Vibrator
Wiper, grounding, for case covers

Note: Tubular condensers must be high temperature (85°C) wax type.

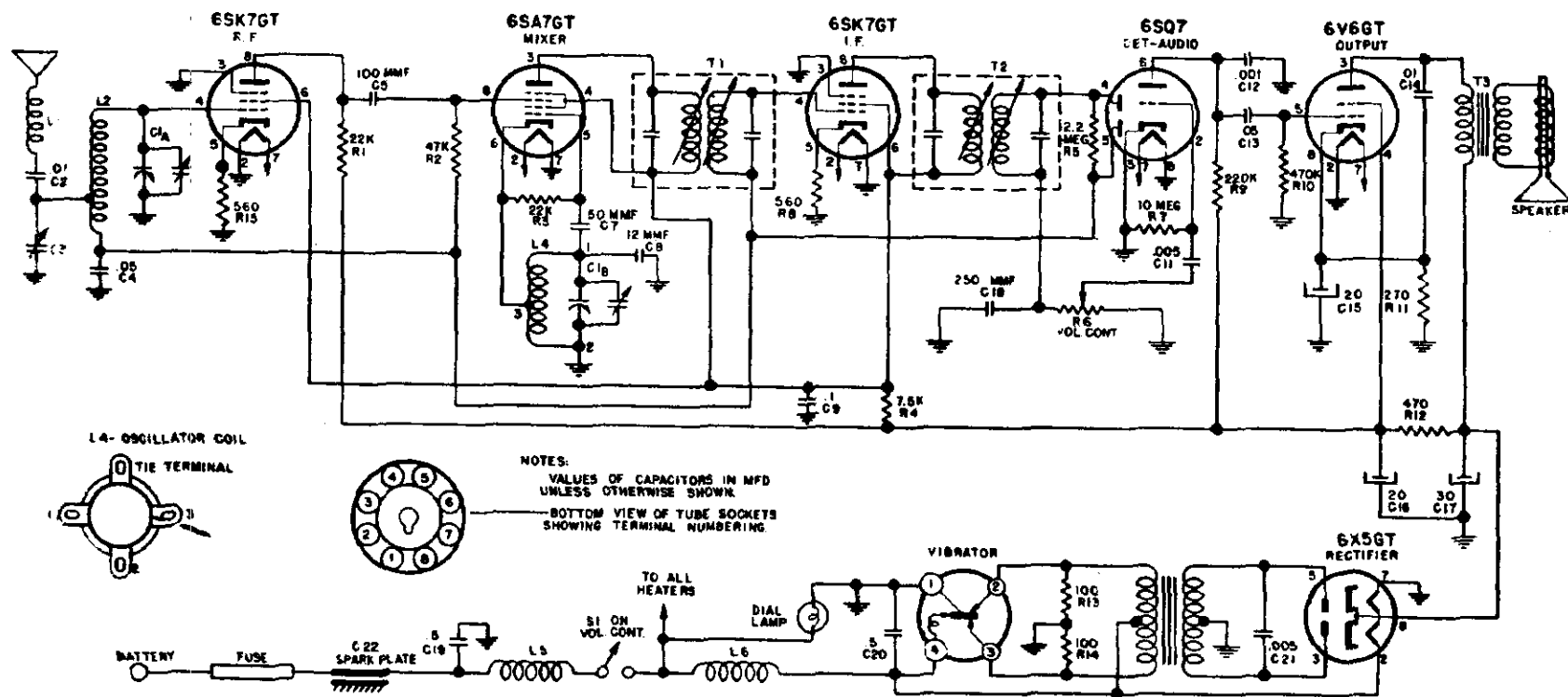


Fig 6. Schematic Diagram

MODEL 6297-2,
Ch. 528.6297-2

DESCRIPTION

Your new automobile receiver is a 5-tube (plus rectifier) superheterodyne, designed to operate from the 6 volt storage battery in your car. It is a universal type of receiver for mounting underneath the dash panel. It has a self-contained PM speaker, and covers the frequency range 540 to 1600 K.C. Two simple controls are provided for operating the receiver. (see fig. 1).

Special care has been taken in the design of this receiver to insure the finest in sensitivity and selectivity, thereby insuring good reception of even distant or weak stations. The unit is simple to install, the antenna input circuit adjustable to permit the use of any two or three section whip or "fish pole" antenna.

OPERATION

To turn the receiver on, rotate the volume control and switch knob (left hand knob) to the right about half its range. After allowing about 30 seconds for the tubes to warm up, the desired station may be tuned by rotating the tuning control (right hand knob) to the desired frequency. The dial scale is calibrated in kilocycles minus the final two zeros. After the station has been properly tuned, the volume may be adjusted by means of the volume control knob. To increase the volume, turn the control to the right; to decrease the volume, turn it to the left. Turning this control to the left as far as it will go, turns the radio off.

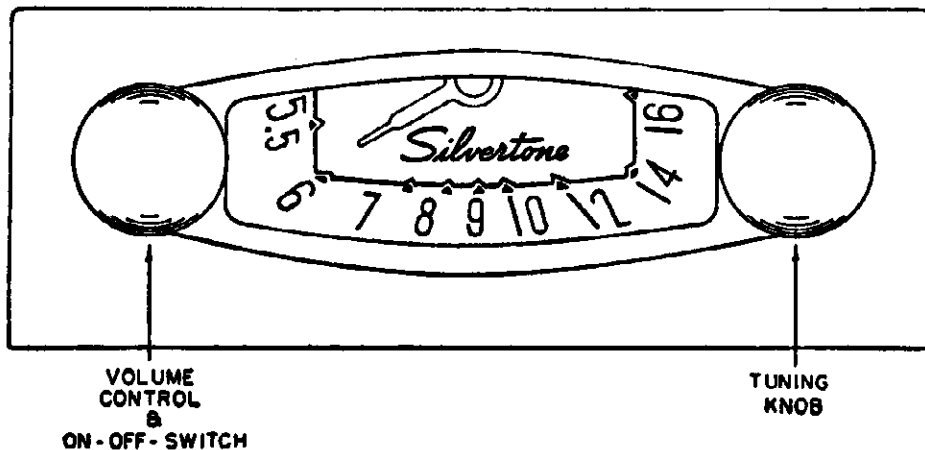


Fig. 1 Front View

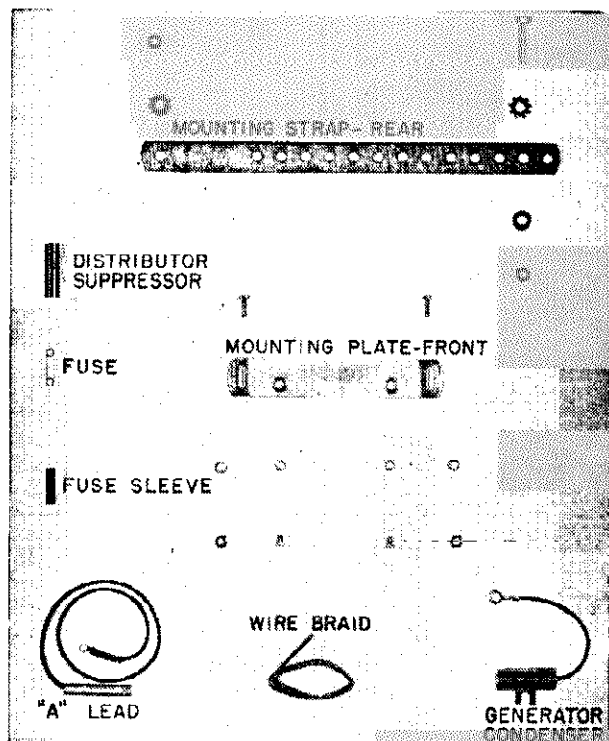


Fig. 2

DIAL POINTER ADJUSTMENT

If it should become necessary to readjust the dial pointer for correct calibration, this may be easily done without removing the radio from the car by proceeding as follows:

- Turn tuning knob to the right (clockwise) as far as it will go.
- Remove snap button located on the right side of the case (viewed from the front), in the extreme upper front corner.
- Insert screwdriver through hole in case and move dial pointer directly over white dot at high end of dial (1600KC).
- Tune receiver to station of known frequency in the center of the dial and readjust pointer for more accurate indication, if necessary.
- Replace snap button into hole in case.

CAUTION: Be careful not to scratch or damage dial scale or dial pointer when making this adjustment.

INSTALLATION

This radio comes to you complete with all hardware necessary for mounting, and also with a distributor suppressor, and generator condenser. By referring to Figures 2 and 3, and following the instructions outlined below, you will find that it is very simple to install.

First determine where the receiver is to be mounted by holding it with the hands in the approximate location in the car. Using the front mounting bracket as a template, mark and drill two $7/32$ " holes in the instrument panel flange. Now secure the mounting bracket to the radio receiver with the screws provided, and then mount the front of the radio to the instrument panel, using the bolts, lock washers and nuts provided for this purpose. The back of the radio is supported by means of the rear mounting strap. The mounting strap should be formed by bending to the correct angles, as illustrated in Figure 3, so that it can then be fastened to the fire wall. After marking and center-punching the fire wall at the correct location, drill with a $3/8$ " drill. The mounting strap is then secured to the radio and fastened to the fire wall of the car with the $1/4$ " bolt, lock washer and nut furnished with the receiver.

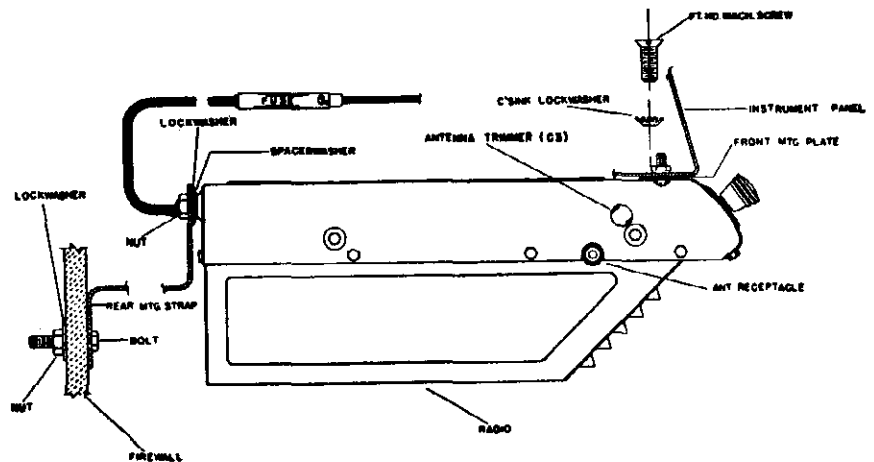


Fig.3. Side View, Showing Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the jack into the socket provided on the side of the radio. Connect the battery cable to the hot side of the ammeter behind the instrument panel. The fuse should then be inserted into the cable receptor.

FINAL ADJUSTMENTS

The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type.

To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 1100 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 3) and adjust the trimmer for maximum volume. A small screw driver will be needed for this purpose.

ACCESSORIES FURNISHED FOR INSTALLATION

All of the parts that are needed for installing this receiver are furnished in the Mounting Parts Kit, part No. S84-192, and the Suppression and Misc. Parts Kit, part No. S84-407, as listed below. Also supplied are the rear mounting strap, part No. B31-134, and the front mounting plate, part No. A31-138.

S84-192 MOUNTING PARTS KIT

- | | |
|--------------------------|-------------------------------|
| 1 $1/4$ " Bolt | 2 External Tooth Lock Washers |
| 2 $1/4$ " Lock Washers | 2 Internal Tooth Lock Washers |
| 2 $1/4$ " Hexagon Nuts | 2 10-32 Hexagon Nuts |
| 2 10-32 x $3/8$ " Screws | 1 Washer-Spacer |
| 2 10-32 x $3/8$ " Screws | |

S84-407 SUPPRESSION KIT & MISC. PARTS

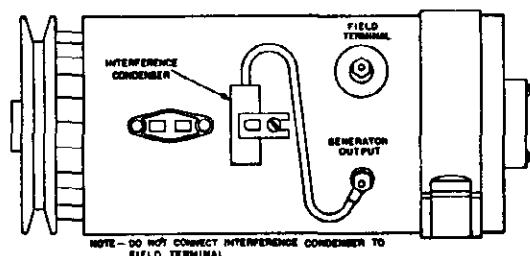
- | | |
|----------------------------|--|
| 1 S84-233 "A" lead assem. | 1 S84-322 Suppression Kit consisting of: |
| 1 A43-10 Fuse | 1—.5 MFD Condenser |
| 2 A52-300 Control Knobs | 1 Distributor Suppressor |
| 1 A81-13 Sleeve (for fuse) | 20" Wire Braid |

MODEL 6297-2,
Ch. 528.6297-2

ELIMINATING MOTOR NOISE

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all three mounting points. A good electrical contact at these points will aid materially in eliminating motor noise.

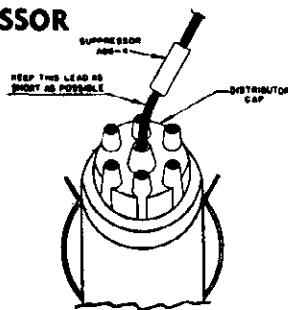
GENERATOR CONDENSER



The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Remove from distributor cap the high tension lead from coil to distributor. Cut the lead two inches from the end, and screw the distributor resistor on to the coil lead, then screw the short length into the resistor and plug the cable into the distributor cap.



NOTE

In most cases the use of the generator condenser and the distributor suppressor will eliminate all objectionable ignition interference. However, if further reduction of noise is found to be desirable, it is suggested that a .5 MFD. condenser, (similar to the one used on the generator), be connected from either side of the ammeter to a good ground.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to try another by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

HIGH AND LOW TENSION LEADS

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These wires will very often pick up motor noise and feed it into the receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension leads. Shield and ground these leads.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead from the coil to the distributor.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

BONDING OF STEERING COLUMN TO BODY

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 75 MMFD.

For alignment points refer to Figures 5 and 6.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T2	Maximum	Output I.F.
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T1	Maximum	Input I.F.
Fully Open	1600 KC	75 MMFD.	Ant. lead	C1B	Maximum	Oscillator
Tune in signal from generator	1400 KC	75 MMFD.	Ant. lead	C1A	Maximum	Antenna

NOTE: The antenna trimmer condenser, C3, (see Fig. 3) should be adjusted after the radio is installed in the car. Tune the receiver to a weak station at about 1100 KC and adjust this trimmer for maximum volume.

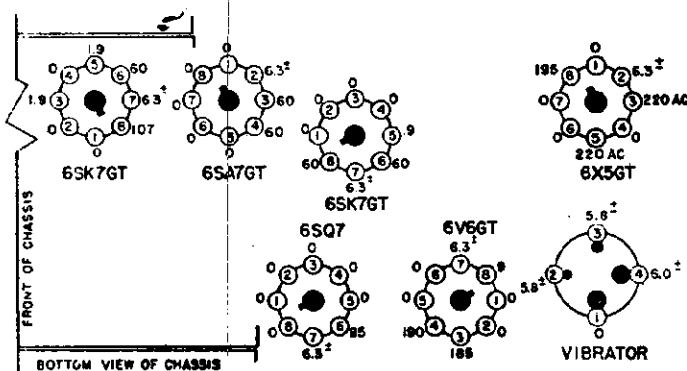


Fig. 4. Socket Voltages

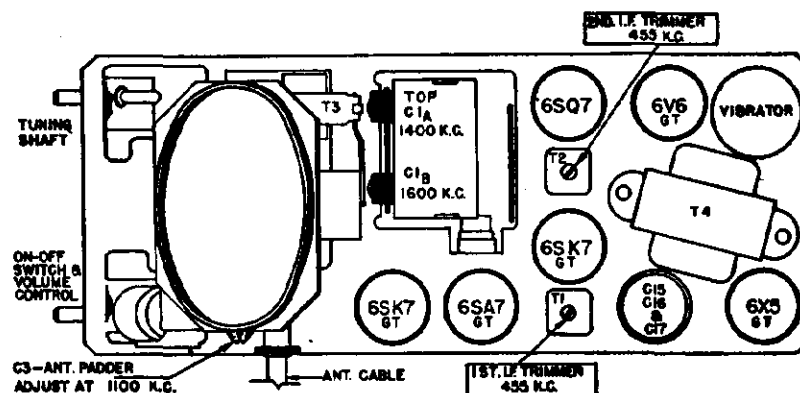


Fig. 5. Tube, Rectifier and Trimmer Locations

MODEL 6297-2,
Ch. 528.6297-2

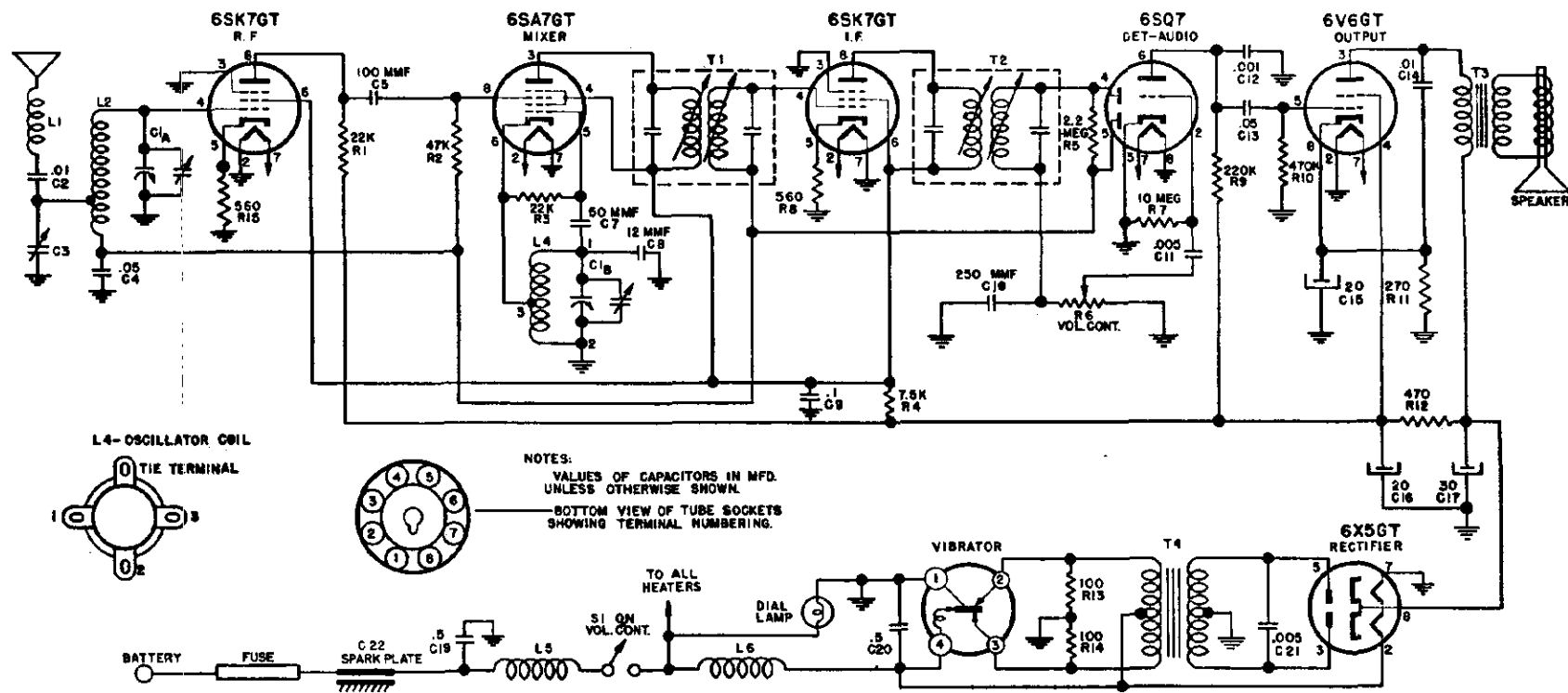


Fig 6. Schematic Diagram

MODEL 6297-2,
Ch. 528.6297-2

Schematic Diagram Reference	Part No.
C1A, C1B	B19-201
C2, C14	A16-192
C3	A20-145
C4	A16-189
C5	A15-196
C7	A15-204
C8	A15-205
C9	A16-187
C10	A15-176
C11	A16-190
C12	A16-195
C13	A16-193
C15	A18-289
C16	
C17	
C19, C20	
C21	A16-184
	A16-185

R1, R3	A60-659
R2	A60-685
R4	A60-769
R5	A60-726
R6	A24-182
R7	A60-728
R8, R15	A60-758
R9	A60-667
R10	A60-731
R11,	A60-771
R12	A60-770
R13, R14	A60-752

L1	A10-527
L2	B10-511
L4	A10-512
L5	A33-229
L6	A33-228
T1	A10-508
T2	A10-509
T3	B80-242
T4	B80-243

Description

CONDENSERS

Variable condenser	_____
.01 MFD 400 volt condenser	_____
Trimmer condenser	_____
.05 MFD 400 volt condenser	_____
100 MMFD ceramic condenser	_____
50 MMFD ceramic condenser	_____
12 MMFD ceramic condenser, temp. comp.	_____
.1 MFD 400 volt condenser	_____
250 MMFD mica condenser	_____
.005 MFD 600 volt condenser	_____
.001 MFD ceramic condenser	_____
.05 MFD 600 volt condenser	_____
20 MFD 25 volt electrolytic condenser	} _____
20 MFD 350 volt electrolytic condenser	
30 MFD 350 volt electrolytic condenser	
.5 MFD 100 volt condenser	_____
.005 MFD 1600 volt oil filled condenser	_____

RESISTORS

22K ohm ½ watt 20% resistor	_____
47K ohm ½ watt 20% resistor	_____
7.5K ohm 2 watt 10% resistor	_____
2.2 megohm ½ watt 20% resistor	_____
Volume control, 500,000 ohm, with switch	_____
10 megohm ½ watt 20% resistor	_____
560 ohm ½ watt 10% resistor	_____
220K ohm ½ watt 20% resistor	_____
470K ohm ½ watt 20% resistor	_____
270 ohm ½ watt 10% resistor	_____
470 ohm ½ watt 10% resistor	_____
100 ohm ½ watt 10% resistor	_____

COILS AND TRANSFORMERS

Antenna Loading Coil	_____
Antenna Coil	_____
Oscillator Coil	_____
Choke, "A" Line	_____
Choke, vibrator hush	_____
1st I.F. Transformer	_____
2nd I.F. Transformer	_____
Output Transformer (Part of Speaker, not furnished separately)	_____
Power transformer	_____

DIAL PARTS

Bracket, Dial Scale	_____
Bracket, String Guide	_____
Bushing, Tuning Shaft Bearing	_____
Clip, Spring, for Tuning Shaft	_____
Dial Pointer	_____
Dial Scale	_____
Gasket for Speaker	_____
Knob	_____
Link, String Guide	_____
Pilot Light, No. 47 Bayonet	_____
Rivet, Shoulder, for Dial Pointer Stringing	_____
Rivet, Shoulder, for String Guide Brkt. and Link	_____
Rivet, Shoulder, for Dial Drive Stringing	_____
Shaft, tuning	_____
Shaft, for Dial Pointer	_____
Spring, for Pilot Light Socket	_____
Spring, Dial Drive String Tension	_____
Spring, Pointer Drive String Tension	_____
String, Pointer Travel, 17"	_____
String, Condenser Drive, 19"	_____

MISCELLANEOUS

"A" lead assembly	_____
Clip, I.F. Transformer Mounting	_____
Clip, Oscillator Coil Mounting	_____
Fuse, 15 Amp.	_____
Grommet, rubber, (Spkr. & Gang mounting)	_____
Mounting strap, rear	_____
Mounting Plate, Front	_____
Mounting parts kit	_____
Receptacle, Antenna Cable	_____
Speaker, 4" P.M. (includes Output Transformer)	_____
Suppression Kit Assembly	_____
Vibrator	_____
Wiper, grounding, for case covers	_____

Note: Tubular condensers must

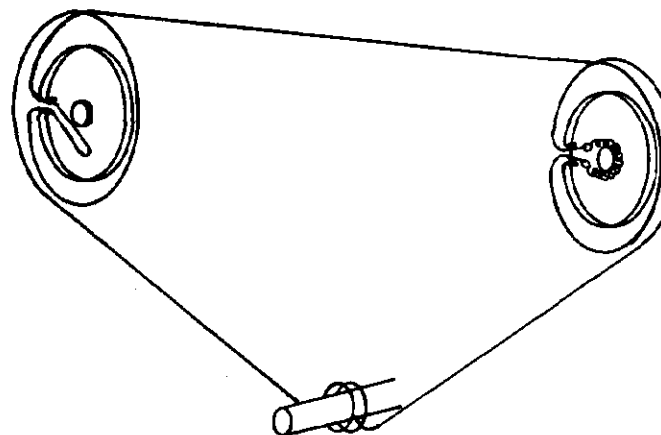
be high temperature (85°C) wax type.

S84-233
A83-421
A83-517
A43-10
A47-112
B31-134
B31-138
S84-192
A87-38
B79-379
S84-322
A34-105
A83-519

**SCHEMATIC PART
LOCATION NUMBER**

DESCRIPTION

	F-7621	Arm, Assembly (including pickup arm, pivot spring and arm lift bearing pin assembly)
	F-7622	Cartridge—Crystal (Less Needle)—Shure Bros. P92B
	F-298	Cabinet (including Lid, Hinges and Lid Support)
	F-7679	Lid—Cabinet (For F-298 Cabinet)
	F-5051	Capacitor—Variable Assembly
C19, C20	F-5051	Capacitor—Electrolytic—40 MFD. 150 V.
		40 MFD. 150 V.
C5, C11	F-6015	Capacitor—Ceramic 100 MMFD. 500 V. 20%
C12	F-7549	Capacitor—Ceramic 100 MMFD. 500 V. 10%
C15	F-6488	Capacitor—Ceramic 250 MMFD. 500 V. 20%
C13	F-4894	Capacitor—Paper .005 MFD. 600 V.
C16	F-1344	Capacitor—Paper .01 MFD. 400 V.
C18	F-1376	Capacitor—Paper .02 MFD. 400 V.
C6, C7, C14	F-1345	Capacitor—Paper .05 MFD. 200 V.
C21	F-1346	Capacitor—Paper .05 MFD. 400 V.
C10	F-4957	Capacitor—Paper .09 MFD. 200 V.
C17	F-1623	Capacitor—Paper .1 MFD. 400 V.
	F-6149	Coil—Antenna
	F-7139	Coil—Oscillator
R5	F-5757	Control—On-Off & Volume
R12	F-6157	Control—Tone
	F-1090	Cord—Line
	F-6738	Knob—Plastic—Volume Control
	F-6740	Knob—Plastic—Tone Control
	F-6742	Knob—Plastic—Radio-Phono
	F-6744	Knob—Station Tuning
	F-7683	Leaflet—Instruction
	F-7623	Motor—Phono—60 Cycle (Less Turntable)
	F-7707	Needle—Phono
	F-7673	Panel Assembly—Cabinet Front
R14	F-4022	Resistor—33 Ohm— $\frac{1}{2}$ W.—20%
R10	F-4067	Resistor—180 Ohm— $\frac{1}{2}$ W.—10%
R1	F-4025	Resistor—22,000 Ohm— $\frac{1}{2}$ W.—20%
R4	F-4063	Resistor—47,000 Ohm— $\frac{1}{2}$ W.—20%
R9	F-4064	Resistor—33,000 Ohm— $\frac{1}{2}$ W.—20%
R2, R8	F-4026	Resistor—220,000 Ohm— $\frac{1}{2}$ W.—20%
R11	F-4027	Resistor—470,000 Ohm— $\frac{1}{2}$ W.—20%
R3, R6	F-1262	Resistor—1 Megohm— $\frac{1}{2}$ W.—20%
R7	F-4028	Resistor—6.8 Megohm— $\frac{1}{2}$ W.—20%
R13	F-5358	Resistor—1,000 Ohm—1 W.—10%
	F-4978	Shield—I.F. Transformer
	F-7515	Socket—Tube—8 Prong—Octal
	F-6148	Speaker—5" P.M. Dynamic
	F-6156	Switch—Radio-Phono
T1	F-7676	Transformer—I.F. #1
T2	F-7677	Transformer—I.F. #2
T3	F-4875	Transformer—Output



DIAL DRIVE STRINGING DIAGRAM

RADIO SPECIFICATIONS

Power Supply:	All models available 117 Volts AC 60 Cycles
Frequency Range:	Broadcast 535-1620 KC
Power Output:	Undistorted 1.0 Watt
	Maximum 1.8 Watts

DISASSEMBLY INSTRUCTIONS

The following steps must be taken in removing the chassis from the cabinet:

1. Remove wood enclosure panel in record changer compartment.
2. Remove two speednuts located in rear of front panel. These speednuts retain the pins used to fasten the top of Dial Crystal to front panel.
3. Remove two pins and lift out crystal.
4. Remove dial pointer, knobs, motor & pickup plugs and antenna connections.
5. Remove five screws used to mount chassis board to underside of cabinet.
6. Remove chassis and mounting board.

NOTE: In some receivers the following components—R8, R11, C15 and C16 are replaced by the assembly listed below:

F-6477 Audio Coupling Plate

MODELS 41, 41A,
9082, Ch. 135.245

POSITION OF TUNER	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMER ADJUSTMENTS (IN ORDER) SHOWN	TRIMMER FUNCTION
Closed	455 KC	.1 mfd.	12SA7GT Transl. Grid	T2, C9, & C8	I.F.
Open	1620 KC	.0002 mfd.	Loop	C4	Oscillator
1400 KC	1400 KC	.0002 mfd.	Loop	C2	Transl.

IMPORTANT ALIGNMENT NOTES

The alignment must be done in the order given.

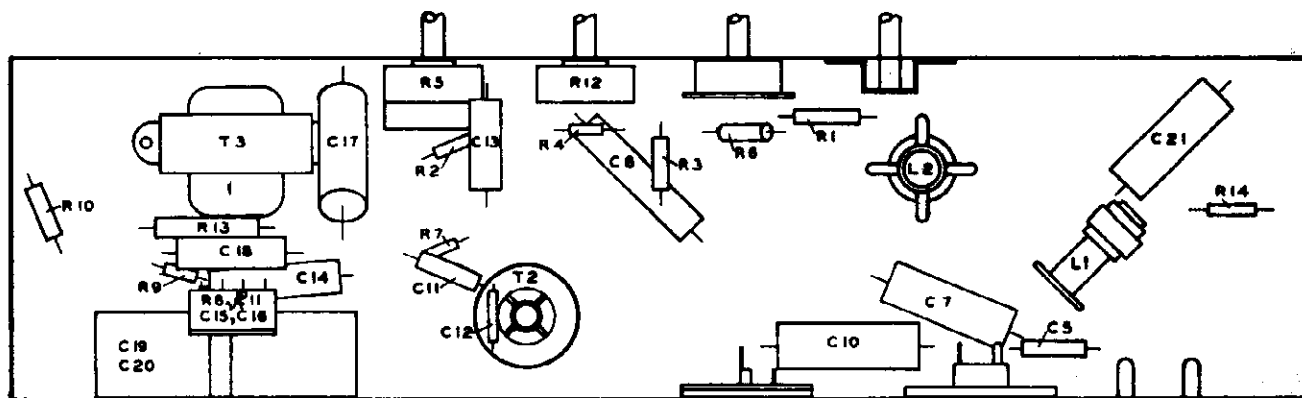
The entire Alignment Procedure should be repeated step by step in the original order for greatest accuracy.

Always keep the output power from the generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment.

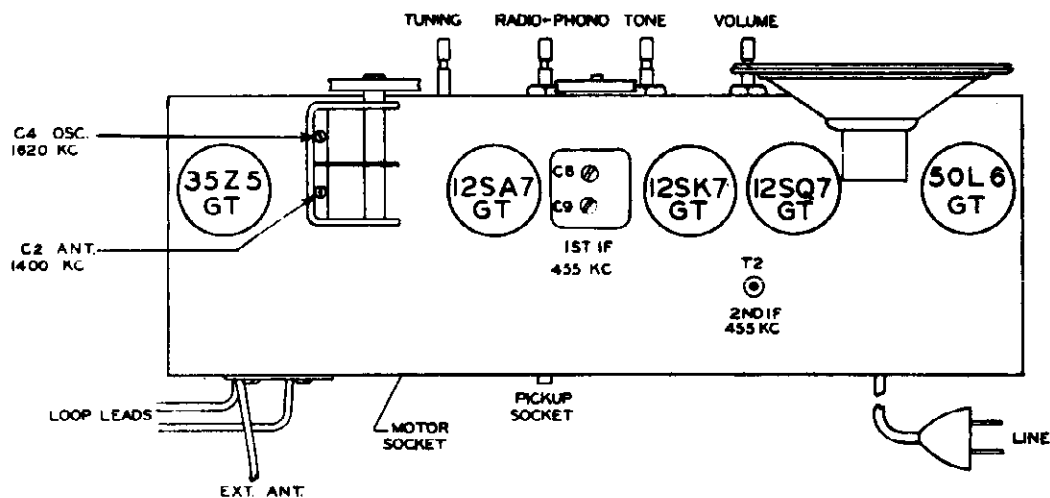
ALIGNMENT PROCEDURE

PRELIMINARY:

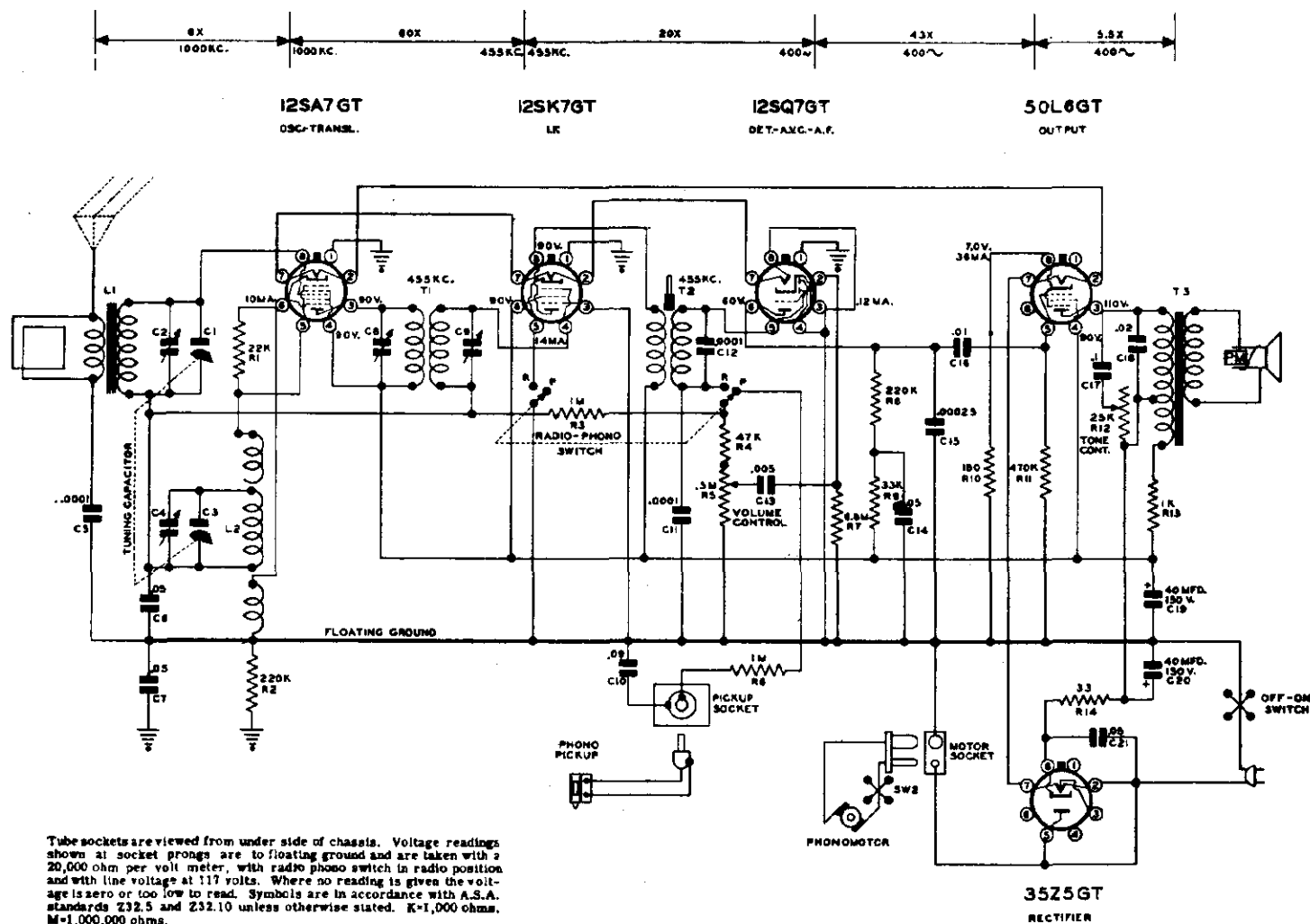
Output Meter Connection. Across loud speaker voice coil
Generator ground lead connection. Floating Ground
Dummy Antenna Value to be in series with generator output. See chart below
Connection of Generator Output lead. See chart below
Generator Modulation. 30%, 400 Cycles
Position of Volume Control. Fully on



LOCATION OF PARTS UNDER CHASSIS



LOCATION OF PARTS ON TOP OF CHASSIS



SEARS, ROEBUCK PAGE 21 8

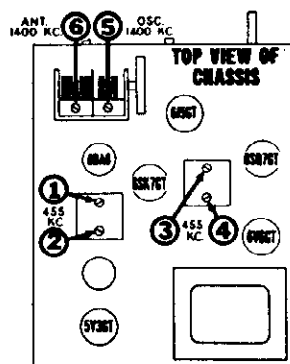
MODELS 41, 41A, 9082, ch. 135.245

PRELIMINARY:

POSITION OF TUNER	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMER ADJUSTMENTS (IN ORDER SHOWN)	TRIMMER FUNCTION	SENSITIVITY (FOR .05 WATT OUTPUT)
Closed	455 Kc.	0.1 mfd.	Trimmer #6	1, 2, 3 & 4	I.F.	46 mv
1400 Kc.	1400 Kc.	200 mmfd.	Ext. Ant. Clip	5	Osc.	
1400 Kc.	1400 Kc.	200 mmfd.	Ext. Ant. Clip	6	Ant.	100 mv/m

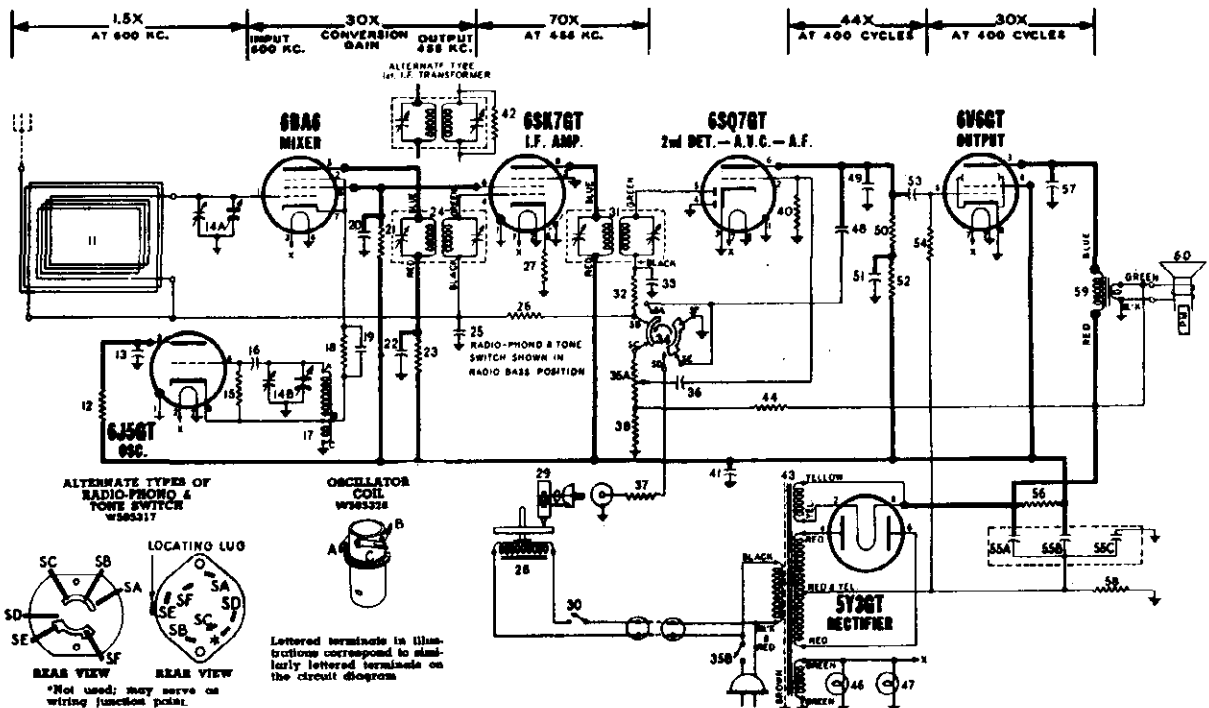
The alignment must be done in the order given.

Always keep the output power from the generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment.



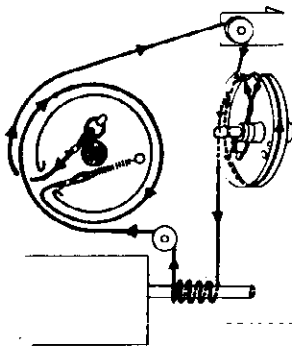
The audio system of this receiver utilizes a two stage type of inverse feed-back arrangement and should it ever be necessary to replace the speaker or output transformer it is important to maintain a definite phase relationship in the feed-back circuit. If the connections to the output transformer are reversed or if the feed-back connection is made to the wrong side of the output transformer secondary, the system will become regenerative instead of degenerative. Under those conditions audio oscillation may result. If that occurs, oscillation may be prevented by reversing the connections to the speaker.

SCHEMATIC DIAGRAM

DIAL POINTER DRIVE CORD
ARRANGEMENT
(Side View)

To string dial cord, set gang condenser to fully open position and use the following parts:

W114955 Clip on end of cord
W117057 Cord (3 feet)
W119087 Ring for dial cord
W505161 Tension spring

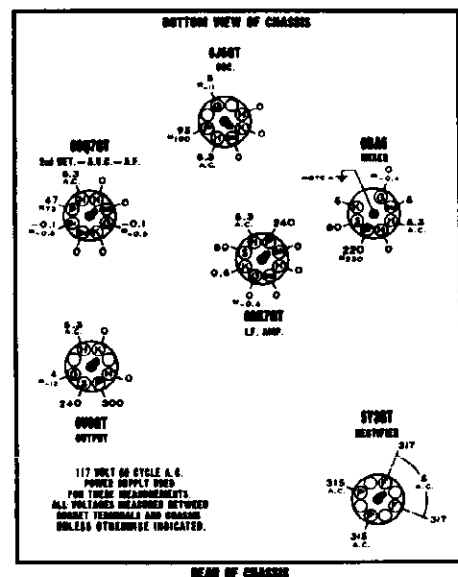


To replace and properly position pointer see step 1 in "Alignment Procedure"

SOCKET VOLTAGES

Measured with voltmeter having sensitivity of 1000 Ohms per volt except where indicated by (*). The (*) symbol designated a vacuum tube voltmeter measurement.

DIAL TUNED TO 540 KC.
VOLUME ON FULL WITH NO SIGNAL
RADIO-PHONO & TONE SWITCH IN
"RADIO-BASE" POSITION



NOTE A: Grounding of center stud on tube socket is necessary to reduce capacity coupling between other pins. Oscillation may result if this ground is omitted.

SPECIFICATIONS

Power Supply
All models available . . . 117 volts AC, 60 cycle Radio 60 watts
Phono 30 watts

Frequency Range
Broadcast . . . 540-1600 Kc.

Power Output
Undistorted . . 3.0 watts
Maximum . . . 5.0 watts

REPAIR PARTS LIST

<u>SCHEMATIC LOCATION</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>
<u>CONDENSERS</u>		
13.....	W502151	Condenser—.01 Mfd. 400 volt.....
14-A,B...	W505315	Condenser—variable gang (with drum)..
16.....	W502931	Condenser—ceramic 100 Mmfd. 500 volt.
19.....	W502153	Condenser—.05 Mfd. 200 volt.....
20.....	W502157	Condenser—.05 Mfd. 400 volt.....
22.....	W502152	Condenser—.02 Mfd. 400 volt.....
25.....	W502153	Condenser—.05 Mfd. 200 volt.....
33.....	W502931	Condenser—ceramic 100 Mmfd. 500 volt.
36.....	W502156	Condenser—.004 Mfd. 400 volt.....
41.....	W502157	Condenser—.05 Mfd. 400 volt.....
48.....	W512006	Condenser—.005 Mfd. 600 volt.....
49.....	W502271	Condenser—mica 260 Mmfd. 500 volt....
51.....	W502410	Condenser—.1 Mfd. 400 volt.....
53.....	W502152	Condenser—.02 Mfd. 400 volt.....
55-A,B,C.	W502207	Condenser—electrolytic A—20 Mfd. 400 volt B—10 Mfd. 400 volt C—20 Mfd. 25 volt.
57.....	W502156	Condenser—.004 Mfd. 400 volt.....
<u>RESISTORS</u>		
12.....	W502466	Resistor—carbon 33,000 Ohms $\pm 10\%$ 1w.
15.....	W502131	Resistor—carbon 47,000 Ohms 1/4 watt.
18.....	W502128	Resistor—carbon 2200 Ohms 1/4 watt...
21.....	W502288	Resistor—carbon 47,000 Ohms 1 watt...
23.....	W502459	Resistor—carbon 6800 Ohms 1/4 watt...
26.....	W502269	Resistor—carbon 3.3 Meg. 1/4 watt....
27.....	W502264	Resistor—carbon 47 Ohms $\pm 10\%$ 1/4 w..
32.....	W502131	Resistor—carbon 47,000 Ohms 1/4 watt.
35-A,B...	W505318	Volume control 1 Meg. (with switch)...
37.....	W510185	Resistor—carbon 470,000 Ohms 1/2 watt
38.....	W510122	Resistor—carbon 150 Ohms 1/2 watt....
40.....	W502468	Resistor—carbon 4.7 Meg. 1/4 watt....
42.....	W510191	Resistor—carbon 1 Meg. 1/2 watt.....
44.....	W510146	Resistor—carbon 150 Ohms 1/2 watt....
50.....	W502133	Resistor—carbon 220,000 Ohms 1/4 watt
52.....	W502133	Resistor—carbon 220,000 Ohms 1/4 watt
54.....	W502134	Resistor—carbon 470,000 Ohms 1/4 watt
56.....	W504771	Resistor—carbon 3300 Ohms 2 watt.....
58.....	W502293	Resistor—wire wound 200 Ohms $\pm 10\%$ 2 w

SCHEMATIC
LOCATIONPART
NUMBERDESCRIPTIONCOILS AND TRANSFORMERS

11.....	W508361	Loop antenna.....
17.....	W505326	Coil—oscillator.....
24.....	W502657	Transformer—1st I.F.....
31.....	W502658	Transformer—2nd I.F.....
43.....	W502174	Transformer—power.....
59.....	W505305	Transformer—output.....

OTHER ELECTRICAL PARTS

28.....	W508120	Motor—for record changer; 115 volt 60 cycle.....
29.....	W508432	Crystal Cartridge.....
30.....	W505269	Switch—"ON-OFF" for record changer...
34.....	W505317	Switch—radio-phonograph.....
46, 47...	W110629	Lamp—dial (Mazda #44) 6.3 volt 0.25 Amp.....
60.....	W506657	Speaker—P.M. Dynamic (6 inch).....

MISCELLANEOUS PARTS

W116467	Base for mtg. electrolytic condenser..
W505165	"C" Washer—for tuning shaft.....
KX508371	Cabinet.....
W112745	Clip—coil mounting.....
W114955	Clip—retainer on end of dial cord....
W160326	Clip—retains dial scale.....
W117057	Cord—dial drive (3 ft. required) .....per foot
W508363	Dial scale (foil).....
W508350	Escutcheon and dial window assy.....
W505464	Hinge for lid.....per pair
W505344	Knob—tuning (clear plastic).....
W505345	Knob—"Volume" (clear plastic).....
W505346	Knob—"Radio-Phono" (clear plastic)...
W508372	Lid (less hardware).....
W505463	Lid support.....
W508433	Needle—phonograph; for standard records.....
W508434	Needle—phonograph; for "Fine Groove" and "Microgroove" records.....
W500966	Plug for phono. pick-up cable.....
W501031	Plug for phono. motor cable.....
W505686	Pointer.....
W508266	Record changer.....
W119087	Ring for dial cord.....
W505944	Rubber pad for mtg. chassis.....
W79993	Screw—#8 x 1 1/4"; for mtg. chassis..
W162054	Shaft and drum for pointer.....
W505313	Shaft—tuning.....
W117716	Shield—tube.....
W505459	Socket—dial lamp.....
W504397	Socket—miniature.....
W116690	Socket—octal base.....
W160392	Socket—octal (rectifier).....
W160039	Socket—phono. plug.....
W505307	Socket and phono. motor cable.....
W505161	Spring—tension.....
W11456	Washer—spring washer for tuning shaft

SPECIFICATIONS

Power Supply:

Power Output:

Undistorted0.15 Watt

Maximum0.30 Watt

117 Volts, DC or 50-60 Cycles AC, 11 Watts or Catalog No.
6404 Battery Pack.

Frequency Range:

Broadcast540-1610 KC

Schematic Location	Part Number	DESCRIPTION
--------------------	-------------	-------------

CHASSIS PARTS

C1, C2, C3 C4, C5, C6 C7 C8, C10 C11 C9 C12, C17 C13 C14 C15, C16 C18, C19 C20, C21, C22 L3 R11, S1	T84-391	Cable, assembly, battery
	T83-421	Clip, I.F. transformer mounting
	T18-296	Capacitor, electrolytic
	T19-207	Capacitor, variable (3 gang)
	T20-149	Capacitor, trimmer
L1	T16-153	Capacitor, .005 mfd. 600 v.
	T15-188	Capacitor, 100 mmfd. mica
	T16-152	Capacitor, .05 mfd. 200 v.
	T15-186	Capacitor, 10 mmfd. mica
	T16-150	Capacitor, .02 mfd. 400 v.
	T16-157	Capacitor, .1 mfd. 200 v.
	T16-179	Capacitor, .05 mfd. 400 v.
	T17-100	Couplate, ceramic unit
	T10-553	Coil, oscillator
	T24-185	Control, volume
L1	T84-77	Cord, power, AC/DC
	T51-105	Cord, pointer travel, 28"
	T21-152	Cover, plate, bottom
	T47-108	Grommet, variable condenser
	T76-13	Insulator, electrolytic
	T52-196	Knob, AC/DC/battery switch
	T82-65	Loop, antenna
	T45-121	Plug, AC/DC
	T58-77	Pointer
	T39-265	Pulley, dial cord
L1	T83-642	Rectifier, selenium

Schematic Location	Part Number	DESCRIPTION
S2	T69-173	Switch, AC/DC/battery
T1, T2	T10-475	Transformer, 1st and 2nd I.F.
T3	T80-228	Transformer, output
L2	T10-535	Transformer, RF
	T86-51	Washer, "C", tuning shaft
	T86-80	Washer, compression, tuning shaft

CABINET PARTS

	T44-10	Baffle
	T22-159	Button, plug (trimmer hole)
	T42-463	Cabinet
	T67-549	Dial scale
	T40-152	Escutcheon
	T52-203	Grille cloth
	T31-157	Knob
	T76-17	Plate, loop cover
	T97-70	Terminal strip, loop
	T97-132	Screw, #6-3/8, statutory bronze
	T98-12	Screw, #6-1/4, statutory bronze

Schematic Location	Part Number	DESCRIPTION
R1	T60-744	Resistor, 22,000 ohms, 1/2 w. 10%
R2	T60-669	Resistor, 4.7 meg. 1/2 w.
R3, R5	T60-728	Resistor, 10 meg. 1/2 w.
R4	T60-730	Resistor, 47,000 ohms, 1/2 w.
R6	T60-704	Resistor, 330 ohms, 1/2 w. 10%
R7	T60-727	Resistor, 100,000 ohms, 1/2 w.
R8	T60-676	Resistor, 30,000 ohms, 1/2 w.
R9	T60-770	Resistor, 470 ohms, 1/2 w. 10%
R10	T60-726	Resistor, 2.2 meg. 1/2 w.
R12, R15	T60-729	Resistor, 1500 ohms, 1/2 w. 10%
R13	T60-708	Resistor, 680 ohms, 1/2 w. 10%
R14	T60-796	Resistor, 110 ohms, 3 w. 10%
R16	T60-757	Resistor, 2000 ohms, 10 w. 5%
R17, R18, R19	T17-100	Couplate, ceramic unit
	T75-79	Shaft, tuning
	T68-39	Socket miniature, wafer
	T79-378	Speaker, 5" P.M.
	T70-122	Spring, dial cord

ALIGNMENT PROCEDURE

Output meter reading to indicate 0.05 watt across voice coil 0.4 v.

Generator ground lead connected.....To B- through 0.1 mfd. capacitor

Generator modulation30%, 400 cycles

Position of volume control.....Fully on

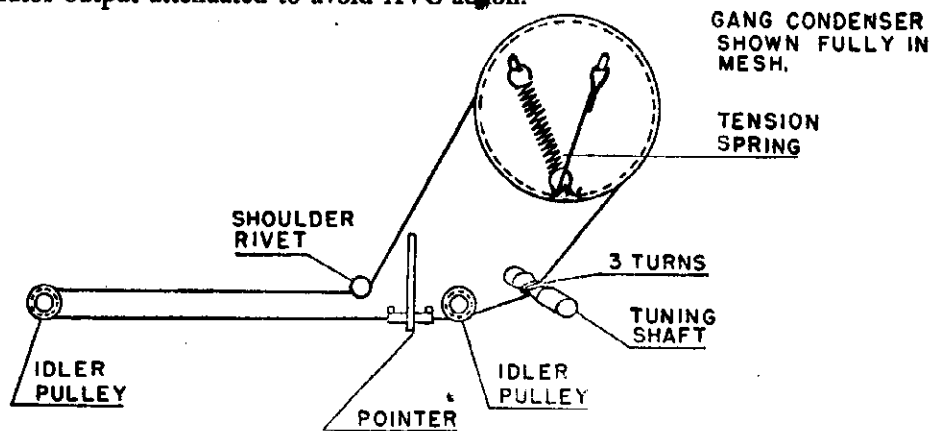
Position of pointer with tuner fully closed.....Center of pointer lined up with extreme
left dot on dial backing plate.
(Chassis right side up.)

MODEL 9280,
Ch. 528.168

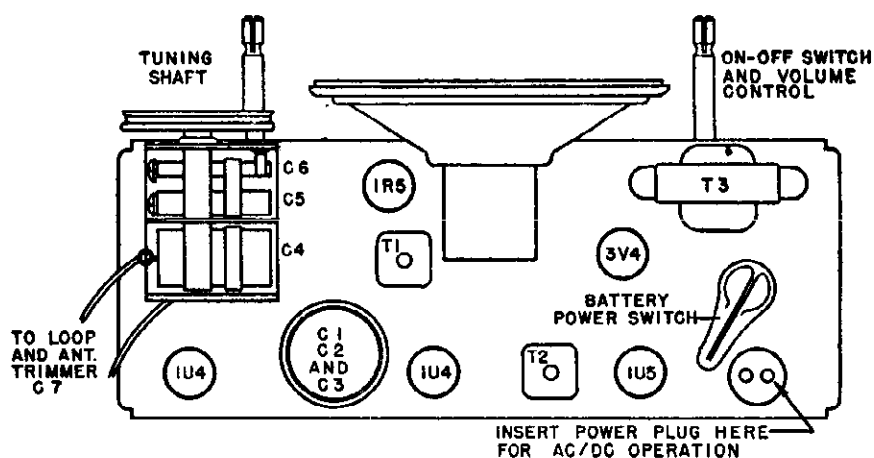
Position of Tuner	Generator Freq.	Dummy Antenna	Generator Connection	Adjustments (in order shown)	Function	Max. Microvolts Input to produce .05 w. output
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1U4 I-F Amp.	T2 (top and bottom)	I.F.	5000
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1R5 Conv.	T1 (top and bottom)	I.F.	250
Min. Cap.	1610 kc	0.1 mfd.	Stator ant. tuner	C6	Osc.	
1400 kc	1400 kc	0.1 mfd.	Stator ant. tuner	C5	R.F.	30
1400 kc	1400 kc		Hazeltine Test Loop	C7	Loop	100

ALIGNMENT NOTES:

1. It is recommended that this set be connected to an isolation transformer when aligning on AC.
2. The alignment must be done in the order given above.
3. While making the above adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

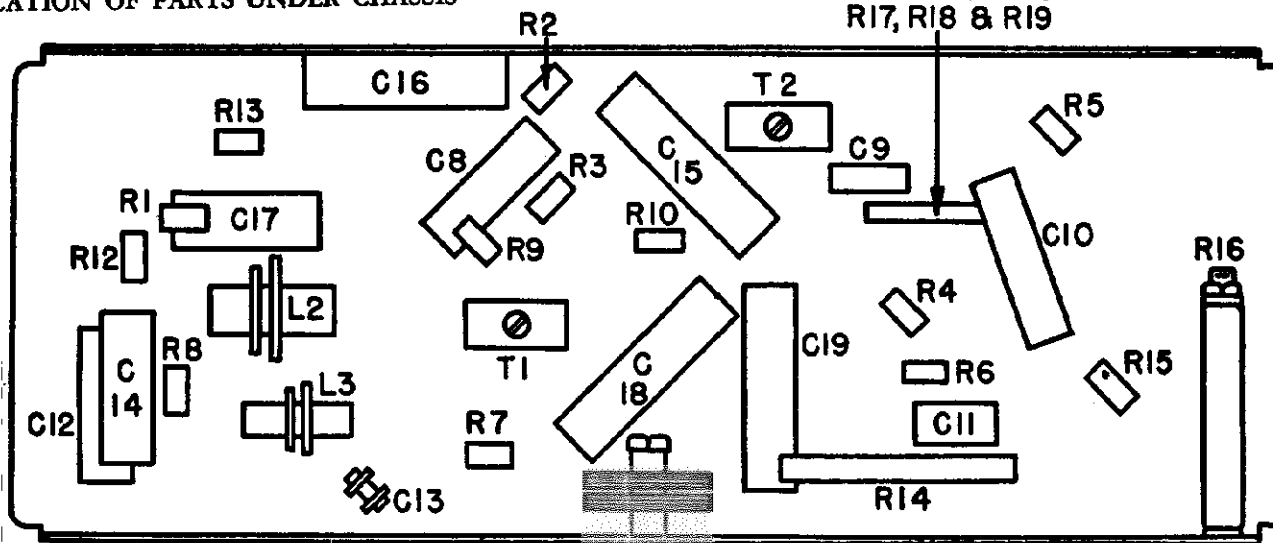


STRING AND POINTER HOOKUP

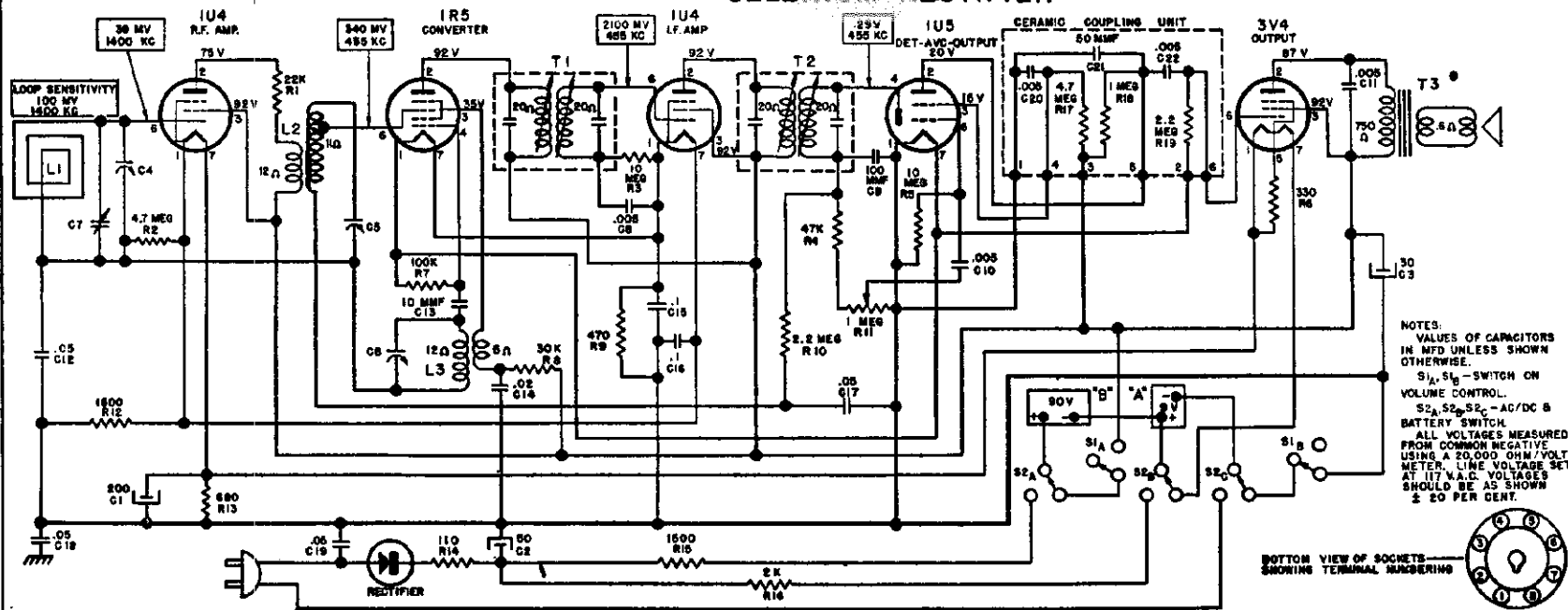


LOCATION OF PARTS ON TOP OF CHASSIS

C20, C21, C22,
R17, R18 & R19

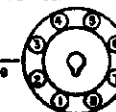


SELECTION RECTIFIER



NOTES:
VALUES OF CAPACITORS
IN MFD UNLESS SHOWN
OTHERWISE.
S₁, S₂ - SWITCH ON
VOLUME CONTROL.
S₂, S₂, S₂ - AC/DC &
BATTERY SWITCH.
ALL VOLTAGES MEASURED
FROM COMMON NEGATIVE
USING A 20,000 OHM/VOLT
METER LINE VOLTAGE SET
AT 117 M.A.C. VOLTAGES
SHOULD BE AS SHOWN
± 20 PER CENT.

**BOTTOM VIEW OF SOCKETS—
SHOWING TERMINAL NUMBERING**



SCHEMATIC DIAGRAM FOR SILVERTONE CHASSIS 528.168

MODEL 215,
Ch. 528.174

SPECIFICATIONS

Power Supply:

Power Output:

Undistorted 0.15 Watt

Maximum 0.30 Watt

117 Volts, DC or 50-60 Cycles AC, 11 Watts or Catalog No.
6480 "B" Battery and two Flashlight Cells

Frequency Range:

Broadcast 540-1625 KC

Schematic Location	Part Number	DESCRIPTION
--------------------	-------------	-------------

CHASSIS PARTS

C1, C2	T19-209	Capacitor, variable (2 gang)
C3, C4, C5	T18-297	Capacitor, electrolytic
C6	T15-205	Capacitor, 50 mmfd. ceramic
C7, C14	T16-153	Capacitor, .005 mfd. 600 v.
C8, C16, } C17	T16-150	Capacitor, .02 mfd. 400 v.
C9, C10, } C11, C12, } C13	T17-103	Capacitor, ceramic unit
C15	T16-152	Capacitor, .05 mfd. 200 v.
C18	T16-179	Capacitor, .05 mfd. 400 v.
	T11-187	Clamp, power cord
	T83-421	Clip, I.F. transformer mounting
L2	T10-554	Coil, oscillator

Schematic Location	Part Number	DESCRIPTION
R11, R12	T60-668	Resistor, 1 megohm, 1/2 w.
R13	T60-708	Resistor, 680 ohm, 1/2 w. 10%
R14	T60-709	Resistor, 820 ohm, 1/2 w. 10%
R15	T60-770	Resistor, 470 ohm, 1/2 w. 10%
R16	T60-729	Resistor, 1500 ohm, 1/2 w. 10%
R17	T60-725	Resistor, 160 ohm, 3 w. 5%
R18	T60-757	Resistor, 2000 ohm, 10 w. 5%
R19	T60-711	Resistor, 2700 ohm, 1/2 w. 10%
R20	T60-771	Resistor, 270 ohm, 1/2 w. 10%
	T71-43	Shield, volume control
	T68-39	Socket, miniature wafer
	T77-151	Spacer, variable condenser
	T79-382	Speaker, 3 1/2" P.M.
	T70-165	Spring

Schematic Location	Part Number	DESCRIPTION
R4, S1	T76-69	Connector, "B" battery
	T24-187	Control, volume and switch
	T23-162	Cord, power, AC/DC
	T21-159	Cover, bottom
	T47-108	Grommet, variable condenser
	T37-126	Insulator, volume control
	T37-127	Insulator, selenium rectifier
L1	T82-68	Loop, antenna
	T83-642	Rectifier, selenium
R1	A60-727	Resistor, 100,000 ohm, 1/2 w.
R2, R5	A60-728	Resistor, 10 megohm, 1/2 w.
R3	A60-730	Resistor, 47,000 ohm, 1/2 w.
R6	A60-669	Resistor, 4.7 megohm, 1/2 w.
R7, R8	A60-726	Resistor, 2.2 megohm, 1/2 w.
R9	A60-690	Resistor, 27 ohm, 1/2 w. 10%
R10	A60-753	Resistor, 220 ohm, 1/2 w. 10%

Schematic Location	Part Number	DESCRIPTION
T1, T2	T10-508	Transformer, 1st and 2nd I.F.
T3	T80-256	Transformer, output

CABINET PARTS

	T42-468	Cabinet—front —back cover
	T22-155	Clip, back cover
	T35-8	Clip, "A" battery retainer
	T83-431	Handle
	T70-164	Hinge, spring clip
	T52-307	Knob
	T67-544	Overlay, dial scale
	T67-555	Overlay, volume

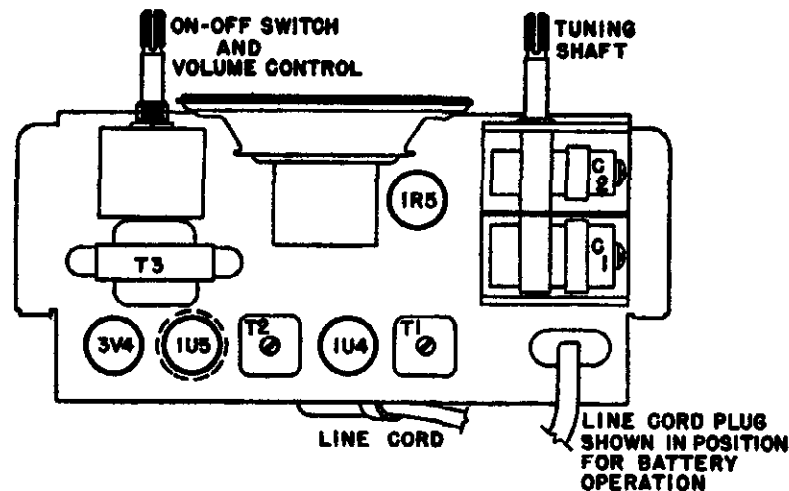
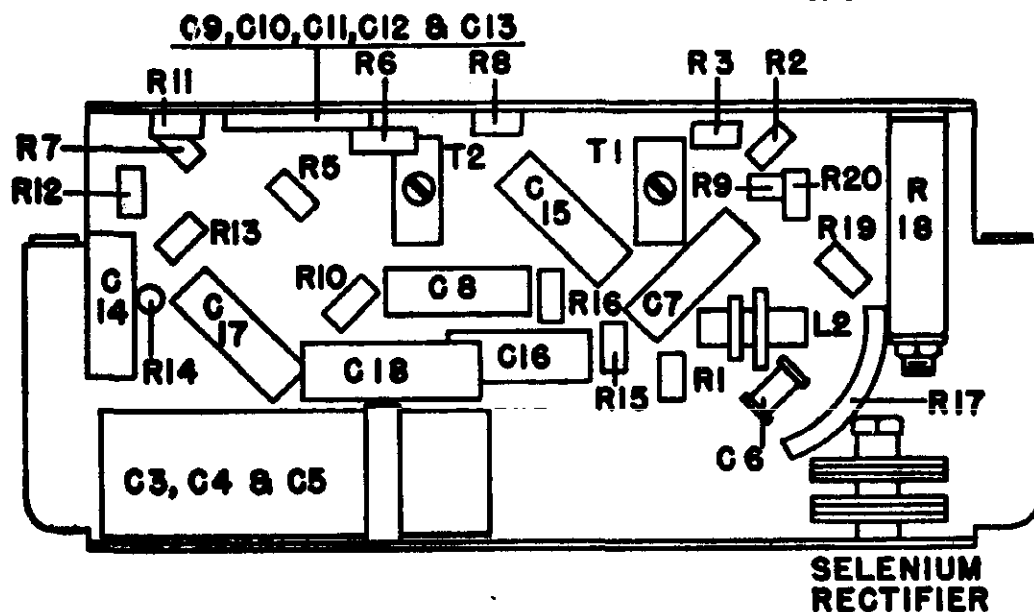
ALIGNMENT PROCEDURE

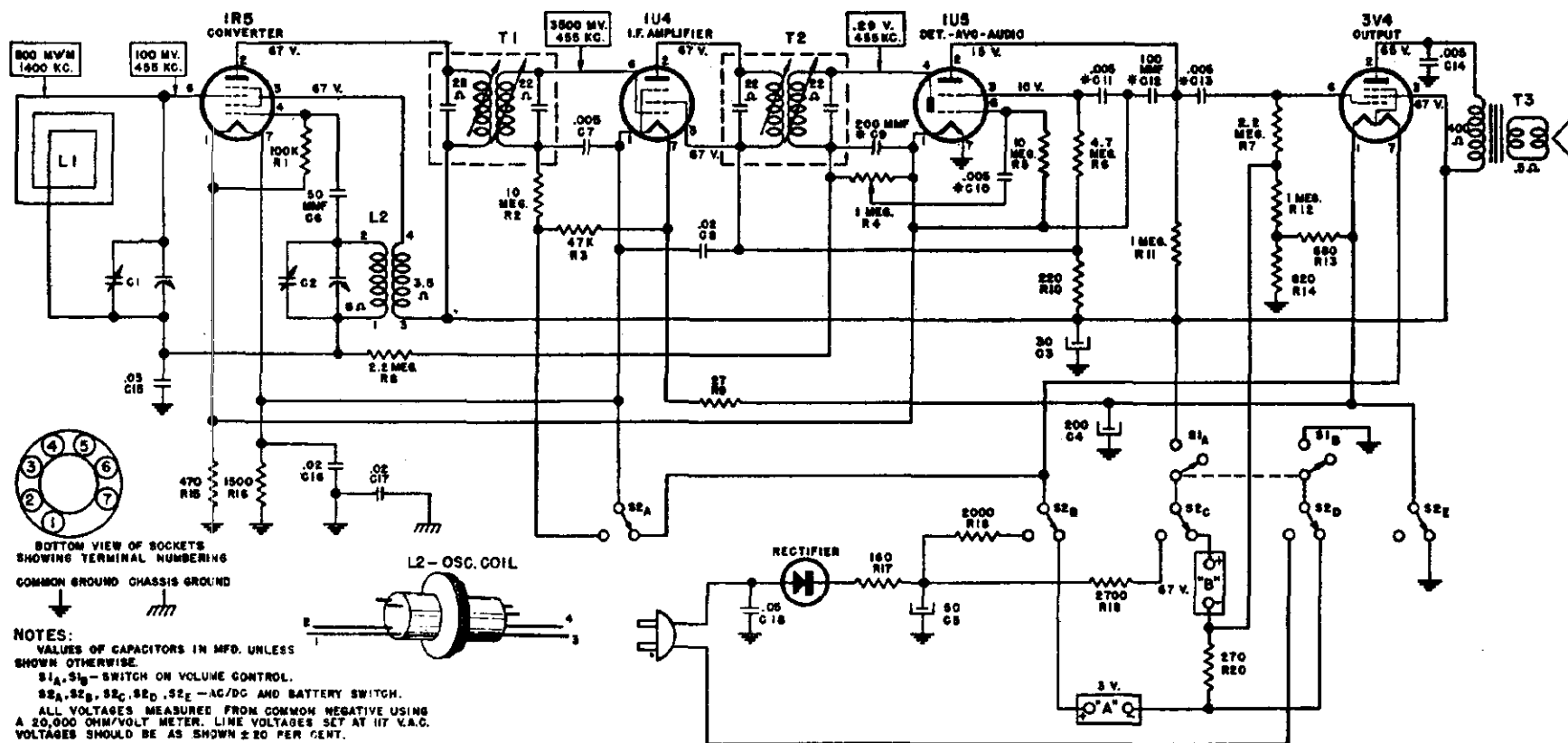
Output meter reading to indicate 0.05 watt across voice coil 0.4 v.
 Generator ground lead connected To B- through 0.1 mfd. capacitor
 Generator modulation 30%, 400 cycles
 Position of volume control Fully on
 Position of pointer with tuner fully closed Pointer should be horizontal, pointing to left (9 o'clock).

Position of Tuner	Generator Freq.	Dummy Antenna	Generator Connection	Adjustments (in order shown)	Function	Max. Microvolts Input to produce .05 w. output
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1U4 I-F Amp.	T2 (top and bottom)	I.F.	5000
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1R5 Conv.	T1 (top and bottom)	I.F.	250
Min. Cap.	1625 kc	0.1 mfd.	Stator ant. tuner	C2	Osc.	
1400 kc	1400 kc		Hazeltine Test Loop	C1	Loop	100

ALIGNMENT NOTES:

1. It is recommended that this set be connected to an isolation transformer when aligning on AC.
2. The alignment must be done in the order given above.
3. While making the above adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

**LOCATION OF PARTS ON TOP OF CHASSIS****LOCATION OF PARTS UNDER CHASSIS**



SCHEMATIC DIAGRAM FOR SILVERTONE CHASSIS 528.174

ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure, read tabulations from left to right. Make the adjustment marked (1) first, (2) next, (3) third.

IF RADIO HAS METAL PLATE ON BOTTOM OF CHASSIS BE SURE TO HAVE PLATE MOUNTED ON CHASSIS WHEN ALIGNING SET IN STEPS 2, 3 AND 4.

Before starting alignment:

- (A) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial indicator must be exactly even with the first mark at the low frequency end of the dial scale. If dial indicator does not point exactly to this mark, move pointer to correct position.
- (B) Use an accurately calibrated test oscillator with some type of output measuring device.
- (C) WHEN ADJUSTING THE 1650 KC OSCILLATOR TRIMMER, remove chassis from cabinet and disconnect the loop connection wires from the loop terminal strip. Attach a 1 megohm resistor across these connections and feed output of test oscillator across the 1 megohm resistor.
- (D) THE 1400 KC LOOP ANTENNA TRIMMER should be adjusted only after all other adjustments have been made and with the set mounted in the cabinet. When aligning the 1400 KC Antenna Trimmer, couple test oscillator to receiver loop by: (1) make loop consisting of five to ten turns of No. 20 to No. 30 size wire, wound on a 2" or 3" form; (2) connect this loop across output of test oscillator; (3) place test oscillator loop near radio loop. Open cabinet back just enough to insert a screw driver to adjust the antenna trimmer. BE SURE THAT NEITHER LOOP MOVES WHILE ALIGNING.

Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to	
1	Any point where no interfering signal is received	Exactly 455 K. C.	0.2 Mfd. Condenser	High side to grid of 1L5 tube. Low side to chassis (common negative in Model 1U312) through a .02 Mfd. blocking condenser.	Adjust each of the 2nd I.F. transformer trimmer adjustment screws for maximum output, then adjust each of the 1st I.F. transformer trimmer adjustment screws for maximum output.
2	Rotate gang condenser to minimum capacity	Exactly 1650 K. C.	See paragraph (C) above	See paragraph (C) above	Adjust 1650 K. C. oscillator trimmer for maximum output.
3	Approximately 1400 K. C.	Approx. 1400 K. C.	See paragraph (D) above	See paragraph (D) above	Adjust 1400 K. C. antenna trimmer for maximum output.
4	Approximately 600 K. C.	Approx. 600 K. C.	See paragraph (D) above	See paragraph (D) above	While rocking gang adjust 600 K. C. R.F. trimmer for maximum output.



MODELS 1U-312-PG, 1U-312-PW, 312-PG, 312-PW

PARTS LIST

Illus. No.	Part No.	Part Name and Description
C-1	23E2027-5	Capacitor, Fixed Ceramic, 10 MMF 350 V.....
C-2A }	Part of 23E2023-2 Ceramic Coupling Plate (See Misc. Parts)	
C-2B }		
C-2C }		
C-3	23E2025	Capacitor, Fixed Ceramic, .005 MFD 350 V. (Disc).....
C-4	23E2025	Capacitor, Fixed Ceramic, .005 MFD 350 V. (Disc).....
C-5	23E2025	Capacitor, Fixed Ceramic, .005 MFD 350 V. (Disc).....
C-6A }	Part of 23E2022-2 Diode Filter Plate (See Misc. Parts)	
C-6B }		
C-7A }		
C-7B }	24E54	Capacitor, 3 Gang, Tuning.....
C-7C }		
C-8	23E2025	Capacitor, Fixed Ceramic, .005 MFD 350 V (Disc).....
C-9	23E416	Capacitor, Tubular .05 MFD 400 V.....
C-10	23E416	Capacitor, Tubular .05 MFD 400 V.....
C-11	20E611	Capacitor, R. F. Choke & Capacitor Assembly (in Model 1U312P only).....
C-12	23E416	Capacitor, Tubular, .05 MFD 400 V.....
C-13	23E416	Capacitor, Tubular, .05 MFD 400 V.....
C-14	23E416	Capacitor, Tubular, .05 MFD 400 V.....
C-15	23E2025	Capacitor, Fixed Ceramic, .005 MFD 350 V. (Disc).....
C-16	23E416	Capacitor, Tubular, .05 MFD 400 V.....
C-17	25E48	Capacitor, Dry Electrolytic, 40-30-20 MFD 150 V., 100 MFD 25 V. (Used in "Series A" only).....
C-17	25E53	Capacitor, Dry Electrolytic 50-50-50 MFD 150 V., 100 MFD 25 V. (Used, starting with "Series B").....
C-17	25E56	Capacitor, Dry Electrolytic, 50-50-50 MFD 150 V., 100 MFD 25 V. (in Model 1U312P only).....
C-18	25E55	Capacitor, Dry Electrolytic, 20 MFD 150 V. (used in Series "A" only).....
C-19	23E416	Capacitor, Tubular .05 MFD 400 V.....
R-1	27E475	Resistor, Carbon, 4.7 Megohm 1/3 W.....

Illus. No.	Part No.	Part Name and Description
R-2	27E154	Resistor, Carbon, 150,000 Ohm 1/3 W.....
R-3	27E103	Resistor, Carbon, 10,000 Ohm 1/3 W.....
R-4A }	Part of 23E2023-2 Ceramic Coupling Plate (See Misc. Parts)	
R-4B }		
R-4C }		
R-5	27E335	Resistor, Carbon, 3.3 Megohm 1/3 W.....
R-6	27E335	Resistor, Carbon, 3.3 Megohm 1/3 W.....
R-7	Part of 23E2022-2 Diode Filter Plate (See Misc. Parts)	
R-8	27E475	Resistor, Carbon, 4.7 Megohm 1/3 W.....
R-9	28E63	Resistor, Volume Control, 2 Megohm.....
R-10	27E335	Resistor, Carbon, 3.3 Megohm 1/3 W.....
R-11	27E681	Resistor, Carbon, 680 Ohm 1/3 W.....
R-12	27E681	Resistor, Carbon, 680 Ohm 1/3 W.....
R-13	27E681	Resistor, Carbon, 680 Ohm 1/3 W.....
R-14	27E391	Resistor, Carbon, 390 Ohm 1/3 W.....
R-15	27E471	Resistor, Carbon, 470 Ohm 1/3 W.....
R-16	27E152-3	Resistor, Carbon, 1500 Ohm 1 W.....
R-17A }	27E1000-6	Resistor, Wirewound, Dual, 1300 Ohm 6.5 W.....
R-17B }		
R-18	27E560-3	Resistor, Carbon, 56 Ohm 1 W.....
R-19	27E335	Resistor, Carbon, 3.3 Megohm 1/3 W.....
R-20	27E105	Resistor, Carbon, 1 Megohm 1/3 W.....
L-1	64E31	Antenna, Loop.....
T-1	20E565	Coil, R. F. Transformer.....
T-2	20E463	Coil, 1st I. F. Transformer.....
T-3	20E463	Coil, 2nd I. F. Transformer.....
T-4	22E50	Transformer, Output.....
T-5	20E566	Coil, Oscillator.....
S-1	1E42	Speaker, 4" x 6" P. M.....
SW-1	29E20	Switch, Change-Over, AC-DC-BATT.....
SR-1	57E4	Rectifier, Selenium.....

IMPORTANT: When ordering complete cabinet, or cabinet parts, BE SURE TO MENTION REQUIRED COLOR in addition to proper part number.

MISCELLANEOUS PARTS

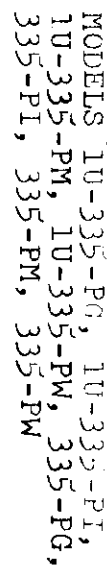
Part No.	Part Name and Description
20E370	Complete Brown Cabinet Assembly, with Handle, Baffle, Grille, Screen, Dial Scale, Loop and Cabinet Back.....
20E370-2	Complete Green Cabinet Assembly, with Handle, Baffle, Grille, Screen, Dial Scale, Loop and Cabinet Back.....
20E371	Cabinet Assembly, less Back and Loop, but with Handle, Baffle, Grille, Screen and Dial Scale, Brown.....
20E371-2	Cabinet Assembly, less Back and Loop, but with Handle, Baffle, Grille, Screen and Dial Scale, Green.....
7E230	Cabinet Assembly, with Handle only—less Back, Loop, Baffle, Grille, Screen and Dial Scale, Brown.....
7E230-2	Cabinet Assembly, with Handle only—less Back, Loop, Baffle, Grille, Screen and Dial Scale, Green.....
7E233	Cabinet Back, Less Loop, with 47E13 Hinge Pin, Brown.....
7E233-2	Cabinet Back, Less Loop, with 47E13 Hinge Pin, Green.....
20E253-26	Dial Drive Cord.....
65E2	Dial Cord Tension Spring.....
35E28	Dial Pointer.....
35E61	Dial Scale, Calibrated, Polystyrene Scale.....
SE62	Dial Backplate, Metal, Background for Dial Scale.....

Part No.	Part Name and Description
20E249-3	B— Battery Connector Assembly.....
20E249-4	B+ Battery Connector Assembly.....
20E340-2	"A" Battery Cable With Plug.....
55E52-2	Handle Bracket, for Mounting Handle.....
52E31-7	Handle Cover, Plastic, Brown.....
52E31-8	Handle Cover, Plastic, Green.....
55E39-2	Handle Strap, Clock Spring Steel.....
47E13	Hinge Pin, for Cabinet Back.....
37E64	Tuning Knob, less Hub, for Brown Cabinet.....
37E64-2	Tuning Knob, less Hub, for Green Cabinet.....
37E66	Off-On-Vol. Knob, for Brown Cabinet.....
37E66-2	Off-On-Vol. Knob, for Green Cabinet.....
37E65	Knob Hub, for 37E64 Tuning Knob.....
37E65-2	Knob Hub, for 37E64-2 Tuning Knob.....
41E13	Line Cord and Plug.....
17E3-2	"A" Battery Plug.....
84E6	Stud, Shaft for Tuning Knob.....
23E2022-2	Diode Filter Plate, Capacitor and Resistor Assembly.....
23E2023-2	Ceramic Coupling Plate, Capacitor and Resistor Assembly.....

MOUNTING HARDWARE

Part No.	Part Name and Description
13E103-20	Clip, Holds Back to Cabinet.....
82E39-F10	Screw, No. 6-20 x 3/4 holds Chassis in Cabinet.....

Part No.	Part Name and Description
10E43	Stud, Trimount, for mounting Speaker Baffle and Screen to Cabinet



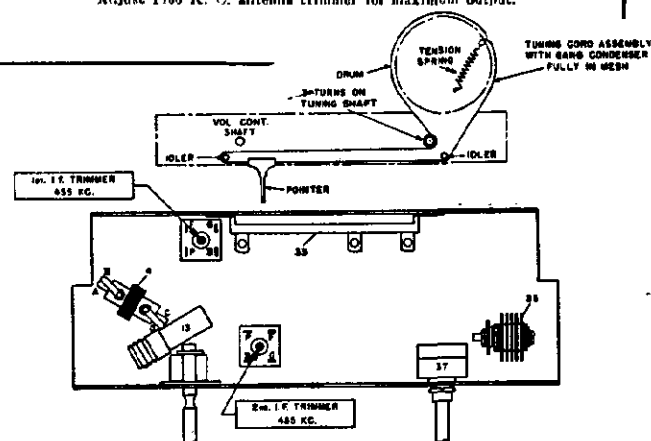
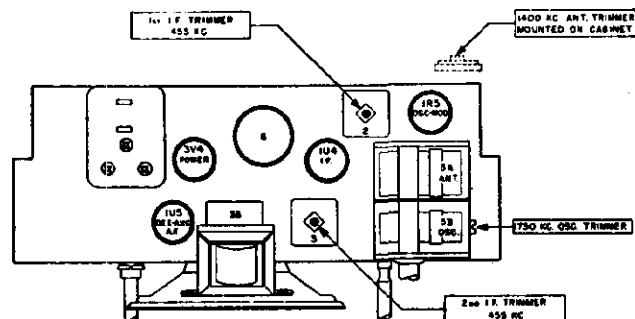
Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure, read tabulations from left to right. Make the adjustment marked (1) first, (2) next, (3) third.

IF RADIO HAS METAL PLATE ON BOTTOM OF CHASSIS BE SURE TO HAVE PLATE MOUNTED ON CHASSIS WHEN ALIGNING SET.

- (A) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial indicator must be exactly even with the outside edge of the first 5 in the 55 calibration number at the low frequency end of the dial scale. If dial indicator does not point exactly to the outside edge, move pointer to correct position.
- (B) Use an accurately calibrated test oscillator with some type of output measuring device.
- (C) **WHEN ADJUSTING THE 1730 KC OSCILLATOR TRIMMER**, remove chassis from cabinet and disconnect the loop connection wires from the loop terminal strip. Attach a 1 megohm resistor across these connections and feed output of test oscillator across the 1 megohm resistor.
- (D) **THE 1400 KC LOOP ANTENNA TRIMMER** should be adjusted only after all other adjustments have been made and with the set mounted in the cabinet. When aligning the 1400 KC Antenna Trimmer, couple test oscillator to receiver loop by: (1) make loop consisting of five to ten turns of No. 20 to No. 30 size wire, wound on a 2" or 3" form; (2) connect this loop across output of test oscillator; (3) place test oscillator loop near radio loop. **BE SURE THAT NEITHER LOOP MOVES WHILE ALIGNING.**

Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to	
1	Any point where no interfering signal is received	Exactly 455 K. C.	0.2 Mfd. Condenser	High side to grid of 1R5 tube. Low side to chassis (common negative in Model 1U-335) through a .02 Mfd. blocking condenser.	Adjust each of the 2nd I.F. transformer trimmer adjustment screws for maximum output, then adjust each of the 1st I.F. transformer trimmer adjustment screws for maximum output.
2	Rotate gang condenser to minimum capacity	Exactly 1730 K. C.	See paragraph (C) above	See paragraph (C) above	Adjust 1730 K. C. oscillator trimmer for maximum output.
3	Approximately 1400 K. C.	Approx. 1400 K. C.	See paragraph (D) above	See paragraph (D) above	Adjust 1400 K. C. antenna trimmer for maximum output.

TUNING CORE ADJ.
WITH GANG COND.



PARTS LIST

Illus. No.	Part No.	Part Name	Description
1	64E32	Antenna	Loop
2	20E463	Coil	1st I.F. Transformer
3	20E463	Coil	2nd I.F. Transformer
4	20E338	Coil	Oscillator
5	24E40	Condenser	Tuning, Two Gang
*5	25E28	Condenser	Dry Electrolytic 40-40 Mfd. 150 V. & 100 Mfd. 10 V.
OR			
*6	25E29	Condenser	Dry Electrolytic, 40-40 Mfd. 150 V. & 100 Mfd. 10 V. (1U-335P Only)
7	23E211	Condenser	Tubular, .01 Mfd. 200 V.
8	23E216	Condenser	Tubular, .05 Mfd. 200 V.
9	23E416	Condenser	Tubular, .05 Mfd. 400 V.
10	23E408	Condenser	Tubular, .005 Mfd. 400 V.
11	23E220	Condenser	Tubular, .2 Mfd. 200 V.
12	23E220	Condenser	Tubular, .2 Mfd. 200 V.
13	20E407	Choke	R. F. (1U-335P Only)
14	23E24	Condenser	Ceramic, .0001 Mfd.
15	23E24	Condenser	Ceramic, .0001 Mfd.
16	23E2024	Condenser	Ceramic Condenser Plate
17	27E475	Resistor	Carbon, 4.7 Megohm, 1/3 W.
18	27E475	Resistor	Carbon, 4.7 Megohm, 1/3 W.

Illus. No.	Part No.	Part Name	Description
19	27E475	Resistor	Carbon, 4.7 Megohm, 1/3 W.
20	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.
21	27E475	Resistor	Carbon, 4.7 Megohm, 1/3 W.
22	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.
23	27E474	Resistor	Carbon, 470,000 Ohm, 1/3 W.
24	27E683	Resistor	Carbon, 68,000 Ohm, 1/3 W.
25	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 W.
26	27E682	Resistor	Carbon, 6,800 Ohm, 1/3 W.
27	27E271	Resistor	Carbon, 270 Ohm, 1/3 W.
28	27E331	Resistor	Carbon, 330 Ohm, 1/3 W.
30	27E471	Resistor	Carbon, 470 Ohm, 1/3 W.
31	27E330-2	Resistor	Carbon, 33 Ohm, 1/2 W.
32	27E680-3	Resistor	Carbon, 68 Ohm, 1 W.
33	27E1005	Resistor	Wire Wound, 1810 and 610 Ohms, 8 W.
*35	57E1-4	Rectifier	Selenium
	OR		
*35	57E1-5	Rectifier	Selenium
36	1E29	Speaker	4" P.M.
*37	28E30	Volume Control	With D.P.S.T. Switch, 2 Megohm.
38	29E20	Switch	Spring Return Type
39	24E33	Condenser	Trimmer 3-35 MMF. Working Range

IMPORTANT: When ordering complete cabinet, or cabinet parts, BE SURE TO MENTION REQUIRED COLOR in addition to proper part number.

MISCELLANEOUS PARTS

Part No.	Part Name	Description
20E577	Cabinet	Complete Cabinet Assembly with Handle, Baffle, Loop and Cabinet Back, Red
20E577-2	Cabinet	Complete Cabinet Assembly with Handle, Baffle, Loop and Cabinet Back, Brown
20E577-3	Cabinet	Complete Cabinet Assembly with Handle, Baffle, Loop and Cabinet Back, White
20E577-4	Cabinet	Complete Cabinet Assembly with Handle, Baffle, Loop and Cabinet Back, Green
20E578	Cabt., less back	Cabinet Assembly, less Back, but with Handle, Baffle and Loop, Red
20E578-2	Cabt., less back	Cabinet Assembly, less Back, but with Handle, Baffle and Loop, Brown
20E578-3	Cabt., less back	Cabinet Assembly, less Back, but with Handle, Baffle and Loop, White
20E578-7	Cabt., less back	Cabinet Assembly, less Back, but with Handle, Baffle and Loop, Green
7E236	Cabinet Back	Back for cabinet with 47E13-2, Hinge Pin, Red
7E236-2	Cabinet Back	Back for cabinet with 47E13-2, Hinge Pin, Brown
7E236-3	Cabinet Back	Back for cabinet with 47E13-2, Hinge Pin, White

Part No.	Part Name	Description
7E236-5	Cabinet Back	Back for cabinet with 47E13-2, Hinge Pin, Green
20E253-19	Dial Cord	Dial Drive Cord
65E2	Dial Spring	Dial Cord Tension Spring
20E348	Dial Shaft	Drive Shaft Assembly
5E32-2	Backplate	Dial Backplate
35E8-13	Dial Pointer	Dial Indicator
20E249	Batt. Connector	B— Battery Connector Assembly
20E249-2	Batt. Connector	B+ Battery Connector Assembly
20E340	"A" Batt. Cable	"A" Battery Cable with Plug
55E52	Handle Bracket	Bracket for Mounting Handle
52E31-9	Handle Cover	Plastic Cover, Red
52E31-10	Handle Cover	Plastic Cover, Brown
52E31-11	Handle Cover	Plastic Cover, White
52E31-12	Handle Cover	Plastic Cover, Green
55E39	Handle Strap	Clock Spring Steel
47E13-2	Hinge	Hinge Pin for Cabinet Back
37E17-15	Knob	Red
37E17-16	Knob	Brown
37E17-17	Knob	White
37E17-18	Knob	Green
41E14	Line Cord	Line Cord and Plug
17E3-2	Plug	"A" Battery Plug
20E579	Speaker Baffle	Baffle Assembly with Grille Cloth

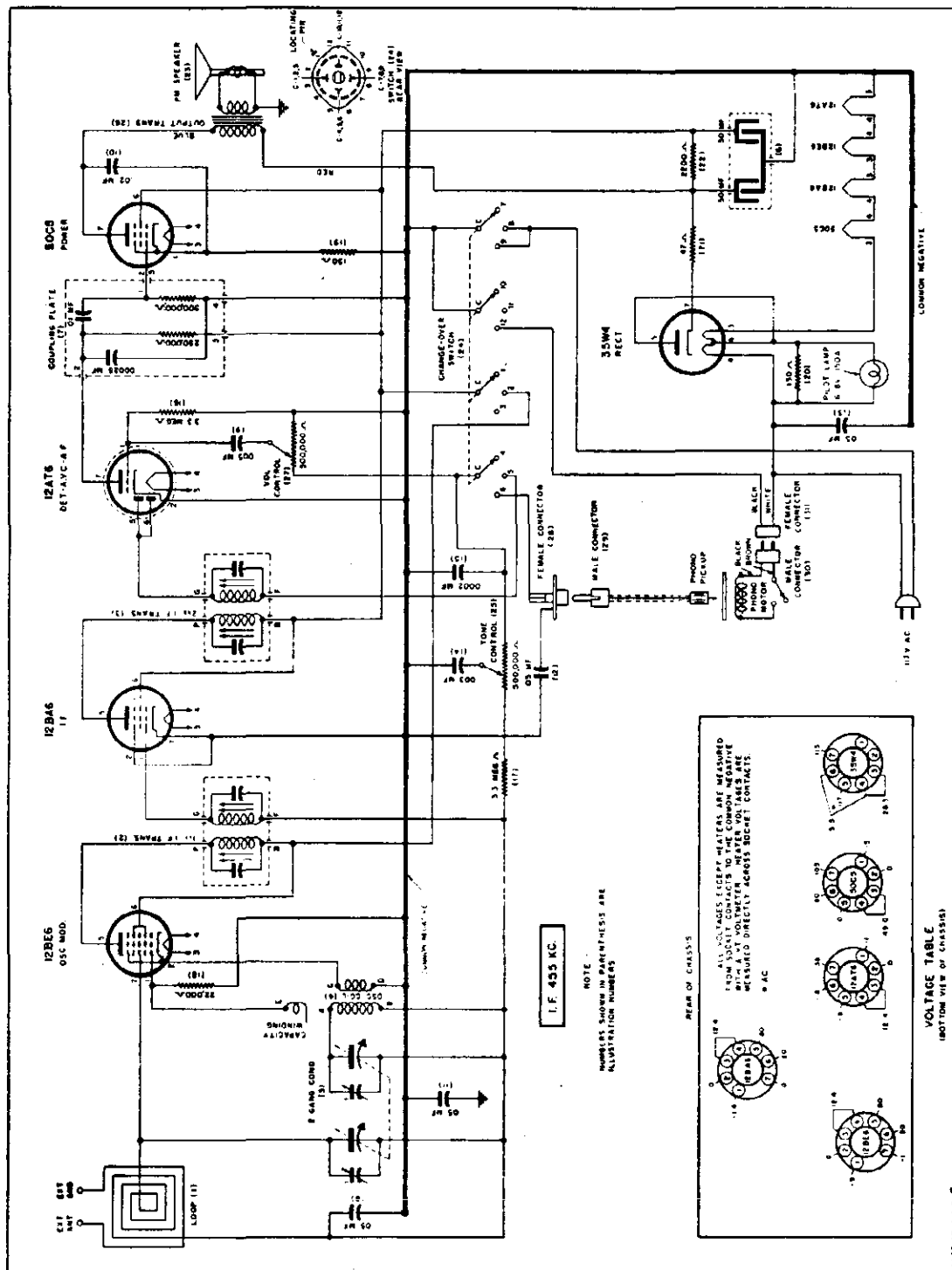
MOUNTING HARDWARE

Part No.	Part Name	Description
13E103-9	Clip	Holds Back to Cabinet
82E37-F10	Screw	5-20x3/8—Holds 13E103-9 Clip to Cabt.

Part No.	Part Name	Description
82E36-F10	Screw	6-20x5/16—For Mounting Chassis
13E103-17	Speednut	For Mounting Speaker Baffle to Cabt.

MODELS 1U-335-PG, 1U-335-PI, 1U-335-PM, 1U-335-PW, 335-PG, 335-PI, 335-PM, 335-PW

MODELS 1U-339-K,
339-K



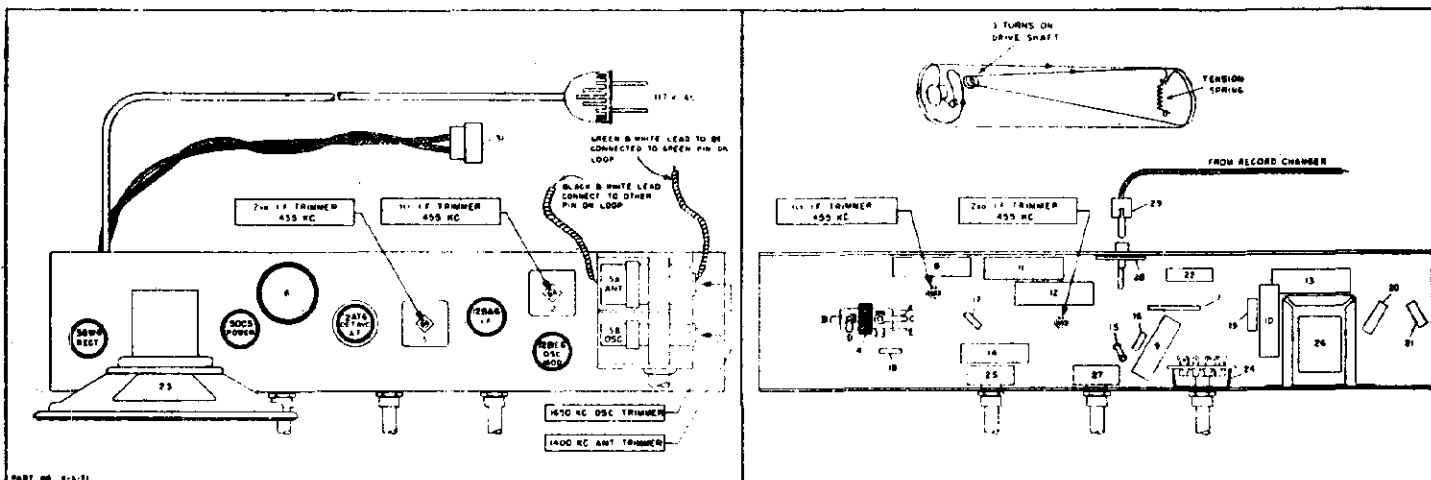
ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

- (A) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If the dial needle does not point exactly to the last line move to correct position by holding dial needle shank at the point where it attaches to its drum while turning the drum on the gang condenser.
- (B) Use an accurately calibrated test oscillator with some type of output measuring device.
- (C) THE LOOP MAY BE LEFT IN THE CABINET and the chassis with its mounting board pulled out of the cabinet just far enough for adjustment of the trimmers, or the loop and chassis may be removed from the cabinet and the loop placed in the same position and plane it will be in when both are mounted in cabinet—approximately 1" space between receiver loop and chassis. Couple test oscillator to receiver loop by: (1) make loop consisting of 5 to 10 turns of No. 20 to No. 30 size wire, wound on a 2" or 3" form; (2) connect this loop across output of test oscillator; (3) place test oscillator loop near radio loop. BE SURE THAT NEITHER LOOP MOVES WHILE ALIGNING.

Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Any point where no interfering signal is received	455 K. C.	.02 MFD. See Paragraph (C) Above	High side to rear stator plates of tuning condenser. Low side to chassis (common negative in 11329K) through a .02 Mfd. blocking condenser.	Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.
2	Exactly 1650 K. C.	Exactly 1650 K. C.	See Paragraph (C) Above	See Paragraph (C) Above	Adjust 1650 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1700 K. C.	See Paragraph (C) Above	See Paragraph (C) Above	Adjust 1400 K. C. antenna trimmer for maximum output.



TO REMOVE TUBES OR REPLACE PILOT LIGHT it is necessary to remove chassis from cabinet. To do this:

- A. Take knobs off control shafts.
- B. Rest cabinet on its side.

C. Unscrew the four copper colored screws that are used to hold mounting board (on which chassis rests) to the cabinet.

D. Gently pull mounting board and chassis from cabinet.

DO NOT REMOVE THE TWO SCREWS USED TO HOLD THE CHASSIS TO THE MOUNTING BOARD.

RADIO PARTS LIST

Illus. No.	Part No.	Part Name	Description
1	64E21	Antenna	Loop
2	20E402	Coil	1st I. F. Transformer.....
3	20E402	Coil	2nd I. F. Transformer.....
4	20E397	Coil	Oscillator
5	24E47	Condenser	2 Gang, Tuning.....
*6	25E1	Condenser	Dry Elect. 50-50 MFD. 150 V.....
	OR		
*6	25E16	Condenser	Dry Elect. 50-50 MFD. 150 V. (in Model 1U339 only).....
7	23E2023	Condenser	Ceramic Coupling Plate.....
8	23E216	Condenser	Paper .05 MF. 200 V.....
9	23E208	Condenser	Paper .005 MF. 200 V.....
10	23E413	Condenser	Paper .02 MF. 400 V.....
11	23E416	Condenser	Paper .05 MF. 400 V. (in Model 1U339 only).....
12	23E416	Condenser	Paper .05 MF. 400 V.....
13	23E416	Condenser	Paper .05 MF. 400 V.....
14	23E406	Condenser	Paper .003 MF. 400 V.....

*Fast Moving Items.

Illus. No.	Part No.	Part Name	Description
15	23E41	Condenser	Mica, .0002 MF.....
	OR		
15	23E2027-3	Condenser	Ceramic, .0002 MF.....
16	27E335	Resistor	Carbon, 3.3 MEG OHM 1/3 W.....
17	27E335	Resistor	Carbon, 3.3 MEG OHM 1/3 W.....
18	27E223	Resistor	Carbon, 22,000 OHM 1/3 W.....
19	27E151	Resistor	Carbon, 150 OHM 1/3 W.....
20	27E151	Resistor	Carbon, 150 OHM 1/3 W.....
21	27E470-2	Resistor	Carbon, 47 OHM 1/2 W.....
22	27E222-3	Resistor	Carbon, 2200 OHM 1 W.....
23	1E33	Speaker	5" PM
24	29E23	Switch	"Off-Radio-Phono"
*25	28E41	Tone Control	500,000 Ohm
26	22E8-2	Transformer	Output
*27	28E46	Vol. Control	500,000 Ohm
28	17E21-5	Connector	Female, for Pickup.....
29	17E21-7	Plug	Male Phono Plug for Pickup.....
30	17E21-2	Plug	Male, Attached to Phono Motor.....
31	20E184-1	Socket	Female, 2 Contact, for Phono Motor.....

MISCELLANEOUS PARTS

Part No.	Part Name	Description
7E246	Cabinet	Cabinet only, less Frontplate Bezel Assembly....
20E428-2	Cabt. Frontplate	Bezel, Frontplate with calibrated crystal.....
7E171-3	Cabinet Bottom	Cardboard Cabinet Bottom (in Model 1U339 only)....
7E171-4	Cabinet Bottom	Cardboard Cabinet Bottom
41E8	Cord	8 Ft. Rubber Line Cord.....
30E116-3	Dial Plate Assembly	Dial Back Plate Assembly.....
20E253-21	Dial Cord	Dial Drive Cord.....
36E64	Dial Scale	Calibrated Scale

Part No.	Part Name	Description
20E394	Dial Shaft & Pulley	Drive Shaft & Pulley Assembly with Mounting Bracket
68E16	Dial Shaft	Drive Shaft only with 12E124 "C" Washer.....
35E25-4	Dial Pointer	Dial Indicator with Set Screw.....
65E2	Dial Spring	Tension Spring for Drive Cord.....
37E56	Knob	.....
37E56-2	Knob	With Dot, for "Off-Radio-Phono" Switch.....
17E34	Pilot Lamp Socket	Pilot Lamp Socket Assembly.....
40E1	Pilot Lamp	6-B Volt, .150 Amp. Type 47.....

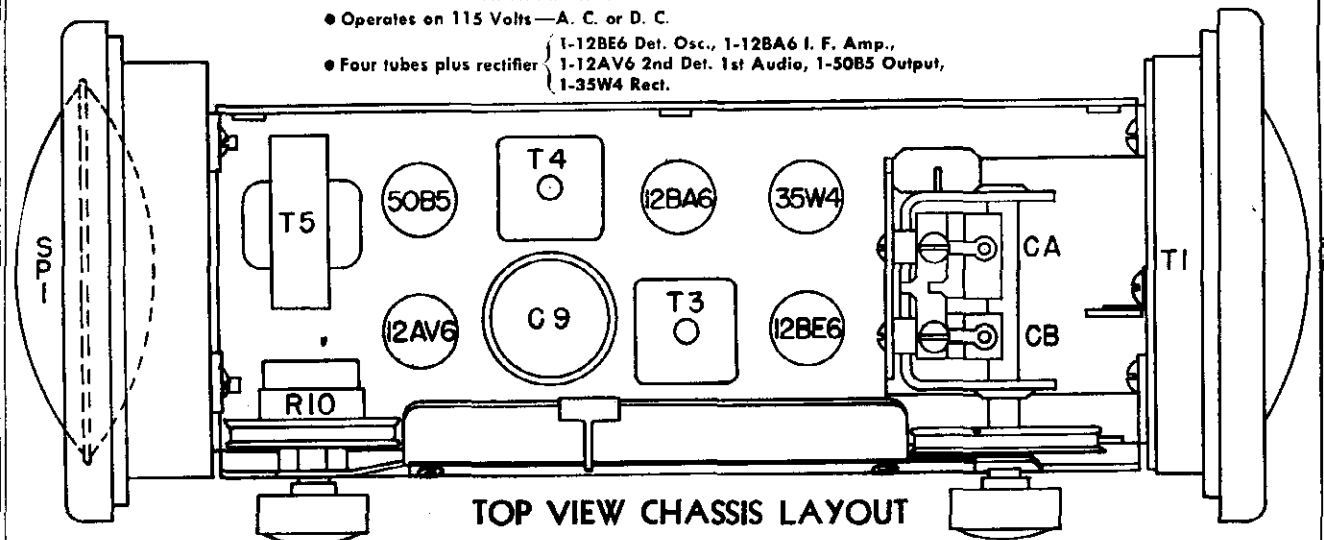
MOUNTING HARDWARE

Part No.	Part Name	Description
P-122	Lid Stop	Cabinet Lid Stop.....
13E103-1	Speed Nut	For Mounting Front Plate Bezel to Cabt.....
82E1111-F10	Screw	6x $\frac{7}{8}$ Hx Hd—no slot—for holding Chassis to Mounting Board
71E162	Screw	3-48x $\frac{1}{4}$ " for Dial Pointer.....

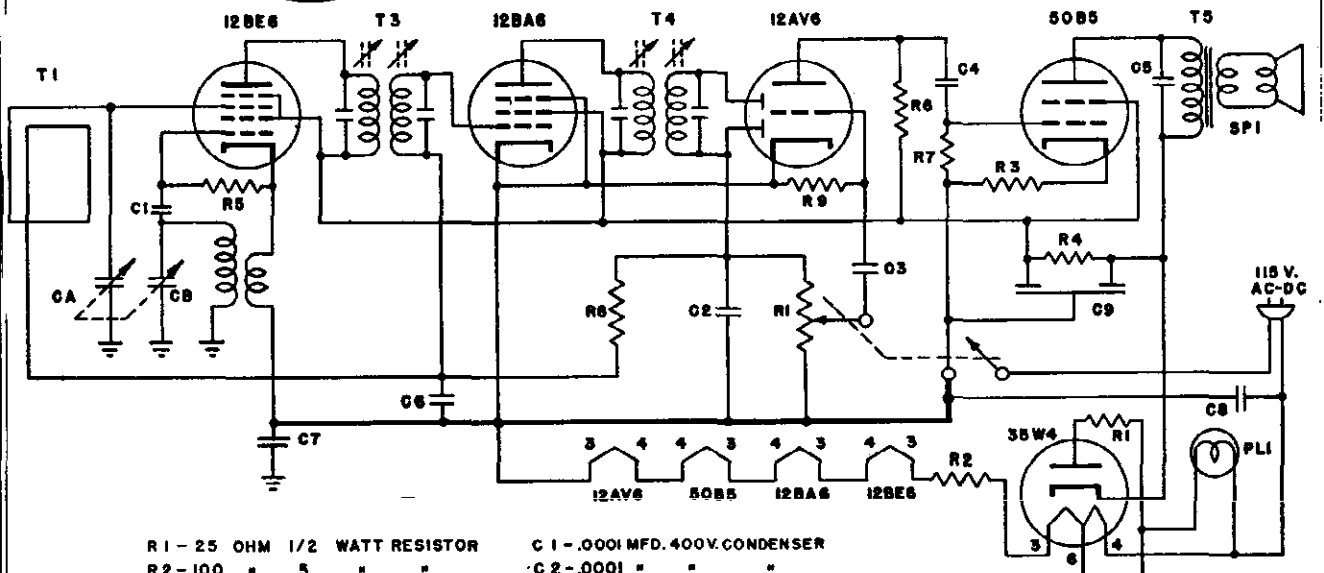
Part No.	Part Name	Description
86E227-F43	Screw	6x $\frac{3}{4}$ Rd Hd Copper Colored Iron Wood Screw for attaching Chassis Mtg. Board to Cabt.....
86E183-F49	Screw	4x $\frac{3}{4}$ Rd Hd Iron Wood Screw for Mtg. Cardboard to Cabinet Bottom.....
12E124	Washer	"C" Washer for Dial Drive Shaft.....



- Band Coverage: 1750 KC to 535 KC.
- Operates on 115 Volts—A. C. or D. C.
- Four tubes plus rectifier
 - 1-12BE6 Def. Osc., 1-12BA6 I. F. Amp.,
 - 1-12AV6 2nd Def. 1st Audio, 1-50B5 Output,
 - 1-35W4 Rect.



TOP VIEW CHASSIS LAYOUT



R1 - 25 OHM 1/2 WATT RESISTOR
 R2 - 100 " 5 " "
 R3 - 180 " 1/2 " "
 R4 - 1500 " " " "
 R5 - 25M " " " "
 R6 - 500M " " " "
 R7 - 500M " " " "
 R8 - 5MEG. " " " "
 R9 - 5MEG. " " " "
 R10 - 500M " POT. WITH SWITCH

C1 - .0001 MFD. 400V. CONDENSER
 C2 - .0001 " " "
 C3 - .01 " " "
 C4 - .01 " " "
 C5 - .01 " " "
 C6 - .05 " 200V. " "
 C7 - .1 " 400V. " "
 C8 - .1 " " "
 C9 - 50x50 " 150V. " "
 CA - B - GANG CONDENSER

T1 - LOOP ANTENNA
 T2 - OSC. COIL
 T3 - 455 KC. I.F.
 T4 - 455 KC. I.F.
 T5 - O. P. TRANSFORMER
 PL1 - NO. 44 PILOT LAMP
 SPI - PILLOW SPEAKER

PAGE 21-2 SETCHELL-CARLSON

MODELS 580,
5803, Ch. 58A

MODEL 580, 5803 SPECIFICATIONS

- Band coverage: 540 KC to 1900 KC.
- Ten-inch Alnico V - P. M. console speaker.
- 3.2-ohm speaker terminals (for T. V.)
- Five tubes, plus rectifier—
1—12BA6 R. F., 1—12BE6 Mixer,
1—12BA6 I. F., 1—12AV6 2nd Detector,
1st Audio, 1—6V6 Output, 1—6X5 Rectifier.
- Wattage load: 45 watts.
- Undistorted power output: 2 watts.

R 1—400	Ohm	1 Watt Resistor
R 2—500	Ohm	2 Watt Resistor
R 3—3K	Ohm	1/2 Watt Resistor
R 4—10K	Ohm	1/2 Watt Resistor
R 5—25K	Ohm	1/2 Watt Resistor
R 6—39K	Ohm	1/2 Watt Resistor
R 7—50K	Ohm	1/2 Watt Resistor
R 8—500K	Ohm	1/2 Watt Resistor
R 9—500K	Ohm	1/2 Watt Resistor
R 10—2 Meg.	Ohm	1/2 Watt Resistor
R 11—5 Meg.	Ohm	1/2 Watt Resistor
R 12—5 Meg.	Ohm	1/2 Watt Resistor
R 13—500K	Potentiometer	

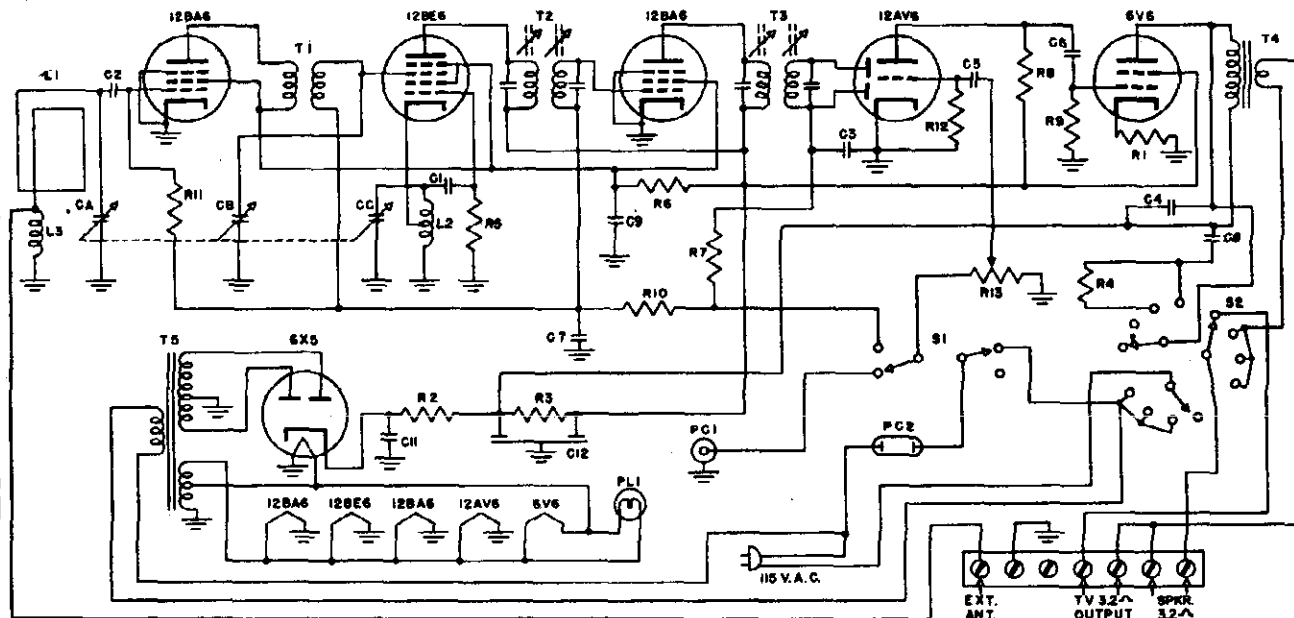
C 1—100	Mmfd.	400 V. Condenser
C 2—250	Mmfd.	400 V. Condenser
C 3—250	Mmfd.	400 V. Condenser
C 4—.0025	Mfd.	400 V. Condenser
C 5—.01	Mfd.	400 V. Condenser
C 6—.01	Mfd.	400 V. Condenser
C 7—.05	Mfd.	200 V. Condenser
C 8—.05	Mfd.	400 V. Condenser
C 9—.1	Mfd.	400 V. Condenser
C 10—.1	Mfd.	400 V. Condenser
C 11—20	Mfd.	450 V. Condenser
C 12—20+20	Mfd.	475 V. Condenser
CA, B and C	Gang	Condenser

- oop Antenna
- Oscillator Coil
- L3—Antenna Coupling Coil
- T1—R. F. Transformer
- T2—455 KC I. F. Transformer
- T3—455 KC I. F. Transformer
- T4—Audio Output Transformer
- T5—Power Transformer
- PL1—No. 47 Pilot Lamp
- S1—2-Pole 2-Pos. Switch
- S2—3-Pole 4-Pos. Switch
- PC1—Phono Pickup Connector
- PC2—Phono Motor Connector 115 V. AC

ALIGNMENT

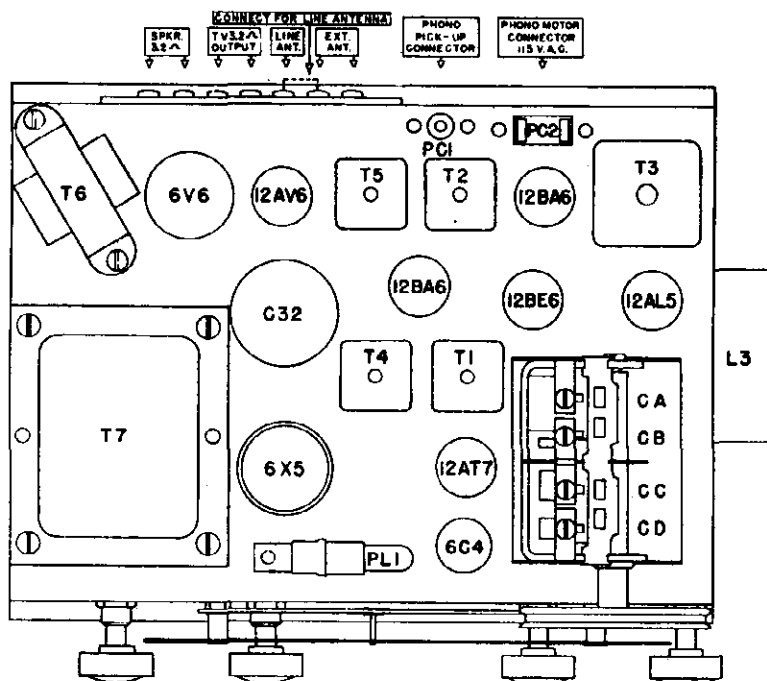
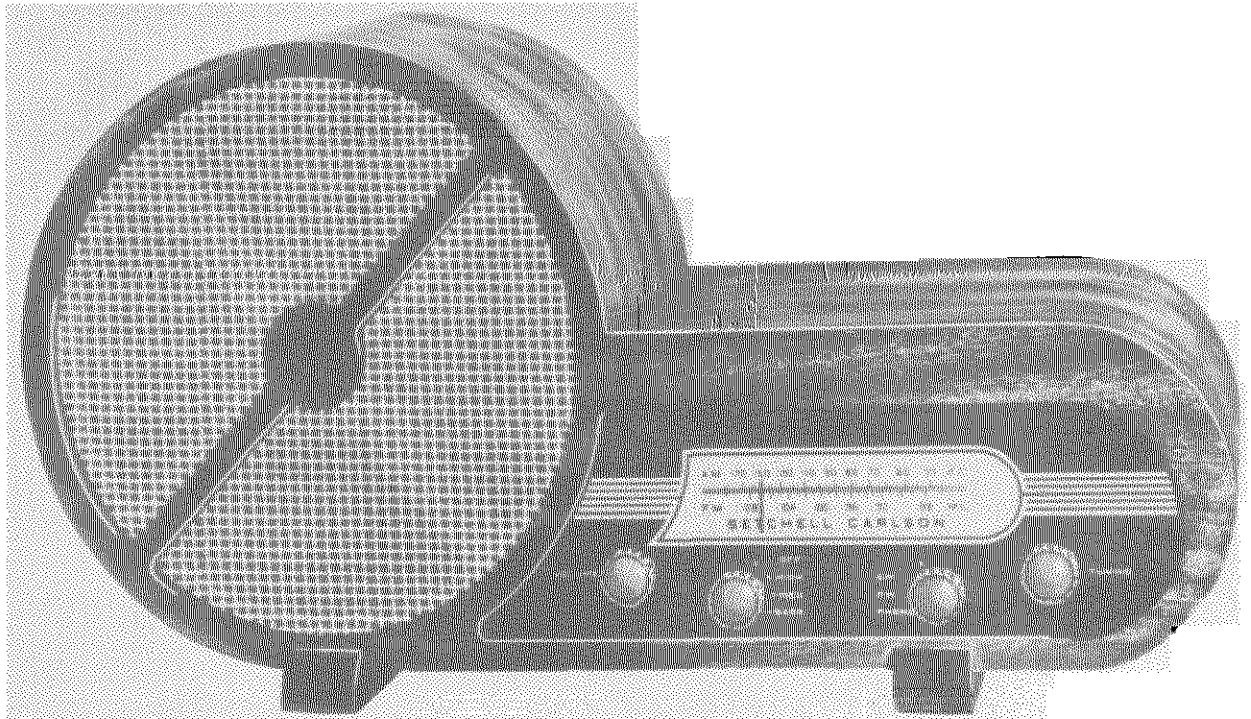
Connect signal generator to mixer grid No. 12BE6 through an .01 condenser and align I.F.'s T2 and T3 to 455 KC. Use output meter across output transformer or vacuum tube volt meter for highest AVC voltage across condenser C7.

Align oscillator trimmer (CC) to dial calibration at approximately 1400 KC. Adjust antenna and RF section (CA and CB) for best sensitivity at approximately 1400 KC. Low frequency and alignment can be made by bending condenser plates.



SCHEMATIC DIAGRAM

MODELS 5110,
51103, Ch. 511A



MODEL 51103 5110 SPECIFICATIONS

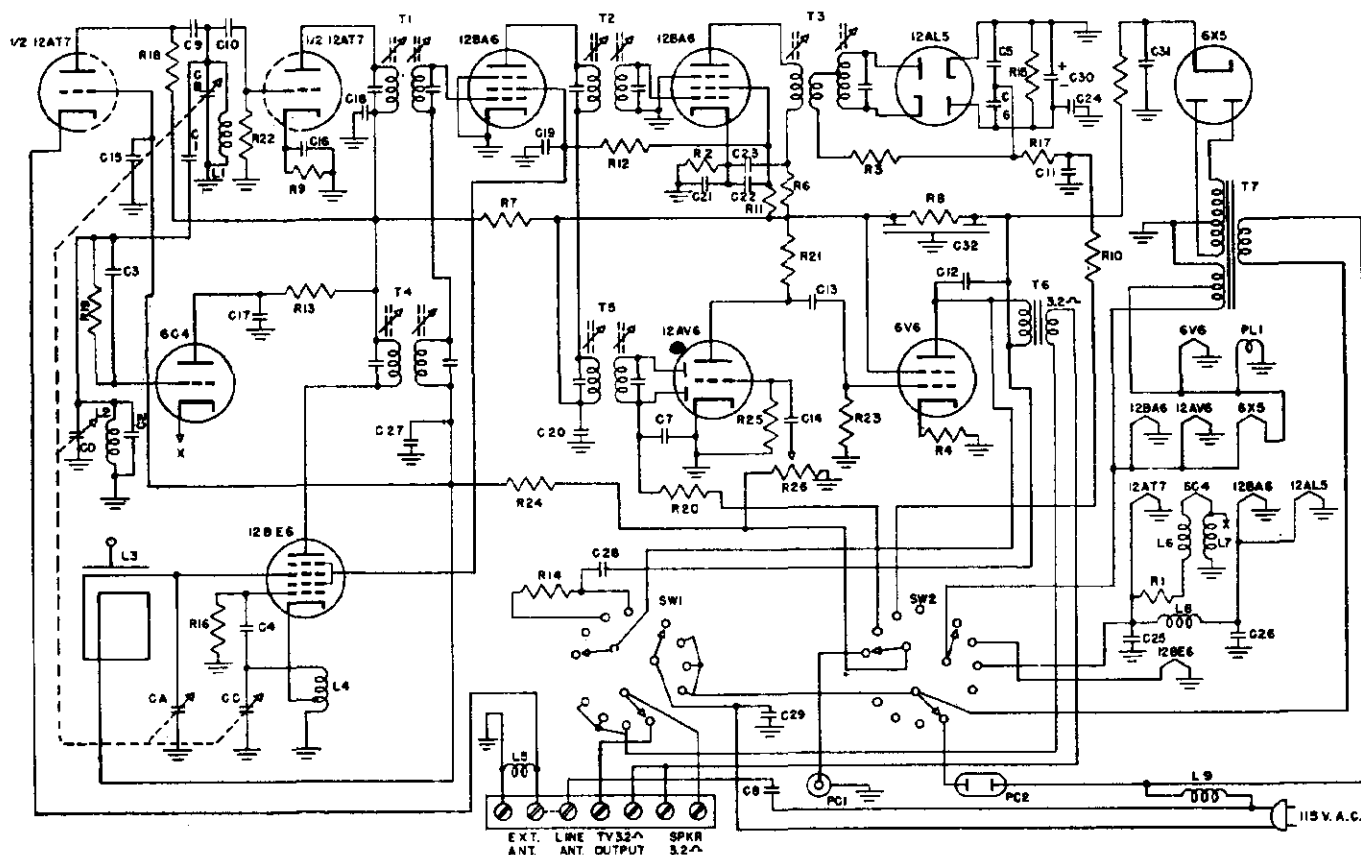
- A. M. band coverage: 535 KC to 1800 KC.
- F. M. band coverage: 110 MC to 87 MC.
- Ten-inch Alnico V - P. M. console speaker.
- 3.2-ohm speaker terminals (for T. V.)
- Wattage load: A. M.—40 watts
F. M.—50 watts
- Undistorted power output: 2 watts.
- Eight tubes, plus rectifier—
6C4, 12AT7, 12BA6, 12BE6, 12BA6,
6V6, 12AL5, 12AV6, 6X5 Rectifier.

F. M. ALIGNMENT

Align I.F.'s T1, T2, primary T3 to 10.7 KC by connecting unmodulated signal generator to grid of 12AT7 through .01 condenser. Use vacuum tube volt meter to read highest AVC voltage across C30 condenser. Adjust secondary T3 (ratio detector coil, top slug) for minimum hiss level (off station). Adjust oscillator trimmer to correspond with dial calibration at 100 mc and RF trimmer for maximum sensitivity.

A. M. ALIGNMENT

Connect signal generator to mixer grid (12BE6) through .01 condenser and align I.F.'s T4 and T5 to 455 KC. Use output meter across output transformer or vacuum tube volt meter for highest AVC voltage across condenser C27. Align oscillator trimmer to dial calibration at approximately 1400 KC and antenna trimmer for best sensitivity.



SCHEMATIC DIAGRAM

R1	42 Ohm	2 Watt	Resistor
R2	68 Ohm	1/2 Watt	Resistor
R3	68 Ohm	1/2 Watt	Resistor
R4	400 Ohm	1 Watt	Resistor
R5	500 Ohm	5 Watt	Resistor
R6	500 Ohm	1/2 Watt	Resistor
R7	500 Ohm	1/2 Watt	Resistor
R8	2000 Ohm	10 Watt	Resistor
R9	2500 Ohm	1/2 Watt	Resistor
R10	5000 Ohm	1/2 Watt	Resistor
R11	10K Ohm	1 Watt	Resistor
R12	10K Ohm	1 Watt	Resistor
R13	10K Ohm	1 Watt	Resistor
R14	10K Ohm	1 Watt	Resistor
R15	15K Ohm	1/2 Watt	Resistor
R16	25K Ohm	1/2 Watt	Resistor
R17	25K Ohm	1/2 Watt	Resistor
R18	50K Ohm	1/2 Watt	Resistor
R19	50K Ohm	1/2 Watt	Resistor
R20	50K Ohm	1/2 Watt	Resistor
R21	200K Ohm	1/2 Watt	Resistor
R22	500K Ohm	1/2 Watt	Resistor
R23	500K Ohm	1/2 Watt	Resistor
R24	5 Meg. Ohm	1/2 Watt	Resistor
R25	15 Meg. Ohm	1/2 Watt	Resistor
R26	500K Ohm	Potentiometer	

L1—FM RF Coil
L2—FM Oscillator Coil
L3—AM Loop Antenna
L4—AM Oscillator Coil
L5—FM Antenna Choke
L6—Filament Choke
L7—Filament Choke
L8—Filament Choke
L9—FM Line Antenna Choke

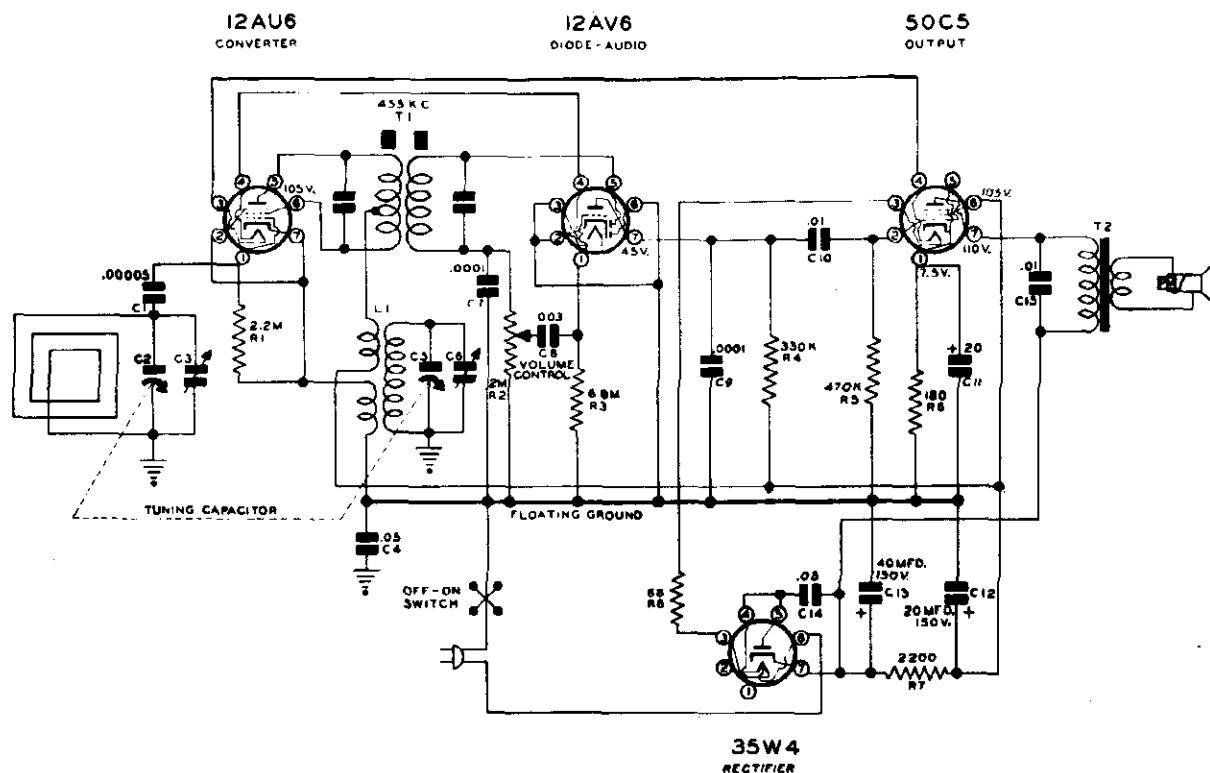
T1—10.7 Meg. I. F. Transformer
T2—10.7 Meg. I. F. Transformer
T3—10.7 Meg. Ratio Detector
T4—455 Meg. I. F. Transformer
T5—455 Meg. I. F. Transformer
T6—Audio O. P. Transformer
T7—Power Transformer

SW1—3-Pole 4-Pos. Off-On Tone Switch
SW2—3-Pole 4-Pos. AM-FM Phono Switch
PC1—Phono Pickup Connector
PC2—Phono Motor Connector 115 V. AC
PL1—No. 47 Pilot Light

C1	1.5	Mmfd.	400 V. Condenser
C2	14	Mmfd.	400 V. N220
C3	100	Mmfd.	400 V. Tubular Ceramic
C4	100	Mmfd.	400 V. Tubular Ceramic
C5	100	Mmfd.	400 V. Tubular Ceramic
C6	100	Mmfd.	400 V. Tubular Ceramic
C7	100	Mmfd.	400 V. Tubular Ceramic
C8	100	Mmfd.	400 V. Tubular Ceramic
C9	250	Mmfd.	400 V. Tubular Ceramic
C10	250	Mmfd.	400 V. Tubular Ceramic
C11	.0015	Mfd.	400 V. Mica Condenser
C12	.0025	Mfd.	400 V. Paper Condenser
C13	.01	Mfd.	400 V. Paper Condenser
C14	.01	Mfd.	400 V. Paper Condenser
C15	.01	Mfd.	400 V. Disc Ceramic
C16	.01	Mfd.	400 V. Disc Ceramic
C17	.01	Mfd.	400 V. Disc Ceramic

C18	.01	Mfd.	400 V. Disc Ceramic
C19	.01	Mfd.	400 V. Disc Ceramic
C20	.01	Mfd.	400 V. Disc Ceramic
C21	.01	Mfd.	400 V. Disc Ceramic
C22	.01	Mfd.	400 V. Disc Ceramic
C23	.01	Mfd.	400 V. Disc Ceramic
C24	.01	Mfd.	400 V. Disc Ceramic
C25	.01	Mfd.	400 V. Disc Ceramic
C26	.01	Mfd.	400 V. Disc Ceramic
C27	.05	Mfd.	200 V. Paper Condenser
C28	.05	Mfd.	400 V. Paper Condenser
C29	.1	Mfd.	400 V. Paper Condenser
C30	4	Mfd.	50 V. Electro. Condenser
C31	20	Mfd.	450 V. Electro. Condenser
C32	20 + 20	Mfd.	475 V. Electro. Condenser

CA, B, C, D Gang Condenser AM-FM



ALIGNMENT PROCEDURE

Step No.	Position of Gang	Signal Generator Frequency	Generator Connection	Dummy Antenna	Adjustment	Type of Adjustment
1.	Open	455 KC.	Rear Gang Terminal	.1 Mfd.	Slugs Top and Bottom in can.	Adjust for Maximum Output
2.	Open	1620 KC.	Dummy Antenna	2 Turns of Hookup Wire 6" in Dia. (Place Approx. a Foot from and in Same Plane as Loop)	Front Gang Trimmer	Adjust for Maximum Output
3.	1400 KC	1400 KC			Rear Gang Trimmer	Adjust for Maximum Output
4.	600 KC	600 KC			—	Check Gang Alignment

Schematic Location	Sonora Part No.	DESCRIPTION	Schematic Location	Sonora Part No.	DESCRIPTION
C1	N-6385	Condenser, Ceramic 50 MMFD. 500V.	R2	N-7142	Resistor 6.8 Megohm 1/2W 20%
C4	N-1345	Condenser, Paper .05 MFD. 200V.	R3	N-4028	Resistor 330,000 Ohm 1/2W 20%
C7, C9	N-6015	Condenser, Ceramic 100 MMFD. 500V.	R4	N-4423	Resistor 470,000 Ohm 1/2W 20%
C8	N-2063	Condenser, Paper .003 MFD. 600V.	R5	N-4027	Resistor 180 Ohm 1/2W 10%
C10, C15	N-1344	Condenser, Paper .01 MFD. 400V.	R6	N-4067	Resistor 2,200 Ohm 1/2W 10%
C11	N-7153	Electrolytic { 20 MFD. 15V.	R7	N-4896	Resistor 68 Ohm 2.0W 10%
C12			R8	N-6014	Transformer, I.F.
C13			T1	N-7694	Oscillator Coil
C14	N-1346	Condenser, Paper .05 MFD. 400V.	L1	N-7725	Loop Antenna Coil
R1	N-4277	Resistor 2.2 Megohm 1/2W 20%		N-7670	Variable Capacitor
		Volume Control—2.0 Megohm		N-7141	Speaker, 4" PM with Output
				N-7824	Transformer

POWER SUPPLY - 110 to 120 Volt, 60 Cycle Only.

GROUND - No ground connection should be used.

TUBES - 5 Tubes (inc. rectifier) are used. See label on bottom of cabinet.

TUNING RANGE - 535 to 1620 Kilocycles

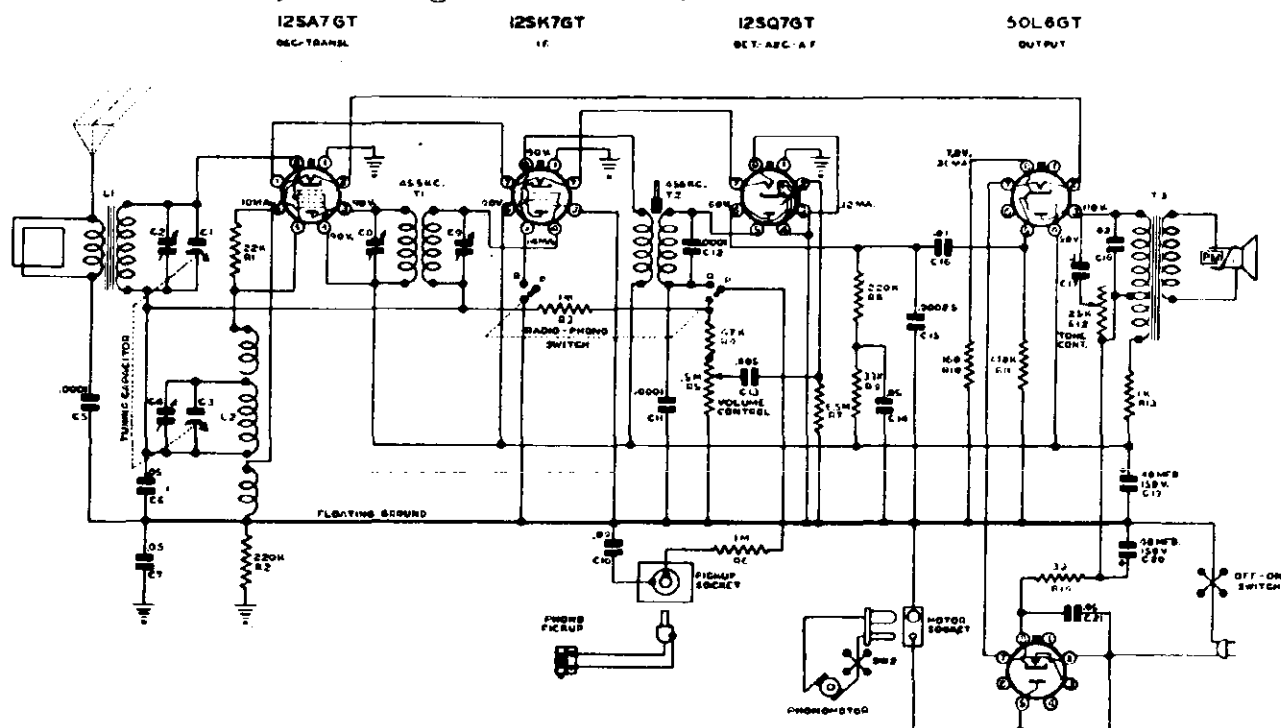
AERIAL SYSTEM - Built-in "Loop" aerial. Provision is made at the rear of cabinet for connecting an external antenna if required.

ALIGNMENT PROCEDURE

STEP NO.	POSITION OF GANG	SIGNAL GENERATOR FREQUENCY	GENERATOR CONNECTION	DUMMY ANTENNA	TYPE OF ADJUSTMENT	ADJUSTMENT
1.	OPEN	455 KC.	REAR GANG TERMINAL.	.1MFD.	T2, C9 & C8	ADJUST FOR MAXIMUM OUTPUT
2.	OPEN	1620 KC.	LOOP	.0002 MFD.	FRONT GANG TRIMMER	ADJUST FOR MAXIMUM OUTPUT
3.	1400 KC.	1400 KC.	LOOP	.0002 MFD.	REAR GANG TRIMMER	ADJUST FOR MAXIMUM OUTPUT
4.	600 KC.	600 KC.	LOOP	.0002 MFD.		CHECK GANG ALIGNMENT

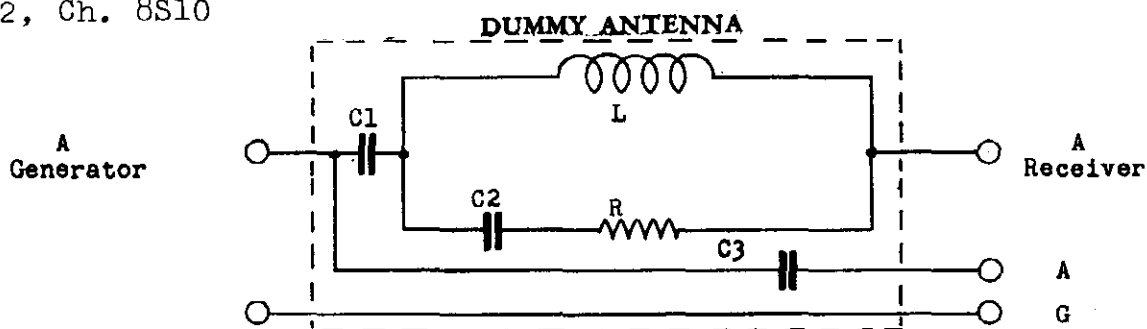
SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION	R12	N-6157	Control - Tone
			R14	N-4022	Resistor - 33 Ohm - 1/2W. 20%
			R10	N-4067	Resistor - 180 Ohm - 1/2W. 10%
C19, C20	N-5051	Capacitor - Electrolytic - 40 MFD. 150 V.	R1	N-4025	Resistor - 22,000 Ohm - 1/2W. 20%
		40 MFD. 150 V.	R9	N-4064	Resistor - 33,000 Ohm - 1/2W. 20%
C5, C11	N-6015	Capacitor - Ceramic 100 MMFD. 500V. 20%	R4	N-4063	Resistor - 47,000 Ohm - 1/2W. 20%
C12	N-7549	Capacitor - Ceramic 100 MMFD. 500V. 10%	R2, R8	N-4026	Resistor - 220,000 Ohm - 1/2W. 20%
C15	N-6488	Capacitor - Ceramic 250 MMFD. 500V. 20%	R11	N-4027	Resistor - 470,000 Ohm - 1/2W. 20%
C13	N-4894	Capacitor - Paper .005 MFD. 600V.	R3, R6	N-1262	Resistor - 1.0 Megohm - 1/2W. 20%
C16	N-1344	Capacitor - Paper .01 MFD. 400V.	R7	N-4028	Resistor - 6.8 Megohm - 1/2W. 20%
C18	N-1376	Capacitor - Paper .02 MFD. 400V.	R13	N-5358	Resistor - 1,000 Ohm - 1.0W. 10%
C6, C7, C14	N-1345	Capacitor - Paper .05 MFD. 200V.	T1	N-7676	Transformer - I.F. #1
C21	N-1346	Capacitor - Paper .05 MFD. 400V.	T2	N-7677	Transformer - I.F. #2
C10	N-4957	Capacitor - Paper .09 MFD. 200V.	T3	N-4875	Transformer - Output
C17	N-1623	Capacitor - Paper .1 MFD. 400V.			
R5	N-5757	Control - On-Off & Volume		N-6149	Coil - Antenna
				N-7139	Coil - Oscillator

RECORD CHANGER: Gen. Instr. Model 700F, See pages RCD.CH.19-1, 2 through RCD.CH.19-9.



PAGE 21-2 SPARTON

MODELS 141A, Ch.
8L10; 4970, 4971,
4972, Ch. 8S10



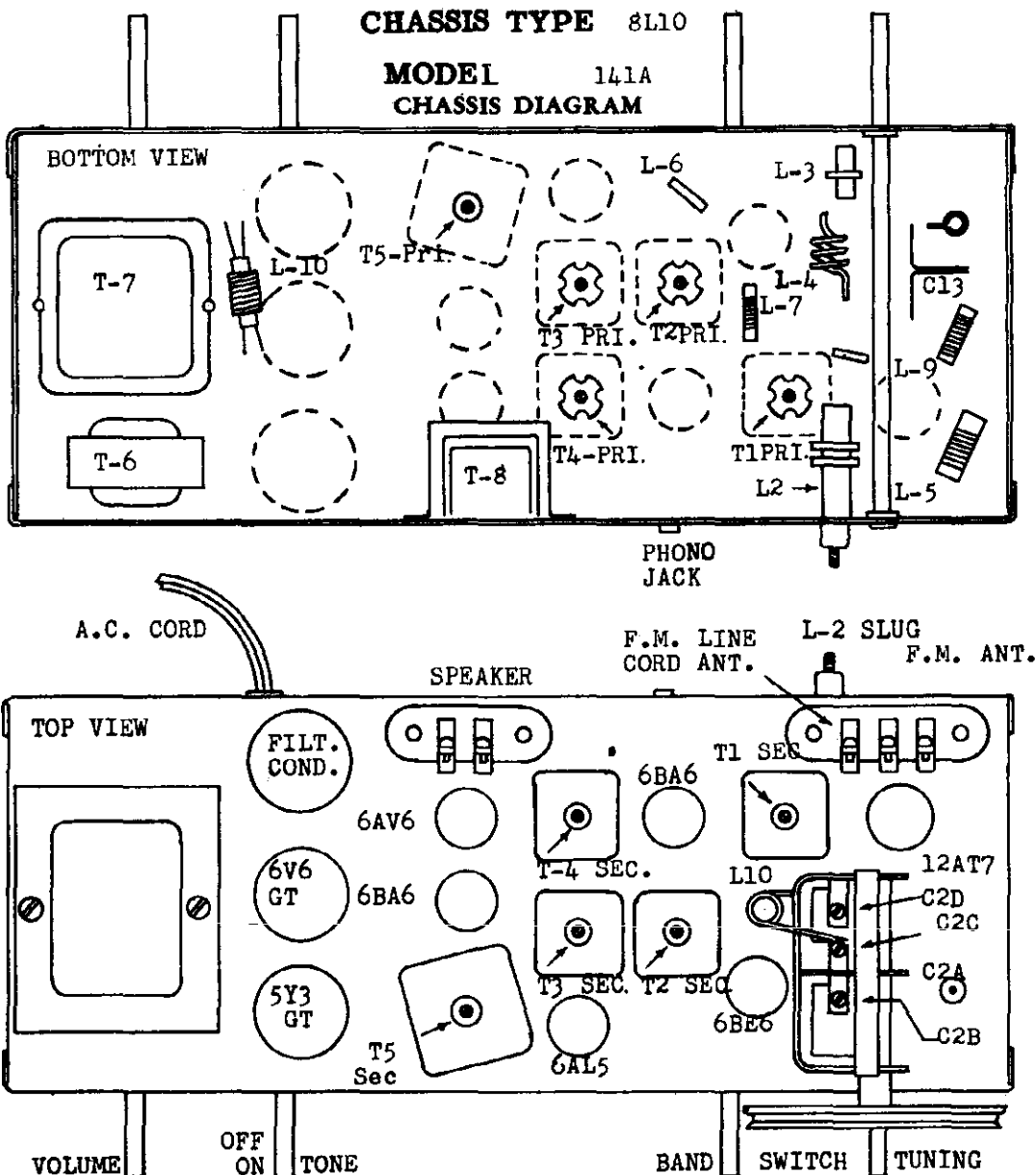
C1 - 200 mmf. Condenser 400 V.D.C.
C2 - 400 mmf. Condenser 400 V.D.C.
C3 - .02 mmf. Condenser 400 V.D.C.
R - 100 ohms Resistor 1/4 Watt
L - Choke Coil

----Case Shield
Choke Coil Specification
Tubing - 3/8" diameter Bakelite
Wire - No. 38 Enameled
Turns - 59 Closely Wound (Impregnated)

NOTE: When using this dummy antenna the generator output impedance should be 10 ohms or lower.

CHASSIS TYPE 8L10

MODEL 141A
CHASSIS DIAGRAM



STEP BY STEP ALIGNMENT PROCEDURE

OPER- ATION	ALIGNMENT OF	GENERATOR CONNECTED TO	DUMMY ANT.	GENERATOR FREQUENCY	BAND SWITCH SETTING	TUNING COND SETTING	TRIMMER OR SLUG	REMARKS
1.	Set dial pointer even with left-hand stop line with condenser gang closed.							
2.	Connect output meter across speaker terminals.							
3.	A.M.-I.F.	Pin #7 of 6BE6 Conv. Tube	.02 MFD. Cond.	456 KC.	A.M.	Open	T4 Sec. Slug	Max. Reading
							T4 Pri. Slug	Max. Reading
							T2 Sec. Slug	Max. Reading
							T2 Pri. Slug	Max. Reading
4.	Repeat operation #3.							
5.		A.M. Ant.	*	1500 KC.		1500 KC.	C2B Osc. Tri.	Peak Accurately
6.	A.M.-R.F.	On Cabinet		1500 KC.	A.M.	1500 KC.	C2D Ant. Tri.	Peak Accurately
7.	A.M.-R.F.	On Cabinet	*	600 KC.	A.M.	600 KC.	L-2 Slug	Max. Reading
8.	Repeat operations #5, #6 and #7.							
9.	Check Calibrations at 600,1000 and 1500 KC.							
10.	SPECIAL NOTE: For complete F.M.-I.F. Visual Alignment instructions please refer to pages 7, 8,9,10,11 and 12 of this bulletin.							
11.	F.M.-I.F. Alignment using an A.M. Generator and Output Meter.							
12.	T5 F.M. Ratio Det.	Pin #1 of 2nd 6BA6 Tube	.02 MFD. Cond.	10.7 MC.	F.M.	Open	T5 Sec. Slug	Max. Reading
							T5 Pri. Slug	Max. Reading
13.	NOTE: Operations 11, 13, 14, 15, 18 and 19 must be made with generator output as low as possible, consistent with usable output meter reading.							
14.	T3 2nd. F.M.-I.F.	Pin #1 1st 6BA6 Tube	.02 MFD. COND.	10.7 MC.	F.M.	Open	T3 Sec. Slug	Max. Reading
							T3 Pri. Slug	Max. Reading
15.	T1 1st F.M.-I.F.	Pin #8 on 12AT7 Mixer Tube	.02 MFD. Cond.	10.7 MC.	F.M.	Open	T1 Sec. Slug	Max. Reading
							T1 Pri. Slug	Max. Reading
16.	Adjust secondary slug on T5 ratio detector transformer to minimum deflection or dip on output meter. Under certain conditions it is possible to adjust T5 sec. slug to minimum noise with the receiver tuned to a weak station. This operation is very critical and the receiver must be tuned to the center response only.							
17.	F.M.-R.F. alignment using an A.M. generator with frequencies of 88 to 108 MC. and a vacuum tube voltmeter, or D.C. voltmeter. (20,000 Ohms per volt.)							
18.	Place meter across C36 elect. condenser. (Meter reading approximately 1 volt.)							
19.	F.M.-R.F.	F.M. Ant.	Match Gen. To 300 Ohm	106 MC.	F.M.	106 MC.	C2A Osc. Tri.	Max. Reading
							C2C Ant. Tri.	Peak Accurately
20.	Check Calibration at 88 MC.							

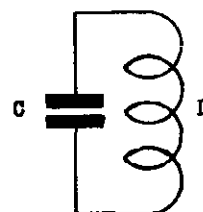
MODELS 141A, Ch. 8110;
4970, 4971, 4972, Ch. 8S10

WARNING: Do not proceed with any of the following alignment instructions unless it is certain that the AM-IF is in accurate alignment. If not, align the AM-IF system according to the step by step alignment procedure.

A 6AL5 is employed as a ratio detector. This tube is preceded by a 6BA6 ratio detector driver and a stage of amplification at 10.7 Mc. also utilizing a 6BA6 tube. The 2nd section of the 12AT7 tube is used as the FM mixer. All IF coupling uses individual slug tuned transformers.



Thus if we were to shift the frequency from high to low or low to high across the resonant frequency and make a record of the voltage across the tuned circuit, we could plot the voltage against frequency and obtain a curve which might look like Fig. 1.

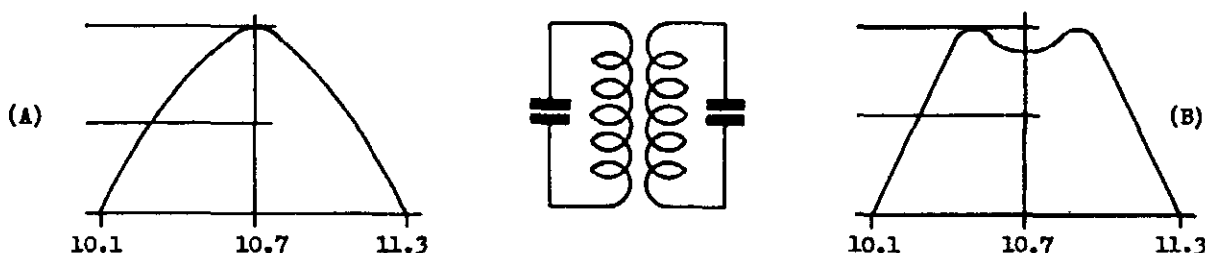


MODELS 141A, Ch. 8L10;
4970, 4971, 4972, Ch. 8S10

VISUAL I. F.-F. M. ALIGNMENT DATA

This is the selectivity curve or response curve for the circuit under discussion. This type of circuit may be aligned or adjusted to resonance by simply changing either L or C until maximum voltage is obtained at the resonant frequency. Now if another circuit tuned to the same resonant frequency is coupled to the simple case above, a number of things can happen. First current flowing in one circuit will induce current in the second circuit, the magnitude of this current depending on the degree or amount of coupling between the two circuits. This coupling may be in the form of mutual inductance, mutual capacitance or any impedance common to the two circuits. Now if we repeat the procedure outlined for obtaining the response curve of a single tuned circuit using the voltage developed across the secondary of the coupled circuit while driving the primary, we may get either of two types of curves depending on the magnitude of the coupling, (a) in Fig. 2 is a typical curve for two circuits coupled below critical coupling and (b) is a representation of the curve for an over coupled circuit.

Fig. 2



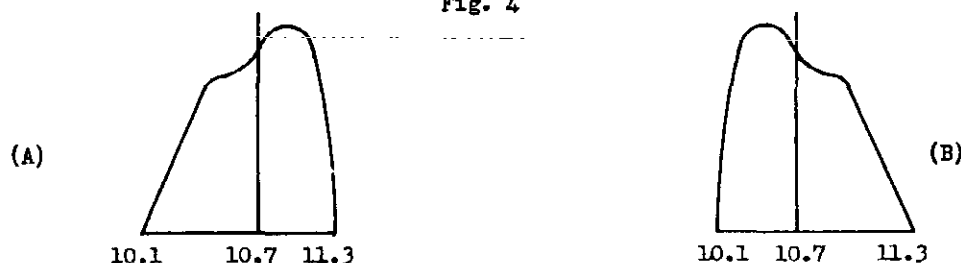
Overcoupled circuits producing a response curve like (b) Fig. 2 are often employed where it is important that the response curve remain approximately flat over a narrow band of frequencies near the resonant frequency. They are also frequently combined with single peaked circuits to produce a response curve like Fig. 3.

Fig. 3



The dotted lines indicate the curves of the individual circuits and the solid curve shows the overall response of the two or more pairs of coupled circuits. Circuits like the above or approaching them in form are desirable in an FM receiver where the pass band should be of the order of 200 Kc. Now from the above it is evident that simple peaking both sides of a circuit coupled below critical for maximum voltage will provide optimum alignment but if this procedure is followed with an over-coupled circuit it is almost a certainty that the two circuits will not be tuned to the resonant frequency but will instead be aligned so that either one or the other is accentuated. The response curve will then look like Fig. 4 (a) or (b).

Fig. 4

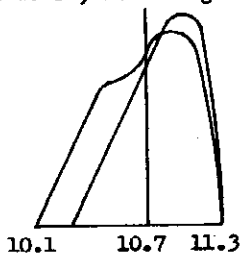


MODELS 141A, Ch. 8L10;
4970, 4971, 4972, Ch. 8S10

VISUAL I. F.-F. M. ALIGNMENT DATA

Now if this overcoupled circuit is combined with a single peaked circuit (where the coupling is below critical), the misalignment becomes worse, something like Fig. 5.

Fig. 5



From the above it appears that to properly align a receiver using overcoupled IF transformers it will be necessary to take a response curve of each stage and align the circuit so that the two peaks are symmetrical, that is, approximately equal in amplitude and displaced equally from the center frequency. To do this with a CW or AM signal would be laborious and time consuming whereas the use of visual equipment makes it nearly as simple as adjusting a simple single peaked amplifier.

Visual alignment test equipment performs the operation of plotting the response curve almost exactly as described above except that instead of manually changing the generator frequency, recording the voltage and then plotting the results, these operations are performed automatically and simultaneously by a combination of electronic circuits. The operation is briefly as follows.

In the signal generator a low AC voltage is applied to a reactance tube modulator which shifts the oscillator frequency from low to high or from high to low at a rate determined by the frequency of the AC voltage and by an amount determined by the AC voltage. The frequency at any instant is dependant on the AC voltage present at that instant of time. An oscilloscope is provided which may be considered a voltmeter used to read the voltage across the tuned circuit, provided a detector is used to convert the RF to a low audio frequency. This voltage is then applied to the vertical plates and results in a vertical displacement of the spot on the screen. Some of the voltage used to shift the oscillator frequency is also applied to the horizontal plates of the oscilloscope providing a means of displacing the spot horizontally. It is now evident that since for any given AC voltage only one frequency may be obtained and since that AC voltage will result in an exact amount of spot deflection on the scope we can read the voltage across the circuit under examination by noticing the position of the spot at this exact instant.

Now if we consider the frequency as shifting from low to high 60 times per second and remember that the spot is moving across the screen of the scope 60 times per second at exact synchronization with the change in frequency it is only necessary to apply the voltage from our circuit to the vertical plates to obtain a replica of the response curve on the face of the cathode ray tube. This curve will be repeated 60 times per second if our sweep frequency is 60 cycles. Adjustments to the circuit may now be made and the effect on the response curve noted instantaneously.

Although it is possible to observe the selectivity curves as shown in Fig. 1, 2, and 3 on the scope by the use of an auxiliary special detector coupled to the plate of the last IF tube, it is much more convenient to observe the effects of IF alignment upon the shape of the ratio detector output trace. When this is done the auxiliary detector is not necessary and a direct connection of the scope into the receiver circuits will provide all the necessary connections.

If the overall selectivity curve is not "flat-topped" (solid line in Fig. 3) the ratio detector curve cannot be linear (straight) throughout the center section, symmetrical and have sufficient band width (Fig. 6).

Under these conditions it would not be possible to receive a signal without distortion and higher than normal noise, the degree of distortion and abnormal noise dependent upon the extent to which the center of the ratio detector trace departs from a straight line and the extent to which the entire trace departs from true symmetry.

After a pattern similar to Fig. 6 is obtained with connection #1 shown in the block diagram, the generator lead may be moved ahead through the IF system one tube at a time and the intervening transformer aligned for maximum output but at all times a curve very similar to Fig. 6 must be maintained.

3. EQUIPMENT REQUIRED.

(a) A sweep signal generator with a center frequency of 10.7 Mc. and a total sweep width of at least 400 Kc. Examination of the block diagram will reveal a variable resistor-capacitor circuit inserted in the lead between the FM sweep generator and the horizontal amplifier of the oscilloscope. This control should be adjusted so that the dual trace observed on the oscilloscope will blend into a single trace and thereby eliminate any confusion due to the two traces.

(b) An Oscilloscope with either a 3" or 5" tube equipped with both vertical and horizontal amplifiers.

MODELS 141A, Ch. 8L10;
4970, 4971, 4972, Ch. 8S10

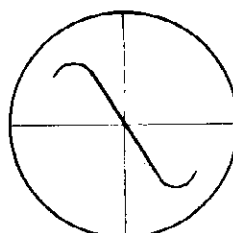
VISUAL I. F.-F. M. ALIGNMENT DATA

4. ALIGNMENT OF THE 10.7 I.F.

Turn the wave band switch to F.M. and the generator to 10.7 Mc. Connect the F.M. signal generator output lead to the grid of the ratio detector driver tube and the scope to the 1st audio plate. Now proceed to align the ratio detector transformer for maximum linearity and output, being careful to maintain as symmetrical a trace as possible. Note that the adjustment of the secondary circuit, controls to a large extent, the linearity and symmetry of the pattern, and adjustment of the primary will influence the gain of the circuit. Fig. 6 represents a linear detector curve properly aligned.

It is important that the generator sweep a sufficiently wide band of frequencies so that the curves on both ends of the straight portion can be seen. Maximum linearity of alignment will result when these curves are symmetrically shaped and as previously stated this will result in minimum distortion and noise.

Fig. 6



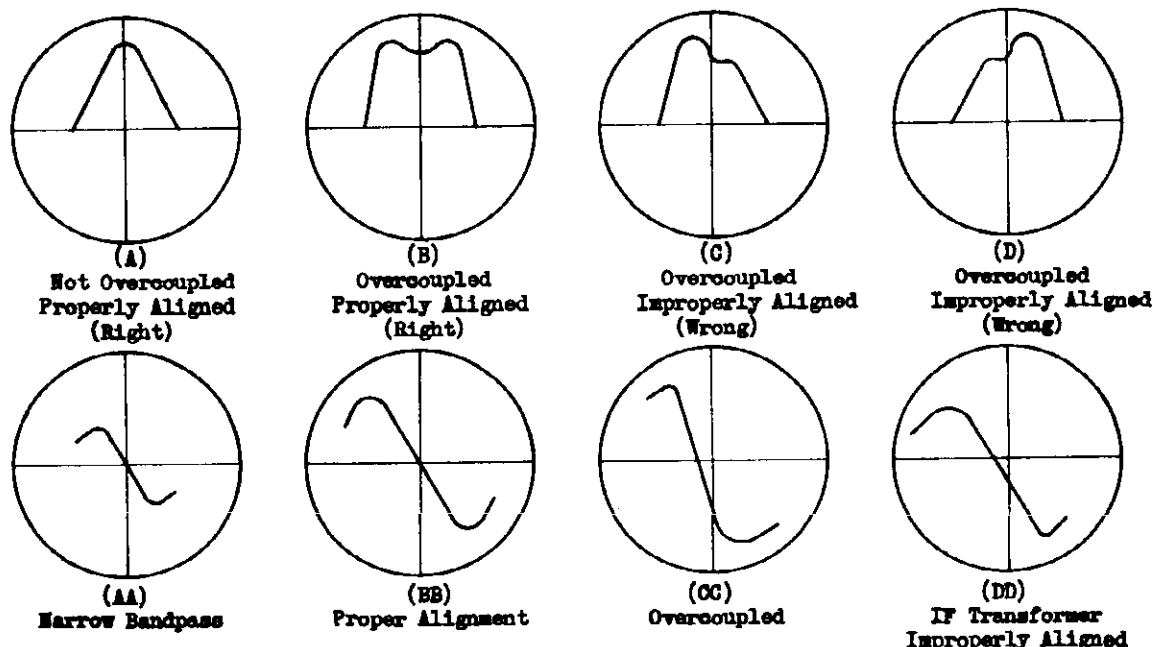
Connect the generator output lead to the grid of the I.F. amplifier. Align primary and secondary of the I.F. transformer being careful to maintain the same basic ratio detector trace as just described.

Observe that by alternately adjusting the primary and secondary, the vertical amplitude can be increased without the response curve becoming distorted. At all times it is important to reduce the signal generator output to maintain the scope picture on the screen. This will avoid overload and possible misalignment therefrom.

Move the generator lead to the grid of the converter tube and align No. 1 I.F. transformer following the same procedure as above.

Fig. 7, (A), (B), (C), and (D) represent typical selectivity curves of an overall I.F. Amplifier. Fig. 7, (AA), (BB), (CC), and (DD) represent the corresponding ratio detector curves.

Fig. 7



Should the trace appear unsatisfactory, a very slight readjustment of the detector secondary alignment may be made at this time as the need for any but a slight correction is an indication of incorrect alignment in one of the other stages. This is permissible only if the degree of correction necessary is slight. If this is not the case the entire alignment procedure should be repeated.

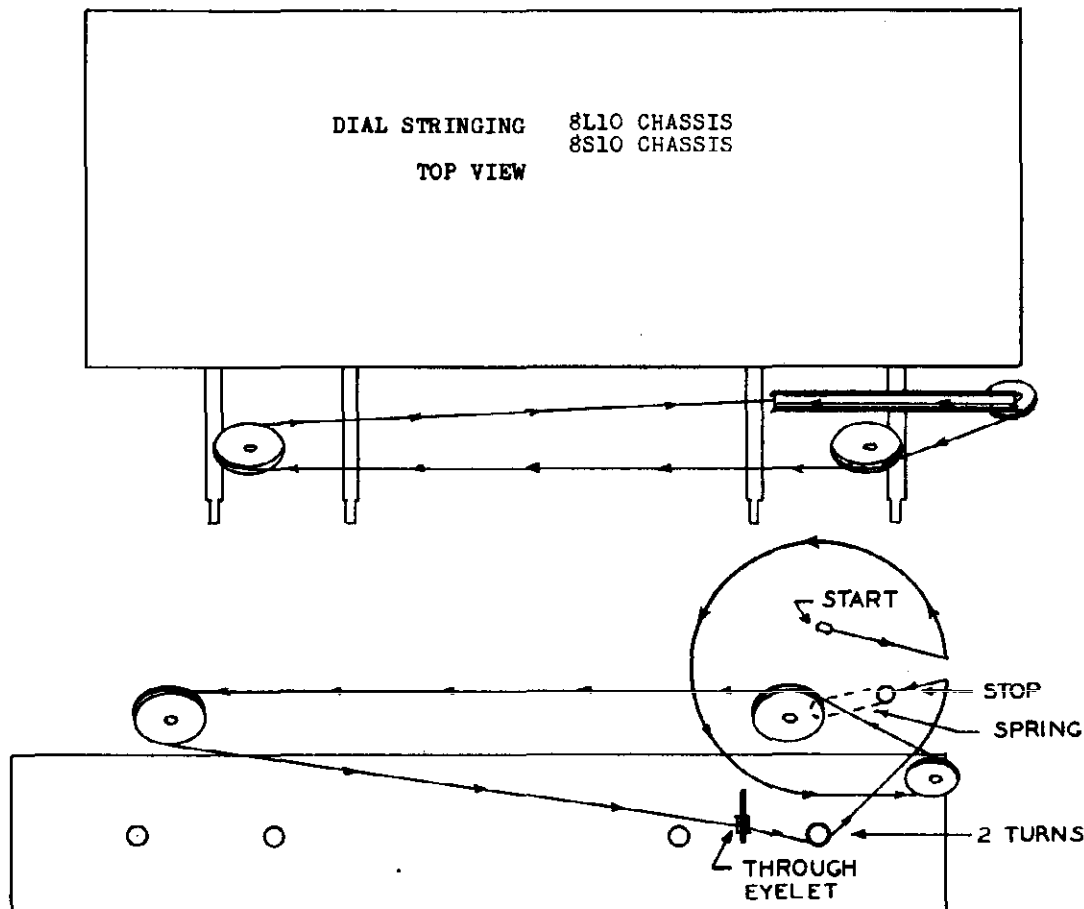
MODELS 141A, Ch. 8L10;
4970, 4971, 4972, Ch. 8S10

WHEN ORDERING PARTS ALWAYS SPECIFY PART NUMBER AND MODEL FOR WHICH PART IS INTENDED.

DESCRIPTION		PART NUMBER	CONDENSERS & MISCELLANEOUS	
<u>COILS</u>			Condenser - 2 Gang Variable	PC65002-1
L-1 Loop Ant. Assembly	PA5250-4		Condenser - (C42) 10-40-40-50 Mfd. Electrolytic	PA4307-4
L-2 Loop Loading Coil	AA6616-1		Condenser - (C36) 8 Mfd. 50 Volt Electro.	PA4303-7
L-3 A.M. Osc. Coil	AA6665-3		C & R Unit - (C26A & B with R19)	PA4329-1
L-4 F.M. Osc. Coil	PA5200-7		Control - (R24) 1 Megohm Volume	PA4408-2
L-5 100 Mc. Choke Coil	AA6798-3		Control - (R35) .5 Megohm Tone & A.C. Switch	PA4400-10
L-6 Choke Coil	AA6798-5		Control - Panel	PC63071
L-7 Choke Coil	AA6798-6		Dial Chart	PB30013
L-8 Choke Coil	AA6769-2		Dial Light Bulb	PA4100-3
L-9 F.M.-R.F. Coil	PA5200-6		Knobs - (4-Black)	PA5625-1
L-10 Line Cord Ant. Choke	AA6664-1		Switch - Wave Band	PA4610
L-11 Choke Coil	AA6798-7		*Speaker - (6" x 9" Oval)	PC63000-19
			<u>TRANSFORMERS</u>	
T1 - Transformer - No. 1 F.M. - I.F. Assembly	AA6667-1			
T2 - Transformer - No. 1 A.M. - I.F. Assembly	AA6668-5			
T3 - Transformer - No. 2 F.M. - I.F. Assembly	AA6667-3			
T4 - Transformer - No. 2 A.M. - I.F. Assembly	AA6668-1			
T5 - Transformer - Ratio Detector Assembly	AA6684-1			
T6 - Transformer - Output	AB44061-2			
T7 - Transformer - Power	AB44013-1			
T8 - Choke - Filter	AB47004-1			

* Complete speakers may be returned to factory Service Department for repair or replacement.

DIAL STRINGING



MODELS 141A, Ch. 8L10;
4970, 4971, 4972, Ch. 3S10

VOLTAGE CHART

Line Voltage: 117 Volts AC

Position of volume control: Full with set tuned to
quiet channel. Position of Band Switch A.M.

TUBE	FUNCTION	Voltage of Sockets Prongs to Ground See Prong Nos. on Schematic.								
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9
6BE6	A.M. Conv. & F.M. Osc.	-2.5	0	0	6.3*	100	100	**		
12AT7	F.M. - R.F. & Mixer	115	-.6	0	0	0	145	-1	1.6	6.3
6BA6	I.F. Amp.	-.1	0	6.3*	0	190	100	1.0		
6BA6	Ratio Det. Driver	-.5	0	6.3*	0	110	100	.85		
6AL5	Ratio Det.	0	-.25	5.6*	0	0	0	0		
6AV6	1st A.F.-A.M. Det. & A.V.C.	-.1	0	6.3*	0	-.1	-.1	75		
6V6GT	Power Amplifier	0	0	220	230	0	145	6.3*	12	
5Y3GT	Rectifier	0	270		260*		260*		270	

NOTES: Voltage readings are for schematic diagram in this bulletin. Allow 15% \pm or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All D.C. measurements made with 20,000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter.

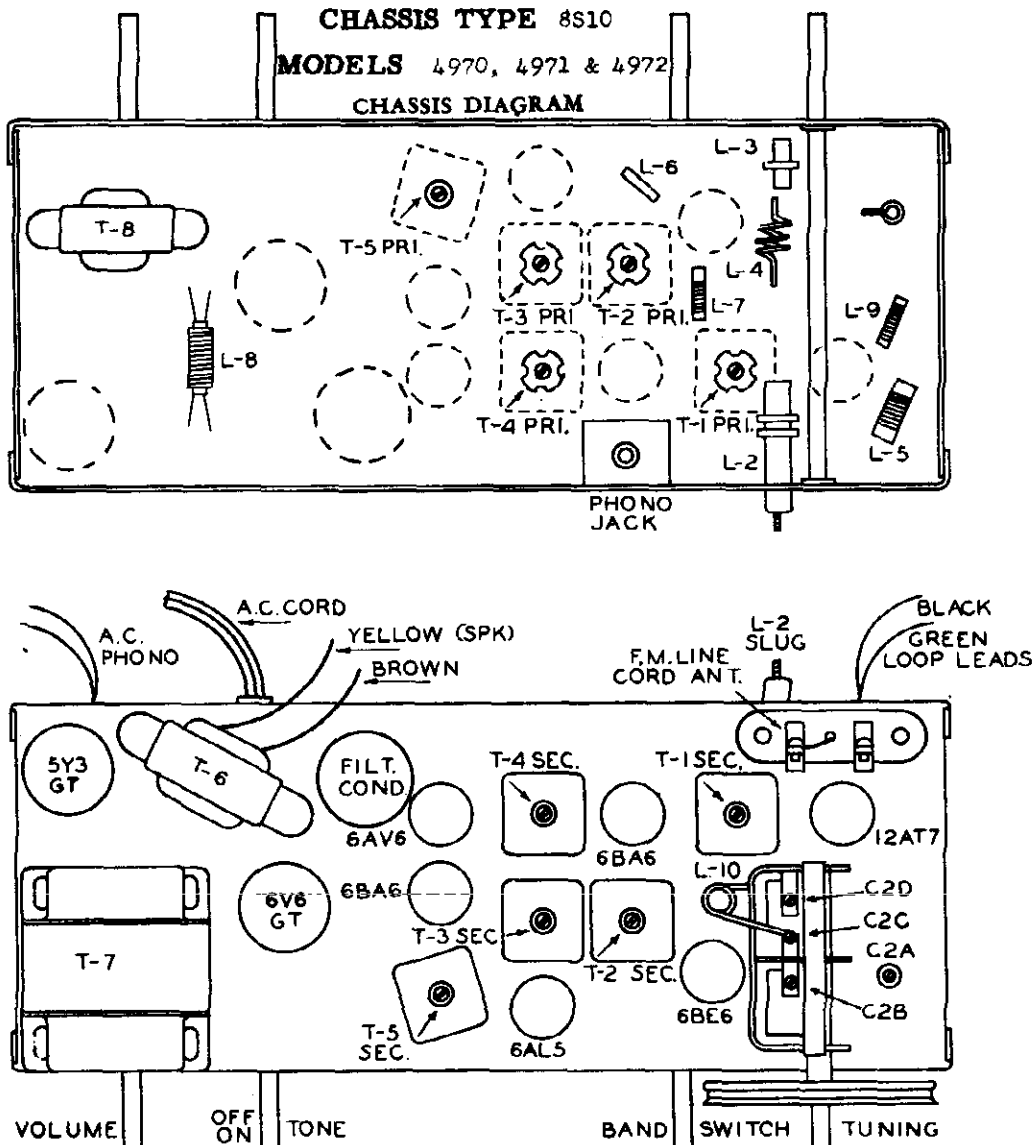
* AC Volts.

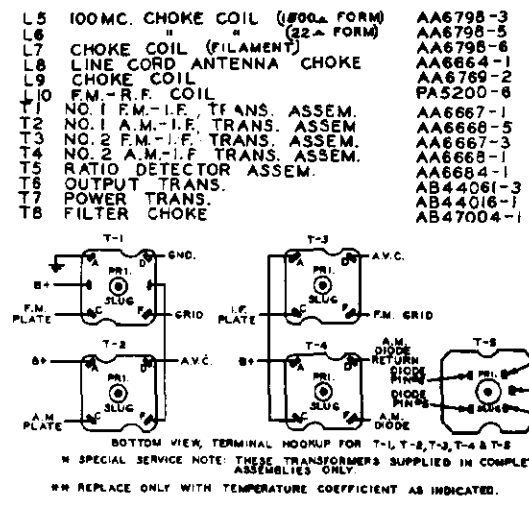
** Cannot be measured with 20,000 ohms per volt voltmeter.

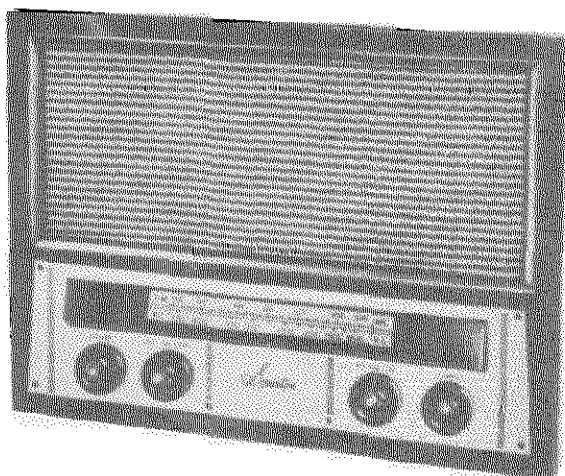
CHASSIS TYPE 8S10

MODELS 4970, 4971 & 4972

CHASSIS DIAGRAM





MODELS 141X, 142X,
1040X, 1041X, Ch. 8M10**MODEL 141X
142X****MODEL 1040X
1041X****VOLTAGE CHART**

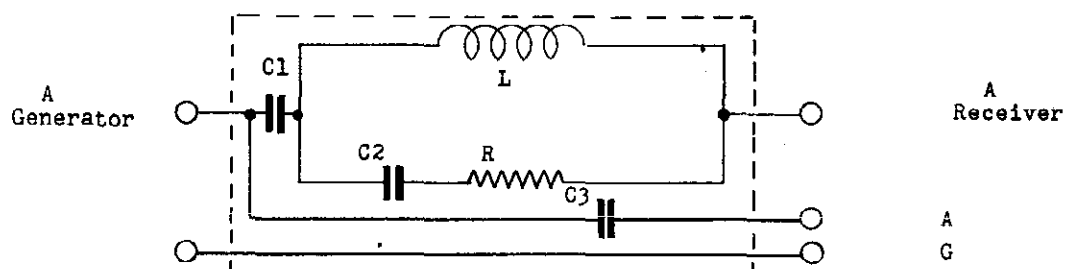
Line Voltage: 117 Volts AC		Position of volume control: Full with set tuned to quiet channel. Position of band switch A.M.								
TUBE	FUNCTION	Voltage of Sockets Prongs to Ground See Prong Nos. on Schematic.								
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9
6BE6	A.M. Conv. & F.M. Osc.	-2.5	0	0	6.3*	90	80	**		
12AT7X	F.M. -R.F. & Mixer	135	-.6	0	0	0	150	-1	1.2	6.3*
6BA6	I. F. Amp.	-.1	0	6.3*	0	235	100	1.0		
6BA6X	Ratio Det. Driver	-.5	0	6.3*0		95	90	1.2		
6AL5	Ratio Det.	0	-.25	5.6*0		0	0	0		
6AV6	1st A.F.-A.M. Det. & A.V.C.	-.1	0	6.3*0		-.1	-.1	95		
6V6GT	Power Amplifier	0	0	250	260	0	240	6.3*	14	
5Y3GT	Rectifier	0	270		260*		260*		270	

NOTES: Voltage readings are for schematic diagram in this bulletin. Allow 15% + or - on all measurements. Always use meter scale which will give greater deflection within scale limits. All D. C. measurements made with 20,000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter.

* AC Volts

** Cannot be measured with 20,000 ohms per volt voltmeter.

X Band switch on F.M.

DUMMY ANTENNA

C1 - 200 mmf. Condenser 400 V.D. C.

C2 - 400 mmf. Condenser 400 V.D.C.

C3 - .02 mmf. Condenser 400 V.D.C.

R - 100 ohms Resistor 1/4 Watt

L - Choke Coil

----Case Shield

Choke Coil Specification

Tubing - 3/8" diameter Bakelite

Wire- No. 38 Enameled

Turns- 59 Closely Wound (Impregnated)

NOTE: When using this dummy antenna the generator output impedance should be 10 ohms or lower.

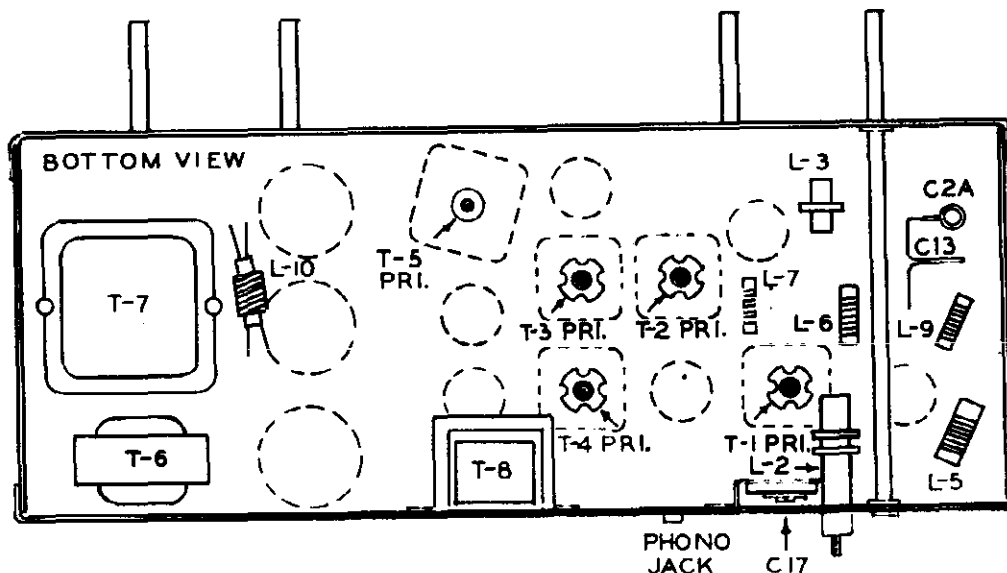
PAGE 21-12 SPARTON

MODELS 141X, 142X,
1040X, 1041X, Ch. 8M10

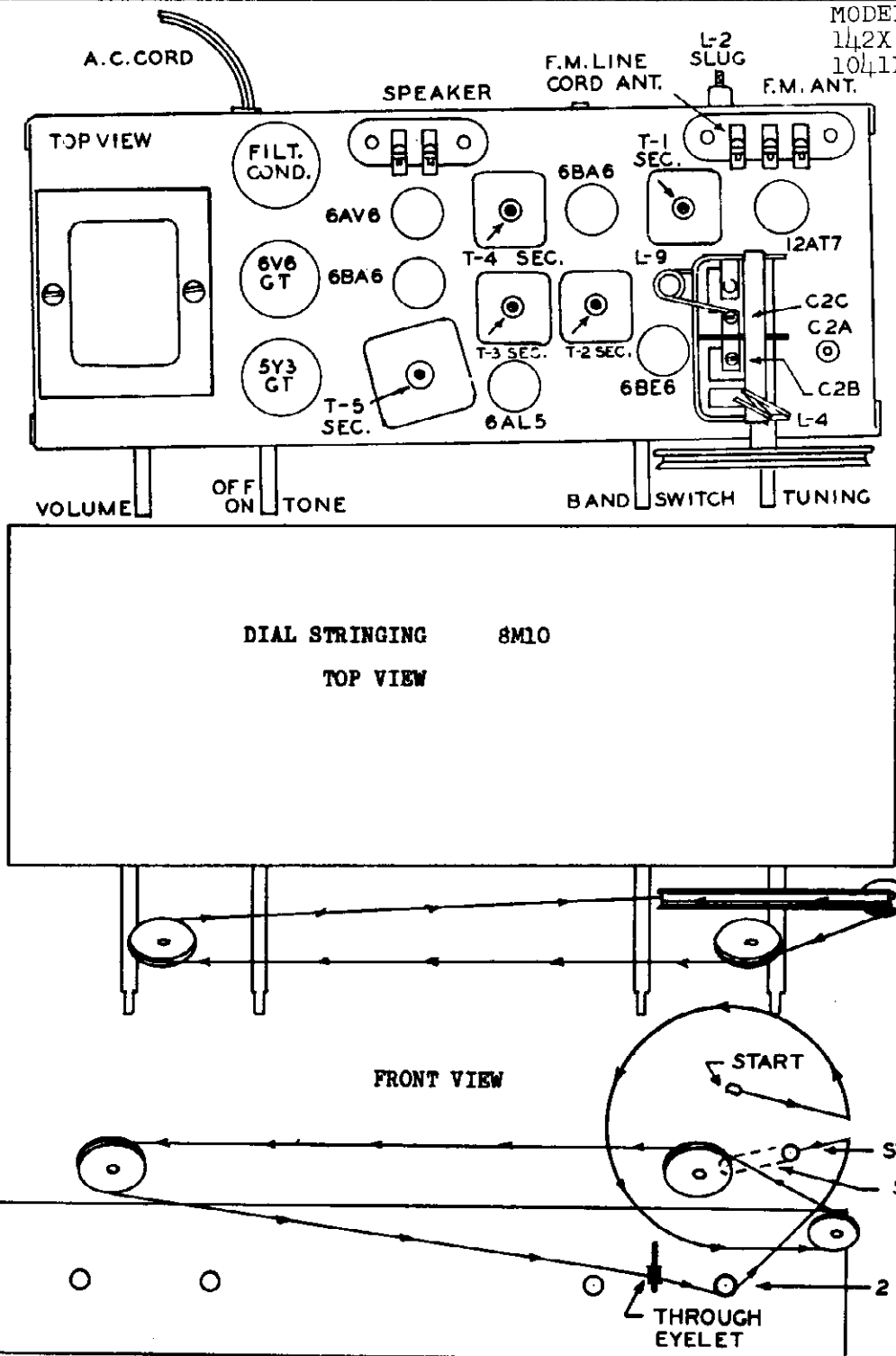
OPER- ATION	ALIGNMENT OF	GENERATOR CONNECTED TO	DUMMY ANT.	GENERATOR FREQUENCY	BAND SWITCH SETTING	TUNING COND SETTING	TRIMMER OR SLUG	REMARKS
1.	Set Dial pointer even with left-hand stop line with condenser gang closed.							
2.	Connect output meter across speaker terminals.							
3.	A.M.-I.F.	Pin #7 of 6BE6 Conv. Tube	.02 MFD Cond.	456 KC.	A.M.	Open	T4 Sec. Slug	Max. Reading
							T4 Pri. Slug	Max. Reading
							T2 Sec. Slug	Max. Reading
							T2 Pri. Slug	Max. Reading
4.	Repeat operation #3.							
5.		A.M. Ant.		1500 KC.		1500 KC.	C2B Osc. Tri.	Peak Accurately
6.	A.M.-R.F.	On Cabinet	*	1500 KC.	A.M.	1500 KC.	C17 Ant. Tri.	Peak Accurately
7.	A.M.-R.F.	On Cabinet	*	600 KC.	A.M.	600 KC.	L-2 Slug	Max. Reading
8.	Repeat operations #5, #6 and #7.							
9.	Check Calibrations at 600, 1000 and 1500 KC.							
10.	SPECIAL NOTE: For complete F.M.- I.F. Visual Alignment instructions please refer to pages 9, 10, 11, 12, 13 and 14 of Bulletin 11, Manual 6.							
11.	F.M.-I.F. Alignment using an A.M. Generator and Output Meter.							
12.	T5 F.M. Ratio Det.	Pin #1 of 2nd 6BA6 Tube	.02 MFD. Cond.	10.7 MC.	F.M.	Open	T5 Sec. Slug	Max. Reading
							T5 Pri. Slug	Max. Reading
13.	NOTE: Operations 11, 12, 14, 15, 18 and 19 must be made with generator output as low as possible, consistent with usable output meter reading.							
14.	T3 2nd. F.M.-I.F.	Pin #1 1st 6BA6 Tube	.02 MFD. COND.	10.7 MC.	F.M.	Open	T3 Sec. Slug	Max. Reading
							T3 Pri. Slug	Max. Reading
15.	T1 1st F.M.-I.F.	Pin #8 on 12AT7 Mixer Tube	.02 MFD. COND.	10.7 MC.	F.M.	Open	T1 Sec. Slug	Max. Reading
							T1 Pri. Slug	Max. Reading
16.	Adjust secondary slug on T5 ratio detector transformer to minimum deflection or dip on output meter. Under certain conditions it is possible to adjust T5 sec. slug to minimum noise with the receiver tuned to a weak station. This operation is very critical and the receiver must be tuned to the center response only.							
17.	F.M.-R.F. alignment using an A.M. Generator with frequencies of 88 to 108 MC. and a vacuum tube voltmeter or D. C. voltmeter. (20,000 Ohms per volt).							
18.	Place meter across C36 elect. condenser. (Meter reading approximately 1 volt)							
19.	F.M.-R.F.	F.M. Ant.	Match Gen. To 300 Ohms	106 MC	F.M.	106 MC.	C2A Osc. Tri.	Max. Reading
							C2C Ant. Tri.	Peak Accurately
20.	Check Calibration at 88 MC.							

*Use standard dummy antenna as described

CHASSIS DIAGRAM



MODELS 141X,
142X, 1040X,
1041X, Ch. 8M10

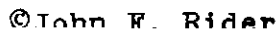


Wave Band Switch
*Speaker (Model 1085, 1086)
*Speaker (Models 141X, 142X)
*Speaker (Models 1040X, 1041X)

PA4614
PC3000-12
PC63000-19
PC63000-20

Escutcheon-(Black) (142X, 1041X, 1086)
Escutcheon-(Maroon) (141X, 1040X, 1085)
Panel (Black) (142X, 1041X, 1086)
Panel (Maroon) (141X, 1040X, 1085)
Knob (142X, 1041X, 1086)
Knob (141X, 1040X, 1085)
Washer-Paper (4 Each Model)

PB40150
PB40150-1
PC63071
PC63071-1
PA5625-1
PA5654
PA709-1



VOLTAGE CHART

MODELS 1051,
1052, Ch. 6B

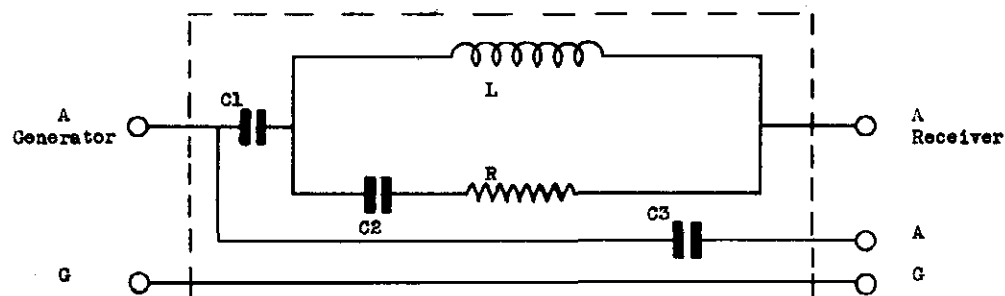
Line Voltage: 117 Volts AC		Position of Volume Control: Full with set tuned to quiet channel. Position of Band Switch: B.C.								
TUBE	FUNCTION	Voltage of Socket Prongs to B- See Prong Nos. on Schematic.								
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	G.Cap
35L6	P.A.	0	80*	82	90	0.25	117*	117*	11	
35L6	P.A.	0	80*	82	90	0.25	5.6	48*	11	
12 SQ 7	1st Audio, Det. & A.V.C.	0	-0.6	0	-0.5	0	61	12*	0	
12 BA 6	I.F. AMP.	0	0	48*	36*	90	90	0.8	-	
12 BA 6	R.F. AMP.	0	0	24*	36*	75	90	2.3	-	
12 HE 6	CONV. & OSC.	-3.8	0	24*	12*	90	90	0	-	

NOTES: Voltage readings are for schematic diagram in this bulletin. Allow 15% / or - on all measurements. Always use meter scale which will give greatest deflection within scale limits. All DC measurements made with 20,000 ohms per volt voltmeter. All AC voltages made with rectifier type voltmeter.

* AC Volts.

** Cannot be measured with 20,000 ohms per volt voltmeter.

DUMMY ANTENNA



C1 - 200 mmf. Condenser 400 V.D.C.

C2 - 400 mmf. Condenser 400 V.D.C.

C3 - .02 mmf. Condenser 400 V.D.C.

R - 100 Ohms Resistor 1/4 Watt

L - Choke Coil

----Case Shield

Choke Coil Specification

Tubing - 3/8" Diameter Bakelite

Wire - No. 38 Enameled

Turns - 59 closely wound (Impregnated)

NOTE: When using this dummy antenna the generator output impedance should be 10 ohms or lower.

STEP BY STEP ALIGNMENT PROCEDURE

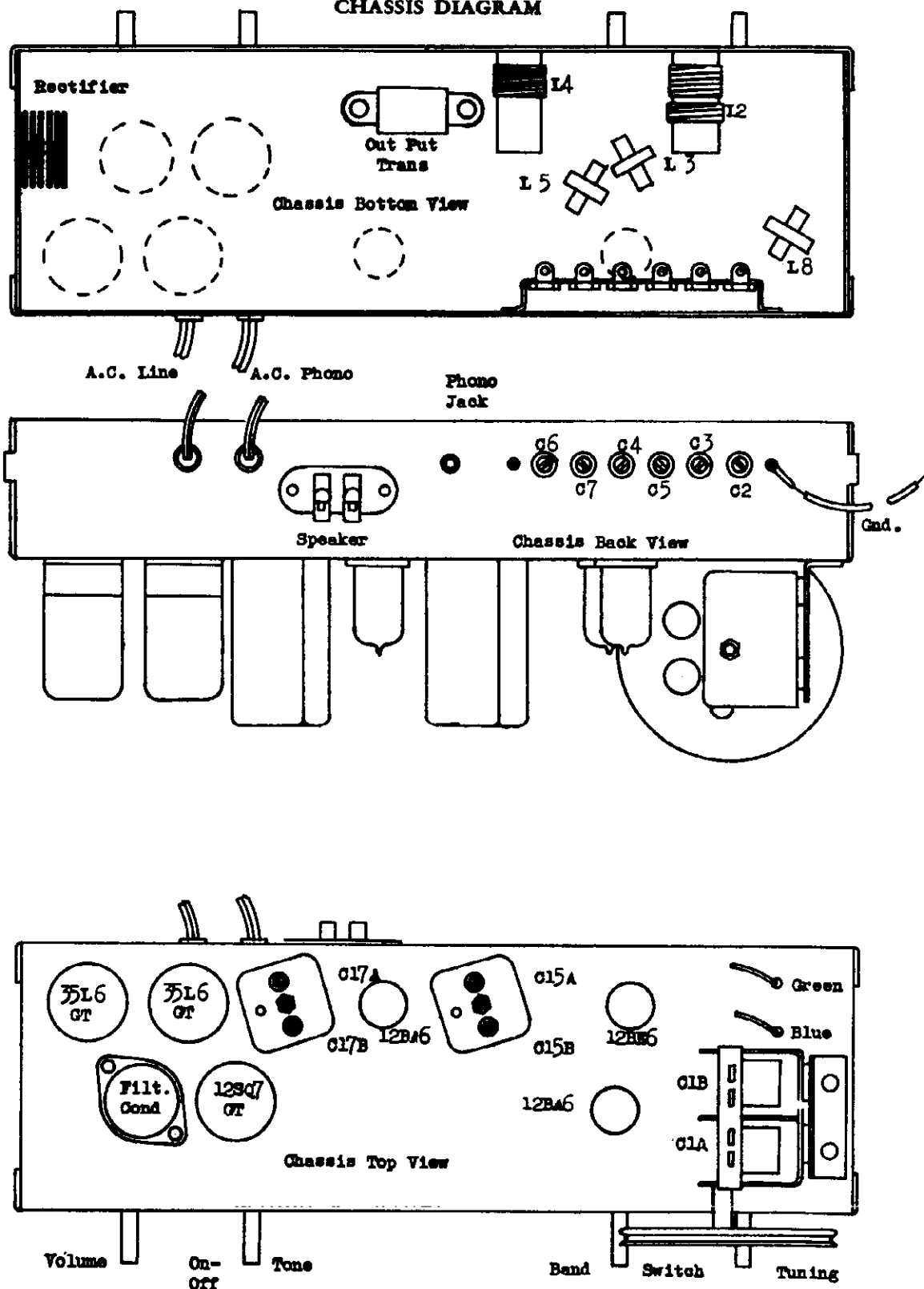
OPERATION	ALIGNMENT OF	GENERATOR CONNECTED TO	DUMMY ANTENNA	GENERATOR FREQUENCY	BAND SWITCH SETTING	TUNING CONDENSER SETTING	TRIMMERS	REMARKS
1	Set dial pointer even with left-hand stop line with gang closed.							
2	I.F.	Pin #7 on 12HE6 conv.	.02 MFD Cond.	456 KC.	B.C.	Open	C17A & C17B	Peak Accurately
3		Antenna	.02 MFD	456 KC.	B.C.	Closed	C15A & C15B	Peak Accurately
4	I.F. Rej.	Antenna	.02 MFD	456 KC.	B.C.	Closed	C7 Trim	Adj. to Min.
5	B.C.	Antenna	*	1500 KC.	B.C.	1500 KC	C5 OSC. Trim	Peak Accurately
6	Band			600 KC.	B.C.	600 KC	C2 ANT. Trim	Peak Accurately
7	Repeat Operations 5 and 6							
8	Check Calibration at 600KC., 1000KC. and 1500KC.							
9	S.W.	Antenna	*	18 MC.	S.W.	18 MC.	C6 OSC. Trim	Peak Accurately
10	Band						C3 ANT. Trim	**
11	Repeat Operations 9 & 10							
12	Check Operations at 18MC., 9MC. and 6 MC.							
13	Check Operations 1 to 10 inclusive.							

NOTES: * Use dummy Antenna as shown below. (STD.)

** Rock dial while adjusting for maximum output.

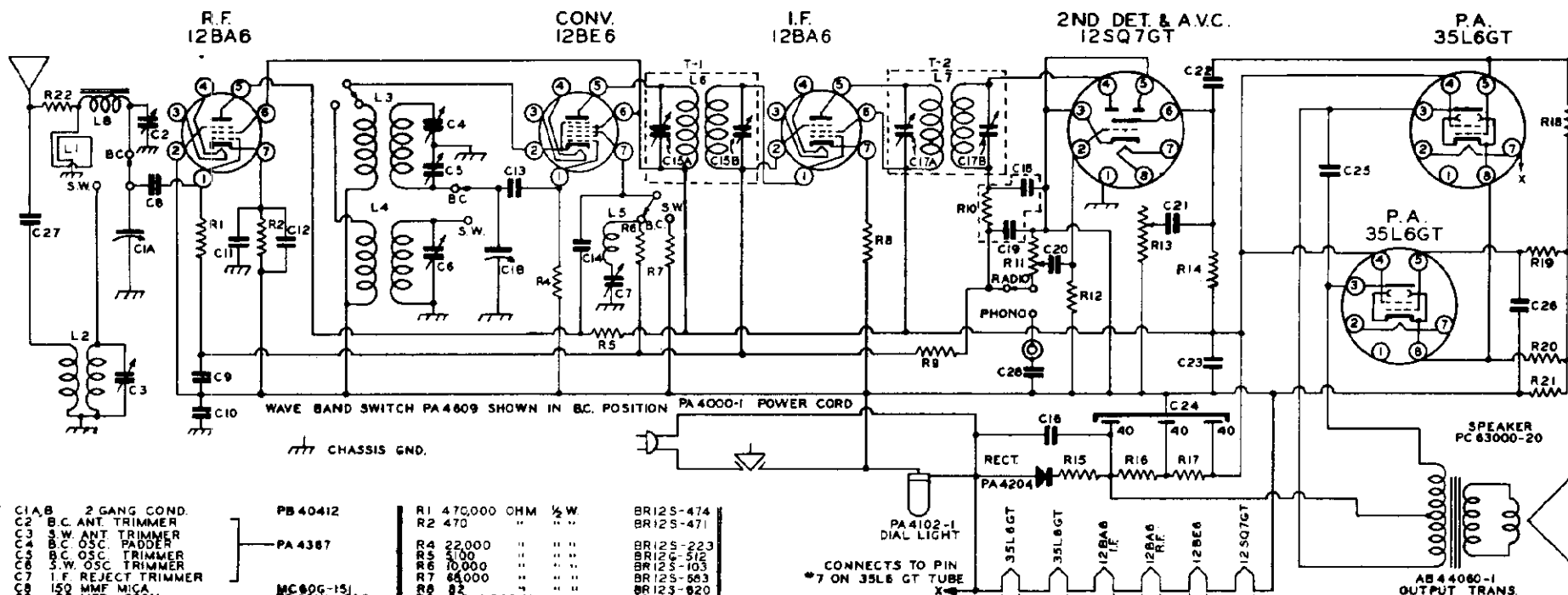
MODELS 1051,
1052, Ch. 6B9

CHASSIS DIAGRAM



SCHEMATIC DIAGRAM SPARTON SUPERHETERODYNE MODEL 6B9 INTERMEDIATE FREQUENCY 456 KC. BOTTOM VIEW OF ALL SOCKET CONNECTIONS

(ORIGINAL) SEP. 10, 1948



C1A, B 2 GANG COND.
C2 B.C. ANT. TRIMMER
C3 3W ANT. TRIMMER
C4 B.C. OSC. TRIMMER
C5 B.C. OSC. TRIMMER
C6 S.W. OSC. TRIMMER
C7 I.F. REJECT TRIMMER
C8 150 MMF MICA
C9 .05 MFD. 200V
C10 .05 MFD. 400V
C11 .05 MFD. 400V
C12 .05 MFD. 400V
C13 .01 MFD. 200V
C14 .01 MFD. 200V
C15 100 MMF MICA
C16 A, B NO. 1 I.F. TRIMMER
C17 .05 MFD. 400V
C18 A, B NO. 2 I.F. TRIMMER
C19 100 MMF MICA
C20 .01 MFD. 200V
C21 .005 MFD. 400V
C22 .01 MFD. 200V
C23 .01 MFD. 200V
C24 40-40-40 ELECTROLYTIC
C25 .006 MFD. 1000V
C26 .01 MFD. 200V
C27 .02 MMF MICA
C28 .05 MFD. 400V

PA40412
PA4367
MC60G-151
PC40HK-503
PC40GL-503
PC40HL-503
PC40HK-503
MC60F-510
MC60E-101
PC40HL-503
PA4329-3
PC40HK-103
PC40GL-502
PC40HK-103
PC40HK-104
PA4300-9
PC40GN-602
PC40HK-103
MC60F-520
PC40GL-503

R1 470,000 OHM 1/2 W.
R2 470 " " "
R3 22,000 " " "
R4 5,000 " " "
R5 10,000 " " "
R6 10,000 " " "
R7 65,000 " " "
R8 100 " " "
R9 100 " " "
R10 5000 OHM C.A.R. UNIT
R11 VOLUME CONTROL
R12 10 MEG
R13 TONE CONTROL
R14 270,000 OHM 1/2 W.
R15 27 " " "
R16 120 " " "
R17 1200 " " "
R18 1 MEG. " " "
R19 " " "
R20 100 " " "
R21 100 " " "
R22 2700 " " "

BR125-474
BR125-471
BR125-223
BR125-515
BR125-103
BR125-563
BR125-820
BR125-225
PA4329-3
PA4402-4
BR125-106
PA4400-9
BR125-274
BR125-270
CR125-121
CR125-122
BR125-105
BR125-105
CR125-101
CR125-101
BR125-272

L1 LOOP ANT.
L2 SW ANT. COIL
L3 B.C. OSC. COIL
L4 B.C. OSC. COIL
L5 I.F. REJECT COIL
L6 NO. 1 I.F. COIL
L7 NO. 2 I.F. COIL
L8 ANT. CHOKE COIL

PA41927-1
AA6758-9
AA6759-9
AA6753-7
AA6787-1
AA6800-1
AA6800-2
AA6806-4

T1 NO. 1 I.F. TRANSFORMER ASSEM. AB43502-24
T2 NO. 2 I.F. TRANSFORMER ASSEM. AB43502-25

SPECIAL SERVICE NOTE: THESE TRANSFORMERS SUPPLIED IN COMPLETE ASSEMBLIES ONLY.

DESCRIPTION

Your new automobile receiver is a 5-tube (plus rectifier) superheterodyne, designed to operate from the 6 volt storage battery in your car. It is a universal type of receiver for mounting underneath the dash panel. It has a self-contained PM speaker, and covers the frequency range 540 to 1600 K.C. Two simple controls are provided for operating the receiver. (See Fig. 1)

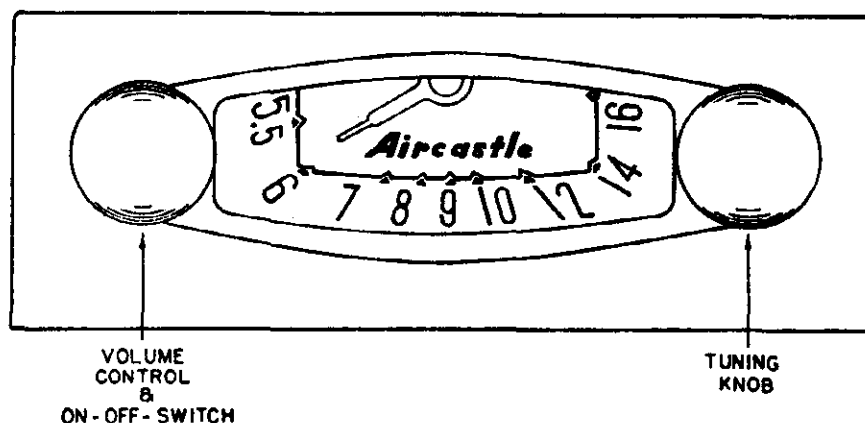


Fig. 1 Front View

SUGGESTIONS FOR ELIMINATING POSSIBLE MOTOR NOISE

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all three mounting points. A good electrical contact at these points will aid materially in eliminating motor noise. (The following steps may not be necessary in all cases. Install your radio and operate it before making changes.)

GENERATOR CONDENSER

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Detach the high tension wire where it goes into the top of the distributor cap and cut two inches off the end. Screw the piece you cut off into one end of the distributor suppressor and then screw the other end of the suppressor on the long wire which leads to the coil. Insert the wire back into the distributor cap.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional .5 MFD condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short wires are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension wire from the coil to the distributor.

they run from the engine compartment up to the instrument panel. These wires should be placed in a flexible wire shield and the shield grounded to frame or motor. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension wires.

BONDING OF FIRE WALL

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

MODEL 662-270144

HIGH AND LOW TENSION WIRES

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These wires will very often pick up motor noise and feed it into the receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

INSTALLATION

This radio comes to you complete with all hardware necessary for mounting, and also with a distributor suppressor, and generator condenser. By referring to Figure 2 and following the instructions outlined below, you will find that it is very simple to install.

First determine where the receiver is to be mounted by holding it with the hands in the approximate location in the car. Using the front mounting bracket as a template, mark and drill two 7/32" holes in the instrument panel flange. Now secure the mounting bracket to the radio receiver with the screws provided, and then mount the front of the radio to the instrument panel, using the bolts, lock washers and nuts provided for this purpose. The back of the radio is supported by means of the rear mounting strap. The mounting strap should be formed to the correct angles, as illustrated in Figure 2, so that it can then be fastened to the fire wall. After marking and center-punching the fire wall at the correct location, drill with a 3/8" drill. The mounting strap is then secured to the radio and fastened to the fire wall of the car with the 1/4" bolt, lock washer and nut furnished with the receiver.

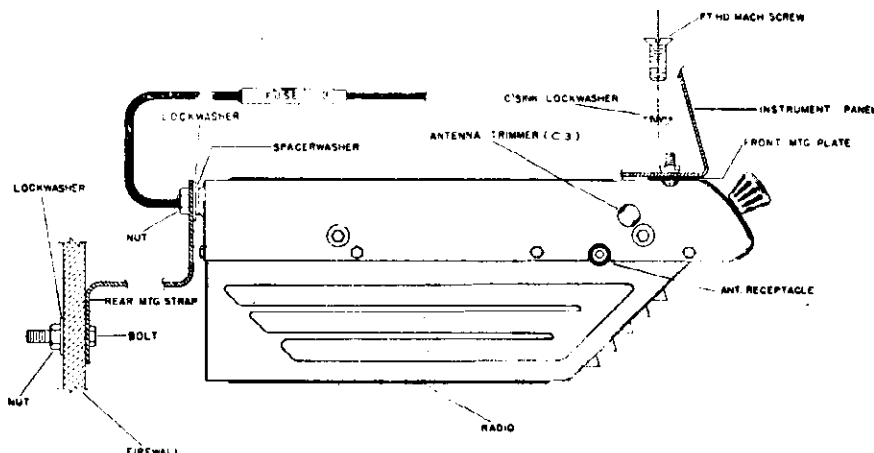


Fig. 2 Side View, Showing Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the jack into the socket provided on the side of the radio. Connect the battery cable to the hot side of the ammeter behind the instrument panel. The fuse should then be inserted into the cable receptor.

S84-413 SUPPRESSION KIT & MISC. PARTS ASSEMBLY

- | | |
|-----------|--------------------------------|
| 1—S84-233 | "A" lead assembly |
| 1—A43-10 | Fuse |
| 2—A52-295 | Control knobs |
| 1—A81-13 | Sleeve (for fuse) |
| 1—S84-193 | Suppression Kit consisting of: |
| | 1—.5 MFD Condenser |
| | 1—Distributor Suppressor |
| | 20"—Wire Braid |

FINAL ADJUSTMENTS

The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type.

To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 1100 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 3) and adjust the trimmer for maximum volume. A small screw driver will be needed for this purpose.

S84-192 MOUNTING PARTS KIT

- | | |
|-----------------------|-------------------------------|
| 1 1/4" Bolt | 2 External Tooth Lock Washers |
| 2 1/4" Lock Washers | 2 Internal Tooth Lock Washers |
| 2 1/4" Hexagon Nuts | 2 10-32 Hexagon Nuts |
| 2 10-32 x 5/8" Screws | 1 Washer-Spacer |
| 2 10-32 x 3/8" Screws | |

ACCESSORIES FURNISHED FOR INSTALLATION

All of the parts that are needed for installing this receiver are furnished in the Mounting Parts Kit, part No. S84-192, and the Suppression & Misc. Parts Kit, part No. S84-413, as listed below. Also supplied are the rear mounting strap, part No. B31-134, and the front mounting plate, part No. A31-158.

NOTE: For shipping, the two control knobs have been removed from the tuning and volume control shafts. To install the knobs, line up the flat side of the knob spring (inside knob), with the flat side of the control shaft and push the knob forward until it stops.

ELECTRICAL SPECIFICATIONS

Power Supply	6.3 volts DC	This receiver contains the following: 1—6SK7GT—R. F. Amplifier. 1—6SA7GT—Converter. 1—6SK7GT—L.F. Amplifier. 1—6SQ7—Detector—AVC—1st audio. 1—6V6GT—Power output. <hr/> A 6X5GT Rectifier is used.
Current	6.2 amp. average	
Frequency Range	540 to 1600 KC	
I. F. Frequency	455 KC	
Speaker	4" P. M.	
Power Output	1.2 watts, undistorted 2.5 watts, maximum	
Sensitivity	10 microvolt average for 1 watt output	
Selectivity ...	50 KC broad at 1000 times signal, at 1000 KC	

SERVICE NOTES

Voltagcs taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 4).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "ALIGNMENT PROCEDURE". After realignment has been completed repeat the procedure as a final check.

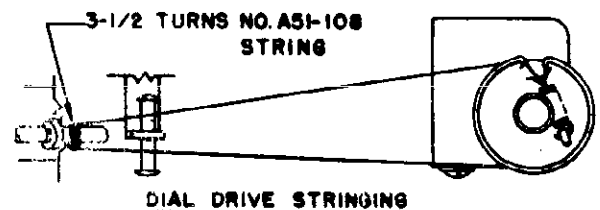
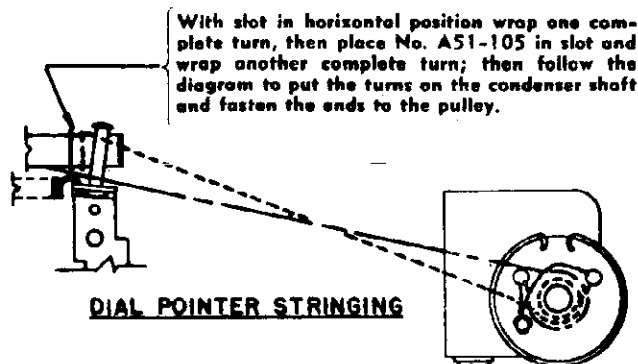
INSTRUCTIONS FOR REMOVING CHASSIS FROM THE CASE

The bottom cover (the one with the speaker louvers) can be removed to permit servicing of major components, such as tubes and vibrator, by removing the eight (8) screws holding it to the top cover. There are three (3) screws on each side, one (1) in the rear, and one (1) in the front.

CAUTION: Before attempting to remove the top cover, to service condensers, resistors, etc., the screw connecting the spark plate to the "A" terminal (inside case) must be removed. This is a round head screw, and is located on the rear of the case, close to the mounting stud bolt. It is recessed in a 1/2 inch hole in the case itself, thereby permitting contact with the spark plate.

After removing the spark plate screw, remove the two knobs by pulling forward and remove the eight (8) screws securing the cover to the chassis. Lift the chassis at the rear, at the same time moving it away from the front of the case so that the volume and tuning shafts will clear the holes in the cover.

NOTE: When reinstalling the chassis into the case, be sure the screw connecting the spark plate to the "A" terminal (inside case) is tightened very securely, otherwise the receiver will not operate properly.



ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 75 MMFD.

For alignment points refer to Figures 5 and 6.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T2	Maximum	Output I.F.
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T1	Maximum	Input I.F.
Fully Open	1600 KC	75 MMFD.	Ant. lead	C1B	Maximum	Oscillator
Tune in signal from generator	1400 KC	75 MMFD.	Ant. lead	C1A	Maximum	Antenna

NOTE: The antenna trimmer condenser, C3, (see Fig. 2) should be adjusted after the radio is installed in the car. Tune the receiver to a weak station at about 1100 KC and adjust this trimmer for maximum volume.

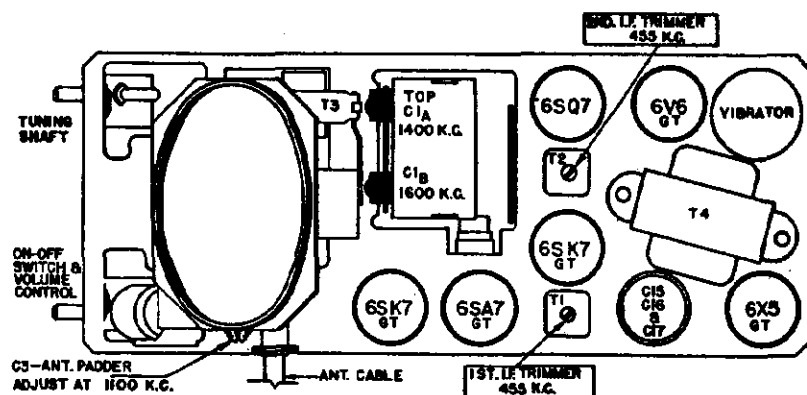


Fig. 5. Tube, Rectifier and Trimmer Locations

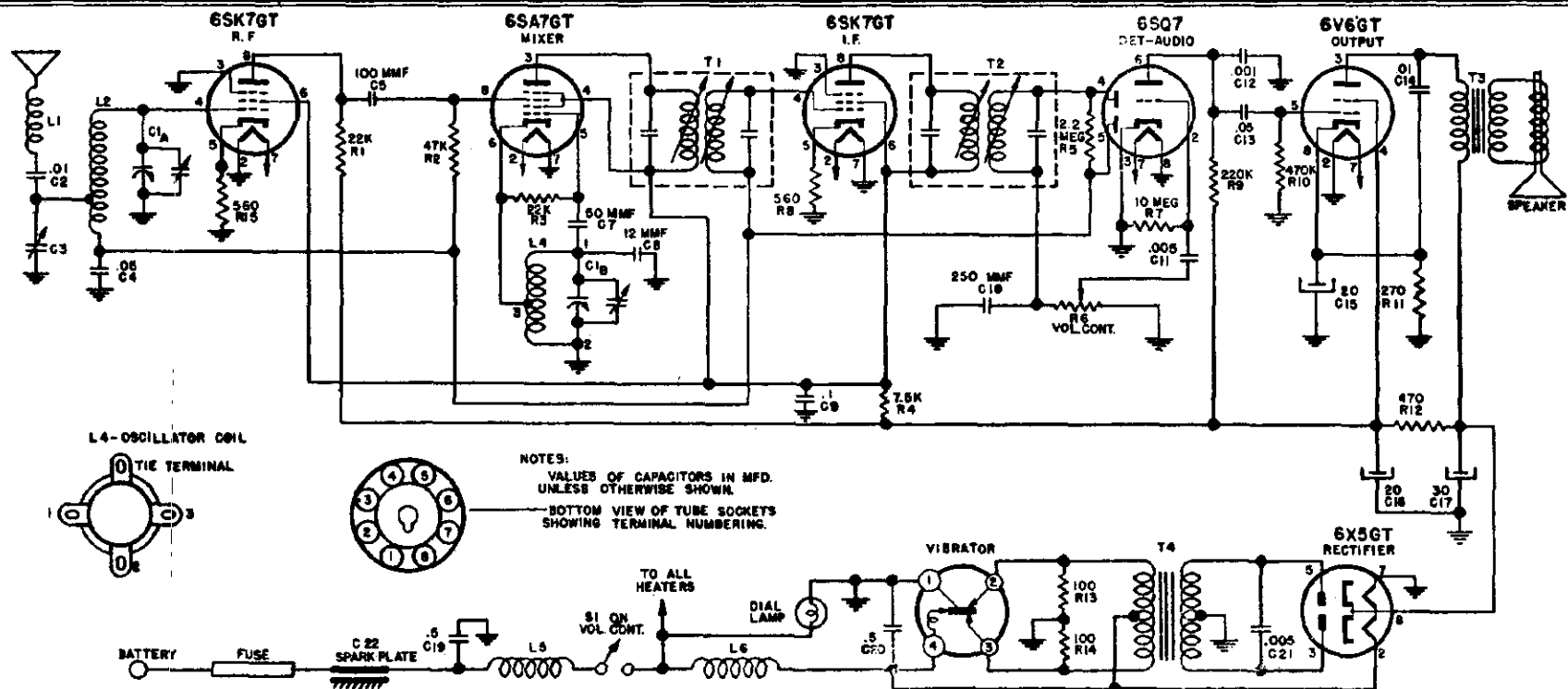


Fig 6. Schematic Diagram

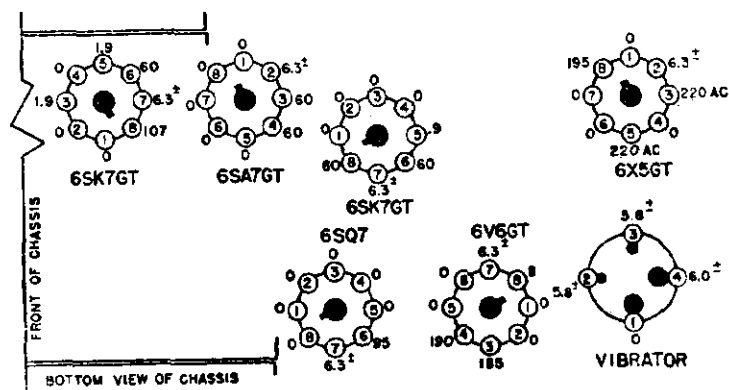


Fig.4. Socket Voltages

MODEL 602-170114

PARTS LIST

CONDENSERS

Schematic Diagram Reference	Part No.	Description
C1A, C1B	B19-201	Variable condenser
C2, C14	A16-192	.01 MFD 400 volt condenser
C3	A20-145	Trimmer condenser
C4	A16-189	.05 MFD 400 volt condenser
C5	A15-196	100 MMFD ceramic condenser
C7	A15-204	50 MMFD ceramic condenser
C8	A15-205	12 MMFD ceramic condenser, temp. comp.
C9	A16-187	.1 MFD 400 volt condenser
C10	A15-176	250 MMFD mica condenser
C11	A16-190	.005 MFD 600 volt condenser
C12	A16-195	.001 MFD ceramic condenser
C13	A16-193	.05 MFD 600 volt condenser
C15	A18-289	20 MFD 25 volt electrolytic condenser
C16		20 MFD 350 volt electrolytic condenser
C17		30 MFD 350 volt electrolytic condenser
C19, C20	A16-184	.5 MFD 100 volt condenser
C21	A16-185	.005 MFD 1600 volt oil filled condenser

RESISTORS

R1, R3	A60-659	22K ohm 1/2 watt 20% resistor
R2	A60-685	47K ohm 1/2 watt 20% resistor
R4	A60-769	7.5K ohm 2 watt 10% resistor
R5	A60-726	2.2 megohm 1/2 watt 20% resistor
R6	A24-177	Volume control, 500,000 ohm, with switch
R7	A60-728	10 megohm 1/2 watt 20% resistor
R8, R15	A60-758	560 ohm 1/2 watt 10% resistor
R9	A60-667	220K ohm 1/2 watt 20% resistor
R10	A60-731	470K ohm 1/2 watt 20% resistor
R11	A60-771	270 ohm 1/2 watt 10% resistor
R12	A60-770	470 ohm 1/2 watt 10% resistor
R13, R14	A60-752	100 ohm 1/2 watt 10% resistor

COILS AND TRANSFORMERS

L1	A10-527	Antenna Loading Coil
L2	B10-511	Antenna Coil
L4	A10-512	Oscillator Coil
L5	A33-229	Choke, "A" Line
L6	A33-228	Choke, vibrator hash
T1	A10-508	1st I.F. Transformer
T2	A10-509	2nd I.F. Transformer
T3	B80-242	Output Transformer (Part of Speaker, not furnished separately)
T4	B80-243	Power transformer

DIAL PARTS

A11-303	Bracket, Dial Scale
B11-328	Bracket, String Guide
A72-29	Bushing, Tuning Shaft Bearing
A70-130	Clip, Spring, for Tuning Shaft
A58-55	Dial Pointer
B67-551	Dial Scale
A28-101	Gasket for Speaker
A52-304	Knob
A11-329	Link, String Guide
A89-10	Pilot Light, Type G.E. No. 422
A65-37	Rivet, Shoulder, for Dial Pointer Stringing
A65-42	Rivet, Shoulder, for String Guide Brkt. and Link
A65-12	Rivet, Shoulder, for Dial Drive Stringing
A75-70	Shaft, tuning
A75-74	Shaft, for Dial Pointer
A70-132	Spring, for Pilot Light Socket
A70-135	Spring, Dial Drive String Tension
A70-142	Spring, Pointer Drive String Tension
A51-105	String, Pointer Travel, 17"
A51-108	String, Condenser Drive, 19"

MISCELLANEOUS

S84-233	"A" lead assembly
A83-421	Clip, I.F. Transformer Mounting
A83-517	Clip, Oscillator Coil Mounting
A43-10	Fuse, 15 Amp.
A47-112	Grommet, rubber, (Spkr. & Gang mounting)
B31-134	Mounting strap, rear
B31-158	Mounting Plate, Front
S84-192	Mounting parts kit
A87-38	Receptacle, Antenna Cable
B79-379	Speaker, 4" P.M. (Includes Output Transformer)
S84-322	Suppression Kit Assembly
A34-105	Vibrator
A83-519	Wiper, grounding, for case covers

Note: Tubular condensers must be high temperature (85°C) wax type.

INSTALLATION

This radio comes to you complete with all hardware necessary for mounting, and also with a distributor suppressor, and generator condenser. By referring to Figures 1 and 2, and following the instructions outlined below, you will find that it is very simple to install.

First determine where the receiver is to be mounted by holding it with the hands in the approximate location in the car. Using the front mounting bracket as a template, mark and drill two 7/32" holes in the instrument panel flange. Now secure the mounting bracket to the radio receiver with the screws provided, and then mount the front of the radio to the instrument panel, using the bolts, lock washers and nuts provided for this purpose. The back of the radio is supported by means of the rear mounting strap. The mounting strap should be formed to the correct angles, as illustrated in Figure 2, so that it can then be fastened to the fire wall. After marking and center-punching the fire wall at the correct location, drill with a 3/8" drill. The mounting strap is then secured to the radio and fastened to the fire wall of the car with the 1/4" bolt, lock washer and nut furnished with the receiver.

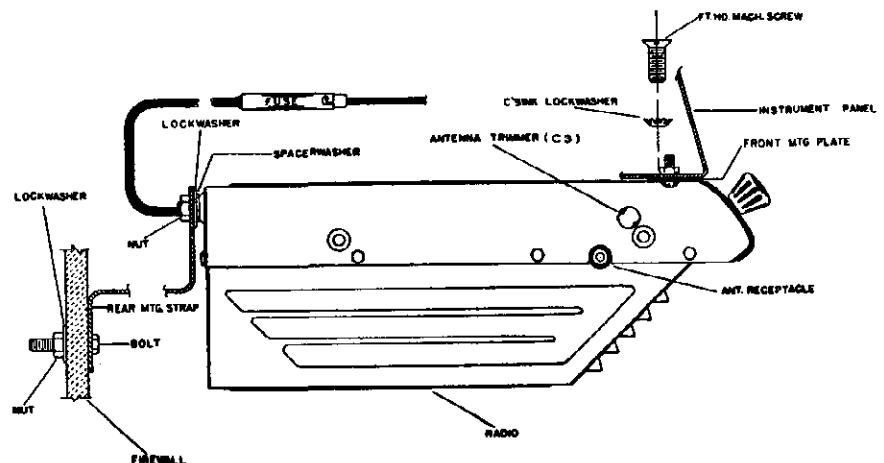


Fig. 2. Side View, Showing Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the jack into the socket provided on the side of the radio. Connect the battery cable to the hot side of the ammeter behind the instrument panel. The fuse should then be inserted into the cable receptor.

FINAL ADJUSTMENTS

The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type.

To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 1100 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 2) and adjust the trimmer for maximum volume. A small screw driver will be needed for this purpose.

ACCESSORIES FURNISHED FOR INSTALLATION

All of the parts that are needed for installing this receiver are furnished in the Mounting Parts Kit, part No. S84-192, and the Suppression & Misc. Parts Kit, part No. S84-445, as listed below. Also supplied are the rear mounting strap, part No. B31-134, and the front mounting plate, part No. A31-158.

NOTE: For shipping, the two control knobs have been removed from the tuning and volume control shafts. To install the knobs, line up the flat side of the knob spring (inside knob), with the flat side of the control shaft and push the knob forward until it stops.

S84-192 MOUNTING PARTS KIT

- | | |
|-----------------------|-------------------------------|
| 1 1/4" Bolt | 2 External Tooth Lock Washers |
| 2 1/4" Lock Washers | 2 Internal Tooth Lock Washers |
| 2 1/4" Hexagon Nuts | 2 10-32 Hexagon Nuts |
| 2 10-32 x 3/8" Screws | 1 Washer-Spacer |

S84-445 SUPPRESSION KIT & MISC. PARTS ASSEMBLY

- | | |
|-----------|--------------------------------|
| 1—S84-233 | "A" lead assembly |
| 1—A43-10 | Fuse |
| 2—A52-314 | Control knobs |
| 1—A81-13 | Sleeve (for fuse) |
| 1—S84-322 | Suppression Kit consisting of: |
| | 1—.5 MFD Condenser |
| | 1—Distributor Suppressor |
| | 20"—Wire Braid |

MODEL 602-182144

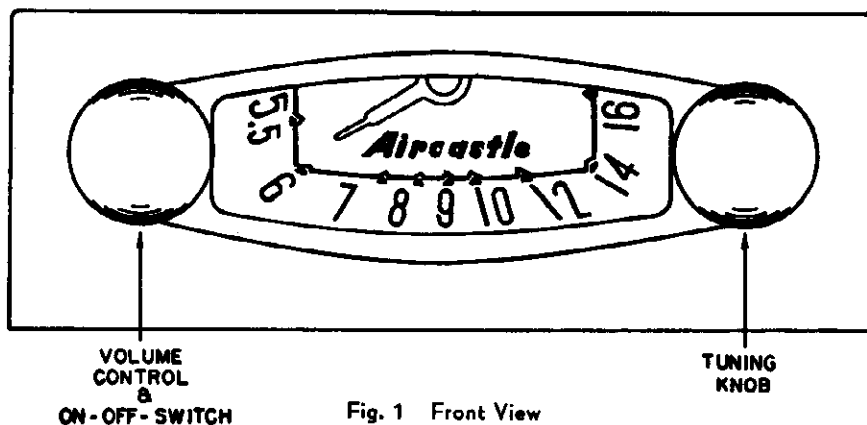


Fig. 1 Front View

SUGGESTIONS FOR ELIMINATING POSSIBLE MOTOR NOISE

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all three mounting points. A good electrical contact at these points will aid materially in eliminating motor noise. (The following steps may not be necessary in all cases. Install your radio and operate it before making changes.)

GENERATOR CONDENSER

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Detach the high tension wire where it goes into the top of the distributor cap and cut two inches off the end. Screw the piece you cut off into one end of the distributor suppressor and then screw the other end of the suppressor on the long wire which leads to the coil. Insert the wire back into the distributor cap.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional .5 MFD condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short wires are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension wire from the coil to the distributor.

HIGH AND LOW TENSION WIRES

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These wires will very often pick up motor noise and feed it into the receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if

they run from the engine compartment up to the instrument panel. These wires should be placed in a flexible wire shield and the shield grounded to frame or motor. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension wires.

BONDING OF FIRE WALL

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

Power Supply.....	6.3 volts DC
Current	6.2 amp. average
Frequency Range.....	540 to 1600 KC
I. F. Frequency.....	455 KC
Speaker.....	4" P. M.
Power Output.....	1.2 watts, undistorted
	2.5 watts, maximum
Sensitivity.....	10 microvolt average for 1 watt output
Selectivity... 50 KC broad at 1000 times signal, at 1000 KC	

A 6X5GT Rectifier is used.

3-1/2 TURNS NO. A51-108 STRING

DIAL DRIVE STRINGING

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 75 MMFD.

For alignment points refer to Figures 5 and 6.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T2	Maximum	Output I.F.
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T1	Maximum	Input I.F.
Fully Open	455 KC	75 MMFD.	Ant. lead	L3	Minimum	Wave trap
Fully Open	1600 KC	75 MMFD.	Ant. lead	C1B	Maximum	Oscillator
Tune in signal from generator	1400 KC	75 MMFD.	Ant. lead	C3	Maximum	Antenna

NOTE: The antenna trimmer condenser, C3, (see Fig. 2) should be adjusted after the radio is installed in the car. Tune the receiver to a weak station at about 1100 KC and adjust this trimmer for maximum volume.

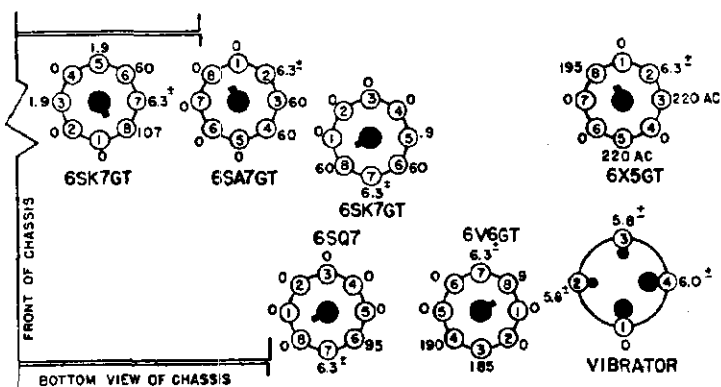


Fig.4. Socket Voltages

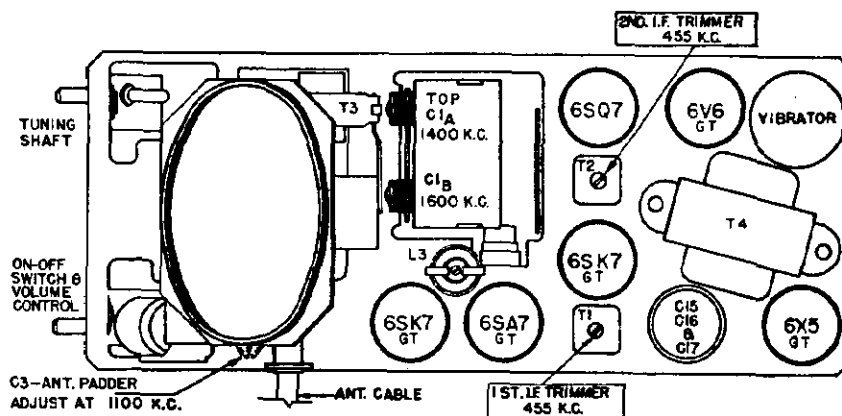


Fig. 5. Tube, Rectifier and Trimmer Locations

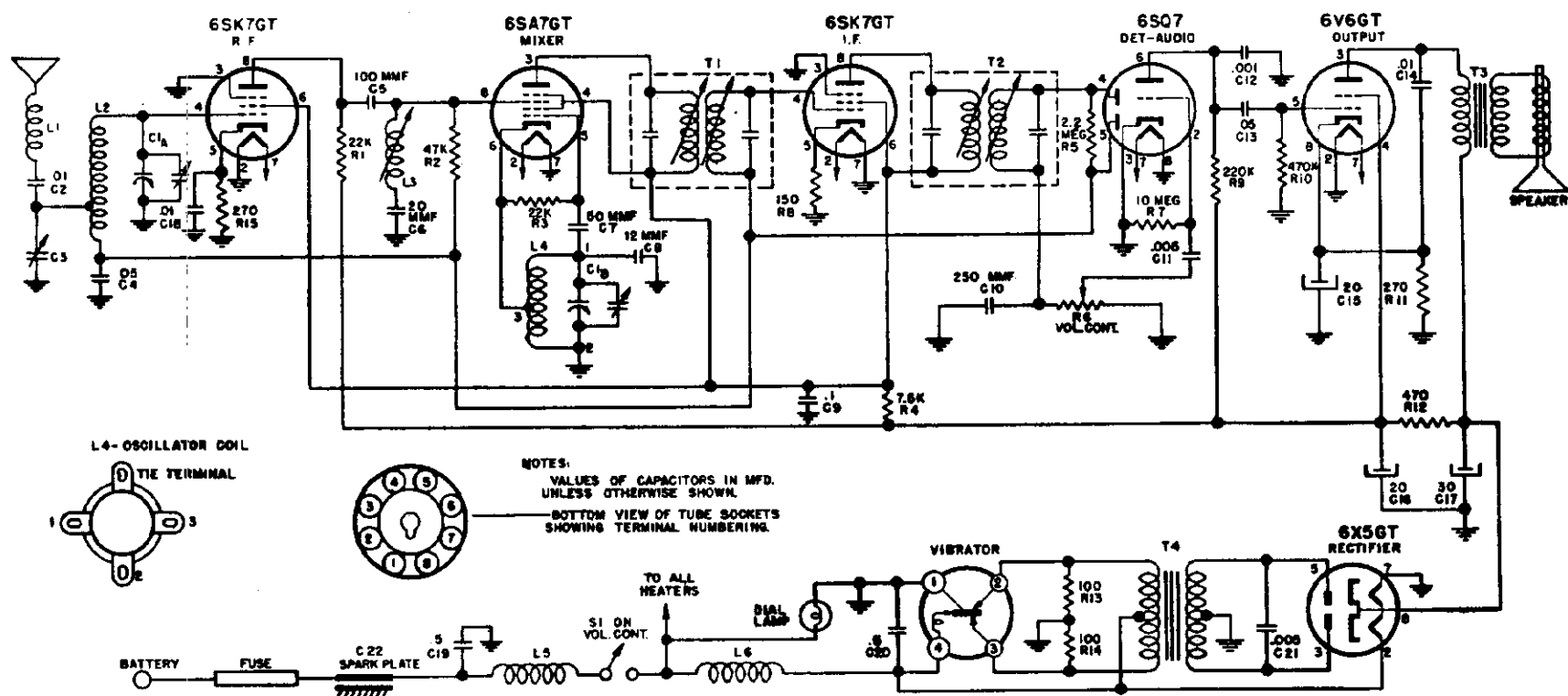


Fig 6. Schematic Diagram

MODEL 602-182144

Schematic Diagram Reference	Part No.	Description
CONDENSERS		
C1A, C1B	B19-201	Variable condenser
C2, C14, C18	A16-192	.01 MFD 400 volt condenser
C3	A20-145	Trimmer condenser
C4	A16-189	.05 MFD 400 volt condenser
C5	A15-196	100 MMFD ceramic condenser
C6	A15-202	20 MMFD ceramic condenser
C7	A15-204	50 MMFD ceramic condenser
C8	A15-205	12 MMFD ceramic condenser, temp. comp.
C9	A16-187	.1 MFD 400 volt condenser
C10	A15-176	250 MMFD mica condenser
C11	A16-190	.005 MFD 600 volt condenser
C12	A16-195	.001 MFD ceramic condenser
C13	A16-193	.05 MFD 600 volt condenser
C15	A18-289	20 MFD 25 volt electrolytic condenser
C16		20 MFD 350 volt electrolytic condenser
C17		30 MFD 350 volt electrolytic condenser
C19, C20	A16-184	.5 MFD 100 volt condenser
C21	A16-185	.005 MFD 1600 volt oil filled condenser
RESISTORS		
R1, R3	A60-659	22K ohm 1/2 watt 20% resistor
R2	A60-685	47K ohm 1/2 watt 20% resistor
R4	A60-769	7.5K ohm 2 watt 10% resistor
R5	A60-726	2.2 megohm 1/2 watt 20% resistor
R6	A24-182	Volume control, 500,000 ohm, with switch
R7	A60-728	10 megohm 1/2 watt 20% resistor
R8	A60-767	560 ohm 1/2 watt 10% resistor
R9	A60-667	220K ohm 1/2 watt 20% resistor
R10	A60-731	470K ohm 1/2 watt 20% resistor
R11, R15	A60-771	270 ohm 1/2 watt 10% resistor
R12	A60-770	470 ohm 1/2 watt 10% resistor
R13, R14	A60-752	100 ohm 1/2 watt 10% resistor
COILS AND TRANSFORMERS		
L1	A10-527	Antenna Loading Coil
L2	B10-511	Antenna Coil
L3	A10-510	I.F. Trap Coil
L4	A10-512	Oscillator Coil
L5	A33-229	Choke, "A" Line
L6	A33-228	Choke, vibrator hash
T1	A10-508	1st I.F. Transformer
T2	A10-509	2nd I.F. Transformer
T3	B80-242	Output Transformer (Part of Speaker, not furnished separately)
T4	B80-243	Power transformer
DIAL PARTS		
A11-303	Bracket, Dial Scale	
B11-328	Bracket, String Guide	
A72-36	Bushings, Tuning Shaft Bearing	
A70-130	Clip, Spring, for Tuning Shaft	
A58-55	Dial Pointer	
B67-551	Dial Scale	
A28-101	Gasket for Speaker	
A52-314	Knob	
A11-329	Link, String Guide	
A89-10	Pilot Light, Type G.E. No. 422	
A65-37	Rivet, Shoulder, for Dial Pointer Stringing	
A65-42	Rivet, Shoulder, for String Guide Brkt. and Link	
A65-12	Rivet, Shoulder, for Dial Drive Stringing	
A75-83	Shaft, tuning	
A75-74	Shaft, for Dial Pointer	
A70-132	Spring, for Pilot Light Socket	
A70-135	Spring, Dial Drive String Tension	
A70-142	Spring, Pointer Drive String Tension	
A51-105	String, Pointer Travel, 17"	
A51-108	String, Condenser Drive, 19"	
MISCELLANEOUS		
S84-233	"A" lead assembly	
A83-421	Clip, I.F. Transformer Mounting	
A83-517	Clip, Oscillator Coil Mounting	
A43-10	Fuse, 15 Amp.	
A47-112	Grommet, rubber, (Spkr. & Gang mounting)	
B31-134	Mounting strap, rear	
B31-158	Mounting Plate, Front	
S84-192	Mounting parts kit	
A87-38	Receptacle, Antenna Cable	
B79-360	Speaker, 4" P.M. (includes Output Transformer)	
S84-322	Suppression Kit Assembly	
A34-105	Vibrator	
A83-519	Wiper, grounding, for case covers	

Note: Tubular condensers must be high temperature (85°C) wax type.

DESCRIPTION

Your New Aircastle Radio is a 4-Tube Superhetrodyne receiver designed to cover a frequency range of from 540 kilocycles to 1725 kilocycles (K.C.). The tubes used are--

1A7 GT--Osc. Converter
1N5 GT--I.F. Amplifier

1H5 GT--AVC Det. Audio Amplifier
3Q5 GT--Power Output

INSTALLATION

This receiver has been designed to operate on a self-contained battery containing both the 'B' battery (90 Volts) and the 'A' Battery (1½ Volts) Aircastle No. 1491.

After inserting the battery plug of the receiver into the socket on the battery, the battery may be placed inside the cabinet in the space provided.

Anyone of the following batteries may also be used with this receiver: Eveready No. 748, General No. 60D1-11 L, Burgess No. 17G-D60, Ray-O-Vac No. AB 82.

For best results an outside antenna about 75-100 feet long, including the lead-in, should be used. It should be erected as high as possible and as far away from surrounding objects as practical. When the receiver is used close to powerful broadcasting stations it may be desirable to use a shorter antenna. (For most ordinary installations use Aircastle House Mast Aerial No. 1396.)

To obtain the best possible performance a good ground should be used. This can be a water pipe, or a galvanized pipe driven into the ground. It should be connected to the ground lead (black) of the receiver. Connect the antenna wire to the other lead coming from the receiver.

OPERATION

Turn the 'On-Off' Switch and Volume Control (left-hand Control) to the right about half its range. This supplies power to the receiver. Now select the desired station by rotating the 'Station Selector' (right-hand Control). For best tone, always tune the desired station with the Volume turned low. This enables you to get the exact point where the station comes in best. Then adjust the Volume Control to the desired level.

ALIGNMENT PROCEDURE

Volume control--Maximum: all adjustments.

Connect ground lead of signal generator to chassis.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil of speaker.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, 30% modulated, 400 c.p.s.

Output meter.

Non-metallic screwdriver.

Dummy antennas--.1 mfd., .00025 mfd.

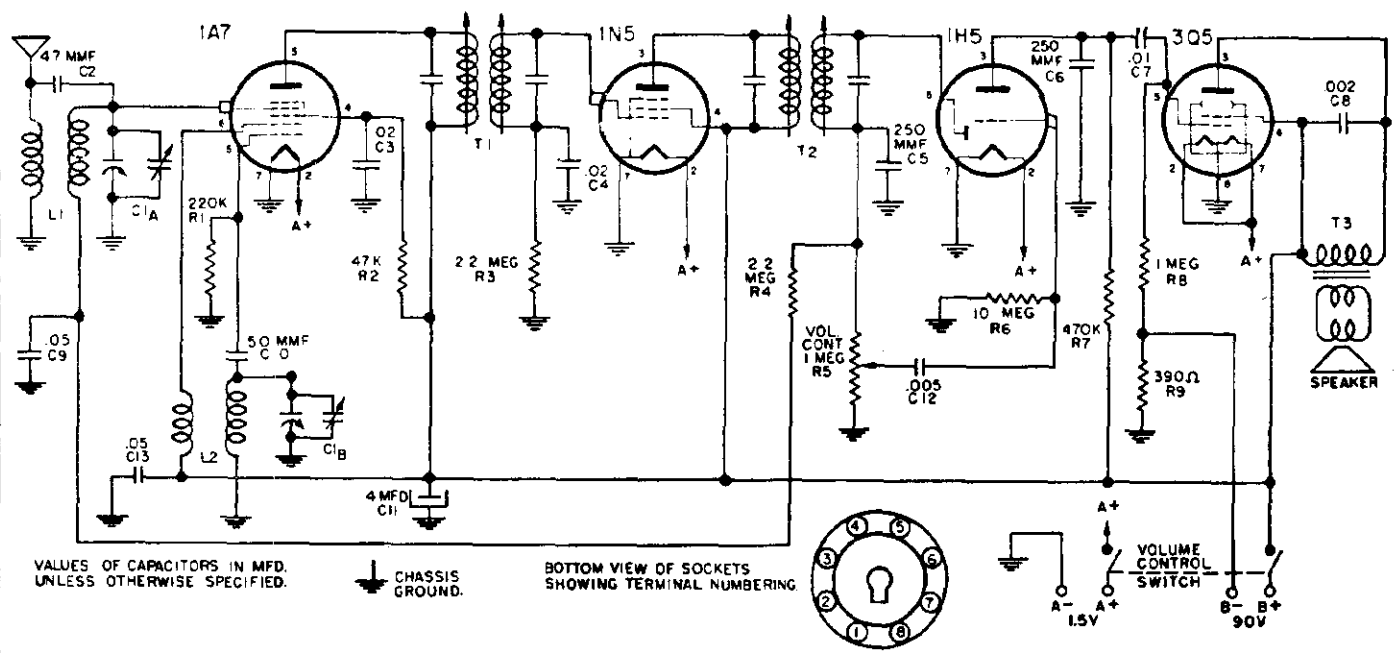
Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	1A7 Grid (Stator of CIA)	T2	Output I.F.
Fully open	455 KC	.1	1A7 Grid (Stator of CIA)	T1	Input I.F.
Fully open	1725 KC	.00025	Antenna Lead	C1B	Oscillator
Tune in signal from generator	1400 KC	.00025	Antenna Lead	C1A	Antenna

VOLTAGE CHART

All voltages measured with a 1000 ohm per volt meter on the 150 volt scale. For the following voltages the "B" battery section of the power pack should read 90 volts under load, the "A" section 1½ volts.

TUBE	PIN NUMBERS							
	1	2	3	4	5	6	7	8
1A7	0	1.5	85	37	0	85	0	0
1N5	0	1.5	85	85	0	0	0	0
1H5	0	1.5	17	0	0	0	0	0
3Q5	0	1.5	83	85	0	5	1.5	

MODEL 600-4100MB



VALUES OF CAPACITORS IN MFD. UNLESS OTHERWISE SPECIFIED.

CHASSIS GROUND.

BOTTOM VIEW OF SOCKETS SHOWING TERMINAL NUMBERING

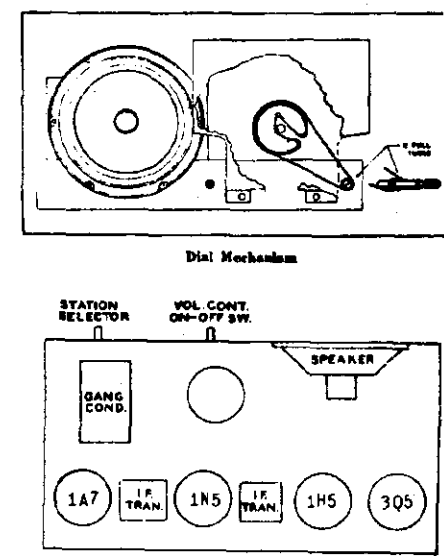


FIG. 2 TUBE AND TRIMMER LOCATIONS

FIG. 1 SCHEMATIC DIAGRAM

HOW TO ORDER REPAIR PARTS

Circuit Diagram Reference			Always give the part No. (No. printed on the part if different from that shown on this list), and the name of the part. When number is not available give complete description of the part. Be sure to always give the Model No. and Catalog No. The Model No. will be found on either the metal plate at the rear of the chassis or on a printed label which may be found on the chassis or cabinet.		
Part No.	Description				
C1A, C1B	B19-188	Variable Condenser	R7	A60-662	470K ohm 1/2 watt resistor
C2	A83-355	4.7 MMFD Condenser	R8	A60-668	1 megohm 1/2 watt resistor
C3, C4	A16-150	.02 MFD 400 volt condenser	R9	A60-665	390 ohm 1/2 watt resistor
C5, C6	A15-176	250 MMFD mica condenser	L1	A10-485	Antenna coil
C7	A16-156	.01 MFD 400 volt condenser	I2	A10-505	Oscillator coil
C8	A16-155	.002 MFD 600 volt condenser	T1, T2	A10-506	1st and 2nd I.F. transformer
C9, C13	A16-152	.05 MFD mica condenser	T3	EB0-232	Output transformer
C10	A15-175	50 MMFD mica condenser		B79-352	Speaker, 5" P.M.
C11	A18-273	4 MFD 150 volt electrolytic condenser		A75-60	Tuning Shaft
C12	A16-153	.005 MFD 600 volt condenser		A45-118	Battery plug
R1	A60-667	220K ohm 1/2 watt resistor		B67-515	Dial scale
R2	A60-685	47K ohm 1/2 watt resistor		58-31	Dial pointer
R3, R4	A60-684	2.2 megohm 1/2 watt resistor		48-21	Dial crystal
R5	A24-170	Volume control, 1 megohm		D42-437	Cabinet walnut, wood
R6	A60-663	10 megohm, 1/2 watt resistor		A52-245	Knob, walnut

TECHNICAL INFORMATION FOR SERVICE ALIGNMENT PROCEDURE

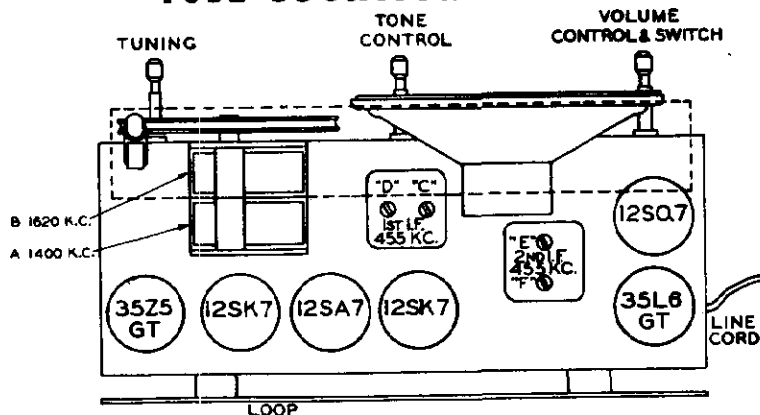
GENERAL DATA. The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 455, 600, 1400 and 1620 KC and an output meter to be connected across the primary or secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE. The intermediate frequency (I.F.) stages should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

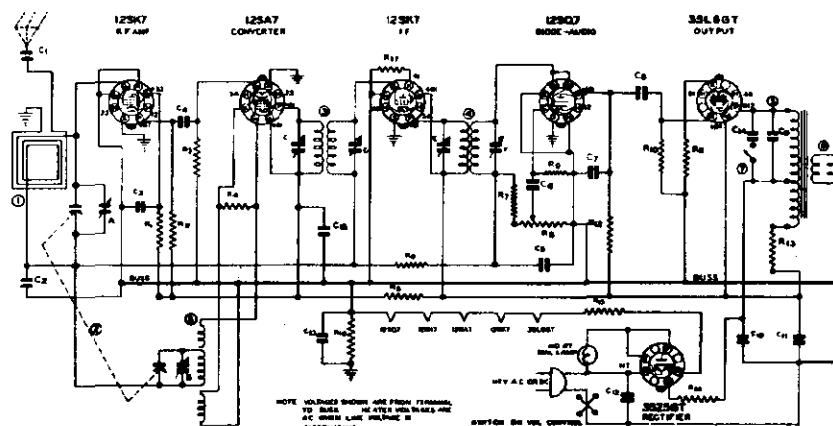
I.F. ALIGNMENT. Remove the chassis and loop antenna from the cabinet and set them up on the bench so that they occupy exactly the same respective position on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench. With the gang condenser set at minimum, adjust the test oscillator to 455 KC and connect the output to the grid of the first detector tube (12SA7) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the ground buss, indicated on the circuit diagram. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT. Connect the test oscillator to a dummy loop which can be made by coiling 2 turns of hookup wire about 6" in diameter. Place this dummy loop about a foot from the loop on the receiver and in the same plane as the receiver loop. With the gang condenser set at minimum capacity, set the test oscillator at 1620 KC, and adjust the oscillator (or 1620 KC trimmer) on the gang condenser. Next—set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.

TUBE LOCATION CHART



SCHEMATIC DIAGRAM AND PARTS LIST



Circuit Diagram Reference	Part No.	Description
C1, C8, C9	N-1344	Condenser, Paper .01 MFD. 400V.
C2	N-1345	Condenser, Paper .05 MFD. 200V.
C4	N-2383	Condenser, Mica 150 MMFD. 500V. 20%
C5	N-1374	Condenser, Mica 100 MMFD. 500V. 20%
C6	N-4894	Condenser, Paper .005 MFD. 600V.
C7	N-4890	Condenser, Paper .0005 MFD. 600V.
C10	N-5051	Electrolytic { 40 MFD. 150V. }
C11	N-5051	Electrolytic { 40 MFD. 150V. }
C12, C14	N-1346	Condenser, Paper .05 MFD. 400V.
C13	N-5160	Condenser, Paper .2 MFD. 200V.
C15	N-1351	Condenser, Paper .1 MFD. 200V.
R1, R3, R7	N-4063	Resistor 47,000 Ohm 1/2W. 20%
R2	N-4896	Resistor 2,200 Ohm 1/2W. 10%
R4	N-5351	Resistor 22,000 Ohm 1/2W. 20%
R5	N-4066	Resistor 470 Ohm 1/2W. 10%
R6	N-1262	Resistor 1.0 Megohm 1/2W. 20%
R8	N-5026	Resistor 0.5 Megohm Volume Control
R9	N-4061	Resistor 4.7 Megohm 0.5W. 20%
R10	N-4027	Resistor 470,000 Ohm 1/2W. 20%
R11	N-4067	Resistor 180 Ohm 1/2W. 10%
R12, R16	N-4025	Resistor 220,000 Ohm 1/2W. 20%
R13	N-4900	Resistor 1200 Ohm 1.0W. 10%
R14	N-4022	Resistor 33 Ohm 1/2W. 20%
R15	N-4628	Resistor 33 Ohm 1.0W. 10%
R17	N-5857	Resistor 82 Ohm 1/2W. 10%
1	N-5765	Antenna Loop Coil
2	N-7106	Variable Condenser
3	N-4872	1st I.F. Transformer
4	N-5571	2nd I.F. Transformer
5	N-4875	Output Transformer
6	N-4868	5" P.M. Speaker
7	N-4942	Tone Switch
8	N-7139	Oscillator Coil
# 222		Cabinet — Ivory Plastic
# 248		Cabinet — Walnut Plastic

MODEL 610.C300,
Chevrolet

INSTALLATION

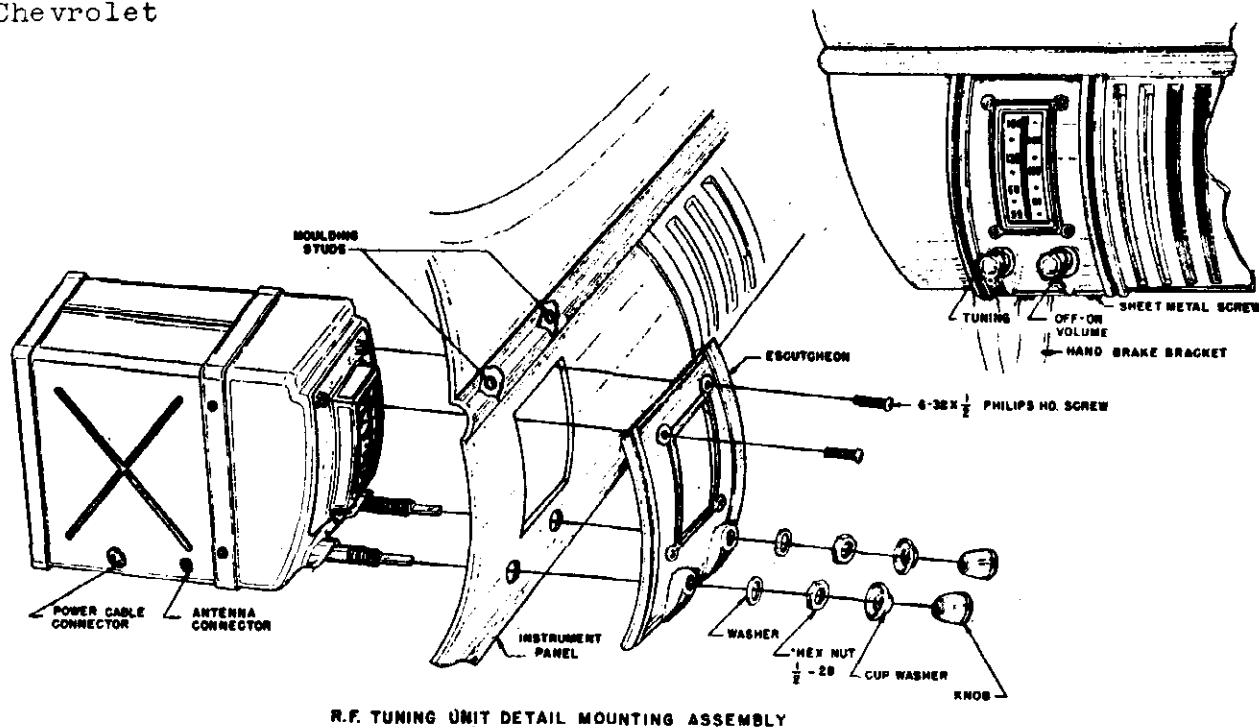


Fig. 1

R. F. TUNING UNIT

1. Loosen nuts on the two moulding studs located behind the instrument panel cover plate.
2. Remove sheet metal screw from the lower edge of the instrument panel cover plate and the two screws and washers attaching the hand brake to the instrument panel. Keep these parts.
3. Remove instrument panel cover plate and discard.
4. Tighten nuts on the two moulding studs located behind the instrument panel cover plate.
5. Drop vent controls by removing screws, lockwashers, and flat washers securing these controls to the instrument panel. This will facilitate installation of both receiver units. Save parts removed.
6. Install R.F. Tuning Unit behind instrument panel so that mounting bushings and tuningshafts protrude through the instrument panel.
7. Slide plastic escutcheon over mounting bushings and secure with flat washers, nuts, cup washers, and knobs as shown in Fig. 1
8. Secure top part of plastic escutcheon to R.F. Tuning Unit with two No. 6-32 x 1/2" long Philips Head screws.

POWER SUPPLY UNIT

1. Insert a thin blade screwdriver or a flat strip of metal through the Radio Grille and slit fiberboard Radio Grille screen. Reach in back of Radio Grille and remove screen by grasping slit edge. Discard fiberboard screen.
2. Remove 10-32 nuts and washers from the moulding studs behind the Radio Grille.
3. Remove 10-32 nuts, screws, and washers securing the lower tabs of the Radio Grille to the instrument panel.
4. Install Power Supply Unit behind Radio Grille and position into place so that holes in top of unit slide over moulding studs as shown in Fig. 2.

NOTE: It may be more convenient, in car models with air conditioner heaters, to remove the vibrator before installing this unit. The vibrator can be replaced after the power unit is mounted.

5. Replace 10-32 nuts and washers on moulding studs.
6. Replace lower grille tab 10-32 mounting screws, nuts, and washers so that screws secure the lower grille tabs and Power Supply Unit to the instrument panel.
7. Connect cable from Power Supply Unit to R.F. Tuning Unit.
8. Replace vent controls.
9. Replace screws and washers securing hand brake.

Connect battery lead to terminal on **Ignition Switch**.

Plug Antenna cable into receiver.

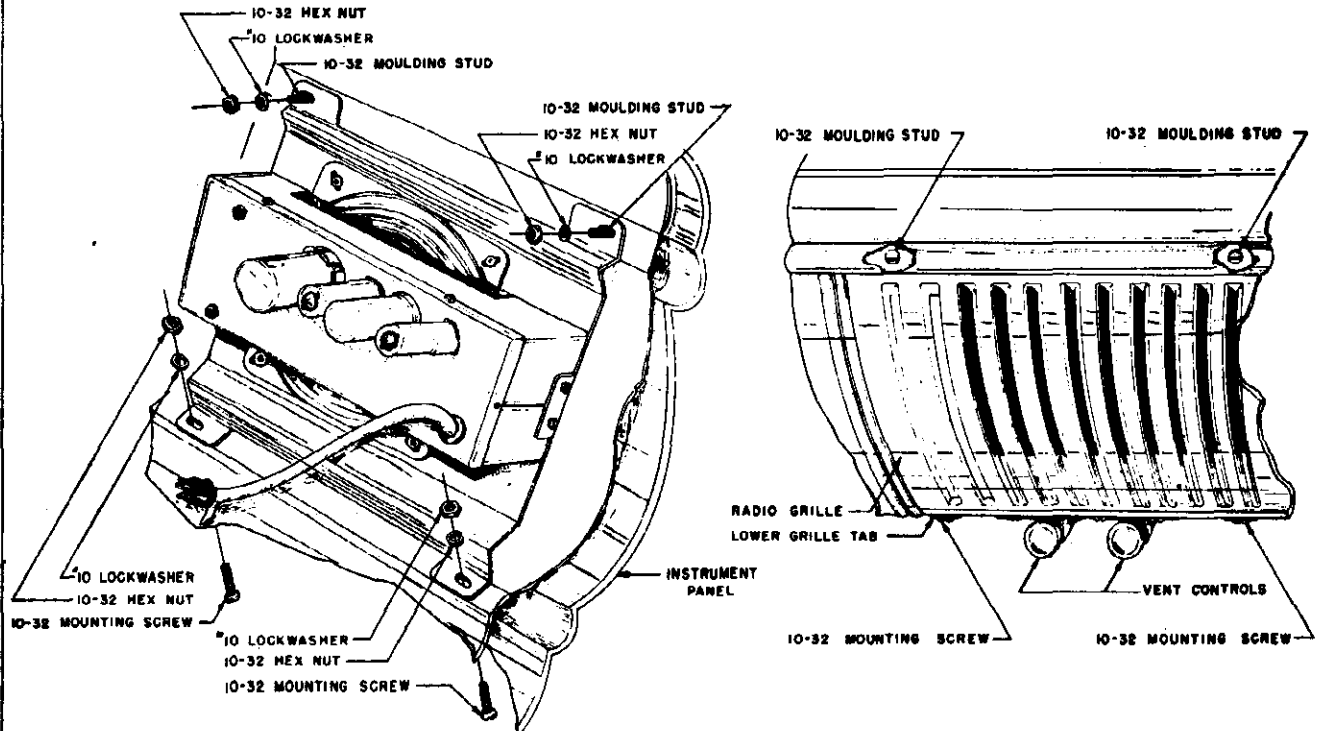


Fig. 2

POWER SUPPLY UNIT DETAIL MOUNTING ASSEMBLY

MOTOR NOISE ELIMINATION

SUPPRESSION KIT

A suppression kit is shipped with this receiver. It contains the following parts:

- 1 Generator Condenser.
- 1 Distributor Suppressor.

GENERATOR CONDENSER

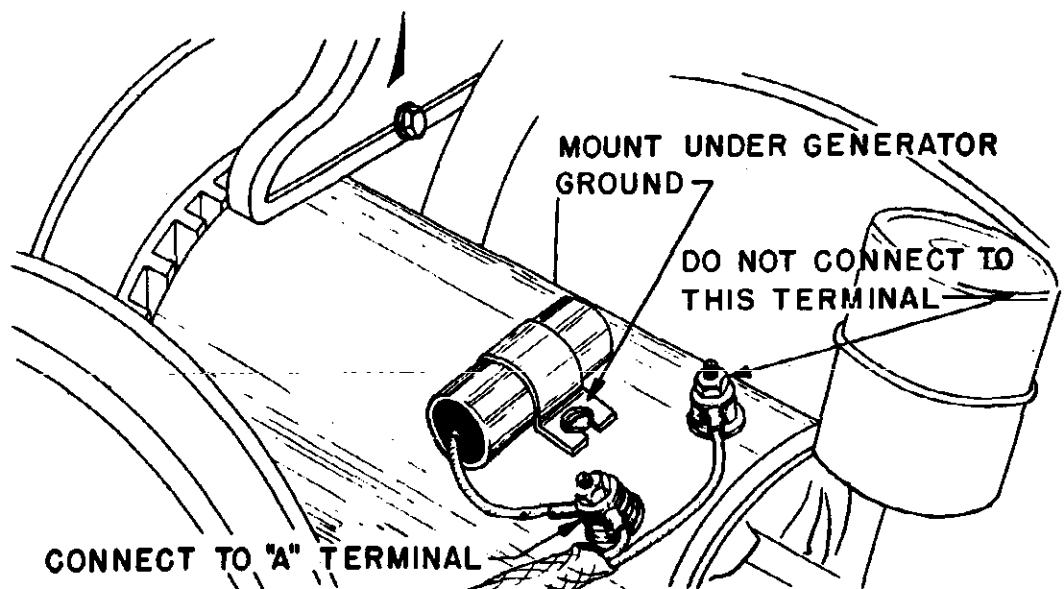


Fig. 3

MODEL 610.0300,
Chevrolet

DISTRIBUTOR SUPPRESSOR

Disconnect the center lead in the distributor head of the motor. Cut lead approximately 2 inches back from metal tip end. Screw suppressor into cut end of long lead. Screw cut end of short lead into suppressor. Plug lead, with attached suppressor, back into distributor head.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

HOW TO ORDER PARTS

Always give the part No. (No. printed on the part if different from that shown on this list), and the name of the part. When No. is not available, give complete description of part. Be sure to always give the Model No. and Catalog No. The Model No. will be found on either the metal plate at the rear of the chassis or on a printed label which may be on the chassis or cabinet.

SERVICE DATA FOR PROFESSIONAL SERVICE MEN

ELECTRICAL SPECIFICATIONS

Power Supply.....	6.3 Volts DC
Current.....	5.5 Amp. average
Frequency Range.....	538-1600 KC
Speaker.....	5 1/4" PM
Power Output.....	2 watts, undistorted
	3 watts, maximum
Sensitivity.....	2-3 microvolts average for 1 watt output
Selectivity.....	40 KC broad at 1000 times signal, at 1000 KC

This receiver contains the following:

- 1—6BA6—RF Amplifier
- 1—6BE6—Converter
- 1—6BA6—I. F. Amplifier
- 1—6AT6—Detector—AVC—1st Audio
- 1—6AQ5—Power Output
- 1—6X4—Rectifier

SERVICE NOTES

Voltage taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 Ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 5).

All voltages should be measured with an input voltage of 6.3 volts DC.

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

ALIGNING INSTRUCTION

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components such as tubes, condensers, resistors, etc. are normal before proceeding with realignment.

If realignment is necessary follow the instructions given under the heading "Alignment Procedure". After realignment has been completed repeat the procedure as final check.

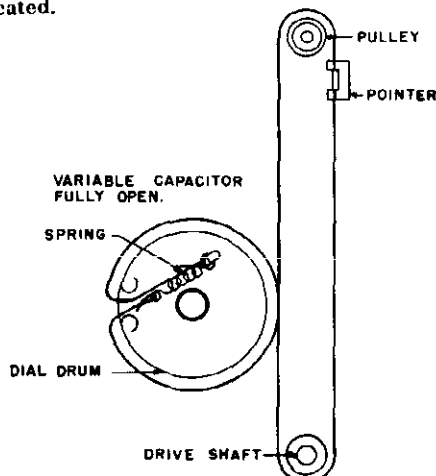


Fig. 4 DIAL CORD DRIVE (REAR VIEW)

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

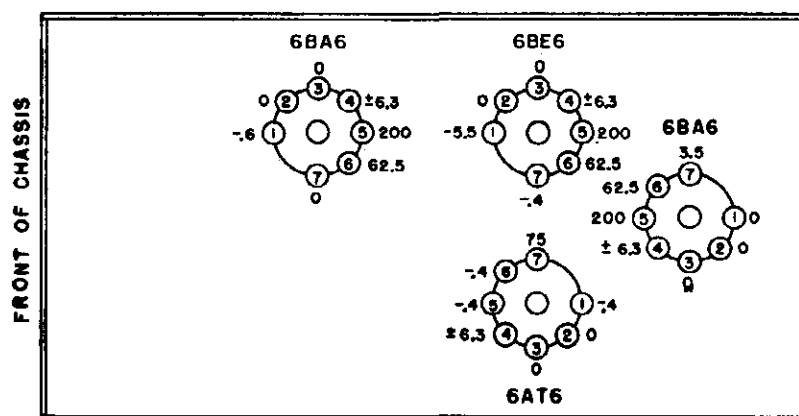
Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 100 MMFD.

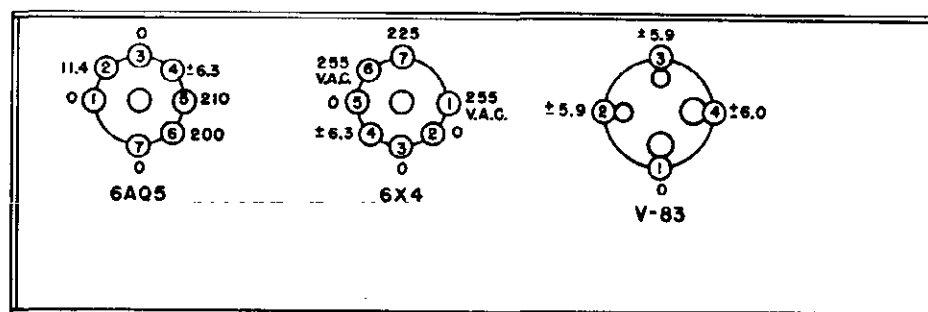
For alignment points refer to Schematic Diagram.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connector	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in Signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						

BOTTOM VIEW OF CHASSIS



BOTTOM VIEW OF POWER PACK



SOCKET VOLTAGES

Fig. 5

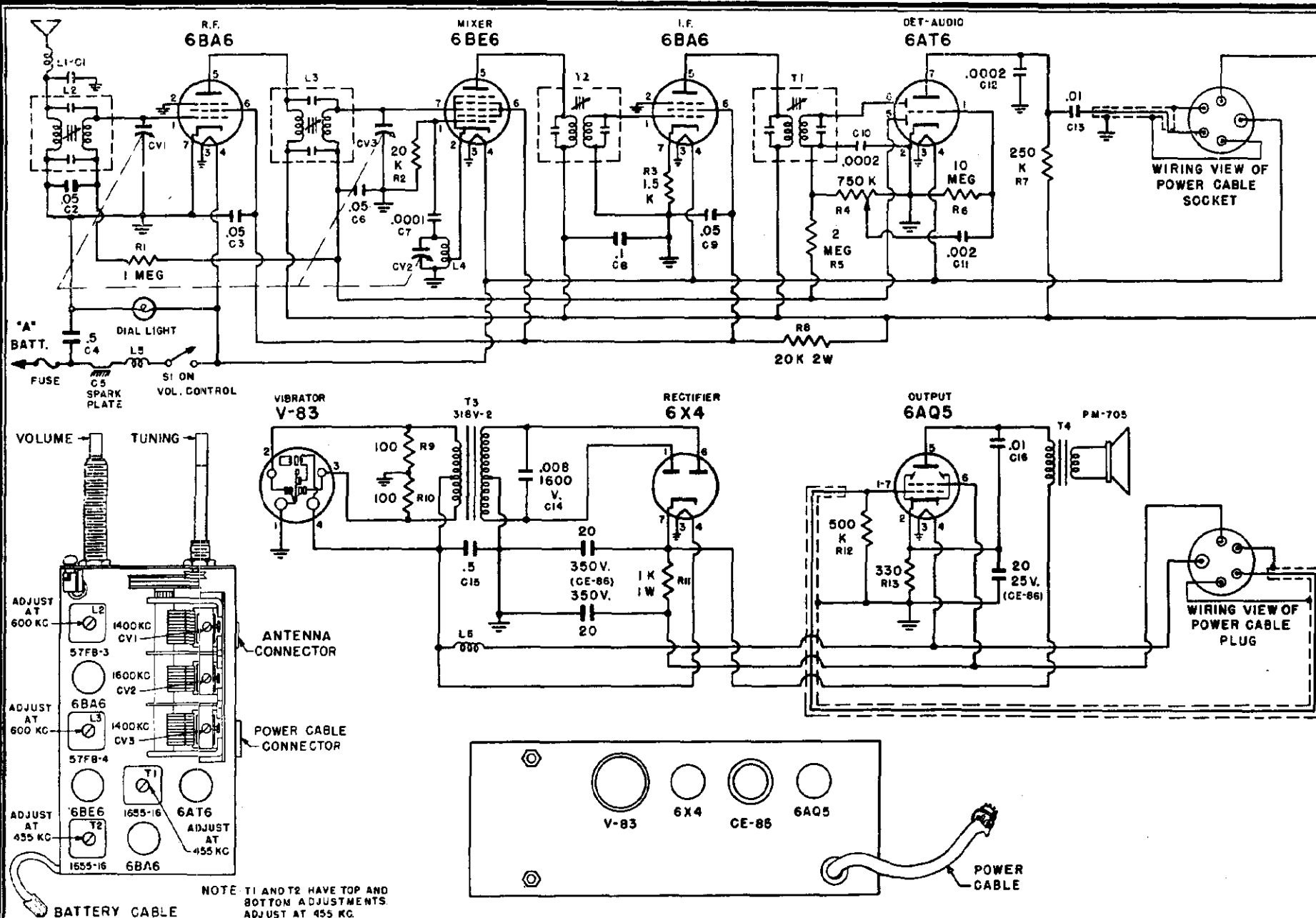


Fig. 6

PARTS AND PRICE LIST Chevrolet

CONDENSERS

Schematic Diagram Reference	Part No.	Description
C2, C3, C6, C9	C207	.05 MFD 200 volt condenser
C4, C15	C209	.5 MFD 100 volt condenser
C7	CC200	100 MMFD ceramic condenser
C8	C210	.1 MFD 400 volt condenser
C10, C12	CC201	200 MMFD ceramic condenser
C13, C16	C206	.01 MFD 600 volt condenser
C14	C205	.008 MFD 1600 volt condenser
C11	C211	.002 MFD 400 volt condenser
CE-86	CE-86	20 MFD 350 volt electrolytic condenser
		20 MFD 350 volt electrolytic condenser
		20 MFD 25 volt electrolytic condenser
CV1-CV2-CV3	CV-300	3 section variable tuning

RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor
R2	R306	20K ohm 1/2 watt 20% resistor
R3	R314	1.5K ohm 1/2 watt 20% resistor
R4	RV-300	Volume control 3/4 megohm with switch
R5	R310	2 megohm 1/2 watt 20% resistor
R6	R311	10 megohm 1/2 watt 20% resistor
R7	R307	250K ohm 1/2 watt 20% resistor
R8	R313	20K ohm 2 watt 20% resistor
R9, R10	R301	100 ohm 1/2 watt 20% resistor
R11	R312	1K ohm 1 watt 20% resistor
R12	R308	500K ohm 1/2 watt 20% resistor
R13	R303	330 ohm 1/2 watt 20% resistor

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit
L2	57FB-3	Antenna coil
L3	57FB-4	R.F. coil
L4	L201	R.F. oscillator coil
L5	L203	Choke, "A" line
L6	L202	Choke, vibrator hash
T1	1655-16	2nd IF transformer
T2	1655-16	1st IF transformer
T3	TV-100 or 318V-2	Vibrator transformer
T4		Output transformer (Part of speaker not furnished separately)

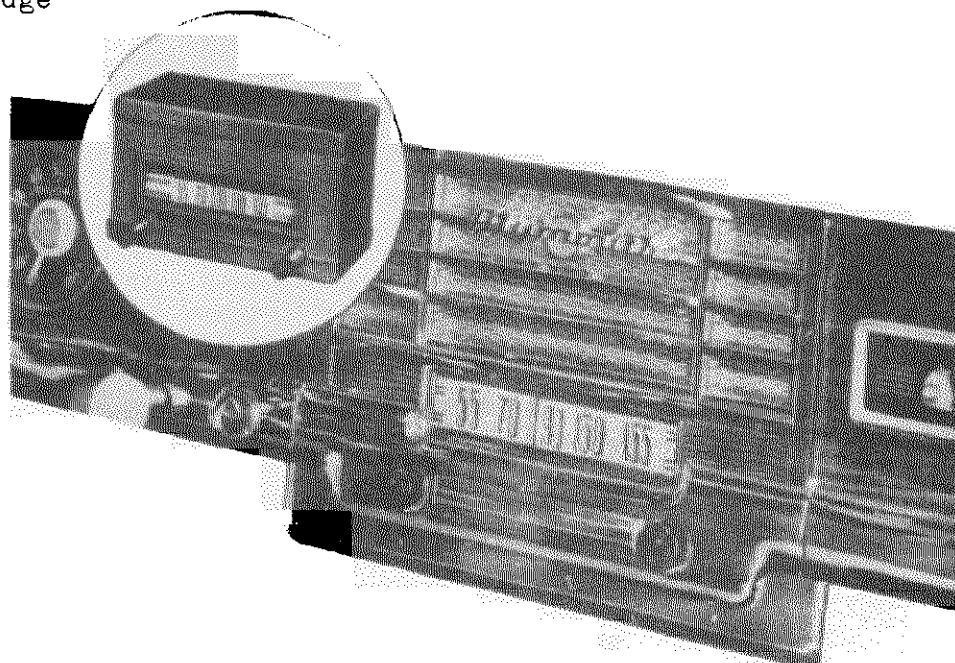
DIAL PARTS

D300	Dial Scale
PS300	Dial Pointer
DS300	Drive Shaft Assembly
H201	Grommet, rubber drive
T51	Pilot Light
H214	Pilot Light Socket
H203	Pulley, idler
H204	Spring, Dial drive String Tension
H215	String, dial drive

MISCELLANEOUS

A300	"A" lead assembly
H301	Case, less covers for Power Supply Unit
H300	Case, complete with covers for R.F. tuning unit
H207	Clip, Anti-rattle
H208	Clip, coil mounting
H302	Cover, power supply unit mounting (with speaker louvers)
A201	Fuse 15 Amp.
504PC-300	Power Cable Assembly (complete with plug)
H212	Receptacle, Antenna cable
504-FC	Socket, power cable
PM-705	Speaker, 5 1/4" PM (includes output transformer)
V-83	Vibrator
H310	Knob
H311	Cup washer
H312	Plastic Escutcheon

MODEL 610.D200,
Plymouth, Dodge



INSTALLATION

PLYMOUTH P18 SPECIAL DELUXE

1. Remove four screws securing Radio Grill in place and remove Radio Grill.
2. Remove dummy plates covering radio dial and control openings.
3. Enlarge holes in radio control cover plate to $\frac{1}{2}$ inch.
4. Remove knobs, cup washers, hex nuts and washers from control shafts and mounting bushings.
5. Secure two mounting brackets to Radio Grill with $\frac{3}{8}$ inch long 10-32 self-tapping screws and cup washers as shown in detail assembly drawing.
6. Place radio control cover plate over mounting bushings.
7. Position receiver behind Radio Grill so that mounting bushings and shafts protrude through the grill.
8. Attach receiver by replacing washers and hex nuts on mounting bushings.
9. Replace cup washers and knobs over shafts.
10. Secure receiver to mounting brackets with two No. 8 self-tapping wing nuts.
11. Insert radio with attached grill through front opening on instrument panel.
12. Replace grill mounting screws.
13. Connect battery lead to terminal marked "ACC" on ignition switch.
14. Plug antenna cable into receiver.

DODGE "CORONET"

Install in the same manner as outlined for the P18 DeLuxe Plymouth except do not remove radio grill.

PLYMOUTH P17, P18 4-DOOR DELUXE AND

P18 CLUB COUPE DELUXE

DODGE "WAYFARER" AND "MEADOWBROOK"

These models are not equipped by the car manufacturers with a radio grill or a radio control cover plate.

The following parts must be obtained from any authorized Plymouth or Dodge dealer before an installation can be made in any of these cars.

Plymouth P17, P18 4-Door DeLuxe, P18 Club Coupe DeLuxe

Radio Grill No. 1299913

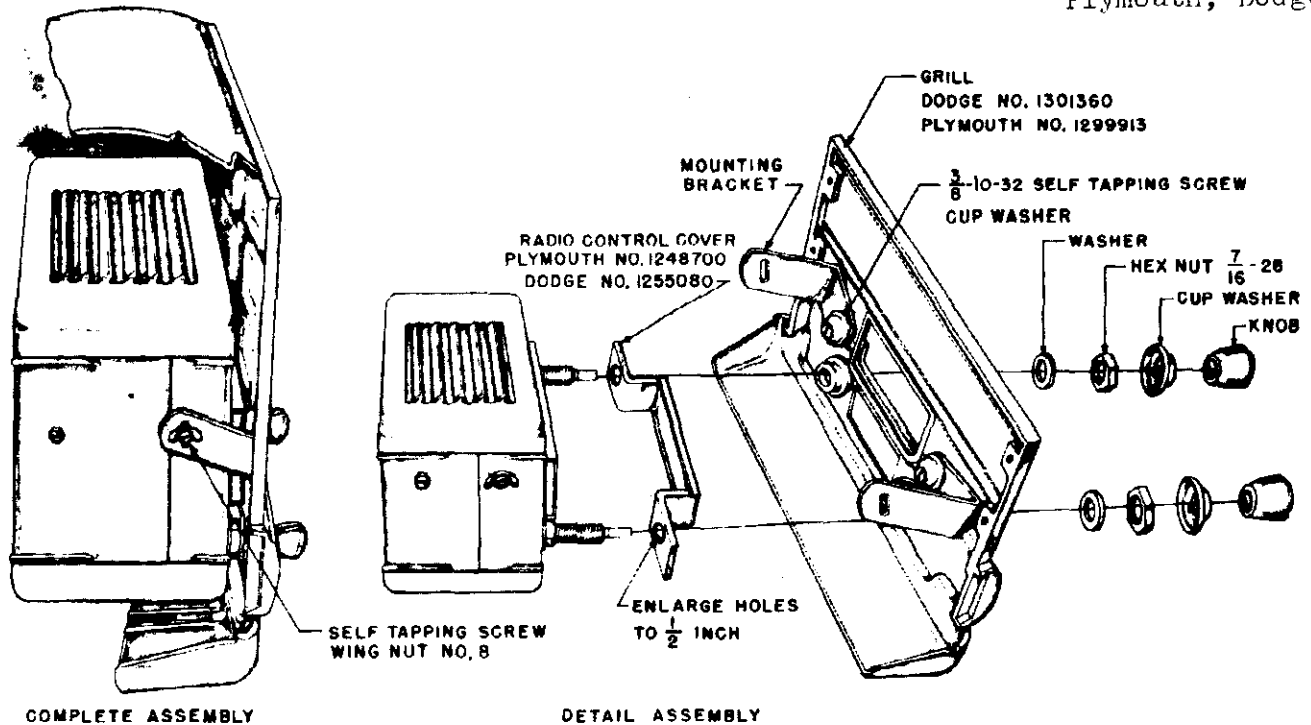
Radio control cover No. 1248700

Dodge "Meadowbrook" or "Wayfarer"

Radio Grill No. 1301360

Radio control cover No. 1255080

MODEL 610.D200,
Plymouth, Dodge



ACCESSORIES FURNISHED FOR INSTALLATION

MOUNTING PARTS KIT

The following mounting hardware parts are shipped attached to the receiver.
(See detail assembly drawing FIG. 2)

- 2 Washers
- 2 7/16-28 hex nuts
- 2 Cup washers
- 2 Knobs
- 2 Mounting Brackets
- 2 No. 8 self-tapping wing nut screws

An envelope containing additional mounting hardware is supplied with this receiver. It contains the following parts:

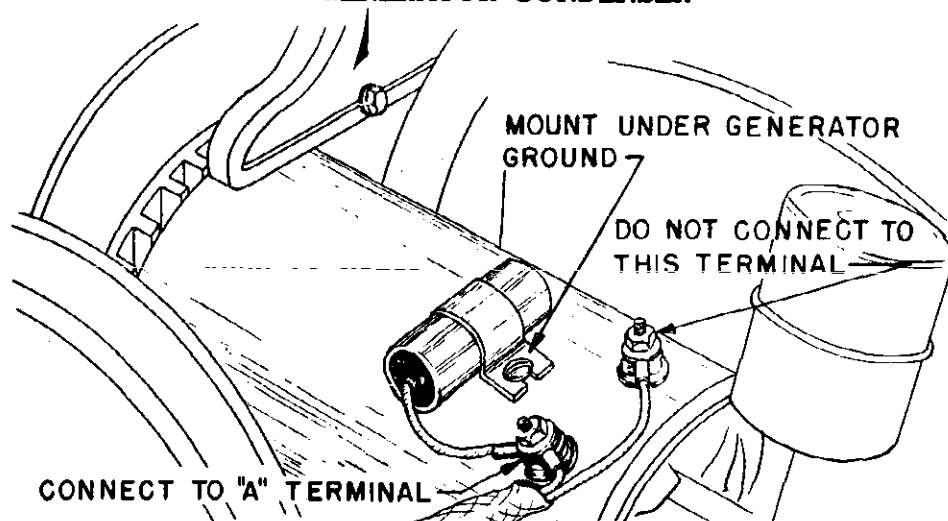
- 2 3/8 10-32 self-tapping screws
- 2 Cup washers

SUPPRESSION KIT

- 1 Distributor Suppressor
- 1 .5 MFD Generator Condenser

MOTOR NOISE ELIMINATION

GENERATOR CONDENSER



MODEL 610.D200,
Plymouth, Dodge

DISTRIBUTOR SUPPRESSOR

NOTE: 1950 Dodge and Plymouth automobiles do *not* require distributor suppressors.

1949 DODGE AND PLYMOUTH

Remove metal tip from the distributor center tower lead and screw lead into the suppressor. Plug suppressor with attached lead back into distributor head.

The generator condenser and distributor suppressor should eliminate all objectionable motor noise in most cases. If the motor noise persists the following steps should be taken. Check operation of radio as each step is made.

WHEEL STATIC

Wheel static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present, it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

AMMETER CONDENSER

A .5 MFD by-pass condenser should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of interference is found. The condenser then should be permanently mounted in this location.

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input .63 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary to proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 100 MMFD.

For alignment points refer to *Schematic Diagram*

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connector	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T4 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T3 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	T2	Maximum	RF Stage
7) Tune in Signal from generator	600 KC	100 MMFD	Ant. lead	T1	Maximum	Antenna
8) Repeat steps 4 and 5						

HOW TO ORDER REPAIR PARTS

Always give the part No. (No. printed on the part if different from that shown on this list), and the name of the part. When No. is not available, give complete description of part. Be sure to always give the Model No. and Catalog No. The Model No. will be found on either the metal plate at the rear of the chassis or on a printed label which may be on the chassis or cabinet.

PARTS AND PRICE LIST

CONDENSERS

Schematic Diagram Reference	Part No.	Description
C2, C3, C4	C207	.05 MFD 200 volt condenser
C5	CC200	100 MMFD ceramic condenser
C8, C13, C14	CC201	200 MMFD ceramic condenser
C7	C203	.002 MFD 200 volt condenser
C8, C9	C206	.01 MFD 600 volt condenser
C10, C11	C209	.5 MFD 100 volt condenser
C12	C205	.008 MFD 1600 volt condenser
CE-86	CE-86	20 MFD 350 volt electrolytic condenser
		20 MFD 350 volt electrolytic condenser
		20 MFD 25 volt electrolytic condenser
CV-200	CV-200	3 section variable tuning condenser

RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor
R2	R306	20K ohm 1/2 watt 20% resistor
R3	R305	2K ohm 1/2 watt 20% resistor
R4	R310	2 megohm 1/2 watt 20% resistor
R5	R311	10 megohm 1/2 watt 20% resistor
R6	R307	250K ohm 1/2 watt 20% resistor
R7	R308	530K ohm 1/2 watt 20% resistor
R8	R303	333 ohm 1/2 watt 20% resistor
R9	R313	20K ohm 2 watt 20% resistor
R10, R11	R301	100 ohm 1/2 watt 20% resistor
R12	R312	1K ohm 1 watt 20% resistor
RV-200	RV-200	Volume control 3/4 megohm with switch

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit
L2	57FB-3	Antenna Coil
L3	57FB-4	RF coil
L4	L201	RF Oscillator coil
L5	L202	Choke, vibrator hash
L6	L203	Choke, "A" line
T1	1655-16	1st IF transformer
T2	1655-16	2nd IF transformer
T3		Output transformer (Part of speaker not furnished separately)
T4	TV-200	Vibrator transformer

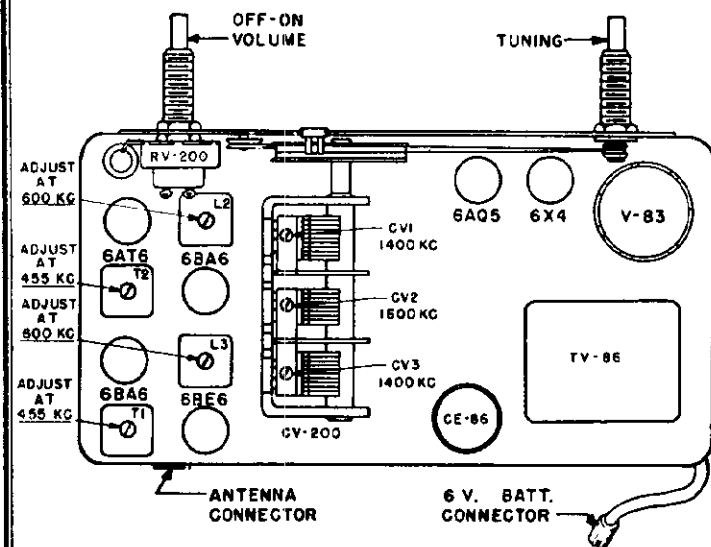
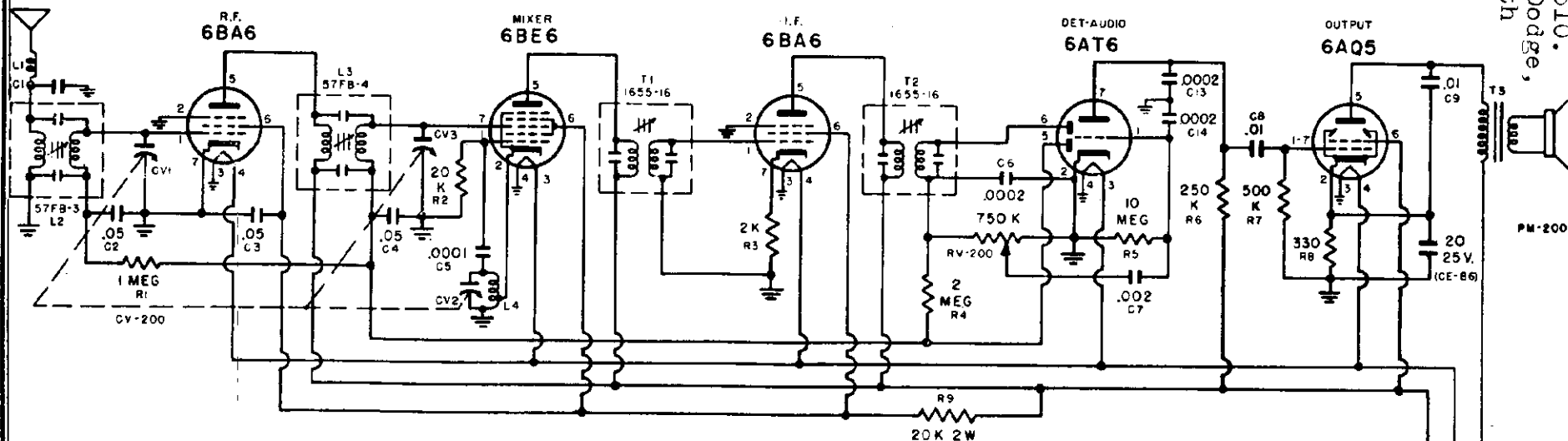
DIAL PARTS

D200	Dial Scale
PS200	Dial Pointer
DS200	Drive shaft assembly
H201	Grommet, rubber drive
T51	Pilot light
H202	Pilot light socket
H203	Pulley, idler
H204	Spring, Dial Drive Spring Tension
H205	String

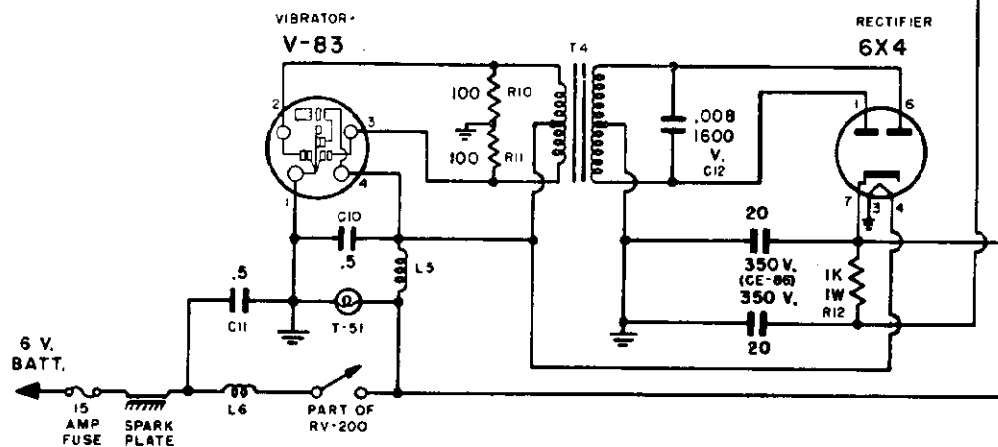
MISCELLANEOUS

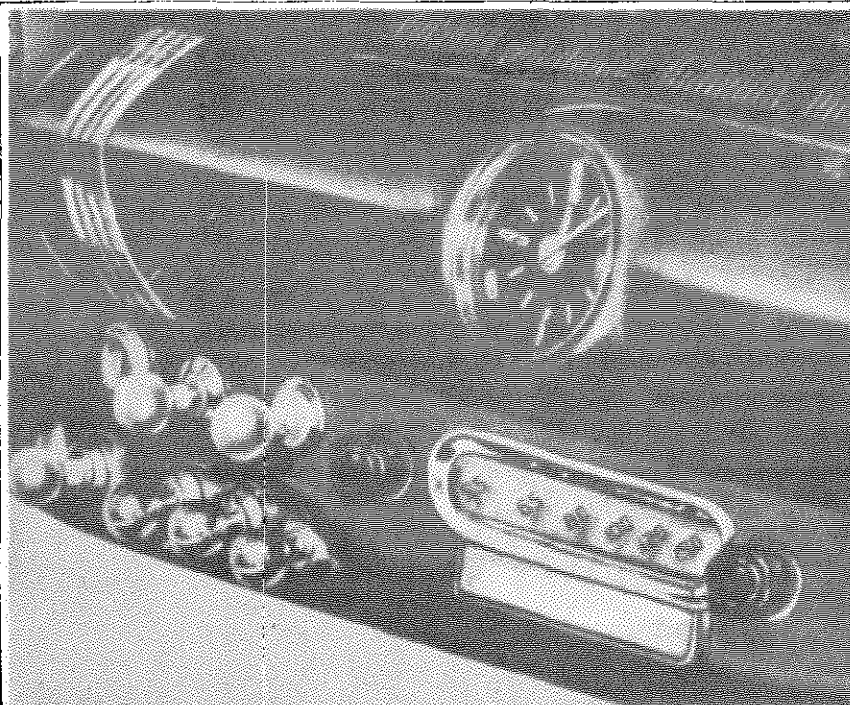
A200	"A" lead assembly
H206	Case (less covers)
H207	Clip, anti-rattle
H208	Clip, coil mounting
H209	Cover, bottom case
H210	Cover, top case (with speaker louvres)
A201	Fuse, 15 Amp.
H211	Grommet, rubber, gang mounting
H212	Receptacle, antenna cable
PM-200	Speaker 4" x 6" PM (includes output transformer)
V-83	Vibrator

MODEL 610.
D200, Dodge,
Plymouth



NOTE: T1 AND T2 HAVE TOP AND
BOTTOM ADJUSTMENTS.
ADJUST AT 455 KC.





INSTALLATION

1. Remove two speed nuts securing radio opening cover plate to instrument panel.
2. Remove cover plate.
3. Place speaker and power pack unit over four threaded stud bolts located on the underside of the instrument panel. (Position power pack unit so that power cable is located on the right hand side.) See Fig. 1.
4. Secure power pack into position with four 8-32 wing nuts supplied in kit of mounting hardware.
5. Remove knobs, cup washers and hex mounting nuts from tuning unit. *Do not remove escutcheon.*
6. Place tuning unit behind instrument panel so that mounting bushings and shafts protrude through the front panel.

7. Attach tuning unit with a hex nut on each mounting bushing.
8. Replace cup washers and knobs over shafts.
9. Secure a supporting bracket (2 supplied in kit of hardware) to each side of the power pack unit by means of two No. 8 self tapping screws. Use end of supporting bracket with round hole. If more convenient, these brackets may be attached before power pack unit is positioned in place.
10. Swing supporting brackets so that slotted holes are in line with the holes on each side of the tuning unit.
11. Secure to tuning unit with two No. 8 self tapping screws.
12. Insert power cable plug into socket on rear of tuning unit.
13. Plug antenna cable into tuning unit.
14. Connect "A" lead to accessory terminal marked RAD. GA, on the ignition switch.

PARTS AND PRICE LIST

CONDENSERS

SCHEMATIC DIAGRAM, REFERENCE	PART NO.	DESCRIPTION
C2, C3, C6, C9	C207	.05 MFD 200 volt condenser
C4, C15	C209	.5 MFD 100 volt condenser
C7	CC200	100 MMFD ceramic condenser
C8	C210	.1 MFD 400 volt condenser
C10, C12	CC201	200 MMFD ceramic condenser
C13, C16	C206	.01 MFD 600 volt condenser
C14	C205	.008 MFD 1600 volt condenser
CE-86	CE-86	20 MFD 350 volt electrolytic condenser.
		20 MFD 350 volt electrolytic condenser.
		20 MFD 25 volt electrolytic condenser.
CV-300	CV-300	3 section variable tuning

RESISTORS

R1	R309	1 megohm 1/2 watt 20% resistor
R2	R306	20 K ohm 1/2 watt 20% resistor
R3	R314	1.5 K ohm 1/2 watt 20% resistor
R4	RV-300	Volume control 3/4 megohm with switch
R5	R310	2 megohm 1/2 watt 20% resistor
R6	R311	10 megohm 1/2 watt 20% resistor
R7	R307	250 K ohm 1/2 watt 20% resistor
R8	R313	20K ohm 2 watt 20% resistor
R9, R10	R301	100 ohm 1/2 watt 20% resistor
R11	R312	1K ohm 1 watt 20% resistor
R12	R308	500K ohm 1/2 watt 20% resistor
R13	R303	330 ohm 1/2 watt 20% resistor

MODEL 610.
F100, Ford

MODEL 610.
F100, Ford

COILS AND TRANSFORMERS

L1-C1	L200	Motor noise elimination unit
L2	57FB-3	Antenna coil
L3	57FB-4	R.F. coil
L4	L201	R.F. oscillator coil
L5	L203	Choke, "A" line
L6	L202	Choke, vibrator hash
T1	1655-16	1st IF transformer
T2	1655-16	2nd IF transformer
T3	TV100 or 318V-2	Vibrator transformer
		Output transformer (Part of speaker not furnished separately)

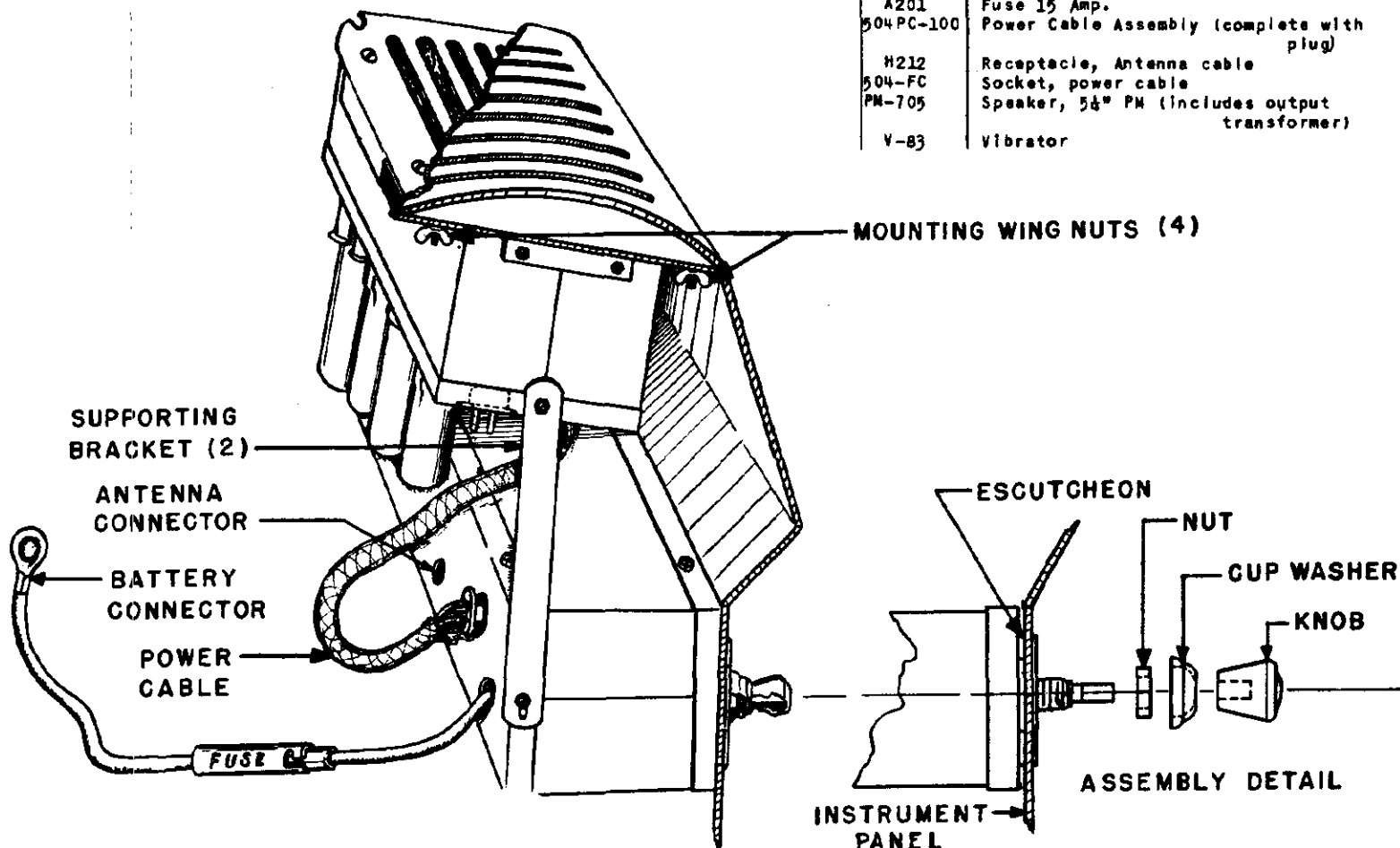
DIAL PARTS

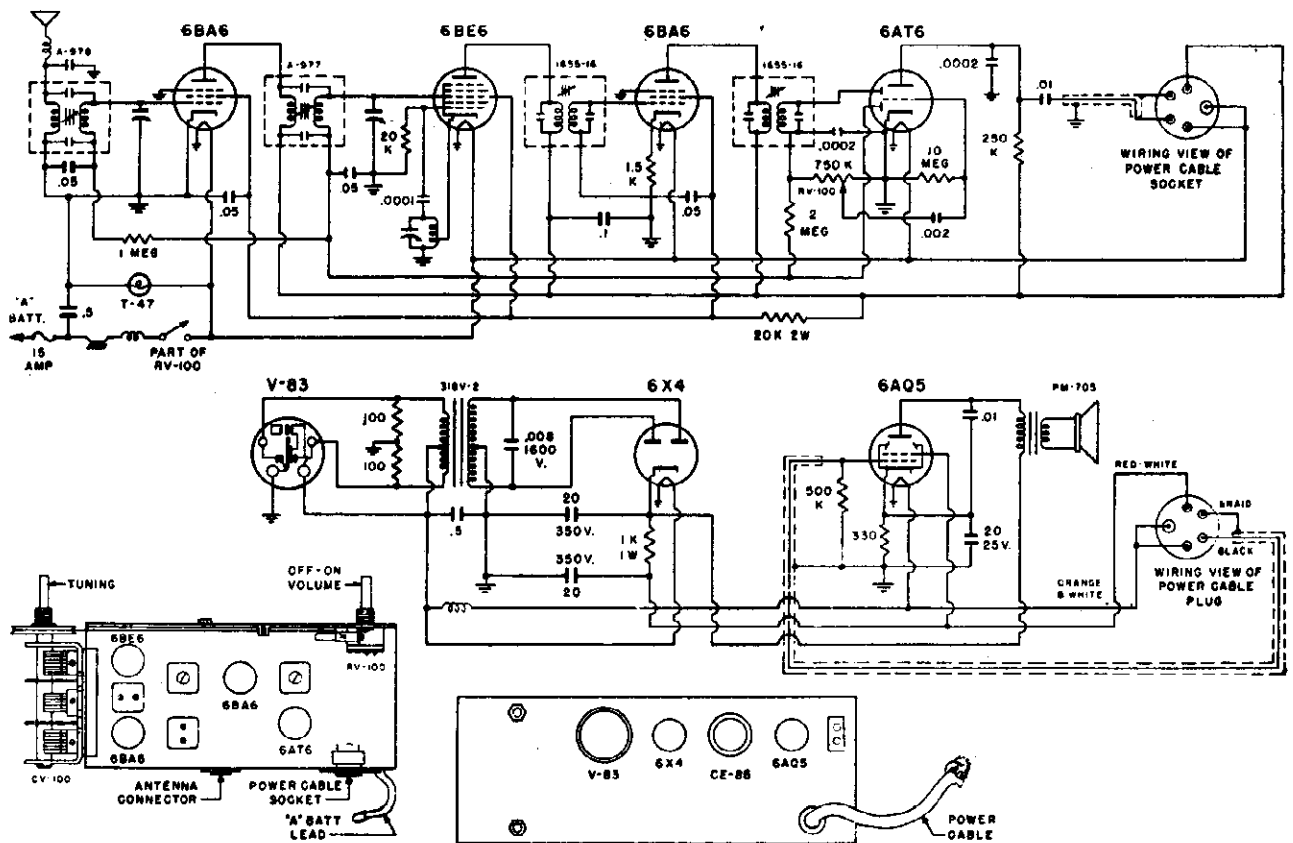
F-100	Dial Scale
PS-800	Dial Pointer

M201	Grommet, rubber drive
T51	Pilot Light
M214	Pilot Light Socket
M203	Pulley, idler
M204	Spring, Dial drive String Tension
M215	String, dial drive

MISCELLANEOUS

A100	"A" lead assembly
M101	Case, less covers for Power Supply Unit
M100	Case, complete with covers for R.F. tuning unit
M207	Clip, Anti-rattle
M208	Clip, coil mounting
M102	Cover, power supply unit mounting (with speaker louvres)
A201	Fuse 15 Amp.
504PC-100	Power Cable Assembly (complete with plug)
M212	Receptacle, Antenna cable
504-FC	Socket, power cable
PM-705	Speaker, 5 $\frac{1}{4}$ " PM (includes output transformer)
V-83	Vibrator



MODEL 610 F100,
Ford

ALIGNMENT PROCEDURE

Volume control— Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—1 MFD., 100 MMFD.

For alignment points refer to Schematic Diagram.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connector	Trimmer Reference	Trimmer Adjustment	Trimmer Function
1) Fully open	455 KC	.1 MFD	6BE6 Grid	T2 Top & bottom	Maximum	Output I.F.
2) Fully open	455 KC	.1 MFD	6BE6 Grid	T1 Top & bottom	Maximum	Input I.F.
3) Fully open	1600 KC	100 MMFD	Ant. lead	CV2	Maximum	Oscillator
4) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV3	Maximum	RF Stage
5) Tune in signal from generator	1400 KC	100 MMFD	Ant. lead	CV1	Maximum	Antenna
6) Tune in signal from generator	600 KC	100 MMFD	Ant. lead	L3	Maximum	RF Stage
7) Tune in Signal from generator	600 KC	100 MMFD	Ant. lead	L2	Maximum	Antenna
8) Repeat steps 4 and 5						

TECHNICAL INFORMATION FOR SERVICE

ALIGNMENT PROCEDURE

I. F. Alignment

1. Set variable condenser to high frequency end of dial.
2. Connect suitable output meter to voice coil of speaker.
3. Connect signal generator to grid of BE6 through .05 condenser. Connect ground side of generator to B.
4. Adjust trimmers A and B for maximum output at 455 Kc.
5. Repeat trimmer adjustment for peak sensitivity.

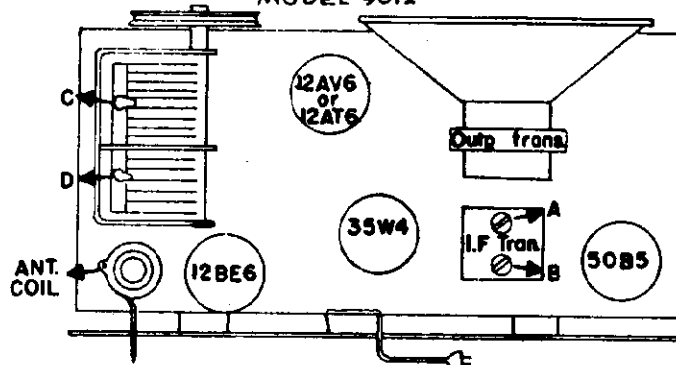
R. F. Alignment

1. Set variable condenser to extreme high frequency end of dial.
2. Connect signal generator to antenna input terminal on antenna coil through 50 mmf. condenser.
3. Set generator to 1720 Kc.
4. Set trimmer C to 1720 Kc.
5. Set generator to 1400 Kc. and tune receiver dial to maximum response.
6. Adjust trimmer D for maximum output at 1400 Kc.
7. Check tracking and make necessary compensations.

PARTS LIST

PART	DESCRIPTION
C7	CLP-10017 Cond. electrolytic, 30-20 mfd. 150 V.
C2	CMP-15251 Cond. mica, .00025 mfd. 500 V.
C1	CPP-12203 Capacitor paper tubular .02 mfd. 200 V.D.C.
C3,4	CPP-12502 Capacitor paper tubular .005 mfd. 200 V (D.C.)
C6,8	CPP-12503 Capacitor paper tubular .05 mfd. 200 V (D.C.)
C5	CPP-14103 Capacitor paper tubular .01 mfd. 400
C9A-B	CVP-100018A Condenser variable, osc. 162 19 plates, 450 mfd.
R4	RC-31005 Resistor carbon 10 meg. 1/2 watt
R1	RC-31002 Resistor carbon 10,000 ohm, 1/2 watt
R7	RC-31500 Resistor carbon 150 ohm, 1/2 watt
R2	RC-32204 Resistor carbon 2.2 meg. 1/2 watt, 20%
R5,6	RC-34703 Resistor carbon 470,000 ohm, 1/2 watt, 20%
R8	RC-40220 Resistor carbon 22 ohm, 1 watt
R9	RC-31001 Resistor carbon 1000 ohm, 1/2 watt
R10	RC-40470 Resistor carbon 47 ohm, 1 watt 20%
T2	SRP-10007 Speaker, 3 inch transformer mounted
L2	TRC-10017 Oscillator coil, 5 lug
L1	TRF-10018 Antenna coil
T1	TS-10039 I.F. transformer (automatic No. 1455-11)
R3	VC-12106E Volume control with switch 1 meg-1/4 inch shaft
XC-10020	Back cover plate, cardboard, non-waxed
DS-10112	Dial scale and nameplate
HF-1003	Washer, white felt 1/4 inch I.D.x5/80. D.x1/16 thick
HX-10027	"T" fastner (to fit .150 hole)
K-10036W	Knob, set screw Ivory or Walnut
K-10042W	Knob push-on with pointer Ivory or Walnut
2P-10025WorU	Cabinet

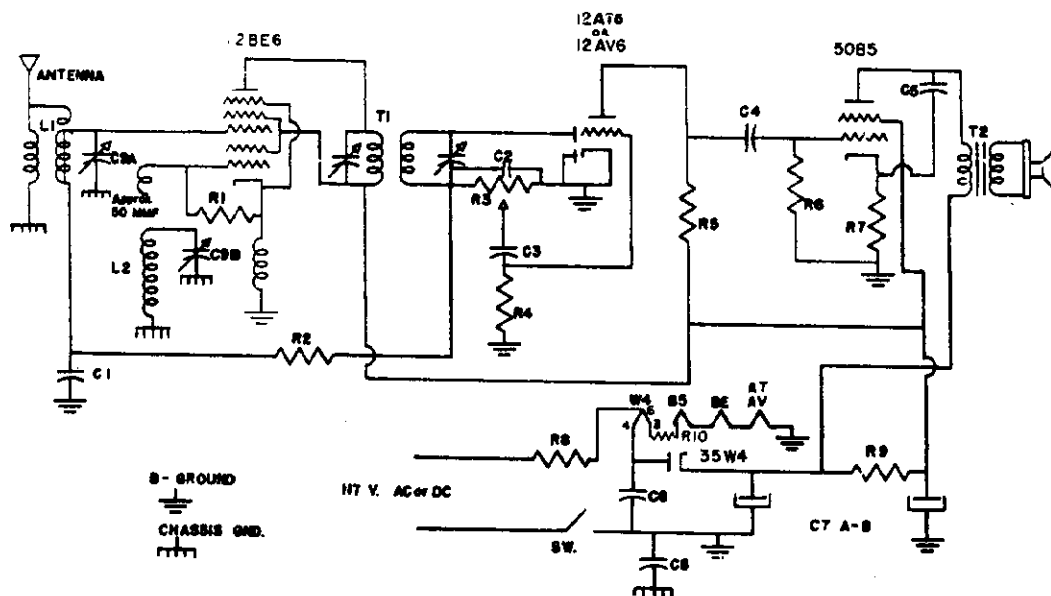
TUBE LOCATION CHART
MODEL 9012



CIR.	SYM.	PART NO.	DESCRIPTION
R1		RC-31002	RESISTOR CARBON 10,000 Ohm 1/2 W
R2		RC-32204	" 2.2 MEG Ohm 1/2 W
R3		VC-12106-E	VOLUME CONTROL 1 MEG WITH SWITCH
R4		RC-31005	RESISTOR CARBON 10 MEG Ohm 1/2 W
R5,6		RC-34703	" 470,000 Ohm 1/2 W
R7		RC-31500	" 150 Ohm 1/2 W
R8		RC-40220	" 22 Ohm 1 W
R9		RC-31001	" 1000 Ohm 1/2 W
T1		TS-10039	TRANSFORMER I.F.
T2		SR-10007	TRANSFORMER OUTPUT & SPEAKER
R10		RC-40470	RESISTOR CARBON 47 Ohm - 1 W

CIR.	SYM.	PART NO.	DESCRIPTION
C1		CP-12203	CONDENSER PAPER .02 MFD 200 V.
C2		CM-25251	" MICA 250 MMF
C3,4		CP-12502	" PAPER .005 MFD 200 V.
C5		CP-14103	" PAPER .01 MFD 400 V.
C6,8		CP-12503	" PAPER .05 MFD 200 V.
C7		CL-10017	" ELECT. 30V/20MFD 150 V.
C9A-B		CV-10018A	" VARIABLE
L1		TRF-10018	ANTENNA COIL
L2		TRC-10017	OSCILLATOR COIL, 5 LUG

CHASSIS MODEL 9012



INSTALLATION

This radio comes to you complete with all hardware necessary for mounting, and also with a distributor suppressor, ammeter condenser and generator condenser. By referring to Figures 1 and 2, and following the instructions outlined below, you will find that it is very simple to install.

First determine where the receiver is to be mounted by holding it with the hands in the approximate location in the car. Using the front mounting bracket as a template, mark and drill two $\frac{3}{8}$ " holes in the instrument panel flange. Now secure the mounting bracket to the radio receiver with the screws provided, and then mount the front of the radio to the instrument panel, using the bolts, lock washers and nuts provided for this purpose. The back of the radio is supported by means of the rear mounting strap. The mounting strap should be formed to the correct angles, as illustrated in Figure 2, so that it can then be fastened to the fire wall. After marking and center-punching the fire wall at the correct location, drill with a $\frac{3}{8}$ " drill. The mounting strap is then secured to the radio and fastened to the fire wall of the car with the $\frac{1}{4}$ " bolt, lock washer and nut furnished with the receiver.

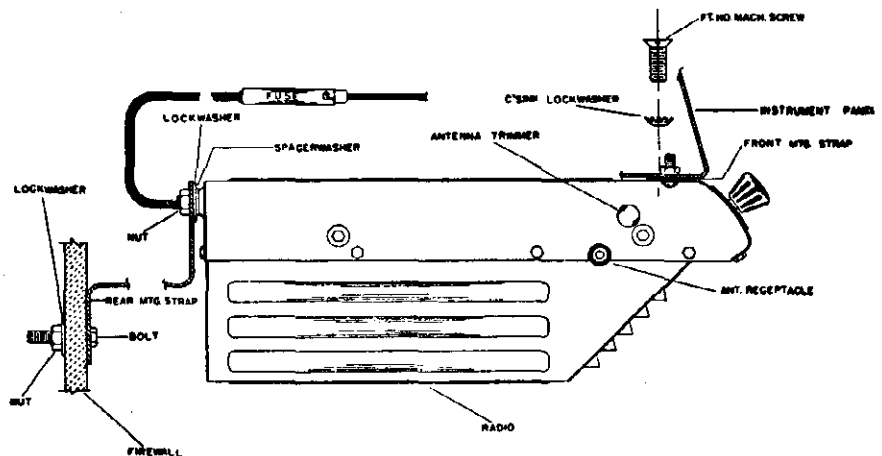


Fig. 3. Side View, Showing Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the jack into the socket provided on the side of the radio. Connect the battery cable to the hot side of the ammeter behind the instrument panel. The fuse should then be inserted into the cable receptor.

FINAL ADJUSTMENTS

The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type.

To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 1100 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 3) and adjust the trimmer for maximum volume. A small screw driver will be needed for this purpose.

ACCESSORIES FURNISHED FOR INSTALLATION

All of the parts that are needed for installing this receiver are furnished in the Mounting Parts Kit, part No. S84-192, and the Suppression & Misc. Parts Kit, part No. S84-344, as listed below. Also supplied are the rear mounting strap, part No. B31-134, and the front mounting plate, part No. A31-148.

NOTE: For shipping, the two control knobs have been removed from the tuning and volume control shafts. To install the knobs, line up the flat side of the knob spring, (inside knob) with the flat side of the control shaft and push the knob forward until it stops.

S84-192 MOUNTING PARTS KIT

- | | |
|----------------------------------|-------------------------------|
| 1 $\frac{1}{4}$ " Bolt | 2 External Tooth Lock Washers |
| 2 $\frac{1}{4}$ " Lock Washers | 2 Internal Tooth Lock Washers |
| 2 $\frac{1}{4}$ " Hexagon Nuts | 2 10-32 Hexagon Nuts |
| 2 10-32 x $\frac{3}{8}$ " Screws | |

S84-344 SUPPRESSION KIT & MISC. PARTS ASSEMBLY

- | | |
|-----------|--------------------------------|
| 1—S84-233 | "A" lead assembly |
| 1—A43-10 | Fuse |
| 2—A52-295 | Control knobs |
| 1—A81-13 | Sleeve (for fuse) |
| 1—S84-193 | Suppression Kit consisting of: |
| | 2—.5 MFD Condensers |
| | 1—Distributor Suppressor |
| | 20"—Wire Braid |

MODEL 159144

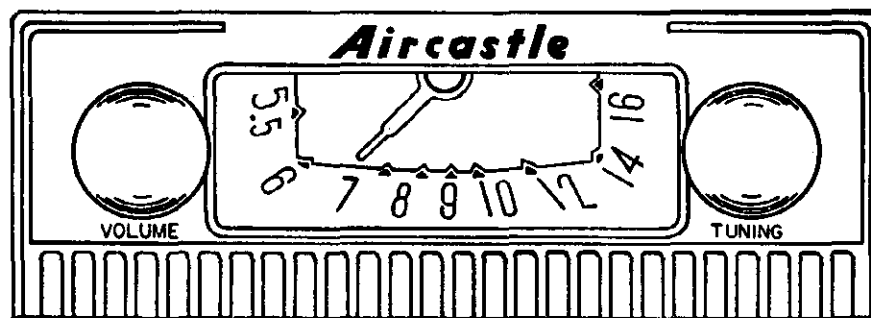


Fig. 1 Front View

SUGGESTIONS FOR ELIMINATING POSSIBLE MOTOR NOISE

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all three mounting points. A good electrical contact at these points will aid materially in eliminating motor noise. (The following steps may not be necessary in all cases. Install your radio and operate it before making changes.)

GENERATOR CONDENSER

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

AMMETER CONDENSER

A .5 MFD bypass condenser is furnished for attaching to the ammeter. This should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby. In most cases the use of this condenser, the distributor suppressor, and the generator condenser, will eliminate all objectionable ignition interference.

DISTRIBUTOR SUPPRESSOR

Detach the high tension wire where it goes into the top of the distributor cap and cut two inches off the end. Screw the piece you cut off into one end of the distributor suppressor and then screw the other end of the suppressor on the long wire which leads to the coil. Insert the wire back into the distributor cap.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional .5 MFD condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short wires are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension wire from the coil to the distributor.

HIGH AND LOW TENSION WIRES

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These wires will very often pick up motor noise and feed it into the

receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. These wires should be placed in a flexible wire shield and the shield grounded to frame or motor. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension wires.

BONDING OF FIRE WALL

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

ELECTRICAL ACCESSORIES

In some cases it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to connect a .5 MFD by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter. (1.8 volt for 1 watt output.)

Dummy antennas—.1 MFD., 75 MMFD.

For alignment points refer to Figures 5 and 6.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T2	Maximum	Output I.F.
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T1	Maximum	Input I.F.
Fully Open	455 KC	75 MMFD.	Ant. lead	L3	Minimum	Wave trap
Fully Open	1600 KC	75 MMFD.	Ant. lead	C18	Maximum	Oscillator
Tune in signal from generator	1400 KC	75 MMFD.	Ant. lead	C19	Maximum	Antenna

NOTE: The antenna trimmer condenser, C3, (see Fig. 2) should be adjusted after the radio is installed in the car. Tune the receiver to a weak station at about 1100 KC and adjust this trimmer for maximum volume.

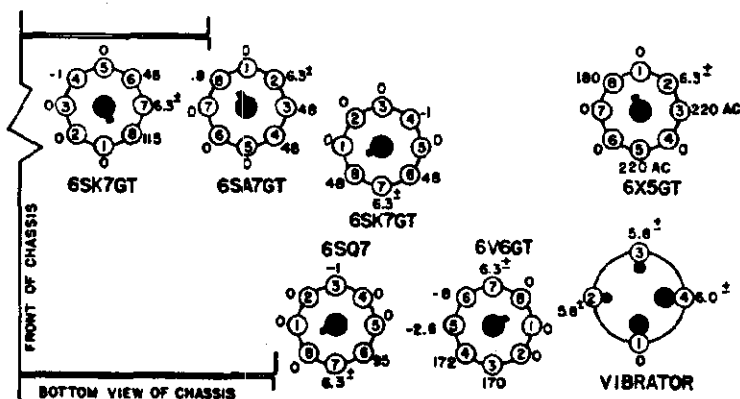


Fig. 4 Socket Voltages

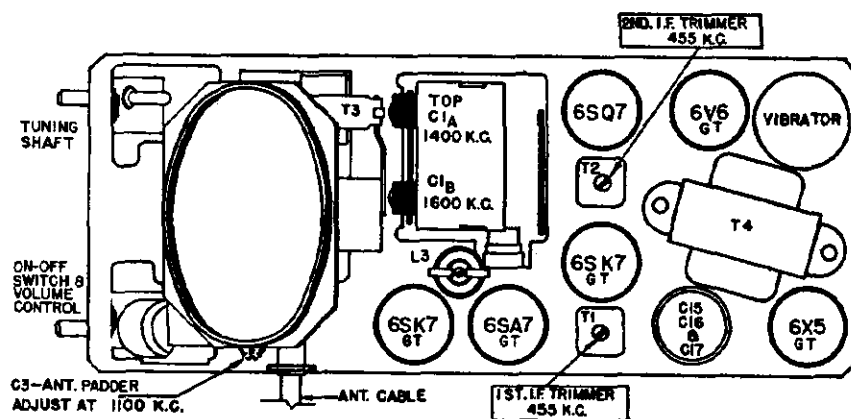


Fig. 5 Tube, Rectifier, and Trimmer Locations



MODEL 159144

Schematic
Diagram
ReferencePart
No.C1A, C1B
C2, C14
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C15
C16
C17
C19, C20
C21A19-201
A16-192
A20-145
A16-189
A15-196
A15-202
A15-204
A15-205
A16-187
A15-176
A16-190
A16-195
A16-193

A18-293

A16-184
A16-185R1, R3
R2
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13, R14A60-659
A60-685
A60-769
A60-726
A24-177
A60-728
A60-768
A60-667
A60-731
A60-767
A60-770
A60-752L1
L2
L3
L4
L5
L6
T1
T2
T3
T4A10-527
B10-511
A10-510
A10-512
A33-229
A33-228
A10-508
A10-509
B80-242
B80-243

CONDENSERS

Description	
Variable condenser	_____
.01 MFD 400 volt condenser	_____
Trimmer condenser	_____
.05 MFD 400 volt condenser	_____
100 MMFD ceramic condenser	_____
20 MMFD ceramic condenser	_____
50 MMFD ceramic condenser	_____
12 MMFD ceramic condenser, temp. comp.	_____
.1 MFD 400 volt condenser	_____
250 MMFD mica condenser	_____
.005 MFD 600 volt condenser	_____
.001 MFD ceramic condenser	_____
.05 MFD 600 volt condenser	_____
20 MFD 25 volt electrolytic condenser	_____
10 MFD 350 volt electrolytic condenser	_____
15 MFD 350 volt electrolytic condenser	_____
.5 MFD 100 volt condenser	_____
.005 MFD 1600 volt oil filled condenser	_____

RESISTORS

22K ohm 1/2 watt 20% resistor	_____
47K ohm 1/2 watt 20% resistor	_____
7.5K ohm 2 watt 10% resistor	_____
2.2 megohm 1/2 watt 20% resistor	_____
Volume control, 500,000 ohm, with switch	_____
10 megohm 1/2 watt 20% resistor	_____
22 ohm 1/2 watt 10% resistor	_____
220K ohm 1/2 watt 20% resistor	_____
470K ohm 1/2 watt 20% resistor	_____
150 ohm 1/2 watt 10% resistor	_____
470 ohm 1/2 watt 10% resistor	_____
100 ohm 1/2 watt 10% resistor	_____

COILS AND TRANSFORMERS

Antenna Loading Coil	_____
Antenna Coil	_____
I.F. Trap Coil	_____
Oscillator Coil	_____
Choke, "A" Line	_____
Choke, vibrator hash	_____
1st I.F. Transformer	_____
2nd I.F. Transformer	_____
Output Transformer (Part of Speaker, not furnished separately)	_____
Power transformer	_____

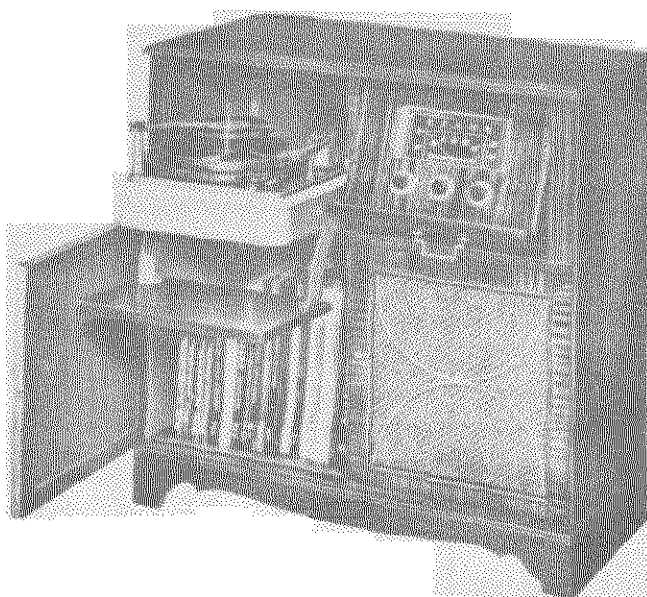
DIAL PARTS

A11-303	Bracket, Dial Scale	_____
B11-328	Bracket, String Guide	_____
A72-29	Bushing, Tuning Shaft Bearing	_____
A70-130	Clip, Spring, for Tuning Shaft	_____
A40-146	Dial Escutcheon	_____
A58-55	Dial Pointer	_____
B67-544	Dial Scale	_____
A28-101	Gasket for Speaker	_____
A52-295	Knob	_____
A11-329	Link, String Guide	_____
A89-10	Pilot Light, Type G.E. No. 422	_____
A65-37	Rivet, Shoulder, for Dial Pointer Stringing	_____
A65-41	Rivet, Shoulder, for String Guide Brkt. and Link	_____
A65-12	Rivet, Shoulder, for Dial Drive Stringing	_____
A75-70	Shaft, tuning	_____
A75-74	Shaft, for Dial Pointer	_____
A70-132	Spring, for Pilot Light Socket	_____
A70-133	Spring, Dial Drive String Tension	_____
A70-142	Spring, Pointer Drive String Tension	_____
A51-105	String, Pointer Travel, 17"	_____
A51-108	String, Condenser Drive, 19"	_____

MISCELLANEOUS

S84-233	"A" lead assembly	_____
A83-421	Clip, I.F. Transformer Mounting	_____
A83-517	Clip, Oscillator Coil Mounting	_____
A43-10	Fuse, 15 Amp.	_____
A47-112	Grommet, rubber, (Spkr. & Gang mounting)	_____
B31-134	Mounting strap, rear	_____
B31-148	Mounting Plate, Front	_____
S84-192	Mounting parts kit	_____
A87-38	Receptacle, Antenna Cable	_____
B79-362	Speaker, 4" P.M. (includes Output Transformer)	_____
S84-193	Suppression Kit Assembly	_____
A34-105	Vibrator	_____
A83-519	Wiper, grounding, for case covers	_____

Note: Tubular condensers must be high temperature (85°C) wax type.



GENERAL SPECIFICATIONS

FREQUENCY RANGES:

AM—540 to 1700 Kc.
FM— 88 to 108 Mc.

TUNING CAPACITOR:

6 section gang (3-AM and 3-Fm); entire R.F. tuning assembly is rubber mounted.

I.F. FREQUENCY:

AM—455 Kc.
FM—10.7 Mc.

POWER SUPPLY:

117 volts A.C.
Radio — 85 watts
Phono—115 watts

SPEAKER:

10 inch P.M. Dynamic
Voice coil impedance—3.2 ohms

POWER OUTPUT:

Undistorted—2.8 watts
Maximum —5.4 watts

ANTENNAS:

AM—Low impedance loop
FM—Single ended half wave dipole

RECORD CHANGER:

Automatic-intermix type; 3-speed

WEIGHT:

Packed—120 lbs.

DIMENSIONS:

Length—36"
Height—34"
Depth —18"

SENSITIVITY:

AM—20 microvolts per meter (average) for 0.5 watt output. This measurement must be made with the R.F. signal generator (modulated 30% at 400 cycles) coupled to the receiver by means of a standard test loop antenna.

FM—10 microvolts per meter (average) for 0.5 watt output. This measurement must be made with the R.F. signal generator (frequency modulated 30%—22½ Kc. deviation—at 400 cycles) coupled to the receiver thru appropriate size carbon resistors to match the 300 ohm antenna input circuit.

HOW TO REMOVE CHASSIS FROM CABINET

1. Remove all knobs by pulling them forward.
2. Disconnect all antenna leads from the terminal strip labeled "FM—FM—AM—AM."
3. Disengage phono pick-up plug from its socket at rear of chassis.
4. Disengage phono motor plug and socket.
5. Disconnect the leads from speaker at bottom left section of cabinet.
6. Remove "ON-OFF" indicator lamp and socket from bottom center of cabinet.
7. Remove bracket which clamps dial plate to front panel of cabinet.
8. Take out the four chassis hold-down screws that are located at each corner of the pan and serve to retain the unit in position on the tilt out panel. Chassis can now be removed by lifting it out of cabinet.

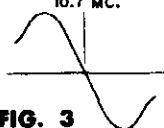
1. Disconnect leads from FM-AM antenna terminal strip (labeled FM—FM—AM—AM) at back of chassis; also disconnect speaker leads and phono plugs. Remove chassis and speaker from cabinet. If desired, allow speaker to remain in cabinet and connect to receiver by extension leads.
2. Loop antenna leads (on cabinet) do not have to be connected to terminal strip on chassis while I.F. stages are being aligned. Before starting alignment of Ant., R.F., and Osc. stages, reconnect AM loop antenna leads to AM antenna terminal strip—do not attempt to use extension leads; place chassis as close as required to cabinet so that connections may be made direct to antenna terminal strip at back.
3. With the gang condenser fully meshed, dial pointer should be in the position indicated by the last division below 55 on the dial. If it is set incorrectly, hold tuning shaft steady and reposition pointer.
4. Connect an output meter across speaker voice coil, or from plate of 6V6GT tube to chassis through a 0.1 Mfd. condenser.
5. Connect ground lead of signal generator to the receiver chassis.
6. Set volume control to maximum volume position and use a weak signal from the signal generator.
7. Set band switch to the "AM" (middle) position.

Repeat adjustment of trimmers 6 & 7 and slugs 8 & 9 until one no longer detunes the other.



FREQUENCY MODULATION—"FM"—ALIGNMENT PROCEDURE

1. If alignment of both AM and FM channels is required it is necessary to align the AM channel first, then align the FM channel as instructed in chart below (AM alignment procedure is given on the preceding page).
2. Disconnect all leads from antenna terminal strip (labeled FM—FM—AM—AM) at back of chassis; also disconnect speaker leads and phono plugs. Remove chassis and speaker from cabinet. If desired, allow speaker to remain in cabinet and connect to receiver by extension leads.
3. With the gang condenser fully meshed, dial pointer should be in the position indicated by the last division below 88 on the dial. If it is set incorrectly, hold tuning shaft steady and reposition pointer.
4. Set volume control at maximum volume position and use a weak signal from the signal generator.
5. Dress FM circuit leads as short and straight as possible, particularly those in the oscillator circuit. I.F. plate and grid leads should also be kept short and straight.
6. Set band switch to the FM (extreme counter-clockwise) position.

STANDARD SIGNAL GENERATOR		SWEEP GENERATOR		VTVM OR OUTPUT METER CONNECTIONS	OSCILLOSCOPE CONNECTIONS	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TYPE OF ADJUSTMENT AND OUTPUT INDICATION
CONNECTIONS	FREQUENCY	CONNECTIONS	FREQ.					
Connect high side to lug on trimmer #17 (see Fig. 1 for location of trimmer) using a .01 Mfd. condenser in series with generator lead. Connect ground lead to the receiver chassis in vicinity of gang condenser.	10.7 MC. Unmodulated	Not used.	————	Connect VTVM as shown in Fig. 4.	Not used.	Any position where it does not affect the signal.	#10 Discriminator secondary #11 Discriminator primary #12-13 2nd IF #14-15 1st IF	Adjust these trimmers for maximum meter reading — the output voltage will be of negative polarity.
Same as above.	Same as above.	Not used.	————	Connect VTVM as shown in Fig. 5.	Not used.	Same as above.	#10 Discriminator secondary	Note that as slug #10 is rotated, a point will be found where the voltmeter will swing rather sharply from a positive to a negative reading or vice versa. The correct setting is obtained when the meter reads zero as the slug is moved thru this point.
Same as above.	Same as above. Attenuate signal to prevent overload and distortion of response curve.	Connect high side to lug on trimmer #17 (see Fig. 1 for location of trimmer) using a .01 Mfd. condenser in series with generator lead. Connect ground lead to the receiver chassis in vicinity of gang condenser.	10.7 MC Sweeping ± 300 Kc.	Not used.	Connect as shown in Fig. 5. Set vertical amplifier of scope for maximum amplification. Synchronize oscilloscope with sweep generator by connecting "horizontal input" terminals of scope to source of horizontal sweep modulating voltage on the sweep generator.	Same as above.	#10 Discriminator secondary	A pattern similar to that shown in Fig. 3 should appear on the oscilloscope screen. Check for symmetry about the 10.7 Mc. center point and linearity of the slope. 10.7 MC.  FIG. 3 If the characteristic is not shaped properly, attempt to obtain symmetry by changing the setting of slug #10. Should that fail to produce the desired results, then a slight readjustment of slugs #11, 12, 13, 14 and 15 should be undertaken.

MODEL 9150-B

FREQUENCY MODULATION—"FM"—ALIGNMENT PROCEDURE (Continued)

STANDARD SIGNAL GENERATOR		SWEEP GENERATOR		VTVM OR OUTPUT METER CONNECTIONS	OSCILLOSCOPE CONNECTIONS	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TYPE OF ADJUSTMENT AND OUTPUT INDICATION
CONNECTIONS	FREQUENCY	CONNECTIONS	FREQ.					
Connect generator "high" side in series with a 270 ohm carbon resistor to end terminal marked "FM" on strip at back of chassis. Generator ground lead must connect to next terminal marked "GND."	108 MC. with 400 cycle AM Modulation.	Not used.	—	Connect VTVM as shown in Fig. 3.	Not used.	108 MC.	#16 FM Oscillator	Set trimmer #16 to receive 108 Mc. signal as indicated by maximum meter reading.
Same as above.	106 MC. with 400 cycle AM Modulation.	Not used.	—	Same as above.	Not used.	Tune to 106 Mc. generator signal.	#13 FM RF #18 FM ANT.	Adjust trimmer for maximum meter reading.

Check calibration and tracking of receiver with input signals of 88, 98 and 106 MC. If difference between dial pointer setting and these frequencies does not exceed ± 0.3 MC. and R.F. circuit is tracking properly, then alignment may be considered satisfactory and no further adjustment is necessary. Where the calibration error is greater than ± 0.3 MC., it is advisable to make the following adjustments:

Tune receiver to an 88 MC. signal and note whether dial pointer is above or below correct calibration point. Then tune receiver so that dial pointer is at the 88 MC. position. If generator signal was previously received at a setting above 88 MC., it will be necessary to slightly spread the windings of the FM oscillator coil so that signal will now be received at the correct dial setting. Then check adjustment of R.F. trimmer #17 and ANT. trimmer dial setting. On the other hand, if generator signal was received at a

dial setting below 88 MC., then slightly compress the windings of the oscillator coil until the signal comes in at the correct calibration point.

Check calibration at 108 MC. and if it is in error by more than ± 0.3 MC., readjust setting of trimmer #16. Then repeat adjustments of trimmers #17 and 18 at 106 MC. Repeat calibration adjustment at 88, 106 and 108 MC. until desired accuracy is obtained.

Observe dial calibration at 106 MC. If it is found to be incorrect by an appreciable amount, then make a very slight adjustment in the spacing of the gang condenser plates to receive the 106 MC. signal at the correct dial setting. Then check adjustment of R.F. trimmer #17 and ANT. trimmer #18 to obtain maximum output indication at 106 MC.

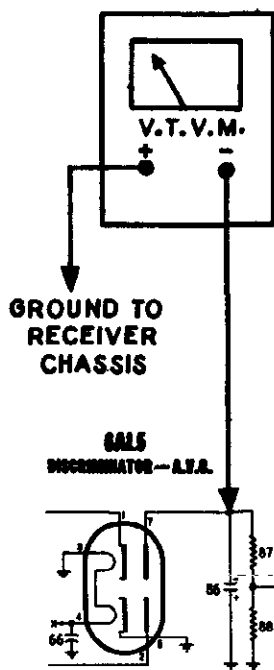


FIG. 4
VTVM Connections
for I.F. Alignment

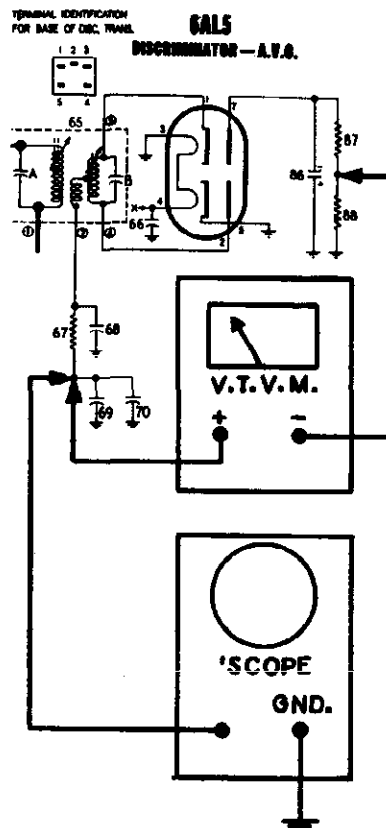
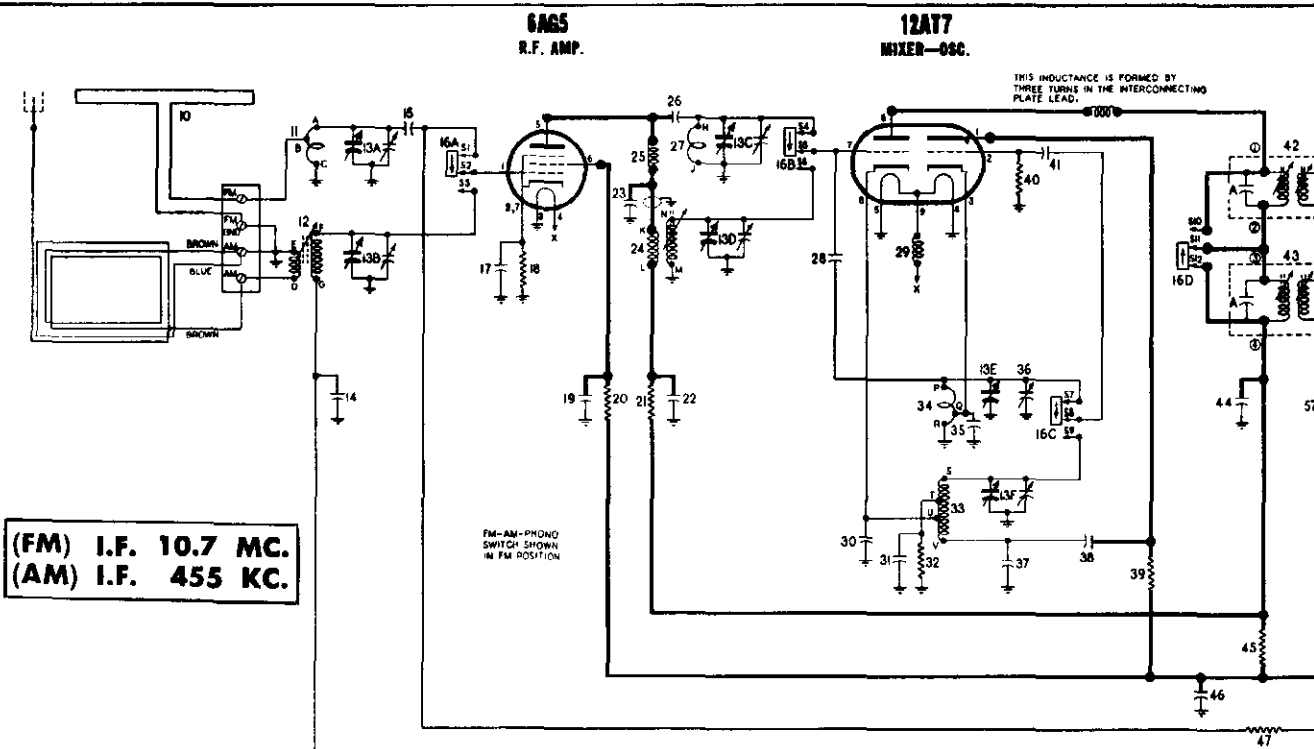


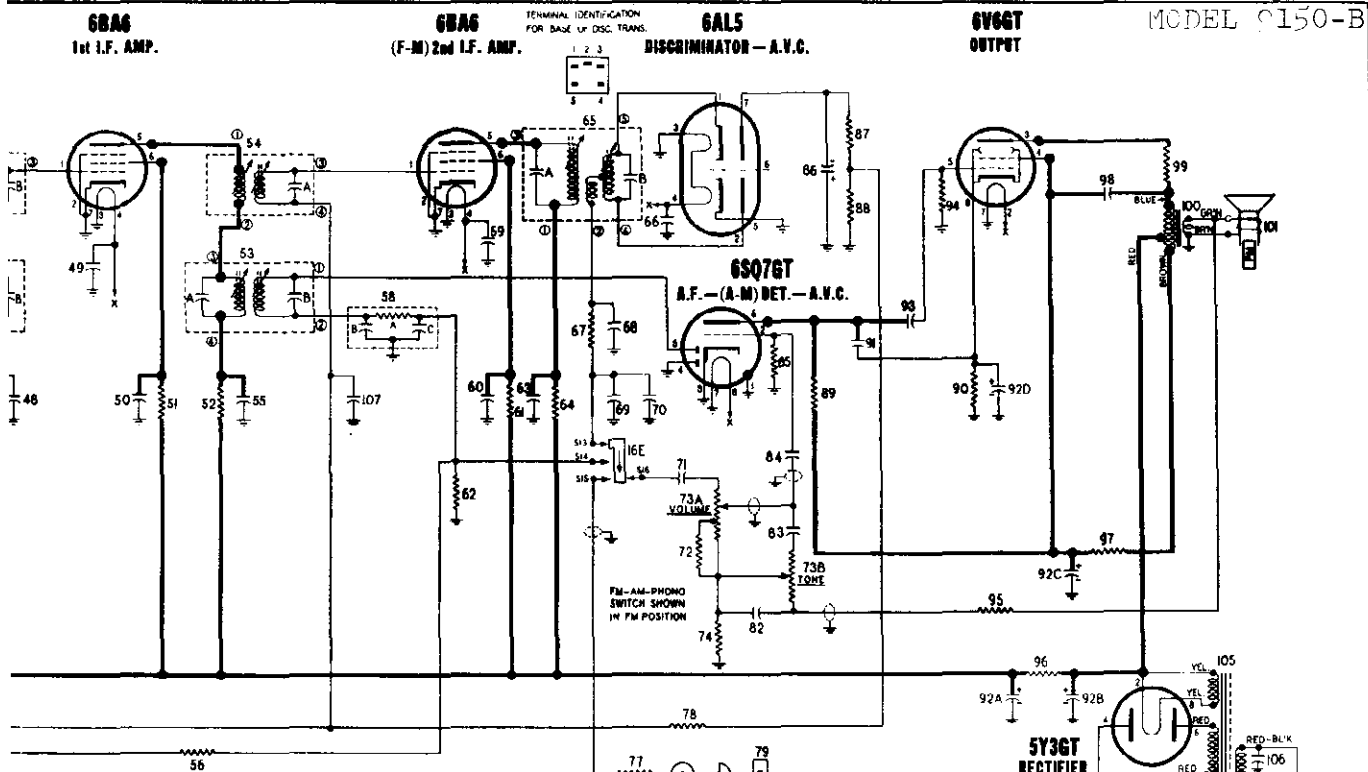
FIG. 5
VTVM and Oscilloscope
Connections for
Discriminator Alignment



PARTS LIST

WARNING: Some parts listed below have special characteristics. Do not use substitutes for replacement purposes.

DIA-GRAM NO.	PART NO.	DESCRIPTION	DIA-GRAM NO.	PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
CONDENSERS							
13-A to F	506348	Condenser—variable gang (with drum)...	93	512009	Condenser—.01 Mfd. 200 volt.	507802	Pull-out mechanism for re
14	512027	Condenser—.05 Mfd. 200 volt.	98	512001	Condenser—.001 Mfd. 600 volt.	508840	Record changer base assa
15	513406	Condenser—ceramic 22 Mmfd. 500 volt (Temperature compensating)	106	512256	Condenser—.01 Mfd. 600 volt.	507807	Red-tie; for record chang
17	513002	Condenser—ceramic 47 Mmfd. 500 volt.	107	513013	Condenser—ceramic 5000 Mmfd. 450 volt.		mechanism
19	513013	Condenser—ceramic 5000 Mmfd. 450 volt.	18	510117	Resistor—carbon 82 Ohms $\pm 10\%$ 1/2 watt.	160496	Rubber pad between dial
22	513013	Condenser—ceramic 5000 Mmfd. 450 volt.	20	510164	Resistor—carbon 33,000 Ohms 1/2 watt.		ing bracket
23	513002	Condenser—ceramic 47 Mmfd. 500 volt.	21	510237	Resistor—carbon 1000 Ohms 1 watt.	160496	Rubber pad for mounting
26	513401	Condenser—ceramic 5 Mmfd. $\pm 2\%$ 500 volt (Temperature compensating)	32	510141	Resistor—carbon 1800 Ohms $\pm 10\%$ 1/2 watt	118621	Rubber pad for record ch
28	513000	Condenser—ceramic 1.0 Mmfd. 500 volt.	39	510237	Resistor—carbon 1000 Ohms 1 watt.		mechanism
30	513007	Condenser—ceramic 330 Mmfd. 500 volt.	40	510155	Resistor—carbon 10,000 Ohms 1/2 watt.	170167	Screw—#8-32x7/8"; for m
31	512009	Condenser—.01 Mfd. 200 volt.	45	510237	Resistor—carbon 1000 Ohms 1 watt.	508480	Socket for indicator lamp
35	513429	Condenser—ceramic 10 Mmfd. $\pm 10\%$ 500 volt (Temperature compensating)	47	510167	Resistor—carbon 47,000 Ohms 1/2 watt.		cabinet (with leads)
36	506336	Condenser—trimmer; 3 to 30 Mmfd.	51	510165	Resistor—carbon 39,000 Ohms $\pm 10\%$ 1/2 w.	506760	Spring—compression for
37	513442	Condenser—ceramic 10 Mmfd. $\pm 10\%$ 500 volt (Temperature compensating)	52	510237	Resistor—carbon 1000 Ohms 1 watt.		pull-out mechanism and
38	513013	Condenser—ceramic 5000 Mmfd. 450 volt.	56	510193	Resistor—carbon 2.2 Meg. 1/2 watt.		ment tilt mechanism
41	513409	Condenser—ceramic 39 Mmfd. $\pm 5\%$ 500 volt (Temperature compensating)	57	510173	Resistor—carbon 100,000 Ohms 1/2 watt.	506761	Spring—tension for radio
42-A	506080	Condenser—ceramic 33 Mmfd. (part of 1st FM I.F. transformer)	58-A	506338	Resistor—carbon 47,000 Ohms (part of diode filter unit)		mechanism
42-B	506080	Condenser—ceramic 72 Mmfd. (part of 1st FM I.F. transformer)	61	510165	Resistor—carbon 39,000 Ohms $\pm 10\%$ 1/2 w.	507821	Spring—tension for reco
43-A, B	506333	Condenser—ceramic 330 Mmfd. (part of 1st AM I.F. transformer)	62	510185	Resistor—carbon 470,000 Ohms 1/2 watt.		out mechanism
44	513013	Condenser—ceramic 5000 Mmfd. 450 volt.	64	510237	Resistor—carbon 1000 Ohms 1 watt.	507822	Trim strip for record cha
46	513013	Condenser—ceramic 5000 Mmfd. 450 volt.	67	510159	Resistor—carbon 18,000 Ohms $\pm 10\%$ 1/2 w.		
48, 49, 50	513013	Condenser—ceramic 5000 Mmfd. 450 volt.	72	510170	Resistor—carbon 68,000 Ohms 1/2 watt.	MISCELLANEOUS PAR	
53-A	505797	Condenser—ceramic 107 Mmfd. (part of 2nd AM I.F. transformer)	73-A, B, C	508483	Volume and tone control	506369	Background for dial (foil)
53-B	505797	Condenser—ceramic 86 Mmfd. (part of 2nd AM I.F. transformer)			A—2 Meg.	301270	Base for mounting electra
54-A	505905	Condenser—ceramic 83 Mmfd. (part of 2nd FM I.F. transformer)			B—2 Meg.	505165	"C" washer for tuning sh
55	513013	Condenser—ceramic 5000 Mmfd. 450 volt.			C—"ON-OFF" switch		shaft
58-B, C	506338	Condenser—ceramic 100 Mmfd. (part of diode filter unit)	74	510128	Resistor—carbon 330 Ohms 1/2 watt.	508488	Clamp—retains dial scale
59, 60	513013	Condenser—ceramic 5000 Mmfd. 450 volt.	75	510170	Resistor—carbon 68,000 Ohms 1/2 watt.	506343	Clip for mounting AM ant
63	513013	Condenser—ceramic 5000 Mmfd. 450 volt.	77	510179	Resistor—carbon 220,000 Ohms 1/2 watt.	505101	Clip for mounting I.F. tra
65-A	506332	Condenser—ceramic 8 Mmfd. (part of discriminator transformer)	78	510193	Resistor—carbon 2.2 Meg. 1/2 watt.	160326	Clip—retains dial backg
65-B	506332	Condenser—ceramic 47 Mmfd. (part of discriminator transformer)	85	510195	Resistor—carbon 4.7 Meg. 1/2 watt.	114955	Clip—retainer on end of
66	513013	Condenser—ceramic 5000 Mmfd. 450 volt.	87, 88	510153	Resistor—carbon 8200 Ohms $\pm 10\%$ 1/2 watt	117057	Cord—dial drive (3 ft. re
68	513007	Condenser—ceramic 330 Mmfd. 500 volt.	89	510179	Resistor—carbon 220,000 Ohms 1/2 watt.	508481	Dial scale—glass
69	512005	Condenser—.003 Mfd. 600 volt.	90	510128	Resistor—carbon 330 Ohms 1/2 watt.	501031	Plug for phono. motor ca
70	513003	Condenser—ceramic 100 Mmfd. 500 volt.	94	510185	Resistor—carbon 470,000 Ohms 1/2 watt.	500968	Plug for phono. pick-up o
71	512027	Condenser—.05 Mfd. 200 volt.	95	510149	Resistor—carbon 4700 Ohms 1/2 watt.	506370	Pointer
76	512011	Condenser—.01 Mfd. 400 volt.	96	510732	Resistor—wire wound 2000 Ohms $\pm 10\%$ 10 watts	119087	Ring for dial cord
82	512033	Condenser—.1 Mfd. 200 volt.	97	510261	Resistor—carbon 22,000 Ohms 1 watt.	38501	Rubber bushing for band
83	512001	Condenser—.001 Mfd. 600 volt.	99	510113	Resistor—carbon 47 Ohms 1/2 watt.	116584	Rubber spacer for mounti
84	512009	Condenser—.01 Mfd. 200 volt.	TRANSFORMERS AND COILS			503588	Shaft and drum for dial
86	504937	Condenser—electrolytic 5 Mfd. 50 volt.	10	508395	Antenna—built-in (FM)	162148	Shaft and link assembly;
91	513008	Condenser—ceramic 470 Mmfd. 350 volt.	11	506353	Coil—FM Antenna	508485	Shaft—tuning
92-A, B, C, D	505908	Condenser—electrolytic	12	506354	Coil—AM Antenna	506349	Slug core for AM antenna
		A—30 Mfd. 450 volt			Slug core for AM antenna coil.	506344	Slug core for AM R.F. coi
		B—40 Mfd. 450 volt	24	506345	Coil—AM R.F.	508841	Slug core for primary or
		C—10 Mfd. 450 volt			Slug core for AM R.F. coil.		criminator transformer
		D—20 Mfd. 25 volt	25	507935	Coil—choke	505307	Socket and phono. motor
			27	506351	Coil—FM R.F.	506372	Socket—dial lamp; pair i
			29	507586	Coil—choke	504597	Socket—miniature (7 pin)
			33	506355	Coil—AM Oscillator	506331	Socket—miniature (9 pin)
			34	506352	Coil—FM Oscillator	116690	Socket—octal base
			42	506080	Transformer—1st FM I.F.	160392	Socket—octal (rectifier)
			43	506333	Transformer—2nd FM I.F.	160039	Socket—phono. plug
			53	505797	Transformer—2nd AM I.F.	505161	Spring—dial cord tension
			54	505905	Transformer—2nd FM I.F.	505924	Terminal strip (FM-FM-AM
			65	506332	Transformer—discriminator	111456	Washer—spring washer f
					Slug core for primary or secondary of dis-		pointer shaft
					criminator transformer		
			100	508486	Transformer—output		
			105	506709	Transformer—power		



DIA-GRAM NO.	PART NO.	DESCRIPTION
d changer	16-A to E 506347	Switch—FM-AM-Phono
Y pull-out	58-A, B, C 506338	Diode filter unit
le and retain-asis		A—Resistor—carbon 47,000 Ohms 1/5 watt
or pull-out		B—Condenser—ceramic 100 Mmfd. 400 volt
ling chassis...ase of		C—Condenser—ceramic 100 Mmfd. 400 volt
ord changer	101 506464	Speaker—P.M. Dynamic (10 inch)
radio compart-	102 118921	Lamp—dial (Mazda 47) 6-8 volt 150 Ma.
partment tilt	103	
hanger pull-	104	
base		
condenser...r pointer		
3 or R.F. coil...		
d...		
cord...		
nd)...per ft.		
itch...		
dial scale...		
d switch...		
ndary of dis...		
e...lead)		
ning shaft or		

OTHER ELECTRICAL PARTS

16-A to E	506347	Switch—FM-AM-Phono
58-A, B, C	506338	Diode filter unit
		A—Resistor—carbon 47,000 Ohms 1/5 watt
		B—Condenser—ceramic 100 Mmfd. 400 volt
		C—Condenser—ceramic 100 Mmfd. 400 volt
		Speaker—P.M. Dynamic (10 inch)
101	506464	
102	118921	Lamp—dial (Mazda 47) 6-8 volt 150 Ma.
103		
104		

RECORD CHANGER PARTS

(for mechanical parts, see record ch'g'r sec. of manual.)

79	508222	Record Changer (3 speed)
	508432	Crystal Cartridge
80	508120	Motor—115 volt 60 cycle
81	505269	Switch—"ON-OFF" for record changer
	508434	Needle—phonograph; for "Fine Groove" and "Microgroove" records
	508433	Needle—phonograph; for "Standard" records

CABINET PARTS

	508217	Bracket for mounting OFF-ON indicator
		lie at base of cabinet
	508487	Bracket—retains dial plate
	506757	Bracket—slide; retains radio compartment
	507808	Bracket—lie for record changer pull-out mechanism
	117131	Bull's-eye for OFF-ON indicator lie at base of cabinet
	508399	Cabinet
	508499	Catch for record storage compartment
	508493	Door and radio tilt compartment assembly (less hardware)
	508494	Door for record changer compartment (less hardware)
	508496	Door for record storage compartment (less hardware)
	508493	Escutcheon—dial
	506380	Fastener for loop antenna
	508497	Handle for radio or record changer door
	508498	Handle for record storage compartment door
	506640	Hinges—for record storage compartment; per pair
	508492	Knob—"PHO. AM FM"
	508490	Knob—"TONE"
	508491	Knob—"TUNE"
	508489	Knob—"VOLUME-ON"
	170188	Nut—Wing #10-24; for tension adjustment of radio compartment tilt mechanism
	507809	Nut—wing #10-32; for tension adjustment on record changer pull-out mechanism
	508397	Pivot bolt for radio tilt compartment
	507801	Pull-out mechanism for record changer compartment (left side)

TERMINAL Q IS LOCATED
7/8 TURN FROM
TERMINAL R



FM OSC.
COIL
506352

TERMINAL B IS LOCATED
1 1/4 TURN FROM
TERMINAL A



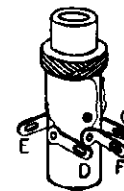
FM ANT.
COIL
506353



FM R.F.
COIL
506351



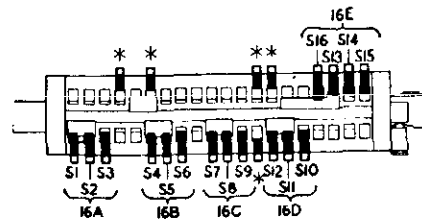
AM OSC.
COIL
506335



AM ANT.
COIL
506354



AM R.F.
COIL
506345



* Not used; may serve as wiring junction point.

BAND SWITCH
506347

Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram.

STAGE GAIN MEASUREMENT PROCEDURE

REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver can be measured with an A.C. Vacuum Tube Voltmeter of the high frequency type (uniform response up to 100 MC.). An AM (600 KC.) as well as an FM (98 MC.) signal source is required. For gain measurements in the FM antenna—FM converter—FM 1st I.F. stages, a microvolt calibrated FM signal generator should preferably be used.

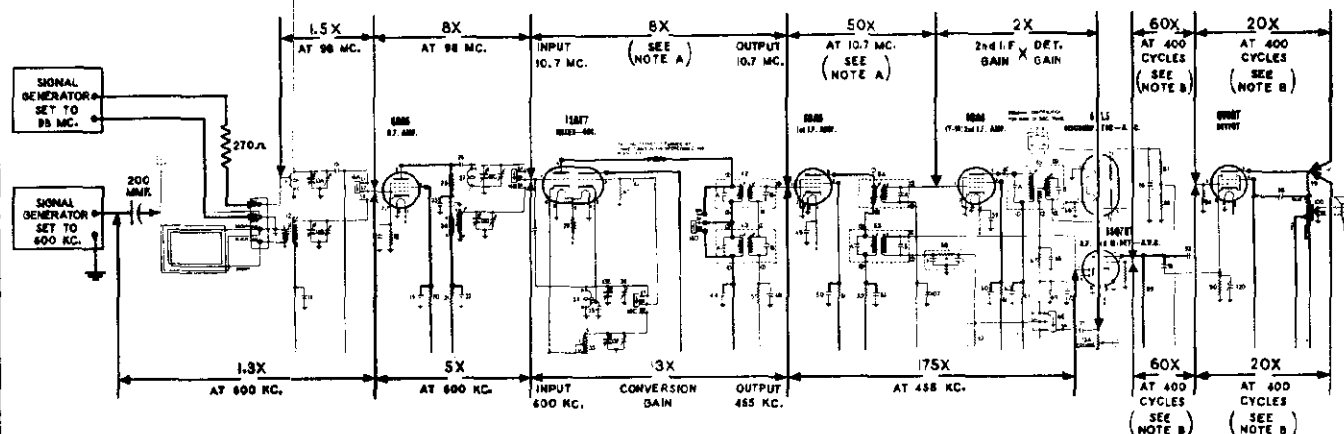
PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F., I.F. and Discriminator stages are carefully and accurately aligned by utilizing the alignment procedure given on pages 1950-49 and 1950-50.
2. Connect Signal Generator as shown below. Note that generator connections differ for "AM" and "FM" measurements.
3. For "AM" measurements, set signal generator to 600 KC. (400 cycle modulation) and then carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
4. For "FM" measurements, set signal generator to 98 MC. (400 cycle modulation with 22½ KC. deviation) and then carefully tune radio re-

ceiver to this signal by using a D.C. Vacuum Tube Voltmeter as an output indicator—meter must be connected between pin No. 7 of 6AL5 tube and chassis. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.

5. The values of stage gain which are given here were measured with a fixed bias of -3 volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. system. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 3 volt battery to both A.V.C. supply lines by effecting a common connection to terminal 4 of 2nd FM I.F. transformer and junction of resistors 56 and 57. Then connect the positive battery lead to the receiver chassis.

6. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.



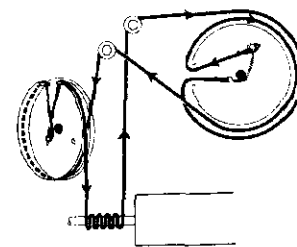
NOTE A: When making this measurement connect signal generator to pin 7 of 12AT7 and adjust frequency to 10.7 MC. Also short oscillator grid, pin 2, to ground so that local oscillator will be inoperative.

NOTE B: Tone control set to its maximum clockwise position.

DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.

DIAL AND POINTER DRIVE CORD ARRANGEMENT

SIDE VIEW



To string dial cord, set gang condenser to fully open position and use the following parts:
 114955 Clip on end of cord
 117057 Cord (3 feet)
 119087 Ring for dial cord
 505161 Tension spring

MODEL 9150-B

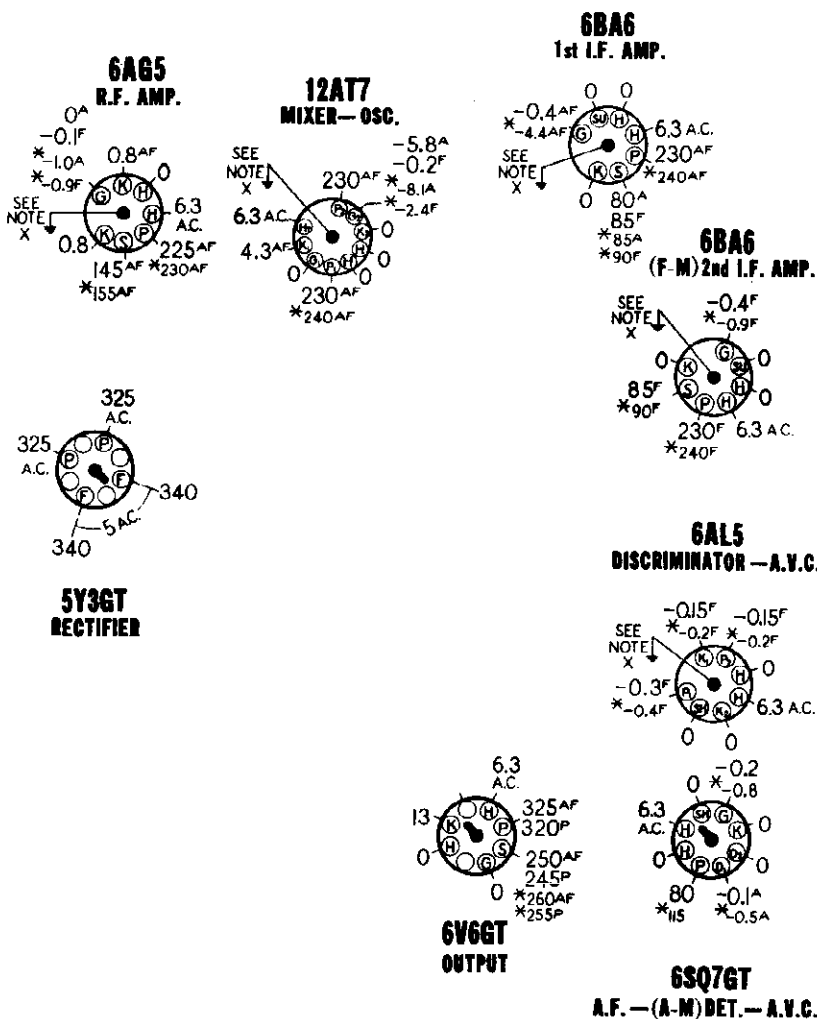
SOCKET VOLTAGES **THE VOLTAGE SHOWN IN THIS CHART WERE MEASURED** **UNDER THE FOLLOWING CONDITIONS**

1. Power Supply—117 volts 60 cycles A.C.
2. All voltages are measured between socket terminals and chassis unless otherwise indicated on the chart.
3. All measurements made with a voltmeter having a sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.
4. Where a particular voltage is dependent upon band switch position, the value shown on the chart carries a letter suffix which is interpreted as follows (no suffix letter indicates that voltage is the same for any of the three switch positions).
5. When measuring FM voltages, receiver should be tuned to 88 Mc.
6. When measuring AM voltages, receiver should be tuned to 540 Kc.
7. All terminals on strip labeled "FM—FM—AM—AM" at rear of chassis are shorted together by using a jumper wire.
8. Volume control set to maximum position with no signal.
9. Tone control set to maximum clockwise position.

"A" indicates band switch set to "AM" (center) position.
 "F" indicates band switch set to "FM" (counter-clockwise) position.
 "P" indicates band switch set to "PHO" (clockwise) position.

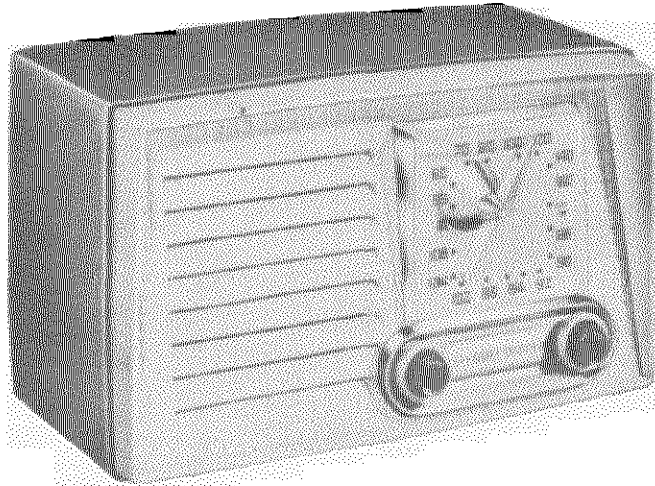
BOTTOM VIEW OF CHASSIS

117 VOLT 60 CYCLE A.C.
 POWER SUPPLY USED
 FOR THESE MEASUREMENTS.
 ALL VOLTAGES MEASURED BETWEEN
 SOCKET TERMINALS AND CHASSIS
 UNLESS OTHERWISE INDICATED.



REAR OF CHASSIS

NOTE X: Grounding of center stud on tube socket is necessary to reduce capacity coupling between other pins. Oscillation may result if this ground is omitted.



GENERAL SPECIFICATIONS

SPEAKER:

6 inch P-M Dynamic

Voice coil impedance—3.2 ohms

POWER OUTPUT:

Undistorted—1.2 watts

Maximum—2.3 watts

ANTENNAS:

AM—High impedance loop

FM—Built-in line cord type

WEIGHT:

13 pounds

DIMENSIONS:

Length—15"

Height—9 1/4"

Depth—8 1/4"

FREQUENCY RANGES:

AM—540 to 1700 KC.

FM—88 to 108 MC.

I.F. FREQUENCY:

AM—455 KC.

FM—10.7 MC.

TUNING CAPACITOR:

4 section gang (2-AM and 2-FM)

rigid mounting.

POWER SUPPLY:

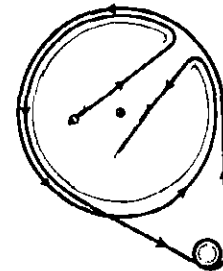
117 volts A.C. or D.C.

40 watts

HOW TO REMOVE CHASSIS FROM CABINET

1. Remove all knobs by pulling them forward.
2. Take off dial scale by pressing down on top center of plastic dial enclosure and at the same time pulling it forward.
3. Remove pointer by pulling it forward.
4. Remove cabinet back by taking out three screws and two clips.
Note: Cabinet back has a power cord interlock which is automatically disconnected when back is removed.
5. Take out two chassis mounting screws at bottom of cabinet. Chassis may now be readily removed by sliding it out of cabinet.
6. When replacing cabinet back be sure that it is parallel to loop and power cord interlock plug fits into socket on chassis.

DIAL POINTER DRIVE CORD ARRANGEMENT



To string dial cord, turn the main drive drum to maximum counter-clockwise position and use following parts:

- 114955 Clip on end of cord
- 117057 Cord (3 1/2 ft. required)
- 119087 Ring for dial cord
- 161384 Spring

SOCKET VOLTAGES

THE VOLTAGES SHOWN IN THIS CHART WERE MEASURED
UNDER THE FOLLOWING CONDITIONS

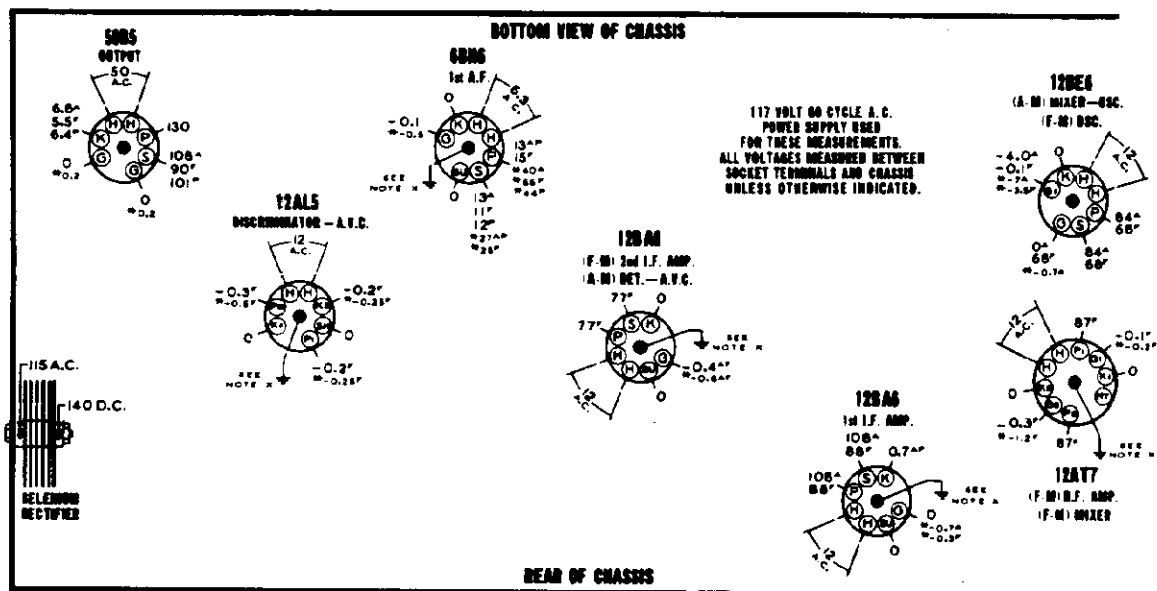
1. Power Supply—117 volts 60 cycles A.C.
2. All voltages are measured between socket terminals and chassis unless otherwise indicated on the chart.
3. All measurements made with a voltmeter having a sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.
4. Where a particular voltage is dependent upon band switch position, the value shown on the chart carries a letter suffix which is interpreted as follows:
 - "A" indicates band switch set to "AM" (counter-clockwise) position.
 - "F" indicates band switch set to "FM" (center) position.
 - "P" indicates band switch set to "PHO" (clockwise) position.
 - No suffix letter indicates that voltage is the same for any of the three switch positions.
5. When measuring FM voltages, receiver should be tuned to 88 Mc.
6. When measuring AM voltages, receiver should be tuned to 540 Kc.
7. Terminals on AM loop antenna are shorted together.
8. Built-in FM antenna lead is disconnected from the "FM ANT." terminal.
9. Volume control set to maximum with no signal.

STAGE GAIN MEASUREMENT PROCEDURE

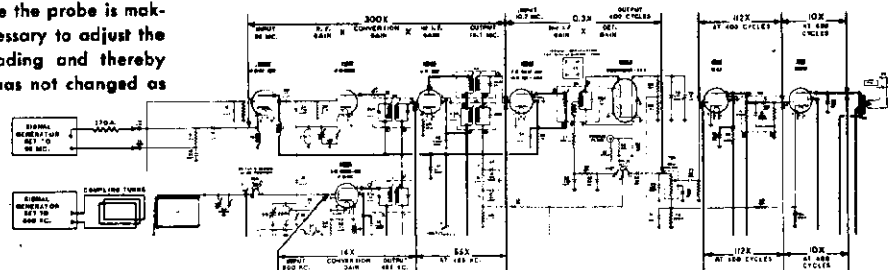
REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver should be measured with an A. C. Vacuum Tube Voltmeter of the high frequency type (uniform response up to 100 MC). A conventional "AM" type signal generator may be used but it must be capable of producing fundamental frequencies of 600 KC. and 98 MC—avoid using a generator that produces the 98 MC. signal by means of harmonics.

PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F., I.F. and Discriminator stages are carefully and accurately aligned by utilizing the alignment procedure given on page 1950-7.
2. Connect Signal Generator as shown below. Note that generator connections differ for "AM" and "FM" measurements.
3. For "AM" measurements, set signal generator to 600 KC. and then carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
4. For "FM" measurements, set signal generator to 98 MC. and then carefully tune radio receiver to this signal by using a D. C. Vacuum Tube Voltmeter as an output indicator—meter must be connected between pin 2 of 12AL5 tube and chassis ground. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
5. The values of stage gain which are given here were measured with a fixed bias of 3 volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 3 volt battery to A.V.C. at terminal 3 of the 1st AM I.F. transformer and connect the positive battery lead to chassis ground.
6. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.



NOTE X: Grounding of center stud on tube socket is necessary to reduce capacity coupling between other pins. Oscillation may result if this ground is omitted.

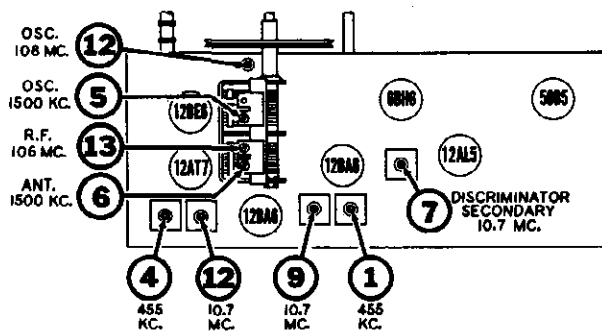
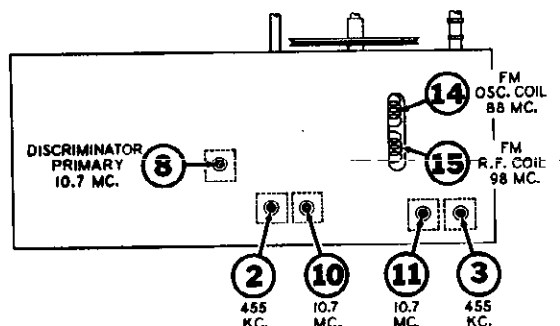
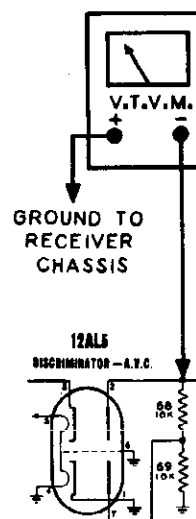
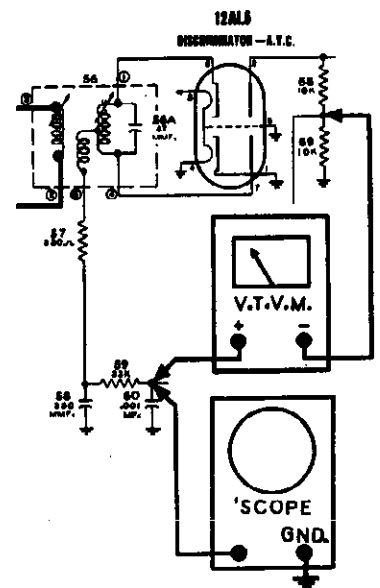


DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.

BROADCAST BAND—"AM"—ALIGNMENT PROCEDURE

1. If alignment of both AM and FM channels are required, it is advisable to align the AM channel first; then align the FM channel as instructed on Page 1950-7.
2. Remove chassis and loop antenna (which is mounted to chassis) from cabinet by following procedure outlined on Page 1950-3. Allow loop to remain attached to chassis.
3. In order to provide a coupling for signal generator during R.F. alignment as instructed in chart below, wind several turns of wire in a circular shape so that it may be placed adjacent and parallel to the loop.
4. Connect an output meter across the speaker voice coil or from the plate of the 50B5 tube to chassis through a 0.1 Mfd. condenser.
5. Set band switch to the "AM" (counter-clockwise) position.
6. Set volume control at maximum and use a weak signal from the signal generator.
7. Since the dial scale is a part of the cabinet, when completely assembled, it becomes necessary to provide a temporary means of locating the dial to obtain calibration points. Rotate gang condenser fully counter-clockwise and replace pointer so that it is parallel with base of the chassis. Now, hold dial scale in front of pointer in such a position that the ends of the indicator point to the "AM" and "FM" markers. While holding the dial scale in this position, rotate tuning sleeve until pointer indicates desired frequency.

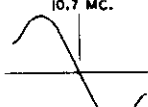
SIGNAL GENERATOR CONNECTIONS		SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
CONNECT HIGH SIDE OF SIGNAL GENERATOR TO	CONNECT GROUND LEAD OF SIGNAL GENERATOR TO					
Lug on trimmer #6 at top of gang (see figure 1 for location of trimmer).	Chassis ground. CAUTION: If your signal generator is designed with an AC-DC type power supply, connect ground lead of signal generator to receiver chassis through a .25 Mfd. condenser.	455 KC	Any point where it does not affect the signal.	1 and 2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				3 and 4	1st I.F.	
Connect directly to coupling turn. See Step 3 above for instruction on coupling loop.		1500 KC	1500 KC See Step 7 above for instructions on how to obtain this calibration point.	5	AM Oscillator	Adjust for maximum output.
Connect directly to coupling turn. See Step 3 above for instruction on coupling loop.		1500 KC	Tune to 1500 Kc. generator signal.	6	AM Antenna	Adjust for maximum output.

**Top View of Chassis****FIG. 1****Bottom View of Chassis****FIG. 2****FIG. 3
VTVM Connections
for IF Alignment****FIG. 4
VTVM and Oscilloscope
Connections for
Discriminator Alignment**

MODEL 9151-A

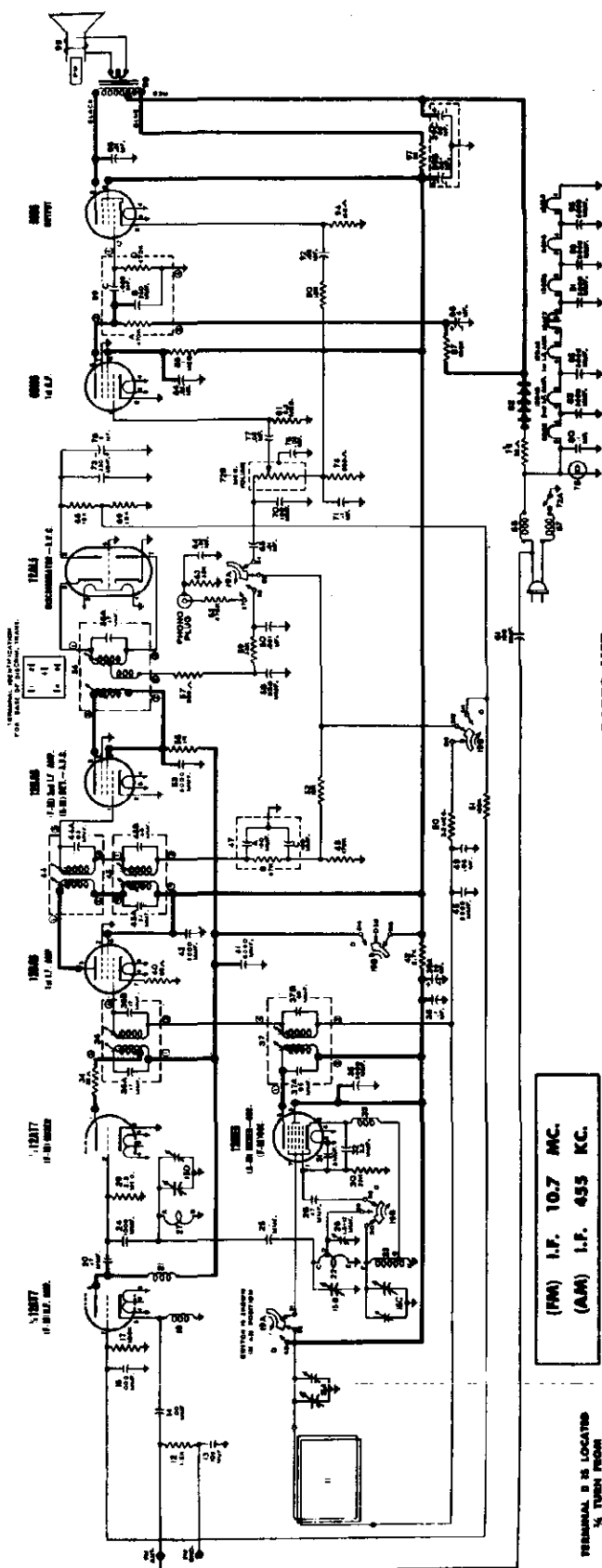
FREQUENCY MODULATION—"FM"—ALIGNMENT PROCEDURE

1. If alignment of both AM and FM channels are required it is advisable to align the AM channel first as instructed in chart on Page 1950-6. Then, accomplish FM channel alignment by using the procedure outlined in the chart below.
2. Remove chassis and loop antenna (which is mounted to chassis) from cabinet by following procedure outlined on Page 1950-3. Allow loop to remain attached to chassis.
3. Disconnect built-in FM lead from "FM ANT." terminal at back of chassis.
4. Set band switch to the "FM" (middle) position.
5. Set volume control at maximum and use a weak signal from the signal generator.
6. Dress FM circuit leads as short and straight as possible, particularly those in the oscillator circuit. IF plate and grid leads should also be kept short and straight.
7. Since the dial scale is a part of the cabinet, when completely assembled, it becomes necessary to provide a temporary means of locating the dial to obtain calibration points. Rotate gang condenser fully counter-clockwise and replace pointer so that it is parallel with base of the chassis. Now, hold dial scale in front of pointer in such a position that the ends of the indicator point to the "AM" and "FM" markers. While holding the dial scale in this position, rotate tuning sleeve until pointer indicates desired frequency.

STANDARD SIGNAL GENERATOR		SWEEP GENERATOR		VTVM OR OUTPUT METER CONNECTION	OSCILLOSCOPE CONNECTIONS	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TYPE OF ADJUSTMENT AND OUTPUT INDICATION
CONNECTIONS	FREQUENCY	CONNECTIONS	FREQ.					
Connect high side to lug on trimmer #13 (see Fig. 1 for location of trimmer) using a .01 Mfd. condenser in series with generator lead. Connect ground lead to the receiver chassis in vicinity of gang condenser. CAUTION: If your signal generator is designed with an AC-DC type power supply, connect ground lead of signal generator to receiver chassis through a .25 Mfd. condenser.	10.7 MC. Unmodulated	Not used.	—	Connect VTVM as shown in Fig. 3.	Not used.	Any position where it does not affect the signal.	#7 Discriminator secondary #8 Discriminator primary #9-10 2nd IF #11-12 1st IF	Adjust these trimmers for maximum meter reading — the output voltage will be of negative polarity.
Same as above.	Same as above.	Not used.	—	Connect VTVM as shown in Fig. 4.	Not used.	Same as above.	#7 Discriminator secondary	Note that as slug #7 is rotated, a point will be found where the volt-meter will swing rather sharply from a positive to a negative reading or vice versa. The correct setting is obtained when the meter reads zero as the slug is moved thru this point.
Same as above.	Same as above. Attenuate signal to prevent overload and distortion of response curve.	Connect high side to lug on trimmer #13 (see Fig. 1 for location of trimmer) using a .01 Mfd. condenser in series with generator lead. Connect ground lead to the receiver chassis in vicinity of gang condenser. CAUTION: If your signal generator is designed with an AC-DC type power supply, connect ground lead of signal generator to receiver chassis through a .25 Mfd. condenser.	10.7 MC Sweeping ± 300 Kc.	Not used.	Connect as shown in Fig. 4. Set vertical amplifier of scope for maximum amplification. Synchronize oscilloscope with sweep generator by connecting "horizontal input" terminals of scope to source of horizontal sweep modulating voltage on the sweep generator.	Same as above.	#7 Discriminator secondary	A pattern similar to that shown in Fig. 5 should appear on the oscilloscope screen. Check for symmetry about the 10.7 Mc. center point and linearity of the slope.  FIG. 5 If the characteristic is not shaped properly, attempt to obtain symmetry by changing the setting of slug #7. Should that fail to produce the desired results, then a slight readjustment of slugs #8, 9, 10, 11 and 12 should be undertaken.
Connect high side in series with a 270 ohm carbon resistor to "FM ANT." terminal at rear of chassis. Connect ground lead to "FM GND." terminal.	108 MC. with 400 cycle AM Modulation.	Not used.	—	Connect VTVM as shown in Fig. 3.	Not used.	108 Mc. See Step 7 above for instructions on how to obtain this calibration point.	#12 FM Oscillator	Set trimmer #12 to receive 108 Mc. signal as indicated by maximum meter reading.
Same as above.	108 MC. with 400 cycle AM Modulation.	Not used.	—	Same as above.	Not used.	Tune to 108 Mc. generator signal.	#13 FM RF	Adjust trimmer for maximum meter reading.

Check calibration and tracking of receiver with input signals of 88 and 98 MC. If difference between dial pointer setting and the above mentioned frequencies does not exceed ± 0.3 MC. and RF circuit is tracking properly then alignment may be considered satisfactory and no further adjustment is necessary. Where the calibration error is greater than ± 0.3 MC. it is advisable to make the following adjustments:
Tune receiver to an 88 MC. signal and note whether dial pointer is above or below correct calibration point. Then tune receiver so that dial pointer is at the 88 MC. position. If generator signal was previously received at a setting above 88 MC., it will be necessary to slightly spread the windings of the FM oscillator coil (#14 in Fig. 2) so that signal will now be received at the correct

dial setting. On the other hand, if generator signal was received at a dial setting below 88 MC., then slightly compress the windings of the oscillator coil until the signal comes in at the correct calibration point.
Check calibration at 108 MC. and if it is in error by more than ± 0.3 MC., readjust setting of trimmer #12. Repeat calibration adjustment at 88 and 108 MC. until desired accuracy is obtained.
Observe dial calibration at 98 MC. If it is found to be incorrect by an appreciable amount, then make a very slight adjustment in the spacing of the gang condenser plates to receive the 98 MC. signal at the correct dial setting. Then check adjustment of RF trimmer #13 to obtain maximum output indication at 98 MC.



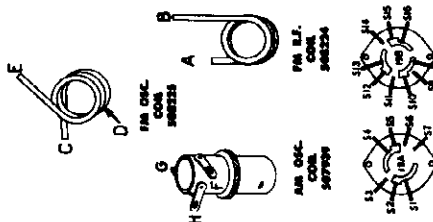
(FMA) I.F. 10.7 MC.
(AM) I.F. 455 KC.

PARTS LIST

THE NEW YORK PUBLIC LIBRARY
ASTOR LENOX TILDEN FOUNDATION
455 FIFTH AVENUE, NEW YORK 17, N. Y.

[illegible]

Lowered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram.



SECTION 1 SECTION 1

NEW LINE
FRONT VIEW

NEW VIEW
REAR VIEW

THE NEW YORK PUBLIC LIBRARY

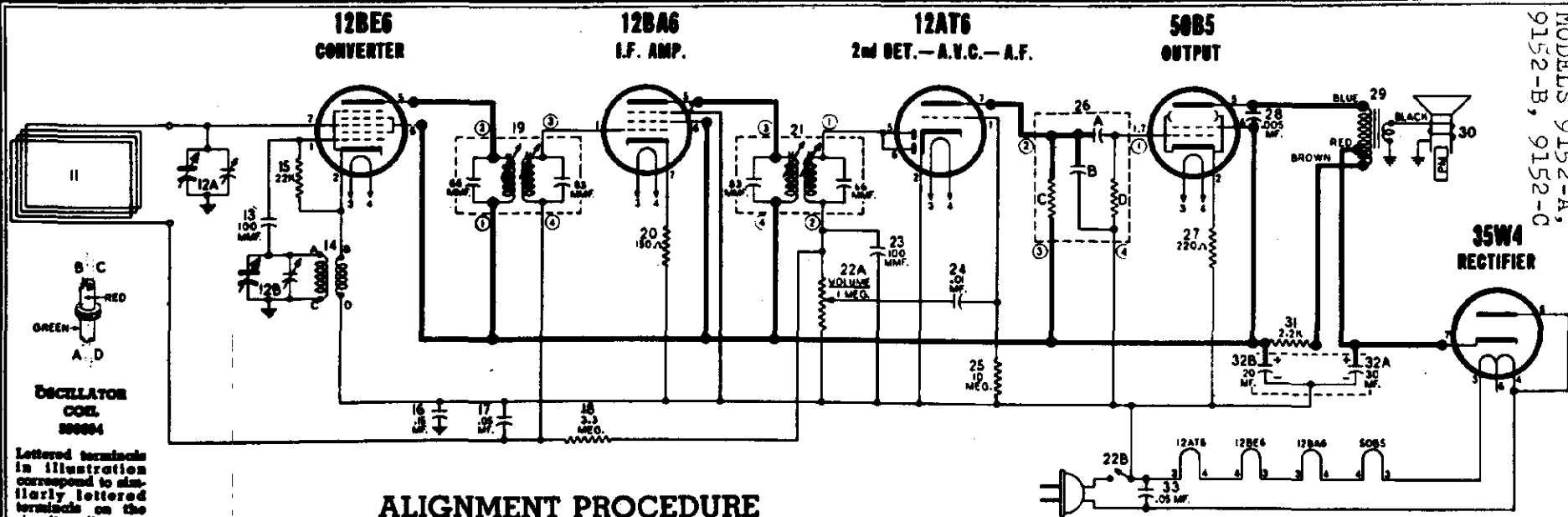
16261

.....

selected hermits in recognition of their services to the church.

Long Term.

MODELS 9152-A,
9152-B, 9152-C

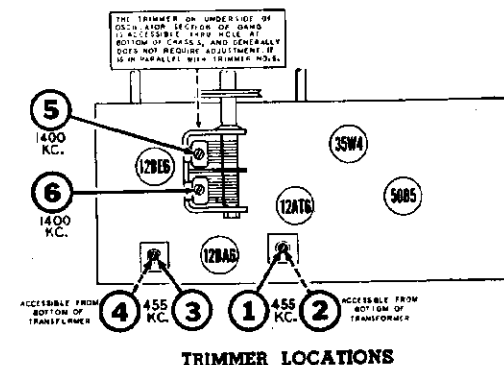


ALIGNMENT PROCEDURE

1. Remove chassis and loop antenna (mounted to chassis) from cabinet allow loop to remain attached to chassis.
2. Replace the dial scale on the shaft of the gang condenser.
3. Since the "position indicator" for the dial scale is an integral part of the cabinet, it becomes necessary to install a "temporary pointer" when the chassis is removed from the cabinet. This can readily be accomplished by securing a piece of heavy wire under the right front gang condenser mounting screw and shaping the free end of the wire so that it can be placed in a vertical position directly in front of the dial scale. With the gang condenser fully meshed, the "temporary pointer" should appear directly in front of the line line preceding "55" on the dial scale.
4. Couple the signal generator to the receiver by connecting its output to several turns of wire formed in a circular shape so that it may be placed adjacent and parallel to the receiver loop antenna.
5. Connect an output meter across the speaker voice coil or from the plate of the 50B5 tube to B through a 0.1 Mfd. condenser.
6. Set volume control at maximum volume position and use a weak signal from the signal generator.

I.F. 455 KC.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
None	Connect directly to coupling turn as instructed in Step 4 above	455 KC	Any point where it does not affect the signal.	1-2 3-4	2nd I.F. 1st I.F.	Adjust for maximum output. Then repeat adjustment.
None	Connect directly to coupling turn as instructed in Step 4 above	1400 KC	1400 KC	5	Broadcast Oscillator	Adjust for maximum output.
None	Connect directly to coupling turn as instructed in Step 4 above	1400 KC	Tune to 1400 KC generator signal.	6	Broadcast Antenna	Adjust for maximum output.



MODELS 9152-A
9152-B, 9152-

STAGE GAIN MEASUREMENT PROCEDURE

REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver may be measured with an A.C. Vacuum Tube Voltmeter or a "channel" type instrument containing a tuned and calibrated amplifier.

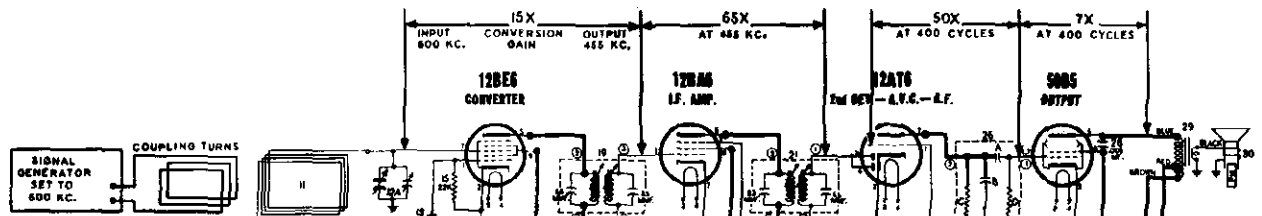
PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F. and I.F. stages are carefully and accurately aligned by utilizing the alignment procedure given above.
2. Connect Signal Generator as shown below.
3. The values of stage gain which are given here were measured with a fixed bias of 3 volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 3 volt battery to A.V.C. at terminal #4 of the 1st I.F. transformer and connect the positive battery lead to B— in receiver chassis.

4. Set Signal Generator for operation at 600 Kc with 400 cycle modulation and carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.

5. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.

6. When using a "channel" type instrument, carefully tune it for maximum output at desired frequency before making measurements.



DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.

PARTS LIST

ORDER PARTS FROM YOUR STEWART-WARNER DISTRIBUTOR ONLY

DIA. GRAM NO.	PART NO.	DESCRIPTION
CONDENSERS		
12-A, B	506143	Condenser—variable gang (with drum).....
13	512503	Condenser—mica 100 Mmfd. 500 volt.....
16	512040	Condenser—.15 Mfd. 400 volt.....
17	512028	Condenser—.05 Mfd. 400 volt.....
23	512503	Condenser—mica 100 Mmfd. 500 volt.....
24	512010	Condenser—.01 Mfd. 400 volt.....
24-A	505858	Condenser—ceramic .005 Mfd. 450 volt (part of audio coupling unit).....
24-B	505858	Condenser—ceramic 250 Mmfd. 450 volt (part of audio coupling unit).....
28	512008	Condenser—.005 Mfd. 500 volt.....
32-A, B	506147	Condenser—electrolytic A—30 Mfd. 150 volt B—20 Mfd. 150 volt.....
33	512090	Condenser—.05 Mfd. 500 volt.....

RESISTORS		
15	510161	Resistor—carbon 22,000 Ohms 1/2 watt.....
18	510184	Resistor—carbon 2.2 Meg. 1/2 watt.....
20	510122	Resistor—carbon 150 Ohms 1/2 watt.....
22-A, B	506067	Volume control 1 Meg. (with switch).....
25	510197	Resistor—carbon 10 Meg. 1/2 watt.....
24-C, D	505858	Resistor—carbon 470,000 Ohms 1/5 watt (part of audio coupling unit).....
27	510125	Resistor—carbon 220 Ohms 1/2 watt.....
31	510243	Resistor—carbon 2,200 Ohms 1 watt.....

OTHER ELECTRICAL PARTS		
11	506148	Loop Antenna.....
14	506094	Coil—oscillator.....
19	505867	Transformer—1st I.F.
21	505867	Transformer—2nd I.F.
28	505858	Audio coupling unit A—Condenser—ceramic .005 Mfd. 450 volt B—Condenser—ceramic 250 Mmfd. 450 volt C—Resistor—carbon 470,000 Ohms 1/5 watt D—Resistor—carbon 470,000 Ohms 1/5 watt.....
29	506148	Transformer—output.....
30	506079	Speaker—P.M. dynamic (4 inch).....

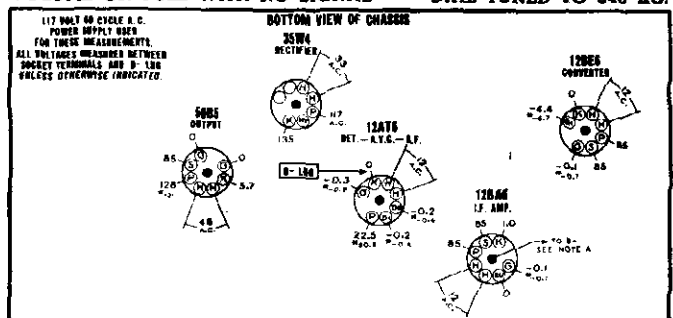
MISCELLANEOUS		
506244		Back for cabinet.....
506245		Background for dial (foil).....
505165		"C" washer for tuning shaft.....
506843		Cabinet—Model 9152-A.....
506844		Cabinet—Model 9152-B.....
506845		Cabinet—Model 9152-C.....
505101		Clip for mounting I.F. transformer.....
506149		Clip for mounting loop antenna.....
114855		Clip—retainer on end of dial cord.....
506235		Clip—retains cabinet back.....

DIA. GRAM NO.	PART NO.	DESCRIPTION
	117057	Cord—dial drive (2 ft. required) per ft.
	506246	Dial scale.....
	506248	Escutcheon—for controls.....
	506247	Knob—green; Models 9152-A and 9152-C.....
	506658	Knob—brown; Model 9152-B.....
	18785	Screw #8x3/8" chassis mounting.....
	506085	Shaft—tuning.....
	507384	Socket—miniature (7 pin).....
	505161	Spring (dial cord tension).....

SOCKET VOLTAGES

Measured with voltmeter having sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.

LOOP ANTENNA TERMINALS SHORTED TOGETHER
VOLUME ON FULL WITH NO SIGNAL DIAL TUNED TO 540 KC.

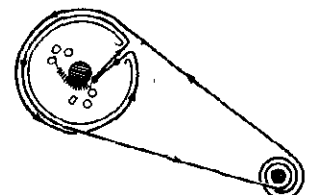


NOTE A: The center stud of this tube must be connected to B— to reduce capacity coupling between other pins. Oscillation may result if this connection is omitted.

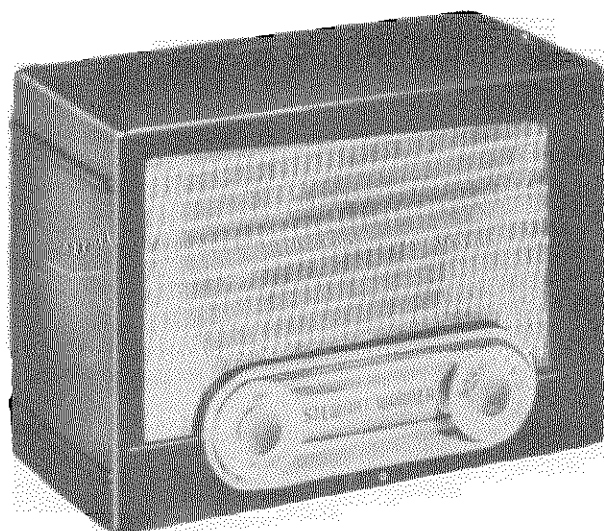
DRIVE CORD
ARRANGEMENT

To string dial cord, turn the main drive drum to maximum counter-clockwise position and use following parts:

- 114955 Clip on end of cord
- 117057 Cord (2 feet)
- 505161 Tension Spring



MODEL 9153-A



GENERAL SPECIFICATIONS

FREQUENCY RANGE:

540 to 1600 KC.

TUNING CAPACITOR:

2 section gang, shock mounted,
Planetary drive.

I.F. FREQUENCY:

455 KC.

ANTENNA:

High impedance loop.

POWER SUPPLY:

Power line { 117 volts A.C. or D.C.
Operation { 15 watts

Portable { 1-67½ volt "B" Battery
Operation { 5- 1½ volt "A" Batteries

POWER OUTPUT:

Undistorted—60 milliwatts
Maximum—110 milliwatts

SPEAKER:

4 inch P.M. Dynamic
Voice coil impedance—3.2 ohms

DIMENSIONS:

Length—9½"
Height—6⅞"
Depth—4¾"

WEIGHT:

7 pounds

HOW TO REMOVE CHASSIS FROM CABINET

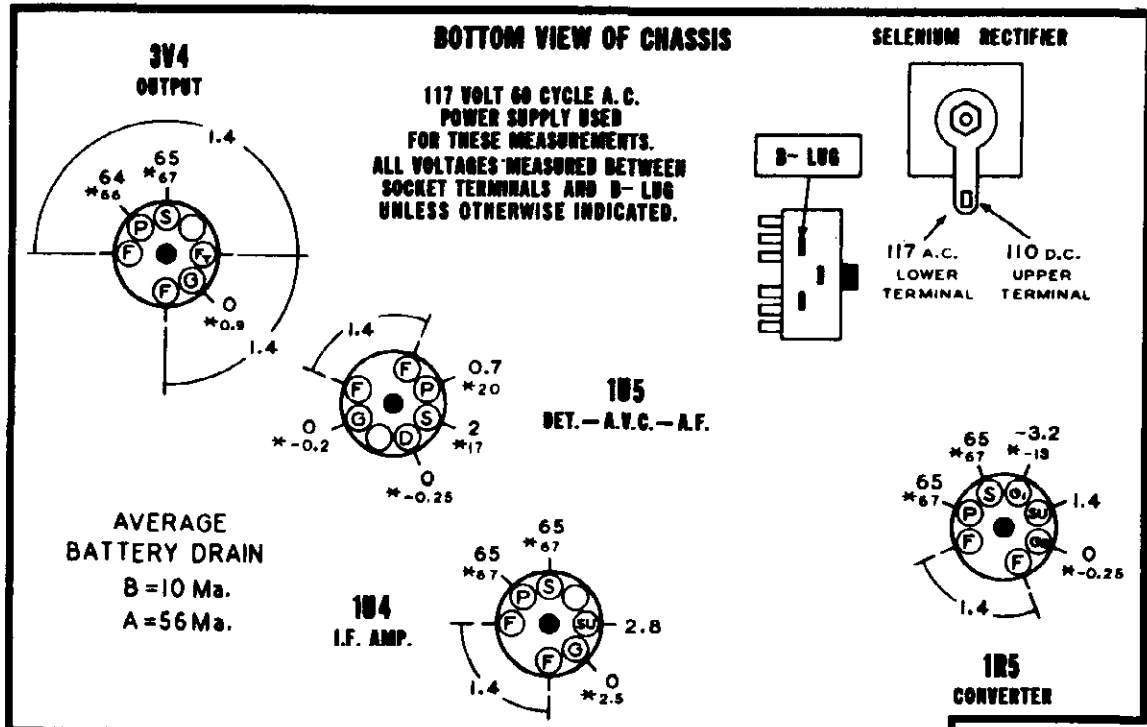
1. Remove volume and the dual tuning knobs by pulling them forward.
2. To remove cabinet back first swing handle outward and note finger grip recess at back edge of cabinet. Grasp back at this recess and pull outward until it is free. Disconnect leads to loop antenna by slipping pin type connectors out of the electrical clips attached to loop.
3. Loosen set screw in hinge pin collar. Then, push hinge pin into one end of handle and withdraw it completely by pulling out of the other end.
4. Remove three chassis mounting screws, two of which are located along one edge and the other located on the opposite edge. To gain access to one of the chassis mounting screws it will first be necessary to remove "A" battery hold down plate as instructed on label attached to this plate.
5. Chassis is now free and may be lifted out of cabinet.
6. Bottom cover on chassis may be removed by taking out three screws at the sides.

SOCKET VOLTAGES

THE VOLTAGES SHOWN IN THIS CHART WERE MEASURED UNDER THE FOLLOWING CONDITIONS

1. Power supply—117 V. 60 cycles, A.C.
2. All voltages were measured between socket terminals and B— unless otherwise indicated on the chart.
3. All measurements were made with a voltmeter having a sensitivity of 1000 Ohms per volt except where indicated by (*).
4. Receiver should be tuned to 540 KC.
5. Loop antenna terminals should be shorted together.
6. The volume control was set to maximum position with no signal.

The (*) symbol designates a vacuum tube voltmeter measurement.



STAGE GAIN MEASUREMENT PROCEDURE

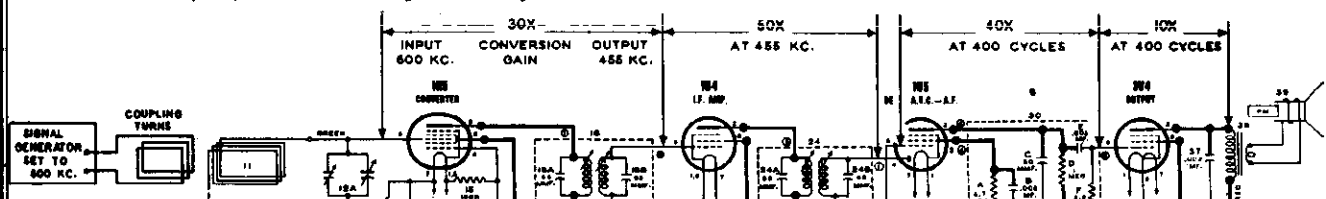
REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver may be measured with an A.C. Vacuum Tube Voltmeter or a "channel" type instrument containing a tuned and calibrated amplifier.

PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F. and I.F. stages are carefully and accurately aligned by utilizing the alignment procedure given on page 1950-118A.
2. Connect Signal Generator as shown below.
3. The values of stage gain which are given here were measured with a fixed bias of $1\frac{1}{2}$ volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a $1\frac{1}{2}$ volt battery to A.V.C. at

frame of gang condenser and connect the positive battery lead to B- in receiver chassis.

4. Set Signal Generator for operation at 600 Kc. with 400 cycle modulation and carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
5. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.
6. When using a "channel" type instrument, carefully tune it for maximum output at desired frequency before making measurements.



DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.

MODEL 9153-A

ALIGNMENT PROCEDURE

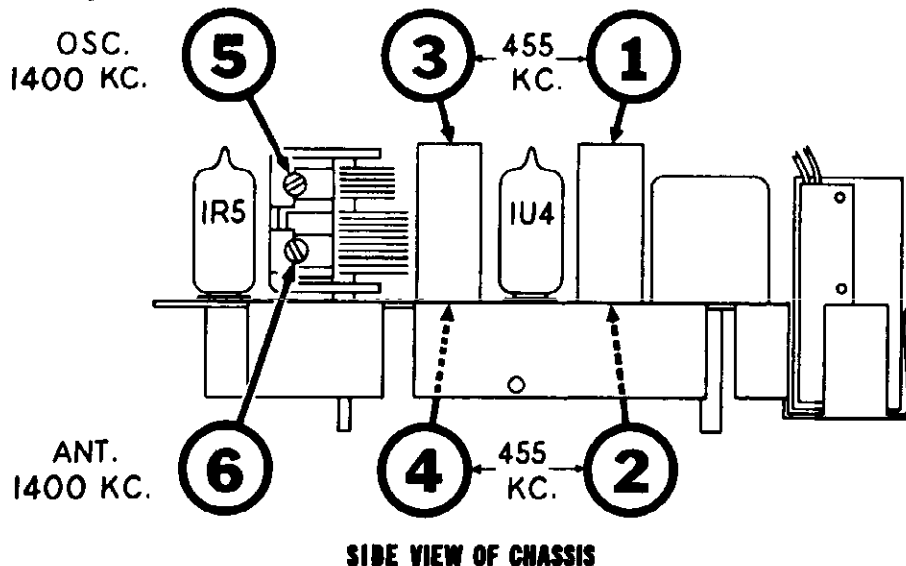
1. Remove chassis from cabinet by following procedure described on page 117. Reconnect loop antenna leads to clips on cabinet back. As battery position slightly affects R.F. alignment, it is preferable to have batteries in proper place during this procedure.
2. Replace dial scale and tuning knob on shafts of the gang condenser.
3. Since the "position indicator" for the dial scale is an integral part of the cabinet, it becomes necessary to install a temporary pointer when the chassis is removed from the cabinet. This can readily be accomplished by securing a piece of heavy wire under the chassis bottom cover mounting screw and then shaping the free end of the wire so that it can be placed in a vertical position directly in front of the dial scale. The dial scale should be installed on the gang condenser shaft so that when the con-

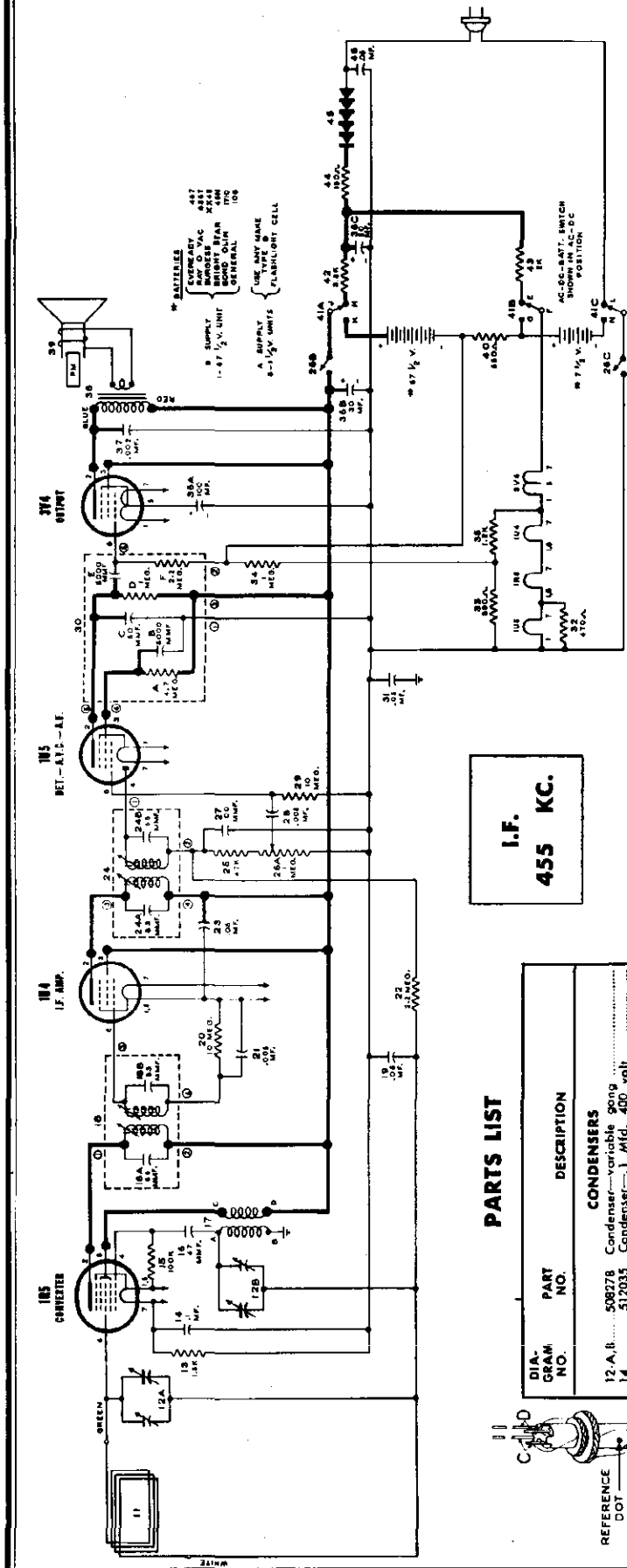
denser is fully meshed the smaller 5 of the 55 on the scale is directly under the pointer.

4. In order to provide a coupling for the signal generator during R.F. alignment, wind several turns of wire in a circular shape so that it may be placed adjacent and parallel to the loop antenna. Position cabinet back so that loop antenna is in approximately the same position as when receiver is completely assembled.
5. Solder approximately 5 in. of insulated wire to each of "soldering lugs" on secondary of output transformer. Connect output meter to these extension leads.
6. Set volume control at maximum and use a weak signal from the signal generator.
7. Operate the receiver from a 117 V. AC or DC line.

SIGNAL GENERATOR CONNECTIONS		SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
CONNECT HIGH SIDE OF SIGNAL GENERATOR TO	CONNECT GROUND LEAD OF SIGNAL GENERATOR TO					
Lug on trimmer #6 at side of gang (see chart below for location of trimmer).	B—lug in chassis. CAUTION If your signal generator is designed with an AC-DC type power supply, connect ground lead of signal generator to receiver through a .25 Mfd. condenser.	455 KC	Any point where it does not affect the signal.	1 and 2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
	3 and 4			1st I.F.		
Connect directly to coupling turn. See Step 4 above for instructions on coupling loop.		1400 KC	1400 KC See Step 3 above for instructions on how to obtain this calibration point.	5	Broadcast Oscillator	Adjust for maximum output.
IMPORTANT: —Before undertaking alignment of the antenna circuit it is necessary to reassemble the chassis in the cabinet. When reinstalling cabinet back be sure that extension leads previously soldered to secondary of output transformer extend through ventilation slot on edge of						
back. Now, replace back and be sure that it snaps into proper position. To gain access to antenna trimmer #6 it will be necessary to first lift off the snap button at bottom of cabinet. Now complete the alignment procedure as follows.						
Connect directly to coupling turn. See Step 4 above for instructions on coupling loop.		1400 KC	Tune to 1400 Kc. generator signal.	6	Broadcast Antenna	Adjust for maximum output.
Open cabinet back and unsolder two extension leads attached to secondary of output transformer.						

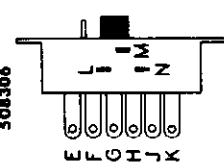
back. Now, replace back and be sure that it snaps into proper position. To gain access to antenna trimmer #6 it will be necessary to first lift off the snap button at bottom of cabinet. Now complete the alignment procedure as follows.





PARTS LIST

DIA-GRAM NO.	PART NO.	DESCRIPTION
CONDENSERS		
12-A, B	508278	Condenser—variable 500g
14	512035	Condenser—1 Mfd. 400 volt
16	512002	Condenser—ceramic 47 Mmfd. 500 volt
18-A	508309	Condenser—ceramic 66 Mmfd. (part of 1st I.F. transformer)
18-B	508309	Condenser—ceramic 83 Mmfd. (part of 1st I.F. transformer)
19	512027	Condenser—.05 Mfd. 200 volt
21	512007	Condenser—.005 Mfd. 600 volt
23	512027	Condenser—.05 Mfd. 200 volt
24-A	508309	Condenser—ceramic 83 Mmfd. (part of 2nd I.F. transformer)
24-B	508309	Condenser—ceramic 66 Mmfd. (part of 2nd I.F. transformer)
27	512003	Condenser—ceramic 100 Mmfd. 500 volt
28	512007	Condenser—.005 Mfd. 600 volt
30-B	508309	Condenser—ceramic 5000 Mmfd. (part of Audio Coupling Unit)
30-C	508309	Condenser—ceramic 30 Mmfd. (part of Audio Coupling Unit)
30-E	508309	Condenser—ceramic 3000 Mmfd. (part of Audio Coupling Unit)
31	512214	Condenser—.05 Mfd. 200 volt
36-A, B, C	508249	Condenser—electrolytic A—100 Mfd. 25 volt B—30 Mfd. 150 volt C—50 Mfd. 150 volt
37	512003	Condenser—.002 Mfd. 600 volt
46	512145	Condenser—.05 Mfd. 400 volt
RESISTORS		
13	510139	Resistor—carbon 1500 Ohms $\pm 10\%$ $\frac{1}{2}$ w.
15	510173	Resistor—carbon 100,000 Ohms $\frac{1}{2}$ w.
20	510167	Resistor—carbon 10 Meg. $\frac{1}{2}$ w.
22	510163	Resistor—carbon 2.2 Meg. $\frac{1}{2}$ w.
25	510167	Resistor—carbon 47,000 Ohms $\frac{1}{2}$ w.
26-A, B, C	508274	Volume control—1 Meg. (with switch)
29	510167	Resistor—carbon 10 Meg. $\frac{1}{2}$ w.
30-A	508309	Resistor—carbon 47 Meg. (part of Audio Coupling Unit)
30-D	508309	Resistor—carbon 1 Meg. (part of Audio Coupling Unit)
COILS AND TRANSFORMERS		
11	508312	Loop antenna
17	508306	Coil—oscillator
18	508309	Transformers—1st I.F. (includes condensers 18-A and 18-B)
24	508309	Transformers—2nd I.F. (includes condensers 24-A and 24-B)
38	508271	Transformer—output
OTHER ELECTRICAL PARTS		
30-A to F	508309	Audio coupling unit A—Resistor—carbon 47 Meg. B—Condenser—ceramic 5000 Mmfd. C—Condenser—ceramic 50 Mmfd. D—Resistor—carbon 1 Meg. E—Condenser—ceramic 5000 Mmfd. F—Resistor—carbon 2.2 Meg.



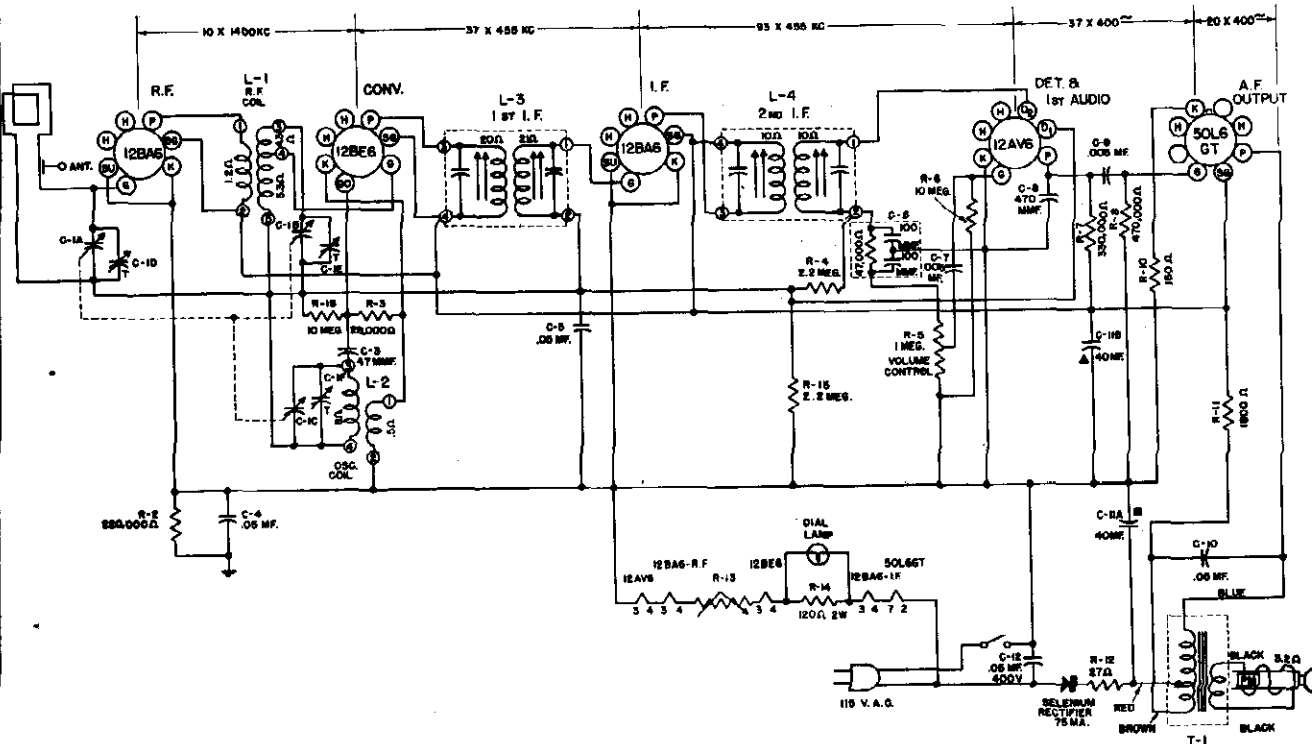
DIA-GRAM NO.	PART NO.	DESCRIPTION
39	508255	Speaker—P.M. dynamic (4 inch)
41-A, B, C	508258	Switch—AC-DC-Batt.
45	508305	Selenium rectifier
MISCELLANEOUS PARTS		
508301		Back for cabinet
504981		Base for mtg. electrolytic condenser
509042		Cabinet (less handle and back)
162119		Chassis bottom cover
505101		Clip for mtg. I.F. transformer
130931		Clip for mtg. power cord retainer
509057		Clip for retaining back cover to cabinet
508310		Collar and set screw for hinge pin
508319		Connector for "B" battery (includes leads)
508316		Dial scale
508302		Escutcheon for knobs
508313		Handle
508317		Hinge pin for handle
508318		Knob—"OFF VOLUME"
162115		Knob—tuning
508304		Plate and contacts for retaining "A" batteries
508277		Retainer for power cord (flex tube)
507364		Shield for volume control
		Socket—miniature (7 pin)

SPECIFICATIONS

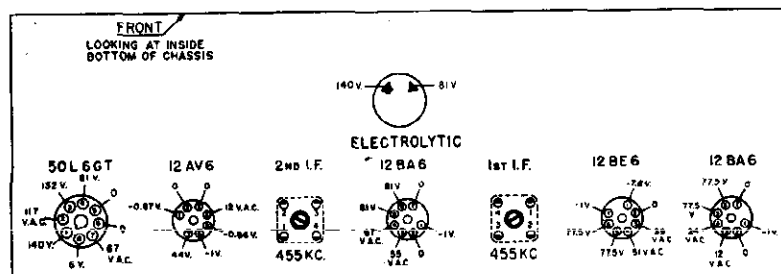
Voltage Rating — Radio 117 Volts AC-DC
 Type of Circuit..... Superheterodyne
 Tuning Range..... 540-1640 Kc
 Input Power Rating..... 30 Watts
 Intermediate Frequency..... 455 Kc
 Speaker Voice Coil Impedance 3 Ohm
 Power Output 1.5 Watts at 10% Distortion

TUBE COMPLEMENT

- 2 12BA6 Miniature RF and IF Amplifier
- 1 12BE6 Miniature Converter
- 1 12AV6 Miniature Detector, AVC and Audio Driver
- 1 50L6GT Power Output



Voltage and Tube Location Chart



Measurements are made at 117V line, using electronic Voltmeter. Except where otherwise indicated, volages are D.C. and are positive with respect to the reference point which is the common Black-White lead.

PAGE 21-2 STROMBERG-CARLSON

MODEL 1500

ALIGNMENT PROCEDURE

CAUTION: As this is a transformless Receiver, observe all usual precautions. The Black-White (B-) lead is common to one side of the 117 Volt Power Line Cord.

Pointer Setting	Generator Setting	Input and Dummy	VTVM and Scope Connection and Scale	Adj. and Notes
I. F. ADJUSTMENT				
(1) Low frequency end of dial	455 kc. 400 gy. mod.	Pin #7, 12BE6 tube 0.01 mfd. dummy	-3V DC Scale Green-White (AVC) lead and Black-White (B-) lead.	Adj. top and bottom cores of each I. F. transformer with non-metallic screwdriver for maximum voltage.
(2) "	455 kc. Swept 15 kc.	"	Scope to Junction C-6 and Volume Control	Adj. same cores as above for best over-lapping curve on scope.

R. F. ADJUSTMENT

(1) 1650 kc. Condenser plates all way out	1650 kc. 400 cy. mod.	Ant. terminal 0.01 mfd. dummy	"	Adj. Osc. (front) trimmer on variable condenser for maximum voltage.
(2) 1400 kc.	1400 kc. 400 cy. mod.	"	"	Adj. R. F. and Loop trimmers on variable condenser for maximum voltage.

Circuit Symbol	S-C Part No.	Capacity	Voltage	Circuit Symbol	S-C Part No.	Description
C-1	110026	Variable		L-1	114055	RF COIL ASSEMBLY
C-3	110458	47 MMF	400 V	L-2	114056	OSC. COIL ASSEMBLY
C-4	40632	.05 MF	400 V	L-3	114336	1st IF TRANSFORMER
C-5	40632	.05 MF	400 V	L-4	114337	2nd IF TRANSFORMER
C-6	110478	Diode Filter				
C-7	27760	.005 MF	600 V			
C-8	110464	470 MMF	400 V	T-1	161413	OUTPUT TRANSFORMER
C-9	27760	.005 MF	600 V			
C-10	40632	.05 MF	400 V			
C-11	111032	2-40 MF	200 V			
C-12	40632	.05 MF	400 V			

Miscellaneous

Circuit Symbol	S-C Part No.	Resistance	Watt	Tol.		
R-2	149115	220K ohms	1/2	20%	139035	LOOP ASSEMBLY
R-3	149109	22K ohms	1/2	20%	117008	POWER CORD
R-4	149121	2.2 megohms	1/2	20%	122032	DIAL LENS
R-5	145032	1 megohm		Pot.	124016	DIAL DRIVE CORD
R-6	149125	10 megohms	1/2	20%	144018	POINTER
R-7	149116	330K ohms	1/2	20%	30933	PILOT LAMP
R-8	149117	470K ohms	1/2	20%	152096	PILOT LIGHT SOCKET
R-10	28148	150 ohms	1/2	10%	152040	SOCKET 7-PT. MIN.
R-11	149047	1800 ohms	2	10%	152041	SOCKET 8-PT. OCTAL.
R-12	149244	27 ohms	2	10%	162034	SELENIUM RECTIFIER — 75 MA
R-13	149243	Special NTC			108065	WALNUT CABINET
R-14	149035	120 ohms	2	10%	134004	BROWN KNOB
R-15	149121	2.2 megohms	1/2	20%	108066	IVORY CABINET
R-16	149125	10 megohms	1/2	20%	134005	IVORY KNOB
					108169	RED CABINET
					134137	BLACK KNOB
					108170	TAN CABINET
					155187	SPEAKER

POWER SOURCES: This receiver is designed for operation on either an external power source or on the enclosed batteries.

AC OR DC OPERATION: This receiver may be operated on 50 to 60 cycle, 110 to 125 volt AC current or 110 to 125 DC current.

CAUTION: Never plug this receiver into a 220 volt line as this will seriously damage the component parts which have been designed for 110 to 125 volt operation only.

To operate on AC or DC open the small door at the right in the back of the cabinet. Pull out the power cord and plug into a convenient outlet of the proper voltage and current. Follow instructions under "Controls."

To operate on the enclosed batteries, follow instructions under "Controls."

ANTENNA: This receiver is equipped with a sensitive loop antenna and requires no external antenna wire. However, due to the directional qualities of the loop some stations may appear to be weak in reception. This condition may be remedied by rotating or changing the position of the receiver.

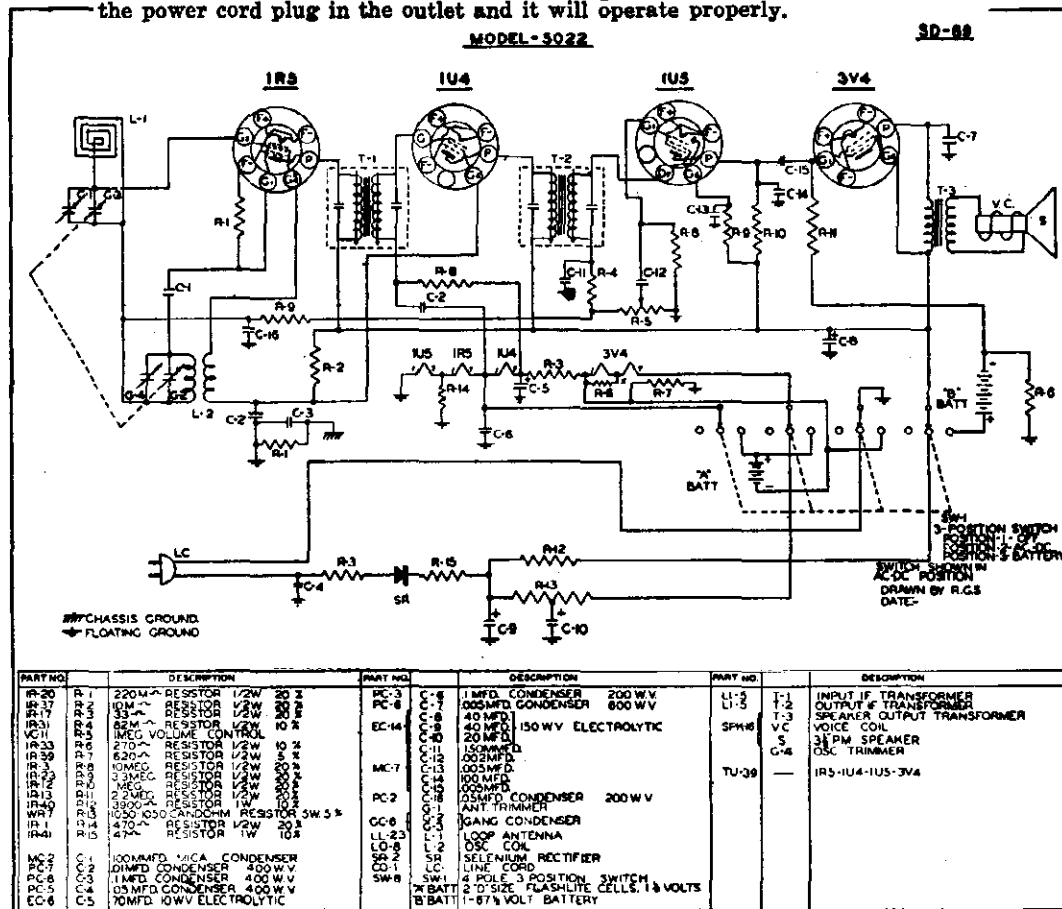
CONTROLS: This receiver has three control knobs which are located on the front panel of the cabinet.

STATION SELECTOR KNOB: The center knob is the station selector. Rotate this knob to the right or left to select your desired station. The dial scale is calibrated in kilocycles. By mentally adding a zero to the numbers on the scale, the result will be read directly in (KC) kilocycles. (i.e., 60 plus 0 equals 600 KC or 140 plus 0 equals 1400 KC).

POWER SELECTOR SWITCH: The right hand knob is the power selector. It has three positions which are indicated on the front panel. The extreme left hand position is the "OFF" position. The small dot on this knob must point to "OFF" when the receiver is not in use. The center position is "AC-DC" and is used when it is desired to operate the receiver from a power line source. The extreme right hand position is "BATT" and is used when it is desired to operate on the enclosed batteries.

AC OPERATION: When an AC power source is used, set the power selector knob to "AC-DC" after the power cord has been plugged into a convenient outlet. The receiver is now ready for operation.

DC OPERATION: If the receiver does not operate after a few seconds, reverse the power cord plug in the outlet and it will operate properly.



BATTERY OPERATION: The power cord is not used for battery operation and may be hanked and put back in the cabinet. Set the power control knob to "BATT" and the receiver is ready for operation on the enclosed batteries.

CAUTION: When the receiver is not in use, the power selector knob must be turned to "OFF." If the knob is allowed to remain in "BATT" position, the batteries will be in use constantly. The volume control does not control the batteries and they are still in operation even though the volume control is turned all the way off.

VOLUME CONTROL: The left hand knob is the volume control. After the power selector knob has been properly set and the receiver is in operation, rotate the volume control knob to the right to increase volume or to the left to decrease volume.

BATTERY SUPPLIERS

The batteries for this receiver may be purchased from any reliable dealer.

For proper operation this receiver requires two "A" batteries and one "B" battery.

The "A" batteries are size "D" flashlight cells and are made by all battery manufacturers.

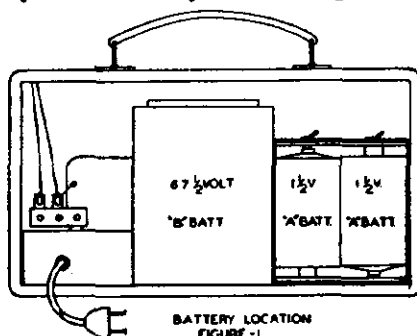
The "B" battery is a 67½ volt battery and is made by the following manufacturers.

Eveready 67½ vlt. #467

Burgess 67½ vlt. #XX45

General 67½ vlt. #W45A

Ray-O-Vac 67½ vlt. #4367



BATTERY SERVICING (See Fig. No. 1)

To replace the batteries in this receiver. Remove the back.

To the right, looking into the rear of the cabinet is the "A" or flashlight battery container. To the left is the "B" or 67½ volt battery.

To replace the "A" batteries, pull the old batteries out of the container. Replace with fresh batteries, making sure the batteries are inserted according to the diagram on the inside of the container.

To replace the "B" battery, disconnect the snap fastener connectors. Replace with a fresh battery and snap the connectors into place. Replace the battery in the cabinet as shown in Fig. No. 1, making sure that the connector end faces the top of the cabinet.

After the batteries have been installed, replace the back, making sure that the two washers in the bottom of the back fit into the slot near the bottom edge of the cabinet.

ALIGNMENT AND SERVICE DATA

(See Fig. No. 2 For Trimmer Location)

Remove chassis from cabinet for alignment.

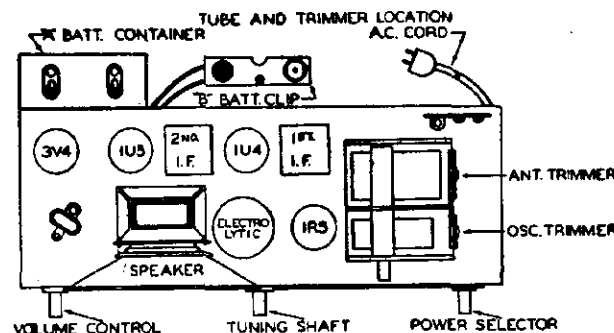
A Signal Generator is required having the following frequencies: 455 KC, 1400 KC, 1650 KC. An output meter should be connected across the speaker.

The volume control of the receiver should be turned to maximum during the I. F. and all subsequent alignment and the generator output as low as possible to prevent the A. V. C. from working and giving false readings.

FIRST STEP: Connect the hot lead from the generator to the ANT. Section of the gang condenser through a .1 MFD. condenser. The ground lead from the generator must be connected to "B" minus under the chassis. Turn the gang condenser to complete minimum capacity. Set the generator to 455 KC. Adjust the movable iron cores in the IF cans. These IF adjustments are made in the top and in the bottom of the can under the chassis. Adjust the cores until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1650 KC. Adjust the OSC. trimmer until the 1650 KC signal is tuned in. The gang condenser must be at complete minimum capacity for this adjustment.

THIRD STEP: Remove the generator leads from the gang condenser and replace the chassis in the cabinet. Loosely couple the generator to the receiver loop by making a complete turn of wire over the outside of the cabinet. With the receiver and generator set at 1400 KC, increase the generator output. Adjust the ANT. trimmer through the hole which is provided in the end of the cabinet until a maximum signal is noted on the output meter. The ANT. trimmer hole in the side of the cabinet is covered by a small plug button. Replace this button after adjustment has been made. No further adjustment should be made as the coils and gang condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.



WARRANTY

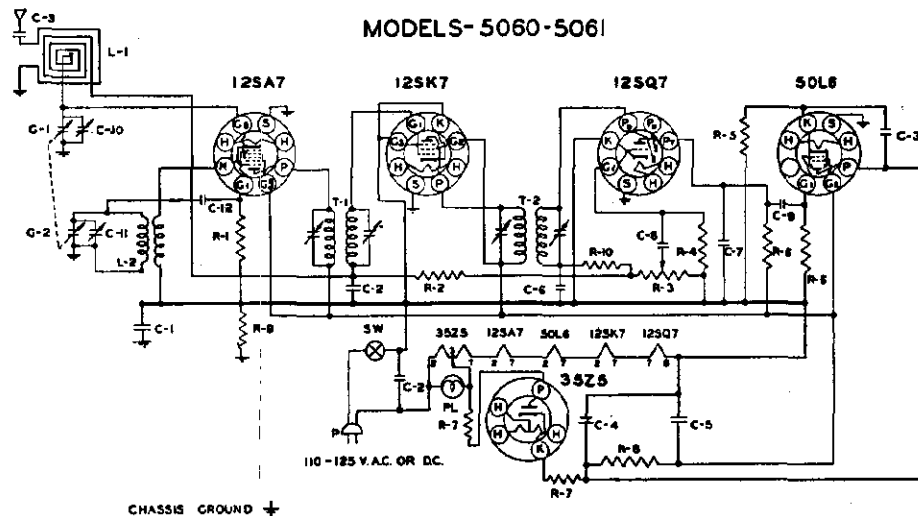
This receiver has been carefully tested and was shipped from our factory in perfect operating condition. If the set arrives damaged in any way, it is important that you file claim immediately against the carrier. We warrant this receiver to be free from defective materials and workmanship. We agree to exchange any part, which under normal use, becomes defective within a period of 90 (ninety) days from the date of sale to the original purchaser. If this receiver does not operate, it should be returned for service to the dealer from whom it was purchased.

This warranty does not apply if the receiver has been damaged, tampered with, or misused. If the receiver is returned to the factory, transportation charges must be prepaid. No receiver may be returned without our written consent.

SCHEMATIC DIAGRAM — MODELS 5060 and 5061

MODELS- 5060-5061

SD-92-U



ALIGNMENT AND SERVICE DATA

Remove chassis from cabinet for alignment.

A Signal Generator is required having the following frequencies: 453 KC, 1400 KC, 1720 KC. An output meter should be connected across the speaker.

The receiver volume control should be turned to maximum during the I.F. and all subsequent alignments to keep the AVC from working and giving false readings. Keep the generator output as low as possible to prevent overloading.

FIRST STEP: Connect the hot lead from the generator to the ANT. section of the gang condenser, through a .1 MFD condenser. The ground lead from the generator must be connected to the floating ground buss under the chassis. Turn the gang condenser to complete minimum capacity. Adjust the generator to 453KC and adjust the trimmers of the 1st and 2nd I.F. transformers until a maximum reading is noted on the output meter.

SECOND STEP: With the leads from the generator still connected in the same manner, adjust the Signal Generator to 1720 KC. The OSC. trimmer is located on the front of the chassis. Adjust this trimmer until the 1720 KC signal is tuned in.

THIRD STEP: Remove the hot lead of the generator from the ANT section of the gang condenser. Connect this lead to the primary of the loop antenna through a 200 MMFD condenser. Adjust the Signal Generator to 1400 KC. Rotate the tuning control until this signal is tuned in. The ANT trimmer is located on the top of the ANT. section of the gang condenser. Adjust this trimmer until a maximum reading is noted on the output meter. No further adjustment should be necessary, unless the set has been damaged, as the coils and condenser in this receiver have been specially handled at the factory to insure proper alignment at the lower frequencies.

PART NO.	DESCRIPTION
1R-9	R-1 22000 Ω RESISTOR 1/2W 20%
1R-23	R-2 3.3MEG. RESISTOR 1/2W 20%
VC-3	R-3 1MEG. VOLUME CONTROL
1R-13	R-4 2.2MEG. RESISTOR 1/2W 20%
1R-14	R-5 150 Ω RESISTOR 1/2W 20%
1R-11	R-6 470M Ω RESISTOR 1/2W 20%
1R-17	R-7 33 Ω RESISTOR 1/2W 20%
1R-25	R-8 2200 Ω RESISTOR 1 W 10%
1R-20	R-9 220V Ω RESISTOR 1/2W 20%
1R-10	R-10 47000 Ω RESISTOR 1/2W 20%
PC-8	C-1 1MFD. CONDENSER 400V.
PC-5	C-2 .05MFD CONDENSER 400V.
PC-7	C-3 .01MFD CONDENSER 400V.
EC-12	C-4 40MFD. 150V. ELECTROLYTIC
	C-5 20MFD.
MC-8	C-6 220MMFD.
	C-7 220MMFD.
	C-8 .002MFD.
	C-9 .005MFD.
	C-10 ANT. TRIMMER.
MC-4	C-11 OSC. TRIMMER
GC-5A	C-12 50MMFD. MICA CONDENSER
LL-6	G-1 GANG CONDENSER
LO-13	G-2
LI-6	L-1 LOOP ANTENNA
	L-2 OSC. COIL
LI-7	T-1 INPUT I.F. TRANSFORMER
	T-2 OUTPUT I.F. TRANSFORMER.
SPK-125	T-3 SPEAKER OUTPUT TRANSFORMER
	V.C. VOICE COIL.
PB-1	S P.M. SPEAKER
	#47 PILOT BULB
CO-1	SW A.C. SWITCH ON VOLUME CONTROL
	P LINE CORD

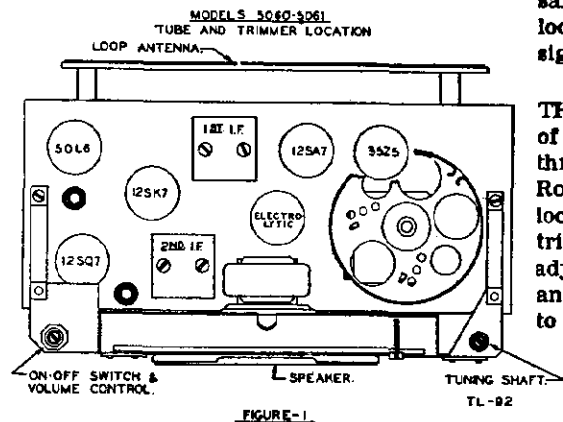


FIGURE-1

GENERAL:

Signal Seeking Tuners are used on the following radios:

Bulletin No.

Buick

Model 980899 1950 6D- 929

Cadillac

Model 7258865 1950 6D-1060

Oldsmobile

Model 982482 1950 6D- 987

Model 982483 1950 6D- 987

The service bulletin for any radio using this tuner will refer to this bulletin for tuner servicing.

This bulletin covers the theory of operation, adjustments, replacements and trouble-shooting procedure.

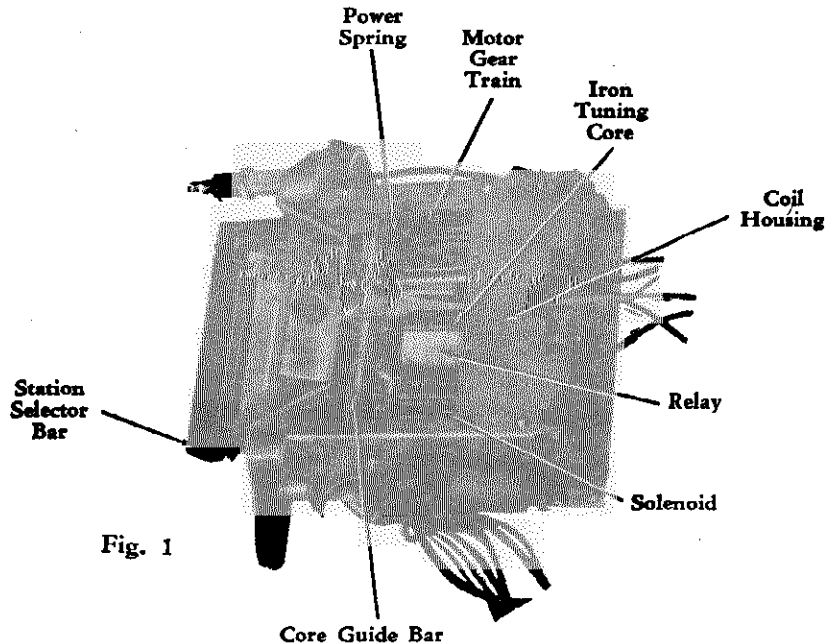


Fig. 1

THE SIGNAL SEEKING TUNER

The Signal Seeking Tuner is an electronically controlled automatic tuner by which the operator can change stations by merely depressing a single station selector bar on the radio or an auxiliary foot switch. The seeking operation is a uni-directional sweep of the broadcast band from low to high frequency with a nearly instantaneous return. The tuning mechanism is driven by a spring loaded mechanical motor which is stopped on station by a triggering circuit actuated by voltage developed from an incoming signal.

The number of stations on which the tuner will stop can be regulated by use of the Sensitivity Control. It is a step control which in the extreme clockwise position gives maximum stopping sensitivity, while it allows the tuner to stop only on strong local stations when in the minimum sensitivity or extreme counterclockwise position. This control is in the circuit only while the tuner is seeking and does not affect the "on station" sensitivity of the receiver.

THEORY OF OPERATION

This discussion of the operation of the Signal Seeking Tuner does not refer to any particular model radio. It covers the overall operation and

the bulletin for the particular radio involved will give the details of the circuit used in the actual receiver.

Sweep and Return Cycle (See Fig. 2)

One Power Spring, which is fastened to the lower plate of the Planetary Arm, pulls this arm around its pivot. The Planetary Arm is linked to the Core Bar. Thus, as the spring contracts and moves the Planetary Arm it also pulls the core bar and its iron cores from the tuning coils thereby changing the tuned frequency of the radio towards the high end of the broadcast band. After the tuner has swept beyond the top broadcast frequency, the High Frequency Switch Operating Cam on the lower Planetary Arm trips the Tuner Return Switch which in turn energizes the Solenoid and this quickly returns the Planetary Arm to its original position with the cores inserted fully into the coils (low frequency) and the power spring is now under maximum tension. As the Planetary Arm returns, the Low Frequency Switch Operating Cam trips the Tuner Re-

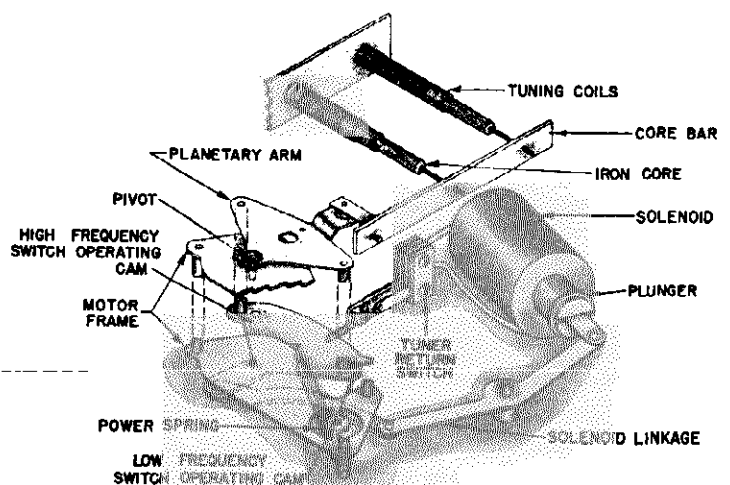


Fig. 2

turn Switch to its original position thus de-energizing the Solenoid and completing the cycle.

MODEL 6D-620,
Tuner

Motor and Control (See Fig. 3)

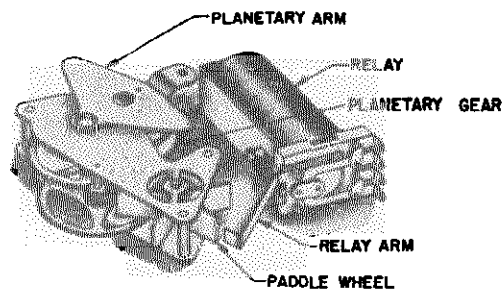


Fig. 3 Manual Tuning Gear Operation (See Fig. 4)

Manual tuning is accomplished by turning the Manual Control Shaft which turns the Worm Gear in its bracket. The Worm Gear is meshed with the Manual Drive Gear which in turn is meshed with the Planetary Pinion Gear. During manual tuning the Paddle Wheel is held in place by the Relay Arm and this Pinion Gear is not free to rotate, thus effectively locking the Planetary Arm to the outer edge of the Manual Drive Gear. Therefore as the Manual Drive Gear turns, the Planetary Arm moves in unison with it and varies the frequency of the tuner by varying the position of the iron cores in the tuning coils. (Notice that when the set is being tuned automatically and the Paddle Wheel is rotating, the Manual Drive Gear is held securely in place by the Worm Gear while the Planetary Pinion Gear "walks around" the periphery of the Manual Drive Gear thereby causing the Planetary Arm to move and change the position of the tuning cores.)

The Power Spring tends to move the Planetary Arm about its pivot point thereby starting the Planetary Gear and its meshed train in motion. This motion is transferred through the gear train to the Paddle Wheel which acts as an air vane governor keeping the motion at a constant speed. This movement of the Planetary Arm is then controlled by merely freeing or blocking the Paddle Wheel with the Relay Arm. Thus, the movement of the Planetary Arm which moves the tuning cores is started or stopped by the action of the Relay Arm.

On sets which have no manual drive, the Manual Drive Gear is secured to the Motor Frame and the Control Shaft and Worm Gear are eliminated.

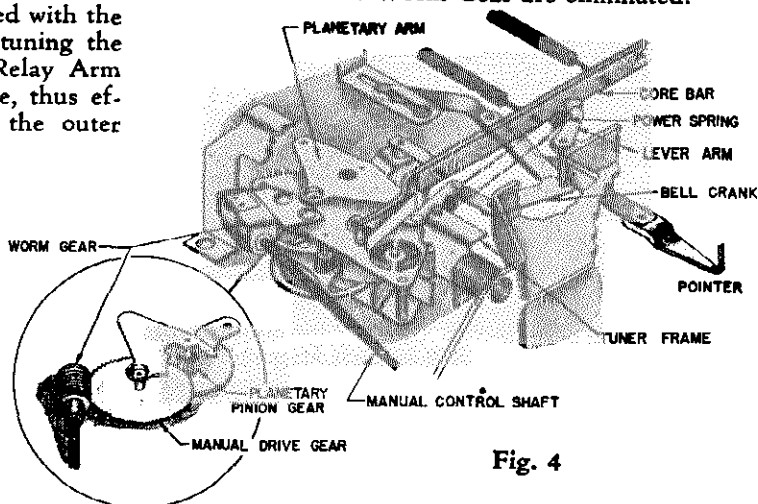


Fig. 4

Pointer and Core Bar Linkage (See Fig. 4)

The second power spring is shown in this view. It has a dual purpose, serving both as a power spring and an antibacklash spring. The primary linkage is from the tuner frame to the Lever Arm which is securely staked to the Bell Crank. At the Bell Crank the linkage splits, with one arm linked to the

core bar at the extreme left end, and the other arm linked to the pointer. Thus, this spring helps pull the core bar in the high frequency direction when it is free to move and provides a spring loaded linkage between the core bar and the pointer preventing any tendency for backlash.

Clutching Operations (See Fig. 5)

The Ratchet Pawl and Wheel are used so that the Solenoid can cock the power springs without running the entire gear train in the reverse direction during the return sweep. Notice that the Ratchet also is used when the dial pointer has reached the high end of the band while tuning manually. Then the Planetary Arm has reached the end of its tuning arc and so the planetary pinion tends to be rotated by the Manual Drive Gear (see Fig. 3). This turns the Ratchet Wheel out of the Pawl and allows the pinion gear to turn freely without exerting further force on the Planetary Arm and thereby eliminates any possible damage to the mechanism.

The purpose of the Friction Disc is to prevent damage to the mechanism when manually tuned past the low frequency stop. This is accomplished because the disc slips before excessive pressure is

exerted when the Pinion Gear tends to rotate the Planetary Gear. The Friction Disc is not found on radios without a manual drive.

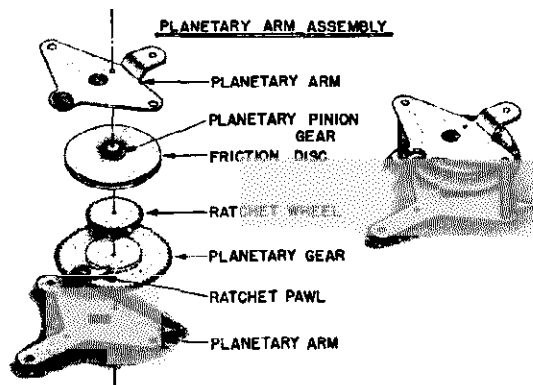


Fig. 5

Tuner Sweep Cycle Outline (Fig. 6)

- I. Tuner is started by removing Relay Arm from Paddle Wheel
 - A. Spring driven gear train begins to sweep. (Fig. 3)
 - B. Planetary Arm moves. (Fig. 2)
 - C. Tuning cores are moved toward higher frequency by core bar linkage to Planetary Arm.
 - D. Spring loaded dial pointer scans dial. (Fig. 4)
- II. Signal actuates relay causing arm to stop paddle wheel
 - A. Gear train stops. (Fig. 3)
 - B. Planetary Arm is stopped.
 - C. Core bar movement is stopped.
 - D. Dial pointer sweep is stopped.
- III. When tuner reaches high end of dial after last stop.
 - A. The High Frequency Switch Operating Cam trips Tuner Return Switch. (Fig. 2)
 - B. Solenoid is energized.
 - C. Plunger is pulled into the Solenoid.
 - D. Planetary Arm and pointer are returned to low end of dial.

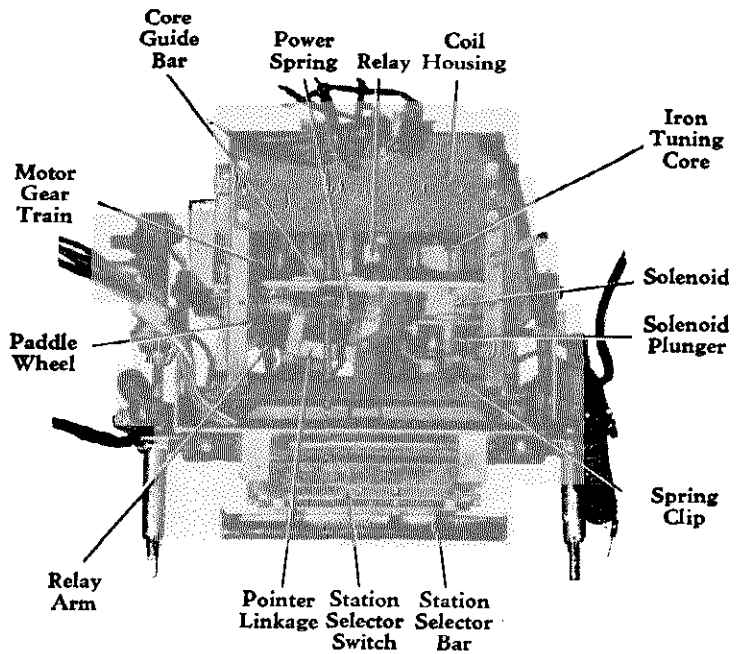


Fig. 6

- E. The Low Frequency Switch Operating Cam trips the Tuner Return Switch in the opposite direction. (Fig. 2)
- F. The Solenoid is de-energized and the sweep starts from the low frequency stop.

ELECTRICAL OPERATION

The purpose of the electrical components associated with the tuner is to control the relay so the operator may start the tuner sweeping cycle by merely depressing the station selector bar and so that the sweeping operation will continue until a signal is received. At that time it is the function of

this circuit to accurately tune to the frequency of the selected station. It also provides the necessary conditions to keep the tuner on the station until a change is desired. The operational cycle of the electronic control system of the signal seeker tuner is outlined

The Electrical Cycle Outline (Fig. 7)

- I. Starting the Tuner Seeking (Energizing the Relay)—The Station Selector Bar (27) is momentarily depressed.
 - A. Contact #2 of the Station Selector Switch opens first, ungrounding secondary of the output transformer therefore muting the set as contact #1 closes.
 - B. Contact #1 closes and provides a circuit from B⁺ through the relay winding, the 15,000 ohm resistor (30), the Selector Switch contacts, and the delay circuit resistor network to ground.
 - C. The current through this circuit energizes the Relay and removes the Relay Arm from the Paddle Wheel—thus starting the tuner, opening contacts #2 and #4, and grounding relay contacts #1 and #3.
- II. Keeping the Tuner Seeking after the Selector Bar is released (Keeping the Relay Energized)
 - A. Relay contact #3 is closed providing a path to ground for the cathodes of the R.F. and I.F. amplifier tubes. This path is through the Sensitivity Control so the sensitivity of the set can be controlled during the sweeping operation.
 - B. Relay contact #1 is grounded thus lowering the cathode to ground resistance of the Relay Section of the Trigger Tube by putting the 6,800 ohm resistor (24) in parallel with the 47,000 ohm cathode resistor (26).



This causes a lowering of the cathode voltage thereby causing an increased plate current flow which is sufficient to keep the relay energized and the tuner seeking.

- A. A voltage from the incoming signal is developed in the primary and secondary of the 2nd I.F. transformer (20).
- B. The voltage in the secondary of the I.F. coil is rectified by the Detector Diode de-

veloping a D.C. voltage across the 330,000 ohm resistor (22).

C. The voltage in the primary of the I.F. coil is rectified by the Bucking Diode developing a D.C. voltage across the 1.5 megohm resistor (17).

D. The voltage developed by the Bucking Diode across the 1.5 megohm resistor (17) opposes the voltage developed by the Detector Diode across the 330,000 ohm resistor (22). The resultant voltage is applied to the grid of the D.C. Amplifier Section of

the Trigger Tube. This triggering voltage gives a substantially constant tuning accuracy for all signals.

E. When the resultant triggering voltage on the grid of the D.C. Amplifier becomes positive it causes the tube to conduct.

F. The plate current flow in the D.C. amplifier section develops a biasing voltage across the 120,000 ohm resistor (25) which is between grid and cathode of the Relay Section of the Trigger Tube, making the grid more negative than the cathode thus reducing the plate current.

G. The decrease in plate current flow causes the relay to be de-energized and the Relay Arm again engages the Paddle Wheel thereby stopping the tuner sweep on a station, opening contacts #1 and #3 and grounding relay contacts #2 and #4.

IV. Holding the Tuner on Station until a new Station is Desired (Holding the Relay De-energized):

A. Relay contact #1 is opened, ungrounding the 6800 Ohm Resistor (24), thus preventing any appreciable current flow in the relay.

B. Relay contact #4 is grounded and this grounds the cathode circuits of the R.F. and I.F. amplifiers effectively by-passing the sensitivity control (4), which is now ungrounded, and leaving the set at normal sensitivity.

C. Relay contact #2 is grounded thereby grounding out the grid of the D.C. Amplifier. Any voltage now developed across the 330,000 ohm resistor (22) keeps the Bucking Diode from conducting by applying a negative voltage to its plate and the Detector Diode now functions as a conventional detector.

The Tuner Detection Circuit (See Figs. 7 and 8)

The purpose of the tuner detection circuit is to take input signal voltages of varying strength and trigger the relay tube so that the tuner will stop accurately on the station frequency. A positive voltage developed by the signal on the grid of the D.C. Amplifier Section causes the tuner to trigger and stop. This is accomplished by using the Detector Diode and Bucking Diode to develop voltages of opposite polarity (E_1 and E_2) between grid and ground of the D.C. Amplifier Section of the Trigger Tube, thus effectively applying the algebraic sum of these voltages (E_T) to this signal grid. (Note that contacts #2 and #4 of the relay are open.) These relative voltages plotted against frequency are shown in Fig. 8 using a station frequency of 1200 KC. Notice that the response curve of the voltage (E_2) across the 1.5 megohm resistor (17) is broader and not as large as the voltage (E_1) developed across the 330,000 ohm (22) detector load. This is because the detector voltage has benefit of one more tuned circuit which gives the narrower curve. Also there is a positive voltage appearing at the cathode of the Bucking Diode which will have the effect of lowering the voltage (E_2) across the 1.5 megohm resistor (17) because it will introduce a delay before the Bucking Diode will begin to conduct. This delay can be controlled by the Delay Adjustment in the cathode of the Bucking Diode. This Delay Adjustment also controls the trigger level so

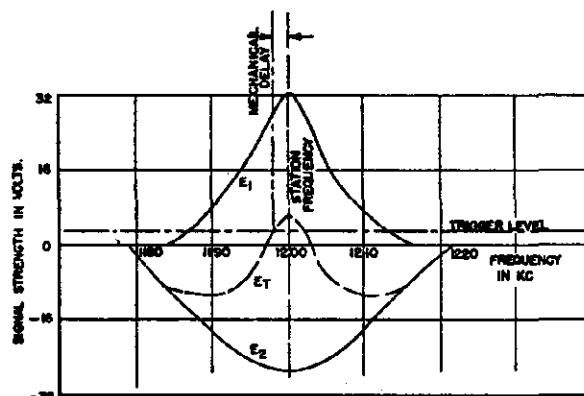


Fig. 8

that the mechanical delay is compensated for and the tuner stops exactly on station. It is a factory adjustment and **SHOULD** not be adjusted unless it is proven faulty.

Since the two diodes obtain their voltages from the same incoming signal, the strength of both voltages will vary directly with the strength of the incoming signal. Therefore, while they both rise and fall with variation in signal strength, their difference (E_T), which is effectively the trigger pulse, will tend to remain constant. Thus, a station will be tuned in with the same degree of accuracy whether it is a strong or weak signal.

Tuner Muting (See Fig. 7)

Various methods of muting are employed in the signal seeker tuner operated radios. To prevent a click in the speaker as the station selector bar energizes the relay, the output transformer circuit is opened (contact #2 of Station Selector Switch (27), before contact #1 is made. Or, in the case of the foot switch, the speaker voice coil is grounded and the set muted before the relay energizing contact is made.

The receiver is also muted when the solenoid is energized during the return cycle of the tuner. This is accomplished because when the tuner return switch (33) is mechanically tripped to position #2 it un-

grounds the Sensitivity Control which is the cathode return for the R.F. and I.F. amplifier tubes thus momentarily disabling the set.

The receiver also may be muted during the sweep cycle of the tuner by applying the negative oscillator voltage to the grids of the audio tubes to cut them off during the sweep time. Then, when the relay stops the paddle wheel on station and contact #1 is ungrounded enough positive voltage is applied through the 2.2 megohm resistor (10) to counteract the negative voltage from the oscillator and return the output tubes to normal operation. Any excess positive voltage will leak off through the diode to ground in the 1st audio tube.

Sensitivity Control

The sensitivity control is a step resistor which is inserted into the cathodes during the tuning sweep when relay contact #3 is grounded and is the means

by which the operator controls the number of stations on which the tuner will stop.

MODEL 6D-620,
Tuner

ADJUSTMENTS

All illustration numbers in this section can be used in conjunction with the bulletin for the radio involved and do not refer to the Theory of Operation portion of this bulletin.

All adjustments on Signal Seeking Tuners are made accurately at the factory and do not require further adjustment unless it is definitely proven they are wrong or tuner parts are replaced. These adjustments are readily accessible and can be made without removing the tuner from the radio. All adjustments are made with the antenna disconnected from the radio. All adjustments can be reached by removing the front and rear covers of the radio and the adjustment cover on the top of the radio. The correct procedures for making these adjustments are as follows:

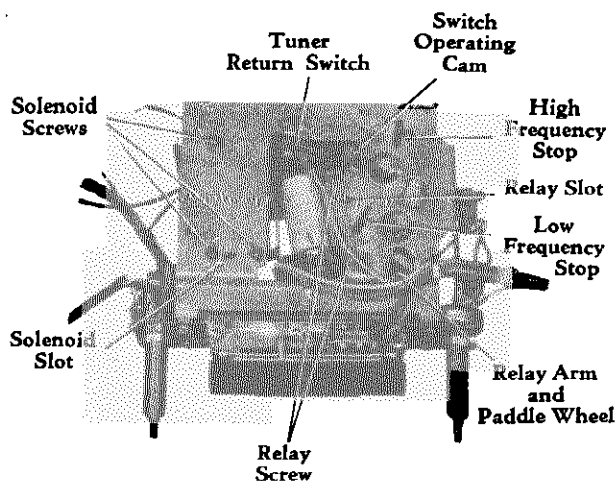
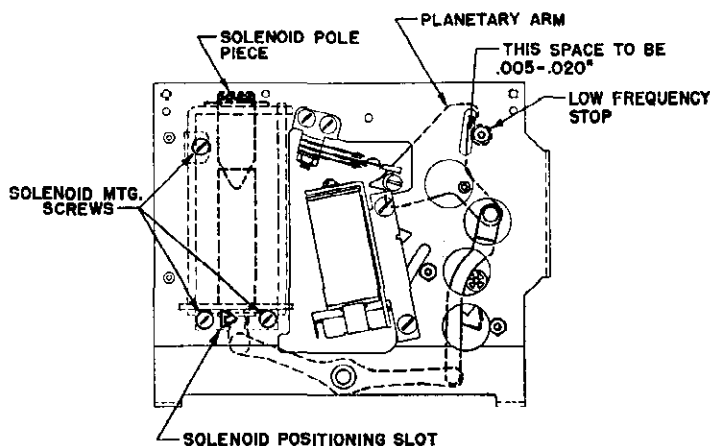


Fig. 9

Solenoid Pole Piece Adjustment (Fig. 10)

This adjustment should be made whenever the Solenoid or Solenoid Plunger is replaced. Its purpose is to obtain the correct amount of force from the Solenoid and to prevent the Solenoid Plunger from sticking.

1. With a screwdriver back the Solenoid Pole Piece out of the Solenoid.
2. Bottom the Solenoid Plunger in the Solenoid. The plunger is bottomed when the "C" washer collar on the plunger hits the frame of the Solenoid.
3. Screw the Solenoid Pole Piece into the Solenoid until it just touches the plunger.
4. Back the pole piece off exactly 1½ turns.
5. Tighten the hex locking nut and seal with glyptal or shellac.



SOLENOID POSITIONING ADJUSTMENT

Fig. 10

Solenoid Adjustment (Fig. 10)

The Solenoid adjustment should be made whenever solenoid or Solenoid plunger is replaced. Its purpose is to provide the correct amount of solenoid plunger movement to move the tuner to the low frequency end of the broadcast band.

1. With the radio turned off, connect a jumper wire across the 0.5 mfd condenser, Illustration #43, on the cold side of the Solenoid. This is the only paper condenser found on the tuner.
2. Turn the radio on. (This energizes the Solenoid.)
3. Energize the Relay by momentarily depressing

the Station Selector Bar.

4. Loosen but do not remove the three solenoid mounting screws.
5. Using a screwdriver in the Solenoid Positioning Slot, turn the screwdriver and move the Solenoid until there is a 0.005 to 0.020 inch gap between the Planetary Arm and its Low Frequency Stop.
6. Tighten the three Solenoid Mounting Screws.
7. Turn the radio off and remove the jumper wire from the condenser.

Relay Adjustment (Fig 11)

This adjustment should be made whenever the relay is replaced. This is the only adjustment of the relay that should be attempted in the field. The adjustment of the relay is to position the relay arm to have the correct engagement and clearance with the gear train paddle wheel.

1. With the radio turned off, connect a jumper wire across the 0.5 mfd condenser, Illustration #43, on the cold side of the Solenoid. This condenser is found on the tuner.
2. Turn the radio on. (This energizes the Solenoid.)
3. Energize the Relay by momentarily depressing the Station Selector Bar.
4. Loosen but do not remove the two Relay Mounting Screws.
5. Using a screwdriver in the Relay Positioning Slot, turn the screwdriver and move the relay until there is a gap of approximately 0.030 or

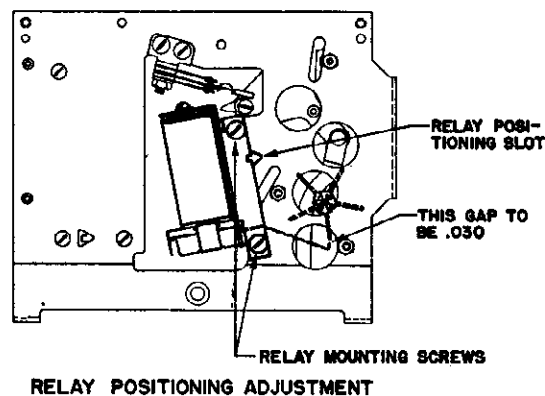


Fig. 11

1/32 inch between the top of the Relay Arm and the tip of the blades on the Paddle Wheel.

6. Tighten the two Relay Mounting Screws.
7. Turn the radio off and remove the jumper wire from the condenser.

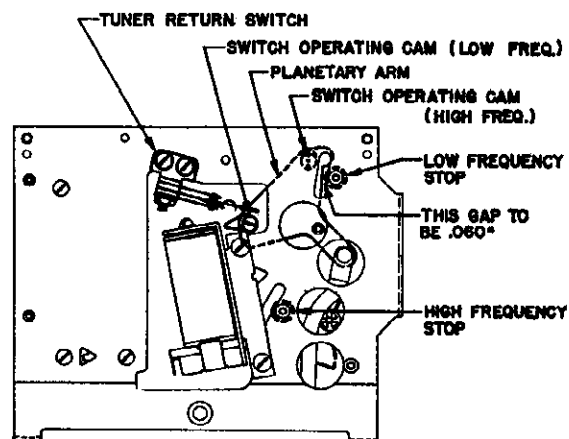
Switch Operating Cam Adjustment (Fig. 12)

This adjustment should be made whenever the Motor Gear Train or the Tuner Return Switch is replaced. Its purpose is to set the timing of the Tuner Return Switch.

1. With the radio turned off, insert a 0.060 inch feeler gauge through the slot against the Low Frequency Stop. Number 14 bare wire is a satisfactory gauge.
2. Position the Planetary Arm against the feeler gauge. This can be done with the manual tuning control or on radios without this control the Planetary Arm can be moved directly or by moving the core guide bar to the low frequency end of the broadcast band (tuning cores all the way in the coils).

CAUTION: ON RADIOS HAVING NO MANUAL TUNING CONTROL, THE PLANETARY ARM CAN BE MOVED ONLY TOWARD THE LOW FREQUENCY STOP WITHOUT DAMAGING THE MOTOR GEAR TRAIN.

3. With a small screwdriver, move the Low Frequency Switch Operating Cam to a position furthest from the Tuner Return Switch.
4. Trip the Tuner Return Switch so that its operating arm is toward the cam.
5. Turn the Low Frequency Switch Operating Cam in a counter clockwise direction until it trips the switch.
6. Insert a 0.060 inch feeler gauge through the slot against the High Frequency Stop.
7. Position the planetary arm against the feeler gauge. **CAUTION: DO NOT USE DIRECT FORCE TO MOVE THE PLANETARY ARM.** The Planetary Arm can be positioned either by using the manual tuning control or on radios without a manual control as follows:
 - (a) Turn the radio on and depress the Station Selector Bar.



SWITCH OPERATING CAM ADJUSTMENTS

Fig. 12

- (b) Turn the radio off very close to the high frequency end of the broadcast band.
 - (c) With a screwdriver turn the Switch Operating Cam to the position furthest from the Tuner Return Switch.
 - (d) Turn the radio on and depress the Station Selector Bar.
 - (e) Allow the Planetary Arm to run against the feeler gauge.
 - (f) Turn the radio off.
8. Turn the Switch Operating Cam to the position furthest from the Tuner Return Switch if this has not already been done.
 9. Trip the Tuner Return Switch so that its operating arm is towards the cam.
 10. Turn the High Frequency Switch Operating Cam in a clockwise direction until it trips the Tuner Return Switch.

MODEL 6D-620,
Tuner

Cathode Delay Adjustment

This adjustment controls the tuning accuracy of the radio and is carefully adjusted at the factory. It should not be made unless the part is replaced. It is adjusted as follows:

1. With the antenna disconnected turn the radio on. If the bulletin for the radio involved specifies the adjustment to be made with the radio "seeking" depress the station selector bar.
2. Adjust the input voltage to the radio to ex-

actly 6 volts at the "A" connector or the spark plate.

3. Connect a meter from the cathode of the D.C. amplifier section of the trigger tube (pin 8 of the 12AU7 tube) to chassis and adjust the cathode delay rheostat, illustration 110, so the meter reads the voltage specified under "Adjustment Procedure" in the service bulletin for the model radio involved.

REPLACEMENTS

All illustration numbers in this section can be used in conjunction with the bulletin for the radio involved and do not refer to the Theory of Operation portion of this bulletin.

This tuner has been designed to provide a maximum of servicing efficiency. All service parts have been made very accessible and easy to replace. The wiring to the tuner has been made long enough so

that the tuner can be dismounted from the radio case and worked on without disconnecting any leads. (NOTE: It may be necessary to remove some connections of bond straps.) For most replacements such as the relay, the tuner return switch, etc., no special instructions other than being sure the proper adjustments are made are necessary. However, to facilitate fast replacement of some parts, the following instructions are included:

Solenoid or Solenoid Plunger Replacement (Fig. 10)

1. Remove the radio rear cover and adjustment cover. (Note: It will be necessary to remove the front cover on some radios.)
2. Remove the three solenoid mounting screws found on the top of the tuner.
3. Disconnect the two leads to the solenoid.
4. Remove the solenoid and bracket from the rear of the tuner. (It will be necessary to disconnect one lead of a 0.5 mfd condenser on some radios to give sufficient clearance.)
5. Remove the solenoid plunger from its linkage by removing the spring clip holding this linkage to it.
6. Place the plunger in the solenoid and make the Solenoid Pole Piece Adjustment.
7. Install the solenoid plunger and solenoid in the tuner.
8. Fasten the solenoid plunger to its linkage with the spring clip.
9. Solder the leads to the terminals from which they were removed. (If the 0.5 mfd condenser lead was removed, solder it in place).
10. Mount the solenoid to the tuner with the three screws and make the solenoid adjustment.

Station Selector Switch Replacement (Fig. 13)

1. Remove the escutcheon from the front of the radio.
2. Remove the Station Selector Bar and switch assembly which is held in place with two screws through the mounting plate.
3. Remove the switch and disconnect the leads.
4. Connect the leads to the new switch and assemble to mounting plate.
5. Adjust the position of the Switch Operating Ring so that it over-travels the opening and closing of the switch contacts in both directions about .030 or 1/32 inch. This adjustment is made by inserting a screwdriver in the slot on the

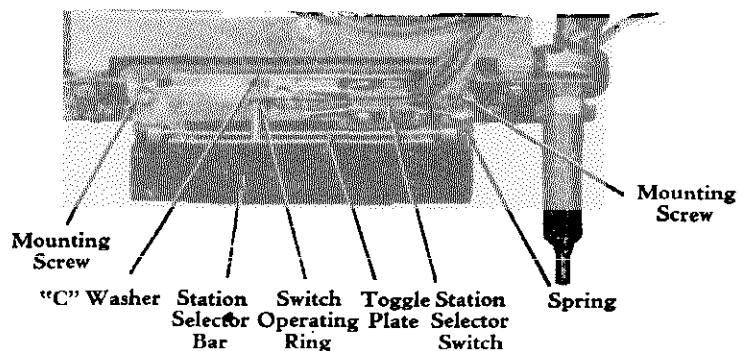


Fig. 13

- ring and sliding on the selector bar shaft.
6. Return the selector bar and switch assembly to the radio and fasten with the two screws.

Station Selector Bar Replacement (Fig. 13)

1. Remove the station selector bar and switch assembly from the radio as described in steps 1 and 2 of **Station Selector Switch Replacement**.
2. Remove the small "C" washer from the end of the station selector bar shaft.
3. Remove the two springs that hold the station selector bar and toggle plate to the mounting plate.
4. Assemble the new station selector bar and toggle plate with the two springs to the mounting plate as shown.
5. Place the "C" washer on the shaft and secure.
6. Adjust the position of the switch operating ring as described in step 5 of **Station Selector Switch Replacement**.
7. Return assembly to the radio and mount with the two screws.

Motor Gear Train Replacement (Fig. 14)

1. Remove the front and rear cover of the radio.
2. Dismount the tuner from the case and move it out of case far enough so that it can be worked on.
3. Divide the tuner into two parts by:
 - (a) Removing the spring clip holding the gear train planetary arm to the core guide bar linkage.
 - (b) Removing the four tuner assembly screws. (Some tuners have two additional screws.)
 - (c) Separating the two halves of the tuner.
4. On radios having a manual tuning control, remove the worm gear and bracket from the gear train.
5. Disconnect the motor gear train from the solenoid plunger linkage by removing the spring clip holding them together.
6. Remove the three nuts mounting the motor gear train.
7. Mount the new motor gear train to the tuner with the three nuts.

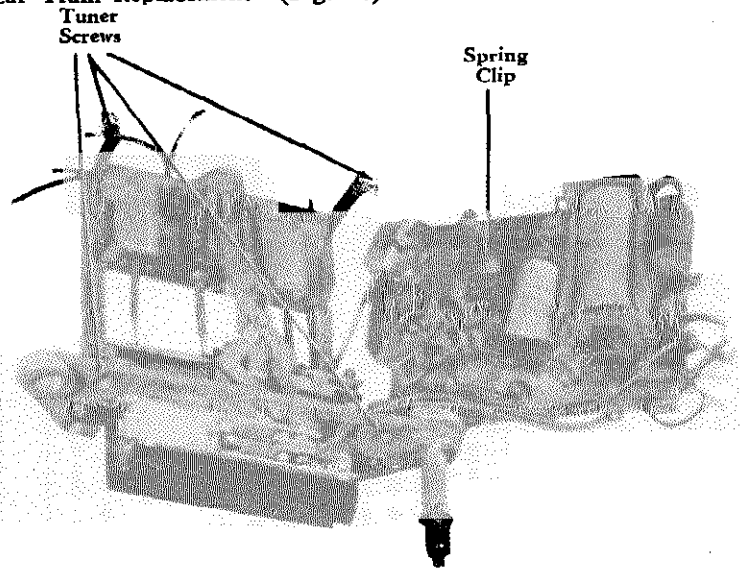


Fig. 14

8. Connect the gear train to the solenoid linkage with the spring clip.
9. On radios having a manual tuning control, remove the screw holding the manual gear of the gear train in position and mount the worm gear and bracket to the gear train. Be careful to get good gear mesh and do not lose the anti-squeak spring on the worm gear bracket.
10. Reassemble the tuner and make the **Switch Operating Cam Adjustment**.

THE TROUBLE SHOOTER'S GUIDE

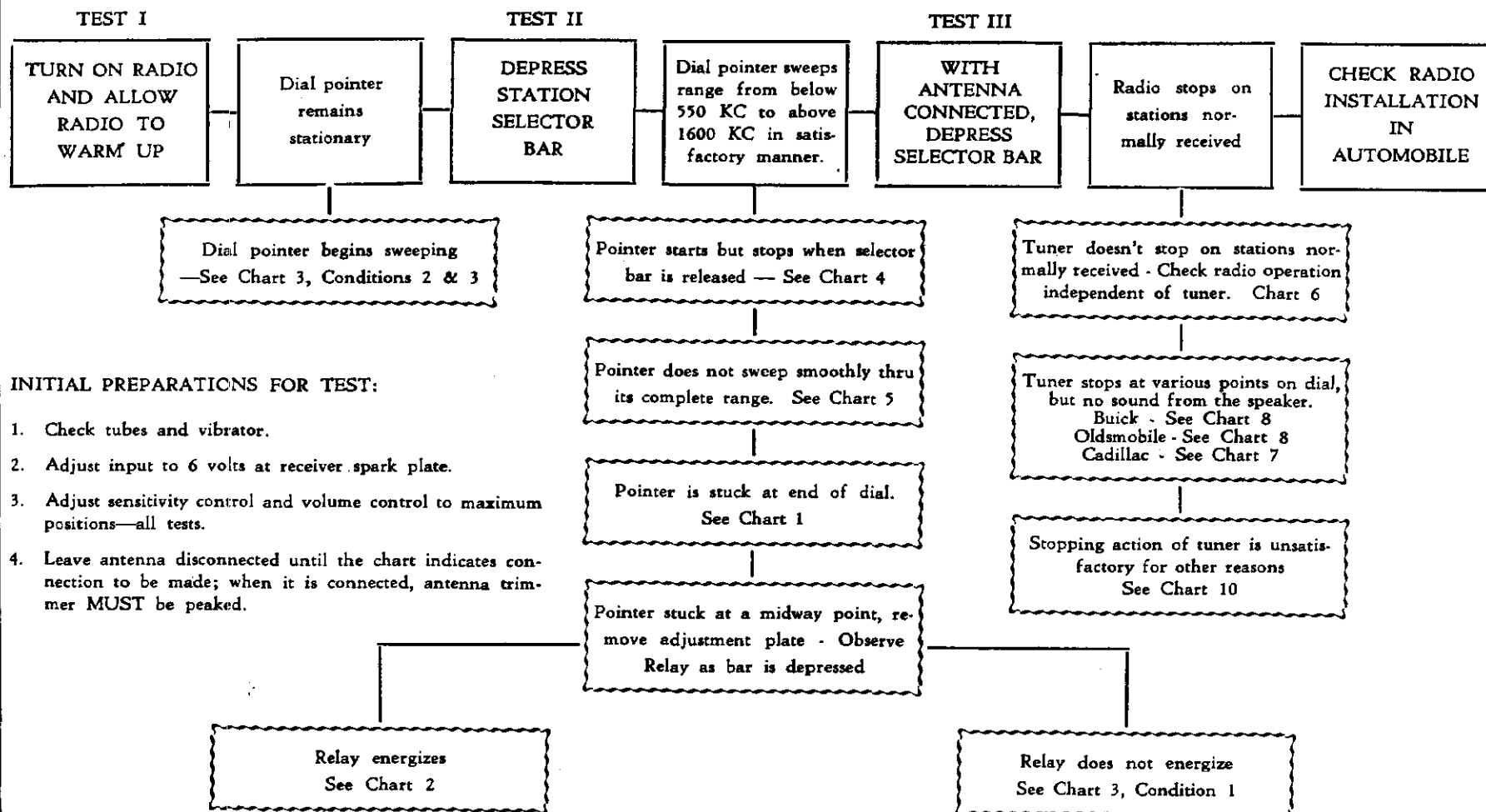
All illustration numbers in this section can be used in conjunction with the bulletin for the radio involved and do not refer to the Theory of Operation portion of this bulletin.

To facilitate rapid diagnosis of troubles which may develop in the Signal Seeking Tuner, those most likely to occur have been classified and listed in a trouble shooting chart. Three fundamental tests which are easily made on the radio are the basis for this chart. The normal indication for each test is shown just to the right of the test block in solid lines and if the indication is normal the next basic test should be made. However, if the normal

indication does not apply to the radio under test, the various abnormal indications that could result from the check are shown in irregular line blocks below the normal condition. When the block which applies to the radio being checked is reached, a chart which will contain a simplified partial schematic will be referred to. The checks necessary to isolate the defective components will also be included in this chart and components common to all sets are assigned illustration numbers which are the same as those in the individual bulletins for each specific set. Thus, through the use of these charts, the vast majority of the troubles can be isolated in a very short period of time.

Initial Trouble-Shooting Tests

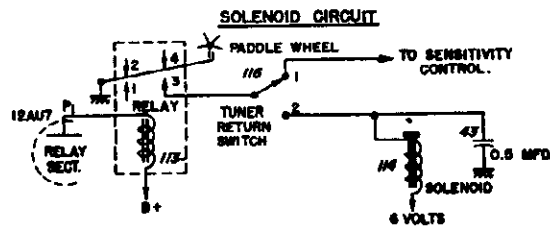
NOTE: Read the chart from LEFT to RIGHT until the specified condition does not apply to the radio being tested, then read down until the condition listed is identical to that of the radio under test. See the chart indicated for further analysis.



INITIAL PREPARATIONS FOR TEST:

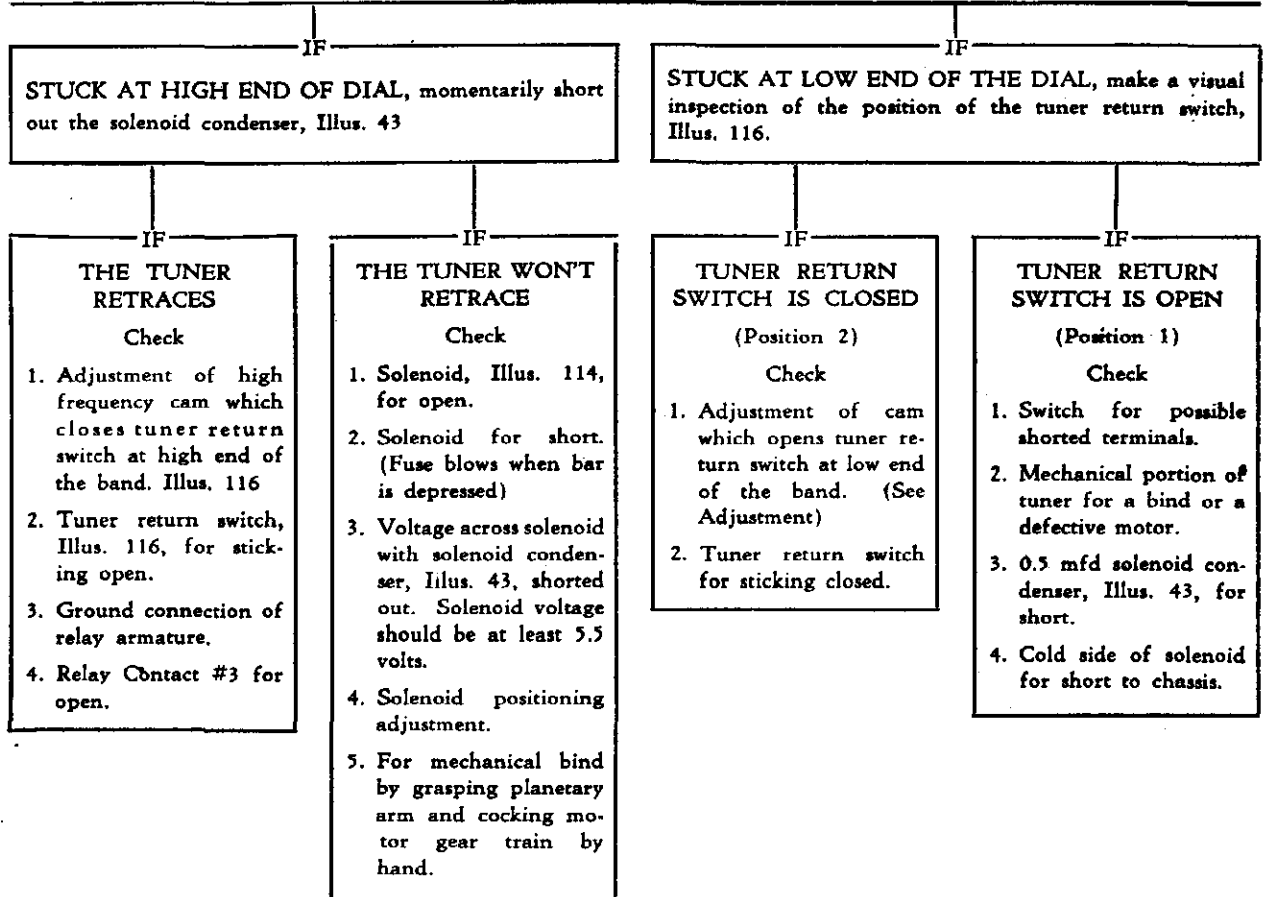
1. Check tubes and vibrator.
2. Adjust input to 6 volts at receiver spark plate.
3. Adjust sensitivity control and volume control to maximum positions—all tests.
4. Leave antenna disconnected until the chart indicates connection to be made; when it is connected, antenna trimmer MUST be peaked.

CHART 1



Solenoid Circuit

CONDITION 1: TUNER WILL NOT START. POINTER STATIONARY AT END OF DIAL



IMPORTANT: IF ABOVE CHECKS PROVE THE SOLENOID CIRCUIT TO BE SATISFACTORY GO TO CHART 2 AND CHECK FOR A MECHANICAL DEFECT.

MODEL 6D-620,
Tuner

CHART 2

Relay Energizes But Tuner Will Not Start

- I. DEPRESS STATION SELECTOR BAR AND NOTICE WHETHER RELAY ARM DISENGAGES PADDLE WHEEL. IF IT DOESN'T—SEE RELAY POSITIONING ADJUSTMENT.
- II. VISUALLY CHECK FOR CAUSE OF BIND. INSPECT TUNER FOR IMPROPERLY ROUTED WIRES FOULING MECHANISM.
- III. REMOVE TUNER FROM THE RADIO. SEPARATE THE TWO HALVES OF THE TUNER.

A.

CHECK THE TOP HALF OF TUNER FOR BIND BY MOVING THE CORE BAR WITH YOUR FINGER.

IF

Top half doesn't bind, check bottom half.

IF

Top half binds, remove clip from connecting link between core bar and pointer, and check each separately for bind.

B.

CHECK BOTTOM HALF OF TUNER FOR BIND BY REMOVING CLIP FROM MOTOR SIDE OF SOLENOID LINKAGE.

CHECK

For bind in solenoid by moving solenoid linkage by hand.

IF

Bind occurs in solenoid linkage, remove clip from solenoid end of solenoid linkage to determine if bind is in solenoid plunger or linkage. If the solenoid linkage and solenoid are O. K., connect the gear train and solenoid together again.

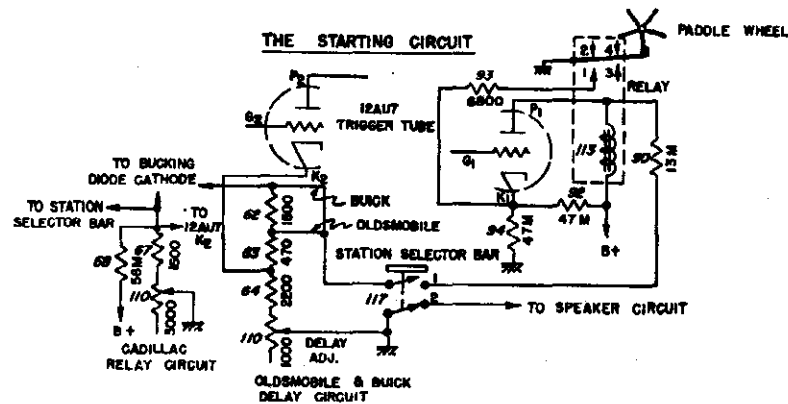
CHECK

Gear train for bind by pressing the plunger into the solenoid then carefully moving the relay arm out of the paddle wheel. The paddle wheel should start running.

IF

The paddle wheel doesn't begin running, the gear train is defective and should be replaced.

CHART 3



The Starting Circuit

CONDITION 1: THE TUNER WILL NOT START. RELAY DOES NOT ENERGIZE WHEN THE STATION SELECTOR BAR IS DEPRESSED.

MEASURE THE VOLTAGE BETWEEN THE CHASSIS AND THE SWITCH SIDE OF THE 13M OHM RESISTOR (ILLUS. 90)—(WITH RADIO ON AND AN INPUT OF 6 VOLTS, THIS VOLTAGE MUST BE AT LEAST 180 VOLTS FOR PROPER OPERATION OF THE RELAY.)

- IF

VOLTAGE IS ZERO, check for

1. Open relay winding.
2. Open 13M ohm resistor.
3. Inoperative power supply or short in B voltage line.

VOLTAGE IS LOW check, for

1. Defect in power supply.
2. Low input voltage.

- IF

VOLTAGE APPROXIMATES THE B VOLTAGE, depress the station selector bar and again note the voltage.

- IF

THE VOLTAGE DROPS. (normal drop approximately 65 volts)

Check

1. Relay winding for short or partial short.
(Normal relay resistance from 3200 - 3600 ohms.)
2. Resistor string from station selector bar switch to ground, for possible excessive resistance.
3. Relay Current. If relay doesn't energize with 9.5MA current relay is defective.

- IF

THERE IS NO CHANGE IN VOLTAGE

Check

1. Station selector switch contacts, Illus. 117, for open.
2. Resistor string from station selector bar switch to ground for possible open.

CONDITION 2: THE POINTER COMMENCES SWEEPING ACTION IMMEDIATELY WHEN THE RADIO IS TURNED ON, WITHOUT PREVIOUS DEPRESSION OF THE STATION SELECTOR BAR.

Check for

1. Defective station selector bar switch, (Sticking closed) or a short at the switch terminals.
2. Short to chassis from either end of the 13M ohm resistor (Illus. 90).
3. Short to chassis at Plate (P1) terminal of the 12AU7 tube. (Pin 1)
4. Relay armature stuck in the energized position. (Should return to de-energized position when set is turned off.)

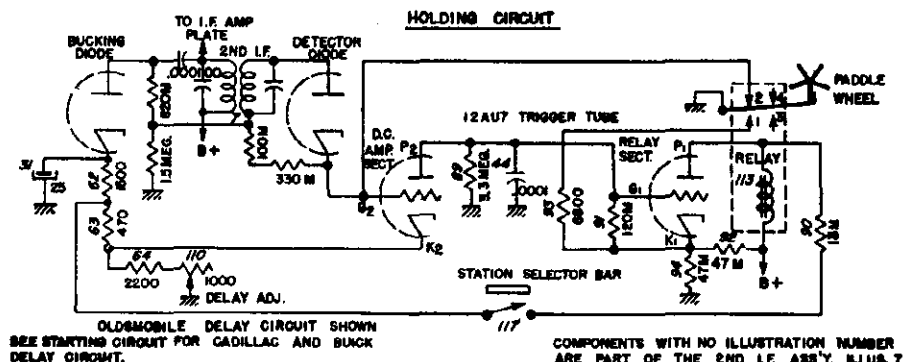
CONDITION 3: POINTER COMMENCES SWEEPING ACTION AFTER WARM UP PERIOD, WITHOUT PREVIOUS DEPRESSION OF THE STATION SELECTOR BAR.

Check for

1. Short from cathode (K1) of 12AU7 (Pin 3) to ground.
2. Contact #1 of the relay switch shorted to ground at all times.

MODEL 6D-620,
Tuner

CHART 4



Holding Circuit

CONDITION: DIAL POINTER STOPS INSTANTLY WHEN STATION SELECTOR BAR IS RELEASED.

I. CHECK TRIGGER TUBE (12AU7). IF OK GO TO NEXT CHECK.

II. MEASURE GRID (G_1) (Pin 2) TO CATHODE (K_1) (Pin 3) VOLTAGE AT 12AU7 TUBE WITH RADIO TURNED ON. (THIS VOLTAGE MUST BE MEASURED WITH A VACUUM TUBE VOLTMETER.)

IF

VOLTAGE READING IS LESS THAN 25 VOLTS — GO TO CHECK III.

IF

VOLTAGE READING IS ABOVE 25 VOLTS check:

- Grid (G_1) to chassis resistance. If 110,000 ohms or less, check:
 - .000100 mfd. condenser (Illus. 44) for short or leakage.
 - P_2 (Pin 6) and G_1 terminals of 12AU7 for possible shorts to chassis.
- D.C. amplifier cathode, (K_2) of 12AU7 (Pin 8), to ground resistance for possible short.
 - Check at station selector switch terminals, Illus. 117, for possible short.
 - Check at D.C. amplifier cathode terminal (K_2) for short to chassis or grid (G_2) terminal. (Pin 7)
- 25 mfd electrolytic, Illus. 31, for short.

III. REPEAT MEASUREMENT MADE IN TEST II, THIS TIME WITH STATION SELECTOR BAR DEPRESSED.

IF

VOLTAGE IS LESS THAN 8 VOLTS, check for:

- Open between P_1 and relay.
- Open 6800 ohm resistor. (Illus. 93)
- Poor relay contact #1.
- Partially shorted relay. (Resistance should be 3200 - 3600 ohms)

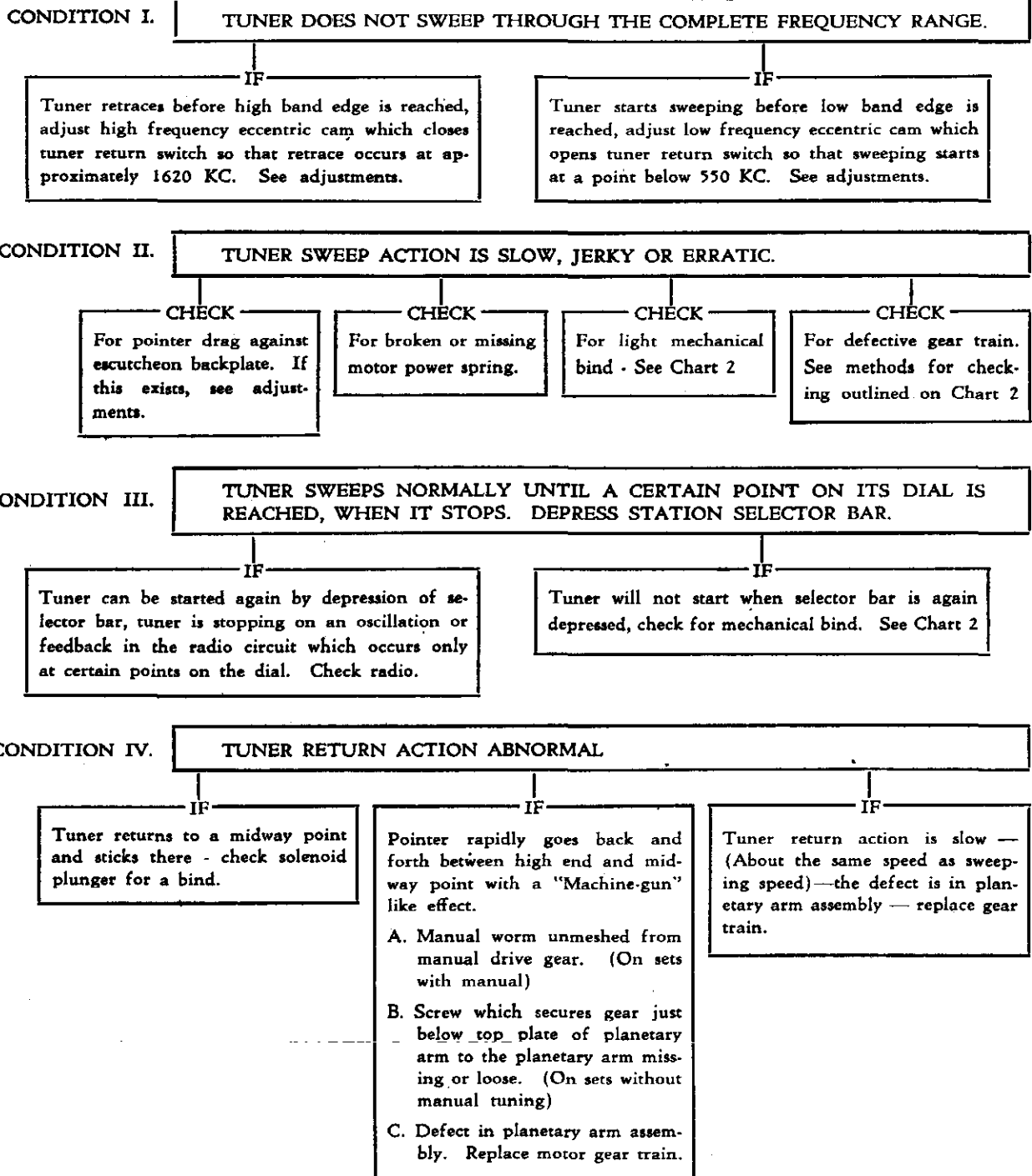
IF

VOLTAGE IS MORE THAN 8 VOLTS, check for:

- Defective detector tube. (Check by substitution. 6R8 - Buick and Oldsmobile, 6AQ7 - Cadillac)
- Leaky .000100 mfd. coupling condenser from I.F. amplifier plate to bucking diode plate. (This part in 2nd I.F. assembly. Check by measuring voltage at orange lead of 2nd I.F. with set turned on. A VTVM reading of more than 3 volts positive with respect to ground indicates a leaky condenser.) Replace 2nd I.F.
- Oscillation in radio. (Check by grounding G_2 and depressing bar. If tuner action is now OK trouble is due to oscillation.) (For oscillation - check AVC filter and screen by-pass condensers.)

CHART 5

Miscellaneous Defects in the Sweep Action of the Tuner

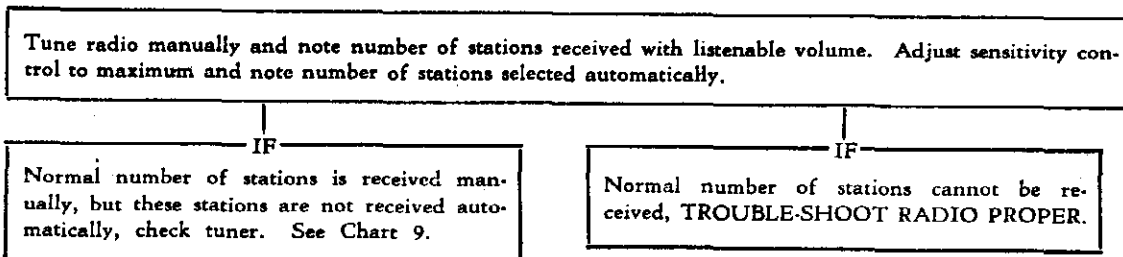


MODEL 6D-620,
Tuner

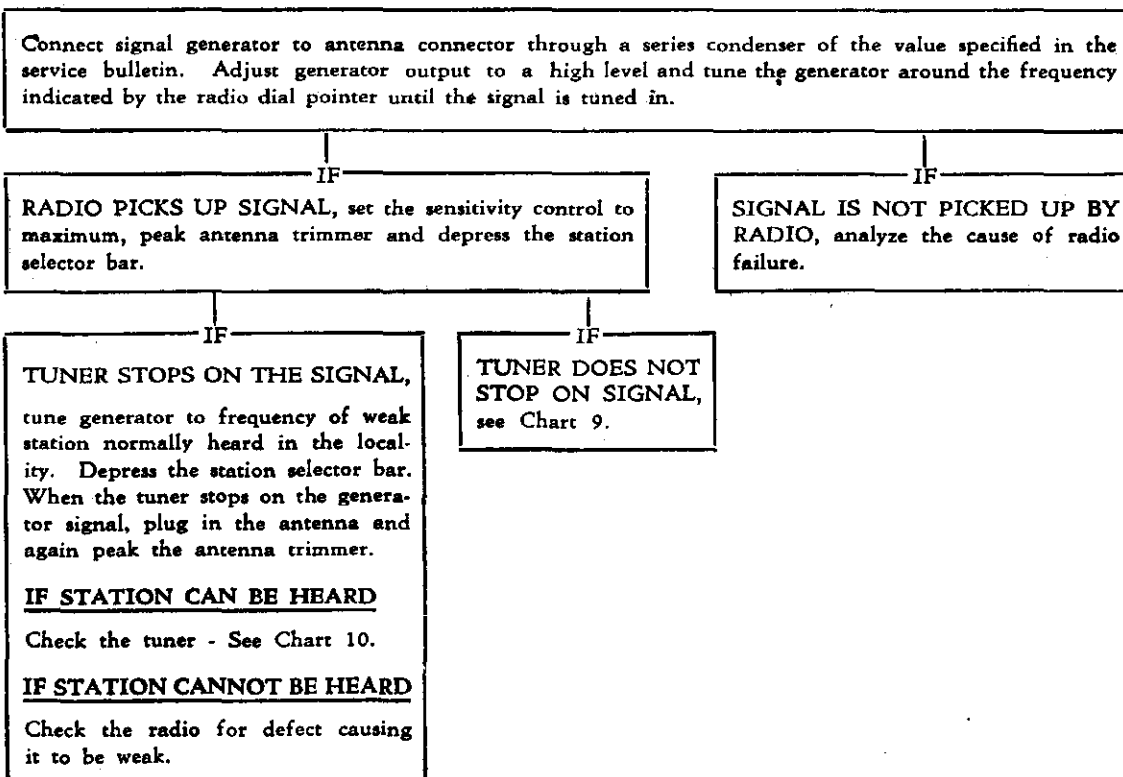
CHART 6

Procedure for Checking Radio Operation Independent of Tuner

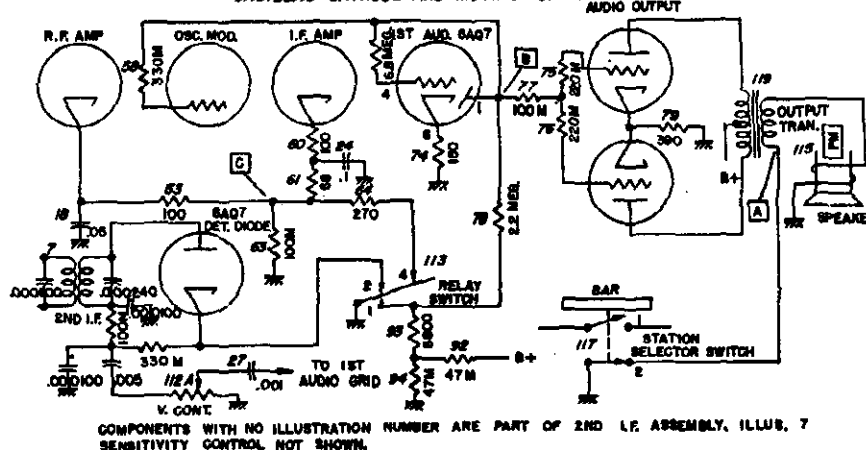
CONDITION I. RADIO HAS MANUAL TUNING KNOB.



CONDITION II. RADIO DOES NOT HAVE MANUAL TUNING.



CADILLAC CATHODE AND MUTING CIRCUITS



Tuner Stops on Signals But No Sound From Speaker

- I. SHORT OUTPUT TRANSFORMER SECONDARY LEAD. GOING TO SELECTOR SWITCH, TO CHASSIS. (POINT A).

SOUND COMES FROM SPEAKER,
find open between transformer sec-
ondary and ground end of muting
section of station selector switch con-
tact 2.

RADIO IS STILL DEAD — go to
check II.

- II. SHORT PIN #1 OF 6AQ7 TUBE TO CHASSIS. (POINT B)

SOUND COMES FROM SPEAKER,
check for open between pin #1 at
6AQ7 and connect #1 of relay switch.

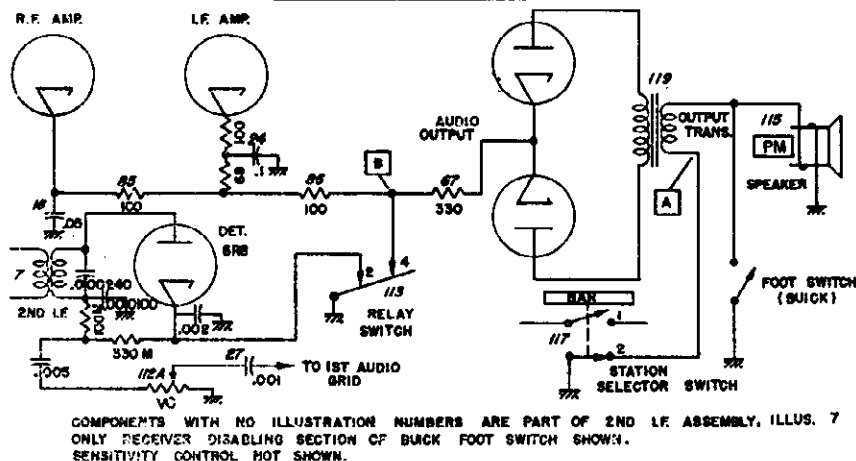
RADIO IS STILL DEAD — go to
check III.

- III. SHORT RF AND IF CATHODE STRING TO CHASSIS. (POINT C)

SOUND COMES FROM THE
SPEAKER, check for open between
cathode string and ground through
relay contact #4.

RADIO IS STILL DEAD, make usual radio checks to localize defective part.

BUICK & OLDSMOBILE CATHODE AND SPEAKER MUTING CIRCUITS



Tuner Stops on Signals But No Sound From Speaker

- I. SHORT TO CHASSIS THE OUTPUT TRANSFORMER SECONDARY LEAD GOING TO SELECTOR SWITCH. (POINT A)

SOUND COMES FROM SPEAKER,
find open between transformer secondary and ground end of muting section of station selector switch. Check for shorted foot switch - (Buick)

RADIO IS STILL DEAD — go to
check II.

- II. SHORT RF, IF, AND OUTPUT CATHODE CIRCUITS TO CHASSIS AT POINT B.

SOUND COMES FROM SPEAKER,
check for open between cathode string
and ground through relay contact #4.

RADIO IS STILL DEAD, make usual radio checks to find defective part.

STOPPING CIRCUIT

I.F. AMP

BUCKING DET.

2ND I.F.

DET.

VOL. CONTROL

12AU7 TRIGGER TUBE

D.C. AMP. SECT.

RELAY SECT.

PADDLE WHEEL

RELAY

TO SENSITIVITY CONTROL

TO SENSITIVITY CONTROL

TUNER RETURN SWITCH

SOLENOID

6V

BAR

117

1

2

TO SPEAKER

STATION SELECTOR SWITCH

COMPONENTS WITH NO ILLUSTRATION NUMBERS ARE PART OF 2ND I.F. ASSEMBLY, ILLUS. 7. OLDSMOBILE DELAY CIRCUIT SHOWN.

I. WITH RADIO OFF, CHECK ENGAGEMENT OF RELAY ARM TO PADDLE WHEEL

Relay arm does not engage paddle wheel—check relay positioning adjustment. (Do not adjust engagement by bending relay arm)

II. WITH TUNER SWEEPING, MOMENTARILY SHORT 12AU7 CATHODE (K₂) (Pin 8) TO GROUND

b. If voltage goes through a large variation corresponding to voltage reading taken across detector load—the bucking detector circuit is defective. Check tube containing bucking diode by substitution. If this does not cure trouble, the 2nd I.F. is probably defective.

4. Open 120 M ohm resistor (Illus. 91) between G_1 and K_1 .

CHART 10

Miscellaneous Defects in the Tuner

SERVICE PARTS INTERCHANGEABILITY

FOR 1950 SIGNAL SEEKING TUNERS

- I. TUNER DOES NOT STOP ON THE PEAK OF SIGNALS.
- Check 2nd IF—See Chart 9.
 - Check relay drop out current. It should not drop out on current above 3.7 MA.
 - Check setting of delay adjustment — See set bulletin.
- II. TUNER MOMENTARILY STOPS, THEN STARTS AGAIN OR WILL STOP ONLY ON STRONG STATIONS.
- This can be caused by improper timing of the relay contacts. To check this, temporarily connect a 10 mfd electrolytic condenser of suitable voltage rating from the terminal on the sensitivity control to which the yellow lead connects, to chassis. If this cures the trouble the defect is due to improper relay point timing and the relay should be replaced.
- III. TUNER STOPS ON STATIONS DURING THE TUNER'S RETURN.
- The sensitivity control circuit is not being opened during the return cycle, because
 - There is a short to chassis at the sensitivity control terminal of the tuner return switch, or at the sensitivity control.
 - The cathode string is shorted to chassis elsewhere.
- IV. THE TUNER WILL JAR OFF STATION ON ROUGH ROADS.
- On sets having manual tuning this is due to a defective friction clutch in the planetary arm assy. - Replace the gear train.
- V. THE RADIO DOES NOT MUTE IN BETWEEN STATIONS.
- This is caused either by a lack of muting voltage appearing on the audio grids due to an open between the oscillator grid and the muting line or a defective audio tube. (Check the Cadillac muting circuit on Chart 7)
- VI. TUNER STOPS ONLY ON STRONG SIGNALS AND THE RADIO IS OK.
- Heater to cathode leakage of the 6R8 tube in case of Buick or Oldsmobile; the 6AQ7 tube in the case of Cadillac. This can be checked by increasing the "A" voltage. If situation gets worse with increased "A" voltage, change 6R8 or 6AQ7 tube, whichever applies.
 - Sensitivity control not at maximum sensitivity.
- VII. TUNER STOPS ON SIGNALS BUT THE SOUND IS DISTORTED.
- Short pin 3 of 6R8 or pin 2 of 6AQ7 (Cadillac) to chassis. If distortion clears, find open between detector cathode and ground through relay contact #2.

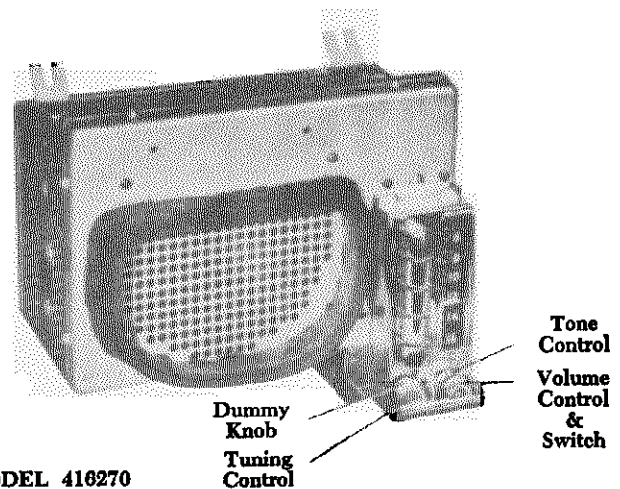
	Buick 980899	Cadillac 7258865	Oldsmobile 982582 982583
Temp. Comp. Cond.	7257567	7257567 (Same)	7257567 (Same)
Dual Trimmer	7242454	7242454 (Same)	7242454 (Same)
Tuning Core	7259201	7259201 (Same)	7259201 (Same)
2nd I.F.	1219602	1219602 (Same)	1219602 (Same)
1st I.F.	1219508	1219508 (Same)	1219508 (Same)
Osc. Coil	7259184	7259184 (Same as Buick)	7259665
Ant. & R.F. Coil	7257979	7257979 (Same)	7257979 (Same)
Det-Aud Tube	6R8	6AQ7GT	6R8 (Same as Buick)
Trigger Tube	12AU7	12AU7 (Same)	12AU7 (Same)
Power Spring	7259055	7259055 (Same)	7259055 (Same)
Selector Bar Switch	7259012	7259012 (Same)	7259012 (Same)
Tuner Return Switch	7259011	7259011 (Same)	7259011 (Same)
Motor Gear Train	1219610	1219610 (Same)	1219610 (Same)
Relay	7259009	7259009 (Same)	7259009 (Same)
Solenoid	1219661	1219661 (Same)	1219661 (Same)

MODEL 416270,
Packard**GENERAL****MOUNTING**—All 1950 Packard Cars.**TUBES**—Seven, Plus Rectifier.**SPEAKER** — 7" Round, Permanent Magnet.**TUNING**—Manual and 5 P.B. Mechanical.**ANTENNA TRIMMER COMPENSATION**—0.000060 - 0.000085 Mfd.**Tuning Range**—540 - 1600 KC.**PUSHBUTTON SET-UP**

Pull pushbutton down and out. Tune in desired station manually. Push button all the way in.

ALIGNMENT PROCEDURE:

MODEL 416270



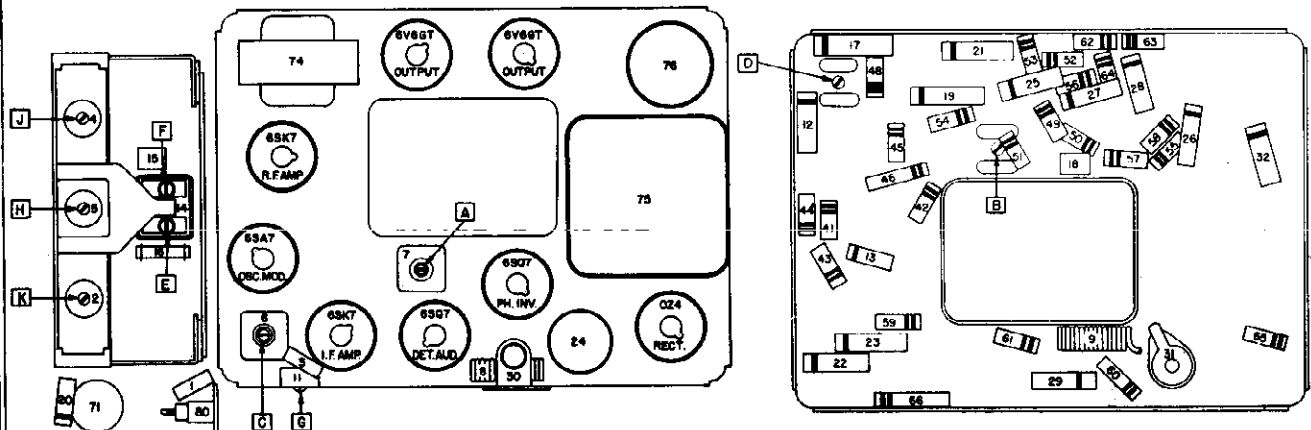
Output Meter Connection-----Across Voice Coil
Signal Generator Return-----To Chassis
Dummy Antenna-----In Series With Generator
Volume Control-----Maximum Volume
Tone Control-----Treble
Generator Output-----Minimum for Readable Indication

Steps	Series Condenser or Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence for Max. Output
1	0.1 Mfd.	6SA7 Grid (Pin #8)	260 KC	High Freq. Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Freq. Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Gen. Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	High Freq. Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Gen. Signal	L**

*Before making this adjustment check the mechanical setting of the oscillator core "H." The slotted end of the core should be 1 25/32" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form). If adjustment is necessary, be sure to first dissolve the glyptal seal on the core studs. Core adjustments are made from the mounting end of the coil form with an insulated screwdriver, and core studs should be re-sealed with glyptal or household cement after alignment.

**"L" is the pointer adjustment screw on the pointer connecting link (See tuner drawing). Adjust so pointer reads 1000 KC (on the "10" calibration mark).

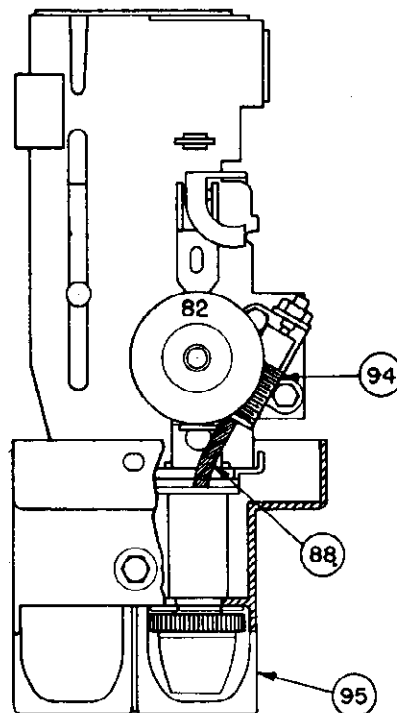
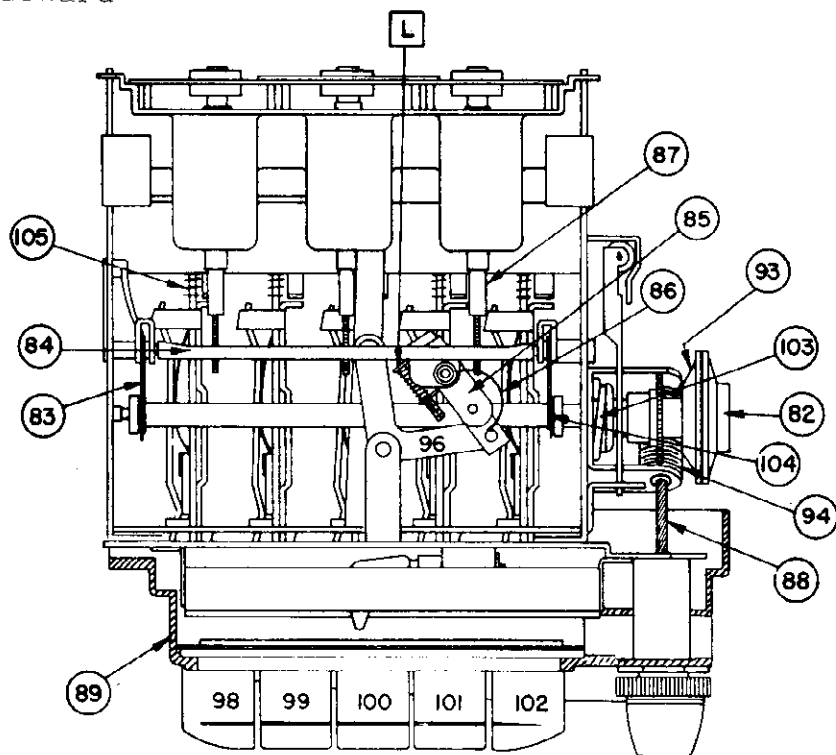
With the radio installed and the car antenna plugged in adjust antenna trimmer "G" (See sticker on case) for maximum volume with the radio turned to a weak station near 1400 KC.



PARTS LAYOUT - TUBE VIEW

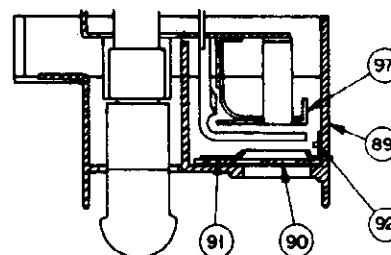
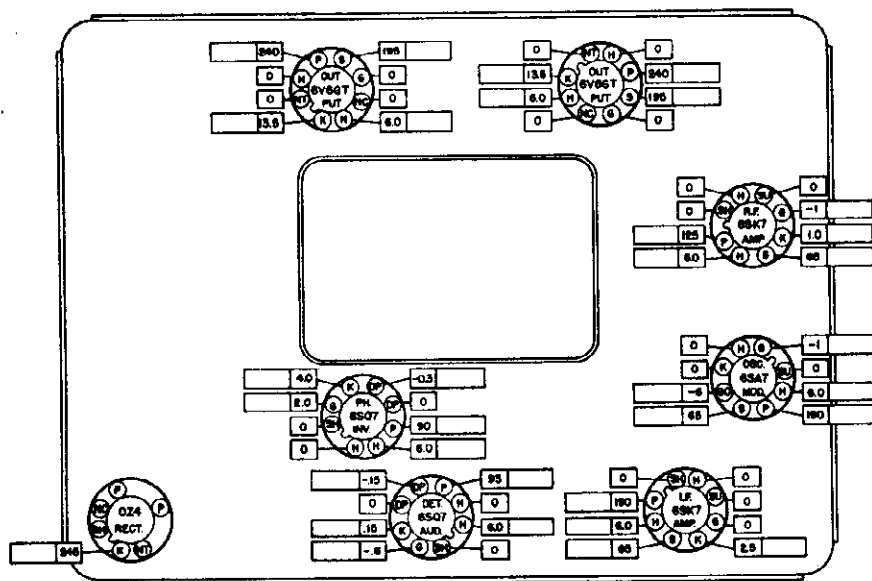
PARTS LAYOUT - CHASSIS VIEW

MODEL 416270,
Packard



TUBE SOCKET VOLTAGE CHART

TUNER



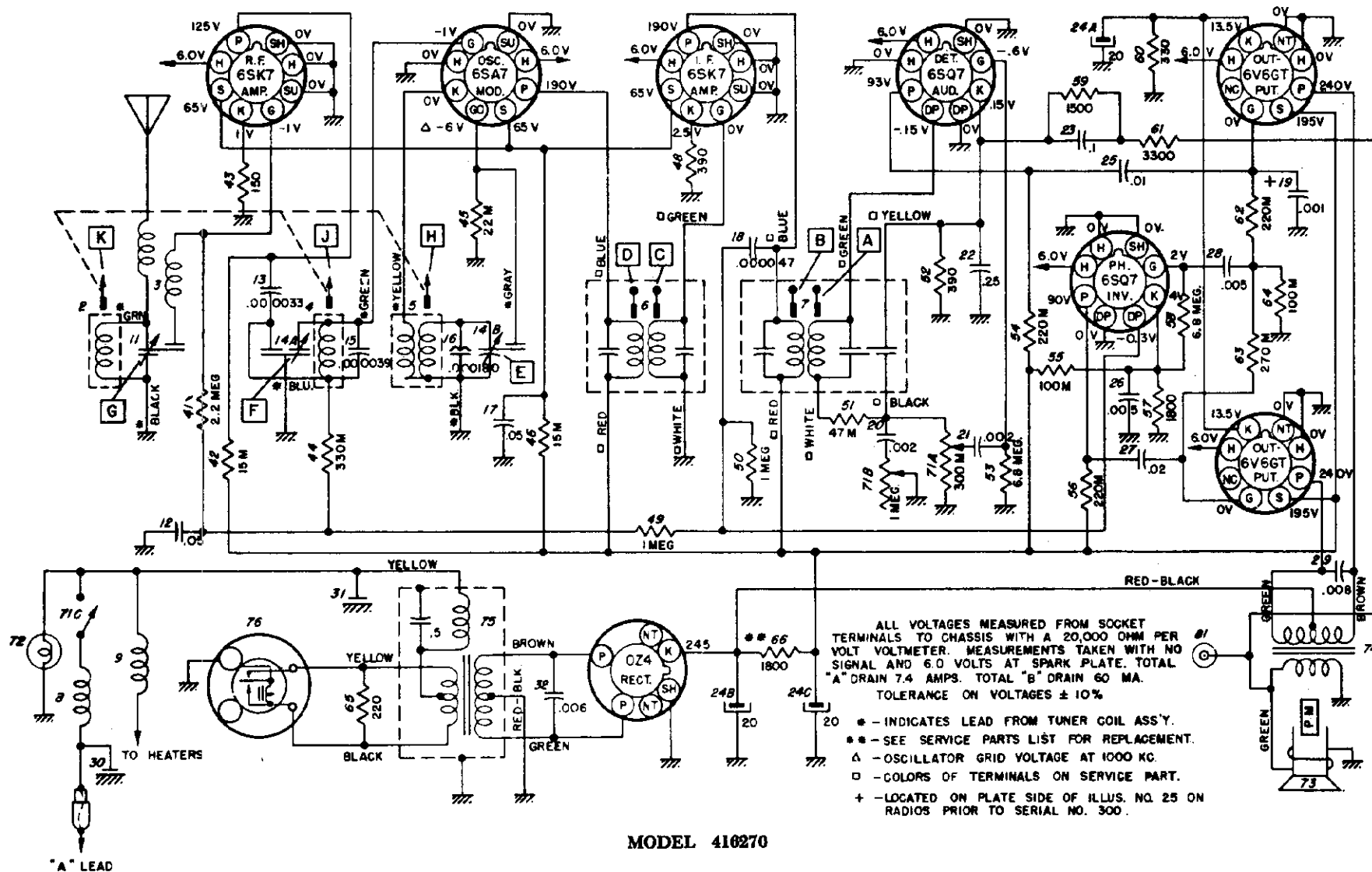
ESCUTCHEON CROSS SECTION

The tube socket voltages, as measured at the factory and under the conditions shown on the schematic diagram, are shown above. The blank spaces are provided so that the serviceman may fill in actual voltage readings as taken with his own equipment. A normal operating radio should be used for these measurements.

Voltmeter resistance-----Ohms Per Volt.

Readings taken with-----Volts at Spark Plate.

All voltages measured from socket terminals to chassis.



MODEL 416270,
Packard

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
ELECTRICAL PARTS			
Coils			
1	7258502	7258502	Antenna Series Choke
2	7258914	7258914	Antenna
3	7240251	7240251	Antenna Spark Choke
4	7258914	7258914	R. F.
5	7259687	7259687	Oscillator
6	7258849	1219508	1st I. F. Assembly
7	7258850	1219509	2nd I. F. Assembly
8	7259620	7259620	"A" Spark Choke
9	7259619	1217846	Hash Choke
Condensers			
11	7259597	7259597	Antenna Trimmer
12	7236842	E503	.05 Mfd. 200 V. Tubular
13	7258222	G330	.000033 Mfd. Molded
14	7242454	7242454	Dual Trimmer
14A			R. F. Section
14B			Oscillator
15	7258223	G390	.000039 Mfd. Ceramic
16	7257424	7257424	.000180 Mfd. Compensating
17	7258125	E503	.05 Mfd. 400 V Tubular
18	1219551	G470	.000047 Mfd. Molded
19	1218883	E102	.001 Mfd. 600 V Tubular
20	7237836	E202	.002 Mfd. 600 V Tubular
21	7237836	E202	.002 Mfd. 600 V Tubular
22	1211202	E254	.25 Mfd. 200 V. Tubular
23	7238789	E104	.1 Mfd. 200 V Tubular
24	7240724	M908	Electrolytic
24A			20 Mfd. 25 V
24B			20 Mfd. 400 V
24C			20 Mfd. 400 V
25	1209309	E103	.01 Mfd. 400 V Tubular
26	7230767	E502	.005 Mfd. 600 V Tubular
27	7238882	E203	.02 Mfd. 400 V Tubular
28	7230767	E502	.005 Mfd. 600 V Tubular
29	1219594	H802	.008 Mfd. 800 V Tubular
30	7259600	7259600	Spark Plate-"A" Connector Choke Assy.
31	1217848	1217848	Chassis Plate Assy.
32	7240906	H602	.006 Mfd. 1600 V Tubular
Resistors			
41	1211147	A225	2.2 Megohms ½ W Insulated
42	7237595	B153	15,000 Ohms 1 W Insulated
43	1213220	A151	150 Ohms ½ W Insulated
44	7240732	A334	330,000 Ohms ½ W Insulated
45	1211192	A223	22,000 Ohms ½ W Insulated
46	7233653	C153	15,000 Ohms 2 W Insulated
48	1213482	A391	390 Ohms ½ W Insulated
49	7238873	A105	1 Megohm ½ W Insulated
50	7238873	A105	1 Megohm ½ W Insulated
51	7240731	A473	47,000 Ohms ½ W Insulated
52	1213482	A391	390 Ohms ½ W Insulated
53	7241937	A685	6.8 Megohms ½ W Insulated
54	1214555	A224	220,000 Ohms ½ W Insulated
55	1213270	A104	100,000 Ohms ½ W Insulated
56	1214555	A224	220,000 Ohms ½ W Insulated
57	7241616	7241616	1800 Ohms ½ W Insulated
58	7241937	A685	6.8 Megohms ½ W Insulated
59	1213237	A152	1500 Ohms ½ W Insulated
60	7233773	C331	330 Ohms 1 W Wire Wound
61	1213481	A332	3300 Ohms ½ W Insulated
62	1214555	A224	220,000 Ohms ½ W Insulated
63	1214556	A274	270,000 Ohms ½ W Insulated
64	1213270	A104	100,000 Ohms ½ W Insulated
65	7237994	B221	220 Ohms 1 W Insulated
66	1214573	B562	1800 Ohms 2 W Wire Wound (or Replace with 2700 Ohms 2 W and 5600 Ohms 1 W in Parallel)
		C272	

MODEL 116270,
Packard

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
		Tubes	
	7237751	5229	6SK7
	7237752	5222	6SA7
	7237753	5231	6SQ7
	1213793	5241	6V6GT
	1211924	5003	OZ4
		Miscellaneous Electrical	
71	7259601	7259601	Control - Volume, Tone, & Switch
71A			Volume Control
71B			Tone Control
71C			Switch
72	125588	55	Lamp - Dial
73	7259608	7259608	Speaker P. M.
74	7259615	7259615	Transformer - Output
75	7259614	6060	Transformer - Power
76	7239124	8542	Vibrator - Non-Synchronous
		MECHANICAL PARTS	
		(Chassis)	
80	7239475	7239475	Socket - Antenna
	1219662	1219662	Socket - Dial Light
	7236279	7236279	Socket - Octal Tube
81	1216747	1216747	Socket - Rear Seat Speaker
	7239125	7239125	Socket - Vibrator
		(Tuner)	
	147481	147481	Ball Bearings (10)
82	7258072	7258072	Clutch Disc-Driven
83	7258203	7258203	Connecting Link-Core Bar
84	7258210	7258210	Core Guide Bar
85	7256271	7256271	Connecting Link - Pointer
86	7255992	7255992	Spring - Pointer Connecting Link
87	7258468	7258468	Core - Iron Tuning
88	7259606	7259606	Drive Shaft - Manual
89	7259570	7259570	Escutcheon Assy.
90	7259569	7259569	Dial Glass
91	7259567	7259567	Dial Backplate
92	7259565	7259565	Dial Retainer (2)
	7259633	7259633	Filter - Dial Light
93	7259539	7259539	Gear and Bushing - Clutch
94	7259556	7259556	Gear and Bracket - Worm
95	7259568	7259568	Guard - Control Knob
	7259656	7259656	Knob - Control
	7259550	7259550	Knob - Tone & Dummy
96	7259584	7259584	Pointer Assembly
	1219663	1219663	Pointer Tip Plate
97	7259676	7259676	Pointer Backplate
98	1219664	1219664	Push Button and Slide No. 1
99	1219665	1219665	Push Button and Slide No. 2
100	1219666	1219666	Push Button and Slide No. 3
101	1219667	1219667	Push Button and Slide No. 4
102	1219668	1219668	Push Button and Slide No. 5
103	7258756	7258756	Spring - Clutch
104	7257415	7257415	Spring - Core Bar Connecting Link
105	7259540	7259540	Spring - Slide Return
		INSTALLATION PARTS	
	7259642	7259642	"A" Lead and Fuse Connector
	7259644	7259644	Capacitor - Generator
	7259643	7259643	Capacitor - Ignition Coil
	7259646	7259646	Distributor Suppressor
	147685	147685	Fuse 14 Amps

MODEL 416387,
Packard

SUBJECT: SERVICE INSTRUCTIONS - PACKARD MODEL 416387

GENERAL

MOUNTING—All 24 Series Packard Cars.

TUBES—Seven, Plus Rectifier.

SPEAKER — 6" x 9" Elliptical, Permanent Magnet.

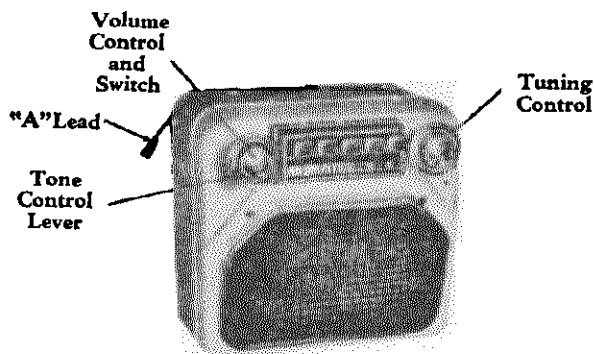
TUNING—Manual and 5 P.B. Mechanical.

ANTENNA TRIMMER COMPENSATION—0.000050 - 0.000090 Mfd.

TUNING RANGE—540 - 1600 KC.

PUSHBUTTON SET-UP

Pull pushbutton to the left and out. Tune in desired station manually. Push button all the way in.



MODEL 416387

ALIGNMENT PROCEDURE:

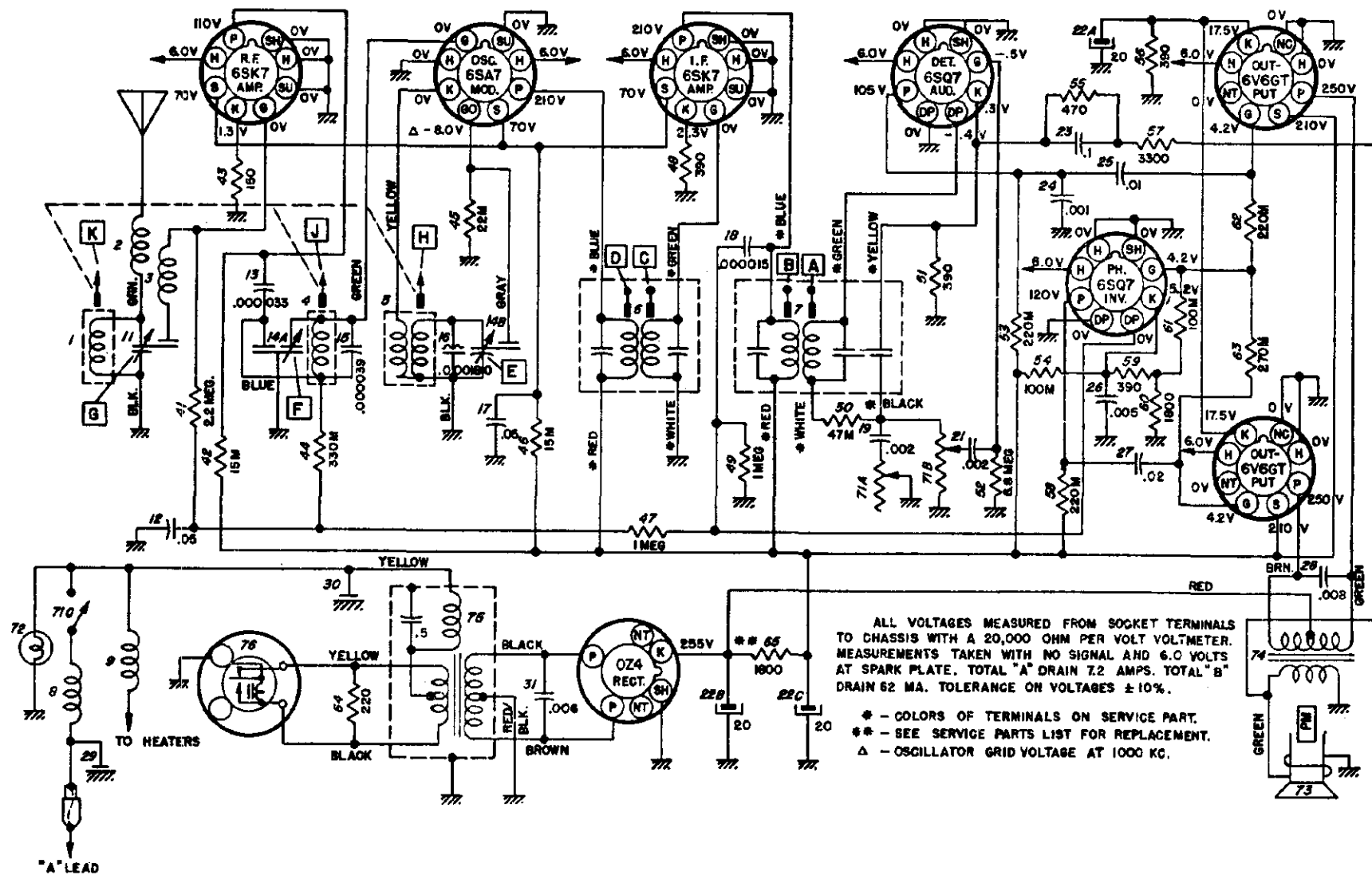
Output Meter Connection Across Voice Coil
Signal Generator Return To Chassis
Dummy Antenna In Series With Generator
Volume Control Maximum Volume
Tone Control Treble
Generator Output Minimum for Readable Indication

Steps	Series Condenser or Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence for Max. Output
1	0.1 Mfd.	6SA7 Grid (Pin #8)	260 KC	High Freq. Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Freq. Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Gen. Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	High Freq. Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Gen. Signal	L**

*Before making this adjustment check the mechanical setting of the oscillator core "H." The slotted end of the core should be 1 25/32" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form). If adjustment is necessary, be sure to first dissolve the glyptal seal on the core studs. Core adjustments are made from the mountings end of the coil form with an insulated screwdriver, and core studs should be re-sealed with glyptal or household cement after alignment.

**"L" is the pointer adjustment screw on the pointer connecting link (See tuner drawing). Adjust so pointer reads 1000 KC (on the "10" calibration mark).

With the radio installed and the car antenna plugged in adjust antenna trimmer "G" (See sticker on case) for maximum volume with the radio turned to a weak station between 600 and 1000 KC.



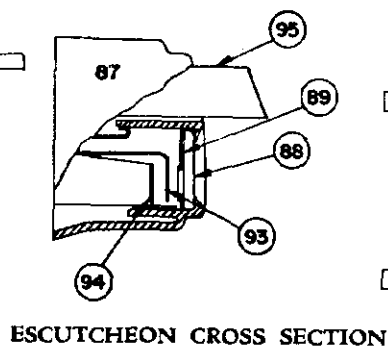
MODEL 416387

MODEL 410387,
Packard

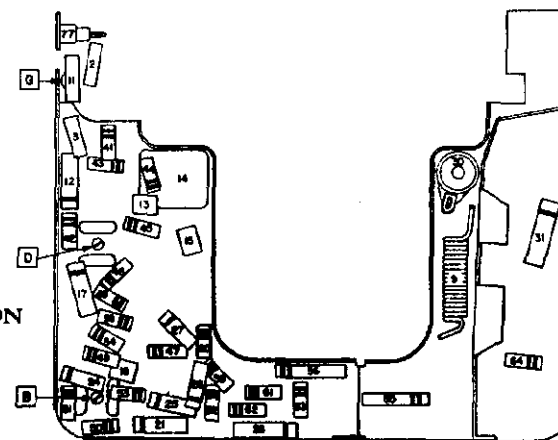
TUBE SOCKET VOLTAGE CHART

The tube socket voltages, as measured at the factory and under the conditions shown on the schematic diagram, are shown

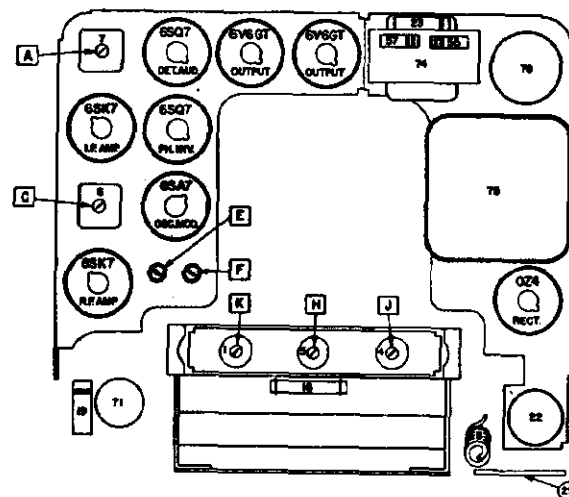
All voltages measured from socket terminals to chassis.



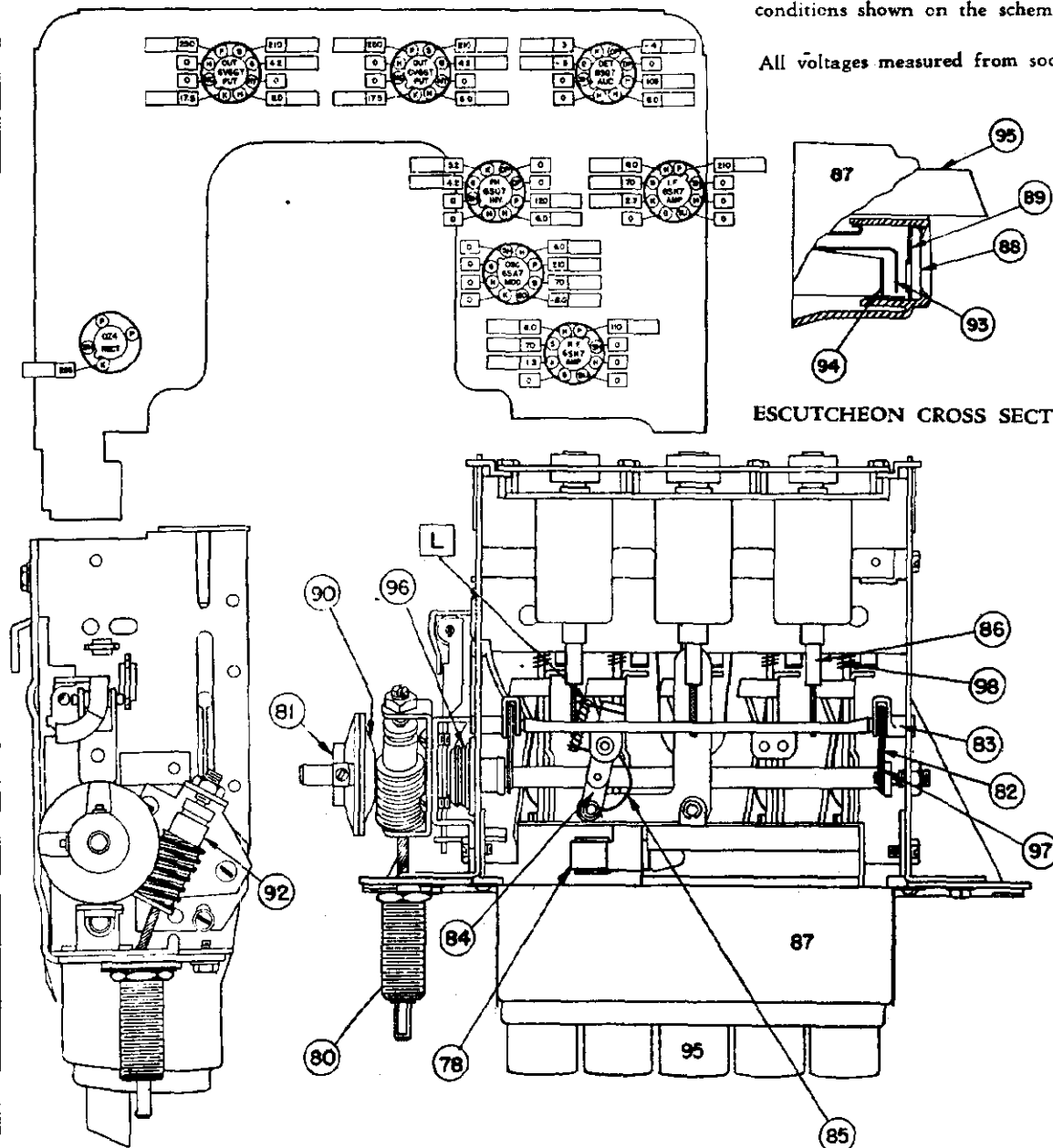
ESCUTCHEON CROSS SECTION



PARTS LAYOUT — CHASSIS VIEW



PARTS LAYOUT — TUBE VIEW



MODEL 416387,
Packard

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
ELECTRICAL PARTS			
Coils			
1	7258914	7258914	Antenna
2	7255738	7255738	Antenna Series Choke
3	7240251	7240251	Antenna Spark Choke
4	7258914	7258914	R.F.
5	7259687	7259687	Oscillator
6	7258849	1219508	1st I.F.
7	7258850	1219509	2nd I.F.
8	7259187	7259187	"A" Spark Choke
9	7237846	1217846	Hash Choke
Condensers			
11	7260158	7260158	Antenna Trimmer
12	7236842	E-503	.05 mfd. 200V Tubular
13	7258222	G-330	.000033 mfd. Molded
14	7242454	7242454	Dual Trimmer
14A			R.F. Section
14B			Oscillator
15	7258221	G-390	.000039 mfd. Molded
16	7257424	7257424	.000180 mfd. Compensating
17	7258125	E-503	.05 mfd. 400V Tubular
18	7230955	G-150	.000015 mfd. Molded
19	7237836	E-202	.002 mfd. 600V Tubular
21	7237836	E-202	.002 mfd. 600V Tubular
22	7260065	7260065	Electrolytic
22A			20 mfd. 25V
22B			20 mfd. 400V
22C			20 mfd. 400V
23	7238789	E-104	.1 mfd. 200V Tubular
24	1218883	E-102	.001 mfd. 600V Tubular
25	1209309	E-103	.01 mfd. 400V Tubular
26	7230767	E-502	.005 mfd. 600V Tubular
27	7238882	E-203	.02 mfd. 400V Tubular
28	1219594	H-802	.008 mfd. 800V Tubular
29	7241259	7241259	Spark Plate
30	1217848	1217848	Chassis Plate
31	7240906	H-602	.006 mfd. 1600V Tubular
Resistors			
41	1211147	A-225	2.2 megohms ½ W Insulated
42	7237595	B-153	15,000 ohms 1 W Insulated
43	1213220	A-151	150 ohms ½ W Insulated
44	7240732	A-334	330,000 ohms ½ W Insulated
45	1211192	A-223	22,000 ohms ½ W Insulated
46	7233653	C-153	15,000 ohms 2 W Insulated
47	7238873	A-105	1 megohm ½ W Insulated
48	1213482	A-391	390 ohms ½ W Insulated
49	7238873	A-105	1 megohm ½ W Insulated
50	7240731	A-473	47,000 ohms ½ W Insulated
51	1213482	A-391	390 ohms ½ W Insulated
52	7241937	A-685	6.8 megohms ½ W Insulated
53	1214555	A-224	220,000 ohms ½ W Insulated
54	1213270	A-104	100,000 ohms ½ W Insulated
55	1213486	A-471	470 ohms ½ W Insulated
56	1219690	1219690	390 ohms 2 W Wire Wound
57	1213481	A-332	3300 ohms ½ W Insulated
58	1214555	A-224	220,000 ohms ½ W Insulated
59	1213482	A-391	390 ohms ½ W Insulated
60	7241616	7241616	1800 ohms ½ W Insulated
61	1213270	A-104	100,000 ohms ½ W Insulated
62	1214555	A-224	220,000 ohms ½ W Insulated
63	1214556	A-274	270,000 ohms ½ W Insulated
64	1219738	B-221	220 ohms 1 W Insulated
65	1214573	{ C-272	1800 ohms 2 W Wire Wound (or replace with
		{ B-562	2700 ohms 2 W and 5600 ohms 1 W in parallel)

MODEL 416387,
Packard

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
Tubes			
	7237751	5229	6SK7
	7237752	5222	6SA7
	7237753	5231	6SQ7
	1213793	5241	6V6GT
	1211924	5003	0Z4
Miscellaneous Electrical			
71	7260139	7260139	Control - Volume, Tone and Switch
71A			Volume Control
71B			Tone Control
71C			Switch
72	187189	44	Light - Dial
73	7260362	7260362	Speaker - 6 x 9 p. m.
74	7260167	7260167	Transformer - Output
75	7259375	7255881	Transformer - Power
76	7239124	8542	Vibrator - Non-Synchronous

MECHANICAL PARTS

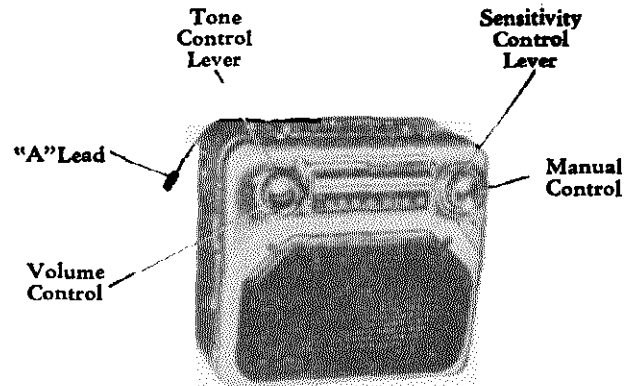
Chassis			
77	7256742	7256742	Socket - Antenna
78	1219747	1219747	Socket - Dial Light
	7236279	7236279	Socket - Octal Tube
	7239125	7239125	Socket - Vibrator
Tuner			
	147481	147481	Ball Bearings (10)
80	7260163	7260163	Bushing & Manual Drive Shaft Assy.
	7260162	7260162	Manual Drive Shaft
81	7258072	7258072	Clutch Disc - Driven
82	7258203	7258203	Connecting Link - Core Bar
83	7260403	7260403	Core Guide Bar
84	7256271	7256271	Connecting Link - Pointer
85	7255992	7255992	Spring - Pointer Connecting Link
86	7258468	7258468	Core - Iron Tuning
87	7260325	7260325	Escutcheon Assy.
88	7260141	7260141	Dial
89	7260125	7260125	Dial Backplate
	7259494	7259494	Retainer Spring - Left Hand
	7259495	7259495	Retainer Spring - Right Hand
90	7256495	7256495	Gear & Bushing - Clutch
92	7260212	7260212	Gear & Bracket - Worm
93	7260199	7260199	Pointer Assembly
94	7260265	7260265	Pointer Backplate
95	1219200	1219200	Push Button and Slide Assy.
96	7258756	7258756	Spring - Clutch
97	7257415	7257415	Spring - Core Bar Connecting Link
98	7255984	7255984	Spring - Slide Return

INSTALLATION PARTS

7260148	7260148	"A" Lead and Fuse Holder Assy.
7259644	7259644	Condenser - Generator
7259643	7259643	Condenser - Ignition Coil
7259646	6007	Distributor Suppressor
147685	147685	Fuse - 14 Amps
7260187	7260187	Knob - Control
7260147	7260147	Lever - Tone Control
7260149	7260149	Trimplate - Control Knob

MODEL 416394,
Packard**GENERAL****MOUNTING**—All 24 Series Packard Cars.**TUBES**—Seven, Plus Rectifier and Trigger.**SPEAKER** — 6" x 9" Elliptical, Permanent Magnet.**TUNING**—Electronic and Manual.**ANTENNA TRIMMER COMPENSATION** — 0.000058 - 0.000090 Mfd.**TUNING RANGE**—540 - 1600 KC.**PUSHBUTTON SET-UP**

No pushbutton set-up is necessary. However, the number of stations on which the tuner will stop can be controlled by the use of the Sensitivity Control.



MODEL 416394

SIGNAL SEEKING TUNER ALIGNMENT PROCEDURE:

NOTE: When aligning the signal seeker tuner type radio, be sure to use a vacuum tube voltmeter as indicated and be sure to follow the alignment sequence given—(Notice that the primary of the 2nd I.F. is aligned first.)

Output Meter Connection VTVM From [2] To Chassis (see parts layout page 2)
 Generator Return Receiver Chassis
 Dummy Antenna In Series With Generator
 Volume Control Maximum Volume
 Sensitivity Control Maximum Sensitivity
 Tone Control Treble
 Generator Output Not To Exceed 2 Volts at VTVM

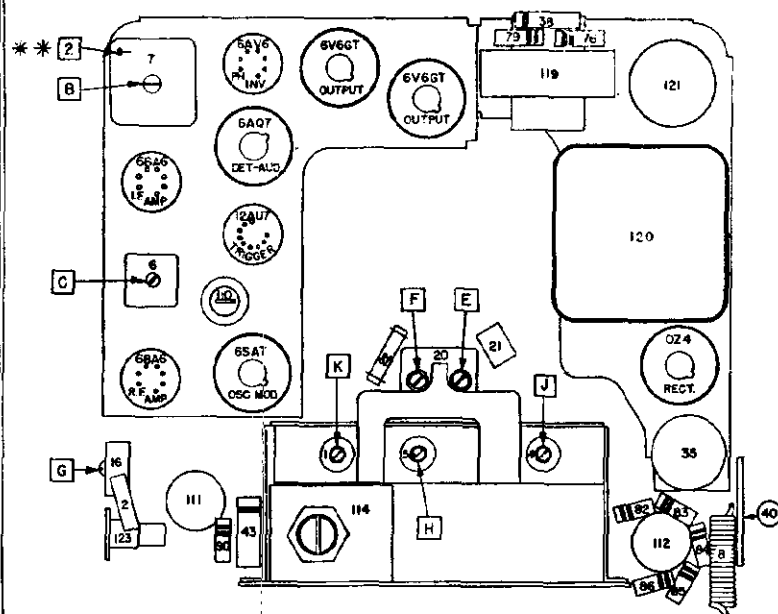
Step	Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence for Max. Output
1	0.1 Mfd.	6SA7 Grid (Pin 8)	260 KC	High Freq. Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Freq. Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	600 KC	Signal Gen. Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	Signal Gen. Signal	F, G
5	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Gen. Signal	**L

*Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be $1\frac{3}{8}$ " from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with an insulated screwdriver. (It will be necessary to steady the core guide bar by applying a downward pressure at the antenna core end of the bar while making these adjustments.) If this adjustment is necessary, first dissolve the glyptal seal on the core stud and be sure to re-seal after making the adjustment.

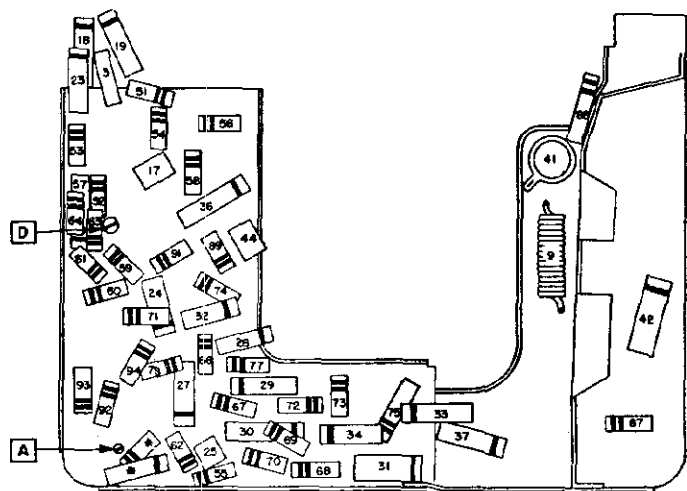
**"L" is the pointer adjustment screw on the end of the core guide bar—adjust so pointer reads 1000 KC.

With the radio installed and the antenna plugged in, adjust antenna trimmer "G" (See sticker on case) for maximum volume with the radio tuned to a weak station from 600 to 1000 KC.

MODEL 410394,
Packard



PARTS LAYOUT — TUBE VIEW

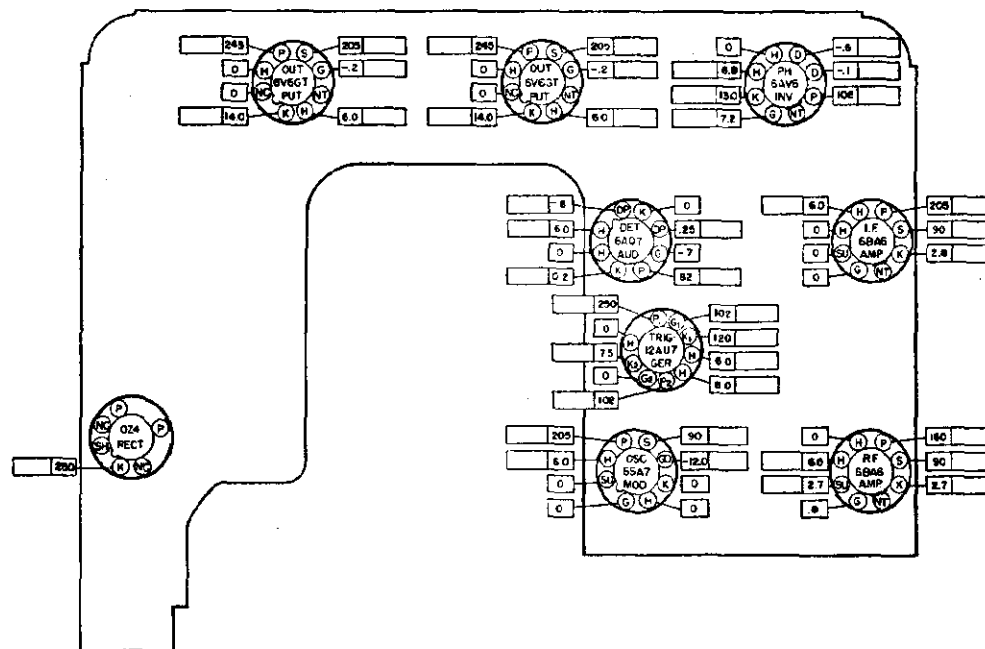


PARTS LAYOUT — CHASSIS VIEW

*Condenser and resistor are included in the 2nd I.F. Coil Assembly.

**Connect a VTVM from this point to ground for output indications during alignment.

TUBE SOCKET VOLTAGE CHART



The tube socket voltages, as measured at the factory and under the conditions shown on the schematic diagram, are shown above. The blank spaces are provided so that the serviceman may fill in actual voltage readings as taken with his own equipment. A normal operating radio should be used for these measurements.

Voltmeter resistance..... Ohms Per Volt.

Readings taken with..... Volts At Spark Plate.

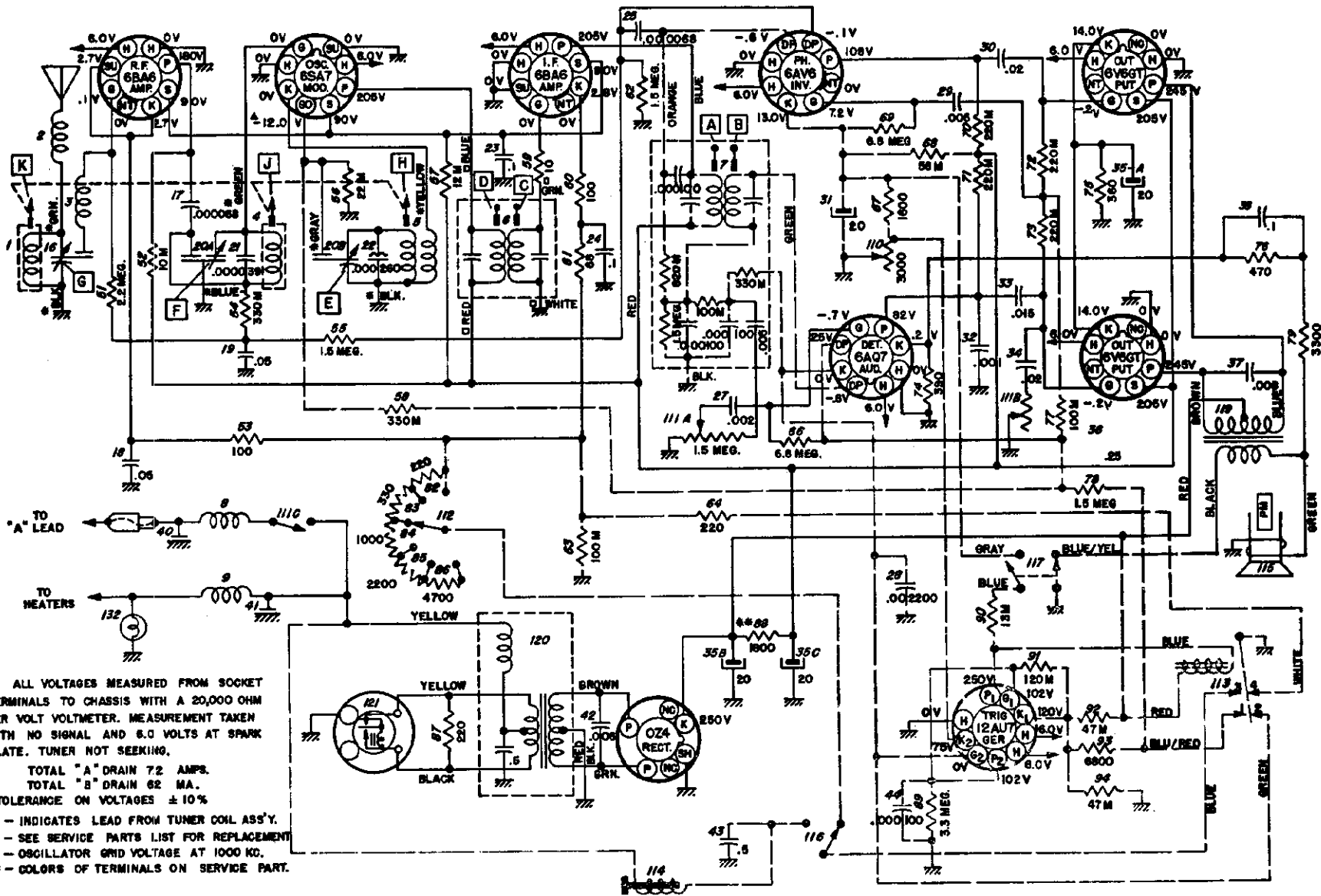
All voltages measured from socket terminals to chassis.

TUNER ADJUSTMENT PROCEDURE:

CATHODE DELAY ADJUSTOR (Illustration #110) (This adjustment should be necessary only if the delay adjustor has been replaced or the adjustment has definitely been proven to be faulty).

With exactly 6.0 volts on the spark plate, set the delay adjustor (Illus. 110) so that the voltage at K₂ of the 12AU7 trigger tube (Pin #8) is exactly 7.5 volts.

NOTE: For all other tuner adjustments, see Bulletin 6D-620.



ALL VOLTAGES MEASURED FROM SOCKET TERMINALS TO CHASSIS WITH A 20,000 OHM PER VOLT VOLTMETER. MEASUREMENT TAKEN WITH NO SIGNAL AND 8.0 VOLTS AT SPARK PLATE. TUNER NOT SEEKING.

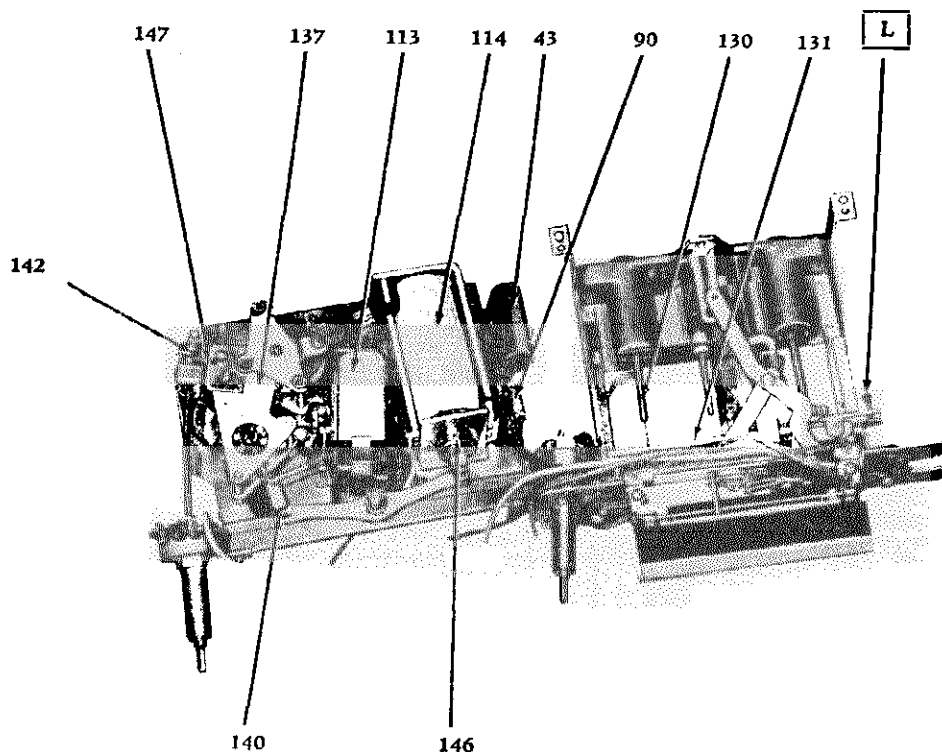
TOTAL "A" DRAIN 7.2 AMPS.
TOTAL "B" DRAIN 62 MA.
TOLERANCE ON VOLTAGES $\pm 10\%$

* - INDICATES LEAD FROM TUNER COIL ASS'Y.
** - SEE SERVICE PARTS LIST FOR REPLACEMENT
Δ - OSCILLATOR GRND VOLTAGE AT 1000 KC.
□ - COLORS OF TERMINALS ON SERVICE PART.

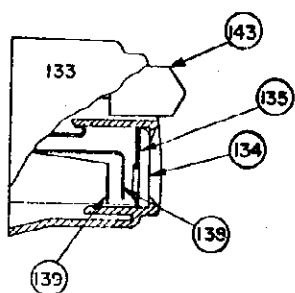
--- TUNER CIRCUIT COMPONENTS

MODEL 416394

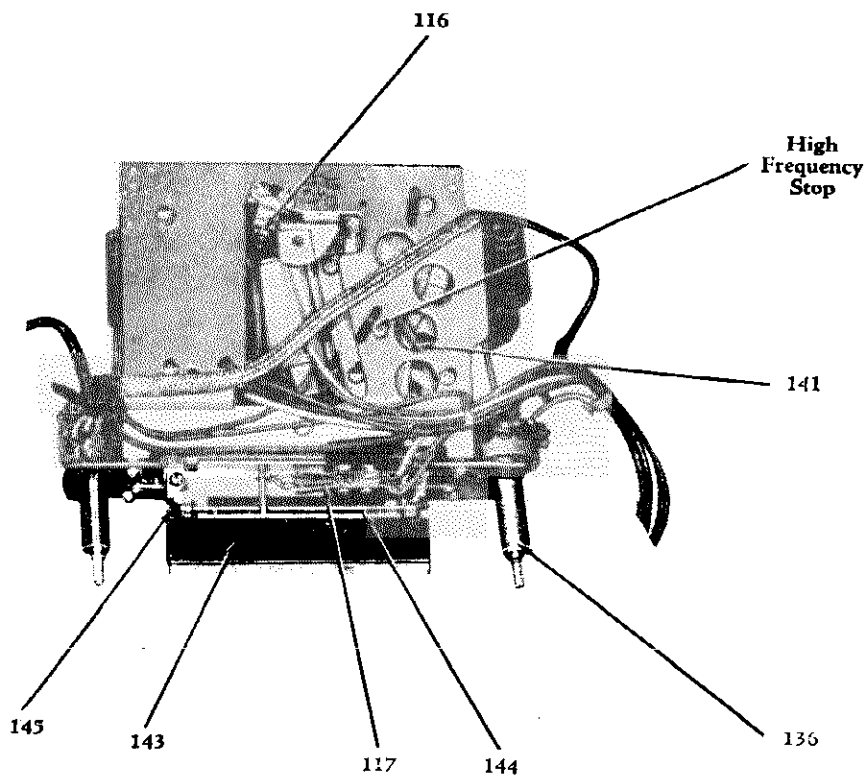
MODEL 4163914,
Packard



TUNER — OPEN



ESCUTCHEON
CROSS-SECTION



TUNER

MODEL 416394,
Packard

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
ELECTRICAL PARTS			
Coils			
1	7257979	7257979	Antenna
2	7255738	7255738	Antenna Series Choke
3	7240251	7240251	Antenna Spark Choke
4	7257979	7257979	R. F.
5	7259184	7259184	Oscillator
6	7259790	1219508	1st I. F.
7	7259290	1219602	2nd I. F.
8	7259187	7259187	"A" Spark Choke
9	7256931	1217846	Hash Choke
Condensers			
16	7260158	7260158	Antenna Trimmer
17	1219550	G 680	.000068 mfd. Molded
18	1210697	E 503	.05 mfd. 200V Tubular
19	1210697	E 503	.05 mfd. 200V Tubular
20	7242454	7242454	Dual Trimmer
20A			R. F. Section
20B			Oscillator Section
21	7258221	G 390	.000039 mfd. Molded
22	7257567	7257567	.000260 mfd. Compensating
23	7238788	E 104	.1 mfd. 400V Tubular
24	7238789	E 104	.1 mfd. 200V Tubular
25	1219550	G 680	.000068 mfd. Molded
27	7237836	E 202	.002 mfd. 600V Tubular
28	1219553	1219553	.0022 mfd. 600V Tubular
29	7230767	E 502	.005 mfd. 600V Tubular
30	7238882	E 203	.02 mfd. 400V Tubular
31	1219660	1219660	20 mfd. 50V Electrolytic
32	1218883	E 102	.001 mfd. 600V Tubular
33	7237719	7237719	.015 mfd. 600V Tubular
34	7238882	E 203	.02 mfd. 400V Tubular
35	7240724	M 908	Electrolytic
35A			20 mfd. 25 Volt
35B			20 mfd. 400 Volt
35C			20 mfd. 400 Volt
36	1209817	E 254	.25 mfd. 200V Tubular
37	1219594	H 802	.008 mfd. 800V Tubular
38	7238789	E 104	.1 mfd. 200V Tubular
40	7241259	7241259	Spark Plate
41	1217848	1217848	Chassis Plate
42	7240906	H 602	.006 mfd. 1600V Tubular
43	1219511	E 504	.5 mfd. 100V Tubular
44	1219499	G 101	.000100 mfd. Molded
Resistors			
51	1211147	A 225	2.2 Megohms 1/2W Insulated
52	1211085	B 103	10,000 Ohms 1W Insulated
53	1213217	A 101	100 Ohms 1/2W Insulated
54	7240732	A 334	330,000 Ohms 1/2W Insulated
55	1213283	A 155	1.5 Megohms 1/2W Insulated
56	1211192	A 223	22,000 Ohms 1/2W Insulated
57	1212491	1212491	12,000 Ohms 2W Insulated
58	1214557	A 334	330,000 Ohms 1/2W Insulated
59	1215107	A 100	10 Ohms 1/2W Insulated
60	1213217	A 101	100 Ohms 1/2W Insulated
61	1215558	1215558	68 Ohms 1/2W Insulated
62	1213283	A 155	1.5 Megohms 1/2W Insulated
63	1213270	A 104	100,000 Ohms 1/2W Insulated
64	7237835	A 221	220 Ohms 1/2W Insulated
66	7241937	A 685	6.8 Megohms 1/2W Insulated
67	1219504	1219504	1600 Ohms 1/2W Insulated
68	1213509	1213509	56,000 Ohms 1W Insulated
69	7241937	A 685	6.8 Megohms 1/2W Insulated
70	1214555	A 224	220,000 Ohms 1/2W Insulated
71	1214555	A 224	220,000 Ohms 1/2W Insulated
72	1214555	A 224	220,000 Ohms 1/2W Insulated
73	1214555	A 224	220,000 Ohms 1/2W Insulated
74	1213482	A 391	390 Ohms 1/2W Insulated
75	7234563	7234563	360 Ohms 1W Wire Wound
76	1213486	A 471	470 Ohms 1/2W Insulated
77	1213270	A 104	100,000 Ohms 1/2W Insulated
78	1213283	A 155	1.5 Megohm 1/2W Insulated
79	1213481	A 332	3300 Ohms 1/2W Insulated
82	7237835	A 221	220 Ohms 1/2W Insulated
83	1213224	A 331	330 Ohms 1/2W Insulated
84	1213235	A 102	1,000 Ohms 1/2W Insulated
85	1214545	A 222	2200 Ohms 1/2W Insulated
86	1214547	A 472	4700 Ohms 1/2W Insulated

MODEL 416394,
Packard

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
Resistors (Continued)			
87	7237994	B 221	220 Ohms 1W Insulated
88	1214573	{ C 272	1800 Ohm 2W Wire Wound (Use 2700 Ohm.
89	1214564	{ B 562	2W and 5600 Ohm 1W in parallel)
90	7231539	A 335	3.3 Megohm 1/2W Insulated
91	1213271	7231539	13,000 Ohms 1W Insulated
92	1216157	1213271	120,000 Ohms 1/2W Insulated
93	1216154	B 473	47,000 Ohms 1W Insulated
94	1216157	1216154	6800 Ohms 1W Insulated
		B 473	47,000 Ohms 1W Insulated

Tubes

1217690	5252	6BA6
7237752	5222	6SA7
1218506	5262	6AV6
1219484	5278	6AQ7GT
1213793	5241	6V6GT
1211924	5003	OZ4
1219485	5328	12AU7

MISCELLANEOUS ELECTRICAL

	7260328	7260328	"A" Lead and Fuse Holder Assy. (Male)
110	7259408	7259408	Adjustor - Cathode Delay
111	7260230	7260230	Control - Volume - Tone - Switch
111A			Volume Control
111B			Tone Control
111C			Switch
112	7260222	7260222	Control - Sensitivity
113	7259009	7259009	Relay
114	7259010	1219661	Solenoid
115	7260362	7260362	Speaker
116	7259011	7259011	Switch - Tuner Return
117	7259012	7259012	Switch - Station Selector
119	7260006	7260006	Transformer - Output
120	7259375	7255881	Transformer - Power
121	7239124	8542	Vibrator

MECHANICAL PARTS

Chassis

123	7256742	7256742	Antenna Connector
	7236279	7236279	Socket - Octal Tube
	7259307	7259307	Socket - 9 Pin Miniature Tube
	7258073	7258073	Socket - 7 Pin Miniature Tube
	7239125	7239125	Socket - Vibrator
	1219747	1219747	Socket - Dial Light

Tuner

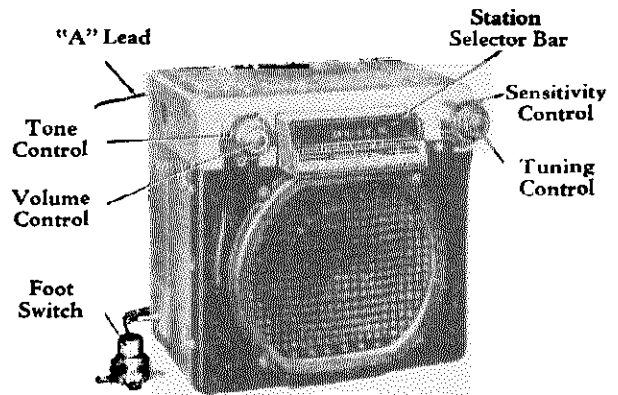
130	7259201	7259201	Core - Tuning
131	7259178	7259178	Core Guide Bar
132	187189	44	Dial Light
133	7260373	7260373	Escutcheon Assy.
134	7260262	7260262	Dial
135	7260125	7260125	Dial Backplate
	7259494	7259494	Retainer Spring - L. H.
	7259495	7259495	Retainer Spring - R. H.
136	7260357	7260357	Manual Drive Shaft
137	7259197	1219610	Motor Gear Train Assy.
138	7260309	7260309	Pointer Assembly
139	7260501	7260501	Pointer Backplate
140	7259100	6047	Spring Clip
141	7259055	7259055	Spring - Motor Power
142	7259207	7259207	Spring - Worm Anti-rattle
	1219751	1219751	Station Selector Bar Pkg.
	7256121	7256121	"C" Washer
143	7260223	7260223	Station Selector Bar and Shaft
144	7259122	7259122	Retainer Spring
145	7259111	7259111	Spring
	7259125	7259125	Switch Operating Ring
			Toggle Plate
146	7259164	7259164	Solenoid Plunger
147	7259026	7259026	Worm Gear and Bracket Assy.

INSTALLATION PARTS

	7260148	7260148	"A" Lead and Fuse Holder Assy.
	7259644	7259644	Condenser - Generator
	7259643	7259643	Condenser - Ignition
	7259646	6007	Distributor - Suppressor
	147685	147685	Fuse - 14 Amps.
	7260187	7260187	Knob - Control
	7260147	7260147	Lever - Tone and Sensitivity
	7260218	7260218	Trimplate - Sensitivity
	7260219	7260219	Trimplate - Tone

MODEL 980899,
Buick**GENERAL****MOUNTING**—All 1950 Buick Cars.**TUBES**—Seven, Plus Rectifier.**SPEAKER**—8" Round, Permanent Magnet.**TUNING**—Manual and Electronic.**ANTENNA TRIMMER COMPENSATION**—For Antennas Between
0.000072 - 0.000088 Mfd.**TUNING RANGE**—550 - 1600 KC.**PUSH BUTTON SET-UP PROCEDURE**

No push button set-up is necessary. However, the number of stations on which the tuner will stop can be controlled through use of the Sensitivity Control.



MODEL 980899

SIGNAL SEEKING TUNER ALIGNMENT PROCEDURE

NOTE: When aligning the signal seeker tuner type radio, be sure to use a vacuum tube voltmeter as indicated and be sure to follow the alignment sequence given—(Notice that the primary of the 2nd I. F. is aligned first.)

Output Meter Connection VTVM from **2** to chassis (see parts layout)
 Generator Return Receiver Chassis
 Dummy Antenna In series with generator
 Volume Control Maximum Volume
 Tone Control Treble
 Generator Output Not to exceed 2 volts at VTVM

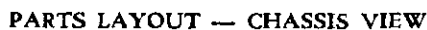
Step	Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence For Max. Output
1	0.1 mfd	6SA7 Grid (Pin 8)	260 KC	*High Frequency Stop	A, B, C, D
2	0.000082 mfd	Antenna Connector	1615 KC	High Frequency Stop	**E, F, G
3	0.000082 mfd	Antenna Connector	600 KC	Signal Generator Signal	J, K
4	0.000082 mfd	Antenna Connector	1615 KC	Signal Generator Signal	F, G
5	0.000082 mfd	Antenna Connector	1000 KC	Signal Generator Signal	***L

*To tune to high frequency, put a 0.070" feeler gauge (or bare #13 wire) in slot against the high frequency stop. Depress station selector bar and allow the planetary arm to run against the feeler gauge. Turn the radio off and then back on.

**Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be $1\frac{1}{2}$ " from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with an insulated screwdriver. (It will be necessary to steady the core guide bar while making these adjustments. This can be done by applying a downward pressure on the guide bar at the antenna coil end.) If this adjustment is necessary, first dissolve the glyptal seal on the core stud and be sure to re-seal after making the adjustment.

***"L" is the pointer adjustment screw on the end of the core guide bar—adjust so pointer reads 1000 KC.

With the radio installed and the antenna plugged in, adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station near 1400 KC (see sticker on case.)

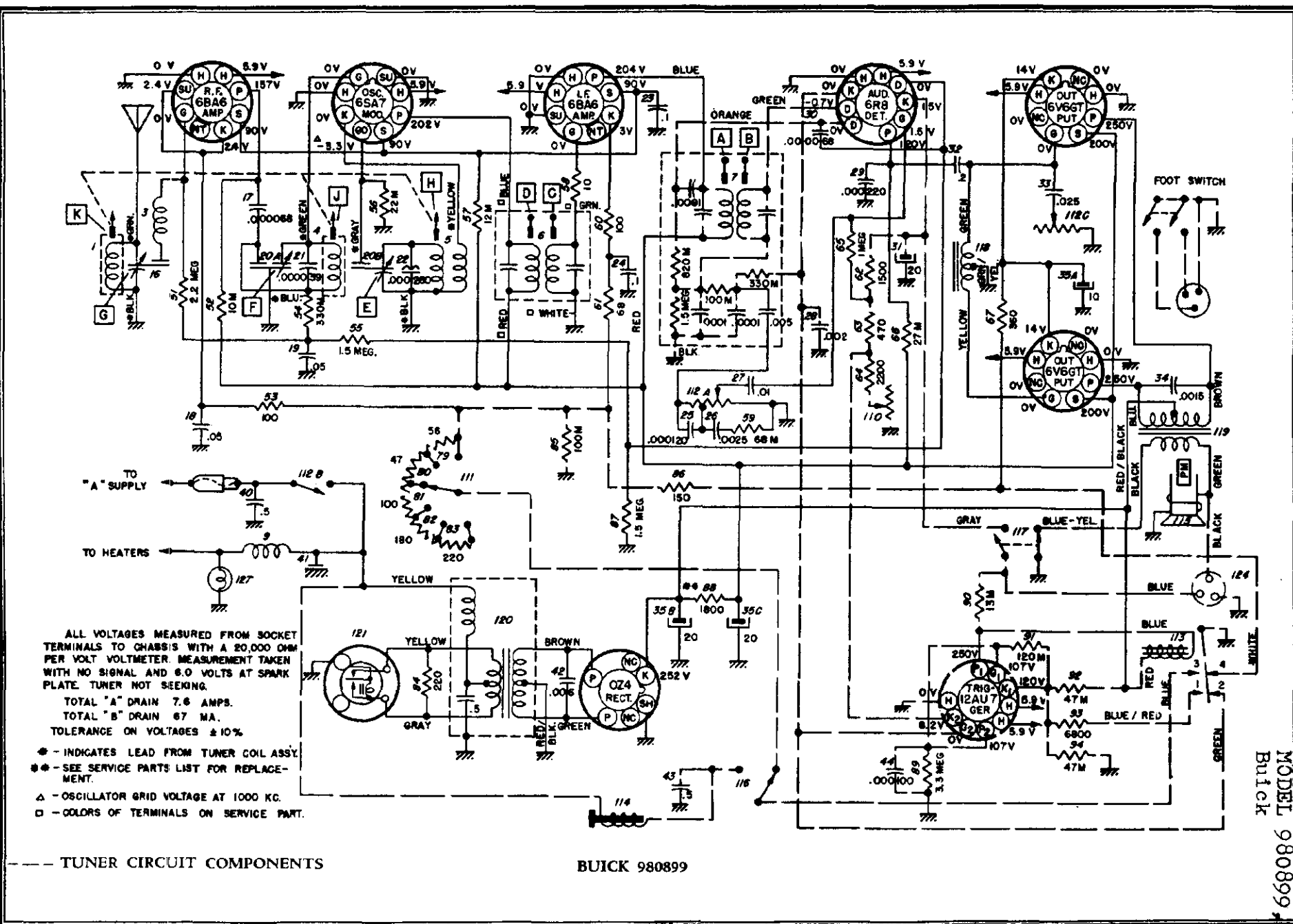


****Connect VTVM between this point and ground for output indications during alignment procedure.**

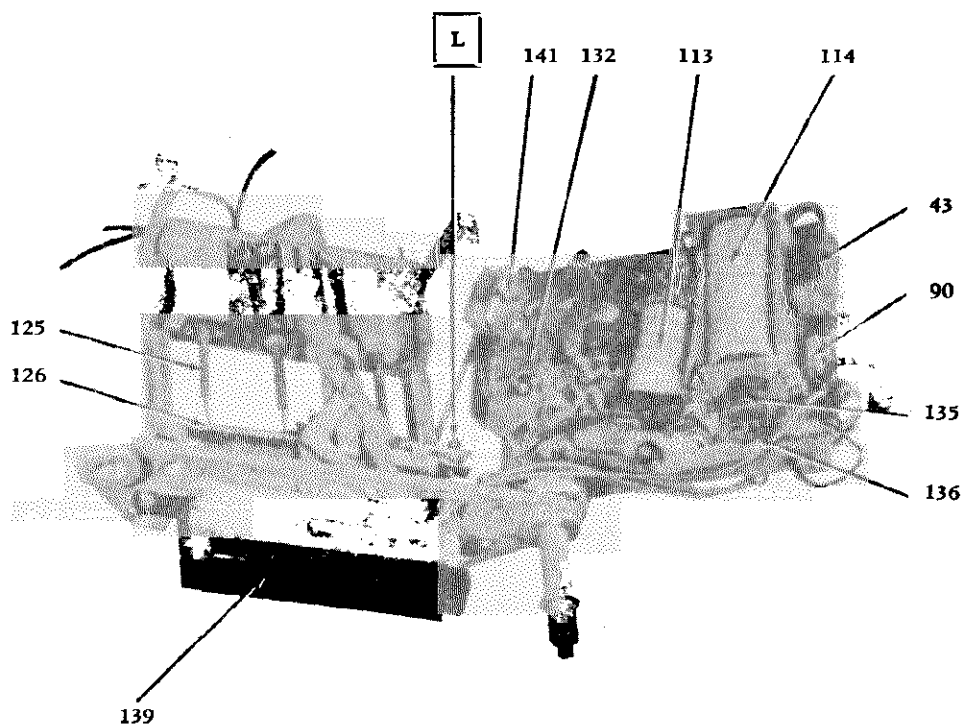
All voltages measured from socket terminals to chassis.

1. Disconnect antenna and turn radio on.
2. Allow set to warm up.
3. Momentarily depress station selector bar.
4. Set voltage at K_2 of the 12AU7 trigger tube (Pin #8) to 8.0 volts by adjusting Illustration 110 while the tuner is seeking and with exactly 6.0 volts at the spark plate.

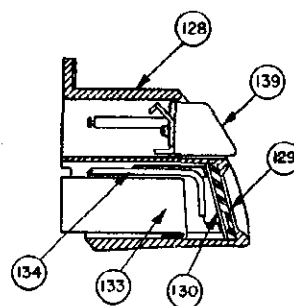
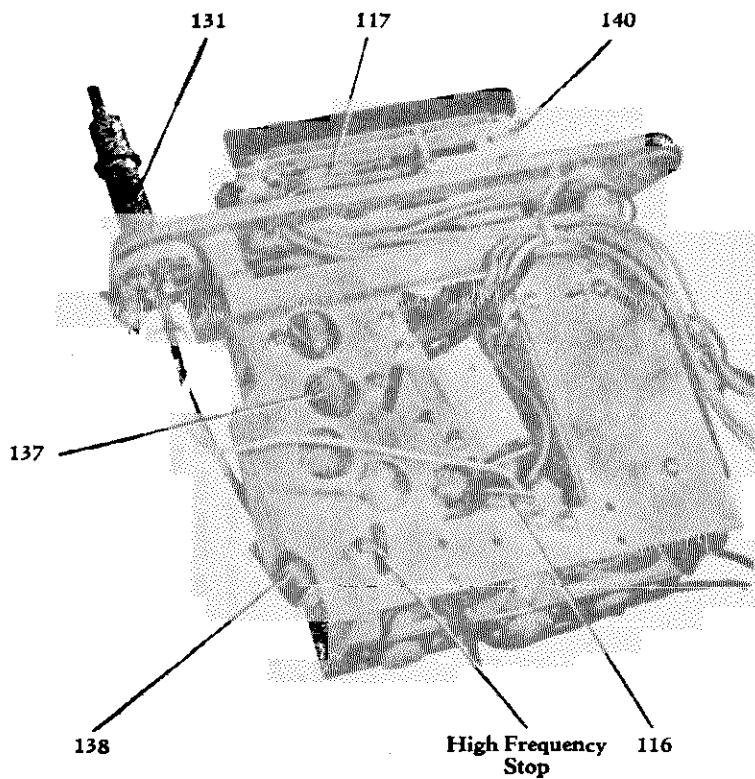
NOTE: For all other tuner adjustments, see Bulletin 6D-620.



MODEL 980399,
Buick



TUNER UNFOLDED



ESCUTCHEON
CROSS-SECTION

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
ELECTRICAL PARTS			
Coils			
1	7257979	7257979	Antenna
3	7240251	7240251	Antenna Spark Choke
4	7257979	7257979	R.F.
5	7259184	7259184	Oscillator
6	7258849	1219508	1st I.F.
7	7259350	1219602	2nd I.F.
9	7240690	1217846	Hash Choke
Condensers			
16	7259308	7259308	Antenna Trimmer
17	1219550	G 680	.000068 mfd Mica
18	7236842	E 503	.05 mfd 200 V Tubular
19	7236842	E 503	.05 mfd 200 V Tubular
20	7242454	7242454	Dual Trimmer
20A			RF Section
20B			Oscillator Section
21	7258221	G 390	.000039 mfd Ceramic
22	7257567	7257567	.000260 mfd Compensating
23	7238788	E 104	.1 mfd 400 V Tubular
24	7238789	E 104	.1 mfd 200 V Tubular
25	7240577	7240577	.000120 mfd Mica
26	7240578	7240578	.0025 mfd 400 V Tubular
27	7237957	E 103	.01 mfd 400 V Tubular
28	7237836	E 202	.002 mfd 600 V Tubular
29	7238792	G 221	.000220 mfd Mica
30	1219550	G 680	.000068 mfd Mica
31	1219660	1219660	20 mfd 50 V Electrolytic
32	7240579	E 204	.2 mfd 400 V Tubular
33	1211232	1211232	.025 mfd 400 V Tubular
34	7236134	7236134	.0015 mfd 800 V Tubular
35	7259128	7259128	Electrolytic
35A			10 mfd 100 V
35B			20 mfd 400 V
35C			20 mfd 400 V
40	7236621	E 504	.5 mfd 200 V Tubular
41	1217848	1217848	Chassis Plate Condenser
42	7240906	H 602	.006 mfd 1600 V Tubular
43	1219511	E 504	.5 mfd 100 V Tubular
44	7239184	G 101	.000100 mfd Mica
Resistors			
51	1211147	A 225	2.2 Megohms ½ W Insulated
52	1211085	B 103	10,000 Ohms 1 W Insulated
53	1213217	A 101	100 Ohms ½ W Insulated
54	7240732	A 334	330,000 Ohms ½ W Insulated
55	1211142	A 155	1.5 Megohms ½ W Insulated
56	1211192	A 223	22,000 Ohms ½ W Insulated
57	1212491	1212491	12,000 Ohms 2 W Insulated
58	1215107	A 100	10 Ohms ½ W Insulated
59	1213844	A 683	68,000 Ohms ½ W Insulated
60	1213217	A 101	100 Ohms ½ W Insulated
61	1215558	1215558	68 Ohms ½ W Insulated
62	1219488	1219488	1500 Ohms ½ W Insulated
63	1219487	1219487	470 Ohms ½ W Insulated
64	1214545	A 222	2200 Ohms ½ W Insulated
65	1213282	A 105	1 Megohm ½ W Insulated
66	7236080	B 273	27,000 Ohms 1 W Insulated
67	7234563	7234563	360 Ohms 1 W (Wire Wound)
79	1214540	1214540	56 Ohms ½ W Insulated
80	1213489	A 470	47 Ohms ½ W Insulated
81	1213217	A 101	100 Ohms ½ W Insulated
82	1215559	1215559	180 Ohms ½ W Insulated
83	7237835	A 221	220 Ohms ½ W Insulated
84	7237994	B 221	220 Ohms 1 W Insulated
85	1211118	A 184	100,000 Ohms ½ W Insulated
86	1213220	A 151	150 Ohms ½ W Insulated
87	1211142	A 155	1.5 Megohms ½ W Insulated
88	1214573	{ C272 B562	1,800 Ohms 2 W Wire Wound (or replace with 2700 Ohms 2 W and 5600 Ohms 1 W in parallel)
89	1214564	A 335	3.3 Megohms ½ W Insulated
90	7231539	7231539	13,000 Ohms 1 W Insulated
91	1213271	1213271	120,000 Ohms ½ W Insulated
92	1216157	B 473	47,000 Ohms 1 W Insulated
93	1216154	1216154	6800 Ohms 1 W Insulated
94	1216157	B 473	47,000 Ohms 1 W Insulated

PAGE 21-42 UNITED MOTORS

MODEL 980899,
Buick

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
			Tubes
	1211924	5003	0Z4
	1213793	5241	6V6GT
	1219496	5541	6R8
	1217690	5252	6BA6
	1219485	5328	12AU7
	7237752	5222	6SA7
			Miscellaneous Electrical
112	7242034	7242034	"A" Lead Connector
112A	7258683	7258683	Control - Volume - Tone and Switch
112B			Volume
112C			Tone
			Switch
111	7259311	7259311	Control - Sensitivity
110	7242204	7242204	Delay Adjustor
113	7259009	7259009	Relay
114	7259010	1219661	Solenoid
115	7259502	7259502	Speaker 8" PM
	7258903	7258903	Switch - Foot Switch Assy.
116	7259011	7259011	Switch - Tuner Return
117	7259012	7259012	Switch - Station Selector
118	7258941	7258941	Transformer - Input
119	7259336	7259336	Transformer - Output
120	7258889	6060	Transformer - Power
121	7239124	8542	Vibrator - Non-synchronous

MECHANICAL PARTS

			Chassis
124	7242035	7242035	Antenna Connector
	7259392	7259392	Socket - Foot Switch
	7236279	7236279	Socket - Octal Tube
	7259307	7259307	Socket - 9 Pin Miniature
	7258073	7258073	Socket - 7 Pin Miniature
	7239125	7239125	Socket - Vibrator
			Tuner
125	7259201	7259201	Core - Powdered Iron
126	7259178	7259178	Core Guide Bar
127	125588	55	Dial Light
128	7259347	7259347	Escutcheon Assy.
129	7259310	7259310	Dial
130	7256886	7256886	Dial Backplate
131	7259341	7259341	Manual Drive Assy.
132	1219610	1219610	Motor Gear Train Assy.
133	7259498	7259498	Pointer Backplate
134	1219093	1219093	Pointer Tip Pkg.
135	7259164	7259164	Solenoid Plunger
136	7259100	7259100	Spring Clip
137	7259055	7259055	Spring - Motor Power
138	7259207	7259207	Spring - Worm Anti-Rattle
	1219612	1219612	Station Selector Bar Pkg.
139	7259309	7259309	Station Selector Bar
140	7259111	7259111	Toggle Plate
			Spring (2)
			"C" Washer
	1219124	1219124	Push Bar Insert "B"
	1219125	1219125	Push Bar Insert "U"
	1219126	1219126	Push Bar Insert "I"
	1219127	1219127	Push Bar Insert "C"
	1219128	1219128	Push Bar Insert "K"
141	7259026	7259026	Worm and Bracket Assy.

INSTALLATION PARTS

1321178	1321178	"A" Lead Assy.
1336763	6030	Condenser - Generator
1910147	6030	Condenser - Ignition
120151	120151	Fuse - 15 Amp.
1341337	1341337	Knob - Sensitivity
1341536	1341536	Knob - Tone Control
1341566	1341566	Knob - Tuning Control
7258903	7258903	Switch - Foot Control
1853686	1853686	Suppressor - Adapter
1217820	1217820	Suppressor - Distributor

MODELS 982543,
982579, Oldsmobile

SUBJECT: SERVICE INSTRUCTIONS—OLDSMOBILE 1950 MODELS 982543 AND 982579 DELUXE AUTO RADIO. (These models differ only in accessory parts, the receiver itself being identical in each case. The accessory parts supplied with Model 982543 are for use with 1950 Oldsmobile cars Models 76 and 88. The accessory parts supplied with Model 982579 are for use with 1950 Oldsmobile cars, Model 98).

GENERAL

MOUNTING... Model 982543 in 1950 Oldsmobile cars Models 76 and 88.
... Model 982579 in 1950 Oldsmobile cars Model 98.

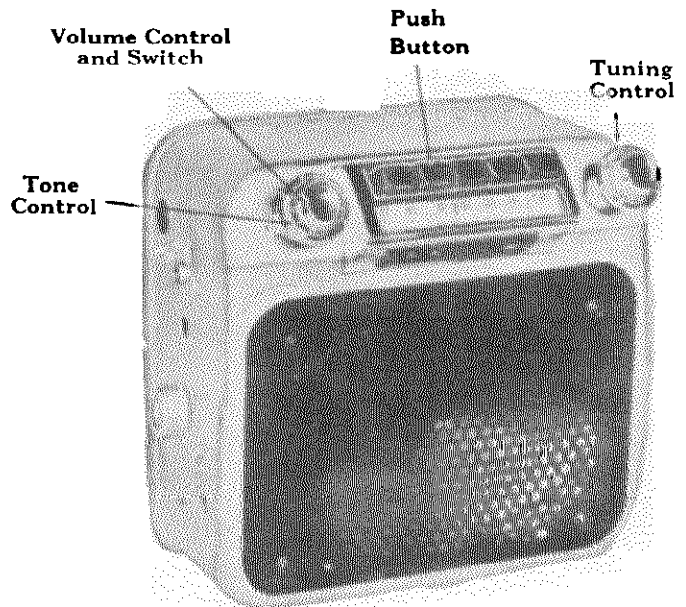
TUBES..... Six, plus rectifier

SPEAKER.....
... 6"x9" Elliptical Permanent Magnetic

TUNING... Manual and 5 P.B. Mechanical

ANTENNA TRIMMER COMPENSATION..... For antennas between
0.000055 - 0.000090 Mfd.

TUNING RANGE..... 535 - 1610 KC.



MODELS 982543 and 982579

PUSH BUTTON SET-UP

Pull push button to the left and then out. Tune in desired station manually. Push button all the way in.

ALIGNMENT PROCEDURE:

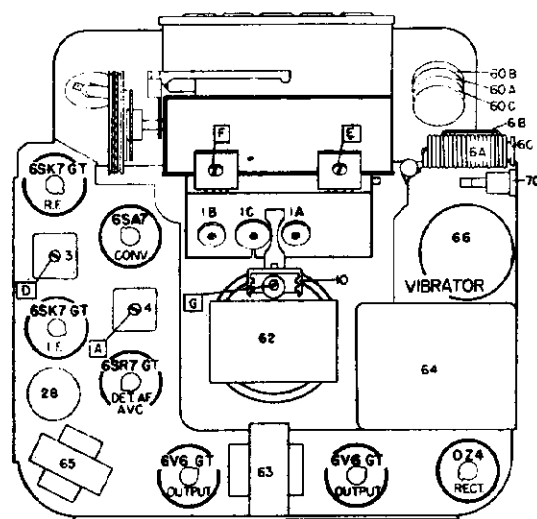
Output Meter Connection.....	Across Voice Coil
Generator Return.....	To Receiver Chassis
Dummy Antenna.....	In Series With Generator
Volume Control Position.....	Maximum Volume
Tone Control Position.....	Treble
Generator Output.....	Minimum for Readable Indication

Steps	Series Condenser or Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust In Sequence For Max. Output
1	0.1 Mfd.	6SA7 Grid (Pin #8)	257.5 KC.	High Frequency Stop	A, B, C, D
2	0.00007 Mfd.	Antenna Connector	1610 KC.	High Frequency Stop	E, F, G

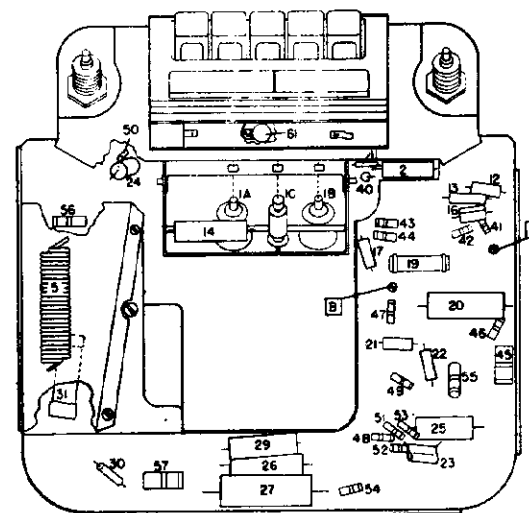
Low frequency alignment not required.

With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station near 1400 KC.

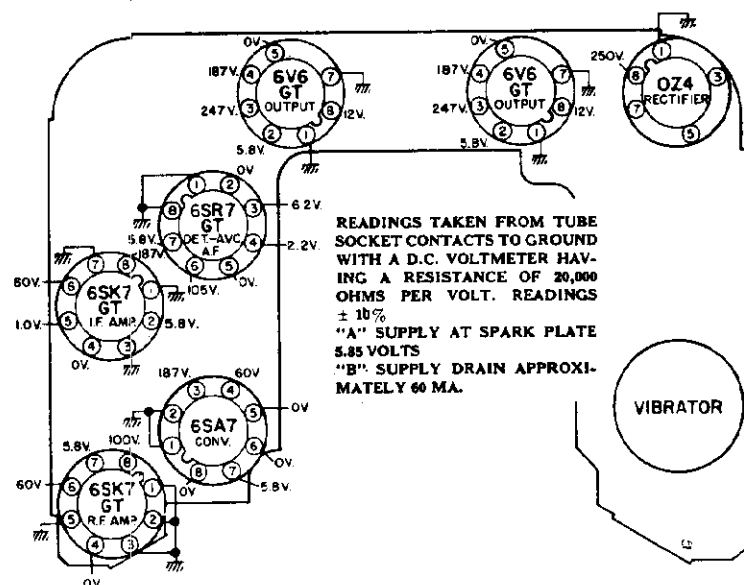
MODELS 982543,
982579, Oldsmobile



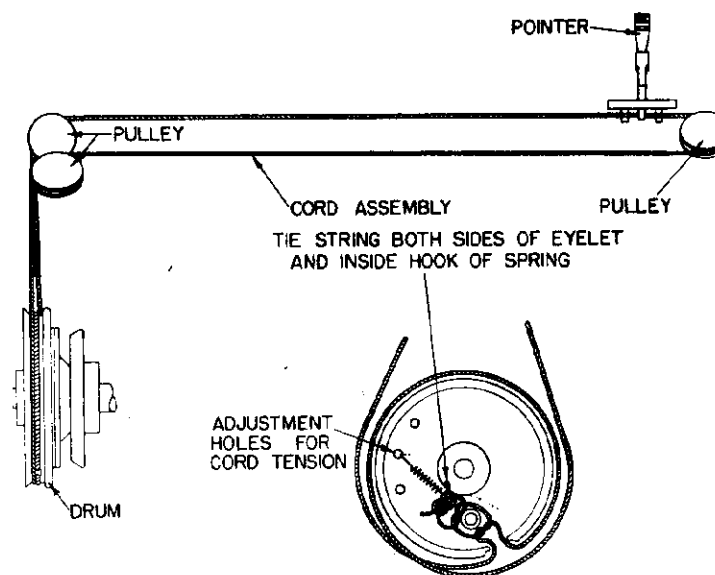
PARTS LAYOUT—TUBE VIEW



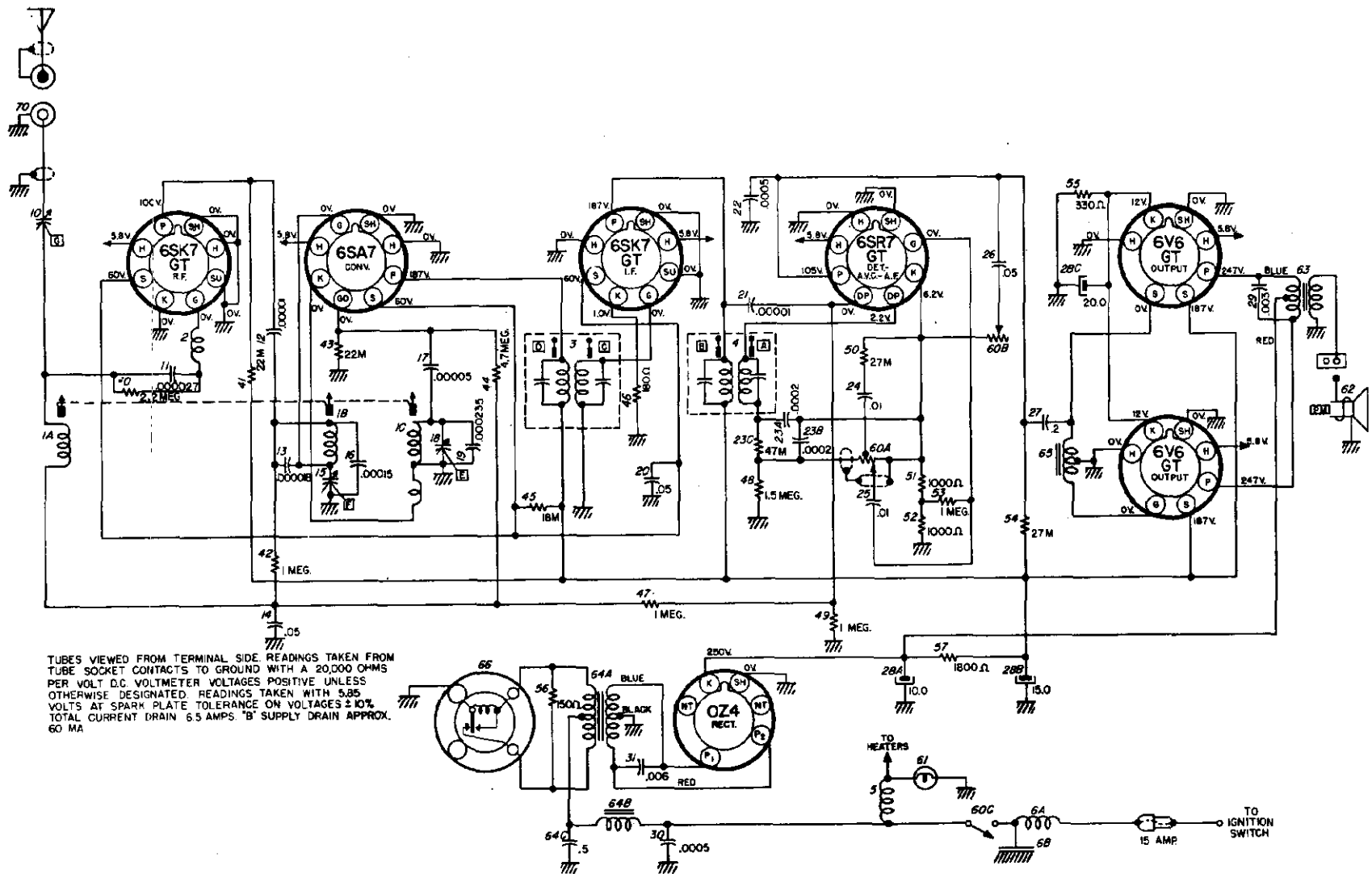
PARTS LAYOUT—CHASSIS VIEW

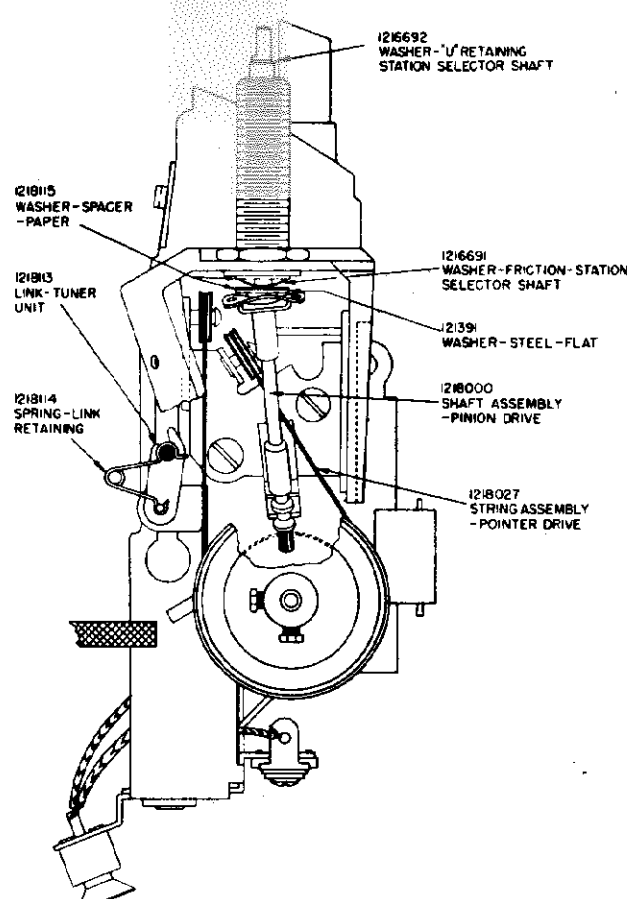
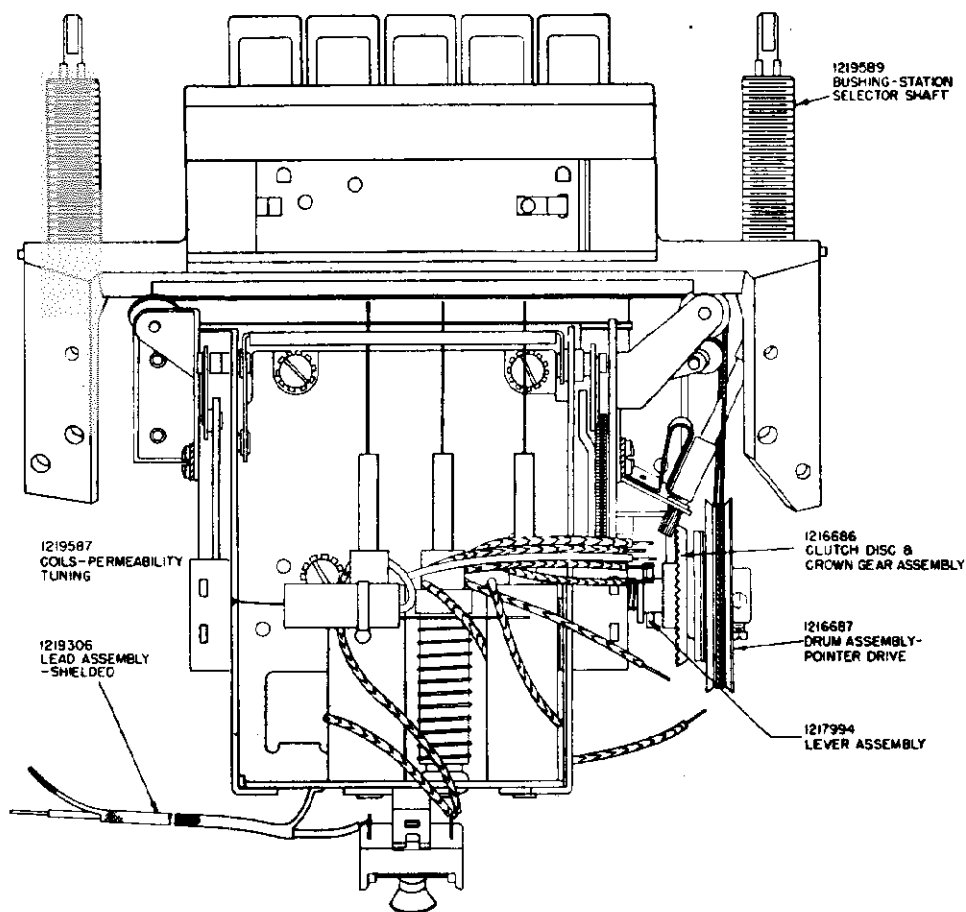


TUBE SOCKET VOLTAGE CHART



POINTER STRING HOOKUP





TUNER

CONDENSERS

	1219312	Antenna Trimmer
	7256259	.000027 Mfd.—Molded
G 100	7234242	.00001 Mfd.—Molded
	1217733	.000018 Mfd.—Molded
E 503	7230592	.05 Mfd.—100 V.—Tubular
	1218046	R.F. Trimmer
G 151	7230893	.00015 Mfd.—Molded
G 470	1207625	.00005 Mfd.—Molded
	1218043	Oscillator Trimmer
	1219305	.000235 Mfd. Temperature Compensating
E 503	7230592	.05 Mfd.—200 V.—Tubular
G 100	7234242	.00001 Mfd.—Molded
G 471	7238879	.0005 Mfd.—Ceramic or Molded
	1219563	Diode—Filter Unit
		.0002 Mfd.
		.0002 Mfd.
		47,000 Ohm
E 103	7237957	.01 Mfd.—100 V.—Tubular
E 103	7237957	.01 Mfd.—100 V.—Tubular
E 503	7230592	.05 Mfd.—200 V.—Tubular

Illus. No.	Service Part No.	Production Part No.	Description	
ELECTRICAL PARTS				
COILS				
1		1219587	Coils—Permeability Tuning	10
1 A			Antenna Coil	11
1 B			R.F. Coil	12
1 C			Oscillator Coil	13
2		1214382	Antenna Choke	14
3		1219583	1st I.F. Assembly	15
4		1219584	2nd I.F. Assembly	16
5		1217996	Filament Choke	17
6		1219310	Spark Filter & "A" Connector Assembly	18
A			Spark Choke	19
B			Spark Plate	20
				21
				22
				23
				A
				B
				C
				24
				25
				26

MODELS 982543,
982579, Oldsmobile

Illus. No.	Service Part No.	Production Part No.	Description
27	E 204	1217876	.2 Mfd.—200 V.—Tubular
28		1218009	Electrolytic Condenser
A			10 Mfd.—350 V.
B			15 Mfd.—350 V.
C			20 Mfd.—25 V.
29	G 471	1219301	.003 Mfd.—800 V.—Tubular
30		7238879	.0005 Mfd.—Ceramic or Molded
31		1219591	.006 Mfd.—1600 V.—Tubular

RESISTORS

40	A 225	1214563	2.2 Megohm— $\frac{1}{2}$ W. Insulated
41	A 223	1214550	22,000 Ohm— $\frac{1}{2}$ W. Insulated
42	A 105	1213282	1 Megohm— $\frac{1}{2}$ W. Insulated
43	A 223	1214550	22,000 Ohm— $\frac{1}{2}$ W. Insulated
44	A 475	1214566	4.7 Megohm— $\frac{1}{2}$ W. Insulated
45	C 183	7239157	18,000 Ohm—2 W. Insulated
46	A 181	1215559	180 Ohm— $\frac{1}{2}$ W. Insulated
47	A 105	1213282	1 Megohm— $\frac{1}{2}$ W. Insulated
48	A 155	1213283	1.5 Megohm— $\frac{1}{2}$ W. Insulated
49	A 105	1213282	1 Megohm— $\frac{1}{2}$ W. Insulated
50	A 273	1214551	27,000 Ohm— $\frac{1}{2}$ W. Insulated
51	A 102	1213235	1000 Ohm— $\frac{1}{2}$ W. Insulated
52	A 102	1213235	1000 Ohm— $\frac{1}{2}$ W. Insulated
53	A 105	1213282	1 Megohm— $\frac{1}{2}$ W. Insulated
54	A 273	1214551	27,000 Ohm— $\frac{1}{2}$ W. Insulated
55	B 331	7233773	330 Ohm—1 W. Insulated
56	B 151	1211005	150 Ohm—1 W. Insulated
57	C 182	1214573	1800 Ohm—2 W. Insulated

TUNER PARTS

1219589	Bushing—Station Selector Shaft
1219597	Background Assembly
1219588	Dial Glass—Calibrated
1218030	Pointer & Slide Assembly
1218027	String Assembly—Pointer Drive
1219595	Spring & Sleeve Assembly—Core Lock
1219596	Plate & Socket Assembly—Dial Lamp
1219309	Tuner Unit Assembly—Mechanical portion only (includes Push Buttons, Clutch Disc, and crown gear assembly)
1216687	Drum Assembly—Pointer Drive
1216686	Clutch Disc & Crown Gear Assembly
1214876	Spring—Clutch Compression
1217999	Lever Actuating Plate Assembly
1217994	Lever Assembly
1218113	Link—Tuner Unit
1218114	Spring—Link Retaining
1217992	Screw—10-32 Special
1216692	Washer—"U" Retaining—Station Selector Shaft
1216691	Washer—Friction—Station Selector Shaft
1218115	Washer—Spacing—Paper

TUBES

5230	1214292	6SK7GT—R.F. Amplifier
5222	7237752	6SA7—Oscillator—Translator
5230	1214292	6SK7GT—I.F. Amplifier
5233	1218149	6SR7GT—Detector—AVC—1st Audio
5241	1213793	6V6GT—Audio Output
5241	1213793	6V6GT—Audio Output
5003	1211924	OZ4—Rectifier

MISCELLANEOUS ELECTRICAL PARTS

60	1219582	Control—Volume, Tone & Switch
60A		Volume Control
60B		Tone Control
60C		Switch
61	187189	Lamp—Dial (Mazda #44)
62	1219291	Speaker—6" x 9" Elliptical
63	1219314	Permanent Magnet
64	1219316	Transformer—Output
64A		Power Transformer & Filter Assembly
64B		Transformer—Power
64C		Hash Choke
65	1219315	Condenser—.5 Mfd.—100 V.
66	1218006	Transformer—Audio Input.
		Vibrator

PAGE 21-48 UNITED MOTORS

MODELS 982543,
982579, Oldsmobile

Service
Part No.

Production
Part No.

Description

MECHANICAL PARTS

CHASSIS

70

1219311	Antenna Connector Assembly
7236279	Socket—Tube—8 Prong—Octal
1216041	Socket—Vibrator
1219586	Clip—IF Mounting
1219585	Cover Assembly—Case Back

INSTALLATION PARTS MODEL 982543

6030

414997	Washer—Flat $\frac{3}{16}$ I.D.
7255287	Nut— $\frac{1}{2}$ —28 Hex.
7258813	Knob—Tone and Dummy
7257400	Washer—Wave— $\frac{3}{16}$ I.D.
7259663	(Anti-Rattle) Tuning and Volume Control
	Includes Set Screw
7256654	Bracket—Receiver Mounting
554519	Bracket—Side Mounting
554690	Bolt— $\frac{1}{4}$ -20x $\frac{3}{8}$ Truss Head
121797	Bolt— $\frac{1}{4}$ -20x $\frac{3}{8}$ Hex. Head
120706	Bolt— $\frac{1}{4}$ -20x $\frac{1}{2}$ Hex. Head
120392	Washer—Flat— $\frac{1}{4}$ I.D. $\frac{5}{8}$ O.D.
103319	Washer—Lock— $\frac{1}{4}$ (Split)
120423	Washer—Lock— $\frac{1}{4}$ (Internal-Tooth)
7256717	Spacer—Instrument panel to gasket
554691	"A" Lead Connector and Filter
	Condenser Assembly
120151	Fuse—15 Amp. 25 V.
1912757	Condenser—Ignition Coil—0.3 Mfd.
or	
555437	Condenser—Ignition Coil—0.3 Mfd.
1911095	Condenser—Generator—0.3 Mfd.
1912900	Condenser—Voltage Regulator—0.5 Mfd.
or	
557531	Condenser—Voltage Regulator—0.5 Mfd.
7257239	Distributor—Suppressor—15,000 Ohms
414237	Insulating Elbow
415823	Static Collector (Front Wheel)
555348	Clip—Hood Grounding
164349	Screw—8-32x $\frac{1}{4}$ Phillips Head
	Self-Tapping
7256684	Gasket—Speaker Baffle
7259626	Panel—Radio Control

INSTALLATION PARTS MODEL 982579

6030

414997	Washer—Flat— $\frac{3}{16}$ I.D.
7255287	Nut— $\frac{1}{2}$ -28 Hex.
7258813	Knob—Tone and Dummy
7257400	Washer—Wave— $\frac{3}{16}$ I.D.
7259663	(Anti-Rattle) Tuning and Volume Control
	Includes Set Screw
120706	Bolt— $\frac{1}{4}$ -20x $\frac{1}{2}$ Hex. Head
103319	Washer—Lock— $\frac{1}{4}$ (Split)
554845	Washer—Flat
554691	"A" Lead & Filter Condenser Assembly
120151	Fuse—15 Amp. 25 V.
1912757	Condenser—Ignition Coil—0.3 Mfd.
or	
555437	Condenser—Ignition Coil—0.3 Mfd.
1911095	Condenser—Generator—0.3 Mfd.
1912900	Condenser—Voltage Regulator—0.5 Mfd.
or	
557531	Condenser—Voltage Regulator—0.5 Mfd.
7257239	Distributor Suppressor—15,000 Ohms
414237	Insulating Elbow
415823	Static Collector (Front Wheel)
555348	Clip—Hood Grounding
164349	Screw #8-32x $\frac{1}{4}$ Phillips Head
	Self-Tapping
7258815	Panel—Radio Control
558956	Gasket—Speaker Baffle

MODELS 982544,
982573, Oldsmobile**GENERAL**

MOUNTING—982544 - All 1950 - 76 & 88 Series Oldsmobile Cars.
982573 - All 1950 - 98 Series Oldsmobile Cars.

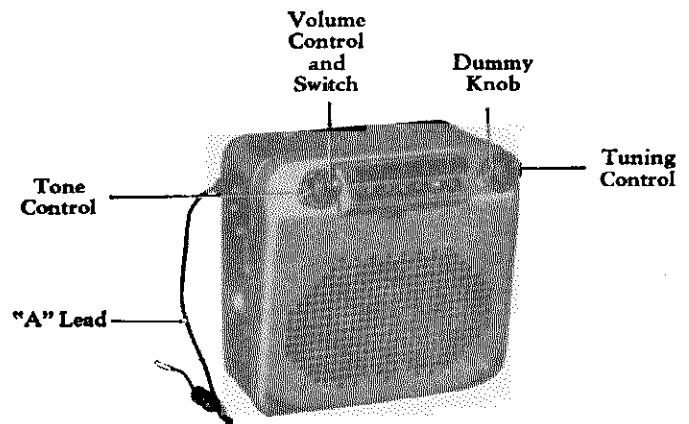
TUBES—Six, Plus Rectifier.

SPEAKER—6" x 9" Elliptical Permanent Magnet.

TUNING—Manual and 5 P. B. Mechanical.

ANTENNA TRIMMER COMPENSATION—For Antennas Between 0.000050 — 0.000070 Mfd.

TUNING RANGE—540 - 1600 KC.

MODELS 982544
982573**PUSHBUTTON SET-UP**

Pull pushbutton to the left and out. Tune in desired station manually. Push button all the way in.

ALIGNMENT PROCEDURE:

Output Meter Connection Across Voice Coil
Generator Return To Receiver Chassis
Dummy Antenna In Series With Generator
Volume Control Position Maximum Volume
Tone Control Position Treble
Generator Output Minimum for Readable Indication

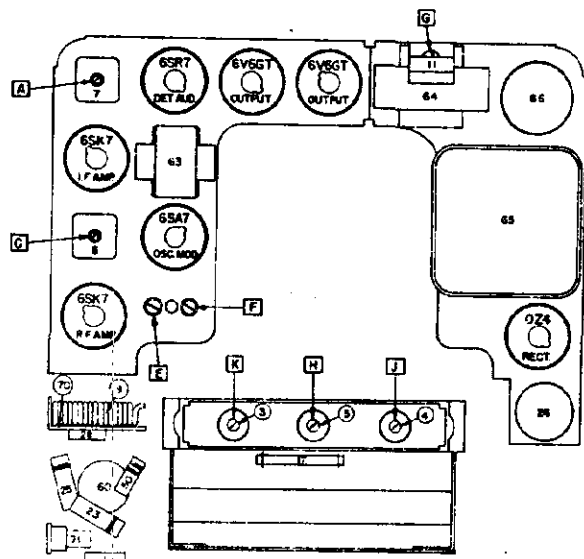
Steps	Series Condenser or Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence For Max. Output
1	0.1 Mfd.	6SA7 Grid (Pin #8)	260 KC	High Frequency Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	1400 KC	Signal Generator Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Generator Signal	**L

*Before making this adjustment check the mechanical setting of the oscillator core "H." The slotted end of core should be $1\frac{1}{2}$ " from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) If adjustment is necessary, first dissolve the glyptal seal on the studs. Core adjustments should be made with an insulated screwdriver and core studs should be re-sealed in place with glyptal or household cement after alignment.

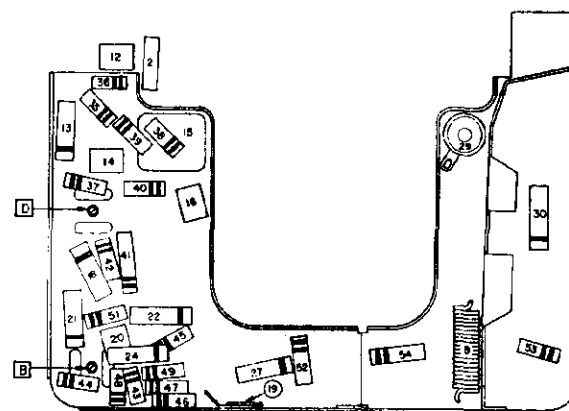
**"L" is the pointer adjustment screw which is on the pointer connecting link (see tuner drawing) and should be adjusted so the pointer reads 1000 KC. (On first "0" of "100.")

With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station near 1400 KC. (See sticker on case.)

MODELS 982544,
982573, Oldsmobile

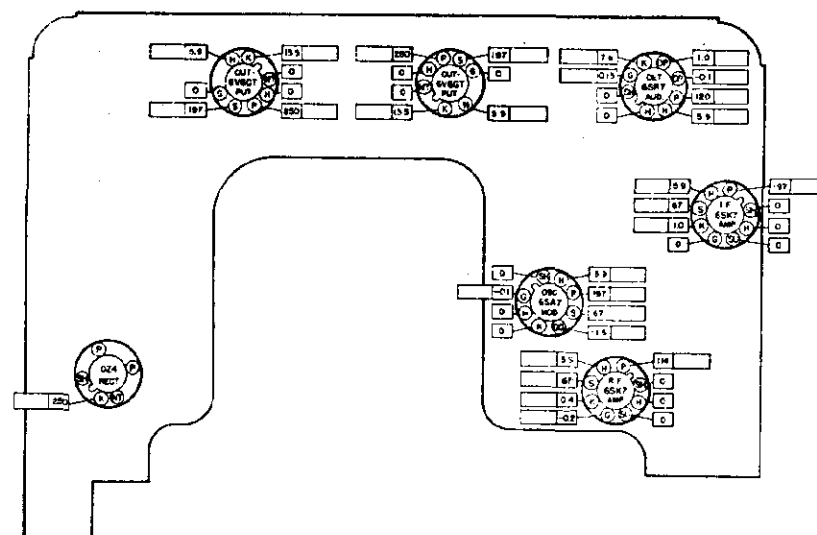


PARTS LAYOUT — TUBE VIEW



PARTS LAYOUT — CHASSIS VIEW

The tube socket voltages as measured at the factory and under the conditions shown on the schematic diagram on Page 3 are shown here. The blank spaces are provided so the serviceman may fill in the actual readings as taken with his own equipment. A normal operating radio should be used for these measurements.



TUBE SOCKET VOLTAGE CHART

VOLTMETER RESISTANCE OHMS
PER VOLT. READING
TAKEN WITH
VOLTS AT SPARK
PLATE. THE VOLT-
AGES ARE MEAS-
URED FROM TUBE
SOCKET TERMINALS
TO CHASSIS AND
ARE POSITIVE UN-
LESS MARKED OTH-
ERWISE.

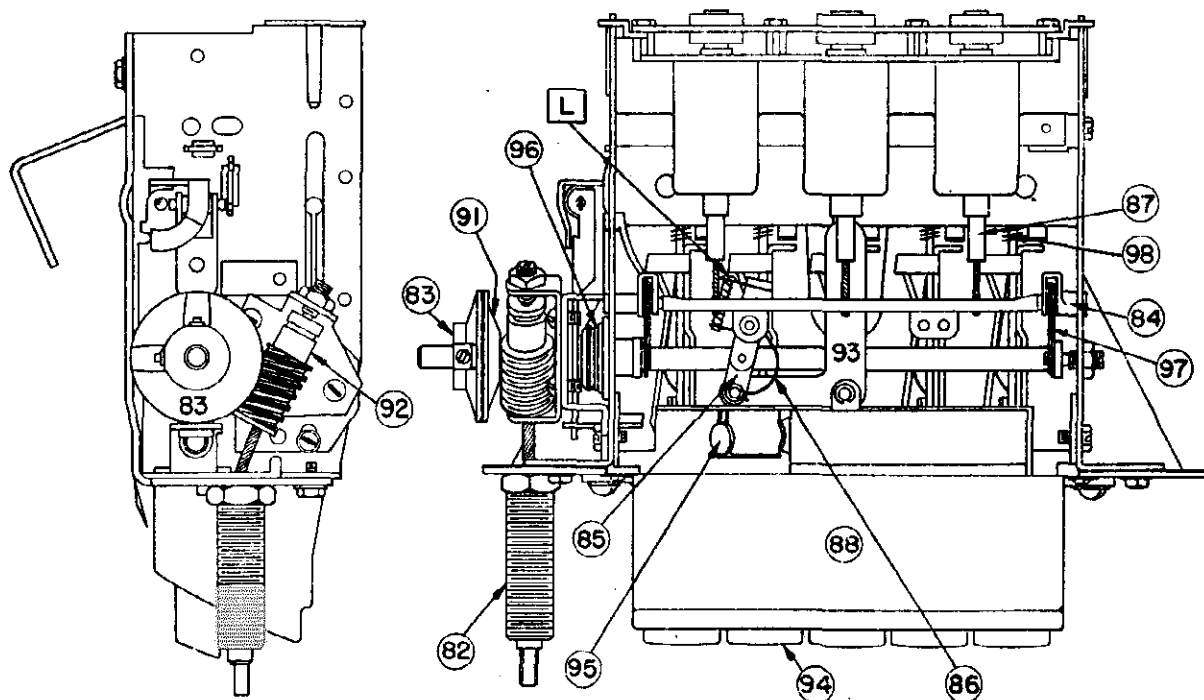


OLDSMOBILE MODELS 982544
982573

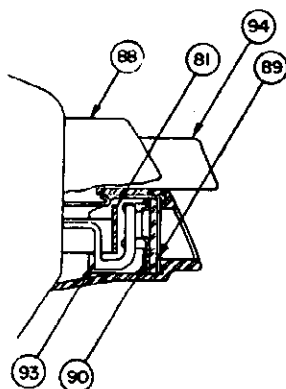
- * - INDICATES LEAD FROM TUNER COIL ASS'Y.
- ** - SEE SERVICE PARTS LIST FOR REPLACEMENT.
- Δ - OSCILLATOR GRID VOLTAGE AT 1000 KC.
- - COLORS OF TERMINALS ON SERVICE PART.

MODELS 982544,
982573, Oldsmobile

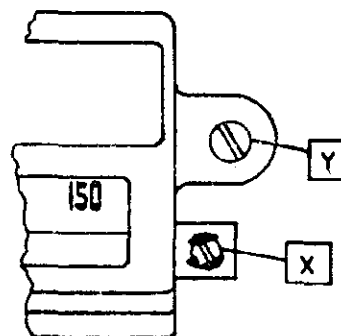
MODELS 982544,
982573, Oldsmobile



TUNER



ESCUTCHEON CROSS SECTION



ESCUTCHEON MOUNTING

SPECIAL INSTRUCTIONS

Unless special precautions are taken in removing the dial escutcheon, there is a possibility that the dial pointer tip will be broken. Therefore, in removal of the escutcheon the following procedure is recommended:

1. Loosen, but do not remove, the two screws holding the pointer back plate ("X" in Escutcheon Mounting Drawing Above) and loosen the shellac so that the back plate is free to move.
2. Remove the escutcheon mounting screws "Y" (see Escutcheon Mounting).
3. Carefully lift off the escutcheon (DO NOT FORCE). If the dial backplate is free to move slightly downward the escutcheon will come off easily.

The same caution should be exercised when replacing the escutcheon.

MODELS 982544,
982573, Oldsmobile

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
ELECTRICAL PARTS			
Coils			
1	7255738	7255738	Antenna Series Choke
2	7240251	7240251	Antenna Spark Choke
3	7258914	7258914	Antenna
4	7258914	7258914	R.F.
5	7259687	7259687	Oscillator
6	1219508	1219508	1st I.F.
7	1219509	1219509	2nd I.F.
8	1217846	1217846	Hash Choke
9	7258434	7258434	Spark Choke
Condensers			
11	7258160	7258160	Antenna Trimmer
12	1210275	G 101	.000100 mfd. Mica
13	7236842	E 503	.05 mfd. 200 V Tubular
14	7258221	G 390	.000039 mfd. Mica
15	7242454	7242454	Dual Trimmer
15 A			R.F. Section
15 B			Oscillator Section
16	7258221	G 390	.000039 mfd. Mica
17	7257424	7257424	.000180 mfd. Compensating
18	7230892	E 503	.05 mfd. 400 V Tubular
19	1217848	1217848	Chassis Plate Cond.
20	1215189	G 100	.000010 mfd. Mica
21	7237870	E 103	.01 mfd. 400 V Tubular
22	1219495	E 104	.1 mfd. 400 V Tubular
23	7232956	E 502	.005 mfd. 600 V Tubular
24	7238881	E 103	.01 mfd. 400 V Tubular
25	7237836	E 202	.002 mfd. 600 V Tubular
26	7240724	M 908	Electrolytic
26 A			20 mfd. 25 V
26 B			20 mfd. 400 V
26 C			20 mfd. 400 V
27	7236134	7236134	.0015 mfd. 800 V Tubular
28	1212278	1212278	Spark Plate Condenser (included in 7258434)
29	1217848	1217848	Chassis Plate Condenser
30	7240906	H 602	.006 mfd. 1600 V Tubular
Resistors			
35	1213217	A 101	100 ohms 1/2 W Insulated
36	1211147	A 225	2.2 megohms 1/2 W Insulated
37	7237595	B 153	15,000 ohms 1 W Insulated
38	7240732	A 334	330,000 ohms 1/2 W Insulated
*39	1215548	A 106	10 megohms 1/2 W Insulated
40	1211192	A 223	22,000 ohms 1/2 W Insulated
41	7233653	C 153	15,000 ohms 2 W Insulated
42	1213217	A 101	100 ohms 1/2 W Insulated
43	7238873	A 105	1 megohm 1/2 W Insulated
44	7240731	A 473	47,000 ohms 1/2 W Insulated
45	7238873	A 105	1 megohm 1/2 W Insulated
46	1213235	A 102	1,000 ohms 1/2 W Insulated
47	1213235	A 102	1,000 ohms 1/2 W Insulated
48	1214561	1214561	820,000 ohms 1/2 W Insulated
49	7238873	A 105	1 megohm 1/2 W Insulated
50	1217436	A 393	39,000 ohms 1/2 W Insulated
51	7236080	B 273	27,000 ohms 1 W Insulated
52	7233773	B 331	330 ohms 1 W Insulated
53	7237994	B 221	220 ohms 1 W Insulated
54	1214573	{ C 272 B 562	1800 ohms 2 W Wire Wound (or replace with 2700 ohm 2 W and 5600 ohm 1 W in parallel)

*This Resistor was removed on all sets above serial #44678

PAGE 21-54 UNITED MOTORS

MODELS 982544,
982573, Oldsmobile

SERVICE PARTS LIST (Cont.)

Illus. No.	Production Part No.	Service Part No.	Description
Tubes			
	1218107	5233	6SR7
	1213793	5241	6V6GT
	7237751	5229	6SK7
	7237752	5222	6SA7
	1211924	5003	0Z4
Miscellaneous Electrical			
60 60 A 60 B 60 C	7259447	7259447	Control - Volume, Tone and Switch Volume Control Tone Control Switch
61	187189	44	Lamp - Dial Light
62	7258146	7258146	Speaker - 6 x 9 P.M.
63	7258941	7258941	Transformer - Input
64	7259419	7259419	Transformer - Output
65	7255881	7255881	Transformer - Power
66	7239124	8542	Vibrator - Non-synchronous

MECHANICAL PARTS

Chassis			
70	7258434	7258434	Connector "A" Lead
71	7256742	7256742	Connector - Antenna
	7236279	7236279	Socket - Octal Tube
	7239125	7239125	Socket - Vibrator
Tuner			
81	7256688	7256688	Backplate - Pointer
	147481	147481	Ball Bearing Pkg. (12)
82	7259443	7259443	Bushing and Manual Drive Shaft
83	7258072	7258072	Clutch Disc - Driven
84	7258211	7258211	Core Guide Bar - Parallel
85	7256271	7256271	Pointer Connecting Link
86	7255992	7255992	Spring - Pointer Connecting Link
87	7258468	7258468	Core - Powdered Iron
88	7259429	7259429	Escutcheon Assy.
89	7259430	7259430	Dial
90	7259496	7259496	Dial Backplate
91	7256495	7256495	Gear and Bushing - Clutch
92	7256705	7256705	Gear and Bracket - Worm
93	7257898	7257898	Pointer Assy.
	1219174	1219174	Pointer Tip Pkg.
94	1219173	1219173	Push Button and Slide Assy.
95	1217820	1217820	Socket - Dial Light
96	7258756	7258756	Spring - Clutch
97	7257415	7257415	Spring - Core Bar Connecting Link
98	7255984	7255984	Spring - Slide Return

INSTALLATION PARTS

554691	554691	"A" Lead, Condenser, and Fuse Connector, Male
	6016	Condenser - "A" Lead
1911095	6030	Condenser - Generator
1912757	6030	Condenser - Ignition Coil
1912900	6030	Condenser - Voltage Regulator
120151	120151	Fuse - 15 Amps
555348	555348	Hook Ground Clip
7259663	7259663	Knob Control
7258813	7258813	Knob - Tone Control and Dummy
7240138	6013	Static Collector
7257239	7257239	Suppressor - Distributor
414237	414237	Suppressor - Insulator
7258815	7258815	Trim Plate (98 series)
7259626	7259626	Trim Plate (76 and 88 series)

MODELS 982582,
982583, Oldsmobile**GENERAL**

MOUNTING—982582 - All 1950 - 76 & 88 Series Oldsmobile Cars.
982583 - All 1950 - 98 Series Oldsmobile Cars.

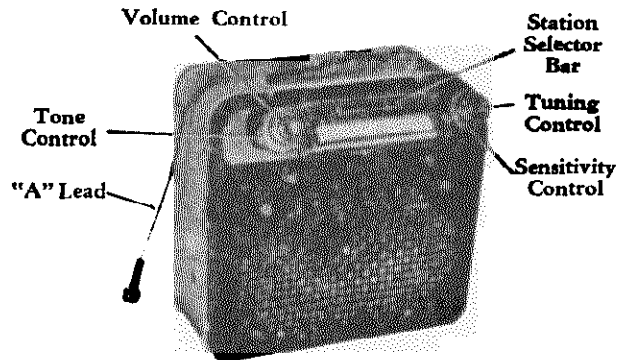
TUBES—Seven, Plus Rectifier.

SPEAKER—6" x 9" Elliptical Permanent Magnet.

TUNING—Manual and Electronic.

ANTENNA TRIMMER COMPENSATION—For Antennas Between 0.000050 - 0.000070 Mfd.

TUNING RANGE—540 - 1600 KC.

MODELS 982582
982583**PUSHBUTTON SET-UP**

No Pushbutton Set-up is required. However, the number of stations on which the tuner will stop can be regulated by use of the Sensitivity Control.

SIGNAL SEEKING TUNER ALIGNMENT PROCEDURE:

NOTE: When aligning the signal seeker tuner type radio, be sure to use a vacuum tube voltmeter as indicated and be sure to follow the alignment sequence given—(Notice that the primary of the 2nd I.F. is aligned first.)

Output Meter Connection VTVM From **[2]** To Chassis (see parts layout page 2)
Generator Return Receiver Chassis
Dummy Antenna In Series With Generator
Volume Control Maximum Volume
Tone Control Treble
Generator Output Not to Exceed 2 Volts at VTVM

Step	Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence For Max. Output
1	0.1 mfd	6SA7 Grid (Pin 8)	260 KC	*High Frequency Stop	A, B, C, D
2	0.000068 mfd	Antenna Connector	1615 KC	High Frequency Stop	**E, F, G
3	0.000068 mfd	Antenna Connector	600 KC	Signal Generator Signal	J, K
4	0.000068 mfd	Antenna Connector	1615 KC	Signal Generator Signal	F, G
5	0.000068 mfd	Antenna Connector	1000 KC	Signal Generator Signal	***L

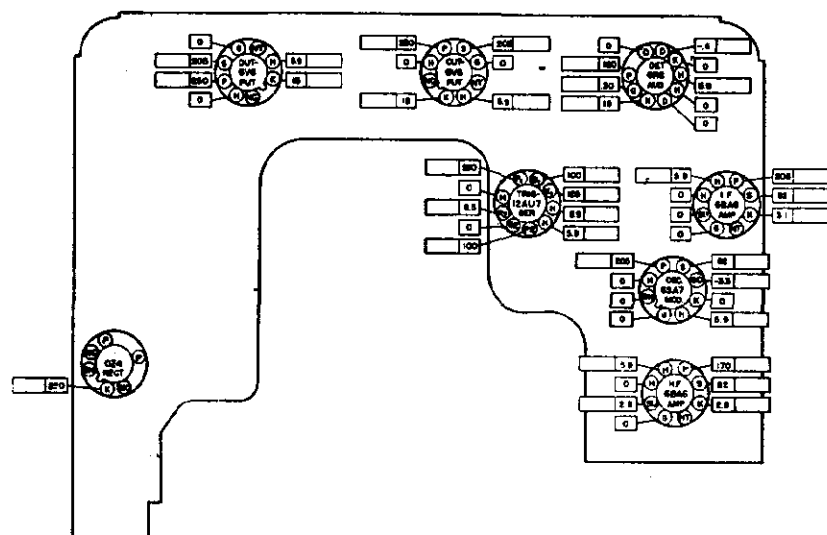
*To tune to high frequency, put a 0.070" feeler gauge (or bare #13 wire) in slot against the high frequency stop. (See tuner pictures). Depress station selector bar and allow the planetary arm to run against the feeler gauge. Turn the radio off and then on.

**Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be 1 $\frac{1}{2}$ " from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with an insulated screwdriver. (It will be necessary to steady the core guide bar by applying a downward pressure at the antenna core end of the bar while making these adjustments.) If this adjustment is necessary, first dissolve the glyptal seal on the core stud and be sure to re-seal after making the adjustment.

***"L" is the pointer adjustment screw on the end of the core guide bar—adjust so pointer reads 1000 KC.

With the radio installed and the antenna plugged in, adjust the antenna trimmer "C" for maximum volume with the radio tuned to a weak station near 1400 KC (see sticker on case).

TUBE SOCKET VOLTAGE CHART



The tube socket voltages, as measured at the factory and under the conditions shown on the schematic diagram, are shown above. The blank spaces are provided so that the serviceman may fill in actual voltage readings as taken with his own equipment. A normal operating radio should be used for these measurements.

Voltmeter resistance Ohms Per Volt.

Readings taken with Volts at Spark Plate.

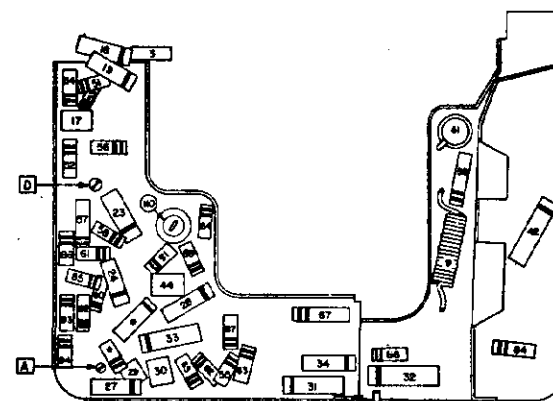
All voltages measured from socket terminals to chassis.

TUNER ADJUSTMENT PROCEDURE:

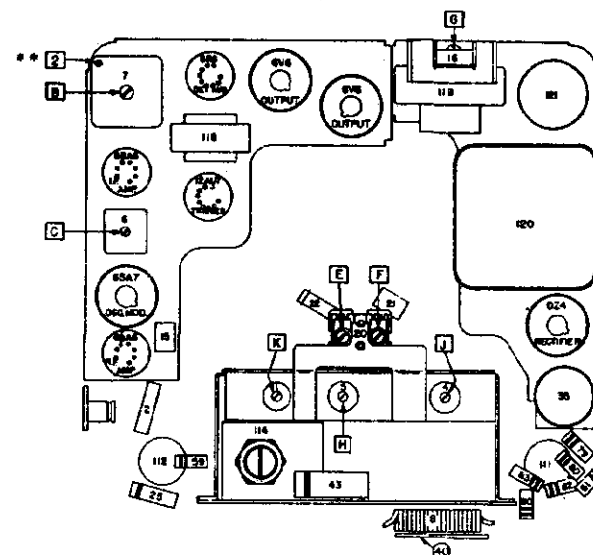
CATHODE DELAY ADJUSTOR (Illustration #110) (This adjustment should not be made unless it is necessary to replace the Delay Adjustor or the setting is definitely proven to be faulty).

1. Disconnect antenna and turn radio on.
2. Allow set to warm up.
3. Depress station selector bar.
4. Set voltage at K₂ of the 12AU7 trigger tube (Pin #8) to 8.0 volts by adjusting Illustration 110 while the tuner is seeking and with exactly 6.0 volts at the spark plate.

NOTE: For all other tuner adjustments, see Bulletin 6D-620.



PARTS LAYOUT — CHASSIS VIEW

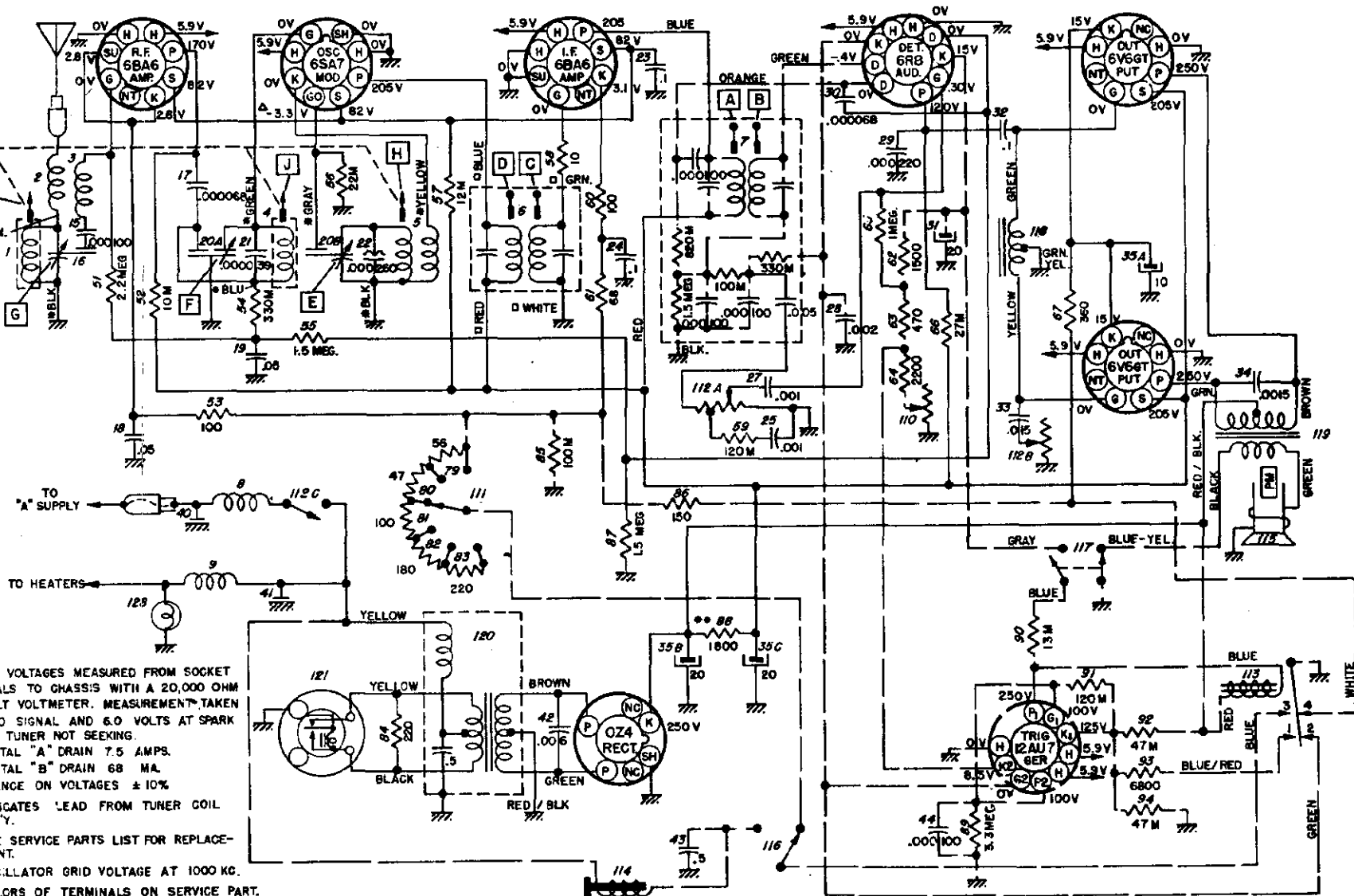


PARTS LAYOUT — TUNER VIEW

*Resistor and condenser are included in the 2nd IF Assy.

**Connect vacuum tube voltmeter between this point and ground during alignment.

MODELS 982582,
982583, Oldsmobile

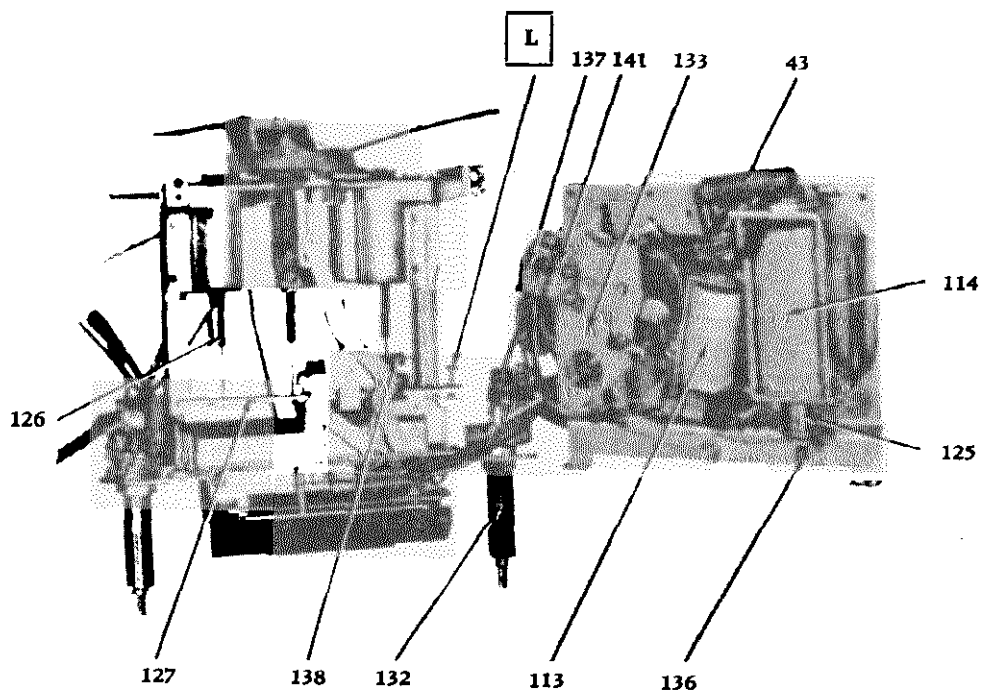


TUNER CIRCUIT COMPONENTS

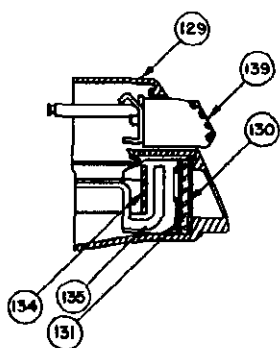
OLDSMOBILE MODELS 982582
982583

PAGE 21-58 UNITED MOTORS

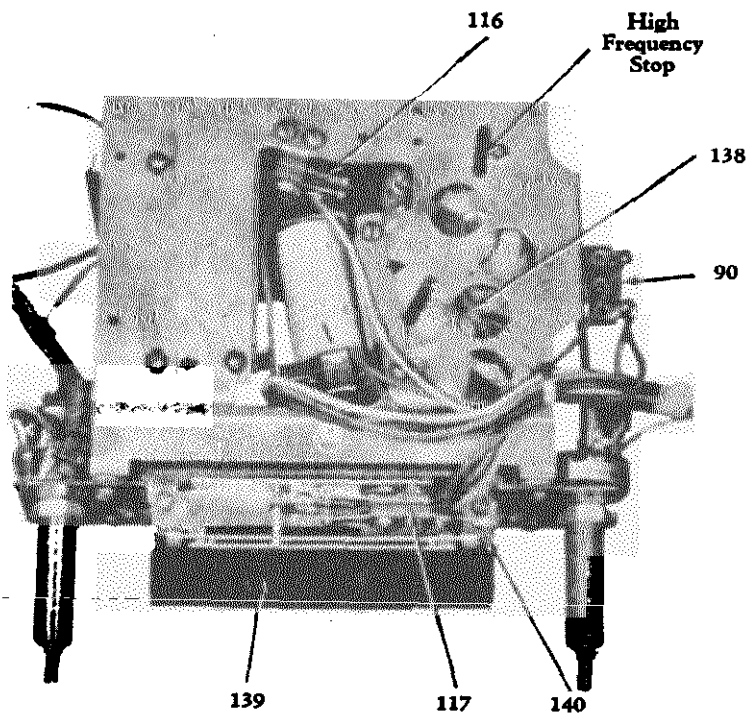
MODELS 982582,
982583, Oldsmobile



TUNER UNFOLDED



ESCUTCHEON
CROSS-SECTION



TUNER

SERVICE PARTS LIST

MODELS 932582,
982583, Oldsmobile

Illus. No.	Production Part No.	Service Part No.	Description
ELECTRICAL PARTS			
Coils			
1	7257979	7257979	Antenna
2	7255738	7255738	Antenna Series Choke
3	7240251	7240251	Antenna Spark Choke
4	7257979	7257979	R.F.
5	7259665	7259665	Oscillator
6	7258849	1219508	1st I.F. Assy.
7	7259350	1219602	2nd I.F. Assy.
8	1217846	1217846	A Spark Choke
9	1217846	1217846	Hash Choke
Condensers			
15	7239184	G 101	.000100 mfd Mica
16	7258160	7258160	Antenna Trimmer
17	7238793	G 680	.000068 mfd Mica
18	7236842	E 503	.05 mfd 200 V Tubular
19	7236842	E 503	.05 mfd 200 V Tubular
20	7242454	7242454	Dual Trimmer
20A			R.F. Section
20B			Oscillator Section
21	7258221	G 390	.000039 mfd Mica
22	7257567	7257567	.000260 mfd Compensating
23	7238788	E 104	.1 mfd 400 V Tubular
24	1209306	E 104	.1 mfd 200 V Tubular
25	1218883	E 102	.001 mfd 600 V Tubular
27	1218883	E 102	.001 mfd 600 V Tubular
28	7237836	E 202	.002 mfd 600 V Tubular
29	7238972	G 221	.000220 mfd Mica
30	1219550	G 680	.000068 mfd Mica
31	1219660	1219660	20 mfd 50 V Electrolytic
32	1219495	E 104	.1 mfd 400 V Tubular
33	7237719	7237719	.015 mfd 600 V Tubular
34	7236134	7236134	.0015 mfd 800 V Tubular
35	7259128	7259128	Electrolytic
35A			10 mfd 100 V
35B			20 mfd 400 V
35C			20 mfd 400 V
40	7241259	7241259	Spark Plate Assy.
41	1217848	1217848	Chassis Plate Condenser
42	7240906	H 602	.006 mfd 1600 V Tubular
43	1219511	E 504	.5 mfd 100 V Tubular
44	7239184	G 101	.000100 mfd Mica
Resistors			
51	1211147	A 225	2.2 Megohms ½ W Insulated
52	1211085	B 103	10,000 Ohms 1 W Insulated
53	1213217	A 101	100 Ohms ½ W Insulated
54	7240732	A 334	330,000 Ohms ½ W Insulated
55	1211142	A 155	1.5 Megohms ½ W Insulated
56	1211192	A 223	22,000 Ohms ½ W Insulated
57	1212491	1212491	12,000 Ohms 2 W Insulated
58	1215107	A 100	10 Ohms ½ W Insulated
59	1213271	1213271	120,000 Ohms ½ W Insulated
60	1213217	A 101	100 Ohms ½ W Insulated
61	1215558	1215558	68 Ohms ½ W Insulated
62	1219488	1219488	1500 Ohms ½ W Insulated
63	1219487	1219487	470 Ohms ½ W Insulated
64	1214545	A 222	2200 Ohms ½ W Insulated
65	7238873	A 105	1 Megohm ½ W Insulated
66	1213342	B 273	27,000 Ohms 1 W Insulated
67	7234563	7234563	360 Ohms 1 W Insulated
79	1214540	1214540	56 Ohms ½ W Insulated
80	1213489	1213489	47 Ohms ½ W Insulated
81	1213217	A 101	100 Ohms ½ W Insulated
82	1215559	1215559	180 Ohms ½ W Insulated
83	7257835	A 221	220 Ohms ½ W Insulated
84	7237994	B 221	220 Ohms 1 W Insulated
85	1213270	A 104	100,000 Ohms ½ W Insulated
86	1213220	A 151	150 Ohms ½ W Insulated
87	1211142	A 155	1.5 Megohm ½ W Insulated
88	1214573	{ C 272 B 562	{ 1800 Ohm 2 W Wire Wound (Replace with C 272 and B 562 in parallel)
89	1214564	A 335	3.3 Megohm ½ W Insulated
*90	*7231539	*7231539	13,000 Ohms 1 W Insulated
91	1213271	1213271	120,000 Ohms ½ W Insulated

*This resistor was 15,000 Ohms until Serial # 82222-76 & 88 — Use above Value in Service.
83179-98

PAGE 21-60 UNITED MOTORS

MODELS 982582,
982583, Oldsmobile

SERVICE PARTS LIST

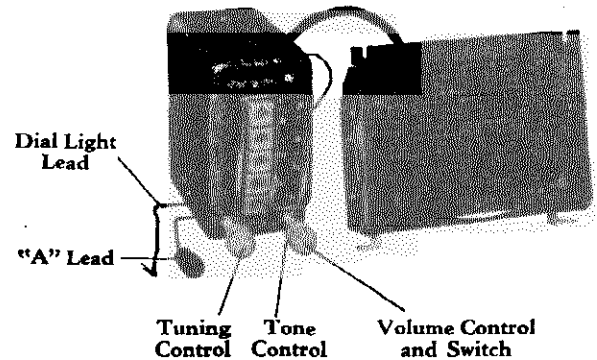
Illus. No.	Production Part No.	Service Part No.	Description
Resistors (Continued)			
92	1216157	B 473	47,000 Ohms 1 W Insulated
93	1216154	1216154	6800 Ohms 1 W Insulated
94	1216157	B 473	47,000 Ohms 1 W Insulated
Tubes			
	1217690	5252	6BA6
	7237752	5222	6SA7
	1219485	5328	12AU7
	1219496	5541	6R8
	1213793	5241	6V6GT
	1211924	5003	0Z4
Miscellaneous Electrical			
112	7259352	7259352	A. Lead and Fuse Holder Assy.
112A	7259034	7259034	Control - Volume - Tone and Switch
112B			Volume
112C			Tone
			Switch
111	7259021	7259021	Control - Sensitivity
110	7242204	7242204	Delay Adjustor
113	7259009	7259009	Relay
114	7259010	1219661	Solenoid
125	7259164	7259164	Solenoid Plunger Assy.
115	7258146	7258146	Speaker
116	7259011	7259011	Switch - Tuner Return
117	7259012	7259012	Switch - Station Selector
118	7258941	7258941	Transformer - Input
119	7259324	7259324	Transformer - Output
120	7259375	7255881	Transformer - Power
121	7239124	8542	Vibrator - Non-Synchronous
MECHANICAL PARTS			
Chassis			
	7256742	7256742	Antenna Connector
	1217820	1217820	Socket - Dial Light
	7236279	7236279	Socket - Octal
	7259307	7259307	Socket - 9 Pin Miniature
	7258073	7258073	Socket - 7 Pin Miniature
	7239125	7239125	Socket - Vibrator
Tuner			
126	7259201	7259201	Core - Tuning Core
127	7259178	7259178	Core - Guide Bar
128	187189	44	Dial Light
129	7259287	7259287	Escutcheon Assy.
130	7259344	7259344	Dial
131	7259496	7259496	Dial Backplate
132	7259017	7259017	Manual Drive Shaft Assy.
133	1219610	1219610	Motor Gear Train Assy.
134	7256688	7256688	Pointer Backplate
135	1219174	1219174	Pointer Tip Pkg.
136	7259100	7259100	Spring Clip
137	7259207	7259207	Spring - Worm Anti-rattle
138	7259055	7259055	Spring - Motor Power
139	1219611	1219611	Station Selector Bar Pkg.
	7259028	7259028	Station Selector Bar & Shaft Assy.
	7259125	7259125	Switch Operating Ring
			Toggle Plate
140	7259111	7259111	Spring (2)
	7256121	7256121	"C" Washer
141	7259026	7259026	Worm and Bracket Assy.

INSTALLATION PARTS

554691	554691	"A" Lead & Condenser Assy.
1911095	6030	Condenser - Generator
1912757	6030	Condenser - Ignition
1912900	6030	Condenser - Regulator
555348	555348	Clip - Hood Bonding
414237	414237	Distributor - Insulator Elbow
7257239	7257239	Distributor - Suppressor
120151	120151	Fuse - 15 Amps
7259663	7259663	Knob - Tuner
7259007	7259007	Knob - Tone Control
7259008	7259008	Knob - Sensitivity Control
7240138	6013	Static Collector
7258815	7258815	Trim Plate - 98 Series
7259626	7259626	Trim Plate - 88 and 76 Series

GENERAL**MOUNTING**—All 1950 Chevrolet Cars.**TUBES**—Five, plus rectifier.**SPEAKER**—6" x 9" Elliptical, Permanent Magnet.**TUNING**—Manual and 5 P. B. Mechanical.**ANTENNA TRIMMER COMPENSATION**—For Antennas Between
0.000058 - 0.000090 Mfd.**TUNING RANGE**—550-1600 KC.**PUSH BUTTON SETUP PROCEDURE**

Pull Push Button down and out. Tune in desired station manually. Push button all the way in.



MODEL 986388

ALIGNMENT PROCEDURE

Output Meter Connections Across Voice Coil
 Generator Return To Receiver Chassis
 Dummy Antenna In Series With Generator
 Volume Control Position Maximum Volume
 Tone Control Position Treble
 Generator Output Minimum for Readable Indication

Steps	Series Condenser or Dummy Antenna	Connect Signal Generator to	Signal Generator Frequency	Tune Receiver to	Adjust in Sequence For Max. Output
1	0.1 Mfd.	6BE6 Grid (Pin #7)	260 KC	High Frequency Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	1400 KC	Signal Generator Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Generator Signal	L**

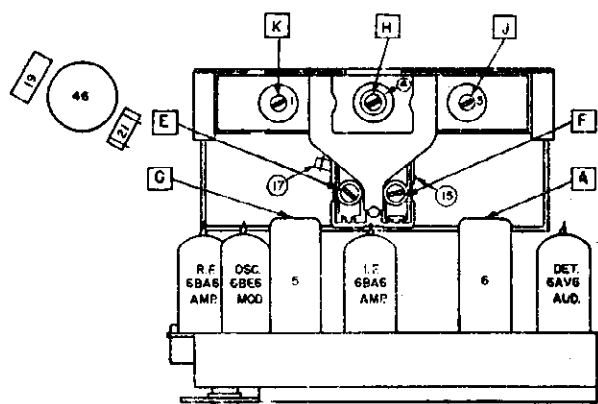
*Before making this adjustment check mechanical setting of oscillator core "H." The rear of the core should be 1 25/32" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) If adjustment is necessary, first dissolve the glyptal seal on the core studs. Core adjustments should be made with an insulated screw driver, and core studs should be cemented in place with glyptal or household cement after alignment.

**L is the pointer adjustment screw which is on the connecting link, between the pointer assembly and core guide bar (See tuner Dwg.). It should be adjusted so that when looking directly at the dial the pointer is 3/16" below the 1000 KC mark. This setting is to give the correct relationship between the pointer and the dial when the radio is installed in a car.

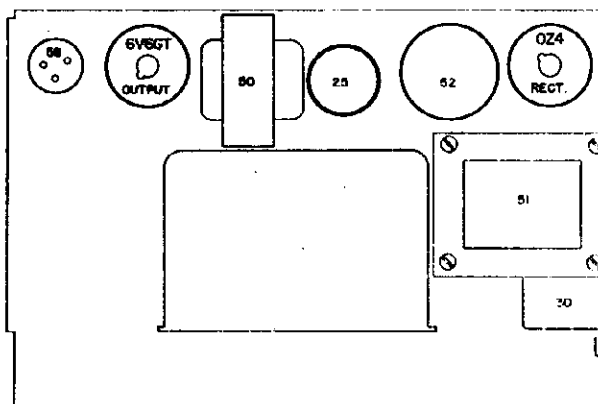
With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station near 1400 KC (see sticker on case).

PAGE 21-62 UNITED MOTORS

MODEL 986338,
Chevrolet

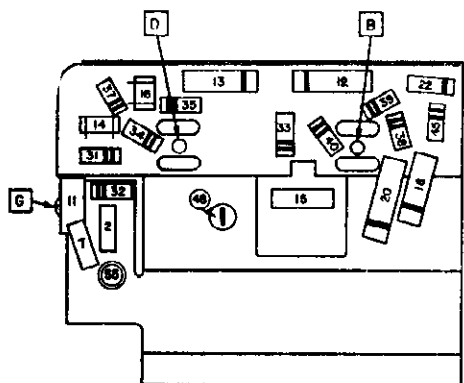


R.F. UNIT

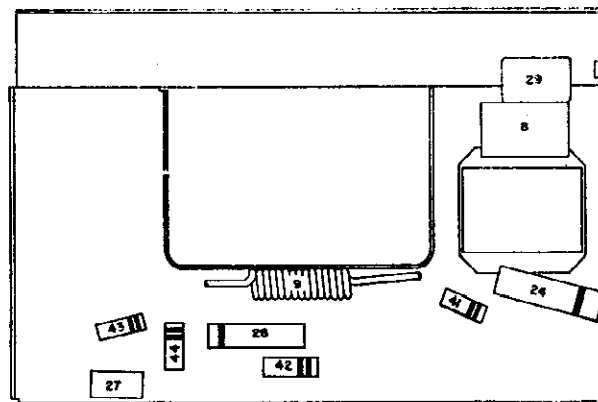


AUDIO UNIT

PARTS LAYOUT — TUBE VIEW

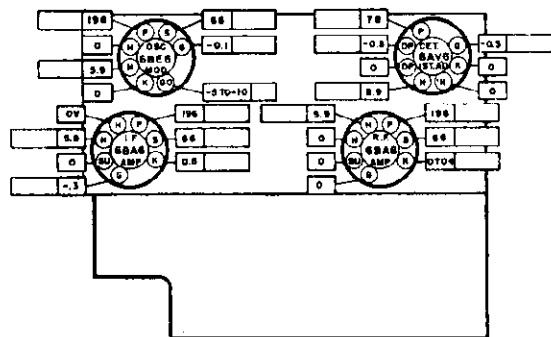


R.F. UNIT

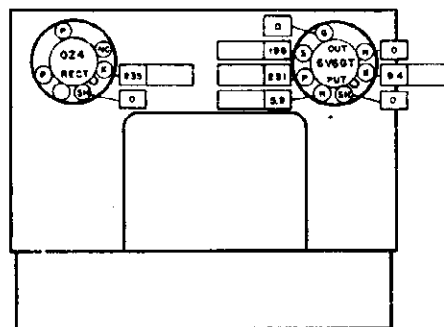


AUDIO UNIT

PARTS LAYOUT — CHASSIS VIEW



R.F. UNIT



AUDIO UNIT

TUBE SOCKET VOLTAGE CHART

The tube socket voltages, as measured at the factory and under the conditions shown on the schematic diagram on page 3 are shown above. The blank spaces are provided so the service man may fill in the actual voltage readings as taken with his own equipment. A normal operating radio should be used for these measurements.

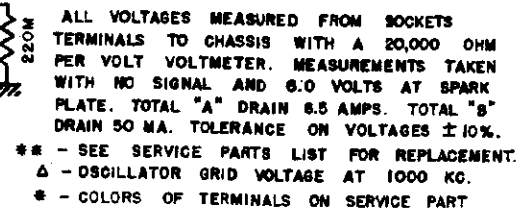
VOLTMETER RESISTANCE

OHMS PER VOLT

READINGS TAKEN WITH

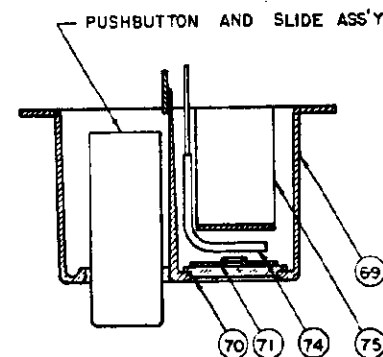
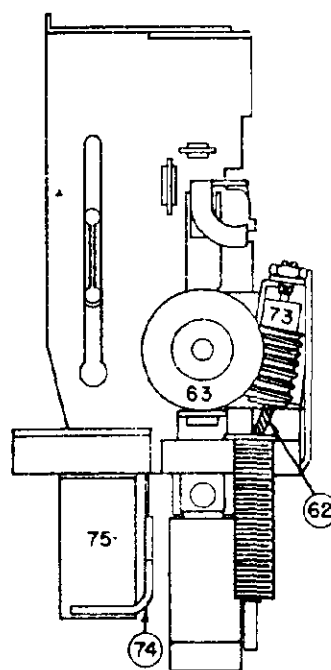
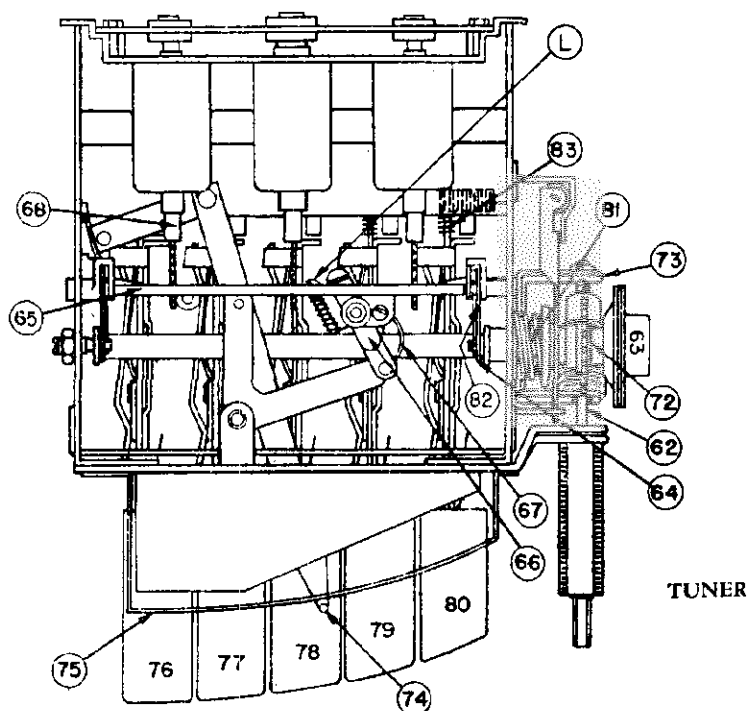
VOLTS AT SPARK PLATE

Voltage measured from socket terminals to chassis and are positive unless marked otherwise.,



CHEVROLET 986388

MODEL 986388,
Chevrolet



ESCUTCHEON CROSS SECTION

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description				
ELECTRICAL PARTS							
Coils							
				16	7258221	G 390	.000039 mfd Ceramic
				17	7257424	7257424	.000180 mfd Compensating
1	7258914	7258914	Antenna	18	1219634	E 202	.002 mfd 600 V Tubular
2	7240251	7240251	Antenna Spark Choke	19	7230767	E 502	.005 mfd 600 V Tubular
3	7258914	7258914	R.F.	20	7242448	E 303	.03 mfd 400 V Tubular
4	7258911	7258911	Oscillator				
5	7258188	1218725	1st IF	21	1219632	E 202	.002 mfd 600 V Tubular
				22	1219635	E 502	.005 mfd 600 V Tubular
6	7258198	1218726	2nd IF	24	7240906	H 602	.006 mfd 1600 V Tubular
7	7258502	7258502	Antenna Series Choke	25	7240724	M 908	Electrolytic
8	7258743	7258743	Hash Choke	25A			20 mfd 400 V
9	7241708	7241708	Hash Choke	25B			20 mfd 400 V
				25C			20 mfd 25 V
Condensers							
				26	7233243	H 402	.004 mfd 800 V Tubular
11	7258000	7258000	Antenna Trimmer Cond.	27	7236105	G 221	.000220 mfd Molded
12	7236841	E 503	.05 mfd 400 V Tubular	28	7258332	7258332	Dual Spark Plate
13	7236842	E 503	.05 mfd 200 V Tubular	28A			"A" Lead Section
14	1218371	G 100	.000010 mfd Ceramic	28B			Dial Light Section
15	7242454	7242454	Dual Trimmer				
15A			RF Section	29	7257879	E 504	.5 mfd 100 V Tubular
15B			Oscillator Section	30	7257879	E 504	.5 mfd 100 V Tubular

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
Miscellaneous Electrical Parts			
46	7258084	7258084	Control - Volume, Tone and Switch
46A			Volume Control
46B			Tone Control
46C			Switch
47	115273	51	Lamp - Dial
48	7242204	7242204	Sensitivity Control
49	7249381	6111	Speaker - 6 x 9 Elliptical PM
50	7256009	7256009	Transformer - Output
51	7258747	7258747	Transformer - Power
52	7239124	8542	Vibrator - Non-synchronous

MECHANICAL PARTS

Chassis - RF Unit			
54	7258022	7258022	Cable
55	7239475	7239475	Socket - Antenna
56	1218724	1218724	Socket - Dial Light
	7258073	7258073	Socket - 7 Pin Miniature
Chassis - Audio Unit			
58	7258111	7258111	Plug - Cable
	7236279	7236279	Socket - Octal Tube
	7239125	7239125	Socket - Vibrator

Tuner

62	147481	147481	Ball Bearings (10)
63	7258608	7258608	Drive Shaft - Manual
64	7258072	7258072	Clutch Disc - Driven
65	7258203	7258203	Connecting Link - Core Bar
66	7258206	7258206	Core Guide Bar
67	7256271	7256271	Connecting Link Pointer
	7255992	7255992	Spring - Pointer Connecting Link
68	7258468	7258468	Core - Iron Tuning
69	7258963	7258963	Escutcheon
70	7258002	7258002	Dial
71	7258962	7258962	Dial Backplate
72	7259480	7259480	Gear and Bushing
73	7258052	7258052	Gear and Bracket - Worm
74	7258059	7258059	Pointer Assy.
	1218848	1218848	Pointer Tip Package
75	7258961	7258961	Pointer Backplate
76	1219558	1219558	Push Button and Slide No. 1
77	1219559	1219559	Push Button and Slide No. 2
78	1219560	1219560	Push Button and Slide No. 3
79	1219561	1219561	Push Button and Slide No. 4
80	1219562	1219562	Push Button and Slide No. 5
81	7258756	7258756	Spring - Clutch
82	7257415	7257415	Spring - Core Bar Connecting Link
83	7255984	7255984	Spring - Pushbutton Return

INSTALLATION PARTS

1912900	Condenser - Ammeter
6030	Condenser - Generator
6030	Condenser - Ignition Coil
1912900	Condenser - Regulator
6003	Distributor Suppressor
7258880	Knob - Control
7258879	Knob - Dummy
7258882	Knob - Tone Control
7257918	Nut - Speed
1888204	Rubber Nipple - Distributor Suppressor
7257920	Spacer - RF Mtg. (inner)
7257922	Spacer - RF Mtg. (outer)
7257925	Speaker Shroud
6009	Static Collector - Wheel
7257917	Stud - Audio Unit Mtg.
7257924	Trim Plate - Instrument Panel
1218728	Fuse Holder Body - Male
1912900	Condenser, Regulator

Resistors

1215558	68 Ohms 1/2 W Insulated
A 225	2.2 Megohms 1/2 W Insulated
C 153	15,000 Ohms 2 W Insulated
B 153	15,000 Ohms 1 W Insulated
A 334	330,000 Ohms 1/2 W Insulated
A 223	22,000 Ohms 1/2 W Insulated
A 105	1 Megohm 1/2 W Insulated
A 224	220,000 Ohms 1/2 W Insulated
A 564	560,000 Ohms 1/2 W Insulated
B 221	220 Ohms 1 W Insulated
C 272	1800 Ohms 2 W { Replace with C 272
B 562	{ and B 567 in parallel
B 271	270 Ohms 1 W Insulated
A 224	220,000 Ohms 1/2 W Insulated
A 685	6.8 Megohms 1/2 W Insulated

Tubes

5241	6V6GT
5003	0Z4
5252	6BA6
5253	6BE6
5262	6AV6

PAGE 21-66 UNITED MOTORS

MODEL 986389,
Chevrolet

GENERAL

MOUNTING All 1950 Chevrolet Cars

TUBES Five, plus Rectifier

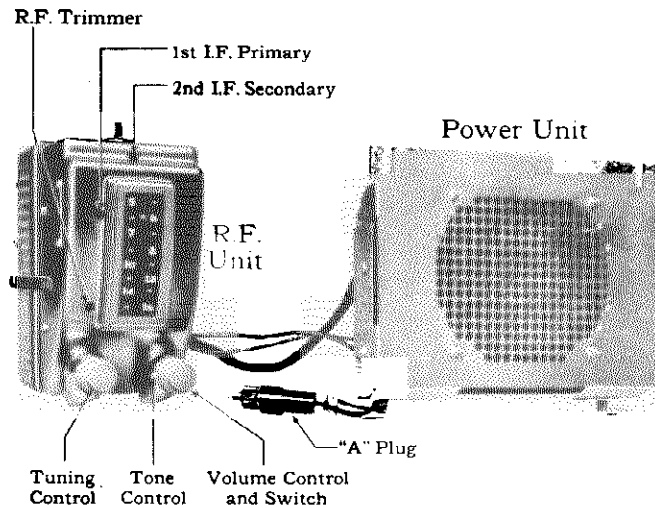
SPEAKER 6" Electro-Magnetic
or 6" Permanent Magnet

TUNING Manual

ANTENNA TRIMMER
COMPENSATION

—For Antennas Between
0.000060 - 0.000090 Mfd.

TUNING RANGE 535 - 1610 KC.



MODEL 986389

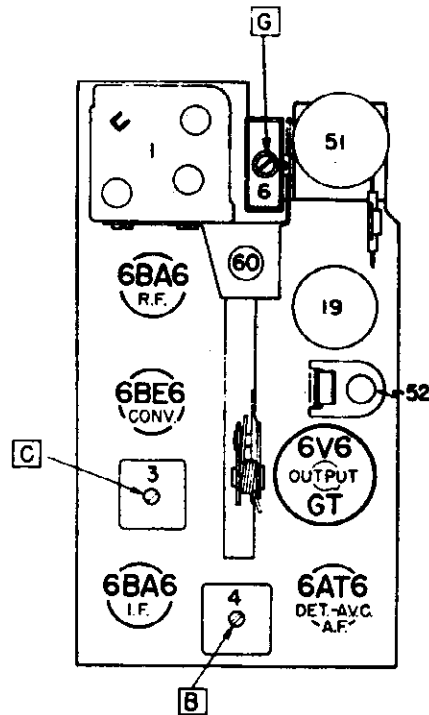
ALIGNMENT PROCEDURE:

Output Meter Connection	.....	Across Voice Coil
Generator Return	.....	To Receiver Chassis
Dummy Antenna	.....	In Series With Generator
Volume Control Position	.....	Maximum Volume
Tone Control Position	.....	Treble
Generator Output	.....	Minimum for Readable Indication

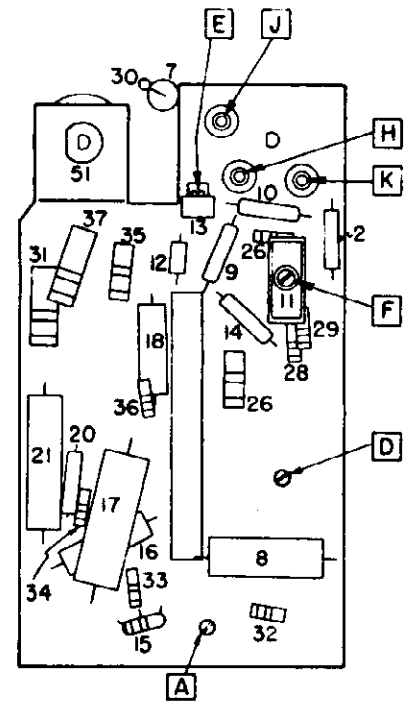
Steps	Series Condenser or Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust In Sequence For Max. Output
1	0.02 Mfd.	6BE6 Grid (Pin #7)	257.5 KC.	High Frequency Stop	A, B, C, D
2	0.000065 Mfd.	Antenna Connector	1610 KC.	High Frequency Stop	E, F, G
3	0.000065 Mfd.	Antenna Connector	1400 KC.	Signal Generator Signal	H, J, K
4	0.000065 Mfd.	Antenna Connector	1610 KC.	High Frequency Stop	F, G
5	0.000065 Mfd.	Antenna Connector	1400 KC.	Signal Generator Signal	*Pointer Adjust. Screw

*Refer to the Pointer String Hookup drawing This should be adjusted so the pointer reads 1400 KC.

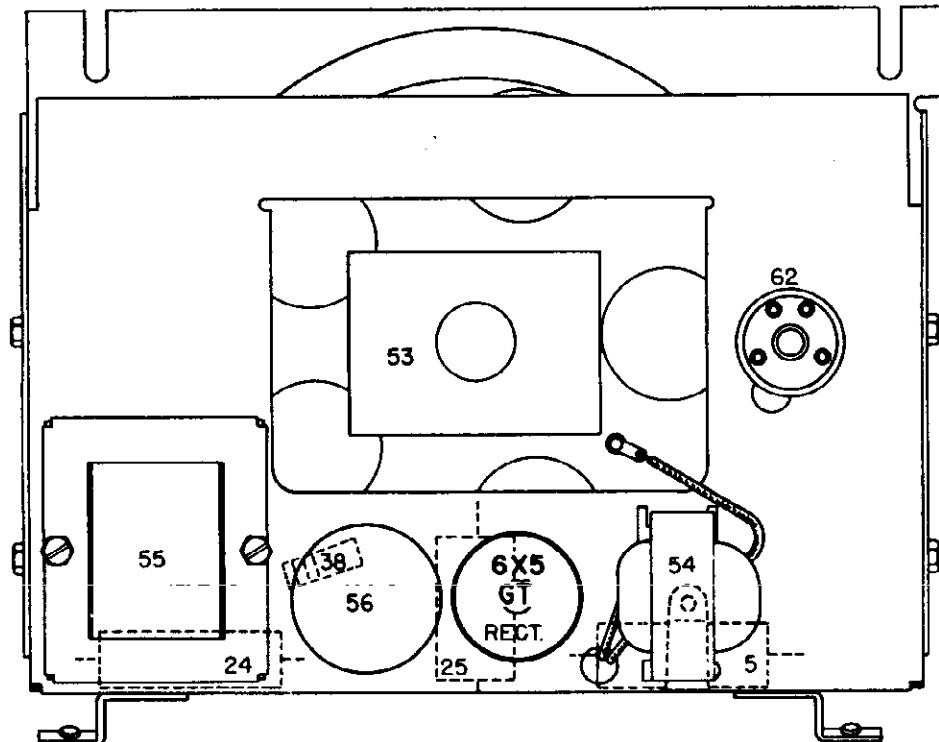
With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station near 1400 KC.



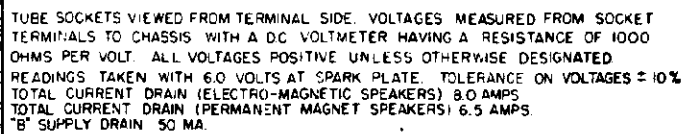
PARTS LAYOUT—TUBE VIEW



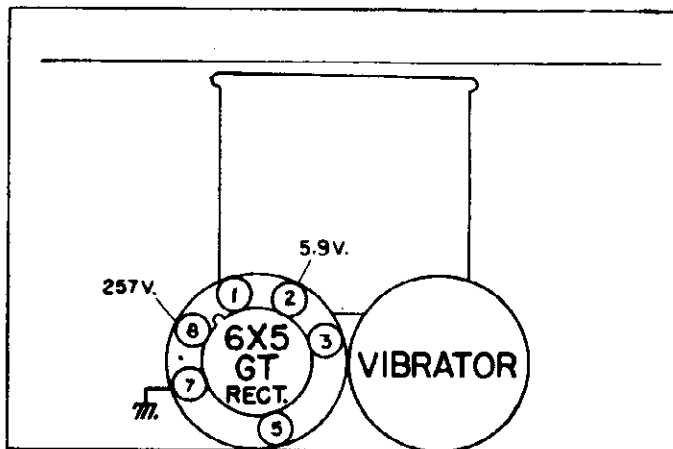
PARTS LAYOUT—CHASSIS VIEW



PARTS LAYOUT—POWER UNIT



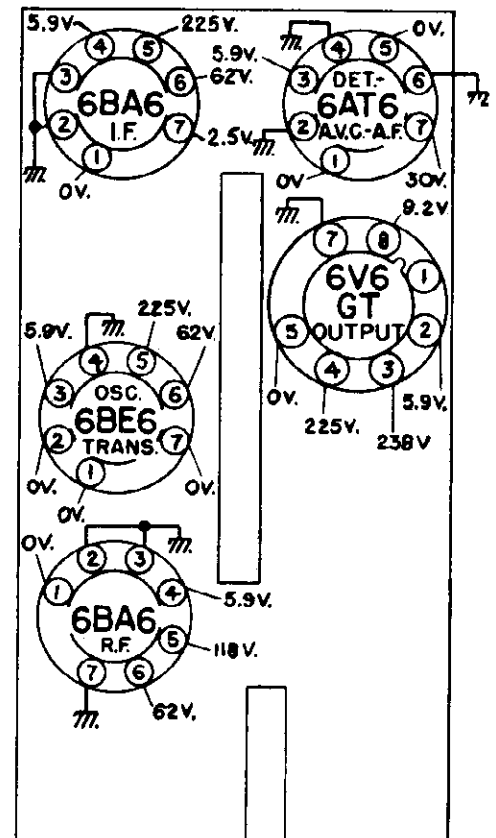
MODEL 986389,
Chevrolet



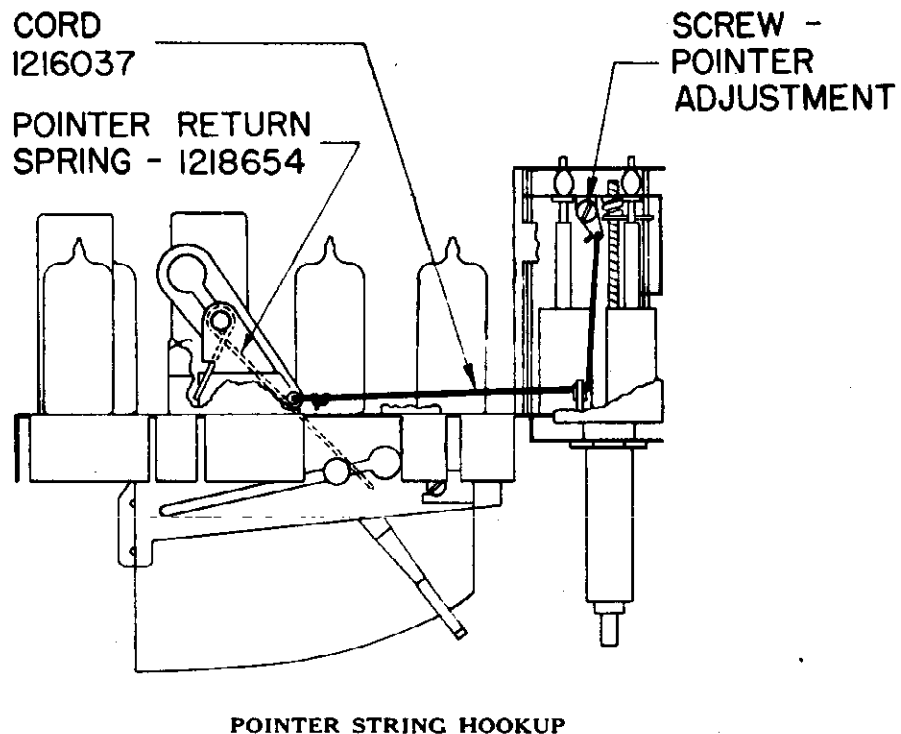
BOTTOM VIEW OF TUBE SOCKETS

READINGS TAKEN FROM TUBE SOCKET CON-
TACTS TO CHASSIS WITH A D. C. VOLT-METER
HAVING A RESISTANCE OF 1000 OHMS PER
VOLT.

"A" SUPPLY AT SPARK PLATE 6.0 VOLTS
"B" SUPPLY DRAIN APPROXIMATELY 50 MA.



TUBE SOCKET VOLTAGE CHART



MODEL 986389,
Chevrolet

ELECTRICAL PARTS

COILS

Illus. No.	Service Part No.	Production Part No.	Description	Illus. No.	Service Part No.	Production Part No.	Description
1		1219569	Coils-Permeability Tuning	51		1218641	Control-Volume, Tone & Switch
1A			Antenna Coil	51A			Volume Control
1B			R. F. Coil	51B			Tone Control
1C			Oscillator Coil	51C			On-Off Switch
2		1218639	Antenna Spark Choke	52		125588	Lamp, Dial (Mazda 55)
3		1219567	1st I. F. Assembly	53		1219575	Speaker—6" Electro-Magnetic
4		1219568	2nd I. F. Assembly				or
5		1219572	Flash Choke	53		1219576	Speaker—6" Perm. Magnet

CONDENSERS

6		1218634	Antenna Trimmer	60			
7	E503	7230592	.05 Mfd. 200 V. Tubular				
8	E503	7230592	.05 Mfd. 200 V. Tubular				
9	C100	1215189	.00001 Mfd. Molded				
10	G271	1215553	.0003 Mfd. Molded				
11		1218636	R. F. Trimmer				
12		1219566	.00033 Mfd.—Silver Mica				
13		1218635	Oscillator Trimmer				
14	G470	7236141	.00005 Mfd. Molded				
15		1219563	Diode Filter Unit				
15A			47,000 Ohm				
15B			.0002 Mfd.				
15C			.0002 Mfd.				
16		7230767	.005 Mfd. 100 V. Tubular				
17	E503	7230592	.05 Mfd. 200 V. Tubular				
18		7230767	.005 Mfd. 100 V. Tubular				
19		1218009	Electrolytic Condenser				
19A			20 Mfd. 25 V.				
19B			15 Mfd. 350 V.				
19C			10 Mfd. 350 V.				
20		1216881	.0005 Mfd. Molded				
21	E103	7233608	.01 Mfd. 600 V.				
22		1219577	Spark Plate				
23		1219577	Spark Plate				
24		7240248	5 Mfd. 100 V. Tubular				
25		1219320	.006 Mfd. 1600 V. Tubular				

RESISTORS

26	B223	1216156	22,000 Ohm 1/2 W. Insulated
27	A105	1213282	1 Megohm 1/2 W. Insulated
28	A223	1214550	22,000 Ohm 1/2 W. Insulated
29		1215562	5.6 Megohm 1/2 W. Insulated
30	A105	1213282	1 Megohm 1/2 W. Insulated
31	C223	7240590	22,000 Ohm 2 W. Insulated
32	A102	1213235	1000 Ohm 1/2 W. Insulated
33	A156	1213289	15 Megohm 1/2 W. Insulated
34	A105	1213282	1 Megohm 1/2 W. Insulated
35	B271	1213846	270 Ohm 1 W. Insulated
36	A224	1214555	220,000 Ohm 1/2 W. Insulated
37	C182	1214573	1800 Ohm 2 W. Insulated
38	B151	1211005	150 Ohm 1 W. Insulated

TUBES

1217690	6BA6—R. F. Amplifier
1217691	6BE6—Oscillator—Translator
1217690	6BA6—1 F. Amplifier
1218105	6AT6—Detector—AVC—1st Audio
1213793	6V6GT—Audio Output
1213794	6X5GT—Rectifier

MISCELLANEOUS ELECTRICAL PARTS

Service Part No.	Production Part No.	Description
	1218641	Control-Volume, Tone & Switch
		Volume Control
		Tone Control
		On-Off Switch
	125588	Lamp, Dial (Mazda 55)
	1219575	Speaker—6" Electro-Magnetic
		or
	1219576	Speaker—6" Perm. Magnet
	1219573	Transformer—Output
	1219571	Transformer—Power
8542	1218006	Vibrator

MECHANICAL PARTS

CHASSIS

1218651	Socket—Antenna Connector
7236279	Socket—Octal
1219570	Socket—Miniature
7239125	Socket—Vibrator
1218640	Clip—Pilot Lamp
1219586	Clip—I. F. Transformer Mtg.
1218642	Cable & Socket—Power
1218645	Lead Assy.—Dimmer
1219574	Plug & Leads Assy.—Power Supply & Speaker
1218650	Plug—Plug & Leads Assy.
1218655	Spring—Case Assembly Cover
1219579	"A" Connector Assembly
1219556	Case—Front

TUNER PARTS

1218621	Pointer Arm
1218623	Pointer Arm Assembly
1219564	Background—Dial
1219565	Background—Pointer
1218644	Dial
1218646	Link & Stud Assy.—Pointer
1218647	Nut—Speed—Dial & Dial Background
1218648	Pointer—Dial
1218654	Spring—Pointer Return
1218659	Stud—Top Mounting

INSTALLATION PARTS

7257921	Body, Fuse Holder
3690332	Bracket—Receiver Mtg.—Top
7257984	Block—Serrated—Radio Mtg.
7257922	Bushing—Control
3690333	Trim Plate
147685	Fuse—14 Amp.—25 V.
3693934	Knob—Tone
7258879	Knob—Dummy
7258880	Knob—Includes Set Screw—Volume & Tuning
1911095	Condenser—Generator
1910147	Condenser—Ignition Coil
1912900	Condenser—Voltage Regulator
	or
557531	Condenser—Voltage Regulator
494786	Static Collector Assy.
1888204	Nipple—Suppressor
7257917	Stud—Power Supply Mtg.
7257925	Shroud—Speaker
1887829	Suppressor Distributor

MODEL 986443,
Chevrolet

MOUNTING—All 1950 Chevrolet Trucks.

TUBES—Five, plus rectifier.

SPEAKER—6" x 9" Elliptical, Permanent Magnet.

TUNING—Manual and 5 P. B. Mechanical.

ANTENNA TRIMMER COMPENSA-

TION—For Antennas Between
0.000058 - 0.000090 Mfd.

TUNING RANGE—550-1600 KC.

PUSH BUTTON SET-UP PROCEDURE

Pull Push Button left and out. Tune in desired station manually. Push button all the way in.

ALIGNMENT PROCEDURE

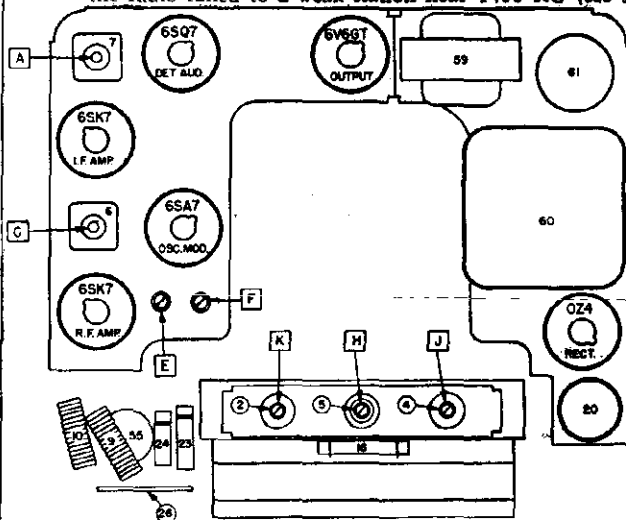
Output Meter Connections Across Voice Coil
 Generator Return To Receiver Chassis
 Dummy Antenna In Series With Generator
 Volume Control Position Maximum Volume
 Tone Control Position Treble
 Generator Output Minimum for Readable Indication

Steps	Series Condenser or Dummy Antenna	Connect Signal Generator to	Signal Generator Frequency	Tune Receiver to	Adjust in Sequence for Max. Output
1	0.1 Mfd.	6SA7 Grid (Pin #8)	260 KC	High Frequency Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Generator Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Generator Signal	L**

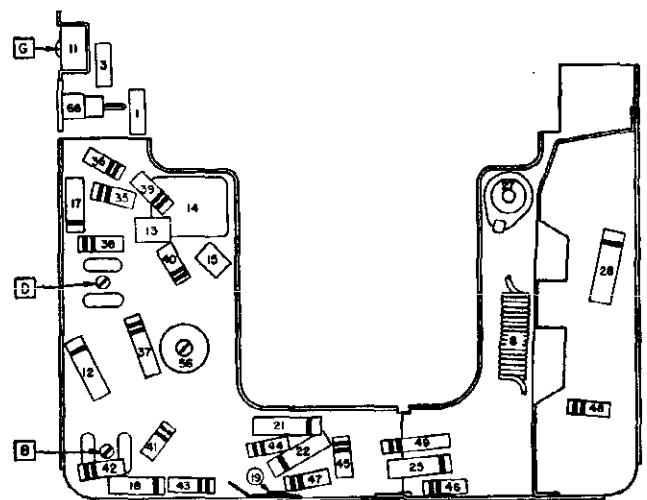
*Before making this adjustment check mechanical setting of oscillator core "H." The rear of the core should be $1\frac{1}{2}$ " from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) If adjustment is necessary, first dissolve the glyptal seal on the core studs. Core adjustments should be made with an insulated screw driver, and core studs should be cemented in place with glyptal or household cement after alignment.

**L is the pointer adjustment screw which is on the connecting link, between the pointer assembly and core guide bar (See tuner Dwg.) It should be adjusted so that when looking directly at the dial the pointer is on the 1100 KC mark. This setting is to give the correct relationship between the pointer and the dial when the radio is installed in a car.

With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station near 1400 KC (see sticker on case).



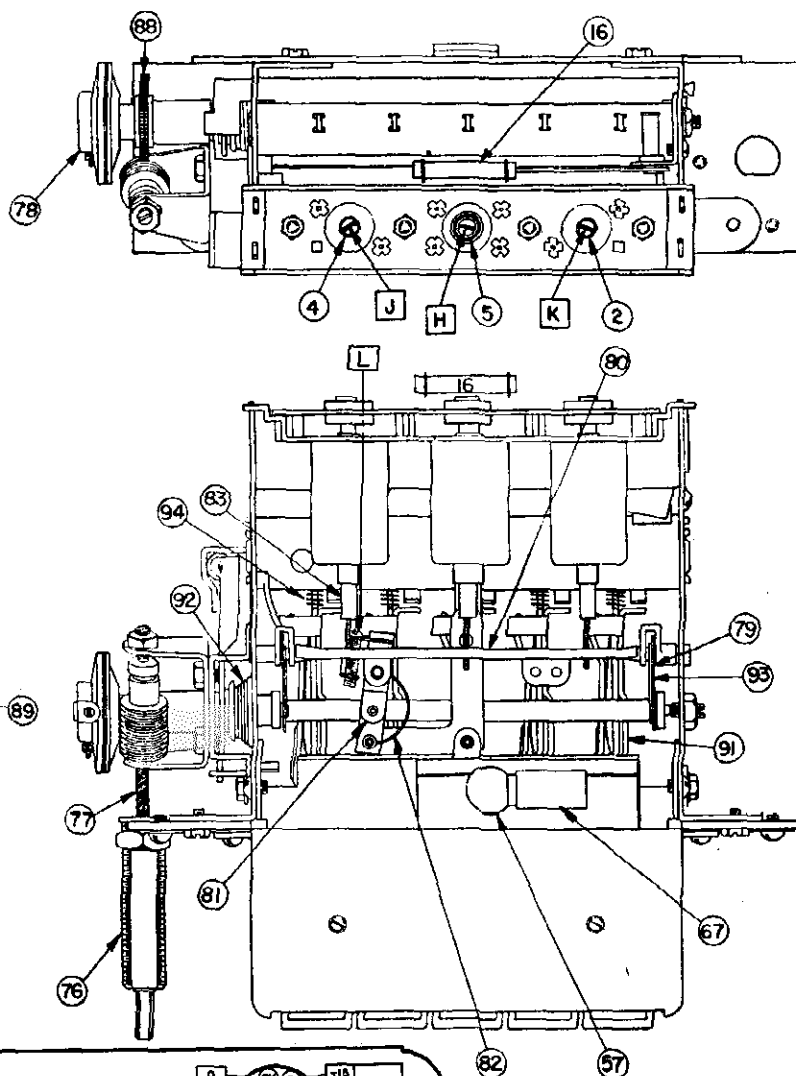
PARTS LAYOUT—TUBE VIEW



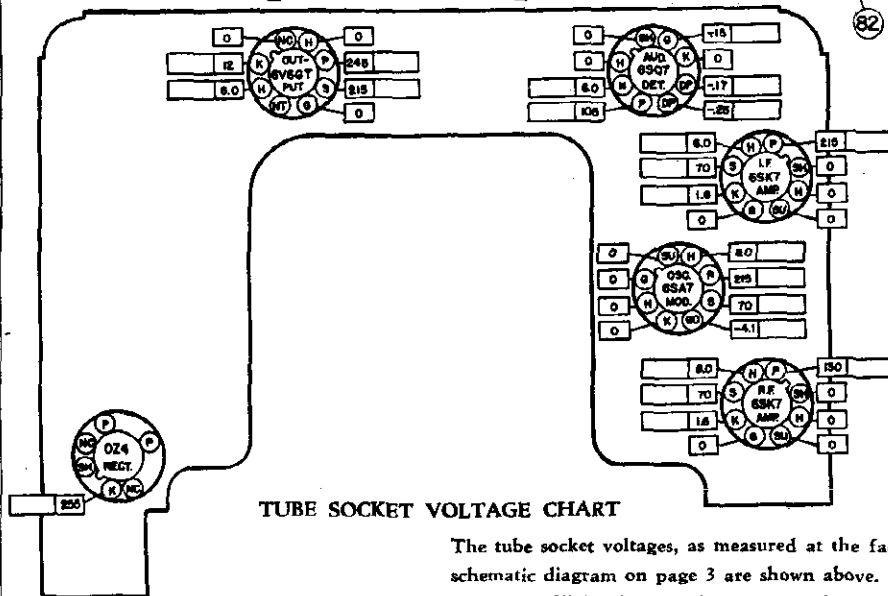
PARTS LAYOUT—CHASSIS VIEW

MODEL 986443,
Chevrolet

TUNER



ESCUTCHEON CROSS SECTION



TUBE SOCKET VOLTAGE CHART

The tube socket voltages, as measured at the factory and under the conditions shown on the schematic diagram on page 3 are shown above. The blank spaces are provided so the service man may fill in the actual voltage readings as taken with his own equipment. A normal operating radio should be used for these measurements.

VOLTMETER RESISTANCE.....OHMS PER VOLT

READINGS TAKEN WITH.....VOLTS AT SPARK PLATE

Voltage measured from socket terminals to chassis and are positive unless marked otherwise.



MODEL 986443,
Chevrolet

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
ELECTRICAL PARTS			
Coils			
1	7255738	7255738	Antenna Series Choke
2	7258914	7258914	Antenna
3	7240251	7240251	Antenna Spark Choke
4	7258914	7258914	R.F.
5	7258911	7258911	Oscillator
6	7258188	1218725	1st I. F.
7	7258198	1218726	2nd I.F.
8	7255912	7255912	Hash Choke
9	7258554	1217846	"A" Spark Choke
10	7258554	1217846	"A" Spark Choke
Condensers			
11	7257959	7257959	Antenna Trimmer & Brkt.
12	7236841	E 503	.05 mfd. 400V Tubular
13	1219550	G 680	.000068 mfd. Mica
14	7242454	7242454	Dual Trimmer
14A			R.F. Section
14B			Oscillator Section
15	7258221	G 390	.000039 mfd. Mica
16	7257424	7257424	.000180 mfd. Compensating
17	7236842	E 503	.05 mfd. 200V Tubular
18	7230767	E 502	.005 mfd. 600V Tubular
19	1217848	1217848	Chassis Plate Cond.
20	7240724	M 908	Electrolytic
20A			20 mfd. 25V
20B			20 mfd. 400V
20C			20 mfd. 400V
21	7239188	E 102	.001 mfd. 600V Tubular
22	7230892	E 503	.05 mfd. 400V Tubular
23	1219632	E 202	.002 mfd. 600V Tubular
24	7232956	E 502	.005 mfd. 600V Tubular
25	7233243	H 402	.004 mfd. 800V Tubular
26	7258332	1219869	Spark Plate Cond.
26A			Pilot Light Section
26B			"A" Lead Section
27	1217848	1217848	Chassis Plate Cond.
28	7240906	H 602	.006 mfd. 1500V Tubular
Resistors			
35	7237835	A 221	220 ohms 1/2W Insulated
36	1211147	A 225	2.2 megohms 1/2W Insulated
37	7233653	C 153	15,000 ohms 2W Insulated
38	7237595	B 153	15,000 ohms 1W Insulated
39	7240732	A 334	330,000 ohms 1/2W Insulated
40	1214550	A 223	22,000 ohms 1/2W Insulated
41	7238873	A 105	1 megohm 1/2W Insulated
42	1214553	A 473	47,000 ohms 1/2W Insulated
43	7241937	A 685	6.8 megohms 1/2W Insulated
44	1213479	A 224	220,000 ohms 1/2W Insulated
45	1213479	A 224	220,000 ohms 1/2W Insulated
46	7233773	C 331	330 ohms 1W Insulated
47	7238873	A 105	1 megohm 1/2W Insulated
48	7237994	B 221	220 ohms 1W Insulated
49	1214573	C 272	1800 ohms 2W wire wound (Replace with 2700
		B 562	2W and 5600 1W in parallel)
Tubes			
	7237751	5229	6SK7
	7237752	5222	6SA7
	1214293	5232	6SQ7GT
	1213793	5241	6V6GT
	1211924	5003	0Z4

MODEL 986443,
Chevrolet

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
Miscellaneous Electrical Parts			
55	7256188	7256188	Control - Volume, Tone & Switch
55A			Volume Control
55B			Tone Control
55C			Switch
56	7242204	7242204	Control - Sensitivity
57	125588	55	Lamp - Dial Light
58	7259381	6111	Speaker - 6x9 Elliptical PM
59	7256009	7256009	Transformer - Output
60	7255881	7255881	Transformer - Power
61	7239124	8542	Vibrator

MECHANICAL PARTS

Chassis			
65	7256250	1217950	"A" Lead & Fuse Holder
66	7256742	7256742	Connector - Antenna
67	1219619	1219619	Socket - Dial Light
	7236279	7236279	Socket - Octal Tube
	7239125	7239125	Socket - Vibrator
Tuner			
75	7255941	7255941	Backplate - Pointer
	147481	147481	Ball Bearings Pkg.
76	7258491	7258491	Bushing & Drive Shaft Assy.
77	7258525	7258525	Manual Drive Shaft Assy.
78	7258072	7258072	Clutch Disc - Driven
79	7258203	7258203	Connecting Link
80	7258211	7258211	Core Guide Bar - Parallel
81	7256271	7256271	Conn. Link - Pointer
82	7255992	7255992	Spring-Conn. Link - Pointer
83	7258468	7258468	Core Assy. - Powdered Iron
84	7259759	7259759	Escutcheon Assy.
85	7259764	7259764	Dial
86	7255940	7255940	Dial Backplate - Upper
87	7256163	7256163	Dial Backplate - Lower
88	7256102	7256102	Gear & Bushing - Clutch
89	7259755	7259755	Gear & Bracket - Worm
	7237172	7237172	Grommet - Osc. Coil Mtg.
	7244021	7244021	Grommet - Ant. - RF Coil Mtg.
	7251168	7251168	Grommet - "A" Lead
90	7256175	7256175	Pointer Assy.
	1219618	1219618	Pointer Tip Pkg.
91	1217837	1217837	Push Button and Slide Assy.
92	7258756	7258756	Spring - Clutch
93	7257415	7257415	Spring - Core Bar Conn. Link
94	7255984	7255984	Spring - Slide Return

INSTALLATION PARTS

7257919	7257919	Condenser - Ammeter
1911095	6030	Condenser - Generator
1910147	6030	Condenser - Ignition Coil
1912900	6030	Condenser - Voltage Regulator
7256098	7256098	Escutcheon - Control Bushing
147685	147685	Fuse - 14 amps
7256148	7256148	Knob - Control
7255935	7255935	Knob - Dummy
7255936	7255936	Knob - Wing
7256466	7256466	Spacer - Radio Mtg. - Lower
7255934	7255934	Spacer - Radio Mtg. - Upper
494786	6009	Static Collector
1887829	6003	Suppressor - Distributor
1888204	1888204	Rubber Nipple

MODEL 2233297

GENERAL

MOUNTING—All 1950 GMC Trucks.

TUBES—Five, plus rectifier.

SPEAKER—6" x 9" Elliptical, Permanent Magnet.

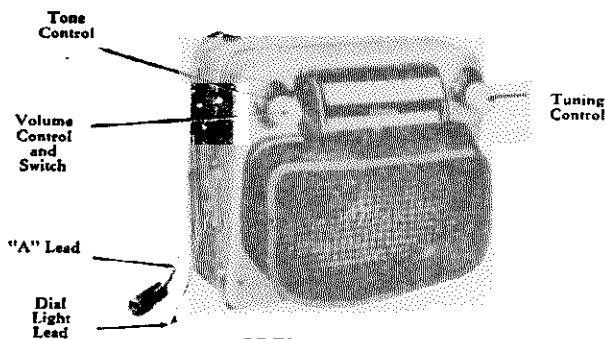
TUNING—Manual and 5 P. B. Mechanical.

ANTENNA TRIMMER COMPENSATION—For Antennas Between 0.000058 - 0.000090 Mfd.

TUNING RANGE—550-1600 KC.

PUSH BUTTON SET-UP PROCEDURE

Pull Push Button left and out. Tune in desired station manually. Push button all the way in.



MODEL 2233297

ALIGNMENT PROCEDURE

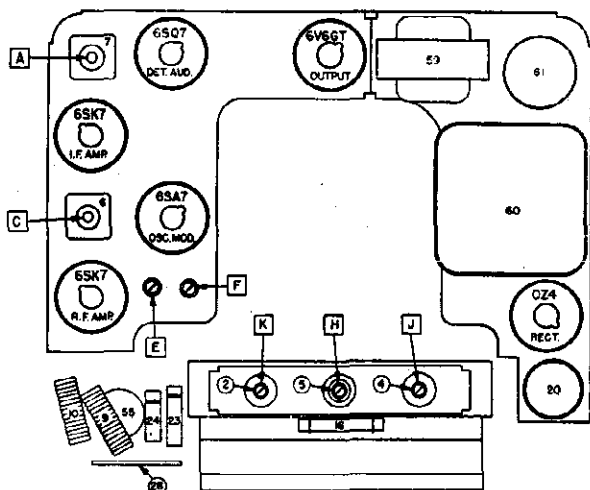
Output Meter Connections Across Voice Coil
 Generator Return To Receiver Chassis
 Dummy Antenna In Series With Generator
 Volume Control Position Maximum Volume
 Tone Control Position Treble
 Generator Output Minimum for Readable Indication

Steps	Series Condenser or Dummy Antenna	Connect Signal Generator to	Signal Generator Frequency	Tune Receiver to	Adjust in Sequence for Max. Output
1	0.1 Mfd.	6SA7 Grid (Pin #8)	260 KC	High Frequency Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Generator Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Generator Signal	L**

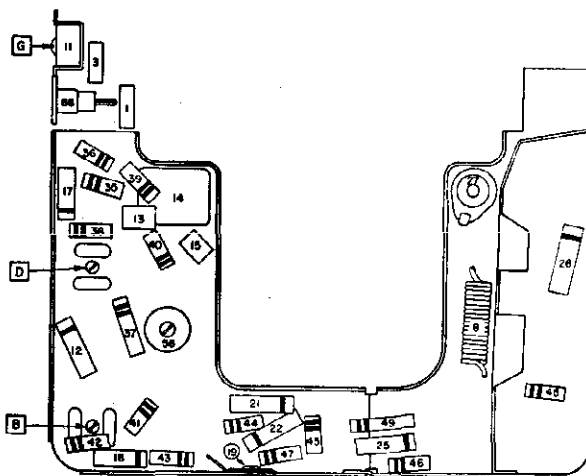
*Before making this adjustment check mechanical setting of oscillator core "H." The rear of the core should be 132" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) If adjustment is necessary, first dissolve the glyptal seal on the core studs. Core adjustments should be made with an insulated screw driver, and core studs should be cemented in place with glyptal or household cement after alignment.

**L is the pointer adjustment screw which is on the connecting link, between the pointer assembly and core guide bar (See tuner Dwg.) It should be adjusted so that when looking directly at the dial the pointer is at the 1100 KC mark. This setting is to give the correct relationship between the pointer and the dial when the radio is installed in a car.

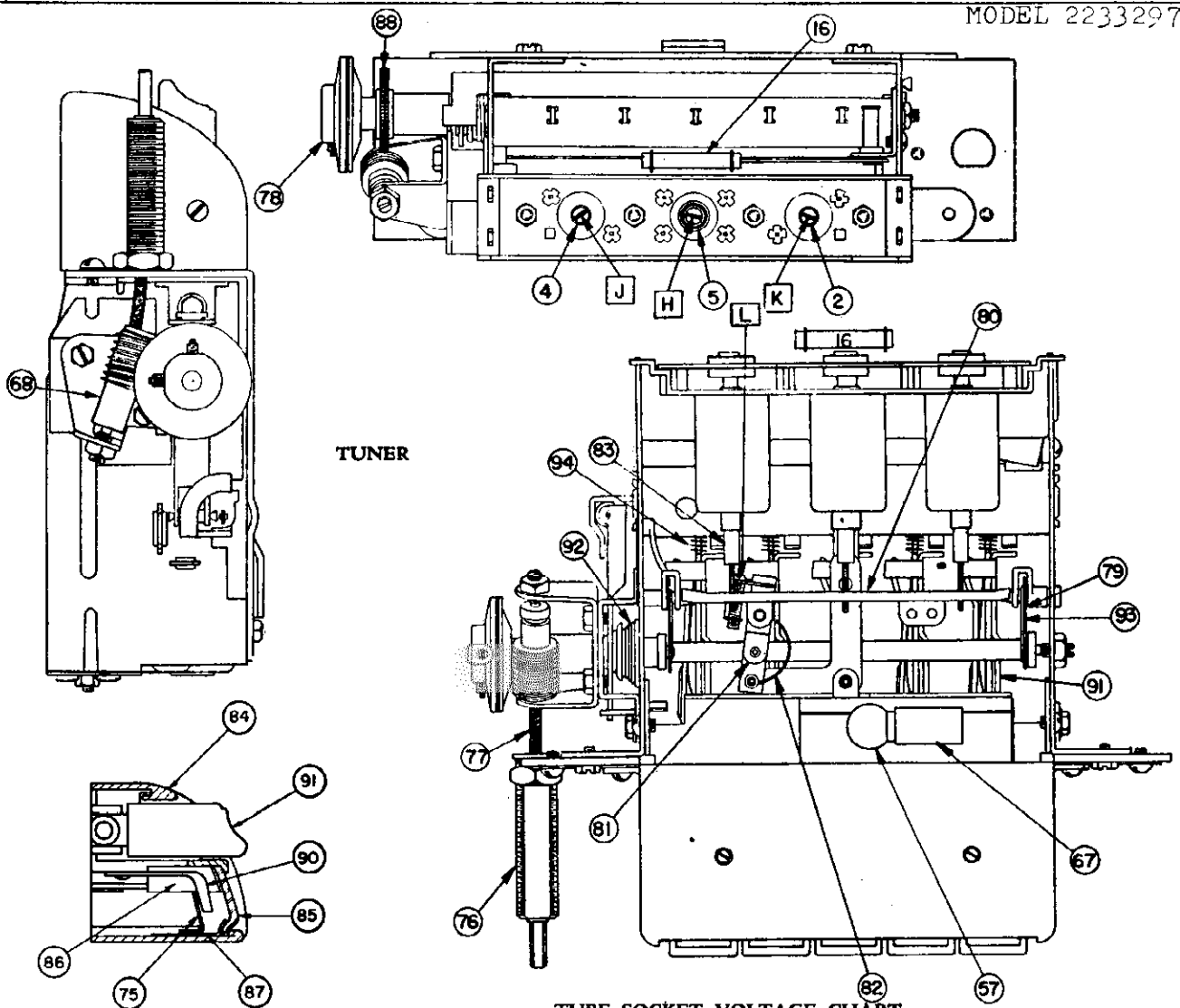
With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station near 1400 KC (see sticker on case).



PARTS LAYOUT—TUBE VIEW



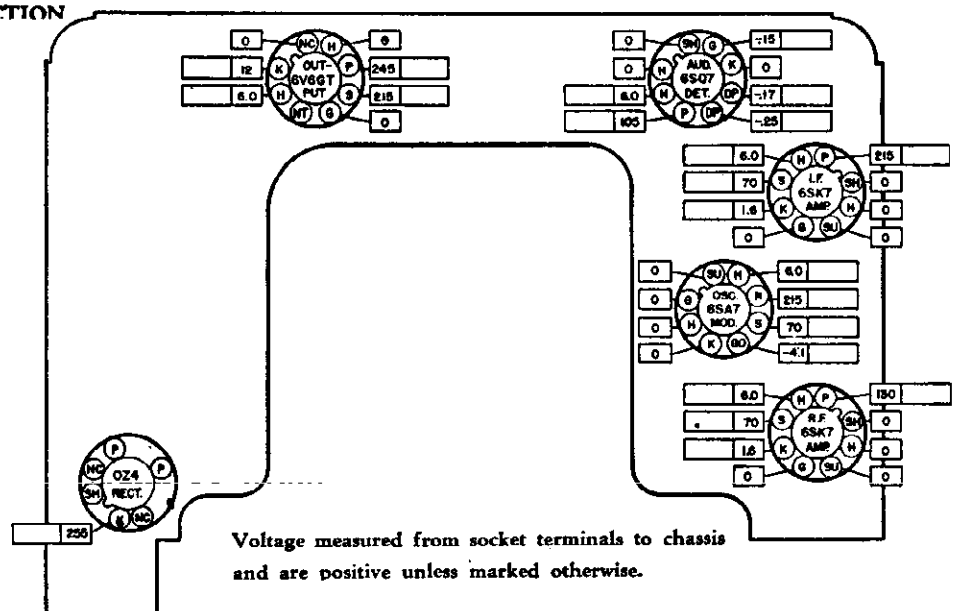
PARTS LAYOUT—CHASSIS VIEW



TUNER

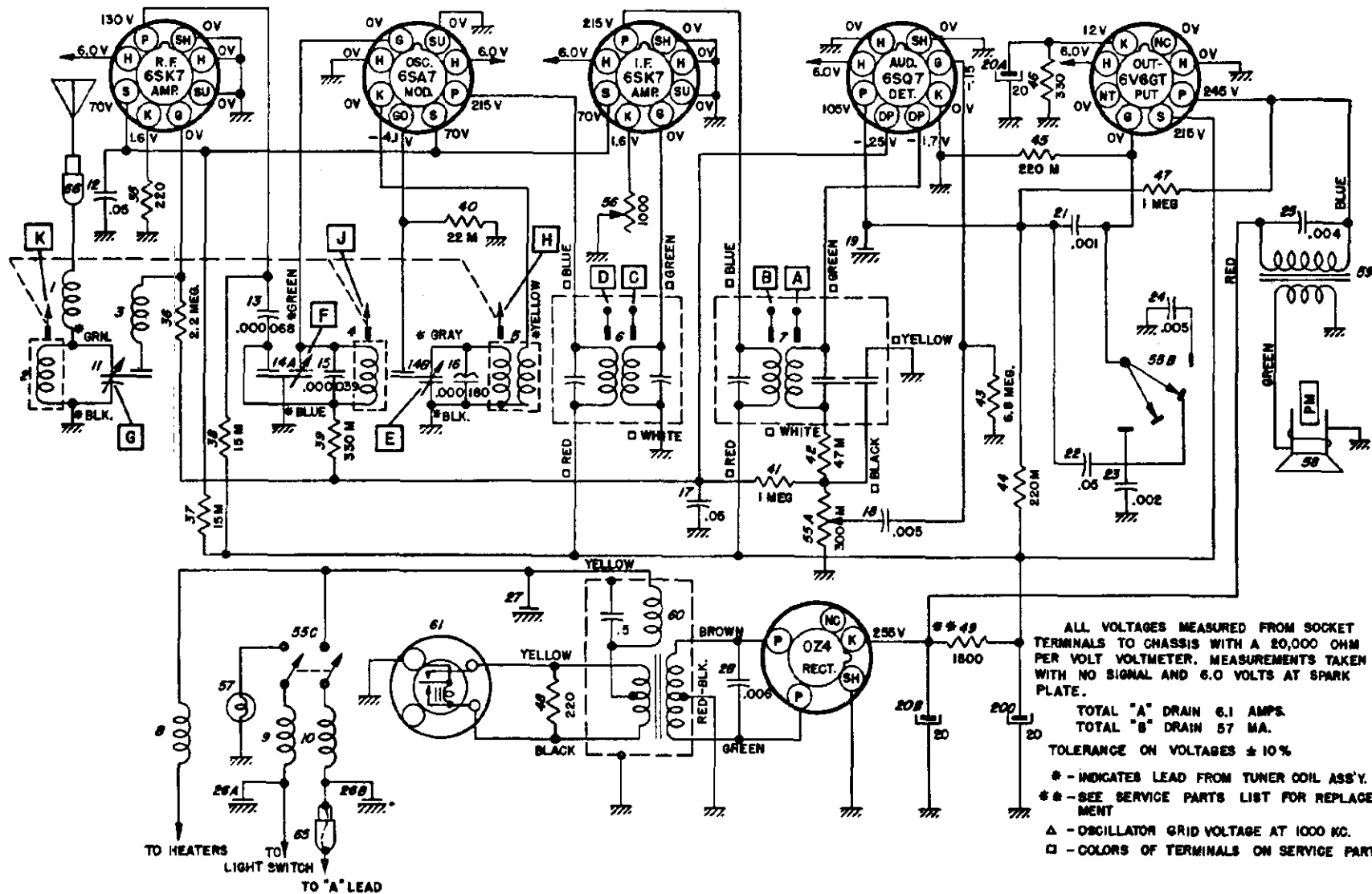
TUBE SOCKET VOLTAGE CHART

ESCUTCHEON CROSS SECTION



Voltage measured from socket terminals to chassis and are positive unless marked otherwise.

The tube socket voltages, as measured at the factory and under the conditions shown on the schematic diagram on page are shown above. The blank spaces are provided so the service man may fill in the actual voltage readings as taken with his own equipment. A normal operating radio should be used for these measurements.



SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
ELECTRICAL PARTS			
Coils			
1	7255738	7255738	Antenna Series Choke
2	7258914	7258914	Antenna
3	7240251	7240251	Antenna Spark Choke
4	7258914	7258914	R.F.
5	7258911	7258911	Oscillator
6	7258188	1218725	1st I.F.
7	7258198	1218726	2nd I.F.
8	7255912	7241708	Hash Choke
9	7258554	1217846	"A" Spark Choke
10	7258554	1217846	"A" Spark Choke
Condensers			
11	7257959	7257959	Antenna Trimmer & Brkt.
12	7236841	E 503	.05 mfd. 400V Tubular
13	1219550	G 680	.000068 mfd. Mica
14	7242454	7242454	Dual Trimmer
14A			R.F. Section
14B			Oscillator Section
15	7258221	G 390	.000039 mfd. Mica
16	7257424	7257424	.000180 mfd. Compensating
17	7236842	E 503	.05 mfd. 200V Tubular
18	7230767	E 502	.005 mfd. 600V Tubular
19	1217848	1217848	Chassis Plate Cond.
20	7240724	M 908	Electrolytic
20A			20 mfd. 25V
20B			20 mfd. 400V
20C			20 mfd. 400V
21	7239188	E 102	.001 mfd. 600V Tubular
22	7230892	E 503	.05 mfd. 400V Tubular
23	1219632	E 202	.002 mfd. 600V Tubular
24	7232956	E 502	.005 mfd. 600V Tubular
25	7233243	H 402	.004 mfd. 800V Tubular
26	7258332	1219369	Spark Plate Cond.
26A			Pilot Light Section
26B			"A" Lead Section
27	1217848	1217848	Chassis Plate Cond.
28	7240906	H 602	.006 mfd. 1600V Tubular
Resistors			
35	7237835	A 221	220 ohms 1/2W Insulated
36	1211147	A 225	2.2 megohms 1/2W Insulated
37	7233653	C 153	15,000 ohms 2W Insulated
38	7237595	B 153	15,000 ohms 1W Insulated
39	7240732	A 334	330,000 ohms 1/2W Insulated
40	1214550	A 223	22,000 ohms 1/2W Insulated
41	7238873	A 105	1 megohm 1/2W Insulated
42	1214553	A 473	47,000 ohms 1/2W Insulated
43	7241937	A 685	6.8 megohms 1/2W Insulated
44	1213479	A 224	220,000 ohms 1/2W Insulated
45	1213479	A 224	220,000 ohms 1/2W Insulated
46	7233773	B 331	330 ohms 1W Insulated
47	7238873	A 105	1 megohm 1/2W Insulated
48	7237994	B 221	220 ohms 1W Insulated
49	1214573	{ C-272	1800 ohms (Replace with 2700
		{ B-562	2W and 5600 1W in parallel)
Tubes			
	7237751	5229	6SK7
	7237752	5222	6SA7
	1214293	5232	6SQ7GT
	1213793	5241	6V6GT
	1211924	5003	0Z4

MODEL 2233297

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
Miscellaneous Electrical Parts			
55	7256188	7256188	Control - Volume, Tone & Switch
55A			Volume Control
55B			Tone Control
55C			Switch
56	7242204	7242204	Control - Sensitivity
57	125588	55	Lamp - Dial Light
58	7259381	7259381	Speaker - 6x9 Elliptical PM
59	7256009	7256009	Transformer - Output
60	7255881	7255881	Transformer - Power
61	7239124	8542	Vibrator

MECHANICAL PARTS

Chassis

65	7256250	1217950	"A" Lead & Fuse Holder
66	7256742	7256742	Connector - Antenna
67	1219619	1219619	Socket - Dial Light
	7236279	7236279	Socket - Octal Tube
	7239125	7239125	Socket - Vibrator

Tuner

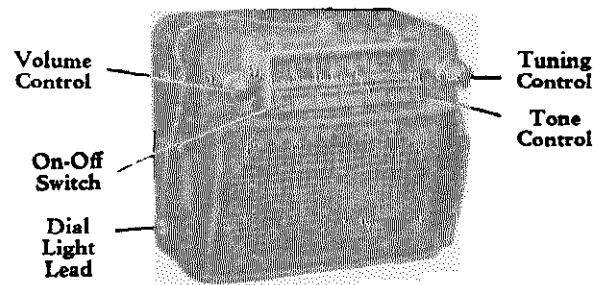
75	7255941	7255941	Backplate - Pointer
	147481	147481	Ball Bearings Pkg.
76	7258491	7258491	Bushing & Drive Shaft Assy.
77	7258525	7258525	Manual Drive Shaft Assy.
78	7258072	7258072	Clutch Disc - Driven
79	7258203	7258203	Connecting Link
80	7258211	7258211	Core Guide Bar - Parallel
81	7256271	7256271	Conn. Link - Pointer
82	7255992	7255992	Spring-Conn. Link - Pointer
83	7258468	7258468	Core Assy. - Powdered Iron
84	7259798	7259798	Escutcheon Assy.
85	7259799	7259799	Dial
86	7255940	7255940	Dial Backplate - Upper
87	7256163	7256163	Dial Backplate - Lower
88	7256102	7256102	Gear & Bushing - Clutch
89	7259755	7259755	Gear & Bracket - Worm
	7237172	7237172	Grommet - Osc. Coil Mtg.
	7244021	7244021	Grommet - Ant. - RF Coil Mtg.
	7251168	7251168	Grommet - "A" Lead
90	7256175	7256175	Pointer Assy.
	1219618	1219618	Pointer Tip Pkg.
91	1217837	1217837	Push Button and Slide Assy.
92	7258756	7258756	Spring - Clutch
93	7257415	7257415	Spring - Core Bar Conn. Link
94	7255984	7255984	Spring - Slide Return

INSTALLATION PARTS

7257919	7257919	Condenser - Ammeter
1911095	6030	Condenser - Generator
1910147	6030	Condenser - Ignition Coil
1912900	6030	Condenser - Voltage Regulator
7256098	7256098	Escutcheon - Control Bushing
147685	147685	Fuse - 14 amps
7256148	7256148	Knob - Control
7255935	7255935	Knob - Dummy
7255936	7255936	Knob - Wing
7256466	7256466	Spacer - Radio Mtg. - Lower
7255934	7255934	Spacer - Radio Mtg. - Upper
494786	6009	Static Collector
1887829	6003	Suppressor - Distributor
1888204	1888204	Rubber Nipple

MODEL 7258755,
Cadillac**GENERAL****MOUNTING**—All 1950 Cadillac Cars.**TUBES**—Seven, Plus Rectifier.**SPEAKER** — 6" x 9" Elliptical, Permanent Magnet.**TUNING**—Manual and 5 P.B. Mechanical.**ANTENNA TRIMMER COMPENSATION** — 0.000060 - 0.000085 Mfd.**TUNING RANGE**—550-1600 KC.**PUSHBUTTON SET-UP**

Pull pushbutton to the right and out.
Tune in desired station manually. Push button all the way in.



MODEL 7258755

ALIGNMENT PROCEDURE:

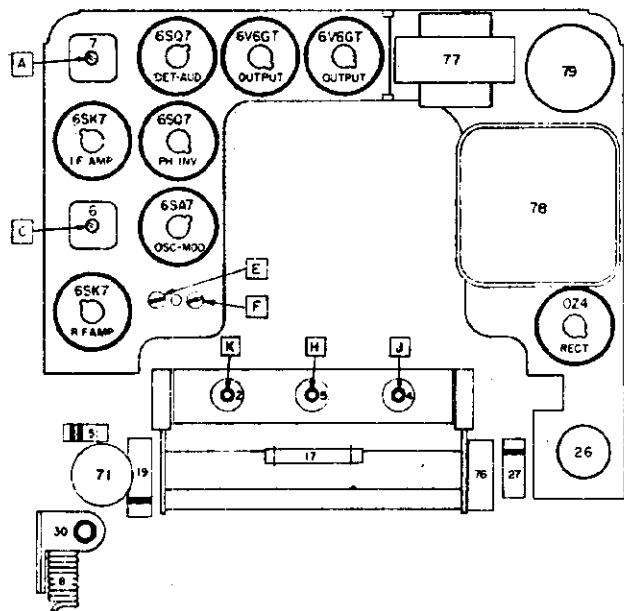
Output Meter Connection Across Voice Coil
Signal Generator Return To Chassis
Dummy Antenna In Series With Generator
Volume Control Maximum Volume
Tone Control Treble
Generator Output Minimum for Readable Indication

Steps	Series Condenser or Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence for Max. Output
1	0.1 Mfd.	6SA7 Grid (Pin #8)	260 KC	High Freq. Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Freq. Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	1430 KC	Signal Gen. Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	High Freq. Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1000 KC	Signal Gen. Signal	L**

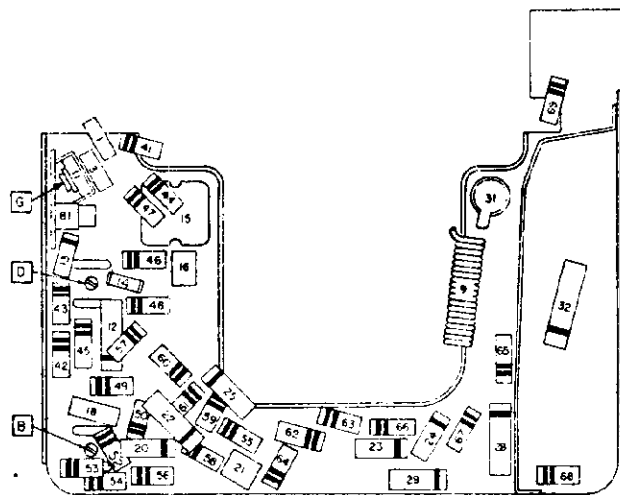
*Before making this adjustment check the mechanical setting of the oscillator core "H." The slotted end of the core should be 1/25/32" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form). If adjustment is necessary, be sure to first dissolve the glyptal seal on the core studs. Core adjustments are made from the mounting end of the coil form with an insulated screwdriver, and core studs should be re-sealed with glyptal or household cement after alignment.

**"L" is the pointer adjustment screw on the pointer connecting link (See tuner drawing). Adjust so pointer reads 1000 KC (on the "10" calibration mark).

With the radio installed and the car antenna plugged in adjust antenna trimmer "G" (See sticker on case) for maximum volume with the radio tuned to a weak station near 1400 KC.

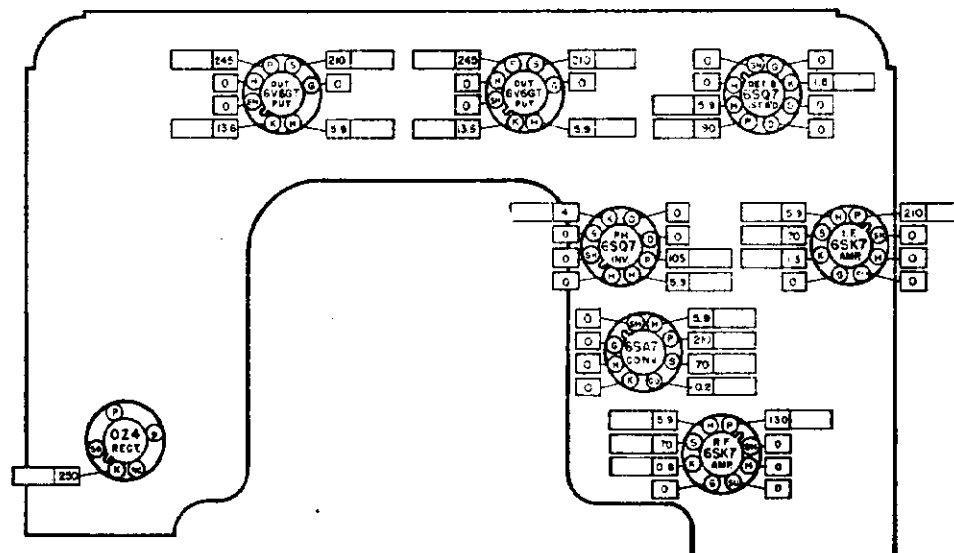


PARTS LAYOUT — TUBE VIEW



PARTS LAYOUT — CHASSIS VIEW

TUBE SOCKET VOLTAGE CHART

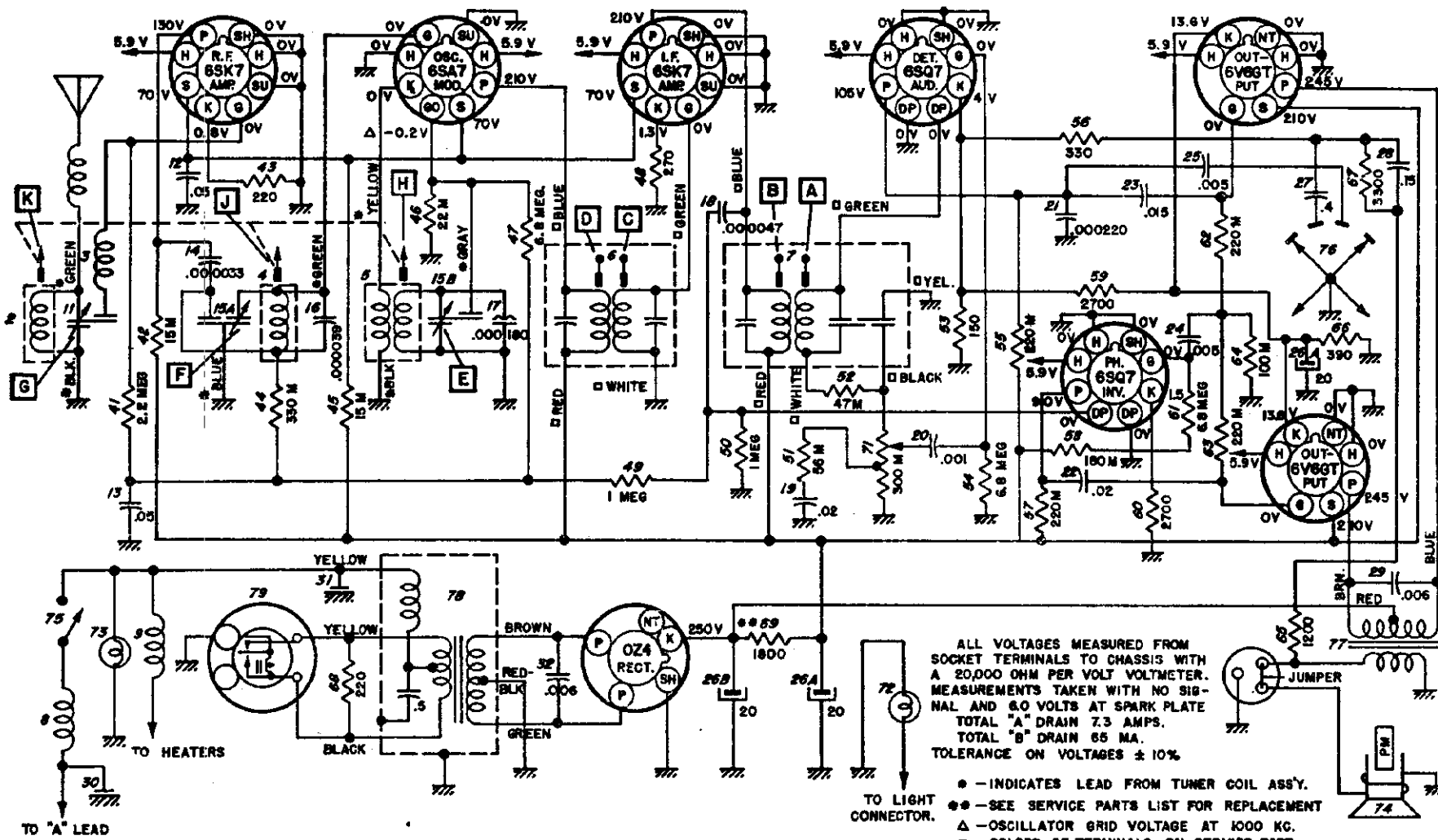


The tube socket voltages, as measured at the factory and under the conditions shown on the schematic diagram, are shown above. The blank spaces are provided so that the serviceman may fill in actual voltage readings as taken with his own equipment. A normal operating radio should be used for these measurements.

Voltmeter resistance Ohms Per Volt.

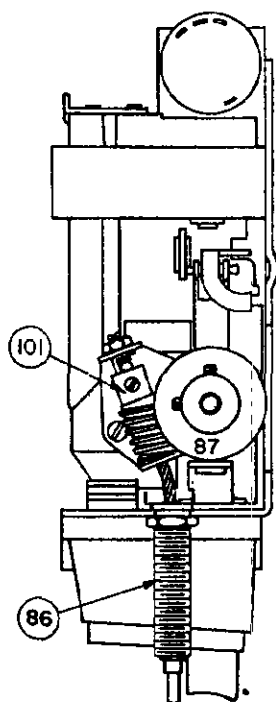
Readings taken with Volts at Spark Plate.

All voltages measured from socket terminals to chassis.

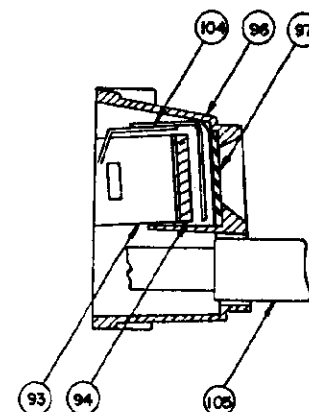
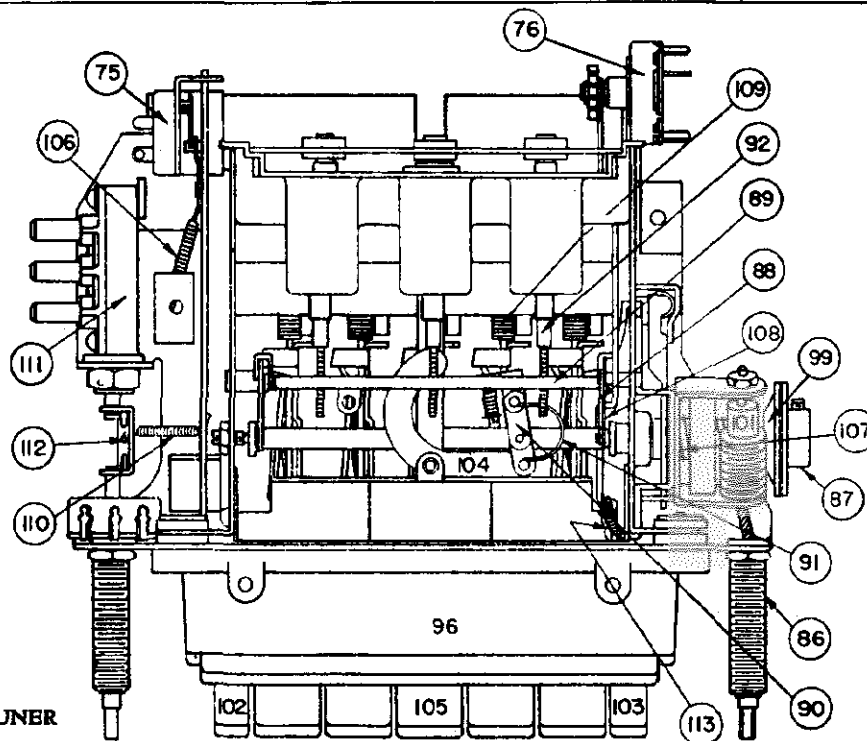


MODEL 7258755

MODEL 7253755,
Cadillac



TUNER



ESCUTCHEON CROSS SECTION

SERVICE PARTS LIST

Illus. No	Production Part No.	Service Part No.	Description
ELECTRICAL PARTS			
Coils			
1	7255738	7255738	Antenna Series Choke
2	7258914	7258914	Antenna
3	7240251	7240251	Antenna Spark Choke
4	7258914	7258914	R.F.
5	7258911	7258911	Oscillator
6	7258849	1219508	1st I.F.
7	7258850	1219509	2nd I.F.
8	1217846	1217846	"A" Spark Plate
9	1217846	1217846	Hash Choke
Condensers			
11	7258226	7258226	Antenna Trimmer
12	7258125	E 503	.05 Mfd 400 V Tubular
13	1210697	E 503	.05 Mfd 200 V Tubular
14	1218348	G 330	.000033 Mfd Ceramic
15	7242454	7242454	Dual Trimmer
15A			R.F. Section
15B			Oscillator
16	7258221	G 390	.000039 Mfd Ceramic
17	7257424	7257424	.000180 Mfd Compensating
18	1218202	G 470	.000047 Mfd Ceramic
19	7237720	E 203	.02 Mfd 400 V Tubular
20	1218883	E 102	.001 Mfd 600 V Tubular
21	1218886	G 221	.000220 Mfd Ceramic
22	7233770	E 203	.02 Mfd 600 V Tubular
23	7237719	7237719	.015 Mfd 600 V Tubular
24	7232956	E 502	.005 Mfd 600 V Tubular
25	7230767	E 502	.005 Mfd 600 V Tubular
26	7240724	M 908	Electrolytic
26A			20 Mfd 25 V
26B			20 Mfd 400 V
26C			20 Mfd 400 V
27	1218882	1218882	.4 Mfd 100 V Tubular
28	1218880	1218880	.15 Mfd 100 V Tubular
29	7240906	H 602	.006 Mfd 600 V Tubular
30	7240797	7240797	Spark Plate and Choke Assy.
31	1217848	1217848	Chassis Plate Assy.

SERVICE PARTS LIST

Illus. Production Service
No Part No. Part No.

Description

Tubes

7237751	5229	6SK7
7237752	5222	6SA7
7237753	5231	6SQ7
1213793	5241	6V6GT
1211924	5003	0Z4

Miscellaneous Electrical

71	7258954	7258954	Control - Volume
72	125588	55	Lamp - Dial Light
73	187189	187189	Lamp - Pilot Light
74	7258488	7258488	Speaker - 6 x 9 Elliptical P.M.
75	7242411	7242411	Switch - "On - Off"
76	7258273	7258273	Switch - Tone Control
77	7258390	7258390	Transformer - Output
78	7255881	7255881	Transformer - Power
79	7239124	8542	Vibrator - Non-synchronous

MECHANICAL PARTS

Chassis

81	7239475	7239475	Socket - Antenna
82	1219106	1219106	Socket - Dial Light
	7236279	7236279	Socket - Octal Tube
	7239125	7239125	Socket - Vibrator

Tuner

86	7258957	7258957	Bushing and Manual Drive Shaft
87	7258072	7258072	Clutch Disc-Driven
88	7258203	7258203	Connecting Link - Core Bar
89	7258206	7258206	Core Guide Bar - Parallel
90	7256271	7256271	Pointer Connecting Link
91	7255992	7255992	Spring - Pointer Connecting Link
92	7258468	7258468	Core - Powdered Iron
93	1219105	1219105	Dial Backplate Assy.
94	7258254	7258254	Dial - Calibration
95	7258239	7258239	Dial - Retainer Spring
96	7258270	7258270	Escutcheon
97	7258236	7258236	Dial Glass
98	7258232	7258232	Dial Retainer
99	7256760	7256760	Gear and Bushing
101	7256758	7256758	Gear and Bracket - Worm
102	7258757	7258757	Plunger and Button - "On - Off"
103	1219138	1219138	Plunger and Button - Tone Control
104	7258269	7258269	Pointer Assy.

105	1219104
106	7257361
107	7258756
108	7257415
109	7255984

113	7258786
110	7258731
111	7258260
112	7258229

7258542
1911095
1910147
147685
7240138
1456932
7259369

41	1211147
42	7237595
43	7237835
44	7240732
45	7233653
46	1211192
47	1215563
48	1214542
49	7238873
50	7238873

51	1213267
52	7240731
53	1213220
54	7241937
55	1214555
56	1213224
57	1214555
58	1215560
59	1213240
60	1213240
61	7241937
62	1214555
63	1214555
64	1213270
65	1213236

66	1216149
67	1213481
68	7237994
69	1214573

1219104
7257361
7258756
7257415
7255984

7258786
7258731
7258260
7258229

INSTALLATION PARTS

7258542	"A" Lead and Fuse Connector
6030	Capacitor - Generator
6030	Capacitor - Ignition Coil
147685	Fuse - 14 amps
6013	Static Collector
1456932	Knob - Dummy
7259369	Knob - Control

Resistors

A 225	2.2 Megohms 1/2 W Insulated
B 153	15,000 Ohms 1 W Insulated
A 221	220 Ohms 1/2 W Insulated
A 334	330,000 Ohms 1/2 W Insulated
C 153	15,000 Ohms 2 W Insulated
A 223	22,000 Ohms 1/2 W Insulated
A 685	6.8 Megohms 1/2 W Insulated
A 271	270 Ohms 1/2 W Insulated
A 105	1 Megohm 1/2 W Insulated
A 105	1 Megohm 1/2 W Insulated
A 563	56,000 Ohms 1/2 W Insulated
A 473	47,000 Ohms 1/2 W Insulated
A 151	150 Ohms 1/2 W Insulated
A 685	6.8 Megohms 1/2 W Insulated
A 224	220,000 Ohms 1/2 W Insulated
A 331	330 Ohms 1/2 W Insulated
A 224	220,000 Ohms 1/2 W Insulated
1215560	180,000 Ohms 1/2 W Insulated
1213240	2,700 Ohms 1/2 W Insulated
1213240	2,700 Ohms 1/2 W Insulated
A 685	6.8 Megohms 1/2 W Insulated
A 224	220,000 Ohms 1/2 W Insulated
A 224	220,000 Ohms 1/2 W Insulated
A 104	100,000 Ohms 1/2 W Insulated
1213236	1200 Ohms 1/2 W Insulated
B 391	390 Ohms 1 W Insulated
A 332	3,300 Ohms 1/2 W Insulated
B 221	220 Ohms 1 W Insulated
C 272	1800 Ohms 2 W Wire Wound (or Replace with
B 562	2700 Ohms 2 W and 5600 Ohms 1 W in Parallel)

MODEL 7258755,
Cadillac

MODEL 7258865,
Cadillac

GENERAL

MOUNTING—All 1950 Cadillac Cars.

TUBES—Eight, Plus Rectifier.

SPEAKER — 6" x 9" Elliptical, Permanent Magnet.

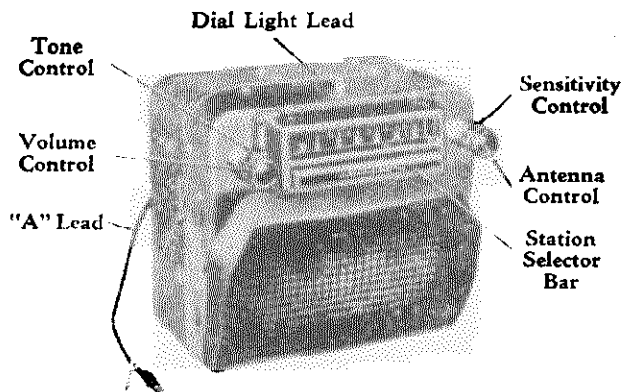
TUNING—Electronic.

ANTENNA TRIMMER COMPENSATION — 0.000060 - 0.000085 Mfd.

TUNING RANGE—540 - 1600 KC.

PUSHBUTTON SET-UP

No pushbutton set-up is necessary. However, the number of stations on which the tuner will stop can be controlled by the use of the Sensitivity Control.



MODEL 7258865

SIGNAL SEEKING TUNER ALIGNMENT PROCEDURE:

NOTE: When aligning the signal seeker tuner type radio, be sure to use a vacuum tube voltmeter as indicated and be sure to follow the alignment sequence given—(Notice that the primary of the 2nd I.F. is aligned first.)

Output Meter Connection VTVM From **2** To Chassis (see parts layout page 2)
 Generator Return Receiver Chassis
 Dummy Antenna In Series With Generator
 Volume Control Maximum Volume
 Sensitivity Control Maximum Sensitivity
 Tone Control Treble
 Generator Output Not To Exceed 2 Volts at VTVM

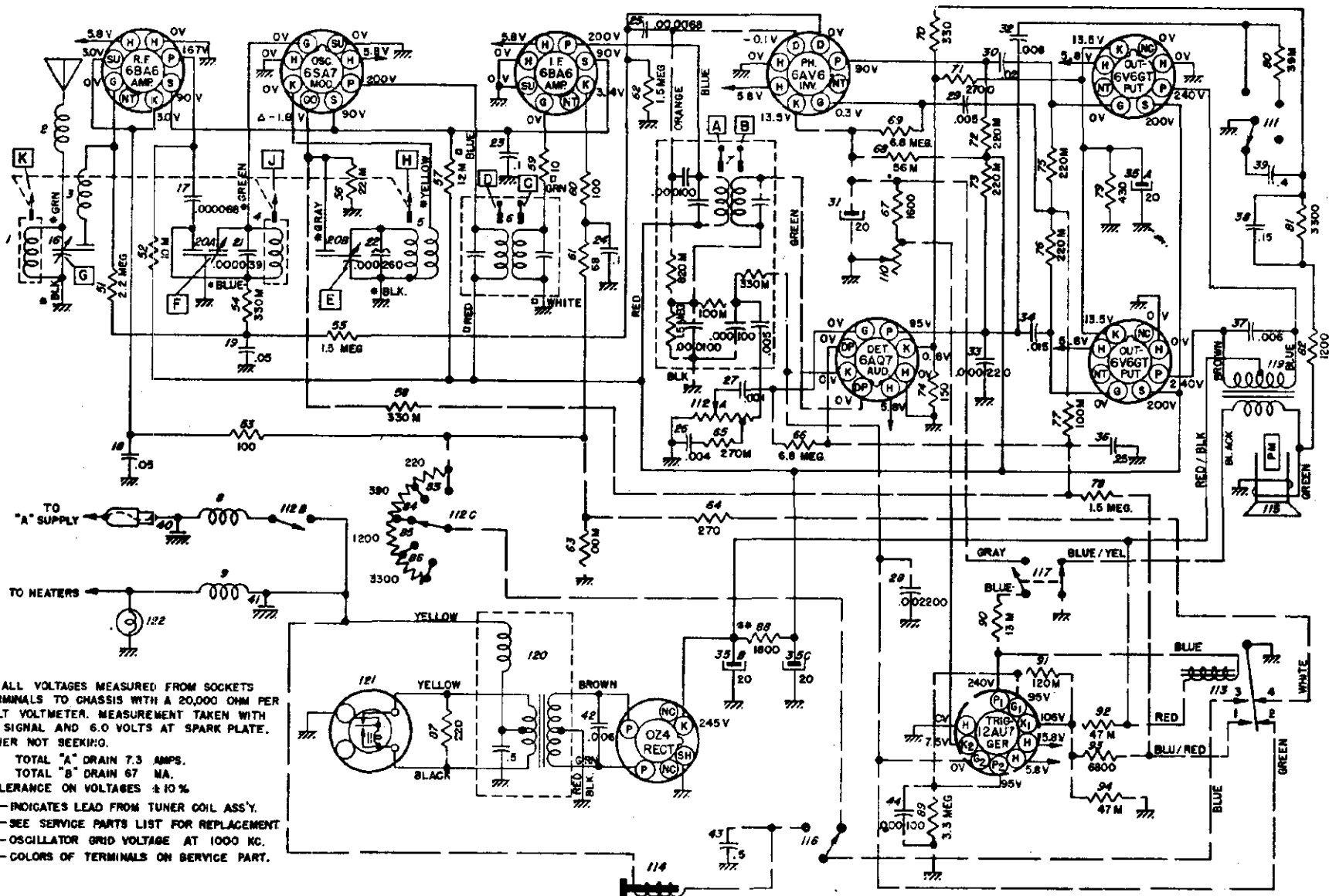
Step	Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence for Max. Output
1	0.1 mfd	6SA7 Grid (Pin 8)	260 KC	*High Frequency Stop	A, B, C, D
2	0.000068 mfd	Antenna Connector	1615 KC	High Frequency Stop	**E, F, G
3	0.000068 mfd	Antenna Connector	600 KC	Signal Gen. Signal	J, K
4	0.000068 mfd	Antenna Connector	1615 KC	Signal Gen. Signal	F, G
5	0.000068 mfd	Antenna Connector	1000 KC	Signal Gen. Signal	***L

*To tune to high frequency, put a 0.070" feeler gauge (or bare #13 wire) in slot against the high frequency stop. (See tuner picture). Depress station selector bar and allow the planetary arm to run against the feeler gauge. Turn the radio off and then on.

**Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be $1\frac{3}{8}$ " from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with an insulated screwdriver. (It will be necessary to steady the core guide bar by applying a downward pressure at the antenna core end of the bar while making these adjustments.) If this adjustment is necessary, first dissolve the glyptal seal on the core stud and be sure to re-seal after making the adjustment.

***"L" is the pointer adjustment screw on the end of the core guide bar—adjust so pointer reads 1000 KC.

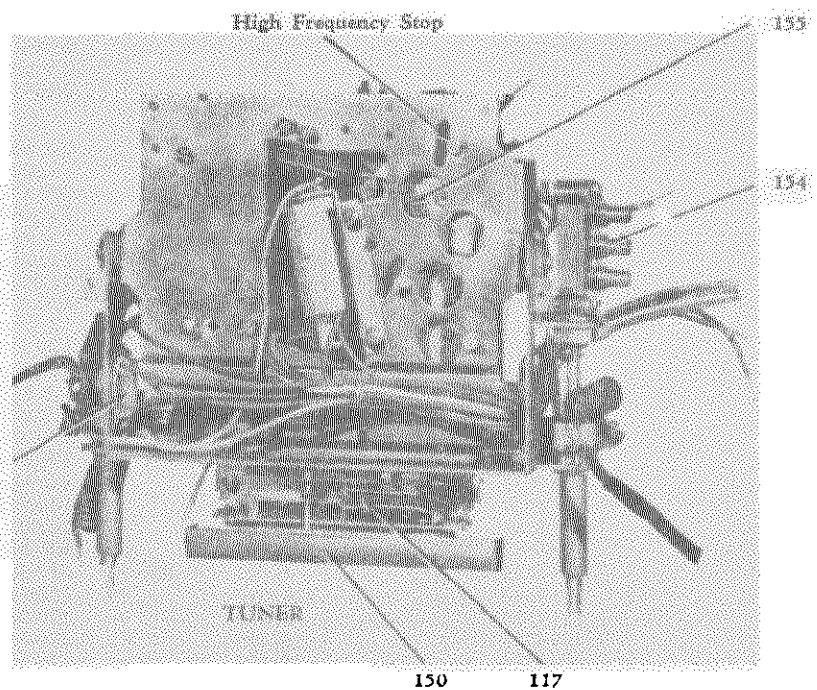
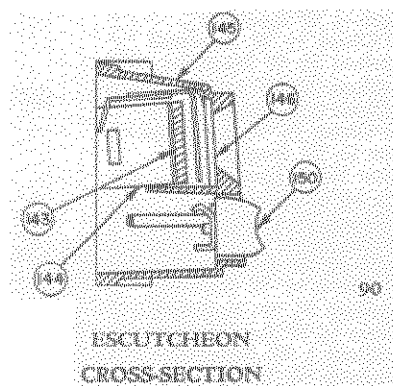
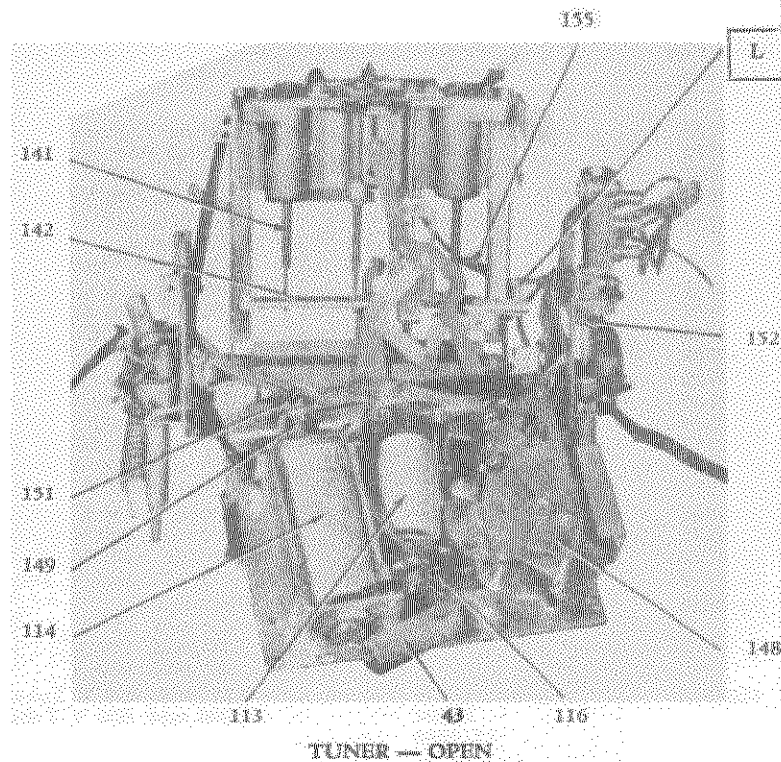
With the radio installed and the antenna plugged in, adjust antenna trimmer "G" (See sticker on case) for maximum volume with the radio tuned to a weak station near 1400 KC.



--- TUNER CIRCUIT COMPONENTS

MODEL 7258865

****Connect a VTVM from this point to ground for output indications during alignment.**

MODEL 7258005,
Cadillac


SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
ELECTRICAL PARTS			
Coils			
1	7257979	7257979	Antenna
2	7258502	7258502	Antenna Series Choke
3	7240251	7240251	Antenna Spark Choke
4	7257979	7257979	R.F.
5	7259184	7259184	Oscillator
6	7258849	1219508	1st I.F. Assy.
7	7259290	1219602	2nd I.F. Assy.
8	1217846	1217846	"A" Spark Choke
9	1217846	1217846	Hash Choke

MODEL 7258865

SERVICE PARTS LIST

Illus. No.	Production Part No.	Service Part No.	Description
Condensers			
16	7258226	7258226	Antenna Trimmer
17	1219550	G 680	0.000068 mfd. molded
18	1210697	E 503	0.05 mfd. 200 V Tubular
19	1210697	E 503	0.05 mfd. 200 V Tubular
20	7242454	7242454	Dual Trimmer
20A			RF Section
20B			Oscillator Section
21	7258221	G 390	0.000039 mfd. Ceramic
22	7257567	7257567	0.000260 mfd. Compensating
23	7238788	E 104	0.1 mfd. 400 V Tubular
24	7238789	E 104	0.1 mfd. 200 V Tubular
25	1219550	G 680	0.000068 mfd. Molded
26	1218969	E 402	0.004 mfd. 600 V Tubular
27	1218883	E 102	0.001 mfd. 600 V Tubular
28	1219553	1219553	0.002200 mfd. 600 V Tubular
29	7230767	E 502	0.005 mfd. 600 V Tubular
30	7233770	E 203	0.02 mfd. 600 V Tubular
31	1219660	1219660	20 mfd. 50 V Electrolytic
32	1219463	1219463	0.008 mfd. 600 V Tubular
33	7238792	G 221	0.000220 mfd. Molded
34	7237719	7237719	0.015 mfd. 600 V Tubular
35	7240724	M 908	Electrolytic
35A			20 mfd. 25 V
35B			20 mfd. 400 V
35C			20 mfd. 400 V
36	1209817	E 254	0.25 mfd. 200 V Tubular
37	1219084	H 602	0.006 mfd. 800 V Tubular
38	1218880	1218880	0.15 mfd. 100 V Tubular
39	1218882	1218882	0.4 mfd. 100 V Tubular
40	7259710	7259710	Spark Plate and "A" Connector
41	1217848	1217848	Chassis Plate Condenser
42	7240906	H 602	0.006 mfd. 1600 V Tubular
43	1219511	E 504	0.5 mfd. 100 V Tubular
44	1219499	G 101	0.000100 mfd. Molded
Resistors			
51	1211147	A 225	2.2 Megohms 1/2 W Insulated
52	1211085	B 103	10,000 Ohms 1 W Insulated
53	1213217	A 101	100 Ohms 1/2 W Insulated
54	7240732	A 334	330,000 Ohms 1/2 W Insulated
55	1213283	A 155	1.5 Megohms 1/2 W Insulated
56	1211192	A 223	22,000 Ohms 1/2 W Insulated
57	1212491	1212491	12,000 Ohms 2 W Insulated
58	1214557	A 334	330,000 Ohms 1/2 W Insulated
59	1215107	A 100	10 Ohms 1/2 W Insulated
60	1213217	A 101	100 Ohms 1/2 W Insulated
61	1215558	1215558	68 Ohms 1/2 W Insulated
62	1213283	A 155	1.5 Megohms 1/2 W Insulated
63	1213270	A-104	100,000 Ohms 1/2 W Insulated
64	1214542	A 271	270 Ohms 1/2 W Insulated
65	1214556	A 274	270,000 Ohms 1/2 W Insulated
66	7241937	A 685	6.8 Megohms 1/2 W Insulated
67	1219504	1219504	1600 Ohms 1/2 W Insulated
68	1213509	1213509	56,000 Ohms 1 W Insulated
69	7241937	A 685	6.8 Megohms 1/2 W Insulated
70	1213224	A 331	330 Ohms 1/2 W Insulated
71	1213240	1213240	2700 Ohms 1/2 W Insulated
72	1214555	A 224	220,000 Ohms 1/2 W Insulated
73	1214555	A 224	220,000 Ohms 1/2 W Insulated
74	1213220	A 151	150 Ohms 1/2 W Insulated
75	1214555	A 224	220,000 Ohms 1/2 W Insulated
76	1214555	A 224	220,000 Ohms 1/2 W Insulated
77	1213270	A 104	100,000 Ohms 1/2 W Insulated
*78	*1213283	*A 155	1.5 Megohms 1/2 W Insulated
79	7239745	7239745	430 Ohms 1 W Wire Wound Insulated
80	1213480	A 393	39,000 Ohms 1/2 W Insulated
81	1213481	A 332	3300 Ohms 1/2 W Insulated
82	1213236	1213236	1200 Ohms 1/2 W Insulated
83	7237835	A 221	220 Ohms 1/2 W Insulated
84	1213482	A 391	390 Ohms 1/2 W Insulated
85	1213236	1213236	1200 Ohms 1/2 W Insulated
86	1213481	A 332	3300 Ohms 1/2 W Insulated
87	7237994	B 221	220 Ohms 1 W Insulated
88	1214573	{ C 272	1800 Ohms Wire Wound (Replace with 2700 ohms
		{ B 562	2 W and 5600 Ohms 1 W in parallel)
89	1214564	A 335	3.3 Megohms 1/2 W Insulated

*This resistor was 2.2 Megohms until Serial #62397—Use above Value in Service.

MODEL 7258865
Cadillac

SERVICE PARTS LIST

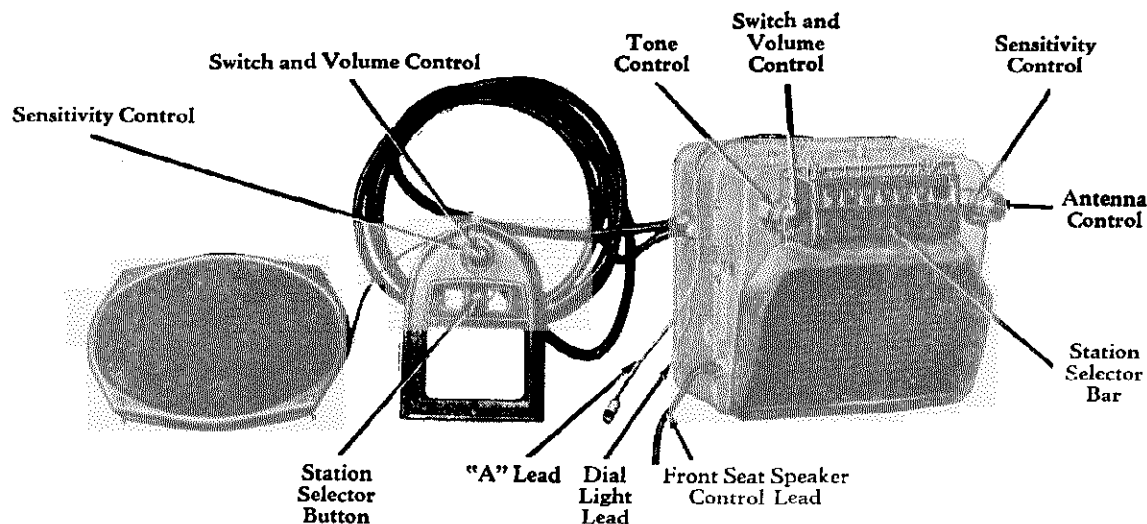
Illus. No.	Production Part No.	Service Part No.	Description
Resistors (Continued)			
*90	*7231539	*7231539	13,000 Ohms 1 W Insulated
91	1213271	1213271	120,000 Ohms ½ W Insulated
92	1216157	B 473	47,000 Ohms 1 W Insulated
93	1216154	1216154	6800 Ohms 1 W Insulated
94	1216157	B 473	47,000 Ohms 1 W Insulated
Tubes			
	1217690	5252	6BA6
	7237752	5222	6SA7
	1218506	5262	6AV6
	1219484	5278	6AQ7GT
	1213793	5241	6V6GT
	1217924	5003	0Z4 Rectifier
	1219485	5328	12AU7
Miscellaneous Electrical Parts			
110	7259408	7259408	Adjuster - Cathode Relay
111	7259239	7259239*	Control - Tone
112	7259240	7259240	Control - Volume, Sensitivity Switch
112A			Volume Control
112B			Switch
112C			Sensitivity Control
113	7259009	7259009	Relay
114	1219661	1219661	Solenoid
115	7258488	7258488	Speaker 6 x 9 Elliptical PM
116	7259011	7259011	Switch - Tuner Return
117	7259012	7259012	Switch - Station Selector
119	7259336	7259336	Transformer - Output
120	7259375	7255881	Transformer - Power
121	7239124	8542	Vibrator - Non-Synchronous
122	125588	55	Lamp - Dial Light
MECHANICAL PARTS			
Chassis			
131	7259710	7259710	"A" Connector and Spark Plate
132	7258520	7258520	Antenna Connector
	7236279	7236279	Socket - Octal Tube
	7259307	7259307	Socket - 9 Pin Miniature Tube
	7258073	7258073	Socket - 7 Pin Miniature Tube
	7239125	7239125	Socket - Vibrator
133	1219603	1219603	Socket - Dial Light
Tuner			
141	7259201	7259201	Core - Iron Tuning
142	7259178	7259178	Core - Guide Bar
143	7259319	7259319	Dial - Calibrated
144	7259531	7259531	Dial Backplate Assembly
	187189	44	Pilot Light
145	7258270	7258270	Escutcheon Assy.
146	7258236	7258236	Dial Glass
	7258232	7258232	Dial Glass Retainer (2)
148	1219610	1219610	Motor Gear Train
149	7259164	7259164	Plunger - Solenoid
150	1219604	1219604	Station Selector Bar Pkg.
	7259125	7259125	Station Selector Bar
			Switch Operating Collar
	7259111	7259111	Toggle Plate
	1216508	1216508	Spring (2)
			"C" Washer
151	7259100	7259100	Spring Clip
152	7257361	7257361	Spring - Vacuum Valve Anti-Rattle
	7258239	7258239	Spring - Calibrated Dial Retainer
154	7258260	7258260	Vacuum Valve
	7259264	7259264	Vacuum Valve Shaft
155	7259055	7259055	Spring - Motor Power
INSTALLATION PARTS			
	7258542	7258542	"A" Lead Assy.
	7240138	6013	Static Collector
	1911095	6030	Condenser - Generator
	1910147	6030	Condenser - Ignition Coil
	7259510	7259510	Escutcheon - Sensitivity Control
	7259509	7259509	Escutcheon - Tone Control
	147685	147685	Fuse - 14 Amperes
	7242024	7242024	Fuse Holder Complete
	7259369	7259369	Knob - Control
	7259508	7259508	Knob - Sensitivity Control
	7259507	7259507	Knob - Tone Control
	7259514	7259514	Spring - Tone Control Retainer

*This resistor was 15,000 Ohms until Serial #62300—Use above Value in Service.

PAGE 21-92 UNITED MOTORS

MODEL 7259825,
Cadillac

This Model Same as Model 7258865, Except as Indicated by This Bulletin



MODEL 7259825

GENERAL

MOUNTING—1950 Cadillac 75 Series Cars.

TUBES—Seven, Plus Rectifier and Trigger.

SPEAKER—6" x 9" Elliptical, Permanent Magnet, Front — 6" x 9" Elliptical, Permanent Magnet, Rear.

TUNING—Electronic.

ANTENNA TRIMMER COMPENSATION—0.000060 - 0.000085 Mfd.

TUNING RANGE—540 - 1600 KC.

PUSHBUTTON SET-UP—No pushbutton set-up is necessary. However, the number of stations on which the tuner will stop can be controlled by the use of the Sensitivity Controls.

ALIGNMENT PROCEDURE—Alignment procedure same as that of Model 7258865, Bulletin 6D-1060.

FUNCTIONAL OPERATION

The Cadillac remote control signal seeker type radio has all the controls of the Cadillac Syncro-Matic Model 7258865 Radio for front seat operation and in addition has a control head mounted in the left rear seat arm rest for rear seat operation. This remote control head has a switch, volume control, and station selector button.

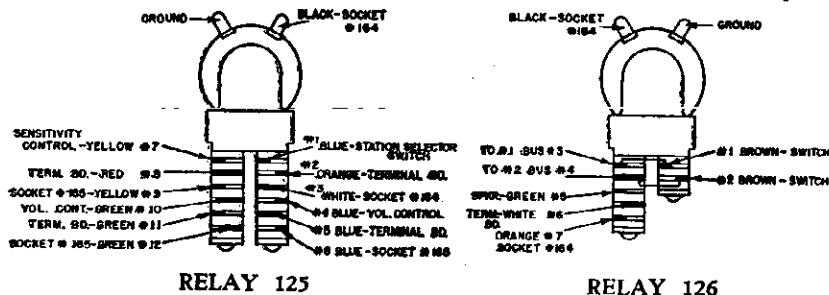
After the rear seat control switch is turned on, only the rear controls operate the radio. The radio can not be operated from the front seat again until the rear control switch is turned off. Two controls that are always operated at the receiver are the tone control and the antenna control.

This radio operates from the front instrument panel in exactly the same manner as the 7258865 Model except for a front speaker switch mounted on the lower edge of the instrument panel to the left of the steering wheel. This switch can only be used when the rear control is in operation, and it gives the front seat occupants the choice of listening at a reduced volume from normal output to the stations selected by the person operating the rear selector button or completely disconnecting the front speaker.

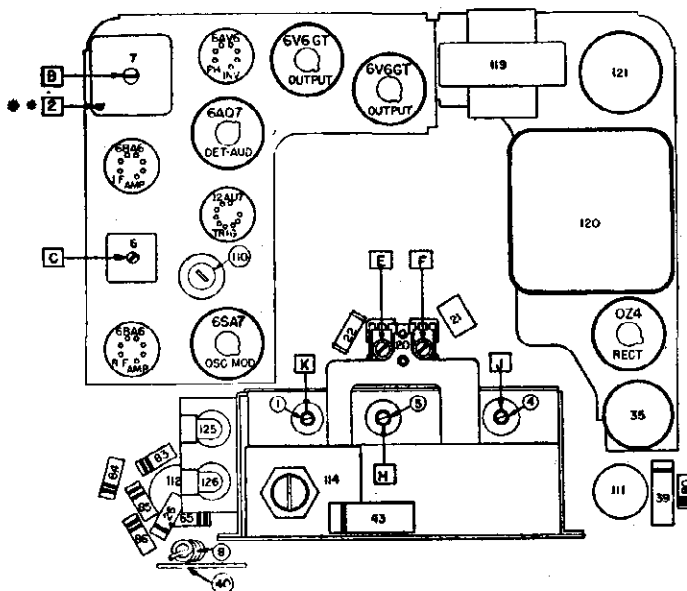
THEORY OF OPERATION

The energizing of relays, illustration numbers 125 and 126, is accomplished by turning the rear control switch (123C) to the "on" position. When this switch is turned on, the "A" voltage is applied across the relays, energizing the relays and closing the contacts to the rear controls. With the relays 125 and 126 energized, the rear seat controls are operative and not the front seat controls.

Once these relays are energized, the "A" supply is connected to the power transformer center-tap through contacts 1-2 and 3-4 of relay 125, regardless of the position of the front switch (112B); therefore the radio can not be turned off until the relays are de-energized by turning off the rear switch (123C). With the relays in the de-energized position, all controls are operative at the receiver, while all remote controls in the left rear arm rest are inoperative.

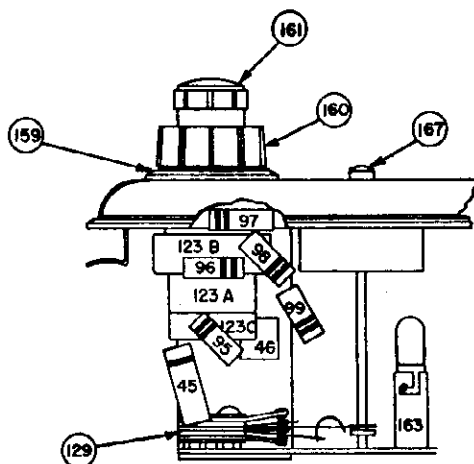


Relay leads' destinations and colors are to the respective contacts as numbered on the schematic.

MODEL 7259825
Cadillac


PARTS LAYOUT — TUBE VIEW

**Connect a VTVM from this point to ground for output indications during alignment.



PARTS LAYOUT — REAR CONTROL

SCHEMATIC DATA

All voltages measured from sockets terminals to chassis with a 20,000 Ohm per volt voltmeter. Measurements taken with no signal and 6.0 volts at spark plate. Oscillator grid voltage taken with the set tuned to 1000 KC. Tuner not seeking.

Total "A" Drain 7.3 Amps.

Total "B" Drain 67MA.

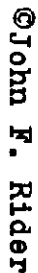
Tolerance on voltages $\pm 10\%$.

*—Indicates lead from tuner coil assy.

**—See Service Parts List for replacement.

□—Colors of terminals on service part.

Note the red and black circuits are exactly the same as those of Model 7258865. The blue circuit has been added so that the tuner can be controlled from the rear seat location. This circuit is switched in or out of control by the relays which are energized from the rear seat.



CADILLAC REMOTE CONTROL SYNCROMATIC MODEL SERVICE PARTS LIST

The Service Parts List of the Cadillac Remote Control Syncromatic Radio is identical to the Cadillac Syncromatic Radio, Model 7258865, except for the illustration numbers and parts listed below: Those parts marked with an asterisk (*) are changed from Model 7258865—the others are added parts.

ELECTRICAL PARTS

Illus. No.	Production Part No.	Service Part No.	Description
Condensers			
* 40	7241259	7241259	Spark Plate
45	1218969	E 402	.004 Mfd 600V Tubular
46	1219350	G 680	.000068 Mfd Molded
Resistors			
95	1214556	A 274	270,000 Ohms ½W Insulated
96	7237835	A 221	220 Ohms ½W Insulated
97	1213482	A 391	390 Ohms ½W Insulated
98	1213236	1213236	1200 Ohms ½W Insulated
99	1213481	A 332	3300 Ohms ½W Insulated
**100	1219672	1219672	15 Ohms 2W Insulated
Miscellaneous			
123	7259947	7259947	Control - Volume, Sensitivity and Switch - Rear
123A			Volume
123B			Sensitivity
123C			Switch
124	187189	44	Lamp - Dial Light
125	7259951	7259951	Relay - 4 Section
126	7259952	7259952	Relay - 3 Section
127	1457062	1457062	Speaker - 6x9 Elliptical PM, Rear
128	7259950	7259950	Switch - Front Speaker
129	7259012	7259012	Switch - Station Selector, Rear

MECHANICAL PARTS

Chassis

*131	7257891	7257891	A-Lead Assembly
------	---------	---------	-----------------

Remote Control

	7259946	7259946	Cable - Rear Seat
157	1219682	1219682	Plug and Shell Pkg.
158	1219679	1219679	Plug and Shell Pkg.
	4589122	4589122	Escutcheon - Arm Rest
159	7259510	7259510	Escutcheon - Sensitivity Control
160	7259508	7259508	Knob - Sensitivity Control
161	7259369	7259369	Knob Control
162	1219688	1219688	Plug - Front Speaker Switch
163	1219686	1219686	Socket Pkg. - Dial Light
164	7259944	7259944	Socket - Cable Plug
165	7259943	7259943	Socket - Cable Plug
166	7258498	7258498	Socket - Front Speaker Plug
167	1219687	1219687	Station Selector Button Pkg.
	7259125	7259125	Push Button Assy.
			Retaining Ring
			Washer
			Felt Washer
	7256121	7256121	"C" Washer

INSTALLATION PARTS

*	7259970	7259970	"A" Lead Assembly
---	---------	---------	-------------------

** Located on the top of the hash cover.

DESCRIPTION

This model is a 4 tube (plus rectifier) superhetrodyne radio receiver designed for use on 117 volts 60 cycle AC or 117 volts DC power supply.

The tubes used are:—

1—12SA7 Oscillator Converter	1—12SQ7 AVC Detector and 1st Audio
1—12SK7 I.F. Amplifier	
1—35Z5GT Power Rectifier	1—50L6GT Power Output

This receiver covers the frequency range from 540 kilocycles to 1630 kilocycles (KC).

INSTALLATION

The loop antenna incorporated in the receiver is sufficient for all normal reception. If the receiver is to be used in very remote areas or in a building constructed mainly of steel, it may be necessary to use an external antenna. The antenna should be approximately fifty feet long, including lead in, and placed as far away from trees, buildings, etc., as possible. The lead in from the external antenna should be connected to the wire at the back of the receiver. An external ground is not necessary.

When using a DC power supply and after allowing sufficient time for the tubes to warm up the receiver does not operate, remove the line cord plug from the receptacle and reverse. Replace the plug in the reversed position and allow tubes to warm up at which time the receiver will operate.

If an excessive hum is noticed when operating from an AC power source, reverse the line cord plug to determine which position gives the best results.

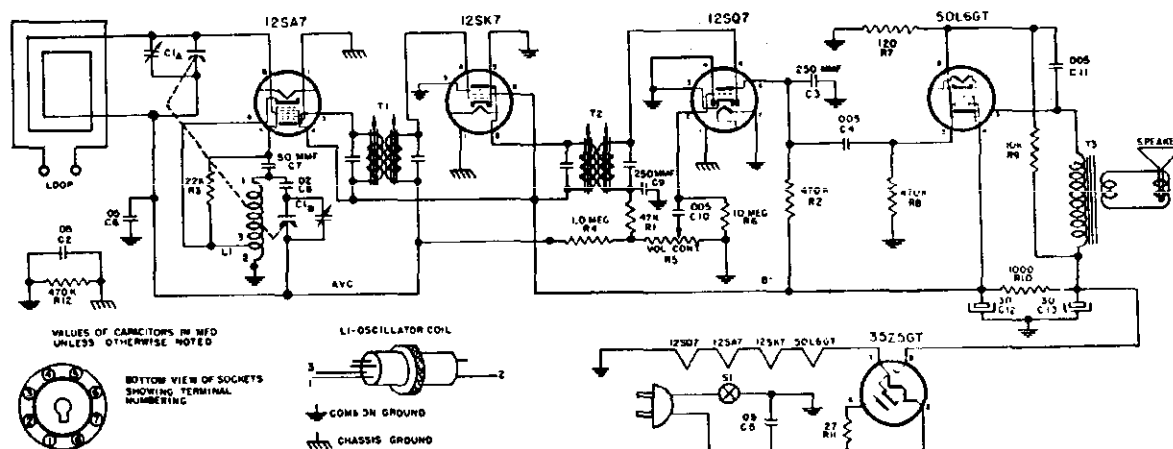
NOTE: All loop antennas are somewhat directional in their characteristics.

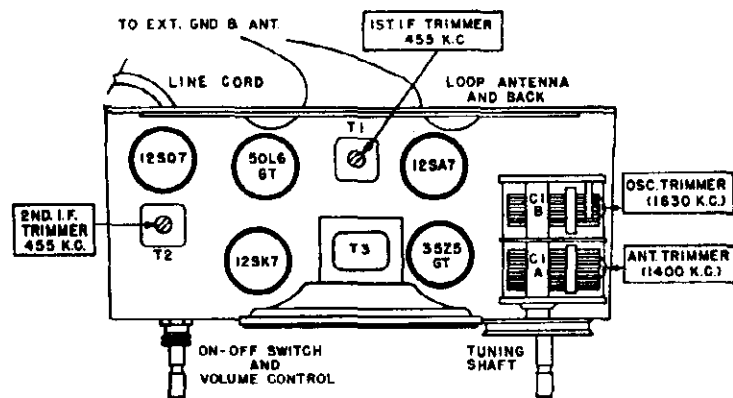
Reception can sometimes be improved and/or local interference reduced by turning the set in a different direction.

OPERATION

To turn the receiver on, rotate the on-off switch and volume control knob (left hand control) clockwise about one-half its range. This supplies power to the receiver. Allow about thirty seconds for the tubes to warm up after which the desired station may be tuned by rotating the station selector (right hand control).

For best tone, tune the desired station with the volume control turned low. This enables you to get the exact point where the station comes in best. Then, adjust the volume to the desired level with volume control.





ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milli-watts is .4 volts using a signal which is modulated 400 c.p.s.

Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

CAUTION: This is an A.C.-D.C. receiver and when aligning the set it is necessary to isolate the Signal Generator or the Receiver from the line by use of a transformer, or place a .2 MFD. condenser in both test leads of the Signal Generator.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*12SA7 Grid (Stator of C1A)	T1	Input I.F.
Fully open	455 KC	.1	*12SA7 Grid (Stator of C1A)	T2	Output I.F.
Fully open	1630 KC	.1	*12SA7 Grid (Stator of C1A)	C1B	Oscillator
Tune in signal from generator	1400 KC	.00025	**Ant. lead from loop	C1A	Antenna

*Connect low side of signal generator to common negative through .25 MFD condenser.

**Connect low side of signal generator to ground lead.

CODE NO.	PART NO.	DESCRIPTION
C1A, C1B	B19-198	Variable condenser
C2, C5	A16-158	.05 MFD 400 volt condenser
C3, C9	A15-176	250 MMF mica condenser
C4, C10, C11	A16-153	.005 MFD 600 volt condenser
C6	A16-152	.05 MFD 200 volt condenser
C7	A15-175	50 MMF mica condenser
C8	A16-150	.02 MFD 400 volt condenser
C12, C13	B18-283	30 x 30 MFD 150 volt electrolytic condenser
R1	A60-685	47K ohm 1/2 watt 20% resistor
R2, R8, R12	A60-662	470K ohm, 1/2 watt 20% resistor
R3	A60-659	22K ohm 1/2 watt 20% resistor
R4	A60-668	1 megohm 1/2 watt 20% resistor
R5, S1	A24-179	Volume control, with switch
R6	A60-663	10 megohm 1/2 watt 20% resistor
R7	A60-702	120 ohm 1/2 watt 10% resistor
R9	A60-698	10K ohm 1 watt 10% resistor
R10	A60-732	1000 ohm 1 watt 10% resistor
R11	A60-690	27 ohm 1/2 watt 10% resistor
T1	C10-475	1st I.F. Transformer
T2	A10-479	2nd I.F. Transformer
L1	B10-480	Oscillator coil
	42-320W	Cabinet, molded, walnut
	A42-420	Cabinet, molded, ivory
	A51-105	Dial cord, 15" long
	48-34	Dial crystal
	67-462	Dial scale
	52-165W	Knob, walnut
	A52-222	Knob, ivory
	A23-151	Line cord
	S84-267	Loop and back assembly
	B79-366	Speaker, 4" P. M. (includes output transformer).

DESCRIPTION

This model is a 4 tube (plus rectifier) superhetrodyne radio receiver designed for use on 117 volts 60 cycle AC or 117 volts DC power supply.

The tubes used are:—

1—12SA7 Oscillator Converter	1—12SQ7 AVC Detector and 1st
1—12SK7 I.F. Amplifier	Audio
1—35Z5GT Power Rectifier	1—50L6GT Power Output

This receiver covers the frequency range from 540 kilocycles to 1630 kilocycles (KC).

OPERATION

To turn the receiver on, rotate the on-off switch and volume control knob (left hand control) clockwise about one-half its range. This supplies power to the receiver. Allow about thirty seconds for the tubes to warm up after which the desired station may be tuned by rotating the station selector (right hand control).

For best tone, tune the desired station with the volume control turned low. This enables you to get the exact point where the station comes in best. Then, adjust the volume to the desired level with volume control.

ALIGNMENT PROCEDURE

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

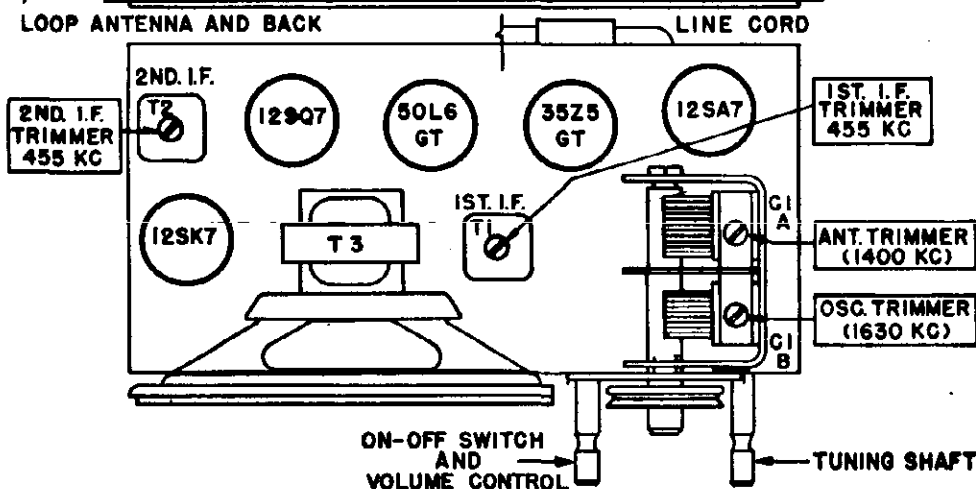
With the output meter connected across the voice coil of the speaker, the output meter reading for 50 milli-watts is .4 volts using a signal which is modulated 400 c.p.s.

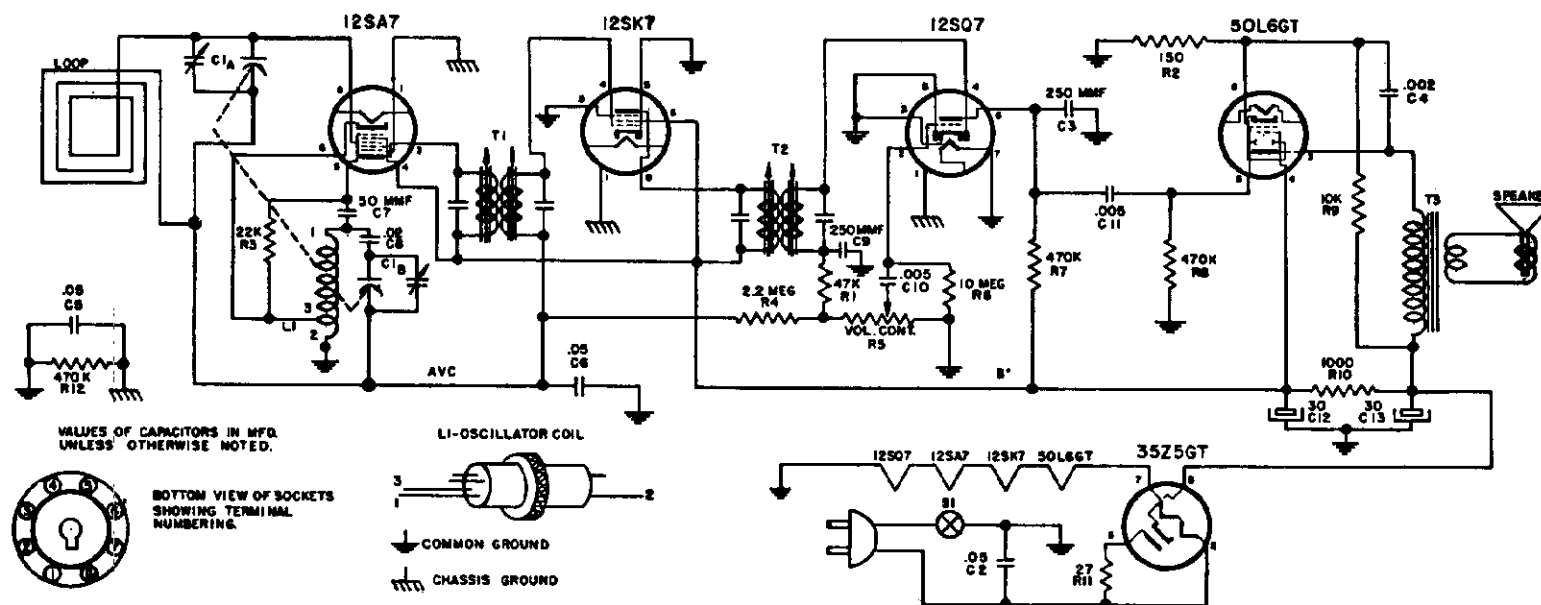
Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

CAUTION: This is an A.C.-D.C. receiver and when aligning the set it is necessary to isolate the Signal Generator or the Receiver from the line by use of a transformer, or place a .2 MFD. condenser in both test leads of the Signal Generator.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*12SA7 Grid (Stator of C1A)	T1	Input I.F.
Fully open	455 KC	.1	*12SA7 Grid (Stator of C1A)	T2	Output I.F.
Fully open	1630 KC	.00025	*12SA7 Grid (Stator of C1A)	C1B	Oscillator
Tune in signal from generator	1400 KC		Loosely coupled to loop antenna	C1A	Antenna

*Connect ground lead of signal generator to common negative.





PARTS LIST

CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION
C1A, C1B	B19-194	Variable condenser.	R8	A60-663	10 megohm 1/2 watt resistor
C2, C5	A16-156	.05 MFD 400 volt condenser	R7, R8, R12	A60-662	470K ohm 1/2 watt resistor
C3, C9	A15-176	250 MMF mica condenser	R9	A60-698	10K ohm 1 watt resistor
C4	A16-155	.002 MFD 600 volt condenser	R10	A60-732	1000 ohm 1 watt resistor
C6	A16-152	.05 MFD 200 volt condenser	R11	A60-690	27 ohm 1/2 watt resistor
C7	A15-175	50 MMF mica condenser	T1, T2	A10-479	1st and 2nd I.F. transformers
C8	A16-150	.02 MFD 400 volt condenser	LI	B10-562	Oscillator coil
C10, C11	A16-153	.005 MFD 600 volt condenser		A42-451	Cabinet, molded, brown
C12, C13	B18-263	30-30 MFD 150 volt electrolytic condenser		D42-424	Cabinet, molded, ivory
R1	A60-685	47K ohm 1/2 watt resistor		B67-510	Dial scale, paper
R2	A60-686	150 ohm 1/2 watt resistor		A52-243	Knob, tenite, black
R3	A60-688	22K ohm 1/2 watt resistor		A52-222	Knob, tenite, ivory
R4	A60-684	2.2 megohm 1/2 watt resistor		S64-266	Loop and back
R5	A24-174	Volume control and switch, 1 megohm		A56-69	Pointer, "Clarion"
				B76-378	Speaker, 6", P.M. (includes output transformer)

DESCRIPTION

Model 11611 is a 4-tube superheterodyne portable receiver designed for operation on a 117 volt 50-60 cycle, 117 volt DC power supply or from a self-contained battery.

This receiver covers the frequency range from 535 kilocycles to 1600 kilocycles (K.C.).

The tubes used are:—

1R5—Mixer, Oscillator
1U4—I. F. Amplifier
1S5—Detector and first Audio
3Q4—Power Output

No rectifier tube is required as a Selenium rectifier is used when operating on A. C. current.

INSTALLATION

The radio is shipped from the factory minus the battery. One combination A. B. Battery Pack is required, having 90 volts "B" and 7½ volts "A," such as Ray-o-vac No. AB-994, General No. 60A6F6/5, Burgess No. D5A60 or Eveready No. 753.

To install the battery remove the back from the cabinet, place the battery in the space provided and insert the battery plug into the socket.

The battery A-C switch, located on the top right side of the chassis, is accessible from the rear of the cabinet after removing the back. For battery operation this switch should be turned so that the extended portion of the knob is over the A. C. socket, thereby making it impossible to connect the radio to A. C. current without setting the change-over switch in its proper position. The set is now ready for operation from its self-contained Battery.

To operate the receiver from 117 volts A. C. or D. C., turn the battery A. C. switch away from the A. C. socket. Remove the A. C. cord from its brackets on the cabinet back and insert the plug into the A. C. socket, placing the plug on the other end of the cord into the wall receptacle. The receiver is now ready for operation on 117 volts A. C. or D. C. current.

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent servicemen having the proper equipment.

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A. V. C. action from interfering with correct alignment.

With the output meter connect across the voice coil of the speaker, the output meter reading for 50 milliwatts is .4 volts using a signal which is modulated 400 c.p.s.

Adjust all trimmers for maximum output. Repeat alignment procedure given below as a final check.

CAUTION: This is an A.C.-D. C. receiver and if alignment is made with the receiver connected to 117 volts A. C. or D. C., it is necessary to isolate the signal generator or the receiver from the line by use of a transformer, or place a .2 M. F. D. condenser in both test leads of the Signal Generator.

ALIGNMENT PROCEDURE

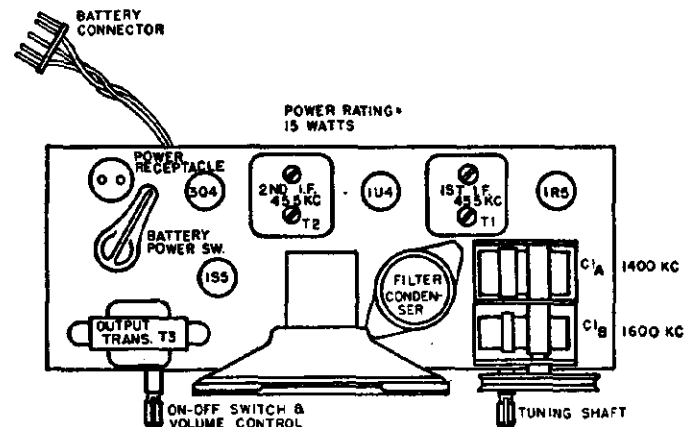
(Continued)

Position of Variable	Generator Frequency	Dummy Ant. Mid.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*1R5 Grid (Stator of CIA)	T2	Output I. F.
Fully open	455 KC	.1	*1R5 Grid (Stator of CIA)	T1	Input I. F.
Fully open	1600 KC	.00025	**Ant. lead (Stapled to Cabinet)	C1B	Oscillator
Tune in signal from generator	1400 KC	.00025	**Ant. lead (Stapled to Cabinet)	C1A	Antenna

*Connect ground lead of signal generator to Common "B."

**Connect ground lead of signal generator to ground wire stapled to cabinet.

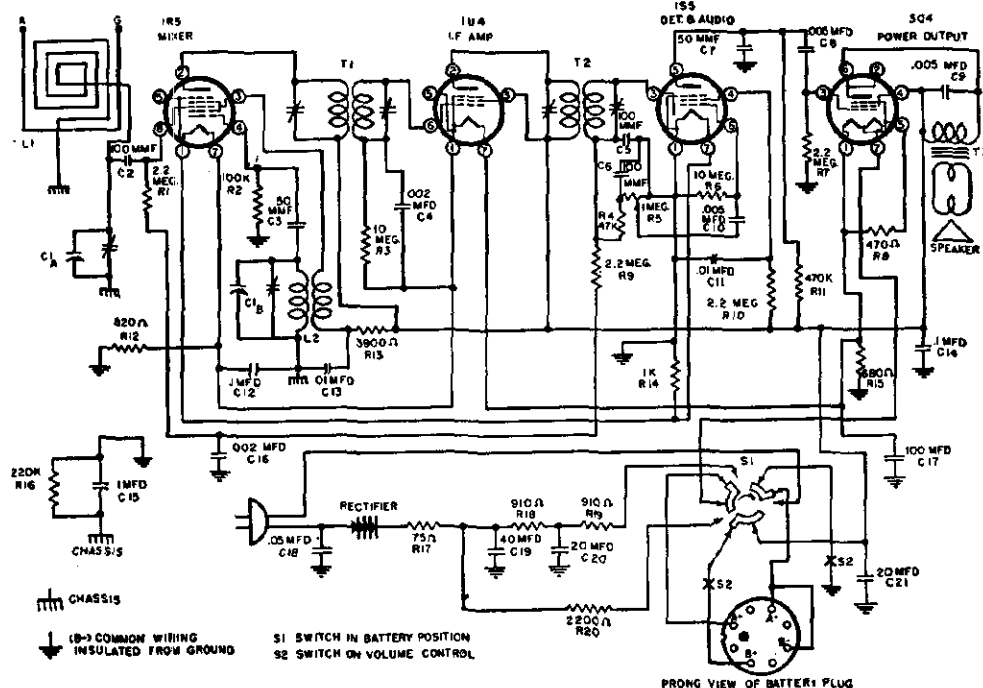
If it should become necessary to re-adjust the loop antenna loading coil tune in a weak station, between 600 and 650 Kilocycles, and adjust for maximum output.



PARTS LIST

Code	Part No.	DESCRIPTION
C1A, C1B	B19-188	Variable Condenser
C2, C5, C6	A15-188	100 MMF Mica Condenser
C3, C7	A15-175	50 MMF Mica Condenser
C4, C16	A16-155	.002 MFD. 600 volt Condenser
C8, C9, C10	A16-166	.005 MFD. 150 volt Condenser
C11, C13	A16-165	.01 MFD. 200 volt Condenser
C12, C15	A16-160	.1 MFD. 400 volt Condenser
C14	A16-157	.1 MFD. 200 volt Condenser
C18	A16-158	.05 MFD. 400 volt Condenser
C17	A18-281	20 MFD. 150 volt Electrolytic Condenser
C19		40 MFD. 150 volt Electrolytic Condenser
C20, C21		100 MFD. 25 volt Electrolytic Condenser

Code	Part No.	DESCRIPTION
R1, R7, R9, R10	A60-684	2.2 Megohm 1/2 watt 20% Resistor
R2	A60-671	100K Ohm 1/2 watt 20% Resistor
R3, R6	A60-663	10 Megohm 1/2 watt 20% Resistor
R4	A60-685	47K Ohm 1/2 watt 20% Resistor
R8	A60-707	470 Ohm 1/2 watt 20% Resistor
R11	A60-662	470K Ohm 1/2 watt 20% Resistor
R12	A60-709	820 Ohm 1/2 watt 10% Resistor
R13	A60-710	3900 Ohm 1/2 watt 10% Resistor
R14	A60-675	1000 Ohm 1/2 watt 20% Resistor
R15	A60-708	680 Ohm 1/2 watt 10% Resistor
R16	A60-667	220K Ohm 1/2 watt 20% Resistor
R17	A60-712	75 Ohm 3 watt 5% Resistor



Code	Part No.	DESCRIPTION
R18, R19	A60-713	1820 Ohm 10 watt 5% Resistor (each section 910 ohms)
R20	A60-714	2200 Ohm 1/2 watt 10% Resistor
L2	B10-460	Oscillator Coil
T1	C10-462	1st I. F. Transformer
T2	C10-463	2nd I. F. Transformer
R5	A24-170	Volume Control and Switch
	A10-470	Loading Coil
	A52-197	Knob, Tuning
	A52-198	Knob, Volume
	A52-196	Knob, Battery—AC-DC
	B67-496	Dial Scale
	A58-63	Dial Pointer
	A83-391	Selenium Rectifier
	A75-60	Tuning Shaft
S1	B69-173	Switch, Battery—AC-DC
T3	A80-228	Output Transformer
	B79-350	Speaker, 5" P.M.
	A45-119	Plug, Battery
	D42-406	Cabinet
	D40-140	Escutcheon and Grille
	S84-123	Line Cord Assembly
	B21-109	Cover, Chassis
	A68-29	Receptacle, Male
	A23-151	Line Cord and Plug
	A68-30	Plug, Female
	C10-473	Alternate 1st I. F. Transformer
	C10-474	Alternate 2nd I. F. Transformer
	C10-471	Alternate 1st I. F. Transformer
	C10-472	Alternate 2nd I. F. Transformer
	C10-475	Alternate I. F. Transformer May be used as 1st or 2nd I. F. Transformer

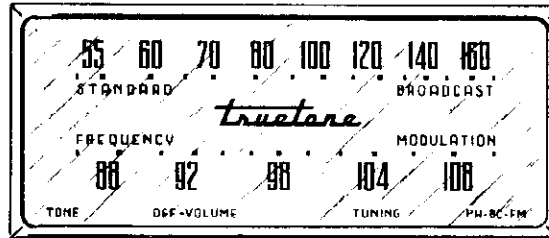
CHECK YOUR LINE VOLTAGE

Unless otherwise marked this radio must be operated on a supply of 105-125 volts AC, 60 cycles only. Do not connect the radio to a wall outlet unless

certain that the power supply is correct for the receiver. If in doubt, telephone your local power company before inserting the plug. Radios of this model which are to be used on other power supplies are marked accordingly.

FM BAND

88 - 108 MEGACYCLES — This band is calibrated in megacycles and covers the newly allocated frequency modulation band of 88-108 megacycles. Reception in this band is usually limited to "line of sight" distances between the transmitting and receiving antennas. This is normally up to about 30 miles with approximately 45 miles being the extreme range.



BROADCAST BAND

540 - 1600 KILOCYCLES — This band is calibrated in channel numbers. To obtain the kilocycle number add a zero to the number on the dial scale.

TONE CONTROL

Use this knob to adjust the tone of the receiver. When turned clockwise the high notes will predominate and when turned counter-clockwise a deep bass effect will result.

ON-OFF SWITCH AND VOLUME CONTROL

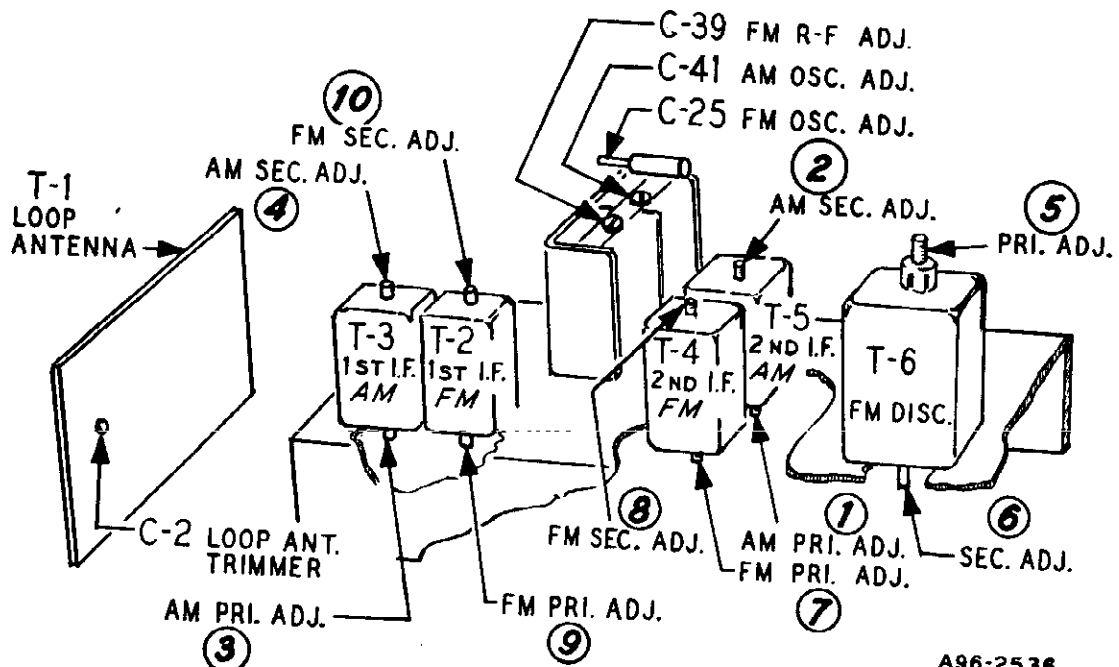
The On-Off switch and Volume control are operated by the same knob. To turn the radio on, turn the knob clockwise until a click is heard. Allow approximately 30 seconds for the tubes to heat. Then continue to turn the knob clockwise to increase the volume.

BAND AND PHONO RADIO SWITCH

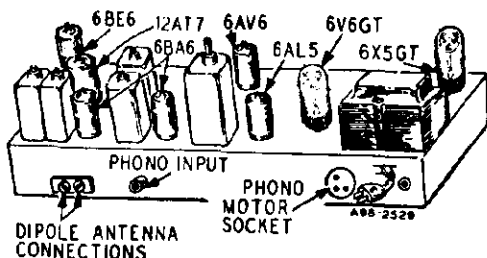
This control has three positions, FM, Broadcast and Phono. In the Phono position, the electrical circuits are connected for the reproduction of records played on the Automatic Record Changer.

TUNING KNOB

Use this control to tune in the desired station. Turn the knob until the station is heard. Then slowly rotate it back and forth until the signal is clearest and strongest. If signal is too strong, reduce it by means of the volume control, not by using the tuning knob.

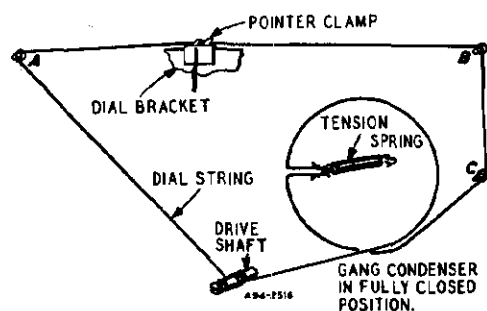


A96-2536



DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns counter-clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



ELECTRICAL SPECIFICATIONS

Power Output—
117 volts AC—40 watts
60 watts phono operating

Power Output—
1.9 watts maximum
.8 watts 10% distortion

Speaker—8 inch PM dynamic

Frequency Ranges—
Broadcast 540-1600 KC
Frequency modulation 88-108 MC

Intermediate Frequency—
AM 455 KC — FM 10.7 MC

Selectivity — AM — 45 KC broad
at 1000 times signal, measured
at 1000 KC

I.F. FM—200 KC broad at 2 times
down

I.F. FM—950 KC broad at 200
times down

AM Sensitivity—(For .5 watt output
with external antenna)
25 microvolts average

FM Sensitivity—(For .5 watt output)
25 microvolts average

ALIGNMENT PROCEDURES AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately
Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
— .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a
Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several
Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Lead	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	Maximum Deflection

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN							
Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

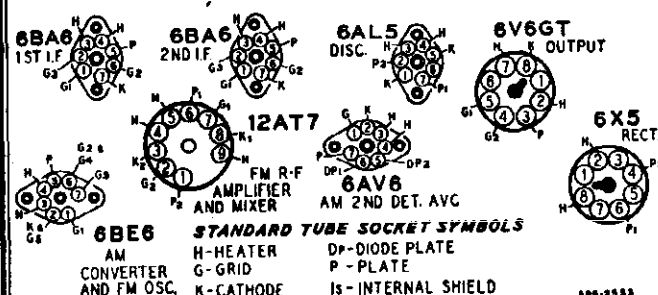
NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



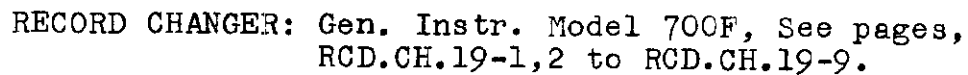
TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube voltmeter. Conditions of measurement are:

Line voltage117 Volts AC

Signal InputNone

A Variation of $\pm 10\%$ is usually permissible.



REPLACEMENT PARTS LIST

NOTICE: There is a model number label on the chassis. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information on this label.

MISCELLANEOUS

12A477	8" P.M. Speaker	.....
4X1082	Escutcheon	.....
10X755	Knob	.....
13X546	Line Cord & Plug Assembly	.....
2A393	Band Change Switch	.....
3A435	Molded Octal Tube Socket	.....
3A305	Phono Socket	.....
3A426	Tube Socket (1st 6BA6)	.....
3A443	Tube Socket (12AT7)	.....
3A304	Phono Motor Socket	.....
3A427	Tube Socket (6BE6)	.....
3A439	Tube Socket (Miniature)	.....
	Cabinet No. 054	.....

CAPACITORS

C-1	14A209	Gang Condenser Assembly	.....
C-2	17A256	2-24 mmf	Trimmer.....
C-3	47X559	130 mmf	Molded Mica.
C-4			
C-5			
C-9			
C-10			
C-11	47X507	5000 mmf	Ceramic.....
C-17			
C-27			
C-43			
C-6		Part of T-2 (1st I-F Trans. FM)	
C-7		Part of T-3 (1st I-F Trans. AM)	
C-8		Part of T-5 (2nd I-F Trans. AM)	
C-12		Part of T-4 (2nd I-F Trans. FM)	
C-13			
C-14			
C-15			
C-16A	47X112	50-50 mmf	Dual Mica....
C-16B			
C-18		Part of T-6 (Discriminator Trans.)	
C-19	47X492	2700 mmf	Molded Mica..
C-20	47X468	220 mmf	Ceramic.....
C-35			
C-21	45X361	5 mf	100 V Dry Electrolytic
C-22	47X557	2.2 mmf	Ceramic.....
C-42			
C-23	47X558	30 mmf	Ceramic.....
C-24	47X516	20 mmf	Ceramic.....
C-25	17A255	1-8 mmf	Trimmer.....
C-26	B66503	.05 mf	200 V Tubular.....
C-28A		20 mf	20 V
C-28B	45X360	40 mf	150 V Dry Electrolytic
C-28C		40 mf	200 V
C-29	H66102	.001 mf	800 V Tubular.....
C-30	47X470	330 mmf	Molded Mica..
C-31	47X508	500 mmf	Ceramic.....
C-32A			
C-32B	76X4	100 mmf	Dual Ceramic..
C-33	B66403	.04 mf	200 V Tubular.....
C-34	D66502	.005 mf	400 V Tubular.....
C-36	B66402	.004 mf	200 V Tubular.....
C-37	D66104	.1 mf	400 V Tubular.....
C-38	D66203	.02 mf	400 V Tubular.....
C-39			
C-41		Part of C-7 (Gang Condenser)	
C-40	47X471	68 mmf	Ceramic.....

RESISTORS

		Ohms	Watts	
R-1	885470	47	0.5	Carbon.....
R-2				
R-3	885102	1000	0.5	Carbon.....
R-6				
R-4	884680	68	0.5	Carbon.....
R-8				
R-5				
R-12	884682	6800	0.5	Carbon.....
R-13				
R-7	885473	47 K	0.5	Carbon.....
R-25				
R-9	885222	2200	0.5	Carbon.....
R-10	885273	27 K	0.5	Carbon.....
R-11	43X233	3.6	0.5	Wirewound...
R-14	885104	100	0.5	Carbon.....
R-16				
R-15	885223	22 K	0.5	Carbon.....
R-17	884221	220	0.5	Carbon.....
R-18				
R-19				
R-24	885474	470 K	0.5	Carbon.....
R-26				
R-20	885153	15 K	0.5	Carbon.....
R-21	36X372	.5 meg		Volume Control
R-23	40X285	3 meg.		Tone Control..
R-27	885106	10 meg.	0.5	Carbon.....
R-28	D84821	820	2.0	Carbon.....
R-29	885105	1 meg.	0.5	Carbon.....
R-30	884271	270	0.5	Carbon.....
R-31	885225	2.2 meg.	0.5	Carbon.....

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke	.....
L-2	9A2068	Parasitic Choke	.....
L-3	35A9	Insulated Choke	.....
L-4	35A8	Insulated Choke	.....
T-1	9A2099	"B" Range Loop Antenna	.....
T-2	9A2060	1st I-F Trans. (FM)	.....
T-3	9A2062	1st I-F Trans. (AM)	.....
T-4	9A2061	2nd I-F Trans. (FM)	.....
T-5	9A2063	2nd I-F Trans. (AM)	.....
T-6	9A2064	Discriminator Transformer	.....
T-7	9A2065	Oscillator Coil (AM)	.....
T-8	9A2067	Oscillator Coil (FM)	.....
T-9	51X134	Output Transformer	.....
T-10	9A2002	Dipole Antenna	.....
T-11	53X291	Power Transformer	.....
T-12	9A2066	Antenna Coil (FM)	.....

DIAL AND DRIVE ASSEMBLY

58X733	Dial Glass	.....
15X260	Pointer	.....
19X192	"C" Washer (Mtg. Drive Shaft)	.....
6X66	Rubber Grommet	.....
25X1616	Dial Bracket	.....
28X113	Drive Cord Tension Spring	.....
7A103	No. 47 Pilot Light	.....
7A199	Pilot Light Socket Assembly	.....
10X38	Drive Cord Assembly	.....
26X486	Drive Shaft	.....

TYPE G.I. — 28A169 RECORD CHANGER PARTS

G.I. 69-73657	Tone Arm	
G.I. 55-73613	Plastic Stabilizer	
G.I. 28A755782	Idle Wheel Assembly	
G.I. 56-76507	Motor, 3 speed, 60 cycles, 105-125 Volts A.C.	
E-V No. 33-4	Crystal Cartridge, complete with needle	
	*Needle only	

*When ordering needles, specify part number and letter stamped on Cartridge.

MODEL D1046A

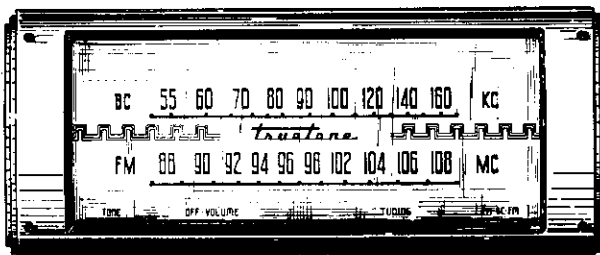
CHECK YOUR LINE VOLTAGE

Unless otherwise marked this radio must be operated on a supply of 105-125 volts AC, 60 cycles only. Do not connect the radio to a wall outlet unless

certain that the power supply is correct for the receiver. If in doubt, telephone your local power company before inserting the plug. Radios of this model which are to be used on other power supplies are marked accordingly.

FM BAND

88 - 108 MEGACYCLES — This band is calibrated in megacycles and covers the newly allocated frequency modulation band of 88-108 megacycles. Reception in this band is usually limited to "line of sight" distances between the transmitting and receiving antennas. This is normally up to about 30 miles with approximately 45 miles being the extreme range.



BROADCAST BAND

540 - 1600 KILOCYCLES — This band is calibrated in channel numbers. To obtain the kilocycle number add a zero to the number on the dial scale.

TONE CONTROL

Use this knob to adjust the tone of the receiver. When turned clockwise the high notes will predominate and when turned counter-clockwise a deep bass effect will result.

ON-OFF SWITCH AND VOLUME CONTROL

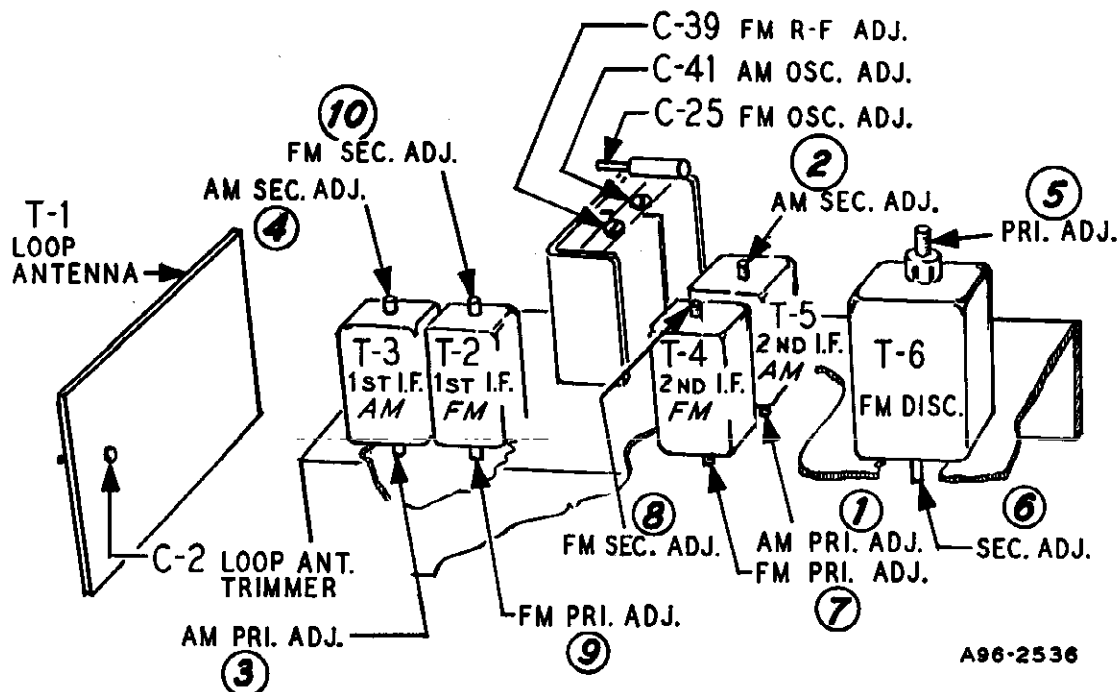
The On-Off switch and Volume control are operated by the same knob. To turn the radio on, turn the knob clockwise until a click is heard. Allow approximately 30 seconds for the tubes to heat. Then continue to turn the knob clockwise to increase the volume.

BAND AND PHONO RADIO SWITCH

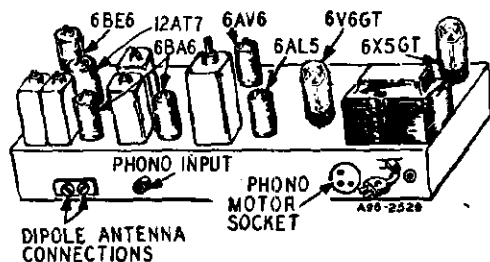
This control has three positions, FM, Broadcast and Phono. In the Phono position, the electrical circuits are connected for the reproduction of records played on the Automatic Record Changer.

TUNING KNOB

Use this control to tune in the desired station. Turn the knob until the station is heard. Then slowly rotate it back and forth until the signal is clearest and strongest. If signal is too strong, reduce it by means of the volume control, not by using the tuning knob.

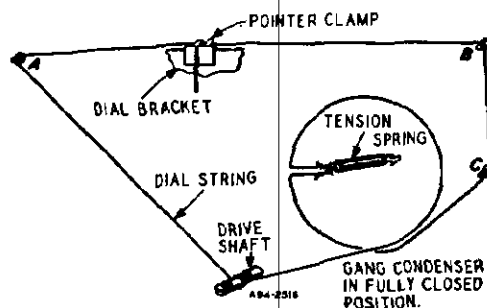


A96-2536



DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns counter-clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



ELECTRICAL SPECIFICATIONS

Power Output—
117 volts AC—40 watts
60 watts phono operating

Power Output—
1.9 watts maximum
.8 watts 10% distortion

Speaker—8 inch PM dynamic

Frequency Ranges—
Broadcast 540-1600 KC
Frequency modulation 88-108 MC

Intermediate Frequency—
AM 455 KC — FM 10.7 MC

Selectivity — AM — 45 KC broad
at 1000 times signal, measured
at 1000 KC

I.F. FM—200 KC broad at 2 times
down

I.F. FM—950 KC broad at 200
times down

AM Sensitivity—(For .5 watt output
with external antenna)
25 microvolts average

FM Sensitivity—(For .5 watt output)
25 microvolts average

ALIGNMENT PROCEDURES AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately
Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
— .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a
Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several
Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I-F Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Lead	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

MODEL D1046A

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	Maximum Deflection

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.

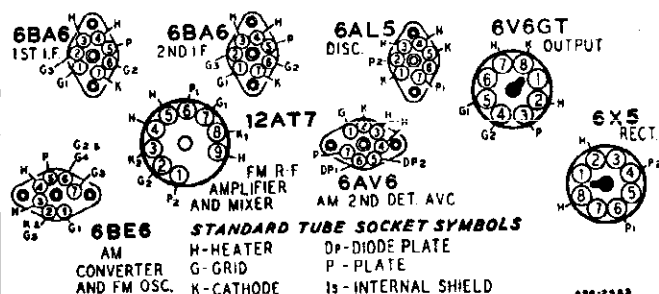
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

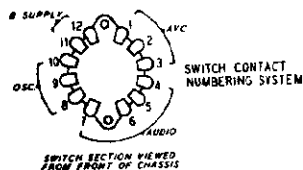
NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube voltmeter. Conditions of measurement are:

Line voltage117 Volts AC
Signal InputNone
A Variation of $\pm 10\%$ is usually permissible.



RECORD CHANGER: Gen.Instr. Model 700F, See pages,
RCD.CH.19-1,2 to RCD.CH.19-9.

MODEL D1046A

REPLACEMENT PARTS LIST

NOTICE: There is a model number label on the chassis. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information on this label.

MISCELLANEOUS

12A477	8" P.M. Speaker
4X1073	Escutcheon
10X751	Knob
13X546	Line Cord & Plug Assembly
2A395	Band Change Switch
3A303	Molded Octal Tube Socket
3A305	Phono Socket
3A426	Tube Socket (Miniature)
3A443	Tube Socket (6BE6)
3A304	Phono Motor Socket
3A427	Tube Socket (12A17)
	Cabinet No. 952

CAPACITORS

C-1	14A209	Gang Condenser Assembly
C-2	17A256	2-24 mmf Trimmer
C-3	47X559	130 mmf Ceramic
C-4		
C-5		
C-9		
C-10		
C-11	47X507	5000 mmf Ceramic
C-17		
C-27		
C-43		
C-6		Part of T-2 (1st I-F Trans. FM)
C-7		
C-8		Part of T-3 (1st I-F Trans. AM)
C-12		Part of T-5 (2nd I-F Trans. AM)
C-13		
C-14		Part of T-4 (2nd I-F Trans. FM)
C-15		
C-16A	47X112	50-50 mmf Dual Mica
C-16B		
C-18		Part of T-6 (Discriminator Trans.)
C-19	47X492	2700 mmf Molded Mica ..
C-20	47X468	220 mmf Ceramic
C-35		
C-21	45X361	5 mf 100 V Dry Electrolytic
C-22	47X557	2.2 mmf Ceramic
C-42		
C-23	47X558	30 mmf Ceramic
C-24	47X516	20 mmf Ceramic
C-25	17A255	1-8 mmf Trimmer
C-26	B66503	.05 mf 200 V Tubular
C-28A		20 mf 20 V
C-28B	45X360	40 mf 150 V Dry Electrolytic
C-28C		40 mf 200 V
C-29	H66102	.001 mf 800 V Tubular
C-30	47X470	330 mmf Molded Mica ..
C-31	47X508	500 mmf Ceramic
C-32A		
C-32B	76X4	100 mmf Dual Ceramic ..
C-33	B66403	.04 mf 200 V Tubular
C-34	D66502	.005 mf 400 V Tubular
C-36	B66402	.004 mf 200 V Tubular
C-37	D66104	.1 mf 400 V Tubular
C-38	D66203	.02 mf 400 V Tubular
C-39		
C-41		Part of C-1 (Gang Condenser)
C-40	47X471	68 mmf Ceramic

RESISTORS

		Ohms	Watts	
R-1	B85470	47	0.5	Carbon
R-2				
R-3	B85102	1000	0.5	Carbon
R-6				
R-4	B84680	68	0.5	Carbon
R-8				
R-5				
R-12	B84682	6800	0.5	Carbon
R-13				
R-7	B85473	47 K	0.5	Carbon
R-25				
R-9	B85222	2200	0.5	Carbon
R-10	B85273	27 K	0.5	Carbon
R-11	43X233	3.6	0.5	Wirewound
R-14	B85104	100 K	0.5	Carbon
R-16				
R-15	B85223	22 K	0.5	Carbon
R-17	B84221	220	0.5	Carbon
R-18				
R-19				
R-24	B85474	470 K	0.5	Carbon
R-26				
R-20	B85153	15 K	0.5	Carbon
R-21	36X381	.5 meg		Volume Control
R-23	40X289	3 meg.		Tone Control ..
R-27	B85106	10 meg.	0.5	Carbon
R-28	D84821	820	2.0	Carbon
R-29	B85105	1 meg.	0.5	Carbon
R-30	B84271	270	0.5	Carbon
R-31	B85225	2.2 meg.	0.5	Carbon

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke
L-2	9A2068	Parasitic Choke
L-3	35A9	Insulated Choke
L-4	35A8	Insulated Choke
T-1	9A1972	"B" Range Loop Antenna
T-2	9A2060	1st I-F Trans. (FM)
T-3	9A2062	1st I-F Trans. (AM)
T-4	9A2061	2nd I-F Trans. (FM)
T-5	9A2063	2nd I-F Trans. (AM)
T-6	9A2064	Discriminator Transformer
T-7	9A2065	Oscillator Coil (AM)
T-8	9A2067	Oscillator Coil (FM)
T-9	51X134	Output Transformer
T-10	9A2003	Dipole Antenna
T-11	53X291	Power Transformer
T-12	9A2066	Antenna Coil (FM)

DIAL AND DRIVE ASSEMBLY

58X730	Dial Glass
15X254	Pointer
19X192	"C" Washer (Mtg. Drive Shaft)
6X66	Rubber Grommet
25X1610	Dial Bracket
28X113	Drive Cord Tension Spring
7A103	No. 47 Pilot Light
7A215	Pilot Light Socket Assembly
10X38	Drive Cord Assembly
26X510	Drive Shaft

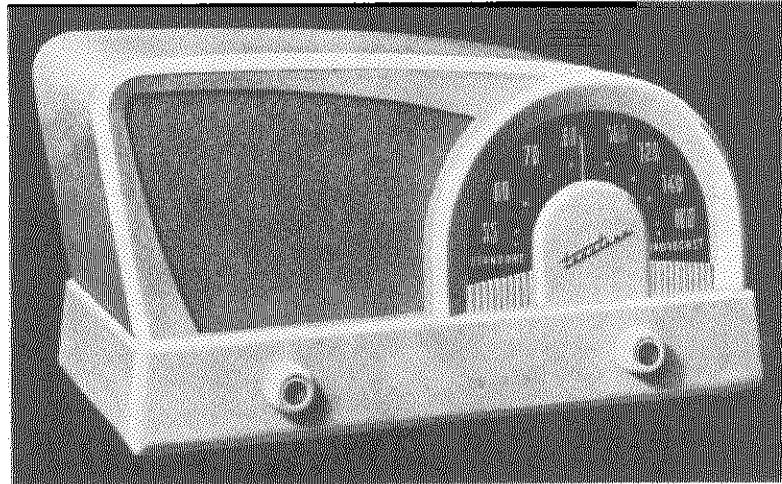
TYPE G.I. - 28A168 RECORD CHANGER PARTS

G.I. 69-73506	Tone Arm
G.I. 55-73613	Plastic Stabilizer
G.I. 28A755782	Idle Wheel Assembly
G.I. 56-76507	Motor, 3 speed, 60 cycles, 105-125 Volts A.C.
ASTATIC LT3D	Crystal Cartridge

*Needle, Regular

*Needle, Microgroove (Red)

*When ordering needles, specify part number and letter stamped on Cartridge.

MODELS D2017,
D2018

SERVICE DATA

ALIGNMENT PROCEDURE

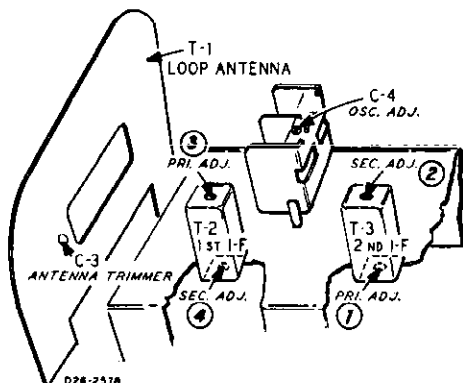
The following equipment is required for aligning:
Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter: Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 50 mmf.
Volume Control—Maximum All Adjustments.
Allow Chassis and Signal Generator to "Heat Up" for several Minutes.

SIGNAL GENERATOR			DUMMY ANTENNA	GANG CONDENSER SETTING	ADJUST TUNING SLUGS (I-F) AND TRIMMERS TO MAXIMUM
FREQUENCY SETTING	ANTENNA CONNECTION	GROUND CONNECTION			
455 KC	Control Grid 12BA6—I.F. Prong No. 1	"X" Point	.1 mf.	Turn Rotor to full open	2nd I.F. Pri. (1) & Sec. (2)
455 KC	Control Grid 12BE6—1st Det. Prong No. 7	"X" Point	.1 mf.	Turn Rotor to full open	1st I.F. Pri. (3) & Sec. (4)
1620 KC	Control Grid 12BE6—1st Det. Prong No. 7	"X" Point	.1 mf.	Turn Rotor to full open	Oscillator (C-4)
1400 KC	External Antenna Clip On Loop	Chassis	50 mmf.	Tune Receiver to 1400 KC.	Antenna (C-3) Trimmer

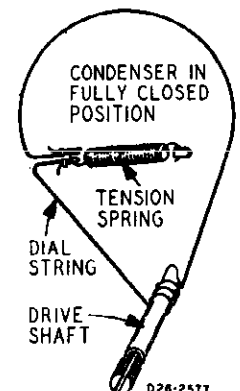
SPECIFICATIONS

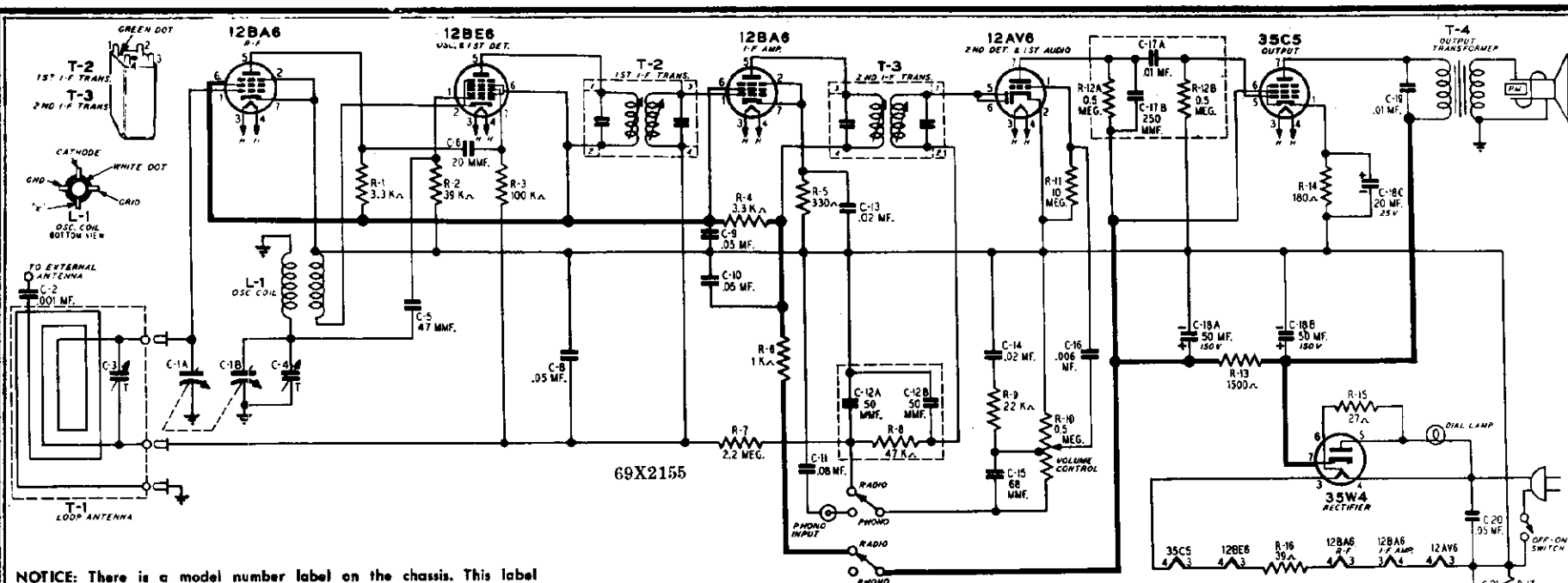
6 Tube Superheterodyne, including Rectifier Tube. Intermediate Frequency 455 KC
Tuning Frequency Range 540 to 1600 KC Sensitivity 10 Microvolts Average
Power Consumption 35 watts (At 117 volts AC) Selectivity 50 KC Wide at 1000 Times Signal
Power Output.. 1.5 watt maximum, .9 watt (10% distortion) Speaker 5 $\frac{1}{4}$ " PM Dynamic



DRIVE CORD REPLACEMENT

Turn the large drive pulley to the fully closed position. Use a new 10x75 drive cord assembly or a piece of cord 15 inches long and fasten one end to the tension spring and fasten the other end of the spring to the drive pulley. Install the cord as shown in the illustration. Wind 2 $\frac{1}{4}$ turns counterclockwise around the tuning shaft with the turns progressing toward the front of the chassis. After string is installed, stretch the tension spring and fasten free end of cord to spring.





NOTICE: There is a model number label on the chassis. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information appearing on this label.

PARTS LIST

MISCELLANEOUS

12A499	5-1/4" P.M. Speaker	L-1
76X5	Multiple Resistor-Capacitor Combination	T-1
76X1	Resistor-Capacitor Combination	T-2
2A402	Switch (Phono-Radio)	T-3
3A305	Phono Socket (Single pin)	T-4
3A426	Tube Socket (Miniature)	
32X386	Tube Shield	
14X497	Grille Cloth (Walnut)	C-1A }
14X500	Grille Cloth (Ivory)	C-1B }
10A760	Knob (Ivory)	C-2
10A761	Knob (Walnut)	C-3
13X546	Line Cord Assembly	
55X384	Plastic Cabinet (Ivory)	C-4
55X392	Plastic Cabinet (Walnut)	C-5

DIAL AND DRIVE ASSEMBLY

58X735	Dial Glass	C-6
15X261	Pointer	C-7
25X1696	Dial Background Bracket	C-8
26X514	Drive Shaft	C-9
28X113	Drive Cord Tension Spring	C-10
19X192	"C" Washer (Mfg. Drive Shaft)	C-11
10X75	Drive Cord Assembly	C-12A }
7A103	No. 47 Pilot Light	C-12B }
7A227	Pilot Light Assembly	C-13
		C-14
		C-15
		C-16

TRANSFORMERS AND COILS

9A2101	Oscillator Coil	
9A2102	Loop Antenna	
9A2108	1st I-F Transformer	
9A2109	2nd I-F Transformer	
51X148	Output Transformer	

CAPACITORS

14A212	Gang Condenser Assembly	
D65102	.001 400 V Ceramic	
17A256	Trimmer	
47X495	Part of Gang Condenser	
47X516	47 mmf Ceramic	
B66503	.05 mf 200 V Tubular	
B66803	.08 mf 200 V Tubular	
B66203	.02 mf 200 V Tubular	
47X471	68 mmf Ceramic	
B66602	.006 mf 200 V Tubular	

C-17A }	
C-17B }	
C-18A }	45X343
C-18B }	
C-18C }	
C-19	B66103
C-20	D66503
C-21	B66204

R-1 }	B84332
R-4 }	
R-2	B85393
R-3	B85104
R-5	B84331
R-6	B84102
R-7	B85225
R-8	
R-9	B85223
R-10	36X385
R-11	B85105
R-12A }	
R-12B }	
R-13	C84152
R-14	B84181
R-15	B83270
R-16	D84390
R-17	B84274

Part of 76X5

(See Miscellaneous)		
50 mf	150 V	
50 mf	150 V	Dry Electrolytic
20 mf	.25 V	
.01 mf	200 V	Tubular
.05 mf	400 V	Tubular
.2 mf	200 V	Tubular

RESISTORS

Ohms	Watts	
3.3 K	0.5	Carbon
39 K	0.5	Carbon
100 K	0.5	Carbon
330	0.5	Carbon
1 K	0.5	Carbon
2.2 meg.	0.5	Carbon
Part of 76X1		
(See Miscellaneous)		
22 K	0.5	Carbon
.5 meg		Volume Control
10 meg.	0.5	Carbon
Part of 76X5		
(See Miscellaneous)		
1500	1.0	Carbon
180	0.5	Carbon
27	0.5	Carbon
39	2.0	Carbon
270 K	0.5	Carbon

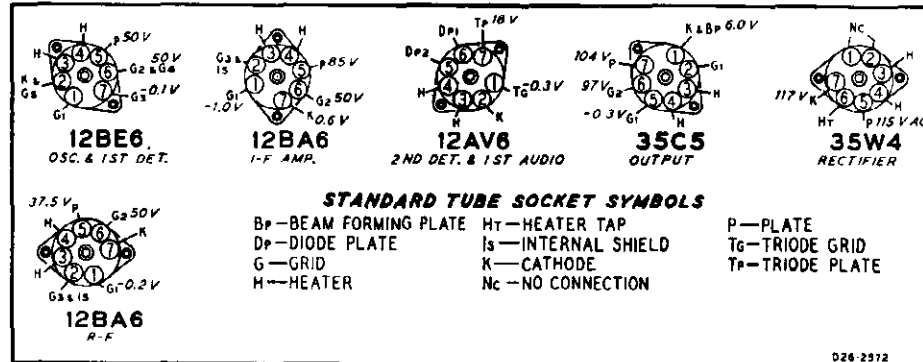
MODELS D2017
D2018**TUBE SOCKET VOLTAGES**

Socket voltages are shown on the Bottom Socket diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage117 Volts AC

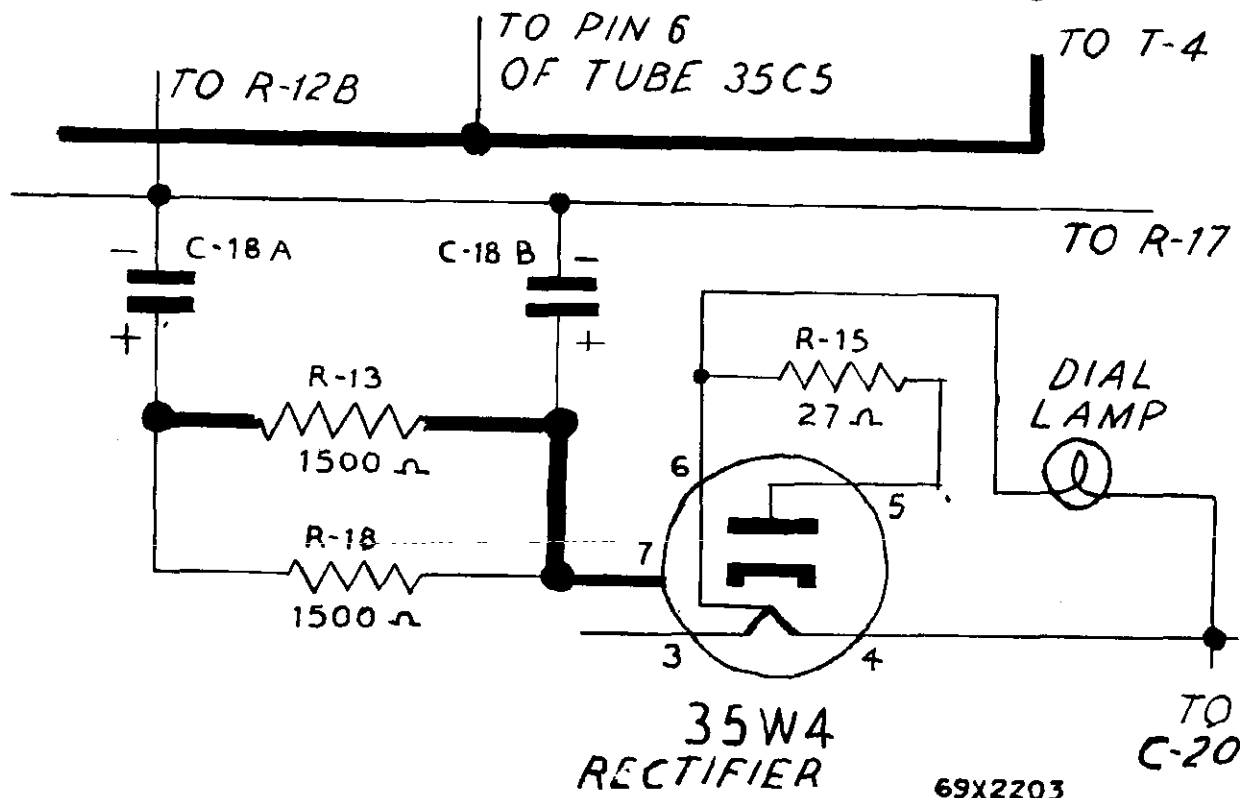
Signal InputNone

A Variation of $\pm 10\%$ is usually permissible.

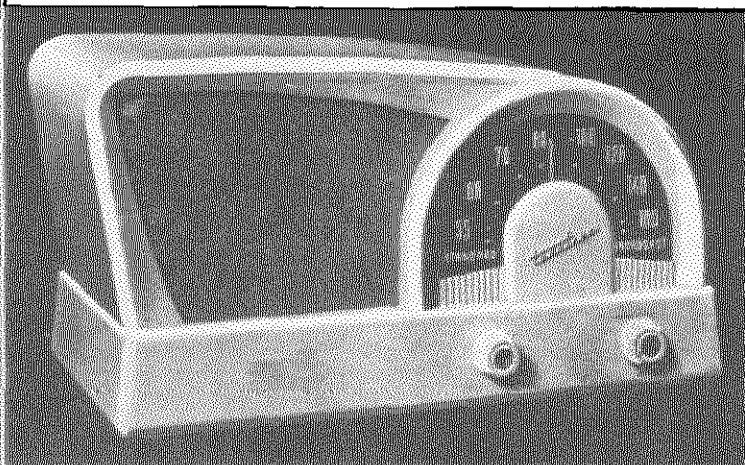


TRUETONE MODELS D2017 & D2018
ISSUE "A"

The circuit of the 35W4 rectifier tube has been modified to reduce hum and to lengthen the life of the pilot light lamp. A 1500 ohm resistor R-18 was also added to the circuit. A partial schematic incorporating these changes is shown below. Due to these changes the voltage reading on Pin #7 of the 35C5 output tube now reads 97 volts instead of 104 volts as shown on the bottom socket voltage chart.



MODELS D2017B, D2018B



ON-OFF SWITCH AND VOLUME CONTROL

Turn until the desired station is heard. Then slowly rotate the knob back and forth until the signal is clearest and strongest. If signal is too strong, reduce it by means of the volume control, not by using the tuning knob.

TUNING KNOB

Turn radio on by turning knob to the right. A click will be heard—allow approximately 30 seconds for tubes to heat. Continue to turn the knob to the right until the desired volume level is obtained. To turn radio off, turn knob to left until click is heard.

GENERAL INFORMATION

ANTENNA

A Stratoscope Loop Antenna is built on the chassis of this radio. For reception of stations no other antenna or ground is required.

When operating the radio with the built-in loop aerial, directional effects are obtained. Better reception of distant stations and reduction of local interference may be obtained by rotating the radio until the desired signal is at a maximum.

TUBES AND DIAL LAMP

The type designation of each tube is stamped on both the tube and the radio chassis base. The correct position in which each tube must be installed is also shown in the tube position illustration.

All tubes and the dial lamp must be in their sockets to operate the radio.

CAUTION—If the dial lamp burns out do not operate the receiver until after the lamp is replaced, as rectifier

tube failure may result. Use **ONLY** a number 47 dial lamp. To remove the dial lamp, push lamp into socket, turn slightly counterclockwise and withdraw from socket.

The tubes in the radio should be checked periodically by taking them out and having them tested. To reach the tubes for servicing, remove the cabinet back from the rear of the receiver. See instructions on cabinet back.

Be sure receiver is turned OFF when checking or replacing tubes, or damage to the receiver may result.

When replacing the tubes, be sure that they are inserted in the proper sockets. To install a tube into a miniature type tube socket, line up the tube prongs with the holes in the socket and then gently push the tube down until it is held firmly in the socket.

Refasten the cabinet back in place before operating the radio.

IF THE RADIO FAILS TO OPERATE SATISFACTORILY

If, after rechecking the foregoing instructions carefully, the radio still does not appear to operate satisfactorily, proceed as follows:

FIRST—Check Phono-Radio Switch. If the radio does not operate after it has been on for a while, check the PHONO-RADIO switch at the rear of the chassis. For radio operation this switch must be in the RADIO position.

SECOND—Check Power Supply. Be sure there is power at the convenience outlet to which the radio is connected. To determine this, connect a lamp to the outlet and see whether or not the lamp lights.

Check the voltage of the power supply with that shown on the power rating notice on the cabinet back. If the supply is AC, also check the frequency (cycles) on the power rating notice. If there is any doubt concerning the power supply, withdraw the plug from the outlet and consult the local power company before reinserting the plug.

When used on a DC line, if the set does not operate after one minute, reverse the plug.

THIRD — Check Tube Positions. See that the tubes are in the correct sockets as shown in the illustration.

CHECK YOUR LINE VOLTAGE

Unless otherwise marked, this radio must be operated on a power supply of 105-125 volts AC, 50 to 60 cycles only, or 105-125 volts DC. Do not connect the radio to the power source until certain that the power supply is correct for the receiver. If in doubt, telephone your local power company before connecting the receiver.

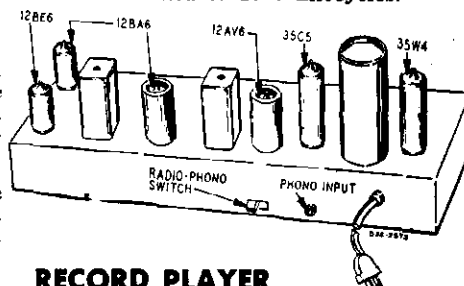
If there appears to be excessive hum when using the radio on AC, reverse the plug. Leave the plug inserted the way which gives the least hum.

When operating the receiver on a DC power supply, if it does not operate within one minute after it is turned on, reverse the power plug in the proper supply outlet.

DIAL SCALE

540 to 1600 Kilocycles

The dial scale is calibrated in channel numbers. To convert these channel numbers to kilocycles add a zero to the dial number. Thus when the dial pointer is at 100 on the dial, the radio is tuned to 1000 kilocycles.



RECORD PLAYER CONNECTION AND PHONO-RADIO SWITCH

This receiver has a PHONO socket located at the rear of the chassis. When it is desired to play records through the radio, insert the connector on the cable of any standard record player or changer into this socket. Then, push the PHONO-RADIO switch to PHONO and use volume control to adjust the sound level.

NOTE—Be sure to push the PHONO-RADIO switch back to the RADIO position when through playing records otherwise the radio will not operate.

Make certain that the tubes are operating. (Glass tubes will light very dimly.)

FOURTH—Test Tubes. Remove the tubes from the radio, take them to your local radio dealer and have them tested either by means of a tube tester or by inserting them in a radio that is operating satisfactorily.

FIFTH—Service. If the radio does not function properly after the above procedure has been followed and the tubes have been tested, get in touch with the dealer from whom the radio was purchased or call in a competent radio technician.

SERVICE DATA**ALIGNMENT PROCEDURE**

The following equipment is required for aligning:
Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter: Non-Metallic Screwdriver.

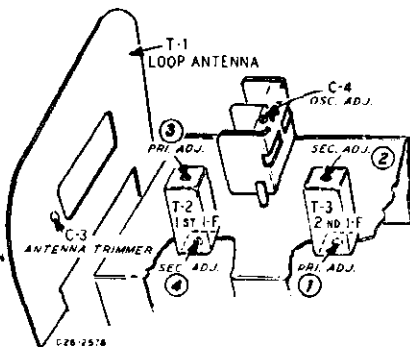
Dummy Antennas—.1 mf., 50 mmf.
Volume Control—Maximum All Adjustments.
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			DUMMY ANTENNA	GANG CONDENSER SETTING	ADJUST TUNING SLUGS (I-F) AND TRIMMERS TO MAXIMUM
FREQUENCY SETTING	ANTENNA CONNECTION	GROUND CONNECTION			
455 KC	Control Grid 12BA6—I.F. Prong No. 1	"X" Point	.1 mf.	Turn Rotor to full open	2nd I.F. Pri. (1) & Sec. (2)
455 KC	Control Grid 12BE6—1st Det. Prong No. 7	"X" Point	.1 mf.	Turn Rotor to full open	1st I.F. Pri. (3) & Sec. (4)
1620 KC	Control Grid 12BE6—1st Det. Prong No. 7	"X" Point	.1 mf.	Turn Rotor to full open	Oscillator (C-4)
1400 KC	External Antenna Clip On Loop	Chassis	50 mmf.	Tune Receiver to 1400 KC.	Antenna (C-3) Trimmer

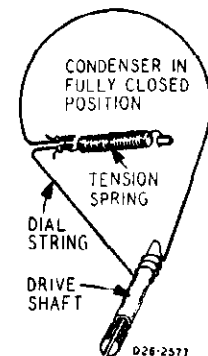
SPECIFICATIONS

6 Tube Superheterodyne, including Rectifier Tube.
Tuning Frequency Range540 to 1600 KC
Power Consumption35 watts (At 117 volts AC)
Power Output...1.5 watt maximum, .9 watt (10% distortion)

Intermediate Frequency455 KC
Sensitivity10 Microvolts Average
Selectivity50 KC Wide at 1000 Times Signal
Speaker5 $\frac{1}{4}$ " PM Dynamic

**DRIVE CORD REPLACEMENT**

Turn the large drive pulley to the fully closed position. Use a new 10x78 drive cord assembly or a piece of cord 16 inches long and fasten one end to the tension spring and fasten the other end of the spring to the drive pulley. Install the cord as shown in the illustration. Wind 2 $\frac{3}{4}$ turns counterclockwise around the tuning shaft with the turns progressing toward the front of the chassis. After string is installed, stretch the tension spring and fasten free end of cord to spring.

**REPLACEMENT PARTS LIST**

NOTICE: There is a model number label on the chassis. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information appearing on this label.

MISCELLANEOUS

12A499 5.1 4" P.M. Speaker	T-1
76X5 Multiple Resistor-Capacitor Combination	T-2
76X1 Resistor-Capacitor Combination	T-3
2A402 Switch (Phono-Radio)	T-4
3A305 Phono Socket (Single pin)	
3A426 Tube Socket (Miniature)	
32X403 Tube Shield	
14X497 Grille Cloth (Walnut)	
14X500 Grille Cloth (Ivory)	
10A760 Knob (Ivory)	
10A761 Knob (Walnut)	
13X546 Line Cord Assembly	
55X405 Plastic Cabinet (Ivory)	
55X406 Plastic Cabinet (Walnut)	
3A458 Tube Socket (12BA6-12AV6)	

DIAL AND DRIVE ASSEMBLY

58X735 Dial Glass	C-11
15X261 Pointer	C-12A
25X1696 Dial Background Bracket	C-12B
26X514 Drive Shaft	C-13
28X113 Drive Cord Tension Spring	C-14
19X192 "C" Washer (Mfg. Drive Shaft)	C-15
10X78 Drive Cord Assembly	C-16
7A103 No. 47 Pilot Light	C-17A
7A227 Pilot Light Assembly	C-17B

TRANSFORMERS AND COILS

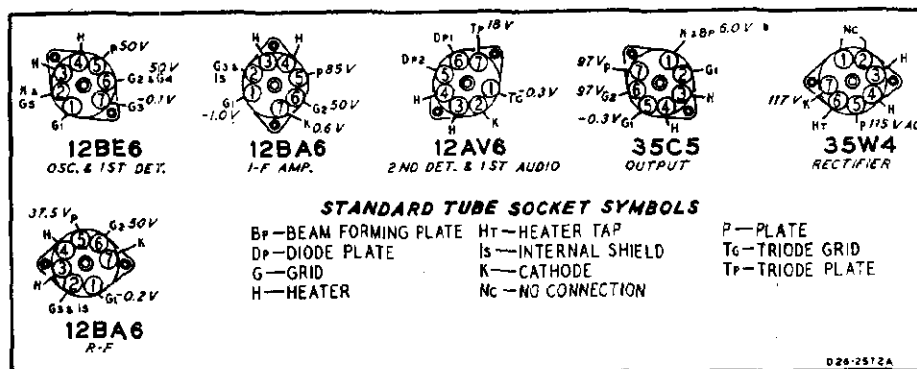
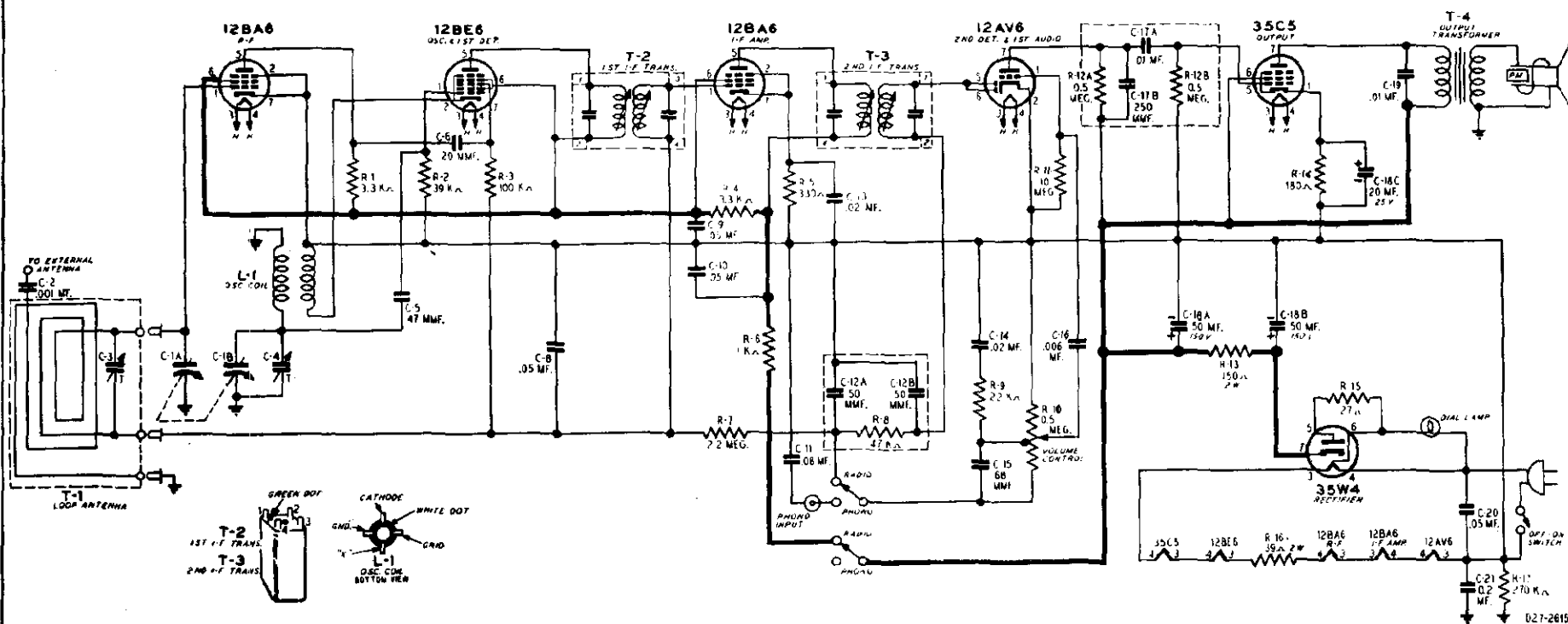
9A2101 Oscillator Coil	C-19
9A2151 Loop Antenna	C-20
9A2108 1st I-F Transformer	R-11
9A2109 2nd I-F Transformer	
51X148 Output Transformer	

CAPACITORS

14A212 Gang Condenser Assembly	C-1A
D65102 .001 400 V Ceramic Trimmer	C-1B
17A256 Part of Gang Condenser	C-2
47X495 .47 mmf Ceramic	C-3
47X516 20 mmf Ceramic	C-4
B66503 .05 mf 200 V Tubular	C-5
B66803 .08 mf 200 V Tubular	C-6
Part of 76X1 (See Miscellaneous)	C-7
B66203 .02 mf 200 V Tubular	C-8
47X471 68 mmf Ceramic	C-9
B66602 .006 mf 200 V Tubular	C-10
Part of 76X5 (See Miscellaneous)	C-11
50 mf 150 V	C-12
45X343 50 mf 150 V Dry Electrolytic	C-13
20 mf 25 V	C-14

RESISTORS

	Ohms	Watts	
R-1	B84332 3.3 K	0.5	Carbon
R-2	B85393 39 K	0.5	Carbon
R-3	B85104 100 K	0.5	Carbon
R-5	B84331 330	0.5	Carbon
R-6	B84102 1 K	0.5	Carbon
R-7	B85225 2.2 meg.	0.5	Carbon
R-8	Part of 76X1 (See Miscellaneous)		
R-9	B85223 22 K	0.5	Carbon
R-10	36X385 .5 meg		Volume Control
R-11	B85106 10 meg.	0.5	Carbon
R-12A	Part of 76X5 (See Miscellaneous)		
R-13	D84751 750	2.0	Carbon
R-14	B84181 180	0.5	Carbon
R-15	B83270 27	0.5	Carbon
R-16	D84390 39	2.0	Carbon
R-17	B84274 270 K	0.5	Carbon

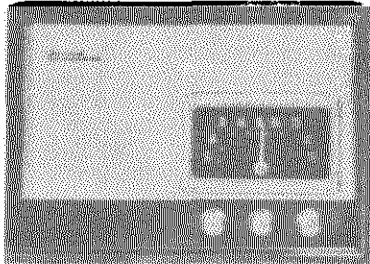


TUBE SOCKET VOLTAGES

Socket voltages are shown on the Bottom Socket diagram at the tube socket terminals. All voltages are between the socket terminal and "X" point. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

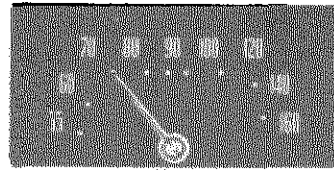
Line voltage117 Volts AC
Signal InputNone
A Variation of $\pm 10\%$ is usually permissible.

HOW TO OPERATE THE CONTROLS



THE DIAL SCALE

is calibrated to cover frequencies between 540 Kc and 1600 Kc. Add a zero to the dial number to obtain the frequency in kilocycles (Kc). Example: When pointer is set to 70, radio is tuned to 700 Kc. See your newspaper for frequencies of local stations.



ON-OFF SWITCH AND VOLUME CONTROL

Turn this knob clockwise to turn set on. Continuing to turn clockwise will increase volume.

TUNING CONTROL

Use this control to tune receiver to the desired station.

TONE AND RADIO-PHONO SWITCH

Use to switch from radio to phonograph operation; also to select most pleasing tone. Four tone positions are provided, two for RADIO and two for PHONO. Starting with the extreme counter-clockwise setting and turning in a clockwise direction the four positions are as follows:

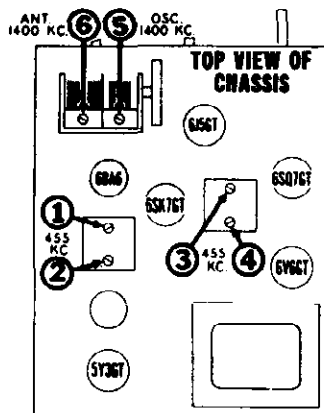
Radio Bass
Radio Treble
Phono Treble
Phono Bass

The Treble position gives widest tone range and the Bass setting accentuates low tones.

ALIGNMENT PROCEDURE

1. With the gang condenser fully meshed, the dial pointer should be in a horizontal position at low end of dial, parallel to the bottom edge of dial scale. If it is set incorrectly, merely hold tuning control shaft steady and turn pointer to correct position.
2. Connect an output meter across the speaker voice coil or from the plate of the 6V6GT tube to chassis through a .1 Mfd. condenser.
3. Connect the ground lead of signal generator to the receiver chassis.
4. Set volume control at maximum volume position and use a weak signal from the signal generator.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF SIG. GENERATOR TO	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
.1 MFD. Condenser	Lug on trimmer No. 6 on antenna section of gang (see figure below for location of trimmer).	455 KC	Any point where it does not affect the signal.	1-2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				3-4	1st I.F.	
200 MMFD. Mica Condenser	External Antenna Clip	1400 KC	1400 KC	5	Broadcast Oscillator	Adjust for maximum output.
200 MMFD. Mica Condenser	External Antenna Clip	1400 KC	Tune to 1400 KC generator signal	6	Broadcast Antenna	Adjust for maximum output.



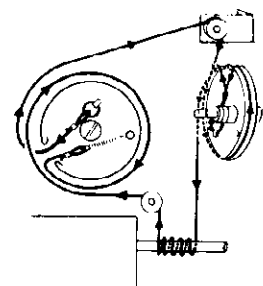
TRIMMER LOCATIONS

DIAL AND POINTER DRIVE CORD ARRANGEMENT SIDE VIEW

To string dial cord, set gang condenser to fully open position and use following parts:

- 114955 Clip on end of cord
- 117057 Cord (3 feet)
- 119087 Ring for dial cord
- 505181 Tension spring

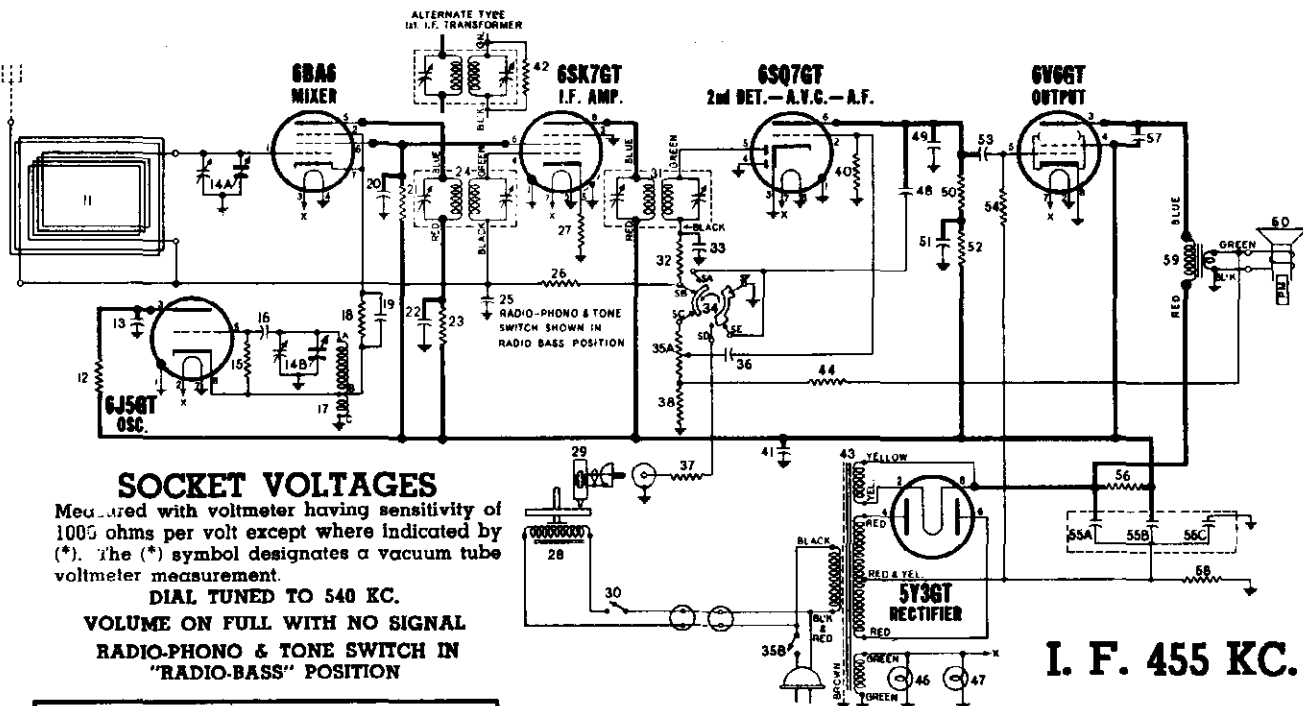
To replace and properly position pointer see step 1 in "Alignment Procedure" above.



AUDIO OSCILLATION

The audio system of this receiver utilizes a two stage type of inverse feed-back arrangement and should it ever be necessary to replace the speaker or output transformer it is important to maintain a definite phase relationship in the feed-back circuit. If the connections to the output transformer are reversed or if the feed-back connection is made to the wrong side of the output transformer secondary, the system will become regenerative instead of degenerative. Under those conditions audio oscillation may result. If that occurs, oscillation may be prevented by reversing the connections to the speaker.

MODEL D2022



SOCKET VOLTAGES

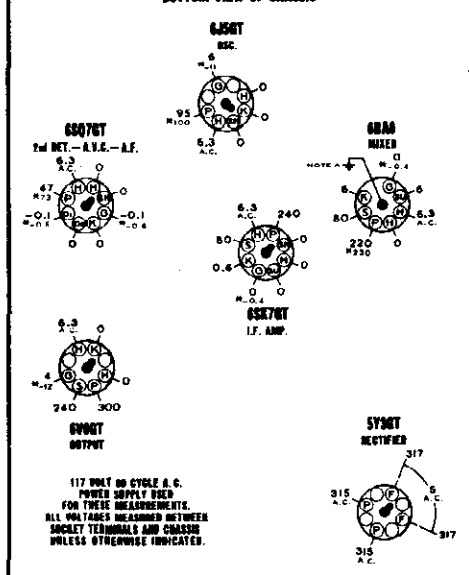
Measured with voltmeter having sensitivity of 1005 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.

DIAL TUNED TO 540 KC.

VOLUME ON FULL WITH NO SIGNAL
RADIO-PHONO & TONE SWITCH IN
"RADIO-BASS" POSITION

I. F. 455 KC.

BOTTOM VIEW OF CHASSIS



REAR OF CHASSIS

NOTE A: Grounding of center stud on tube socket is necessary to reduce capacity coupling between other pins. Oscillation may result if this ground is omitted.

Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram

COILS AND TRANSFORMERS

11	508361	Loop antenna
17	505326	Coil-oscillator
24	502657	Transformer—1st I. F.
31	502658	Transformer—2nd I. F.
43	502174	Transformer—power
59	505305	Transformer—output

OTHER ELECTRICAL PARTS

28	505758	Motor—for type "VM" 508365 record changer 115 volt 60 cyc.
29	506840	Crystal cartridge
30	505269	Switch—"ON-OFF" for type "VM" 508365 record changer.
34	505317	Switch—radio-phono
46, 47	110629	Lamp—dial (Mazda #44) 6.3 V. 0.25 A.
60	506657	Speaker P. M. dynamic (6 inch)

MISCELLANEOUS PARTS

116467	Base for mtg. electrolytic condenser
505165	"C" washer
508370	Cabinet
112745	Clip—coil mounting
114955	Clip—retainer on end of dial cord
160326	Clip—retains dial scale
117057	Cord—dial drive (3 ft. required) per ft.
508362	Dial scale (foil)
508350	Escutcheon and dial window assy.
508366	Emblem "Truetone"
505464	Hinge for lid
505344	Knob—tuning
505345	Knob—"VOLUME"
505346	Knob—"RADIO-PHONO"
508372	Lid (less hardware)
505463	Lid support
506841	Needle—phonograph
500966	Plug—Phono. pick-up cable
501031	Plug—Phono. motor cable
505686	Pointer
508365	Record changer
119087	Ring for dial cord
505944	Rubber pad for mtg. chassis
79993	Screw—No. 8x1 1/4 for mtg. chassis
505716	Screw—set for phono needle
162054	Shaft and drum for pointer
505313	Shaft—tuning
117716	Shield—tube
116690	Socket—octal base
160039	Socket—phono. plug
160392	Socket—octal (rectifier)
505307	Socket and phono. motor cable
505459	Socket—dial lamp
504397	Socket—miniature
505161	Spring—tension
111456	Washer—spring washer for tuning shaft

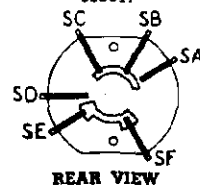
DIA-GRAM NO.	PART NO.	DESCRIPTION
21	502288	Resistor—carbon 47,000 Ohms 1 watt
23	502459	Resistor—carbon 6,800 Ohms 1/4 watt
26	502269	Resistor—carbon 3.3 Meg. 1/4 watt
27	502264	Resistor—carbon 47 Ohms ± 10% 1/4 w.
32	502131	Resistor—carbon 47,000 Ohms 1/4 watt
35 A, B	505318	Volume Control 1 Meg. (with switch)
37	510185	Resistor—carbon 470,000 Ohms 1/2 watt
38	510122	Resistor—carbon 150 ohms 1/2 watt
40	502468	Resistor—carbon 4.7 Meg. 1/4 watt
42	510191	Resistor—carbon 1 Meg. 1/2 watt
44	510146	Resistor—carbon 3,300 Ohms 1/2 watt
50	502133	Resistor—carbon 220,000 Ohms 1/4 watt
52	502133	Resistor—carbon 220,000 Ohms 1/4 watt
54	502134	Resistor—carbon 470,000 Ohms 1/4 watt
56	504771	Resistor—carbon 3,300 Ohms 2 watt
58	502293	Resistor—wire wound 200 Ohms ± 10% 2 watt

PARTS LIST

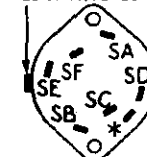
DIA-GRAM NO.	PART NO.	DESCRIPTION
CONDENSERS		
13.....	502151	Condenser—.01 Mfd. 400 volt
14 A, B.....	505315	Condenser—variable gang (with drum)
16.....	502931	Condenser—mica 100 Mmfd. 500 volt
19.....	502153	Condenser—.05 Mfd. 200 volt
20.....	502157	Condenser—.05 Mfd. 400 volt
22.....	502152	Condenser—.02 Mfd. 400 volt
25.....	502153	Condenser—.05 Mfd. 200 volt
33.....	502931	Condenser—mica 100 Mmfd. 500 volt
36.....	502156	Condenser—.004 Mfd. 400 volt
41.....	502157	Condenser—.05 Mfd. 400 volt
48.....	512006	Condenser—.005 Mfd. 500 volt
49.....	502271	Condenser—mica 250 Mmfd. 500 volt
51.....	502410	Condenser—.1 Mfd. 400 volt
53.....	502152	Condenser—.02 Mfd. 400 volt
55 A, B, C.....	502207	Condenser—electrolytic A—20 Mfd. 400 volt B—10 Mfd. 400 volt C—20 Mfd. 25 volt
57.....	502156	Condenser—.004 Mfd. 400 volt
RESISTORS		
12.....	502466	Resistor—carbon 33,000 Ohms $\pm 10\%$ 1 w.
15.....	502131	Resistor—carbon 47,000 Ohms $\frac{1}{4}$ watt
18.....	502128	Resistor—carbon 2,200 Ohms $\frac{1}{4}$ watt



ALTERNATE TYPES OF
RADIO-PHONO &
TONE SWITCH
505317



LOCATING LUG



*Not used; may serve
as wiring junction point.

STAGE GAIN MEASUREMENT PROCEDURE

REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver may be measured with an A.C. Vacuum Tube Voltmeter or a "channel" type instrument containing a tuned and calibrated amplifier.

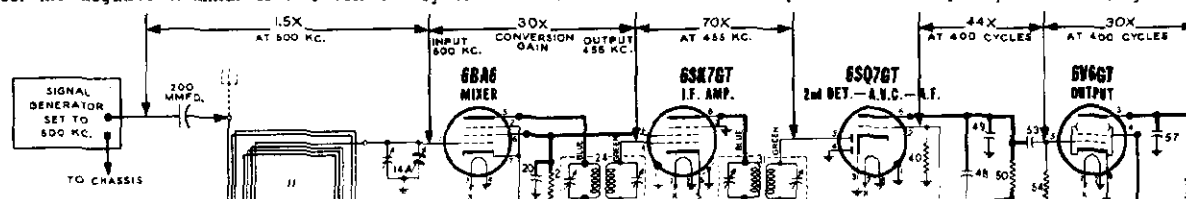
PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F. and I.F. stages are carefully and accurately aligned by utilizing the alignment procedure given above.
2. Connect Signal Generator as shown below.
3. The values of stage gain which are given here were measured with a fixed bias of 3 volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 3 volt battery to A.V.C. at

black lead of 1st I.F. and connect the positive battery lead to receiver chassis.

IMPORTANT: Disconnect battery when measuring audio stage gain.

4. Set Signal Generator for operation at 600 Kc with 400 cycle modulation and carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
5. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.
6. When using a "channel" type instrument, carefully tune it for maximum output at desired frequency before making measurements.



DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.

MODEL D2027A

CHECK YOUR LINE VOLTAGE

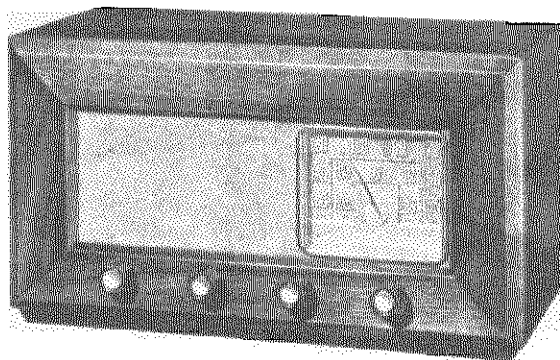
Unless otherwise marked this radio must be operated on a supply of 105-125 volts AC, 50 to 60 cycles only. Do not connect the radio to a wall outlet unless

certain that the power supply is correct for the receiver. If in doubt, telephone your local power company before inserting the plug. Radios of this model which are to be used on other power supplies are marked accordingly.

FM BAND

88 - 108 MEGACYCLES —

This band is calibrated in megacycles and covers the newly allocated frequency modulation band of 88-108 megacycles. Reception in this band is usually limited to "line of sight" distances between the transmitting and receiving antennas. This is normally up to about 30 miles with approximately 45 miles being the extreme range.



BROADCAST BAND

540 - 1600 KILOCYCLES — This band is calibrated in channel numbers. To obtain the kilocycle number add a zero to the number on the dial scale.

BAND AND PHONO RADIO SWITCH

This control has three positions, FM, Broadcast and Phono. In the Phono position, the electrical circuits are connected for the reproduction of records played on a record player. (See paragraph "Record Player Connection.")

TOPE CONTROL

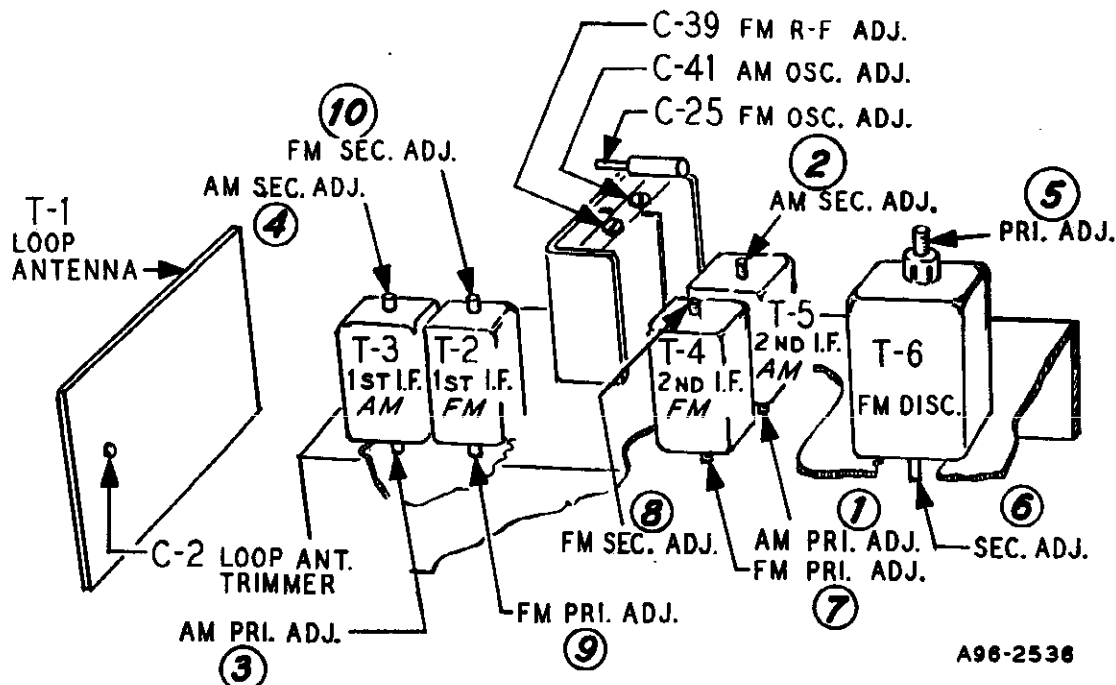
Use this knob to adjust the tone of the receiver. When turned clockwise the high notes will predominate and when turned counter-clockwise a deep bass effect will result.

ON-OFF SWITCH AND VOLUME CONTROL

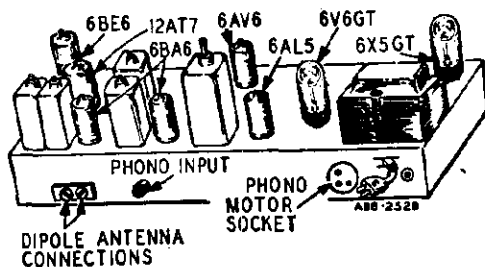
The On-Off switch and Volume control are operated by the same knob. To turn the radio on, turn the knob clockwise until a click is heard. Allow approximately 30 seconds for the tubes to heat. Then continue to turn the knob clockwise to increase the volume.

TUNING KNOB

Use this control to tune in the desired station. Turn the knob until the station is heard. Then slowly rotate it back and forth until the signal is clearest and strongest. If signal is too strong, reduce it by means of the volume control, not by using the tuning knob.

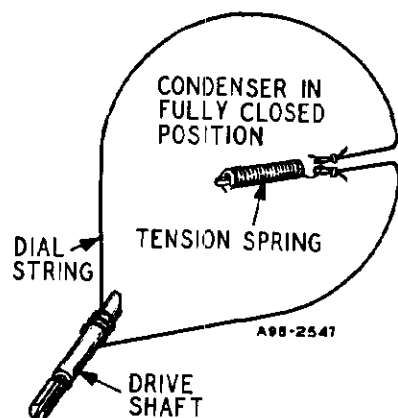


A96-2536



DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns counter-clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



ELECTRICAL SPECIFICATIONS

Power Output—
117 volts AC—40 watts

Power Output—
1.9 watts maximum
.8 watts 10% distortion

Speaker—5¼ inch PM dynamic

Frequency Ranges—
Broadcast 540-1600 KC
Frequency modulation 88-108 MC

Intermediate Frequency—
AM 455 KC — FM 10.7 MC

Selectivity — AM — 45 KC broad
at 1000 times signal, measured
at 1000 KC

I.F. FM—200 KC broad at 2 times
down

I.F. FM—950 KC broad at 200
times down

AM Sensitivity—(For .5 watt output
with external antenna)
50 microvolts average

FM Sensitivity—(For .5 watt output)
25 microvolts average

ALIGNMENT PROCEDURES AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately
Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas
— .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a
Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several
Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Clip	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

MODEL D2027A

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	Maximum Deflection

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect hank antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.

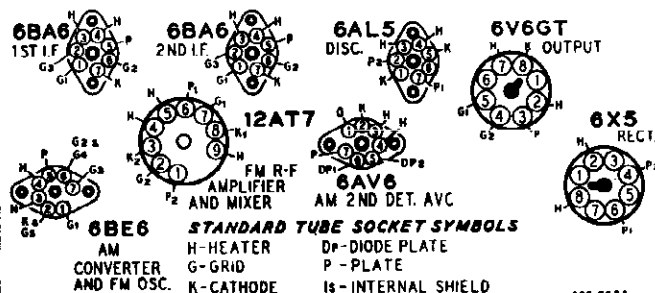
Note output voltage on the zero center DC vacuum tube voltmeter

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

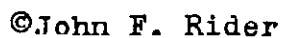
NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram at the tube socket terminals. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube voltmeter. Conditions of measurement are:

Line voltage117 Volts AC
Signal InputNone
A Variation of $\pm 10\%$ is usually permissible.



MODEL D2027A

REPLACEMENT PARTS LIST

NOTICE: There is a model number label on the chassis. This label identifies the radio as to chassis, dial and issue letter. When ordering parts or writing, give ALL information on this label.

MISCELLANEOUS

12A494	5 1/4" P.M. Speaker
4X1055	Escutcheon
10A734	Knob
13X546	Line Cord & Plug Assembly
2A393	Band Change Switch
3A303	Molded Octal Tube Socket
3A305	Phono Socket
3A426	Tube Socket (Miniature)
3A443	Tube Socket (6BE6)
14X466	Speaker Baffle
14X467	Grille Cloth
20X1551	Stud (Mtg. Speaker to Baffle)
3A304	Phono Motor Socket
3A427	Tube Socket (12A77)
	Mahogany Cabinet No. 906

CAPACITORS

C-1	14A211	Gang Condenser Assembly
C-2	17A256	2-24 mmf Trimmer
C-3	47X559	130 mmf Ceramic
C-4		
C-5		
C-9		
C-10		
C-11	47X507	5000 mmf Ceramic
C-17		
C-27		
C-43		
C-6 }		Part of T-2 (1st I-F Trans. FM)
C-7 }		
C-8		Part of T-3 (1st I-F Trans. AM)
C-12 }		
C-13 }		Part of T-5 (2nd I-F Trans. AM)
C-14 }		
C-15 }		Part of T-4 (2nd I-F Trans. FM)
C-16A }		
C-16B }	47X112	50-50 mmf Dual Mica
C-18		Part of T-6 (Discriminator Trans.)
C-19	47X492	2700 mmf Molded Mica
C-20 }		
C-35 }	47X468	220 mmf Ceramic
C-21	45X361	5 mf 100 V Dry Electrolytic
C-22 }		
C-42 }	47X557	2.2 mmf Ceramic
C-23	47X558	30 mmf Ceramic
C-24	47X516	20 mmf Ceramic
C-25	17A255	1-8 mmf Trimmer
C-26	B66503	.05 mf 200 V Tubular
C-28A }		
C-28B }	45X360	20 mf 20 V Dry Electrolytic
C-28C }		40 mf 150 V
		40 mf 200 V
C-29	H66102	.001 mf 800 V Tubular
C-30	47X470	330 mmf Molded Mica
C-31	47X508	500 mmf Ceramic
C-32A }		
C-32B }	76X4	100 mmf Dual Ceramic
C-33	B66403	.04 mf 200 V Tubular
C-34	D66502	.005 mf 400 V Tubular
C-36	B66402	.004 mf 200 V Tubular
C-37	D66104	.1 mf 400 V Tubular
C-38	D66203	.02 mf 400 V Tubular
C-39 }		
C-41 }		Part of C-1 (Gang Condenser)
C-40	47X471	68 mmf Ceramic

RESISTORS

		Ohms	Watts	
R-1	B85470	47	0.5	Carbon
R-2 }				
R-3 }	B85102	1000	0.5	Carbon
R-6 }				
R-4 }	B84680	68	0.5	Carbon
R-8 }				
R-5 }	B84682	6800	0.5	Carbon
R-12 }				
R-13 }				
R-7 }	B85473	47 K	0.5	Carbon
R-25 }				
R-9	B85222	2200	0.5	Carbon
R-10	B85273	27 K	0.5	Carbon
R-11	43X233	3.6	0.5	Wirewound
R-14 }				
R-16 }	B85104	100 K	0.5	Carbon
R-15	B85223	22 K	0.5	Carbon
R-17	B84221	220	0.5	Carbon
R-18 }				
R-19 }				
R-24 }	B85474	470 K	0.5	Carbon
R-26 }				
R-20	B85153	15 K	0.5	Carbon
R-21	36X372	.5 meg.		Volume Control
R-23	40X285	3 meg.		Tone Control ..
R-27	B85106	10 meg.	0.5	Carbon
R-28	D84821	820	2.0	Carbon
R-29	B85105	1 meg.	0.5	Carbon
R-30	B84271	270	0.5	Carbon
R-31	B85225	2.2 meg.	0.5	Carbon

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke
L-2	9A2068	Parasitic Choke
L-3	35A9	Insulated Choke
L-4	35A8	Insulated Choke
T-1	9A2097	"B" Range Loop Antenna
T-2	9A2060	1st I-F Trans. (FM)
T-3	9A2062	1st I-F Trans. (AM)
T-4	9A2061	2nd I-F Trans. (FM)
T-5	9A2063	2nd I-F Trans. (AM)
T-6	9A2064	Discriminator Transformer
T-7	9A2065	Oscillator Coil (AM)
T-8	9A2067	Oscillator Coil (FM)
T-9	51X144	Output Transformer
T-11	53X291	Power Transformer
T-12	9A2066	Antenna Coil (FM)

DIAL AND DRIVE ASSEMBLY

58X731	Dial Glass
15X256	Pointer
19X192	"C" Washer (Mtg. Drive Shaft)
6X66	Rubber Grommet
25X1679	Dial Bracket
28X113	Drive Cord Tension Spring
7A103	No. 47 Pilot Light
7A225	Pilot Light Socket Assembly
10X60	Drive Cord Assembly
26X486	Drive Shaft

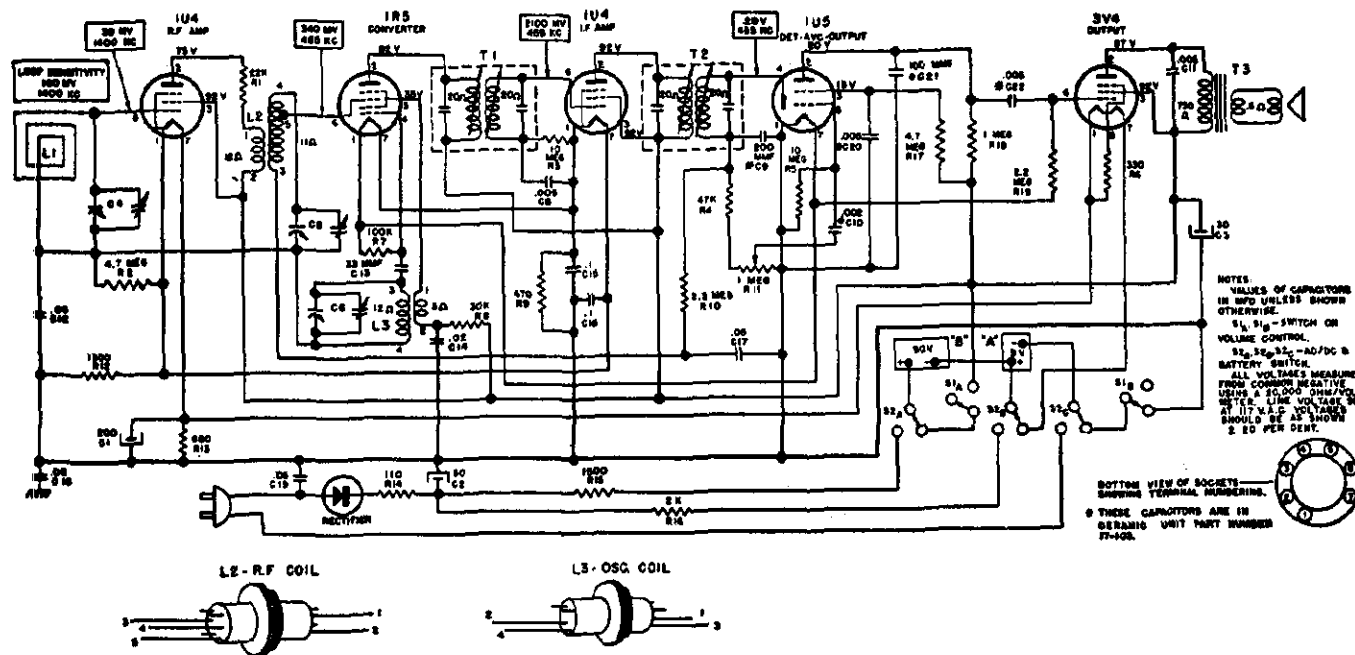


Fig. 1. Schematic diagram

SPECIFICATIONS

Power Supply
105, 125 volt AC-DC Battery

Battery
Combination AB pack
9 volt "A", 90 volt "B"
Wizard B6460

Tuning Range
540 to 1610 KC

I.F. Frequency
455 KC

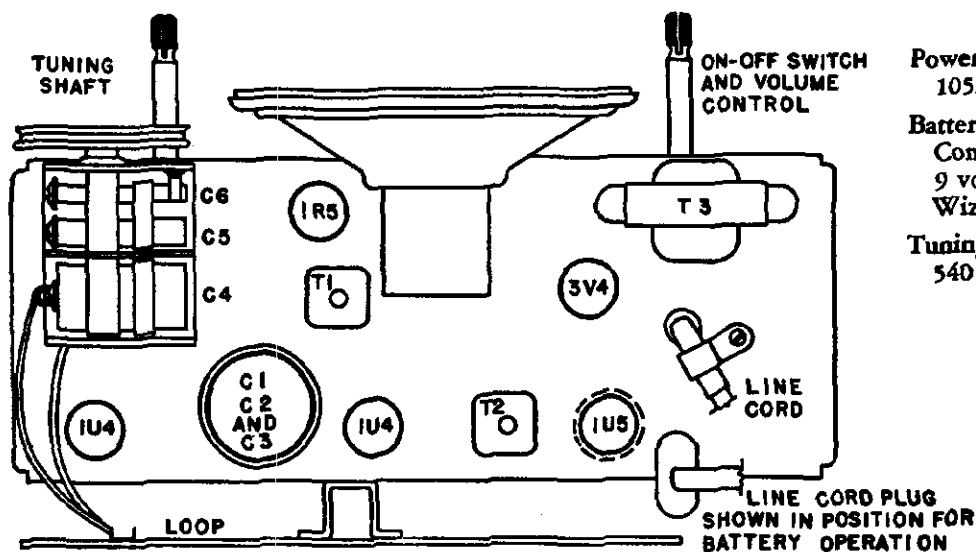
Loud Speaker
5 inch P.M.

Voice Coil Impedance
3.2 ohms at 400 cycles

Power Output
Maximum 300 milliwatts

Tube Complement

1U4—R.F. Amplifier
1R5—Oscillator Conv.
1U4—I.F. Amplifier
1U5—AVC, Detector, 1st Audio
3V4—Power Output



ALIGNMENT PROCEDURE

ALIGNING INSTRUCTIONS

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given below in the order listed. After realignment has been completed repeat the procedure as a final check. For alignment points refer to Figure No. 2.

Volume control—Maximum: all adjustments.

Connect ground lead of signal generator to common "B." negative.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil of speaker.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, 30% modulated, 400 c.p.s.

Output meter.

Non-metallic screwdriver.

Dummy antenna—.1 mfd.

CAUTION: This is an AC-DC receiver and if alignment is made with the receiver connected to 117 volts AC or DC, it is necessary to isolate the signal generator or the receiver from the line by use of a transformer, or place a .2 M.F.D. condenser in both test leads of the Signal Generator.

Position of Tuner	Generator Freq.	Dummy Antenna	Generator Connection	Adjustments (in order shown)	Function
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1U4 I-F Amp.	T2 (top and bottom)	I.F.
Min. Cap.	455 kc	0.1 mfd.	Pin #6 of 1R5 Conv.	T1 (top and bottom)	I.F.
Min. Cap.	1610 kc	0.1 mfd.	Stator ant. tuner	C6	Osc.
1400 kc	1400 kc	0.1 mfd.	Stator ant. tuner	C5	R.F.
1400 kc	1400 kc		Loosely coupled to loop	C4	Loop

*Connect ground lead of signal generator to common "B" negative.

Circuit Diagram Reference	Part Number	Description
	69-186	Switch, AC/DC/Battery
	86-51	Washer, "C", tuning shaft
	86-80	Washer, compression, tuning shaft

CONDENSERS

C1, C2, C3	18-296	Capacitor, electrolytic	44-13
C4, C5, C6	19-208	Capacitor, variable (3 gang)	42-470
C8, C11	16-153	Capacitor, .005 mfd. 600 volt	31-161
C9, C10, C20, C21, C22	17-103	Capacitor, ceramic unit	67-556
C12, C17	16-152	Capacitor, .05 mfd. 200 volt	40-161
C13	15-186	Capacitor, 10 mmfd. mica	98-15
C14	16-150	Capacitor, .02 mfd. 400 volt	52-309
C15, C16	16-157	Capacitor, .1 mfd. 200 volt	
C18, C19	16-179	Capacitor, .05 mfd. 400 volt	

RESISTORS

R1	60-744	Resistor, 22,000 ohm, 1/2 watt, 10%
R2, R17	60-669	Resistor, 4.7 megohm, 1/2 watt
R3, R5	60-728	Resistor, 10 megohm, 1/2 watt
R4	60-730	Resistor, 47,000 ohm, 1/2 watt
R6	60-704	Resistor, 330 ohm, 1/2 watt, 10%
R7	60-727	Resistor, 100,000 ohm, 1/2 watt
R8	60-676	Resistor, 30,000 ohm, 1/2 watt
R9	60-770	Resistor, 470 ohm, 1/2 watt, 10%
R10, R19	60-726	Resistor, 2.2 megohm, 1/2 watt
R12, R15	60-729	Resistor, 1500 ohm, 1/2 watt, 10%
R13	60-708	Resistor, 680 ohm, 1/2 watt, 10%
R14	60-796	Resistor, 110 ohm, 3 watt, 10%
R16	60-757	Resistor, 2000 ohm, 10 watt, 5%
R18	60-668	Resistor, 1 megohm, 1/2 watt

COILS AND TRANSFORMERS

L1	82-66	Loop, antenna
L2	10-535	R.F. coil
L3	10-553	Oscillator coil
T1, T2	10-508	Transformer, 1st and 2nd I.F.
T3	80-228	Transformer, output

MISCELLANEOUS

R11, S1	84-391	Cable, assembly, battery
	83-421	Clip, I.F. transformer mounting
	24-186	Control, volume with switch
	23-151	Cord, power, AC/DC
	51-105	Cord, pointer travel, 29"
	47-108	Grommet, variable condenser
	76-13	Insulator, electrolytic
	84-435	Pointer rail assembly
	58-81	Pointer
	83-642	Rectifier, selenium
	75-69	Shaft, tuning
	68-39	Socket, miniature, wafer
	79-383	Speaker, 5" P.M.
	70-122	Spring, dial cord

CABINET

Baffle
Cabinet
Dial plate
Dial scale
Escutcheon
Grille cloth
Knob

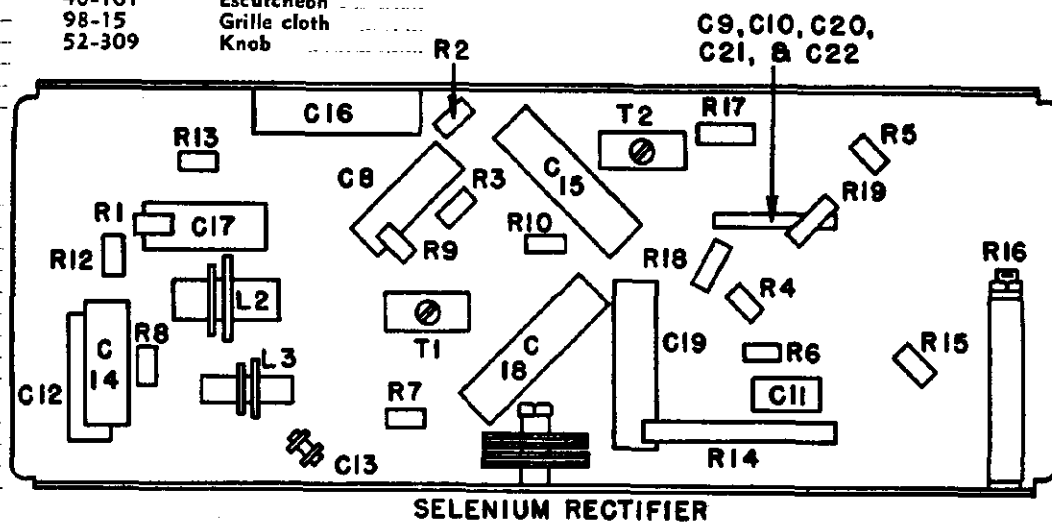


Fig. 3. Chassis—bottom view

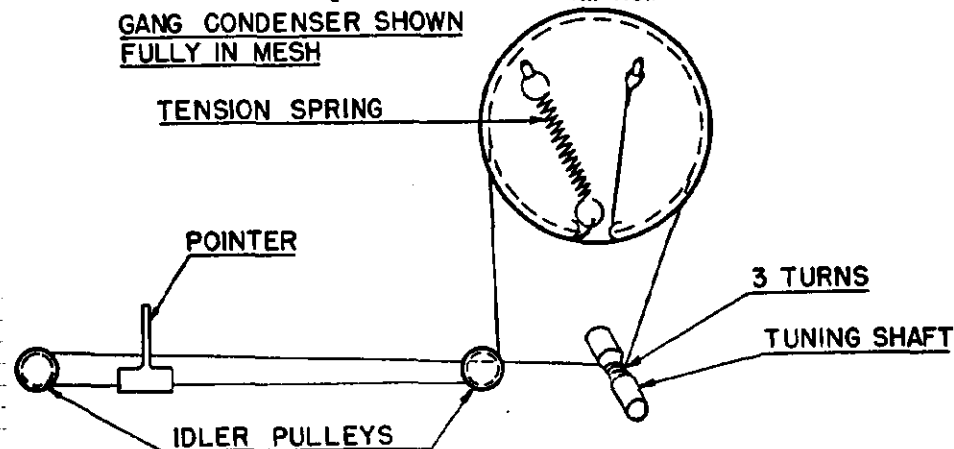


Fig. 4. Stringing diagram

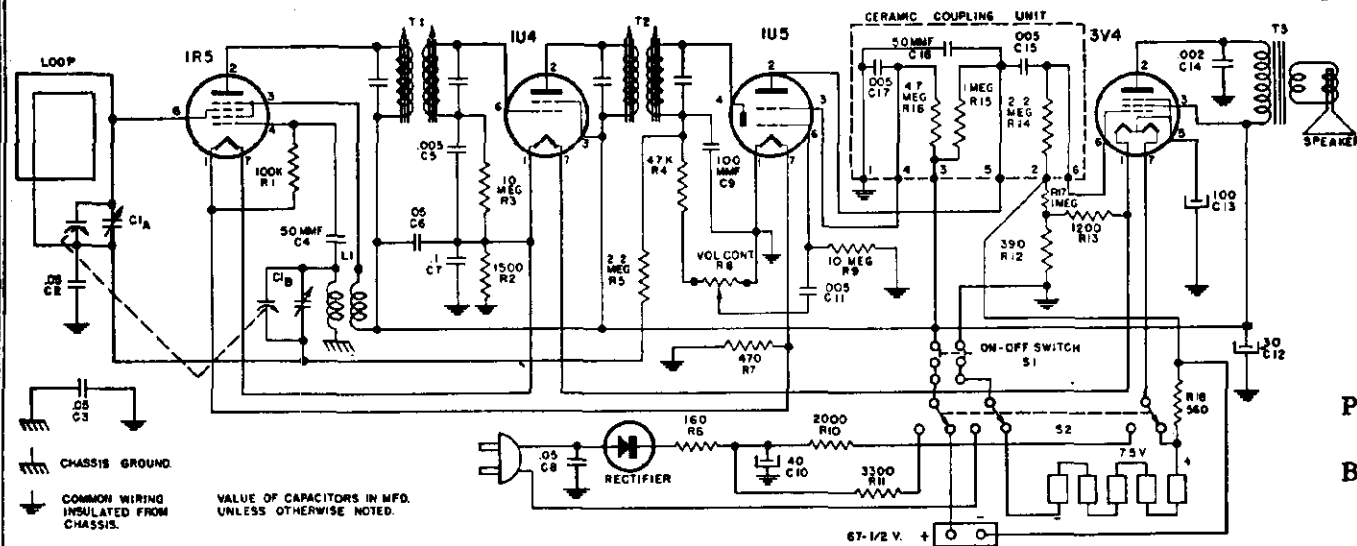


Fig. 1 Schematic Diagram

SPECIFICATIONS

Power Supply
105, 125 volt AC-DC or Batteries

Batteries
Five 1½ volt "A" Wizard B6722,
B6732, B6740 or B6745
One 67½ volt "B" Wizard B6258

Tuning Range
545 to 1610 KC

I.F. Frequency
455 KC

Loud Speaker
4 inch P.M.

Voice Coil Impedance
3.2 ohms at 400 cycles
Power Output
Maximum 100 milliwatts

Tube Complement
1R5—Oscillator Conv.
1U4—I.F. Amplifier
1U5—AVC, Detector, 1st Audio
3V4—Power Output

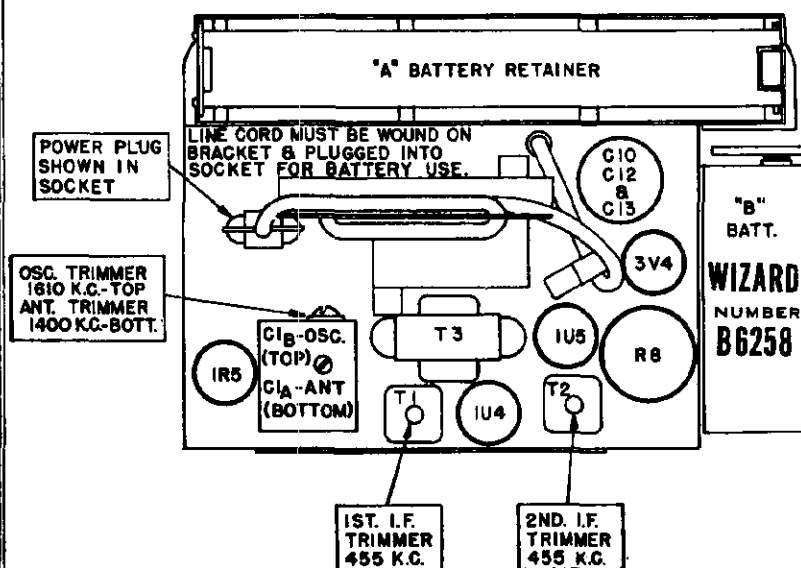


Fig. 2. Tube, Trimmer and Battery Locations

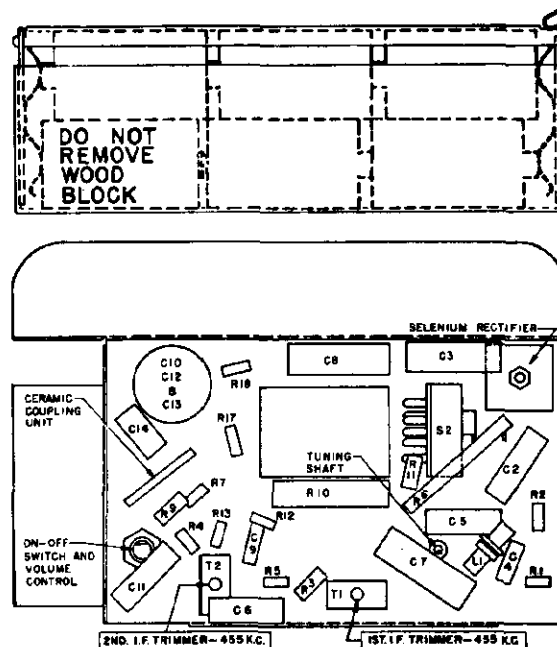


Fig 3

All voltages are measured from tube pin to common "B" negative with a 20,000 ohm per volt voltmeter.

Voltages shown in circles are obtained when set is operated on 117 volt current.

Voltages shown outside the circles are obtained when the set is operated on batteries. New batteries in good condition should be used for these measurements.

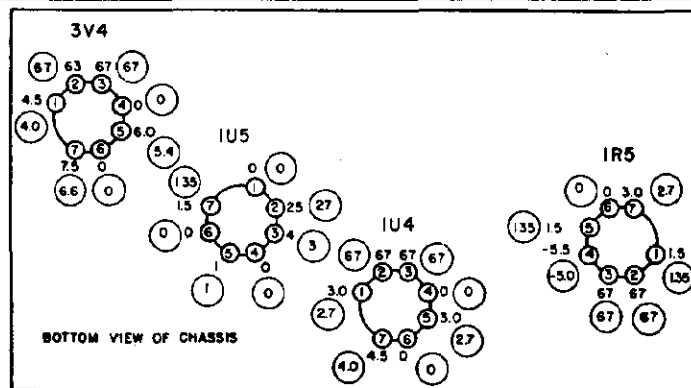


Fig 4 Voltage Chart

Circuit Diagram Reference

C1A, C1B
C2, C6
C3
C4
C5
C7
C8
C9
C10
C12
C13
C11
C14
C15, C17
C16

Part No.

Description

CONDENSERS

B19-206	Variable condenser
A16-204	.05 MFD 200 volt condenser
A16-172	.05 MFD 400 volt condenser
A15-175	50 MMF mica condenser
A16-205	.005 MFD 600 volt condenser
A16-203	.1 MFD 200 volt condenser
A16-189	.05 MFD 400 volt condenser
A15-188	100 MMF mica condenser
A18-290	40 MFD 150 volt electrolytic condenser
	30 MFD 150 volt electrolytic condenser
	100 MFD 10 volt electrolytic condenser
A16-153	.005 MFD 600 volt condenser
A16-182	.002 MFD 200 volt condenser
A17-100	.005 MFD
	50 MMF

See note below.

RESISTORS

R1	A60-727	100K ohm 1/2 watt 20% resistor
R2	A60-729	1500K ohm 1/2 watt 10% resistor
R3, R9	A60-728	10 megohm 1/2 watt 20% resistor
R4	A60-730	47K ohm 1/2 watt 20% resistor
R5	A60-726	2.2 megohm 1/2 watt 20% resistor
R6	A60-725	160 ohm 5 watt 10% resistor
R7	A60-722	470 ohm 1/2 watt 10% resistor
R8, S1	A24-178	Volume control, with switch
R10	A60-757	2000 ohm 10 watt 10% resistor
R11	A60-724	3300 ohm 1 watt 10% resistor
R12	A60-665	390 ohm 1/2 watt 10% resistor
R13	A60-756	1200 ohm 1/2 watt 10% resistor
A17-100	2.2 megohm	See note below.
	1 megohm	
	4.7 megohm	
R17	A60-668	1 megohm 1/2 watt 20% resistor
R18	A60-758	560 ohm 1/2 watt 10% resistor

L1
T1, T2
T3

A10-514
A10-475
B80-245

S2

A69-182
S84-333
S84-334
B21-144
A83-421
B71-40
A53-1
S84-243
C52-268
C52-269
S84-338
A83-642
A68-39
B79-364
A76-49

COILS

Oscillator coil
1st and 2nd I.F. transformer
Output transformer

MISCELLANEOUS

Switch, AC-DC-BATTERY
Cabinet assembly
Cover, cabinet back
Cap for handle
Clip, I.F. transformer mounting
Cover, "A" battery retainer
Handle
Hub and pointer assembly
Knob, tuning
Knob, volume
Loop antenna
Rectifier, Selenium
Socket, tube
Speaker, 4" P.M.
Terminal, for "B" battery

NOTE: C15, C16, C17, R14, R15 and R16 are contained in the Ceramic Coupling Unit, Part No. A17-100.

ALIGNMENT PROCEDURE

ALIGNING INSTRUCTIONS

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

If realignment is necessary follow the instructions given below in the order listed. After realignment has been completed repeat the procedure as a final check. For alignment points refer to Figure No. 2.

Volume control—Maximum: all adjustments.

Connect ground lead of signal generator to common "B." negative.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil of speaker.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, 30% modulated, 400 c.p.s.

Output meter.

Non-metallic screwdriver.

Dummy antennas— .1 mfd., .00025 mfd.

CAUTION: This is an AC-DC receiver and if alignment is made with the receiver connected to 117 volts AC or DC, it is necessary to isolate the signal generator or the receiver from the line by use of a transformer, or place a .2 M.F.D. condenser in both test leads of the Signal Generator.

Position of Variable	Generator Frequency	Dummy Ant. Mfd.	Generator Connections	Trimmer Adjustment	Trimmer Function
Fully open	455 KC	.1	*1R5 Grid (Stator of C1A)	T2	Output I.F.
Fully open	455 KC	.1	*1R5 Grid (Stator of C1A)	T1	Input I.F.
Fully open	1610 KC	.00025	*1R5 Grid (Stator of C1A)	C1B	Oscillator
Tune in signal from generator	1400 KC	—	Loosely coupled to loop	C1A	Antenna

*Connect ground lead of signal generator to common "B" negative.

INSTALLATION

This radio comes to you complete with all hardware necessary for mounting, and also with a distributor suppressor, ammeter condenser and generator condenser. By referring to Figures 1 and 2, and following the instructions outlined below, you will find that it is very simple to install.

First determine where the receiver is to be mounted by holding it with the hands in the approximate location in the car. Using the front mounting bracket as a template, mark and drill two $\frac{3}{8}$ " holes in the instrument panel flange. Now secure the mounting bracket to the radio receiver with the screws provided, and then mount the front of the radio to the instrument panel, using the bolts, lock washers and nuts provided for this purpose. The back of the radio is supported by means of the rear mounting strap. The mounting strap should be formed to the correct angles, as illustrated in Figure 2, so that it can then be fastened to the fire wall. After marking and center-punching the fire wall at the correct location, drill with a $\frac{3}{8}$ " drill. The mounting strap is then secured to the radio and fastened to the fire wall of the car with the $\frac{1}{4}$ " bolt, lock washer and nut furnished with the receiver.

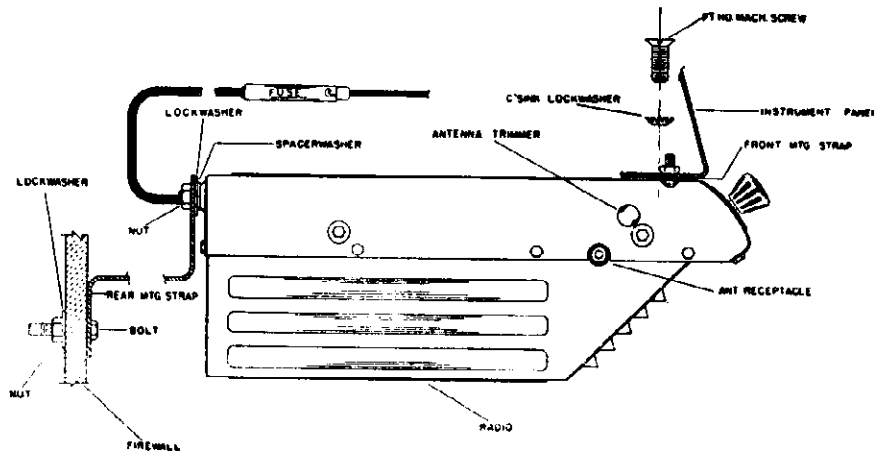


Fig. 2 Side View, Showing Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the jack into the socket provided on the side of the radio. Connect the battery cable to the hot side of the ammeter behind the instrument panel. The fuse should then be inserted into the cable receptor.

FINAL ADJUSTMENTS

The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type. Truetone Antennas are especially recommended for use with this radio.

To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 600 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 2) and adjust the trimmer for maximum volume. A small screw driver will be needed for this purpose.

DIAL POINTER ADJUSTMENT

If it should become necessary to readjust the dial pointer for correct calibration, this may be easily done without removing the radio from the car by proceeding as follows:

- Turn tuning knob to the right (clockwise) as far as it will go.
- Remove snap button located on the right side of the case (viewed from the front), in the extreme upper front corner.
- Insert screwdriver through hole in case and move dial pointer directly over white dot at high end of dial (1600KC).
- Tune receiver to station of known frequency in the center of the dial and readjust pointer for more accurate indication, if necessary.
- Replace snap button into hole in case.

CAUTION: Be careful not to scratch or damage dial scale or dial pointer when making this adjustment.

ACCESSORIES FURNISHED FOR INSTALLATION

All of the necessary parts that are needed for installing this receiver are furnished in the Mounting Parts Kit No. S84-192 and the Suppression Kit Assembly Part No. S84-230, as listed below. Also supplied are the rear mounting strap, Part No. B31-134, and the front mounting plate, Part No. B31-133.

S84-192 MOUNTING PARTS KIT

- | | |
|----------------------------------|-------------------------------|
| 1 $\frac{1}{4}$ " Bolt | 2 External Tooth Lock Washers |
| 2 $\frac{1}{4}$ " Lock Washers | 2 Internal Tooth Lock Washers |
| 2 $\frac{1}{4}$ " Hexagon Nuts | 2 10-32 Hexagon Nuts |
| 2 10-32 x $\frac{5}{8}$ " Screws | 1 Washer-Spacer |
| 2 10-32 x $\frac{3}{8}$ " Screws | |

S84-230 SUPPRESSION KIT & MISC. PARTS

- | | |
|----------------------------|--|
| 1 S84-233 "A" lead assem. | 1 S84-193 Suppression Kit consisting of: |
| 1 A43-10 Fuse | 2 .5 MFD Condensers |
| 2 A52-256 Control knobs | 1 Distributor Suppressor |
| 1 A81-13 Sleeve (for fuse) | 20" Wire Braid |

MODEL D4818A

ELIMINATING MOTOR NOISE

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all three mounting points. A good electrical contact at these points will aid materially in eliminating motor noise.

GENERATOR CONDENSER

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Remove the coil to distributor high tension lead from the distributor. Cut the lead two inches from the end, and screw the distributor resistor on to the coil lead, then screw the short length into the resistor and plug the cable into the distributor cap.

AMMETER CONDENSER

A .5 MFD bypass condenser is furnished for attaching to the ammeter. This should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby. In most cases the use of this condenser, the distributor suppressor, and the generator condenser, will eliminate all objectionable ignition interference.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to try another by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

HIGH AND LOW TENSION LEADS

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These leads will very often pick up motor noise and feed it into the

receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension leads. Shield and ground these leads.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead from the coil to the distributor.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

BONDING OF FIRE WALL TUBES

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

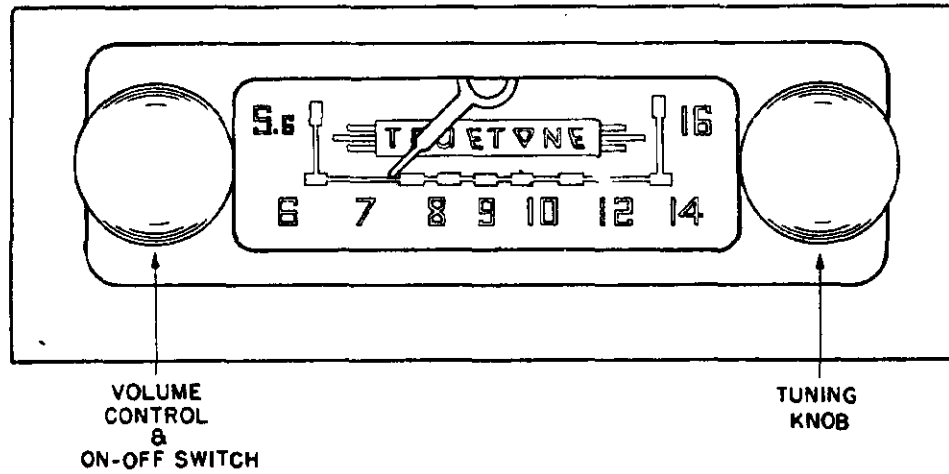


Fig. 1 Front View

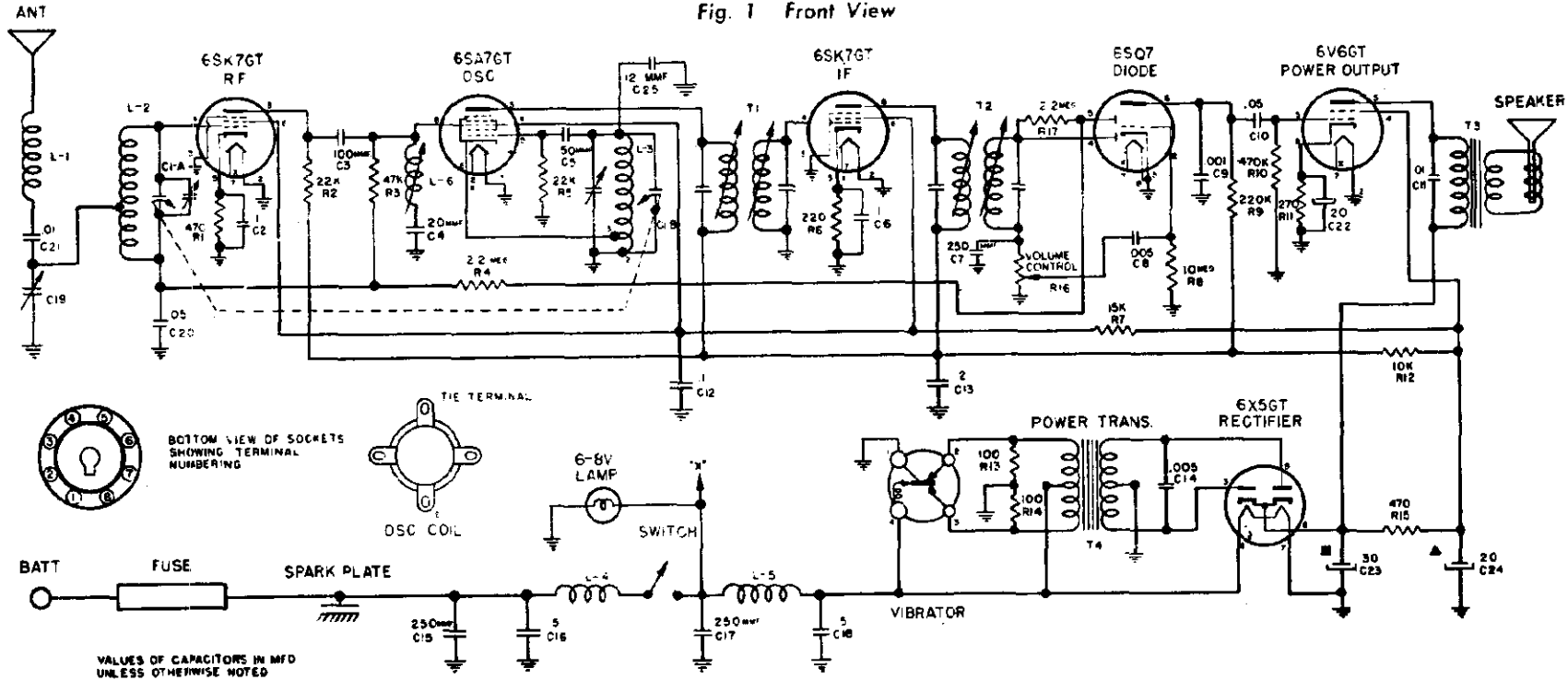


Fig. 3 Schematic Diagram

ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed.

Non-metallic screwdriver.

Output meter.

Dummy antennas—.1 MFD., .00025 MFD.

For alignment points refer to Figures 4 and 5.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T2	Maximum	Output I.F.
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T1	Maximum	Input I.F.
Fully Open	455 KC	.00025 MFD.	Ant. lead	L6	Minimum	Wave trap
Fully Open	1600 KC	.00025 MFD.	Ant. lead	C1B	Maximum	Oscillator
Tune in signal from generator	1400 KC	.00025 MFD.	Ant. lead	C1A	Maximum	Antenna

NOTE: The antenna padder condenser, C19, (see Fig. 2) should be adjusted after the radio is installed in the car. Tune the receiver to a weak station at about 600 KC and adjust this trimmer for maximum volume.

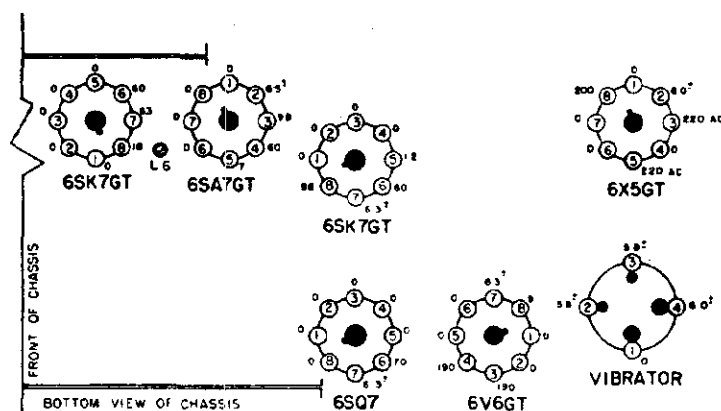


Fig. 4 Socket Voltages

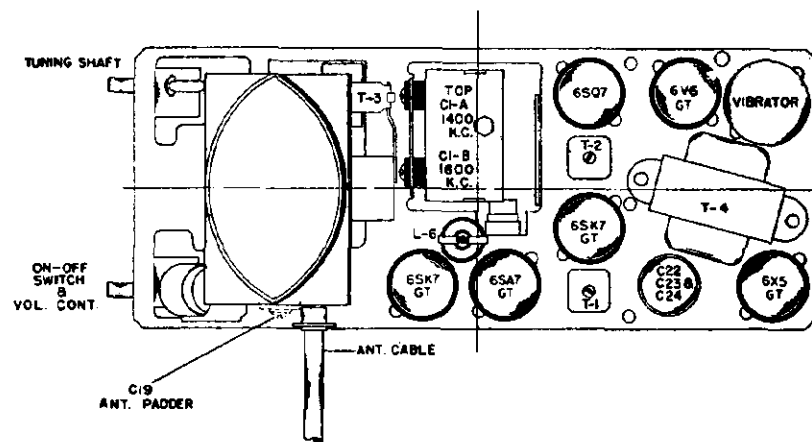


Fig. 5 Tube and Trimmer Locations

MODEL D4818A

C1A, C1B
C2, C6, C12
C3
C4
C5
C7, C15, C17
C8
C9
C10
C11, C21
C13
C14
C16, C18
C19
C20
C22
C23
C24
C25

B19-196
A16-187
A15-196
A15-202
A15-204
A15-176
A16-190
A16-195
A16-193
A16-192
A16-188
A16-185
A16-184
A20-145
A16-189
A18-289
A15-205

R1
R13, R14
R2, R5
R3
R4, R17
R6
R7
R8
R9
R10
R11
R12
R15
R16

A60-722
A60-752
A60-744
A60-685
A60-726
A60-753
A60-716
A60-728
A60-667
A60-731
A60-754
A60-698
A60-694
A24-177

L1
L2
L3
L4
L5
L6
T1
T2

A10-513
B10-511
A10-512
A33-229
A33-228
A10-510
A10-508
A10-509

T3
T4

B80-242
B80-243

A11-303
B11-328
A72-29
A70-130
A48-43
A58-55
B67-516
A28-101
A52-256
A11-329
A89-10
A65-37
A65-41
A65-12
A75-70
A75-67
A70-132
A70-133
A70-142

S84-233
A83-421
A83-517
A43-10
A47-112
B31-134
B31-133
S84-192
A87-38
B79-362
S84-193
A34-105
A83-519

Variable Condenser
.1 MFD. 400 Volt Condenser
100 MMFD Ceramic Condenser
20 MMFD Ceramic Condenser
50 MMFD Ceramic Condenser
250 MMFD Mica Condenser
.005 MFD. 600 Volt Condenser
.001 MFD. Ceramic Condenser
.05 MFD. 600 Volt Condenser
.01 MFD. 400 Volt Condenser
.2 MFD. 400 Volt Condenser
.005 MFD. 1600 Volt Oil Filled Condenser
.5 MFD. 100 Volt Condenser
Trimmer Condenser
.05 MFD. 400 Volt Condenser
20 MFD 25 Volt Electrolytic Condenser
30 MFD 350 Volt Electrolytic Condenser
20 MFD. 350 Volt Electrolytic Condenser
12 MMFD ceramic condenser, temp. comp.

RESISTORS

470 Ohm 1/2 Watt 20% Resistor
100 Ohm 1/2 Watt 10% Resistor
22K Ohm 1/2 Watt 10% Resistor
47K Ohm 1/2 Watt 20% Resistor
2.2 Megohm 1/2 Watt 20% Resistor
220 Ohm 1/2 Watt 10% Resistor
15K Ohm 1 Watt 10% Resistor
10 Megohm 1/2 Watt 20% Resistor
220K Ohm 1/2 Watt 20% Resistor
470K Ohm 1/2 Watt 20% Resistor
270 Ohm 1 Watt 10% Resistor
10K Ohm 1 Watt 10% Resistor
470 Ohm 1 Watt 10% Resistor
Volume Control, 500,000 Ohms, with Switch

COILS

Antenna Loading Coil
Antenna Coil
Oscillator Coil
Choke, "A" Line
Choke, Vibrator Hash
I.F. Trap Coil
1st I.F. Transformer
2nd I.F. Transformer

TRANSFORMERS

Output Transformer (Part of Speaker, not furnished separately)
Power Transformer

DIAL PARTS

Bracket, Dial Scale
Bracket, String Guide
Bushing, Tuning Shaft Bearing
Clip, Spring, for Tuning Shaft
Dial Crystal
Dial Pointer
Dial Scale
Gasket for Speaker
Knob
Link, String Guide
Pilot Light, Type G. E. No. 422
Rivet, Shoulder, for Dial Pointer Stringing
Rivet, Shoulder, for String Guide Brkt. and Link
Rivet, Shoulder, for Dial Drive Stringing
Shaft, Tuning
Shaft, for Dial Pointer
Spring, for Pilot Light Socket
Spring, Dial Drive String Tension
Spring, Pointer Drive String Tension

MISCELLANEOUS

"A" Lead Assembly
Clip, I.F. Transformer Mounting
Clip, Oscillator Coil Mounting
Fuse, 15 Amp.
Grommet, Rubber (for Mounting Speaker and Variable Condenser)
Mounting Strap, Rear
Mounting Plate, Front
Mounting Parts Kit
Receptacle, Antenna Cable
Speaker, 4" P.M. (includes Output Transformer)
Suppression Kit Assembly
Vibrator
Wiper, Grounding, for Case Covers

INSTALLATION

This radio comes to you complete with all hardware necessary for mounting, and also with a distributor suppressor, ammeter condenser and generator condenser. By referring to Figures 1 and 2, and following the instructions outlined below, you will find that it is very simple to install.

First determine where the receiver is to be mounted by holding it with the hands in the approximate location in the car. Using the front mounting bracket as a template, mark and drill two $\frac{3}{8}$ " holes in the instrument panel flange. Now secure the mounting bracket to the radio receiver with the screws provided, and then mount the front of the radio to the instrument panel, using the bolts, lock washers and nuts provided for this purpose. The back of the radio is supported by means of the rear mounting strap. The mounting strap should be formed to the correct angles, as illustrated in Figure 2, so that it can then be fastened to the fire wall. After marking and center-punching the fire wall at the correct location, drill with a $\frac{3}{8}$ " drill. The mounting strap is then secured to the radio and fastened to the fire wall of the car with the $\frac{1}{4}$ " bolt, lock washer and nut furnished with the receiver.

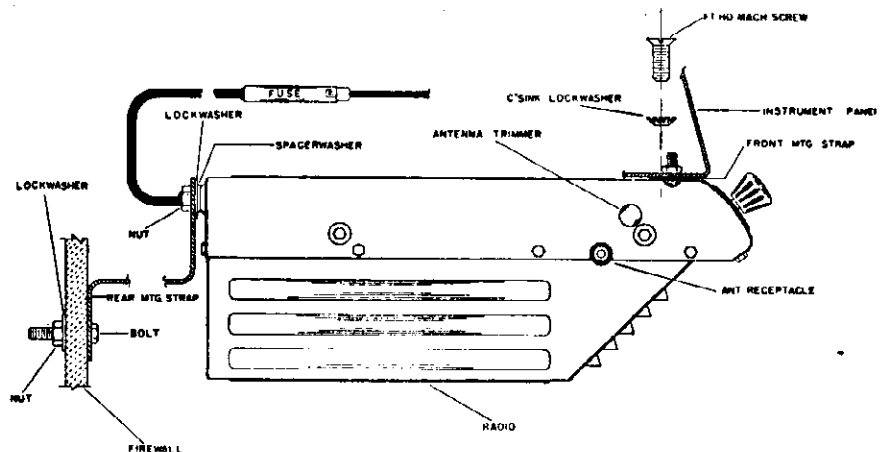


Fig. 2 Side View, Showing Mounting

CONNECTING THE RADIO

The antenna cable should be connected to the radio by inserting the jack into the socket provided on the side of the radio. Connect the battery cable to the hot side of the ammeter behind the instrument panel. The fuse should then be inserted into the cable receptor.

FINAL ADJUSTMENTS

The input circuit has been especially designed to be used with a low capacity antenna, of the fish pole or whip type. Truetone Antennas are especially recommended for use with this radio.

To adjust the antenna trimmer condenser, carefully tune the receiver to a weak station at approximately 1100 kilocycles (K.C.). Remove the snap button covering the antenna trimmer (See Figure 2) and adjust the trimmer for maximum volume. A small screw driver will be needed for this purpose.

DIAL POINTER ADJUSTMENT

If it should become necessary to readjust the dial pointer for correct calibration, this may be easily done without removing the radio from the car by proceeding as follows:

- Turn tuning knob to the right (clockwise) as far as it will go.
- Remove snap button located on the right side of the case (viewed from the front), in the extreme upper front corner.
- Insert screwdriver through hole in case and move dial pointer directly over white dot at high end of dial (1600KC).
- Tune receiver to station of known frequency in the center of the dial and readjust pointer for more accurate indication, if necessary.
- Replace snap button into hole in case.

CAUTION: Be careful not to scratch or damage dial scale or dial pointer when making this adjustment.

ACCESSORIES FURNISHED FOR INSTALLATION

All of the necessary parts that are needed for installing this receiver are furnished in the Mounting Parts Kit No. S84-192 and the Suppression Kit Assembly Part No. S84-230, as listed below. Also supplied are the rear mounting strap, Part No. B31-134, and the front mounting plate, Part No. B31-133.

S84-192 MOUNTING PARTS KIT

- | | |
|----------------------------------|-------------------------------|
| 1 $\frac{1}{4}$ " Bolt | 2 External Tooth Lock Washers |
| 2 $\frac{1}{4}$ " Lock Washers | 2 Internal Tooth Lock Washers |
| 2 $\frac{1}{4}$ " Hexagon Nuts | 2 10-32 Hexagon Nuts |
| 2 10-32 x $\frac{5}{8}$ " Screws | 1 Washer Spacer |
| 2 10-32 x $\frac{3}{8}$ " Screws | |

S84-230 SUPPRESSION KIT & MISC. PARTS

- | | |
|----------------------------|--|
| 1 S84-233 "A" lead assem. | 1 S84-193 Suppression Kit consisting of: |
| 1 A43-10 Fuse | 2 .5 MFD Condensers |
| 2 A52-256 Control knobs | 1 Distributor Suppressor |
| 1 A81-13 Sleeve (for fuse) | 20" Wire Braid |

MODEL D4818B

ELIMINATING MOTOR NOISE

IMPORTANT: Special care should be taken when mounting the radio to make sure all paint, grease, rust, etc., is removed from all three mounting points. A good electrical contact at these points will aid materially in eliminating motor noise.

GENERATOR CONDENSER

The generator condenser must be connected to the battery terminal of the generator in all cases. If your car is equipped with a generator using an automatic regulator, make sure the condenser IS NOT fastened to the field winding terminal. If in doubt, your local car dealer can advise you as to where the car manufacturer recommends connecting it.

DISTRIBUTOR SUPPRESSOR

Remove from distributor cap the high tension lead from the distributor. Cut the lead two inches from the end, and screw the distributor resistor on to the coil lead, then screw the short length into the resistor and plug the cable into the distributor cap.

AMMETER CONDENSER

A .5 MFD bypass condenser is furnished for attaching to the ammeter. This should be connected to either side of the ammeter with the ground lug fastened to a good ground nearby. In most cases the use of this condenser, the distributor suppressor, and the generator condenser, will eliminate all objectionable ignition interference.

ELECTRICAL ACCESSORIES

In some cases, it may be found that car accessories such as electric heaters, lighters, automatic relays, or gauges, may cause interference while in operation. Proper procedure in such cases is to try another by-pass condenser from ground to the suspected accessory until the source of the interference is found. The condenser then should be permanently mounted in this location.

HIGH AND LOW TENSION LEADS

In many cases the low tension battery leads, etc., are grouped together with the high tension wires. These leads will very often pick up motor noise and feed it into the

receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. This condition is particularly true on the V-8 Ford, as the battery and primary leads run through a special tube which also houses the high tension leads. Shield and ground these leads.

IGNITION COILS

In cars where the ignition coil is located on the back side of the instrument panel it is often necessary to use an additional condenser. It must be installed from the battery side of the ignition coil to the closest ground on the instrument panel.

Short leads are very important. Where coils are mounted either on the instrument panel or in the driver's compartment, it may be necessary to shield the high tension lead from the coil to the distributor.

WHEEL STATIC

Wheel Static is a form of interference caused by the rotation of the front wheels of the car, and it is, of course, only noticed when the car is in motion. If this form of interference is present it can be eliminated by installing wheel static collector springs between the inner hub cap and the spindle shaft.

BONDING OF FIRE WALL RODS AND TUBES

Bonding the steering column to the fire wall with a short braid may also be effective. Clean the paint from the steering column at the fire wall where the column enters the motor compartment, and solder on a short piece of braid. Ground the end of the braid to the fire wall.

In some cases it may be necessary to ground the tubes and rods coming through the fire wall in order to reduce the interference. Clean them with emery cloth and spot-solder the braid, fastening the end under a convenient screw. A 1/4" piece of wire braid 20 inches long is furnished in the suppression kit assembly for this purpose.

Power Supply.....	6.3 volts DC
Current	5.5 amp. average
Frequency Range.....	540 to 1600 KC
I. F. Frequency.....	455 KC
Speaker.....	4" P. M.
Power Output.....	1.2 watts, undistorted 2.5 watts, maximum
Sensitivity.....	10 microvolts average for 1 watt output
Selectivity.....	40 KC broad at 1000 times signal, at 1000 KC

Voltages taken from the different points of the circuit to the chassis are measured with volume control in maximum position, all tubes in their sockets, no signal applied, and with a volt meter having a resistance of 20,000 ohms per volt. These voltages are clearly shown on the voltage chart, (Fig. 4).

To check for open by-pass condensers, shunt each condenser with another one having the same capacity and voltage rating which is known to be good until the defective unit is located.

Never attempt any adjustments on this receiver unless it becomes necessary to replace a coil or transformer, or the adjustments have been tampered with in the field. Always make certain that other circuit components, such as tubes, condensers, resistors, etc., are normal before proceeding with realignment.

The tube compliment of this receiver is as follows:

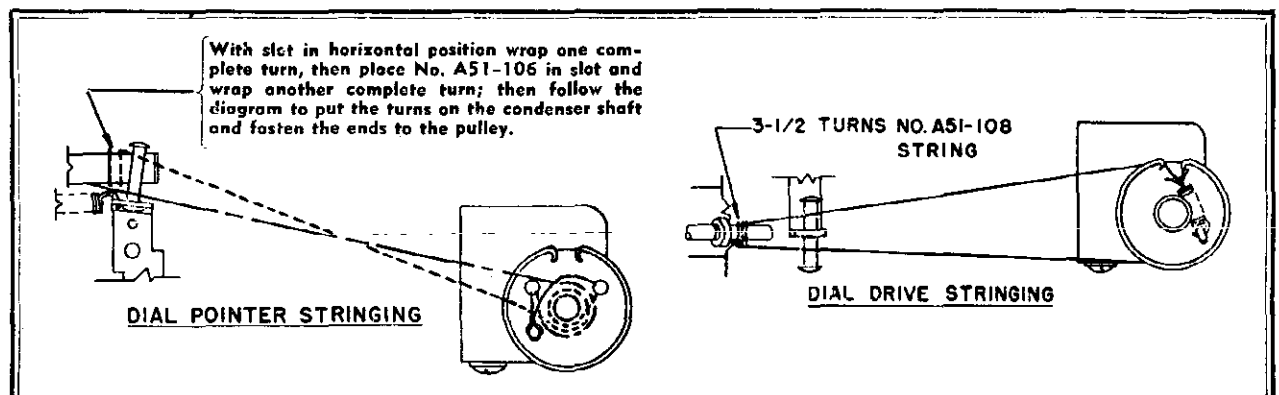
- 1—6SK7GT—R. F. Amplifier.
1—6SA7GT—Converter.
1—6SK7GT—I.F. Amplifier.
1—6SQ7—Detector—AVC—1st audio.
1—6V6GT—Power output.
1—6X5GT—Rectifier.

The bottom cover (the one with the speaker louvers) can be removed to permit servicing of major components, such as tubes and vibrator, by removing the eight (8) screws holding it to the top cover. There are three (3) screws on each side, one (1) in the rear, and one (1) in the front.

CAUTION: Before attempting to remove the top cover, to service condensers, resistors, etc., the screw connecting the spark plate to the "A" terminal (inside case) must be removed. This is a round head screw, and is located on the rear of the case, close to the mounting stud bolt. It is recessed in a 1/2 inch hole in the case itself, thereby permitting contact with the spark plate.

After removing the spark plate screw, remove the two knobs by pulling forward and remove the eight (8) screws securing the cover to the chassis. Lift the chassis at the rear, at the same time moving it away from the front of the case so that the volume and tuning shafts will clear the holes in the cover.

NOTE: When reinstalling the chassis into the case, be sure the screw connecting the spark plate to the "A" terminal (inside case) is tightened very securely, otherwise the receiver will not operate properly.



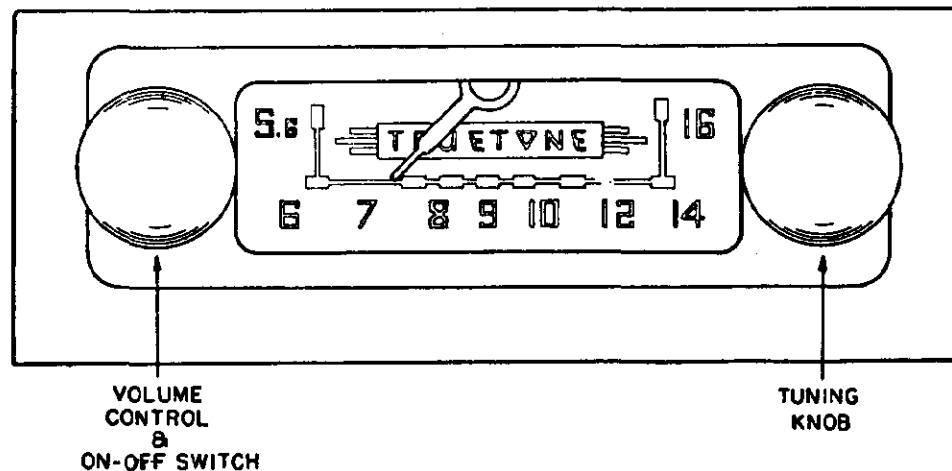
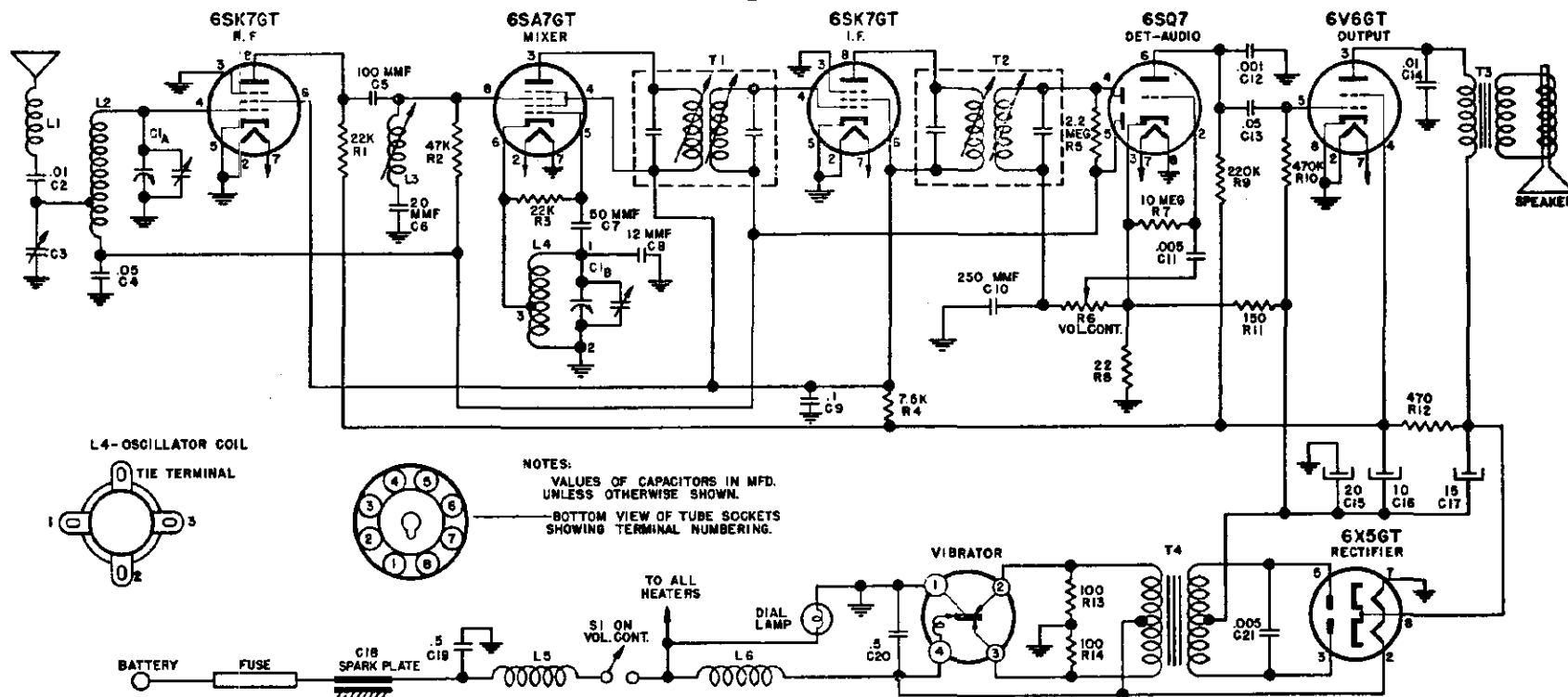


Fig. 1. Front View

Fig. 3 Schematic Diagram



ALIGNMENT PROCEDURE

Volume control—Maximum, all adjustments.

No signal applied to antenna.

Power input—6.3 volts.

Connect dummy antenna in series with output lead of signal generator.

Connect output meter across voice coil.

Connect ground lead of signal generator to chassis.

Repeat alignment procedure as a final check.

The following equipment is necessary for proper alignment:

Signal generator that will provide the test frequencies as listed, modulated 400 cycles, 30%.

Non-metallic screwdriver.

Output meter.

Dummy antennas—.1 MFD., 75 MMFD.

For alignment points refer to Figures 5 and 6.

Dial Setting	Generator Frequency	Dummy Ant.	Generator Connections	Trimmer Reference	Trimmer Adjustment	Trimmer Function
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T2	Maximum	Output I.F.
Fully Open	455 KC	.1 MFD.	6SA7 Grid	T1	Maximum	Input I.F.
Fully Open	455 KC	75 MMFD.	Ant. lead	L3	Minimum	Wave trap
Fully Open	1600 KC	75 MMFD.	Ant. lead	C1B	Maximum	Oscillator
Tune in signal from generator	1400 KC	75 MMFD.	Ant. lead	C19	Maximum	Antenna

NOTE: The antenna trimmer condenser, C3, (see Fig. 2) should be adjusted after the radio is installed in the car. Tune the receiver to a weak station at about 1100 KC and adjust this trimmer for maximum volume.

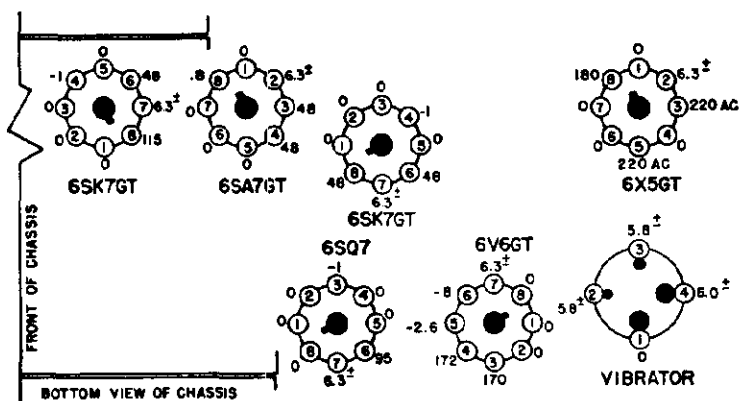


Fig. 4 **Socket Voltages**

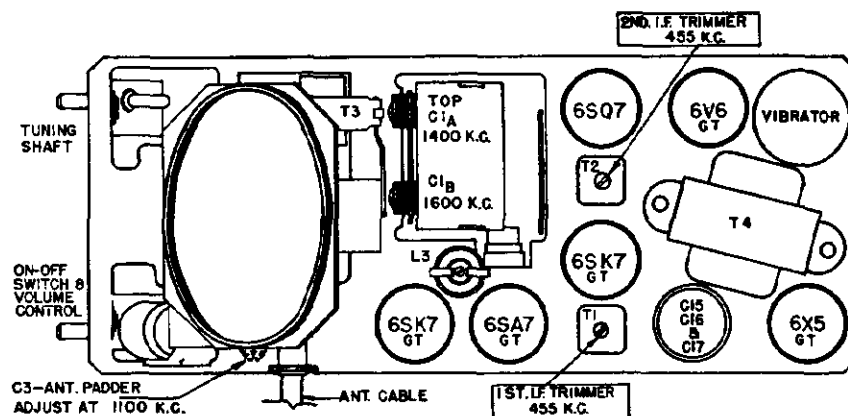


Fig. 5 Tube and Trimmer Locations

MODEL D4318B

C1A, C1B

C2, C14

C3

C4

C5

C6

C7

C8

C9

C10

C11

C12

C13

C15

C16

C17

C19, C20

C21

A19-201

A16-192

A20-145

A16-189

A15-196

A15-202

A15-204

A15-205

A16-187

A15-176

A16-190

A16-195

A16-193

A18-293

A16-184

A16-185

Variable condenser

.01 MFD 400 volt condenser

Trimmer condenser

.05 MFD 400 volt condenser

100 MMFD ceramic condenser

20 MMFD ceramic condenser

50 MMFD ceramic condenser

12 MMFD ceramic condenser, temp. comp.

.1 MFD 400 volt condenser

250 MMFD mica condenser

.005 MFD 600 volt condenser

.001 MFD ceramic condenser

.05 MFD 600 volt condenser

20 MFD 25 volt electrolytic condenser

10 MFD 350 volt electrolytic condenser

15 MFD 350 volt electrolytic condenser

.5 MFD 100 volt condenser

.005 MFD 1600 volt oil filled condenser

RESISTORS

R1, R3

R2

R4

R5

R6

R7

R8

R9

R10

R11

R12

R13, R14

A60-659

A60-685

A60-769

A60-726

A24-177

A60-728

A60-768

A60-667

A60-731

A60-767

A60-770

A60-752

22K ohm 1/2 watt 20% resistor

47K ohm 1/2 watt 20% resistor

7.5K ohm 2 watt 10% resistor

2.2 megohm 1/2 watt 20% resistor

Volume control, 500,000 ohm, with switch

10 megohm 1/2 watt 20% resistor

22 ohm 1/2 watt 10% resistor

220K ohm 1/2 watt 20% resistor

470K ohm 1/2 watt 20% resistor

150 ohm 1/2 watt 10% resistor

470 ohm 1/2 watt 10% resistor

100 ohm 1/2 watt 10% resistor

COILS AND TRANSFORMERS

L1

L2

L3

L4

L5

L6

T1

T2

T3

T4

A10-527

B10-511

A10-510

A10-512

A33-229

A33-228

A10-508

A10-509

B80-242

B80-243

Antenna Loading Coil

Antenna Coil

I.F. Trap Coil

Oscillator Coil

Choke, "A" Line

Choke, vibrator hash

1st I.F. Transformer

2nd I.F. Transformer

Output Transformer (Part of Speaker, not furnished separately)

Power transformer

DIAL PARTS

A11-303

B11-328

A72-29

A70-130

A48-43

A58-55

B67-516

A28-101

A52-256

A11-329

A89-10

A65-37

A65-41

A65-12

A75-70

A75-74

A70-132

A70-133

A70-142

A51-106

A51-108

Bracket, Dial Scale

Bracket, String Guide

Bushing, Tuning Shaft Bearing

Clip, Spring, for Tuning Shaft

Dial Crystal

Dial Pointer

Dial Scale

Gasket for Speaker

Knob

Link, String Guide

Pilot Light, Type G.E. No. 422

Rivet, Shoulder, for Dial Pointer Stringing

Rivet, Shoulder, for String Guide Brkt. and Link

Rivet, Shoulder, for Dial Drive Stringing

Shaft, tuning

Shaft, for Dial Pointer

Spring, for Pilot Light Socket

Spring, Dial Drive String Tension

Spring, Pointer Drive String Tension

String, Pointer Travel, 17"

String, Condenser Drive, 19"

MISCELLANEOUS

"A" lead assembly

Clip, I.F. Transformer Mounting

Clip, Oscillator Coil Mounting

Fuse, 15 Amp.

Grommet, rubber, (Spkr. & Gang mounting)

Mounting strap, rear

Mounting Plate, Front

Mounting parts kit

Receptacle, Antenna Cable

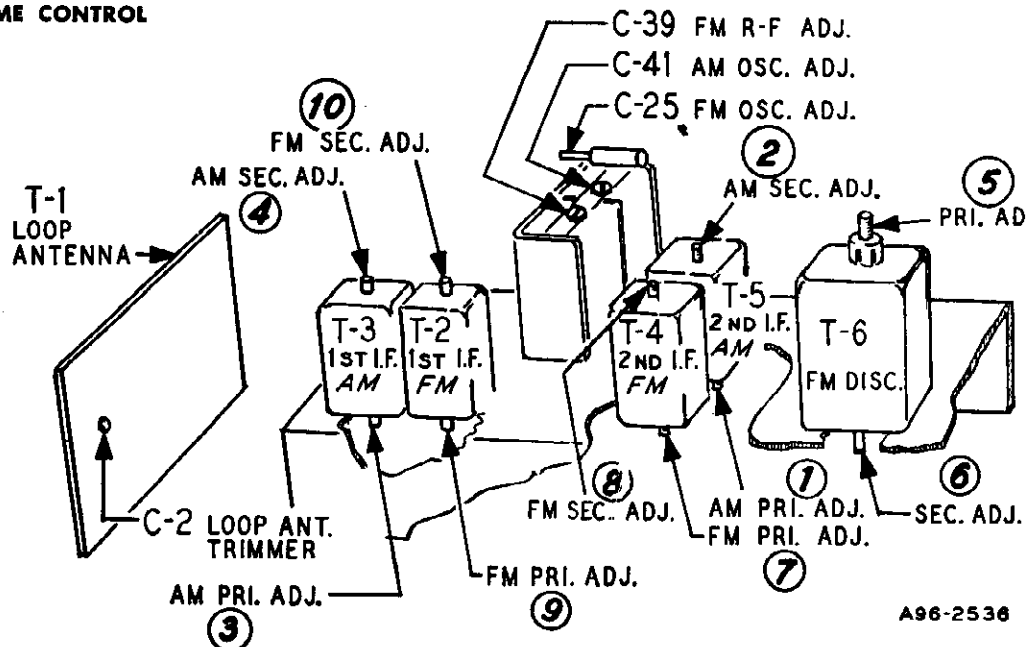
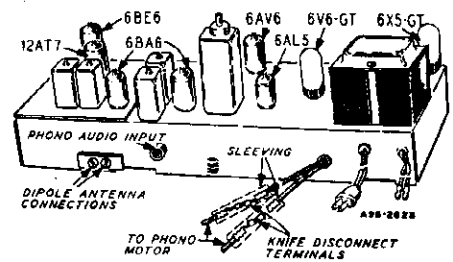
Speaker, 4" P.M. (includes Output Transformer)

Suppression Kit Assembly

Vibrator

Wiper, grounding, for case covers

Note: Tubular condensers must be high temperature (85°C) wax type.



A schematic diagram of the dial mechanism in its fully closed position. The diagram shows a triangular frame with vertices labeled A, B, and C. At vertex A, there is a 'DIAL BRACKET' which holds a 'DIAL STRING'. At vertex B, there is a 'POINTER CLAMP'. At vertex C, there is a 'DRIVE SHAFT' which is connected to a 'TENSION SPRING'. The 'DIAL STRING' is shown as a line connecting the dial bracket to the drive shaft. A circular inset provides a magnified view of the 'TENSION SPRING' mechanism, showing it as a coiled spring with a central rod. Below the drive shaft, the text 'GANG CONDENSER IN FULLY CLOSED POSITION.' is written. The part number 'A80-2316' is printed at the bottom center of the diagram.

FM Sensitivity—(For .5 watt output)
25 microvolts average

MODEL D1034B

ALIGNMENT PROCEDURES**AM STAGES**

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Terminal	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR				BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA				
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN**FM ALIGNMENT NOTES**

NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.

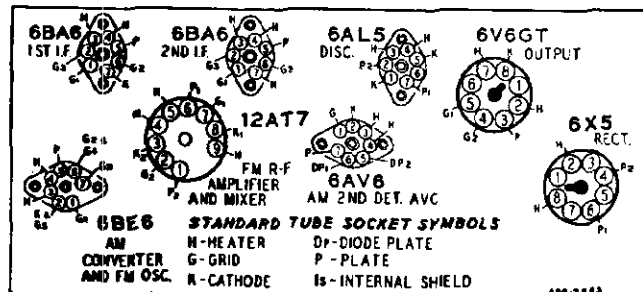
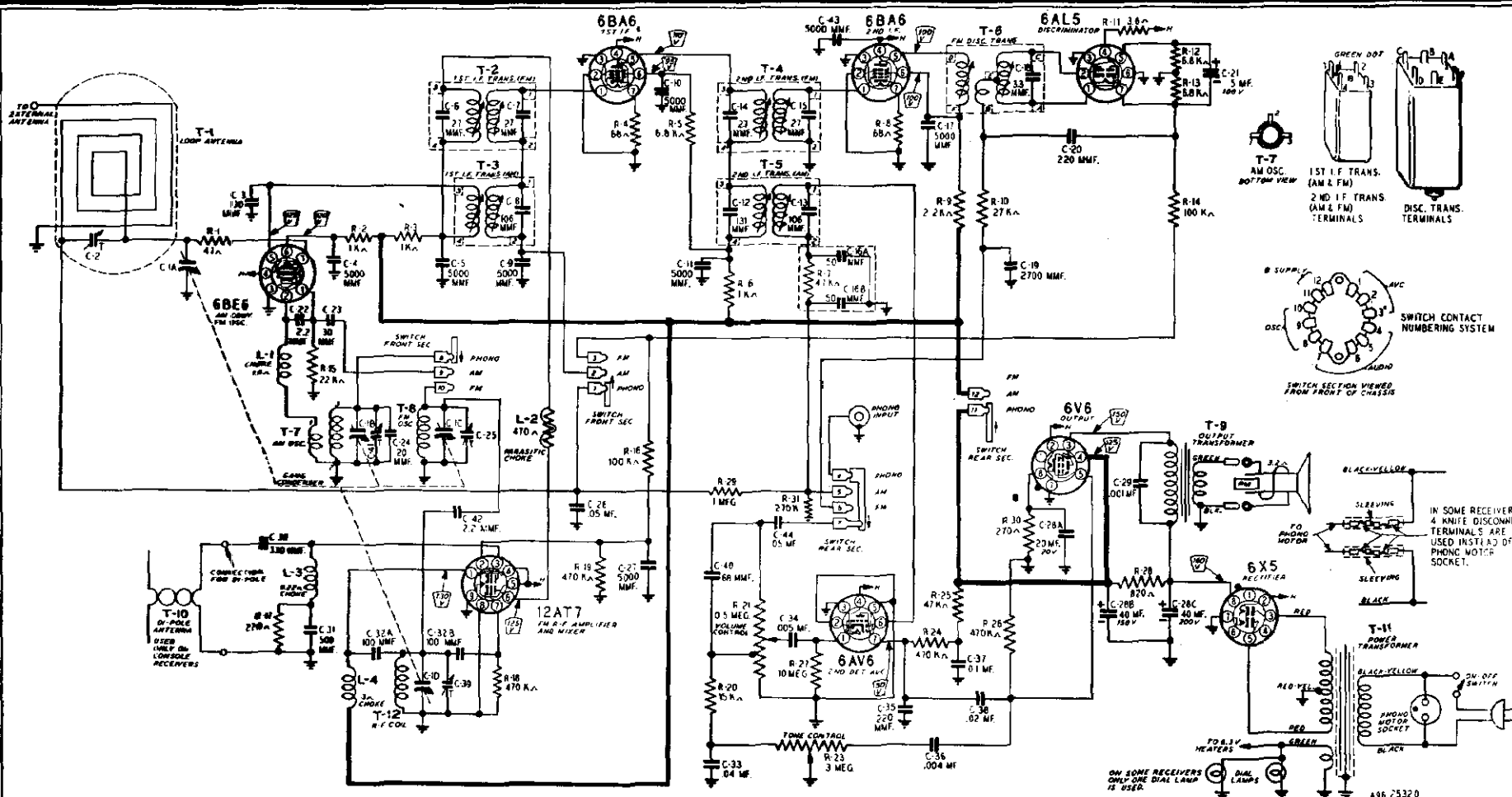
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage117 Volts AC
Signal InputNone
A Variation of $\pm 10\%$ is usually permissible.

MODEL D1034B

REPLACEMENT PARTS LIST

NOTICE: There is a model number label on the chassis. This label identifies the receiver as to chassis and issue letter. When ordering parts or writing, give ALL information on this label.

MISCELLANEOUS

12A477	8" P.M. Speaker	
4X1082	Escutcheon	
10X759	Knob	
13X546	Line Cord & Plug Assembly	
2A393	Band Change Switch	
3A435	Molded Octal Tube Socket	
3A305	Phono Socket	
3A426	Tube Socket (1st 6BA6)	
3A443	Tube Socket (12AT7)	
3A427	Tube Socket (6BE6)	
3A439	Tube Socket (Miniature)	
	Cabinet No. 054	

CAPACITORS

C-1	14A209	Gang Condenser Assembly	
C-2	17A256	2-24 mmf	Trimmer
C-3	47X559	130 mmf	Molded Mica ..
C-4			
C-5			
C-9			
C-10			
C-11	47X507	5000 mmf	Ceramic
C-17			
C-27			
C-43			
C-6		Part of T-2 (1st I-F Trans. FM)	
C-7		Part of T-3 (1st I-F Trans. AM)	
C-8		Part of T-5 (2nd I-F Trans. AM)	
C-12		Part of T-5 (2nd I-F Trans. AM)	
C-13		Part of T-4 (2nd I-F Trans. FM)	
C-14		Part of T-4 (2nd I-F Trans. FM)	
C-15		Part of T-4 (2nd I-F Trans. FM)	
C-16A	47X112	50-50 mmf	Dual Mica
C-16B			
C-18	47X492	2700 mmf	Molded Mica ..
C-19			
C-20	47X468	220 mmf	Ceramic
C-35			
C-21	45X361	5 mf	100 V Dry Electrolytic
C-22			
C-42	47X557	2.2 mmf	Ceramic
C-23	47X538	30 mmf	Ceramic
C-24	47X516	20 mmf	Ceramic
C-25	17A255	1.8 mmf	Trimmer
C-26			
C-44	866503	.05 mf	200 V Tubular
C-28A		20 mf	20 V
C-28B	45X360	40 mf	150 V Dry Electrolytic
C-28C		40 mf	200 V
C-29	H66102	.001 mf	800 V Tubular
C-30	47X470	330 mmf	Molded Mica ..
C-31	47X508	500 mmf	Ceramic
C-32A			
C-32B	76X4	100 mmf	Dual Ceramic ..
C-33	B66403	.04 mf	200 V Tubular
C-34	D66502	.005 mf	400 V Tubular
C-36	B66402	.004 mf	200 V Tubular
C-37	D66104	.1 mf	400 V Tubular
C-38	D66203	.02 mf	400 V Tubular
C-39			
C-41		Part of C-1 (Gang Condenser)	
C-40	47X471	68 mmf	Ceramic

RESISTORS

		Ohms	Watts	
R-1	B85470	47	0.5	Carbon
R-2				
R-3	B85102	1000	0.5	Carbon
R-6				
R-9				
R-4	B84680	68	0.5	Carbon
R-8				
R-5				
R-12	B84682	6800	0.5	Carbon
R-13				
R-7	B85473	47 K	0.5	Carbon
R-25				
R-10	B85273	27 K	0.5	Carbon
R-11	43X233	3.6	0.5	Wirewound
R-14	B85104	100 K	0.5	Carbon
R-16				
R-15	B85223	22 K	0.5	Carbon
R-17	B84221	220	0.5	Carbon
R-18				
R-19				
R-24	B85474	470 K	0.5	Carbon
R-26				
R-20	B85153	15 K	0.5	Carbon
R-21	36X372	.5 meg.		Volume Control
R-23	40X285	3 meg.		Tone Control
R-27	B85106	10 meg.	0.5	Carbon
R-28	D84821	820	2.0	Carbon
R-29	B85105	1 meg.	0.5	Carbon
R-30	B84271	270	0.5	Carbon
R-31	B84274	270 K	0.5	Carbon

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke
L-2	9A2103	Parasitic Choke
L-3	35A9	Insulated Choke
L-4	35A8	Insulated Choke
T-1	9A2099	"B" Range Loop Antenna
T-2	9A2060	1st I-F Trans. (FM)
T-3	9A2062	1st I-F Trans. (AM)
T-4	9A2061	2nd I-F Trans. (FM)
T-5	9A2063	2nd I-F Trans. (AM)
T-6	9A2064	Discriminator Transformer
T-7	9A2065	Oscillator Coil (AM)
T-8	9A2067	Oscillator Coil (FM)
T-9	51X134	Output Transformer
T-10	9A2002	Dipole Antenna
T-11	53X291	Power Transformer
T-12	9A2066	Antenna Coil (FM)

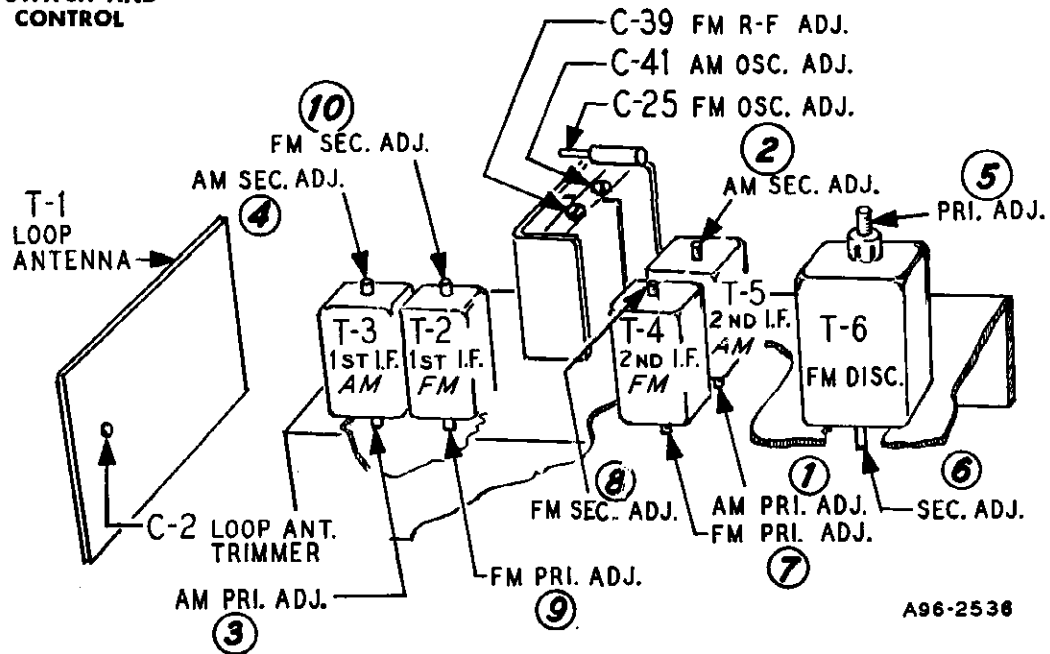
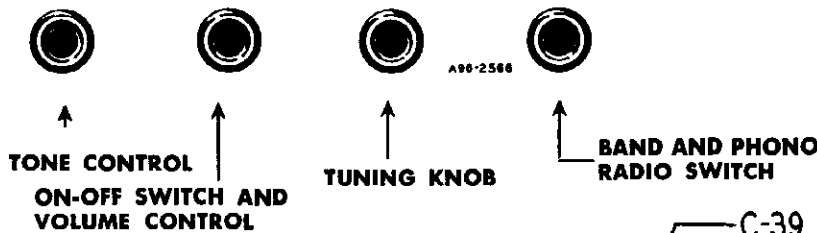
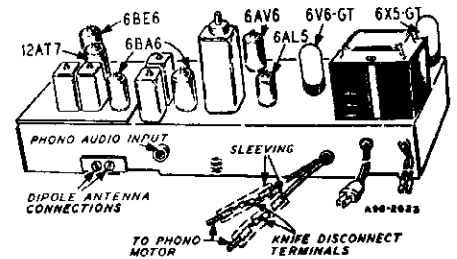
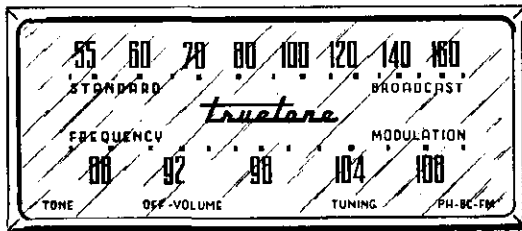
DIAL AND DRIVE ASSEMBLY

58X733	Dial Glass
15X260	Pointer
19X192	"C" Washer (Mtg. Drive Shaft)
6X66	Rubber Grommet
25X1616	Dial Bracket
28X113	Drive Cord Tension Spring
7A103	No. 47 Pilot Light
7A199	Pilot Light Socket Assembly
10X38	Drive Cord Assembly
26X486	Drive Shaft

TYPE G.I. - 28A169 RECORD CHANGER PARTS

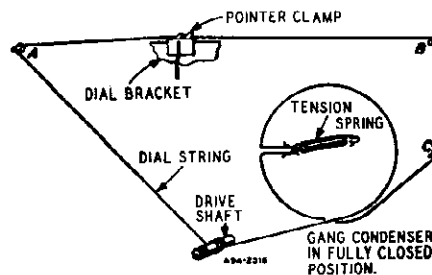
G.I. 69-73657	Tone Arm
G.I. 55-73613	Plastic Stabilizer
G.I. 28A755782	Idler Wheel Assembly
G.I. 56-76597	Motor, 3 speed, 60 cycles, 105-125 Volts A.C.
E-V No. 33-4	Crystal Cartridge, complete with needle
	*Needle only

*When ordering needles, specify part number and letter stamped on Cartridge.



DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns counter-clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



ELECTRICAL SPECIFICATIONS

Power Output—
117 volts AC—40 watts
60 watts phono operating

Power Output—
1.9 watts maximum
.8 watts 10% distortion

Speaker—8 inch PM dynamic

Frequency Ranges—
Broadcast 540-1600 KC
Frequency modulation 88-108 MC

Intermediate Frequency—
AM 455 KC — FM 10.7 MC

Selectivity — AM — 45 KC broad at 1000 times signal, measured at 1000 KC

I.F. FM—200 KC broad at 2 times down

I.F. FM—950 KC broad at 200 times down

AM Sensitivity—(For .5 watt output with external antenna)
25 microvolts average

FM Sensitivity—(For .5 watt output)
25 microvolts average

MODEL D1034C

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:
An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.
Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Det.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I-F Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Terminal	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN

FM ALIGNMENT NOTES

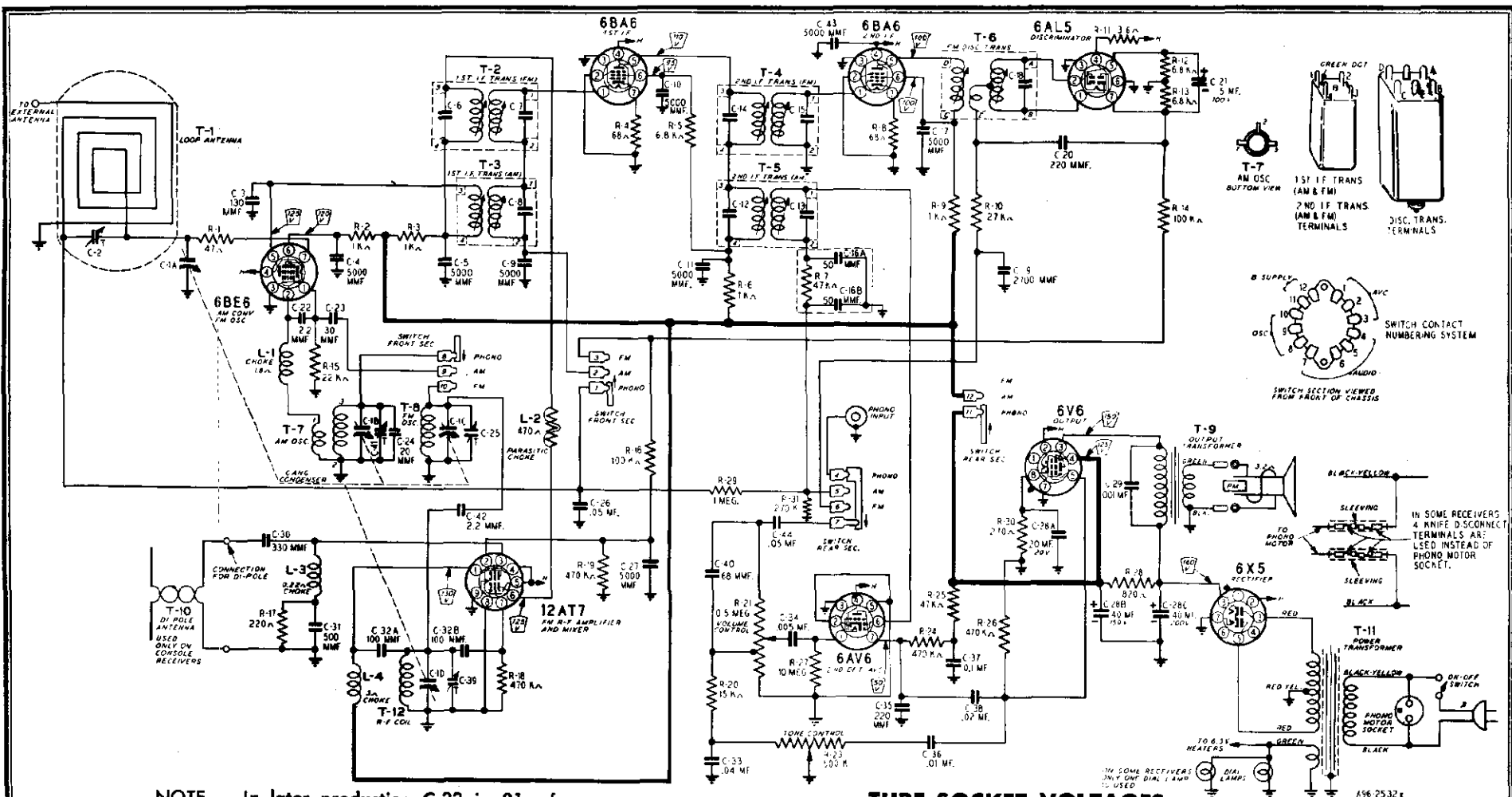
NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

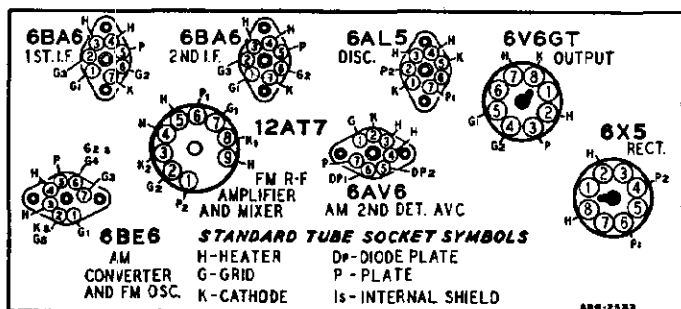
27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



NOTE — In later production C-33 is .01 mf.



TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage 117 Volts AC
Signal Input None
A Variation of $\pm 10\%$ is usually permissible.

MODEL D1034C

REPLACEMENT PARTS LIST

NOTICE: There is a model number label on the chassis. This label identifies the receiver as to chassis and issue letter. When ordering parts or writing, give ALL information on this label.

MISCELLANEOUS

12A477	8" P.M. Speaker
4X1082	Escutcheon
10A759	Knob
13X546	Line Cord & Plug Assembly
2A393	Band Change Switch
3A435	Molded Octal Tube Socket
3A305	Phono Socket
3A426	Tube Socket (1st 6BA6)
3A443	Tube Socket (12AT7)
3A427	Tube Socket (6BE6)
3A439	Tube Socket (Miniature)
	Cabinet No. 054

CAPACITORS

C-1	14A209	Gang Condenser Assembly
C-2	17A256	2-24 mmf Trimmer
C-3	47X559	130 mmf Ceramic
C-4		
C-5		
C-9		
C-10		
C-11	47X507	5000 mmf Ceramic
C-17		
C-27		
C-43		
C-6		Part of J-2 (1st I-F Trans. FM)
C-7		
C-8		Part of T-3 (1st I-F Trans. AM)
C-12		
C-13		Part of T-5 (2nd I-F Trans. AM)
C-14		
C-15		Part of T-4 (2nd I-F Trans. FM)
C-16A		
C-16B	47X112	50-50 mmf Dual Mica
C-18		Part of T-6 (Discriminator Trans.)
C-19	47X492	2700 mmf Molded Mica
C-20		
C-35	47X468	220 mmf Ceramic
C-21	45X361	5 mf 100 V Dry Electrolytic
C-22		
C-42	47X557	2.2 mmf Ceramic
C-23	47X558	30 mmf Ceramic
C-24	47X516	20 mmf Ceramic
C-25	17A255	1-8 mmf Trimmer
C-26		
C-44	866503	.05 mf 200 V Tubular
C-28A		20 mf 20 V
C-28B	45X360	40 mf 150 V Dry Electrolytic
C-28C		40 mf 200 V
C-29	H66102	.001 mf 800 V Tubular
C-30	47X470	330 mmf Molded Mica
C-31	47X508	500 mmf Ceramic
C-32A		
C-32B	76X4	100 mmf Dual Ceramic
C-33		
C-36	B66103	.01 mf 200 V Tubular
C-34	D66502	.005 mf 400 V Tubular
C-37	D66104	.1 mf 400 V Tubular
C-38	D66203	.02 mf 400 V Tubular
C-39		
C-41		Part of C-1 (Gang Condenser)
C-40	47X471	68 mmf Ceramic

RESISTORS

		Ohms	Watts	
R-1	B85470	47	0.5	Carbon
R-2				
R-3	B85102	1000	0.5	Carbon
R-6				
R-9				
R-4	B84680	68	0.5	Carbon
R-8				
R-5				
R-12	B84682	6800	0.5	Carbon
R-13				
R-7	B85473	47 K	0.5	Carbon
R-25				
R-10	B85273	27 K	0.5	Carbon
R-11	43X233	3.6	0.5	Wirewound
R-14				
R-16	B85104	100 K	0.5	Carbon
R-15	B85223	22 K	0.5	Carbon
R-17	B84221	220	0.5	Carbon
R-18				
R-19				
R-24	B85474	470 K	0.5	Carbon
R-26				
R-20	B85153	15 K	0.5	Carbon
R-21	36X372	.5 meg.		Volume Control
R-23	40X310	.5 meg.		Tone Control
R-27	B85106	10 meg.	0.5	Carbon
R-28	D84821	820	2.0	Carbon
R-29	B85105	1 meg.	0.5	Carbon
R-30	B84271	270	0.5	Carbon
R-31	B84274	270 K	0.5	Carbon

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke
L-2	9A2103	Parasitic Choke
L-3	35A9	Insulated Choke
L-4	35A8	Insulated Choke
T-1	9A2099	"B" Range Loop Antenna
T-2	9A2060	1st I-F Trans. (FM)
T-3	9A2062	1st I-F Trans. (AM)
T-4	9A2061	2nd I-F Trans. (FM)
T-5	9A2063	2nd I-F Trans. (AM)
T-6	9A2161	Discriminator Transformer
T-7	9A2065	Oscillator Coil (AM)
T-8	9A2067	Oscillator Coil (FM)
T-9	51X134	Output Transformer
T-10	9A2002	Dipole Antenna
T-11	53X291	Power Transformer
T-12	9A2066	Antenna Coil (FM)

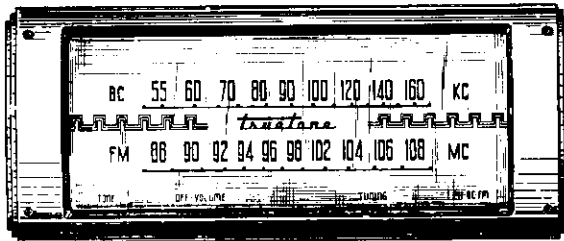
DIAL AND DRIVE ASSEMBLY

58X733	Dial Glass
15X260	Pointer
19X192	"C" Washer (Mtg. Drive Shaft)
6X66	Rubber Grommet
25X1616	Dial Bracket
28X113	Drive Cord Tension Spring
7A103	No. 47 Pilot Light
7A199	Pilot Light Socket Assembly
10X38	Drive Cord Assembly
26X486	Drive Shaft

TYPE G.I. — 28A169 RECORD CHANGER PARTS

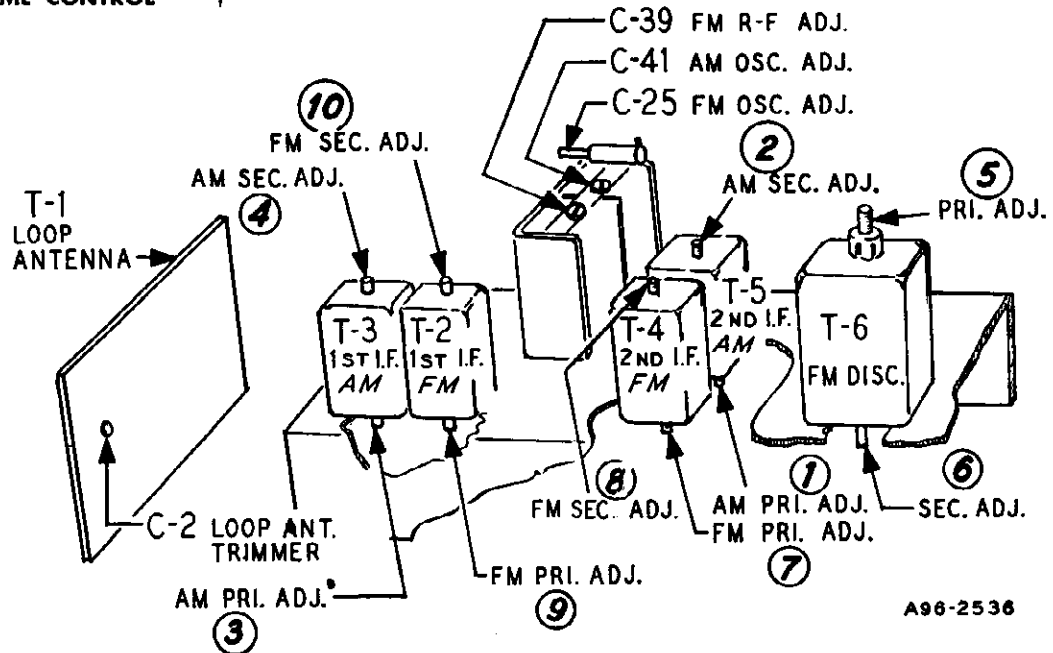
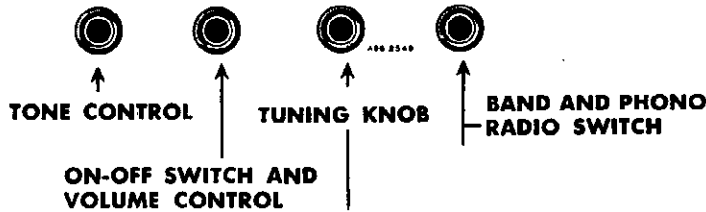
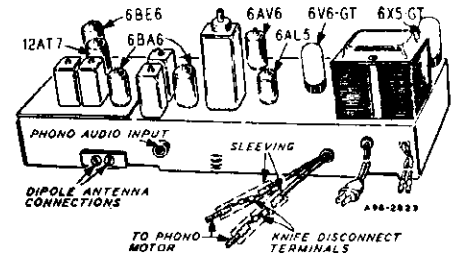
G.I. 69-73657	Tone Arm
G.I. 55-73613	Plastic Stabilizer
G.I. 28A755782	Idle Wheel Assembly
G.I. 56-76507	Motor, 3 speed, 60 cycles, 105-125 Volts A. C.
P-81	Crystal Cartridge, complete with needle
	*Needle only

*When ordering needles, specify part number and letter stamped on Cartridge.



BROADCAST BAND

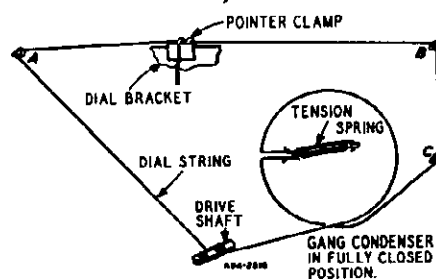
FM BAND



A96-2536

DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the new drive cord assembly listed in the Replacement Parts List. Turn the gang condenser until the plates are fully meshed. Then install the string as shown, winding three turns counter-clockwise around the tuning shaft with the turns progressing away from the chassis. After the cord is installed, rotate the tuning shaft several times in order to take up any slack in the cord.



ELECTRICAL SPECIFICATIONS

Power Output—
117 volts AC—40 watts
60 watts phono operating

Power Output—
1.9 watts maximum
.8 watts 10% distortion

Speaker—8 inch PM dynamic

Frequency Ranges—
Broadcast 540-1600 KC
Frequency modulation 88-108 MC

Intermediate Frequency—
AM 455 KC — FM 10.7 MC

Selectivity — AM — 45 KC broad at 1000 times signal, measured at 1000 KC

I.F. FM—200 KC broad at 2 times down

I.F. FM—950 KC broad at 200 times down

AM Sensitivity—(For .5 watt output with external antenna)
25 microvolts average

FM Sensitivity—(For .5 watt output)
25 microvolts average

MODEL D1046C

ALIGNMENT PROCEDURES**AM STAGES**

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antennas — .1 mf, and 50mmf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR				GANG CONDENSER SETTING	ADJUST	ADJUST FOR
FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT GROUND TO			
455 KC	Control Grid 1st 6BA6 Pin No. 1	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7 1st Dot.	.1 mf	Chassis Base	Rotor Fully Open	1st I.F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	2nd I.F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 6BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-41	Maximum Output
1400 KC	External Antenna Terminal	50 mmf	Chassis Base	Turn Rotor to Max. Output. Set Pointer to 1400 KC See Note A	Antenna C-2	Maximum Output

NOTE A—If the pointer is not at 1400 KC on the dial, reset pointer to the 1400 KC mark on the dial scale.

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

Dummy Antennas and I-F Loading Resistor—2500 mmf, 300 ohms

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

(If a zero center scale meter is not available, a standard scale vacuum tube voltmeter may be used by reversing the meter connections for negative readings).

Allow chassis and signal generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO					
Discriminator	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note A	Maximum Deflection
	10.7 MC	6BA6 2nd I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	
I-F	10.7 MC Note C	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	2nd I-F Pri. (7) Sec. (8) Note D	Maximum Deflection
Discriminator	10.7 MC	6BA6 1st I-F Pin 1 and Chassis	2500 mmf	FM	Rotor Fully Open	Disc. Pri. (5) Note D	Maximum Deflection
I-F	10.7 MC	Junction C-32A & B (Dual 100 mmf cond.) And chassis	2500 mmf	FM	Rotor Fully Open	1st I-F Pri. (9) & Sec. (10) 2nd I-F Pri. (7) & Sec. (8) Disc. Pri. (5) In Order Shown Note D	Maximum Deflection
	10.7 MC	Same as above	2500 mmf	FM	Rotor Fully Open	Disc. Sec. (6) Note B	

RECHECK I-F ADJUSTMENTS IN ORDER GIVEN

Oscillator	108.5	Disconnect built-in dipole antenna and connect generator to dipole terminals with resistor in series.	300 ohms	FM	Rotor Fully Open	Osc. C-25	Maximum Deflection
Antenna	104.5	Same as above	300 ohms	FM	Tune rotor for max. AVC voltage	Ant. C-39	Maximum Deflection

RECHECK ANTENNA & OSC. ADJUSTMENTS IN ORDER GIVEN**FM ALIGNMENT NOTES**

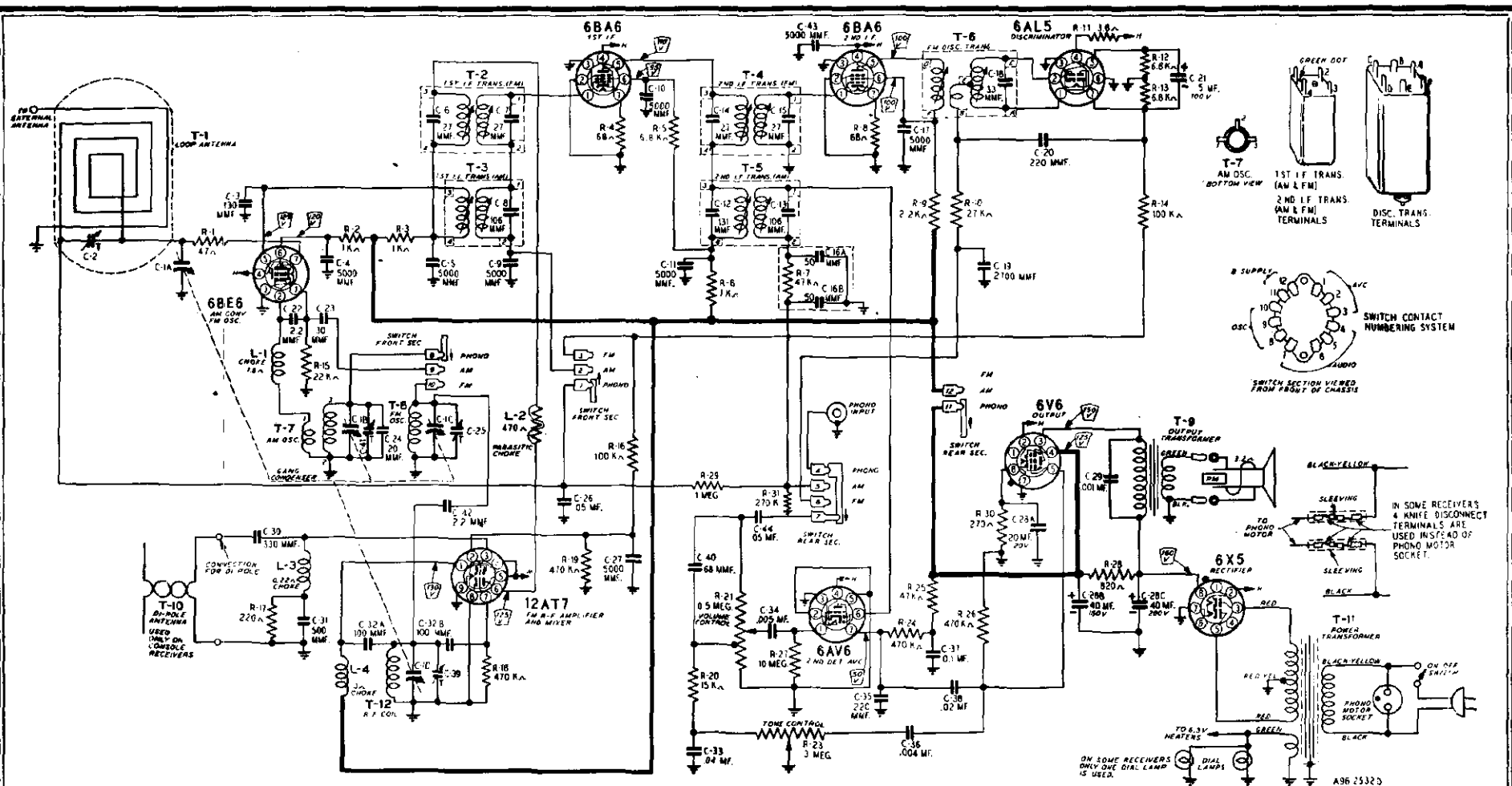
NOTE A—The zero center scale DC vacuum tube voltmeter is to be connected between chassis ground and the AVC line. A signal of .1 volt must be fed into the receiver for this adjustment.
Note output voltage on the zero center DC vacuum tube voltmeter.

NOTE B—Disconnect zero center DC vacuum tube voltmeter from AVC and connect it at the audio takeoff point at the

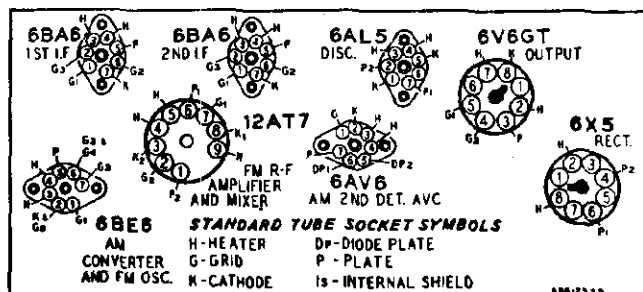
27 K ohm resistor (R-10) and its junction with the terminal strip. Adjust for zero voltage indication.

NOTE C—AM I-F coils must be aligned before attempting to align the FM I-F coils.

NOTE D—Connect zero center DC vacuum tube voltmeter as in Note A. Adjust input to give same output on the zero center DC vacuum tube voltmeter as in Note A.



NOTE—R-9 is 1000 Ohms not 2.2 K Ohms as shown on the schematic diagram.



TUBE SOCKET VOLTAGES

Socket voltages are shown on the schematic diagram. All voltages are between the socket terminal and chassis ground. Plate, screen and cathode voltages were taken with a 1000 ohm-per-volt meter with a 300 volt scale used for plate and screen voltages. Audio grid voltages were read with a vacuum tube volt-meter. Conditions of measurement are:

Line voltage 117 Volts AC

Signal Input None

A Variation of $\pm 10\%$ is usually permissible

MODEL D1046C

REPLACEMENT PARTS LIST

MISCELLANEOUS

12A477	8" P.M. Speaker
4X1073	Escutcheon
10A758	Knob
13X546	Line Cord & Plug Assembly
2A395	Band Change Switch
3A435	Molded Octal Tube Socket
3A305	Phono Socket
3A426	Tube Socket (1st 6BA6)
3A443	Tube Socket (12A77)
3A427	Tube Socket (6BE6)
3A439	Tube Socket (Miniature)
	Cabinet No. 952

CAPACITORS

C-1	14A209	Gang Condenser Assembly
C-2	17A256	2-24 mmf Trimmer
C-3	47X559	130 mmf Molded Mica
C-4		
C-5		
C-9		
C-10		
C-11	47X507	5000 mmf Ceramic
C-17		
C-27		
C-43		
C-6 }		
C-7 }		Part of T-2 (1st I-F Trans. FM)
C-8 }		Part of T-3 (1st I-F Trans. AM)
C-12 }		Part of T-5 (2nd I-F Trans. AM)
C-13 }		
C-14 }		Part of T-4 (2nd I-F Trans. FM)
C-15 }		
C-16A }	47X112	50-50 mmf Dual Mica
C-16B }		
C-18 }		Part of T-6 (Discriminator Trans.)
C-19 }	47X492	2700 mmf Molded Mica
C-20 }	47X468	220 mmf Ceramic
C-35 }		
C-21 }	45X361	5 mf 100 V Dry Electrolytic
C-22 }	47X557	2.2 mmf Ceramic
C-42 }		
C-23 }	47X558	30 mmf Ceramic
C-24 }	47X516	20 mmf Ceramic
C-25 }	17A255	1 8 mmf Trimmer
C-26 }		
C-44 }	B66503	.05 mf 200 V Tubular
C-28A }		20 mf 20 V
C-28B }	45X360	40 mf 150 V Dry Electrolytic
C-28C }		40 mf 200 V
C-29 }	H66102	.001 mf 800 V Tubular
C-30 }	47X470	330 mmf Molded Mica
C-31 }	47X508	500 mmf Ceramic
C-32A }		
C-32B }	76X4	100 mmf Dual Ceramic
C-33 }	B66403	.04 mf 200 V Tubular
C-34 }	D66502	.005 mf 400 V Tubular
C-36 }	B66402	.004 mf 200 V Tubular
C-37 }	D66104	.1 mf 400 V Tubular
C-38 }	D66203	.02 mf 400 V Tubular
C-39 }		
C-41 }		Part of C-1 (Gang Condenser)
C-40 }	47X471	68 mmf Ceramic

RESISTORS

		Ohms	Watts	
R-1	B85470	47	0.5	Carbon
R-2				
R-3	B85102	1000	0.5	Carbon
R-6				
R-9				
R-4 }	B84680	68	0.5	Carbon
R-8 }				
R-5 }	B84682	6800	0.5	Carbon
R-12 }				
R-13 }	B85473	47 K	0.5	Carbon
R-7 }	B85273	27 K	0.5	Carbon
R-25 }	43X233	3.6	0.5	Wirewound
R-10 }				
R-11 }	B85104	100 K	0.5	Carbon
R-14 }	B85223	22 K	0.5	Carbon
R-16 }	B84221	220	0.5	Carbon
R-15 }				
R-17 }				
R-18 }				
R-19 }	B85474	470 K	0.5	Carbon
R-24 }				
R-26 }	B85153	15 K	0.5	Carbon
R-20 }	36X381	.5 meg.		Volume Control
R-21 }	40X289	3 meg.		Tone Control
R-23 }	B85106	10 meg.	0.5	Carbon
R-27 }	D84821	820	2.0	Carbon
R-28 }	B85105	1 meg.	0.5	Carbon
R-29 }	B84271	270	0.5	Carbon
R-30 }	B84274	270 K	0.5	Carbon
R-31 }				

TRANSFORMERS AND COILS

L-1	35A5	Insulated Choke
L-2	9A2103	Parasitic Choke
L-3	35A9	Insulated Choke
L-4	35A8	Insulated Choke
T-1	9A1972	"B" Range Loop Antenna
T-2	9A2060	1st I-F Trans. (FM)
T-3	9A2062	1st I-F Trans. (AM)
T-4	9A2061	2nd I-F Trans. (FM)
T-5	9A2063	2nd I-F Trans. (AM)
T-6	9A2064	Discriminator Transformer
T-7	9A2065	Oscillator Coil (AM)
T-8	9A2067	Oscillator Coil (FM)
T-9	51X134	Output Transformer
T-10	9A2003	Dipole Antenna
T-11	53X291	Power Transformer
T-12	9A2066	Antenna Coil (FM)

DIAL AND DRIVE ASSEMBLY

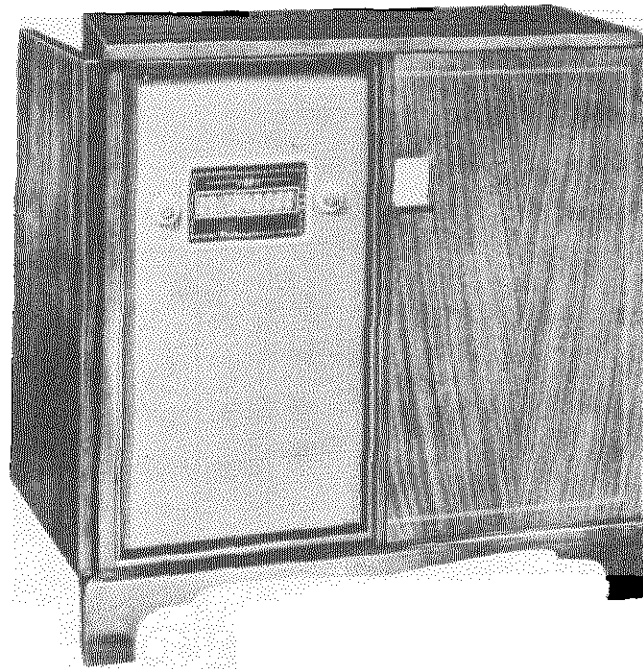
58X730	Dial Glass
15X251	Pointer
19X192	"C" Washer (Mtg. Drive Shaft)
6X66	Rubber Grommet
25X1610	Dial Bracket
28X113	Drive Cord Tension Spring
7A103	No. 47 Pilot Light
7A215	Pilot Light Socket Assembly
10X38	Drive Card Assembly
26X510	Drive Shaft

TYPE G.I. — 28A169 RECORD CHANGER PARTS

G.I. 69-73657	Tone Arm
G.I. 55-73613	Plastic Stabilizer
G.I. 28A755782	Idler Wheel Assembly
G.I. 56-76507	Motor, 3 speed, 60 cycles, 105-125 Volts A.C.
E-V No. 33-4	Crystal Cartridge, complete with needle
	*Needle only

*When ordering needles, specify part number and letter stamped on Cartridge.

MODELS H-305C8, H-306C8, Ch. V-2137



SPECIFICATIONS

FREQUENCY RANGES:

Amplitude Modulation540 to 1600 kc.
Frequency Modulation88 to 108 mc.

INTERMEDIATE FREQUENCIES:

Amplitude Modulation455 kc.
Frequency Modulation10.7 mc.

TUBE COMPLEMENT:

1 12AT7R-F Amp. and Mixer (FM)
1 6BE6H-F Osc. (AM/FM) and
converter (AM)
1 6BA6I-F Amp.
1 6BA6I-F Driver (FM)

1 6AL5Ratio Det. (FM)
1 6AV6Det. & AVC (AM) and A-F Amp
1 6V6GTOutput Amp
1 5Y3GTRectifier

PILOT LAMPS:

2 Westinghouse No. 44.....6.3 v., 0.25 a

POWER OUTPUT:

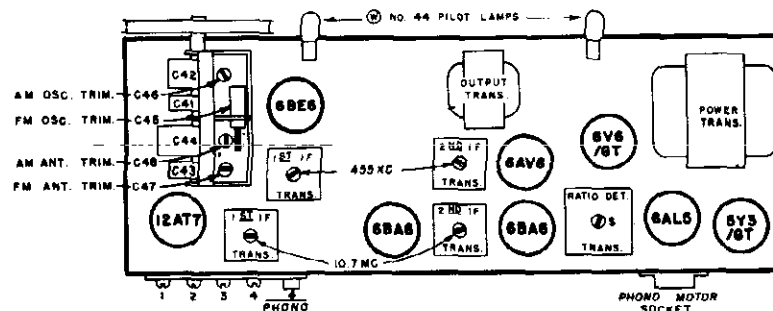
Undistorted3.5 watt
Maximum6 watt

LOUDSPEAKER:12" P.M.

OPERATING

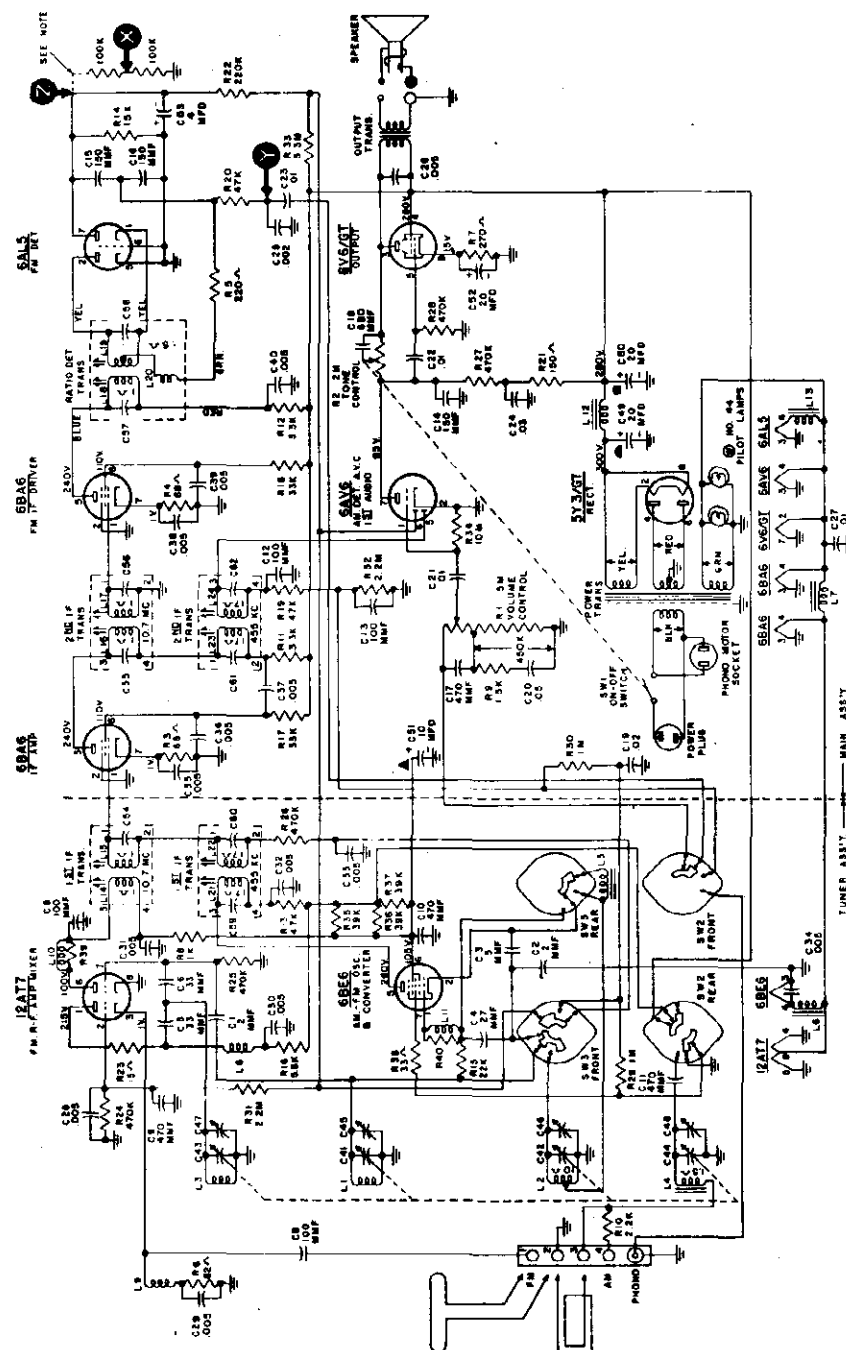
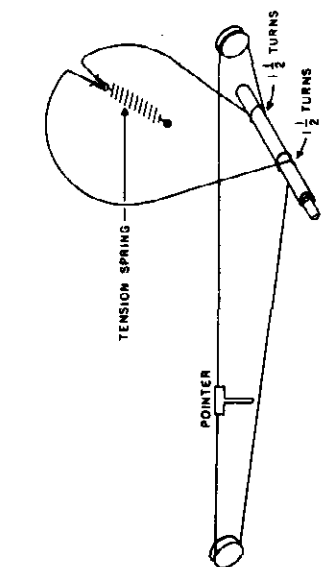
VOLTAGE:.....105 to 120 volts, 60 cycles A-C

POWER CONSUMPTION:110 watt



CHASSIS NO. V-2137-4

FIG. 1—TOP VIEW



NOTE
1. SELECTOR SWITCH SW2 AND SW3 ARE SHOWN IN EXTREME COUNTER CLOCKWISE POSITION ON FM BAND
2. TO BE INSTALLED FOR ALIGNMENT ONLY
3. ALL VOLTAGES MEASURED FROM CHASSIS (GND) UNLESS A 10,000 OHM/VOLT METER LINE VOLTAGE
IS SPECIFIED
4. SET AT 17.4 K.C. VOLTAGES SHOULD BE SHOWN ± 20 PER CENT

MODELS H-305C8, H-306C8, Ch. V-2137-4

ALIGNMENT**BROADCAST BAND**

Connect an output meter across the speaker voice coil.

While making the following adjustments, keep the volume control set for maximum output, the tone control set for maximum treble, and the signal generator output attenuated to avoid A.V.C. action.

Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust
1	Set the band switch to AM.			
2	Stator of tuning capacitor (C44) through a 0.1 mfd capacitor	455 kc.	maximum capacity	455 kc. pri. and sec. of 1st and 2nd I-F trans. for max. output
<i>NOTE: If the I-F transformers are badly mis-aligned, it may be impossible to obtain sufficient output using the above system. In this event, it will be necessary to align each transformer separately. Start with the last I-F transformer and work forward, connecting the signal generator to the control grid of the tube preceding the transformer under alignment.</i>				
3	Radiated signal (no actual connection)	1600 kc.	1600 kc.	AM osc. trimmer (C46) for max. output
4	Radiated signal (no actual connection)	1400 kc.	tune to signal	AM ant. trimmer (C48) for max. output (rock-in adjustment)

FM BAND

Do not align the FM circuits until all AM adjustments have been completed.

Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust
1	Set the band switch to FM.			
2	Connect two 100,000 ohm resistors (the resistances must be equal within 5 percent) between pin No. 7 of the 6AL5 tube and ground as shown on the schematic diagram.			
3	Connect a V. T. V. M. between points "X" and "Y" (see schematic diagram).			
4	Stator of FM ant. section (C43) on tuning capacitor through a .01 mfd mica capacitor	10.7 mc.	maximum capacity	Sec. of ratio det. trans. for zero (use medium strength signal)
5	Connect the V. T. V. M. between point "Z" and ground.			
6	Same as step 4	10.7 mc.	maximum capacity	Pri. of ratio det. trans. and pri. and sec. of 10.7 mc. 1st and 2nd I-F trans. for max.
<i>NOTE: The pri. of the ratio det. trans. peaks in two places. Use the peak with the slug farthest out.</i>				
7	Reconnect the V. T. V. M. between points "X" and "Y", and increase the signal strength 10 times.			
8	Same as step 4	10.7 mc.	maximum capacity	Recheck sec. of ratio det. trans. for zero voltage
9	Reconnect the V. T. V. M. between point "Z" and ground.			
10	Same as step 4	10.7 mc.	maximum capacity	Pri. of ratio det. trans. for maximum voltage
11	Remove the two 100,000 ohm resistors that were inserted in step 2.			
12	FM ant. terminal through a 300 ohm non-inductive resistor	105 mc.	105 mc.	FM osc. trimmer (C45) for maximum output
13	Same as step 12	105 mc.	105 mc.	FM ant. trimmer (C47) for maximum output

PARTS LIST FOR MODELS H-305C8 AND H-306C8

When ordering parts, specify model number of set in addition to part number and description of part.

CABINET AND MISCELLANEOUS PARTS

Part No.	Description	Part No.	Description
V-5986-4	Antenna assembly, AM loop	V-9426-2	Cover, back (Mahogany)
V-5982-2	Antenna assembly, FM dipole	V-9426-3	Cover, back (Blonde)
V-6120	Background, dial	V-9433	Dial
V-1196-1	Cabinet (Mahogany)	V-8283	Doors, matched pair—completely finished less hardware (Mahogany)
V-1196-2	Cabinet (Blonde)		
V-4965-2	Cable, phono		
V-5860-3	Cable, assembly, speaker	V-8285	Doors, matched pair—completely finished less hardware (Mahogany)
V-5426	Clip, I-F mounting		
V-9075-1	Clip, spring (Mahogany)		
V-9075-2	Clip, spring (Blonde)		
V-4349-1	Cord, A-C power	V-8284	Drawer, record changer—completely finished less hardware (Mahogany)
V-4966-2	Cord, A-C (record changer)		
V-3219S-1	Cord, dial drive		

PAGE 21-4 WESTINGHOUSE

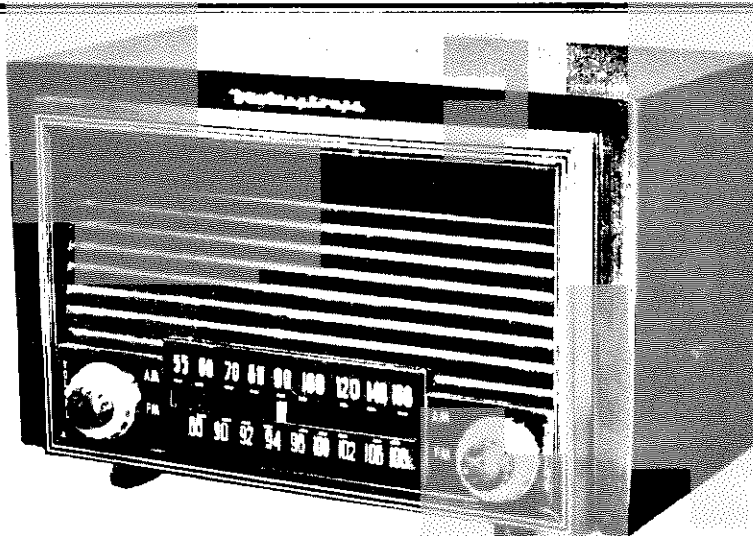
MODELS H-305C8, H-306C8, Ch. V-2137-4

PARTS LIST FOR MODELS H-305C8 AND H-306C8 (Continued)

Part No.	Description	Part No.	Description
V-8286	Drawer, record changer—completely finished less hardware (Blonde)	V-9252-1	Nameplate, Westinghouse
V-9428-1	Escutcheon	V-9429-2	Plate, front glass
V-4643	Eyeclet, chassis mounting	V-9442	Pointer, dial
V-4902	Glide, furniture	V-3166	Pulley
V-9425-1	Grille assembly, panel (Mahogany)	V-6127	Sleeve, dial drive
V-9425-2	Grille assembly, panel (Blonde)	V-3353-11	Slide mechanism, left hand
V-4852	Grommet, chassis mounting	V-3353-12	Slide mechanism, right hand
V-4644	Grommet, chassis shock	V-6072-1	Socket, miniature wafer (12AT7)
V-9091-1	Hinge, L. H. (Mahogany)	V-6163-1	Socket, miniature wafer (6BE6)
V-9091-2	Hinge, R. H. (Mahogany)	V-4195	Socket, molded octal (6V6GT, 5Y3GT)
V-9091-3	Hinge, L. H. (Blonde)	V-5405	Socket, molded (Phono A-C)
V-9091-4	Hinge, R. H. (Blonde)	V-5673	Socket, miniature wafer (unshielded) (6AV6)
V-6146-1	Knob, on-off-tone	V-6295-1	Socket, miniature wafer (6BA6, 6AL5)
V-6146-2	Knob, band	V-9434-2	Socket, pilot lamp
V-5301-3	Knob, door (Mahogany)	V-9431	Speaker, 12" PM
V-5301-2	Knob, door (Blonde)	V-3248	Spring, dial
V-9104-1	Knob, volume (rear)	V-9076-1	Strike, ball head (Mahogany)
V-9104-2	Knob, tuning (rear)	V-9076-2	Strike, ball head (Blonde)
		V-6136	Terminal board, phono, ant., gnd.

V-2137-4 CHASSIS ELECTRICAL PARTS

R2CC30CK020D	Capacitor, 2 mmf (C1)	RC30AE332K	Resistor, 3300 ohms 1 w. (R11)
R2CC30UK020D	Capacitor, 2 mmf (C2)		R12)
R2CC30CK050D	Capacitor, 5 mmf (C3)	RC10AE472K	Resistor, 4700 ohms 1/4 w. (R13)
R3CC30CK270K	Capacitor, 27 mmf (C4)	RC10AE153K	Resistor, 15,000 ohms 1/4 w. (R14)
R3CC26CK330M	Capacitor, 33 mmf (C5, C6)	RC10AE223K	Resistor, 22,000 ohms 1/4 w. (R15)
R3CC30SL101M	Capacitor, 100 mmf (C7)	RC30AE562K	Resistor, 5600 ohms 1 w. (R16)
R3CC30SL101J	Capacitor, 100 mmf (C8)	RC30AE333K	Resistor, 33,000 ohms 1 w. (R17, R18)
R5CC21ZY471M	Capacitor, 470 mmf (C9, C10, C11)	RC10AE473M	Resistor, 47,000 ohms 1/4 w. (R19, R20)
RCM20A101M	Capacitor, 100 mmf (C12, C13)	RC10AE154M	Resistor, 150 ohms 1/4 w. (R21)
RCM20A151M	Capacitor, 150 mmf (C14)	RC10AE224M	Resistor, 220,000 ohms 1/4 w. (R22)
RCM20A151J	Capacitor, 150 mmf (C15, C16)	RC10AE150M	Resistor, 15 ohms 1/4 w. (R23)
RCM20A471M	Capacitor, 470 mmf (C17)	RC10AE474M	Resistor, 470,000 ohms 1/4 w. (R24, R25, R26, R27, R28)
RCM20A681M	Capacitor, 680 mmf (C18)	RC10AE105M	Resistor, 1.0 megohms 1/4 w. (R29, R30)
RCP10W2203A	Capacitor, .02 mfd. 200 v. (C19)	RC10AE225M	Resistor, 2.2 megohms 1/4 w. (R31, R32)
RCP10W2503A	Capacitor, .05 mfd. 200 v. (C20)	RC10AE335M	Resistor, 3.3 megohms 1/4 w. (R33)
RCP10W4103A	Capacitor, .01 mfd. 400 v. (C21, C22, C23)	RC10AE106M	Resistor, 10.0 megohms 1/4 w. (R34)
RCP10W4303A	Capacitor, .03 mfd. 400 v. (C24)	RC30AE393K	Resistor, 39,000 ohms 1 w. (R35, R36, R37)
RCP10W6202A	Capacitor, .002 mfd. 600 v. (C25)	RC10AE330K	Resistor, 33 ohms 1/4 w. (R38)
RCP10M6502A	Capacitor, .005 mfd. 600 v. (C26)	V-4886-2	Reactor, R-F 1.1 microhenries (L5, L6, L7)
V-5040-13	Capacitor, .01 mfd. 200 v. molded paper (C27)	V-4886-4	Reactor, R-F (L8)
V-5596	Capacitor, .005 min. mfd. (C28 to C40 incl.)	V-4886-10	Reactor, R-F (L9)
V-6137	Capacitor, variable (C41 to C48 incl.)	V-4886-6	Reactor, R-F (L10, R39)
V-6121	Capacitor, electrolytic, 20 mfd. 400 v. (C49), 20 mfd. 400 v. (C50), 10 mfd. 350 v. (C51), 20 mfd. 25 v. (C52)	V-4886-7	Reactor, R-F (L11, R40)
V-6638	Capacitor, electrolytic, 4 mfd. 150 v. (C53)	V-6161	Reactor, filter choke (L12)
V-6157	Coil, ant. loading (L4)	V-4886-1	Reactor, R-F 14 microhenries (L13)
V-6164	Coil, AM oscillator (L2)	V-6538	Switch, selector (SW2, SW3)
V-6138	Coil, FM oscillator (L1)	V-6131	Transformer, power
V-6139	Coil, FM antenna (L3)	V-5798	Transformer, audio output
V-6122	Control, vol.-tone-off-on (R1, R2, SW1)	V-6142	Transformer, FM 1st I-F (L14, L15, C54)
No. 44	Lamp, pilot	V-6129	Transformer, FM 2nd I-F (L16, L17, C55, C56)
RC10AE680K	Resistor, 68 ohms 1/4 w. (R3, R4)	V-6128	Transformer, ratio detector L18, L19, L20, C57, C58)
RC10AE221M	Resistor, 220 ohms 1/4 w. (R5)	V-6130	Transformer, AM 1st and 2nd I-F (L21, L22, C59, C60, L23, L24, C61, C62)
RC10AE820K	Resistor, 82 ohms 1/4 w. (R6)		
RC30AE271K	Resistor, 270 ohms 1 w. (R7)		
RC10AE102K	Resistor, 1000 ohms 1/4 w. (R8)		
RC10AE152M	Resistor, 1500 ohms 1/4 w. (R9)		
RC10AE222K	Resistor, 2200 ohms 1/4 w. (R10)		



MODELS H-307T7 AND H-308T7

(BROWN) (IVORY)

SERVICE NOTES

SPECIFICATIONS

FREQUENCY RANGES:

Amplitude Modulation540 to 1615 kc.
Frequency Modulation88 to 108 mfc.

INTERMEDIATE FREQUENCIES:

Amplitude Modulation455 kc.
Frequency Modulation10.7 mc.

TUBE COMPLEMENT:

1 12AT7R-F Amp. and Mixer (FM)
1 12BE6FM Osc. and AM Converter
1 12BA6I-F Amp.
1 6BJ6I-F Driver (FM)

1 12AL5Ratio Det. (FM)
1 12AV6Det. and AVC (AM) and A-F Amp.
1 50C5Output Amp.

POWER OUTPUT:

Undistorted1.0 watts
Maximum1.9 watts

LOUDSPEAKER:5 $\frac{1}{4}$ " PM

OPERATING

VOLTAGE:.....117 volts, DC or 60 cycles AC

POWER CONSUMPTION:35 watts

WARNING

The chassis of this receiver is connected directly to one side of the power line. When making repairs or adjustments, it is recommended that the chassis be isolated from the line by means of an isolation transformer. Otherwise, *serious shock may result* if the radio chassis and ground are contacted at the same time.

ANTENNA INFORMATION

An external AM antenna can be coupled to the set by taping the lead-in wire to the outside of the rear cover as shown in Fig. 3. The wire should be dressed in the position shown and can be held in place with adhesive tape or other similar material.

The blue wire emerging from the hole in the rear cover is a "line" antenna for FM reception. It should be connected to the left antenna terminal as shown in Fig. 3. If an external FM antenna is to be used, disconnect the blue wire and connect the transmission line to the two terminals.

MODELS H-307T7, H-308T7, Ch. V-2136



- NOTES:
1. SELECTOR SWITCH SW2 IS SHOWN IN EXTREME CLOCKWISE POSITION ON AM BAND. EXTREME COUNTER CLOCKWISE POSITION IS FM. MINIMUM SWR IS 1.5.
 2. ALL VOLTAGES MEASURED FROM CHASSIS (GROUND) USING A 20,000 OHM/VOLT METER. LINE VOLTAGE SET AT 115V A.C. VOLTAGES SHOULD BE AS SHOWN ± 20 PER CENT.
 3. TO BE INSTALLED FOR ALIGNMENT ONLY.

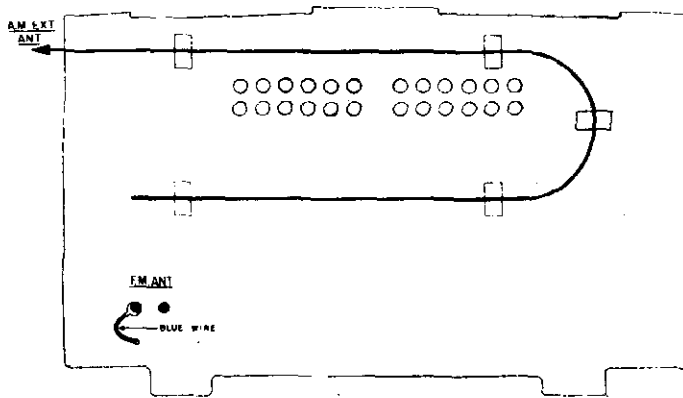


FIG. 3—ANTENNA COUPLING METHOD

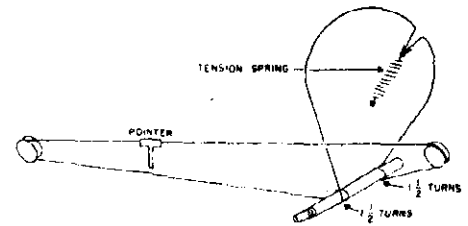


FIG. 4—DIAL DRIVE

ALIGNMENT BROADCAST BAND

Connect an output meter across the speaker voice coil.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Check the dial pointer position by meshing the tuning capacitor plates completely and seeing that the dial pointer is set on the end mark of the dial scale.

Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust
1	Set the band switch to AM			
2	Stator of tuning capacitor (C33A) through a 0.1 mfd capacitor	455 kc.	minimum capacity	Pri. and sec. of T6 and T5 for max. output in order given
NOTE: If the I-F transformers are badly mis-aligned, it may be impossible to obtain sufficient output using the above system. In this event, it will be necessary to align each transformer separately. Start with the last I-F transformer and work forward, connecting the signal generator to the control grid of the tube preceding the transformer under alignment.				
3	Radiated signal (no actual connection)	1615 kc.	minimum capacity	AM osc. trimmer (C33D) for max. output
4	Radiated signal (no actual connection)	1400 kc.	tune to signal	AM R-F. trimmer (C33B) for max. output (rock-in adjustment)

FM BAND

Do not align the FM circuits until all AM adjustments have been completed.

Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust
1	Set the band switch to FM.			
2	Connect two 100,000 ohm resistors (the resistances must be equal within 5 per cent) between pin No. 7 of the 12AL5 tube and ground as shown on the schematic diagram.			
3	Connect a V.T.V.M. between points "X" and "Y" (see schematic diagram).			
4	Pin No. 7 of 12AT7 through a .01 mfd mica capacitor	10.7 mc.	minimum capacity	Sec. of T3 for zero (use medium strength signal)
5	Connect the V.T.V.M. between point "Z" and ground.			
6	Same as step 4	10.7 mc.	minimum capacity	Pri. of T3 and pri. and sec. of T1 and T2 for max.
7	Reconnect the V.T.V.M. between points "X" and "Y" and increase the signal strength 10 times.			
8	Same as step 4	10.7 mc.	minimum capacity	Recheck sec. of T3 for zero voltage
9	Reconnect the V.T.V.M. between point "Z" and ground			
10	Same as step 4	10.7 mc.	minimum capacity	Pri. of T3 for maximum voltage
11	Remove the two 100,000 ohm resistors that were inserted in step 2.			
12	FM ant. terminal through a 300 ohm non-inductive resistor	98 mc.	98 mc.	FM osc. core for maximum voltage
13	Same as step 12	98 mc.	98 mc.	FM R-F trimmer (C32) for maximum voltage
14	Same as step 12	105 mc.	tune to signal	FM R-F core for maximum voltage
15	Same as step 12	90 mc.	tune to signal	FM R-F trimmer (C32) for maximum voltage (rock-in)
16	Recheck steps 14 and 15 for tracking.			

MODELS H-307T7, H-308T7, Ch. V-2136

PARTS LIST FOR MODELS H-307T7 AND H-308T7

When ordering parts, specify model number of set in addition to part number and description of part.

CABINET AND MISCELLANEOUS

Part No.	Description	Part No.	Description
V-6120-1	Background, dial	V-9506-1	Nameplate, Westinghouse
V-1199-2	Cabinet (brown)	V-9661	Plug, power (for interlock)
V-1199-3	Cabinet (ivory)	V-9639-1	Pointer
V-5426	Clip, I-F mounting	V-9678-2	Pulley, gang
V-3219S-1	Cord, dial drive	V-3166S	Pulley, dial cord
V-9636-1	Cover assembly, back	V-9655	Shell, interlock
V-9651-1	Cover, back	V-9654	Socket, interlock
V-9637-1	Foot, mounting	V-9641	Speaker, 5 1/4 PM
V-6146-11	Knob, off-on, volume, front (ivory)	V-3248S	Spring, dial drive
V-6146-5	Knob, off-on, volume, front (brown)	V-5421-5	Washer, felt (knobs)
V-6146-10	Knob, band (ivory)	V-4292-1	Socket, miniature molded (50C5)
V-6146-2	Knob, band (brown)	V-6878-2	Socket, miniature wafer (12BA6, 6BJ6, 12AL5, 12AV6)
V-9104-3	Knob, off-on, volume (rear)	V-5556-2	Socket, miniature (12AT7)
V-9104-2	Knob, tuning (rear)	V-4292S-2	Socket, miniature molded (12BE6)
V-9653	Loop, antenna		

V-2136 CHASSIS

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
C1	RCP10W2103M	Capacitor, .01 mfd 200 v.		V-9640	Rectifier, selenium
C2	V-5596	Capacitor, .005 mfd	R1	RC30AE181K	Resistor, 180 ohms 1 w.
C3	RCP10W4103M	Capacitor, .01 mfd 400 v.	R2	RC20AE474M	Resistor, 470,000 ohms 1/2 w.
C4	RCP10W4103M	Capacitor, .01 mfd 400 v.	R3	RC20AE474M	Resistor, 470,000 ohms 1/2 w.
C5	RCP10W6202M	Capacitor, .002 mfd 600 v.	R4	RC20AE474M	Resistor, 470,000 ohms 1/2 w.
C6	RCP10W6202M	Capacitor, .002 mfd 600 v.	R5	RC20AE153K	Resistor, 15,000 ohms 1/2 w.
C7	RCP10W2103M	Capacitor, .01 mfd 200 v.	R6	RC20AE473M	Resistor, 47,000 ohms 1/2 w.
C8	RCP10W6102M	Capacitor, .001 mfd 600 v.	R7	RC20AE223M	Resistor, 22,000 ohms 1/2 w.
C9	V-5596	Capacitor, .005 mfd	R8	RC20AE223M	Resistor, 22,000 ohms 1/2 w.
C10	V-6023-4503M	Capacitor, .05 mfd 400 v.	R9	RC20AE223M	Resistor, 22,000 ohms 1/2 w.
C11	R3CC30SL330K	Capacitor, 33 mmf	R10	RC20AE475M	Resistor, 4.7 megohms 1/2 w.
C12	RCP10W2103M	Capacitor, .01 mfd 200 v.	R11	RC20AE221M	Resistor, 220 ohms 1/2 w.
C13	RCP10W2503M	Capacitor, .05 mfd 200 v.	R12	RC20AE221M	Resistor, 220 ohms 1/2 w.
C14	V-5596	Capacitor, .005 mfd	R13	RC20AE221M	Resistor, 220 ohms 1/2 w.
C15	V-5596	Capacitor, .005 mfd	R14	RC20AE221M	Resistor, 220 ohms 1/2 w.
C16	RCP10W2103M	Capacitor, .01 mfd 200 v.	R15	RC20AE221M	Resistor, 220 ohms 1/2 w.
C17	V-5596	Capacitor, .005 mfd	R16	V-6984-10	Resistor, 820 ohms 5 w.
C18	RCP10W2103M	Capacitor, .01 mfd 200 v.	R17	RC30AE220K	Resistor, 22 ohms 1 w.
C19	V-9634-1	Capacitor, multiple ceramic .002 mfd, 220 mmf, 220 mmf, .005 mfd.	R18	RC20AE225M	Resistor, 2.2 megohms 1/2 w.
C20	V-5596	Capacitor, .005 mfd	R19	RC20AE225M	Resistor, 2.2 megohms 1/2 w.
C21	R2CC30UK270K	Capacitor, 27 mmf	R20	RC20AE470M	Resistor, 47 ohms 1/2 w.
C22	R2CC30UK050D	Capacitor, 5 mmf	R21	RC20AE820K	Resistor, 82 ohms 1/2 w.
C24	R2CC30CK020D	Capacitor, 2 mmf	R22	RC20AE105M	Resistor, 1 megohm 1/2 w.
C25	R5CC20ZY221M	Capacitor, 220 mmf	R23	RC20AE221M	Resistor, 220 ohms 1/2 w.
C26	RCM20D101J	Capacitor, 100 mfd	R24	RC20AE224M	Resistor, 220,000 ohms 1/2 w.
C27	RCM20A221M	Capacitor, 220 mmf	R25	RC20AE475M	Resistor, 4.7 megohms 1/2 w.
C28	RCM20A101M	Capacitor, 100 mfd	R26	RC20AE473M	Resistor, 47,000 ohms 1/2 w.
C29	V-9635	Capacitor, electrolytic, 80 mfd 150 v., 60 mfd 150 v.	R27	RC20AE335M	Resistor, 3.3 meg. 1/2 w.
C30	V-4637	Capacitor, electrolytic, 4 mfd 50 v.	R28	RC20AE330M	Resistor, 33 ohms 1/2 w.
C31	RCM20A151M	Capacitor, 150 mmf	R29	RC20AE470M	Resistor, 47 ohms 1/2 w.
C32	V-9670	Capacitor, trimmer (F-M—R-F)	*R30	V-9673-1 assy	Control, volume 1 megohm (assy consists of R30 and SW1)
C33	V-9671	Capacitor, variable tuning (consists of A, B, C and D)	*SW1	V-9673-1 assy	Switch, on-off (assy consists of R30 and SW1)
L1	V-9672	Coil, A-M osc.	SW2	V-9681-1	Switch, selector
L2	V-9674	Coil, F-M—R-F	T1	V-9688	Transformer, 1st F-M—I-F
	V-9676-1	Core, F-M—R-F and osc. tuning	T2	V-9642	Transformer, 2nd F-M—I-F
L4	V-9099-1	Choke, 1.1 microhenries	T3	V-9048	Transformer, ratio detector
L5	V-9099-1	Choke, 1.1 microhenries	T4	V-9665	Transformer, output
L6	V-9099-1	Choke, 1.1 microhenries	T5	V-9649-1	Transformer, 1st A-M—I-F
L8	V-4886-10	Choke, antenna input	T6	V-6130-1	Transformer, 2nd A-M—I-F
			Z1	V-4886-6	Choke
			Z2	V-9675	Coil and capacitor assy, F-M osc.
				V-9676-1	Core, F-M—R-F and osc. tuning

*Sold only as complete assembly.



MODELS H-309P5 AND H-309P5U CHASSIS V-2156 SERVICE NOTES

SPECIFICATIONS

FREQUENCY RANGE540 to 1615 kc.

INTERMEDIATE FREQUENCY455 kc.

TUBE COMPLEMENT:

1 1U4R-F Amplifier
1 1R5Converter
1 1U4I-F Amplifier
1 1U5Det., AVC, and 1st A-F Amp.
1 3V4Output Amplifier

POWER OUTPUT:

Maximum0.38 watt
Undistorted0.18 watt

LOUDSPEAKER5 1/4" PM

POWER SUPPLY:

Battery Operation—"AB" Battery Pack (9 v. "A" and 90 v. "B")—Eveready 756W, Burgess T6Z60 or Ray-O-Vac AB601

Line Operation105 to 120 volts, D-C or 50 to 60 cycles A-C

CURRENT CONSUMPTION (Battery Operation):

"A" section of "AB" battery05 amp
"B" section of "AB" battery016 amp

POWER CONSUMPTION (Line Operation).....15 watts

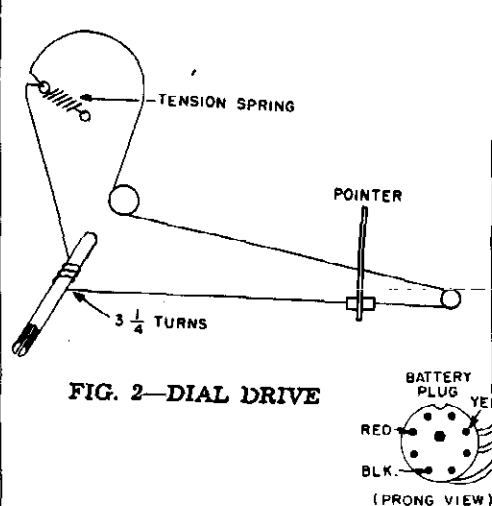


FIG. 2—DIAL DRIVE

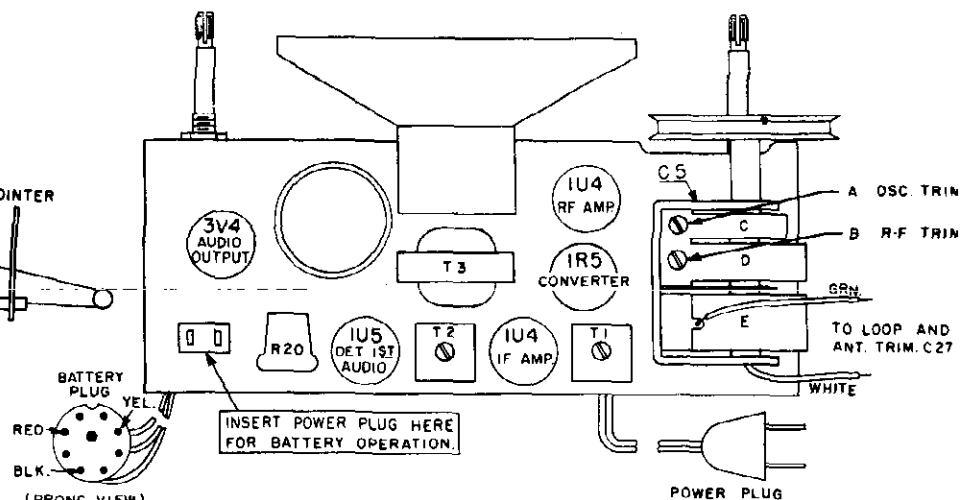
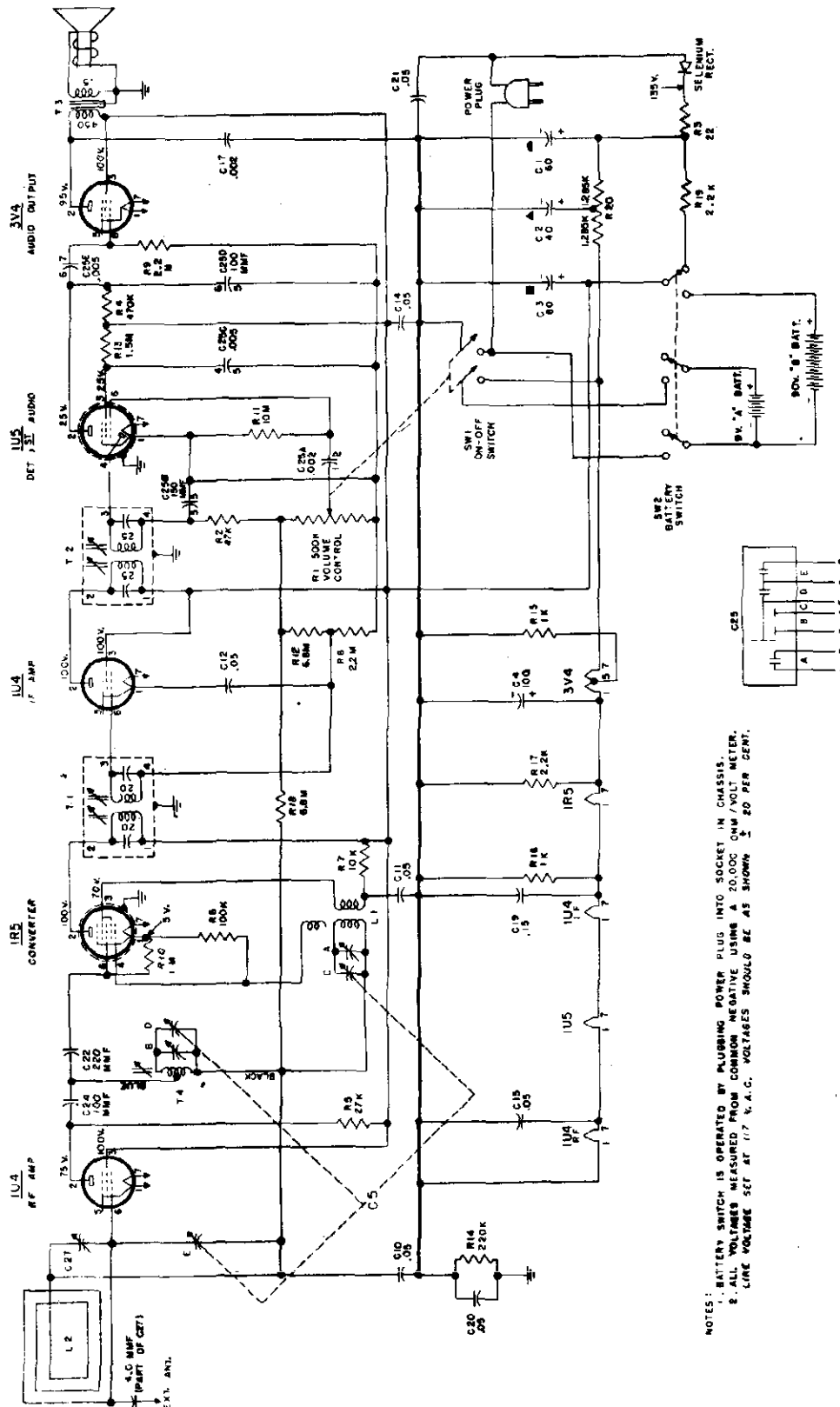


FIG. 3—CHASSIS LAYOUT

MODELS R-309P5, R-309P5U, Ch. V-2156



NOTES:
1. BATTERY SWITCH IS OPERATED BY PLUGGING POWER PLUG INTO SOCKET IN CHASSIS.
2. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING A 20,000 OHM/VOLT METER.
LINE VOLTAGE SET AT 117 V.A.C. VOLTAGES SHOULD BE AS SHOWN \pm 20 PER CENT.

FIG. 1—SCHEMATIC DIAGRAM OF V-2156 CHASSIS

ALIGNMENT

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust for Maximum Output—
1	Pin No. 6 of the 1R5 converter through a 200 mmf capacitor	455 kc.	Minimum capacity	Top and bottom slugs of T2 and T1 in order given *
2	Stator of antenna tuning section of gang (E) through a 200 mmf capacitor	1615 kc.	Minimum capacity	Osc. trimmer (A)
3	Same as step 2	1400 kc.	1400 kc.	R-F trimmer (B)
4	Same as step 2	600 kc.	600 kc.	Slug of R-F trans. (T4)**
5	Recheck steps 3 and 4			
6	Radiated signal	1400 kc.	1400 kc.	Antenna trimmer (C27)

* It is recommended that a fiber aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.

**A 10/32" Allen wrench can be used to adjust the slug in T4.

PARTS LIST FOR MODELS H-309P5 AND H-309P5U

When ordering parts, specify model number of set in addition to part number and description of part.

CABINET AND MISCELLANEOUS

Part No.	Description
V-1204-1	Cabinet
V-6554-1	Cable assembly, battery
V-5426	Clip, I-F mounting
V-5684	Clip, tubular (back cover catch)
V-3219S-1	Cord, dial drive
V-4349-6	Cord, Power A-C
V-9699-1	Knob
V-9701	Loop, antenna
V-9697-1	Nameplate, Westinghouse
V-6568-2	Pointer
V-9704-2	Shaft, tuning
V-9706-1	Shield, miniature tube spring (1U5, 1R5)
V-4292S-1	Socket, miniature molded (3V4, 1U4, 1R5, 1U5)
V-9705	Speaker, 5" PM
V-4057	Spring, dial cord
V-5687	Spring, back cover hinge

V-2156 CHASSIS

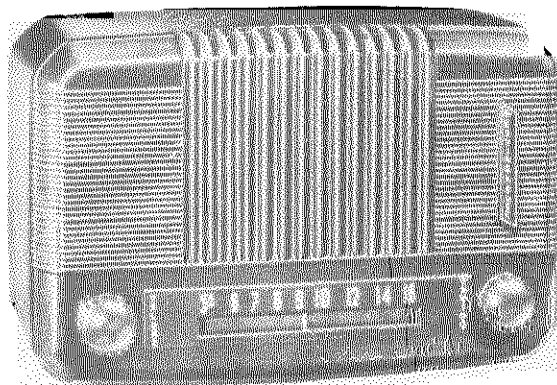
Ref. No.	Part No.	Description
*C1	V-6552-2 assy	Capacitor, electrolytic 80 mfd 150 v. (assy consists of C1, C2, C3 and C4)....
*C2	V-6552-2 assy	Capacitor, electrolytic 40 mfd 150 v. (assy consists of C1, C2, C3 and C4)....
*C3	V-6552-2 assy	Capacitor, electrolytic 80 mfd 150 v. (assy consists of C1, C2, C3 and C4)....
*C4	V-6552-2 assy	Capacitor, electrolytic 100 mfd 25 v. (assy consists of C1, C2, C3 and C4)....
*C	V-6556	Capacitor, variable tuning (consists of A, B, C, D and E)

C10	RCP10W2503M	Capacitor, .05 mfd
C11	RCP10W2503M	Capacitor, .05 mfd
C12	RCP10W2503M	Capacitor, .05 mfd
C14	RCP10W2503M	Capacitor, .05 mfd
C15	V-6066-2503M	Capacitor, .05 mfd 200 v.
C17	V-6066-4202M	Capacitor, .002 mfd 400 v.
C19	RCP10W2154M	Capacitor, .15 mfd 200 v.
C20	RCP10W2503M	Capacitor, .05 mfd
C21	RCP10W4503M	Capacitor, .05 mfd
C22	RCM20A221M	Capacitor, 220 mmf
C24	RCM20A101M	Capacitor, 100 mmf
C25	V-9703-1	Capacitor, multiple (consists of A, B, C and D)
*C27	V-9701 assy	Capacitor, variable (assy consists of C27 and L2)
L1	V-5661	Coil, osc.
*L2	V-9701 assy	Loop, ant. (assy consists of C27 and L2)
*R1	V-5666-5 assy	Control, volume 500,000 ohms (assy consists of R1 and SW1)
R2	V-6558-1	Rectifier, selenium
R3	RC20AE473M	Resistor, 47,000 ohms ½ w.
R4	RC30AE220M	Resistor, 22 ohms 1 w.
R5	RC20AE474M	Resistor, 470,000 ohms ½ w.
R6	RC20AE273M	Resistor, 27,000 ohms ½ w.
R7	RC20AE104M	Resistor, 100,000 ohms ½ w.
R8	RC20AE103M	Resistor, 10,000 ohms ½ w.
R9	RC20AE225M	Resistor, 2.2 megohms ½ w.
R10	RC20AE105M	Resistor, 2.2 megohms ½ w.
R11	RC20AE106M	Resistor, 1 megohm ½ w.
R12	RC20AE685M	Resistor, 10 megohms ½ w.
R13	RC20AE155M	Resistor, 6.8 megohms ½ w.
R14	RC20AE224M	Resistor, 1.5 megohms ½ w.
R15	RC20AE102K	Resistor, 220,000 ohms ½ w.
R16	RC20AE102K	Resistor, 1000 ohms ½ w.
R17	RC20AE222K	Resistor, 1000 ohms ½ w.
R18	RC20AE685M	Resistor, 2200 ohms ½ w.
R19	RC30AE222K	Resistor, 6.8 megohms ½ w.
R20	V-9246-1	Resistor, 2200 ohms 1 w.
*SW1	V-5666-5 assy	Resistor, ballast 2570 ohms Switch, on-off (assy consists of SW1 and R1)
SW2	V-6565	Switch, line-battery
T1	V-6972-5	Transformer, 1st I-F
T2	V-6972-6	Transformer, 2nd I-F
T3	V-6567	Transformer, audio
T4	V-6561	Transformer, RF

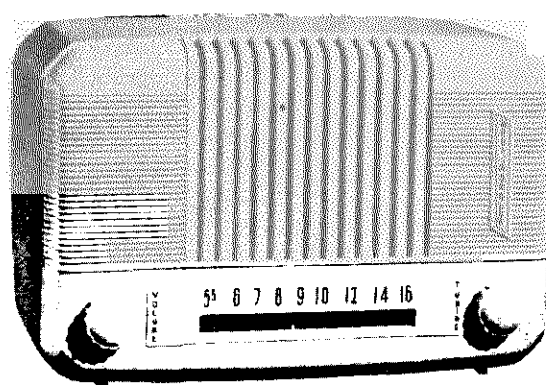
*Sold only as complete assembly.

PAGE 21-12 WESTINGHOUSE

MODELS H-310T5, H-311T5, Ch.
V-2161; H-310T5U, H-311T5U, Ch. V-2161U



**H-310T5
H-310T5U**
(BROWN)



**H-311T5
H-311T5U**
(IVORY)

SERVICE NOTES

SPECIFICATIONS

FREQUENCY RANGE: 540 to 1615 kc.

INTERMEDIATE FREQUENCY: 455 kc.

TUBE COMPLEMENT:

1	12BE6	.....	Converter
1	12BA6	.....	I-F Amp.
1	12AV6	.....	Det., AVC, and 1st A-F Amp.
1	50C5	.....	Output Amp.
1	35W4	.....	Rectifier

POWER OUTPUT:

Undistorted	.....	0.9 watt
Maximum	.....	1.5 watts

LOUDSPEAKER: 4" P.M.

OPERATING VOLTAGE: 105 to 120 volts, 50-60 cycles A-C or D-C

POWER CONSUMPTION: 35 watts

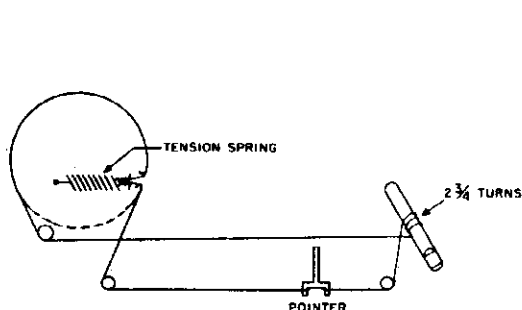


FIG. 1—DIAL DRIVE

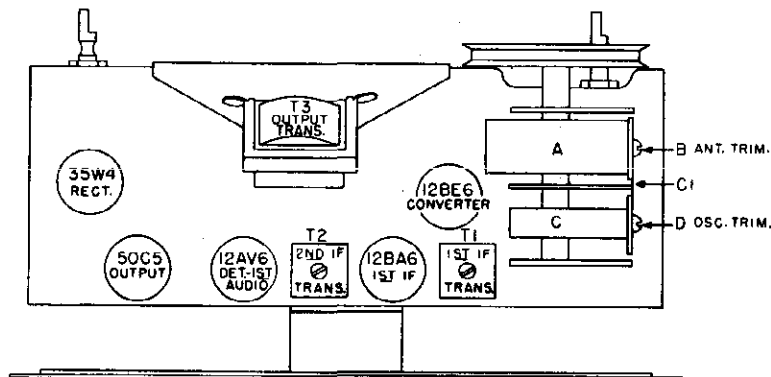


FIG. 2—CHASSIS LAYOUT

MODELS H-310T5, -H-311T5,
Ch. V-2161; H-310T5U,
H-311T5U, Ch. V-2161U

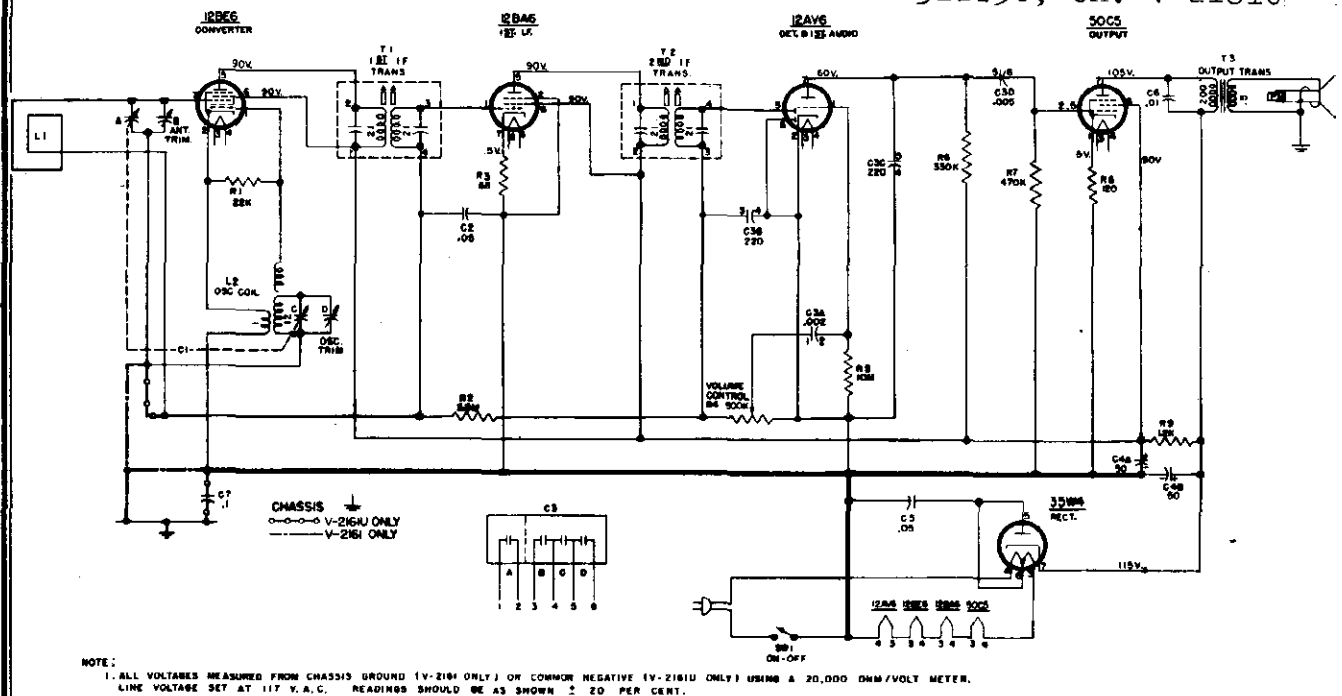


FIG. 3—SCHEMATIC DIAGRAM OF V-2161 AND V-2161U CHASSIS

WARNING: The V-2161 chassis is connected directly to one side of the power line. When making repairs or adjustments, it is recommended that the chassis be isolated from the line by means of an isolation transformer. Otherwise serious shock may result if the radio chassis and ground are contacted at the same time.

ALIGNMENT

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

Make certain that the dial pointer is correctly positioned. When the gang is completely closed, the pointer should be over the small bump near the left end of the dial background.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Step	Connect Signal Generator to —	Signal Generator Frequency	Radio Dial	Adjust for Maximum Output—
1	Stator of R-F tuning capacitor (A) through a 0.1 mfd capacitor	455 kc.	Minimum capacity	Top and bottom slugs in 2nd and 1st I-F trans. in order given *
2	Same as step 1	1615 kc.	Minimum capacity	Osc. trimmer (D)
3	Radiated Signal	1400 kc.	1400 kc.	Ant. trimmer (B)

* It is recommended that a fiber aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.

MODELS H-310T5, H-311T5,
Ch. V-2161; H-310T5U,
H-311T5U, Ch. V-2161U

PARTS LIST FOR MODELS H-310T5, H-311T5, H-310T5U, AND H-311T5U

When ordering parts, specify model number of set in addition to part number and description of part.

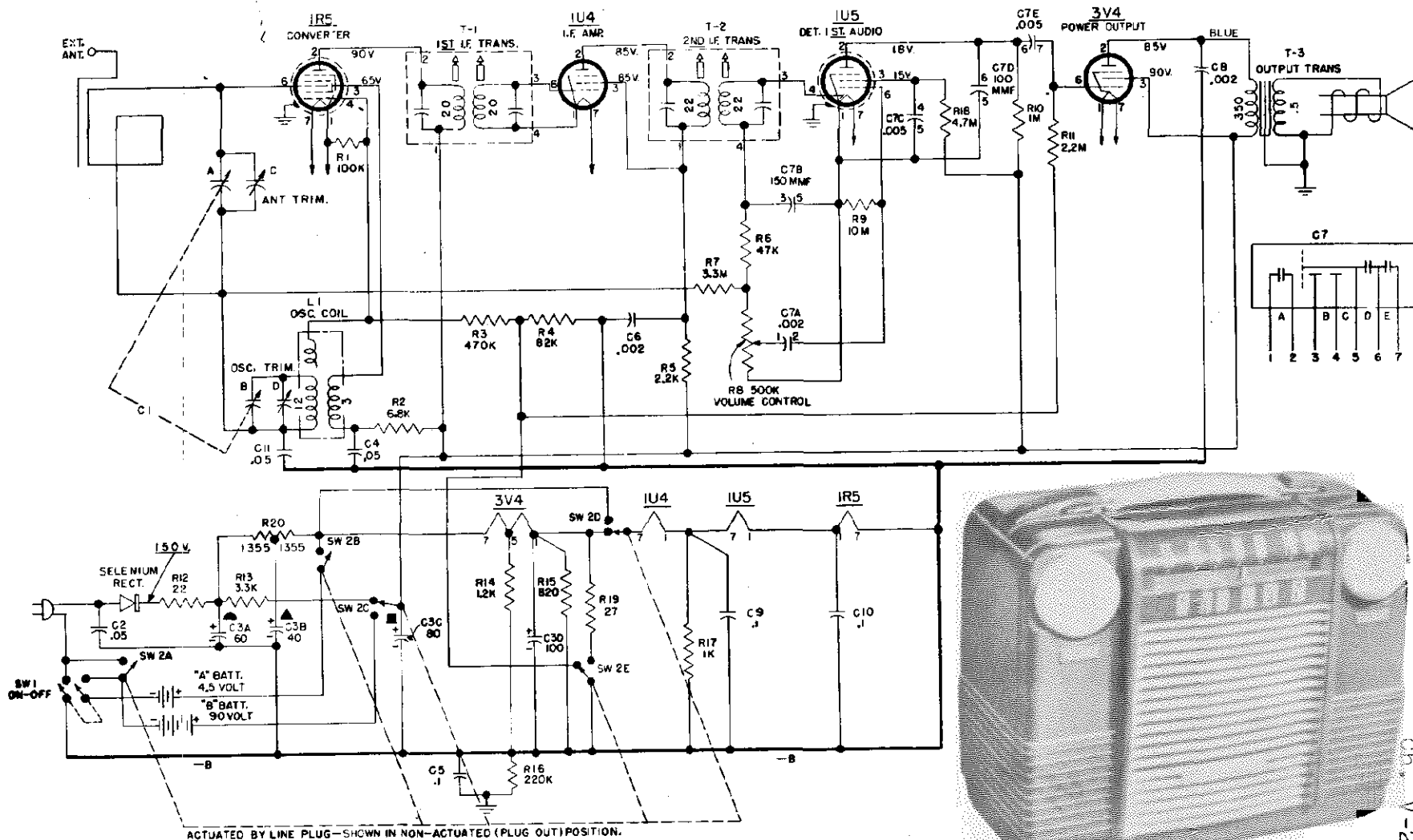
CABINET AND ACCESSORIES

Part No.	Description
V-9746-1	Baffle and grille cloth assembly (ivory)
V-1207-1	Cabinet (brown)
V-1207-2	Cabinet (ivory)
V-5426	Clip, I-F mounting
V-3219S-1	Cord, dial drive
V-6184-4	Knob (brown)
V-6184-5	Knob (ivory)
V-6190-3	Pointer, dial
V-6191-5	Shaft, tuning
V-9706-1	Shield, spring (12AV6)
V-4292S-1	Socket, miniature molded (12BE6, 12BA6, 12AV6, 50C5 and 35W4)
V-9727	Speaker, 4" PM
V-4057	Spring, dial drive

V-2161 AND V-2161U CHASSIS

Ref. No.	Part No.	Description
C1	V-6231	Capacitor, variable (consists of A, B, C and D)
C2	RCP10W2503M	Capacitor, .05 mfd 200 v.
C3	V-9634-1	Capacitor, multiple ceramic (consists of A, B, C and D)
C4	V-6230	Capacitor, electrolytic 50-50 mfd 150 v. (consists of A and B)
C5	RCP10W4503M	Capacitor, .05 mfd 400 v.
C6	RCP10W4103M	Capacitor, .01 mfd 400 v.
C7	RCP10W4104M	Capacitor, .1 mfd 400 v. (V-2161U only)
L1	V-9725	Loop, antenna
L2	V-9724	Coil, osc.
R1	RC20AE223M	Resistor, 22,000 ohms $\frac{1}{2}$ w.
R2	RC20AE335M	Resistor, 3.3 meg. $\frac{1}{2}$ w.
R3	RC20AE680M	Resistor, 68 ohms $\frac{1}{2}$ w.
*R4	V-6198-5	Control, volume 500,000 ohms (assy consists of R4 and SW1)
R5	RC20AE106M	Resistor, 10 meg.
R6	RC20AE334M	Resistor, 330,000 ohms $\frac{1}{2}$ w.
R7	RC20AE474M	Resistor, 470,000 ohms $\frac{1}{2}$ w.
R8	RC20AE121M	Resistor, 120 ohms $\frac{1}{2}$ w.
R9	RC30AE122M	Resistor, 1200 ohms 1 w.
*SW1	V-6198-5	Switch, on-off (assy consists of SW1 and R4)
T1	V-9735-1	Transformer, 1st I-F
T2	V-9735-1	Transformer, 2nd I-F

* Sold only as complete assembly.



NOTE

1. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING A 20,000 OHM/VOLT METER. VOLTAGES SHOULD BE AS SHOWN ± 20 PER CENT.
2. ALL CAPACITOR VALUES ARE SHOWN IN MFD. UNLESS OTHERWISE SPECIFIED ALL RESISTOR VALUES ARE SHOWN IN OHMS UNLESS OTHERWISE SPECIFIED

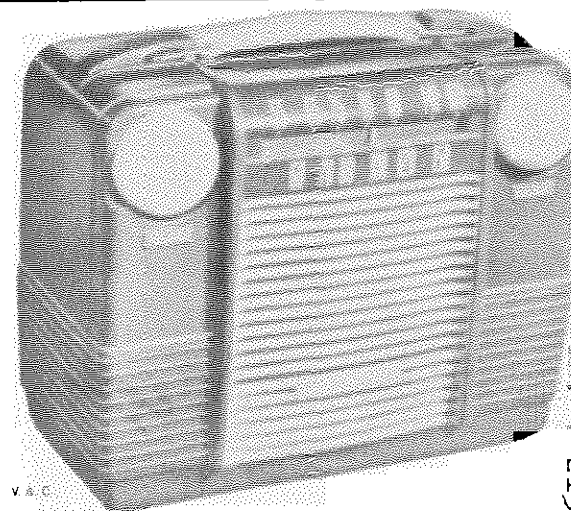
FREQUENCY RANGE: 540 to 1615 kc.

POWER CONSUMPTION (Line Operation):

..... 15 watts
INTERMEDIATE FREQUENCY. 455 kc.

POWER OUTPUT:

Maximum 0.23 watt
 Undistorted 0.12 watt
LOUDSPEAKER: 4" P.M.



MODELS H-312P4, H-312P4U, H-313P4, U
 H-314P4, H-314P4U, H-315P4, H-315P4U,
 Ch. V-2153-1

POWER CORD PLUG. FOR BATTERY OPERATION THIS PLUG MUST BE INSERTED AS SHOWN. FOR OPERATION ON HOUSE CURRENT THIS PLUG MUST BE INSERTED INTO AN ELECTRIC OUTLET.

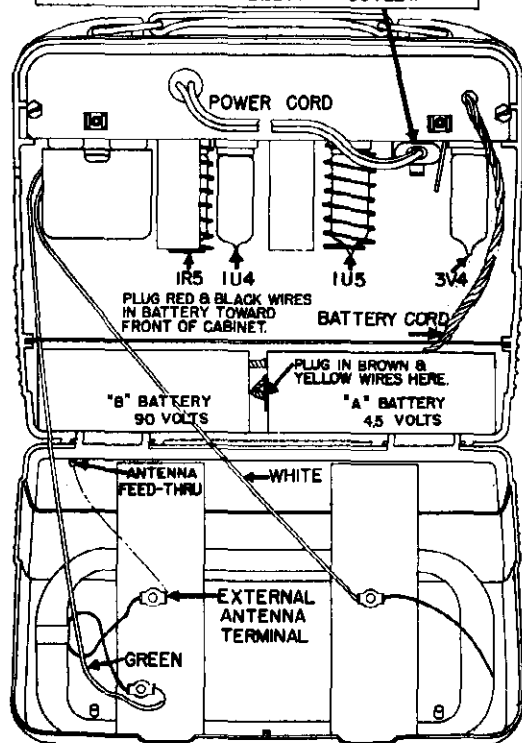


FIG. 2 — REAR VIEW WITH COVER OPEN

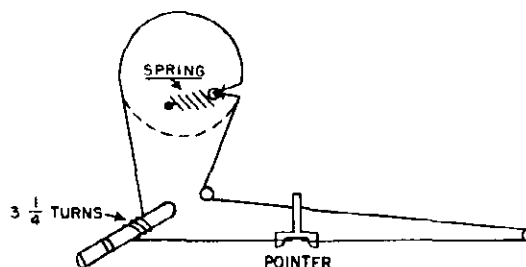
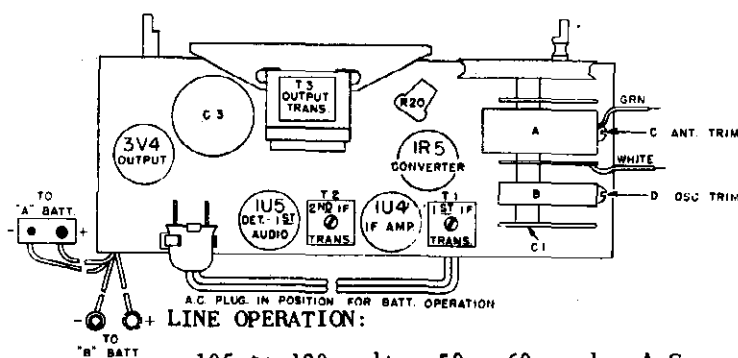


FIG. 3 — DIAL DRIVE



105 to 120 volts, 50 - 60 cycles A-C, or D-C

CURRENT CONSUMPTION (Battery Operation):

"A" Battery 0.1 amp.
"B" Battery 0.014 amp.

BATTERY PLACEMENT NOTE: The batteries should be inserted in the relative position shown in Fig. 2 with the connector end of the "B" battery facing the front of the receiver the connector end of the "A" battery facing the side of the "B" battery.

BATTERY OPERATION:

1 "A" Battery (4.5 v.) — Eveready 736, Ray-O-Vac P93A, or Burgess F3

1 "B" Battery (90 v.) — Eveready 490, Ray-O-Vac 4390, or Burgess N60

ALIGNMENT

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Step	Connect Signal Generator to —	Signal Generator Frequency	Radio Dial	Adjust for Maximum Output
1.	Stator of R-F tuning capacitor (A) through a 0.1 mfd	455 kc.	minimum capacity	Top and bottom slugs in 2nd and 1st I-F trans. in order given*
2.	Same as step 1	1615 kc.	minimum capacity	Osc. trimmer (D)
3.	Radiated Signal	1400 kc.	1400 kc.	Ant. trimmer (C)

*It is recommended that a fiber aligning tool that snugly fits the slot in the powered iron core be used to prevent chipping of the slot.

CABINET AND MISCELLANEOUS

MODELS H-312P4,
H-312P4U, H-313P4,
H-314P4, H-314P4U,
H-315P4, H-315P4U,
Ch. V-2153-1

Part No.	Description
V-5675-2	Baffle and grille cloth assembly
V-5652	Background, dial
V-1157-8	Cabinet (brown and ivory)
V-1157-9	Cabinet (ivory and brown)
V-9415-2	Cable assembly, battery
V-5426	Clip, I-F mounting
V-5684	Clip, tubular (back cover catch)
V-4349-8	Cord, A-C
V-4304-16	Cord, dial drive
V-9751-1	Handle (brown)
V-9751-2	Handle (ivory)
V-5698-3	Knob (brown)
V-5698-4	Knob (ivory)
V-9405-2	Loop, antenna
V-5650	Pointer, dial
V-6191-1	Shaft, tuning
V-9753-1	Shelf, battery retainer
V-9706	Shield, spring (1R5, 1U5)
V-4292S-1	Socket, miniature molded (1U5, 1R5, 1U4, and 3V4)
V-9419	Speaker, 4" P.M.
V-5687	Spring, back cover hinge
V-4057	Spring, dial drive
V-4651	Stud, baffle and grille cloth mounting

V-2153-1 CHASSIS

Ref. No.	Part No.	Description
C1	V-5651	Capacitor, variable (consists of A, B, C and D)
C2	RCP10W4503M	Capacitor, .05 mfd 400 v.
C3	V-6552-2	Capacitor, electrolytic (consists of A, B, C and D)
C4	RCP10W2503M	Capacitor, .05 mfd 200 v.
C5	RCP10W2104M	Capacitor, .1 mfd 200 v.
C6	RCP10W4202M	Capacitor, .002 mfd 400 v.
C7	V-9703-1	Capacitor, multiple (consists of A, B, C and D)
C8	RCP10W4202M	Capacitor, .002 mfd 400 v.
C9	RCP10W2104M	Capacitor, .1 mfd 200 v.
C10	RCP10W2104M	Capacitor, .1 mfd 200 v.
C11	RCP10W2503M	Capacitor, .05 mfd 200 v.
L1	V-5661	Coil, osc.
	V-9446-1	Rectifier, selenium
R1	RC20AE104M	Resistor, 100,000 ohms $\frac{1}{2}$ w.
R2	RC20AE682M	Resistor, 6800 ohms $\frac{1}{2}$ w.
R3	RC20AE474M	Resistor, 470,000 ohms $\frac{1}{2}$ w.
R4	RC20AE823K	Resistor, 82,000 ohms $\frac{1}{2}$ w.
R5	RC20AE222M	Resistor, 2200 ohms $\frac{1}{2}$ w.
R6	RC20AE473M	Resistor, 47,000 ohms $\frac{1}{2}$ w.
R7	RC20AE335M	Resistor, 3.3 megohms $\frac{1}{2}$ w.
R8	V-6198-6	Control, volume 500,000 ohms (consists of R8 and SW1)
R9	RC20AE106M	Resistor, 10 megohms $\frac{1}{2}$ w.
R10	RC20AE105M	Resistor, 1.0 megohms $\frac{1}{2}$ w.
R11	RC20AE225M	Resistor, 2.2 megohms $\frac{1}{2}$ w.
R12	RC30AE220M	Resistor, 22 ohms 1 w.
R14	RC20AE122K	Resistor, 1200 ohms $\frac{1}{2}$ w.
R15	RC20AE821K	Resistor, 820 ohms $\frac{1}{2}$ w.
R16	RC20AE224M	Resistor, 220,000 ohms $\frac{1}{2}$ w.
R17	RC20AE102M	Resistor, 1000 ohms $\frac{1}{2}$ w.
R18	RC20AE475M	Resistor, 4.7 megohms $\frac{1}{2}$ w.
R19	RC20AE270K	Resistor, 27 ohms $\frac{1}{2}$ w.
R20	V-9125-2	Resistor, ballast, 2710 ohms
SW1	V-6198-6	Switch, on-off (consists of SW1 and R8)
SW2	V-9420	Switch, line battery
T1	V-6972-5	Transformer, 1st I-F
T2	V-6972-6	Transformer, 2nd I-F

following parts apply only to Models H-314P4, H-314P4U, H-315P4 and H-315P4U:

V-1157-10	Cabinet (black cabinet, red grille)
V-1157-11	Cabinet (red cabinet, black grille)
V-9751-3	Handle (black)
V-9751-4	Handle (red)
V-5698-5	Knob (black)
V-5698-6	Knob (red)

MODELS H-316C7, H-326C7
Ch. V-2136-1

SPECIFICATIONS

FREQUENCY RANGES:

Amplitude Modulation540 to 1615 kc.
Frequency Modulation88 to 108 mc.

INTERMEDIATE FREQUENCIES:

Amplitude Modulation455 kc.
Frequency Modulation10.7 mc.

TUBE COMPLEMENT:

1 12AT7R-F Amp. and Mixer (FM)
1 12BE6FM Osc. and AM Converter
1 12BA6I-F Amp.
1 6BJ6I-F Driver (FM)
1 12AL5Ratio Det. (FM)
1 12AV6Det. and AVC (AM) and A-F Amp.
1 50L6GTOutput Amp.

POWER OUTPUT:

Undistorted2.5 watts
Maximum3.0 watts

LOUDSPEAKER:10" PM

OPERATING

VOLTAGE:117 volts, 60 cycles AC

POWER CONSUMPTION:70 watts

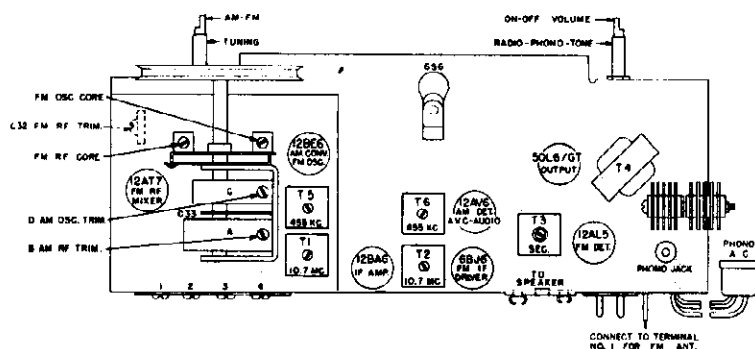


FIG. 2—TOP VIEW OF CHASSIS

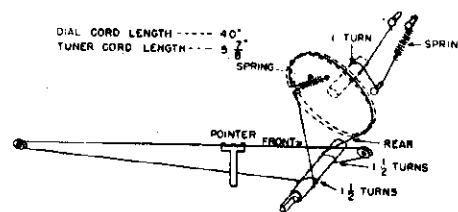
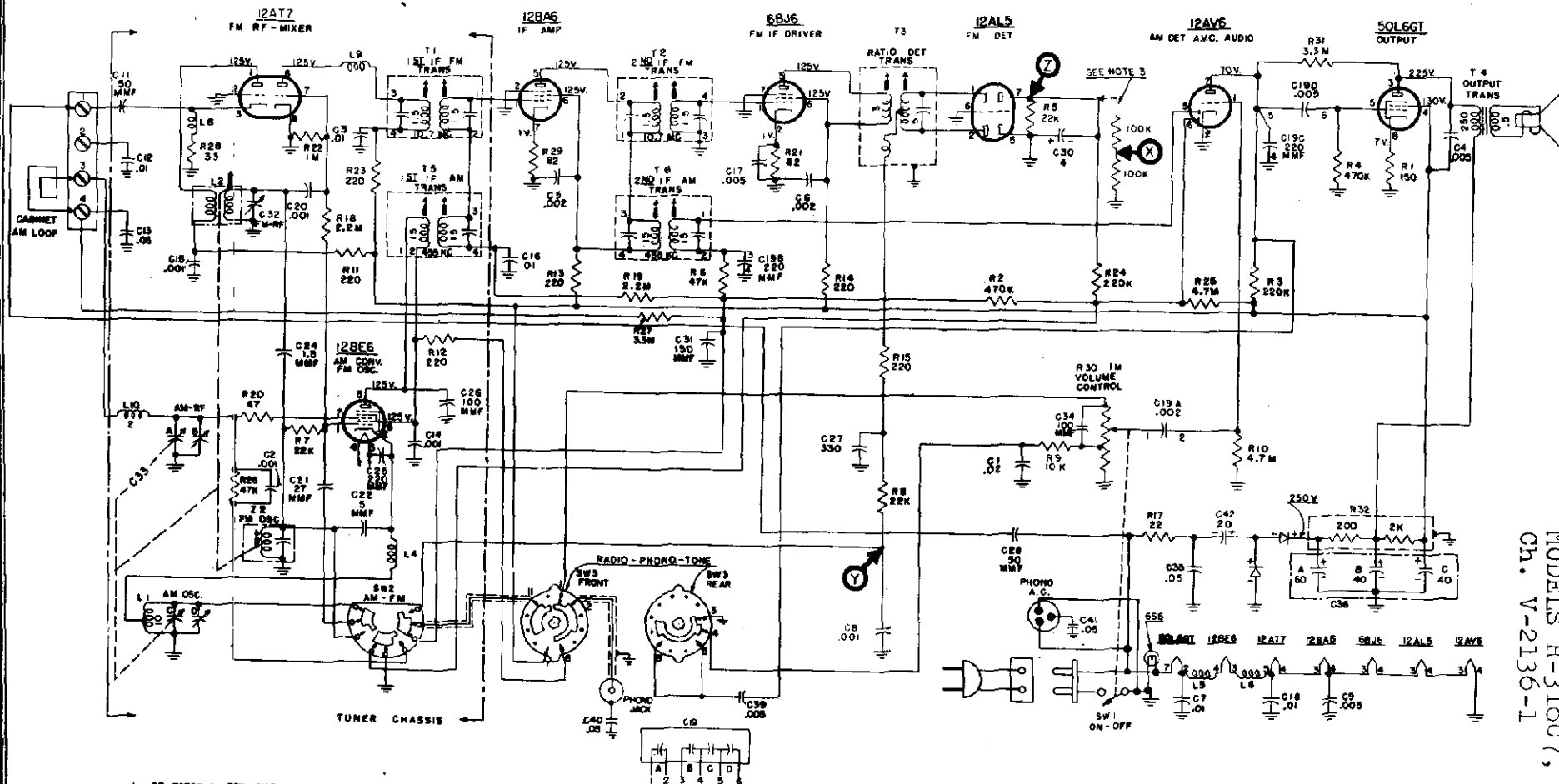


FIG. 3—DIAL DRIVE

WARNING: The chassis of this receiver is connected directly to one side of the power line. When making repairs or adjustments, it is recommended that the chassis be isolated from the line by means of an isolation transformer. Otherwise, serious shock may result if the radio chassis and ground are contacted at the same time.



1. SELECTOR SWITCH SW2 IS SHOWN IN EXTREME CLOCKWISE POSITION ON AM BAND AS VIEWED FROM THE FRONT.
2. SELECTOR SWITCH SW3 IS IN EXTREME CLOCKWISE POSITION ON PHONE TREBLE POSITION AS VIEWED FROM FRONT.
3. TO BE INSTALLED FOR ALIGNMENT ONLY

4. ALL VOLTAGES MEASURED FROM CHASSIS (GROUND) USING A 20,000 OHM/VOLT METER. LINE VOLTAGE SET AT 117 V.A.C. VOLTAGES SHOULD BE AS SHOWN \pm 20 PER CENT.

FIG. 1—SCHEMATIC DIAGRAM OF V-2136-1 CHASSIS

MODELS H-316C7, H-326C7,
Ch. V2136-1**ALIGNMENT**
BROADCAST BAND

Connect an output meter across the speaker voice coil.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Check the dial pointer position by meshing the tuning capacitor plates completely and seeing that the dial pointer is set on the end mark of the dial scale.

Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust
1	Set the band switch to AM and the radio-phono-tone control to RADIO			
2	Stator of tuning capacitor (A) through a 0.1 mfd capacitor	455 kc.	minimum capacity	Pri. and sec. of T6 and T5 for max. output in order given
NOTE: If the I-F transformers are badly mis-aligned, it may be impossible to obtain sufficient output using the above system. In this event, it will be necessary to align each transformer separately. Start with the last I-F transformer and work forward, connecting the signal generator to the control grid of the tube preceding the transformer under alignment.				
3	Radiated signal (no actual connection)	1615 kc.	minimum capacity	AM osc. trimmer (D) for max. output
4	Radiated signal (no actual connection)	1400 kc.	tune to signal	AM R-F trimmer (B) for max. output (rock-in adjustment)

FM BAND

Do not align the FM circuits until all AM adjustments have been completed.

Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust
1	Set the band switch to FM.			
2	Connect two 100,000 ohm resistors (the resistances must be equal within 5 per cent) between pin No. 7 of the 12AL5 tube and ground as shown on the schematic diagram.			
3	Connect a V.T.V. M. between points "X" and "Y" (see schematic diagram).			
4	Pin No. 7 of 12AT7 through a 0.1 mfd mica capacitor	10.7 mc.	minimum capacity	Sec. of T3 for zero (use medium strength signal)
5	Connect the V.T.V.M. between point "Z" and ground.			
6	Same as step 4	10.7 mc.	minimum capacity	Pri. of T3 and pri. and sec. of T1 and T2 for max.
7	Reconnect the V.T.V.M. between points "X" and "Y" and increase the signal strength 10 times.			
8	Same as step 4	10.7 mc.	minimum capacity	Recheck sec. of T3 for zero voltage
9	Reconnect the V.T.V. M. between point "Z" and ground.			
10	Same as step 4	10.7 mc.	minimum capacity	Pri. of T3 for maximum voltage
11	Remove the two 100,000 ohm resistors that were inserted in step 2.			
12	FM ant. terminal through a 300 ohm non-inductive resistor	98 mc.	98 mc.	FM osc. core for maximum voltage
13	Same as step 12	98 mc.	98 mc.	FM R-F trimmer (C32) for maximum voltage
14	Same as step 12	105 mc.	tune to signal	FM R-F core for maximum voltage
15	Same as step 12	90 mc.	tune to signal	FM R-F trimmer (C32) for maximum voltage (rock-in)
16	Recheck steps 14 and 15 for tracking.			

PARTS LIST FOR MODEL H-316C7**CABINET AND MISCELLANEOUS****Part No. Description**

V-5982-6 Antenna assembly, AM loop
V-6120-1 Background, dial
V-1212-1 Cabinet (mahogany)
V-5860-11 Cable assembly, speaker
V-9822-1 Cable assembly, phono AC (female)
V-9833-1 Cable assembly, phono AC (male)
V-6415-2 Cable, phono pick-up
V-9075-1 Clip, spring (ball-head-strike)
V-5426 Clip, I-F mounting
V-9053 Connector, phono
V-3219S-1 Cord, dial drive (100' spool)
V-9845-1 Cover, back (record changer)
V-9834-1 Cover assembly, back (radio)
V-8340 Doors (matched pairs)
V-8341 Drawer, record changer (complete less hardware)
V-9835-1 Escutcheon, dial
V-9832-1 Grille assembly, panel
V-9091-1 Hinge, L. H.
V-9091-2 Hinge, R. H.
V-6146-1 Knob, on-off-volume

Part No. Description

V-6146-5 Knob, AM-FM
V-9861-1 Knob, radio-phono-tone
V-9104-6 Knob, tuning
V-9252-2 Nameplate, Westinghouse
No. 656 Pilot light
V-9661 Plug, AC
V-9826-3 Pointer, dial
V-4967 Pull, drawer
V-3166S Pulley, dial cord
V-9678-2 Pulley, gang
V-3353-11 Slide, mechanism, L. H.
V-3353-12 Slide, mechanism, R. H.
V-4292-1 Socket, miniature molded
V-3556-1 Socket, miniature (12AT7)
V-4292S-2 Socket, miniature molded (12BE6)
V-3163 Socket, octal wafer
V-9860-1 Socket, pilot light
V-9770-2 Speaker, 10" PM
V-3248S Spring, dial drive
V-9076-1 Strike, ball head
V-9348 Terminal board, ant.-gnd.

V-2136-1 CHASSIS

MODELS H-316C7, H-326C7,
Ch. V-2136-1

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
C1	RCP10W4202M	Capacitor, .02 mfd 400 v.		V-9640	Rectifier, selenium
C2	V-9863-1	Capacitor, .001 mfd	R1	RC30AE151K	Resistor, 150 ohms 1 w.
C3	RCP10W4103M	Capacitor, .01 mfd 200 v. .	R2	RC20AE474M	Resistor, 470,000 ohms ½ w
C4	RCP10W4502M	Capacitor, .005 mfd 400 v.	R3	RC20AE224M	Resistor, 220,000 ohms ½ w
C5	RCP10W6202M	Capacitor, .002 mfd 600 v.	R4	RC20AE474M	Resistor, 470,000 ohms ½ w
C6	RCP10W6202M	Capacitor, .002 mfd 600 v.	R5	RC20AE153K	Resistor, 15,000 ohms (used when T3 is V-9048 or V-9984)
C7	RCP10W2103M	Capacitor, .01 mfd 200 v.		RC20AE223K	Resistor, 22,000 ohms ½ w. (used when T3 is V-9828)
C8	RCP10W6102M	Capacitor, .001 mfd 600 v.	R6	RC20AE473M	Resistor, 47,000 ohms ½ w
C9	V-5596	Capacitor, .005 mfd, hi-kep	R7	RC20AE223K	Resistor, 22,000 ohms ½ w
C11	V-5658-10	Capacitor, 50 mmf	R8	RC20AE223M	Resistor, 22,000 ohms ½ w
C12	RCP10W4103M	Capacitor, .01 mfd 400 v. .	R9	RC20AE103M	Resistor, 10,000 ohms ½ w
C13	RCP10W2503M	Capacitor, .05 mfd 200 v. .	R10	RC20AE475M	Resistor, 4.7 megohms ½ w
C14	V-5596	Capacitor, .005 mfd	R11	RC20AE221M	Resistor, 220 ohms ½ w
C15	V-9863-1	Capacitor, .001 mfd	R12	RC20AE221M	Resistor, 220 ohms ½ w
C16	RCP10W2103M	Capacitor, .01 mfd 200 v. .	R13	RC20AE221M	Resistor, 220 ohms ½ w
C17	V-5596	Capacitor, .005 mfd	R14	RC20AE221M	Resistor, 220 ohms ½ w
C18	RCP10W2103M	Capacitor, .01 mfd 200 v. .	R15	RC20AE221M	Resistor, 220 ohms ½ w (used when T3 is V-9048 or V-9828)
C19	V-9634-1	Capacitor, multiple ceramic (A .002 mfd) (B 220 mfd) (C 220 mfd) (D .005 mfd)		RC20AE471M	Resistor, 470 ohms ½ w (used when T3 is V-9984)
C20	V-9863-1	Capacitor, .001 mfd	R17	V-6067-7	Resistor, 22 ohms 3 w.
C21	R2CC30UK270K	Capacitor, 27 mmf	R18	RC20AE225M	Resistor, 2.2 megohms ½ w
C22	R2CC30UK050D	Capacitor, 5 mmf	R19	RC20AE225M	Resistor, 2.2 megohms ½ w
C24	V-5658-9	Capacitor, 1.5 mmf	R20	RC20AE470M	Resistor, 47 ohms ½ w
C25	R5CC20ZY221M	Capacitor, 220 mmf	R21	RC20AE820K	Resistor, 82 ohms ½ w
C26	RCM20D101J	Capacitor, 100 mmf	R22	RC20AE105M	Resistor, 1 megohm ½ w
C27	RCM20A221M	Capacitor, 220 mmf (used when T3 is V-9048 or V-9984)	R23	RC20AE221M	Resistor, 220 ohms ½ w ...
	RCM20A331M	Capacitor, 330 mmf (used when T3 is V-9828)	R24	RC20AE224M	Resistor, 200,000 ohms ½ w
C28	V-5658-10	Capacitor, 50 mmf	R25	RC20AE475M	Resistor, 4.7 megohm ½ w
C30	V-4637	Capacitor, 4 mfd 50 v.	R26	RC20AE473M	Resistor, 47,000 ohms ½ w
C31	RCM20A151M	Capacitor, 150 mmf	R27	RC20AE333M	Resistor, 3.3 megohms ½ w
C32	V-9670	Capacitor, trimmer (FM RF)	R28	RC20AE330M	Resistor, 33 ohms ½ w
C33	V-9671-2	Capacitor, variable (con- sists of A, B, C and D)	R29	RC20AE820K	Resistor, 82 ohms ½ w
C34	RCM20A101M	Capacitor, 100 mmf	*R30	V-9824-1	Control, vol. 1 megohm, on- off, selector switch
C35	V-6772-4473M	Capacitor, .05 mfd 400 v.	R31	RC20AE335M	Resistor, 3.3 megohms ½ w
C36	V-9919	Capacitor, 60-40-40 mfd 250 v. (consists of A, B, and C)	R32	V-10054	Resistor, ballast (2000 ohms 6 w. - 200 ohms 3 w.) ...
C39	RCP10W4503M	Capacitor, .005 mfd 400 v.	*SW1	V-9824-1	Switch, on-off (consists of vol. and phono-tone)
C40	RCP10W2503M	Capacitor, .05 mfd 200 v.	SW2	V-9681-1	Switch, band (AM-FM)
C41	RCP10W2503M	Capacitor, .05 mfd 200 v.	*SW3	V-9824-1	Switch, phono-tone (con- sists of vol. and on-off)
C42	V-9823	Capacitor, 20 mfd 200 v.			
L1	V-9672	Coil, AM osc.	T1	V-9688	Transformer, 1st FM I-F ..
L2	V-9674	Coil, FM RF	T2	V-9642	Transformer, 2nd FM I-F ..
L4	V-9099-1	Choke, RF	T3	V-9828	Transformer, ratio detector
L5	V-9099-1	Choke, RF	T4	V-9827	Transformer, audio
L6	V-9099-1	Choke, RF	T5	V-9649-1	Transformer, 1st AM I-F ..
L8	V-9099-1	Choke, RF	T6	V-6130-1	Transformer, 2nd AM I-F ..
L9	V-4886-12	Choke, RF	Z2	V-9675	Coil & cap. assy., FM osc
L10	V-6157	Coil, antenna loading		V-9676-1	Core, FM-RF & osc. tuning

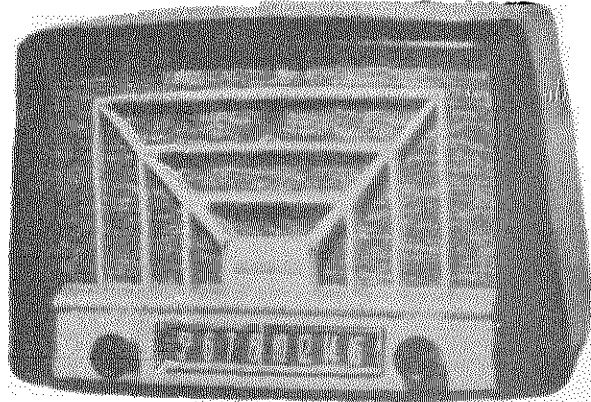
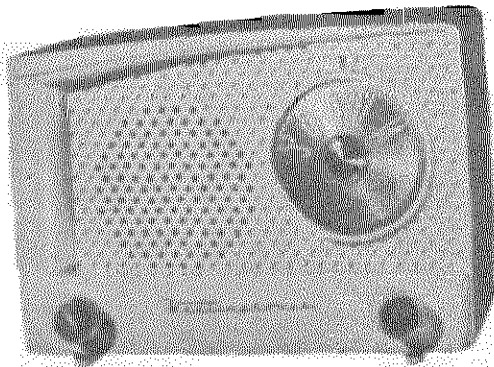
CABINET AND MISCELLANEOUS PARTS FOR MODEL H-326C7

When ordering parts, specify model number of set in addition to part number and description of part.

Part No.	Description	Part No.	Description
V-5982-4	Antenna assy., AM loop	V-9104-6	Knob, tuning
V-6120-1	Background, dial	V-8344	Motor board (with rails)
V-9485-5	Baffle and grille cloth assy..	No. 6S6	Pilot light
V-1222-1	Cabinet	V-9661	Plug, AC
V-5860-3	Cable assy., speaker	V-9826-3	Pointer, dial
V-9822-1	Cable assy., phono AC (female)	V-9981-3	Pull, door
V-9833-1	Cable assy., phono AC (male) .	V-3166S	Pulley, dial cord
V-6415-2	Cable, phono pick-up	V-9678-2	Pulley, gang
V-4898-1	Catch, bullet	V-9680-1	Sleeve, dial drive
V-5426	Clip, I-F mounting	V-3353-1	Slide mechanism, L.H.
V-9053	Connector, phono	V-3353-2	Slide mechanism, R.H.
V-3219S-1	Cord, dial drive (100' spool)	V-4292-1	Socket, miniature molded (12BA6, 6BJ6, 12AL5, 12AV6)
V-9834-1	Cover assy., back	V-5556-1	Socket, miniature (12AT7) ...
V-8342	Door, upper (matched pairs) ..	V-4292S-2	Socket, miniature molded (12BE6)
V-8343	Door, lower (matched pairs) ..	V-3163	Socket, octal wafer (50L6GT)
V-9835-1	Escutcheon	V-9860-1	Socket, pilot light
V-10109-1	Hinge, L.H.	V-9431-3	Speaker, 12" PM
V-10109-2	Hinge, R.H.	V-3248S	Spring, dial drive
V-5301-4	Knob, lower door	V-4900-1	Strike, bullet
V-6146-1	Knob, on-off-volume	V-9348	Terminal board, ant.-gnd. ...
V-6146-5	Knob, AM-FM		
V-9861-1	Knob, radio-phono-tone		

PAGE 21-22 WESTINGHOUSE

MODELS H-318T5, H-320T5, Ch. V-2157:
H-318T5U, H-320T5U, Ch. V-2157U;
H-321T5, H-322T5, Ch. V-2157-1;
H-321T5U, H-322T5U, Ch. V-2157-1U



SPECIFICATIONS

FREQUENCY RANGE:540 to 1615 kc.

INTERMEDIATE FREQUENCY:455 kc.

TUBE COMPLEMENT:

1	12BE6	.....	Converter
1	12BA6	.....	I-F Amp.
1	12AV6	.....	Det., AVC, and 1st A-F Amp.
1	50C5	.....	Output Amp.
1	35W4	.....	Rectifier

POWER OUTPUT:

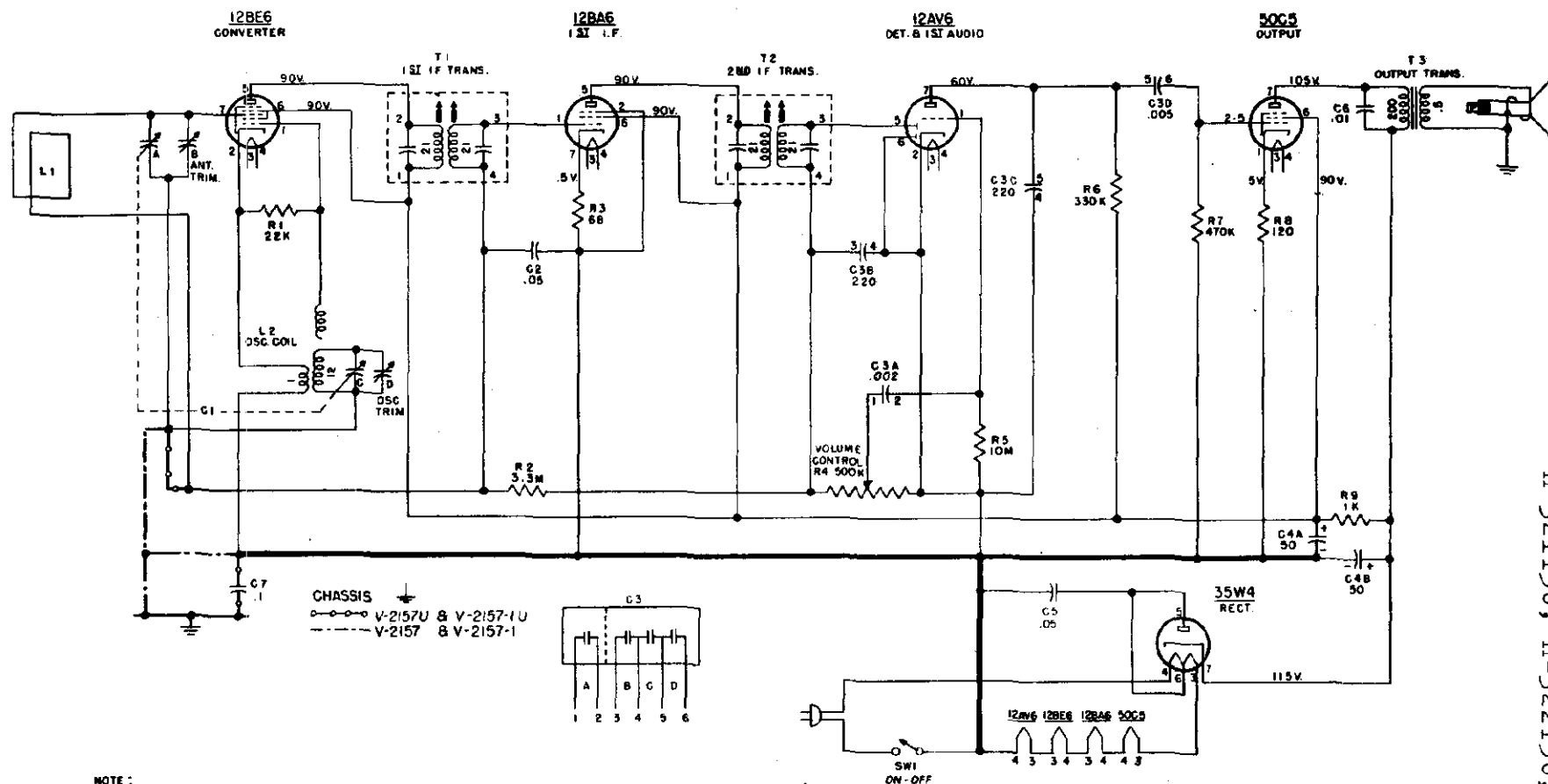
Undistorted	.....	0.9 watt
Maximum	.....	1.5 watts

LOUDSPEAKER:4" P.M.

OPERATING VOLTAGE:105 to 120 volts, 50-60 cycles A-C or D-C

POWER CONSUMPTION:35 watts

WARNING: The V-2157 and V-2157-1 chassis are connected to one side of the power line. When making repairs or adjustments, it is recommended that the chassis be isolated from the line by means of an isolation transformer. Otherwise serious shock may result if the radio chassis and ground are contacted at the same time.



NOTE:
1. ALL VOLTAGES MEASURED FROM CHASSIS GROUND (V-2157 & V-2157-1U ONLY) OR COMMON NEGATIVE (V-2157U & V-2157-1U ONLY) USING A 20,000 OHM/VOLT METER.
LINE VOLTAGE SET AT 117 V.A.C. READINGS SHOULD BE AS SHOWN ± 20 PER CENT.

FIG. 1—SCHEMATIC DIAGRAM OF V-2157, V-2157U, V-2157-1,
AND V-2157-1U CHASSIS

MODELS H-318T5, H-320T5, Ch. V-2157,
H-318T5U, H-320T5U, Ch. V-2157U;
H-321T5, H-322T5, Ch. V-2157-1;
H-321T5U, H-322T5U, Ch. V-2157-1U

PAGE 21-24 WESTINGHOUSE

MODELS H-318T5, H-320T5,
Ch. V-2157; H-318T5U,
H-320T5U, Ch. V2157U;
H-321T5, H-322T5, Ch.
V-2157-1; H-321T5U,
H-322T5U, Ch. V-2157-1U

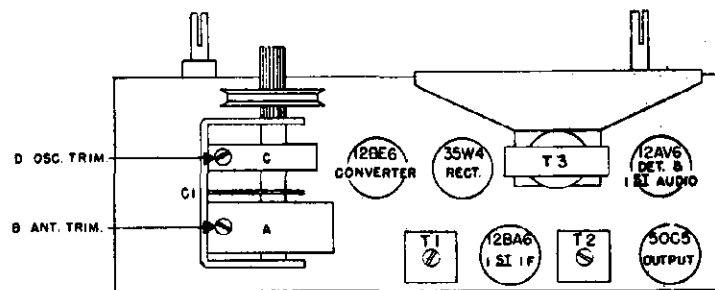
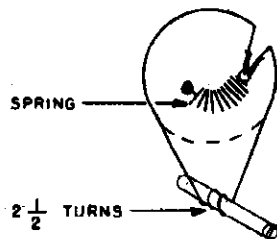


FIG. 2—DIAL DRIVE AND CHASSIS LAYOUT
FOR V-2157 AND V-2157U CHASSIS

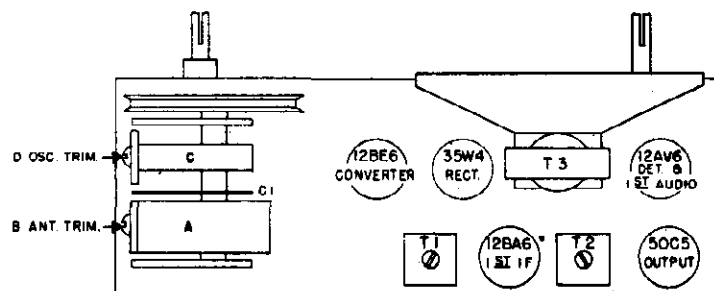
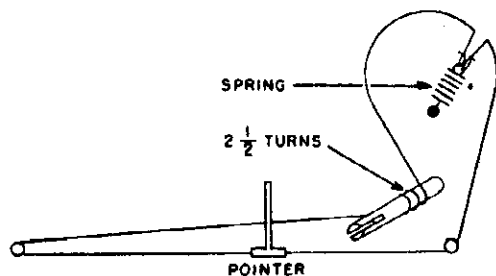


FIG. 3—DIAL DRIVE AND CHASSIS LAYOUT
FOR V-2157-1 AND V-2157-1U CHASSIS

ALIGNMENT

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

Make certain that the dial pointer is correctly positioned.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Step	Connect Signal Generator to —	Signal Generator Frequency	Radio Dial	Adjust for Maximum Output —
1	Stator of R-F tuning capacitor (A) through a 0.1 mfd capacitor	455 kc.	Minimum capacity	Top and bottom slugs in 2nd and 1st I-F trans. in order given*
2	Same as step 1	1615 kc.	Minimum capacity	Osc. trimmer (D)
3	Radiated Signal	1400 kc.	1400 kc.	Ant. trimmer (B)

*It is recommended that a fiber aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.

PARTS LIST

CHASSIS V-2157,
V-2157U, V-2157-1,
V-2157-1UH-318T5 AND H-318T5U CABINET PARTS

<i>Part No.</i>	<i>Description</i>
V-1219-1	Cabinet
V-10008-1	Dial
V-10009-1	Knob
V-5786	Spring, compression

H-320T5 AND H-320T5U CABINET PARTS

V-10012-2	Background, dial
V-9746-1	Baffle and grille cloth assy
V-1219-3	Cabinet
V-10008-3	Dial
V-10009-5	Knob
V-5786	Spring, compression

H-321T5 AND H-321T5U CABINET PARTS

V-10017-1	Baffle and grille cloth assy
V-1220-1	Cabinet
V-10013-3	Escutcheon
V-10009-1	Knob

H-322T5 AND H-322T5U CABINET PARTS

V-10017-2	Baffle and grille cloth assy
V-1220-2	Cabinet
V-10013-2	Escutcheon
V-10009-3	Knob

MISCELLANEOUS PARTS

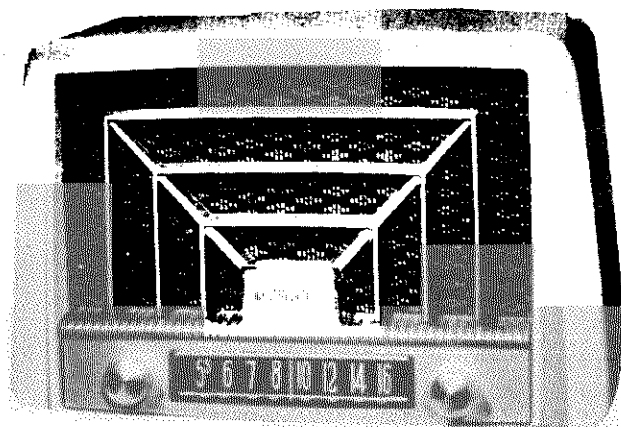
V-3219S-1	Cord, dial drive
V-10001	Loop, antenna (chassis V-2157-1)
V-9994	Loop, antenna (chassis V-2157)
V-10002-2	Pointer (chassis V-2157-1)
V-9996-2	Shaft, tuning
V-9727-1	Speaker, 4" PM (includes T3)
V-10076-1	Spring, dial drive
V-9888-2	Socket, wafer (12BE6, 50C5 and 35W4)
V-9888-3	Socket, wafer (12BA6, and 12AV6)

CHASSIS PARTS

<i>Ref. No.</i>	<i>Part No.</i>	<i>Description</i>
C1	V-9990	Capacitor, variable (consists of A, B, C and D) (V-2157-1 chassis)
	V-10047	Capacitor, variable (consists of A, B, C and D) (V-2157 chassis)
C2	RCP10W2503M	Capacitor, .05 mfd 200 v.
C3	V-9634-1	Capacitor, multiple ceramic (consists of A,B,C and D)
C4	V-9991	Capacitor, electrolytic 50-50 mfd 150 v. (consists of A and B)
C5	RCP10W4503M	Capacitor, .05 mfd 400 v.
C6	RCP10W4103M	Capacitor, .01 mfd 400 v.
C7	RCP10W4104M	Capacitor, .1 mfd 400 v. (V-2157U and V-2157-1U chassis)
L1	V-9994	Loop, antenna (V-2157 chassis)
	V-10001	Loop, antenna (V-2157-1 chassis)
L2	V-9992	Coil, osc.
R1	RC20AE223M	Resistor, 22,000 ohms ½ w.
R2	RC20AE335M	Resistor, 3.3 meg. ½ w.
R3	RC20AE680M	Resistor, 68 ohms ½ w.
*R4	V-9993-1	Control, volume 500,000 ohms (assy consists of R4 and SW1)
R5	RC20AE106M	Resistor, 10 megs.
R6	RC20AE334M	Resistor, 330,000 ohms ½ w.
R7	RC20AE474M	Resistor, 470,000 ohms ½ w.
R8	RC20AE121M	Resistor, 120 ohms ½ w.
R9	RC30AE102M	Resistor, 1000 ohms 1 w.
*SW1	V-9993-1	Switch, on-off (assy consists of SW1 and R4)
T1	V-9735-1	Transformer, 1st I-F
T2	V-9735-1	Transformer, 2nd I-F
T3	V-9727-1	Transformer, audio (includes T3 and speaker)

PAGE 21-26 WESTINGHOUSE

MODELS H-323T5, Ch. V-2157-2; H-323T5U, Ch. V-2157-2U



FREQUENCY RANGE:540 to 1615 kc.

INTERMEDIATE FREQUENCY:455 kc.

TUBE COMPLEMENT:

1	12BE6	.....Converter
1	12BA6	.....I-F Amp.
1	12AV6	.....Det., AVC, and 1st A-F Amp.
1	50C5	.....Output Amp.
1	35W4	.....Rectifier

POWER OUTPUT:

Undistorted	.....0.9 watt
Maximum	.....1.5 watts

LOUDSPEAKER:4" P.M.

OPERATING VOLTAGE:105 to 120 volts, 50-60 cycles A-C or D-C

POWER CONSUMPTION:35 watts

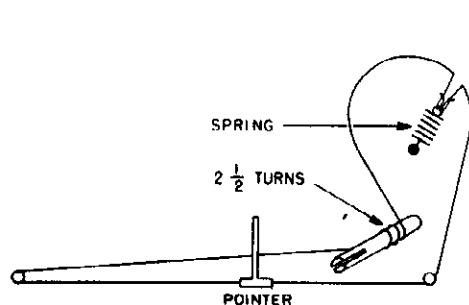


FIG. 1—DIAL DRIVE

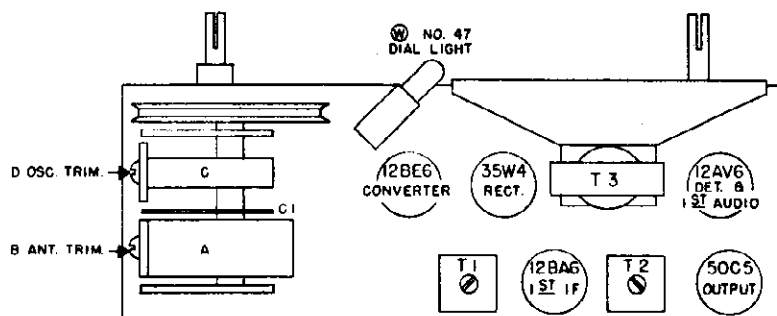


FIG. 2—CHASSIS LAYOUT

WARNING: The V-2157-2 chassis is connected directly to one side of the power line. When making repairs or adjustments, it is recommended that the chassis be isolated from the line by means of an isolation transformer. Otherwise serious shock may result if the radio chassis and ground are contacted at the same time.

MODELS H-323T5, Ch. V-2157-2;
H-323T5U, Ch. V-2157-2U

ALIGNMENT

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

Make certain that the dial pointer is correctly positioned.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Step	Connect Signal Generator to —	Signal Generator Frequency	Radio Dial	Adjust for Maximum output—
1	Stator of R-F tuning capacitor (A) through a 0.1 mfd capacitor	455 kc.	Minimum capacity	Top and bottom slugs in 2nd and 1st I-F trans. in order given*
2	Same as step 1	1615 kc.	Minimum capacity	Osc. trimmer (D)
3	Radiated Signal	1400 kc.	1400 kc.	Ant. trimmer (B)

*It is recommended that a fiber aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.

PARTS LIST FOR MODELS H-323T5 AND H-323T5U

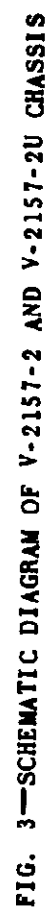
When ordering parts, specify model number of set in addition to part number and description of part.

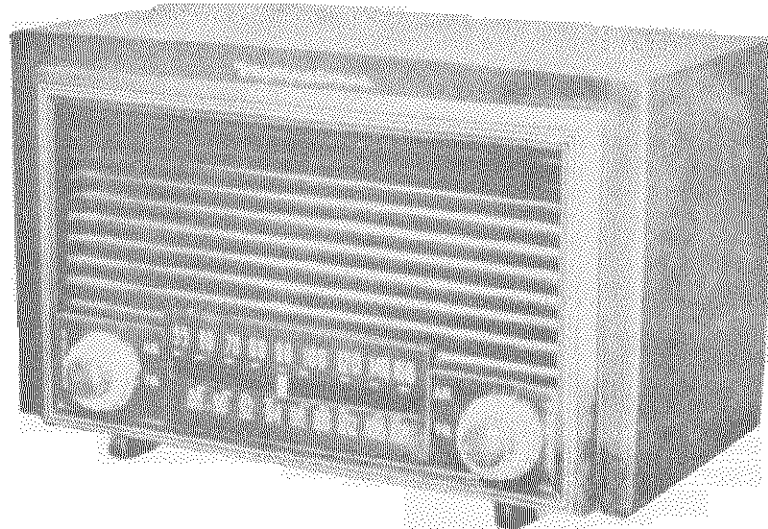
CABINET AND ACCESSORIES

Part No.	Description
V-6120-3	Background, dial
V-10017-3	Baffle and grille cloth assy
V-1220-3	Cabinet
V-3219S-1	Cord, dial drive
V-10013-3	Escutcheon
V-10009-5	Knob
No. 47	Light, pilot
V-10002-2	Pointer
V-9996-2	Shaft, tuning
V-9122-2	Socket, dial light
V-9888-2	Socket (12BE6, 50C5 and 35W4)
V-9888-3	Socket (12AV6 and 12BA6)
V-10079-1	Speaker, 4" PM (includes T3)

V-2157-2 AND V-2157-2U CHASSIS

Ref. No.	Part No.	Description
C1	V-9990	Capacitor, variable (consists of A, B, C and D)
C2	RCP10W2503M	Capacitor, .05 mfd 200 v.
C3	V-9634-1	Capacitor, multiple ceramic (consists of A, B, C and D)
C4	V-9991	Capacitor, electrolytic 50-50 mfd 150 v. (consists of A and B) ..
C5	RCP10W4503M	Capacitor, .05 mfd 400 v.
C6	RCP10W4103M	Capacitor, .01 mfd 400 v.
C7	RCP10W4104M	Capacitor, .1 mfd 400 v. (V-2157-2U only)
C8	RCP10W2203M	Capacitor, .02 mfd 200 v.
L1	V-10001	Loop, antenna
L2	V-9992	Coil, osc.
R1	RC20AE223M	Resistor, 22,000 ohms $\frac{1}{2}$ w.
R2	RC20AE335M	Resistor, 3.3 meg. $\frac{1}{2}$ w.
R3	RC20AE680M	Resistor, 68 ohms $\frac{1}{2}$ w.
*R4	V-9993-2	Control, volume 500,000 ohms (assy consists of R4 and SW1)
R5	RC20AE106M	Resistor, 10 megs.
R6	RC20AE334M	Resistor, 330,000 ohms $\frac{1}{2}$ w.
R7	RC20AE474M	Resistor, 470,000 ohms $\frac{1}{2}$ w.
R8	RC20AE121M	Resistor, 120 ohms $\frac{1}{2}$ w.
R9	RC30AE102M	Resistor, 1000 ohms 1 w.
R10	RC20AE103M	Resistor, 10,000 ohms $\frac{1}{2}$ w.
*SW1	V-6198-5	Switch, on-off (assy consists of SW1 and R4)
T1	V-9735-1	Transformer, 1st I-F
T2	V-9735-1	Transformer, 2nd I-F
T3	V-10079-1	Transformer, audio (consists of T3 and speaker)





MODELS H-324T7,
H-325T7, Ch. V-
2136-2; H-324T7U,
H-325T7U, Ch. V-
2136

SPECIFICATIONS

FREQUENCY RANGES:

Amplitude Modulation 540 to 1615 kc.
Frequency Modulation 88 to 108 mc.

INTERMEDIATE FREQUENCIES:

Amplitude Modulation 455 kc.
Frequency Modulation 10.7 mc.

TUBE COMPLEMENT:

1 12AT7 R-F Amp. and Mixer (FM)
1 12BE6 FM Osc. and AM Converter
1 12BA6 I-F Amp.
1 6BJ6 I-F Driver (FM)

1 12AL5 Ratio Det. (FM)
1 12AV6 .. Det. and AVC (AM) and A-F Amp.
1 50C5 Output Amp.

POWER OUTPUT:

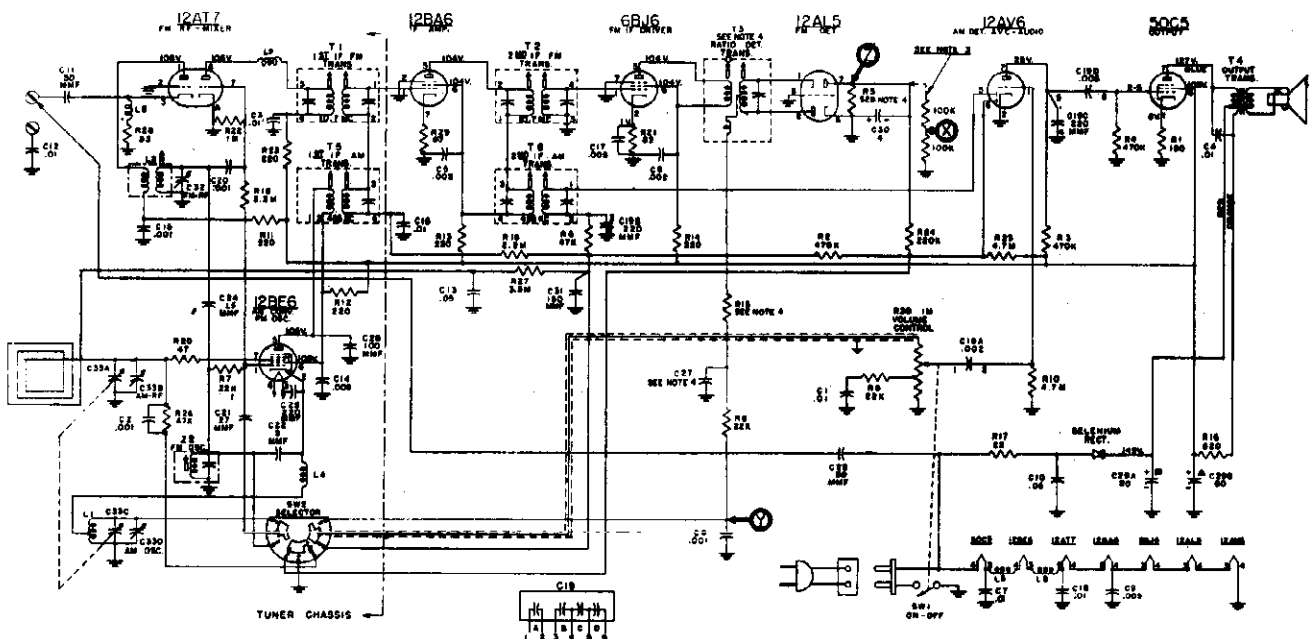
Undistorted..... 1.0 watts
Maximum 1.9 watts

LOUDSPEAKER: 5½" PM

OPERATING

VOLTAGE:.. 117 volts, DC or 60 cycles AC

POWER CONSUMPTION: 35 watts



- NOTES:
1. SELECTOR SWITCH SW1 IS SHOWN IN EXTREME CLOCKWISE POSITION ON AM BAND. EXTREME COUNTER CLOCKWISE POSITION IS FM BAND.
 2. ALL VOLTAGE MEASURED FROM CHASSIS (GROUND) USING A 20,000 OHM/VOLT METER. LINE VOLTAGE SET AT 117V. A.C. VOLTAGES SHOULD BE AS SHOWN ± 20 PER CENT.
 3. TO BE INSTALLED FOR ALIGNMENT ONLY.
 4. TRANSFORMER V-2048 USE 0-5-120-0. 6Z7-250MFD 50-100V. V-2049 USE 0-5-120-0. 6Z7-250MFD 50-100V. V-2050 USE 0-5-120-0. 6Z7-250MFD 50-100V.

FIG. 1—SCHEMATIC DIAGRAM OF V-2136 CHASSIS

MODELS H-324T7, H-325T7,
Ch. V-2136-2; H-324T7U,
H-325T7U, Ch. V-2136

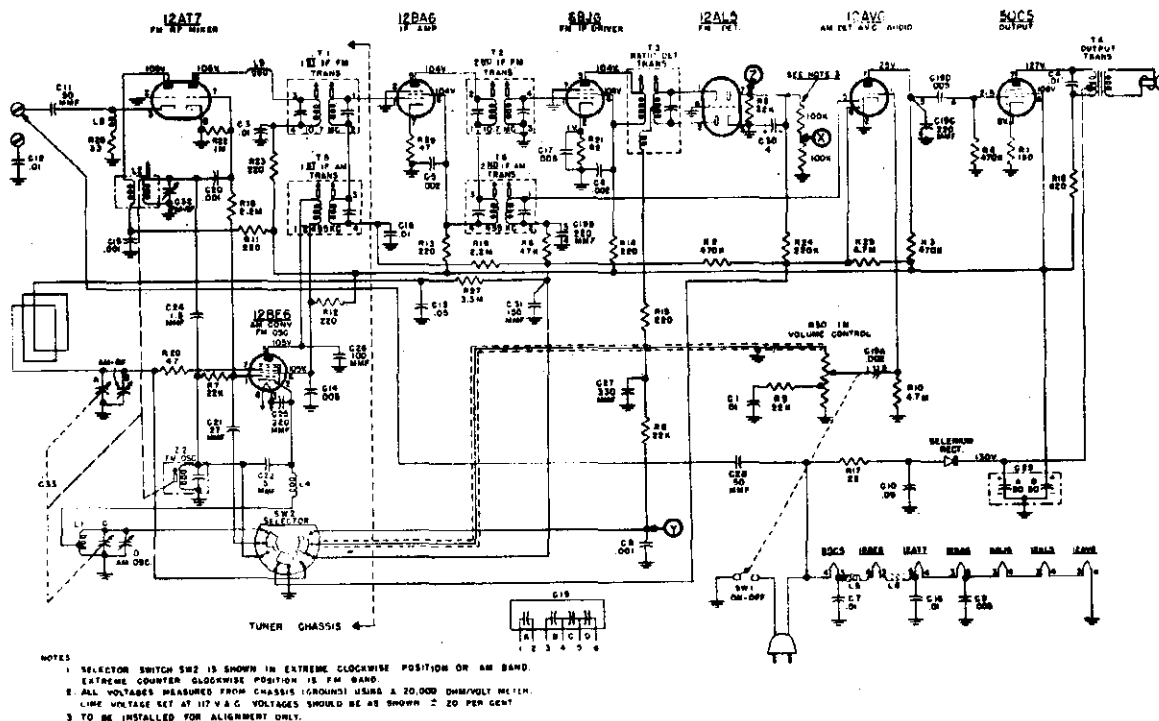


FIG. 2—SCHEMATIC DIAGRAM OF V-2136-2 CHASSIS

WARNING

The chassis is connected directly to one side of the power line. When making repairs or adjustments, it is recommended that the chassis be isolated from the line by means of an isolation transformer. Otherwise, serious shock may result if the radio chassis and ground are contacted at the same time.

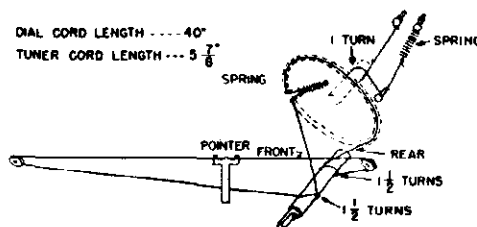


FIG. 3—DIAL DRIVE

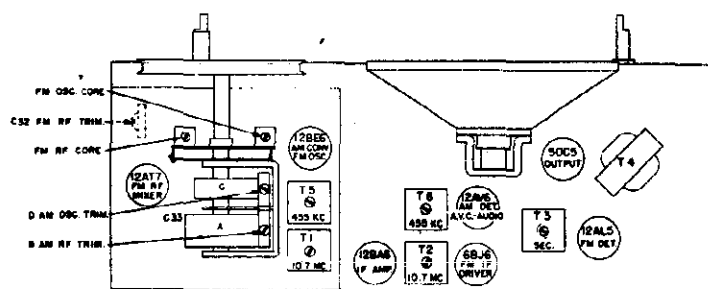


FIG. 4—TOP VIEW OF CHASSIS

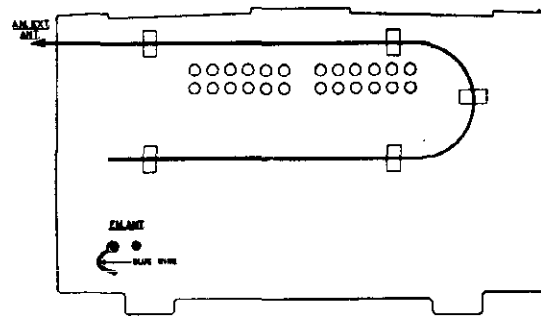


FIG. 5—ANTENNA COUPLING

ANTENNA INFORMATION

An external AM antenna can be coupled to the set by taping the lead-in wire to the outside of the rear cover as shown in Fig. 5. The wire should be dressed in the position shown and can be held in place with adhesive tape or other similar material.

The blue wire emerging from the hole in the rear cover is a "line" antenna for FM reception. It should be connected to the left antenna terminal as shown in Fig. 5. If an external FM antenna is to be used, disconnect the blue wire and connect the transmission line to the two terminals.

MODELS H-324T7, H-325T7,
Ch. V-2136-2; H-324T7U,
H-325T7U, Ch. V-2316

ALIGNMENT BROADCAST BAND

Connect an output meter across the speaker voice coil.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Check the dial pointer position by meshing the tuning capacitor plates completely and seeing that the dial pointer is set on the end mark of the dial scale.

Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust
1	Set the band switch to AM			
2	Stator of tuning capacitor (A) through a 0.1 mfd capacitor	455 kc.	minimum capacity	Pri. and sec. of T6 and T5 for max. output in order given
NOTE: If the I-F transformers are badly mis-aligned, it may be impossible to obtain sufficient output using the above system. In this event, it will be necessary to align each transformer separately. Start with the last I-F transformer and work forward, connecting the signal generator to the control grid of the tube preceding the transformer under alignment.				
3	Radiated signal (no actual connection)	1615 kc.	minimum capacity	AM osc. trimmer (D) for max. output
4	Radiated signal (no actual connection)	1400 kc.	tune to signal	AM R-F trimmer (B) for max. output (rock-in adjustment)

FM BAND

Do not align the FM circuits until all AM adjustments have been completed.

Step	Connect Signal Generator to—	Signal Generator Frequency	Radio Dial Setting	Adjust
1	Set the band switch to FM			
2	Connect two 100,000 ohm resistors (the resistances must be equal within 5 per cent) between pin No. 7 of the 12AL5 tube and ground as shown on the schematic diagram.			
3	Connect a V.T.V.M. between points "X" and "Y" (see schematic diagram).			
4	Pin No. 7 of 12AT7 through a .01 mfd mica capacitor	10.7 mc.	minimum capacity	Sec. of T3 for zero (use medium strength signal)
5	Connect the V.T.V.M. between point "Z" and ground.			
6	Same as step 4	10.7 mc.	minimum capacity	Pri. of T3 and pri. and sec. of T1 and T2 for max.
7	Reconnect the V.T.V.M. between points "X" and "Y" and increase the signal strength 10 times.			
8	Same as step 4	10.7 mc.	Minimum capacity	Recheck sec. of T3 for zero voltage
9	Reconnect the V.T.V.M. between point "Z" and ground.			
10	Same as step 4	10.7 mc.	minimum capacity	Pri. of T3 for maximum voltage
11	Remove the two 100,000 ohm resistors that were inserted in step 2.			
12	FM ant. terminal through a 300 ohm non-inductive resistor	98 mc.	98 mc.	FM osc. core for maximum voltage
13	Same as step 12	98 mc.	98 mc.	FM R-F trimmer (C32) for maximum voltage
14	Same as step 12	105 mc.	tune to signal	FM R-F core for maximum voltage
15	Same as step 12	90 mc.	tune to signal	FM R-F trimmer (C32) for maximum voltage (rock-in)
16	Recheck steps 14 and 15 for tracking.			

PAGE 21-32 WESTINGHOUSE

MODELS H-324T7, H-325T7,
Ch. V-2316-2; H-324T7U,
H-325T7U, Ch. V-2316

PARTS LIST FOR MODELS H-324T7, H-324T7U, H-325T7 AND H-325T7U

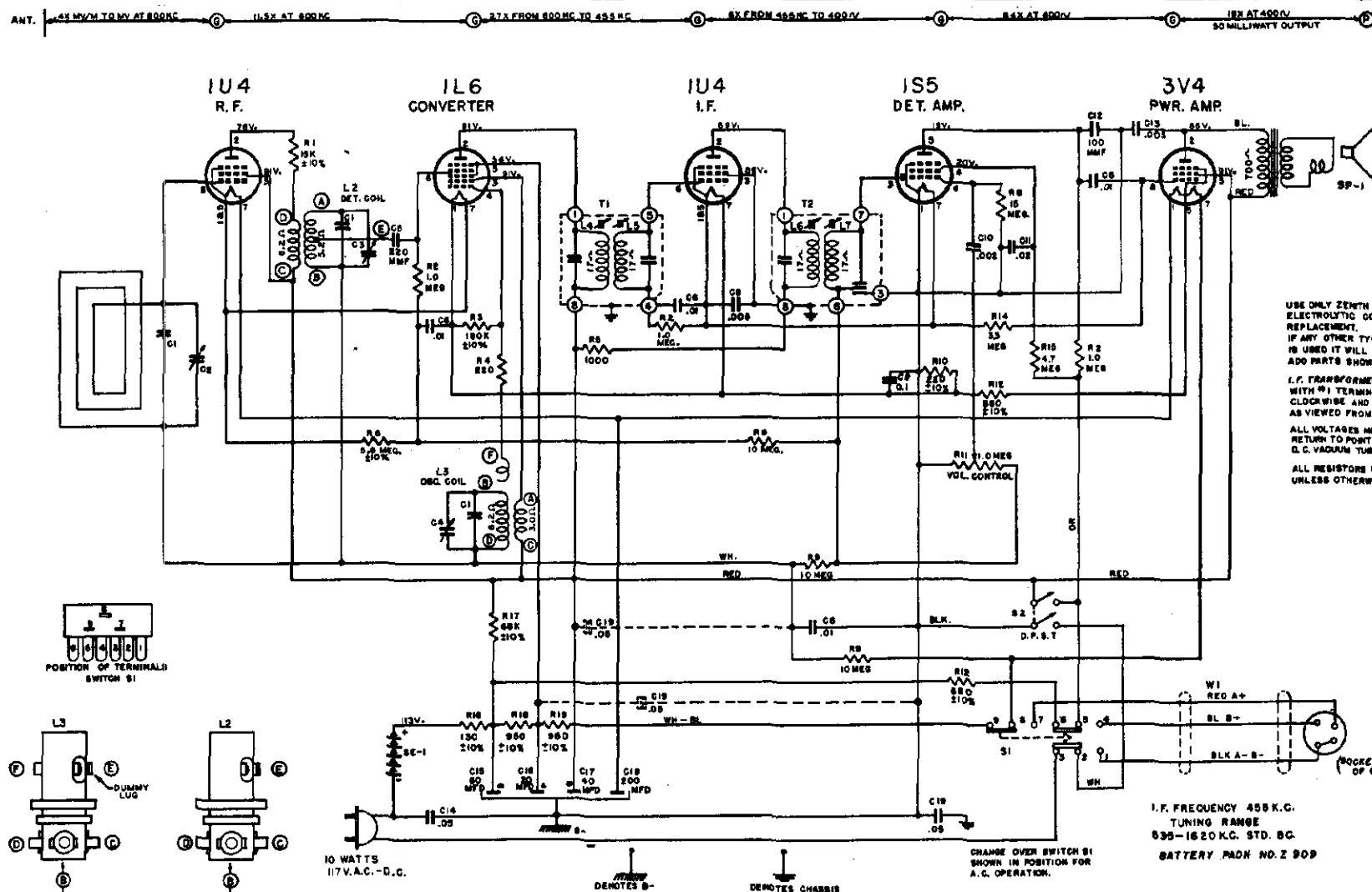
WHEN ORDERING PARTS, SPECIFY MODEL NUMBER OF SET IN ADDITION TO PART NUMBER AND DESCRIPTION OF PART.

CABINET AND MISCELLANEOUS

Part No.	Description	Part No.	Description
V-6120-1	Background, dial	V-9104-7	Knob, tuning, rear (black)
V-1199-4	Cabinet (black)	V-9104-8	Knob, on-off, volume, rear (black)
V-1199-3	Cabinet (ivory)	V-9506-1	Nameplate, Westinghouse
V-5426	Clip, I-F mounting	V-9661	Plug, power, male (V-2136 chassis)
V-3219S-1	Cord, dial drive (100' spool)	V-9639-1	Pointer
V-9636-1	Cover assembly, back (V-2136 chassis)	V-9678-2	Pulley, gang
V-9636-2	Cover assembly, back (V-2136-2 chassis)	V-3166S	Pulley, dial cord
V-9651-1	Cover, back	V-9655	Shell, interlock (V-2136 chassis)
V-9637-1	Foot, mounting	V-9654	Socket, interlock (V-2136 chassis)
V-6146-11	Knob, off-on, volume, front (ivory)	V-9641-1	Speaker, 5 $\frac{1}{2}$ PM
V-6146-15	Knob, off-on, volume, front (black)	V-3248S	Spring, dial drive
V-6146-10	Knob, band (ivory)	V-5421-5	Washer, felt (knobs)
V-6146-14	Knob, band (black)	V-4292-1	Socket, miniature molded (50C5) ..
V-9104-3	Knob, off-on, volume (rear)	V-6878-2	Socket, miniature wafer (12BA6, 6BJ6, 12AL5, 12AV6)
V-9104-2	Knob, tuning (rear)	V-5556-2	Socket, miniature (12AT7)
V-9653	Loop, antenna	V-4292S-2	Socket, miniature molded (12BE6) ..

V-2136 AND V-2136-2 CHASSIS

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
C1	RCP10W2103M	Capacitor, .01 mfd 200 v.	L9	V-4886-12	Choke, RF
C2	V-5596	Capacitor, .005 mfd (V-2136 chassis)		V-9640	Rectifier, selenium
C3	RCP10W4103M	Capacitor, .01 mfd 400 v.	R1	RC30AE181K	Resistor, 180 ohms 1 w.
C4	RCP10W4103M	Capacitor, .01 mfd 400 v.	R2	RC20AE474M	Resistor, 470,000 ohms $\frac{1}{2}$ w.
C5	RCP10W6202M	Capacitor, .002 mfd 600 v.	R3	RC20AE474M	Resistor, 470,000 ohms $\frac{1}{2}$ w.
C6	RCP10W6202M	Capacitor, .002 mfd 600 v.	R4	RC20AE474M	Resistor, 470,000 ohms $\frac{1}{2}$ w.
C7	RCP10W2103M	Capacitor, .01 mfd 200 v.	R5	RC20AE223K	Resistor, 22,000 ohms $\frac{1}{2}$ w.
C8	RCP10W6102M	Capacitor, .001 mfd 600 v.	R6	RC20AE473M	Resistor, 47,000 ohms $\frac{1}{2}$ w.
C9	V-5596	Capacitor, .005 mfd	R7	RC20AE223M	Resistor, 22,000 ohms $\frac{1}{2}$ w.
C10	V-6023#4503M	Capacitor, .05 mfd 400 v.	R8	RC20AE223M	Resistor, 22,000 ohms $\frac{1}{2}$ w.
C11	V-5658-10	Capacitor, 50 mmf	R9	RC20AE223M	Resistor, 22,000 ohms $\frac{1}{2}$ w.
C12	RCP10W2103M	Capacitor, .01 mfd 200 v.	R10	RC20AE475M	Resistor, 4.7 megohms $\frac{1}{2}$ w.
C13	RCP10W2503M	Capacitor, .05 mfd 200 v.	R11	RC20AE221M	Resistor, 220 ohms $\frac{1}{2}$ w. ..
C14	V-5596	Capacitor, .005 mfd	R12	RC20AE221M	Resistor, 220 ohms $\frac{1}{2}$ w. ..
C15	V-9863-1	Capacitor, .001 mfd	R13	RC20AE221M	Resistor, 220 ohms $\frac{1}{2}$ w. ..
C16	RCP10W2103M	Capacitor, .01 mfd 200 v.	R14	RC20AE221M	Resistor, 220 ohms $\frac{1}{2}$ w. ..
C17	V-5596	Capacitor, .005 mfd	R15	RC20AE221M	Resistor, 220 ohms $\frac{1}{2}$ w. ..
C18	RCP10W2103M	Capacitor, .01 mfd 200 v.	R16	V-6984-10	Resistor, 820 ohms 5 w. ..
C19	V-9634-1	Capacitor, multiple ceramic .002 mfd, 220 mmf, 220 mmf, .005 mfd	R17	RC30AE220K	Resistor, 22 ohms 1 w.
C20	V-9863-1	Capacitor, .001 mfd	R18	RC20AE225M	Resistor, 2.2 megohms $\frac{1}{2}$ w.
C21	R2CC30UK270K	Capacitor, 27 mmf	R19	RC20AE225M	Resistor, 2.2 megohms $\frac{1}{2}$ w.
C22	R2CC30UK050D	Capacitor, 5 mmf	R20	RC20AE470M	Resistor, 47 ohms $\frac{1}{2}$ w.
C24	V-5658-9	Capacitor, 15 mmf	R21	RC20AE820K	Resistor, 82 ohms $\frac{1}{2}$ w.
C25	R5CC20ZY221M	Capacitor, 220 mmf	R22	RC20AE105M	Resistor, 1 megohm $\frac{1}{2}$ w. ..
C26	RCM20D101J	Capacitor, 100 mfd	R23	RC20AE221M	Resistor, 220 ohms $\frac{1}{2}$ w. ..
C27	RCM20A331M	Capacitor, 330 mmf	R24	RC20AE224M	Resistor, 220,000 ohms $\frac{1}{2}$ w.
C28	V-5658-10	Capacitor, 50 mmf	R25	RC20AE475M	Resistor, 4.7 megohms $\frac{1}{2}$ w.
C29	V-9920	Capacitor, electrolytic, 80 mfd 150 v., 60 mfd 150 v.	R26	RC20AE473M	Resistor, 47,000 ohms $\frac{1}{2}$ w. (V-2136 chassis)
C30	V-4637	Capacitor, electrolytic, 4 mfd 50 v.	R27	RC20AE335M	Resistor, 3.3 megohms $\frac{1}{2}$ w.
C31	RCM20A151M	Capacitor, 150 mmf	R28	RC20AE330M	Resistor, 33 ohms $\frac{1}{2}$ w.
C32	V-9670	Capacitor, trimmer (FM RF)	R29	RC20AE470M	Resistor, 47 ohms $\frac{1}{2}$ w.
C33	V-9671-2	Capacitor, variable tuning (consists of A, B, C, and D)	*R30	V-9673-1 assy	Control, volume 1 megohm (assy consists of R30 and SW1)
L1	V-9672	Coil AM osc.	*SW1	V-9673-1 assy	Switch, on-off (assy con- sists of R30 and SW1) ...
L2	V-9674	Coil, FM RF	SW2	V-9681-1	Switch, selector
	V-9676-1	Core, FM RF and osc. tuning	T1	V-9688	Transformer, 1st FM IF ...
L4	V-9099-1	Choke, 1.1 microhenries ..	T2	V-9642	Transformer, 2nd FM IF ...
L5	V-9099-1	Choke, 1.1 microhenries ..	T3	V-9828	Transformer, ratio detector
L6	V-9099-1	Choke, 1.1 microhenries ..	T4	V-9665	Transformer, output
L8	V-9099-1	Choke, antenna input	T5	V-9649-1	Transformer, 1st AM IF ...
			T6	V-6130-1	Transformer, 2nd AM IF ...
			Z2	V-9675	Coil and capacitor assy, FM osc.
				V-9676-1	Core, FM RF and osc. tuning

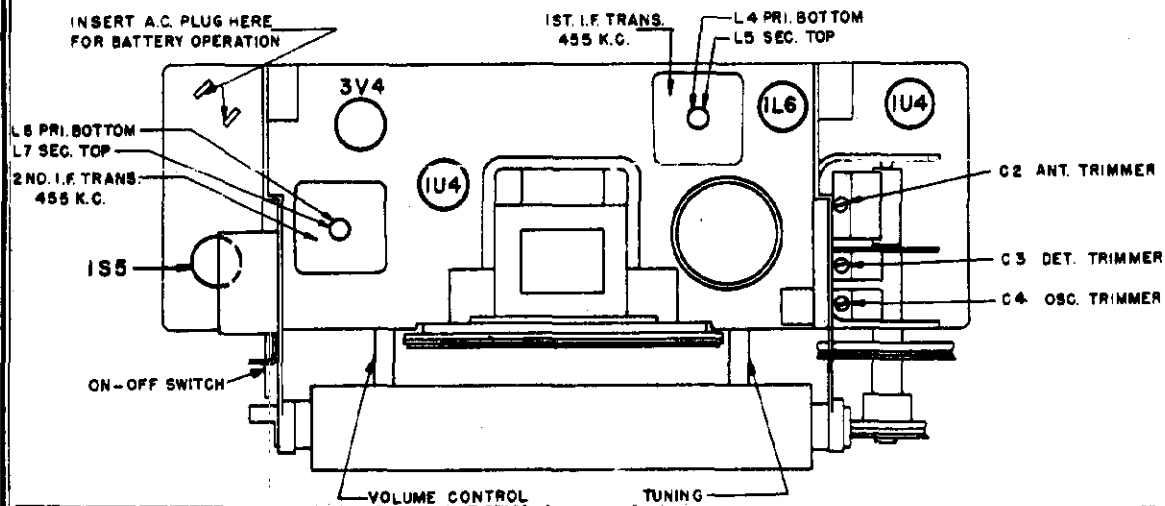


The 5G41 chassis is an AC, DC or battery operated super-heterodyne. The chassis is isolated from the DC circuit, and all measurements must be made from a common negative point. The most convenient place to reach this negative point is the negative side or container of the electrolytic. When the change-over Switch S1 is in AC position, the DC resistance from chassis to any circuit must be almost in-

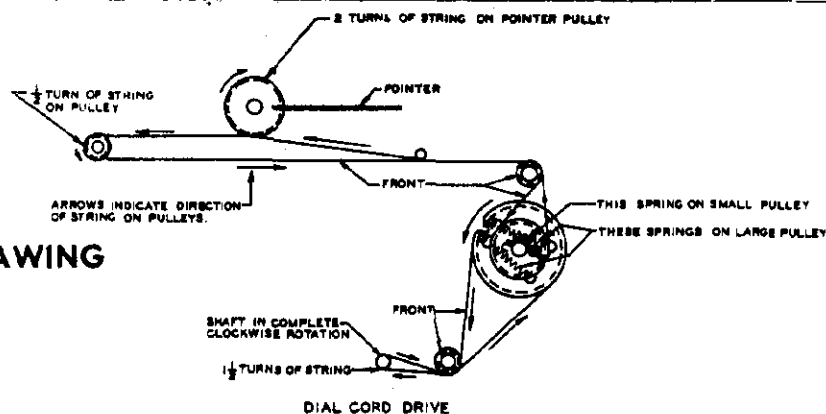
finite. If any circuit becomes grounded a hum will result. Microphonic tubes will cause audio howl. Check the 1L6 and IS5.

The wavemagnet is connected to the chassis by two wires that pass through the hollow dial pivots. If the R.F. becomes weak or dead, check the D.C. resistance of the wavemagnet. This D.C. resistance should be approximately .9 ohm. If it is open

TUBE AND TRIMMER LOCATION

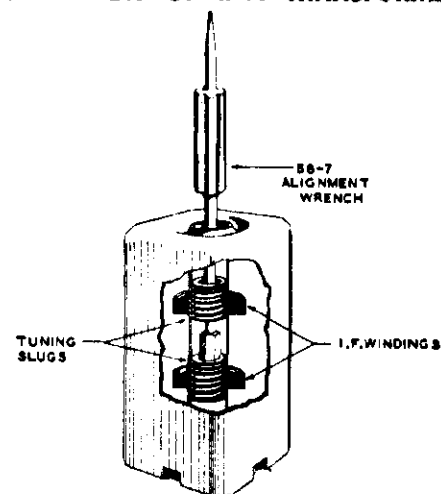


OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIG. FREQUENCY	BAND	SET DIAL TO	TRIMMERS	PURPOSE
1	Converter Grid	.1 Mfd	455 Kc.	BC	600 Kc.	L4, 5, 6 & 7	I.F. Alignment
2	Two turns loosely coupled to Wavemagnet		1600 Kc.	BC	1600 Kc.	Osc. Trim. C4	Set Oscillator to scale
3	Two turns loosely coupled to Wavemagnet		1400 Kc.	BC	1400 Kc.	Ant. & Det. Trims C2 & C3	Align Wavemagnet



DIAL CABLE DRAWING

DETAILED VIEW OF I. F. TRANSFORMERS.



IF Alignment: Remove the chassis from the cabinet and arrange the units so that the wavemagnet can be connected. All the connections and adjustments can be made from the top of the chassis. Connect a signal generator, through a .1 mfd. dummy antenna, to the converter grid and B- (common return). Connect an output meter across the voice coil of the speaker (two lugs provided). Set the signal generator to 455 Kc. and adjust L4, L5, L6 and L7 for the maximum indication on the output meter. Always keep the signal output from the generator just high enough to get an indication, otherwise excessive loading may result.

RF Alignment: Connect a two turn loop across the leads of the signal generator, loosely couple this loop to the wavemagnet. Set the signal generator and the dial pointer of the receiver to 1600 Kc. and adjust C4 oscillator trimmer to resonance. Set the signal generator and dial pointer to 1400 and adjust C2 and C3 antenna detector trimmers to resonance. These trimmers are on the top of gang condenser. Check operation and re-install set in cabinet. Tune in a weak station near 1400 Kc. or use background noise and re-adjust antenna trimmer for maximum sensitivity.

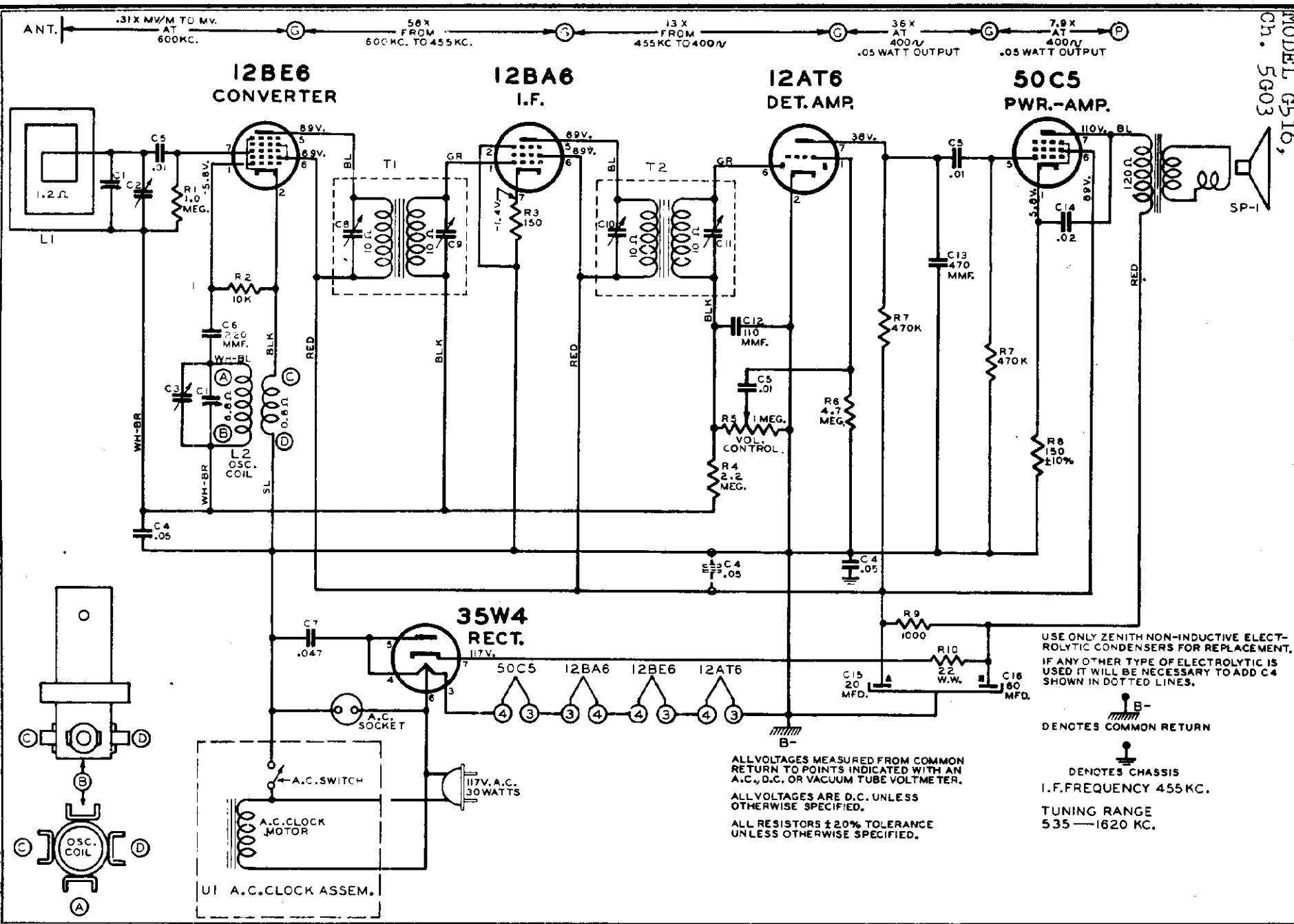
The I.F. transformers incorporated in this receiver are of the new permeability tuned type. The advantage of an I.F. transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these I.F. transformers the tuning wrench 68-7 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

MODEL G503,
Ch. 5041

PARTS LIST

Part No.	Ref. No.	Description	Part No.	Ref. No.	Description
DIAL ASSEMBLY			MISCELLANEOUS (Continued)		
12-1554		Tuning Shaft Bracket	36-42		Cabinet Handle (Y model only)
26-420		Dial Scale	36-43		Cabinet Handle
57-1630		Escutcheon (Y Model only)	46-785		Tuning & Vol. Control Knob (2 used)
57-1631		Escutcheon	49-658 SP-1		4" PM Speaker
57-1632		Emblem Plate			208-658 Cone & Voice Coil
57-1633		Emblem Plate (Y Model only)			206-658 Output Trans.
57-1634		Trim Plate	54-34		#6-32 x 1/4" x 3/32 Hex. Nut Steel
59-225		Dial Pointer			NP (Used on 212-10)
76-540		Tuning Shaft	54-139		#3/8-32 x 9/16" Palnut Type 9N Cad.
80-209		Dial Cord Tension Spring			Pl. (used on 63-2013)
93-978		Felt Washer (2 used)	93-1004		Fibre Spacer Washer (2 used on ea. S-16711 & S-15977)
188-32		Retaining Ring (used on 76-540)	94-295		Gang Cond. Mtg. Bushing (3 used)
S-15430		Pointer & Pulley Assembly	97-367		Handle Mtg. Stud
S-15440		Dial Cord Assembly (Short)	112-800		#2 x 1/4" Phill. R.H.S.T. Screw Brass Plate (2 used on 57-1632)
S-16106		Dial Cord Assembly (Long)	113-18		#6-32 x 5/16" Hex. Hd. Sl. M.S. Cad. Pl. (2 used on 85-450)
COILS & CHOKES			114-26		#8 x 1/4" Hex. Hd. S.T. Screw Cad. Pl. (4 used on 57-1480)
95-1132	T1	1st IF Transformer	114-295		#8 x 5/16" Hex. Hd. Sl. S.T. Screw Shakeproof Cad. Pl. (4 used chassis mtg.)
95-1133	T2	2nd IF Transformer	114-311		#6-32 x 1" Hex. Hd. Sl. M.S. Steel (used on 212-10)
S-15811	L2	Detector Coil Assembly	138-36		Cabinet Grille
S-15812	L3	Oscillator Coil Assembly	147-166		Speaker Mtg. Spacer (2 used)
CONDENSERS			156-41		Door Latch
22-3	C6	.01 Mfd. Ceramic (Disc) 500V	166-44		Rubber Bumper (Speaker & Gang)
22-182	C5	220 Mmfd. Mica (Molded) 500V	192-132		Dial Glass
22-229	C13	.005 Mfd. 600V	202-804		Instruction Book
22-319	C8	.005 Mfd. 200V	212-10 SE-1		Selenium Rectifier
22-492	C10	.002 Mfd. 600V	S-15433		Support Brkt. & Idler Pulley Assy.
22-827	C9	.1 Mfd. 200V	S-15434		Wavemagnet Assembly
22-829	C19	.05 Mfd. 200V	S-15438		Battery Cable & Socket Assy.
22-1017	C14	.05 Mfd. 400V	S-15977		Wavemagnet, Pulley & Sleeve Assy. (Y model only)
22-1386	C11	.02 Mfd. 200V	S-16710		Speaker Baffle & Grill Cloth Assy.
22-1669	C12	100 Mmfd. Ceramic 500V	S-16711		Wavemagnet Pulley & Sleeve Assy.
22-1741	C15, 16,		Z909		Battery
	17, 18	Four Section Elect. Cond.	54-267		#6-32 x 5/16" Palnut Cad. Pl. (1 ea. used on 95-1132 & 95-1133)
22-2070	G1	Three Section Gang Cond.	54-282		Spring Nut Cad. Pl. (1 each used on 26-420 & S-16711)
RESISTORS			54-283		Spring Nut Black Oxide (used on S-16711)
63-1362	R18, 19	Two Section Candohm	54-284		Wavemagnet Lead Retaining Nut (2 used)
63-1757	R10	220 Ohm 1/2W 10% Ins. Res.	54-307		Spring Nut (7 used on Esc. Mtg.)
63-1778	R12	680 Ohm 1/2W 10% Ins. Res.	57-1480		Chassis Bottom Cover Plate
63-1758	R4	220 Ohm 1/2W 20% Ins. Res.	57-1491		Latch Plate
63-1786	R5	1000 Ohm 1/2W 20% Ins. Res.	61-71		Idler Pulley (4 used)
63-1834	R1	15K Ohm 1/2W 10% Ins. Res.	61-133		Pointer Pulley
63-1862	R17	68K Ohm 1/2W 10% Ins. Res.	61-136		Idler Pulley
63-1880	R3	180K Ohm 1/2W 10% Ins. Res.	64-290		Shoulder Rivet (used on 61-71)
63-1912	R2	1 Megohm 1/2W 20% Ins. Res.	64-303		Shoulder Rivet (used on S-15433)
63-1933	R14	3.3 Megohm 1/2W 20% Ins. Res.	70-158		#2 x 3/8" Phill. Oval Hd. W.S. Steel Black Oxide (3 used on Esc. Mtg.)
63-1940	R15	4.7 Megohm 1/2W 20% Ins. Res.	70-159		#5 x 7/16 Phill. R.H.W.S. Steel N.P. (2 used on each 12-1433)
63-1943	R6	5.6 Megohm 1/2W 10% Ins. Res.	78-274		Elect. Cond. Socket
63-1954	R9	10 Megohm 1/2W 20% Ins. Res.	78-543		Battery Cable Socket (4 contact)
63-1961	R8	15 Megohm 1/2W 20% Ins. Res.	78-782		Miniature Tube Socket
63-2013	R11	Volume Control 1.0 Meg.	78-806		Miniature Tube Socket
63-2018	R16	130 Ohm Zipohm 3W 10% Ins. Res.	78-807		Miniature Tube Socket
MISCELLANEOUS			80-742		Door Catch Spring
11-104		Line Cord & Plug Assembly	80-799		Latch Spring
12-1733		Chassis Mtg. Brkt.	85-450		S1 Power Change Over Switch
14-1230		Plastic Cabinet for G503	85-451		S2 On-Off Switch
14-1231		Plastic Cabinet for G503Y	93-869		#6 Split Lockwasher (used on 212-10)
15-51		Cable Socket Cap & Insulator	93-1003		Brass Spacer Washer (used on S-16711 & S-15977)
19-185		Speaker Baffle Retaining Clip (2 used)			
24-482		On-Off Switch Cover			
24-543		Front Door (Y model only)			
24-544		Front Door			

MODEL G516,
Ch. 5G03



PARTS LIST

DIAL ASSEMBLY

26-444	Dial Scale
46-854	Volume Control Knob
46-856	Tuning Control Knob
46-851	Volume Control Knob (W & Y Model)
46-852	Tuning Control Knob (W & Y Model)
59-244	Dial Pointer
59-246	Dial Pointer (W & Y Model)
80-402	Dial Cord Tension Spring
80-746	Pointer Pulley Retaining Spring
S-16689	Pointer Pulley & Shaft Assembly
S-16696	Pulley Mtg. Strip & Bushing Assembly
S-16697	Dial Cord Assembly
S-16728 U1	Clock & Timer Assembly (Complete)
S-16774 U1	Clock & Timer Assembly (W Model) Complete
S-16775 U1	Clock & Timer Assembly (Y Model) Complete

COILS & CHOKES

95-1230 T1	1st. I. F. Transformer
95-1231 T2	2nd. I. F. Transformer
S-16681 L2	Osc. Coil Assembly

CONDENSERS

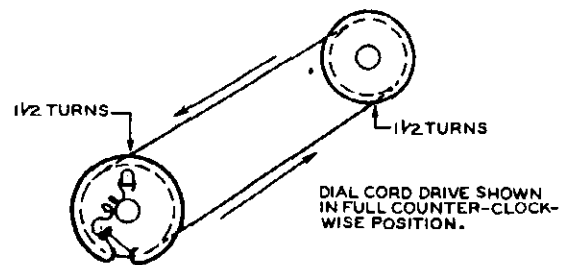
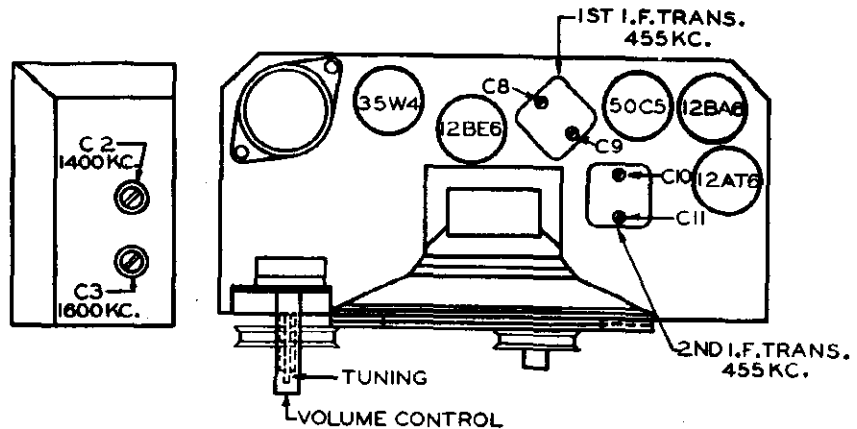
22-3	AC5	.01 Mfd.	Ceramic (3 used)	500V
22-5	C12	110 Mmfd.	Ceramic (or 22-162)	500V
22-6	C13	470 Mmfd.	Ceramic (or 22-1196)	500V
22-182	C6	220 Mmfd.	Molded Mica	500V
22-829	C4	.05 Mfd.	(2 used)	200V
22-1017	C7	.05 Mfd.		400V
22-1379	C14	.02 Mfd.		400V
22-2202	C15	C16	Elect. 20-60 Mfd.	150V
22-2209	C1		Two Gang Variable	

RESISTORS

63-1219 R10	22 Ohm	W.W.	1/2W 20% Ins.
63-1574 R9	1000 Ohm	1W 20% Ins.	
63-1751 R3	150 Ohm	1/2W 20% Ins.	
63-1826 R2	10K Ohm	1/2W 20% Ins.	
63-1898 R7	470K Ohm	1/2W 20% Ins.	
63-1912 R1	1 Megohm	1/2W 20% Ins.	
63-1926 R4	2.2 "	1/2W 20% Ins.	
63-1940 R6	4.7 "	1/2W 20% Ins.	
63-1977 R8	150 Ohm	1W 10% Ins.	
63-2106 R5		Volume Control	

MISCELLANEOUS

11-85	Line Cord & Plug (6 ft.)
14-1234	Plastic Cabinet for G516
14-1237	Plastic Cabinet for G516 White
14-1238	Plastic Cabinet for G516 Black
16-603	Packing Carton
24-541	Volume Control Cover
49-680 SP-1	4" P. M. Speaker
	+208-680 Cone & Voice Coil
	+208-680 Output Transformer
54-139	3/8-32 x 9/16 Hex Nut
54-227	5/16-40 x 1/4 Hex Nut Steel (3 used to Mount Clock)
54-271	6-32 x 1/4 Hex Nut Steel (2 used on each 95-1230 & 95-1231)
57-1613	Emblem Plate
78-275	Elect. Cond. Socket
78-781	Miniature Tube Socket (2 used)
78-782	Miniature Tube Socket (3 used)
78-840	Two Prong Socket (A.C.)
93-501	#4 Int. Shakeproof Lockwasher (3 used on Clock Mtg.)
94-334	Gang Mtg. Bushing (3 used)
110-150	Grill Cloth
113-15	6-32 x 5/16" Hex Hd. M.S. (3 used on Gang Cond. Mtg.)
114-252	#6 x 3/8 Hex Hd. Sl. S. T. (2 used Chassis Mtg.)
114-343	#8 x 1/2 Hex Hd. Sl. Washer Hd. S. T. (2 used Chassis Mtg.)
125-17	Rubber Grommet (3 used Gang Mtg.)
159-69	Trimount Stud (4 used Back Mtg.)
202-805	Instruction Book
S-16729 L1	Wavemagnet & Back Assem. (Walnut & Black Models)
S-16768	Clock Cover & Bushing (Rear)
S-16776	Wavemagnet & Back Assem. (White Models)
S-17001	Twisted Wire Cable Assembly



DIAL CORD DRIVE

Clock and Timer Note:

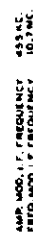
The clock and timer assemblies used in this receiver are manufactured by Telechron. Face parts, such as hands, knobs, scales, bezel, etc., are not available through local Telechron service depots. We suggest that all clock and timer assemblies complete (less the rear cover and bushing - S-16768) be returned to your local Zenith Distributor for repair or replacement. Be sure to pack all clock and timer assemblies individually and carefully to prevent damage in shipment.

To remove the clock from the cabinet proceed as follows:

1. Remove the three 6/32 hex nuts that fasten the rear clock cover to the clock.
2. Slide the rear clock cover off the time set control shaft and then slide this cover down over the three-wire cable that connects the clock to the receiver.
3. Next unsolder the three-wire cable from the clock motor and switch. Be certain not to tear out the solder terminals from the clock motor or switch.
4. The clock can then be removed from the front of the cabinet.

ALIGNMENT PROCEDURE

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIG. FREQUENCY	SET DIAL AT	TRIMMERS	PURPOSE
1	Converter Grid	.5 Mfd.	455 Kc.	600 Kc.	C8, C9, C10, C11	For I. F. Alignment
2	One Turn Loop Coupled Loosely to	---	1600 Kc.	1600 Kc.	C-3	Set Oscillator to Dial Scale
3	Wave Magnet	---	1400 Kc.	1400 Kc.	C-2	Align Antenna Stage



TUNING RANGES
340-1620 K.C. STD. BC.
88-108 M.C. F.M.

1186453103030

ALL VOLTAGES MEASURED FROM COMMON
RETURN TO POINTS INDICATED WITH AN
A.C. D.C. OR VACUUM TUBE VOLTMETER

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED

ALL RESISTORS ±20% TOLERANCE
UNLESS OTHERWISE SPECIFIED

REAR VIEW OF BAND SWITCH WITH KNOB
IN FULL CLOCKWISE POSITION.
CLOCKWISE POSITION — 5 M. 100 M.C.
COUNTER-CLOCKWISE POS. — STD. BC.

The 7G04 chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and one stage on the AM Band. There is one stage of RF amplification on the FM Band.

When adjustments are made on the 7G04 or any AC-DC chassis, a line isolation transformer (110-V input to 110-V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground, and if there is any indication of voltage, reverse the plug before handling the set.

FM-AM 1st IF Alignment: The alignment of the 1st IF transformer is conventional. The alignment slugs are threaded and screw into the coil forms. The slugs are slotted for a small size fiber screw driver. Do not press hard on the aligning tool or the threads in the coil forms will strip and adjustment will be impossible. The 2nd AM and FM IF transformers and the discriminator transformer are the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF and discriminator transformers, tuning wrench 68-7 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM RF Alignment: The tuning slugs are attached to threaded shafts and the slugs are varied in the field of the coils by turning the shafts clockwise or counter-clockwise. After adjustment the shafts must be secured with a drop of speaker cement.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Genera-

tor (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined in this service note.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

Alignment of this chassis will, in most cases, be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

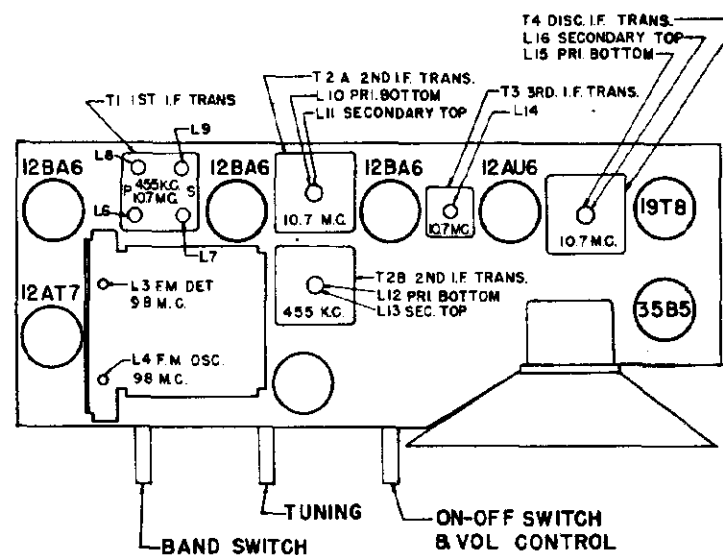
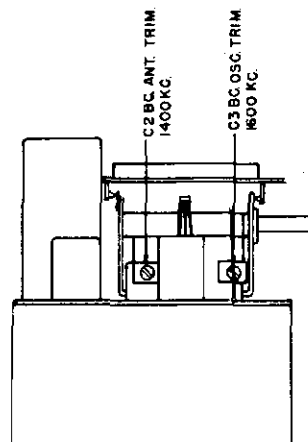
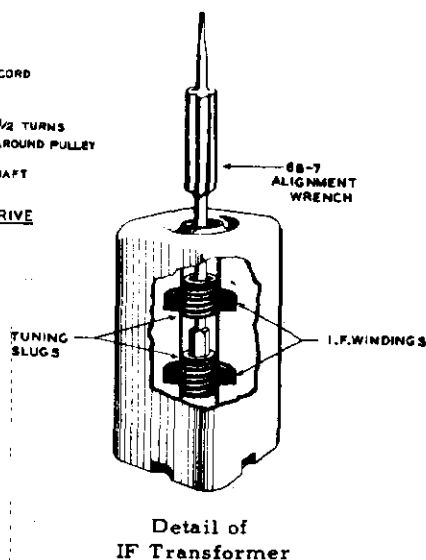
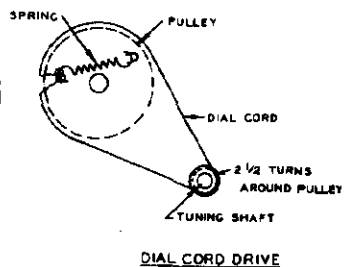
A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

- (a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).
- (b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).
- (c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.
- (d) Loosen Slugs by applying a hot iron to the cement.

TUBE AND TRIMMER LOCATION



ALIGNMENT PROCEDURE

Operation	Connect Oscillator to	Dummy Antenna	Input Signal Frequency	Band	Set Dial To	Adj. Trimmers	Purpose
1	Pin 7 12BE6 Converter 2 turns loosely cpd. to savenagnet	.05 Mfd.	455 KC. Modulated	BC	600 Kc.	L8, 9, 12, 13	Align I. F. channel for maximum output.
2	2 turns loosely cpd. to savenagnet		1600 Kc. Modulated	BC	1600 Kc.	C3	Set oscillator to dial scale.
3	2 turns loosely cpd. to savenagnet		1400 Kc. Modulated	BC	1400 Kc.	C2	Align antenna stage.
4 (a)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L15 coil slug Primary discr.	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L16 coil slug sec. of discr.	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 12BA6 2nd IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L14 Prim. of 3rd IF trans.	Align 3rd IF transformer for maximum reading.
7 (c)	Pin 1 (grid) on 12BA6 1st IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L10 and L11 Prim. and Sec. of 2nd IF transformer	Align 2nd IF transformer for maximum reading.
8 (c)	Pin 7 (grid) on 12BE6 converter tube socket.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L6 and L7 Prim. and Sec. of 1st IF transformer.	Align 1st IF transformer for maximum reading.
9 (c)	Antenna Post FM (Re- move line ant.)	270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L4 Osc. Coil Slug	Set Oscillator to dial scale.
10 (c) (d)		270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L3 Det. Coil Slug	Align det. stage to maximum reading.

PARTS LIST

MODEL G723

Ch. 7G04

PART NO. DESCRIPTION

DIAL ASSEMBLY

26-443	Dial Scale
46-859	Band Switch Knob
46-860	Tuning & Volume Control Knob (2 used)
59-243	Dial Pointer
80-402	Dial Cord Tension Spring
80-444	Tuner Arm Tension Spring
80-580	Tuner Arm Stop Spring
80-817	Tuner Spring
80-818	Tuner Arm Pressure Spring
93-910	Felt Washer - Brown (2 used on 46-860 & 1 used on 46-859)
93-956	1/16" x 9/32" x 3/4" Black Felt Washer (Used on 59-243)
188-32	Retaining Ring (Used on S-16885)
199-35	Dial Scale Spacer Sleeve
S-14523	Tuning Shaft Brkt. & Insulating Strip Assem.
S-14524	Condenser Pulley & Cam Assembly
S-14525	Tuner Arm Assembly
S-16885	Tuning Shaft & Pulley Assembly
S-16888	Dial Cord & Eyelet Assembly

COILS & CHOKES

95-1102	2nd. I. F. Transformer
95-1150	2nd. I. F. Transformer
95-1153	Discriminator Transformer
S-13871	F. M. Detector Coil Assembly
S-13997	Filament Choke Assembly (2 used)
S-14481	Broadcast Osc. Coil Assembly
S-14509	3rd. I. F. Coil Assembly
S-14521	1st. I. F. Transformer Assembly
S-14695	F. M. Osc. Coil Assembly
S-15690	F. M. Antenna Coil Assembly

CONDENSERS

22-3	.01	Mfd. Ceramic (10 used)	500V
22-229	.005	"	600V
22-448	.004	"	600V
22-829	.05	"	200V
22-830	.02	"	600V
22-854	500	Mmfd.	600V
22-887	.001	Mfd.	600V
22-1017	.05	"	400V
22-1126	.01	"	400V
22-1158	.05	"	200V
22-1220	.002	"	600V
22-1492	50	Mmfd. Ceramic	500V
22-1507	25	"	500V
22-1511	50	"	500V
22-1669	100	" (or 22-5) (3 used)	500V
22-1676	.001	Mfd. Ceramic	500V
22-1688	19	Mmfd.	500V
22-1742		Two Section Variable	
22-1757		Elect. Cond. 80-40 Mfd. - 150V	
22-1768	30	Mmfd. Ceramic	500V
22-1852	7.5	"	500V

PART NO. DESCRIPTION

RESISTORS

63-686	150 Ohm	W.W.	1/2W	10%	Ins.	Res.
63-1223	1.0	"	W.W.	"	"	"
63-1450	22	"	W.W.	1W	20%	"
63-1527	1000	"	W.W.	3W	"	"
63-1737	68	"	"	1/2W	"	"
63-1744	100	"	"	"	"	" (2 used)
63-1758	220	"	"	"	"	" (4 used)
63-1779	680	"	"	"	"	"
63-1793	1500	"	"	"	"	"
63-1800	2200	"	"	"	"	" (2 used)
63-1828	10K	"	"	"	"	"
63-1835	15K	"	"	"	"	"
63-1842	22K	"	"	"	"	" (2 used)
63-1856	47K	"	"	"	"	"
63-1870	100K	"	"	"	"	" (2 used)
63-1876	150K	"	"	10%	"	" (2 used)
63-1898	470K	"	"	20%	"	" (2 used)
63-1912	1 Megohm	"	"	"	"	"
63-1926	2.2	"	"	"	"	"
63-1940	4.7	"	"	"	"	"
63-2113						Volume Control & Switch

MISCELLANEOUS

12-1070	Wavemagnet Mounting Bracket
14-1232	Plastic Cabinet for G723
49-667	4" P.M. Speaker
	208-667 Cone & Voice Coil
	206-667 Output Transformer
54-139	3/8-32 x 9/16" Palnut (1 ea. used 85-481 & 63-2113)
54-226	Speed Nut Tinnerman (1 ea. used S-13871 & S-14695)
54-267	#6-32 x 5/16" Palnut (Used on 26-443)
54-269	#8-32 x 11/32" Palnut Steel Cad. (Used on S-14521)
54-271	6-32 x 1/4" Palnut (5 used on I.F.'s.)
57-1269	I. F. Transformer Terminal Plate (2 used)
57-1613	Cabinet Emblem Plate
58-128	Two Prong Plug
73-131	#6-32 x 3/8" Slab Hd. Set Screw Cuppoint (2 used on Gang)
78-788	Miniature Tube Socket
78-806	Miniature Tube Socket
78-807	Miniature Tube Socket (5 used)
83-1056	Wavemagnet Mounting Strip
83-1090	Insulating Strip
83-1520	Rectifier Insulating Strip
83-1736	Felt Strip (2 used)
93-1773	Insulating Strip (3 hole strip over controls)
85-481	Band Switch
93-35	.032 x .144 x 3/8" Steel Washer N.P. (2 used on 26-443 & 49-667)
94-613	Iron Core Insulating Bushing (2 used)
97-293	Chassis Mounting Stud (2 used)
412-281	#10 x 3/4" Oval Blind Hd. S.T. Stat. Bronze (2 used on Chassis Mtg.)
114-293	#6-32 x 3/8" Hex Hd. Sl. M.S. Steel (3 used)
114-340	#6 x 1-1/8" Hex Hd. Sl. S.T. (used on 212-7)
139-79	Speaker Baffle
149-64	Iron Core & Spring (2 used)
149-65	Iron Core & Screw
159-50	Cinch Plug Button Black Ox. (4 used on 192-117)
159-69	Plug Button Stat. Bronze (4 used on S-14549)
192-117	Dial Glass
196-111	Speaker Gasket
202-497	F. M. Instruction Book
202-808	Instruction Book
212-7	Selenium Rectifier
S-14527	Wavemagnet Lead & Stop Assembly
S-14549	Cabinet Back Assembly (Complete)
S-14957	Wavemagnet Assembly
S-15739	Speaker Support Bracket & Plate Assembly

MODEL G724,
Ch. 7G02

PARTS LIST

DIAL ASSEMBLY

12-1546 Indicator Socket Brkt.
26-442 Dial Scale
46-780 Tone Control Knob
46-811 Tuning & Vol. Control Knob (2 Used)
46-844 Band Switch Knob
59-243 Dial Pointer
78-585 Indicator Socket
80-402 Dial Cord Tension Spring
80-444 Tuner Arm Tension Spring
80-580 Tuner Arm Stop Spring
80-817 Tuner Spring
80-818 Tuner Arm Pressure Spring
93-774 Felt Washer - Brown (1 Used 46-844 & 2 Used 46-811)
93-956 1/16 X 9/32 X 3/4" Black Felt Washer (Used on 59-243)
100-105 PL-1 Neon Indicator Bulb
114-51 #6-32 X 1/2" Hex Sl. Hd. M.S. Steel N.P. (1 ea. used on 12-1546 & 26-442)
188-32 Retaining Ring (Used on S-16885)
199-35 Dial Scale Spacer Sleeve
S-14523 Tuning Shaft Brkt. & Insulating Strip Assem.
S-14524 Condenser Pulley & Cam Assem.
S-14525 Tuner Arm Assem.
S-16885 Tuning Shaft & Pulley Assem.
S-16888 Dial Cord & Eyelet Assem.

COILS & CHOKES

95-1102 T2B 2nd I.F. Trans. (Broadcast)
95-1150 T2A 2nd I.F. Trans. (F.M.)
95-1153 T4 Discriminator Trans.
S-13871 L3 F.M. Detector Coil Assem.
S-14509 L14 3rd I.F. Coil Assem.
S-15690 L2 F.M. Antenna Coil Assem.
S-15694 L5 Broadcast Osc. Coil Assem.
S-15695 T1 1st. I.F. Trans. Assem.
S-15733 L4 F.M. Oscillator-Coil Assem.

CONDENSERS

22-3	C4	.01 Mfd. Ceramic (9 Used)	500V
22-5	C12	110 Mmfd. Ceramic (3 Used) (Or 22-1669)	500V
22-229	C18	.005 Mfd.	600V
22-448	C25	.004 Mfd.	600V
22-829	C10	.05 Mfd.	200V
22-830	C16	.02 Mfd.	600V
22-854	C17	500 Mmfd.	600V
22-887	C15	.001 Mfd.	600V
22-1017	C24	.05 Mfd.	400V
22-1025	C21	.15 Mfd.	200V
22-1126	C19	.01 Mfd.	400V
22-1158	C20	.05 Mfd.	200V
22-1220	C11	.002 Mfd.	600V
22-1367	C9	50 Mmfd.	500V
22-1506	C7	22 Mmfd. Ceramic (2 Used)	500V
22-1507	C13	25 Mmfd. Ceramic	500V
22-1676	C5	.001 Mfd. Ceramic (2 Used)	500V
22-1752	C1	Two Section Variable	
22-1757	C22-C23	Elect. Cond. 80-40 Mfd.	150V
22-1766	C8	.68 Mmfd. Ceramic	500V
22-1768	C14	30 Mmfd. Ceramic	500V
22-1852	C26	7.5 Mmfd. Ceramic	500V

RESISTORS

63-686	R15	150 Ohm W.W. 1/2W 10% Ins. Res.
63-1223	R8	1.0 Ohm W.W. 1/2W 10% Ins. Res.
63-1450	R20	22 Ohm W.W. 1W 20% Ins. Res.
63-1527	R19	1000 Ohm W.W. 3W 20% Ins. Res.
63-1737	R1	68 Ohm 1/2W 20% Ins. Res.
63-1744	R3	100 Ohm 1/2W 20% Ins. Res. (2 Used)
63-1758	R2	220 Ohm 1/2W 20% Ins. Res. (5 Used)
63-1782	R17	820 Ohm 1/2W 10% Ins. Res.
63-1800	R4	2200 Ohm 1/2 20% Ins. Res. (3 Used)
63-1828	R5	10K Ohm 1/2W 20% Ins. Res.
63-1835	R11	15K Ohm 1/2W 20% Ins. Res.
63-1856	R9	47K Ohm 1/2W 20% Ins. Res.
63-1870	R6	100K Ohm 1/2W 20% Ins. Res. (2 Used)
63-1876	R12	150K Ohm 1/2W 10% Ins. Res. (2 Used)
63-1884	R21	220K Ohm 1/2W 20% Ins. Res.
63-1898	R14	470K Ohm 1/2W 20% Ins. Res. (2 Used)
63-1912	R10	1 Megohm 1/2W 20% Ins. Res.
63-1926	R7	2.2 Megohm 1/2W 20% Ins. Res.
63-1940	R13	4.7 Megohm 1/2W 20% Ins. Res. (3 Used)
63-2008	R16	Tone Control
63-2113	R18	Volume Control & Switch

MISCELLANEOUS

12-1070		Wavemagnet Mtg. Brkt.
14-1233		Plastic Cabinet for G724
43-165		Handle Housing
49-634	SP-1	5-1/4" P.M. Speaker
		208-634 Cone & Voice Coil
54-139		206-634 Output Trans.
		3/8-32 X 9/16" Palnut (1 Ea. Used on 63-2113 & 85-481)
54-226		Speed Nut (1 Ea. Used on S-13871 & S-15733)
54-267		#6-32 X 5/16" Palnut - Steel Cad. (7 Used)
54-269		#8-32 X 11/32" Palnut - Steel Cad. (Used on S-15695)
54-305		3/8-32 X 9/16 Palnut - Steel Stat. Bronze
57-1269		I.F. Trans. Terminal Plate (2 Used)
57-1613		Cabinet Emblem Plate
58-128		Two Prong Plug
73-131		#6-32 X 3/8" Slab. Hd. Set Screw (2 Used on Gang)
78-806		Miniature Tube Socket
78-807		Miniature Tube Socket (4 Used)
78-850		Miniature Tube Socket (9 Contact)
78-868		Miniature Tube Socket (9 Contact)
83-1056		Wavemagnet Mtg. Strip
83-1090		Insulating Strip
83-1393		Rubber Strip (Handle)
83-1520		Rectifier Insulating Strip
83-1736		Felt Strip (2 Used)
83-1773		Insulating Strip (3 Hole Strip over Controls)
85-481	S-1	Band Switch
93-35		.032 X .144 X 3/8 Steel Washer (2 Used on 26-442)
93-125		#6 Int. Shakeproof Lockwasher (5 Used on Gang)
93-487		1/16 X .144 X 3/8" Steel Washer (2 Used on 43-165)
93-719		031 X 3/16 X 7/16" Steel Washer (Used on 26-442)

PARTS LIST CONT'D

93-729	032 X .187 X 5/8" Steel Washer (Used on 26-442)
94-613	Iron Core Insulating Bushing (2 Used)
97-293	Chassis Mtg. Stud (2 Used)
112-281	#10 X 3/4" Oval Binding Hd. S.T. Screw Type Z Stat. Br. (2 Used Chassis Mtg.)
114-340	#6 X 1-1/2" Hex Hd. S1. S.T. (Used on 212-7)
126-618	Tube Shield
149-64	Iron Core & Spring (2 Used)
149-65	Iron Core & Screw
159-50	Plug Button - Stat. Bronze (4 Used on 192-117)
159-69	Plug Button - Stat. Bronze (4 Used on S-14549)
192-117	Dial Glass
196-111	Speaker Gasket
199-103	Flexible Handle Sleeve
202-697	F.M. Instruction Book
202-809	Instruction Book
212-7 SE-1	Selenium Rectifier
S-13210	Strip & Rivet Assem. (Handle)
S-14527	Wavemagnet Lead & Stop Assem.
S-14549	Cabinet Back Assem. (Complete)
S-14957 L1	Wavemagnet Assem.

The 7G02 chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and one stage on the AM Band. There is one stage of RF amplification on the FM Band.

When adjustments are made on the 7G02 or any AC-DC chassis, a line isolation transformer (110-V input to 110-V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground, and if there is any indication of voltage, reverse the plug before handling the set.

FM-AM 1st IF Alignment: The alignment of the 1st IF transformer is conventional. The alignment slugs are threaded and screw into the coil forms. The slugs are slotted for a small size fiber screw driver. Do not press hard on the aligning tool or the threads in the coil forms will strip and adjustment will be impossible. The 2nd AM and FM IF transformers and the discriminator transformer are the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF and discriminator transformers, tuning wrench 68-7 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM RF Alignment: The tuning slugs are attached to threaded shafts and the slugs are varied in the field of the coils by turning the shafts clockwise or counter-clockwise. After adjustment the shafts must be secured with a drop of speaker cement.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined in this service note.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

Alignment of this chassis will, in most cases, be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

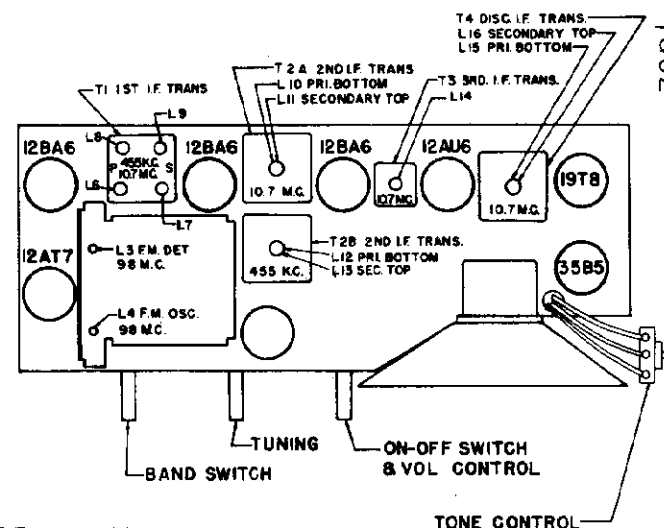
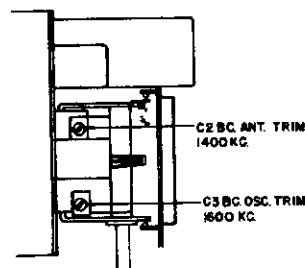
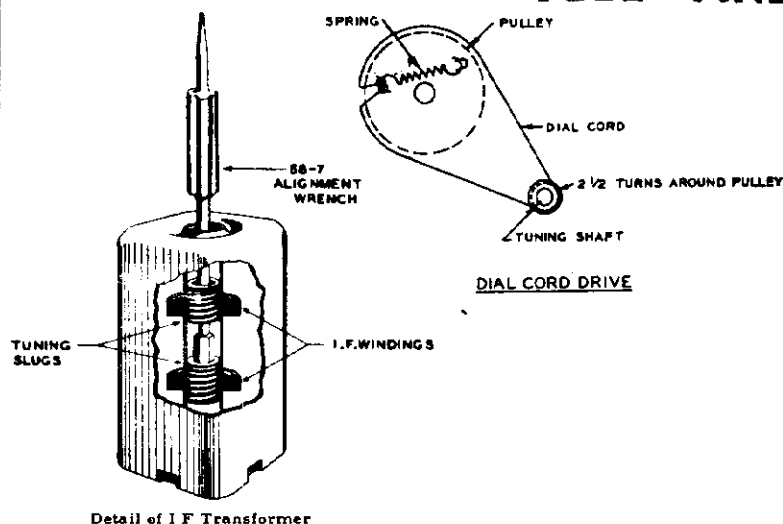
A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

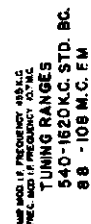
- Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).
- Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).
- Vacuum Tube Voltmeter from Limiter Grid to Chassis.
- Loosen Slugs by applying a hot iron to the cement.

TUBE AND TRIMMER LOCATION



ALIGNMENT PROCEDURE

Operation	Connect Oscillator To	Dummy Antenna	Input Signal Frequency	Band	Set Dial To	Adj. Trimmers	Purpose
1	Pin 2 12AT7 Converter	.05 Mfd.	455 Kc. Modulated	BC	600 Kc.	L8, 9, 12, 13	Align I.F. channel for maximum output.
2	2 turns loosely cpld. to wavemagnet		1600 Kc. Modulated	BC	1600 Kc.	C3	Set oscillator to dial scale.
3	2 turns loosely cpld. to wavemagnet		1400 Kc. Modulated	BC	1400 Kc.	C2	Align antenna stage.
4 (a)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L15 coil slug Primary discr.	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L16 coil slug sec. of discr.	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 12BA6 2nd. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L14 Prim. of 3rd IF trans.	Align 3rd. IF transformer for maximum reading.
7 (c)	Pin 1 (grid) on 12BA6 1st. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L10 and L11 Prim. and Sec. of 2nd. IF transformer	Align 2nd IF transformer for maximum reading
8 (c)	Pin 2 (grid) on 12AT7 converter tube socket	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L6 and L7 Prim. and Sec. of 1st. IF transformer	Align 1st. IF transformer for maximum reading.
9 (c)	Antenna Post FM (Remove line ant.)	270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L4 Osc. Coil Slug	Set Oscillator to dial scale.
10 (c) (d)		270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L3 Det. Coil Slug	Align det. stage to maximum reading.



ALL VOLTAGES MEASURED FROM COMMON
RETURN TO POINTS INDICATED WITH AN
A.C. D.C. OR VACUUM TUBE VOLTMETER.

ALL VOLTAGES ARE D.C. UNLESS
NOTED OTHERWISE.

OTHERWISE SPECIFIED

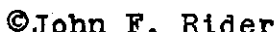
ALL REGISTRATIONS 20% FOLLOWING
UNLESS OTHERWISE SPECIFIED.

NOTE: V2A-V2B & Y4
LE TRANSFORMER NUMBERING STARTS

1. TERMINAL, AS FIRST TERMINAL C
AND ADJACENT TO MARKER AS
BOTTOM OF CHANNEL

500

1. *Journal of the American Medical Association*, 2000; 283: 2689-2695.



The 7G01 chassis incorporates a superheterodyne circuit with two stages of IF, and one stage of RF amplification on all bands.

When adjustments are made on the 7G01 or any AC-DC chassis, a line isolation transformer (110 V input to 110 V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground, and if there is any indication of voltage, reverse the plug before handling the set.

AM Alignment: The alignment of this chassis on the standard broadcast band is conventional. The alignment slugs in the IF transformers are threaded and screw into the coil forms. The slugs are slotted for a small size fiber screw driver. Do not press hard on the aligning tool or the threads in the coil forms will strip and adjustments will be impossible.

FM RF Alignment: The tuning slugs are attached to threaded shafts and the slugs are varied in the field of the coils by turning the shafts clockwise or counter-clockwise. After adjustment the shafts must be secured with a drop of speaker cement.

FM IF Alignment: The same type of tuning slugs for aligning the AM IF Amplifier are used for the FM I.F.'s. Observe the same precautions when making adjustments.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with. Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

(a) Vacuum Tube Voltmeter Lug 6 on discriminator transformer to chassis (half discriminator load).

(b) Vacuum Tube Voltmeter Lug 3 on discriminator transformer to chassis (full discriminator load).

(c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.

(d) Loosen Slugs by applying a hot iron to the cement.

ALIGNMENT PROCEDURE

Operation	Connect Oscillator To	Dummy Antenna	Input Signal Frequency	Band	Set Dial To	Adj. Trimmers	Purpose
1	Pin 7 12AT7 Converter	.05 Mfd.	455 KC Modulated	BC	600 Kc	L-9, 10, 13, 14, 17 and 18	Align I.F. channel for maximum output.
2	2 turns loosely cpld. to wavemagnet		1600 Kc. Modulated	BC	1600 Kc	C4	Set oscillator to dial scale
3	2 turns loosely cpld. to wavemagnet		1400 Kc Modulated	BC	1400 Kc	C3 and C2	Align det. and ant. stages
4 (a)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc Unmodulated	FM 100		L19 coil slug Primary discr.	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L20 coil slug sec. of discr.	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 12BA6 2nd. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L15 and L16 Prim. and Sec. of 3rd IF transformer	Align 3rd. IF transformer for maximum reading.
7 (c)	Pin 1 (grid) on 12BA6 1st. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L11 and L12 Prim. and Sec. of 2nd. IF transformer	Align 2nd. IF transformer for maximum reading.
8 (c)	Pin 7 (grid) on 12AT7 converter tube socket	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L7 and L8 Prim. and Sec. of 1st IF transformer	Align 1st. IF Transformer for maximum reading.
9 (c)(d)		270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L5 Osc. Coil Slug	Set Oscillator to dial scale
10 (c)(d)	Antenna Post F (Remove line ant.)	270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L3 and L2 Det. and RF coil Slugs	Align det. and ant. stages to maximum reading.

MODEL G725,
Ch. 7001

PARTS LIST

DIAL ASSEMBLY

12-1407		Dial Light Socket Mtg. Brkt.
*26-445		Dial Scale
46-538		Tuning Control Knob
46-718		Band Switch Knob
*46-855		Tone Control Knob
57-1613		Cabinet Emblem Plate
57-1615		Dial Scale Clamping Plate (4 Used)
*57-1641		Name Plate
*59-245		Dial Pointer
78-786		Dial Light Socket
80-69		Dial Cord Spring
80-209		Dial Cord Spring
80-444		Tuner Arm Tension Spring
80-580		Tuner Arm Stop Spring
80-581		Tuner Arm Pressure Spring
93-475		Felt Washer (Part of S-14124)
94-613		Iron Core Insulating Bushing (3 Used on S-14429)
100-97	PL-1	Dial Light Bulb - 115V
114-26		#8-32 X 1/4" Hex. Hd. Sl. M. S. (Used on 12-1407)
188-30		Retaining Ring (Used on 76-493)
188-102		Clamping Ring (46-538)
S-13983		Dial Cord & Eyelet Assem.
S-13945		Cam, Pulley & Bushing Assem.
S-13981		Tone Control Brkt. & Lug Assem.
S-14129		Vol. Control Knob Assem.
S-14429		Tuner Arm Assem.
*S-16735		Pointer Pulley & Bushing Assem.
*S-16884		Pulley & Shaft Assem.
*S-16887		Dial Cord & Eyelet Assem.

COILS & CHOKES

S-12256	L21	A.C. Line Choke Coil Assem.
S-13971	T2	2nd I.F. Trans. Assem.
S-13972	T3	3rd I.F. Trans. Assem.
S-13973	T4	Discriminator Trans. Assem.
S-14192	L2	F.M. Antenna Coil Assem.
S-15733	L5	F.M. Oscillator Coil Assem.
S-15743	L3	F.M. Detector Coil Assem.
S-15981	T1	1st. I.F. Trans. Assem.
S-16344	L4	Broadcast Detector Coil Assem.
S-16345	L6	Broadcast Osc. Coil Assem.

CONDENSERS

22-3	C5	.01 Mfd. Ceramic (Disc.) (10 Used)	500V
22-5	C8	.110 Mfd. Ceramic (Disc.) (4 Used)	500V
		or 22-1669	
22-829	C10	.05 Mfd. (3 Used)	200V
22-830	C17	.02 Mfd.	600V
22-854	C18	.0005 Mfd.	600V
22-1220	C13	.002 Mfd. (2 Used)	600V
22-1367	C12	50 Mmfd. Ceramic	500V
22-1506	C7	22 Mmfd. Ceramic (3 Used)	500V
22-1507	C15	25 Mmfd. Ceramic	500V
22-1661	C21,		
C22, C23, C24		Elect. Cond. 80-40-40- Mfd. - 150V 40 Mfd.	25V
22-1678	C6	.001 Mfd. (3 Used)	500V
22-1677	C1	Three Gang Variable Cond.	
22-1683	C16	.02 Mfd. (Shielded)	400V
22-1702	C19	.005 Mfd.	400V
22-1705	C9	30 Mmfd. Ceramic	500V
22-1766	C11	.68 Mmfd. (Molded)	500V
22-1775	C26	.047 Mfd.	400V
22-2084	C20	.1 Mfd. (2 Used)	200V

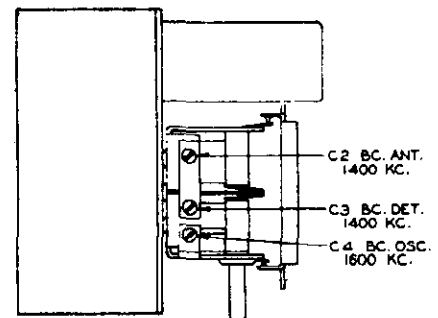
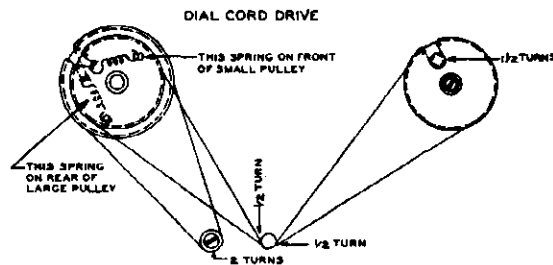
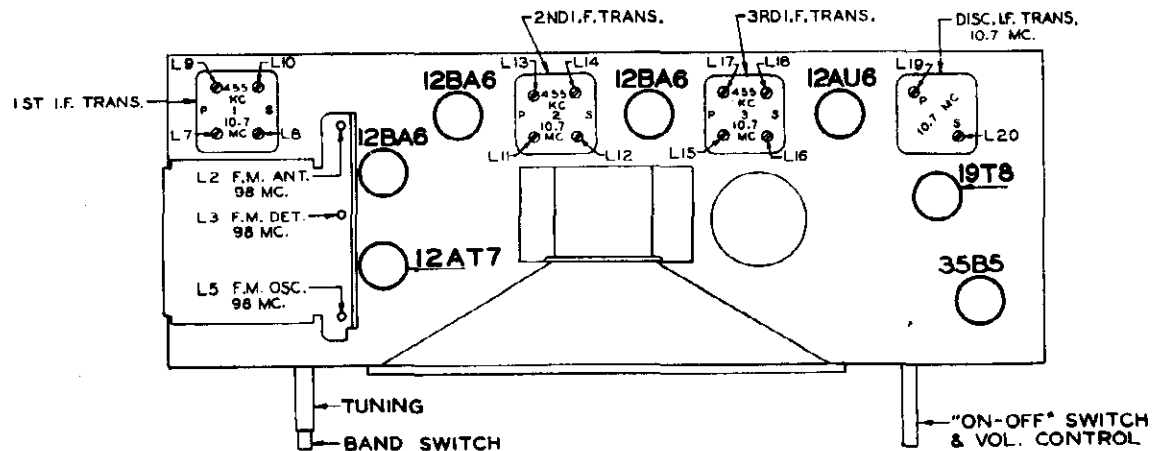
RESISTORS

63-1202	R21	330 Ohm W.W. 2W 10% Ins. Res.
63-1450	R23	22 Ohm W.W. 1W 20% Ins. Res.
63-1452	R20	270 Ohm W.W. 2W 10% Ins. Res.
63-1584	R18	Volume Control & Switch
63-1737	R3	68 Ohm 1/2W 20% Ins. Res.
63-1744	R6	100 Ohm 1/2W 20% Ins. Res. (2 Used)
63-1747	R19	120 Ohm 1/2W 10% Ins. Res.
63-1772	R2	470 Ohm 1/2W 20% Ins. Res.
63-1779	R1	680 Ohm 1/2W 20% Ins. Res. (4 Used)
63-1785	R8	1000 Ohm 1/2W 10% Ins. Res. (2 Used)
63-1786	R9	1000 Ohm 1/2W 20% Ins. Res.
63-1799	R24	2200 Ohm 1/2W 10% Ins. Res.
63-1800	R7	2200 Ohm 1/2W 20% Ins. Res.
63-1806	R13	3300 Ohm 1/2W 10% Ins. Res.
63-1810	R14	3900 Ohm 1/2W 10% Ins. Res.
63-1817	R22	5600 Ohm 1/2W 10% Ins. Res.
63-1824	R15	8200 Ohm 1/2W 10% Ins. Res.
63-1828	R5	10K Ohm 1/2W 20% Ins. Res. (2 Used)
63-1856	R11	47K Ohm 1/2W 20% Ins. Res.
63-1870	R12	100K Ohm 1/2W 20% Ins. Res. (3 Used)
63-1876	R16	150K Ohm 1/2W 10% Ins. Res. (2 Used)
63-1898	R10	470K Ohm 1/2W 20% Ins. Res. (3 Used)
63-1926	R4	2.2 Megohm 1/2W 20% Ins. Res.
63-1940	R17	4.7 Megohm 1/2W 20% Ins. Res. (3 Used)
*63-2108	R25	Tone Control

MISCELLANEOUS

12-1070		Wavemagnet Mtg. Brkt. (2 Used)
*14-1235		Plastic Cabinet for G725
19-139		Cabinet Back Retaining Clip (4 Used)
49-608	SP-1	7-1/2" P.M. Speaker
54-139		208-608 Cone & Voice Coil #3/8-32 x 9/16" Palnut Type 9N Steel Cad. (Used on 63-1584)
54-140		#3/8-32 x 9/16" Hex Nut-Steel N.P. (Used on 63-2108)
54-226		Speed Nut-Tinnerman (1 ea. used on S-14192-S-15733 & S-15743)
54-269		#8-32 x 11/32" Palnut (6 Used to Mt. I.F.'s.)
57-1269		I. F. Trans. Terminal Plate (8 Used)
58-128		Two Prong Plug
*74-64		Grill Screen
78-782		Miniature Tube Socket (7 Contact)
78-787		Two Contact Socket (Used on S-14128)
78-788		Miniature Tube Socket (9 Contact)
78-794		Miniature Tube Socket (3 Used)
78-795		Miniature Tube Socket (7 Contact)
78-854		Miniature Tube Socket (9 Contact)

TUBE AND TRIMMER LOCATION



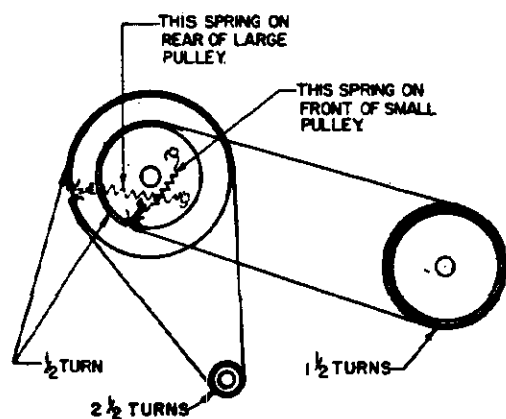
PARTS LIST—Continued

Part No.	Ref. No.	Description
----------	----------	-------------

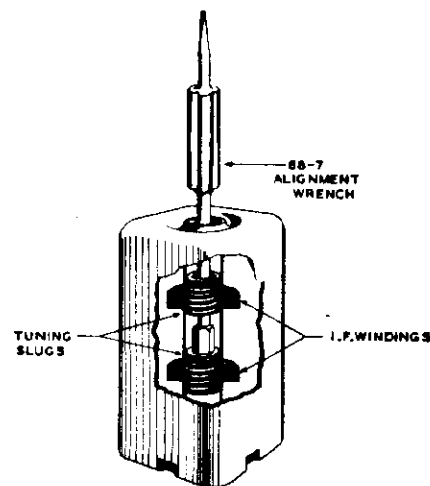
MISCELLANEOUS (Continued)

83-1056		Wavemagnet Mtg. Strip (2 Used)
83-1519		Aluminum Foil Strip
*83-1755		Aluminum Foil Strip
*83-1756		Indicator Strip
85-464	S1	Band Switch
93-665		Fibre Washer (2 Used on S-14385)
93-729		.032 X .187 X 5/8 Steel Washer N.P. (2 Used on S-13981)
94-334		Speaker Mtg. Bushing (4 Used)
94-485		Fibre Bushing (1 ea. used on 63-1584 & 63-2108)
95-1035	T5	Output Trans.
97-284		Dial Cord Guide Stud
97-293		Insulating Stud (4 Used)
112-281		#10 X 3/4" Oval B.H.S.T. Screw-Type Z - Stat. Bronze (4 Used Chassis Mtg.)
112-697		#6 X 7/16" Straight Side B.H.S.T. Screw (4 Used on Back)
114-26		#8 X 1/4" Hex Hd. S.T. (2 Used on S-13977)
114-78		#8 X 5/16" Hex Hd. S1. S.T. N.P. (2 Used Wavemagnet Mtg)
114-292		#6 X 5/8" Hex Hd. S1. S.T. Screw (8 Used)
114-319		#8-32 X 11/16" Hex Hd. S1. M.S. Steel (2 Used on S-13981)
125-17		Rubber Grommet (4 Used on 49-608)
125-62		Rubber Grommet (4-Used)
*139-88		Baffle Board
149-64		Tuning Core (3 Used)
188-34		Retaining Ring
*188-136		Trim Ring
202-697		F.M. Instruction Book
*202-810		Instruction Book
212-7	SE-1	Selenium Rectifier
S-13977	L1	Wavemagnet Assem.
S-14128		Cabt. Back Assem. (Complete)
S-14358		Wavemagnet Cable Assem.

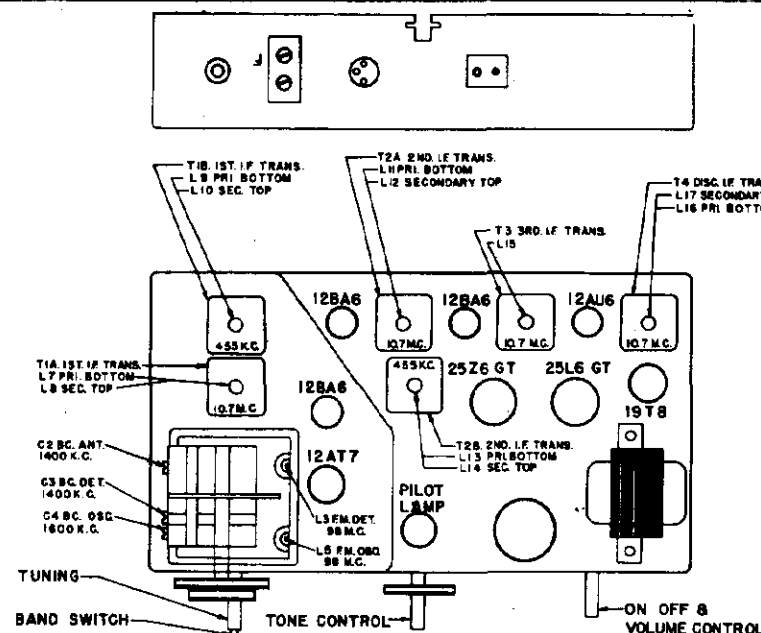
MODEL 8G21
Ch. 8G21



DIAL CORD DRIVE



Detail of IF Transformer



TUBE AND TRIMMER LOCATION

The 8G21 chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and one stage on the AM Band. There is one stage of RF amplification on all bands.

When adjustments are made on the 8G21 chassis, a line isolation transformer (110 V input to 110V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground and if there is any indication of voltage, reverse the plug before handling the set.

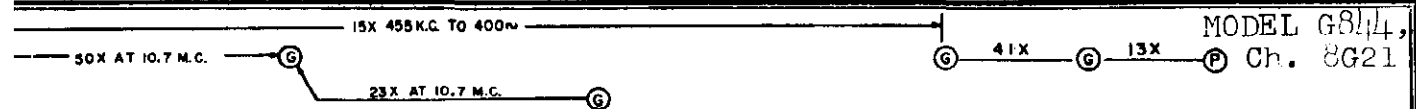
FM RF Alignment: The tuning slugs are attached to threaded shafts and the slugs are varied in the field of the coils by turning the shafts clockwise or counter-clockwise. After adjustment the shafts must be secured with a drop of speaker cement.

AM And FM IF Alignment: The AM and FM IF transformers in this receiver are of the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF transformers the tuning wrench 68-7 can be inserted

into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined below.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.



BA6

T. I.F.

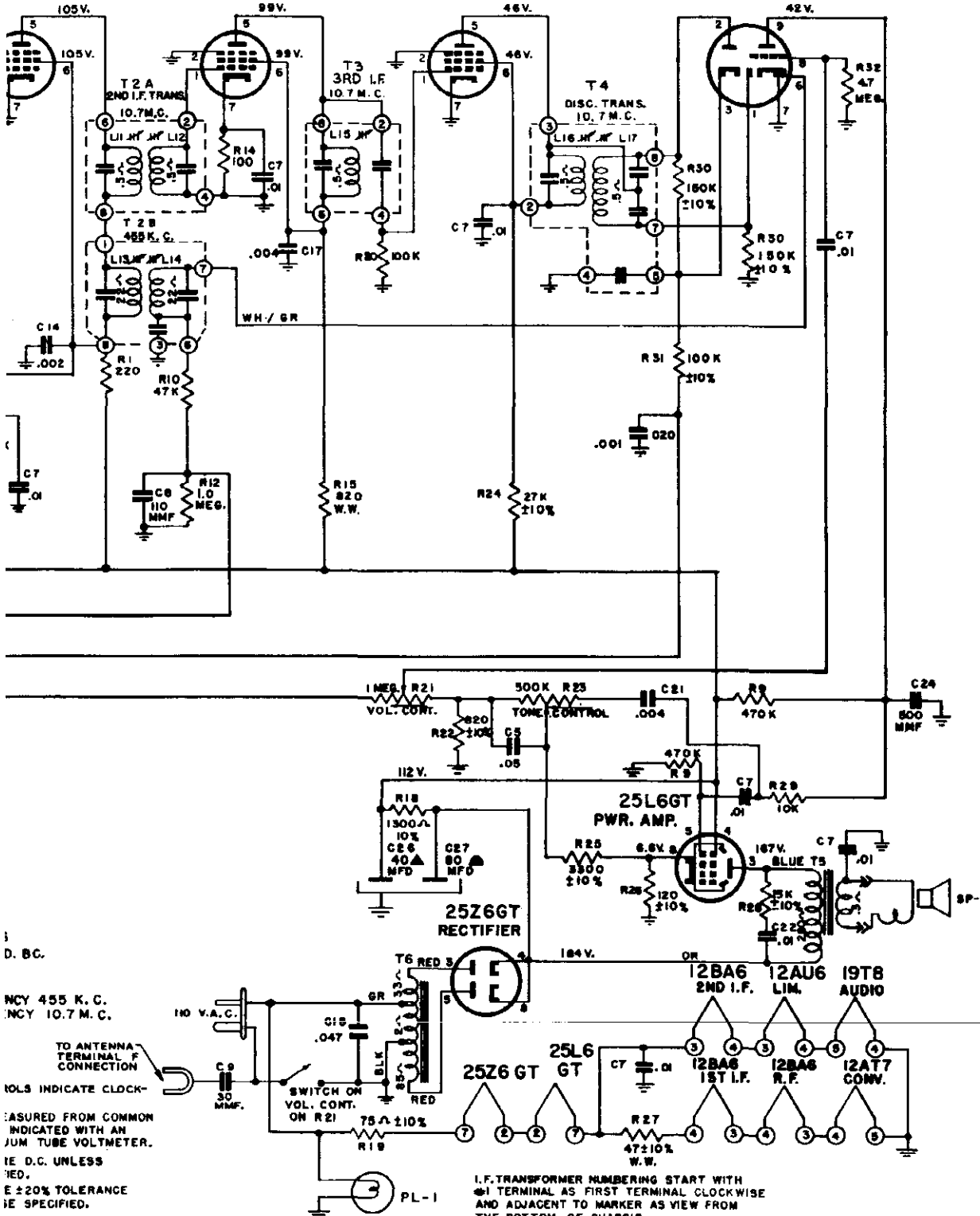
12BA6

2ND. I.F.

12AU6

LIMITER

19T8

DISCRIMINATOR DET.
1 ST. AUDIO

ALIGNMENT PROCEDURE

Operation	Connect Oscillator To	Dummy Antenna	Input Signal Frequency	Band	Set Dial To	Adj. Trimmers	Purpose
1	Pin 2 12AT7 Converter	.05 Mfd.	455 Kc. Modulated	BC	600 Kc.	L9, 10, 13, 14	Align I F. channel for maximum output.
2	2 turns loosely cpld. to wavemagnet		1600 Kc. Modulated	BC	1600 Kc.	C4	Set oscillator to dial scale.
3	2 turns loosely cpld. to wavemagnet		1400 Kc. Modulated	BC	1400 Kc.	C3, C2	Align detector and antenna stage.
4 (a)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L16 coil slug Primary discr.	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L17 coil slug sec. of discr.	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 12BA6 2nd. I F.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L15 Prim. of 3rd. IF trans.	Align 3rd. IF transformer for maximum reading.
7 (c)	Pin 1 (grid) on 12BA6 1st. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L11 and L12 Prim. and Sec. of 2nd. IF transformer.	Align 2nd IF transformer for maximum reading.
8 (c)	Pin 2 (grid) on 12AT7 converter tube socket.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L7 and L8 Prim. and Sec. of 1st. IF transformer.	Align 1st. IF transformer for maximum reading.
9 (c)	Antenna Post FM (Remove line ant.)	270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L5 Osc. Coil Slug.	Set Oscillator to dial scale.
10 (c) (d)		270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L3 Det. Coil Slug	Align det. stage to maximum reading.

IMPORTANT

Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

(a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).

(b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).

(c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.

(d) Loosen Slugs by applying a hot iron to the cement.

MODEL G844
Ch. 8G21

MODEL G844,
Ch. 8G21PARTS LIST

PART NO. DESCRIPTION

DIAL ASSEMBLY

26-429 Dial Scale & Glass (F.M. Band)
46-522 Dummy Knob
46-538 Tuning Knob
46-718 Band Switch & Vol. Control Knob (2 used)
46-831 Tone Control Knob
54-292 Speed Nut - Tinnerman (Used on 94-671)
76-578 Tuning Control Shaft
78-872 Dial Light Socket & Wire
80-69 Dial Cord Spring
80-402 Dial Cord Spring
80-746 Pulley Retaining Spring
80-801 Tuner Arm Tension Spring
93-993 Insulating Washer (2 used)
94-671 Pointer Pulley Bushing
100-97 Pilot Light Bulb
148-122 Tuner Arm
S-16281 Pointer Pulley & Shaft Assembly
S-16346 Dial Cord & Eyelet Assembly (Long)
S-16351 Dial Scale & Brkt. Assembly
S-16740 Dial Cord & Eyelet Assembly (Short)

COILS & CHOKES

95-1102 2nd. I. F. Transformer
95-1150 2nd. I. F. Transformer
95-1152 3rd. I. F. Transformer
95-1153 Disc. Trans.
95-1200 1st. I. F. Transformer
95-1201 1st. I. F. Transformer
S-15691 F.M. Osc. Coil Assembly
S-15743 F.M. Detector Coil Assembly
S-16344 Broadcast Det. Coil Assembly
S-16345 Broadcast Osc. Coil Assembly
S-16408 Antenna Choke Coil Assembly

CONDENSERS

22-3 .01 Mfd. Ceramic 500V
22-4 .004 Mfd. Ceramic 500V
22-5 110 Mmfd. Ceramic (or 22-1669) 500V
22-448 .004 Mfd. 600V
22-669 .01 Mfd. 600V
22-829 .05 Mfd. 200V
22-854 .0005 Mfd. 600V
22-1220 .002 Mfd. 600V
22-1367 50 Mmfd. Ceramic 500V
22-1506 22 Mmfd. Ceramic 500V
22-1676 .001 Mfd. Ceramic 500V
22-1705 30 Mmfd. 500V
22-1717 .001 Mfd. 200V
22-1762 1 Mmfd. Ceramic 500V
22-1775 .047 Mfd. (Molded) 400V
22-1852 7.5 Mmfd. Ceramic 500V
22-2104 Three Section Variable Cond.
22-2105 Elect. 80-40 Mfd. 250V

RESISTORS

63-1726 39 Ohm 1/2W 10% Ins. Res.
63-1737 68 Ohm 1/2W 20% Ins. Res.
63-1744 100 Ohm 1/2W 20% Ins. Res.
63-1758 220 Ohm 1/2W 20% Ins. Res.
63-1772 470 Ohm 1/2W 20% Ins. Res.
63-1782 820 Ohm 1/2W 10% Ins. Res.

PART NO. DESCRIPTION

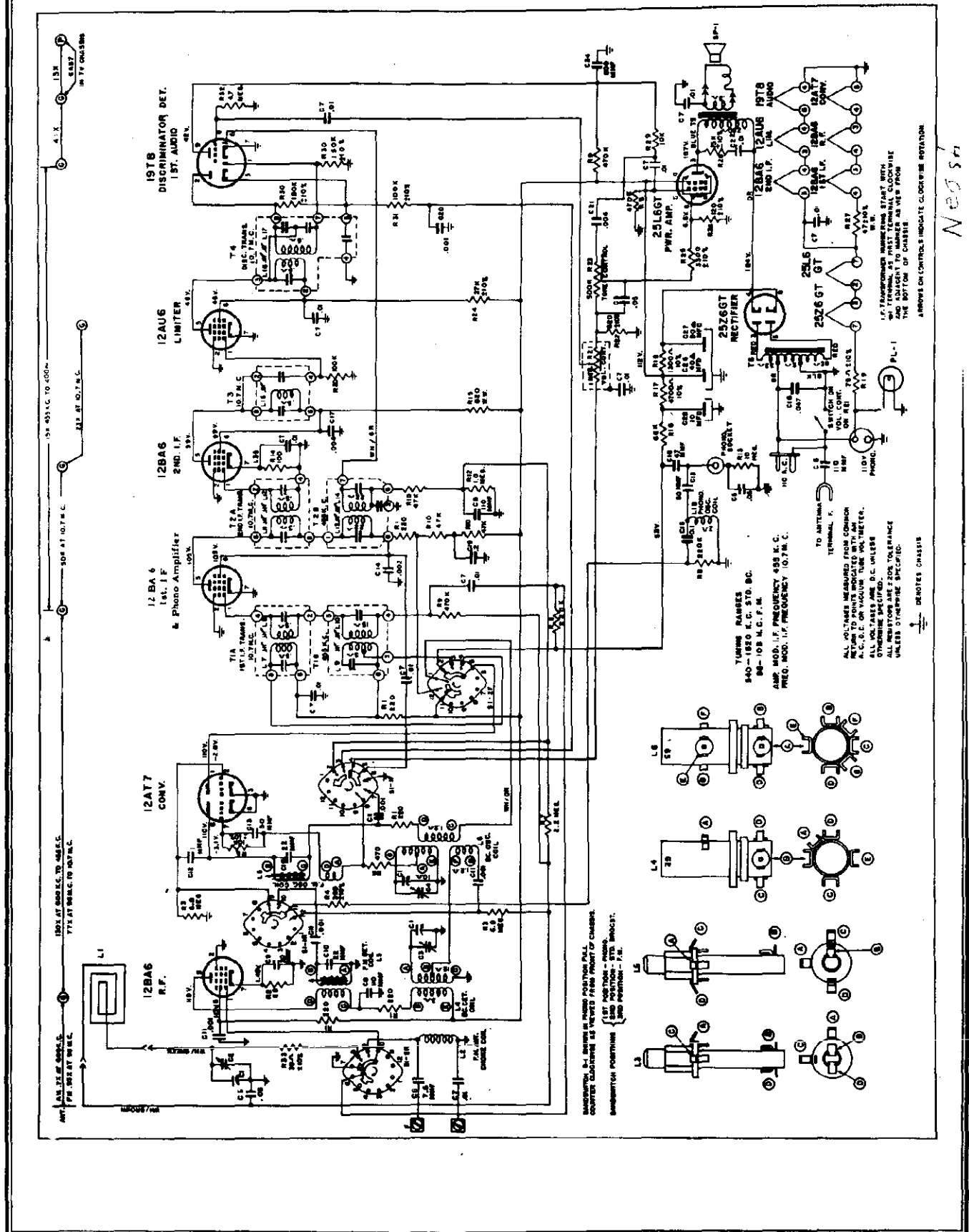
RESISTORS

63-1806 3300 Ohm 1/2W 10% Ins. Res.
63-1827 10K Ohm 1/2W 10% Ins. Res.
63-1828 10K Ohm 1/2W 20% Ins. Res.
63-1834 15K Ohm 1/2W 10% Ins. Res.
63-1845 27K Ohm 1/2W 10% Ins. Res.
63-1856 47K Ohm 1/2W 20% Ins. Res.
63-1869 100K Ohm 1/2W 10% Ins. Res.
63-1870 100K Ohm 1/2W 20% Ins. Res.
63-1876 150K Ohm 1/2W 10% Ins. Res.
63-1898 470K Ohm 1/2W 20% Ins. Res.
63-1912 1 Megohm 1/2W 20% Ins. Res.
63-1926 2.2 Megohm 1/2W 20% Ins. Res.
63-1940 4.7 Megohm 1/2W 20% Ins. Res.
63-1947 6.8 Megohm 1/2W 20% Ins. Res.
63-1981 120 Ohm 1W 10% Ins. Res.
63-2062 Vol. Control & Switch
63-2063 Tone Control
63-2068 Candohm Resistors - Two Section
63-2091 820 Ohm W.W. 1/2W 20% Ins. Res.
63-2093 47 Ohm W.W. 1W 10% Ins. Res.

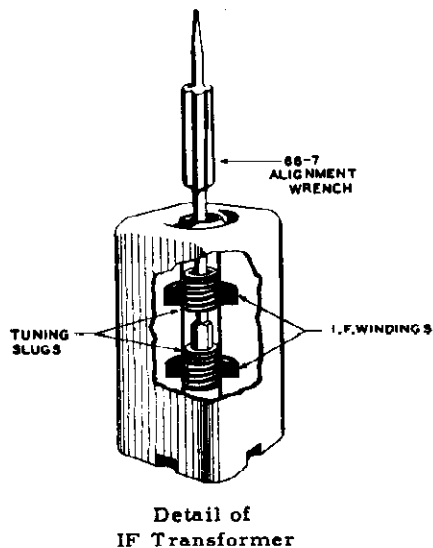
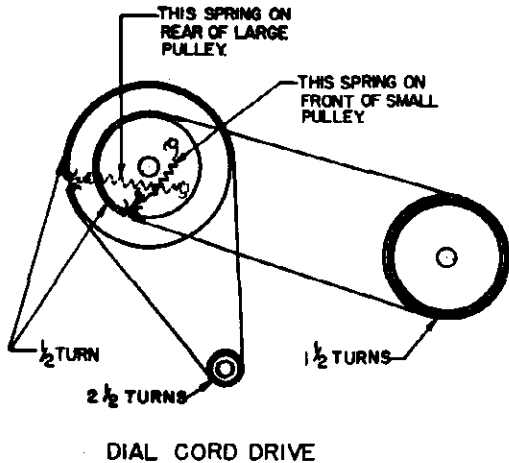
MISCELLANEOUS

49-678 10" P.M. Speaker
208-678 Cone & Voice Coil
54-303 Speed Nut - Tinnerman (5 used on Esc. Mtg.)
57-1481 Esc. Clamping Plate
57-1613 Emblem Plate
57-1616 Escutcheon
70-86 #6 x 5/8" Washer Hd. Wood Screw Stat. Bronze (7 used S-16498)
78-755 Octal Tube Socket (2 used)
78-807 Miniature Tube Socket
78-854 Miniature Tube Socket
78-869 Miniature Tube Socket
78-870 Miniature Tube Socket
78-871 Miniature Tube Socket
80-780 Iron Core Tension Spring
83-1698 Rubber Channel Strip
83-1701 Chassis Insulating Strip
85-477 Band Switch
93-968 .046 x .171 x 1/2 Steel Washer Cad. (2 used on Esc. Mtg.)
95-1188 Auto Power Trans.
95-1189 Output Trans.
97-293 Chassis Mtg. Insulating Stud
114-148 #10 x 7/8" Hex Washer Hd. S.T. Screw (3 used Chassis Mtg.)
114-297 #6 x 1/4" Hex Hd. Sl. S.T. (2 used on Esc.)
114-313 #8 x 1/2" Hex Hd. Sl. S.T. (4 used on Esc. Mtg.)
149-95 Iron Core & Spring
165-9 Glides (4 used)
188-30 Retaining Ring (Used on 85-477)
196-135 Dust Gasket
202-697 F.M. Instruction Book
202-774 Instruction Book
S-16161 Speaker Cable & Eyelet Assembly
S-16359 Wavemagnet Assembly
S-16498 Cabinet Back Assembly (Complete with A.C. Cord and Wavemagnet)

MODELS G881, G882, G883,
G884, G885, Ch. 8G20



MODELS G381, G882, G883,
G884, G885, Ch. 8G20



The 8G20 chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and one stage on the AM Band. There is one stage of RF amplification on all Bands.

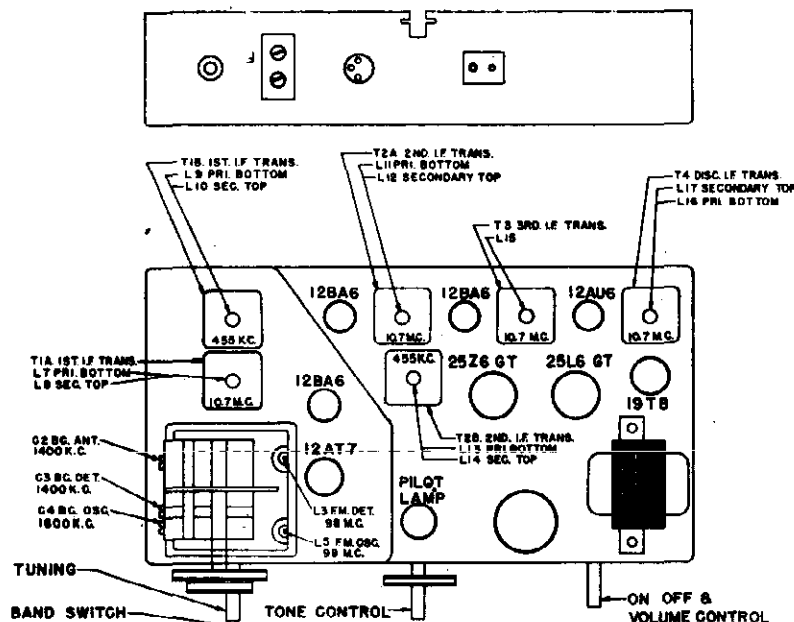
When adjustments are made on the 8G20 chassis, a line isolation transformer (110 V input to 110V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground and if there is any indication of voltage, reverse the plug before handling the set.

FM RF Alignment: The tuning slugs are attached to threaded shafts and the slugs are varied in the field of the coils by turning the shafts clockwise or counter-clockwise. After adjustment the shafts must be secured with a drop of speaker cement.

AM And FM IF Alignment: The AM and FM IF transformers in this receiver are of the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF transformers the tuning wrench 68-7 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined below.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.



TUBE AND TRIMMER LOCATION

ALIGNMENT PROCEDURE

Operation	Connect Oscillator To	Dummy Antenna	Input Signal Frequency	Band	Set Dial To	Adj. Trimmers	Purpose
1	Pin 2 12AT7 Converter	.05 Mfd.	455 Kc. Modulated	BG	600 Kc.	L9, 10, 13, 14	Align I F. channel for maximum output.
2	2 turns loosely cpd. to wavemagnet		1600 Kc. Modulated	BC	1600 Kc.	C4	Set oscillator to dial scale.
3	2 turns loosely cpd. to wavemagnet		1400 Kc. Modulated	BC	1400 Kc.	C3, C2	Align detector and antenna stage.
4 (a)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L16 coil slug Primary discr.	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L17 coil slug sec. of discr.	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 12BA6 2nd. I F.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L15 Prim. of 3rd. IF trans.	Align 3rd. IF transformer for maximum reading.
7 (c)	Pin 1 (grid) on 12BA6 1st. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L11 and L12 Prim. and Sec. of 2nd. IF transformer.	Align 2nd IF transformer for maximum reading.
8 (c)	Pin 2 (grid) on 12AT7 converter tube socket.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L7 and L8 Prim. and Sec. of 1st. IF transformer.	Align 1st. IF transformer for maximum reading.
9 (c)	Antenna Post FM (Remove line ant.)	270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L5 Osc. Coil Slug.	Set Oscillator to dial scale.
10 (c) (d)		270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L3 Det. Coil Slug	Align det. stage to maximum reading.

IMPORTANT

Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

(a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).

(b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).

(c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.

(d) Loosen Slugs by applying a hot iron to the cement.

MODELS G881, G882, G883,
G884, G885, Ch. 8G20

PARTS LIST

PART NO.	DESCRIPTION
DIAL ASSEMBLY	
76-578	Tuning Control Shaft
78-872	Dial Light Socket & Wire
80-402	Dial Cord Springs (2 used)
80-746	Pulley Retaining Spring
80-781	Tuner Arm Tension Spring
94-671	Pointer Pulley Bushing
100-97	Pilot Light Bulb
148-122	Tuner Arm
S-16281	Pointer Pulley & Shaft Assembly
S-16346	Dial Cord & Eyelet Assembly (Long)
S-16347	Dial Cord & Eyelet Assembly (Short)
S-16351	Dial Scale & Bracket Assembly (26-438)

COILS & CHOKES

95-1102	2nd. I.F. Transformer
95-1150	2nd. I.F. Transformer
95-1152	3rd. I.F. Transformer
95-1153	Disc. Transformer
95-1200	1st. I.F. Transformer
95-1201	1st. I.F. Transformer
S-12603	Phono Osc. Coil Assembly
S-15691	F.M. Osc. Coil Assembly
S-15743	F.M. Detector Coil Assembly
S-16344	Broadcast Detector Coil Assembly
S-16345	Broadcast Oscillator Coil Assembly
S-16408	Antenna Choke Coil Assembly

CONDENSERS

22-3	.01 Mfd.	Ceramic	500V
22-4	.004 "	"	500V
22-5	110 Mmfd.	" (or 22-1669)	500V
22-177	.2 Mfd.	"	400V
22-448	.004 Mfd.	"	600V
22-649	.01 "	"	600V
22-827	.1 "	"	200V
22-829	.05 "	"	200V
22-854	.0005 "	"	600V
22-1220	.002 "	"	600V
22-1367	50 Mmfd.	Ceramic	500V
22-1506	22 "	"	500V
22-1676	.001 Mfd.	"	500V
22-1705	30 Mmfd.	"	500V
22-1717	.001 Mfd.	"	200V
22-1762	1 Mmfd.	"	500V
22-1775	.047 Mfd. (Molded)	"	400V
22-1852	7.5 Mmfd.	Ceramic	500V
22-1876	47 "	"	500V
22-2104	Three Section Variable Cond.		
22-2105	Elect. Cond. 40-40 Mfd.		250V
22-2154	Elect. Cond. 10 Mfd.		250V

RESISTORS

63-1726	39	Ohm	1/2W	10%	Ins.	Res.
63-1736	68	Ohm	1/2W	20%	Ins.	Res.
63-1744	100	Ohm	1/2W	20%	Ins.	Res.
63-1758	220	Ohm	1/2W	20%	Ins.	Res.
63-1768	390	Ohm	1/2W	10%	Ins.	Res.
63-1772	470	Ohm	1/2W	20%	Ins.	Res.
63-1782	820	Ohm	1/2W	10%	Ins.	Res.
63-1806	3300	Ohm	1/2W	10%	Ins.	Res.
63-1813	4700	Ohm	1/2W	10%	Ins.	Res.
63-1827	10K	Ohm	1/2W	10%	Ins.	Res.
63-1828	10K	Ohm	1/2W	20%	Ins.	Res.
63-1834	15K	Ohm	1/2W	10%	Ins.	Res.
63-1845	27K	Ohm	1/2W	10%	Ins.	Res.
63-1856	47K	Ohm	1/2W	20%	Ins.	Res.
63-1863	68K	Ohm	1/2W	20%	Ins.	Res.
63-1869	100K	Ohm	1/2W	10%	Ins.	Res.
63-1870	100K	Ohm	1/2W	20%	Ins.	Res.
63-1876	150K	Ohm	1/2W	10%	Ins.	Res.
63-1884	220K	Ohm	1/2W	20%	Ins.	Res.
63-1898	470K	Ohm	1/2W	20%	Ins.	Res.
63-1912	1 Megohm	1/2W	20%	Ins.	Res.	
63-1926	2.2 Megohm	1/2W	20%	Ins.	Res.	
63-1940	4.7 Megohm	1/2W	20%	Ins.	Res.	
63-1947	6.8 Megohm	1/2W	20%	Ins.	Res.	
63-1954	10 Megohm	1/2W	20%	Ins.	Res.	
63-1981	120	Ohm	1W	10%	Ins.	Res.
63-2062	Volume Control & Switch					
63-2063	Tone Control					
63-2068	Candohm - Two Section					
63-2091	820	Ohm	W.W.	1/2W	20%	Ins. Res.
63-2093	47	Ohm	W.W.	1W	10%	Ins. Res.

MISCELLANEOUS

44-25	Phono Jack
54-108	3/8-32 x 9/16 Palmst Cad. (1 ea. used 63-2062 & 63-2063)
54-271	6-32 x 1/4" Palmst Steel Cad. (1 ea. used on I.F.'s)
54-292	Speed Nut-Tinnerman (Used on 94-671)
58-128	Two Prong Plug (A.C. Interlock)
78-461	Two Contact Socket
78-755	Octal Tube Socket (2 used)
78-807	Miniature Tube Socket
78-854	Miniature Tube Socket (9 Contact)

78-869	Miniature Tube Socket
78-870	Miniature Tube Socket (2 used)
78-871	Miniature Tube Socket
80-780	Iron Core Tension Spring
85-467	Band Switch
93-993	Insulating Washer (2 used)
93-1039	Cong Mounting Cup Washer (2 used)
95-1188	Auto Power Trans.
95-1189	Output Transformer (Speaker)
113-8	#6-32 x 1/4" Hex. Hd. Sl. S.T. (2 used on S-16351)
114-297	#6 x 1/4" Hex Hd. Sl. S.T. (2 used on S-16351)
125-62	Rubber Grommet (3 used)
125-73	Rubber Grommet (2 used)
149-95	Iron Core & Spring
188-30	Retaining Ring (Used on 85-467)
S-16161	Speaker Cable & Eyelet Assembly

G884 CABINET PARTS

2-106	Cabinet Back (Phono-Section)
26-429	Dial Scale & Glass (F.M. Band)
46-522	Dummy Knob
46-538	Tuning Knob
46-718	Band Switch & Volume Control Knob (2 used)
46-831	Tone Control Knob
49-624	12" P.M. Speaker
	208-624 Cone & Voice Coil
54-303	Speed Nut (5 used on Esc.)
57-1481	Esc. Clamping Plate (2 used)
57-1591	Escutcheon
57-1613	Emblem Plate
70-86	#6 x 5/8 Washer Hd. Wood Screw Steel Stat. Bronze (5 used on S-16516-5 Used 2-160)
80-604	Hinge Spring (2 used)
83-1698	Rubber Channel Strip (Used on Esc.)
97-293	Chassis Mtg. Insulating Stud (3 used)
114-148	#10 x 7/8 Hex Washer Hd. S.T. Screw (3 used Chassis Mtg.)
114-313	#8 x 1/2" Hex Hd. Sl. S. T. Screw-Cad. (4 used Mtg. Esc.)
138-33	Metal Grill
165-9	Glides (2 used)
165-14	Glides (2 used)
196-135	Dust Gasket
202-777	Radio & Phono Instruction Book
S-14025	Three Speed Changer

PART NO. DESCRIPTION

S-15536	Record Changer Compl. Hinge Brkt. & Link Assembly (2 used)
S-15780	Cobra Cartridge
S-16196	Record Changer Mtg. Frame & Arm Assem.
S-16359	Wavemagnet Assembly
S-16516	Cabinet Back Assembly (Complete with A.C. Cord and Wavemagnet) (Radio Section)

G885 CABINET PARTS

2-165	Cabinet Back (Phono Section)
19-123	Record Changer Mtg. Clip (4 used)
26-429	Dial Scale (F.M. Band)
43-185	Record Changer Housing
46-522	Dummy Knob
46-538	Tuning Knob
46-718	Band Switch & Volume Control Knob
46-831	Tone Control Knob
49-678	10" P.M. Speaker
	#208-678 Cone & Voice Coil
54-303	Speed Nut-Tinnerman (5 used on Esc.)
57-1481	Esc. Clamping Plate (2 used)
57-1591	Escutcheon
57-1613	Emblem Plate
70-86	#6 x 5/8" Washer Hd. Wood Screw - Steel Stat. Bronze (5 used S-16513 & 4 used 2-165)
70-98	#8 x 5/8" R.H. Wood Screw-Steel N.P. (3 used on S-16509)
83-1698	Rubber Channel Strip
83-1721	Roller Bearing Strip
83-1722	Latch Support Strip
97-293	Chassis Mtg. Insulating Stud (3 used)
112-791	Record Changer Mtg. Screw (4 used)
113-25	6-32 x 3/8 Hex Hd. Sl. M.S. Shakeproof Lockwasher (2 used on 156-20)
114-148	#10 x 7/8" Hex Washer Hd. S.T. Screws (3 used Chassis Mtg.)
114-253	6-20 x 3/8 Hex Hd. Sl. S.T. Screw Cad. Shakeproof (4 used on S-16509)
114-313	#8 x 1/2" Hex Hd. Sl. S. T. Screw (4 used on Esc.)
125-76	Rubber Grommet (4 used on Changer)
156-20	Record Changer Housing Latch
165-9	Glides (2 used)
165-14	Glides (2 used)
196-135	Dust Gasket
202-776	Radio & Phono Inst. Book
S-14026	Twin Seven Record Changer
S-15222	Cobra Tone Arm Cartridge
S-16359	Wavemagnet Assembly Type 38C
S-16508	Channel Brkt. & Lever Assembly
S-16509	Channel Brkt. & Roller Assembly
S-16513	Cabinet Back Assembly (Complete with A.C. Cord & Wavemagnet)
26-429	Dial Scale
46-522	Dummy Knob
46-538	Tuning Knob
46-718	Band Switch & Vol. Control Knob (2 used)
46-831	Tone Control Knob
49-624	12" P.M. Speaker
	208-624 Cone & Voice Coil
54-303	Speed Nut (5 used on Esc. Mtg.)
57-1481	Esc. Clamping Plate (2 used)
57-1591	Escutcheon
57-1613	Emblem Plate
58-75	Connector Plug
58-86	Two Prong Plug
70-66	#8 x 1/2" R.H.W.S. Steel N.P. (2 used on 95-1228)
70-86	#6 x 5/8 Washer Hd. Wood Screw Steel Stat. Bronze (5 used on S-16516 & 8 used 2-179)
78-750	Six Contact Socket (used on S-16683)
80-604	Hinge Spring (2 used)
80-678	Record Changer Mtg. Spring (4 used)
83-1245	Record Changer Trim Strip
83-1698	Rubber Channel Strip
93-968	.046 x .171 x 1/2" Steel Washer Cad. (2 used on Esc. Mtg.)
95-1228	Filament Transformer
97-293	Chassis Mtg. Insulating Stud (3 used)
112-712	Record Changer Mtg. Screw
114-148	#10 x 7/8 Hex Washer Hd. S. T. Screw (3 used Chassis Mtg.)
114-313	#8 x 1/2" Hex Hd. Sl. S. T. Screw (4 used on Esc. Mtg.)
138-33	Metal Grill
165-9	Glides (2 used)
165-14	Glides (2 used)
196-135	Dust Gasket
202-802	Radio & Phono Inst. Book
S-14021	Dual Speed Record Changer
S-15536	Record Changer Compl. Hinge Brkt. & Link Assembly (2 used)
S-15538	Record Changer Frame Assembly
S-15780	Cobra Tone Arm Cartridge
S-16359	Wavemagnet Assembly Type 38C
S-16516	Cabinet Back Assembly (Complete with A.C. Cord & Wavemagnet)
S-16683	Adapter Cable Assembly

G883E CABINET PARTS

26-429	Dial Scale
46-522	Dummy Knob
46-538	Tuning Knob
46-718	Band Switch & Volume Control Knob
46-831	Tone Control Knob
49-624	12" P.M. Speaker
	208-624 Cone & Voice Coil
54-303	Speed Nut Tinnerman (5 used on Esc.)
57-1481	Esc. Clamping Plate (2 used)
57-1591	Esc.
57-1613	Emblem Plate
70-86	#6 x 5/8 Washer Hd. Wood Screw Steel Stat. Bronze (5 used on S-16641)
80-604	Hinge Spring (2 used)
83-1698	Rubber Channel Strip
93-968	.046 x .171 x 1/2" Steel Washer (2 used on Esc.)
97-293	Chassis Mtg. Insulating Stud (3 used)
114-148	#10 x 7/8 Hex Washer Hd. St. T. Screw (3 used Chassis Mtg.)
114-313	#8 x 1/2" Hex Hd. Sl. S.T. Screw (4 used on Esc. Mtg.)
165-9	Glides (2 used)
165-14	Glides (2 used)
196-135	Dust Gasket
202-777	Radio & Phono Instruction Book
S-14025	Three Speed Record Changer
S-15536	Record Changer Compl. Hinge Brkt. & Link Assembly (2 used)
S-15780	Cobra Tone Arm Cartridge
S-16196	Record Changer Mtg. Frame & Arm Assem.
S-16359	Wavemagnet Assembly Type 38C
S-16641	Cabinet Back Assembly (Complete with A.C. Cord & Wavemagnet)

G882R CABINET PARTS

G882R is the same as G883E except the following:

Omits:

S-16641 Cabinet Back Assembly (Complete)

Add:

S-16513 Cabinet Back Assembly (Complete with A.C. Cord & Wavemagnet)

G881 CABINET PARTS

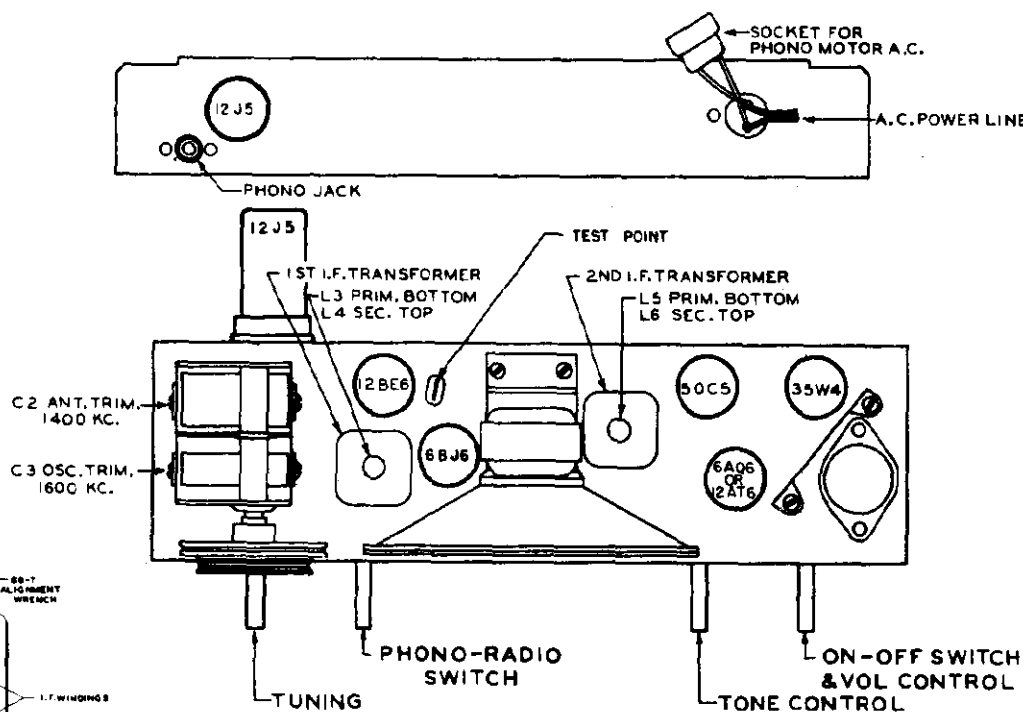
2-179	Cabinet Back (Phono-Section)
19-169	Record Changer Mtg. Clip (4 used)
22-2144	150 Mmfd. Ceramic Cond. 500V
26-429	Dial Scale
46-522	Dummy Knob
46-538	Tuning Knob
46-718	Band Switch & Vol. Control Knob (2 used)
46-831	Tone Control Knob
49-624	12" P.M. Speaker
	208-624 Cone & Voice Coil
54-303	Speed Nut (5 used on Esc. Mtg.)
57-1481	Esc. Clamping Plate (2 used)
57-1591	Escutcheon
57-1613	Emblem Plate
58-75	Connector Plug
58-86	Two Prong Plug
70-66	#8 x 1/2" R.H.W.S. Steel N.P. (2 used on 95-1228)
70-86	#6 x 5/8 Washer Hd. Wood Screw Steel Stat. Bronze (5 used on S-16516 & 8 used 2-179)
78-750	Six Contact Socket (used on S-16683)
80-604	Hinge Spring (2 used)
80-678	Record Changer Mtg. Spring (4 used)
83-1245	Record Changer Trim Strip
83-1698	Rubber Channel Strip
93-968	.046 x .171 x 1/2" Steel Washer Cad. (2 used on Esc. Mtg.)
95-1228	Filament Transformer
97-293	Chassis Mtg. Insulating Stud (3 used)
112-712	Record Changer Mtg. Screw
114-148	#10 x 7/8 Hex Washer Hd. S. T. Screw (3 used Chassis Mtg.)
114-313	#8 x 1/2" Hex Hd. Sl. S. T. Screw (4 used on Esc. Mtg.)
138-33	Metal Grill
165-9	Glides (2 used)
165-14	Glides (2 used)
196-135	Dust Gasket
202-802	Radio & Phono Inst. Book
S-14021	Dual Speed Record Changer
S-15536	Record Changer Compl. Hinge Brkt. & Link Assembly (2 used)
S-15538	Record Changer Frame Assembly
S-15780	Cobra Tone Arm Cartridge
S-16359	Wavemagnet Assembly Type 38C
S-16516	Cabinet Back Assembly (Complete with A.C. Cord & Wavemagnet)
S-16683	Adapter Cable Assembly

MODELS H661E, H661R,
H665, H665R, H665RZ,
H665Z, Ch. 6H01

The I.F. transformers incorporated in this receiver are of the new permeability tuned type. The advantage of an I.F. transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these I.F. transformers the tuning wrench 68-7 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

In the event the receiver oscillates during phono operation, adjust C16 4-80 mmf. capacitor to a point at which the oscillation ceases.

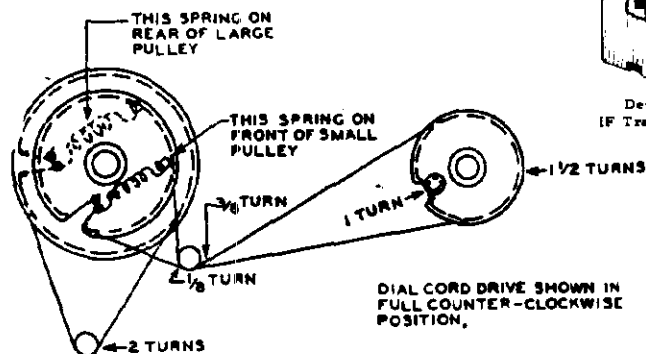
This position of no oscillation will sometimes vary with different cartridges, and in this case readjustment of C16 must be made.



TUBE AND TRIMMER LOCATION

ALIGNMENT PROCEDURE

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIG. FREQUENCY	SET DIAL AT	TRIMMERS	PURPOSE
1	Converter Grid	.5 Mfd.	455 Kc.	600 Kc.	L3, 4, 5, 6	For I. F. Alignment
2	One Turn Loop Coupled Loosely to Wave Magnet	--	1600 Kc.	1600 Kc.	C-3	Set Oscillator to Dial Scale.
3		--	1400 Kc.	1400 Kc.	C-2	Align Antenna Stage



DIAL CABLE DRAWING AND
DETAIL OF I. F. TRANSFORMER

MODELS H661E, H661R,
H665, H665R, H665RZ,
H665Z, Ch. 6H01

PARTS LIST

MODELS H665, H665R, H665Z, H665RZ, H661E & H661R CHASSIS 6H01

Coils & Chokes

95-1101 T1-1st. I.F. Transformer
95-1102 T2-2nd. I.F. Transformer
S-12603 L7-Phono Oscillator Coil Assembly
S-13799 L2-Oscillator Coil Assembly

Condensers

22-3 C8-.01 Mfd. Ceramic (Disc.) 500V (3 used)
22-4 C10.004 Mfd. Ceramic (Disc.) 500V
22-5 C5-.110 Mmfd. Ceramic (Disc.)
(or 22-162) 500V
22-178 C9-.05 Mfd. 200V
22-829 C4-.05 Mfd. 200V (3 used)
22-854 C6-.0005 Mfd. 600V (2 used)
22-1182 C11-.01 Mfd. 400V
22-1444 C7-.001 Mfd. 200V
22-1701 C17-100 Mmfd. Ceramic 500V
22-1775 C18-.047 Mfd. 400V
22-2085 C1-Variable - 2 gang
22-2272 C12,13,14 Elect. - 20 Mfd. 150V x 40 Mfd.
150V x 80 Mfd. - 150V
22-2241 C15.002 Mfd. Ceramic 500V
22-2242 C16-Trimmed Capacitor

Resistors

63-1219 R14-22 ohm W.W. 1/2W 20% Ins. Res.
63-1574 R13-1000 ohm 1W 20% Ins. Res.
63-1786 R5-1000 ohm 1/2W 20% Ins. Res.
63-1782 R8-820 ohm 1/2W 10% Ins. Res.
63-1821 R11-6800 ohm 1/2W 20% Ins. Res.
63-1828 R2-10K ohm 1/2W 20% Ins. Res.
63-1842 R17-22K ohm 1/2W 20% Ins. Res.
63-1856 R15-47K ohm 1/2W 20% Ins. Res.
63-1898 R9-470K ohm 1/2W 20% Ins. Res.
63-1926 R3-2.2 Megohm 1/2W 20% Ins. Res.
63-1940 R7-4.7 Megohm 1/2W 20% Ins. Res.
63-1961 R1-15 Megohm 1/2W 20% Ins. Res.
63-1977 R12-150 ohm 1W 10% Ins. Res.
63-2045 R10-Tone Control
63-2046 R6-Volume Control & Switch

Miscellaneous

11-104 Line Cord & Plug - 7 ft. long
26-437 Dial Scale
46-811 Tuning, Volume & Tone Control Knob (3 used)
46-844 Radio-Phono Switch Knob
49-669 SP-1-5 1/4" PM Speaker
TS-2025 Output Transformer
ZC-5091 Cone
52-538 Two Prong Receptacle & Cable
54-139 3/8-32 x 9/16" Nut (1 ea. used on 85-465,
63-2045 & 63-2046)
57-1626 Chassis Cover Plate
59-250 Dial Pointer
70-117 #6 x 5/16" Phill. R.H.W.S. Steel Stat. Br.
(8 used to Mt. 57-1626)
76-556 Tuning Control Shaft
78-229 Elect. Cond. Socket
78-644 Phono Connector Socket
78-709 Octal Tube Socket
78-806 Miniature Tube Socket (2 used)
78-807 Miniature Tube Socket (3 used)
78-808 Pilot Light Socket & Wire
80-69 Dial Cord Tension Spring
30-209 Dial Cord Tension Spring
85-465 S1-Phono-Radio Switch (or 85-466)
93-138 Felt Washer (used on S-16029)
93-392 1/32 x 33/64 x 1" Brown Felt Washer
(4 used on Knobs)
94-295 Gang Mtg. Bushing
100-67 PL-1-Dial Light Bulb
114-297 #6 x 1/4" Hex. Hd. Sl. S.T. (2 used on 126-624)

Miscellaneous (Cont)

126-624 Heat Shield
139-71 Speaker Baffle (Rubber)
171-12 Pilot Light Lens
188-32 Retaining Ring (used on 76-556)
S-15708 Cobra Tone Arm Cartridge Assembly
S-15903 Dial Cord Assembly (Short)
S-15904 Dial Cord Assembly (Long)
S-16028 Pulley & Bushing Assembly
S-16029 Bracket & Stud Assembly
S-16419 Record Adapter Plug & Envelope Assembly

Cabinet Parts Model H665Z & H665RZ

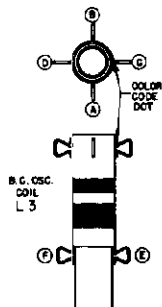
14-1265 Cabinet for H665Z - Radio-Phono Table Model
14-1265R Cabinet for H665RZ - Radio-Phono Table Model
16-639 Packing Carton
74-62 Speaker Screen
114-251 #10-32 x 5/8" Hex. Washer Hd. Sl. M.S.
(4 used chassis mtg.)
114-291 #8-32 x 7/16" Hex. Hd. Sl. M.S. Steel
(2 used on S-16029)
139-90 Speaker Baffle (Duron)
166-41 Rubber Bumper (used on gang)
202-839 Instruction Book (Radio & Phono)
S-14027 3 Speed Record Changer
S-17211 L1-Wavemagnet Assembly

Cabinet Parts Model H665 & H665R

14-1241 Cabinet for H665 Radio-Phono Table Model
14-1241R Cabinet for H665R Radio-Phono
16-639 Packing Carton
19-123 Record Changer Mtg. Clip (4 used)
57-1481 Clamping Strip (2 used)
70-83 #6 x 1/2" Rd. Washer Hd. Wood St. Br.
(6 used on Wavemagnet & 1 used 83-1671)
72-87 #6 x 5/8" Phill. F.H.W.S. Stat. Br. (8 used on
dial scale mtg.)
72-91 #6 x 7/16" Phill. F.H.W.S. (1 used on each
57-1481)
74-62 Speaker Screen
80-407 Record Changer Mtg. Spring (4 used)
83-1671 Wavemagnet Terminal Strip
83-1737 Speaker Screen Retaining Strip
112-544 Record Changer Mtg. Screw (3 used)
114-40 #10-32 x 7/8" Hex. Washer Hd. (4 used chassis
Mtg.)
139-90 Speaker Baffle (Duron)
166-46 Bumper (4 used)
202-833 Instruction Book
S-14031 Variable Speed Record Changer
S-17211 L1-Wavemagnet Assembly (or S-17314)

Cabinet Parts Model H661E & H661R

14-1281E Cabinet for H661E Radio-Phono Table Model
14-1281R Cabinet for H661R Radio-Phono Table Model
16-667 Packing Carton
19-123 Record Changer Mtg. Clip (4 used)
70-83 #6 x 1/2" Rd. Washer Hd. Wood Screw St. Br.
(6 used to mt. S-17476)
72-87 #6 x 5/8" Phill. F.H.W.S. St. Br. (8 used to
mt. Dial Scale & Baffle)
80-407 Record Changer Mtg. Spring (4 used)
83-1737 Speaker Screen Retaining Strip (4 used)
112-544 Record Changer Mtg. Screw (3 used)
114-40 #10-32 x 7/8" Hex. Washer Hd. Sl. (4 used
chassis mtg.)
139-94 Speaker Baffle & Grille Cloth
166-46 Bumper (4 used)
202-833 Instruction Book (Radio & Phono)
S-14031 Variable Speed Record Changer
S-17475 L1-Wavemagnet Assembly H661R
S-17476 L1-Wavemagnet Assembly



The 7H02 chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and two stages on the AM Band. There is one stage of RF amplification on the FM Band.

When adjustments are made on the 7H02 or any AC-DC chassis, a line isolation transformer (110-V input to 110-V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground, and if there is any indication of voltage, reverse the plug before handling the set.

The I.F. transformers and the discriminator transformer are the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF and discriminator transformers, tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined in this service note.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

Alignment of this chassis will, in most cases, be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

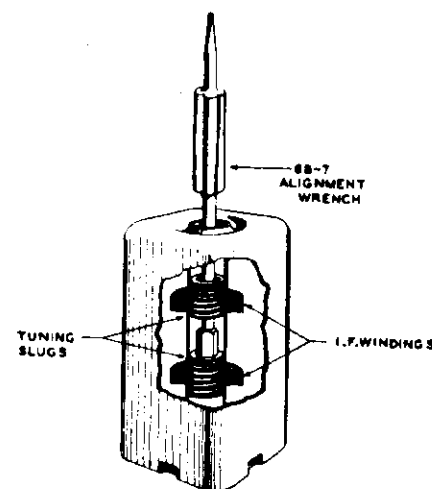
The signal generator output should be kept just high enough to get an indication on the meter.

(a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).

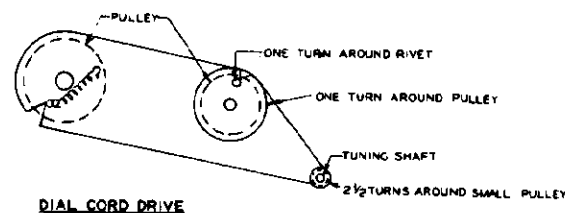
(b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).

(c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.

(d) Loosen Slugs by applying a hot iron to the cement.



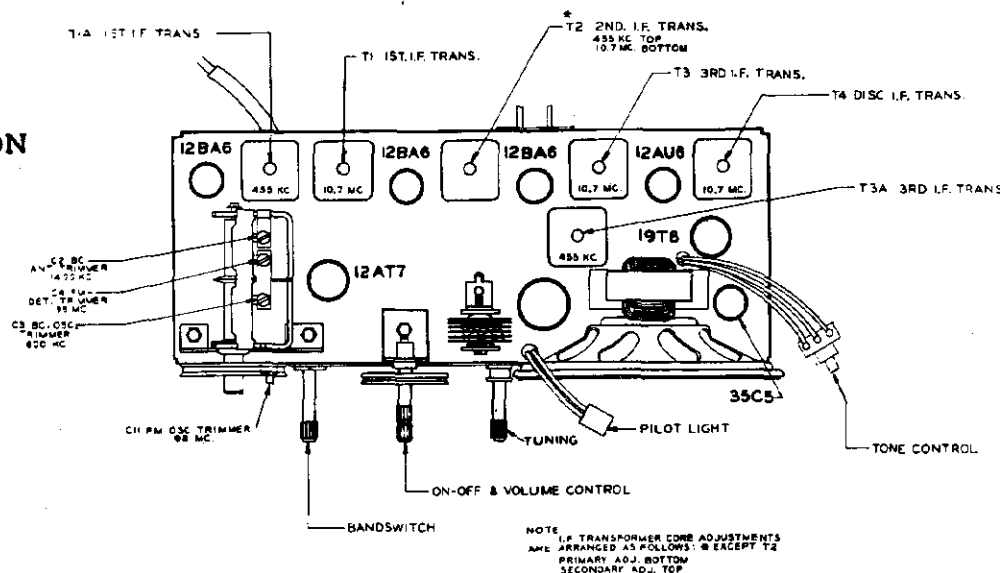
Detail of
IF Transformer



ALIGNMENT PROCEDURE

Operation	Connect Oscillator to	Dummy Antenna	Input Signal Frequency	Band	Set Dial To	Adj. Trimmers	Purpose
1	Pin 2 12AT7 Converter	.05 Mfd.	455 Kc. Modulated	BC	600 Kc.	L8, 9,11,14,15	Align I. F. channel for maximum output.
2	2 turns loosely cpd. to wavenagnet		1500 Kc. Modulated	BC	1600 Kc.	C 3	Set oscillator to dial scale.
3	2 turns loosely cpd. to wavenagnet		1400 Kc. Modulated	BC	1400 Kc.	C 2	Align antenna stage.
4 (a)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM		L16 coil slug Primary discr.	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM		L17 coil slug sec. of discr.	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 12BA6 2nd IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM		L12 and L13 Prim. and Sec. of 3rd IF trans.	Align 3rd IF transformer for maximum reading.
7 (a)	Pin 1 (grid) on 12BA6 1st IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM		L10 Prim. of 2nd IF transformer	Align 2nd IF transformer for maximum reading.
8 (c)	Pin 2 (grid) on 12AT7 converter tube socket.	.05 Mfd.	10.7 Mc. Unmodulated	FM		L6 and L7 Prim. and Sec. of 1st IF transformer.	Align 1st IF transformer for maximum reading.
9 (c)	Antenna Post FM (Remove line cmt.)	270 ohms	98 Mc. Unmodulated	FM	98 Mc.	C11 Osc. Coil Slug	Set Oscillator to dial scale.
10 (c) (d)		270 ohms	98 Mc. Unmodulated	FM	98 Mc.	C4 Det. Coil Slug	Align det. stage to maximum reading.

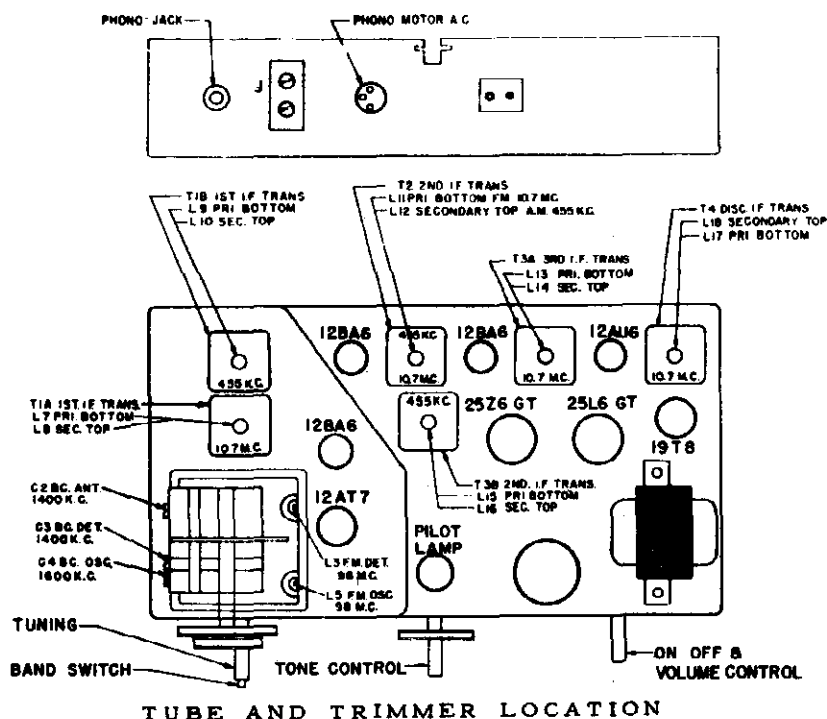
TUBE AND TRIMMER LOCATION



PARTS LIST

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
<u>DIAL ASSEMBLY</u>		<u>CONDENSERS (Cont'd.)</u>		<u>MISCELLANEOUS Cont'd.</u>	
26-451	Dial Scale	22-1676 C20	.001 Mfd. Ceramic 500V	54-271	6-32 X 1/4" Palmnut Steel Cad. (1 used on ea. I.F.)
46-859	Band Switch Knob	22-1757 C17, C18	Elect. 40 Mfd. 150V - 80 Mfd 150V	54-305	3/8-32 X 9/16" Panut St. Br. (Chassis Mtg.)
46-860	Tuning Control Knob	22-1775 C24	.047 Mfd. 400V	57-1686	Emblem Plate
46-900	Vol. Control Knob	22-1852 C5	7.5 Mmfd. Ceramic (2 Used) 500V	57-1690	Emblem Mtg. Plate
46-901	Tone Control Knob	22-2253 C11	Trimmer Cond. (Slug Tuned)	58-188	Two Prong Plug (AC)
59-251	Dial Pointer	22-2255 C1	Variable Gang (2 Section BC - 2 Section FM)	78-787	Two Contact Socket (Cabt. Back)
78-904	Dial Light Socket Assem.	22-2256 C10	65 Mmfd. Ceramic 500V	78-806	Miniature Tube Socket
80-69	Dial Cord Tension Spring	22-2257 C12	16 Mmfd. Ceramic 500V	78-807	Miniature Tube Socket
100-105 PL1	Neon Indicator Bulb	22-2258 C9	85 Mmfd. Ceramic 500V	78-869	Miniature Tube Socket
188-129	Retaining Ring (1 ea. used on S-17334 & S-17467)	<u>RESISTORS</u>		78-870	Miniature Tube Socket (2 Used)
S-17334	Tuning Shaft & Pulley Assem.	63-686 R18	150 Ohm W.W. 1/2W 10% Ins. Res.	78-871	Miniature Tube Socket
S-17336	Tuning Shaft Brkt. & Ins. Strip Assem.	63-1450 R13	22 Ohm W.W. 1W 20% Ins. Res.	78-903	Miniature Tube Socket
S-17350	Dial Cord & Eyelet Assem.	63-1527 R12	1000 Ohm W.W. 3W 20% Ins. Res.	83-1056	Wavemagnet Mtg. Strip
S-17467	Pointer Shaft, Brkt. & Pulley Assem.	63-1737 R1	68 Ohm 1/2W 20% Ins. Res.	83-1393	Rubber Strip (Handle)
<u>COILS & CHOKES</u>		63-1744 R2	100 Ohm 1/2W 20% Ins. Res. (3 Used)	83-1789	Rubber Strip (Rubber)
20-329 L1	F. M. Antenna Coil	63-1758 R5	220 Ohm 1/2W 20% Ins. Res. (4 Used)	83-1829	Insulator Strip
20-330 L2	R. F. Plate Load Coil	63-1782 R11	820 Ohm 1/2W 10% Ins. Res.	85-493	Band Switch
20-331 L4	F. M. Mixer Coil	63-1800 R14	2200 Ohm 1/2W 20% Ins. Res.	93-487 S1	1/16 X .144 X 3/8" Steel Washer Cad. (2 Used on 43-165)
20-333 L18	R. F. Choke Coil	63-1828 R4	10K Ohm 1/2W 20% Ins. Res.	97-293	Chassis Mtg. Stud (2 Used)
95-1102 T3A	3rd. I. F. Trans. 455KC.	63-1835 R15	15K Ohm 1/2W 20% Ins. Res.	110-152	Grill Cloth
95-1150 T1-T3	1st. & 3rd. I. F. Trans. 10.7 MC (2 Used)	63-1856 R19	47K Ohm 1/2W 20% Ins. Res.	112-281	#10 X 3/4" Oval Binding Hd. S.T. St. Br. (2 Used Chassis Mtg.)
95-1153 T4	Discriminator Trans. 10.7 MC	63-1870 R8	100K Ohm 1/2W 20% Ins. Res. (4 Used)	114-78	#8 X 5/16 Hex Hd. Sl. S.T. (Used on S-17364)
95-1250 T1A	1st. I. F. Trans. 455KC.	63-1876 R16	150K Ohm 1/2W 10% Ins. Res. (2 Used)	114-261	#6 X 3/8 Hex Hd. Sl. S.T. (2 Used on 43-165)
95-1251 T2	2nd. I. F. Trans. 10.7 MC & 455KC	63-1898 R17	470K Ohm 1/2W 20% Ins. Res. (2 Used)	114-356	#6-32 X 1-1/4" Hex Hd. S.T. (Used on 212-7)
S-17340 L3	B.C. Osc. Coil Assem.	63-1912 R9	1 Megohm 1/2W 20% Ins. Res.	138-42	Cabinet Grille
<u>CONDENSERS</u>		63-1926 R7	2.2 Megohm 1/2W 20% Ins. Res.	139-91	Speaker Baffle
22-3 C6	.01 Mfd. Ceramic (9 Used) 500V	63-1940 R3	4.7 Megohm 1/2W 20% Ins. Res. (2 Used)	149-89	Iron Core (Used on S-17340)
22-4 C25	.004 Mfd. Ceramic 500V	63-1961 R6	15 Megohm 1/2W 20% Ins. Res.	159-69	Plug Button (4 Used to mt. Back)
22-5 C26	110 Mmfd. Ceramic (Disc) (or 22-1669) (2 Used) 500V	63-2143 R10	Volume Control & Switch	171-11	Pilot Light Jewel
22-6 C22	470 Mmfd Ceramic 500V	63-2144 R20	Tone Control	194-22	Insulator
22-229 C21	.005 Mfd. 500V	<u>MISCELLANEOUS</u>		196-153	Speaker Gasket
22-448 C13	.004 Mfd. 600V	11-85	Line Cord & Plug (6 ft. lg.)	199-103	Flexible Handle Sleeve
22-830 C15	.02 Mfd. 600V	12-1070	Wavemagnet Mtg. Brkt.	202-697	F.M. Inst. Book
22-1126 C23	.01 Mfd. 400V	14-1273	Plastic Cabinet for H724 Table Model	202-842	Instruction Book
22-1158 C16	.05 Mfd. 200V	16-657	Packing Carton	212-7 SE1	Selenium Rectifier
22-1220 C14	.002 Mfd. 600V	24-535	Line Cord Plug Cover	S-13210	Strap & Rivet Assem. (Handle)
22-1507 C19	25 Mmfd. Ceramic 500V	43-165	Handle Housing	S-14527	Wavemagnet Lead & Stop Assem.
22-1669 C7	100 Mmfd. Ceramic 500V	49-689 SP1	5 1/4" PM Speaker	S-17364 L19	Wavemagnet Assem.
22-1675 C8	150 Mmfd. Ceramic 500V	54-129	Speed Nut (9 Used on Mtg. Grill & Baffle)	S-17366	Cabinet Back Assem. (Complete)

MODEL H380R,
Ch. 3H20, Rev.



The 8H20 revised chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and one stage on the AM Band. There is one stage of RF amplification on all Bands.

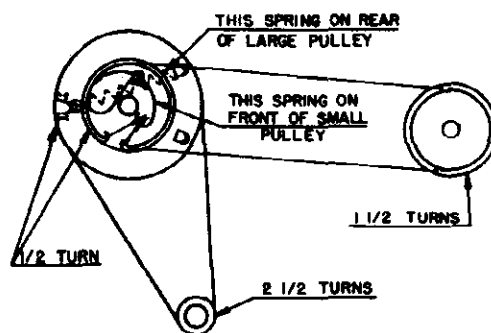
When adjustments are made on the 8H20 revised chassis, a line isolation transformer (110 V input to 110V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground and if there is any indication of voltage, reverse the plug before handling the set.

FM RF Alignment: The tuning slugs are attached to threaded shafts and the slugs are varied in the field of the coils by turning the shafts clockwise or counter-clockwise. After adjustment the shafts must be secured with a drop of speaker cement.

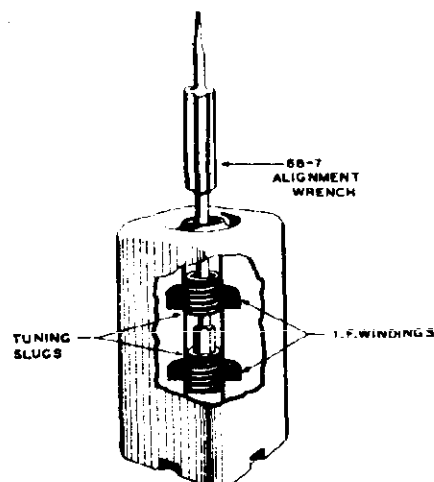
AM and FM IF Alignment: The AM and FM IF transformers in this receiver are of the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF transformers the tuning wrench 68-7 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined below.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.



DIAL CORD DRIVE



Detail of
IF Transformer

ALIGNMENT PROCEDURE

Operation	Connect Oscillator To	Dummy Antenna	Input Signal Frequency	Band	Set Dial To	Adj. Trimmers	Purpose
1	Pin 2 12AT7 Converter	.05 Mfd.	455 Kc.	BC	600 Kc.	L9, 10, 12 15 & 16	Align I. F. channel for maximum output.
2	2 turns loosely cpd. to wavemagnet		1600 Kc.	BC	1600 Kc.	C4	Set oscillator to dial scale.
3	2 turns loosely cpd. to wavemagnet		1400 Kc.	BC	1400 Kc.	C3, C2	Align detector and antenna stage.
4 (a)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc.	FM		L17 coil slug Primary discr.	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc.	FM		L18 coil slug sec. of discr.	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 12BA6 2nd. I.F.	.05 Mfd.	10.7 Mc.	FM		L13 and L14 Pri. & Sec. of 3rd. IF trans.	Align 3rd. IF transformer for maximum reading.
7 (c)	Pin 1 (grid) on 12BA6 1st. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		Adjust L11 for maximum reading. L7 and L8 Prim.	Align 2nd IF transformer for maximum reading.
8 (c)	Pin 2 (grid) on 12AT7 converter tube socket.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		and Sec. of 1st. IF transformer.	Align 1st. IF transformer for maximum reading.
9 (c)	Antenna Post FM (Re-move line ant.)	270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L5 Osc. Coil Slug.	Set Oscillator to dial scale.
10 (c) (d)		270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L3 Det. Coil Slug	Align det. stage to maximum reading.

Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

(a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).

(b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).

(c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.

(d) Loosen Slugs by applying a hot iron to the cement.

Dial Assembly

54-292	Speed Nut (used on S-17165)
78-895	Dial Light Socket & Wire
80-69	Dial Cord Spring
80-746	Pulley Retaining Spring
80-747	Dial Cord Spring
80-781	Tuner Arm Tension Spring
94-732	Pointer Pulley Bushing (Part of S-17165)
100-97 PL-1	Pilot Light Bulb
114-262	#8 x 7/16" Hex Hd. Sl. S.T. (2 used to mount S-17149)
114-297	#6 x 1/4" Hex Hd. Sl. S.T. (2 used to mount S-17165)
148-122	Tuner Arm
188-30	Retaining Ring (used on S-17155)
S-17149	Dial Scale & Bracket Assembly (26-449 & 26-450)
S-17155	Tuning Shaft & Pulley Assembly
S-17157	Pointer & Pulley Assembly
S-17158	Dial Cord & Eyelet Assembly (Long)
S-17159	Dial Cord & Eyelet Assembly (Short)
S-17165	Bracket & Pulley Bushing Assembly

MODEL H880R,
Ch. 8H20, Rev.

Coils & Chokes

95-1251 T2 2nd. IF Transformer 10.7 Mc & 455 Kc
95-1102 T3B 3rd. IF Transformer
95-1150 T3B 3rd. IF Transformer
95-1153 T4 Disc. Transformer
95-1248 T1B 1st. IF Transformer
95-1201 T1A 1st. IF Transformer
S-12603 L18 Phono Oscillator Coil
S-15691 L5 F.M. Oscillator Coil Assembly
S-15743 L3 F.M. Detector Coil Assembly
S-16344 L4 Broadcast Det. Coil Assembly
S-16345 L6 Broadcast Osc. Coil Assembly
S-16408 L2 Antenna Choke Coil Assembly

Condensers

22-3 C7 .01 Mfd. Ceramic (10 used) 500V
22-4 C21 .004 Mfd. Ceramic 500V
22-5 C8 110 Mmfd. Ceramic
(or 22-1669) (3 used) 500V
22-177 C19 .2 Mfd. 400V
22-448 C17 .004 Mfd. 600V
22-669 C22 .01 Mfd. 600V
22-927 C15 .1 Mfd. 600V
22-829 C5 .05 Mfd. (3 used) 200V
22-854 C24 .0005Mfd. 600V
22-1220 C14 .002 Mfd. 600V
22-1367 C13 50 Mmfd. Ceramic (2 used) 500V
22-1506 C10 22 Mmfd. Ceramic (2 used) 500V
22-1676 C11 .001 Mfd. Ceramic (4 used) 500V
22-1705 C9 30 Mmfd. Ceramic 500V
22-1717 C20 .001 Mfd. 200V
22-1762 C12 1 Mmfd.(molded) (Ceramic) 500V
22-1775 C18 .047 Mfd. 400V
22-2104 C1 Variable - 3 Section
22-2105 C26,27 Elect. 80-40 Mfd. 250V
22-2140 C6 15 Mmfd. Ceramic (3 used) 500V
22-2154 C25 Elect. Cond. 10 Mfd. 250V
22-2240 C16 Trimmer Condenser
22-1507 C28 25 Mmfd. Ceramic 500V

Resistors

63-1726 R33 39 ohm 1/2W 10% Ins. Res.
63-1737 R2 68 ohm 1/2W 20% Ins. Res.
63-1744 R14 100 ohm 1/2W 20% Ins. Res.
63-1758 R1 220 ohm 1/2W 20% Ins. Res. (5 used)
63-1768 R4 390 ohm 1/2W 10% Ins. Res.
63-1772 R6 470 ohm 1/2W 20% Ins. Res.
63-1782 R21 820 ohm 1/2W 10% Ins. Res.
63-1806 R25 3300ohm 1/2W 10% Ins. Res.
63-1814 R17 4700ohm 1/2W 20% Ins. Res.
63-1827 R5 10K ohm 1/2W 10% Ins. Res.
63-1828 R29 10K ohm 1/2W 20% Ins. Res.
63-1834 R28 15K ohm 1/2W 10% Ins. Res.
63-1845 R24 27K ohm 1/2W 10% Ins. Res.
63-1856 R10 47K ohm 1/2W 20% Ins. Res. (3 used)
63-1863 R16 68K ohm 1/2W 20% Ins. Res.
63-1869 R31 100Kohm 1/2W 10% Ins. Res.
63-1870 R20 100Kohm 1/2W 20% Ins. Res.
63-1876 R30 150Kohm 1/2W 10% Ins. Res. (2 used)
63-1884 R8 220Kohm 1/2W 20% Ins. Res. (2 used)
63-1898 R9 470Kohm 1/2W 20% Ins. Res. (3 used)
63-1912 R14 1 Megohm 1/2W 20% Ins. Res. (2 used)
63-1926 R7 2.2 " 1/2W 20% Ins. Res.
63-1940 R32 4.7 " 1/2W 20% Ins. Res.
63-1947 R3 6.8 " 1/2W 20% Ins. Res. (2 used)
63-1954 R13 10 " 1/2W 20% Ins. Res.
63-1981 R26 120 ohm 1W 10% Ins. Res.
63-2068 R18,19 Candohm - Two Section
63-2091 R15 820 ohm W.W. 1/2W 20% Ins. Res.
63-2093 R27 47 ohm W.W. 1W 10% Ins. Res.
63-2131 R22 Volume Control & Switch
63-2132 R11 Tone Control

Miscellaneous

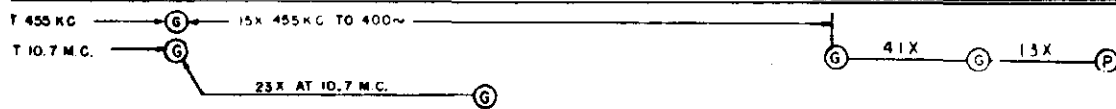
44-25 Phono Jack
54-139 3/8-32 x 9/16 Palnut Cad. (1 ea. used on 63-2131 & 63-2132)
54-271 6-32 x 1/4" Palnut Steel Cad. (1ea. used on 95 1102, 95-1150, 95-1152 & 95-1153)
58-128 Two Prong Plug (A-C Interlock)
78-755 Octal Tube Socket (2 used)
78-807 Miniature Tube Socket
78-854 Miniature Tube Socket (9 contact)
78-869 Miniature Tube Socket
78-870 Miniature Tube Socket (2 used)
78-871 Miniature Tube Socket
78-896 Three Contact Socket
80-780 Iron Core Tension Spring
85-489 S-1 Band Switch
93-993 Insulating Washer (used on 63-2132)
93-1039 Gang Mtg. Cup Washer (2 used)
95-1188 T6 Auto Trans.
95-1189 T5 Speaker Output Trans.
149-95 Iron Core & Spring
S-16838 Speaker Cable & Eyelet Assembly

Cabinet Parts

2-196 Cabinet Back (Phono Section)
11-106 Line Cord & Plug (9 ft. long)
14-1254R Cabinet for H880R Console Comb. Model
14-1254 Cabinet for H880 Console Combination Model
16-632 Packing Carton
19-169 Record Changer Mounting Clip
46-872 Dummy Knob
46-873 Tone Control Knob
46-876 Tuning Knob
46-877 Volume Control Knob
46-899 Band Switch Knob
49-688 SP-1 10" P.M. Speaker
57-1481 ZC-1061 Cone
57-1658 Esc. Clamping Ring (4 used)
70-86 Escutcheon
78-847 #6 x 5/8 Washer Hd. Wood Screw Steel Stat. Br. (12 used) to Mt. Backs)
80-604 Two Contact Socket
93-1059 Hinge Spring (2 used)
97-293 Felt Washer (used on 46-873)
112-809 Chassis Mtg. Ins. Stud (3 used)
114-128 Record Changer Mtg. Screw (3 used)
114-350 #10 x 1/16" Hex Washer Hd. S.T. (3 used Chassis Mtg.)
125-56 #8 x 7/16" Hex Hd. Sl. S.T. (4 used on 57-1658)
156-35 Rubber Grommet (4 used Speaker Mtg.)
159-50 Bullet Catch
165-9 Cinch Plug Button (4 used on 192-138)
165-14 Glides (2 used)
188-54 Glides (2 used)
192-138 Knob Clamping Ring (46-876)
202-697 Dial Glass
202-828 F.M. Instruction Book
S-14029 Radio & Phono Instruction Book
S-15536 Record Changer Variable Speed
S-15780 Record Changer Compt. Hinge Brkt. & Link Assembly (2 used)
S-17005 Cobra Tone Arm Cartridge Assembly
S-16419 Record Changer Mtg. Frame & Arm Assembly
S-16841 L1 Package of 6 - 45 RPM Center Hole Adaptors
S-17167 Low Impedance Loop & Clip Assembly
S-17169 Volume Control Knob Assembly
S-17328 L19 Cabinet Back Assembly (Radio Section)
Loop Loading Coil Assembly

 DENOTES CHASSIS

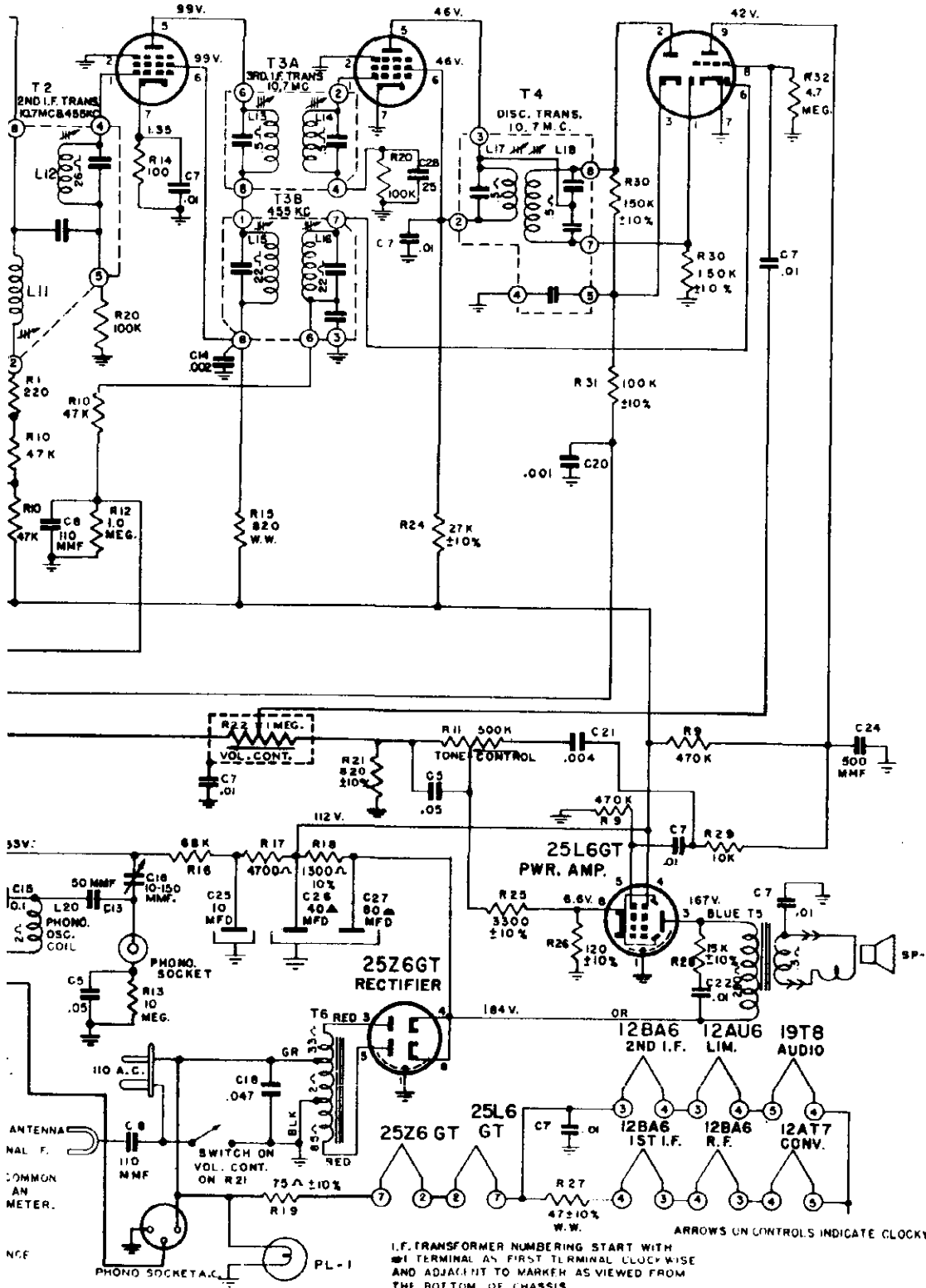
MODEL H880R,
Ch. 8H20,
Rev.



12BA6
2ND. I.F.

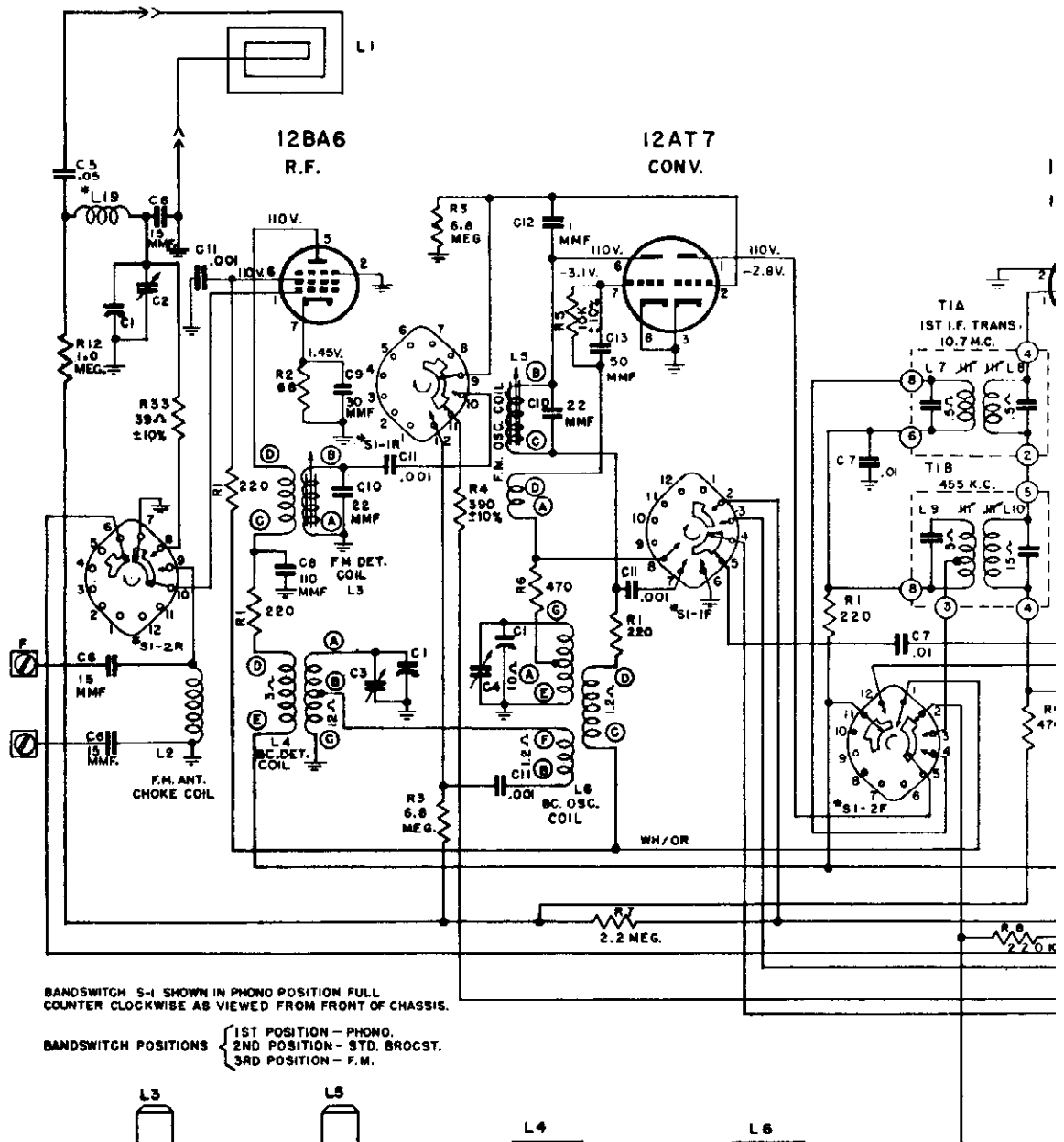
12AU6
LIMITER

19T8
DISCRIMINATOR DET.
1 ST. AUDIO



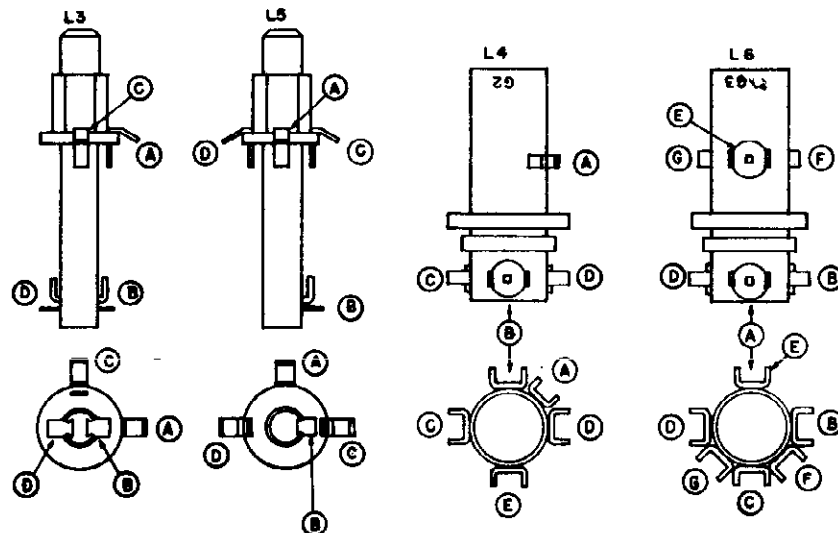
MODEL H88QRZ
Ch. 8H20

ANT. AM 7X AT 600 K.C. 130X AT 600 K.C. TO 455 K.C.
FM 95X AT 98 M.C. 77X AT 98 M.C. TO 10.7 M.C.



BANDSWITCH S-1 SHOWN IN PHONO POSITION FULL COUNTER CLOCKWISE AS VIEWED FROM FRONT OF CHASSIS.

BANDSWITCH POSITIONS
1ST POSITION - PHONO.
2ND POSITION - STD. BROCAST.
3RD POSITION - F.M.

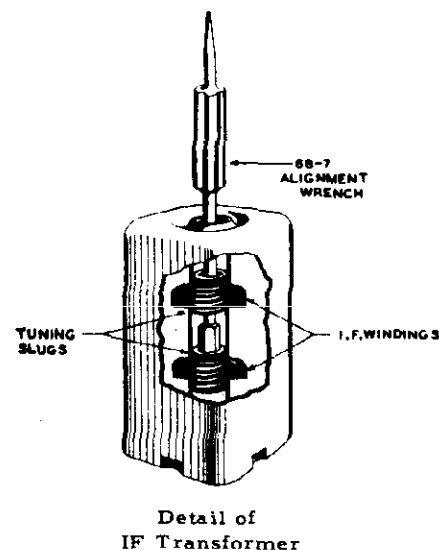


TUNING RANGE
540-1620 K.C. S
88-108 M.C. F. M
AMP. MOD. I.F. FREQU
FREQ. MOD. I.F. FREQU

ALL VOLTAGES 1
RETURN TO POINT
A. C., D.C. OR VA
ALL VOLTAGES
OTHERWISE SPEC
ALL RESISTORS 1
UNLESS OTHERV



PM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.



ALIGNMENT PROCEDURE

Operation	Connect Oscillator To	Dummy Antenna	Input Signal Frequency	Band	Set Dial To	Adj. Trimmers	Purpose
1	Pin 2 12AT7 Converter	.05 Mfd.	455 Kc. Modulated	BC	600 Kc.	L9, 10, 13, 14	Align I. F. channel for maximum output.
2	2 turns loosely cpld. to wavemagnet		1600 Kc. Modulated	BC	1600 Kc.	C4	Set oscillator to dial scale.
3	2 turns loosely cpld. to wavemagnet		1400 Kc. Modulated	BC	1400 Kc.	C3, C2	Align detector and antenna stage.
4 (a)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L16 coil slug Primary discr.	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 12AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L17 coil slug sec. of discr.	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 12BA6 2nd. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L15 Prim. of 3rd. IF trans.	Align 3rd. IF transformer for maximum reading.
7 (c)	Pin 1 (grid) on 12BA6 1st. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L11 and L12 Prim. and Sec. of 2nd. IF transformer.	Align 2nd IF transformer for maximum reading.
8 (c)	Pin 2 (grid) on 12AT7 converter tube socket.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		L7 and L8 Prim. and Sec. of 1st. IF transformer.	Align 1st. IF transformer for maximum reading.
9 (c)	Antenna Post FM (Remove line ant.)	270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L5 Osc. Coil Slug.	Set Oscillator to dial scale.
10 (c) (d)		270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L3 Det. Coil Slug	Align det. stage to maximum reading.

IMPORTANT

Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

(a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).

(b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).

(c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.

(d) Loosen Slugs by applying a hot iron to the cement.

PARTS LIST

DIAL ASSEMBLY

54-292		Speed Nut (used on S-17165)
78-895		Dial Light Socket & Wire
80-69		Dial Cord Spring
80-746		Pulley Retaining Spring
80-747		Dial Cord Spring
80-781		Tuner Arm Tension Spring
94-732		Pointer Pulley Bushing (Part of S-17165)
100-97	PL-1	Pilot Light Bulb
114-262		#8 x 7/16" Hex. Hd. Sl. S.T. (2 used to Mount S-17149)
114-297		#6 x 1/4" Hex. Hd. Sl. S.T. (2 used to Mount S-17165)
148-122		Tuner Arm
188-30		Retaining Ring (used on S-17155)
S-17149		Dial Scale & Bracket Assembly (26-449 & 26-450)
S-17155		Tuning Shaft & Pulley Assembly
S-17157		Pointer & Pulley Assembly
S-17158		Dial Cord & Eyelet Assembly (Long)
S-17159		Dial Cord & Eyelet Assembly (Short)
S-17165		Bracket & Pulley Bushing Assembly

COILS & CHOKES

95-1102	T2B	2nd. I. F. Transformer
95-1150	T2A	2nd. I. F. Transformer
95-1152	T3	3rd. I. F. Transformer
95-1153	T4	Disc. Transformer
95-1200	T1B	1st. I. F. Transformer
95-1201	T1A	1st. I. F. Transformer
S-12603	L18	Phono Oscillator Coil
S-15691	L5	F. M. Oscillator Coil Assembly
S-15743	L3	F. M. Detector Coil Assembly
S-16344	L4	Broadcast Det. Coil Assembly
S-16345	L6	Broadcast Osc. Coil Assembly
S-16408	L2	Antenna Choke Coil Assembly

CONDENSERS

22-3	C7	.01 Mfd. Ceramic (10 used)	500V
22-4	C21	.004 Mfd. Ceramic	500V
22-5	C8	.110 Mmfd. Ceramic (3 used)	500V
22-177	C19	.2 Mfd.	400V
22-448	C17	.004 Mfd.	600V
22-669	C22	.01 Mfd.	600V
22-827	C15	.1 Mfd.	600V
22-829	C5	.05 Mfd. (3 used)	200V
22-854	C24	.0005 Mfd.	600V
22-1220	C14	.002 Mfd.	600V
22-1367	C13	50 Mmfd. Ceramic (2 used)	500V
22-1506	C10	22 Mmfd. Ceramic (2 used)	500V
22-1676	C11	.001 Mfd. Ceramic (4 used)	500V
22-1705	C9	30 Mmfd. Ceramic	500V
22-1717	C20	.001 Mfd.	200V
22-1762	C12	1 Mmfd. (Molded) Ceramic	500V
22-1775	C18	.047 Mfd.	400V
22-2104	C1	Variable - 3 Section	
22-2105	C26,27	Elect. 80-40 Mfd. 250V	
22-2140	C6	15 Mmfd. Ceramic (3 used)	500V
22-2154	C25	Elect. Cond. 10 Mfd. 250V	
22-2240	C16	Trimmer Condenser	

RESISTORS

63-1726	R33	39 Ohm 1/2W 10% Ins. Res.	159-50
63-1737	R2	68 Ohm 1/2W 20% Ins. Res.	165-9
63-1744	R14	100 Ohm 1/2W 20% Ins. Res.	165-14
63-1758	R1	220 Ohm 1/2W 20% Ins. Res. (5 used)	188-54
63-1768	R4	390 Ohm 1/2W 10% Ins. Res.	192-138
63-1772	R6	470 Ohm 1/2W 20% Ins. Res.	202-697
63-1782	R21	820 Ohm 1/2W 10% Ins. Res.	202-840
63-1806	R25	3300 Ohm 1/2W 10% Ins. Res.	S-14025
63-1814	R17	4700 Ohm 1/2W 20% Ins. Res.	S-15536
63-1827	R5	10K Ohm 1/2W 10% Ins. Res.	S-15780
63-1828	R29	10K Ohm 1/2W 20% Ins. Res.	S-16196
63-1834	R28	15K Ohm 1/2W 10% Ins. Res.	
63-1845	R24	27K Ohm 1/2W 10% Ins. Res.	S-16419
63-1856	R10	47K Ohm 1/2W 20% Ins. Res. (3 used)	S-16841
63-1863	R16	68K Ohm 1/2W 20% Ins. Res.	S-17167
63-1869	R31	100K Ohm 1/2W 10% Ins. Res.	S-17169
63-1870	R20	100K Ohm 1/2W 20% Ins. Res.	S-17328

RESISTORS Continued

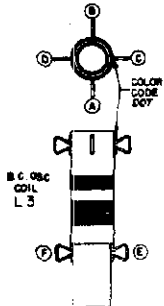
150K Ohm	1/2W 10%	Ins. Res. (2 used)
220K Ohm	1/2W 20%	Ins. Res. (2 used)
470K Ohm	1/2W 20%	Ins. Res. (3 used)
1 Megohm	1/2W 20%	Ins. Res. (2 used)
2.2 "	1/2W 20%	Ins. Res.
4.7 "	1/2W 20%	Ins. Res.
6.8 "	1/2W 20%	Ins. Res. (2 used)
10 "	1/2W 20%	Ins. Res.
120 Ohm	1W 10%	Ins. Res.
Candohm - Two Section		
820 Ohm W.W.	1/2W 20%	Ins. Res.
47 Ohm W.W.	1W 10%	Ins. Res.
Volume Control & Switch		
Tone Control		

MISCELLANEOUS

44-25	Phono Jack
54-139	3/8-32 x 9/16 Palmnut Cad. (1 ea. used on 63-2131 & 63-2132)
54-271	6-32 x 1/4" Palmnut Steel Cad. (1 ea. used on 95-1102, 95-1150, 95-1152 & 95-1153)
58-128	Two Prong Plug (A-C Interlock)
78-755	Octal Tube Socket (2 used)
78-807	Miniature Tube Socket
78-854	Miniature Tube Socket (9 Contact)
78-869	Miniature Tube Socket
78-870	Miniature Tube Socket (2 used)
78-871	Miniature Tube Socket
78-896	Three Contact Socket
80-780	Iron Core Tension Spring
85-489	Band Switch
93-993	Insulating Washer (used on 63-2132)
93-1039	Gang Mtg. Cup Washer (2 used)
95-1188	Auto Trans.
95-1189	Speaker Output Trans.
149-95	Iron Core & Spring
S-16838	Speaker Cable & Eyelet Assembly

CABINET PARTS

2-196	Cabinet Back (Phono Section)
11-106	Line Cord & Plug (9 ft. long)
14-1268R	Cabinet for H880RZ Console Comb. Model
16-632	Packing Carton
46-873	Tone Control Knob
46-876	Tuning Knob
46-899	Band Switch Knob
49-688	10" P. M. Speaker
57-1481	ZC-1061 Cone
57-1658	Esc. Clamping Ring (4 used)
70-86	Escutcheon
78-847	#6 x 5/8 Washer Hd. Wood Screw Steel Stat. Br. (12 used) to Mt. Backs)
80-604	Two Contact Socket
93-1059	Hinge Spring (2 used)
97-293	Felt Washer (used on 46-873)
114-128	Chassis Mtg. Ins. Stud (3 used)
114-350	#10 x 1/16" Hex. Washer Hd. S. T. (3 used Chassis Mtg.)
159-50	#8 x 7/16" Hex. Hd. Sl. S. T. (4 used on 57-1658)
165-9	Cinch Plug Button (4 used on 192-138)
165-14	Glides (2 used)
188-54	Glides (2 used)
192-138	Knob Clamping Ring (46-876)
202-697	Dial Glass
202-840	F. M. Instruction Book
S-14025	Radio & Phono Instruction Book
S-15536	Record Changer Assembly
S-15780	Record Changer Comp. Hinge Brkt. & Link Assembly (2 used)
S-16196	Cobra Tone Arm Cartridge Assembly
S-16419	Record Changer Mtg. Frame & Arm Assembly
S-16841	Package of 6 - 45 RPM Center Hole Adapto.
S-17167	Low Impedance Loop & Clip Assembly
S-17169	Volume Control Knob Assembly
S-17328	Cabinet Back Assembly (Radio Section)
	Loop Loading Coil Assembly



DIAL ASSEMBLY

The 7H04 chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and two stages on the AM Band. There is one stage of RF amplification on the FM Band.

When adjustments are made on the 7H04 or any AC-DC chassis, a line isolation transformer (110-V input to 110-V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground, and if there is any indication of voltage, reverse the plug before handling the set.

The IF transformers and the discriminator transformer are the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF and discriminator transformers, tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined in this service note.

FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

Alignment of this chassis will, in most cases, be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

(a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).

(b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).

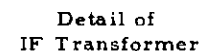
(c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.

(d) Loosen Slugs by applying a hot iron to the cement.

46-859	Band Switch Knob
46-860	Tuning Control Knob
46-900	Volume Control Knob
59-251	Dial Pointer
80-69	Dial Cord Tension Spring
188-129	Retaining Ring (1 ea. used S-17334 & S-17467)
S-17334	Tuning Shaft & Pulley Assem.
S-17336	Tuning Shaft Brkt. & Ins. Strip Assem.
S-17350	Dial Cord & Eyelet Assem.
S-17467	Pointer Shaft, Brkt. & Pulley Assem.
	COILS & CHOKES
20-329-L1	F.M. Antenna Coil
20-330-L2	R.F. Plate Load Coil
20-331-L4	F.M. Mixer Coil
20-333-L18	R.F. Choke Coil
95-1102-T3A	3rd I.F. Transformer 455 KC
95-1150-T1T3	1st & 3rd I.F. " 10.7 MC
95-1153-T4	Discriminator " 10.7 MC
95-1250-T1A	1st I.F. " 455 KC
95-1251-T2	2nd I.F. " 10.7 MC & 455KC
S-17340-L3	B.C. Osc. Coil Assem.
	CONDENSERS
22-3-C6	.01 Mfd. Ceramic (disc) (9 Used) 500V
22-5-C26	110 Mmfd. Ceramic (disc) (2 Used) (or 22-1669) 500V
22-6-C22	470 Mmfd. Ceramic 500V
22-229-C21	.005 Mfd. 600V
22-448-C13	.004 Mfd. 600V
22-830-C15	.02 Mfd. 600V
22-1126-C23	.01 Mfd. 400V
22-1158-C16	.05 Mfd. 200V
22-1220-C14	.002 Mfd. 600V
22-1507-C19	25 Mmfd. Ceramic 500V
22-1669-C7	100 Mmfd. Ceramic 500V
22-1675-C8	150 Mmfd. Ceramic 500V
22-1676-C20	.001 Mfd. Ceramic 500V
22-1757-C17, C18	Elect. 40 Mfd. 150V - 80 Mfd.
22-1775-C24	.047 Mfd. 400V
22-1852-C5	7.5 Mmfd. Ceramic (2 Used) 500V
22-2253-C11	Trimmer Cond. (Slug Tuned)
22-2255-C1	Variable Gane (Two Sect. B.C. - Two Sect. FM)
22-2256-C10	65 Mmfd. Ceramic 500V
22-2257-C12	16 Mmfd. Ceramic 500V
22-2258-C9	85 Mmfd. Ceramic 500V
	RESISTORS
63-686-R18	150 Ohm W.W. 1/2W 10% Ins. Res.
63-1450-R13	22 Ohm W.W. 1W 20% Ins. Res.
63-1527-R12	1000 Ohm W.W. 3W 20% Ins. Res.
63-1737-R1	68 Ohm 1/2W 20% Ins. Res.
63-1744-R2	100 Ohm 1/2W 20% Ins. Res.
63-1758-R5	220 Ohm 1/2W 20% Ins. Res. (3 Used)
63-1782-R11	820 Ohm 1/2W 10% Ins. Res.
63-1800-R14	2200 Ohm 1/2W 20% Ins. Res.
63-1828-R4	10K Ohm 1/2W 20% Ins. Res.
63-1835-R15	15K Ohm 1/2W 20% Ins. Res.
63-1856-R19	47K Ohm 1/2W 20% Ins. Res.
63-1870-R8	100K Ohm 1/2W 20% Ins. Res. (3 Used)
63-1876-R16	150K Ohm 1/2W 10% Ins. Res. (2 Used)
63-1898-R17	470K Ohm 1/2W 20% Ins. Res. (2 Used)
63-1912-R9	1 Megohm 1/2W 20% Ins. Res.
63-1926-R7	2.2 Megohm 1/2W 20% Ins. Res.
63-1940-R3	4.7 Megohm 1/2W 20% Ins. Res. (2 Used)
63-1961-R6	15 Megohm 1/2W 20% Ins. Res.
63-2143-R10	Vol. Control & Switch
	MISCELLANEOUS
11-85	Line Cord & Plug (6 ft. lg.)
12-1070	Wavemagnet Mtg. Brkt.
14-1272	Plastic Cabinet for H723 Table Model
16-656	Packing Carton
24-535	Line Cord Plug Cover
49-689-SP1	5-1/4" PM Speaker ZC5091 Cone
54-129	Speed Nut (9 Used on Mtg. Grille & Baffle)
54-271	6-32 X 1/4" Palmut Steel (1 ea. used on I.F.)
57-1686	Emblem Plate
57-1690	Emblem Mtg. Plate
58-188	Two Print Plug (AC)

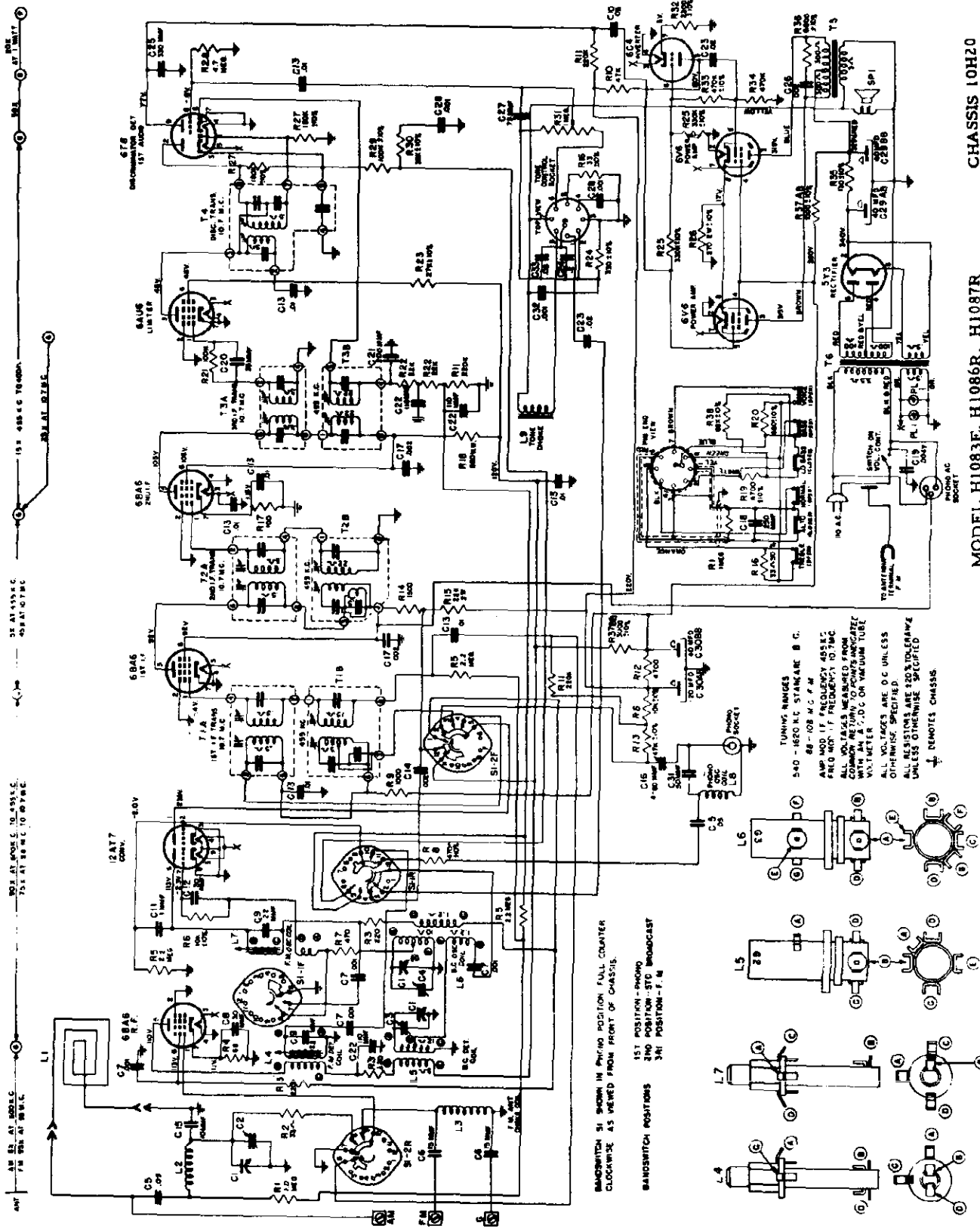


AM and FM Alignment: The AM and FM IF transformers in this receiver are of the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF transformers the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.



FM Discriminator Alignment: When the secondary of the discriminator is aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

MODELS H1083E, H1086R,
H1087R, Ch. 10H20



CHASSIS 10H20

MODEL H1083E, H1086R, H1087R

ALIGNMENT PROCEDURE

Operation	Connect Oscillator To	Dummy Antenna	Input Signal Frequency	Band	Set Dial To	Adj. Trimmers	Purpose
1	Pin 2 12AT7 Converter	.05 Mfd.	455 Kc. Modulated	BC	600 Kc.	Adj. Pri. and Sec. T1B, T2B, T3B	Align I. F. channel for maximum output.
2	2 turns loosely cpld. to wavemagnet		1600 Kc. Modulated	BC	1600 Kc.	C4	Set oscillator to dial scale.
3	2 turns loosely cpld. to wavemagnet		1400 Kc. Modulated	BC	1400 Kc.	C3, C2	Align detector and antenna stage.
4 (a)	Pin 1 (grid) on 6 AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		Adj. Primary of Discriminator T4	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 6 AU6 limiter.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		Adj. Secondary of Discriminator T4	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 6 BA6 2nd. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		Adj. Pri. and Sec. T3A	Align 3rd. IF transformer for maximum reading.
7 (c)	Pin 1 (grid) on 6 BA6 1st. IF.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		Adj. Pri. and Sec. T2A	Align 2nd IF transformer for maximum reading.
8 (c)	Pin 2 (grid) on 12AT7 converter tube socket.	.05 Mfd.	10.7 Mc. Unmodulated	FM 100		Adj. Pri. and Sec. T1A	Align 1st. IF transformer for maximum reading.
9 (c)	Antenna Post FM (Remove line ant.)	270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L7 Osc. Coil Slug.	Set Oscillator to dial scale.
10 (c) (d)		270 ohms	98 Mc. Unmodulated	FM 100	98 Mc.	L4 Det. Coil Slug	Align det. stage to maximum reading.

IMPORTANT

Alignment of this chassis will in most cases be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

In the event the receiver oscillates during phono operation, adjust C16 4-80 mmf. capacitor to a point at which the oscillation ceases.

This position of no oscillation will sometimes vary with different cartridges, and in this case readjustment of C16 must be made.

(a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (Half discriminator load).

(b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (Full discriminator load).

(c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.

(d) Loosen Slugs by applying a hot iron to the cement.

PARTS LIST

Model H1087R - H1086R

(Chassis 10H20)

Dial Assembly

78-898	Dial Light Socket & Wire
80-69	Dial Cord Spring
80-746	Pulley Retaining Spring (used on S-17157)
80-747	Dial Cord Spring
93-1061	Shoulder Washer (used on S-17258)
100-67	Dial Light Bulb
188-30	Retaining Ring (used on S-17155)
S-17155	Tuning Shaft & Pulley Assembly
S-17157	Pointer & Pulley Assembly (59-219)
S-17158	Dial Cord & Eyelet Assembly (Long)
S-17159	Dial Cord & Eyelet Assembly (Short)
S-17258	Dial Scale & Brkt. Assem. (25-449 & 26-450)
S-17261	Brkt. & Pulley Assembly

Coils & Chokes

95-1150	2nd. & 3rd. I. F. Trans. (FM) (2 used)
95-1153	Discriminator Trans.
95-1201	1st. I. F. Trans. (FM)
95-1248	1st. I. F. Trans. (BC)
95-1249	2nd. I. F. Trans. (BC)
95-1254	3rd. I. F. Trans. (BC)
S-12603	Phono Oscillator Coil
S-13800	Tone Choke Assembly
S-15691	F. M. Osc. Coil Assembly
S-15743	F. M. Detector Coil Assembly
S-16344	Broadcast Detector Coil Assembly
S-16345	Broadcast Oscillator Coil Assembly
S-16408	Antenna Choke Coil Assembly

Condensers

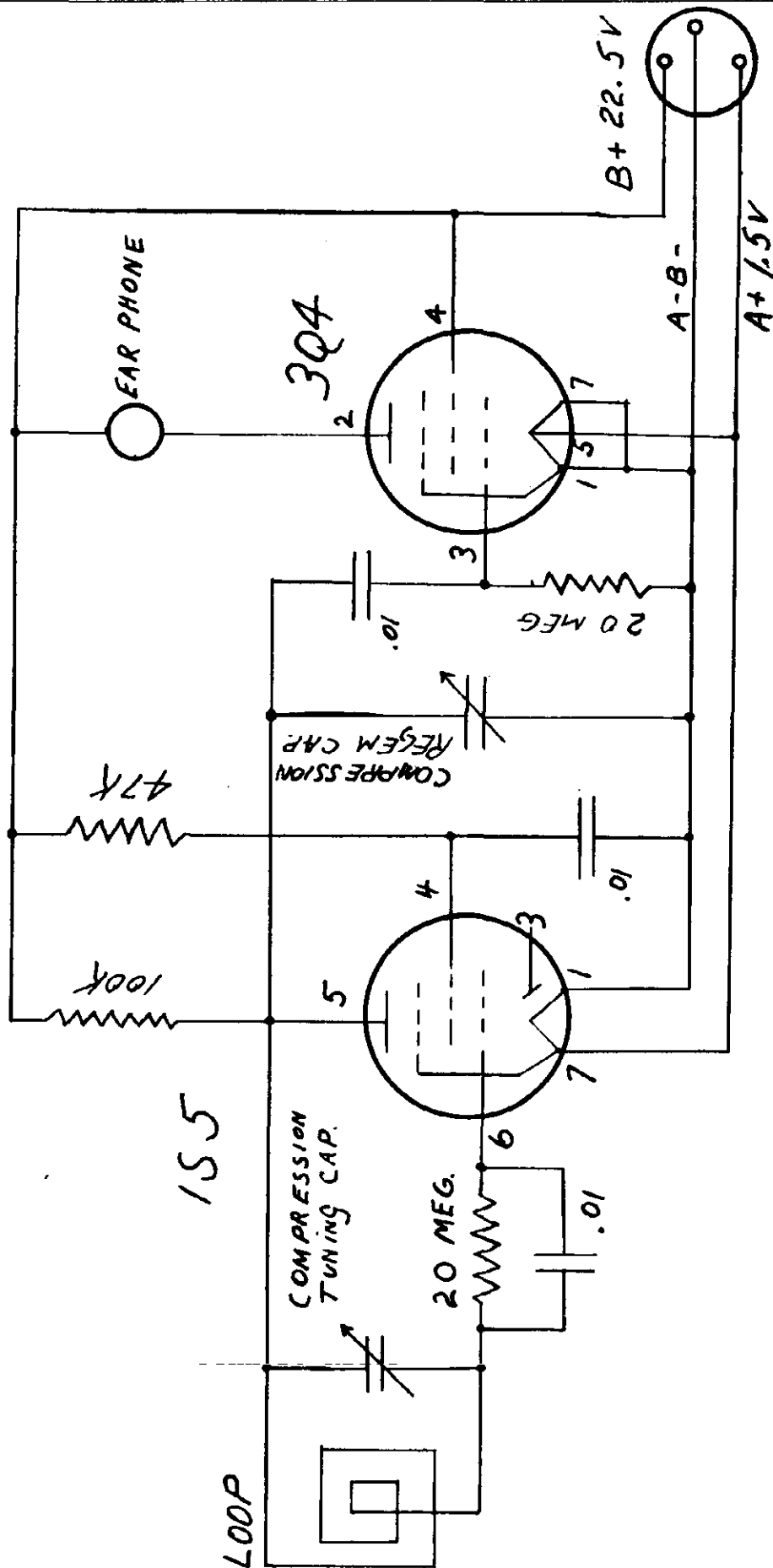
22-3	C13	.01	Mfd.	Ceramic	(7 used)	500V
22-5	C22	110	Mmfd.	Ceramic	(3 used)	500V
					(or 22-1659)	
22-171	C10	.05	Mfd.			600V
22-178	C33	.05	Mfd.			200V
22-348	C32	.001	Mfd.	(Molded)		500V
22-492	C14	.002	Mfd.			600V
22-629	C5	.05	Mfd.	(2 used)		200V
22-810	C23	.02	Mfd.	(2 used)		600V
22-1203	C28	.001	Mfd.	(2 used)		600V
22-1220	C17	.002	Mfd.	(2 used)		600V
22-1256	C27	.75	Mmfd.	(Molded)		500V
22-1367	C12	50	Mmfd.	Ceramic		500V
22-1506	C9	22	Mmfd.	Ceramic	(2 used)	500V
22-1531	C24	.2	Mfd.			200V
22-1612	C29A-B-C29BB	Elect. 40 Mfd.-40 Mfd.				450V
22-1645	C25	330	Mmfd.	(Molded)		500V
22-1668	C21	200	Mmfd.	Ceramic		500V
22-1676	C7	.001	Mfd.	Ceramic	(4 used)	500V
22-1705	C8	30	Mmfd.	Ceramic		500V
22-1761	C11	50	Mmfd.	Ceramic		500V
22-1762	C11	1	Mmfd.	Ceramic		500V
22-1782	C19	.0047	Mfd.	(Molded)		600V
22-1802	C26	.002	Mfd.			1600V
22-1887	C20	25	Mmfd.	Ceramic		500V
22-2104	C1	Three Section Gang				
22-2140	C5	15	Mmfd.	Ceramic		500V
22-2243	C30A-B-C30BB	Elect. 20 Mfd.-40 Mfd.				450V
22-2251	C16	Trimmer Cond.				

ZENITH PAGE 21-4
MODELS H1083E, H1086R,
H1087R, Ch. 10H20

MODELS H1083E, H1086R,
H1087R, Ch. 10H20

Restorers									
63-966	R12	4700 ohm	2W	20%	Ins.	Res.			
63-1452	R26	270 ohm	WW	20%	10%	Ins.	Res.		
63-1722	R16	33 ohm	1/2W	10%	Ins.	Res.			
63-1723	R2	33 ohm	1/2W	20%	Ins.	Res.			
63-1737	R4	68 ohm	1/2W	20%	Ins.	Res.			
63-1744	R17	100 ohm	1/2W	20%	Ins.	Res.			
63-1758	R3	220 ohm	1/2W	20%	Ins.	Res.			
63-1764	R28	330 ohm	1/2W	10%	Ins.	Res.			
63-1771	R8	470 ohm	1/2W	10%	Ins.	Res.			
63-1772	R7	470 ohm	1/2W	20%	Ins.	Res.			
63-1786	R9	1000 ohm	1/2W	20%	Ins.	Res.			
63-1793	R14	1500 ohm	1/2W	10%	Ins.	Res.			
63-1799	R32	2200 ohm	1/2W	10%	Ins.	Res.			
63-1820	R36	6800 ohm	1/2W	10%	Ins.	Res.			
63-1827	R6	10K ohm	1/2W	10%	Ins.	Res.			
63-1842	R22	22K ohm	1/2W	20%	Ins.	Res.			
63-1845	R23	27K ohm	1/2W	10%	Ins.	Res.			
63-1848	R30	33K ohm	1/2W	10%	Ins.	Res.			
63-1855	R13	47K ohm	1/2W	10%	Ins.	Res.			
63-1856	R10	47K ohm	1/2W	20%	Ins.	Res.			
63-1869	R29	100K ohm	1/2W	20%	Ins.	Res.			
63-1870	R27	150K ohm	1/2W	10%	Ins.	Res.			
63-1876	R21	220K ohm	1/2W	10%	Ins.	Res.			
63-1884	R11	220K ohm	1/2W	10%	Ins.	Res.			
63-1890	R25	330K ohm	1/2W	10%	Ins.	Res.			
63-1897	R33	470K ohm	1/2W	10%	Ins.	Res.			
63-1898	R34	470K ohm	1/2W	20%	Ins.	Res.			
63-1912	R1	1 Megohm	1/2W	20%	Ins.	Res.			
63-1926	R5	2.2 ohm	1/2W	20%	Ins.	Res.			
63-1940	R28	4.7 ohm	1/2W	20%	Ins.	Res.			
63-2091	R18	820 ohm	WW	1/2W	20%	Ins.	Res.		
63-2138	R37AB-R37EB	Candohm							
63-2139	R31	Volume Control & Switch							
63-2141	R1	22K ohm	2W	20%	Ins.	Res.			
63-2142	R35	130 ohm	2ipohm	5W	10%	Ins.	Res.		
Miscellaneous									
Line Cord & Plug 9 ft. long									
Transformer Mtg. Clip (95-1252)									
Speed Nut (used on S-13800)									
Nine Contact Socket									
Phono Connector Socket									
Octal Tube Socket (3 used)									
Miniature Tube Socket (2 used)									
Miniature Tube Socket (9 contact)									
Miniature Tube Socket									
Miniature Tube Socket (2 used)									
Three Contact Socket									
Two Contact Socket									
Iron Core Tension Spring (3 used)									
Tuner Arm Tension Spring									
Band Switch									
Rubber Washer (used on S-13800)									
Gang Mtg. Cup Washer (2 used)									
Power Transformer									
Speaker Output Trans.									
Power Transformer									
#6 x 1/4 Hex Hd. S.T. (used on S-17258)									
#6 x 1/4 Hex Hd. S.T. (2 used on S-17258)									
Tuner Arm									
Iron Core & Spring (2 used)									
Speaker Cable & Eyelet Assembly									
Radiogram Eac. Parts Used on H1087R-H1086R									
2-192	Cabinet Back (Phono Section)	2-215	Cabinet Back (Phono Section)	2-215	Cabinet Back (Phono Section)	2-215	Cabinet Back (Phono Section)	2-215	Cabinet Back (Phono Section)
14-1251R	Cabinet for H1086R Console Combination Model	14-1280E	Cabinet for H1087R Console Combination Model	14-1280E	Cabinet for H1083E Console Combination	14-1280E	Cabinet for H1083E Console Combination	14-1280E	Cabinet for H1083E Console Combination
16-641	Packing Carton	16-666	Packing Carton	16-666	Packing Carton	16-666	Packing Carton	16-666	Packing Carton
S-17255 Radiogram Cable Assembly									
15-779	Plug Cap & Insulator	15-779	Plug Cap & Insulator	15-779	Plug Cap & Insulator	15-779	Plug Cap & Insulator	15-779	Plug Cap & Insulator
22-1745	250 Mmild. Ceramic	22-1745	250 Mmild. Ceramic	22-1745	250 Mmild. Ceramic	22-1745	250 Mmild. Ceramic	22-1745	250 Mmild. Ceramic
58-195	9 Prong Plug	58-195	9 Prong Plug	58-195	9 Prong Plug	58-195	9 Prong Plug	58-195	9 Prong Plug
63-1722	R16 33 ohm 1/2W 10% Ins. Res.	63-1722	R16 33 ohm 1/2W 10% Ins. Res.	63-1722	R16 33 ohm 1/2W 10% Ins. Res.	63-1722	R16 33 ohm 1/2W 10% Ins. Res.	63-1722	R16 33 ohm 1/2W 10% Ins. Res.
63-1778	R20 680 ohm 1/2W 10% Ins. Res.	63-1778	R20 680 ohm 1/2W 10% Ins. Res.	63-1778	R20 680 ohm 1/2W 10% Ins. Res.	63-1778	R20 680 ohm 1/2W 10% Ins. Res.	63-1778	R20 680 ohm 1/2W 10% Ins. Res.
63-1813	R19 4700 ohm 1/2W 10% Ins. Res.	63-1813	R19 4700 ohm 1/2W 10% Ins. Res.	63-1813	R19 4700 ohm 1/2W 10% Ins. Res.	63-1813	R19 4700 ohm 1/2W 10% Ins. Res.	63-1813	R19 4700 ohm 1/2W 10% Ins. Res.
63-1862	R38 68K ohm 1/2W 10% Ins. Res.	63-1862	R38 68K ohm 1/2W 10% Ins. Res.	63-1862	R38 68K ohm 1/2W 10% Ins. Res.	63-1862	R38 68K ohm 1/2W 10% Ins. Res.	63-1862	R38 68K ohm 1/2W 10% Ins. Res.
63-1912	R1 1 Megohm 1/2W 20% Ins. Res.	63-1912	R1 1 Megohm 1/2W 20% Ins. Res.	63-1912	R1 1 Megohm 1/2W 20% Ins. Res.	63-1912	R1 1 Megohm 1/2W 20% Ins. Res.	63-1912	R1 1 Megohm 1/2W 20% Ins. Res.
S-14261	Radiogram Strip & Contact Assembly (2 used)	S-14261	Radiogram Strip & Contact Assembly (2 used)	S-14261	Radiogram Strip & Contact Assembly (2 used)	S-14261	Radiogram Strip & Contact Assembly (2 used)	S-14261	Radiogram Strip & Contact Assembly (2 used)
S-17255	Radiogram Cable Assembly	S-17255	Radiogram Cable Assembly	S-17255	Radiogram Cable Assembly	S-17255	Radiogram Cable Assembly	S-17255	Radiogram Cable Assembly
Cabinet Parts H1087R									
2-214	Cabinet Back (Phono Section)	2-214	Cabinet Back (Phono Section)	2-214	Cabinet Back (Phono Section)	2-214	Cabinet Back (Phono Section)	2-214	Cabinet Back (Phono Section)
14-1279R	Cabinet for H1087R Console Combination Model	14-1279R	Cabinet for H1087R Console Combination Model	14-1279R	Cabinet for H1087R Console Combination Model	14-1279R	Cabinet for H1087R Console Combination Model	14-1279R	Cabinet for H1087R Console Combination Model
16-662	Packing Carton	16-662	Packing Carton	16-662	Packing Carton	16-662	Packing Carton	16-662	Packing Carton
19-9	Cable Clip	19-9	Cable Clip	19-9	Cable Clip	19-9	Cable Clip	19-9	Cable Clip
19-169	Record Changer Mtg. Clip (2 used)	19-169	Record Changer Mtg. Clip (2 used)	19-169	Record Changer Mtg. Clip (2 used)	19-169	Record Changer Mtg. Clip (2 used)	19-169	Record Changer Mtg. Clip (2 used)
19-210	Loop Connector Clip (2 used)	19-210	Loop Connector Clip (2 used)	19-210	Loop Connector Clip (2 used)	19-210	Loop Connector Clip (2 used)	19-210	Loop Connector Clip (2 used)
46-872	Volume Control Knob	46-872	Volume Control Knob	46-872	Volume Control Knob	46-872	Volume Control Knob	46-872	Volume Control Knob
46-876	Tuning Control Knob	46-876	Tuning Control Knob	46-876	Tuning Control Knob	46-876	Tuning Control Knob	46-876	Tuning Control Knob
46-877	Dummy Knob	46-877	Dummy Knob	46-877	Dummy Knob	46-877	Dummy Knob	46-877	Dummy Knob
46-899	Band Switch Knob	46-899	Band Switch Knob	46-899	Band Switch Knob	46-899	Band Switch Knob	46-899	Band Switch Knob
49-693	SP-1 12" PM Speaker	49-693	SP-1 12" PM Speaker	49-693	SP-1 12" PM Speaker	49-693	SP-1 12" PM Speaker	49-693	SP-1 12" PM Speaker
57-1284	ZC12161 Cone & Voice Coil	57-1284	ZC12161 Cone & Voice Coil	57-1284	ZC12161 Cone & Voice Coil	57-1284	ZC12161 Cone & Voice Coil	57-1284	ZC12161 Cone & Voice Coil
57-1481	Strike Plate (3 used)	57-1481	Strike Plate (3 used)	57-1481	Strike Plate (3 used)	57-1481	Strike Plate (3 used)	57-1481	Strike Plate (3 used)
57-1666	Excitouch Clamping Plate (4 used)	57-1666	Excitouch Clamping Plate (4 used)	57-1666	Excitouch Clamping Plate (4 used)	57-1666	Excitouch Clamping Plate (4 used)	57-1666	Excitouch Clamping Plate (4 used)
70-3	Radio Dial Esc.	70-3	Radio Dial Esc.	70-3	Radio Dial Esc.	70-3	Radio Dial Esc.	70-3	Radio Dial Esc.
70-86	#5 x 5/8 Washer Hd. Wood Screw St. Br.	70-86	#5 x 5/8 Washer Hd. Wood Screw St. Br.	70-86	#5 x 5/8 Washer Hd. Wood Screw St. Br.	70-86	#5 x 5/8 Washer Hd. Wood Screw St. Br.	70-86	#5 x 5/8 Washer Hd. Wood Screw St. Br.
74-71	[8 used to Mt. 2-214]	74-71	[8 used to Mt. 2-214]	74-71	[8 used to Mt. 2-214]	74-71	[8 used to Mt. 2-214]	74-71	[8 used to Mt. 2-214]
78-891	Ventilating Screen	78-891	Ventilating Screen	78-891	Ventilating Screen	78-891	Ventilating Screen	78-891	Ventilating Screen
80-504	Pilot Light Socket & Wire	80-504	Pilot Light Socket & Wire	80-504	Pilot Light Socket & Wire	80-504	Pilot Light Socket & Wire	80-504	Pilot Light Socket & Wire
80-830	Hinge Spring (2 used)	80-830	Hinge Spring (2 used)	80-830	Hinge Spring (2 used)	80-830	Hinge Spring (2 used)	80-830	Hinge Spring (2 used)
83-1220	Record Changer Mtg. Spring (4 used)	83-1220	Record Changer Mtg. Spring (4 used)	83-1220	Record Changer Mtg. Spring (4 used)	83-1220	Record Changer Mtg. Spring (4 used)	83-1220	Record Changer Mtg. Spring (4 used)
90-367	Pilot Light Socket Mtg. Strip	90-367	Pilot Light Socket Mtg. Strip	90-367	Pilot Light Socket Mtg. Strip	90-367	Pilot Light Socket Mtg. Strip	90-367	Pilot Light Socket Mtg. Strip
93-168	Pilot Light Tube	93-168	Pilot Light Tube	93-168	Pilot Light Tube	93-168	Pilot Light Tube	93-168	Pilot Light Tube
100-36	Rubber Shoulder Washer (4 used)	100-36	Rubber Shoulder Washer (4 used)	100-36	Rubber Shoulder Washer (4 used)	100-36	Rubber Shoulder Washer (4 used)	100-36	Rubber Shoulder Washer (4 used)
112-808	Pilot Light Bulb	112-808	Pilot Light Bulb	112-808	Pilot Light Bulb	112-808	Pilot Light Bulb	112-808	Pilot Light Bulb
114-350	#6 x 5/16 Phillips Rd. Hd. S.T. (4 used on Esc. Mtg.)	114-350	#6 x 5/16 Phillips Rd. Hd. S.T. (4 used on Esc. Mtg.)	114-350	#6 x 5/16 Phillips Rd. Hd. S.T. (4 used on Esc. Mtg.)	114-350	#6 x 5/16 Phillips Rd. Hd. S.T. (4 used on Esc. Mtg.)	114-350	#6 x 5/16 Phillips Rd. Hd. S.T. (4 used on Esc. Mtg.)
156-33	Record Changer Mtg. Screw (3 used)	156-33	Record Changer Mtg. Screw (3 used)	156-33	Record Changer Mtg. Screw (3 used)	156-33	Record Changer Mtg. Screw (3 used)	156-33	Record Changer Mtg. Screw (3 used)
159-50	Chassis Mtg. Screw (4 used)	159-50	Chassis Mtg. Screw (4 used)	159-50	Chassis Mtg. Screw (4 used)	159-50	Chassis Mtg. Screw (4 used)	159-50	Chassis Mtg. Screw (4 used)
165-9	Bullet Catch (3 used)	165-9	Bullet Catch (3 used)	165-9	Bullet Catch (3 used)	165-9	Bullet Catch (3 used)	165-9	Bullet Catch (3 used)
165-14	Plug Button Black Oxide (2 used)	165-14	Plug Button Black Oxide (2 used)	165-14	Plug Button Black Oxide (2 used)	165-14	Plug Button Black Oxide (2 used)	165-14	Plug Button Black Oxide (2 used)
166-55	Metal Glide (2 used)	166-55	Metal Glide (2 used)	166-55	Metal Glide (2 used)	166-55	Metal Glide (2 used)	166-55	Metal Glide (2 used)
171-7	Tack Bumper (3 used)	171-7	Tack Bumper (3 used)	171-7	Tack Bumper (3 used)	171-7	Tack Bumper (3 used)	171-7	Tack Bumper (3 used)
186-54	Pilot Light Lens	186-54	Pilot Light Lens	186-54	Pilot Light Lens	186-54	Pilot Light Lens	186-54	Pilot Light Lens
192-138	Knob Clamping Ring (46-876)	192-138	Knob Clamping Ring (46-876)	192-138	Knob Clamping Ring (46-876)	192-138	Knob Clamping Ring (46-876)	192-138	Knob Clamping Ring (46-876)
202-697	Dial Glass	202-697	Dial Glass	202-697	Dial Glass	202-697	Dial Glass	202-697	Dial Glass
202-834	F. M. Instruction Book	202-834	F. M. Instruction Book	202-834	F. M. Instruction Book	202-834	F. M. Instruction Book	202-834	F. M. Instruction Book
5-14029	Radio-Phono Instruction Book	5-14029	Radio-Phono Instruction Book	5-14029	Radio-Phono Instruction Book	5-14029	Radio-Phono Instruction Book	5-14029	Radio-Phono Instruction Book
5-15228	Variable Speed Record Changer	5-15228	Variable Speed Record Changer	5-15228	Variable Speed Record Changer	5-15228	Variable Speed Record Changer	5-15228	Variable Speed Record Changer
5-15536	Low Impedance Loop Assembly	5-15536	Low Impedance Loop Assembly	5-15536	Low Impedance Loop Assembly	5-15536	Low Impedance Loop Assembly	5-15536	Low Impedance Loop Assembly
5-15780	Record Changer Compt. Hinge Brkt. & Link Assembly (2 used)	5-15780	Record Changer Compt. Hinge Brkt. & Link Assembly (2 used)	5-15780	Record Changer Compt. Hinge Brkt. & Link Assembly (2 used)	5-15780	Record Changer Compt. Hinge Brkt. & Link Assembly (2 used)	5-15780	Record Changer Compt. Hinge Brkt. & Link Assembly (2 used)
5-16419	Cobra Tone Arm Cartridge	5-16419	Cobra Tone Arm Cartridge	5-16419	Cobra Tone Arm Cartridge	5-16419	Cobra Tone Arm Cartridge	5-16419	Cobra Tone Arm Cartridge
5-17005	Record Adapter Plug & Envelope Assembly	5-17005	Record Adapter Plug & Envelope Assembly	5-17005	Record Adapter Plug & Envelope Assembly	5-17005	Record Adapter Plug & Envelope Assembly	5-17005	Record Adapter Plug & Envelope Assembly
5-17167	Record Changer Mtg. Frame Assembly	5-17167	Record Changer Mtg. Frame Assembly	5-17167	Record Changer Mtg. Frame Assembly	5-17167	Record Changer Mtg. Frame Assembly	5-17167	Record Changer Mtg. Frame Assembly
5-17255	Volume Control Knob Assembly	5-17255	Volume Control Knob Assembly	5-17255	Volume Control Knob Assembly	5-17255	Volume Control Knob Assembly	5-17255	Volume Control Knob Assembly
5-17328	Radiogram Cable Assembly	5-17328	Radiogram Cable Assembly	5-17328	Radiogram Cable Assembly	5-17328	Radiogram Cable Assembly	5-17328	Radiogram Cable Assembly
76-444	Loop Loading Coil Assembly	76-444	Loop Loading Coil Assembly	76-444	Loop Loading Coil Assembly	76-444	Loop Loading Coil Assembly	76-444	Loop Loading Coil Assembly
114-297	Radiogram Eac. Parts Used on H1087R	114-297	Radiogram Eac. Parts Used on H1087R	114-297	Radiogram Eac. Parts Used on H1087R	114-297	Radiogram Eac. Parts Used on H1087R	114-297	Radiogram Eac. Parts Used on H1087R
Radiogram Eac. Parts Used on H1087R-H1086R									
2-215	Cabinet Back (Phono Section)	2-215	Cabinet Back (Phono Section)	2-215	Cabinet Back (Phono Section)	2-215	Cabinet Back (Phono Section)	2-215	Cabinet Back (Phono Section)
14-1280E	Cabinet for H1087R Console Combination Model	14-1280E	Cabinet for H1087R Console Combination Model	14-1280E	Cabinet for H1087R Console Combination Model	14-1280E	Cabinet for H1087R Console Combination Model	14-1280E	Cabinet for H1087R Console Combination Model
16-666	Packing Carton	16-666	Packing Carton	16-666	Packing Carton	16-666	Packing Carton	16-666	Packing Carton
19-9	Cable Clip	19-9	Cable Clip	19-9	Cable Clip	19-9	Cable Clip	19-9	Cable Clip
19-169	Record Changer Mtg. Clip (2 used)	19-169	Record Changer Mtg. Clip (2 used)	19-169	Record Changer Mtg. Clip (2 used)	19-169	Record Changer Mtg. Clip (2 used)	19-169	Record Changer Mtg. Clip (2 used)
19-210	Loop Connector Clip (2 used)	19-210	Loop Connector Clip (2 used)	19-210	Loop Connector Clip (2 used)	19-210	Loop Connector Clip (2 used)	19-210	Loop Connector Clip (2 used)
46-872	Volume Control Knob	46-872	Volume Control Knob	46-872	Volume Control Knob	46-872	Volume Control Knob	46-872	Volume Control Knob
46-876	Tuning Control Knob	46-876	Tuning Control Knob	46-876	Tuning Control Knob	46-876</			

MODEL 7400,
Radio Hat



The Maguire Model 6L is a superheterodyne radio receiver having 5 tubes plus a rectifier tube, with provision for phonograph input, for operation on 105-125 volt AC or DC power supply. The tubes used are a 12SK7 as an R.F. amplifier, a 12SA7 as an oscillator-converter, a 12SK7 as an I.F. amplifier, a 12SQ7 as an AVC, detector, and 1st audio amplifier, a 35L6 as an output, and a 35Z5 as a power rectifier.

The broadcast band covers a frequency range from 535 to 1620 kilocycles. The dial is calibrated in kilocycles (KC) (less the final zero).

CONTROLS

TONE CONTROL: (Center knob).

Turn knob counter-clockwise for maximum bass and clockwise for maximum treble response.

VOLUME CONTROL: (Left-hand knob).

Turning knob clockwise turns the receiver on and turning further increases the volume.

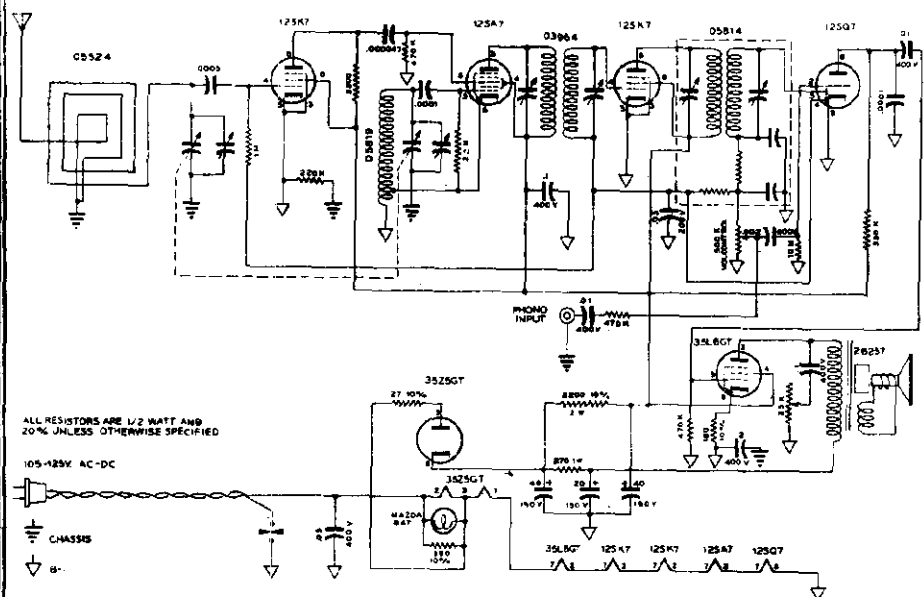
TUNING CONTROL: (Right-hand knob).

This knob is used to select stations. Tune station until it is at maximum clearness. Never attempt to reduce the volume by detuning the station—always use the volume control.

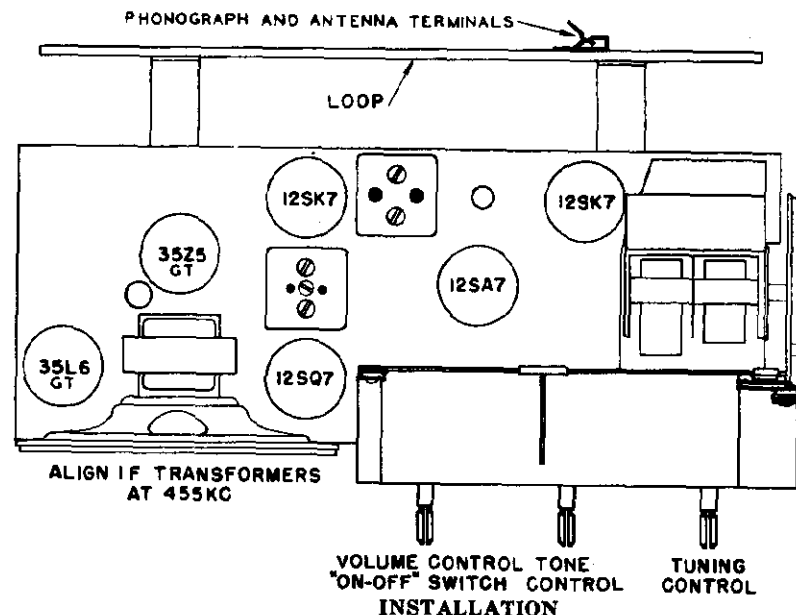
OPERATION

Turn the "On-Off" switch and volume control clockwise about half its range. This supplies power to the receiver. After allowing the tubes to warm up, tune in the desired station by rotating the tuning control. For best results, tune the desired station with the volume turned low. This enables you to get the exact point where the station comes in best. Then adjust the volume control.

To operate the receiver as a phonograph amplifier, connect phonograph lead to phonograph terminals at rear of loop, according to instructions printed at phonograph terminals. Turn "On-Off" switch and volume control clockwise about half its range and adjust tone control to desired position. Turn tuning control clockwise to the extreme right hand end of its range to silence radio.



TUBE LAYOUT



When using D.C. power supply, and after allowing sufficient time for tubes to warm up, if the receiver does not operate, remove the line cord plug from the socket and reverse. Replace the plug in the reverse position and allow tubes to warm up, at which time the receiver will operate.

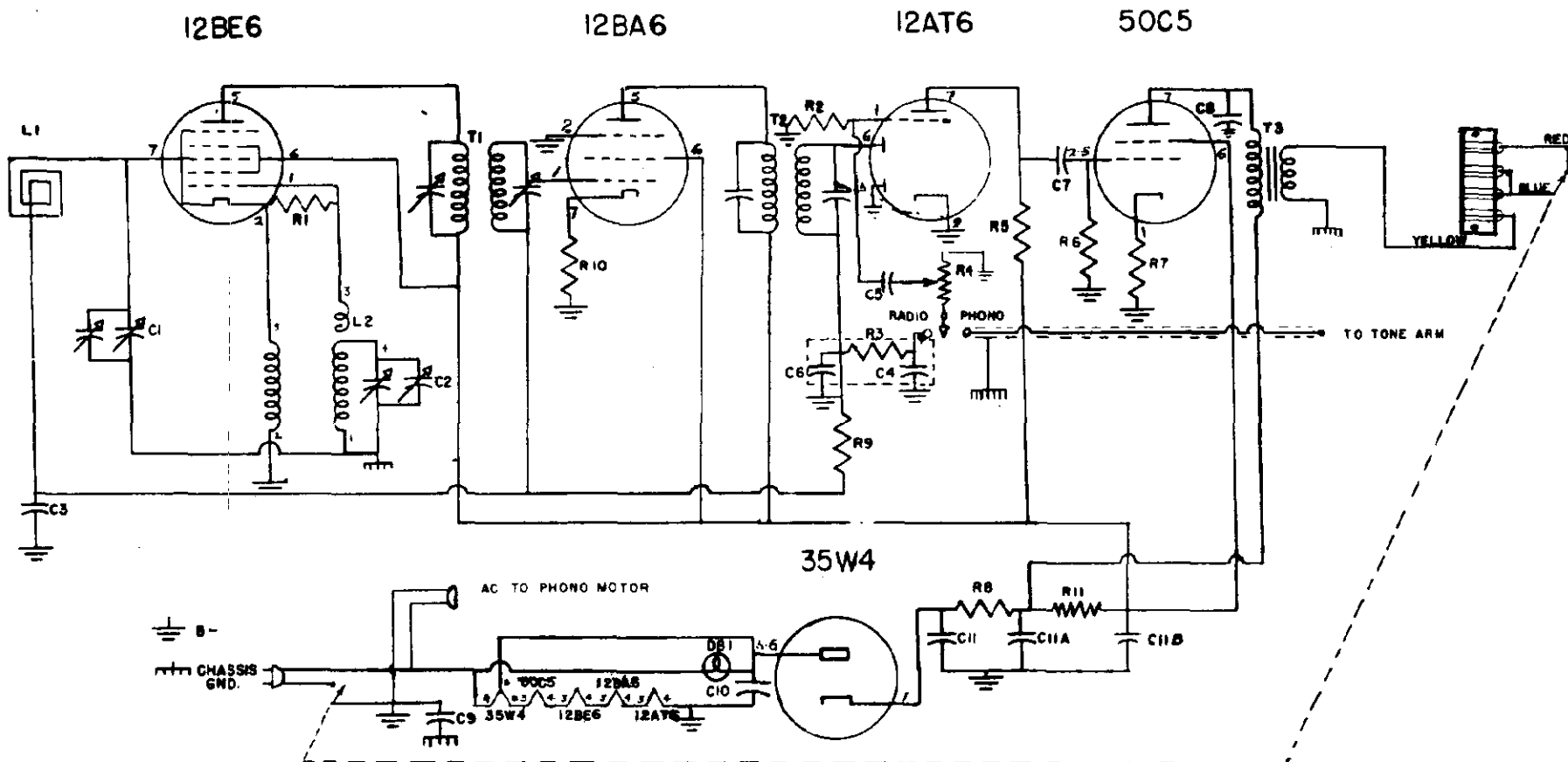
When using A.C. power supply, it will be found that there will be less hum when the line cord is in the best position. Try both positions, leaving the plug in the position that produces the least hum.

For reception of local stations no antenna is necessary, the built-in loop providing sufficient volume. If it is desired to listen to more distant stations, an antenna 50 to 100 feet long should be connected to the antenna terminal at the rear of the loop. Do not use a ground with this receiver.

If the receiver fails to operate, see that all tubes are pushed down in their respective sockets as illustrated in the tube layout diagram below. Always disconnect line cord plug before making any adjustments inside cabinet. It is necessary to remove the receiver from the cabinet to replace tubes.

Sometimes, when operating this receiver in buildings having steel in their construction, it will be necessary to use an external antenna to provide sufficient volume for satisfactory operation.

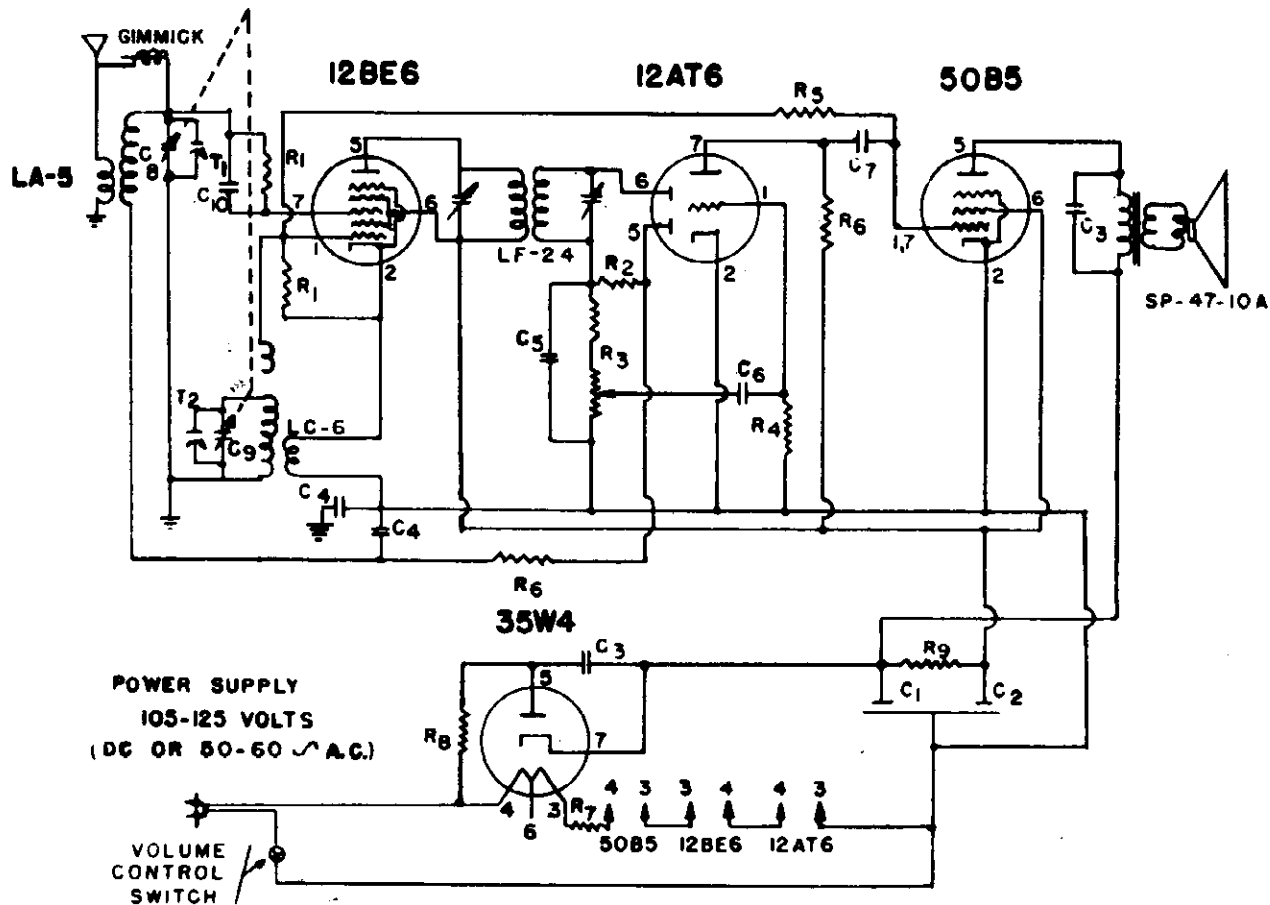
Phonograph terminals are provided at the rear of the cabinet. Shielded cable should be used to connect a crystal type phonograph pickup to the radio. When the tuning control is turned clockwise to the end of its range the radio section of the receiver is silenced, permitting use of the receiver amplifier with phonograph input.



CIR. SYM.	PART NO.	DESCRIPTION	CIR. SYM.	PART NO.	DESCRIPTION
C1-2	CV-10025	CONDENSER VARIABLE	R1	RC-32202	RESISTOR CARBON 22,000 OHM 1/2 W.
C4-6	CM-18251	" MICA 100 MMF	R2	RC-31005	" " 10 MEG OHM 1/2 W.
C5-7	CP-12508	" PAPER .005 MFD 200 VOLTS.	R3	RC-31003	" " 10,000 OHM 1/2 W.
C8	CP-18208	" .02 MFD 400 VOLTS.	R4	VCP-12128A	VOLUME CONTROL 1 MEG
C9	CP-14154	" .15 MFD 400 VOLTS.	R5	RC-32203	RESISTOR CARBON 220,000 OHM 1/2 W.
C10-3	CP-14303	" .05 MFD 400 VOLTS.	R6	RC-34703	" " 470,000 OHM 1/2 W.
C11-11A-11B	CLS-100667A	" ELECT. 40-20-2 MFD 150 VOLTS.	R7	RC-31500	" " 150 OHM 1/2 W.
DB 1	DB-10000	DIAL LIGHT BULB NO. 47	R8	RC-42200	" " 220 OHM 1 W.
L1	ALP-40026	ANTENNA LOOP	R9	RC-32204	" " 2.2 MEG OHM 1/2 W.
L2	TRC-10013-4	OSCILLATOR COIL	T1	TS-10003	TRANSFORMER I.F. 1ST
			T2	TS-10044	" " I.F. 2ND
			T3	TDC-10032	" " OUTPUT
			R10	RC-30680	RESISTOR CARBON 68 OHM 1/2 W.
			R11	RC-44702	" " 470 OHM 1 W.

MISC. PAGE 21-4 TELE-TONE

MODELS 153, 196,
197U, Ch. AR



ITEM	DESCRIPTIONS	PART NO.
C ₁ , C ₂	2X40 MFD. 150 VOLT ELECT.	CE-15
C ₃	.02 MFD. 400 V. PAPER COND.	CP-203-1
C ₄	.05 MFD. 400 V. PAPER COND.	CP-503-1
C ₅	100 MMFD. 500 V. MICA COND.	CM-101-1
C ₆	.002 MFD. 400 V. PAPER COND.	CP-202-2
C ₇	.005 MFD. 200 V. PAPER COND.	CP-502-3
C ₈ , C ₉	VARIABLE CONDENSER	CV-14
C ₁₀	500 MMFD. 500 V. MICA COND.	CM-501-1
LC-6	OSCILLATOR COIL	LC-6
LA-5	ANTENNA COIL	LA-5
LF-24	IF TRANSFORMER	LF-24
R ₁	10,000 OHMS 1/2 W. 10%	RC-183-2
R ₂	4.7 MEGOHMS 1/2 W. RESISTOR	RC-475-1
R ₃	2 MEG. VOL. CONTROL, 100K STOP	VC-11
R ₄	10 MEGOHMS 1/2 W. RESISTOR	RC-106-1
R ₅	330,000 OHMS 1/2 WATT	RC-334-1
R ₆	220,000 OHMS 1/2 WATT	RC-224-1
R ₇	39 OHMS 1 WATT RESISTOR	RW-390-5
R ₈	18 OHMS 1/2 W RESISTOR	RC-180-2
R ₉	2200 OHMS 1 W. RESISTOR	RC-222-5
T ₁ , T ₂	TRIMMERS	
SP-47-10A	SPEAKER - 4" P.M. WITH OUTPUT TRANSFORMER MTD.	SP-47-10A

CHASSIS SERIES "AR"

I.F. - 455 K.C.

FREQ. RANGE - 532.5 to 1620 K.C.

ALIGN T₂ at 1620 K.C.

T₁ at 1420 K.C.

TRACK at 600 K.C.

GANGING INSTRUCTIONS

MODEL OJ Series

An OUTPUT METER, connected to the speaker voice coil terminals, should be used for accuracy in making ganging adjustments.

The voice coil terminals, as well as the I.F. trimmers, may be made accessible by removing the screws by which the motor panel is mounted in the cabinet. Before lifting off the phono-recorder unit, MOVE THE PHONO. ARM TO THE CENTER OF THE TURNTABLE, and permit the arm to maintain this position until after the unit has been restored to the cabinet. In this way, the follower arm which engages the lateral feed screw will be protected against damage.

The R.F. trimmers and loop loading coil may be reached by raising front edge of panel.

Connect signal generator to control grid of 6BE6 tube.*

SIGNAL GENERATOR FREQUENCYDIAL POSITIONTRIMMER

456 K.C.
456 K.C.
456 K.C.
456 K.C.

1400 K.C.
1400 K.C.
1400 K.C.
1400 K.C.

T2-S** (Top Screw)
T2-P** (Bottom Screw)
T1-S** (Bottom Screw)
T1-P** (Top Screw)

Place hot lead from signal generator near antenna loop.

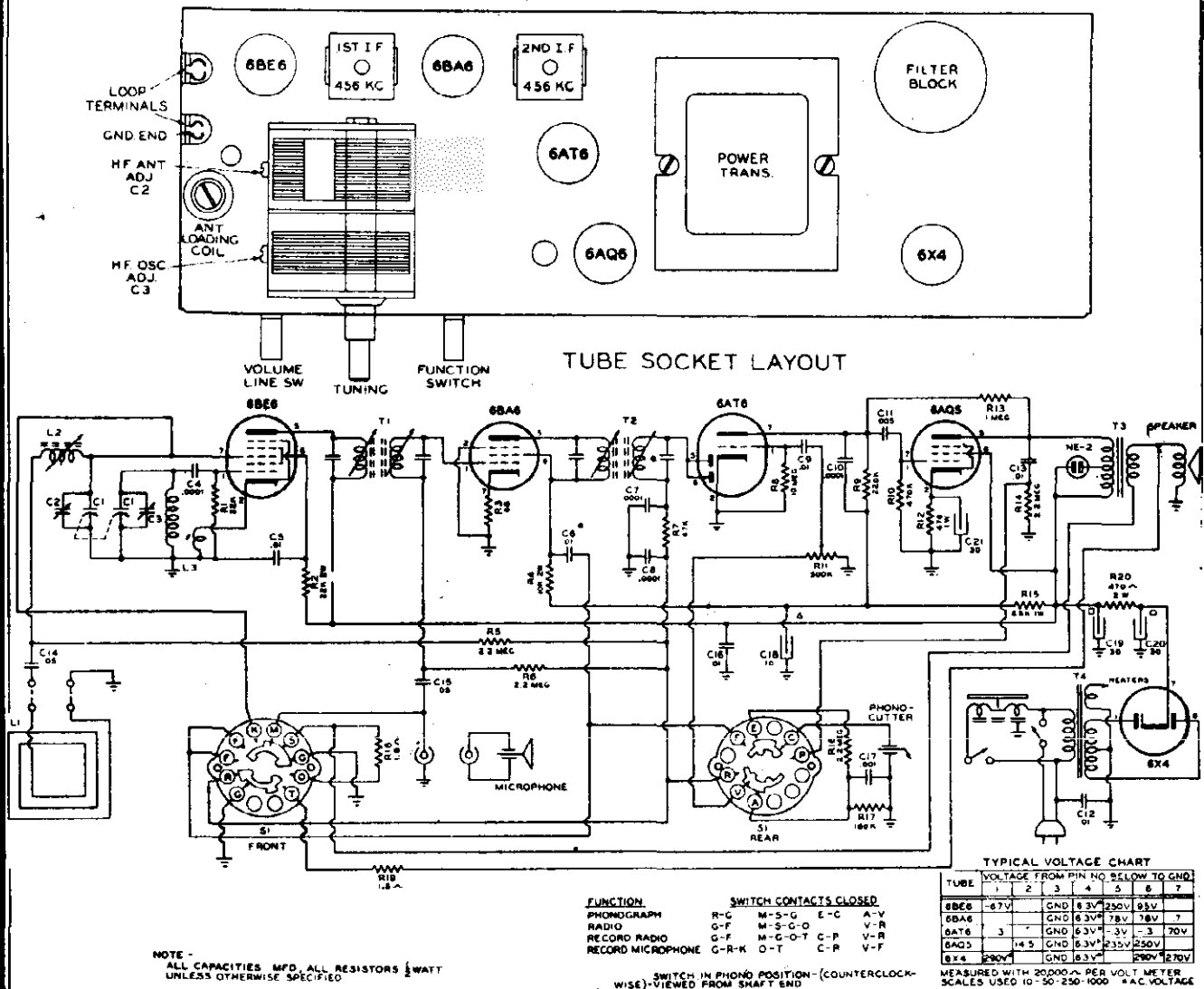
1400 K.C.
1400 K.C.
600 K.C.

1400 K.C.
1400 K.C.
600 K.C.

C-3 OSC.
C-2 ANT.
L-2 Loop Loading Coil

* Check the alignment of pointer with reference line below 550 K.C. on the scale. The pointer may be slipped on the shaft to correct for misalignment.

** In ganging the I.F. amplifier; use a low signal input.



Admiral Record Changers RC220, RC221, RC222; RC320, RC321, RC322, early, late production

Record Changers RC221 and RC222 appear on record changer pages RCD, CH. 20-9 through RCD, CH. 20-20 of *Rider's Manual Volume XX*. RC220, RC320, RC321, and RC322 are similar to RC221 and RC222.

The only changes which were made in the late production RC220, RC221, and RC222 changers were the addition of the turntable retaining ring and the trip counterweight, reference number 138. Two types of turntable retaining devices have been used. The early type was a flat external retaining ring (part no. 401A286) which is no longer used. This has been replaced by the present retaining clip (part no. 414A36). When installing this clip, be sure that its "turned-up" ends are facing upward. The trip counterweight was added to eliminate erratic trip action because of a weak or stretched trip cocking spring (ref. no. 110). The trip cocking spring is no longer used. In order to mount the trip counterweight it was necessary to tap the trip lever (111) to accommodate the trip counterweight mounting screw (ref. no. 139).

In the parts list for RC221 and RC222, reference number 17, pickup arm, should have 403C35 as its part number.

The only difference between late production RC220, RC221, RC222 changers and RC320, RC321, RC322 changers is in the method of mounting the pawl and the trip serration plate. This change was made to simplify the adjustment for proper trip on 7-inch 33 $\frac{1}{3}$ -rpm records and 10-inch and 12-inch 33 $\frac{1}{3}$ -rpm or 78-rpm records. The oscillating trip is used for these types of records.

In the RC320, RC321, RC322 changers, the shape of the pawl (ref. no. 141A) has changed slightly from that shape given in *Volume XX*, and it is now mounted where the trip serrations plate (ref. no. 114) was mounted. The pawl and trip serrations have merely reversed their mounting positions. The accompanying figure shows the layout for this change.

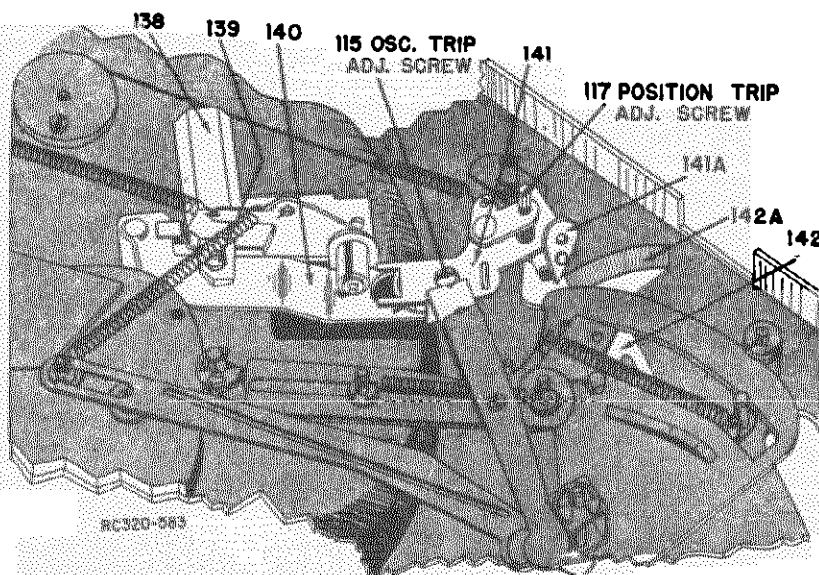
All adjustments on the RC320, RC321, and RC322 changers are the same as for the RC220, RC221, and RC222. The ideal adjustment of the oscillating trip adjusting screw is when the point of the pawl is horizontally even or level with the smooth side of the trip serrations.

In late production of RC320, RC321, and RC322, the 45-rpm centerpost cap (ref. no. 63) was changed to slightly decrease the over-all height of the cap and to include two extra ribs which help prevent the possibility of bending the slicers (65 and 66) if the 45-rpm centerpost adjustment is improperly made. The new centerpost cap is interchangeable with the old cap and should be used when replacing any centerpost cap. Two new cap mounting screws listed below should be used instead of the old type screws.

A felt washer is used between the changer pan and the motor mounting grommet at the mounting stud closest to the centerpost. This prevents the motor from tilting.

The parts listed below include corrections and additions to the parts list that appears for RC221 and RC222. It also contains all new parts for the RC320, RC321, and RC322 changers. For any parts not listed here see the parts list on page RCD, CH. 20-20 in *Volume XX*.

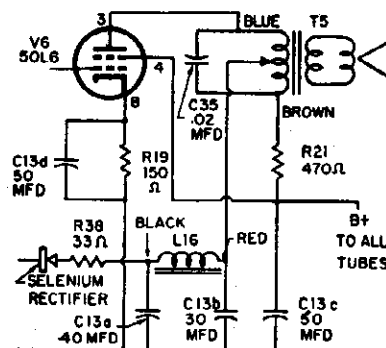
Ref. No.	Part No.	Description
	414A 36	Turntable retaining clip
	5A4-1	Felt washer ($\frac{1}{4}$ " ID x $\frac{3}{4}$ " OD x $\frac{1}{16}$ ")
17	403C 35	Pickup arm
63	403A 303	Centerpost cap (new, use on all models)
73	60-1125-C2-47	Screw (2 req.) 6-32 x $1\frac{1}{2}$ " BH MS
138	402A 203	Trip counterweight
139	85-187-C2-47	Screw, 8-32 x $\frac{3}{16}$ " BH MS
140	G400A 361	Trip lever and reject arm support
141	G400A 353	Trip engagement and adjusting plate (includes pawl)
141A		Pawl (part of 141)
142	G400A 357	Arm control lever (includes trip serrations)
142A	405A 112	Trip serrations (part of 142)
	405A 113	30 cycle conversion spring for 33-1/3 rpm shaft
		50 cycle conversion spring for 78 rpm shaft
	98A 15-15	50 cycle conversion pulley (45 rpm).



Bottom view of Admiral RC320, RC321, RC322 Record Changers.

Bendix 75B5, 75M5, 75M8, 75P6, 75W5

These models appear on pages 20-16 through 20-23 of *Rider's Manual Volume XX*. It has been found possible to reduce the hum level in these models by installing a choke in the output circuit of the speaker as shown in the accompanying diagram.



Changes for Bendix 75B5, 75M5, 75M8, 75P6, 75W5.

Remove capacitor C35, 0.02 μ f, connected from pin 3 of the 50L6 (V6) tube socket and terminal board. Remove red lead from pin 4 of 50L6 tube socket and terminal of electrolytic, C13c. Remove resistor R55, 470 ohms, from pin 6 of 50L6 tube socket and terminal board.

Move the pickup point of brown lead of output transformer from the terminal board to pin 6 of 50L6 tube socket. Move the red lead from terminal C13a, 40 μ f, to terminal C13b, 30 μ f, of electrolytic capacitor C13.

Drill a hole through the chassis near the electrolytic capacitor for the leads of an added reactor, L16. This choke is available as Bendix stock number LFO102. Bend one ear of reactor L16 and mount on top of chassis by soldering both ears to the chassis, or holes may be punched in each ear and the reactor mounted with self-tapping screws. Insert the reactor leads through the hole.

Since leads of capacitor C35, 0.02 μ f, are too short, install new capacitor C35 between pins 3 and 6 of 50L6, with tubing over the positive lead, and negative capacitor plate attached to pin 3.

Connect red lead of added reactor L16 to terminal C13b, 30 μ f, of electrolytic capacitor C13. Connect black lead of added reactor to terminal C13a, 30 μ f, of electrolytic capacitor C13.

The connection of bypass capacitor C56 has been changed from chassis ground to common B— to eliminate a-c hum modulation. If hum is objectionable on a receiver not using an external antenna, this revised connection is recommended. Capacitor C63, 0.001 μ f, is now connected to common B—, instead of to pin 11 of S1B.

To clarify the adjustments in step 4, FM Alignment-CW Meter Method on page 20-18, revise it to read as follows:

"Repeat steps 1, 2, and 3 until adjustment in step 1 does not require a readjustment to produce a zero reading on the VTVM in step 3."

The extended length of the spring in the dial cord of 75B5, 75W5, 75M5, and 75M8 has been designated as $1\frac{1}{4}$ inches minimum, to $1\frac{1}{2}$ inches maximum. Revise Fig. 9 on page 20-21 to show only 2 turns around the lower shaft in lieu of 4 turns originally indicated. The maximum dimensions of $1\frac{1}{2}$ inches should also be indicated for spring attached at dial-cord drive wheel.

Ansley 709

Model 709 is the same as Model 53 which appears on pages 17-18 through 17-5 of *Rider's Manual Volume XVII*.

Automatic A.T.T.P.

The alignment and battery information that appears on page 17-8 of *Rider's Manual Volume XVII* under the heading of Models 660, 662, 666, Series C is labeled incorrectly. This page should be labeled Model A.T.T.P. The schematic for Model A.T.T.P. appears on page 18-1 of *Rider's Manual Volume XVI*.

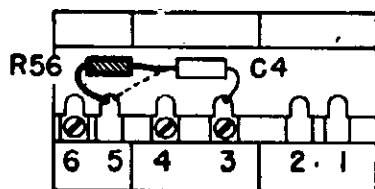
Automatic C-65

This model is the same as Model C-60X which appears on page 16-1 of *Rider's Manual Volume XVI*.

Bendix 95B3, 95M3, 95M9

The switch and its components for the long-playing record player have heretofore been mounted on the back cover. To avoid future difficulty in removing the back cover, this switch and its components are now mounted on a bracket attached to the rear of the cabinet. The bracket is mounted on the top rear cabinet rail and is placed so that the switch, in Models 95B3 and 95M3, extends through the ventilation louver in the upper left corner of the back cover. The strip between the louvers in Model 95M9 covers the switch and it is necessary to remove the strip between the louvers from the back cover.

The terminals of the gang capacitor are numbered from the front to the rear of the chassis as is indicated in the accompanying diagram. In the figure showing trimmer location, the capacitor designated in the r-f sub-chassis as C8, is C4. Resistor R56 has been added to the circuit to avoid any possibility of regeneration occurring, and this resistor is soldered from terminal 5 of the gang capacitor directly to capacitor C4. The other lead of capacitor C4 remains connected to terminal 3 of the gang capacitor as indicated in the diagram. On the schematic diagram, resistor R56 should be inserted in the a-m external lead between terminal board J6 and capacitor C4. Add R56, Comp., 1,000 ohms, 1/4 w, Part No. RC22A102M to the replacement parts list.



Terminals of gang capacitor used in Bendix 95B3, 95M3, 95M9.

An additional filter capacitor C65 has been added to the avc circuit. The 470- μ f capacitor goes from terminal 10 of switch S1C to chassis ground. Add capacitor C65, Mica, 470 μ f, 500 v, Part No. CMSA38 to the replacement parts list.

The figure showing the f-m antenna should show 26" as the dimension for the lower half of the f-m antenna, instead of 6". The dipole should measure 26" on both sides of the center leads.

Farnsworth P-8

This a-m-f-m radio chassis used in Models 1002-F, 1003-M, and 1004-B, is identical to the P-7 chassis which appears on pages 19-19 through 19-33 of *Rider's Manual Volume XIX*, with the exception of the phono-input circuit. The differences are listed below:

1. The P-7 chassis employed a separate phono preamplifier stage; the P-8 does not.
2. Since the P-8 does not employ a pre-amp, the preamp power cable and plug and the 3.3-ohm resistor, ref. no. 14, are not included in this chassis.
3. The record changer, Capehart "333", used with the P-8 chassis employs a crystal pickup. Therefore, a 680,000-ohm, 1/2-watt resistor is connected from the phono-input lead to chassis ground.

Following is a list of parts which apply to the Models 1002-F, 1003-M, and 1004-B. These parts are different from those shown for the P-7 chassis.

Part No.	Description
650189A-G1	Loop antenna assembly
59534	On-off volume and tuning knobs
59535	Band switch knob
59537	Treble tone knob
31472	Glass escutcheon.

Farnsworth P-10

This a-m-f-m radio chassis used in Model 100-M, is identical to the P-10 chassis which appears on pages 19-19 through 19-33 of *Rider's Manual Volume XIX*, with the exception of the phono-input circuit.

In Model 1001-M, the P-10 chassis employs a 680,000-ohm resistor, from phono-input to chassis ground, instead of a 100,000-ohm resistor, ref. no. 15.

Following is a list of parts which apply to Model 1001-M. These parts are different from those shown in the Manual for the P-10 chassis.

Part No.	Description
650183A-G1	Speaker, 10" PM, output trans. assy.
750114B-1	Glass escutcheon
650189A-G1	Loop antenna assy.
650186A-4	On-off volume knob
650186A-2	Tuning knob
650186A-1	Band switch knob
650186A-3	Tone control knob.

Farnsworth P73

This model appears on pages RCD. CH. 18-1 through 18-9 of *Rider's Manual Volume XVIII*. The following part should be added to the parts list:
71245 Removal needle only, osmium tipped (P73).

Farnsworth Service Hints

The following service suggestions are offered in the event that the P70 series changers occasionally drop two or more records at one time. If this situation exists with new records, in which the center hole is not worn, the cause may be one of the following:

1. Misadjustment of the amount of tension on the compression spring (part no. 58789). This adjustment is on the underside of the compression lever assembly (part no. 15195) and consists of the adjustment nut (part no. 37344) and the lock-nut and washer (part nos. 2015-002 and 2121-003). Adjustment of this nut controls the amount of downward pressure exerted on the upper spindle assembly (part no. 13674) by the compression lever, which in

turn controls the degree of expansion of the rubber sleeve (part no. 62152). Reference is made to paragraph "D", page RCD. CH. 19-8 of *Rider's Manual Volume XIX*, of the P71 record changer material for proper adjustment of the compression lever. If the rubber sleeve does not expand sufficiently to hold the remaining records on the spindle, one or more of these records will drop along with the record that is to be played. If this sleeve does not expand to the required value, the adjustment nut (37344) should be adjusted while the rubber is compressed to provide the correct expansion. After the adjustment is set, the lock nut should be tightened, and a small amount of Glyptol applied to secure the adjustment.

2. Incorrect position of the outer spindle (part no. 55334). The outer spindle is fastened to the main frame by a special hex-head bolt (part no. 37334) located on the underside of the main frame. The proper position of the outer spindle is given in relation to the inner spindle (part no. 11379) when the changer is in playing position and with no records on the spindle. Under these conditions the top of the outer spindle should be 1/16" below the point of bend of the metal springs on the inner spindle which form the spindle shelf. If the outer spindle is too high, the spindle shelf will recede into the outer spindle before the rubber sleeve is fully compressed, leaving the records without support.

3. If neither of the two previously mentioned suggestions corrects the situation, it is further suggested that the compression lever assembly (part no. 15195) be inspected to determine if the metal roller on this assembly has a diameter of 1/4" or 5/16". If it is the smaller diameter, replace it with one employing the 5/16" roller. The replacement of this compression lever will require a readjustment of the compression spring (part no. 58789) tension.

General Electric 64, 65, 66, 67, 123, 124, 125, 135, 136, 226

These models are found in *Rider's Manual Volume XX*. Models 64 and 65 appear on pages 20-3 through 20-8; 66 and 67 appear on pages 20-9 through 20-12; 123, 124 and 125 appear on pages 20-13 through 20-15; 135 and 136 appear on pages 20-16 through 20-18; and Model 226 appears on pages 20-27 through 20-29.

Power-supply filter resistor URF-053, 1,500 ohms, 2 watt, carbon in earlier receivers has been changed in later production to URF-049, 1,000 ohms, 2 watt, carbon. Some of the early Model 135 and 136 receivers will be found to have a 2,200-ohm resistor. URF-049, 1,000 ohms, 2 watts, is recommended for service replacement of the filter resistor and will result in improved tube performance.

Late production receivers incorporate an i-f tube change from the 12SK7 tube of early receivers to a miniature type 12BA6. The tube-pin connections are not the same as those for the 12SK7 tube. This should be considered when reading the diagrams of early production receivers. A tube socket for the 12BA6 tube has been added to the Replacement Parts List and catalogued RJS-141.

For Models 64, 65, 66, 67, 123, 124, and 125, a 47-ohm, 1/2-watt, carbon resistor, part number URD-017, is used in series with the 12BA6 tube cathode to B— to improve circuit stability.

General Electric 50

This model appears on pages 15-1 through 15-4 of *Rider's Manual Volume XV*. The following items should be added to the parts list:

Symbol	Part No.	Description
R4	RRC-013	1.0-megohm volume control
	RJS-060	Tube socket, miniature tube socket for 35W4 rectifier
	RJX-010	Assembly, tube socket and mounting plate assembly for 35W4 rectifier.
	RHH-004	Snapfastener, for mounting cabinet-back.

General Electric 106

This model appears on pages 16-9 through 16-10 of *Rider's Manual Volume XV*. Part no. RJX-005 should be changed to read RJX-007. Delete part no. ROP-006. Add part no. UOX-001, cone, replacement speaker cone.

General Electric 115, 115W

These models appear on page 18-13 of *Rider's Manual Volume XVIII*. The following changes have been made in the parts list.

Delete catalogue numbers and parts RDK-121 and RDK-122.

Add the following:

RAG-019	Grille, for Model 115 and 115W
RDK-130	Knob and bezel, brown, for Model 115
RDK-151	Knob and bezel, white, for Model 115W.

General Electric 118, 119

These models appear on pages 19-8 through 19-10 of *Rider's Manual Volume XIX*. The following changes should be made in the parts list. RLC-001 should be changed to RLC-061, T4, coil, oscillator coil. RAY-054 should be RAV-054.

Add:

RAV-056	Cabinet, Model 119 (oak)
RDK-037	Knob, plain, fawn colored
RDK-040	Knob, with arrow, fawn colored
RHH-004	Snapfastener, holds cabinet back to cabinet on Model 118

General Electric 123, 124

These models appear on pages 20-13 through 20-15 of *Rider's Manual Volume XX*. The following changes should be noted in the replacement parts list. Item RDS-083 is a metal dial scale, tan color, with red and white figures. Later production receivers use the same type scale except for color. The later scale, cat. no. RDS-091, is gold in color, with brown and white figures.

The following catalogue numbers have been changed: URD-127 should read URD-137, R5, Resistor, 4.7 megohms, $\frac{1}{2}$ w, carbon; RAU-037 should read RAU-307, Cabinet, Model 124 plastic cabinet (ivory).

General Electric 303

This model appears on pages 15-37 through 15-39 of *Rider's Manual Volume XV*. The symbol for RSW-019, switch, tone control switch, should read S4. Stock no. RMX-013 should be changed to read stock no. RMX-079.

General Electric 125

This model is identical mechanically and electrically to the late production Model 123 and 124 receivers, which appear on pages 20-13 through 20-15 of *Rider's Manual Volume XX*. Model 125 is identified by its maroon color plastic cabinet. The cabinet replacement is listed as: RAU-321, Cabinet, plastic, for Model 125.

General Electric 123, 124, 125, 135, 136, 226

Models 123, 124, and 125 appear on pages 20-13 through 20-15 of *Rider's Manual Volume XX*. Models 135 and 136 appear on pages 20-16 through 20-18 of the same Volume. Model 226 appears on pages 20-27 through 20-29 of the same Volume.

The grid resistor, URD-113, 470,000 ohms, $\frac{1}{2}$ watt, carbon, has been changed in later production receivers to URD-121, 1 megohm. This change improved the audio gain.

General Electric 135, 136, 226

Models 135 and 136 appear on pages 20-16 through 20-18 of *Rider's Manual Volume XX*. Model 226 appears on pages 20-27 through 20-29 of the same Volume.

Late production receivers use a new type output transformer having a tapped primary. The tapped section to the B+ lead is connected in series with the power-supply filter resistor at the input filter capacitor. B+ ripple current through this winding is out of phase with ripple current to the receiver tubes, thus producing bucking voltage and reducing hum. The transformer leads are connected as follows: yellow to input filter capacitor, red to filter resistor, blue to plate of input tube, and secondary leads to speaker voice coil.

The new transformer, catalogue number RTO-078, will be carried in replacement stock in place of the original early production items RTO-063 and RTO-075 for the Models 135, 136, and 226, respectively.

General Electric 141, 143

Instability on the high end of the broadcast band might be caused by an oscillator coil whose coupling winding has changed its coupling capacitance. This defect can be corrected by replacing the coupling winding with a capacitor C15 of the value 56 μ f, catalogue number UCG-022. This capacitor connects the "high" side of the tuning capacitor C2 with the oscillator grid, pin 4, of the tube VI, 1R5.

Late production receivers always use capacitor C15 in conjunction with a new type of oscillator coil, RLC-101. This item replaces coil formerly catalogued RLC-089.

The hinge used in these receivers can easily be removed and replaced in the plastic cabinet or cover by the application of heat. To remove the hinge from the back cover or cabinet proper, heat the hinge at the half to be removed from the cabinet with a soldering iron. The hinge may then be pulled out of the groove of the plastic hinge recess. Since the cabinet plastic softens at a relatively low temperature, it will be unnecessary to apply the heat very long. To replace the hinge into the new unit, first start the hinge into the slotted recess in the plastic, then heat the hinge with the soldering iron and gently push the hinge into place.

General Electric 124, 135, 136

Model 124 appears on pages 20-13 through 20-15 of *Rider's Manual Volume XX*. Models 135 and 136 appear on pages 20-16 through 20-18 of the same Volume.

Where speakers have broken loose from cabinet mountings, or damage occurs when servicing receiver, the speaker can be re-mounted using screws in place of the original clips where the mounting bosses are broken. It is suggested that all four bosses be re-worked to use screws for mounting, since the operation of removing the speaker may result in the breaking of additional bosses. The repair procedure is outlined as follows:

1. Cut off speaker mounting bosses and flatten to the level of the speaker baffle ring.
2. Drill hole $\frac{5}{16}$ -inch deep in each boss with #42 or 3/32-inch diameter drill.
3. Mount speaker with self-tapping screw #4 x $\frac{1}{4}$ inch long, Shakeproof Type 2 catalogue number RHS-044.

General Electric 233 Kaiser-Fraser

This model appears on pages 18-2 through 18-36 of *Rider's Manual Volume XVIII*. Noise in the form of rattle can be attributed to mechanical insecurity of parts, loose fittings, and screw fastenings etc. Some of these are:

1. Loose tone control knobs and loose tone and volume control shafts may rattle against the cast grille. The keyway in the tone control shaft may be spread slightly to provide a tighter fit to the control knob.
2. If the shaft assembly seems loose or tends to rattle within the grille mounting hole, a $\frac{1}{4}$ -inch length of #1 spaghetti (fabric or cambric tubing) may be slipped over the shaft assembly and into the bushing. This will displace the loose fitting and cushion against rattle.
3. Vibration of the screen which is set behind the case instrument panel grill causes a buzz sound when loose. The screen may be shimmed at its four corners to stabilize its mounting.

Suggestions for improving circuit and pick-up noise are as follows:

1. The former condition can be improved by antenna selection and careful peaking of the antenna trimmer to increase sensitivity and reduce noise. For metropolitan areas, a 62-inch antenna is quite adequate while in outlying country areas the antenna length of 93 inches is recommended. Adjustment of the antenna trimmer is important and should not be overlooked. Every receiver installation should be adjusted for normal operation after the receiver has been operating approximately 1 minute to reach normal operating temperatures, and with antenna fully extended. Tune in one of the weakest stations at approximately 1,200 kc, or near the higher-frequency end of the dial scale. Adjust trimmer for minimum noise level and maximum clarity on station used for test.
2. Noise pick-up may come from various sources, chiefly from ignition circuits of the car. The recommended noise suppressor and noise filter capacitor units should be checked. To eliminate wheel static insert about $\frac{1}{2}$ ounce of powdered graphite through the valve of all four tire tubes. This will provide a ground leakage path to dampen static radiation.

General Electric 143

The connection between terminal number 4 of the 2nd i-f transformer to the 8,200-ohm resistor R2 is connected at the intersection with the B+ line. Late production receivers incorporate the following changes in order to improve the i-f stability. A 0.05- μ f, 200-volt paper capacitor has been added in parallel with resistor R9. This capacitor has a reference number of C16 and stock number UCC-045. Capacitor C5 has been changed to a 0.1- μ f, 200-volt capacitor, stock number UCC-050.

General Electric 145

The following parts have been added to provide replacement of the battery cover plate and assembly parts:

Ref. No.	Description
RAC-078	Cover, cover plate only
RHR-009	Rivet, "A" battery spring rivet
RHR-010	Rivet, "A" battery clip rivet
RHW-014	Washer, "A" battery spring washer
RIL-027	Insulator, insulator strip
RMC-037	Clip, battery clip
RMS-189	Spring, "A" battery spring.

The following miscellaneous parts have been added. Most of these parts are required because of the addition of brown and white cabinets.

Ref. No.	Description
RAB-093	Cover, back cover (white)
RAB-094	Cover, back cover (brown)
RAC-063	Cover, loop cover (maroon) substitute for RAC-057
RAC-069	Cabinet, main body (brown) includes hinge
RAC-070	Cabinet, main body (white) includes hinge
RAC-071	Cover, front cover (white) includes hinge
RAC-072	Cover, front cover (brown) includes hinge
RAC-075	Cover, loop cover (white)
RAC-076	Cover, loop cover (brown)
RAI-007	Stop, cover stop
RDK-173	Knob, brown control knob
RNR-004	Rivet, tube socket rivet
RHY-009	Handle, cabinet handle
REW-070	Switch, power, operates in conjunction with lid.

General Electric 226

This model appears on pages 20-27 through 20-29 of *Rider's Manual Volume XX*. Resistor R1, tube V1 cathode resistor, was removed from the circuit of late production receivers. This change results in an increase of gain in the r-f amplifier.

Solid dots indicating circuit wiring connections should be added and placed in the cathode lead of tube V4, one at the point where the lead intersects the lower end of R7, the other at the junction of R6 (low end of volume control) and C10. The circuit will then show the cathode properly terminated to B-.

Replacement item RTO-075 should read RTO-083, Audio output transformer.

General Electric 250

This model appears on pages 15-32 through 15-36 of *Rider's Manual Volume XV*. With particularly rough handling, the battery may be cracked while in place in the battery compartment. To forestall this failure, an additional strip of sponge rubber may be installed at the bottom of the battery cover to give added padding. If the battery does not charge and the fuse checks o.k. and the rectifier disks are not defective, check continuity of the power cord. A few isolated cases have been found in which the power cord has opened up where the cord fastens to the prong in the molded plug. An appreciable increase in duration of operation from a fully charged battery can be effected in the following manner, realizing, however, that some degree of performance is sacrificed in regard to sensitivity and power output. Replace power-supply filter resistor R17 (1,500 ohms) with a 4,700-ohm, 1-watt, carbon resistor. This change should be made only when there is a demand for longer duration of operation to one battery charge.

General Electric 200 Series

These models appear on pages 18-19 through 18-20 of *Rider's Manual Volume XVIII*. The following changes should be added to the parts list:

RHM-002	Clip, for mounting speaker board
RHM-004	Clip, dial scale mounting clip for plastic cabinet models
RHM-005	Clip, dial scale mounting clip for wood cabinet models.

General Electric 250, 260

Model 250 appears on pages 15-32 through 15-36 of *Rider's Manual Volume XV*. Model 260 appears on pages 16-6 through 16-12 of *Rider's Manual Volume XVI*. Add REC-003, Antenna loop connector strip to the parts lists for these models.

General Electric 356

This model appears on pages 18-40 through 18-44 of *Rider's Manual Volume XVIII*. Resistor R12 has been changed from 220 ohms, $\frac{1}{2}$ w, to 330 ohms, $\frac{1}{2}$ w, $\pm 10\%$, Cat. No. URD-037.

B. F. Goodrich 92-527, 92-528

These models are the same as Models 92-523,

92-524, 92-525, 92-526.

B. F. Goodrich 93-109, 93-110, 93-111

These models are the same as Models 93-104, 93-105, 93-106.

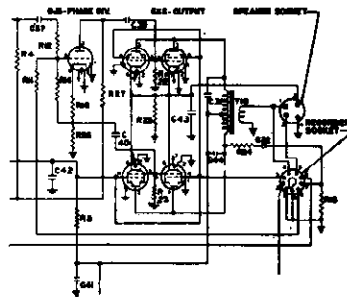
B. F. Goodrich 93-112, 93-113

These models are the same as Models 93-107 and 93-108.

Hoffman C503 and C513, Ch. 115

These models are identical with Models B503 and B513, which appear on pages 17-8 through 17-13 of *Rider's Manual Volume XVII*, except for the following changes:

1. Push-pull parallel 6K6's are used in the output stage instead of push-pull 6V6's. This is shown in the accompanying diagram.



Circuit changes for Hoffman C503 and C513.

2. On the recorder amplifier the screen dropping resistor R11 has been changed from 0.1 megohm to 2.2 megohms. The cathode resistor, R1, for this stage has been changed from 2,200 ohms to 4,700 ohms. This allows the screen current of the 6SJ7 tube to be self-regulating and to eliminate variations in gain between various 6SJ7's.
3. R31 and C49 have been added in parallel to the S1-sec 2, rear, wafer lead that goes to the phonograph receptacle.
4. Capacitor C30 is now connected to the variable resistor, R20, instead of to ground.

Magnavox AMP-101B

This model is the same as Model AMP-101A which appears on pages 17-1 and 17-2 of *Rider's Manual Volume XVII*, except for the following change in parts values.

Ref. Part No.	No.	Description
5	250129G4	Capacitor, paper, 0.03 μ f, 400 v.

Montgomery Ward 04WG-672 Series

Model 04WG-672 appears on pages 12-31 and 12-32 of *Rider's Manual Volume XII*. Models A and B are the same as that model which appears in Volume XII. Models C, D, and E are similar to Model 04WG-672 with the following exceptions. Model C employs a plug-in resistor, R13 and R12. The values remain the same as in the earlier models. Model D employs the plug-in resistor and, in addition, a new oscillator coil and 2 section dry electrolytic capacitor. In Model E the loop antenna assembly has been redesigned.

Montgomery Ward 05WG-2745A

This model is the same as Model 94WG-2745A. To reduce regeneration in later production receivers, the following changes were made:

Ref. No.	Part No.	Description
L-1	35A5	Removed Insulated choke
C-6	47X496	Added 500 μ f ceramic capacitor
R-37	B84562	Added 5,600-ohm, 0.5-w carbon resistor. This resistor replaces the insulated choke L-5 in the circuit diagram.

Montgomery Ward 14WG-518A.

14WG-519A, 14WG-518B, 14WG-519B

These models are similar to Model 14WG-518 and 14WG-519 which appear on page 13-46 of *Rider's Manual Volume XIII*.

Montgomery Ward 64WG-2007B, 74WG-2007B and C

These models are similar to 54WG-2007A shown on pages 15-28 to 15-30 of *Rider's Manual Volume XV*, except for the following changes. The drive-cord length has been increased and the following drive-cord replacement instructions are to be used.

Turn the gang condenser to the fully closed position. Use a new drive cord 18 inches in length and tie one end to the tension spring. Fasten the other end of the tension spring to the hook on the drive pulley. Pass the cord through the slot in the drive pulley rim and continue around pulley $\frac{1}{2}$ turn, counterclockwise. Wind $3\frac{1}{2}$ turns counterclockwise (from front of chassis) around tuning shaft. Turns should progress toward rear of chassis. Wind cord counterclockwise around drive pulley in back of previous $\frac{1}{2}$ turn. Pass cord through the slot in the pulley rim. Stretch tension spring and tie free end of cord to the spring. Cut off any excess string.

The component parts are the same as those listed on page 15-29 of *Rider's Manual Volume XV*, except for those listed below.

Ref. Part No.	No.	Description
C-15	B67204	0.20 μ f, 200 v, tubular
C-16	D67104	0.10 μ f, 400 v, tubular
C-18	D67102	0.001 μ f, 400 v, tubular
C-19	17A123	1.0-12 μ f, trimmer.

Montgomery Ward 74WG-2700C

This model is the same as Model 54WG-2700A that appears on pages 16-31 through 15-35 of *Rider's Manual Volume XV*. The parts lists are the same except for the following changes:

Ref. Part

No.	No.	Description
C2	17A149	1.8-12 μ f, loop antenna trimmer
C6	17A234	300-450 μ f, 600 kc, padder
C7	D67501	0.0005 μ f, 400 v, tubular
C16	14A150	Gang condenser assembly
C32	47X182	7 μ f, ceramic
T6	53X235	117 v, 60 cycle, standard power transformer
T7	9A1395	"B" band loop antenna
	12A455	10" electrodynamic speaker, cone and voice assembly
	19X432	Flat washer
	26A382	Pulley mtg. plate assem. complete with idler pulleys, idler studs, brace brackets, string guide and dial back-ground
	10X59	Drive cord
	28X113	Drive cord tension spring
Type V-28A159 Record Changer Parts		
	V-961B	Motor assembly 60 cycle, 115-120 v
Shure .P30-1		Crystal cartridge and semi-permanent needle assembly.

Montgomery Ward 93WG-801A, 93WG-801B, 93WG-801C, 93WG-801D, 93WG-801E, 93WG-802A, 93WG-802B, 93WG-802C

Models 93WG-801A, 93WG-801B, 93WG-801C, 93WG-802A, 93WG-802B, and 93WG-802C are without the built-in loop and their schematics are the same as those for Models 93WG-801 and 93WG-802 that appear on page 11-47 of *Rider's Manual Volume XI*. Models 93WG-801D and 93WG-801E are with built-in antennas and their schematics are the same as that for Model 93WG-801 which appears on page 11-48 of *Rider's Manual Volume XI*.

Montgomery Ward 94WG-2748C

Model 94WG-2748C receivers differ from the Model 94WG-2748B receivers by the replacement of a V-28A166 record changer with a G.I.-28A168 record changer. The following are the parts applicable to the G.I.-28A168 record changer:

G.I. 56-76507	Motor, 3-speed, 60 cycles 105-125 volts, a.c.
Asatic - LT3D	Crystal cartridge Needle, regular (78 rpm) Needle, microgroove (red).

Motorola KR9, OE9, PC9, SR9

These models are schematically identical to Ch. 8A. Model KR9 is designed for installation in the 1949 Kaiser-Frazer. Model OE9 is designed for installation in all 1949 Oldsmobiles and in the 1948 Futuramic Oldsmobile. Model PC9 is designed for installation in the 1949 Pontiac. Model SR9 is designed for installation in the 1949 Studebaker.

National Service Hints

The NC-57 appears on pages 18-1 through 18-16 of *Rider's Manual Volume XVIII*. Following is a list of troubles common to the NC-57 and suggestions for correcting them:

1. Audio oscillation with automatic noise limiter (ANL) on and a-f gain on full.
 - a. Dress the primary leads to the output transformer under the ANL switch. Pull the excess length of leads through the hole to the top of the chassis.
2. Hum with ANL on and a-f gain on full.

- a. Change the 6H6.
3. Oscillation on B and C bands.

Check C19 h-f osc. grid coupling capacitor. This should be 100 μ f. A higher value than this will produce oscillation. Also change the oscillator grid resistor from 47,000 to 22,000 ohms.
 4. Parasitic oscillation on A band above 50 Mc.
 - a. Check the ground lead of the r-f amp. screen bypass capacitor. This should be as short as possible and soldered to the lug on the socket mounting ring adjacent to pin 4. The r-f amp cathode bias resistor should be 220 ohms.
 5. Noisy band switch.
 - a. Poor contacts in the switch, and poor contact between the switch shaft and the ground brushes on ER 210 coils.
 - b. Ground brushes on switch shaft rubbing on the coil partition of the ER 210 coils.
 - c. Coil partition mounting screws not tightened down.
 6. Noisy trimmer control.
 - a. Shorted plates.
 - b. Poor rotor brush contact or rotor brush not grounded to the mounting bracket.
 - c. Rotor shaft grounding spring on front end of chassis is loose or missing.
 7. Oscillation on E band at twice the i.f.
 - a. Check to see that there is a metal shield mounted on the trimmer control bracket.

National Service Hints

The NC-183 appears on pages 19-11 through 19-35 of *Rider's Manual Volume XIX*. Following is a list of troubles and suggestions for correcting them:

1. Oscillation in the E band at twice and three times the i.f.
 - a. Look for loose screws on sides of coil compartment.
 - b. Be sure second i-f and a-v-c amp. plate leads are down near the chassis.
 - c. Be sure the diode leads of the 6H6 are down near the chassis.
 - d. Check ground leads on side of coil compartment.
 - e. Be sure that the first r-f grid lead is down near the chassis.
 - f. Check ground at the end of the shield on the bfo lead near the 6H6 det. tube.
2. Oscillation at low end of the B band.
 - a. Check ground on main tuning capacitor and the ground brushes on band-change switch shaft.
 - b. Be sure first i-f plate lead is down near the chassis.
3. Pulling of signal with antenna trimmer on the A band.
 - a. Check ground on band-change switch shaft.
 - b. Check ground from tie rod on tuning capacitor to chassis.
4. Motorboating with both r-f and audio gains at zero.
 - a. Check value of inverse feedback resistor R47. This resistor should be 4,700 ohms. A lower value than this will cause the motorboating.
5. Audio oscillation.
 - a. Output transformer may be wired wrong.
 - b. Connecting leads to the transformer may be reversed.

6. Hum with limiter on.
 - a. Change limiter tube.
7. Back lash in main tuning or bandspread dials.
 - a. Check end bearings of main tuning and bandspread capacitors.
 - b. Check tension of spring on antiback-lash gears.

Noblitt-Sparks Models 358T, 359T

Arvin Models 358T and 359T have the same chassis assembly as Models 152T and 153T which appear on pages 18-1 through 18-3 of *Rider's Manual Volume XVIII*. The only difference in these models is the color of the cabinet, rear cover, and knobs. The parts that differ from those listed in the 152T-153T parts list are as follows:

AA22993-1	Cabinet, sandal wood, for Model 358T
AA22993-2	Cabinet, willow green, for Model 359T
AC21696-3	Cabinet rear cover assy., willow green, for Model 358T
AC2169-4	Cabinet rear cover assy., willow green, for Model 359T
AC20501-3	Knob, gold for Model 358T and Model 359T.

Philco 50-1421 and 50-1422

These models are similar to Model 50-1420 which appears on pages 20-183 through 20-188 of *Rider's Manual Volume XX*, with the exceptions given below.

Model 50-1421 uses an M-9C record changer, which appears on pages RCD. CH. 19-35 through RCD. CH. 19-54 of *Rider's Manual Volume XIX*; while Model 50-1422 uses an M-20 record changer, which appears on pages RCD. CH. 20-1 through RCD. CH. 20-16 of *Rider's Manual Volume XX*.

The connection from pin 6 of the 12BE6 goes to tap 2 of the oscillator transformer, T400, instead of to tap 4 of Z300. Resistor R401, 47,000 ohms, is connected from pin 2 of the 12BE6 to pin 1, and the lead from pin 2 now goes directly to B—, instead of to tap 2 of T400. The lead from C400B goes to the a-v-c.

The inside loop lead must be wired to the aerial section of C400, and the outside lead to the gang frame.

To prevent audio regeneration, the green lead from pin 1 of the 6AQ5 tube to the wiring panel must have excess wire dressed toward the 6AQ5 socket, and away from C203 and the blue lead of T200.

The replacement parts list for Model 50-1420 applies to Models 50-1421 and 50-1422, except for the differences indicated below:

Ref. No.	Part No.	Description
C100	45-3500	Capacitor, 0.04 μ f
C204	61-0179	Capacitor, 0.004 μ f
R200	33-3564-3	Volume control (with power on-off switch), 2 meg-ohms
R203	66-3568340	Resistor, 56,000 ohms
LS200	36-1629	Loudspeaker, p.m.
R306	66-0828340	Resistor, 82 ohms
C400	31-2731-3	Capacitor, tuning gang
R401	66-3478340	Resistor, 47,000 ohms
LA400	32-4375-1	Loop aerial, 50-1421 only
	46-7675-1	Baffle and cloth ass'y
	54-7745-3	Bottom cover
	10734-B	Cabinet
	56-7059FA9	Changer mtg. spring, 50-1422 only (3 required)
	56-7059-1FA9	Changer mtg. spring, 50-1421 only (3 required)
	76-4477-1	Drive shaft
	56-7001-1PCP	Pointer
	42-1847-2	Radio-phone switch.

Philco Model 50-1423

This model is electrically similar to Model 50-1420, which appears on pages 20-183 through 20-188 of *Rider's Manual Volume XX*, except for the differences which are described below. Model 50-1423 is housed in a wood, table-model cabinet, with an M-20 record changer, which appears on pages RCD. CH. 20-1 through RCD. CH. 20-16 of *Rider's Manual Volume XX*.

The connection from pin 6 of the 12BE6 goes to tap 2 of the oscillator transformer T400, instead of to tap 4 of Z300. Resistor R302 now goes from pin 6 of the 12BE6 to pin 6 of the 12BA6. Resistor R401, 47,000 ohms, is connected from pin 2 of the 12BE6 to pin 1, and the lead from pin 2 now goes directly to B—, instead of to tap 2 of T400. The lead from C400B goes to the avc.

The green lead from the aerial section of C400 must be wired to the same loop panel lug as the inside loop lead (side away from cabinet), and the black lead must be wired to the same lug as the outside loop lead (adjacent to cabinet).

The white lead from the oscillator section of C400 must be dressed upward from the chassis, and away from the trimmer screw.

The yellow lead from Z301 to lug 12 of the wafer switch must be wired along the top side of the chassis, and dressed downward to the chassis.

The orange and brown leads wired to lugs 1 and 2 of the wafer switch must be wired along the removable side, and dressed downward to the chassis.

All wiring and components must be kept clear of R100, R101, and R102.

The under-chassis layout of Model 50-1423 differs from that of Model 50-1420. The parts layout of Model 50-1423 is shown in the accompanying figure.

Ref. No.	Part No.	Description
LS200	36-1629	Loudspeaker, p.m.
R200	33-3564-2	Volume control (with power on-off switch), 2 meg-ohms, tapped at 1 meg-ohm
T200	32-8242	Transformer, output
C400	31-2751-2	Capacitor, tuning gang
LA400	76-2127-9	Loop aerial
	10767	Cabinet
	56-5955	Apron
	40-7550	Baffle-and-cloth ass'y
	56-5931	Bezel
	54-7678-1	Bottom, celonox
	54-4379	Foot, rubber (4 required)
	54-4227-9	Knob, (3 required)
	45-6434	Lid
	56-6434	Butt hinge
	56-5992	Support
	56-7059FA9	Spring, changer mta. (3 required)

56-7059-1FJ47	Spring, changer mta. (3 required)
54-4630	Window, acetate
54-5022	Dial scale, metal
76-3751-1	Drive shaft
56-6310	Heat shield, aluminum
27-6233-6	Pilot-lamp-socket ass'y
56-7001	Pointer
27-4771-1	Rubber mount, tuning gang (4 required)

Philco 50-526

Model 50-526 is similar to Models 50-522 and 50-524 which appear on pages 20-153 through 20-157 of *Rider's Manual Volume XX*, except for the following changes. Model 50-526 is housed in a new phenolic-plastic cabinet. The 1-megohm resistor, from the avc circuit, pin 5 of the 14B6 detector to B—, pin 4 of the same tube, that was listed under Modifications on page 20-155 as R304, is designated now as R305. A 68-ohm resistor, R304, is added in the cathode line of the 12BA6 i-f amplifier. This resistor is connected from pin 7 of the 12BA6 to pin 7 of the 14B6. R301, the grid-return resistor, has been changed in value to 1 megohm.

In Run #2 the tuning gang, C400, has been changed to improve performance, and the new part number is 31-2751.

In Run #3, R301 has been removed to increase sensitivity.

The replacement parts list for Model 50-522 and 50-524 applies to Model 50-526 except for the differences indicated below:

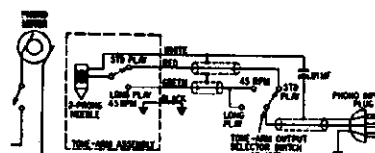
Ref. No.	Part No.	Description
I100	34-2068	Pilot lamp, 6-8 volt, brown bead
R301	66-5108340	Resistor, grid return, 1 megohm
R304	66-0688340	Resistor, cathode bias, 68 ohms
R305	66-5108340	Resistor, avc load, 1 meg-ohm
Z300	32-4160-6A	Transformer, 1st i-f
Z301	32-4240-2A	Transformer, 2nd i-f
LA400	32-4052-38	Loop aerial
	10769	Cabinet
	54-7911	Back
	40-7778	Baffle-and-cloth ass'y
	74-7761	Bezel, speaker
	76-5157	Dial backplate
	54-5069	Dial scale, glass
	54-4728-1	Grille, plastic
	54-5718-2	Knob (2 required)
	56-5630-14	Pointer
	57-1468FA1	Hairpin fastener, drive shaft
	27-6233-6	Pilot-lamp-socket ass'y
	56-3543-6PA3	Clip, pilot-lamp mta.
	54-7953	Cover, pilot lamp
	56-7373FA3	Scale strap, l.h.
	56-73731FA3	Scale strap, r.h.

Philco 50-1720

This model is electrically similar to Model 50-1725. It is housed in a different style of cabinet and employs an M-20 record changer.

The following schematic changes have been made. The connection from C421 now goes to R409, which goes to the junction of R410 and C422, instead of to R306. L410 has been inserted from the junction of C306 and C422 to the junction of C330 and C309. The value of R403 has been changed from 10,000 ohms to 22,000 ohms. Capacitor C320 has been added from ground to the junction of C306, R300, and tap 4 of Z300. Capacitor C329 is now located from ground to the junction of tap 2 of Z303 and pin 7 of the 6BJ6 2nd i-f amplifier, instead of from B— to ground. Capacitor C331 is now connected from the junction of C332 and C327 to ground, instead of across C333. Capacitor C320 has been deleted. It was connected from ground to the junction of C321 and R312. Capacitor C210 has been inserted from the junction of pin 7 of the 1st audio amplifier, 1/2 19T8, to ground. The value of R201 has been changed from 47,000 ohms to 33,000 ohms. Capacitor C105 has been inserted from ground to the junction of L100 and pin 5 of the 19T8. Coils L402, L403, L405, and L408 are 1/4 μh.

The accompanying diagram shows the hookup for the record changer, Model M-20.

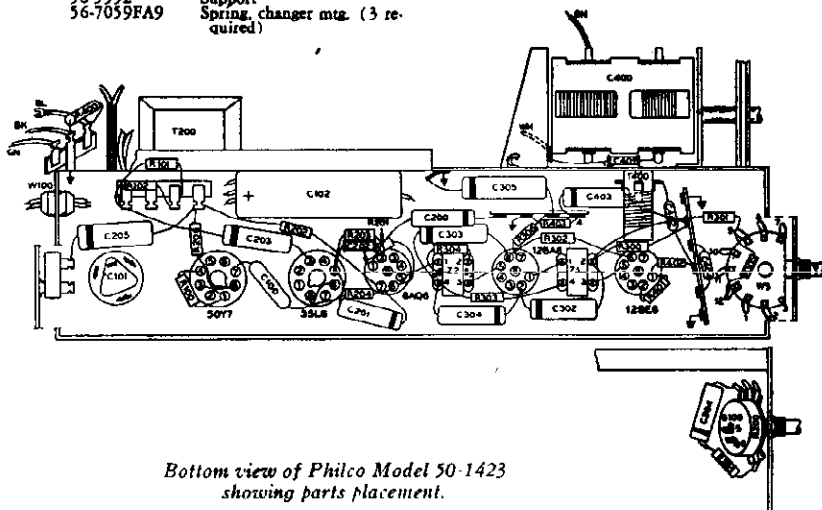


Hookup for Record Changer, Philco Model M-20, in Philco Model 50-1720.

In Run #2, Capacitor C330 has been removed to improve f-m discriminator performance.

The replacement parts list for Model 50-1725 applies to Model 50-1720, except for the differences indicated below:

Ref. No.	Part No.	Description
C105	62-110009001	Capacitor, filament bypass, 100 μf
CR100	34-8003-2	Rectifier, selenium, dry-disk, 150 ma
CR101	34-8003-2	Rectifier, selenium, dry-disk, 150 ma
R100	33-1335-84	Resistor, current limiting, 50 ohms
R101	33-3435-23	Resistor, 2-section filter
C210	62-120001001	Capacitor, cathode bypass, 220 μf
LS200	36-1610-4	Loudspeaker
R201	66-3338340	Resistor, bass compensation, 33,000 ohms
T200	32-8367-1	Transformer, audio output
C320	62-110009001	Capacitor, plate decoupling bypass (f-m) 100 μf (rewired)
C329	62-110009001	Capacitor, r-f bypass, 100 μf (rewired)
C333	62-110009001	Capacitor, r-f bypass, 100 μf
Z300	32-4257A	Transformer, f-m 1st i-f
Z301	32-4258A	Transformer, a-m 1st i-f
Z302	32-4372-1A	Transformer, f-m 2nd i-f
Z303	32-4160-3A	Transformer, a-m 2nd i-f
Z305	32-4240-2A	Transformer, a-m 3rd i-f
C400	31-2724-7	Capacitor, tuning gang (f-m, 3-section; a-m, 2-section)
L410	32-4143-4	Coil, B— i-f isolating choke, 100 μh
LA400	76-3583-13	Loop aerial
	10762	Cabinet
	54-7846	Back
	1W25345FE11	Screw, back mta. (12 required)
	219-179	Baffle, wood, speaker
	40-7715	Baffle-and-cloth ass'y
	56-5855	Bezel
	54-3021	Dial scale
	56-2234-3	Scale strap (2 required)
	45-6564	Drop door
	27-4610	Grommer, control shaft, light shield (4 required)
	45-6565	Instrument panel
	27-6233-39	Socket ass'y, pilot lamp



Philco M-12C

This model appears on pages RCD. CH. 19-55 through RCD. CH. 19-74 of *Rider's Manual Volume XIX*. The three parts referred to below were listed twice in the parts list, and should be deleted as indicated.

Part No. Description

58-4647	Retainer spring	Delete
58-5753	Push-off saddle	Delete
76-4008	Base plate assembly	Delete.

RCA QU-62. Ch. RC-802B

This model appears on pages 17-12 through 17-20 of *Rider's Manual Volume XVII*. Capacitor C12 has been changed from 39 μ f to 33 μ f. Delete 70934, Capacitor, ceramic, 39 μ f, and add 73247, Capacitor, ceramic, 33 μ f (C12) to the replacement parts list.

RCA RP-168 Series

The RP-168 Record Changer Series is used in the following instrument models:
Record Player Attachments 9JY, CP-5203, 45J, QJY

Record Players (without radio) 9EY3, 9EY31, 9EY32, 9EY35, 9EY36, 45EY, QEY3

Radio-Phonograph Combinations 9QV5, 9W51, 9W78, 9W101, 9W102, 9W103, 9W105, 9W106, 9Y7, 9Y51, A55, A78, A106.

Radio-Phonograph-Television Combinations 9TW309, 9TW333, 9TW390, TA128, TA129, TR126, S1000

Detailed drawings (see Fig. 1) and descriptions for the pickup arm assemblies are given below:

SUB-BASE ASSEMBLIES

Type I—Sub-base Stock No. 74070. Has staked studs for spring anchors and one-piece reject lever. Stamped or labelled RP168-1 or RP168-3.

Type II—Same as Type I, except it uses a two-piece reject lever. Use Stock No. 74743 Sub-base (Type III) for replacement.

Type III—Sub-base Stock No. 74743. Same as Type II, except that it has pickup-arm rest on sub-base (when motor-board rest is used, the sub-base rest is to be deformed).

Type IV—Sub-base Stock No. 74468. It uses an a-c input connector and audio output jack mounted on a separate bracket. Labelled RP168-2 and used only with Model CP-5203.

Type V—Sub-base Stock No. 74856. Has turned up lances for spring anchors. Idler wheel mounting plate (45B, Stock No. 74814) is removable. It is labelled RP168-1, RP168-B, etc. It has pickup-arm rest on sub-base (when motorboard rest is used, the sub-base rest is to be deformed).

NOTE—Two different main levers (director lever) are used, depending upon which turntable assembly is used. Lever (41), Stock No. 74076 has a long end (41C) and is used with Turntables Types I and II. Lever (41), Stock No. 74857 has a short end and is used with Turntable Type III.

Type VI—Stock No. 74803. Similar to Type V, but it does not bear any "RP168" identification. It has pickup-arm rest on sub-base. Idler wheel mounting plate (45B) is secured to the sub-base with a shoulder rivet.

Type VII—Same as Type VI, except it does not have pickup-arm rest on sub-base. Use Stock No. 74803 (Type VI) for replacement (the pickup-arm rest is to be deformed).

NOTE: Type VI and VII—Late production of these types have the idler wheel mounting stud (22) staked to its mounting plate. The idler wheel retainer (horseshoe washer) is Stock No. 75081.

PICKUP-ARM ASSEMBLIES (LESS PICKUP)

Type I—Arm Stock No. 74041. Stamped 970488. Pickup-arm stud (9A) is full diameter for entire length (do not use where pickup-arm rest is on sub-base). Lead counter-balance is riveted to arm. Arm Stock No. 74443. For Model CP-5203 only. Black finish, otherwise similar to No. 74041.

Type II—Arm Stock No. 74824. Same as No. 74041 except that stud (9A) has a flat on one side at bottom end. Can be used with either type of pickup rest. Arm Stock No. 75058. For Model 45EY only. Two-tone finish, otherwise same as No. 74824.

Type III—Arm Stock No. 75073. Stamped 3R1. Similar to No. 74824 except that a different pivot (9B) is used and the lead counter-balance is fastened to the arm with a screw. Stud (9A) is of smaller diameter

at bottom end. Can be used with either type of pickup rest. Use only with No. 74059 pivot arm.

Type IV—Same as Type III except that stud (9A) is of full diameter for entire length. Use No. 75073 for replacement.

Type V—Arm Stock No. 74796. Stamped 3R1. Similar to Type III except that a different pivot (9B) is used and the lead counter-balance is not used. A $\frac{3}{4}$ " o.d. counter-balance spring is used. Can be used with either type of pickup rest. Use only with No. 74799 pivot arm.

Type VI—Same as Type V except that stud (9A) is of full diameter for entire length. Use No. 74796 for replacement.

When replacing a stylus, never bend the stylus support wire with crystal pickups (Stock Nos. 74057 and 74025) remove the two screws holding sapphire guard in place and remove the guard. Remove the small nut and washer on the threaded shaft of the sapphire holder and gently push the shaft through the hole in the armature shaft until the sapphire holder assembly comes free. Extreme care should be used when loosening the nut so that the twisting motion does not break the crystal. Take hold of the lower end of the shaft with a pair of pliers while loosening or tightening the nut, being very careful so as not to strip the threads or break the crystal. Insert threaded shaft of replacement sapphire holder through armature shaft and replace the washer and nut. Make sure that the sapphire is in the correct position. Replace the sapphire guard, positioning it by means of the oversize screw slots. Make certain that the sapphire and its supporting wire are centered in the guard. Tighten the guard screws. Before using, check to see that the sapphire projects far enough beyond the guard so that the guard will not touch the record. If necessary, bend the guard a little.

When using a variable reluctance pickup (Stock No. 74466) to remove the stylus assembly, insert a bent paper clip or equivalent tool into the stylus stud pin socket (see Fig. 2). Press the assembly out from the cartridge with the tool as shown by the arrow in the illustration. To replace the stylus assembly, insert the stud pin into the recess, with the locating tab positioned above the locating slot between the two pole pieces. Press assembly in firmly by applying pressure upon the stud pin with a blunt tool. Care must be taken to press assembly only at this point so as not to damage or distort the stylus arm.

When using a ceramic pickup (Stock No. 74984) to remove the stylus insert the point of a knife blade between the stylus wire and the case. The stylus may be pried out of its rubber mounting with a twisting motion of the knife blade. To replace stylus, push end of stylus wire down into its rubber mounting. Be certain that the stylus is centered in the groove of the pickup case.

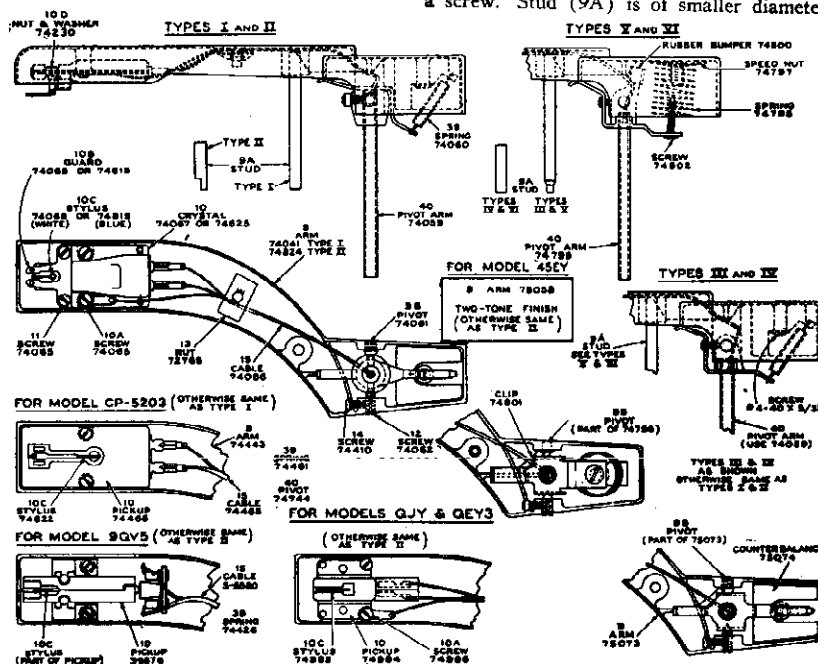


Fig. 1 PICKUP ARM ASSEMBLIES

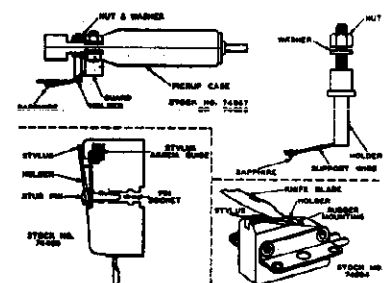


Fig. 2 STYLUS REPLACEMENT

RCA 54B6, Ch. RC-589UE

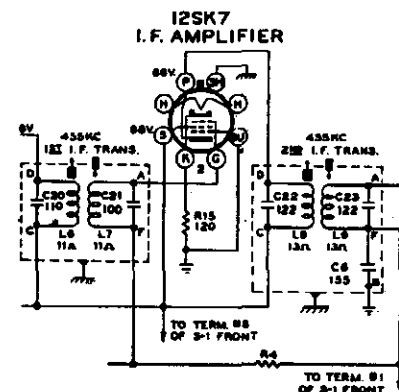
This model is similar to Model 54B1, 2nd Production, which appears on *changes pages C18-8 and C18-9 of Rider's Manual Volume XVIII*, and on *pages 15-22 through 15-24 of Rider's Manual Volume XV*, with the exception of the parts listed below:

Part No.	Description
73284	Fastener, push fastener to hold loop, chrome (2 required)
73281	Hinge, lid hinge, ivory
73276	Lid, case lid complete with loop support less loop, ivory
73282	Loop, antenna loop complete with connectors less lid, ivory
73280	Plate, backing plate for mounting hinge on lid, chrome
73279	Screw, case cover mounting screw, 1 set, ivory
73286	Bottom, case bottom, ivory
73277	Center, case center, gold
73287	Handle, carrying handle, tan
73288	Link, handle link

RCA 75ZU 2nd Prod., Ch. RC-1063B

This model is the same as 75ZU, Ch. RC-1063A, which appears on *pages 19-45 and 19-46 of Rider's Manual Volume XIX*, except for the following changes:

Different i-f transformers are used, as shown in the accompanying diagram. Resistor R15 has been added to the cathode circuit of the 12SK7 i-f amplifier, and R14, in the diode circuit of the 12SQ7 2nd detector, has been deleted. Changes that apply to both the RC-1063A and RC-1063B chassis are given in the change notice for 75ZU, RC-1063A, that appears on *changes page C20-10 of Rider's Manual Volume XX*.



Changes for RCA 75ZU, RC-1063B.

The replacement parts list is the same as that for RC-1063A except for the differences listed below:

Part No.	Description
70128	Transformer, first i-f transformer, stamped 922246-11 (L6, L7, C20, C21)
70129	Transformer, second i-f transformer stamped 922246-12 (L8, L9, C6, C22, C23)
	Resistor, fixed composition, 120 ohms, $\pm 10\%$ (R15).

RCA 77V2, Ch. RC-806C

This model appears on *pages 19-29 through 19-53 of Rider's Manual Volume XIX*. The top-view diagram of the chassis layout that appears on *page 19-52* illustrates tube V5 as 6K6GT. Tube V5 should be a 6V6GT.

Radio Wire JS-168

Model JS-168 is the same as Model JS-174 which appears on *page 19-17 of Rider's Manual Volume XIX*.

Radio Wire JS-175

Model JS-175 is the same as Models JS-173, JS-184, and JS-185 which appear on *page 19-18 of Rider's Manual Volume XIX*.

Regal 1107, 7254

Models 7254 and the revised 1107 are the same as Model 1107 which appears on *page 19-8 of Rider's Manual Volume XIX* with the following changes:

Antenna loop, 30-128, has been changed to an antenna coil, 30-145.

Ganged variable capacitors 40-101 have been changed to 40-101G.

The value of the 13,000-ohm resistor connected to the B lead of 30-127 has been changed to 15,000 ohms and is designated as 65-155.

The 200,000-ohm resistor, 65-142 has been changed to 220,000 ohms and is designated as 65-108.

The 0.01- μ f capacitor connected to the A lead of 30-127 has been changed to 0.006 μ f and is designated as 50-101.

Resistor 20-101 is now 20-103, the value remains the same.

Capacitor 53-103 is now 55-103, the value remains the same.

The 25-ohm, $\frac{1}{2}$ -watt resistor, 65-101 has been changed to 22 ohms, $\frac{1}{2}$ watt, and is designated as 65-160.

The two 50- μ f capacitors, 60-106, have been changed to 40 μ f and are designated as 60-108.

The 2,400-ohm resistor, 65-132, has been changed to 2,200 ohms and is designated as 65-162.

Sears 101.206-1, 101.206-2, and 101.206-3

These automatic record changers are similar to Chassis 101.206 which appears on *pages RCD, CH. 18-8 through RCD, CH. 18-9 of Rider's Manual Volume XVIII*, with the following exceptions. Chassis 101.206-1 has a revised pickup-arm hub which permits manual movement of the pickup arm while the changer is in automatic cycle. The cam seat for the pickup arm permits return of the arm to the correct position after manual dislocation, without readjustment of the 10" or 12" drop points. This chassis incorporates a "Manual-Automatic" switch.

Chassis 101.206-2 is the same as the 101.206-1 except that it does not have the "Manual-Automatic" switch. Chassis 101.206-3 is the same as the 101.206-2 except that the phono-pickup lead has cotton overbraid for insulation from the chassis.

Sears 6686A, Ch. 139.151-1

This chassis is similar to Chassis 139.151 which appears on *page 17-1 of Rider's Manual Volume XVII*, except that an "ON-OFF" switch is used in the line cord. The parts list for this chassis is the same as that for the 139.151 except for the following change:

Ref. No.	Part No.	Description
H	J20667	Line cord, switch and plug.

Sears 101.211-4

This model appears in the *Record Changer Section of Rider's Manual Volume XIX* on *pages RCD, CH. 19-1 through 19-14*. Chassis 101.211-4 is basically the same as the 101.211-1; however, the 101.211-4 incorporates a revised spindle assembly, turntable and hinge body assembly. The change in parts list is as follows:

Location Number	Part Number	Description
5	R57943	Turntable assembly
12	R49953	Hinge pin
14	R57945	Hinge body assembly
15	R57710	Adjusting screw
20	R65101	Cartridge-syntronic pickup (grounded)

21	R66691	Arm-pickup (less cartridge)
68	R62360	Motor assembly, 110-volt, 50-cycle (Alliance)
70	R57902	Spindle assembly
70	R57934	Spindle shaft and base assembly
71	R57940	Record pusher
73	R57903	Pusher spring
76	R57051	Turntable bearing
81	R57768	Spring-pusher shaft
105	R49958	Spring-counterbalance

Location number 83 through 88 and number 103 have been deleted.

The 456.211-5 Record Changer is basically the same as the 101.211-1, except that the 456.211-5 incorporates a bottom pan assembly, R56692, and a revised spindle assembly, turntable and hinge body assembly. The syntronic pickup arm and grounded syntronic cartridge replace the old style plastic arm.

Sears 8005, Ch. 132.839-1

This chassis is similar to Chassis 132.839 which appears on *pages 17-8 through 17-10 of Rider's Manual Volume XVII*, except for the following changes. The filament connections have been reversed on the 50L6 tube socket to prevent burning of resistor R11 and damage to the tube. R12, a 1,200-ohm, 1-watt resistor has been added to the B+ circuit between T3 and C10B. The filter choke L3 has been deleted. The parts list for this chassis is the same as that for the 132.839 except for the following changes:

Ref. No.	Part No.	Description
R12		Resistor, 1,200 ohms, 1 w
T3	N21921	Transformer, output
Spk	N21922	Speaker, 4", p.m.

Sears 8210, Ch. 101.820-1A

This chassis is similar to Chassis 101.820 which appears on *pages 17-4, 17-6, and 17-16 of Rider's Manual Volume XVII*, except for the changes in the parts list. The parts list for this chassis is the same as that for the 101.820 except for the following changes:

Ref. No.	Part No.	Description
R10	R62705	Control, On-Off & volume
R15		Resistor, 680 ohms, $\frac{1}{2}$ w
R14		Resistor, 820 ohms, $\frac{1}{2}$ w
T3	R62721	Transformer, output
	R62717	Speaker, $5\frac{1}{4}$ " p-m
	R63190	Cone, voice coil
	R57272	Plug, 1 prong.

Sears 9073A, Ch. 135.244; 9073B, Ch. 135.244-1

These models are similar to Model 9073, Ch. 135.244, which appears on *pages 20-70 through 20-72 of Rider's Manual Volume XX*. Models 9073A and 9073B use a three-speed manual record player, part no. F-7625 and the number F-296 cabinet.

Chassis 135.244-1 is the same as 135.244 except that a protective resistor, R12, has been added to the rectifier circuit, from pin 8 to the junction of C18 and C16.

The change in parts lists is as follows:

Ref. No.	Part No.	Description
R12	F-4022	Resistor, 33 ohms, $\frac{1}{2}$ w, 20% (in 132.244-1 only)
	F-7625	Motor, phono, 60-cycle (less turntable) (speed indicator arm is in center of rear plate of motor)
	F-7626	Idler wheel
	F-7627	Turntable, 8"
	F-296	Cabinet, radio, molded.

Sears 101.666-1B

This chassis appears on page 19-15 of *Rider's Manual Volume XIX*. The d-c resistances of the r-f coils (L1 and L3), are 9.6 ohms.

Sears 9073C, Ch. 135.244-1

Model 9073C uses chassis 135.244-1 and is the same as Model 9073B except for the following differences. Capacitor C20 has been deleted from the circuit. The value of resistor R6 has been changed to 1.5 megohms. The value of volume control resistor R6 has been changed to 500,000 ohms. The values of capacitors C12 and C14 have been changed to 0.0001 μ f and 0.0005 μ f, respectively. Resistor R13, 2.2 megohms, has been added across the pickup socket. The change in the parts list is as follows:

Ref. No.	Part No.	Description
	F-7881	Arm, pickup (less crystal)
	F-7882	Cartridge, crystal, Shure Bros. P37C
	F-7883	Needle, phono, unipoint, sapphirine
	F-7163	Capacitor, variable assembly
C12	F-6015	Capacitor, ceramic, 0.0001 μ f 500 V
C14	F-4890	Capacitor, 0.0005 μ f 600 V
R6	F-6239	Control, On-Off and Volume
R7	F-3450	Resistor, 1.5 megohm, $\frac{1}{2}$ w, 20%
R13	F-4277	Resistor, 1,000 ohm, 1.0 w, 10%

Sears 9005, 9006, Ch. 132.858

These models appear on pages 20-65 and 20-66 of *Rider's Manual Volume XX*. The following changes have been made in the replacement parts list:

Ref. No.	Part No.	Description
	N22166	Scale, dial, clear plastic
R4		Resistor, 2.2 megohms, $\frac{1}{4}$ w
R5	N22192	Resistor, volume control & on-off switch, 1 megohm
R6		Resistor, 15 megohms, $\frac{1}{4}$ w
R7		Resistor, 22 ohms, $\frac{1}{4}$ w
R8, R9		Resistor, 470,000 ohms, $\frac{1}{4}$ w
R10		Resistor, 150 ohms, $\frac{1}{4}$ w
R11		Resistor, 1,200 ohms, 1 w

Sears 9270, Ch. 547.245

This model appears on pages 20-73 through 20-75 of *Rider's Manual Volume XX*. The parts number of "Bearing, tuning shaft," should be changed from V3449 to V9160. A 50- μ f capacitor, C28, has been added to the filament network from the junction of pin 7 of the 1U5 and pin 1 of the 1U4, i.e., to the B-line. The following part should be added to the replacement parts list: C28, V4636, Capacitor, electrolytic, 50 μ f, 25 v.

Stewart-Warner A92CR3S, Code 9028-CS, A92CR6S, Code 9028-FS

These models are similar to Models A92CR3, Code 9028-C, and A92CR6, Code 9028-F, which appear on pages 17-11, 12 through 17-21 of *Rider's Manual Volume XVII*, except for the following differences. The "S" chassis is designed to provide greater sensitivity so as to accommodate the requirements of satisfactory performance in low signal strength areas. Due to certain design differences in these models it is desirable to set the band switch to the FM position whenever the record changer is used.

The high side of loop antenna no. 2 is connected to terminal R of antenna coil no. 18 as shown in Fig. 1. This loop is used only for a-m push-button operation. Band-switch section 3A is not used in the "S" chassis. One side of loop antenna no. 134 is connected to terminal L of antenna

coil no. 15 through the 0.01- μ f capacitor, no. 136. The other side of the antenna is grounded. This loop is used only for a-m operation. The brown lead from the external antenna is routed to terminal L of

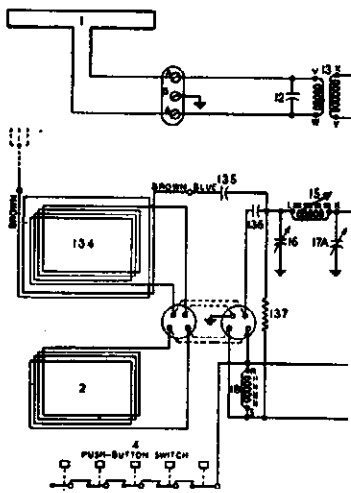


Fig. 1. Circuit changes for Stewart-Warner A92CR3S and A92CR6S.

antenna coil no. 15 through the 100- μ f capacitor no. 135. Terminal L of antenna coil no. 15 is connected to ave through the 680,000-ohm resistor no. 137. The high side of the wave trap consisting of coil no. 39 and capacitor no. 38 is connected to terminal S10 of band-switch section 3C. Resistor no. 69 is deleted and the cathode of the 6BA6 1st i-f tube is grounded. The cathode of the 6SJ7 tube is connected to ground through the 1,000-ohm resistor no. 139, instead of through the 1,500-ohm resistor no. 103. One side of the voice coil of the speaker is connected to the screen of the 6SJ7 tube through a 470-ohm resistor no. 140 and a 0.25- μ f capacitor no. 108. The junction point between capacitor no. 108 and resistor no. 140 is connected to terminal S29 of band-switch section 3B. Terminals S30 and S31 are connected to the junction of resistor nos. 128 and 129. The change in section 3 band switch, front view, is shown in Fig. 2.

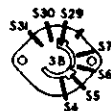


Fig. 2. Section 3, front view, band switch for Stewart-Warner A92CR3S and A92CR6S.

The additional parts used in the "S" type chassis are given below. Other parts are the same as those for the A92CR3 and A92CR6.

Ref. No.	Part No.	Description
	502261	Capacitor, 0.01 μ f, 600 v
	504725	Capacitor, 0.02 μ f, 200 v (used only on chassis with "H" designation)
134	505668	Loop antenna for a-m. (29" x 30 1/4")
135	502931	Capacitor, mica 100 μ f, 500 v
136	502261	Capacitor, 0.01 μ f, 600 v
137	502267	Resistor, carbon, 680,000 ohms, $\frac{1}{4}$ w
138	502406	Resistor, carbon, 1,500 ohms, $\frac{1}{4}$ w
139	502478	Resistor, carbon, 1,000 ohms, $\frac{1}{4}$ w
140	502126	Resistor, carbon, 470 ohms, $\frac{1}{4}$ w

Stewart-Warner B92CR Series

These models are similar to Models B92CR1, 2, 3, 4, 8, 9, and 10 which appear on pages 19-8 through 19-14 of *Rider's Manual Volume XIX*. The following revisions apply to the B92CR Series. Capacitor no. 103 has been changed from 0.01 μ f to 0.001 μ f. The high side of the capacitor was formerly connected to the grid, pin 5, of the 6V6GT output tube. It is now connected to the grid of the 6SQ7, 1st a-f tube. These changes were made to eliminate low-frequency distortion, and are incorporated in chassis stamped with the letter "S" or "H".

The list of models in the B92CR Series and their code numbers is as follows:

Radio Model No.	Radio Code No.	Radio Model No.	Radio Code No.
B92CR1	9043-A	B92CR8	9043-K
B92CR1LP	9043-ALPW	B92CR9	9043-L
B92CR2	9043-B	B92CR10	9043-M
B92CR2LP	9043-BLP	B92CR12	9043-GR
B92CR2LPX	9043-BLPX	B92CR12LP	9043-GRLP
B92CR2X	9043-BX	B92CR13	9043-GL
B92CR3	9043-C	B92CR13LP	9043-GLLP
B92CR3LP	9043-CLP	B92CR14	9043-GM
B92CR3LPX	9043-CLPX	B92CR14LP	9043-GMLP
B92CR3X	9043-CX	B92CR15	9043-GT
B92CR4	9043-D	B92CR15LP	9043-GTLP
B92CR4LP	9043-DLP	B92CR18	9043-GH
B92CR4LPX	9043-DLPX	B92CR18LP	9043-GHLP
B92CR4X	9043-DX	B92CR19	9043-HM
B92CR5	9043-E	B92CR19LP	9043-HMLP

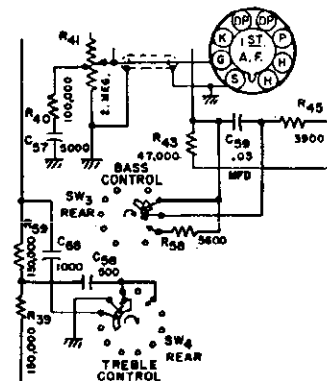
Change in parts list is as follows:

Ref. No.	Part No.	Description
118	505342	Speaker, p-m dynamic (8 inch) used on all models
119	506328	Speaker, p-m, dynamic (8 inch) used on all models except B92CR19 and B92CR19LP
119	506657	Speaker, p-m dynamic (6 inch) used only on models B92CR19 and B92CR19LP

United Motors R-1253, R-1254, R-1255

Models R-1253 and R-1254 are found on pages 18-11 through 18-19 of *Rider's Manual Volume XVIII*. Model R-1255 is similar to these. The circuit changes for these models are shown in the accompanying diagram. The changes in the parts list are as follows:

Illus. No.	Production Part No.	Service Part No.	Description
C67	CM20A470M	G470	47 μ f, 500 v, ceramic
C68	CM20A102M	G102	1,000 μ f, 500 v, mica
R43	RC40AE473K	C473	47,000 ohms, 2 w, carbon
R45, 47	RC20AE392K	A392	3,900 ohms, $\frac{1}{2}$ w, carbon
R57	RC30AE068K	B068	68 ohms, 1 w, carbon
R58	RC20AE562K	A562	5,600 ohms, $\frac{1}{2}$ w, carbon
R59	RC20AE154M	A154	150,000 ohms, $\frac{1}{2}$ w, carbon
SW3	60B265	1218695	Switch, power and tone (bass)
SW4	60B325	1218697	Switch, tone control (treble)



Circuit changes for United Motors R-1253, R-1254, and R-1255.

Templetone G418, G4108

Model G418 appears on page 17-1 of *Rider's Manual Volume XVII*. The value of resistor R5 has been changed to 10 megohms. Model G4108 is the same as G418.

Templetone H-727

Model H-727 is similar to model G-725 which appears on pages 17-3 through 17-6 of *Rider's Manual Volume XVII*.

United Motors R-705

This model appears on pages 17-1 through 17-6 of *Rider's Manual Volume XVII*. This receiver may be installed in the 1949 Chevrolet by using speaker and control mounting parts in adapter package No. 4415. Speaker installation instructions noted under "Pontiac" are used for mounting the speaker to the instrument panel.

United Motors 7258155

This model appears on pages 19-76 through 19-80 of *Rider's Manual Volume XIX*. The following changes have been made in the parts list after serial 5596000:

Illus. No.	Production No.	Service Part No.	Description
6	1219508	1219508	1st i-f assy. (miniature)
7	1219509	1219509	2nd i-f assy. (miniature)
26	7240724	M908	Electrolytic
26A			20 μ f, 25 v
26B			20 μ f, 400 v
26C			20 μ f, 400 v

United Motors 984249

Model 984249, Pontiac, appears on pages 19-66 through 19-70 of *Rider's Manual Volume XIX*. The 330-ohm, $\frac{1}{2}$ -watt, i-f cathode resistor, No. 54, has been replaced by a 390-ohm, $\frac{1}{2}$ -watt resistor on the late production sets. It has been found that the tendency to motor boat is caused by a 6SK7 tube with a much higher than average contact potential. A slightly higher bias on the i-f tube corrects this tendency, and the slightly higher value of cathode resistor accomplishes this.

United Motors 984296

Model 984296, Pontiac, appears on pages 19-60 through 19-64 of *Rider's Manual Volume XIX*. The following change has been made in all sets above serial number 691137 and B39-54401:

Illus. No.	Production No.	Service Part No.	Description
------------	----------------	------------------	-------------

43	1213220	A 151	150 ohms, $\frac{1}{2}$ w, insulated.
----	---------	-------	---------------------------------------

United Motors 986240, Chevrolet

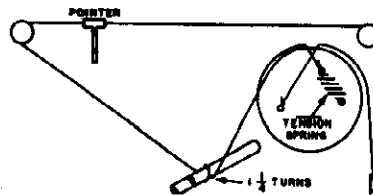
This model appears on pages 20-48 through 20-58 of *Rider's Manual Volume XX*. The following changes are effective on only those sets above serial no. C49-0401050. The voltage at the grid of the r-f amplifier, 6BA6, is now 0 v, and that at the grid of the i-f amplifier, 6BA6, is now 0.3 v. The voltage at the first diode plate of the 6AV6 is -0.3 v.

Capacitor 30, choke 8, and transformer 51A have been added, replacing section 51. Capacitor 23 has been deleted. The following changes should be made to the replacement parts list:

Ref. No.	Prod. Part No.	Service Part No.	Description
23	1217848	1217848	Capacitor, chassis plate
51	7255881	7255881	Transformer, power (potted)
		Add:	
8	7258743	7258743	Choke
30	7257879	E-504	Capacitor, 0.5 μ f, 100 v. tubular
51A	7258747	7258747	Transformer, power (un-potted)

Westinghouse H-190, H-191, H-191A H-220, Ch. V-2134

Model H-220 is similar to Models H-190, H-191, H-191A, Ch. V-2134 which appear on pages 19-20 through 19-23 of *Rider's Manual Volume XIX*. Model H-220 and late production of Model H-190 are identical, except that different record changers are used. In later production of Models H-190 and H-191 several changes were made. These changes, which are incorporated in all Model H-220 receivers, consist of a different dial-drive system, deletion of the 6BA6 1st i-f cathode resistor R3, and the addition of by-pass capacitor C61 in the cathode circuit of the 6BA6 2nd i-f stage. The dial-drive drawing is shown in the accompanying figure.



Dial-drive connections for Westinghouse H-190, H-191, H-191A, and H-220.

All parts listed for Model H-190 in the replacement parts list in the manual, except the crystal cartridge and the phono needle, apply also to Model H-220. Additional parts for Model H-220 are listed below.

Part No.	Description
RCM30B222M	Capacitor, 2,200 μ mf, mica, C61
V-8058	Crystal cartridge (for V-6313 changer)
V-8037	Needle, phono (for V-6313 changer)
V-1164-1	Cabinet (mahogany)
V-4898-1	Catch, bullet
V-3353-3	Slide mechanism (l. h.)
V-3353-4	Slide mechanism (r. h.)
V-4900-1	Strike, bullet catch
V-4965-3	Cable, phono input.

Westinghouse H-161, H-168, H-168A, H-168B

These models appear on pages 18-6 through 18-32 of *Rider's Manual Volume XVIII*. In production of some chassis, V-5596 "HI-KAP" capacitors are substituted for the following capacitors:

V-5040-15	(C7, C8, C9, C61, C62)
V-5040-11	(C19, C20, C63)

Westinghouse H-198, Ch. V-2137-2; H-199, Ch. V-2137-1; H-203, Ch. V-2137

Model H-198 appears on pages 20-1 through 20-4 of *Rider's Manual Volume XX*, Model H-199 appears on pages 20-5 through 20-8 of the same volume, and Model H-203 appears on pages 19-29 through 19-32 of *Rider's Manual Volume XIX*.

In later production, a resistor was added and a capacitor deleted in order to minimize effects caused by production variances in the 6AV6 tubes. The resistor, 470,000 ohms, $\frac{1}{4}$ watt, was inserted in the lead between termi-

nal #2 of the 1st 455-kc i-f transformer and the selector switch. The capacitor that was deleted had been connected between the a-c line and ground. This capacitor is shown as C38 on the Model H-198 schematic and as C37 on the Models H-199 and H-203 schematics.

In case of oscillation and poor sensitivity on the f-m band, a check should be made to determine that the capacitor is not present in any chassis in which the resistor has been inserted. If both the resistor and capacitor are present, the capacitor should be removed and the receiver realigned.

Westinghouse H-203

This model appears on pages 19-29 through 19-32 of *Rider's Manual Volume XIX*. If bass response is objectionable, it can be decreased by changing C29 from 0.05 μ f to 0.005 μ f.

Westinghouse H-214, H214A, Ch. V-2103-3

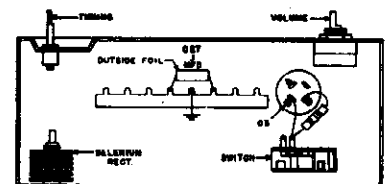
These models appear on pages 20-9 through 20-11 of *Rider's Manual Volume XX*. In order to prevent i-f oscillation, the green lead from the 1st i-f transformer to the 6SF7 grid should be dressed close to the chassis. The blue and green leads from the 2nd i-f transformer should be separated so far as possible.

As a heat precaution, all leads must be dressed well away from the ballast resistor R4.

Westinghouse H-303P4, H-304P4, Ch. V-2153

The chassis used in later production contains modifications that eliminate the possibility of burning out the filament of the 3V4 tube by inserting the a-c plug in position for battery operation with the on-off switch in off position. Sets that contain the modified chassis are identified by a warning label pasted on the inside of the back cover. The warning, which reads, "Always remove plug from wall socket before operating battery change-over switch," serves as a further precaution against damage. Sets that do not contain the revisions can be modified in the following manner:

1. Remove the chassis from the cabinet.
2. Refer to the accompanying figure, and remove enough components from their positions over C3 to permit ease in performing steps 3, 4, and 5.
3. Remove the 3 red B+ wires from the C3 section lug of the filter capacitor.
4. Solder the 3 wires together and apply tape to the joint until they are well insulated.
5. Connect a single red wire between C3 lug and the battery switch terminal to which R16 is connected. The wire should be the same type as the wires that were removed.
6. Connect a 0.1- μ f, 200-v, capacitor (C27, RCP10W2104M) to the terminal board as shown in the figure.
7. Replace the components that were removed in step 2.



BOTTOM VIEW SHOWING WIRE REVISIONS

Westinghouse H-203, H-212

These models appear on pages 19-29 through 19-32 of *Rider's Manual Volume XIX*. The volume control is tapped at 50,000 ohms from ground rather than 450,000 ohms as shown on the schematic diagram.

In later production, a 33-ohm, 1/4-watt resistor (RC10AE330K) was inserted in the lead from pin 7 of the 6BE6 oscillator-converter tube. The purpose of this resistor is to suppress parasitic oscillations that may develop when certain 6BE6 tubes are used.

In early sets, R35 in the cathode circuit of the 12AT7 FM rf amplifier and mixer tube served as a form around which was wound the reactor, L21. For convenience in later production, the resistor was deleted from the circuit and the reactor was wound on other material. The part number, V-4886-10, shown in the parts list for this item applies to the later version which does not include the resistor, and R35 should be disregarded.

On some chassis, V-5596 "HI-KAP" capacitors are substituted for V-5040-13, C36 and C37, capacitors. These capacitors were substituted for convenience in production, and the operation of the receiver is not affected by the substitution.

Zenith 8H832, Ch. 8E20

This chassis appears on pages 19-16 through 19-21 of *Rider's Manual Volume XIX*. If replacement of one of the speakers is required, care should be taken when connecting the new speaker in the circuit so that the speakers are properly phased. If the speakers are out of phase, all bass notes will be absent and distortion will be dominant. This condition can be corrected by reversing the voice coil wires on the newly replaced speaker.

Zenith 7H820Z, Ch. 7E01Z

Chassis 7E01Z is similar to Chassis 7E01 except that the 45-megacycle f-m band has been removed. The receiver now has the broadcast band and the 100-megacycle f-m band only. The new section is shown in the accompanying diagram. Balancing procedure is the same as for the 7E01.

The change in Parts List is given below:

Ref. No.	Part No.	Description
C30	22-1775	0.047 μ f, 400 v
C10	22-1778	0.047 μ f, 200 v
C19	22-1809	0.01 μ f, 200 v
C25	22-1810	0.1 μ f, 200 v
C24	22-1811	0.0047 μ f, 400 v
C22	22-1813	0.22 μ f, 600 v
C15	22-1814	0.0022 μ f, 600 v
	58-128	Two-prong plug
	74-52	Plastic speaker screen
	83-1545	Insulating strip
	85-443	Bandswitch
	93-690	Felt washer
	93-719	0.031 x 3/16" x 7/16" steel washer
	93-961	Ins. shoulder washer
	114-160	6 x 1/4" hex. hd. s.t. screw
	114-277	8-32 x 9/16" hex. hd. m.s.

Zenith 5D811, Ch. 5E01

Model 5D811, Ch. 5E01, was erroneously listed in the Volume XX Index as 5D811, Ch. 5F01.

Zenith 5G003Z, Ch. 5C40Z

This model appears on page 16-4 of *Rider's Manual Volume XVI*, R2 is listed as 2,200 ohms. It should be listed as 220 ohms.

Zenith 7H820, Ch. 7E01

On some of the later run 7E01 chassis, the wax bypass capacitors were replaced with molded capacitors. Their part numbers are as follows:

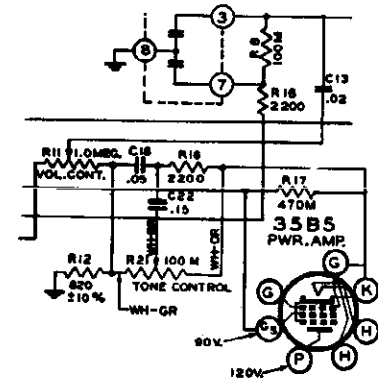
Ref. No.	Part No.	Description
C10	22-1778	Capacitor, 0.047 μ f, 200 v, molded
C22	22-1750	Capacitor, 0.022 μ f, 600 v, molded
C15	22-1754	Capacitor, 0.0022 μ f, 600 v, molded
C19	22-1809	Capacitor, 0.01 μ f, 200 v, molded
C24	22-1811	Capacitor, 0.0047 μ f, 400 v, molded
C25	22-1810	Capacitor, 0.1 μ f, 200 v, molded.

Zenith 7H822Z, Ch. 7E02Z

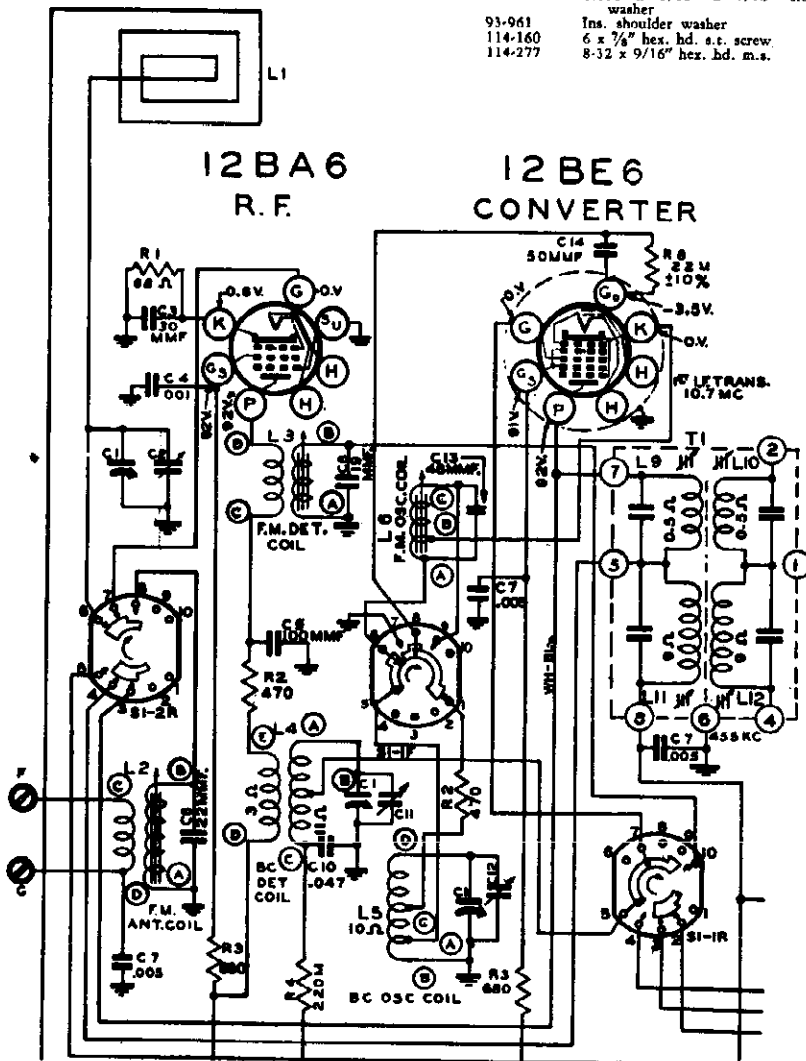
Chassis 7E02Z is similar to the 7E02 which appears on pages 18-21,22 through 18-25 of *Rider's Manual Volume XVIII*. On the 7E02Z receiver a tone control has been added and a neon bulb on-off indicator. The accompanying figure shows the tone-control circuit. The following parts list shows the new components included in this receiver:

Part No.	Description
12-1546	Indicator socket brkt.
14-857	Model 822Z, plastic cab.
22-1025	0.15 μ f, 200 v, capacitor
22-1511	50 μ f, ceramic 500 v, capacitor
26-419	Dial scale
46-769	Tuning & vol. con. knob
46-770	Band-switch knob
46-780	Tone-control knob
46-781	Tone-control knob
63-1744	100 ohms, ins. resistor, 20%, 1/2 w
63-1884	220,000 ohms, ins. resistor, 20%, 1/2 w
63-2008	Tone control
78-585	Indicator socket
80-402	Dial cord tension spring
83-1593	Felt strip (2 used)
83-1595	Spacer strip
93-961	Ins. shoulder washer
100-105	Neon indicator bulb
199-35	Dial scale
202-687	Instruction book
S-15325	Cab. back & plug cover assy.

The 220,000-ohm resistor, R22, and the neon bulb on-off indicator have been inserted from pin 4 of the 35B5 power amplifier to ground.



Circuit changes for the Zenith 7H822Z, Chassis 7E02Z.



(Changer model number appears at top rear of changer pan and also on model label on underside of pan.)

NOTE

When servicing this Record changer, note that the Push-off, Velocity Trip, and Set-Down mechanisms function independently. One of these units may become inoperative without affecting the rest of the changer.

At time of publication, changer model label was being stamped with "RUN 4". See page 5.

OPERATING INSTRUCTIONS

This Admiral record changer will automatically play—

twelve of the 10-inch, 78 or 33 RPM records, or ten of the 12-inch, 78 RPM records, or twelve of the 12-inch, 33 RPM records, or fourteen of the 7-inch, 45 RPM records, or ten of the 7-inch, 33 RPM records.

Do not inter-mix these records.

SETTING RECORD SIZE SELECTOR KNOB: Turn this knob until it points to the size of record to be played.

SETTING SPEED CHANGE KNOB: Turn this knob until it points to the speed of the record to be played. "STD" indicates standard 78 RPM records.

SETTING PUSH-OFF ASSEMBLY: Pivot the Push-off assembly toward the centerpost to play 10-inch records and away from the centerpost to play 12-inch records. For 7-inch records, place the Push-off assembly in the 10-inch position and move the extension arm toward the centerpost.

LOADING AND STARTING: Place a stack of records over the centerpost so that they rest on the record support (64) and the centerpost offset. Records must be the same size and speed. If 10 or 12-inch records are being played, place the record clip on the stack.

The record changer is turned on by placing the function switch on the radio, in the "Phono" position.

REJECTING A RECORD: If the record changer will not trip into change cycle at the end of a record, or if you wish to stop playing a record and start playing the next one, merely move the reject knob to the "Rej" position.

STOPPING AND UNLOADING: Do not turn the record changer off during change cycle. Turn the phono motor off by turning the function switch (Radio-Phono) to the center position.

45 RPM ADAPTER: An adapter must be inserted into the center hole of the 45 RPM records in order to play them with this phonograph. A supply of these adapters is included with the set.

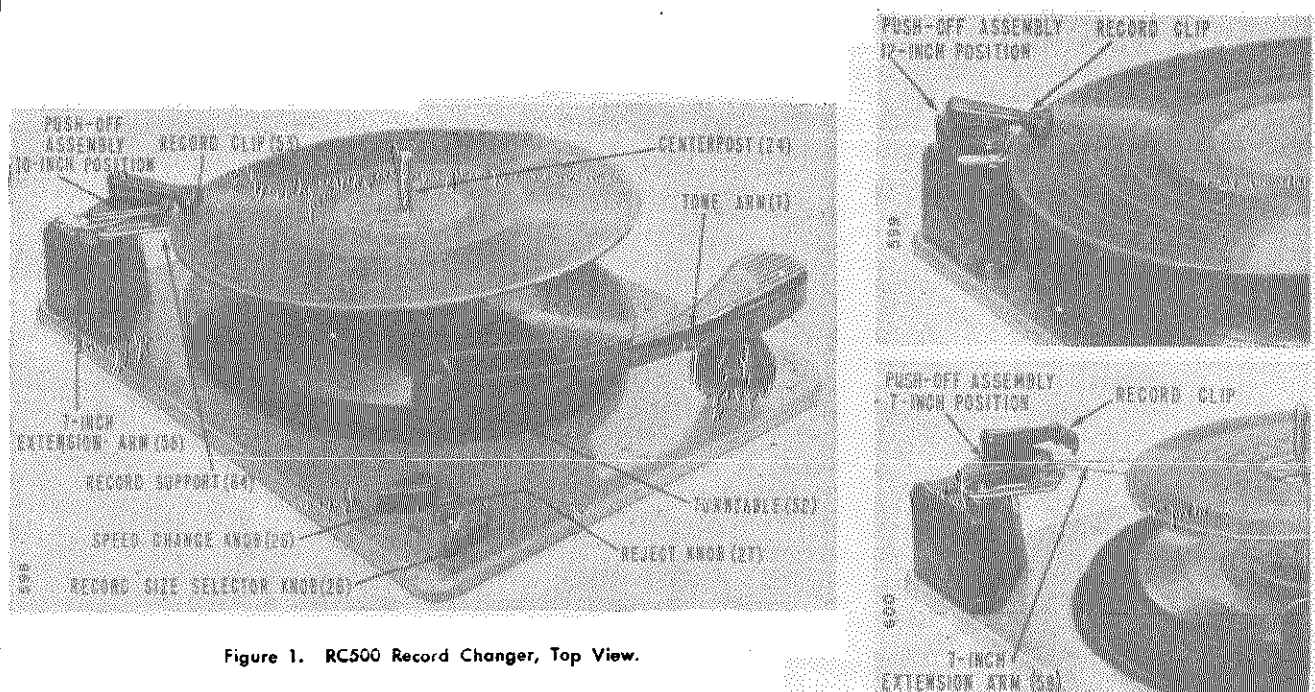


Figure 1. RC500 Record Changer, Top View.

MODEL RC500

CHANGE CYCLE

When following this change cycle, keep in mind that a velocity type trip is used, which depends upon a rapid movement of the tone arm toward the centerpost. Also, note that the Push-off, Trip, and Set-Down mechanisms function independently. Therefore, one of these units may become inoperative without affecting the rest of the changer.

If at all possible, we recommend that you carefully observe the change cycle of a record changer which is operating properly. It is a good idea to rotate the turntable by hand and repeat the change cycle until the function of each part is understood.

The changer operates as follows: The turntable is driven by the motor idler wheel (48), riding against its inside rim. The speed of the turntable is determined by the diameter of the drive shaft (either 78 RPM, 45 RPM, or 33 RPM) which rides against the idler wheel rubber tire (48).

The 78 RPM drive shaft is part of the motor armature. The 33 RPM drive shaft (44) and the 45 RPM drive shaft (45) are moved in and out of position mechanically by the speed change knob. See figure 3.

The changer mechanism is driven during its change cycle by the drive gear (30), which in turn is driven by the geared hub of the turntable. During normal record play, the "dead spot" on the drive gear is held next to the turntable hub by the gear indexing arm (41) and spring (39).

This changer employs a velocity trip, which consists primarily of two parts: the trip motion arm (32), and the gear engagement pawl (33). These parts are mounted near the "dead spot" on the drive gear. See Figure 2A.

During normal record play, the trip slider (36) is moved slowly by the stud on the arm control lever (23) which moves with the tone arm. The stud on the trip slider (36) rides against the trip motion arm (32), moving it very slightly. Since the gear engagement pawl (33) is held against the trip motion arm (32) by the trip friction washer (34), the gear engagement pawl (33) is also moved slightly toward the turntable hub. Since

this movement is only slight, the vertical catch on the gear engagement pawl (33) is just touched and "kicked away" by the lug on the turntable hub. This occurs with each revolution of the turntable until the gear engagement pawl is moved in rapidly enough to be positioned in front of the lug before the next turntable cycle.

This rapid movement only occurs when the trip slider (36) is moved rapidly, by the tone arm, as the needle enters the trip grooves of the record. The gear engagement pawl (33) then moves in front of and engages the lug on the turntable hub. This causes the drive gear (30) to be rotated far enough so that the teeth on the drive gear will engage the teeth on the turntable hub, starting the change cycle. See figure 2B.

The changer can also be tripped by moving the reject knob to the "Rej" position. The stud on the end of the reject lever (88) moves the gear engagement pawl (33) into position to engage the lug on turntable hub.

As the drive gear begins to rotate, the control cam (90) also rotates, since both parts are mounted on the same shaft. See fig. 4. As the control cam rotates clockwise, roller (109) riding against the cam moves the drive link (107), which in turn rotates the control plate (102). As the control plate rotates, the incline tab (102A) rides across the tone arm lift rod (12), lifting the tone arm from the record. The stud on the arm control lever (23) then is engaged by the safety arm (105) (which rotates with the control plate), moving the tone arm away from the centerpost.

When the tone arm is almost clear of the record, the stud on the push-off link (84) (which is pivoted by the control cam), pivots the push-off arm (79) counter-clockwise. Since the push-off arm is held to the push-off plate and shaft (64) by two Allen screws, the push-off plate is also

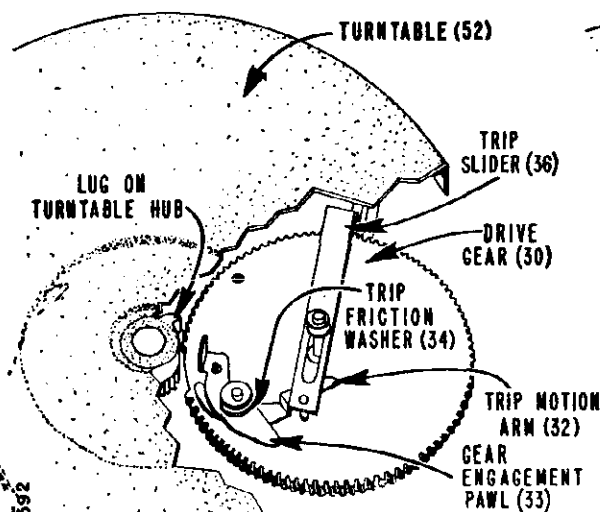


Figure 2A. Drive Gear Position Out of Change Cycle.

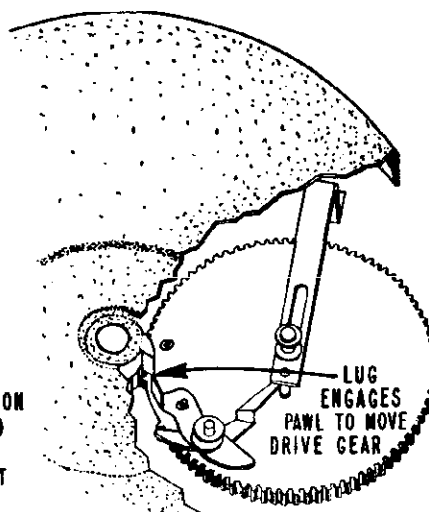


Figure 2B. Drive Gear Position During Change Cycle.

pivoted. Just before the control cam reaches half rotation, the tone arm will be positioned as far as possible from the centerpost, and the push-off plate (60) will "push-off" the record to the turntable.

As the control cam (90) rotates through the second half of the change cycle, the push-off plate is returned by the push-off arm return spring (78) and the remainder of the stack of records drops to the record support (64).

At the same time, the tone arm is returned by the set-down spring (98) which causes the set-down indexing stud on the size change plate (99) to ride against the indexing portion of the arm control lever (23).

The tone arm will move toward the record until the set-down indexing stud on the size change plate has reached the indexing point (end of cut-away section) on the arm control lever. After the arm stops moving inward, the lift rod will ride down the control plate incline (102A), and the tone arm will move toward the record.

Just before the tone arm touches the record, the safety arm engages the stud on the size change plate (99) and pivots it away from the arm control lever (23); releasing the tone arm.

The set-down point is determined by the position of the size change plate (99), which can be set for either 7-inch, 10-inch, or 12-inch set-down by the record size selector knob.

Fig. 3. RC500 Record Changer with Turntable Removed.

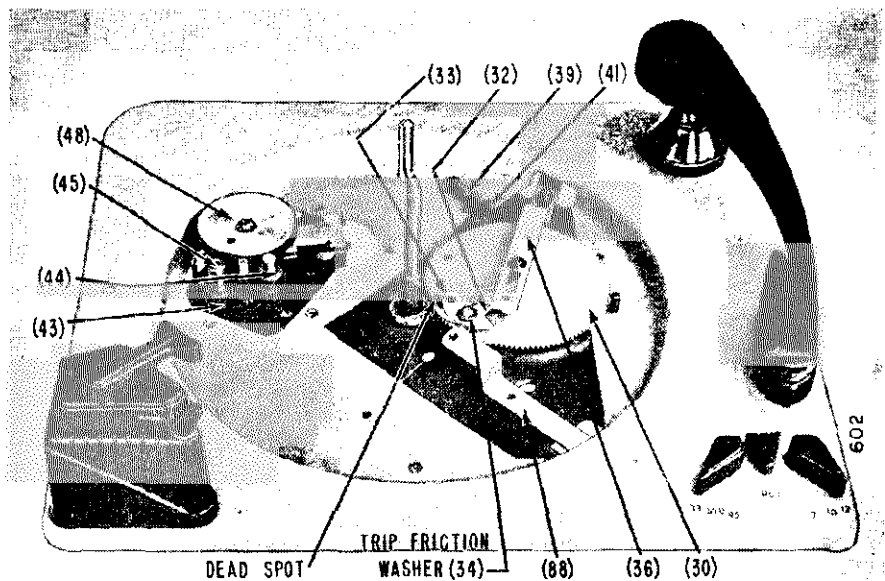
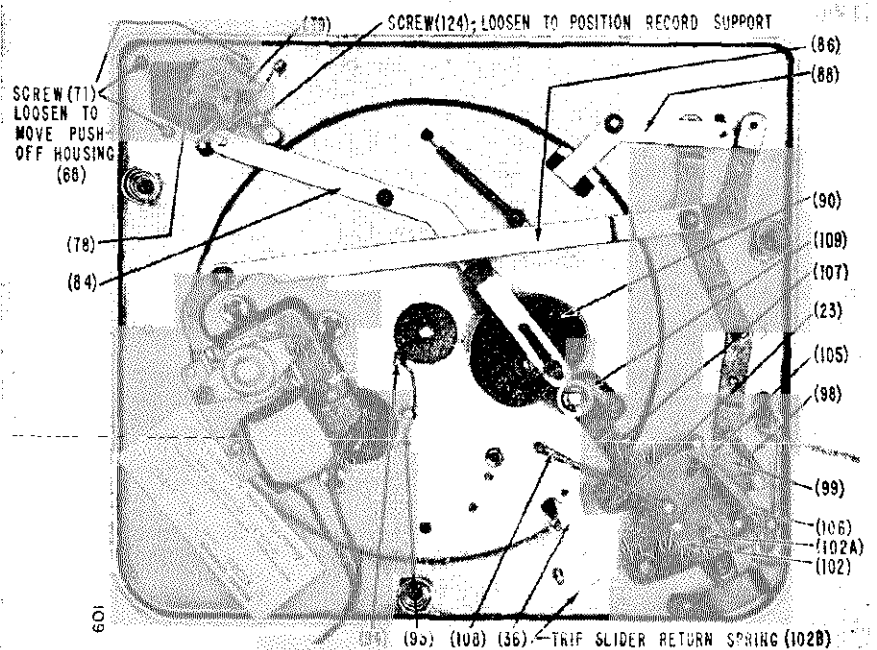


Fig. 4. RC500 Record Changer, Bottom View, Changer Out of Cycle.



MODEL RC500

ADJUSTMENTS

When making the following adjustments, keep in mind that the Push-off, Trip, and Set-Down mechanisms function independently. Therefore, one of these units may become inoperative without affecting the rest of the changer.

VELOCITY TRIP MECHANISM

This record changer uses a velocity type trip, which depends upon a rapid movement of the tone arm toward the centerpost in any area between $2\frac{7}{8}$ " to $7\frac{7}{8}$ " from the center of the record. This trip requires no adjustment. However, in order for the changer to trip properly, there must be sufficient friction between the trip motion arm (32) and the gear engagement pawl (33). If the friction is lost, a small amount of lubricant (such as lubriplate #110) should be placed between these parts. If this does not help, it may be necessary to replace the trip friction washer (34). See Figure 2A.

SET-DOWN ADJUSTMENT

Adjustment of the set-down point, is made by adjusting the set-down adjusting screw (6). See Figure 5. The tone arm will automatically set-down properly on 7-inch or 12-inch records if the set-down adjustment is made properly on a 10-inch record. The set-down adjusting screw is accessible through the hole in the right side of the tone arm. Turning this screw in moves the set-down point of the tone arm closer to the centerpost, and turning this screw out moves it away from the centerpost. Make this adjustment as follows:

1. Place the record size selector knob in the "10" position.
2. Push the reject knob to the reject position. Then start to rotate the turntable clockwise by hand.
3. As the change cycle is almost completed, and the tone arm just starts to move down towards the turntable, place a ruler against the centerpost and check the distance between the near side of the centerpost and the needle. This distance should be between $4\frac{10}{16}$ " and $4\frac{11}{16}$ ".
4. If the 10-inch adjustment is correct, the needle should set down between $5\frac{19}{32}$ " and $5\frac{22}{32}$ " from the near side of the centerpost on 12-inch records, and between $3\frac{1}{4}$ " to $3\frac{5}{32}$ " on 7-inch records.

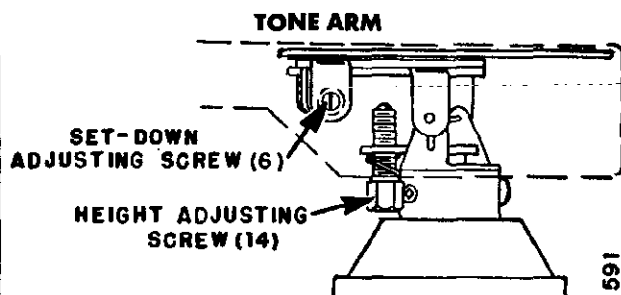


Figure 5. Set-Down and Height Adjustments.

ADJUSTING THE TONE ARM HEIGHT

This record changer is so designed that the tone arm will clear the bottom record of a stack to be played if the needle is $\frac{1}{4}$ " above the changer pan when the changer is not in change cycle and $1\frac{3}{8}$ " above the turntable during change cycle. See Figure 6. With proper tone arm height setting, the tone arm will lift high enough during change cycle to clear a complete stack of records of any type on the turntable. This stack may consist of as many records as specified on page 1. Make this adjustment by placing the size selector knob in the "10" or "12" inch position, check the distance between the needle and the changer pan with the changer out of change cycle. If the needle is more than $\frac{1}{4}$ " above the pan, turn the lift adjusting screw (14, Figure 5) counterclockwise; if less, turn clockwise.

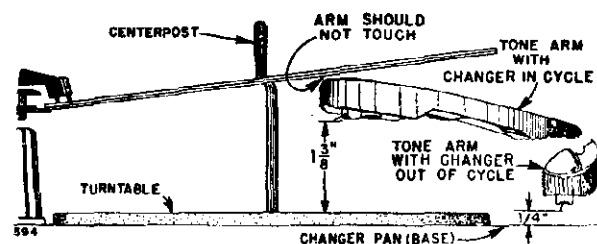


Figure 6. Checking Tone Arm Height.

POSITIONING RECORD SUPPORT (64)

If the record support is not positioned evenly under the bottom record of a stack to be played, one side of the record may drop to the turntable before the other. With the push-off assembly in the 10-inch position, place a 10-inch record over the upper portion of the centerpost so that the edge of the record fits against the edge of the record support (64). See figures 4 and 7. The contour of the record **SHOULD** follow the contour of the record support. If these contours do not match, position the push-off assembly as follows:

CAUTION: Be sure that the "testing" record has an even edge. For best results, try more than one record.

1. Loosen the screw (124) that holds the push-off positioning arm assembly (75) stationary.
2. Grip the push-off assembly and pivot it to the point where the edge of the record support "lines up" with the edge of the record.
3. Remove the record and tighten the screw (124).
4. Load the changer with a stack of 10-inch records, and "reject" the entire stack to the turntable. Check to see that all records drop to the turntable evenly.

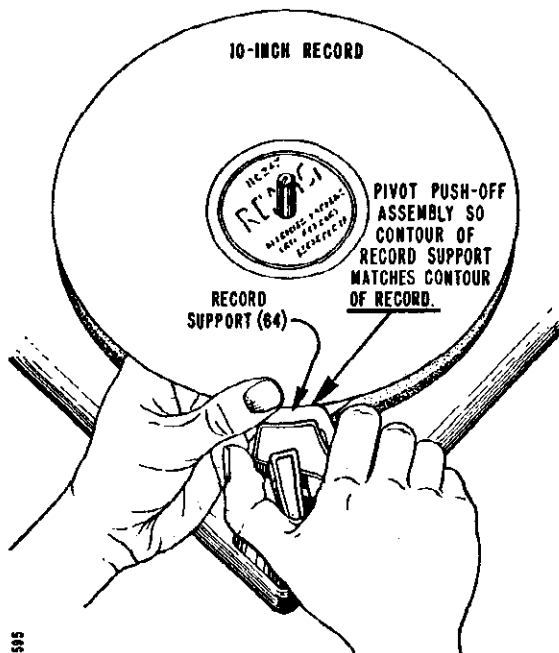


Figure 7. Positioning Record Support with 10-inch Record.

ADJUSTING DISTANCE BETWEEN RECORD SUPPORT (64) AND CENTERPOST (24)

If records do not push-off satisfactorily, or more than one record drops to the turntable during change cycle, it may be necessary to adjust the distance between the centerpost and the record support. See Figures 4 and 8. Make this adjustment as follows:

1. Place the push-off assembly in the 10-inch position.

2. Hold the centerpost as far away from the push-off assembly as possible.
3. Measure the distance from the edge of the record support (64) to the inside edge of the offset shelf on the centerpost. This distance should be between $4 \frac{29}{32}$ " and $4 \frac{31}{32}$ ".
4. If it is necessary to adjust for this distance, loosen the three screws (71) holding the plastic push-off housing (68) to the changer pan. Then move the assembly until the specified distance is obtained.
5. Tighten the three screws, and recheck the distance. Place a stack of records (any size) on the changer, and "reject" each record in the stack to the turntable. Check to see that each record is pushed off satisfactorily. If one side of the record drops to the turntable before the other, it may be necessary to make the "Positioning Record Support (64)" adjustment.

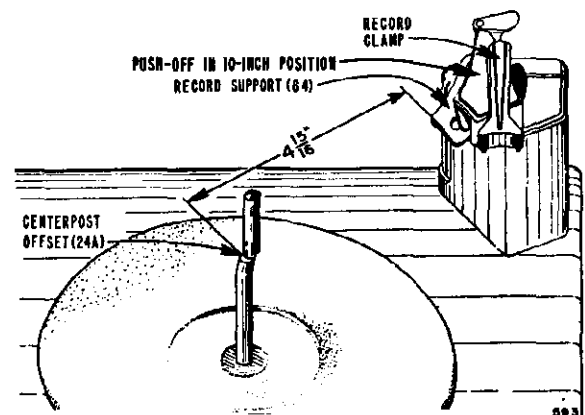


Figure 8. Checking Distance from Centerpost to Record Support.

SERVICE AND REPAIR

PRODUCTION CHANGES

Changer model label (on underside of changer pan) is stamped with run number corresponding to production changes.

RUN 1: Start of production.

RUN 2: Knob escutcheon (121) was added to changer. Speed change arm (89) and set-down change arm (96) were also changed so that knobs would line up with numbers on escutcheon. If wrong part for (89) or (96) is used, knob pointer will not correctly indicate changer set-down or speed. **RUN 3:** See (32), (36) in parts list. **RUN 4:** See (24).

LUBRICATION

DO NOT apply grease or oil to the trip slider (36). Also, under normal operating conditions, the motor should never require oiling.

Friction can sometimes be increased between the gear engagement pawl (33) and the trip motion arm (32), by placing a small amount of lubricate #110 between these two parts. If a substitute lubricant is used, be sure that it is of equal viscosity (weight). See "Velocity Trip Mechanism" on page 4.

The rest of the changer should be lubricated with grease (such as lubriplate #107) whenever it comes into the shop for repair or adjustment.

A good automobile chassis grease can be used for this purpose. All pivot and friction points should be greased.

The powdered iron roller (109) and oilite bearings (used in the turntable hub and tone arm base) may be lubricated with SAE No. 20 oil.

Care should be taken to prevent any of the lubricant from coming into contact with the idler wheel tire, the rubber drive belts, or any of the rubber grommets. Also be careful, when using oil, that an excess does not seep into the felt of the turntable.

REMOVING AND REPLACING TURNTABLE

To remove the turntable, first remove the turntable retaining clip (51). Be sure that the changer is not in change cycle, and then, grasp the turntable by its edges and lift up. Before replacing the turntable, make sure that the changer is not in change cycle. The pickup arm should be positioned away from the turntable. In replacing the turntable, force is not needed to seat it. Make certain, however, that the idler wheel of the motor has been pushed in towards the centerpost and that the idler wheel is making contact with the

MODEL RC500

inner side of the turntable flange. The idler wheel should be pushed in with a screwdriver or similar flat tool. Do NOT push toward the rear of the changer.

REPLACING CONTROL KNOBS (26 AND 27)

To remove the control knobs, place the blade of a screw driver between the knob and the retaining ring, directly under the knob, and pry up.

If it is difficult to remove the knobs without scratching the changer pan or the escutcheon

(121), it may be necessary to use a flat ruler as a protector. Place the ruler next to the knob. Then insert a screw driver under the knob and pry up.

When re-installing the speed change knob, or the record size selector knob, place the blade of a screw driver between two halves of the knurled shaft and position the control in the center position. Be sure that the knobs lock into position. Line up the pointed end of the speed change knob with "STD", and the record size selector knob with "10", and then push the knobs straight down.

RECORD CHANGER TROUBLE SHOOTING

Changer Will Not Trip.

1. Check to see that the trip slider (36) moves freely.
2. Apply small amount of grease between the trip motion arm (32) and the gear engagement pawl (33). See "Trip Mechanism" on page 4.
3. Check tension on trip friction washer (34). If necessary, replace with new washer.
4. Check for grease or oil on trip slider.
5. Check for broken, loose, or misplaced trip slider return spring (102B, Figure 4). It may have slipped over the stud on the slider.

Changer Repeatedly Trips into Change Cycle.

1. Check tension of gear indexing spring (39).
2. Check for bent trip slider return spring (102B, Figure 4).
3. Check for bent trip slider (36).

Tone Arm Does Not Set-Down Properly.

1. Check set-down adjustment. See "Set-Down Adjustment" on page 4.
2. Check to see that the record size selector knob has locked into position.
3. Check for broken, weak, or missing control plate return spring (108).

* Tone Arm Skips Across Records.

1. Check to see that the cabinet is level.
2. Check for worn needle.
3. Check height adjustment. See page 4.

Changer Causes Rumble or Noise.

1. BE SURE that the shipping screws (72) on each side of changer pan have been removed.
2. Check for any mechanical rub near the 3-speed motor.
3. Check for broken or missing float spring (74).

Records Do Not Push Off or More Than One Record Drops to the Turntable.

1. See "Adjusting Distance Between Record Support and Centerpost" on page 5.
2. Check for broken, missing, or weak push-off return spring (78). The push-off plate (60) may not be returning correctly.

*IMPORTANT: If needle is type not held by knurled nut and does not follow 33 or 45 RPM grooves, bend needle tip at right angles to record, or replace. If trouble persists with either type cartridge, install parts (32) and (36). See parts list.

3. Check to see that the push-off assembly is properly locked into position.

4. Check to see that no foreign material is between record support (64) and push-off plate (60).

Changer Trips Into Change Cycle Before Finishing Record.

1. Check for foreign material between trip motion arm (32) and gear engagement pawl (33).
2. Check for bent trip slider return spring (102B, Figure 4).
3. Check for bent trip slider (36).

Records Fall to Turntable Unevenly.

See "Positioning Record Support" on page 5.

Changer Stalls in Change Cycle.

1. Idler wheel (48) rubber tire may have foreign material on it. Try cleaning it with carbon tetrachloride solution.
2. Motor drive belts (43) may be slipping. If necessary, replace with a new belt.
3. Be sure push-off assembly is locked in position.

CAUTIONS

1. See that the rubber tire on the idler wheel (48), and both drive belts are kept clean from oil, grease, dirt or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts. When handling these parts, keep fingers and hands away from the driving surface. Natural body oils may cause slippage.
2. To avoid scratching changer pan or escutcheon, see discussion at top of page when replacing control knobs (26, 27).
3. Always move each control until it makes a definite stop and locks into position. Erratic action will result if this is not done.
4. Be sure that the shipping screws (72) on each side of the changer pan are removed. Noise will result from any mechanical vibration, and can be heard as a rumble in the speaker.

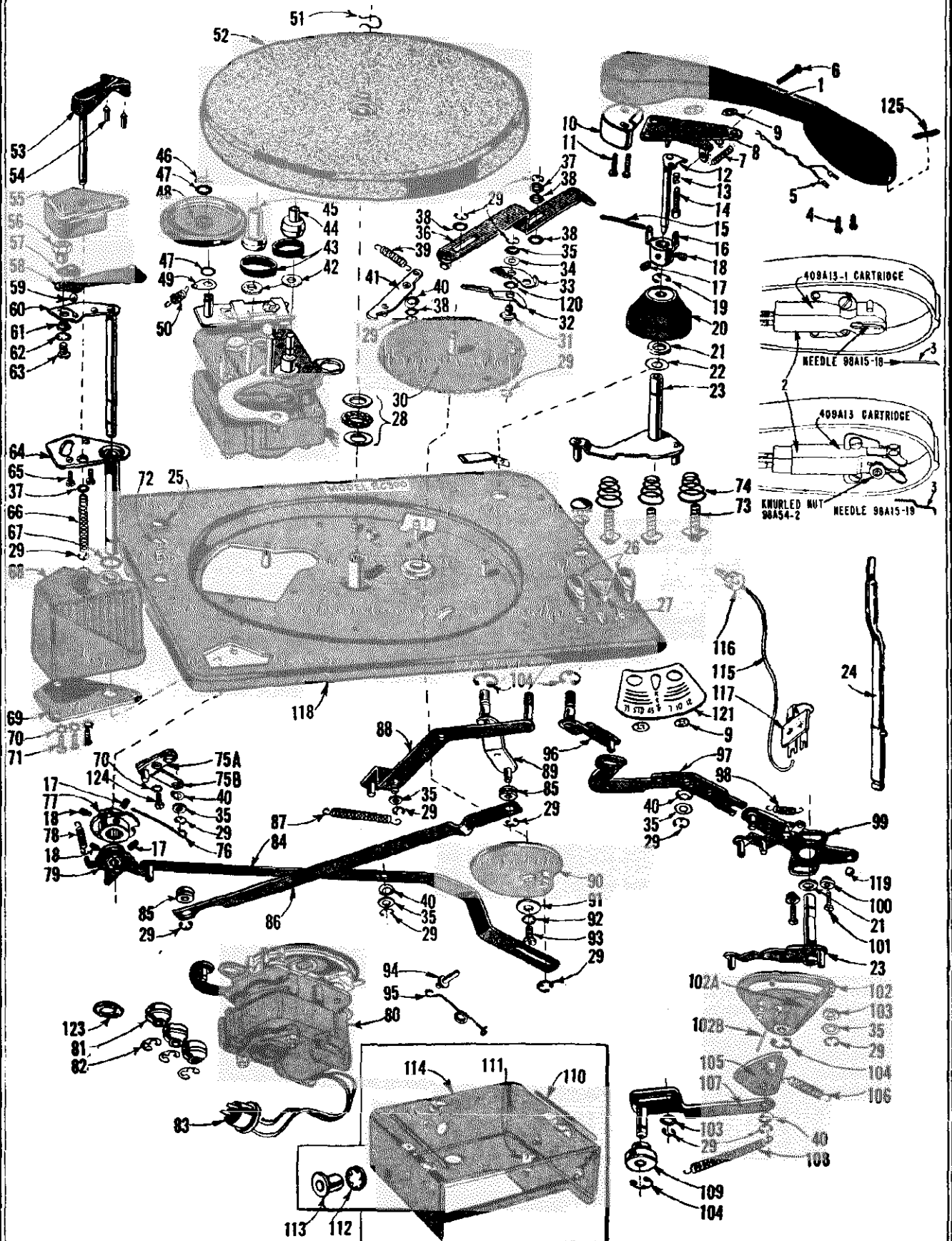


Figure 9. RC500 Record Changer, Exploded View.

MODEL RC500

RC500 PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	{403C51	Tone Arm (Maroon)	60	G400A509	Push-off Plate and Shaft Assembly
	{403C51 G	Tone Arm (Gold)	61	402A250	Spacer Washer
2	{409A13-1	Pickup Cartridge with needle (push-in type)	62	3B1-23-47	Lockwasher #4 I.T.
	{409A13	Pickup Cartridge with needle and knurled nut	63	45-312-C2-47	Screw, #4x5/16 BH MS
		Cartridges (with needle) are interchangeable	64	G400A508	Record Support and Tube Assembly
	98A54-2	Knurled Nut (for 409A13 Cartridge)	65	1A72-2-20	Screw, Shakeproof type 25 (#4 x 5/16")
3	{98A15-18	Needle for 409A13-1 Cartridge	66	405A136	Record Clamp Spring
	{98A15-19	Needle for 409A13 Cartridge	67	4B1-158-47	Washer (.390 x 9/10 x 1/32)
4	1A72-1-20	Cartridge Mtg. Screw Shakeproof type 25 (2 req.)	68	403C50	Plastic Push-off Housing
5	G400A529	Tone Arm Lead and Pin Jack Assembly	69	401A346	Housing Bottom Plate
6	45-750-C2-47	Set-Down Adjusting Screw, #4-40x3/4 BH MS	70	3B1-3-47	Lockwasher, #6 E. T.
7	405A137	Set-Down Adjusting Lock Spring	71	1A68-13-20	Plasticscrew, #6 x 5/8 R.H.
8	G400A526	Tone Arm Mtg. and Pivot Plate Assembly	72	103-1250-F2-57	"Hold Down" Screw, #10-32 x 1 1/4" (for shipping only)
9	2B10-5-59	Speed Nut (4 req.)	73	AA210	Mounting Screw and Washer (table models only)
10	404A31	Tone Arm Counterweight	74	405A139	Float Spring (3 req.)
11	1A70-6-20	Counterweight Retaining Screws, #4 x 3/8" (2 req.)	75	G400A565	Push-off Positioning Arm Assembly
12	G400A520	Lift Rod and Plate Assembly	76	414A40	Push-off Indexing Spring
13	405A138	Lift Adjusting Spring	77	G400A514	Push-off Index Plate and Hub Assembly
14	402A245	Lift Adjusting Screw	78	405A133	Push-off Return Spring
15	414A43	Pivot Shaft	79	G400A517	Push-off Arm and Hub Assembly
16	G400A525	Tone Arm Support and Hub (Includes set screws)	80	*407B19	*3-Speed Motor Complete, 60 cycle, 117 volts
17	1A43-14	Allen Set Screw, #8-32x3/16" (3 req.)	81	406A19	Motor Mounting Grommet (3 req.)
18	402A247	Allen Set Screw, #8-32x1/4" (3 req.)	82	401A355-4	Motor Mtg. Retaining Ring (3 req.)
19	401A355-3	Retaining Ring	83	88A8-1	Phono Motor Plug
20	{403A52	Tone Arm Plastic Base (Maroon)	84	G400A562	Push off Link and Stud Assembly
	{403A52 G	Tone Arm Plastic Base (Gold)	85	406A24	Speed Change Link Grommets (2 req.)
21	401A358	Spacer Washer	86	401A322	Speed Change Link
22	401A284	Bronze Washer (.316 x 15/32 x .005)	87	405A135	Reject Return Spring
23	G400A542	Arm Control Lever and Shaft Assembly	88	G400A551	Reject Arm and Stud Assembly
24	{G400B505	Centerpost (Run 3 or earlier; uses pin 94 and spring 95)	89	{G400A567	Speed Change Arm (Run 2 or later)
	{G400B505-1	Centerpost (Run 4 or later; uses retaining ring 401A355-3)		{G400A553	Speed Change Arm (Run 1)
	401A355-3	Retaining ring, for G400B505-1 centerpost	90	G400A548	Control Cam and Stud Assembly
25	13A2-8-57	Snap-in Buttons	91	401A145	Control Cam Washer
26	{403A54	Speed Change or Record Size Selector Knob (Maroon)	92	3B1-26-47	Lockwasher, #8 I.T.
	{403A54 G	Speed Change or Record Size Selector Knob (Gold)	93	85-375-C2-47	Screw, #8/32 x 3/8" BH MS
27	{403A55	Reject Knob (Maroon)	94	402A228	Centerpost Retaining Pin {Use only with early
	{403A55 G	Reject Knob (Gold)	95	414A42	Centerpost Lock Spring {centerpost (24)
28	415A11	Thrust Bearing	96	{G400A568	Set-Down Change Arm (Run 2 or later)
29	401A355-1	Retaining Ring		{G400A545	Set-Down Change Arm (Run 1)
30	G400A532	Drive Gear and Stud Assembly	97	401A332	Set-Down Change Link
31	402A229	Trip Pivot Stud	98	405A130	Set-Down Spring
32	98A15-22	Trip Motion Arm (Supplied with Trip Slider (36). Replace both parts.)	99	G400A546	Set-Down Change Plate and Arm Assembly
33	401A352	Gear Engagement Pawl	100	402A238	Spacer
34	401A353	Trip Friction Washer	101	1A70-11-20	Plasticscrew, #6 x 7/16"
35	4B1-68-47	Washer	102	G400A537	Control Plate Assembly
36	98A15-22	Trip Slider (Supplied with Trip Motion Arm (32). Replace both parts.)	103	401A173	Washer
37	4B1-67-47	Washer (.196 x 5/16 x 1/32)	104	401A355-2	Retaining Ring
38	4B2-178-0	Washer (.196 x 3/8 x 1/64)	105	401A345	Safety Arm
39	405A134	Gear Indexing Spring	106	405A131	Safety Spring
40	405A22	Spring Washer	107	G400A538	Drive Link and Stud Assembly
41	G400A549	Gear Indexing Arm and Stud Assembly	108	405A132	Control Plate Return Spring
42	98A15-9	Oil Retaining Felt Washer (2 req.)	109	415A27	Drive Link Roller
43	406A20	Drive Belt (2 req.)	110	403A38-1	Plastic Trim (2 req.)
44	98A15-11	45 RPM Drive Shaft (60 cycles)	111	32A88	Antenna Lead Support
45	98A15-10	33 RPM Drive Shaft (60 cycles)	112	2B10-10-59	Speed Nut (4 req.)
46	405A15	Idle Wheel Retaining Clip	113	27A24	Bottom Cover Bushing (4 req.)
47	412A30	Fibre Washer (2 req.)	114		Bottom cover
48	G400A279	Idle Wheel Assembly	115	413A11-1	Shielded Cable (includes plug, 5")
49	98A15-21	Idle Wheel Tie Lug	116	8B2-3	Plug (for lead-in cable)
50	98A15-20	Idle Wheel Spring	117	10B1-18	Terminal Board
51	414A36	Turntable Retaining Clip	118		Changer Pan
52	G400B507	Turntable	119	415A28-2	Ball Bearing (5/32 diameter)
53	{G400A511	Record Clamp and Shaft and Rubber Tips (Maroon)	120	412A36	Fibre Washer (.196 x 3/8 x .005)
	{G400A511 G	Record Clamp and Shaft and Rubber Tips (Gold)	121	{403B57	Escutcheon (Maroon) } Not on early sets.
54	406A25	Record Clamp Rubber Tip (2 req.)		{403B57 G	Escutcheon (Gold) } See Run 2 on page 5
55	{403B53	Push-off Plastic Cap (Maroon)	122	4B1-19-47	Washer (.125 x 1/4 x 1/32 Steel)
	{403B53 G	Push-off Plastic Cap (Gold)	123	412A38	Motor Mounting Washer
56	402A249	Push-off Plate Nut	124	65-187-C2-47	Screw, #6-32 x 3/16"
57	401A326	7" Record Support Detent Spring	125	414A45	Tone Arm Weight
58	G400A510	7" Record Support			
59	415A28-1	Ball Bearing (1/2" diameter)			

PARTS FOR CONVERTING 407B19 MOTOR TO 50 CYCLE

45 RPM Drive Shaft (50 cycles).....	98A15-15
78 RPM Drive Shaft Spring (50 cycles).....	405A113
33 RPM Drive Shaft (50 cycles).....	405A112

*407B19 motor is not used on "Canadian Admiral" chang-ers. For Canadian Admiral replacement motors order: 60 cycle, 105 to 125 volts..... 407X19-60
25 cycle, 105 to 125 volts..... 407X19-25

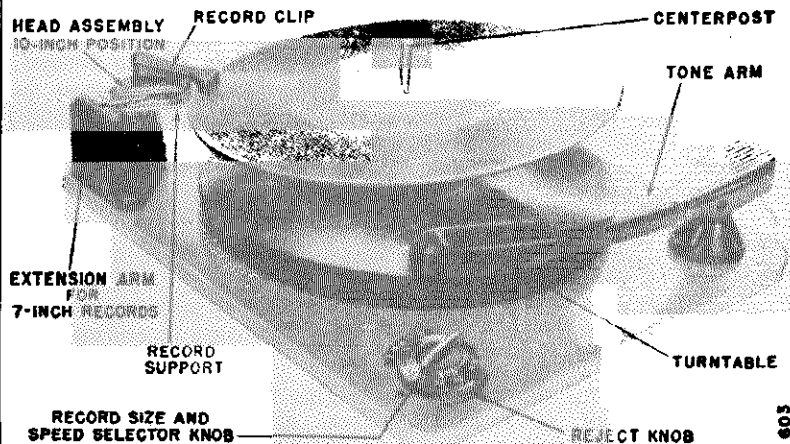
†Run number is stamped on changer model label (on underside of changer).

‡If wrong part is used, knob pointer will not correctly indicate changer set-down or speed. See "RUN 2" on page 5, and ‡ footnote above.

Changer model number appears at top rear of changer pan and also on model label on underside of pan. Except for a few early changers, the changer model labels are stamped with run numbers (RUN 1, RUN 2, etc.) corresponding to production changes.

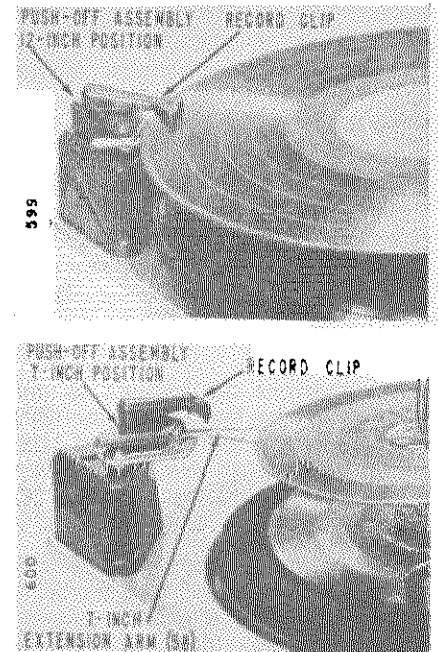
RC500 Record Changers (covered in Service Manual No. S298) and RC550 Record Changers are identical except for the control knobs, associated arms and links, and a few minor parts (such as washers, screws, etc.). Note that the position of the selector cam (89) determines both speed and set-down in RC550 changers.

When servicing this Record Changer, note that the Push-off, Velocity Trip, and Set-Down mechanisms function independently. One of these units may become inoperative without affecting the other two.



Head Assembly Set for Playing 10-inch Records.

Figure 1. RC550 Record Changer, Top View.



OPERATING INSTRUCTIONS

This Admiral record changer will automatically play—

twelve of the 10-inch, 78 or 33 RPM records, or ten of the 12-inch, 78 RPM records, or twelve of the 12-inch, 33 RPM records, or fourteen of the 7-inch, 45 RPM records, or ten of the 7-inch, 33 RPM records.

Do not inter-mix these records.

SETTING THE SIZE AND SPEED SELECTOR KNOB: The available record sizes (7, 10, 12) are engraved under the three different speeds (33, STD, 45) on this knob. Rotate the knob until the size of record to be played (under the proper speed), lines up with the indicating dot on the changer pan. (Note that no size number is engraved under "45" since only 7-inch 45 RPM records are available.)

SETTING PUSH-OFF ASSEMBLY: Pivot the Push-off assembly toward the centerpost to play 10-inch records and away from the centerpost to play 12-inch records. For 7-inch records, place the Push-off assembly in the 10-inch position and move the extension arm toward the centerpost.

LOADING AND STARTING: Place a stack of records over the centerpost so that they rest on the record support (64) and the centerpost offset. Records must be the same size and speed. If 10 or 12-inch records are being played, place the record clip on the stack.

The record changer is turned on by placing the function switch on the radio, in the "Phone" position.

REJECTING A RECORD: If the record changer will not trip into change cycle at the end of a record, or if you wish to stop playing a record and start playing the next one, merely rotate the reject knob to the left momentarily.

STOPPING AND UNLOADING: Do not turn the record changer off during change cycle. Turn the phono motor off by turning the function switch on the radio to the center position.

45 RPM ADAPTER: An adapter must be inserted into the center hole of the 45 RPM records in order to play them with this changer. A supply of these adapters is included with the set.

CHANGE CYCLE

When following this change cycle, keep in mind that a velocity type trip is used, which depends upon a rapid movement of the tone arm toward the centerpost. Also, note that the Push-off, Trip, and Set-Down mechanisms function independently. One of these units may become inoperative without affecting the other two.

If at all possible, we recommend that you carefully observe the change cycle of a record changer which is operating properly. It is a good idea to rotate the turntable by hand and repeat the change cycle until the function of each part is understood.

The changer operates as follows: The turntable is driven by the motor idler wheel (48), riding against its inside rim. The speed of the turntable is determined by the diameter of the drive shaft (either 78 RPM, 45 RPM, or 33 RPM) which rides against the idler wheel rubber tire (48).

The 78 RPM drive shaft is part of the motor armature. The 33 RPM drive shaft (44) and the 45 RPM drive shaft (45) are moved in and out of position mechanically by the motor shift link (84), which is controlled by the selector cam (89). See figure 4.

The changer mechanism is driven during its change cycle by the drive gear (30), which in turn is driven by the geared hub of the turntable. During normal record play, the "dead spot" on the drive gear is held next to the turntable hub by the gear indexing arm (41) and spring (39).

This changer employs a velocity trip, which consists primarily of two parts: the trip motion arm (32), and the gear engagement pawl (33). These parts are mounted near the "dead spot" on the drive gear. See Figure 2A.

During normal record play, the trip slider (36) is moved slowly by the stud on the arm control lever (23) which moves with the tone arm. The stud on the trip slider (36) rides against the trip motion arm (32), moving it very slightly. Since the gear engagement pawl (33) is held against the trip motion arm (32) by the trip friction washer (34), the gear engagement pawl (33) is also moved slightly toward the turntable hub. Since

this movement is only slight, the vertical catch on the gear engagement pawl (33) is just touched and "kicked away" by the lug on the turntable hub. This occurs with each revolution of the turntable until the gear engagement pawl is moved in rapidly enough to be positioned in front of the lug before the next turntable cycle.

This rapid movement only occurs when the trip slider (36) is moved rapidly, by the tone arm, as the needle enters the trip grooves of the record. The gear engagement pawl (33) then moves in front of and engages the lug on the turntable hub. This causes the drive gear (30) to be rotated far enough so that the teeth on the drive gear will engage the teeth on the turntable hub, starting the change cycle. See figure 2B.

The changer can also be tripped by rotating the reject knob to the left momentarily. The stud on the end of the reject arm (88) moves the gear engagement pawl (33) into position to engage the lug on turntable hub.

As the drive gear begins to rotate, the control cam (90) also rotates, since both parts are mounted on the same shaft. See fig. 4. As the control cam rotates clockwise, drive link roller (109) riding against the cam moves the drive link (107), which in turn rotates the control plate (102). As the control plate rotates, the incline tab (102A) rides across the tone arm lift rod (12), lifting the tone arm from the record. The stud on the arm control lever (23) then is engaged by the safety arm (105) (which rotates with the control plate), moving the tone arm away from the centerpost.

When the tone arm is almost clear of the record, the stud on the push-off link (86) (which is pivoted by the control cam), pivots the push-off arm (79) counterclockwise. Since the push-off arm is held to the push-off plate and shaft (60) by two Allen screws, the push-off plate is also

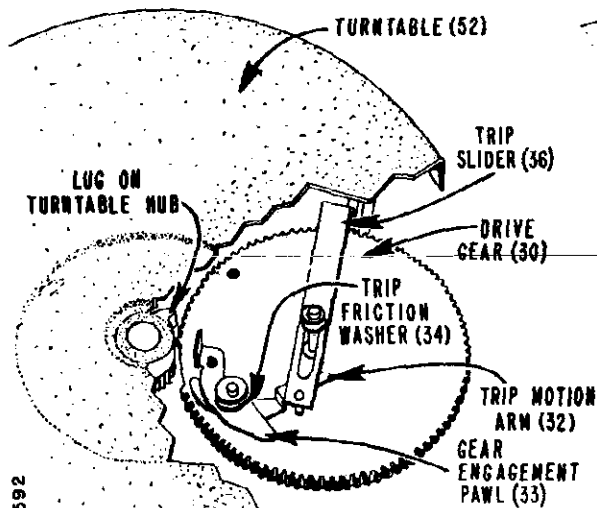


Figure 2A. Drive Gear Position Out of Change Cycle.

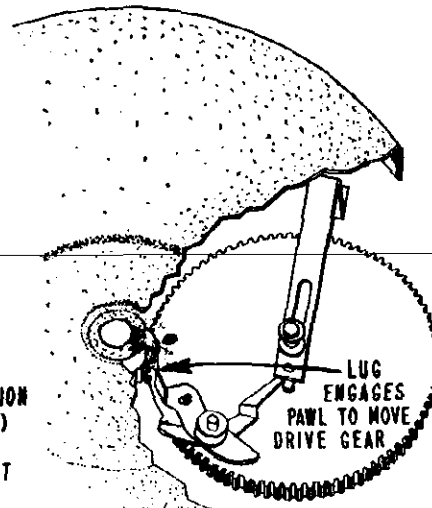


Figure 2B. Drive Gear Position During Change Cycle.

pivoted. Just before the control cam reaches half rotation, the tone arm will be positioned as far as possible from the centerpost, and the push-off plate (60) will "push-off" the record to the turntable.

As the control cam (90) rotates through the second half of the change cycle, the push-off plate is returned by the push-off arm return spring (78) and the remainder of the stack of records drops to the record support (64). See figure 1.

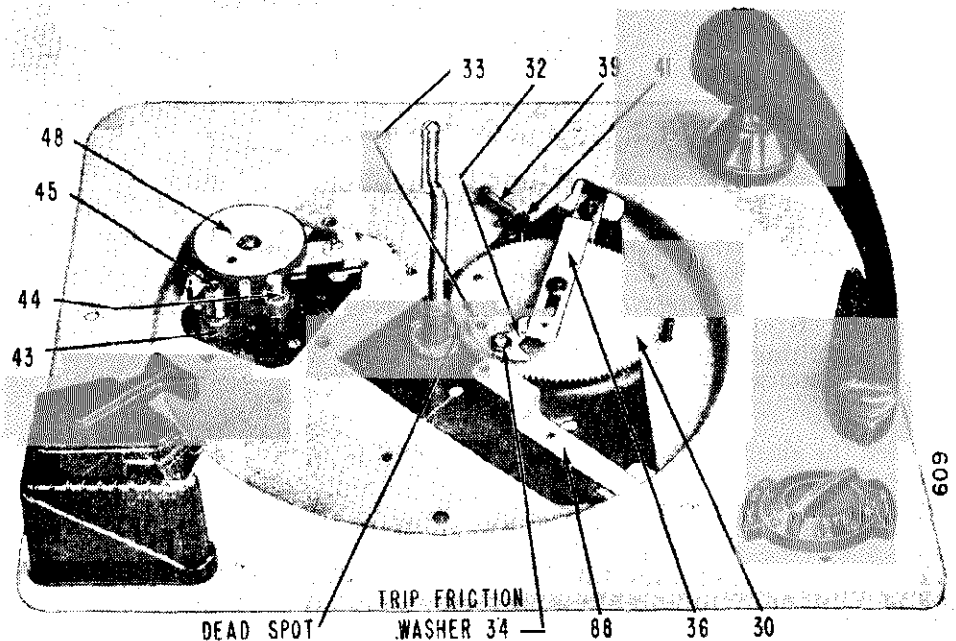
At the same time, the tone arm is returned by the set-down spring (98) which causes the set-down indexing stud on the size change plate (99) to ride against the indexing portion of the arm control lever (23).

The tone arm will move toward the record until the set-down indexing stud on the size change plate has reached the indexing point (end of cut-away section) on the arm control lever. After the arm stops moving inward, the lift rod will ride down the control plate incline (102A), and the tone arm will move toward the record.

Just before the tone arm touches the record, the safety arm engages the stud on the set-down change plate (99) and pivots it away from the arm control lever (23); releasing the tone arm.

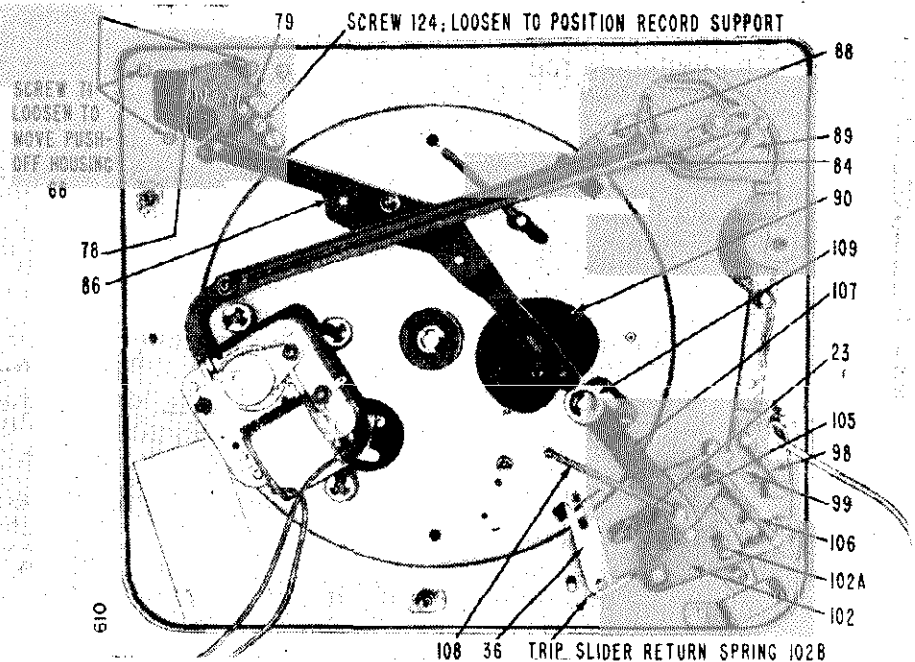
The set-down point is determined by the position of the set-down change plate (99), which can be set for either 7-inch, 10-inch, or 12-inch set-down by the set-down change lever (97) which is controlled by the selector cam (89).

Fig. 3. RC550 Record Changer with Turntable Removed.



For Individual parts detail, see Figure 9, "RC550 Record Changer, Exploded View."

Fig. 4. RC550 Record Changer, Bottom View, Changer Out of Cycle.



MODEL RC550

ADJUSTMENTS

When making the following adjustments, keep in mind that the Push-off, Trip, and Set-Down mechanisms function independently. One of these units may become inoperative without affecting the other two.

VELOCITY TRIP MECHANISM

This record changer uses a velocity type trip, which depends upon a rapid movement of the tone arm toward the centerpost in any area between $2\frac{7}{8}$ " to $7\frac{7}{8}$ " from the center of the record. This trip requires no adjustment. However, in order for the changer to trip properly, there must be sufficient friction between the trip motion arm (32) and the gear engagement pawl (33). If the friction is lost, a small amount of lubricant (such as lubriplate #110) should be placed between these parts. If this does not help, it may be necessary to replace the trip friction washer (34). See Figure 2A.

SET-DOWN ADJUSTMENT

Adjustment of the set-down point, is made by adjusting the set-down adjusting screw (6). See Figure 5. The tone arm will automatically set-down properly on 7-inch or 12-inch records if the set-down adjustment is made properly on a 10-inch record. The set-down adjusting screw is accessible through the hole in the right side of the tone arm. Turning this screw in moves the set-down point of the tone arm closer to the centerpost, and turning this screw out moves it away from the centerpost. Make this adjustment as follows:

1. Place the size and speed selector knob (26) in the "78-10" position.
2. Rotate the reject knob to the left momentarily. Then start to rotate the turntable clockwise by hand.
3. As the change cycle is almost completed, and the tone arm just starts to move down towards the turntable, place a ruler against the centerpost and check the distance between the near side of the centerpost and the needle. This distance should be between $4\frac{10}{16}$ " and $4\frac{11}{16}$ ".
4. If the 10-inch adjustment is correct, the needle should set-down between $5\frac{19}{32}$ " and $5\frac{22}{32}$ " from the near side of the centerpost on 12-inch records, and between $3\frac{1}{4}$ " to $3\frac{5}{32}$ " on 7-inch records.

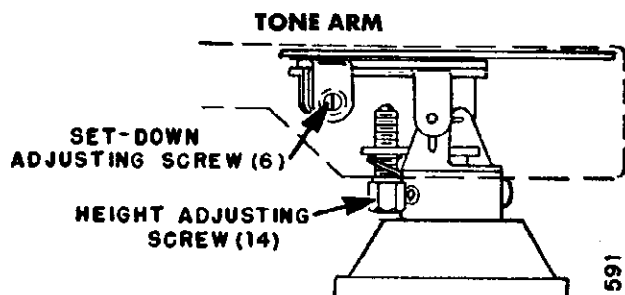


Figure 5. Set-Down and Height Adjustments.

ADJUSTING THE TONE ARM HEIGHT

This record changer is so designed that the tone arm will clear the bottom record of a stack to be played if the needle is $\frac{1}{4}$ " above the changer pan when the changer is not in change cycle and $1\frac{3}{8}$ " above the turntable during change cycle. See Figure 6. With proper tone arm height setting, the tone arm will lift high enough during change cycle to clear a complete stack of records of any type on the turntable. This stack may consist of as many records as specified on page 1. Make this adjustment by placing the size and speed selector knob (26) in the "78-10" position, check the distance between the needle and the changer pan with the changer out of change cycle. If the needle is more than $\frac{1}{4}$ " above the pan, turn the lift adjustment screw (14, Figure 5) counterclockwise; if less, turn clockwise.

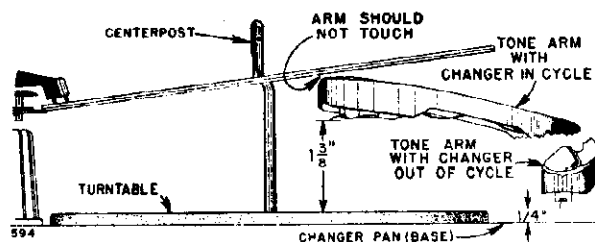


Figure 6. Checking Tone Arm Height.

POSITIONING RECORD SUPPORT (64)

If the record support is not positioned evenly under the bottom record of a stack to be played, one side of the record may drop to the turntable before the other. With the push-off assembly in the 10-inch position, place a 10-inch record over the upper portion of the centerpost so that the edge of the record fits against the edge of the record support (64). See figures 4 and 7. The contour of the record SHOULD follow the contour of the record support. If these contours do not match, position the push-off assembly as follows:

CAUTION: Be sure that the "testing" record has an even edge. For best results, try more than one record.

1. Loosen the screw (124) that holds the push-off positioning arm assembly (75) stationary.
2. Grip the push-off assembly and pivot it to the point where the edge of the record support "lines up" with the edge of the record.
3. Remove the record and tighten the screw (124).
4. Load the changer with a stack of 10-inch records, and "reject" the entire stack to the turntable. Check to see that all records drop to the turntable evenly.

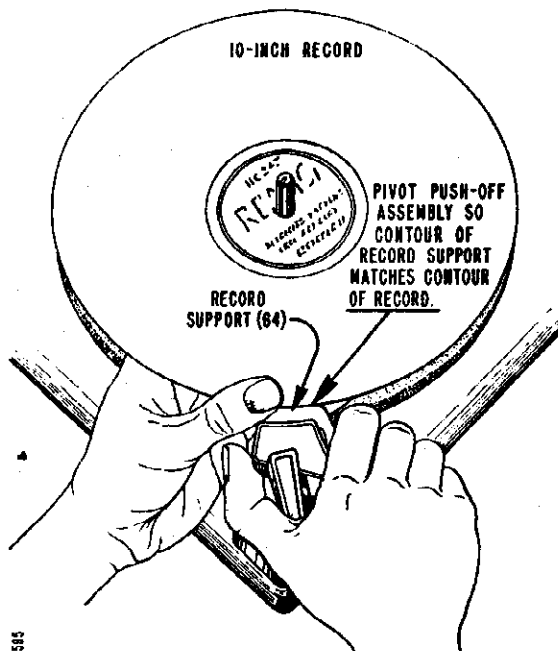


Figure 7. Positioning Record Support with 10-inch Record.

ADJUSTING DISTANCE BETWEEN RECORD SUPPORT (64) AND CENTERPOST (24)

If records do not push-off satisfactorily, or more than one record drops to the turntable during change cycle, it may be necessary to adjust the distance between the centerpost and the record support. See Figures 4 and 8. Make this adjustment as follows:

1. Place the push-off assembly in the 10-inch position.

2. Hold the centerpost as far away from the push-off assembly as possible.
3. Measure the distance from the edge of the record support (64) to the inside edge of the offset shelf on the centerpost. This distance should be between $4 \frac{29}{32}$ " and $4 \frac{31}{32}$ ".
4. If it is necessary to adjust for this distance, loosen the three screws (71) holding the plastic push-off housing (68) to the changer pan. Then move the assembly until the specified distance is obtained.
5. Tighten the three screws, and recheck the distance. Place a stack of records (any size) on the changer, and "reject" each record in the stack to the turntable. Check to see that each record is pushed off satisfactorily. If one side of the record drops to the turntable before the other, it may be necessary to make the "Positioning Record Support (64)" adjustment.

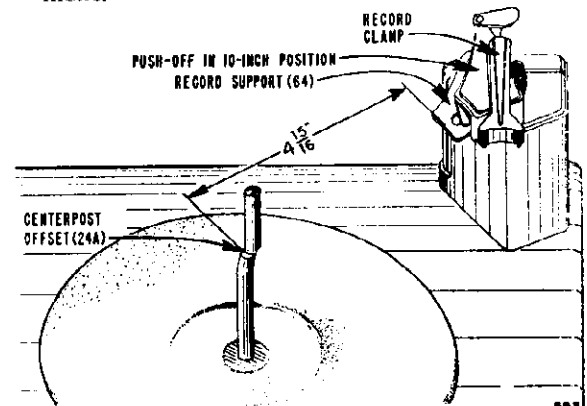


Figure 8. Checking Distance from Centerpost to Record Support.

SERVICE AND REPAIR

When reshipping Changer, be sure to place the Size and Speed Selector Knob in the "78-10" position.

LUBRICATION

DO NOT apply grease or oil to the trip slider (36). Also, under normal operating conditions, the motor should never require oiling.

Friction can sometimes be increased between the gear engagement pawl (33) and the trip motion arm (32), by placing a small amount of Lubriplate #110 between these two parts. Ordinary Vaseline can generally be used as a substitute for Lubriplate #110.

The rest of the changer should be lubricated with grease (such as Lubriplate #107) whenever it comes into the shop for repair or adjustment. A good automobile chassis grease can be used for this purpose. All pivot and friction points should be greased.

The powdered iron roller (109) and oilite bearings (used in the turntable hub and tone arm base) may be lubricated with SAE No. 20 oil.

Care should be taken to prevent any of the lubricant from coming into contact with the idler wheel tire, the rubber drive belts, or any of the rubber grommets. Also be careful, when using oil, that an excess does not seep into the felt of the turntable.

REMOVING AND REPLACING TURNTABLE

To remove the turntable, first remove the turntable retaining clip (51). Be sure that the changer is not in change cycle, and then, grasp the turntable by its edges and lift up. Before replacing the turntable, make sure that the changer is not in change cycle. The pickup arm should be positioned away from the turntable. In replacing the turntable, force is not needed to seat it. Make certain, however, that the idler wheel of the motor has been pushed in towards the centerpost and that the idler wheel is making contact with the inner side of the turntable flange. The idler wheel should be pushed in with a screwdriver or similar flat tool. Do NOT push toward the rear of the changer.

REPLACING SELECTOR CAM (89)

When replacing the selector cam (89), place the size and speed selector knob (26) so "STD-10" lines up with the indicating dot, hold the selector cam in the position shown in Figure 4, and install.

REPLACING CONTROL CAM (90)

Before replacing the control cam (90), be sure that the changer is out of change cycle. Place the control cam in the position shown in Figure 4, and install.

MODEL RC550

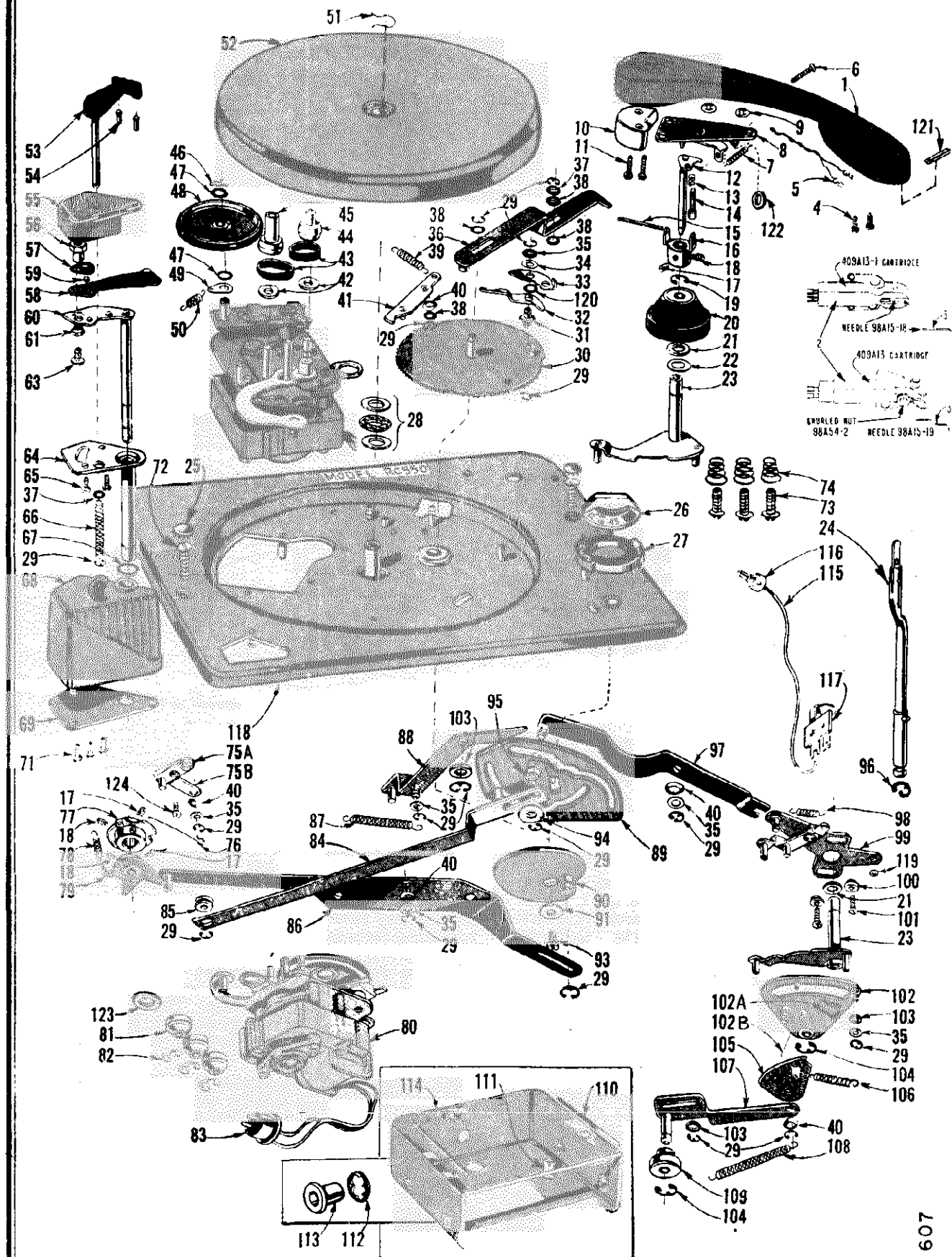


Figure 9. RC550 Record Changer, Exploded View.

REPLACING THE PUSH-OFF INDEX PLATE (77)

Position the push-off index plate (77) as shown in figure 10. Be sure that the Allen screw which is called out "falls into" the milled slot.

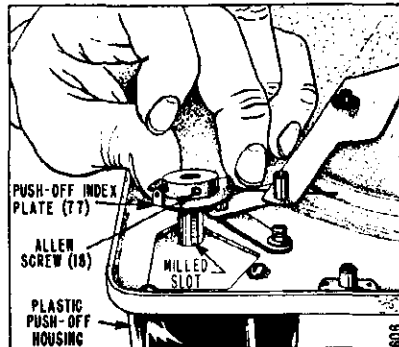


Figure 10. Installing Push-Off Index Plate.

REPLACING THE PUSH-OFF ARM (79)

Place push-off arm (79) over the push-off shaft so that the Allen screw which is called out below fits against the "flat section" of shaft.

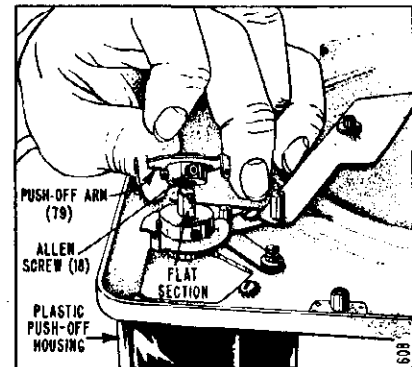


Figure 11. Installing Push-Off Arm.

RECORD CHANGER TROUBLE SHOOTING**Changer Will Not Trip.**

1. Check to see that the trip slider (36) moves freely.
2. Apply small amount of grease between the trip motion arm (32) and the gear engagement pawl (33). See "Velocity Trip Mechanism" on page 4.
3. Check tension on trip friction washer (34). If necessary, replace with new washer.
4. Check for grease or oil on trip slider.
5. Check for broken, loose, or misplaced trip slider return spring (102B, Figure 4). It may have slipped over the stud on the slider.

Changer Repeatedly Trips into Change Cycle.

1. Check tension of gear indexing spring (39).
2. Check for bent trip slider return spring (102B, Figure 4).
3. Check for bent trip slider (36).

Tone Arm Does Not Set-Down Properly.

1. Check set-down adjustment. See "Set-Down Adjustment" on page 4.
2. Check to see that size and speed selector knob (26) has locked into position.
3. Check for broken, weak, or missing control plate return spring (108).

Tone Arm Skips Across Records.

1. Check to see that the cabinet is level.
2. Check for worn needle.
3. Check height adjustment. See page 4.

Changer Causes Rumble or Noise.

1. BE SURE that the shipping screws (72) on each side of changer pan have been removed.
2. Check for any mechanical rub near the 3-speed motor.
3. Check for broken float spring (74).

Records Do Not Push Off or More Than One Record Drops to the Turntable.

1. See "Adjusting Distance Between Record Support and Centerpost" on page 5.
2. Check for broken, missing, or weak push-off return spring (78). The push-off plate (60) may not be returning correctly.

3. Check to see that the push-off assembly is properly locked into position.

4. Check to see that no foreign material is between record support (64) and push-off plate (60).

Changer Trips into Change Cycle Before Finishing Record.

1. Check for foreign material between trip motion arm (32) and engagement pawl (33).
2. Check for bent trip slider return spring (102B, Figure 4).
3. Check for bent trip slider (36).

Records Fall to Turntable Unevenly.

See "Positioning Record Support" on page 4.

Changer Stalls in Change Cycle.

1. Idler wheel (48) rubber tire may have foreign material on it. Try cleaning it with carbon tetrachloride solution.
2. Motor drive belts (43) may be slipping. If necessary, replace with new belts.
3. Be sure push-off assembly locks in position.

CAUTIONS

1. See that the rubber tire on the idler wheel (48), and both drive belts are kept clean from oil, grease, dirt or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts. When handling these parts, keep fingers and hands away from the driving surface. Natural body oils may cause slippage.
2. Always move the size and speed selector knob (26) control until it makes a definite stop and locks into position. Erratic action will result if this is not done.
3. Be sure that the shipping screws (72) on each side of the changer pan are removed. Noise will result from any mechanical vibration, resulting in a rumble in the speaker.

MODEL RC550

RC550 PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	403C51	Tone Arm (Maroon)	61	402A250	Spacer Washer
	403C51 G	Tone Arm (Gold)	63	402A262	Screw, #4-40x5/16 BH MS (includes lockwasher)
2	409A13-1	Pickup Cartridge with needle (push-in type)	64	G400A508	Record Support and Tube Assembly
	409A13	Pickup Cartridge with needle and knurled nut	65	1A72-2-20	Screw, Shakeproof type 25 (#4 x 5/16")
		Cartridges (with needle) are interchangeable	66	405A136	Record Clamp Spring
	98A54-2	Knurled Nut (for 409A13 Cartridge)	67	481-158-47	Washer (.390 x 9/10 x 1/32)
3	98A15-18	Needle for 409A13-1 Cartridge	68	403C50	Push-off Housing (Maroon)
	98A15-19	Needle for 409A13 Cartridge		403C50G	Push-off Housing (Gold)
4	1A72-1-20	Cartridge Mtg. Screw Shakeproof type 25 (2 req.)	69	401A346	Housing Bottom Plate
5	G400A529	Tone Arm Lead and Pin Jack Assembly	71	402A263	Plasticscrew, #6x5/8 R.H. (includes lock washer)
6	45-750-C2-47	Set-Down Adjusting Screw, #4-40x3/4 BH MS	72	402A258	"Hold Down" Screw, #10-32 x 1 1/4" (for shipping only)
7	405A137	Set-Down Adjusting Lock Spring	73	AA210	Mounting Screw and Washer (table models only)
8	G400A526	Tone Arm Mtg. and Pivot Plate Assembly	74	405A139	Float Spring (3 req.)
9	2810-5-59	Speed Nut (2 req.)	75	G400A565	Push-off Positioning Arm Assembly
10	40A31	Tone Arm Counterweight	76	414A40	Push-off Indexing Spring
11	1A70-6-20	Counterweight Retaining Screws, #4 x 5/8" (2 req.)	77	G400A514	Push-off Index Plate and Hub Assembly
12	G400A520	Lift Rod and Plate Assembly			See "Replacing The Push-Off Index Plate (77)" on page 8.
13	405A120	Lift Adjusting Spring	78	405A133	Push-off Return Spring
14	402A245	Lift Adjusting Screw	79	G400A517	Push-off Arm and Hub Assembly (includes Allen screw)
15	414A43	Pivot Shaft			See "Replacing The Push-Off Arm (79)" on page 8.
16	G480A525	Tone Arm Support and Hub (includes set screws)	80	*407B19	*3-Speed Motor Complete, 60 cycle, 117 volts
17	1A43-14	Allen Set Screw, #8-32x3/16" (3 req.)	81	406A19	Motor Mounting Grommet (3 req.)
18	402A247	Allen Set Screw, #8-32x1/4" (3 req.)	82	401A355-4	Motor Mtg. Retaining Ring (3 req.)
19	401A355-3	Retaining Ring	83	88A8-1	Phono Motor Plug
20	403A32	Tone Arm Plastic Base (Maroon)	84	G400A580	Motor Shift Link (includes rubber grommet)
	403A32 G	Tone Arm Plastic Base (Gold)	85	406A24	Speed Change Link Grommet
21	401A358	Spacer Washer	86	G400A562	Push-off Link and Stud Assembly
22	401A284	Bronze Washer (.316 x 15/32 x .005)	87	405A140	Reject Return Spring
23	G400A542	Arm Control Lever and Shaft Assembly	88	G400A581	Reject Arm and Stud Assembly
24	G400B505-1	Centerpost	89	401B365	Selector Cam (When replacing, see "Replacing Selector Cam (89)" on page 5.)
25	13A2-8-57	Snap-in Buttons	90	G400A548	Control Cam and Stud Assembly
26	403A59	Size and Speed Selector Knob (Maroon)			See "Replacing Control Cam (90)" on page 5.
	403A59G	Size and Speed Selector Knob (Gold)	91	401A145	Control Cam Washer
27	G400A582	Reject Knob (Maroon)	93	402A265	Screw, #8/32x3/4" BH (includes lock washer)
	G400A582G	Reject Knob (Gold)	94	481-78-47	Washer (.196x1/2x1/6)
28	415A11	Thrust Bearing	95	402A254	Selector Cam Stud
29	401A355-1	Retaining Ring	96	401A355-3	Centerpost Retaining Ring
30	G400A532	Drive Gear and Stud Assembly	97	G400A579	Set-Down Change Lever
31	402A229	Trip Pivot Stud	98	405A130	Set-Down Spring
32	401A351-1	Trip Motion Arm	99	G400A546	Set-Down Change Plate and Arm Assembly
33	401A352	Gear Engagement Pawl	100	402A238	Spacer
34	401A353	Trip Friction Washer	101	1A70-11-20	Plasticscrew, #6 x 7/16"
35	481-68-47	Washer (5 req.)	102	G400A537	Control Plate Assembly
36	G400A575	Trip Slider	103	401A173	Washer
37	481-67-47	Washer (.196 x 5/16 x 1/32)	104	401A355-2	Retaining Ring
38	482-178-0	Washer (.196 x 3/4 x 1/64)	105	401A345	Safety Arm
39	405A134	Gear Indexing Spring	106	405A131	Safety Spring
40	405A22	Spring Washer	107	G400A538	Drive Link and Stud Assembly
41	G400A549	Gear Indexing Arm and Stud Assembly	108	405A132	Control Plate Return Spring
42	98A15-9	Oil Retaining Felt Washer (2 req.)	109	415A27	Drive Link Roller
43	406A20	Drive Belt (2 req.)	110	403A38-1	Plastic Trim (2 req.)
44	98A15-11	45 RPM Drive Shaft (60 cycles)	111	32A88	Antenna Lead Support
45	98A15-10	33 RPM Drive Shaft (60 cycles)	112	2810-10-59	Speed Nut (4 req.)
46	405A15	Idle Wheel Retaining Clip	113	27A24	Bottom Cover Bushing (4 req.)
47	412A30	Fibre Washer (2 req.)	114		Bottom cover
48	G400A279	Idle Wheel Assembly	115	413A11-1	Shielded Cable (Includes plug, 15")
49	98A15-21	Idle Wheel Tie Lug	116	88A2-3	Plug (for lead-in cable)
50	98A15-20	Idle Wheel Spring	117	10B1-18	Terminal Board
51	414A36	Turntable Retaining Clip	118		Changer Pan
52	G400B507	Turntable	119	415A28-2	Ball Bearing (5/32 diameter)
53	G400A511	Record Clamp and Shaft and Rubber Tips (Maroon)	120	412A36	Fibre Washer (.196 x 3/4" x .005)
	G400A511 G	Record Clamp and Shaft and Rubber Tips (Gold)	121	414A45	Tone Arm Weight
54	406A25	Record Clamp Rubber Tip (2 req.)	122	481-19-47	Washer (.125 x 1/4 x 1/32 Steel)
55	403B53	Push-off Plastic Cap (Maroon)	123	412A36	Motor Mounting Washer
	403B53 G	Push-off Plastic Cap (Gold)	124	402A264	Screw, #6-32 x 3/16" BH
56	402A249	Push-off Plate Nut			
57	401A326	7" Record Support Detent Spring			
58	G400A510	7" Record Support			
59	415A28-1	Ball Bearing (1/4" diameter)			
60	G400A509	Push-off Plate and Shaft Assembly			

PARTS FOR CONVERTING 407B19 MOTOR TO 50 CYCLE

45 RPM Drive Shaft (50 cycles).....	98A15-15
78 RPM Drive Shaft Spring (50 cycles).....	405A113
33 RPM Drive Shaft Spring (50 cycles).....	405A112

*407B19 motor is not used on "Canadian Admiral" chang- 60 cycle, 105 to 125 volts.....407X19-60
ers. For Canadian Admiral replacement motors order: 125 cycle, 105 to 125 volts.....407X19-25

GENERAL

This single post and single tone arm record changer is designed for dual speed operation (33 $\frac{1}{3}$ or 78 revolutions per minute) from a power source of 110 volts at 60 cycles. It will play the Standard Groove or Microgroove type records for these speeds, a single record at a time or a series of twelve 10-inch or ten 12-inch records. *Note: Never stack together the Standard and Microgroove records intermixed for automatic operation as playing of each type record requires special attention to the pickup discussed below.*

The tone arm is designed to use either of two pickup heads which are interchanged by a plug arrangement at the end of the tone arm. The pickup heads are finished in color for identification. The TAN head is used to play Standard Groove records while the RED colored head is for Microgroove reproduction. *Always use the TAN head with Standard Groove records and the RED head with Microgroove records.* Use of the wrong head is certain to result in damage to records and pickup stylus.

RECORD PLAYER OPERATION

TO PLAY STANDARD RECORDS (78 RPM) 10-INCH OR 12-INCH—Rotate speed change switch to Std Play and plug the standard pickup cartridge (tan) into the pickup arm. The record player may then be operated manually or automatically, as outlined below, for either 10-inch or 12-inch records.

TO PLAY LONG PLAYING (MICROGROOVE 33 $\frac{1}{3}$ RPM) RECORDS 10-INCH OR 12-INCH—Rotate the speed change switch to Long Play and

plug the microgroove pickup (red) into the pickup arm. The record player may then be operated manually or automatically as outlined below for either 10-inch or 12-inch records.

TO PLAY 33 $\frac{1}{3}$ RPM STANDARD GROOVE RECORDS—Rotate the speed change switch to Long Play and plug the standard pickup cartridge (tan) into the pickup arm. The record player may then be operated manually or automatically as outlined below for either 10-inch or 12-inch records.

CAUTION—To avoid damage to the pickup stylus and to the record surfaces, do not allow the standard pickup cartridge to be used on the microgroove records. Do not drop the pickup arm onto the record.

To prevent depressions, which cause "WOW" and poor reproduction, from forming in the rubber drive wheel always return the speed change knob to the neutral or center position.

MANUAL OPERATION

Raise the *hinged shelf* for 10-inch records and the *hold-down arm* into a vertical position. Slip the record down over the *spindle* onto the turntable. Turn the record mechanism *control knob* to the **MANUAL** position. This will start the turntable rotating. Gently lower the tone arm on the first groove of the record. When the record is through playing, return the tone arm by hand to its rest position. Stop turntable rotation by turning *control knob* to **OFF** position. When through playing phonograph, turn the *Phono-Radio control* to its **OFF** position.

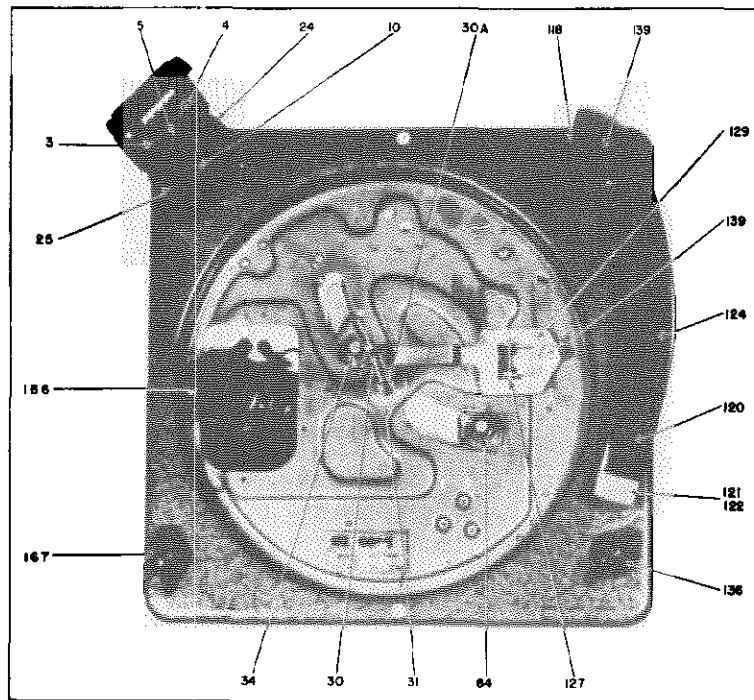
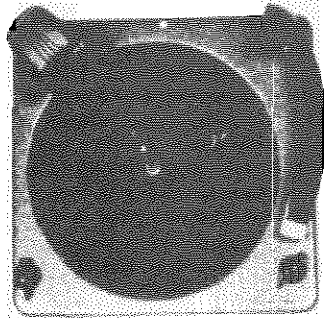


Fig. 1. Top View of Record Changer

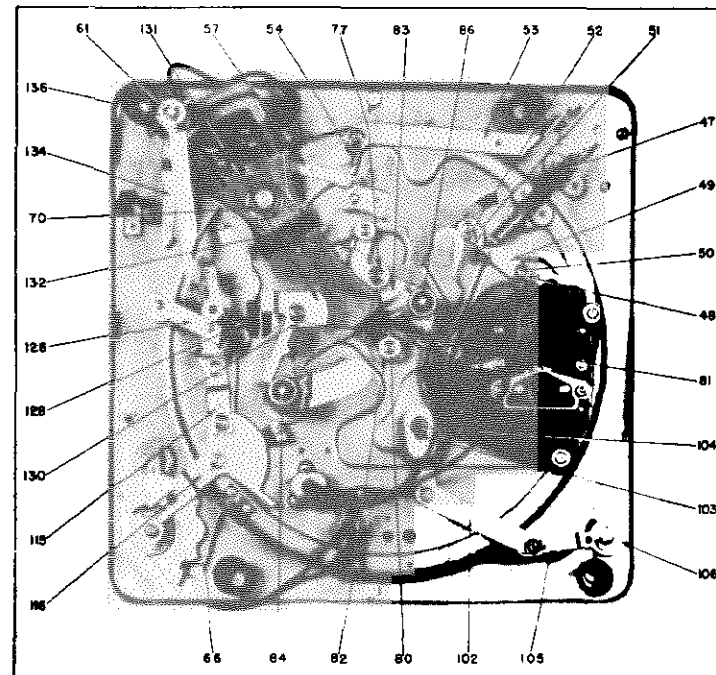


Fig. 2. Bottom View

MODEL P13

AUTOMATIC OPERATION

Before placing records on the changer make sure the tone arm is placed on its rest. The *hold-down arm* should be in a vertical position to permit stacking of records. If 10-inch records are to be played, lower *hinged shelf* for 10-inch records to horizontal position. For 12-inch records raise the *hinged shelf* for 10-inch records into a vertical position, and rest the records on the *shelf* for 12-inch records. Place stack not to exceed twelve 10-inch or ten 12-inch records over *spindle* supported in the center on the record shelf of spindle, and at one side by the shelf for 10-inch or 12-inch records as the case may be. Place the *hold-down arm* to rest on the top record of the stack to be played. This steadies the records and assures correct dropping of records. Do not intermix 10-inch and 12-inch records.

Turn the phono *control knob* to **REJECT** position and release it. The changer will now play the entire stack and repeat the last record. To shut off phonograph before or after all records are played, turn *control knob* to **OFF** and lift tone arm and move it out to the rest position.

If you wish to reject a record before it has finished playing, turn the *control knob* to **REJECT** and release it. The changer will reject the record and then continue to play the remainder of the stack.

Before removing records, it is advisable to drop all unplayed records onto turntable by repeatedly turning *control knob* to **REJECT** position. After last record has dropped down on turntable, lift the tone arm and place it on its rest while the turntable and records are rotating. Turn *control knob* to **OFF** position. Raise *hold-down arm* and *shelf* for 10-inch records into vertical position. Lift records from turntable. If through operating the phonograph, turn the Phono-Radio control to **OFF** position.

PICKUP CARTRIDGE

The Model P13 record changer is equipped with two pickup arm cartridge heads, each containing a General Electric Variable Reluctance Cartridge incorporating a replaceable stylus assembly. The "TAN" colored head is plugged into the end of the pickup arm to play wide groove records known as the Standard type. The "RED" colored head is similarly inserted into the arm when using the Long Playing Microgroove records.

SERVICE—The stylus assemblies may be removed readily from the cartridge for replacement. Instructions for replacement are supplied with each new Replaceable Stylus Assembly catalogued in the replacement parts lists on the last page of this publication.

To insure optimum performance from the cartridge, its stylus, magnetic pole pieces, and gaps should be cleaned periodically of foreign particles accumulated from the record surfaces. A soft bristle brush similar to Cat. No. RQB-001 should be used to clean these parts. The gap clearance between stylus and each of its pole pieces has been adjusted to be not less than .011 inch. Care should be taken not to disturb this adjustment during service adjustment or cleaning.

OPERATING PRECAUTIONS

1. Do not, under any circumstances, connect the motor to a source of direct current or to alternating current other than that specified by the label.
2. Do not allow oil or grease to come in contact with the rubber tired friction drive wheels (166) or the Velocity Trip Arm friction washers, part of item (134).
3. Never use force to start or stop the motor, or any part of the record changer mechanism.
4. Do not intermix Microgroove records with the Standard Groove type.
5. Make certain the correct pickup head is used to play the desired records. The TAN head (121) is for Standard Groove recordings, while the RED head (122) is used to reproduce Microgroove recordings.
6. Always make certain that the Speed Control is set to the proper speed position as required for the type of record.
7. Use only records in good condition for automatic operation. For warped, odd size, or home recorded records, play as for manual operation.
8. Do not store the records upon the record post and spindle or on the turntable as they may warp, especially if the temperature is high.
9. When through operating the record changer, make certain the Speed Control (167) is returned to the "OFF" position. This prevents a damaging flat surface upon the rubber tired drive wheels otherwise developed as the motor drive shaft bears pressure upon them when the record changer remains idle for long periods engaged in either of the speed positions.

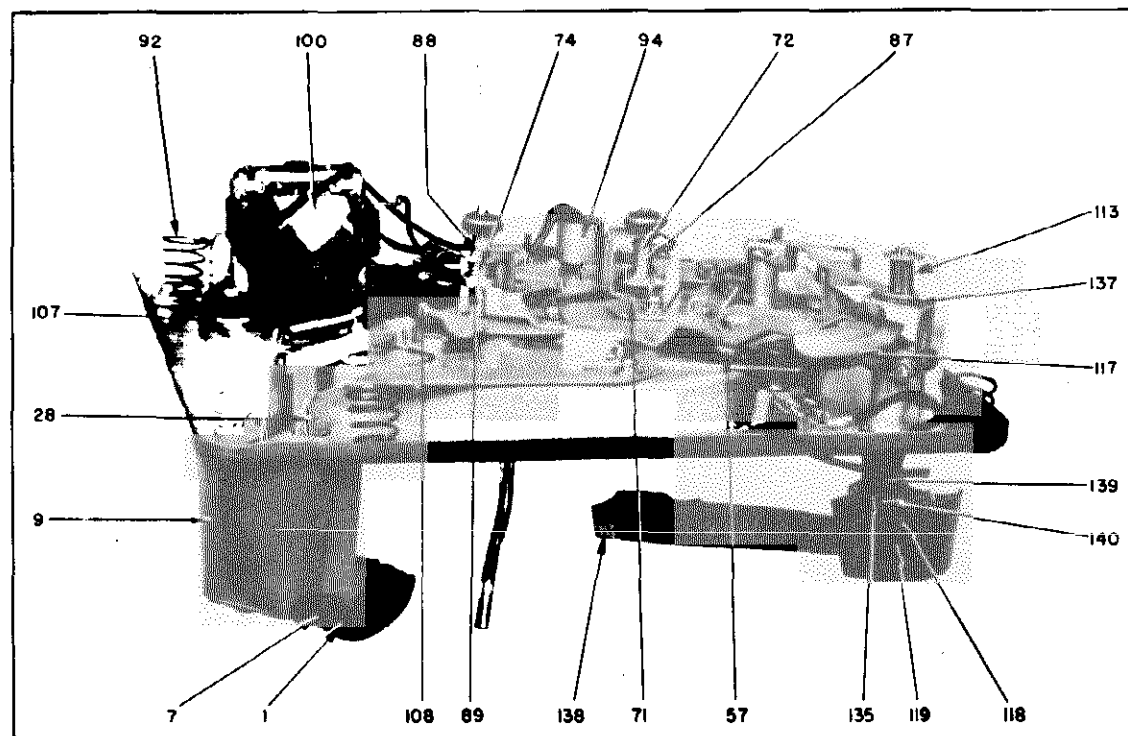


Fig. 3. Bottom View

CYCLE OF AUTOMATIC OPERATION

The following titled paragraphs describe in sequence each action of the record changer mechanism through the automatic cycle of operation.

INITIATING THE CHANGE CYCLE—Rotate the control knob (136) to auto position. This action closes switch and starts motor which turns the turntable. Rotating the control button to reject causes reject control link lever (115) to strike velocity trip lever (126) whose trip dog trips lead pin drop lever (131) from under swing plate lead pin (34). The lead pin (34) is pushed upward by compression spring (87) and engages the spiral on bottom side of turntable. As the turntable rotates, the spiral moves the lead roller (34) towards the center spindle, causing the swing arm (132) to rotate on its pivot.

PICKUP ARM MOVEMENT—The swing plate assembly (132) operates the pickup arm lift pin, thus raising and lowering the pickup arm. The swing plate assembly (132) also engages the velocity trip arm (134) through the swing plate friction spring (61), causing the pickup arm to move into its proper position in the change of cycle. The brake spring (81) assures a gentle lowering of the pickup arm onto the record. The swing arm then moves free of the velocity trip arm (34), allowing free action of the pickup arm.

RECORD FEED—As swing arm (132) approaches the end of the first half of its cycle, it comes in contact with and pushes the lever bearing washer and ejector idler lever (49). This lever, in turn, pushes the ejector push pin which moves the ejector lever (28) to operate either 10-inch or 12-inch record push-off plate, pushing off 10-inch or 12-inch records respectively.

PICKUP ARM INDEXING—The index of the pickup arm is set for 10-inch or 12-inch records by the position of the 10-inch record support (3) which controls the index change lever (53). The change lever (53) operates the pickup arm swing index lever (57).

COMPLETING CHANGE CYCLE—At the end of the first half of cycle, the dropping lever (83) contacts the lever trip bracket and allows the return cam and pin (89) to rise into the outer turn of the spiral on the under side of the turntable. At the same time, the lead cam and pin (71) is pushed out of the spiral by the cam at the center of the turntable and is locked out of the spiral by the lead roller drop lever (131). The turntable continues to rotate and the swing arm returns, and the return pin is pushed out of the turntable spiral and locked into that position by the return pin lock lever (83) completing the change of cycle.

AUTOMATIC TRIP—After the record has been played, the pickup stylus (121) follows the eccentric record grooves toward the spindle. The change in velocity of the pickup arm (124) at this point also causes a change in velocity of the velocity trip lever (126) which is coupled to it through a spring friction drive. At this velocity, enough striking pressure is brought to bear upon the velocity trip lever (126) by the trip lever, causing the upper velocity trip lever assembly (129) to be brought closer to the center of turntable. The revolving cam on the underside and center of the turntable carries the upper assembly of the velocity trip lever (129) to a position where the trip lever trip dog on item (129) triggers the lead pin drop lever (131) from under lead pin cam. The lead pin then drops into position, engaging spiral cam of turntable to start a new change cycle.

SERVICE ADJUSTMENTS

1. PICKUP ARM DROP POINT ADJUSTMENT:

(A) With the control knob in the off position, rotate turntable until swing arm (132) allows index swing arm lever (57) to move into position to contact index arm. Loosen index arm screw and move tone arm so that needle lands approximately $\frac{1}{8}$ inch from edge of record. Tighten screw on index lever. Note 10-inch record support (3) should be horizontal for 10-inch indexing adjustment. (B) Index arm lever spring (54) should actuate index arm lever (57) as swing arm moves through its cycle.

2. RECORD SUPPORT POST ADJUSTMENT:

Trip changer and rotate turntable by hand until the swing arm has completed the first half of its cycle.

(A) Adjust screw (52) so that 12-inch push-off slide plate (10) extends $\frac{3}{8}$ inch past the ears of the record support post.

(B) If 10-inch records fail to drop, check to see if the 10-inch record support (3) rests on the edge of the record support post and not on the 12-inch push-off slide plate.

(C) Either 10- or 12-inch records fail to drop. Check to see that ejector arm spring (47) returns. Lower push pin and ejector lever (28) to the neutral position.

3. AUTOMATIC TRIP:

(A) Friction parts of the automatic trip arm (part of item 134) should be kept free of grease or oil. Clean if necessary with carbon-tetrachloride, or equivalent solvent.

(B) If mechanism fails to trip, it may be necessary to stretch spring (113) to increase friction of automatic trip arm.

(C) Make certain the automatic trip arm is aligned to strike the arm of the automatic trip lever assembly (126). Bend arm slightly if necessary.

LUBRICATION

Use Lubriplate, or equivalent, on the following:

1. Ten-inch record push-off plate (4) and 12-inch record push-off plate (10).
2. Cam swing plate lead and return pin at bottom of items 72-88.
3. On slide bolt operated by item (49).

Use Millicott 70K, or equivalent, on the following:

1. On edges of slots where swing arm clamps, slide on mounting plate.
2. Sloping edge of cammed dropping lever assembly (83).
3. Between friction washer at bottom of item (132).
4. Lever bearing washer (48). Part of item (49).
5. Ejector idler lever pivot pin on item (49).
6. Cammed dropping lever roller and pivot pin (83).
7. Index arm lever pivot pin (57).
8. Change lever fulcrum pin and slide washer (53).
9. Guides at bottom turntable (125).

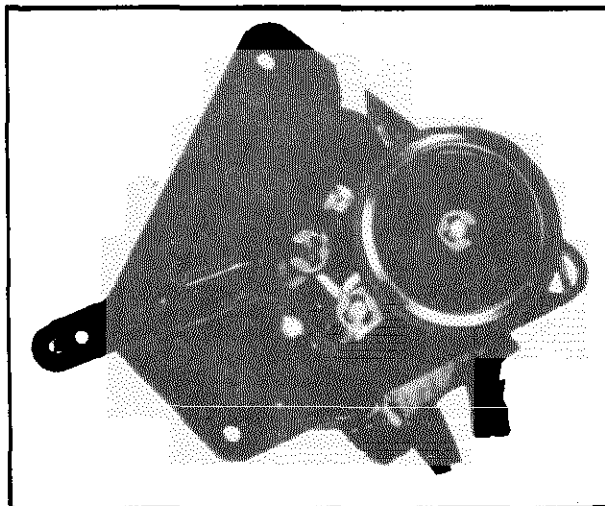
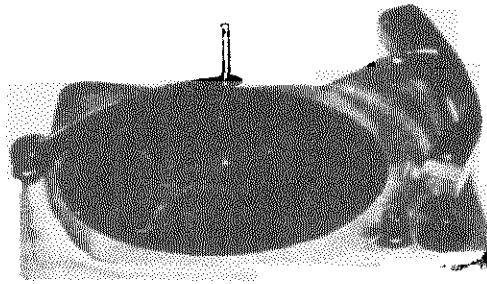


Fig. 4. RBH-011

Two-speed phone meter with idler wheel switching cam

TROUBLE SHOOTING CHART

SYMPTOMS			REMEDIES OR CAUSES		
RECORD SELECTION:					
1. Records fail to drop.			1. Check adjustments 2A, 2B, 2C, 3A, 3B and 3C.		
2. More than one record drops.			2. Check slider at top of spindle.		
TOPE ARM MOVEMENT:					
1. Tone Arm lands incorrectly.			1. Check adjustment 1A and 1B.		
2. Tone Arm descends onto record too fast.			2. Check friction brake spring (81) (spring may be too weak to slow swing arm at end of cycle).		
3. Does not lower onto record.			3. Check adjustment of acorn nut top of tone arm lift pin. Check end of swing plate, see that it is not bent.		
TRIPPING AND CYCLING:					
1. Changer fails to trip.			1. Check adjustment 3A, 3B, 3C.		
2. Changer changes too soon.			2. Check adjustment 3A.		
3. Changer trips continuously.			3. Check selector lever spring (66).		
4. Changer fails to cycle after tripping.			4. Adjustment (3B).		
5. Changer jams at start of the change cycle.			5. Check to see that return roller (34) is held out of turntable spiral by cammed dropping lever (83) and cammed dropping lever spring (77).		
6. Changer jams in the last half of change cycle.			6. Check to see that dropping lever torsion spring (77) is strong enough to actuate dropping lever (83) to prevent lead roller from re-entering the spiral on second-half of changer cycle.		
7. Changer action is sluggish or fails to trip.			7. Check lubrication.		
MOTOR:					
1. Changer is sluggish or motor overheats.			1. (a) Check lubrication, oil old or gummy. (b) Incorrect line voltage. (c) Defective motor.		
2. Motor rumble heard in record reproduction.			2. (a) Shipping bolts not removed from motor board. (b) Flat spot on idler wheel (166).		
Cat. No.	Item	Description	RMA-007	116	LEVER PLATE—"Off-Manual-Auto-Reject" lever plate
RAP-015	120	COVER PLATE—Aluminum retainer cover for pickup head receptacle	RMB-014	34	PIN AND ROLLER—Swing plate lead or return pin
RBH-011	100	MOTOR—Two-speed phono motor assembly	RMB-016	140	BUSHING—Centers pickup arm spring with pickup arm lift pin
RDK-128	36,157	CONTROL KNOB—"Off-Manual-Auto-Reject" or motor speed control knob	RMB-017	139	BALL BEARINGS—3.32-inch diameter, set of 15 used in tone arm pivot, one used in assembling item
RHG-023	103	GROMMET For motor speed lever	RME-001	9	EJECTOR MECHANISM HOUSING—Cast metal case
RHJ-008	82	SPACER Spacing collar for record spindle	RML-027	115	LINK LEVER—Reject control lever (linked to item RMA-007)
RHM-044	84	ROLLER BEARING SPEED NUT—Holds item 34	RML-028	126	VELOCITY TRIP LEVER—Lower assembly consists of: lever flat spring stop, balanced fulcrum, and pivot pin
RHM-045	86	WASHER—Rubber cushion for item 34	RML-029	129	VELOCITY TRIP LEVER—Upper assembly consists of: lever, trip dog, and trip dog pin
RHN-007	80	NUT—Record spindle mounting nut	RML-030	131	DROP LEVER—Operates lead pin and roller, item 134
RHW-020	136	WASHER—Square center steel washer in velocity trip arm assembly	RMM-062	3	SUPPORT—10-inch record support
RHW-021	137	WASHER—Velocity trip arm friction washer (round hole)	RMM-063	31	WASHER—Reinforcement washer beneath spindle
RJP-003		PLUG 110 volt, two prong male plug			
RMA-003	1	RECORD STABILIZER WEIGHT			
			RMM-064	48	BRASS WASHER—Lever bearing washer for item 49
			RMM-065	71	CAM Swing plate lead pin locking cam
			RMM-066	72,88	SPACER—For item 34
			RMM-067	89	CAM Swing plate return pin locking cam
			RMM-069	4	10-INCH RECORD—Push-off plate
			RMM-070	8	HINGE BRACKET—For items 1 and 3
			RMM-071	10	12-INCH RECORD—Push-off plate
			RMM-072	53	INDEX LEVER—Index change control lever
			RMM-073	57	LEVER—Indexes pickup arm swing lever (134)
			RMM-076		WASHER—Slide washer (beneath item RMM-077)
			RMM-077		PIN Lever fulcrum pin fastens item 53
			RMM-080		PIN—Record changer deck lever fulcrum pin (part of item 57)
			RMM-108	102	LEVER Motor speed lever
			RMM-109	104	"C" WASHER—"ON" motor speed lever, velocity trip, idler wheel, and idler wheel linkage
			RMM-110	105	LEVER—Motor speed change lever
			RMM-111	106	WASHER—Friction washer
			RMM-112	107	SPACER—Thin motor spacer
			RMM-113	108	SPACER—Thick motor spacer
			RMM-122	128	TRIP DOG—Part of item RML-029 (trips item 131, RML-030)
			RMP-012	7	PIN—Hinge pin for item 8
			RMP-016	50	PIN LEVER—Lever fulcrum pin for item 49
			RMP-019	117	PICKUP ARM LIFT PIN
			RMP-020	118	PICKUP ARM HINGE PIN
			RMP-022	127	PIN—Hinge pin for trip dog (part of item RML-029)
			RMS-131	5	SPRING—Ejector compression spring for 10-inch record push-off plate
			RMS-133	24	SPRING—Balance arm spring for record stabilizer weight
			RMS-134	25	SPRING—For 10-inch record support
			RMS-135	30A	WASHER—Friction washer for record spindle
			RMS-136	47	SPRING—Ejector arm extension spring
			RMS-137	54	SPRING—Lever spring for item 53
			RMS-138	61	SPRING—Friction spring on swing plate
			RMS-139	70	RING—Engages item 13A for swing plate assembly
			RMS-140	74,87	SPRING—Compression spring on item 34
			RMS-142	79	SPRING—Cammed dropping lever tension spring on item 83
			RMS-143	81	SPRING—Friction brake spring
			RMS-144	92	SPRING—Mounting springs on main plate
			RMS-146	66	SPRING—Selector lever index spring
			RMS-185	119	SPRING—Pickup arm spring
			RMS-187	130	SPRING—Used with drop lever, item 131, RML-030
			RMS-188	133	SPRING—Velocity trip arm spring
			RMT-016	125	TURNTABLE
			RMU-040	30	RECORD SPINDLE ASSEMBLY
			RMW-057	166	IDLER WHEEL
			RMX-111	28	EJECTOR PIVOT CHANNEL SUB-ASSEMBLY
			RMX-112	49	LEVER ASSEMBLY—Ejector idler lever assembly, including items 51 and 52
			RMX-114	83	LEVER—Drop lever assembly for swing plate return pin
			RMX-142	132	SWING PLATE ASSEMBLY—Operates pickup arm swing lever, item 34, and ejector idler lever, item 49 (assembly includes all attached parts)
			RMX-143	134	LEVER AND VELOCITY TRIP ARM—Pickup arm swing lever and velocity trip arm assembly
			RMX-144	135	PIVOT POST—Pickup arm pivot post with hinge bracket
			RPA-011	124	PICKUP ARM—Pickup arm shell with leads and pickup receptacle
			RPH-009	121	STANDARD PICKUP HEAD ASSEMBLY—Tan colored die cast head, complete with male connector
			RPH-010	122	LONG-PLAY PICKUP HEAD ASSEMBLY—Red colored die cast head, complete with male connector
			RPX-040	15	PICKUP CARTRIDGE—Includes 3 mil sapphire replaceable stylus, RPJ-001
			RPX-041	114	PICKUP CARTRIDGE—Includes 1 mil sapphire replaceable stylus, RPJ-005
			RSW-052	94	SWITCH—Phono motor switch
			RWP-004	138	BALLAST WEIGHT—Used in tan pickup head only



GENERAL.

The Model P14 is a three-speed record changer for playing records of $33\frac{1}{3}$ rpm, 45 rpm or 78 rpm with either standard grooves, wide grooves or narrow grooves (microgrooves). The changer has two plug-in heads to change from 1 mil pickup for playing narrow groove records to a 3 mil pickup for playing standard or wide groove records. The 1 mil head has a red color, while the 3 mil head has a brown color. The record changer will play automatically 10- and 12-inch, $33\frac{1}{3}$ rpm or 78 rpm records intermixed and automatically 7-inch 45 rpm or $33\frac{1}{3}$ rpm records.

INSTALLATION—The record player is designed to operate from a 110-120 volt, 60 cycle per second power supply.

Mounting screws are supplied with the record changer to hold it secure during shipment. These screws are located on the plate under the turntable. The mounting screws should be turned clockwise to allow the record changer to float freely on its grommets. Before the turntable can be fully seated, the drive wheel (124) must be gently pushed back out of the way to prevent damage to the rubber tire. In case of reshipment of the receiver, these screws should be turned counterclockwise to draw the changer base plate down firmly against the mounting board. Do not remove these mounting screws.

LEVELING RECORD CHANGER—It is important to check that the record changer is absolutely level. Use a torpedo or similar type level on the record changer baseplate. Use adequate shims to level the record changer pan or radio combination cabinet to

obtain perfect level. If changer is used for a new installation consult Fig. 7 for motorboard cutout, etc.

OPERATION.

TO PLAY A SINGLE RECORD—(See Fig. 1.) To play single records or home recordings, lift up the record support (1) and move it counterclockwise out of the way. Place the record on the spindle and lower to the spindle shelf. Tilt the record down towards the rear of the tone arm and lower the record to the turntable. Place the proper pickup head into the pickup arm (brown for standard groove records, or red for microgroove records). Turn the Control Knob (34) to proper speed position. Turn the Control Knob (42) to "ON" position, and trip the Index Trigger (14) on the rear inside of the Pickup Arm. Place Pickup Arm on the record with the stylus in the leading groove of the record. Then replace record support (1) over spindle.

TO PLAY 10-INCH AND 12-INCH RECORDS (78 RPM AND $33\frac{1}{3}$ RPM) AUTOMATICALLY—Lift the record support and rotate until pin drops into locating groove. Place ten 12-inch or twelve 10-inch records, or ten 10-inch and 12-inch records intermixed over the spindle and lower to the offset shelf.

(Note: Standard and long-play or microgroove (78 rpm) and fine-groove (45 rpm) records cannot be intermixed for automatic operation, as a different type of stylus has to be used for each type of record.)

Hold records level and place record support over spindle. Plug in the proper head into the pickup arm (brown for standard

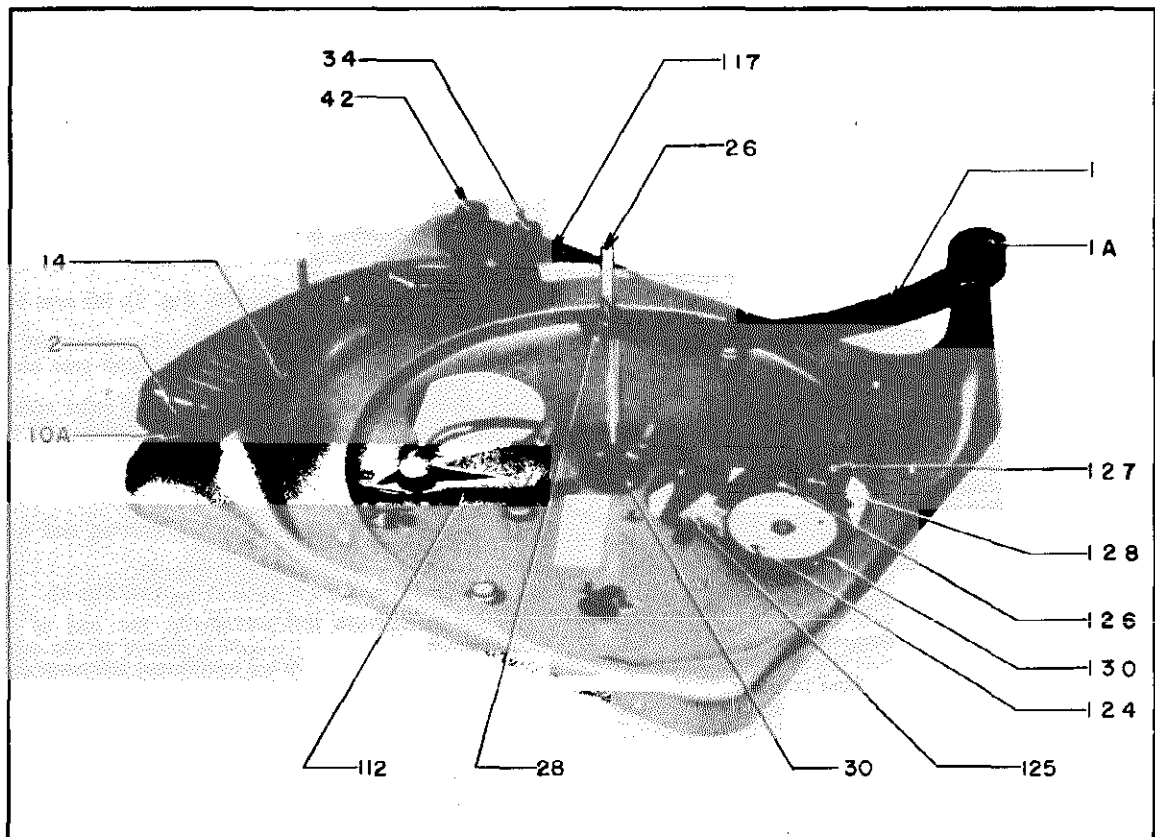


Fig. 1. Top View

MODEL P14

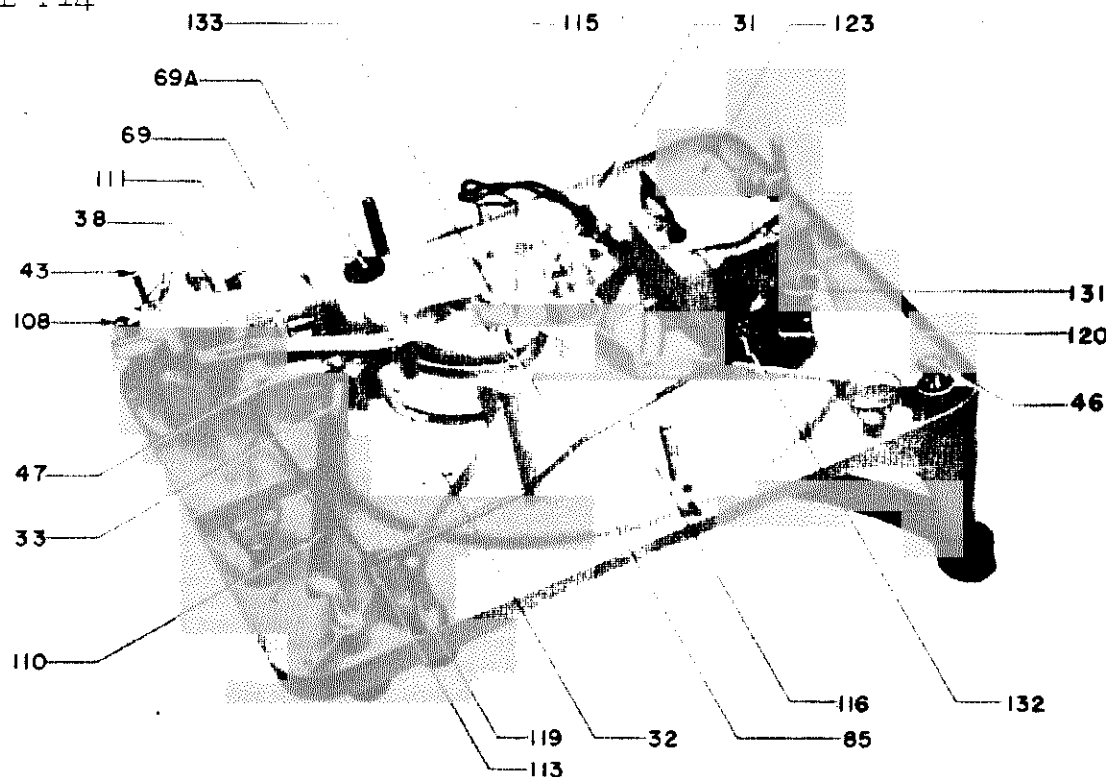


Fig. 2. Bottom View

groove, and red for microgroove ($33\frac{1}{3}$ rpm) and fine-groove (45 rpm) records. Rotate the motor speed control knob (34) to the 78 rpm position or 33-10"-12" position for 10- or 12-inch long-play $33\frac{1}{3}$ rpm records.

To start the changer operating, turn the changer control knob to "Rej." and release. The changer will operate automatically until the last record has played. The pickup arm will return to the rest and the changer will automatically stop.

TO PLAY FINE-GROOVE (45 RPM) RECORDS—Turn motor speed knob to the 45 position for the 7-in. fine-groove 45 rpm records. Insert the record adapter which will hold the records with its $1\frac{1}{2}$ -in. spindle. Be sure that the pickup arm carries the red pickup head.

REJECTING A RECORD—To reject a record at any time while changer is operating, turn changer control knob to "Rej." and release.

STOPPING THE RECORD CHANGER—To turn off the record changer before the automatic shut-off, turn the changer control knob to the "Off" position and lift pickup arm and place it on its rest position.

UNLOADING RECORDS—Lift the record changer support and rotate it counterclockwise until pin on the shaft drops into the locating groove. Lift the stack of records straight up off the spindle.

REPEATING OF 7-, 10- OR 12-INCH RECORDS—To repeat records, place record on the turntable, the record support off the spindle and start changer. Records repeat until control is turned to "OFF" position.

OPERATING SUGGESTIONS.

Do not use warped records for automatic operation. Play these records singly.

Use care when loading or unloading records to prevent bending of the spindle.

Do not attempt to play microgroove or fine-groove with the standard pickup head (brown) or standard records with the red pickup head.

Keep stylus free from dust and lint to insure best reproduction.

When the record changer is not in use, the speed control knob should be left in the "78" position.

Store records flat in folders or in albums and do not lay record on record.

OPERATING PRECAUTIONS.

DO NOT use force to start or stop motor or any part of the record mechanism.

store records on the shelf of the record changer spindle, as the record may warp, especially if the temperature is high.

allow oil or grease to come in contact with the rubber idler wheel.

LUBRICATION—Additional lubrication should not be required for the life of the changer, but in cases of unusually high operating temperatures where lubrication is necessary, lubricate as follows:

Apply Lubriplate to:

1. Hinge bearing inside hinge assembly (13, Fig. 3).
2. Locator housing (75, Fig. 3) and set-down locator plate (43, Fig. 2).
3. Cam faces on lift arm (69, Fig. 2), lift arm bearing and lift arm cut-off rod bearings.
4. Between lever spring (38, Fig. 3) and cut-off rod.
5. Heart-shaped cam track on cam and cam bearing (133, Fig. 2).
6. Spindle between roller plunger and roller spring housing and between the roller spring housing and the spindle body (31, Fig. 2).
7. Turntable ball bearing (30, Fig. 1).

Apply a small quantity of mineral oil to:

1. Pickup arm locator assembly bearing and ball bearing pickup arm post (75, Fig. 3).
2. Control lever bearing (47, Fig. 2).
3. Turntable and spindle bearing (30, Fig. 1).

CYCLE OF AUTOMATIC OPERATION—At the end of the record when the stylus is in the eccentric groove at the center of the record, the rate of the forward movement increases and the end of the trip link nearest the spindle contacts the trip lever and turns it as the pickup arm advances. The trip lever, through spring washer tension, turns the trip pawl. The trip pawl is moved far enough for the sharp point at the end to definitely engage the projection on the turntable hub, thereby turning the cam to start the change cycle.

As the main cam gear is turned by the turntable gear, the lift arm roller (133, Fig. 2) moves around the heart-shaped cam at the center of the cam gear. The outside end of the lift

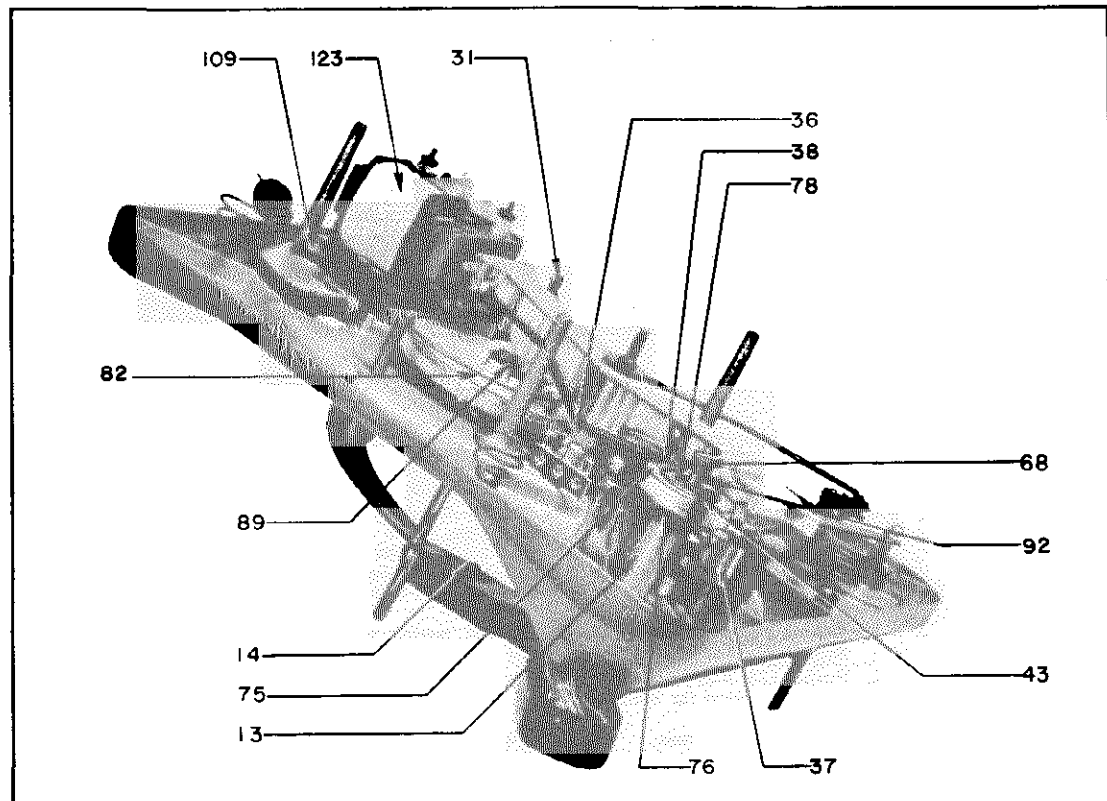


Fig. 3. Bottom View

arm raises or lowers the pickup arm by one cam action and swings the pickup arm in or out by another cam action. The pickup arm is first lifted by the cam pushing on the pickup arm lift rod (92, Fig. 3), then the pickup arm is swung out away from the records by the end of the lift arm which hits the stud of the ratchet arm (75, Fig. 4) assembly and rotates the pickup arm. After the pickup arm has swung out of the way, the inside end of the lift arm pushes up roller plunger (31, Fig. 3) which actuates the record pusher and causes it to move the bottom record into position to fall to the turntable.

Indexing is accomplished by the locator plate (43, Fig. 2) and the ratchet arm (75, Fig. 3). During the change cycle, the ratchet arm (75, Fig. 3) is pressed up against the locator plate (43, Fig. 3). The notches in these two parts should come together. During the last half of the cycle, the locator spring (38, Fig. 3) rotates the locator (43, Fig. 3) and the ratchet arm against the seven-inch index cam (37, Fig. 3).

During each cycle the adjusting ring (9, Fig. 4), rotates out and allows cam (11) to return to 10-inch index position if it had previously been tripped by a 12-inch record. Automatic shut-off after last record is accomplished by the cut-off rod (36, Fig. 3). When the record support arm falls onto the shelf of the spindle, the record pusher (28, Fig. 1) is stopped by the record support arm (1, Fig. 1). This limits the vertical travel of the Record Pusher Shaft Assembly (31, Fig. 3) so that the inside end of the

cut-off rod (36, Fig. 3) hits the collar on the shaft assembly, causing cut-off rod (36) to rotate so that the outside end of rod (36) hits the control lever (47, Fig. 2) and rotates the lever to the "OFF" position.

ADJUSTMENTS

PICKUP ARM INDEXING—Screws (18, Fig. 4) and (19, Fig. 4) are used to adjust the point at which the stylus lands on the record. If the stylus lands too far out on the edge of the record, loosen screw (18) slightly and tighten screw (19).

If stylus is too far in on the record, loosen screw (19) slightly and tighten screw (18).

If it is necessary to make adjustment of screw (20, Fig. 4), loosen screw (20) and match locator plate (43, Fig. 2) and ratchet arm (75, Fig. 3) and with locator plate rotated against index stop in the base plate, rotate pickup arm to index approximately for a 10-inch record. Make a fine adjustment of indexing with screws (18, Fig. 4) and (19, Fig. 4), as above. When the correct set-down is obtained for the 10-in. position, the 12- and 7-inch needle set-down will be also correct.

PICKUP ARM HEIGHT—The pickup arm height is adjusted by the screw (92, Fig. 4) located on top of the pickup arm lift rod. Turn the screw out or in until the underneath side of the pickup arm clears the rest by $\frac{1}{8}$ in. or $\frac{1}{16}$ in.

TROUBLE SHOOTING CHART

SYMPTOM	CAUSE	REMEDY
1. Control Knob (42, Fig. 1) cannot be turned to "ON" position.	Machine shut off during cycle.	Rotate the turntable clockwise, by hand, until the control knob (42, Fig. 1) is free.
2. Turntable does not turn when control knob (42, Fig. 1) is moved to "ON" position.	1. Changer stalled in cycle. 2. No voltage at motor (123, Fig. 2). 3. Motor defective. 4. Idler wheel (124, Fig. 1) not engaging turntable rim.	1. Revolve the turntable clockwise, by hand, until it starts turning under its own power. 2. (a) Check wiring and joints. (b) Check the switch (32, Fig. 2) for proper operation. 3. Remove turntable and check whether motor operates without load. If a voltage is present at the motor and the pulley does not revolve, the motor is defective. 4. In case turntable is not moving with no load rotation of motor pulley: (a) Check motor idler assembly for free contact between motor pulley and turntable. (b) Clean turntable rim and rubber tire of the idler wheel.

MODEL P14

TROUBLE SHOOTING CHART (Cont'd)

SYMPTOM	CAUSE	REMEDY
3. Changer fails to cycle when the control knob is turned to "Rej."	The manual reject not actuating the trip.	Check for contact between reject link (112, Fig. 1) on the control lever (47, Fig. 2) and the trip pawl (84, Fig. 6) on the main cam (82, Fig. 3) when knob is in the "Rej" position. Contacting the trip should actuate the trip pawl (84, Fig. 6) to engage with pinion gear on the turntable hub. When the trip rod is turned and the cam pawl (84, Fig. 6) does not move forward, engaging the teeth on the turntable hub, check for binding between cam pawl and the cam. Clean and check for free movement, but do not lubricate.
4. Record fails to drop when changer cycles.	<ol style="list-style-type: none"> 1. Spindle pusher shaft broken. 2. Pusher in spindle does not move far enough forward to eject record. 3. Lift screw loose. 4. Pusher raises outside spindle body. 	<ol style="list-style-type: none"> 1. Loosen the spindle holding setscrews and replace the spindle assembly (26, Fig. 1) with a new unit. 2. If the roller (31, Fig. 2) is compressed and the pusher (28, Fig. 1) does not move far enough forward to eject record, the spindle should be replaced. 3. Check screw (69A, Fig. 2) and tighten. 4. The pusher (28, Fig. 1) should first rise inside the spindle body, then move forward inside the center hole in the record. If faulty operation, replace complete spindle assembly.
5. More than one record drops.	<ol style="list-style-type: none"> 1. Record hole too large. 2. Spindle slide not fully down. 3. Record support binding on spindle, or bent out of square with the shaft. 4. Record pusher (28, Fig. 1) defective. 	<ol style="list-style-type: none"> 1. Check diameter of hole. 2. Check to determine if the spindle slide is all the way down. <ol style="list-style-type: none"> (a) Check for free movement of the slide. (b) After records are placed, be sure the slide is in proper position. When a record is dropped, it will raise slightly returning immediately to its original position. 3. Check straightness of spindle. Straighten the record support (1, Fig. 1) if it is not square with the record support shaft. 4. Record pusher may be deformed, etc. Replace with a new spindle assembly or pusher.
6. Record hits pickup arm.	<ol style="list-style-type: none"> 1. Pusher (28, Fig. 1) in spindle not moving far enough to eject record. 2. Lift arm screw loose. 3. Pusher extending beyond outside diameter of spindle. 	<ol style="list-style-type: none"> 1. See No. 4. 2. Tighten lift arm screw (69-A, Fig. 2). 3. Cycle the changer by hand, until roller assembly (31, Fig. 2) is at the top of its travel. Use new record as gage and see if it binds at any point. File off high points on pusher (28, Fig. 1) until record passes freely over spindle.

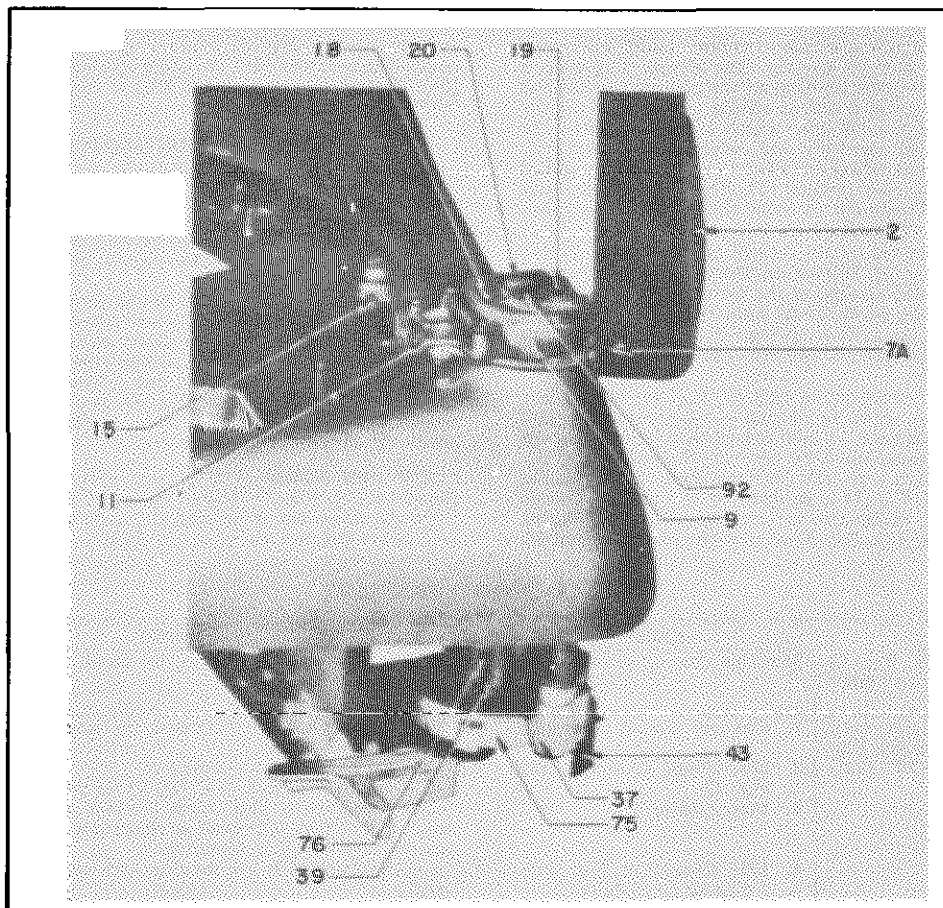


Fig. 4. Pickup Arm Mounting and Adjustment

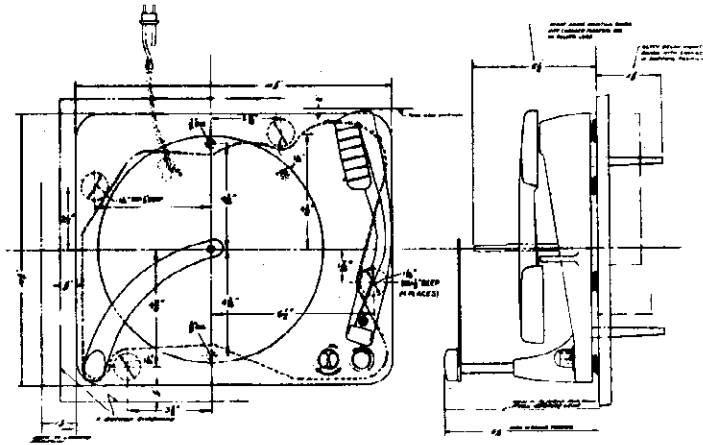


Fig. 5. Over-all Dimensions and Motorboard Cutout

TROUBLE SHOOTING CHART (Cont'd)

SYMPTOM	CAUSE	REMEDY
6. Record hits pickup arm.	4. Pickup arm not adjusted properly.	4. If the hinge bearing (13, Fig. 3) has been removed or the hinge bearing setscrew (20, Fig. 4) has been loosened, the realign position between hinge bearing and the pickup arm locator assembly must be reset. Follow the following procedure: (a) Loosen the setscrew (20, Fig. 4) sufficiently to allow the hinge bearing to slide on the pickup arm locator assembly shaft. The setscrew may be adjusted with an Allen wrench through the hole in the adjusting ring (9, Fig. 4) located between the two adjusting screws. (b) Place a $\frac{3}{32}$ " shim between the set-down locator (43, Fig. 4) and the locator housing (75, Fig. 4). (c) Turn the control knob to the "OFF" position. (d) Raise the pickup arm and rotate the hinge assembly counterclockwise as far as it will go. In this position the arm extending from the setdown locator should be engaged by the turned-down leg on the control lever (47, Fig. 2). (e) Take up all the play between the parts by pressing up on the bottom of the locator housing and down on the top of the hinge bearing. (f) Then tighten the hinge body setscrew (20, Fig. 4) and remove shim.
7. Pickup arm does not set down on 10" record in proper position.	1. Pickup arm not adjusted properly. 2. Hinge catch (11, Fig. 4) does not return to 10" record position when changer cycles. 3. Binding between safety spring (38, Fig. 2) and locator housing.	1. See No. 6. 2. When the lift arm (69, Fig. 2) has moved as far out as it will go and is about to move back to its starting position, stop the change cycle. Lift the pickup arm and check the gap between the end of the leg on the catch (11, Fig. 4) and outside step on the adjusting ring (9, Fig. 4) to be at least $\frac{1}{16}$ ". If the gap is too small, check the setting of the hinge body and the pickup arm locator. The cam face on the lift arm (69, Fig. 2) which contacts the round stud on the bottom of the locator housing (75, Fig. 4), may be bent. Lubricate the hinge bearing with Lubriplate. 3. (a) Check binding of safety spring (38, Fig. 2) against the locator housing. Disassemble the pickup arm locator assembly by removing the lift arm (69, Fig. 2) loosening the hinge bearing setscrew (20, Fig. 4) and pulling the locator housing and pickup arm locator assemblies down from the bottom of the changer. Hold the pickup arm locator shaft and turn the locator housing assembly to slightly compress the safety spring release and check that safety spring returns the pickup locator casting firmly against the stop surface in the locating housing assembly. If binding is present, remove the safety spring to see if the pickup arm locator casting turns freely in the locator housing casting. Remove burrs or sharp edge on end of safety spring, stretch it to increase tension or replace. (b) Check to see if the locator plate (43, Fig. 2) is meshing with the locator housing when the lift rod (92, Fig. 3) is positioned at the beginning of the sloping cam surface of the lift arm (69, Fig. 2) in the final stage of the cycle. Swing the pickup arm halfway in towards the spindle. If the locator plate and locator housing disengage in this position, it is necessary to reset the clearance between the locator plate and the locator housing. It may be necessary to file off any burrs which may be present on the mating surfaces of the locator plate and the locator housing. When the index lever (15, Fig. 4) has been depressed, it is held in the position until the catch (11, Fig. 4) is disengaged. See No. 8.

MODEL P14

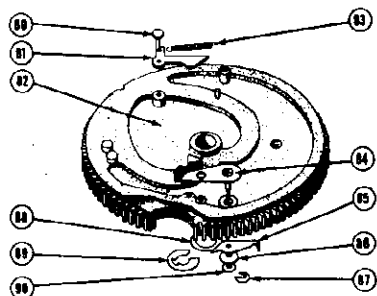
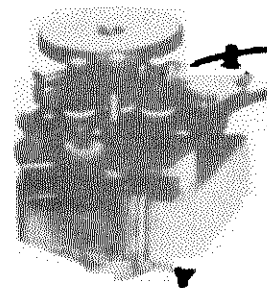
TROUBLE SHOOTING CHART (Cont'd)

SYMPTOM	CAUSE	REMEDY
7. Pickup arm does not set down on 10" record in proper position (Cont'd).	4. Hinge catch does not disengage from the hinge cam.	4. (a) Check to see if the leg on the catch (11, Fig. 4) is sliding down the incline on the leg of the adjusting ring. (b) If the catch (11, Fig. 4) and the hinge cam are not disengaging when the catch leg is resting on the inside step on the adjusting ring, file the edge of the catch which contacts the hinge cam until the two parts have a clearance between them of about $\frac{1}{16}$ " when the leg on the catch is on the inside step on the adjusting ring.
8. Pickup arm does not set down on 12" record in proper position.	1. Diameter of 12" record under-size. 2. Enlarged center hole in record. 3. Pickup arm not adjusted properly. 4. Binding between safety spring and locator housing. 5. Index lever does not lock when 12" record drops. 6. Hinge catch (11, Fig. 4) does not go inside step on adjusting ring when index lever is depressed.	1. The set-down position for 12" records is determined by the edge of the record striking the index lever (15, Fig. 4). If a 12" record has a diameter of less than standard size of $11\frac{7}{8}$ " plus or minus $\frac{1}{32}$ ", it may fail to depress the trip lever far enough. 3. See No. 6. 4. See No. 7. 5. Stop the changer just after a 12" record has dropped to the turntable and before the pickup arm has a chance to move in over the record. The index lever should be forced down until the step on the hinge cam passes the edge of the catch (11, Fig. 4), preventing the hinge cam and the index lever from returning to their original position. If the trip lever does not stay down in a depressed position, check: (a) To see if the catch (11, Fig. 4) is free to move forward and engage the hinge cam. (b) If the stop on the hinge body is defective, it might allow the pickup arm to move too far out, thus moving the index finger away from the spindle. When a 12" record falls towards the turntable, the index lever (15, Fig. 4) is tripped and the leg on the catch (11, Fig. 4) should be moved out over the incline between the inside and outside steps on the adjusting ring leg and held in that position by the shoulder on the hinge cam until the pickup arm starts to move in over the record. The leg on the catch should contact the incline and be moved out as it slides down the incline until the catch is disengaged and the index lever can snap back to a horizontal position. If this does not occur, file about a $\frac{1}{16}$ " diameter on the edge of the catch leg which contacts the incline. Check for binding between hinge body and hinge bearing (13, Fig. 3). Burrs on the bearing surfaces or lack of lubrication may prevent the hinge bearing from turning freely.
9. Needle does not track across record properly.	1. Needle may be clogged by accumulation of lint, dirt, etc. 2. Locator housing does not disengage from the set-down locator when a cycle is completed. 3. Hinge bearing binds. 4. Changer not level. 5. Excessive vibration during long play operation.	1. Clean foreign material from around the needle. 2. When the changer is not in cycle, a $\frac{1}{32}$ " gap should exist between the locator housing and the set-down locator (43, Fig. 2). If the gap is small enough to allow the parts to touch and bind as the needle moves across the record, the hinge bearing must be reset. See No. 6. 3. (a) Check the locator housing and set-down locator for binding. (b) Check the bearing in the pickup arm post for binding. The bearing is located below the hinge bearing (13, Fig. 3). In order to inspect it, loosen the setscrew (20, Fig. 4) in the hinge bearing. Unsolder the pickup leads and pull them out. Pull up on the hinge and pickup assemblies. Clean foreign matter or corrosion from the bearings and lubricate with light mineral oil. 5. Check mounting of changer.
10. Changer trips before arm reaches end of record.	1. Record hole too large. 2. Binding of trip link.	1. The groove may turn eccentric with the spindle and therefore cause premature tripping. 2. With the trip link released, check the trip link for freedom of motion.
11. Changer does not cycle when record has been played.	1. No eccentric trip groove on record. 2. Needle jumps out of groove in record. 3. Trip pawl binding on cam face.	1. Turn control knob to "REJ." at end of the record. 2. (a) Check trip pressure. (b) Check for shallow groove on record. (c) Check for clean needle. (d) Check for binding in the pickup bearing or locator housing. 3. The trip pawl (84, Fig. 6) must be free to move forward and engage the teeth of the turntable hub when the link releases it. Check for burrs or foreign matter lodged between the cam and the pawl. Do not oil as this might collect dirt and gum up the pawl.
12. Turntable speed too slow.	1. Binding in turntable bearing. 2. Motor pulley too small in diameter. 3. Line voltage too low. 4. Operating temperature too low.	1. Check turntable bearing for freedom of movement. Hold the idler wheel (124, Fig. 1) out of engagement with the turntable and spin the turntable by hand to see if it turns readily. If binding occurs, clean and lubricate with light oil. 2. Replace pulley. 3. Minimum line voltage should be 105 volts. 4. Operating temperature should not be less than 60° F.

TROUBLE SHOOTING CHART (Cont'd)

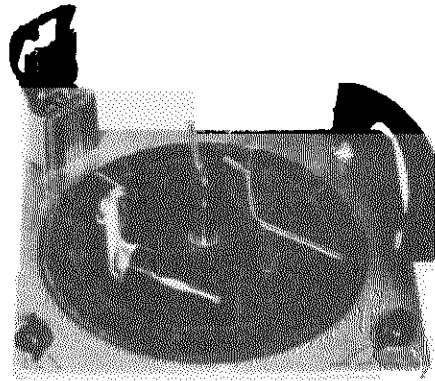
SYMPTOM	CAUSE	REMEDY
13. Turntable speed too fast.	1. Line voltage high. 2. Motor pulley too large in diameter.	1. Check line voltage. 2. Replace pulley.
14. Turntable stalls during cycle.	1. Motor idler (124, Fig. 1) not engaging turntable. 2. Turntable bearing tight. 3. Operating temperature too low. 4. Line voltage too low. 5. Binding in drive mechanism. 6. Binding between pickup arm lift rod and lift arm cam face. 7. Spindle roller spring compressed too far.	1. See No. 2. 2. See No. 2. 3. See No. 12. 4. Minimum voltage should not be less than 105 volts. 5. (a) Check for binding in gear teeth, check for bent cam bearing or bent spindle pushing. (b) Check lift arm bearing for freedom and the lift arm roller to be sure it is not bent, causing binding in the cam track. 6. Cycle the changer, stopping it half way through the cycle as the left arm is about to return. Lift pickup arm and raise lift rod (92, Fig. 3) by pulling up on the adjusting screw (92, Fig. 4) as high as it will go. Feel the lift arm (69, Fig. 2) for play. The lift rod may still touch the lift arm cam face, but it should not bind. If binding occurs, check for bent lift arm bearing or remove fiber washer under the lift arm to lower it. 7. Cycle the changer and check that before the top of the lift cam arm is reached, the pusher housing should stop its upward motion and the roller should continue up .005" to .047" more, slightly compressing the roller spring. If the spring compresses too much, (a) Check the lift arm to see it is square with the base plate. (b) If spring is too much compressed, remove fiber washer between lift arm and steel washer.
15. Changer continues to cycle.	1. Reject spring (33, Fig. 2) loose. 2. Locator spring (83, Fig. 6) loose. 3. Trip link (112, Fig. 1) frozen. 4. Trip pawl (84, Fig. 6) binding.	1. Check that reject spring (33, Fig. 2) is secured in position at both ends. 2. Check cam locator spring (83, Fig. 6) to see it has not fallen off or is not secured at an end. 3. Check trip link (112, Fig. 1) in the reject position. 4. Check trip pawl (84, Fig. 6) for binding, clean and do not oil.
16. Noise during playing of record.	1. Rumble from motor. 2. Defective turntable bearings. 3. Defective motor idler wheel (124, Fig. 1) 4. Defective records. 5. Turntable scrapes. 6. Squeaks.	1. Check the motor grommets for free suspension of motor. 2. Check for foreign matter in bearing, defective belts, binding between balls and ball retainer, rough surfaces on washers. Clean and lubricate with Lubriplate or light mineral oil. 3. A rapid thumping sound may indicate a flat spot on the motor idler wheel (124, Fig. 1). Check the rubber tire on the idler and the bearing of the idler. 4. Check for defective or warped record. 5. (a) Check for warped record. (b) Check for bent motor idler. 6. Check for good lubrication of changer parts as indicated under "Lubrication."
17. Changer does not shut off after last record has been played.	1. Record support binding on spindle. 2. Cut-off rod (36, Fig. 3) not engaging shoulder pusher housing.	1. The record support (1, Fig. 1) must rest on the offset shoulder of the spindle. See also No. 5. 2. On the shut-off cycle, the end of the cut-off rod (36, Fig. 3) should contact the shoulder on the bottom of the spindle pusher housing, part of pusher and roller assembly (31, Fig. 3), and turn the cut-off rod over 90°. If the end of the cut-off rod passes under the pusher housing as the changer cycles on the shut-off cycle: (a) Check that record support rests on spindle. (b) Check spindle to see it is being held in place by the spindle setscrews. (c) Check lift arm screw (69A, Fig. 2) for tightness. (d) Check for cut-off rod (36, Fig. 3) being too short.
18. Changers shut off prematurely.	1. Spindle roller spring compressed too far. 2. Roller spring in spindle too weak. 3. Record too thick. 4. Cut-off rod (36, Fig. 3) not being reset.	1. See No. 14. 2. If the roller spring is compressed under the load of a full stack of records, it may cause premature shut off; replace spindle assembly (26, Fig. 1). 3. Old style $\frac{1}{8}$ " thick records will shut-off the changer. 4. The flat spring (38, Fig. 3) acting against the cut-off rod should throw the rod against its top on the lift arm (69, Fig. 2) and hold it there. If the cut-off rod is not fully turned, the bent-up end next to the spindle may stick up high enough to prematurely contact the shoulder on the pusher housing, part of pusher and roller assembly (31, Fig. 3). Check: (a) Lever spring (38, Fig. 3) for tension. (b) Lubrication of cut-off rod bearings. (c) Clearance between the end of the cut-off rod (36, Fig. 3) which passes under the control lever (47, Fig. 2) and the bottom of the round stud on the control lever.
19. Turntable continues to revolve when control knob is turned to "OFF" position.	Switch (32, Fig. 2) defective.	Check switch for intermittent contact.
20. Needle does not set down on 7" record in proper position.	Tail on set-down locator plate (43, Fig. 2) damaged or bent out of position.	Straighten locator plate or replace it.

MODEL P14

Fig. 6. Triple Speed
Main Cam GearFig. 7.
Motor RBH-014REPLACEMENT PARTS LIST
MODEL P14

Ref. No.	Description	Cat. No.	Ref. No.	Description	Cat. No.
1	RECORD SUPPORT ARM ASSEMBLY—Includes knob, support arm, shaft with cross pin	RMX-160	60A	"C" WASHER—Prevents record support shaft from being pulled out of base plate	RHC-028
1A	KNOB—For record support arm assembly	RDK-185		RIVET—For attaching item 47 to the arm of the control knob crank	RHR-011
2	PICKUP ARM	RPA-012	69	LIFT ARM ASSEMBLY—Die cast arm which is moved by the heart-shaped cam of the main cam gear (115); includes roller drive pin, roller, lift arm spring lever, automatic shut-off rod, spring and pin	RMX-168
2A	LONG-PLAY PICKUP HOUSING—Red, housing less pickup	RPH-008	75	LOCATOR ASSEMBLY—Pickup arm locator assembly, includes pickup shaft and pickup locator	RMU-056
2B	STANDARD PICKUP HOUSING—Brown, pickup housing less pickup	RPH-007		PIN—Drive pin for holding (122) onto locator assembly (75)	RMP-027
2C	WEIGHT—For pickup housing RPH-007	RWP-005	76	SPRING—Ratchet pawl spring for holding ratchet pawl (122) against serrated edge of trip rod	RMS-198
3	SPRING—Counterbalance spring for pickup arm	RMS-192	78	SPRING—Conical spring for holding pickup lift rod against cam end of lift arm (69)	RMS-199
7A	PIN—Hinge pin on pickup arm	RMP-025	86	WASHER—Spring washer on cam locator pawl assembly	RHW-022
	BRACKET—Hinge pin bracket, fits around item 7A	RAD-046	92	LIFT ROD AND ADJUSTING SCREW—For raising pickup arm as lift arm end moves through its cycle	RMU-057
10	ADJUSTING RING ASSEMBLY—Includes spring adjusting ring and two adjusting screws; used for adjusting pickup arm set down	RMX-151	89	"C" WASHER—For mounting main cam gear (82) onto stud of base plate	RMC-046
13	HINGE ASSEMBLY—One which pickup arm rotates across record; does not include item 10, adjusting ring assembly	RMX-152		ROD—Connects between 7-inch index cam and motor speed control linkage	RMU-059
14	PICKUP—Long play variable reluctance pickup with 1 mil stylus	RPX-041	87	"C" WASHER—For index cam	RHC-033
17	PICKUP—Standard play variable reluctance pickup with 3 mil stylus	RPX-040	109	MOTOR FASTENER—For mounting 3-speed motor, 3 required	RHH-011
22	PICKUP ARM HINGE BEARING ASSEMBLY—Fits inside item 13 and rotates on ball bearings	RMX-153	110	INDEX ROD—Operates index arm	RML-042
24	BEARINGS—Ball bearings for pickup arm to rotate on	RMB-019	84	LEVER—Trip lever engaging pawl on main cam gear	RML-043
25	SPACER—For ball bearing, item 24	RHJ-011		ROD—Speed control rod	RML-046
26	SPINDLE—Includes spindle, guide at top of spindle, spindle base, and guide spring	RMX-154	116	ESCUTCHEON—Speed control escutcheon	RDE-072
28	RECORD PUSHER—In spindle for pushing record off spindle shelf	RML-037	117	SPRING—Motor speed control shaft spring	RMS-210
30	BEARING—Ball bearing and race for turntable to rotate on	RMB-020	120	ARM—Motor speed control shaft and arm	RMX-165
31	RECORD PUSHER SHAFT ASSEMBLY—Includes spindle roller pin, record pusher shaft, roller spring housing, roller spring, groove pin and roller plunger	RMX-155	121	LINK—Trip link	RML-047
32	SWITCH—A-c switch and plate assembly for 110 volts, 60 cycles	RSW-077	85	PAWL—Trip pawl on main cam gear (115)	RMM-139
33	SPRING—For returning control lever from "Rej." to "ON" position	RMS-195	123	MOTOR ASSEMBLY—Includes idler wheel, two springs, idler wheel shift cam, speed control arm and 3 pulleys	RBH-014
34	KNOB—Speed control knob	RDK-186	124	IDLER WHEEL—Rubber tired wheel	RMW-060
37	CAM—For 7-inch records, is moved into position when motor speed knob is rotated to 7-inch slow position	RMC-047	125	ARM—Idler wheel arm	RMA-008
38	SPRING—Locator spring for rotating locator plate back against index cam at end of change cycle	RMS-196	126	PULLEY—Low speed pulley (33 1/2 rpm)	RMW-061
38A	WASHER—Two required, one below turntable bearing and the other between bearing and turntable	RHW-016	127	PULLEY—Medium speed pulley (45 rpm)	RMW-062
39	WASHER—Compression washer for holding locator plate against ratchet arm assembly	RHW-019	128	PULLEY—High speed pulley (78 rpm)	RMW-063
42	KNOB—For changer control "ON," "OFF," "REJ." knob	RDK-187	129	ARM—Pulley mounting arm	RMA-009
43	LOCATOR PLATE—For indexing pickup arm, is rotated against index cam by spring (38)	RAP-016	130	SPRING—Idler wheel tension spring to pull wheel against inside of turntable rim	RMS-205
46	SPRING—Safety coil spring inside locator assembly	RMS-197	131	SPRING—Pulley arm tension spring	RMS-211
47	LEVER—ON OFF-REJ. control lever and cam	RML-033	132	ARM—Motor speed arm on motor assembly	RMA-010
80	DRIVE PIN—For mounting cam locator lever (114) to base plate	RMP-026	112	ROD—Reject rod	RML-044
83	SPRING—To hold cam locator (114) against main cam gear	RMS-193	113	GROMMET—For motor speed control shaft	RHG-027
			81	LOCATOR—Cam locator lever fastens to base plate under main cam gear	RML-045
			82	MAIN CAM GEAR ASSEMBLY—Main cam gear with heart-shaped cam channel. Includes main cam pawl, pawl tension spring and spring wire	RMX-164
			123A	MOTOR—3-speed motor with belts*	RBH-016
			124	WHEEL—Idler wheel	RMW-060
			133	BELT—Drive belt	RMD-005
			130	SPRING—Idler wheel tension spring	RMS-205
			134	PULLEY—Pulley for 45 rpm	RMW-064
			135	PULLEY—Pulley for 33 1/2 rpm	RMW-065
			136	GROMMET—Motor mounting grommet	RHG-028

* Some changers use this type of motor.



GENERAL

This single pickup arm record changer is designed for triple speed operation ($33\frac{1}{3}$, 45 or 78 revolutions per minute) from a power source of 110 volts at 60 cycles. It will play the Standard Groove or Microgroove type records for these speeds, a single record at a time or a series of twelve 7-inch, twelve 10-inch or ten 12-inch records automatically.

Note: *Never stack the Standard and Microgroove records intermixed for automatic operation as playing of each type record requires special attention to the pickup and record speed required.*

The pickup arm is designed to use a two position knob control dual stylus assembly. The control knob is indexed to the figures on the *pickup arm* corresponding to the speed of the record being played. The speed control knob is set to the position corresponding to the rotation speed required by the record being played. Three record spindles are used. The slender spindle with the least offset is used for 10-inch and 12-inch records. The slender spindle with larger offset is used for 7-inch records. A third spindle is required to accommodate the large center hole of the 7-inch 45 rpm records.

RECORD PLAYER OPERATION

STANDARD-GROOVE RECORDS (78 RPM, 10- OR 12-INCH).

Use 10-inch/12-inch spindle, the spindle with the slightest bend. The bend should face ejector table. Turn cartridge selector lever to 78 rpm. Turn motor speed control knob to 78 rpm. If 10-inch records, lower 7-inch/10-inch record support to horizontal position. Place records over spindle onto record support. Lower balance arm to horizontal position resting on top of record stack. If 12-inch records are to be played, raise 7-inch/10-inch support arm to a vertical position. Place records on spindle, supporting edge of records on 12-inch record support. Lower balance arm to horizontal position, resting on top of record stack.

STANDARD-GROOVE RECORDS ($33\frac{1}{3}$ RPM, 10- OR 12-INCH).

If 10-inch or 12-inch ($33\frac{1}{3}$ rpm) records are to be played, use the same spindle as for 78 rpm. Follow directions for playing 78 rpm, except set cartridge selector lever at 78 position and set motor speed control knob at 33 position.

MICROGROOVE RECORDS ($33\frac{1}{3}$ RPM, 7-, 10- OR 12-INCH).

If 7-inch ($33\frac{1}{3}$ rpm) records are to be played, use $\frac{1}{4}$ -inch plain spindle, with largest offset, insert it in center of turntable firmly, the bend facing the record support. Seven-inch records should

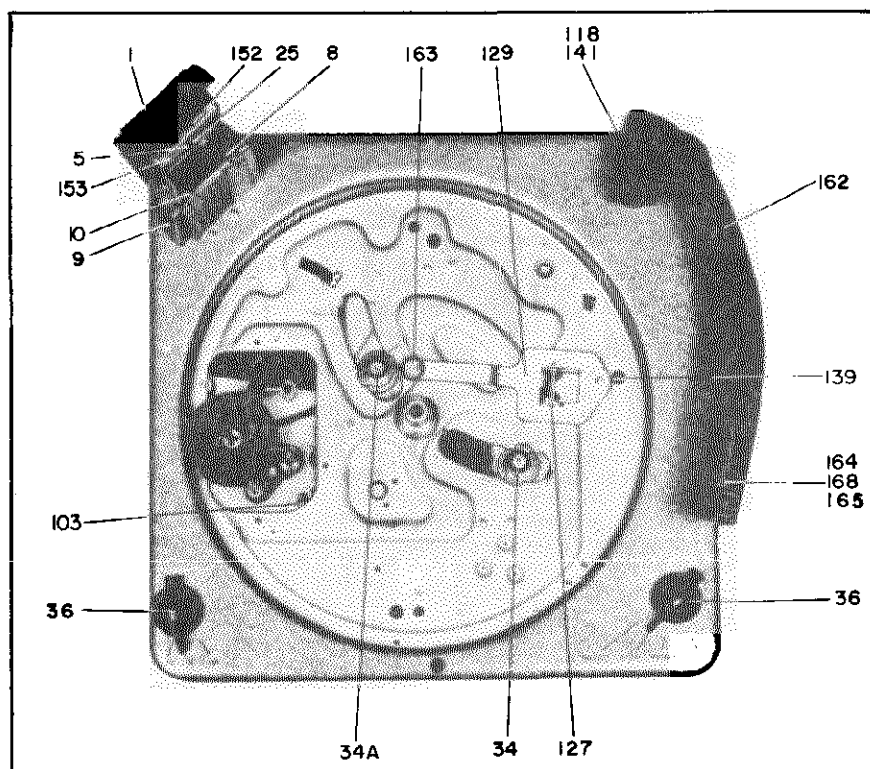


Fig. 1. Top of Record Changer

MODEL P15

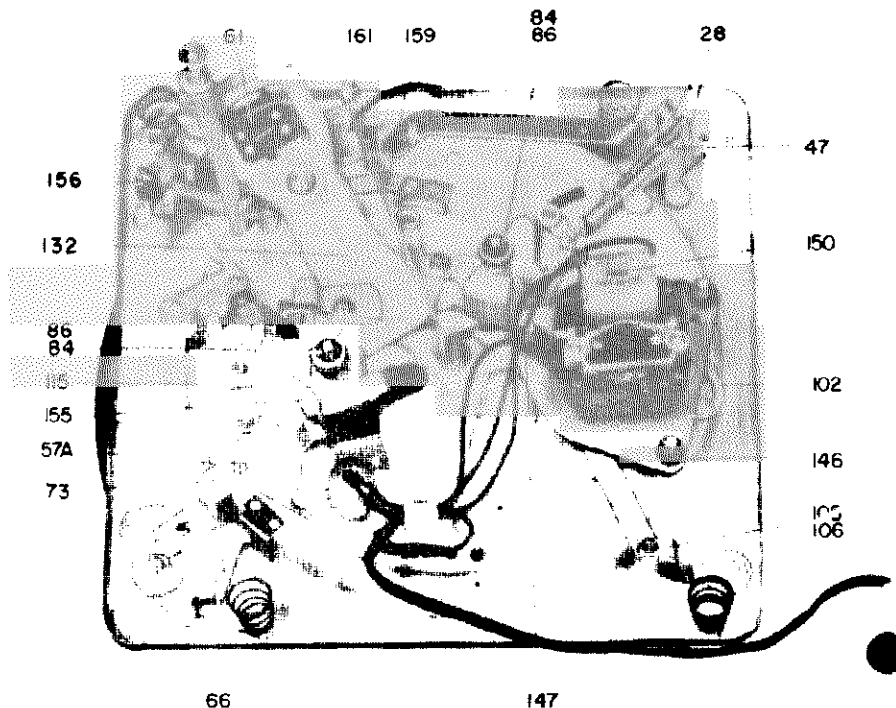


Fig. 2. Bottom View

be placed on the spindle and supported at the edge by the lower step of the 7-inch/10-inch support. The record stabilizer should then be lowered to the horizontal position resting on top of record stack. Turn cartridge selector lever to 33/45 rpm. Set motor speed control lever to 33 rpm.

MICROGROOVE RECORDS (45 RPM, 7-INCH).

Use 1 1/2-inch spindle (with plastic ends). Insert spindle in turntable center hole; with spindle top facing record support, make sure the spindle sets in slot firmly. Set dual pickup cartridge to 33/45 position, and set speed control knob to the 45 position.

Seven-inch (45 rpm) records should be placed on the spindle and supported at the edge by the upper step of the 7-inch 10-inch record support. When playing 45 rpm records, the balance arm must remain in vertical position.

CAUTION—To avoid damage to the pickup stylus and to the record surfaces, do not allow the standard pickup stylus to be used on the microgroove records. Do not drop the pickup arm onto the record.

MANUAL OPERATION

Raise the *hinged shelf* for 10-inch records and the *hold-down arm* into a vertical position. Slip the record down over the proper spindle onto the turntable. Turn the record mechanism *control knob* to the **MANUAL** position. This will start the turntable rotating. Gently lower the pickup arm on the first groove of the record. When the record is through playing, return the tone arm by hand to its rest position. Stop turntable rotation by turning *control knob* to OFF position. When through playing phonograph, turn the Phono-Radio control to its OFF position.

AUTOMATIC OPERATION

Be sure the pickup is on the pickup arm rest. Point arrow on the pickup arm to select the stylus for records to be played, 78 or 33/45. Place the proper spindle in center hole. Place a stack of records, not to exceed twelve 10-inch or 7-inch records, or ten 12-inch records, not intermixed, over center post. All records must be of the same speed. The records will now rest on center post and on record support post. Set speed control to proper speed, turn control knob to reject position and release it. This

turns changer on and starts change of cycle, dropping the first record on the turntable. To reject record, turn the control knob to "reject" and release it.

To discontinue operation, all records should be dropped to the turntable by repeatedly turning the control knob to reject position until all unplayed records have been dropped to the turntable. Place the pickup arm on the pickup arm rest and turn the control knob to the OFF position.

PICKUP CARTRIDGE

The Model P15 record changer is equipped with a dual stylus pickup for playing microgroove and standard groove records. A selector knob control permits instant setting of the dual assembly, to bring the required stylus into operating position of a corresponding type of record. The knob index (arrow) indicates the operating position of the styli and is pointed to the 1 mil microgroove stylus with respect to the stylus assembly. To operate the knob control, the knob is first depressed and then turned to the desired position with its arrow index pointed to the end of the tone arm for microgroove records, or pointing to the tone arm rear for standard groove types.

SERVICE—To remove styli assembly from cartridge, pull off the knob and compress spring slightly to release tension upon retaining washer. Retaining washer, spring and flat washer may then be picked off shaft and stylus assembly removed from cartridge. To insure optimum performance from the RPX-050 cartridge, its styli, magnetic pole pieces and gaps should be cleaned periodically of foreign particles accumulated from the record surfaces. A soft bristle brush, Cat. No. RQB-001, or equivalent, should be used to clean these parts. These parts are more readily accessible for cleaning if the stylus assembly control knob is depressed and rotated to expose the styli, poles, gaps, and the stylus guide and its recess. The gap clearance between stylus and each of its pole pieces has been adjusted to be not less than .010 inch. To obtain optimum performance from your cartridge, be careful not to distort parts of the assembly which would disturb this adjustment.

OPERATING PRECAUTIONS

1. Do not, under any circumstances, connect the motor to a source of direct current or to alternating current other than that specified.

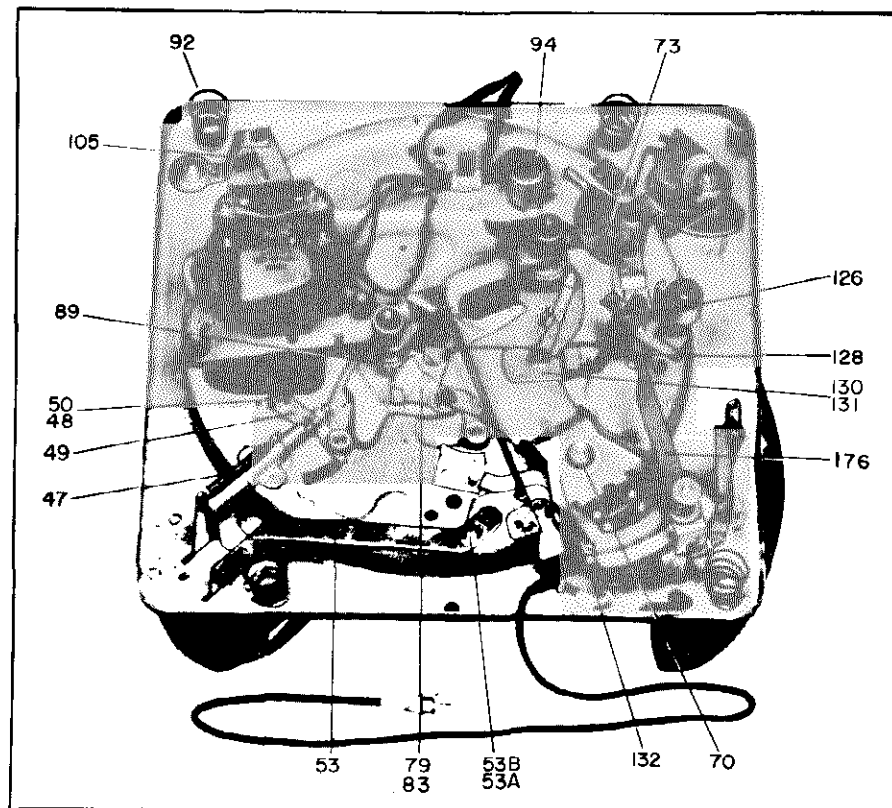


Fig. 3. Bottom View

2. Do not allow oil or grease to come in contact with the rubber tired friction drive wheels (or belts) or the Velocity Trip Arm friction washers, part of item (134).

3. Never use force to start or stop the motor, or any part of the record changer mechanism.

4. Do not intermix Microgroove records with the Standard Groove type.

5. Always make certain that the Speed Control is set to the proper speed position as required for the type of record.

6. Use only records in good condition for automatic operation. For warped, odd size, or home recorded records, play as for manual operation.

7. Do not store the records upon the record post and spindle as they may warp, especially if the temperature is high.

CYCLE OF OPERATION

INITIATING THE CHANGE CYCLE—Rotating the control knob or movement of the pickup arm which controls the velocity trip arm (176) moves the velocity trip lever (126) so that the idler wheel (163) moves toward the center of the turntable and strikes the cam at the center of the turntable. Meanwhile the trip dog (128) falls in back of the lead pin drop lever (131). The cam at the center of the turntable kicks the idler wheel (163) moving it away from the center post and causing the lead pin dropping lever (131) to move out from under the lead pin (34). The lead pin (34) is pushed upward into the large spiral on the bottom of the turntable by the spring (87). As the turntable rotates, the spiral moves the lead roller (34) towards the spindle causing the swing arm (132) to rotate on its pivot.

PICKUP ARM MOVEMENT—The cam end of the swing arm (132) raises and lowers the pickup arm lift pin (117) as the swing arm (132) is rotated on its pivot. The brake spring (155) slows the swing arm (132) at the end of its cycle to allow gentle lowering of the pickup arm to the record surface.

The pickup arm is rotated on its pivot by the friction spring (61) on the end of the swing arm (132) grasping the pickup arm

bracket (135) as the swing arm is rotated on its pivot. At the end of the cycle, the friction spring (61) is moved free of the pickup arm, allowing the pickup arm to rotate freely.

RECORD FEED—As the swing arm (132) approaches the end of the first half of its cycle, it pushes the ejector lever (49) which in turn pushes the ejector push pin which moves the ejector lever (28) to operate the 7-10 inch and the 12-inch push plate (152) and (10) respectively.

PICKUP ARM INDEXING—When the 10-inch or 12-inch spindle is inserted in the center of the turntable, the discriminator lever (160) is moved out of the way so that lever (159) may be pulled against the 10-inch or 12-inch indexing lever (53). The 10-inch or 12-inch indexing lever (53) is controlled by the 7-10 inch record support. If the 7-10 inch record support is in a vertical position, index lever (159) is positioned for 12-inch record index. If the 7-10 inch record support is lowered, the index lever 159 is positioned for 10-inch record index. If either 7-inch spindle is inserted in the center of the turntable, the index lever (159) is stopped by the leg of the discriminator lever (160) which is not moved out of the way by the shorter 7-inch spindles. As the pickup arm is swung towards the spindle by the return action of the swing arm, the pickup arm is stopped by the arm (145) contacting the stepped end of index lever (159). At the end of the change cycle index lever (159) is moved out of the way by the swing arm which allows the pickup arm to be free on its pivot. Lever 170 is a braking lever for the pickup arm during the change cycle.

COMPLETING THE CHANGE CYCLE—At the end of the first half of the cycle, the dropping lever (83) contacts the lever trip bracket and allows the return roller (34A) to raise into the spiral on the underside of the turntable. At the same time, the cam at the inside of the spiral pushes the lead roller (34) down. The lead roller dropping lever (131) is moved into position by its spring and holds the lead roller (34) out of the spiral during the last half of the change cycle. As the turntable rotates, the swing arm (132) is swung back to its starting position. At the end of the last half of the cycle, the return roller (34A) is pushed out of the spiral by the cam at the center of the spiral. The return roller (34A) is held out of the spiral by lever (83).

MODEL P15

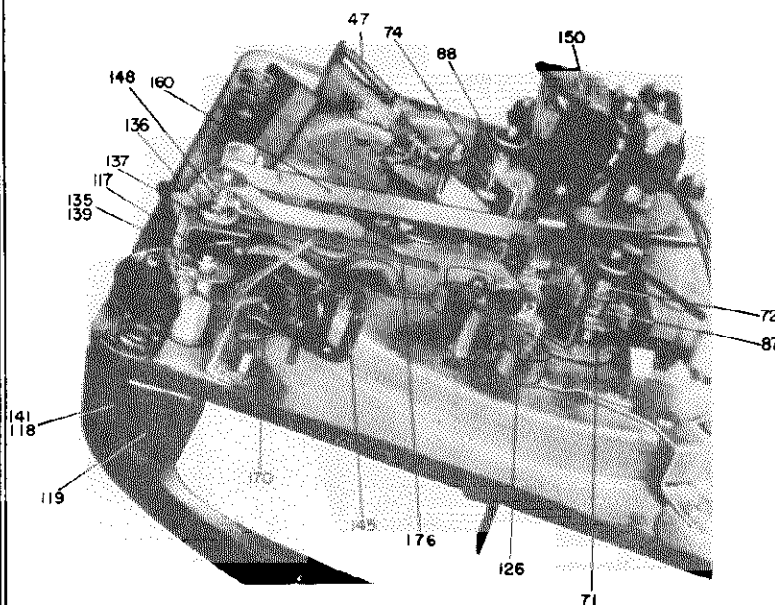


Fig. 4. Bottom View

SERVICE ADJUSTMENTS

1. PICKUP ARM DROP POINT ADJUSTMENT.

(A) With the control knob in OFF position, trip dropping lever (131) to trip changer and manually rotate the turntable until index lever (159) is free. Rotate pickup arm lever (145) so that it hits the middle or 10-inch index step of lever (159). (Place 10- or 12-inch spindle in center of turntable and lower 7- and 10-inch record support to a horizontal position.) Loosen the screw which clamps pickup arm pivot post (135) and rotate the pickup arm so that the stylus lands about $\frac{1}{8}$ -inch in from the outer edge of a ten-inch record. Check for proper indexing on 7-inch and 12-inch records.

(B) Spring on index lever (159) should have enough tension to rotate index lever (159) into position.

2. RECORD SUPPORT POST ADJUSTMENT.

Trip changer and rotate turntable manually until the swing arm has completed the first half of its cycle.

(A) Adjust the screw on lever (49) so that the 12-inch record pushoff plate (10) moves out flush with the ejector housing (9).

3. AUTOMATIC TRIP.

(A) Adjust nut on top of spring to increase or decrease pressure on velocity trip lever (134).

(B) Bend velocity trip lever (134) to contact end of lever (126).

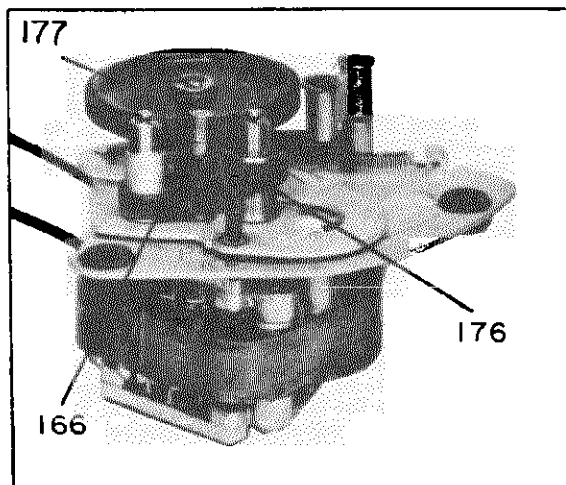


Fig. 5. Three Speed Photo Motor RBH-013

LUBRICATION

Use Millicott 70K, or equivalent, on the following:

1. On edges of slots where swing arm clamps slide on base plate.
2. Sloping edge of cam dropping lever (83).
3. Between washer which holds swing arm (132).
4. Lever bearing washer on item (49).
5. Pivot pin on item 49.
6. Roller and pivot of lever (83).
7. Index arm lever pivot pin (159).
8. Index lever fulcrum pin and slide washer (53).
9. Spiral channel on bottom of turntable.
10. Slide bolt which pushes lever 28.
11. 7-10 inch record pushoff plate and 12-inch record push-off plate.

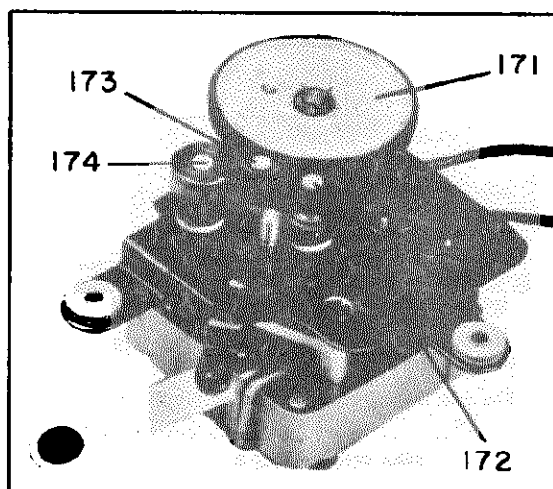


Fig. 6. Three Speed Photo Motor RBH-015

REPLACEMENT PARTS LIST

Cat. No.	Item	Description
RBH-013	150	MOTOR—Three-speed, belt-driven motor, uses two small belts to turn 33 $\frac{1}{3}$ and 45 rpm pulleys. See Fig. 5.
RBH-015	150	MOTOR—Three-speed motor uses bushings for low speeds (used in late production). See Fig. 6.
*RDK-128	36	KNOB—Control knob.
*RHC-032	141	HAIRPIN COTTER—Pickup arm hinge pin.
*RHG-023	103	GROMMET—For motor speed lever.
*RHM-044	84	NUT—Roller bearing speed nut, top of items 72 and 88.
*RHM-045	86	WASHER—Rubber cushion washer, on top of items 72 and 88.
*RHW-020	136	WASHER—Round adjustable steel washer, on top of item 134.
*RHW-021	137	WASHER—Velocity trip arm friction washer, part of item 134.
*RJP-003		PLUG—110 volt, two prong male plug.
*RKP-009	168	STYLUS SERVICE KIT.
*RMA-003	1	ARM—Balance arm assembly rest on top of record stack.
*RMA-007	116	LEVER PLATE—"Off-Manual-Auto-Reject" lever plate.
*RMB-014	34, 34A	PIN AND ROLLER—Swingplate lead and return pin.
*RMB-017	139	BALL BEARINGS— $\frac{1}{8}$ -inch diameter, set of 15 used in tone arm pivot, one used in assembling items 126, RML-028 and 129, RML-029.
RMD-003	166	BELT—Small pulley belt.
RMD-004	167	BELT—Large pulley belt.
*RME-001	9	EJECTOR MECHANISM HOUSING—Cast metal case, top side of record changer.
*RML-027	115	LINK LEVER—Reject control lever linked to item 116.

Cat. No.	Item	Description
*RML-028	126	VELOCITY TRIP LEVER—Lower assembly consists of: lever, flat spring stop, balanced fulcrum, and pivot pin.
*RML-029	129	VELOCITY TRIP LEVER—Upper assembly consists of: lever, trip dog, and trip dog pin.
*RML-030	131	DROP LEVER—Operates lead pin and roller, item 34.
*RML-038	151	MOTOR SPEED LEVER ASSEMBLY—For motor RBH-013.
*RML-039	158	RBH-015 MOTOR SPEED LINK.
*RML-040	159	LEVER—Index ratchet arm lever.
*RML-041	160	INDEX—7-inch record discriminator lever.
*RML-050	170	WASHER—Lever spacer washer on item 49.
*RMM-064	48	WASHER—Shoulder washer on item 34.
*RMM-065	71	SPACER—For item 34 or item 34A.
*RMM-066	72, 88	CAM—Swing plate return pin locking washer.
*RMM-067	89	HINGE BRACKET—For items 1 and 153.
*RMM-070	8	PLATE—12-inch record push-off plate.
*RMM-071	10	INDEX LEVER—10-inch record index control.
*RMM-072	53	WASHER—Slide washer beneath item RMM-077.
*RMM-076	53A	PIN—Index lever fulcrum pin fastens item 53 to record changer deck.
*RMM-077	53B	PIN—Change lever fulcrum pin, part of item 57.
*RMM-080	57A	LEVER—Motor speed lever, part of control changing from 33 1/3, 45 and 78 rpm for RBH-013.
*RMM-108	102	WASHER—Friction washer, part of item 105.
*RMM-111	106	TRIP DOG—Part of item 129, RML-029 (trips item 131, RML-030).
*RMM-122	128	SPACER—Short motor spacer at base of motor for RBH-013 motor.
*RMM-135	146	SPACER—Long motor spacer at base of motor for RBH-013 motor.
*RMM-136	147	7-INCH AND 10-INCH RECORD SLIDE BOLT.
*RMM-137	152	7-INCH AND 10-INCH RECORD SUP. PORT.
*RMM-138	153	LEVER—Motor speed change lever, part of item 102 for Motor RBH-013.
*RMP-012	7	PIN—Hinge pin for item 8.
*RMP-016	50	PIN—Lever fulcrum pin, for item 49.
*RMP-019	117	PICKUP ARM LIFT PIN—Part of item 162.
*RMP-020	118	PICKUP ARM HINGE PIN—Part of item 162.
*RMP-022	127	PIN—Hinge pin, for trip dog on item 129.
*RMP-024	176	LEVER—Velocity trip lever.
RPX-050	164	G-E DUAL PICKUP.
*RMS-131	5	SPRING—Ejector compression spring for 10-inch push-off plate.
*RMS-134	25	SPRING—For 10-inch record support.
*RMS-136	47	SPRING—Ejector arm tension spring.
*RMS-138	61	SPRING—Two friction springs on 132.
*RMS-139	70	RING—Retaining ring engages item 132 swingplate assembly.
*RMS-140	74, 87	SPRING—Compression spring on item 34.
*RMS-142	79	SPRING—Canned dropping lever tension spring on item 83.
*RMS-144	92	SPRING—Mounting spring on record chassis.
*RMS-146	86	SPRING—Selector lever index spring.
*RMS-185	119	SPRING—Pickup arm spring, part of item 162.
*RMS-187	130	SPRING—Used with drop lever, item 131.
*RMS-205	175	SPRING—Tension spring for idler wheel for RBH-015.
*RMS-206	148	SPRING—Velocity trip lever clutch spring.
*RMS-207	155	SPRING—Large brake spring stops swing arm at end of cycle.
*RMS-208	156	SPRING—Brake spring (wide black spring).
*RMS-209	161	SPRING—Index discriminator lever spring, part of item 160 assembly.
*RMT-016	125	TURNABLE.
*RMU-060	154	SPINDLE—Off-set spindle for 10- and 12-inch records.
*RMW-059	163	IDLER WHEEL—On velocity trip lever assembly.
RMW-060	171	IDLER WHEEL—For RBH-015 motor.
RMW-061	172	BUSHING—Low speed, 33 1/3 rpm.
RMW-062	173	BUSHING—Medium speed, 45 rpm.

RMW-063	174	BUSHING—High speed, 78 rpm.
RMW-066	177	IDLER WHEEL—For RBH-013.
RMX-111	28	EJECTOR PIVOT CHANNEL SUB-ASSEMBLY.
RMX-112	49	LEVER ASSEMBLY—Ejector idler lever assembly.
*RMX-114	83	LEVER ASSEMBLY—Dropping lever assembly for swingplate return pin.
*RMX-142	132	SWINGPLATE ASSEMBLY—Operates pickup arm lever and ejector idler lever, item 49 (assembly includes all attached parts).

*RMX-144	135	PIVOT POST—Pickup arm pivot post.
RMX-161	145	ARM—Index arm assembly.
RMX-162	149	SPINDLE—10- and 12-inch spindle post assembly.
RMX-163	157	SPINDLE—1 1/2 inch spindle post assembly.
RPA-013	162	ARM—Pickup arm assembly.
RPJ-010	165	REPLACEABLE STYLUS ASSEMBLY.
RSW-052	94	SWITCH—Phono motor switch.

*Used on previous record changers.

TROUBLE SHOOTING CHART

SYMPTOMS	REMEDIES OR CAUSES
RECORD SELECTION	
1. Records fail to drop.	1. Check adjustment 2A. Check to see that 7-10 inch record support rests on the edge of the selector housing (9) and not on the 12-inch record pushoff plate. Check to see that ejector spring (47) returns levers (49) and (28) to the neutral position at the end of each cycle.
2. More than one record drops.	2. Check slider at top of 10- and 12-inch spindle to see that it is free to slide up and down.
PICKUP ARM MOVEMENT	
1. Pickup arm lands incorrectly.	1. Check adjustments 1A, 1B. Check operation of levers 159, 160 and 53.
2. Pickup arm descends onto record too fast.	2. Check friction brake spring (155). This spring may be too weak to slow swing arm (132) at the end of cycle.
3. Pickup arm does not lower onto record.	3. Check to see that cam end of swing arm (132) is not bent.
TRIPPING AND CYCLING	
1. Changer fails to trip.	1. Check adjustment 3A and 3B. Clean friction surfaces between velocity trip lever (134) and the friction washers. Clean with carbon tetrachloride or equivalent solvent. Check to see that idler wheel (163) is moved against cam at center of turntable by the velocity trip lever (134) pressing against lever (126) as the pickup arm is moved towards the center of the turntable. Levers 129 and 126 should not bind on their pivot.
2. Changer trips too soon.	2. Check adjustment 3A. Pressure on velocity trip lever may be too great.
3. Changer trips continuously.	3. Check selector lever spring (66). It should return selector lever to auto position from reject.
4. Changer fails to cycle after being tripped.	4. Check to see that lead roller (34) is being pushed upward into spiral on bottom of the turntable by the spring 87.
5. Changer jams at start of change cycle.	5. Check to see that return roller 34A is held out of the spiral by the cam dropping lever (83). During second half of cycle, spring should rotate lever (83) under return roller (34A) collar as it is pushed out of the spiral.
6. Changer action is sluggish.	6. Check lubrication. Check to make sure that slow speed bushings on the motor are not binding in their bearings due to dirt or gummy oil or grease.
MOTOR	
1. Changer is sluggish or motor overheats.	1. (a) Check lubrication (oil may be old or gummy). (b) Low line voltage. (c) Defective motor.
2. Motor rumble heard in record reproduction.	2. (a) Shipping bolts not removed from motor board. (b) Flat spot on idler wheel.

SUBJECT:

SUPPLEMENT TO P15

Substitution of RBH-015 motor for RBH-017 and RBH-013 motors in the P15 three-speed record changer. Stock RBH-013 and RBH-017 motors will not be carried as a replacement unit. Parts for RBH-013 and RBH-017 will be stocked and are listed below and in ER-S-P15 parts list. Stock RBH-015 motor as listed in service notes for the P15 will be stocked. Parts for RBH-015 are listed below. RBH-015 motor is shown in Figure 1. RBH-017 motor is shown in Figure 2.

SUBSTITUTION OF RBH-015 MOTOR FOR RBH-017 MOTOR

RBH-017 motor, Figure 2, was used in late production of the P15 record changer. Stock RBH-015 motor may be substituted directly for RBH-017 motor without any change in the mechanism.

SUBSTITUTION OF RBH-015 MOTOR FOR RBH-013 MOTOR

Stock RBH-015 motor may be substituted for RBH-013 motor by changing to a new speed control linkage. All parts for this new linkage are contained in kit RKP-010. Kit RKP-010 contains the following:

- | | |
|-----------------------------------|---|
| 1. Link Lever, Cat. No. RML-039 | 4. Shoulder Rivet, Cat. No. RMM-080 |
| 2. Rocker Lever, Cat. No. RMA-011 | 5. Decal to identify RPM position of knob |
| 3. Knob Lever, Cat. No. RMM-110 | 6. Small rubber sleeve RMB-022 |

PROCEDURE.

1. Remove old RBH-013 motor and replace with RBH-015 motor as shown in Figure 3. Motor mounting studs are the same for RBH-015 and RBH-013.
2. Remove connecting lever and linkage between old RBH-013 motor and speed control knob. Save the knob, the flat washer, lockwasher and machine screw which secures lever to the speed control knob.
3. Rivet lever RMA-011 in place as shown in Figure 3 with shoulder rivet RMM-080. A hole is already stamped in the base plate to mount the shoulder rivet as shown in Figure 3.
4. Connect link lever RML-039, as shown in Figure 3, using grommet and rubber sleeve on motor speed change lever pin.
5. Mount lever RMM-110 as shown in Figure 3, using flat washer lockwasher and machine screw and knob. Figures 3 and 4 show the levers in the 45 rpm position.
6. Remove old decal by scraping the numbers off lightly with a razor blade. Replace with the decal as shown in Figure 4.
7. Make switch and plug connections. Connect ground lead between motor and base plate.

CAT. NO.

RKP-010
RMA-011
RML-039
RMM-080
RMM-110
RMS-205
RMS-211
RMS-212
RMS-218

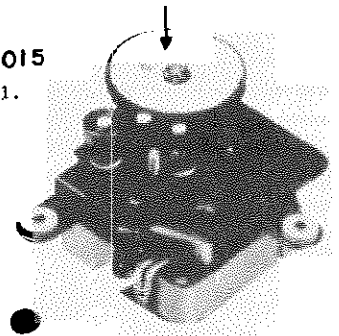
RMW-060
RMW-061
RMW-062
RMW-063
RMW-066

DESCRIPTION

KIT - Speed change lever kit for converting from RBH-013 motor to RBH-015 motor.
LEVER - Rocker lever for speed control linkage for RBH-015 or RBH-017 motors.
LINK - Link lever for RBH-015 or RBH-017 motor with grommet.
RIVET - Shoulder rivet for mounting lever RMA-011.
LEVER - Knob lever for use with RBH-015 or RBH-017 motor.
SPRING - Idler wheel tension spring for RBH-015 motor.
SPRING - Pulley arm index spring for RBH-015 and RBH-017 motors.
SPRING - Idler wheel spring for RBH-017 motor.
LOCK RING - Small lock ring for holding 33 1/3, 45 and 78 rpm speed change pulleys onto spindle.
WHEEL - Idler wheel for RBH-015 motor.
PULLEY - 33 RPM speed change pulley for RBH-015 or RBH-017 motors.
PULLEY - 45 RPM speed change pulley for RBH-015 or RBH-017 motors.
PULLEY - 78 RPM speed change pulley for RBH-015 or RBH-017 motors.
WHEEL - Idler wheel for RBH-017 motor.

RMW-060

RBH-015
FIGURE 1.



RMW-066

RBH-017
FIGURE 2.

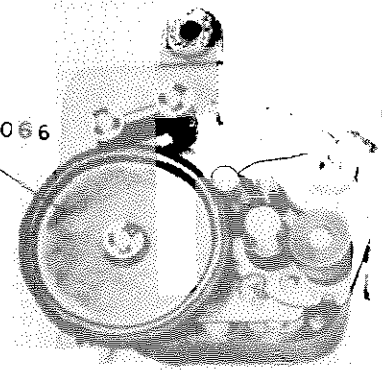


FIGURE 4.

RML-039

RMM-080

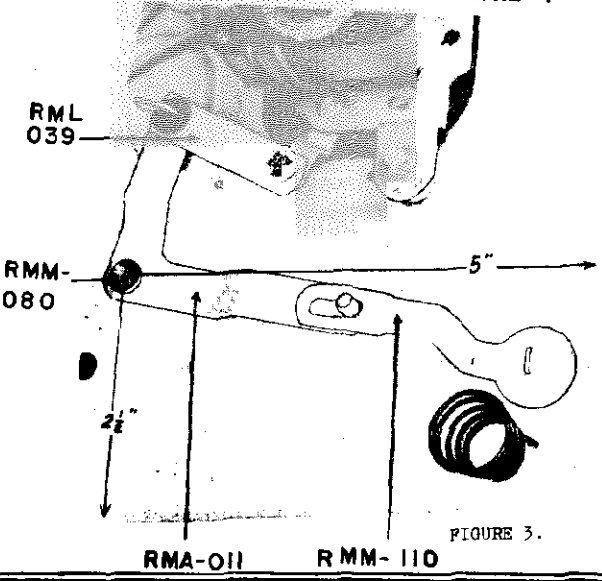
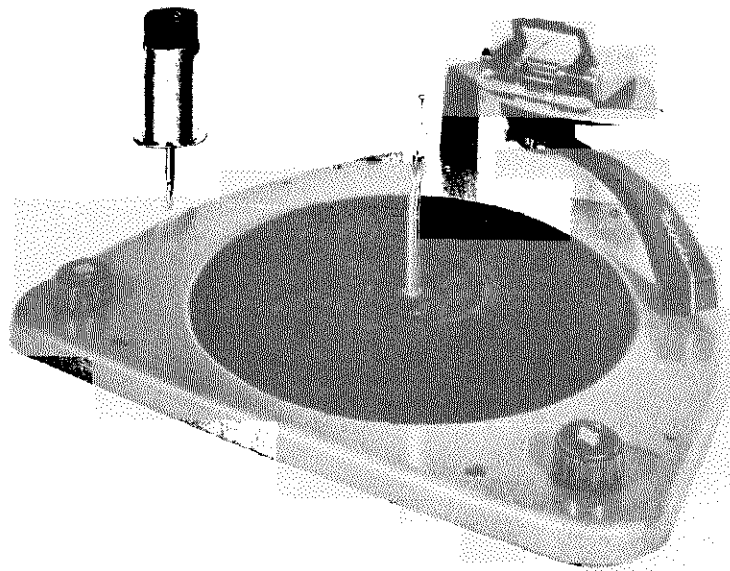


FIGURE 3.

RMA-011

RMM-110



DESCRIPTION

Motorola Model RC-36 Record Changer is a three-speed, single-post changer, designed to play the following records not intermixed:

- | | |
|--|---------------------------------------|
| a. ten 12-inch 33 or 78 RPM records, or - | c. twelve 7-inch 45 RPM records, or - |
| b. twelve 10-inch 33 or 78 RPM records, or - | d. twelve 7-inch 33 RPM records |

A specially designed single-point needle is used for playing both standard and fine-groove records. Two interchangeable record spindles are used - a large diameter spindle for 45 RPM records and a small diameter spindle for all other type records.

The last record to drop to the turntable will be repeated until the changer speed control is turned off. This stops the turntable but the phono motor will continue to run until the "power" or "phono" control on the radio panel is turned off. No power switch is incorporated in the changer. The motor is designed to operate on 105 to 120 volts, 60 cycles AC only.

This changer features a limit stop mechanism which assures correct dropping of the pick-up arm on the lead-in grooves of the records and proper timing of the change cycle after the record has played, regardless of the record size - 7-inch, 10-inch or 12-inch.

OPERATION

PHONOGRAPH CONTROLS

SPEED. The SPEED control determines the speed at which the turntable revolves. You must set this control to the position corresponding to the playing speed of the records you wish to play, viz., record speed 33 RPM, SPEED control to 33; record speed 45 RPM (large center-hole records), SPEED control to 45; or record speed 78 RPM, SPEED control to 78.

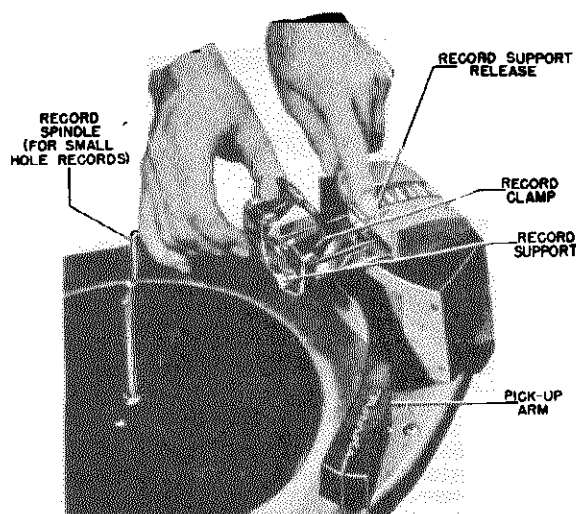
CAUTION: The SPEED control can only be moved clockwise from a playing speed position, but may be moved counterclockwise or clockwise, one position, from an OFF position. To stop turntable - rotate SPEED control clockwise.

REJECT. The REJECT control is momentarily turned clockwise and released to start playing action or to reject a record before it has completely played.

OPERATING PROCEDURE

1. Turn the radio power switch "on" and the phono-radio control to the "phono" position.
2. Select the appropriate center post for the records you desire to play.
 - a. Two spindles are provided; one spindle for small-hole records and one for large-hole records.
 - b. To play small center-hole records, insert the small diameter spindle into the hole in the center of the turntable and rotate the spindle until the pin of the spindle drops into the slot in the turntable bushing.
 - c. To play large center-hole records, insert the large diameter spindle into the turntable hole and turn the spindle counterclockwise until the spindle reaches a stop. NOTE: If the two metal separator discs of the large spindle are seen protruding from the spindle, turn the spindle shaft until they disappear inside the spindle, then insert the spindle into the turntable.
 - d. To remove a spindle from the turntable, merely lift the spindle straight up from the turntable.

3. Adjust the RECORD SUPPORT to the correct position according to the size record you desire to play.
 - a. Three positions of the record support are provided, i.e., a separate position for playing 7-inch, 10-inch, and 12-inch records (see Figure 2).
 - b. To adjust the RECORD SUPPORT press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the correct position according to the size records being played. The RECORD SUPPORT will lock in position (see Figure 1). NOTE: Although the ledge of the RECORD SUPPORT is not used when playing 7-inch 45 RPM records, the RECORD SUPPORT must be in the 7-inch playing position.
4. Load the records.
 - a. Raise the RECORD CLAMP to a vertical position.
 - b. Place a stack of records over the center post in the desired sequence, with the last record to be played on top.
 - c. Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the spindle when playing small-hole records. If you are playing large-hole records, place the records over the spindle and rest them on the off-sets of the large spindle.



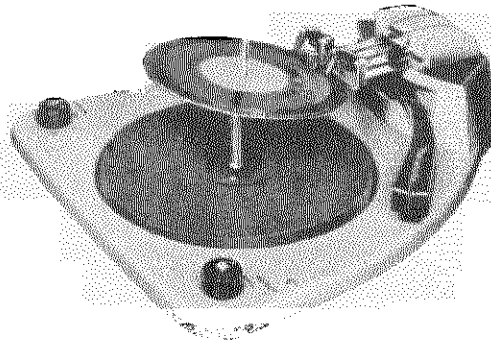
To adjust the RECORD SUPPORT, press down on the RECORD SUPPORT RELEASE and move the record support to the desired position.

FIGURE 1. RECORD SUPPORT ADJUSTMENT

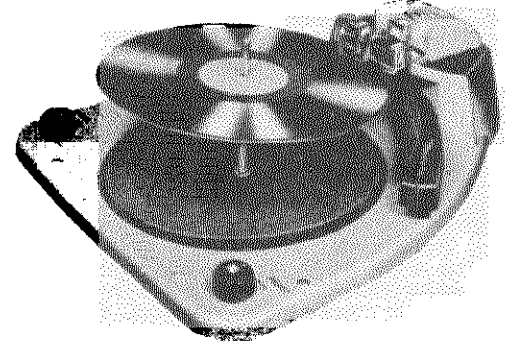
- d. Gently lower the RECORD CLAMP on the records. NOTE: DO NOT LOWER THE RECORD CLAMP WHEN PLAYING 7-INCH 45 RPM RECORDS.
5. Adjust the SPEED control to the position corresponding to the record speed of the records you are playing.
6. Momentarily turn the REJECT control clockwise.
 - a. The bottom record will now drop to the turntable, the pick-up arm will lift, swing in, and drop to the turntable; record playing will now begin.
 - b. The REJECT control may be turned momentarily clockwise to reject a record before it has completely played. NOTE: Never touch the pick-up arm while the record changer is in a changing cycle.
7. At the conclusion of playing and as the last record is being repeated, lift the pick-up arm and move it to the right.
8. Turn the SPEED control clockwise to the OFF position. NOTE: This stops the turntable, but the motor will continue to run until turned off either with the "phono" control or "power" switch on the radio panel.
9. Turn the power switch on the radio panel "off".

TO UNLOAD RECORDS

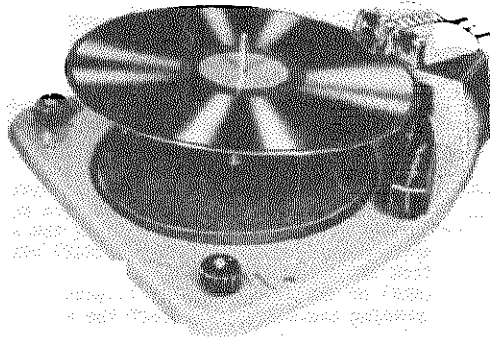
1. Raise the RECORD CLAMP.
2. Lift the records straight up from the turntable. Do not apply pressure to the top record. Keep your thumbs free. NOTE: When removing 45 RPM records, if the two metal separator discs of the large spindle are seen protruding from the spindle, lift the spindle, with the records, from the turntable and turn the spindle shaft until the discs disappear inside the holder before removing records.



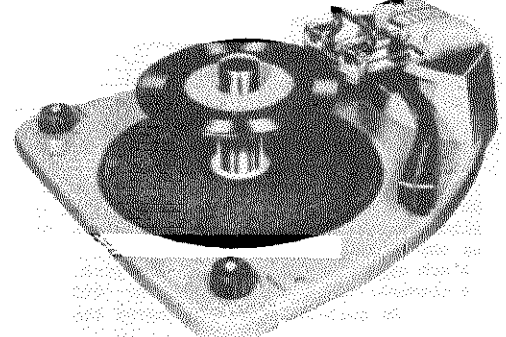
A. To play 7-inch small-hole records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme outward position. Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.



B. To play 10-inch records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the middle position (1-1/2 inches in from the extreme outward position). Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.



C. To play 12-inch records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme inward position. Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.



D. To play 7-inch large-hole records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme outward position. Rest the records on the off-set of the large spindle.

FIGURE 2. RECORD SUPPORT IN RECORD PLAYING POSITIONS

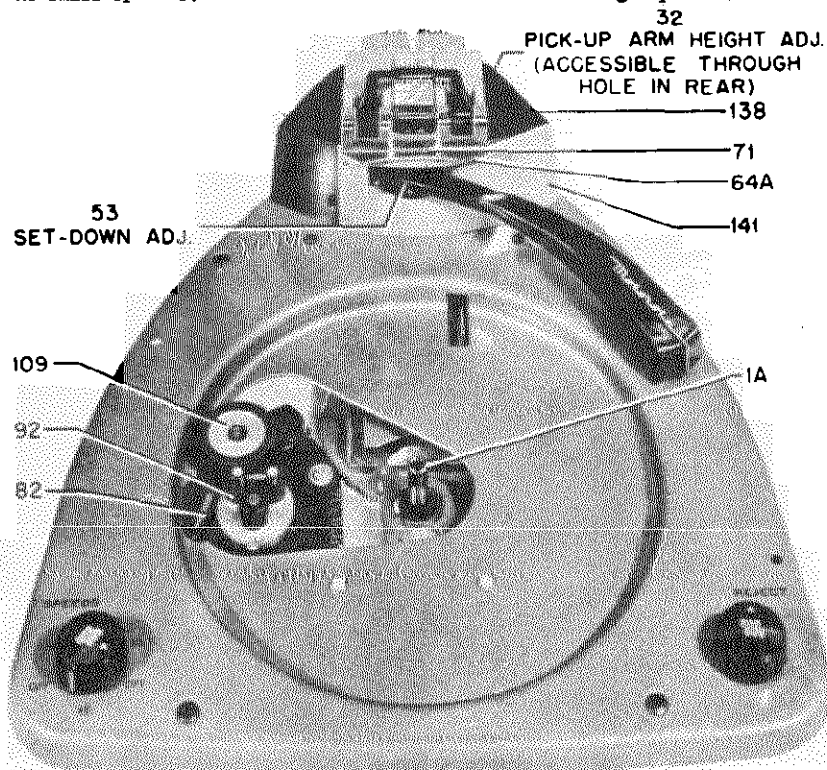


FIGURE 3. TOP VIEW OF RECORD CHANGER WITH TURNTABLE REMOVED

THEORY OF OPERATION

Refer to Figures 3, 4, 5, 6, 7 & 8 for location of the various parts described in this section. This will enable you to readily follow the operation of this unit.

The turntable is rim-driven. Power is transmitted to the turntable through an idler wheel (109) and a speed control turret (92). The speed control turret is operated by means of a 3-gear train, linking the turret to the speed change shaft assembly (87) which is manually operated by the speed control knob on the record changer base. This control has six positions - 78, 45 & 33-1/3 RPM and three "off" positions - controlled by an ingenious six-point cam (87A). This cam permits easy selection of turntable speeds, yet prevents the speed control turret (92) from jamming idler wheel (109) against turntable and causing flat-spots. The speed control can only be moved clockwise from a playing speed position, but may be moved counterclockwise or clockwise, one position, from an OFF position.

During a playing of a record, only the motor assembly (82) and turntable (119) are in operation. Balance of the mechanism is inoperative until the change cycle starts.

THE CHANGE CYCLE

The change cycle may be initiated in two ways - by means of the pick-up arm entering the cut-off grooves in the record or by manual operation of the reject knob. Power for the change cycle is obtained from the turntable.

Prior to a change cycle and while the turntable revolves, the weighted end of the drive clutch lever (118) is resting on the trip lever (21A). When the pick-up arm needle finishes playing a record and enters the cut-off groove, the trip arm (36A), attached to pick-up arm shaft (33), pushes the trip flag bracket (21B) - or when the changer's "reject" control is turned, the reject arm (4), acting through the reject rod (134), pushes the trip flag bracket (21B). This action releases trip lever arm (21C) allowing the trip lever spring (22) to pull the trip lever (21A) away from the drive clutch lever (118), causing the weighted end (118A) of the drive clutch lever (118) to lower and, consequently, the drive dog (118B) of the drive clutch lever contacts the drive screw (120) on the turntable and the change cycle begins.

When the drive clutch lever (118) engages the drive screw (120) and as the turntable continues to revolve, this revolving action causes the cycle gear (9) to turn through the drive gear (117). As the cycle gear revolves, its roller (9A) moves the slide channel (21) back and in doing so, the pick-up arm shaft (33) rides up on the incline (21D) of the slide channel, raising the pick-up arm. As the slide channel (21) continues its backward motion, the clutch fingers (21F) will engage the set-down arm assembly (36) to swing the pick-up arm in a direction away from the spindle. At the extreme backward travel of the slide channel (21) the push-off lever (60C), which rides in the slot (21E) of the slide channel, is actuated and this in turn, through the push-off link (72) moves the record push-off lever (71) pushing the lower record off the record support

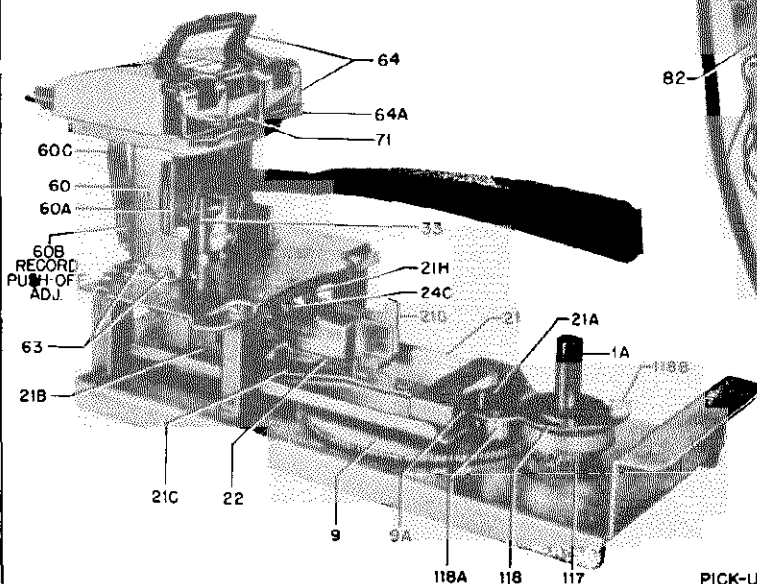


FIGURE 5. VIEW OF RECORD CHANGER WITH BASE & MOTOR ASSEMBLY REMOVED

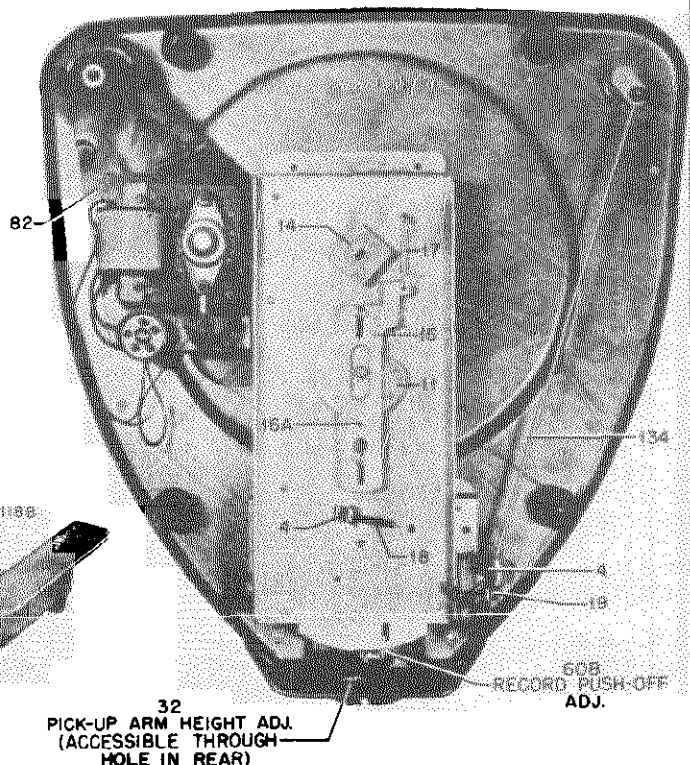


FIGURE 4. BOTTOM VIEW OF RECORD CHANGER

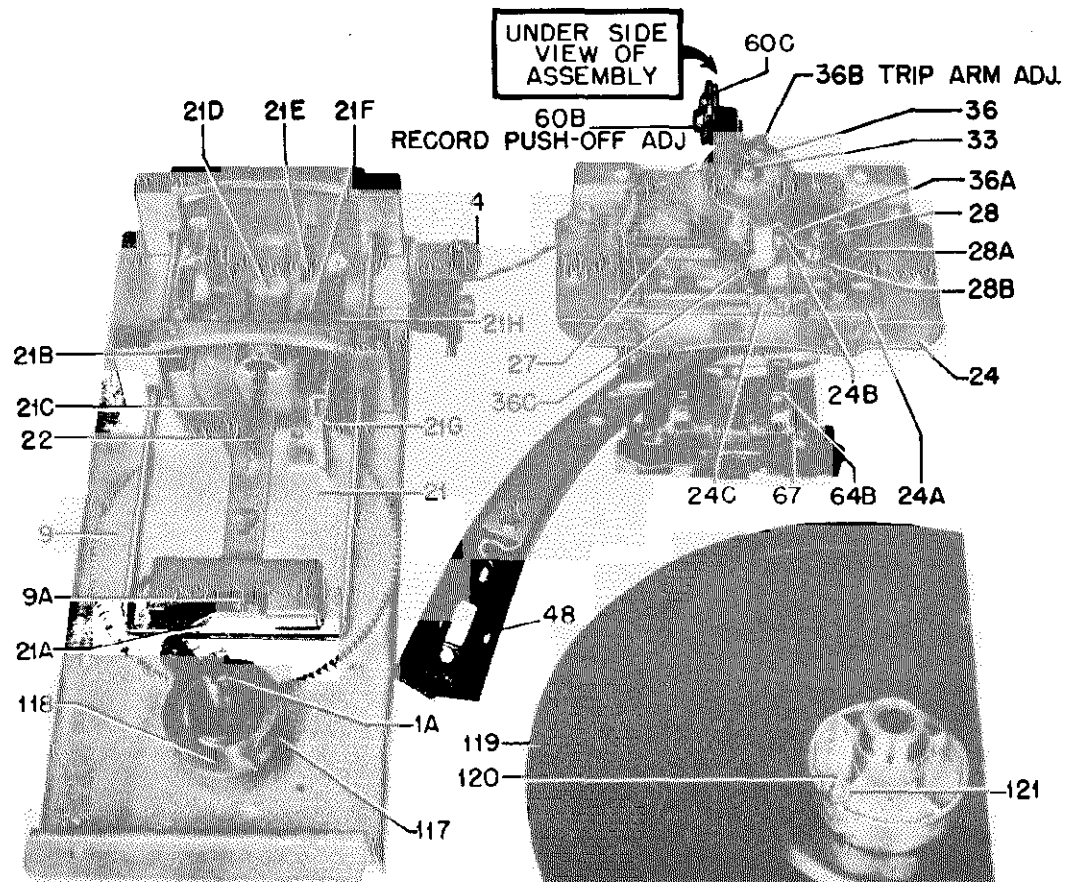


FIGURE 6. DISASSEMBLED VIEW OF RECORD CHANGER MECHANISM

(64A) thus permitting it to drop to the turntable. At this same time, the restoring lever (21G) lowers the set-down flag (24C) (which will index the pick-up arm when the slide channel makes its forward motion) also the trip slide cocking stud (6) engages the trip arm (21C) with the trip flag (21B) to set it for the next cycle and to prevent re-cycling when the slide channel completes its cycle. At this point one-half of the change cycle is completed.

The cycle gear (9) will continue to rotate until it completes one revolution. As it continues to revolve, the slide channel (21) will move forward and the clutch fingers (21F) that are still engaging the set-down arm assembly (36) will now swing the pick-up arm back toward the record spindle until the set-down arm (36C) contacts the set-down flag (24C); this controls the pick-up arm set-down point. While the arm is being held over the set-down point by (24C), continued rotation of the cycle gear (9) makes the pick-up arm shaft (33) ride down the incline (21D), lowering the pick-up arm onto the record.

As the slide channel (21) approaches the end of the cycle (fully forward position) the set-down flag (24C) is moved out of the way by the restoring lever (21H) to give the pick-up arm complete freedom of movement during playing of the record.

When the slide channel moves fully forward, the drive clutch lever (11B) rides up the trip lever incline (21A) and disengages the drive clutch lever dog (11B) from the drive dog screw (120) in the turntable, thus ending the cycle.

PICK-UP ARM SET-DOWN POINT

The point at which the pick-up arm drops to the turntable for either 7-inch, 10-inch or 12-inch records is determined by the position of the set-down flag (24C).

When the record support assembly (64) is adjusted for a specific size record, the movement of the record support causes rotation of the gear and pinion shaft assembly (60A) through the rack gear (64B) on the record support. Since the gear and pinion shaft assembly (60A) engages the set-down gear (28B) and the set-down cam (28A) is attached to the set-down gear, any movement of the record support will cause the set-down cam to turn. The set-down cam stud (24B), on the slide plate and spring assembly (24A), rides with the set-down cam due to the tension of the slide plate spring (27); therefore, any action of the set-down cam will affect the position of the set-down flag (24C).

45 RPM RECORD DROP

The 45 RPM spindle shaft, when dropped in the turntable center hole, fits into the slot in the timing stop (14).

When the change cycle begins and the slide channel (21) is making its backward movement, the reject plate (16)

MODEL RC-36

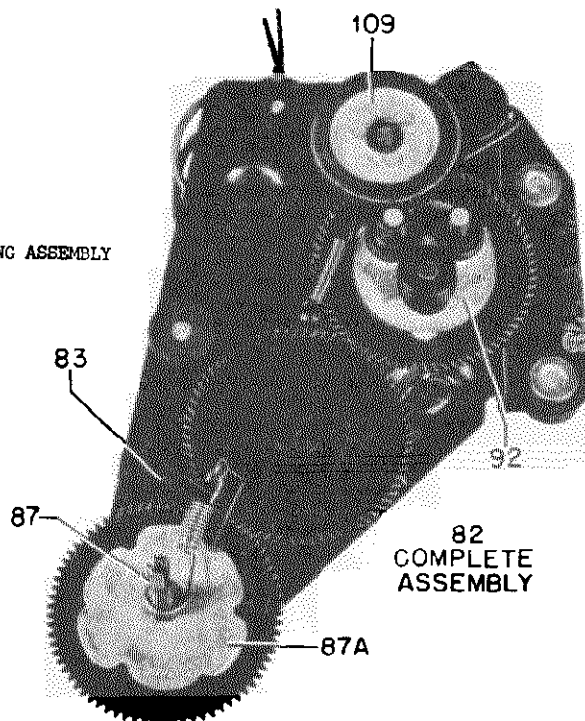


FIGURE 7. MOTOR & SPEED CHANGING ASSEMBLY

moves forward due to the eccentric form of the drop cam (11) riding on roller (16A) and the tension of the spring (17), pulls the reject plate (16) forward until it contacts timing stop (14), preventing it from rotating. Since the turntable with the 45 RPM spindle continues to rotate and the timing stop (14) and spindle shaft (153) remain stationary, the two pinion gears (155) in the upper section of the spindle rotate around the spindle shaft (153) gear. The eccentric extending from the upper end of the two pinion gears (155) runs in a slot in the molded record supports to produce the necessary action which causes the supports to move in against the tension of spring (156). As the plastic record supports recede, the separator discs mounted above each record support separate the lower record of the stack and support the remaining stack while the lower record drops to the turntable. With continued rotation of the spindle the record supports, due to the action of spring (156), will move out to support the record stack, while the separator discs recede into the spindle.

When the slide channel (21) is making its forward movement, the reject plate (16) moves back releasing the timing stop (14) allowing the timing stop and the spindle shaft to revolve for the playing of the record.

LUBRICATION

Factory lubrication should be sufficient for a long period of service.

When lubrication is required use only the following lubricants in the places specified:

<u>Part</u>	<u>Lubricant</u>
Turntable Bearing	- "All-State" Front Wheel Bearing Grease (car lubricant)
Slide Channel (21), Slide Plate & Spring Assembly (24A)	- Moly-Kote (Alpha Corp type M) (Motorola Part No. 11M490126)
All other moving parts	- Silicone High Temperature Lubricant (Dow Corning Corp #DC-44) (Motorola Part No. 11M476079)

DO NOT LUBRICATE THE FOLLOWING PARTS:

- Trip flag bracket (21B)
- Trip lever assembly (21C)

If any oil or grease should come in contact with the idler wheel tire, inside rim of turntable, or any of the motor drive surfaces, clean with carbon-tetrachloride.

MAINTENANCE

It is advised that the service man thoroughly study and familiarize himself with the operation of the integral parts of the record changer and to carefully analyze the trouble before attempting to make any adjustments or to do any repair work on the record changer. The changer, after it leaves the factory, will not require any periodic adjustments, except to adjust the needle set-down point, if the needle or cartridge is replaced.

Should it become necessary to remove the changer from the cabinet, or the changer mechanism from the base plate, the service man is further advised not to unnecessarily remove parts or sections of the changer, since the changer then will require adjustment.

In order for the changer to operate properly, it is important that the changer remain level, either mounted in the cabinet or, while repairing the changer, on the bench. If the changer is working satisfactorily, leave it alone.

ADJUSTMENTS

NEEDLE SET-DOWN ADJUSTMENT

A template, (Motorola Part No. 54B792330) furnished with the record changer, is required to index the needle to the correct set-down point after a needle or cartridge has been replaced. If a template is not available, you may improvise one as follows:

1. Set a compass to 3-5/16 inches and draw a circle on a piece of cardboard.
2. Punch out a 17/64 inch diameter hole at the exact center of the circle.

To index the needle to the correct set-down point:

1. Place the small diameter spindle in the turntable and the template over the spindle.
2. Move the record support to the 7-inch record playing position. NOTE: When the needle is set correctly for this position, the index will be automatically set for 10-inch and 12-inch records.
3. Rotate the turntable by hand and turn the reject control to start the change cycle. Watch the needle carefully. It must land on the curved line of the template.
4. If the needle does not land on the line, adjust the set-down setscrew (53) located on the pick-up arm (see Figure 11). Turn the setscrew clockwise to move the pick-up arm in a direction towards the spindle, or turn the setscrew counterclockwise to move the pick-up arm in a direction away from the spindle. IMPORTANT: Turn the screw very slightly and repeat step 3. Repeat this procedure until the needle lands exactly on the curved line.

PICK-UP ARM HEIGHT ADJUSTMENT

If the pick-up arm strikes the bottom record of a stack of records resting on the 45 RPM spindle or the pick-up arm does not rise sufficiently to clear a 1-inch stack of records after they have dropped to the turntable, proceed as follows:

1. Remove the cabinet back or remove the record changer from the cabinet, as required, to gain access to the rear of the record changer.
2. The height adjustment screw (32) is accessible through a hole in the rear of the record support housing (138) (see Figure 3).
3. If insufficient clearance is noted, turn the height adjustment screw (32) clockwise to raise the arm, or counterclockwise to lower the arm, as required.

PUSH-OFF LEVER ADJUSTMENT

If a record fails to drop to the turntable, check the position of the record push-off lever (71) on the record support during a change cycle; it should protrude a minimum of 1/32 inch from the record support during the record dropping portion of change cycle. If adjustment is required, proceed as follows:

1. Remove the cabinet back or remove the record changer from the cabinet, as required, to gain access to the rear of the record changer.
2. Turn the reject knob to place changer in cycle and rotate turntable by hand until record push-off lever (71) is at its point of maximum forward travel.
3. Turn the push-off adjustment screw (60B) until push-off lever (71) protrudes 1/32 inch beyond lip (64A) of record support.

TURNTABLE DRIVE PIN ADJUSTMENT

If a "clicking" noise is heard while a record is playing, the drive dog adjusting screw (120) on the bottom of the turntable is touching the drive dog (118B). To remedy:

1. Remove the turntable. NOTE: Do not remove the drive clutch lever (118); also do not lose the bearing washer (115).
2. Loosen the hex nut (121) and turn the drive dog adjusting screw (120) counterclockwise to bring the screw further away from the drive dog. CAUTION: Do not turn the screw too much, since the screw will not engage the drive dog and, as a consequence, the changer will fail to cycle.
3. Tighten the hex nut (121).
4. Replace the turntable.

MODEL RC-36

TRIP ARM ADJUSTMENT

If the mechanism does not trip after playing a record or trips before a record has completed its play, the set-down arm (36) requires adjustment.

1. Readjust the needle set-down setscrew (53) (see paragraph on NEEDLE SET-DOWN ADJUSTMENT).
2. If adjusting the setscrew in step 1 does not correct the fault, remove the cabinet back or remove the record changer from the cabinet, as required, to gain access to the rear of the record changer.
3. Turn the set-down adjustment screw (53) until the end of the setscrew is even with the pick-up arm.
4. Adjust the trip arm adjustment stud (36B) (this is an eccentric stud) sufficiently so that mechanism trips correctly.
5. Readjust the needle set-down setscrew (53) (see paragraph on NEEDLE SET-DOWN ADJUSTMENT).

PARTS REMOVAL AND REPLACEMENT

TO REMOVE THE RECORD CHANGER FROM THE CABINET

1. Disconnect the power and phono input leads from the record changer.
2. Loosen and remove the four Phillips head screws (123) on the top of the record changer and pull the record changer straight up from the cabinet.

NEEDLE REPLACEMENT

Use only a Motorola needle; do not use any other needle, as damage to the records or crystal cartridge will result. IMPORTANT: After needle is replaced, check the set-down point as outlined in NEEDLE SET-DOWN ADJUSTMENT.

Two types of needles and crystal cartridges are being used. Look at your needle and cartridge!

IMPORTANT: The needle should be held in the cartridge perpendicular to the surface of the turntable.

1. If the needle is secured to the cartridge with a small, round knurled nut (see Figure 9), loosen the nut and remove the needle from the cartridge. Replace with Motorola needle, Part No. 59K691908. Insert the replacement needle in the cartridge needle receptacle and tighten the knurled nut.
2. If the needle is not held in place with a knurled nut, merely pull the needle from the cartridge using your fingers or pliers (see Figure 10). Replace with Motorola needle, Part No. 59K691909. The replacement needle is partly encased in a small guard to protect the needle point; push the needle into the cartridge needle receptacle and remove the guard. Friction will hold the needle in position.



FIGURE 9.



FIGURE 10.

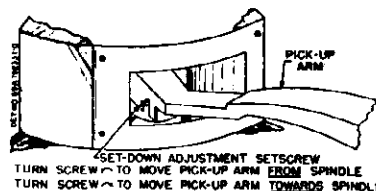


FIGURE 11.

CARTRIDGE REPLACEMENT

Two types of cartridges are being used, they are interchangeable. To remove the cartridge, merely remove the cartridge retainer clip (48) and disconnect the pick-up leads. IMPORTANT: After cartridge is replaced, check the needle set-down point as outlined in NEEDLE SET-DOWN ADJUSTMENT paragraph.

TO REMOVE THE TURNTABLE

1. Remove the turntable retaining clip.
2. Lift the turntable straight up from the base plate. Be sure the bearing (116) and bearing washer (115) do not get lost or dirty.
3. When replacing the turntable, it will be necessary to center the drive clutch lever (118) and bearing washer (115) to allow proper seating of the turntable over the spindle post.
4. Replace the turntable retaining clip.

TO REPLACE THE DRIVE CLUTCH LEVER

1. Place the changer mechanism in the rest position (slide channel (21) in full forward position) with the trip flag bracket (21B) engaged in the trip lever arm (21C).
2. Place the drive clutch lever (118) in position with the weighted end (118A) of the drive dog resting on the trip lever (21A).

TO REMOVE THE DRIVE GEAR

1. Remove the turntable and drive clutch lever (118).
2. Lift the drive gear (117) straight up from the spindle post.
3. When replacing the drive gear (117) it is important that the changer be timed correctly. To time, position cycle gear so that cycle gear roller (9A) is directly in line with the spindle post (1A) and pull the trip lever (21A) forward so that trip flag (21B) falls in and locks it in position. Now place the drive clutch lever (118) in position on drive gear (117) and mesh the gears so that weighted end of clutch lever (118) rests on the lowest edge of the trip lever (21A) incline. Check the timing by playing a stack of 45 RPM records. If a record of the stack fails to drop during a cycle, move the drive gear (117) one "tooth" and play another stack of records to again check the timing.

TO REMOVE THE RECORD SUPPORT HOUSING COVER AND RECORD SUPPORT HOUSING

1. Remove the four Phillips head screws (142) that secure the housing cover (141) to the housing (138).
2. Remove the four hex head screws (140) and four washers (139), accessible from the bottom of the changer, that secure the housing to the base plate.

TO REMOVE THE COMPLETE CHANGER MECHANISM AND MOTOR ASSEMBLY

1. Disconnect the power and phono leads.
2. Remove the speed control knob.
3. Disconnect the reject rod (134).
4. Remove the turntable and drive clutch lever (118) from the changer.
5. Remove the record support housing cover (141) and housing (138).
6. From the bottom of the changer, remove one machine screw (131) securing the motor assembly (82) to the base plate (122).
7. Remove the four Phillips head lockscrews (130).
8. Remove the two hex head screws (129).

TO REMOVE THE MOTOR ASSEMBLY

1. Disconnect the power lead.
2. Remove one machine screw (131) from the bottom of the record changer securing the motor assembly to the base plate.
3. Remove the turntable from the record changer.
4. Remove the two machine screws (114) securing the motor assembly to the changer mechanism.
5. Remove the speed control knob.

PICK-UP ARM MOUNTING PLATE ASSEMBLY REPLACEMENT

Should it ever become necessary to remove the pick-up arm mounting plate assembly (24), the following precautions should be observed when replacing the assembly.

1. Be sure that the hole in the set-down cam (28A) lines up with the hole in the mounting plate and that the set-down cam stud (24B) on the set-down flag (24C) is on the outside of the cam.
2. Be sure that the set-down flag (24C) is in a position so that it can be actuated by the restoring lever (21G).
3. The record support must be in the 12-inch playing position when replaced.

TO REMOVE THE SLIDE HINGE AND SLIDE BRACKET

1. Slide hinge (145) is secured with a spring clip (149). To unlatch the slide hinge: Place a folded piece of paper on both sides of the slide hinge, between the slide hinge and the slide cover (143) and pull the paper forward, simultaneously pulling the slide hinge upwards. See Figure 12.
2. Four machine screws secure the slide bracket (146) to the record support and slide cover (143).

MODEL RC-36

REPLACEMENT PARTS LIST

Ref. No.	Part Number	Description	Ref. No.	Part Number	Description
1	1X691802	Mounting Plate Riveted Assembly (includes items 1 through 8)...	62	588497	Rivet: .088 x 1/8; stl; nkl pl.....
2	7A470234	Bracket, receptacle mtg	63	387350	Lockscrew: 6-32 x 1/4; slotted hex head machine screw
3	587701	Rivet: .122 x 3/16; stl	64	1X691824	Record Support & Clamp Assembly: complete; includes items 64 through 70
4	45D691361	Arm, manual reject	65	1X691964	Clamp Assembly, record hold-down
5	5K691478	Rivet, shoulder	66	41A691279	Spring, extension
6	46A691227	Stud, trip slide cocking	67	41A691795	Spring, push off restoring
7	5K26998	Rivet, shoulder	68	58691794	Rivet, shoulder
8	46A691273	Stud, reject plate slide	69	46A691485	Stud, drive
9	1X691803	Cycle Gear, Shaft & Roller Assembly	70	46A691243	Pin, spring retainer
10	4A691767	Washer, spring	71	47K691953	Lever, record push-off
11	45A691256	Cam, record drop (45 RPM)	72	1X691826	Push-Off Link & Bushing Assembly
12	4S7569	Washer, flat: 5/16 x .145 x .027; cad pl	73	46A691235	Stud, slide locking
13	387247	Lockscrew: 6-32 x 3/16; slotted hex head machine screw; cad pl	74	41A691466	Spring, coil
14	46A691309	Stop, timing	75	4S8279	Washer, flat: 5/16 x .125 x .027; cad pl
15	42A691462	Clip	76	4K73809	Washer, "C"
16	1X691843	Reject Plate & Roller Assembly..	77	64B691342	Plate, record rest cover
17	41A76925	Spring, coil tension	78	386932	Screw, machine: 4-40 x 3/16 slotted locking type binderhead
18	41A691489	Spring, manual reject	79	43K471634	Ball, steel
19	9A470260	Receptacle, 1-prong	80	42A691405	Clip, ball bearing
20	387506	Screw, sheet metal: #6 x 1/4 PKZ plain hex head; cad pl.....	81	41A691467	Spring, extension
21	1X691804	Slide Channel Assembly: complete..	82	59D691876	Motor Drive Assembly: complete; includes items 82 through 113..
22	41A691469	Spring, trip lever arm actuating..	83	45A691223	Pawl, speed detent
23	41A14244	Spring, tension coil	84	5K691481	Rivet, shoulder
24	1X691962	Set-Down Flag & Pick-Arm Mounting Assembly: complete; includes items 24 through 30	85	37K15125	Grommet, rubber
25	41A691258	Spring, set-down flag detent ..	86	5A12105	Eyelet, mounting
26	587769	Rivet: .088 x 3/32 stl;.....	87	1X691965	Speed Change Shaft Assembly
27	41A691282	Spring, slide plate	88	44A691219	Gear, speed change
28	1X691813	Set-Down Cam & Gear Assembly ..	89	43A17431	Bushing, collar: brass
29	4K73809	Washer, "C"	90	387113	Setscrew: 8-32 x 1/4 slab head ..
30	5A790684	Grommet, rubber	91	41A691280	Spring, pawl extension
31	1X691815	Pick-up Arm Brkt. & Stud Assembly..	92	1X691966	Speed Control Turret Assembly: in- cludes items 92 through 97
32	3A691288	Screw, pick-up arm adj	93	4A691407	Washer, pulley: felt
33	47A691221	Shaft, pick-up arm	94	42A691438	Clip, pulley retainer
34	46A691268	Pin, pick-up carriage	95	49A691333	Pulley, speed control (78 RPM)...
35	3S3858	Setscrew: 4-40 x 1/4 allen head ...	96	49K691337	Pulley, speed control (45 RPM)...
36	1X691816	Set-Down Arm Assembly	97	49A691335	Pulley, speed control (33 RPM)....
37	3S9700	Setscrew: 6-32 x 3/16 allen head...	98	44A691219	Gear, speed change
38	46C691431	Counterbalance, pick-up arm.....	99	4A691214	Washer, turret spring: phosphor bronze
39	3S1452	Screw, machine: 4-40 x 1/2 slotted binderhead; cad pl	100	3S490530	Screw, machine: 3-48 x 3/16 slotted round head; cad pl
40	1X691817	Pick-up Arm Assembly: includes items 40 through 53	101	59C691379	Motor, phono
41	45D691428	Arm, pick-up: arm only	102	28A470534	Plug, cable connector
42	1X691818	Pick-up Cartridge Leads Assembly...	103	29A481785	Lug, ground connector
43	9A72670	Contact, pin terminal	104	4S7657	Lockwasher: #8 ext; cad pl ...
44	59B691430	Cartridge, crystal: with needle (Shure)	105	3S2957	Screw, machine: 8-32 x 1/2 plain hex head; cad pl
45 or	59K691907	Cartridge, crystal: with needle (Electro Voice)	106	3A691237	Screw, motor mounting
46	59K691908	Needle (for 59B691430 cartridge)...	107	41A691284	Spring, motor extension
47	59K691909	Needle (for 59K691907 cartridge)...	108	1X691967	Idler Wheel Bracket Assembly ..
48	42A691429	Clip, cartridge retainer	109	49A691277	Wheel, idler
49	1X691819	Pick-up Arm Plate & Bushing Assem...	110	4A691891	Washer, insulating: rubber ...
50	3S490739	Screw: #4 x 1/4 PKZ Phillips bin- derhead; cad pl	111	42A691893	Clip, hair pin
51	3S490535	Screw, machine: 4-40 x 5/16 Phillips flat head; cad pl	112	46A691420	Pin, groove
52	41A691329	Spring, torsion	113	41A691281	Spring, idler extension
53	3S9710	Setscrew: 4-40 x 5/16 slotted head- less	114	3S7279	Screw, machine: 8-32 x 5/8 slotted binderhead; cad pl
54	4K580282	Washer, spring: phosphor bronze..	115	4A691286	Washer, bearing
55	4A16556	Washer, spring	116	43A691278	Bearing, turntable
56	3S2286	Lockscrew: 4-40 x 3/16 slotted hex head machine screw; cad pl ...	117	44B691354	Gear, drive
57	46C691368	Block, guide slide	118	1X691827	Drive Clutch Lever & Weight Assembly
58	4S7651	Lockwasher: #8 int; cad pl ...	119	1X691978	Turntable Assembly
59	3S2963	Screw, machine: 8-32 x 1-3/4" plain hex head; cad pl	120	3A691225	Screw, drive dog adjusting ..
60	1X691820	Record Support Housing Assembly: complete with push-off lever & gears	121	2S7003	Nut, hex: 8-32 x 5/16
61	1X691963	Bracket Lock Assembly	122	1X691829	Record Changer Base Assembly: in- cludes items 122 through 128 ...
			123	3S488108	Screw, machine: 10-32 x 1-3/8 Phillips flat head; antique copper finish
			124	4S8214	Washer, flat: 7/8 x .203 x .067

Ref. No.	Part Number	Description
125	35A481870	Mounts, shock:rubber
126	43A484295	Sleeve, shock mount:rolled
127	2A484296	Nut, shock mount: tapered tee ..
128	37A17361	Grommet, rubber
129	3S7205	Lockscrew: 8-32 x 1/4 slotted hex head machine; cad pl
130	3S490533	Lockscrew: 6-32 x 1/4 Phillips binderhead machine screw; antique copper finish
131	3S7279	Screw, machine: 8-32 x 5/8 slotted binderhead; cad pl
132	1X691830	Reject Lever & Shaft Assembly
133	4A11722	Washer, "C"
134	47A691464	Rod, reject
135	43A691917	Sleeve, rubber
136	2A691432	Nut, speed
137	36B691483	Knob, control
138	15D691488	Housing, record support
139	4S8279	Washer, flat: 5/16 x .125 x .027; cad pl
140	3S490531	Screw: #4 x 3/8 PKF plain hex head; cad pl
141	15C691393	Cover, housing
142	3S490532	Screw: #2 x 3/8 PKF Phillips oval head; nkl pl
143	15C691395	Cover, slide
144	42A691415	Fastener, slide cover
145	55B691391	Hinge, slide release: chrome pl....
146	7B691418	Bracket, slide release hinge
147	47A691424	Shaft, slide release hinge
148	3S490352	Screw, machine: 2-56 x 5/32 slotted binderhead; cad pl
149	41A691463	Spring, retainer
150	4S8406	Lockwasher: #2 int; cad pl ...
151	47C691499	Spindle, record: 33 & 78 RPM.....
152	1X691832	Spindle, record: 45 RPM: complete.

153	1X691834	Drive Gear & Shaft Assembly
154	42A691283	Clip, shaft
155	1X691835	Record Support & Separator Assembly
156	41A691406	Spring, compression
157	1X691836	Center Post Cap & Spring Assembly .
158	41A691253	Spring, spindle cap
159	3S7164	Screw, machine: 6-32 x 1/4 slotted binderhead; cad pl
160	4S7666	Lockwasher: #6 ext; cad pl ...
161	3S488082	Screw, machine: 6-32 x 1-3/4" slotted round head; cad pl ..

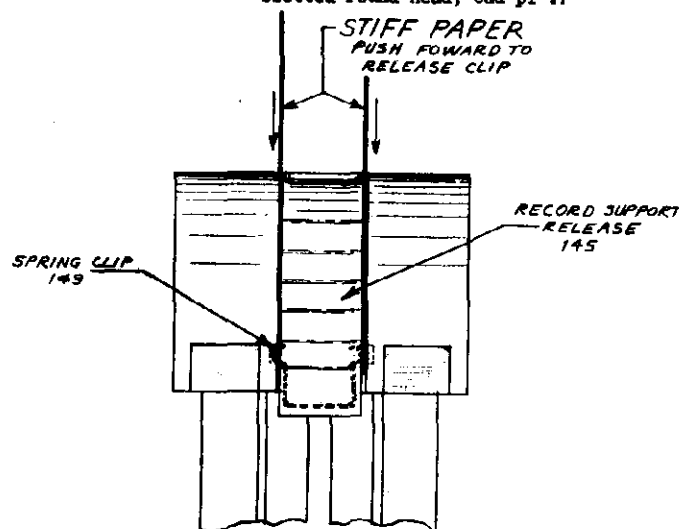


FIGURE 12. METHOD OF RELEASING CLIP ON RECORD SUPPORT RELEASE

SERVICE HINTS

STANDARD OR 33 RPM RECORDS FAIL TO DROP

1. Adjust the push-off lever (71), or -
2. Record center-hole binding on spindle. Ream out with pencil.

45 RPM RECORDS FAIL TO DROP

1. Drive gear (117) does not mesh with cycle gear (9) correctly.

PICK-UP ARM DOES NOT SET DOWN IN CORRECT POSITION

1. Adjust the set-down setscrew (53).

MECHANISM TRIPS BEFORE RECORD IS COMPLETED, OR DOES NOT TRIP AFTER RECORD IS COMPLETED

1. Adjust set-down setscrew (53) and the trip arm stud (36B).

CONTINUOUS CYCLING

1. Drive clutch lever (118) 180° out of phase; merely reverse the drive clutch lever's position on the drive gear (117), or -
2. Grease or dirt on trip flag bracket (21B), or -
3. Set-down flag (24C) not being actuated by restoring lever (21G), or -
4. Turntable bearing (116) or bearing washers (115) missing.

MECHANISM FAILS TO TRIP WHEN REJECT BUTTON IS TURNED

1. Reject rod (134) not connected, or -
2. Trip lever spring (22) weak or not connected.

MECHANISM SLOW IN STARTING

1. Bad motor, or -
2. Grease on idler wheel (109) or on speed control pulleys (95, 96 or 97), or -
3. Parts binding.

TURNTABLE DOES NOT REVOLVE

1. Check the power to the motor, or -
2. Remove the turntable and check to see if the motor shaft revolves, or -
3. Bad motor, or -
4. Grease on the idler wheel (109) or on speed control pulleys (95, 96 or 97), or -
5. Turntable not seated properly.

NEEDLE JUMPS GROOVES

1. Record changer not level, or -
2. Records dirty - clean with soap and water, or -
3. Needle not set correctly in the cartridge - it should be perpendicular to surface of the record.

RECORD SUPPORT CANNOT BE ADJUSTED TO THE THREE RECORD PLAYING POSITIONS

1. Set-down cam (28A) not set properly with relation to the set-down cam stud (24B). See Pick-up Arm Mounting Plate Assembly Replacement.

MODELS RC-36, RC-36A

DESCRIPTION

The Model RC-36A record changer differs from the Model RC-36 only in the type of record reject mechanism used. The RC-36 employs a limit trip, whereas the RC-36A uses a velocity trip, the operation of which depends upon the speed at which the tone arm approaches the center of the

record, not upon any predetermined dimension from the center spindle.

The operating procedure for the RC-36A changer is as described in the RC-36 manual.

THEORY OF OPERATION

The change cycle of the RC-36A changer is similar to the RC-36, except where the new trip flag assembly (164) the set-down arm and trip assembly (167), and the set-down flag (165C) are involved. Refer to Figures 1 and 2 for the locations of the new parts.

The theory of operation of the velocity trip mechanism is as follows:

As the pick-up arm (40) approaches the center of a record, the trip arm (167A) tends to release the trip flag (164A) from the trip lever arm (163B); but, with every revolution of the turntable, the wiper (184) strikes the trip rod (164) and resets the trip flag (164A). This action continues until the pick-up arm enters the cut-off grooves, when the movement of the trip arm (167A) is so rapid that the trip flag (164A) cannot be reset by the wiper (184). The change cycle thus is initiated.

The trip arm spring (168) has been designed to allow the proper amount of slippage between the trip arm (167A) and the set-down arm (167B) so that the changer will not cycle during the normal playing of a record, and yet the friction is great enough to trigger the trip flag (164A) when the cut-off groove is reached.

As the pick-up arm moves outward, off the record, the rear projection on the trip arm (167A) encounters a stud (173) in the rear slide guide block (172), and the trip arm (167A) is reset to its proper position for the next cycle.

The set-down flag (165C) on the RC-36A has been revised to include a formed, flat spring (165D) which holds the set-down arm (167B) firmly until the pick-up arm has been lowered to the record, thus preventing "skating" if the changer is jarred or is setting at a slight angle.

ADJUSTMENTS AND SERVICE HINTS

All adjustments and service hints for the RC-36 changer apply equally to the RC-36A changer except the trip arm adjustment.

If the mechanism does not trip after playing a record, or trips before a record has completed its play, proceed as follows:

1. Remove the turntable (182).
2. Measure the distance between the outer edge of the hub on the turntable and the point of contact of the trip rod on the wiper (184). The dimension should be approximately 7/8". Bend the wiper bracket (183) if necessary.
3. Check the operation by playing a 78 RPM record and a 33 RPM record. If the changer trips too soon at 78 RPM, bend the wiper bracket (183) downward slightly (toward the trip rod). If the changer does not reject at 33 RPM, bend the wiper bracket (183)

upward slightly (away from the trip rod).

4. If the above adjustment does not correct the trouble, remove the changer from the cabinet and proceed as in steps 5 & 6.
5. Check the reject operation visually. Move the trip flag (164A) outward until it is flush with the projection on the trip lever arm (163B). As the turntable is rotated, the wiper (184) should contact the trip rod (164) very lightly. Bend the wiper bracket (183) if necessary.
6. If the adjustment in step 5 is correct, and the changer still does not reject properly, check for any looseness or binding of the trip arm (167A) on the set-down arm assembly. The pressure required to move the trip arm (167A), measured from the tip of the trip arm, should be 10 to 18 grams. Replace the trip arm spring (168) if necessary.

REPLACEMENT PARTS LIST

LATE MODEL RC-36 REPLACEMENT PARTS SUPPLEMENT

The following parts are replacements for, or additions to, the original items listed in the RC-36 Service Manual. They are also used in the RC-36A.

Ref. No.	Part Number	Description	Ref. No.	Part Number	Description
5	5A691472	Rivet, shoulder (replaces 5K691478 rivet)	162	42A600415	Clip (replaces item 15, when used with 46A691309-A timing stop (14)
35	3S3863	Set screw: 4-40 x 1/4 Bristo head; cad pl (replaces 3S9700 set screw)	170	4S7683	Lockwasher, internal: #4; cad pl (under screw, item 39)
85	37K692036	Grommet, rubber (replaces 37K15125 grommet)	171	4S7683	Lockwasher, internal: #4 cad pl (under screw, item 50)
123	3S400110	Screw, machine: 10-32 x 1-3/4" Phillips flat head; antique copper finish (replaces 3S488108 screw)	174	35A600113	Bumper, rubber (inserted in front edge of record hold-down clamp, item 65)
140	3S400038	Screw, thread cutting: #4 x 5/16; type 25; plain hex head; cad pl (replaces 3S490531 screw).	180	2S7981	Speednut: for 1/8" stud (fits over ends of screws, item 106)
			181	29R5301	Lug, soldering (on motor grounding lead)
			186	42K692053	Clip, speed (turntable retainer)

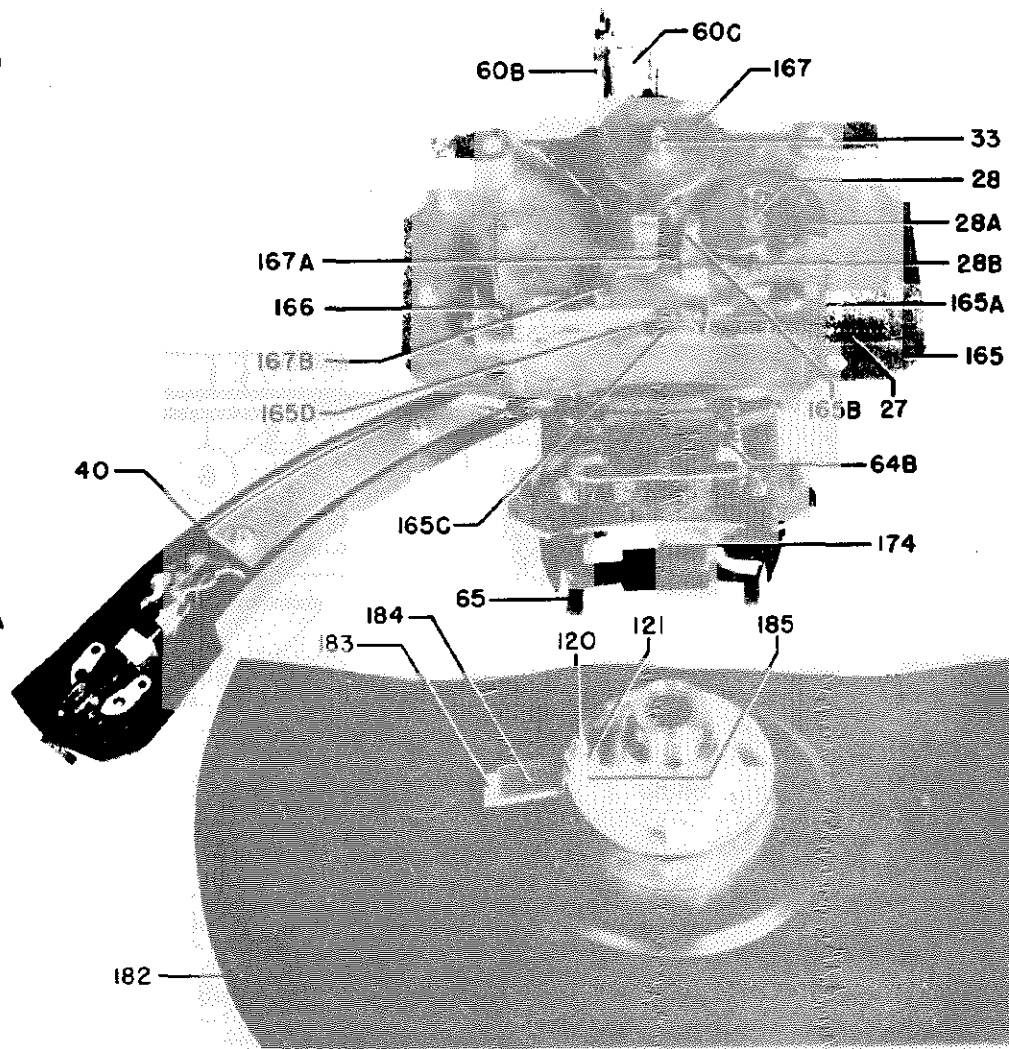
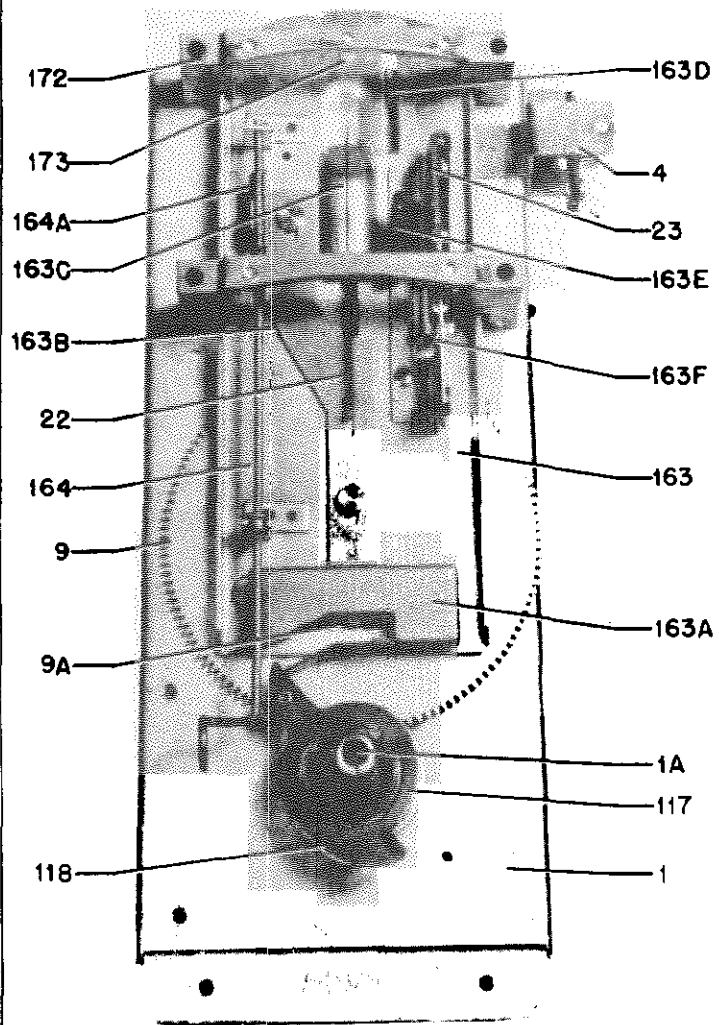
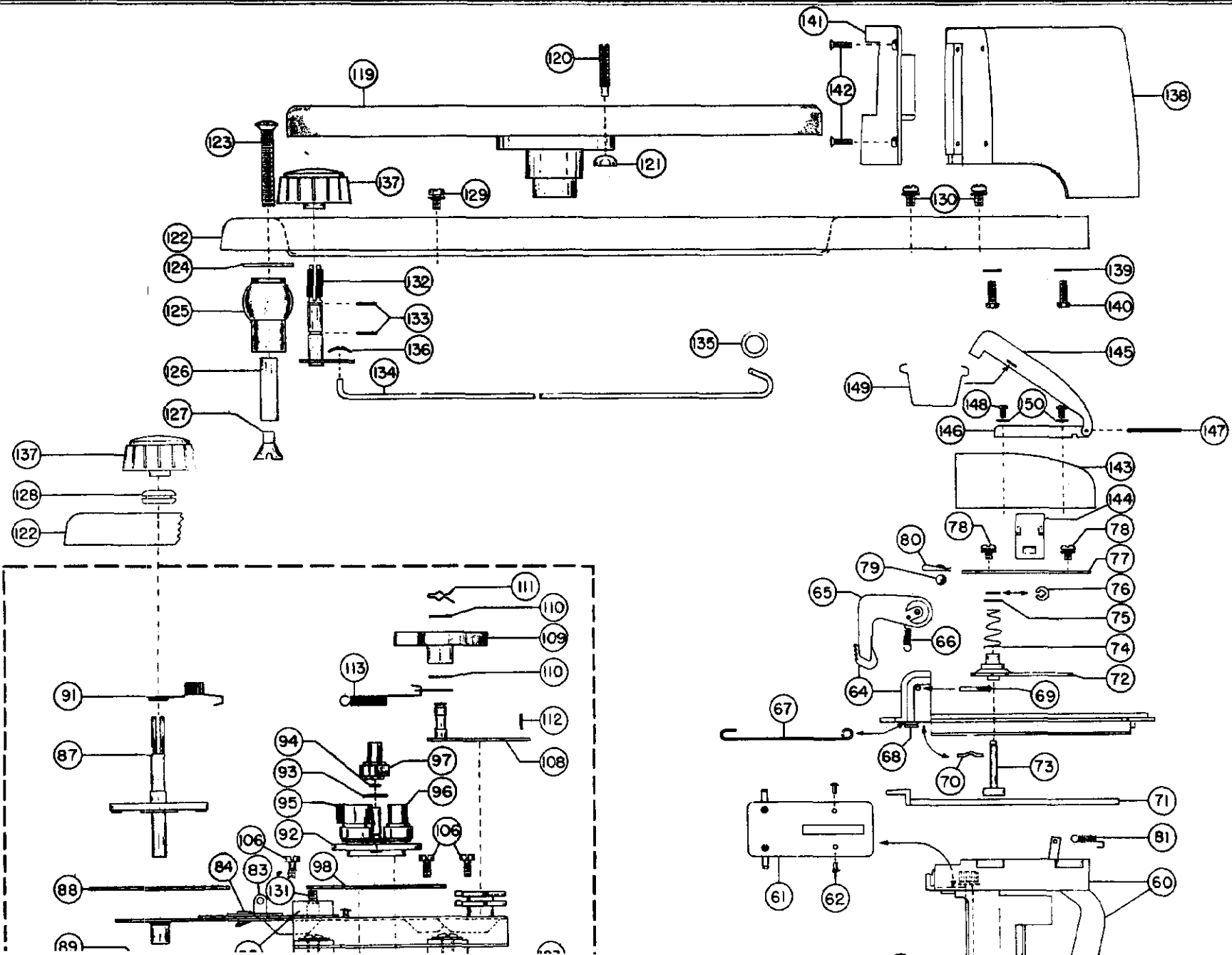


FIGURE 1. DISASSEMBLED VIEW OF RC-36A RECORD CHANGER MECHANISM
(BALANCE OF PARTS SAME AS RC-36)

MODEL RC-36A REPLACEMENT PARTS LIST
Same as RC-36 except:

-
- Exploded view diagram of a mechanical assembly, likely a gun or machine gun, showing various components and their assembly sequence. The diagram includes numerous numbered callouts (1 through 100) pointing to specific parts. The parts list on the left side of the diagram provides the following information:
- 1. LIST
 - 2. om-
 - 3. 23
 - 4.
 - 5. assembly
 - 6. Arm
 - 7. lete;
 - 8. 29;
 - 9.
 - 10. at..
 - 11. m
 - 12.
 - 13. to
 - 14.
 - 15. s item
 - 16.
 - 17. g:
 - 18. (rs)
 - 19. ed
 - 20.
 - 21. used
 - 22.
 - 23. rnal:
 - 24. (5)
 - 25. ad
 - 26.
 - 27. lete;
 - 28. 3,
 - 29.
 - 30.

FIGURE 2. RC-36A RECORD CHANGER REPLACEABLE PARTS
(BALANCE OF PARTS SAME AS RC-36)



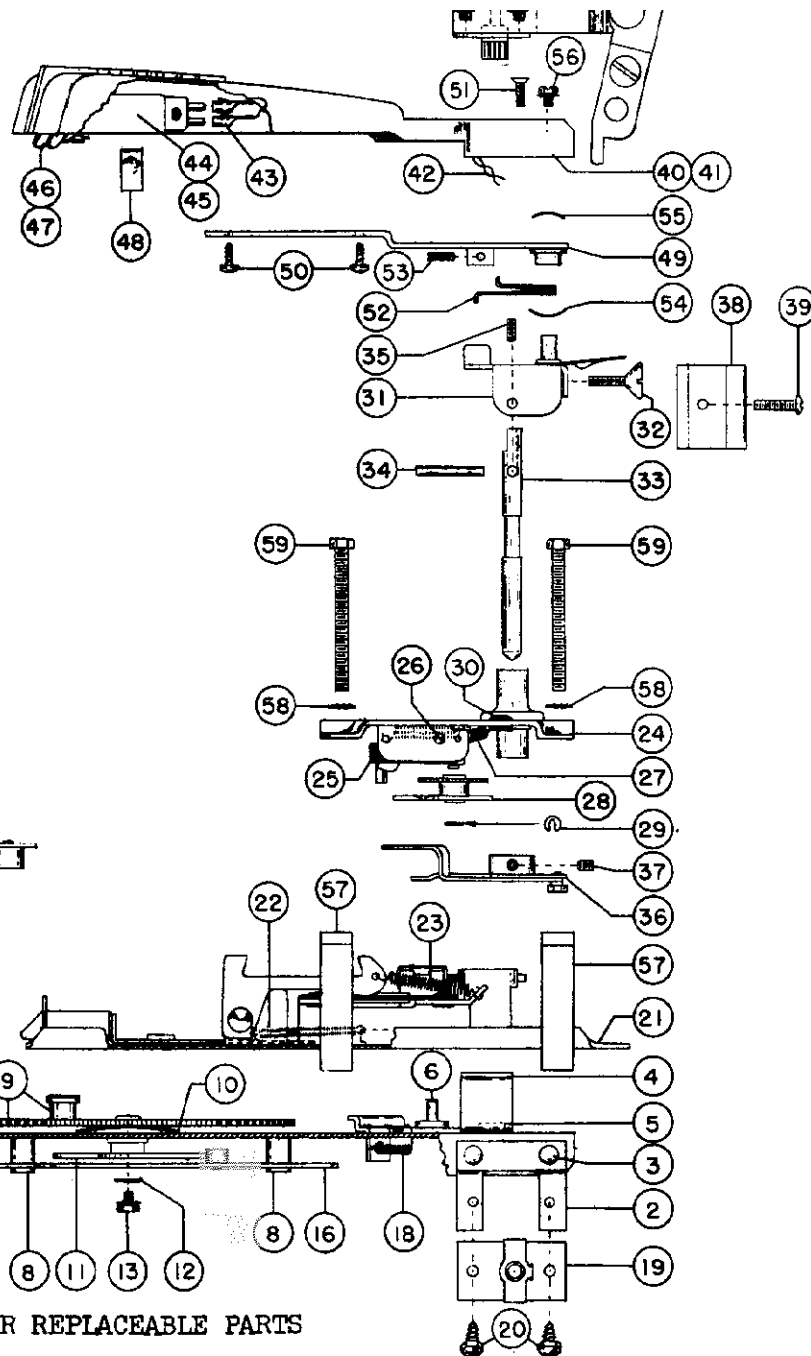
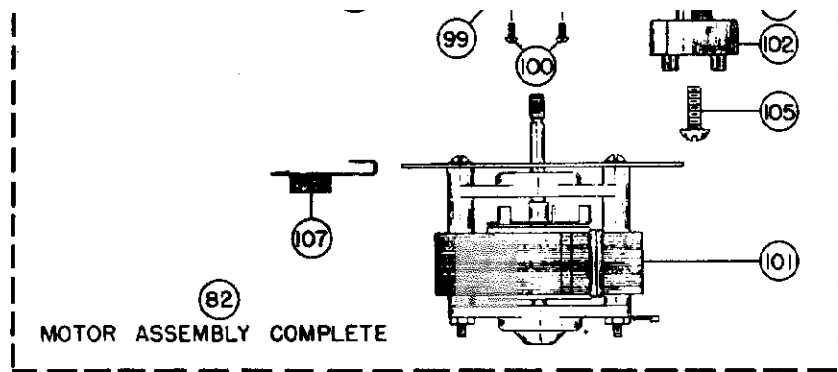
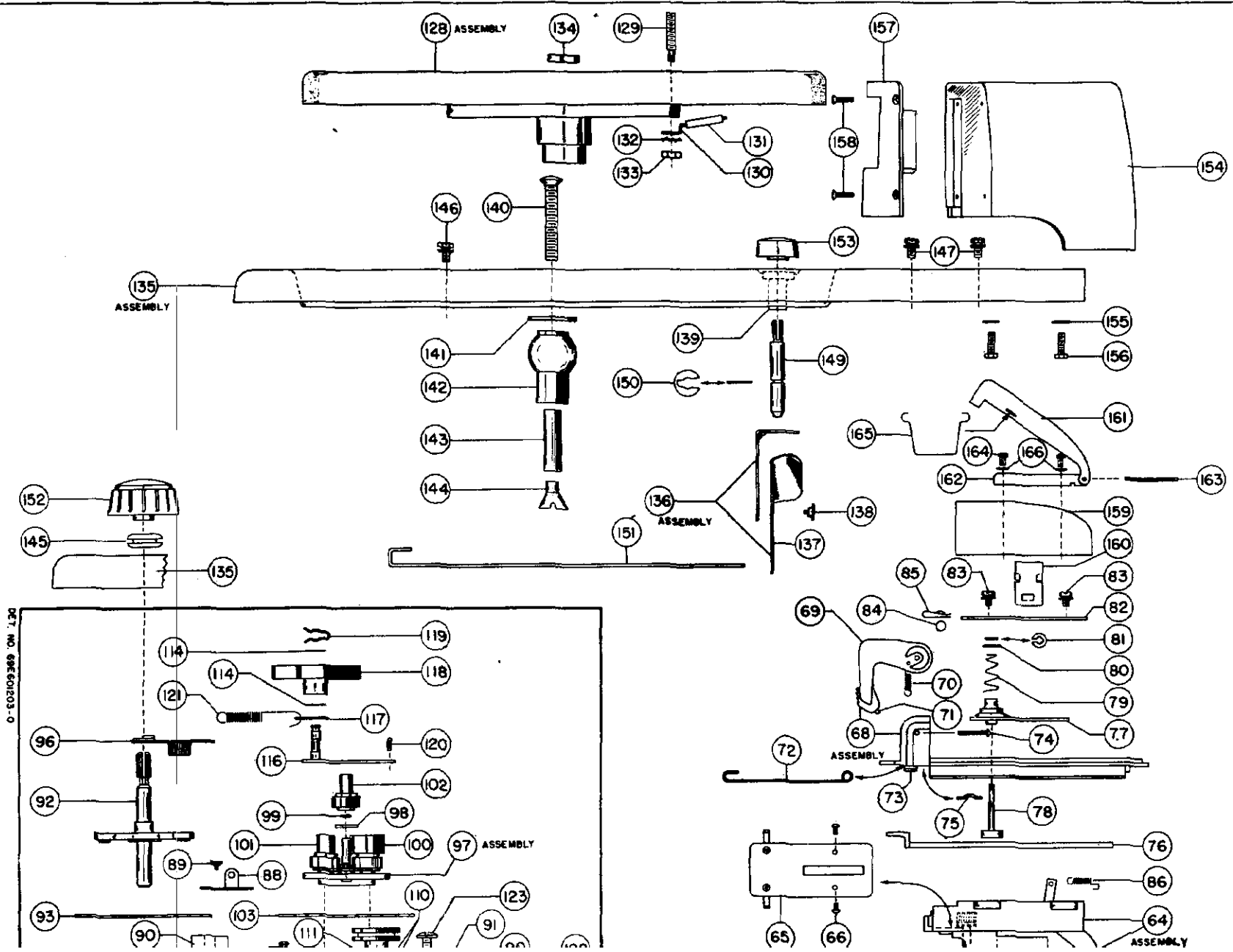


FIGURE 8. RECORD CHANGER REPLACEABLE PARTS



DET. NO. 696C00203-0

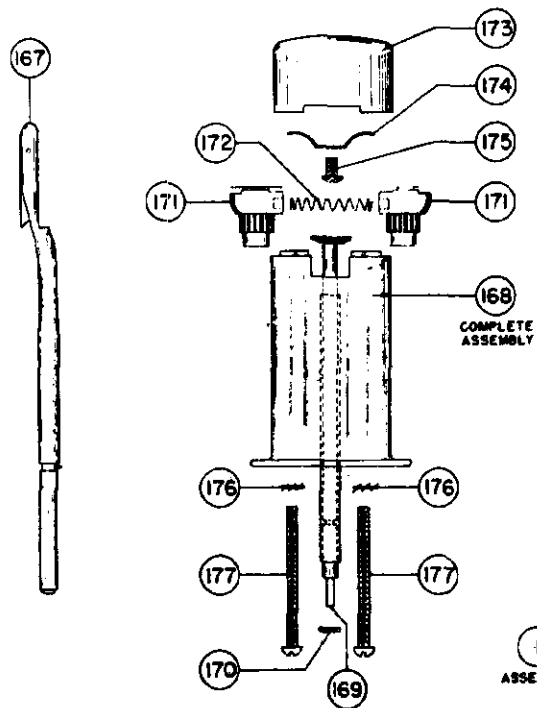
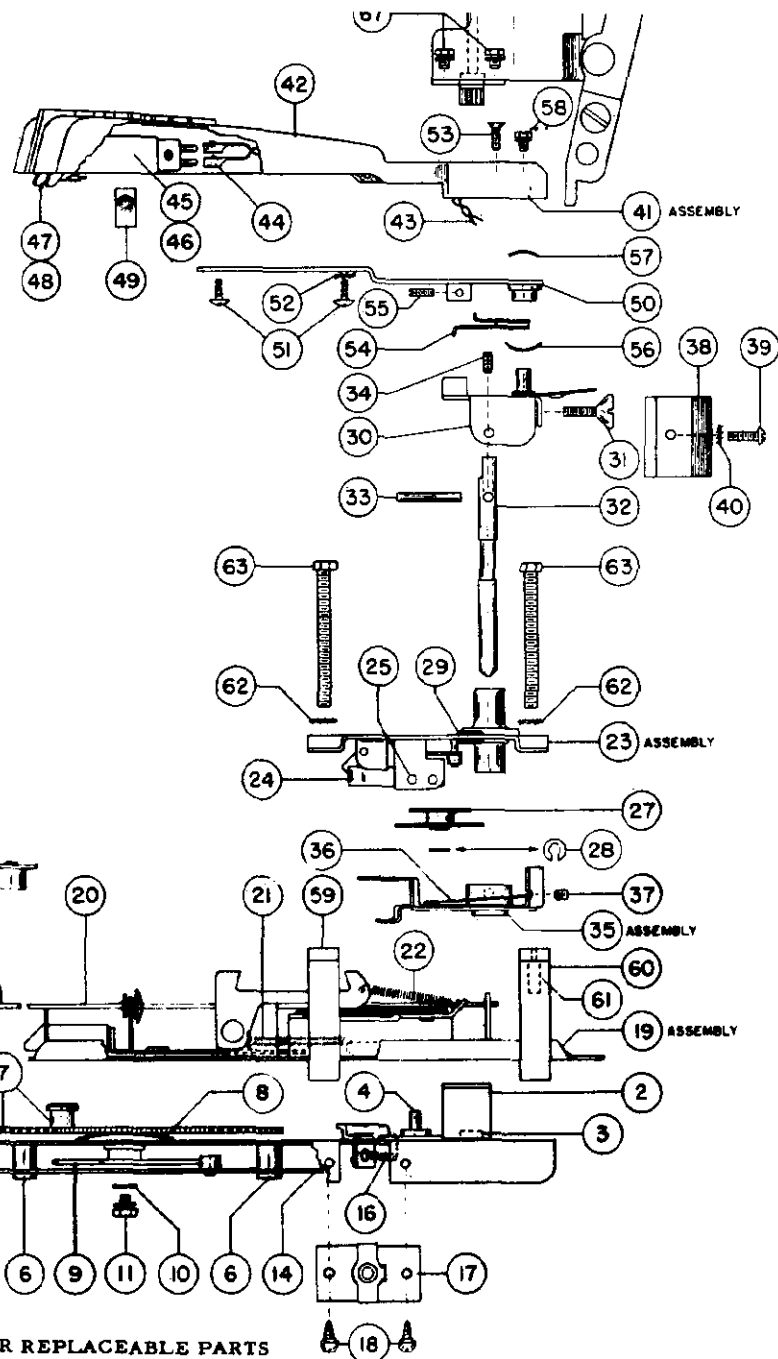
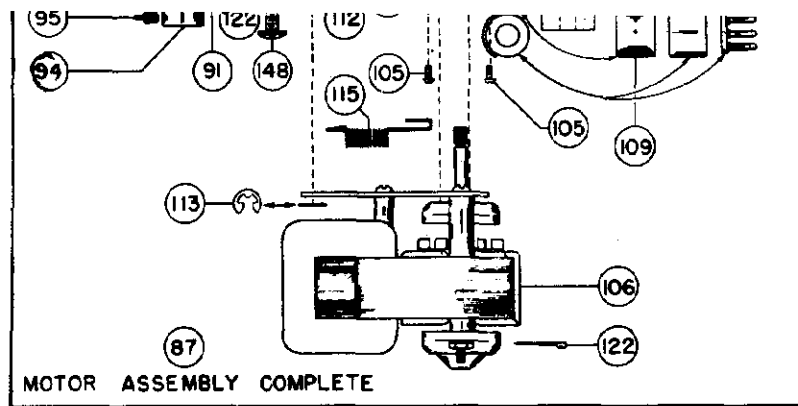


FIGURE 9. RECORD CHANGER REPLACEABLE PARTS

DESCRIPTION

Motorola Model RC-37 Record Changer is a three-speed, single-post changer, designed to play the following records, not intermixed:

- a. ten 12-inch 33 or 78 RPM records, or -
- b. twelve 10-inch 33 or 78 RPM records, or -
- c. twelve 7-inch 45 RPM records, or -
- d. twelve 7-inch 33 RPM records

Both standard and fine-groove records may be played with a specially designed single-point needle. Two interchangeable record spindles are used - a large diameter spindle for 45 RPM records and a small diameter spindle for all other type records.

The last record to drop to the turntable will be repeated until the changer is turned off. The speed control on the changer will stop the turntable; but, since no power switch is incorporated in the changer, the phono motor will continue to run until the "power" or "phono" control on the radio panel is turned off.

The RC-37 changer employs a velocity trip, the operation of which depends upon the speed at which the tone arm approaches the center of the record, not upon any pre-

determined dimension from the center spindle.

The motor is designed to operate on 105 to 120 volts, 60 cycles AC only.

OPERATION

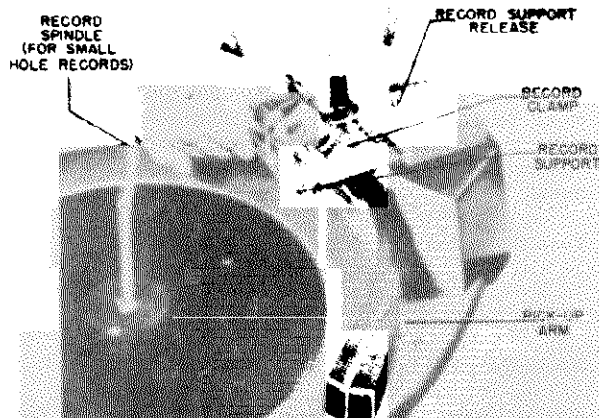
OPERATING PROCEDURE

PHONOGRAPH CONTROLS

SPEED. The **SPEED** control determines the speed at which the turntable revolves. Set this control to the position corresponding to the playing speed of the records, viz., record speed 33 RPM, **SPEED** control to 33; record speed 45 RPM (large center-hole records), **SPEED** control to 45; or record speed 78 RPM, **SPEED** control to 78.

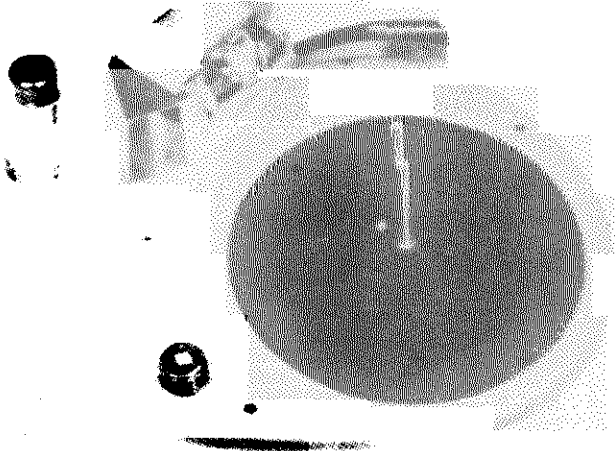
CAUTION: The **SPEED** control can be rotated clockwise only from a playing speed position, but it may be rotated in either direction, one position, from OFF.

REJECT. The **REJECT** knob is pushed momentarily and then is released to start playing action or to reject a record before it has completely played.



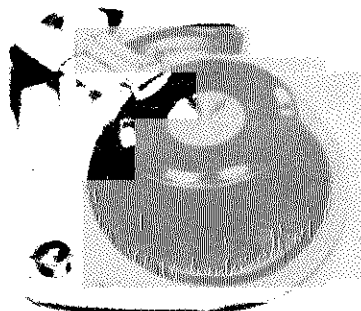
To adjust the **RECORD SUPPORT**, press down on the **RECORD SUPPORT RELEASE** and move the record support to the desired position.

FIGURE 1. RECORD SUPPORT ADJUSTMENT

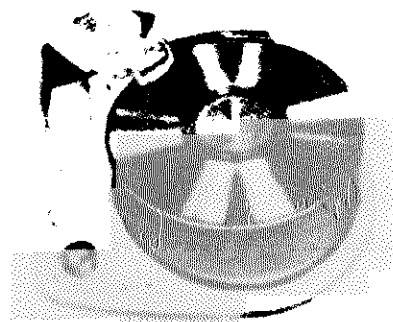


1. Turn the radio power switch "on" and the phono-radio control to the "phono" position.
2. Select the appropriate center post for the records to be played.
 - a. Two spindles are provided: one for small-hole records and one for large-hole records.
 - b. To play small center-hole records, insert the small diameter spindle into the hole in the center of the turntable, and rotate the spindle until the pin drops into the slot in the turntable bushing.
 - c. To play large center-hole records, insert the large diameter spindle into the turntable hole and rotate it counterclockwise until it reaches a stop. If the two metal separator discs of the spindle are protruding, remove the spindle, turn the spindle shaft until they disappear, and re-insert it into the turntable.
 - d. To remove a spindle from the turntable, lift it straight up.
3. Adjust the **RECORD SUPPORT** to the correct position, according to the size record to be played.
 - a. Three positions of the record support are provided: for 7-inch, 10-inch or 12-inch records (see Figure 2).
 - b. To adjust the **RECORD SUPPORT**, press down on the **RECORD SUPPORT RELEASE** and move the **RECORD SUPPORT** to the correct position, according to the size records being played. The **RECORD SUPPORT** will lock in position (see Figure 1). **NOTE:** When playing 7-inch 45 RPM records, the **RECORD SUPPORT** must be in the 7-inch playing position, although the ledge is not used.

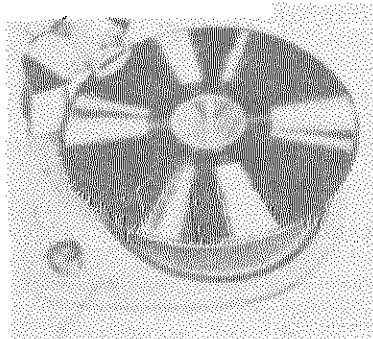
MODEL RC-37



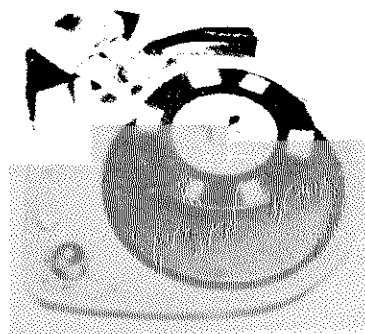
A. To play 7-inch small-hole records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme outward position. Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.



B. To play 10-inch records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the middle position (1 1/2 inches in from the extreme outward position). Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.



C. To play 12-inch records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme inward position. Rest the records on the ledge of the RECORD SUPPORT and on the off-set of the small spindle.



D. To play 7-inch large-hole records, press down on the RECORD SUPPORT RELEASE and move the RECORD SUPPORT to the extreme outward position. Rest the records on the off-set of the large spindle. Do not lower the RECORD CLAMP.

FIGURE 2. RECORD SUPPORT IN RECORD PLAYING POSITION

4. Load the records.
 - a. Raise the RECORD CLAMP to a vertical position.
 - b. Place a stack of records on the center post in the desired sequence, with the last record to be played on top.
 - c. When playing small-hole records, rest them on the ledge of the RECORD SUPPORT and on the off-set of the spindle. Rest large-hole records on the supports on the large spindle.
 - d. Gently lower the RECORD CLAMP on the records. NOTE: DO NOT LOWER THE RECORD CLAMP WHEN PLAYING 7-INCH 45 RPM RECORDS.
5. Adjust the SPEED control to the position corresponding to the playing speed of the records to be played.
6. Momentarily push the REJECT knob.
 - a. The bottom record will drop to the turntable, the pick-up arm will lift, swing in, and lower to the record. Playing will now begin.
 - b. The REJECT knob may be pushed to reject a record before it has completely played. NOTE: Never touch the pick-up arm while the phonograph is in a changing cycle.
7. At the conclusion of playing, and as the last record is being repeated, lift the pick-up arm and move it to the right.
8. Turn the SPEED control clockwise to the OFF position. NOTE: The turntable will stop but the motor will continue to run until turned off, either with the "phono" control or the "power" switch on the radio panel.
9. Turn the power switch on the radio panel "off".

TO UNLOAD RECORDS

1. Raise the RECORD CLAMP.
2. Lift the records straight up from the turntable. Do not apply pressure to the top records. Keep the thumbs free. NOTE: If, when removing 45 RPM records from the large spindle, the two metal separator discs are protruding from the spindle, lift both the spindle and the records from the turntable. Rotate the shaft on the bottom of the spindle to retract the discs, and then remove the records.

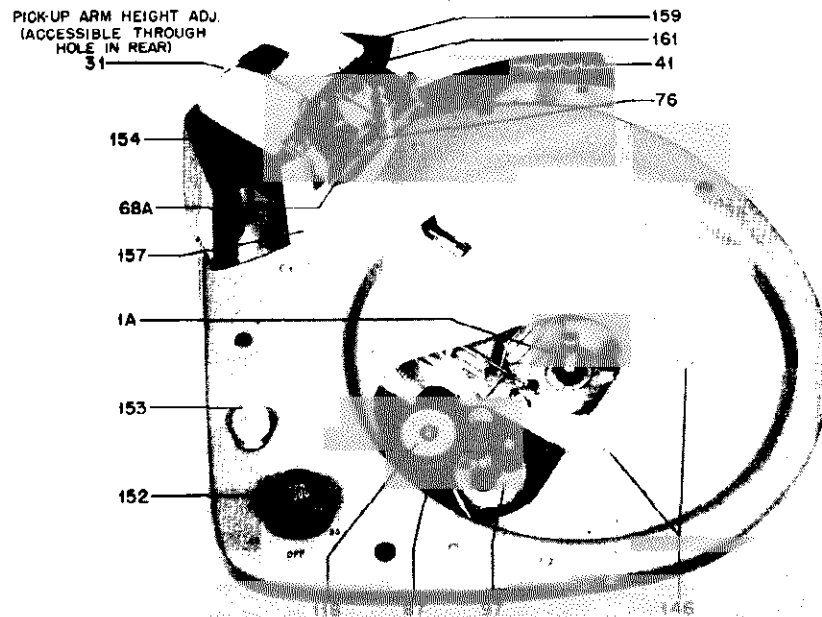


FIGURE 3. TOP VIEW OF RECORD CHANGER WITH TURNTABLE REMOVED

THEORY OF OPERATION

Refer to Figures 3, 4, 5, 6, 7 and 9 for the location of the various parts described in this section.

The turntable is rim-driven through an idler wheel (118) and a speed control turret (97). The speed control turret is operated by means of a 3-gear train, linking the turret to the speed change shaft assembly (92), which is manually operated by the speed control knob on the record changer base. This control has six positions - 78, 45 & 33 RPM and three "off" positions - controlled by a six-point cam (92A). This

cam permits easy selection of turntable speeds, yet it prevents the speed control turret (97) from jamming the idler wheel (118) against the turntable and causing flat spots. The speed control can be rotated clockwise only from a playing speed position, but it may be rotated in either direction, one position, from OFF.

During the playing of a record, only the motor assembly (87) and the turntable (128) are in operation. The balance of the mechanism is inoperative until the change cycle starts.

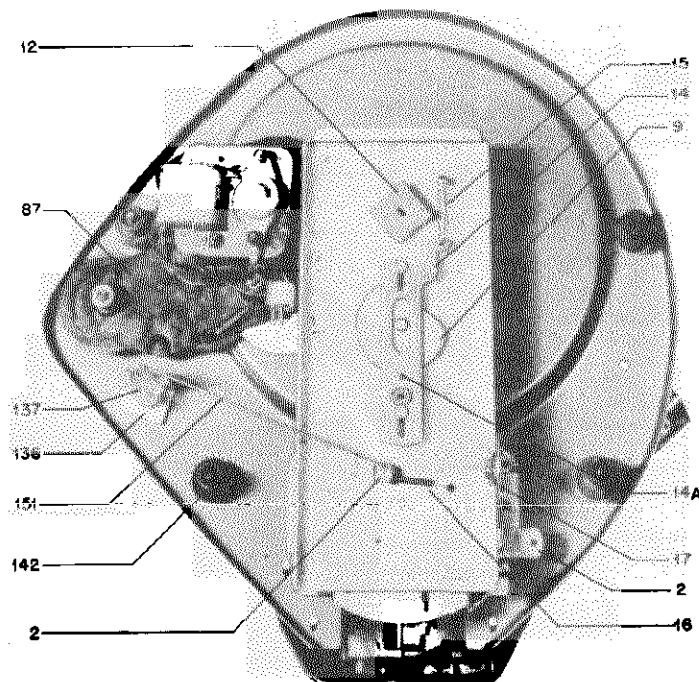


FIGURE 4. BOTTOM VIEW OF RECORD CHANGER

MODEL RC-37

THE CHANGE CYCLE

The change cycle may be initiated in two ways - by means of the pick-up arm entering the cut-off grooves in the record or by manual operation of the reject knob. Power for the change cycle is obtained from the turntable. As the pick-up arm (41) approaches the center of a record during playing, the trip arm (35A) tends to release the trip flag (20A) from the trip lever arm (19B); but, with every revolution of the turntable, the wiper (131) strikes the trip rod (20) and resets the trip flag (20A). This action continues until the pick-up arm enters the cut-off grooves, when the movement of the trip arm (35A) is so rapid that the trip flag (20A) cannot be reset by the wiper (131). The change cycle thus is initiated. The trip arm spring (36) has been de-

signed to allow the proper amount of slippage between the trip arm (35A) and the set-down arm (35B) so that the changer will not cycle during the normal playing of a record and yet the friction is great enough to trigger the trip flag (20A) when the cut-off groove is reached.

If the reject knob is pushed manually, the reject arm (2) acting through the reject rod (151), releases the trip flag (20A) from the trip lever arm (19B), thereby starting the change cycle.

Prior to a change cycle, and while the turntable revolves the weighted end of the drive clutch lever (127) is resting on the trip lever (19A). The releasing of the trip flag (20A) from the trip lever arm (19B) allows the trip lever spring (21) to

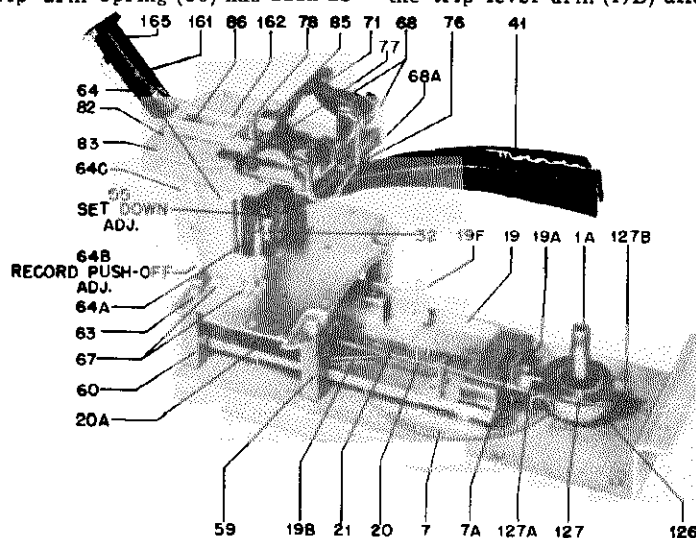


FIGURE 5. VIEW OF RECORD CHANGER WITH BASE & MOTOR ASSEMBLY REMOVED

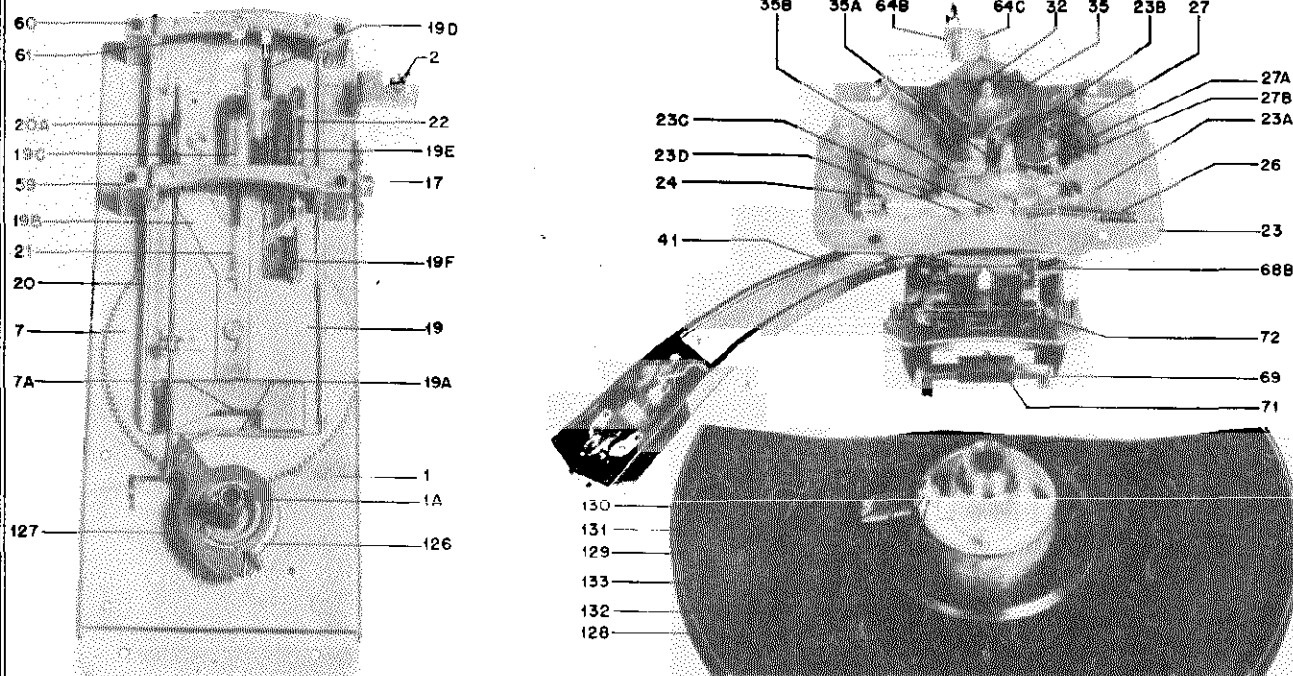


FIGURE 6. DISASSEMBLED VIEW OF RECORD CHANGER MECHANISM

pull the trip lever (19A) away from the drive clutch lever (127), causing the weighted end (127A) of the drive clutch lever (127) to lower. Consequently, the drive dog (127B) of the drive clutch lever contacts the drive screw (129) on the turntable.

Since the turntable continues to revolve when the drive clutch lever (127) engages the drive screw (129), the drive gear (126) causes the cycle gear (7) to turn. As the cycle gear revolves, its roller (7A) moves the slide channel (19) back and, in so doing, the pick-up arm shaft (32) rides up on the incline (19C) of the slide channel, raising the pick-up arm. As the slide channel (19) continues its backward motion, the clutch fingers (19E) will engage the set-down arm assembly (35) to swing the pick-up arm in a direction away from the spindle. At the extreme backward travel of the slide channel (19) the push-off lever (64C), which rides in the slot (19D) of the slide channel, is actuated. This lever, in turn, through the push-off link (77), moves the record push-off lever (76), ejecting the lower record from the record support (68A) and permitting it to drop to the turntable.

While the slide channel (19) is in its extreme backward position, the rear projection on the trip arm (35A) encounters a stud (61) in the rear slide guide block (60), and the trip arm (35A) is reset to its proper position for the next cycle; the restoring lever (19F) lowers the set-down flag (23C) (which will index the pick-up arm when the slide channel makes its forward motion); and the trip slide cocking stud (4) engages the trip arm (19B) with the trip flag (20A) to set it for the next cycle. At this point one-half of the change cycle is completed.

While the cycle gear (7) is in its second half-revolution, the slide channel (19) will move forward, and the clutch fingers (19E) that are still engaging the set-down arm assembly (35) will swing the pick-up arm back toward the record spindle until the set-down arm (35B) contacts the set-down flag (23C), which controls the pick-up arm set-down point. The set-down flag (23C) includes a formed, flat spring (23D) which holds the set-down arm (35B) firmly until the pick-up arm has been lowered to the record, thus preventing "skating" if the changer is jarred or is setting at a slight angle.

While the arm is being held over the set-down point by the set-down flag (23C), continued rotation of the cycle gear (7) makes the pick-up arm shaft (32) ride down the incline (19C), lowering the pick-up arm onto the record.

As the slide channel (19) approaches the end of the cycle (fully forward position) the set-down flag (23C) is moved out of the way by the restoring lever (19F) to give the pick-up arm complete freedom of movement during playing of the records. Also, the drive clutch lever (127) rides up the trip lever incline (19A) and disengages the drive clutch lever dog (127B) from the drive dog screw (129) in the turntable. The cycle thus is ended.

PICK-UP ARM SET-DOWN POINT

The point at which the pick-up arm drops to the turntable for either 7-inch, 10-inch or 12-inch records is determined by the position of the set-down flag (23C).

The movement of the record support assembly (68), when it is adjusted for a specific size record, causes rotation of the gear and pinion shaft assembly (64A), through the rack gear (68B) on the record support. Since the gear and pinion shaft assembly (64A) engages the set-down gear (27B), and the set-down cam (27A) is attached to the set-down gear, any movement of the record support will cause the set-down cam to turn. The set-down cam stud (23B) on the slide plate and spring assembly (23A), rides with the set-down cam, due to the tension of the slide plate spring (26). Therefore, any action of the set-down cam will affect the position of the set-down flag (23C).

45 RPM RECORD DROP

The 45 RPM spindle shaft, when placed into the turntable center hole, fits into the slot in the timing stop (12).

When the change cycle begins, and as the slide channel (19) is making its backward movement, the reject plate (14) moves forward, due to the eccentric form of the drop cam (9) riding on the roller (14A); and the tension of the spring (15) pulls the reject plate (14) forward until it contacts the timing stop (12), preventing it from rotating. Since the turntable and spindle continue to rotate, while the timing stop (12) and spindle shaft (169) remain stationary, the two pinion gears (171) in the upper section of the spindle rotate around the gear on the spindle shaft. The eccentric extending from the upper end of the two pinion gears (171) runs in a slot in the molded record supports to produce an action which causes the supports to move in against the tension of the spring (172). As the plastic record supports recede, the separator discs mounted above each record support separate the lower record from the stack and support the remainder of the stack, while the lower record drops to the turntable. With continued rotation of the spindle, the record supports, due to the action of the spring (172), will move out to support the record stack, while the separator discs recede in to the spindle.

When the slide channel (19) is making its forward movement, the reject plate (14) moves back, releasing the timing stop (12) and allowing the timing stop and the spindle shaft to revolve for the playing of the record.

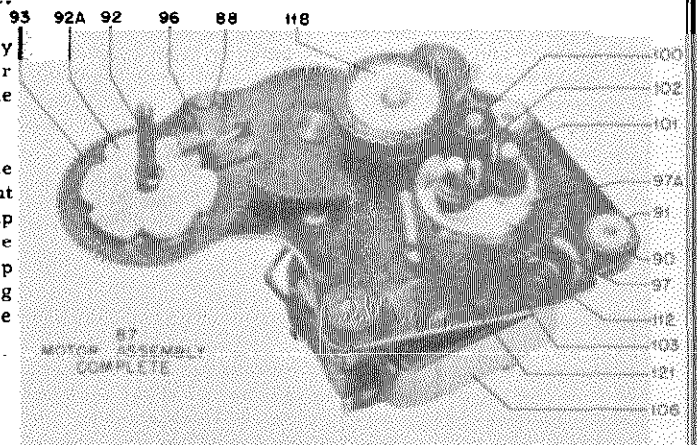


FIGURE 7. MOTOR & SPEED CHANGING ASSEMBLY

MODEL RC-37

MAINTENANCE

It is recommended that the service man thoroughly study and familiarize himself with the operation of the integral parts of the record changer and analyze the trouble carefully before attempting to make any adjustments or to do any repair work on the record changer.

Should it become necessary to remove the changer from the cabinet, or the changer mechanism from the base plate,

the service man is advised not to remove parts or sections of the changer unnecessarily, since the changer then may require readjustment.

The changer will not operate properly, either in the cabinet or on the repair bench, unless it is level. If the changer is working satisfactorily, leave it alone.

ADJUSTMENT

NEEDLE SET-DOWN ADJUSTMENT

A template (Motorola Part No. 54B792330), furnished with the record changer, is required to index the needle to the correct set-down point after a needle or cartridge has been replaced. If a template is not available, one may be improvised as follows:

1. Draw a circle of 3-5/16 inches radius on a piece of cardboard.
2. Punch out a 17/64 inch diameter hole at the exact center of the circle.

To index the needle to the correct set-down point:

1. Place the small diameter spindle in the turntable and the template over the spindle.
2. Move the record support to the 7-inch record playing position.
3. Rotate the turntable by hand and push the reject knob to start the change cycle. Watch the needle carefully. It must land on the curved line of the template.
4. If the needle does not land on the line, adjust the set-down setscrew (55) located on the pick-up arm (see Figure 12). Turn the setscrew clockwise to move the pick-up arm towards the spindle, or turn it counterclockwise to move the pick-up arm away from the spindle. IMPORTANT: Turn the screw very slightly, and repeat steps 3 & 4 until the needle lands exactly on the curved line.
5. When the needle is set correctly for the 7-inch position, the index will be set automatically for 10-inch and 12-inch records.

PICK-UP ARM HEIGHT ADJUSTMENT

If the pick-up arm strikes the bottom record of a stack of records resting on the 45 RPM spindle, or if the pick-up arm does not rise sufficiently to clear a 1-inch stack of records after they have dropped to the turntable, proceed as follows:

1. Remove the cabinet back or remove the record changer from the cabinet, as required, to gain access to the rear of the record changer.

2. The height adjustment screw (31) is accessible through a hole in the rear of the record support housing (154) (see Figure 3).

3. Turn the height adjustment screw (31) clockwise to raise the arm, or counterclockwise to lower the arm, as required.

PUSH-OFF LEVER ADJUSTMENT

If a record fails to drop to the turntable, check the position of the record push-off lever (76) on the record support during a change cycle. It should protrude a minimum of 1/32 inch from the record support during the record dropping portion of the change cycle. If adjustment is required, proceed as follows:

1. Remove the cabinet back or remove the record changer from the cabinet, as required, to gain access to the rear of the record changer.
2. Push the reject knob to place the changer in cycle and rotate the turntable by hand until the record push-off lever (76) is at its point of maximum forward travel.
3. Turn the push-off adjustment screw (64B) until the push-off lever (76) protrudes at least 1/32 inch beyond the lip (68A) of the record support.

TURNTABLE DRIVE PIN ADJUSTMENT

If a "clicking" noise is heard while a record is playing, the drive dog adjusting screw (129) on the bottom of the turntable is touching the drive dog (127B). To remedy:

1. Remove the turntable. NOTE: Do not remove the drive clutch lever (127); also, do not lose the bearing washer (124).
2. Loosen the hex nut (133) and turn the drive dog adjusting screw (129) counterclockwise to bring the screw farther from the drive dog. CAUTION: Do not turn the screw too much, since the screw will not engage the drive dog and, as a consequence, the changer will fail to cycle.
3. Tighten the hex nut (133).
4. Replace the turntable.

TRIP ADJUSTMENT

If the mechanism does not trip after playing a record, or trips before a record has completed its play, proceed as follows:

1. Remove the turntable (128).
2. Measure the distance between the outer edges of the hub on the turntable and the point of contact of the trip rod on the wiper (131). The dimension should be approximately 7/8 inch. Bend the wiper bracket (130), if necessary.
3. Check the operation by playing a 78 RPM record and a 33 RPM record. If the changer trips too soon at 78 RPM, bend the wiper bracket (130) downward slightly (toward the trip rod). If the changer does not reject at 33 RPM, bend the wiper bracket (130) upward slightly (away from the trip rod).

4. If the above adjustment does not correct the trouble, remove the changer from the cabinet and proceed as in steps 5 & 6.

5. Check the reject operation visually. Move the trip flag (20A) outward until it is flush with the projection on the trip lever arm (19B). As the turntable is rotated, the wiper (131) should contact the trip rod (20A) very lightly. Bend the wiper bracket (130), if necessary.

6. If the adjustment in step 5 is correct, and the changer still does not reject properly, check for any looseness or binding of the trip arm (35A) on the set-down arm assembly. The pressure required to move the trip arm (35A), measured from the tip of the trip arm, should be 10 to 18 grams. Replace the trip arm spring (36), if necessary.

PARTS REMOVAL & REPLACEMENT

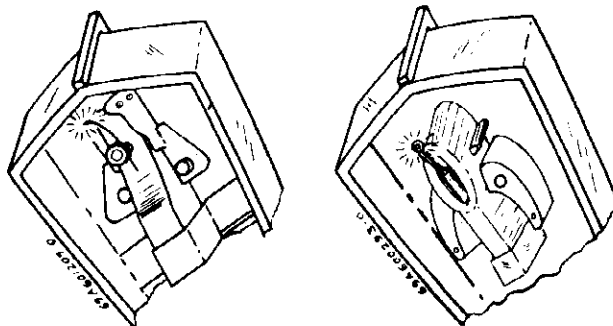
TO REMOVE RECORD CHANGER FROM CABINET

1. Disconnect the power and phono input leads from the record changer.
2. Remove the changer from the cabinet, as shown in Figure 8.

NEEDLE REPLACEMENT

Replace the needle with a Motorola needle of the proper type only; otherwise, damage to the records or crystal cartridge will result. Two types of cartridges and needles, as described below, are used in the Model RC-37 changer. The needles are not interchangeable between the two cartridges.

1. Motorola needle, Part No. 59K691908, is used in the Shure cartridge. It is held in the cartridge with a small, round, knurled nut (see Figure 10). To replace the needle, loosen the nut and remove the needle.
2. Motorola needle, Part No. 59K691909, is used in the Electro-Voice cartridge. It is not held with a nut, but is pushed into the cartridge (see Figure 11). To remove the needle, pull it from the cartridge with fingers or pliers.

FIGURE 11. ELECTRO-VOICE
NEEDLE REPLACEMENTFIGURE 10.
SHURE NEEDLE REPLACEMENT

IMPORTANT: The needles should be held in the cartridges perpendicular to the surface of the record. After the needle has been replaced, check the set-down point as outlined in NEEDLE SET-DOWN ADJUSTMENT.

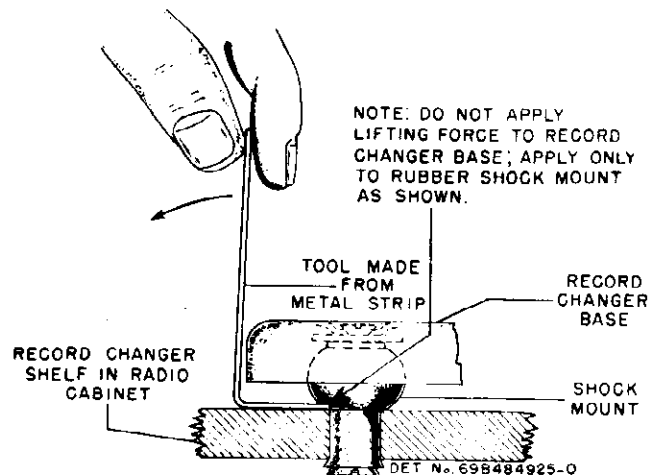
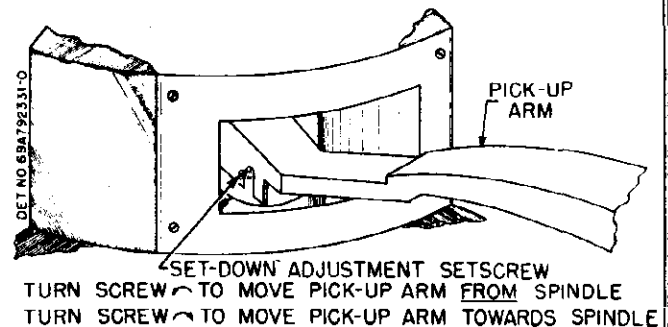


FIGURE 8. REMOVAL OF CHANGER FROM CABINET

FIGURE 12. NEEDLE SET-DOWN ADJUSTMENT
CARTRIDGE REPLACEMENT

Two types of cartridges, Shure and Electro-Voice, are used. The two cartridges are interchangeable. To remove the cartridge, merely remove the retainer clip (49) and disconnect the pick-up leads. **IMPORTANT:** After the cartridge has been replaced, check the needle set-down point as outlined in NEEDLE SET-DOWN ADJUSTMENT.

MODEL RC-37

TO REMOVE THE TURNTABLE

1. Remove the turntable retaining clip (134).
2. Lift the turntable straight up from the base plate. Be sure the bearing (125) and the bearing washers (124) do not get lost or dirty.
3. When replacing the turntable, it will be necessary to center the drive clutch lever (127) and the bearing washer (124) to allow proper seating of the turntable over the spindle post.

TO REPLACE THE DRIVE CLUTCH LEVER

1. Place the changer mechanism in the rest position [slide channel (19) in full forward position], with the trip flag bracket (20A) engaged in the trip lever arm (19B).
2. Place the drive clutch lever (127) in position with the weighted end (127A) resting at the bottom of the trip lever incline (19A).

TO REMOVE THE DRIVE GEAR

1. Remove the turntable and drive clutch lever (127).
2. Lift the drive gear (126) straight up from the spindle post.
3. When replacing the drive gear (126) it is important that the changer be timed correctly. To time the changer, rotate the cycle gear (7) until the cycle gear roller (7A) is directly in line with the spindle post (1A), and pull the slide channel (19) forward until it is locked by the trip flag (20A). Then place the drive clutch lever (127) in position on the drive gear (126), and mesh the gears so that the weighted end of the clutch lever (127A) rests on the lowest edge of the trip lever incline (19A). Check the timing by playing a stack of 45 RPM records. If a record of the stack fails to drop during a cycle, move the drive gear (126) one "tooth" and play another stack of records to again check the timing.

TO REMOVE THE RECORD SUPPORT HOUSING COVER AND RECORD SUPPORT HOUSING

1. Remove the four Phillips head screws (158) that secure the housing cover (157) to the housing (154).
2. Remove the four hex head screws (156) and four washers (155), accessible from the bottom of the changer, that secure the housing to the base plate.

TO REMOVE THE SLIDE RELEASE HINGE AND HINGE BRACKET

1. The record support slide release hinge (161) is held

in place with a spring clip (165). To release the clip, place a piece of stiff paper on both sides of the release hinge, between the release hinge and the slide cover (159). See Figure 13. Pull the paper forward, simultaneously lifting upward on the release hinge.

2. Remove the four machine screws (164) holding the slide release hinge bracket (162).

TO REMOVE THE COMPLETE CHANGER MECHANISM AND MOTOR ASSEMBLY

1. Remove the record support housing cover (157) and housing (154).
2. Remove the speed control knob (152).
3. Disconnect the reject rod (151).
4. Remove the turntable and drive clutch lever (127).
5. From the bottom of the changer, remove one machine screw (148) securing the motor assembly (87) to the base plate (135).
6. Remove the four Phillips head lockscrews (147).
7. Remove the two hex head screws (146).
8. Carefully lift the base plate from the motor and changer mechanism.

MOTOR SPEED CONTROL TURRET ASSEMBLY REPLACEMENT

CAUTION: Do not disassemble the speed changing mechanism without first marking the positions of turret assembly, the speed change gears, and the speed change cam, as shown in Figure 14. But, if the turret has been removed accidentally, or if the above precaution has not been taken, the assembly procedure is as follows (refer to Figures 9 & 14).

1. Assemble the speed control pulleys (100), (101), (102) to the turret plate (97A). They are snapped over the pulley shafts, and they can be pried off with a screwdriver. Note that the 45 RPM pulley is adjacent to the part number on the turret plate, as shown in Figure 14.
2. Attach the turret plate (97) and the speed change gear (103) to the speed control bracket with the turret spring washer (104) and the two machine screws (105).
3. Place the speed change shaft assembly (92) and the speed change gear (93) on the speed control bracket. Do not tighten the collar bushing (94) to the shaft.
4. Rotate the turret assembly until the correct angle is obtained between the center of the turret plate and the speed change shaft and 33 RPM speed control pulley, as in Figure 14. Use a combination square with a protractor, or other accurate protractor, for measuring the angle.
5. Lift the speed change gear (93) from the idler gear and rotate it until the slot in the shaft is in the direction shown in Figure 14 and the speed detent pawl (88) falls into the detent in the speed change cam (92A). There are two detents, on opposite sides of the cam, into which the pawl may fall. The correct detent is the one which will permit clockwise rotation only of the speed change shaft.
6. Tighten the setscrew (95) in the collar bushing (94).
7. Attach the motor (106) to the studs on the speed control bracket with the "C" washers (113).
8. Attach the tension springs (121), (96), (115). Note that the idler wheel spring (121) hooks into a soldering lug (117) under the idler wheel.
9. Check the complete assembly for the correct speeds and the sequence of speeds.

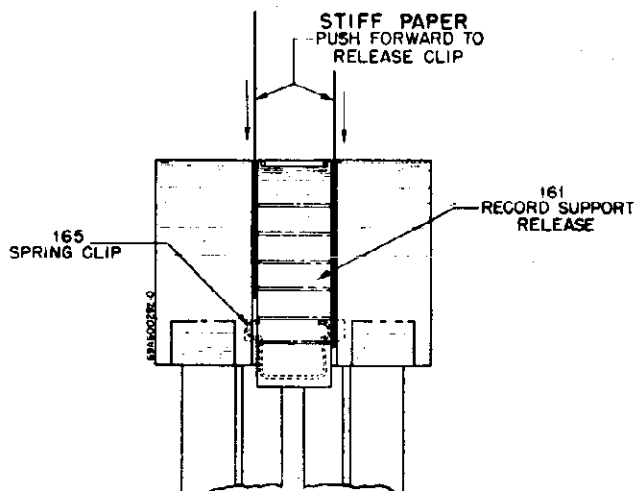


FIGURE 13. REMOVAL OF RECORD SUPPORT RELEASE

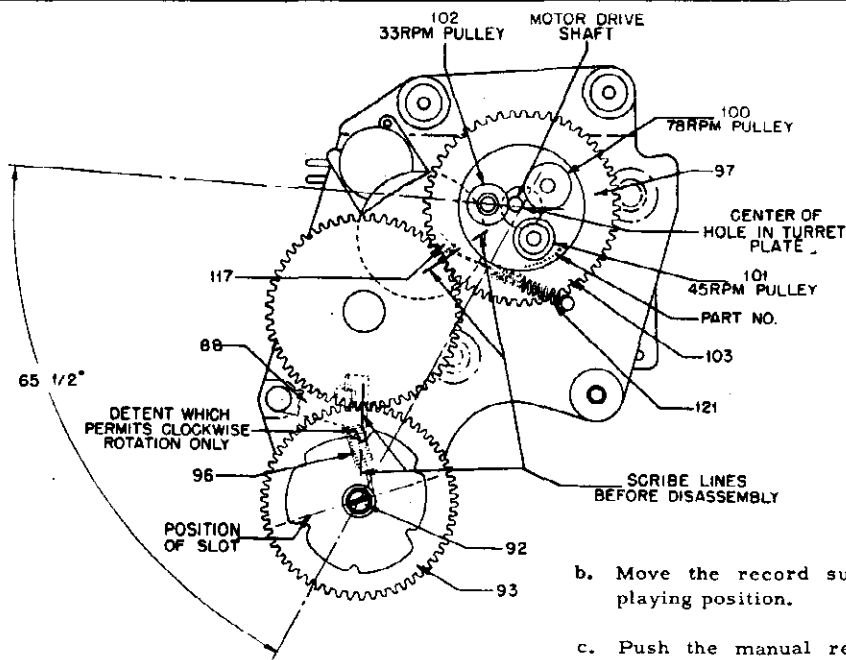


FIGURE 14. MOTOR GEAR TRAIN ASSEMBLY

PICK-UP ARM MOUNTING PLATE ASSEMBLY REPLACEMENT

If it is necessary to remove the pick-up arm mounting plate assembly (23), the following precautions should be observed when replacing the assembly.

1. Move the record support to the 12-inch playing position.
2. Align the hole in the set-down cam (27A) with the hole in the mounting plate. The stud (23B) on the set-down flag (23C) should be on the outside of the cam.
3. Move the set-down flag (23C) to the "up" position.
4. Carefully place the pick-up arm mounting plate (23) on the slide guide blocks (59) and (60), making sure the trip assembly (35) does not rest or bind on any portion of the slide channel assembly (19).
5. If the set-down arm and trip assembly (35) has been loosened or removed from the pick-up arm shaft (32) readjust as follows:
 - a. Place the turntable, small spindle, and template (see section on NEEDLE SET-DOWN ADJUSTMENT) on the spindle post.
 - b. Move the record support to the 7-inch record playing position.
 - c. Push the manual reject arm (2), to start the change cycle.
 - d. Slowly rotate the turntable until the slide channel assembly (19) starts to move backward. NOTE: The SPEED control should be in an "off" position for ease of operation.
 - e. As the pick-up arm shaft (32) rides up on the incline (19C) of the slide channel (19), raise or lower the set-down arm and trip assembly (35) until it is in a position to be grasped by the clutch fingers (19E).
 - f. Continue rotating the turntable until the slide channel moves forward to a point where the set-down arm (35B) touches the set-down flag (23C).
 - g. With the fingers, move the set-down arm (35B) against the guiding edge of the set-down flag (23C).
 - h. Rotate the turntable until the set-down arm (35B) is just about to lose contact with the set-down flag (23C), and place the pick-up needle directly over the line on the template.
 - i. Tighten the setscrew (37) in the set-down arm and trip assembly (35).
 - j. Cycle the changer several times to check the needle set-down point. Small corrections of the set-down point may be made with the set-down adjustment screw (55).

LUBRICATION

Factory lubrication should be sufficient for a long period of service. When lubrication is required, use only the following lubricants in the places specified.

Part	Lubricant
Turntable Bearing (125) & Slide Channel (19)	-E. F. Houghton "Stay-Put" #512 Grease (Motorola Part Number 11M476047)
Motor Speed Change Gears (93 & 103)	-Silicone High Temperature Lubricant (Dow Corning Corp. #DC-33 - Motorola Part Number 11M488020)

DO NOT LUBRICATE THE FOLLOWING PARTS:

Trip flag (20A)
Slide Plate & Spring Assembly (23A)
Trip Lever Arm (19B)
Set-Down Arm Assembly (35)
Drive Clutch Lever (127)

If any oil or grease should come in contact with the idler wheel tire, inside rim of the turntable, or any of the motor drive surfaces, clean with carbon-tetrachloride.

MODEL RC-37

SERVICE HINTS

78 RPM or 33 RPM RECORDS FAIL TO DROP

1. Adjust the push-off lever (76).

2. Record center hole binding on spindle.

MECHANISM SLOW IN STARTING

- *1. Bad motor.

2. Grease on idler wheel (118) or on speed control pulleys (100, 101, 102).

3. Parts binding.

MECHANISM TRIPS BEFORE RECORD IS COMPLETED, OR DOES NOT TRIP AFTER RECORD IS COMPLETED

1. Adjust the wiper bracket (130) on the turntable (see section on Trip Adjustment).

CONTINUOUS CYCLING

1. Drive clutch lever (127) 180° out of phase. Reverse the position of the drive clutch lever on the drive gear (126).
2. Grease or dirt on trip flag (20A).
3. Set-down flag (23C) not being actuated by restoring lever (19F).

RECORD SUPPORT CANNOT BE ADJUSTED TO THE THREE RECORD PLAYING POSITIONS

1. Set-down cam (27A) not set properly with relation to the set-down cam stud (23B). See PICK-UP ARM MOUNTING PLATE ASSEMBLY REPLACEMENT.

PICK-UP ARM DOES NOT SET DOWN IN CORRECT POSITION

1. Adjust the set-down setscrew (55).
NEEDLE JUMPS GROOVES

1. Record changer not level.

2. Records dirty - clean with soap and water.

3. Needle not set correctly in the cartridge - it should be perpendicular to the surface of the record.

MECHANISM FAILS TO TRIP WHEN REJECT KNOB IS PUSHED

1. Reject rod (151) not connected.

TURNABLE DOES NOT REVOLVE

1. No power to motor.

2. Bad motor.

3. Grease on the idler wheel (118) or on speed control pulleys (100, 101, 102).

4. Turntable not seated properly.

45 RPM RECORDS FAIL TO DROP

1. Drive gear (126) does not mesh correctly with the cycle gear.

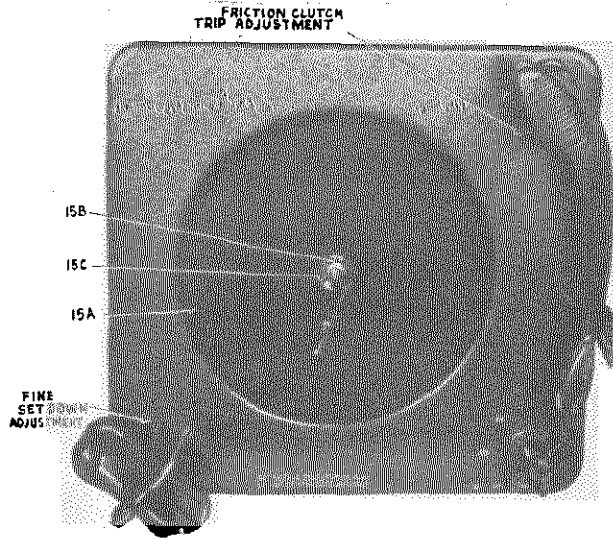
2. Record center hole binding on spindle.

REPLACEMENT PARTS LIST

NOTE: When ordering parts specify model number of set in addition to part number and description of part.

Ref. No.	Part No.	Description			
1	1X691802	Mounting Plate Riveted Assembly (includes items 1 through 6)	29	5A790684	Grommet, rubber
2	45B691361	Arm, manual reject	30	1X691815	Pick-up Arm Brkt. & Stud Assembly..
3	5A691472	Rivet, shoulder	31	3A691288	Screw, pick-up arm adj.
4	46A691227	Stud, trip slide cocking	32	47A691221	Shaft, pick-up arm
5	5K600898	Rivet, shoulder	33	46A691268	Pin, pick-up carriage
6	46A691273	Stud, reject plate slide	34	3S3863	Setcrew: 4-40 x 1/4 Bristo head; cad pl
7	1X691803	Cycle Gear, Shaft & Roller Assembly	35	1B600752	Set-Down Arm and Trip Arm Assembly.
8	4A691767	Washer, spring	36	41A600856	Spring, clutch
9	45A691256	Cam, record drop (45 RPM)	37	3S3866	Setcrew: 6-32 x 3/16 Bristo head; cad pl
10	4S7569	Washer, flat: 5/16 x .145 x .027; cad pl	38	46C691431	Counterbalance, pick-up arm
11	3S7247	Screw, machine: 6-32 x 3/16; slot- ted hex head lock screw; cad pl	39	3S1452	Screw, machine: 4-40 x 1/2 slotted binderhead; cad pl
12	46A691309	Stop, timing	40	4S7683	Lockwasher, int: #4; cad pl...
13	42A600415	Clip	41	1X691817	Pick-up Arm Assembly: includes items 42 through 55
14	1X691843	Reject Plate & Roller Assembly	42	45D691428	Arm, pick-up: arm only
15	41A76925	Spring, coil tension	43	1X691818	Pick-up Cartridge Leads Assembly
16	41A600699	Spring, manual reject	44	9A72670	Contact, pin terminal
17	9A470260	Receptacle, 1-prong	45	59B691430	Cartridge, crystal: with needle (Shure)
18	3S7506	Screw, sheet metal: #6 x 1/4 PKZ plain hex head; cad pl	46 or	59K691907	Cartridge, crystal: with needle (Electro Voice)
19	1X600757	Slide Channel Assembly: complete, includes items 20, 21 and 22	47	59K691908	Needle (for 59B691430 cartridge)...
20	1B600748	Trip Flag and Trip Rod Assembly	48	59K691909	Needle (for 59K691907 cartridge)...
21	41A691469	Spring, trip lever arm actuating	49	42A691429	Clip, cartridge retainer
22	41A14244	Spring, tension coil	50	1X691819	Pick-up Arm Plate & Bushing Assem..
23	1X600761	Set-Down Flag and Pick-up Arm Mounting Assembly: complete; in- cludes items 24 through 29	51	3S490739	Screw, sheet metal: #4 x 1/4 PKZ Phillips binderhead; cad pl
24	41A600766	Spring, set-down flag detent	52	4S7683	Lockwasher, int: #4 cad pl...
25	5S7769	Rivet: .088 x 3/32 stl;	53	3S490535	Screw, machine: 4-40 x 5/16 Phil- lips flat head; cad pl
26	41A691282	Spring, slide plate	54	41A691329	Spring, torsion
27	1X691813	Set-Down Cam & Gear Assembly	55	3S9710	Setcrew: 4-40 x 5/16 slotted head- less
28	4K692188	Washer, "C"	56	4K580282	Washer, spring: phosphor bronze.
			57	4A16556	Washer, spring
			58	3S2286	Screw, machine: 4-40 x 3/16 slotted hex head lock screw; cad pl...

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
59	46C691368	Block, slide guide	118	49A691277	Wheel, idler
60	1X600895	Block, slide guide: includes item 61	119	42A691893	Clip, hair pin
61	46A600738	Stud, reset	120	46A691420	Pin, groove
62	487651	Lockwasher, int: #8 cad pl..	121	41A691281	Spring, idler extension
63	382963	Screw, machine: 8-32 x 1-3/4" plain hex head; cad pl	122	29R5301	Lug, soldering
64	1X691820	Record Support Housing Assembly: complete with push-off lever & gears	123	387279	Screw, machine: 8-32 x 5/8 slotted binderhead; cad pl
65	1X691963	Bracket Lock Assembly	124	4A691286	Washer, bearing
66	588497	Rivet: .088 x 1/8; stl; nkl pl	125	43A691278	Bearing, turntable
67	387350	Screw, machine: 6-32 x 1/4; slotted hex head lockcrew; cad pl.....	126	44B691354	Gear, drive
68	1X691824	Record Support & Clamp Assembly: complete; includes items 69 through 74	127	1X691827	Drive Clutch Lever & Stud Assembly.
69	1X691964	Clamp Assembly, record hold-down	128	1X600773	Turntable Assembly: complete; in- cludes items 129 through 134.....
70	41A691279	Spring, extension	129	3A691225	Screw, drive dog adjusting
71	35A600113	Bumper, rubber	130	7A600745	Bracket, wiper
72	41A691795	Spring, push off restoring	131	37A600771	Wiper, plastic
73	58691794	Rivet, shoulder	132	487651	Lockwasher, int: #8; cad pl ..
74	46A600523	Stud, drive	133	287003	Nut, hex: 8-32 x 5/16; cad pl.
75	46A691243	Pin, spring retainer	134	42K692053	Clip, speed
76	47K691953	Lever, record push-off	135	1X600775	Record Changer Base Assembly: in- cludes items 136 through 139.....
77	1X691826	Push-Off Link & Bushing Assembly.	136	1X600776	Bracket Assembly, manual reject: includes items 137 & 138
78	46A691235	Stud, slide locking	137	7A600723	Bracket, manual reject actuating...
79	41A691466	Spring, coil	138	5K691481	Rivet, shoulder
80	488279	Washer, flat: 5/16 x .125 x .027; cad pl	139	43A600718	Bushing, manual reject shaft
81	4K692188	Washer, "C"	140	38400110	Screw, machine: 10-32 x 1-3/4" Phillips flat head; antique copper finish
82	64B691342	Plate, record rest cover	141	488214	Washer, flat: 7/8 x .203 x .067
83	382950	Screw, machine: 4-40 x 1/4 slotted locking binderhead; cad pl	142	35A481870	Mounts, shock: rubber
84	43K471634	Ball, steel	143	43A484295	Sleeve, shock mount.....
85	42A691405	Clip, ball bearing	144	2A484296	Nut, shock mount: tapered tee..
86	41A691467	Spring, extension	145	37A17361	Grommet, rubber
87	59D600612	Motor Drive Assembly: complete; in- cludes items 88 through 122	146	387205	Screw, machine: 8-32 x 1/4 slotted hex head lockcrew; cad pl
88	45A691223	Pawl, speed detent	147	38400218	Screw, machine: 6-32 x 1/4 Phillips binder head lockcrew; nkl pl.
89	5K691481	Rivet, shoulder	148	387279	Screw, machine: 8-32 x 5/8 slotted binderhead; cad pl
90	37K15125	Grommet, rubber	149	47A600721	Shaft, manual reject
91	5A12105	Eyelet, mounting	150	4K600617	Washer, "C"
92	1X691965	Speed Change Shaft Assembly ...	151	47A600719	Rod, manual reject
93	44A691219	Gear, speed change	152	36B691483	Knob, speed control
94	43A17431	Bushing, collar: brass	153	36A600725	Knob, reject control
95	387113	Setcrew: 8-32 x 1/4 slab head..	154	15D691488	Housing, record support
96	41A691280	Spring, pawl extension	155	488279	Washer, flat: 5/16 x .125 x .027; cad pl
97	1X691966	Speed Control Turret Assembly: in- cludes items 98 through 102	156	38400038	Screw, thread cutting: #4 x 5/16; type 25; plain hex head cad pl
98	4A691407	Washer, felt	157	15C691393	Cover, housing
99	42A691438	Clip, pulley retainer	158	38490532	Screw, thread cutting: #2 x 3/8 PKF Phillips oval head; nkl pl
100	49A691333	Pulley, speed control (78 RPM)...	159	15C691395	Cover, slide
101	49K691337	Pulley, speed control (45 RPM)...	160	42A691415	Fastener, slide cover
102	49A691335	Pulley, speed control (33 RPM)...	161	55B691391	Release Hinge, record support slide; chrome pl
103	44A691219	Gear, speed change	162	78691418	Bracket, slide release hinge.....
104	4A691214	Washer, turret spring: phosphor bronze	163	47A691424	Shaft, slide release hinge
105	38490530	Screw, machine: 3-48 x 3/16 slotted round head; cad pl	164	38490352	Screw, machine: 2-56 x 5/32 slotted binderhead; cad pl
106	59C600611	Motor, phono	165	41A691463	Spring, retainer
107	28A16313	Plug, phono motor: 3-prong; with shell	166	488406	Lockwasher, int: #2; cad pl..
108	15A690616	Shell, phono motor plug (used with item 107)	167	47C691499	Spindle, record: 33 & 78 RPM.....
109	42A600114	Clamp, phono motor plug (used with item 107)	168	1X691832	Spindle, record: 45 RPM; complete
110	487657	Lockwasher, ext: #8; cad pl..	169	1X691834	Drive Gear & Shaft Assembly
111	383397	Screw, sheet metal: #8 x 5/16 PKZ plain hex head; cad pl	170	42A691283	Clip, shaft
112	46A600613	Stud, motor mtg	171	1X691835	Record Support & Separator Assembly
113	4K600617	Washer, "C"	172	41A691406	Spring, compression
114	4K691439	Washer, insulating	173	1X691836	Center Post Cap & Spring Assembly..
115	41A691284	Spring, motor extension	174	41A691253	Spring, spindle cap
116	1X691967	Idler Wheel Bracket Assembly .	175	387164	Screw, machine: 6-32 x 1/4 slotted binderhead; cad pl
117	29R3042	Lug, soldering	176	487666	Lockwasher, ext: #6; cad pl..
			177	38488082	Screw, machine: 6-32 x 1-3/4" slotted round head; cad pl .



TPO-1042

Figure 1. Top View of Record Changer

ADJUSTMENT PROCEDURES

Spindle Adjustment

The spindle should be checked for perpendicularity when changer is out of cycle. To adjust, bend the ear on the push-off lever assembly; bending toward spindle spring will throw top of spindle away from record shelf.

Record Shelf

Place gauge on the 10" record shelf with changer in manual position. Loosen the two screws holding the shelf to the base plate. Adjust pushoff saddle location so that without flexing spindle away from saddle, but with all clearances taken up, the edge of the gauge fits snugly against the edge of the raised portion of the shelf. Tighten screw. CAUTION: This adjustment must be made immediately after completing a change cycle.

Tone-Arm Height and Lift

With the changer out of cycle, and the tone-arm free, set the arm over the base plate. The needle point should be $1/8"$ $\pm 1/16"$ above the base plate. To adjust the clearance, bend the protruding ear of the swivel post (at the rear of the tone-arm heel). Bending the ear upward decreases the clearance, downward increases the clearance. Raise the tone-arm to its maximum height, and place it against the rest post. There should be approximately $3/32"$ clearance between the lower edge of the tone-arm and the top of the rest-post hook. Adjust the ear on the swivel until a mean is reached between the correct rest-post clearance and base-plate clearance.

Vertical Timing

Adjust by bending, the end of the lifting lever, which attaches to the lift cord, so that there is $1/32"$ to $1/16"$ slack

in lift cord for all tone-arm positions between the tone-arm rest-post and spindle when changer is out of cycle. Check by cycling changer and noting if lifter lever and pull cord will raise tone-arm to its maximum heights.

Setdown

Set record shelf to 12" position. Set the eccentric stud to its center position. Place a 7" record on the turntable, set the record shelf to 7" position, and cycle changer by hand until tone-arm is $1/2"$ above record. Loosen hex-head clamp screw on friction clutch and rotate turntable until needle is over a point $1/8"$ in from record edge. Tighten clamp screw and check by putting changer through another cycle. Remove 7" record. Set record shelf to 10" position and place a 10" record on turntable. Rotate turntable until needle is just above record. If needle is not $1/8"$ in from record edge an adjustment may be made by bending the ear of the setdown cam that is in contact with the eccentric stud. Bending the ear outward will move the setdown position away from the spindle, bending the ear in toward the shelf spindle will move the setdown point toward the spindle. Recheck. Using a 12" record and shelf set to 12" position repeat as for 10" record, bending the corresponding ear for adjustment.

When the setdown is equal for the three record sizes (7", 10", and 12") a fine adjustment is provided in the form of an eccentric stud available through a hole in the base plate by the record shelf stanchion. This adjustment will vary the setdown position of ALL size records a total of $3/16"$. Do not use this adjustment unless it is desired to vary all three setdown positions on equal amount.

Trip

The trip plate assembly should be so adjusted that when the ear of the reset arm is contacting the peak point of the reset cam, the finger of the trip plate supporting the dog latch will

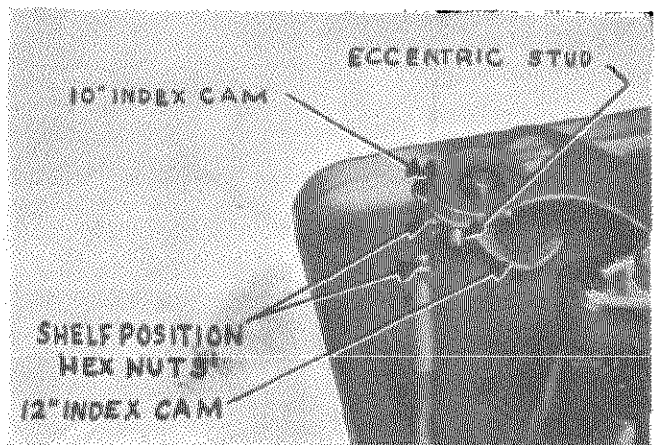


Figure 2. Cam Adjustment

engage the latch by 1/16"; or twice the thickness of latch metal. The amount of engagement between the finger and the latch is adjustable by bending the ear of the trip plate. Bending the ear inward decreases the amount of engagement, bending the ear outward increases the amount of engagement. This adjustable ear is accessible through the large hole in the bridge and should be bent by using long nose pliers. CAUTION: Too much engagement will prevent tripping.

After the trip-latch engagement is set, the friction clutch should be adjusted. This is a screw adjustment accessible when the tone arm is on the rest-post, through a hole in the base plate by the tone-arm stanchion. Turn the screw, counterclockwise, until just tight, then loosen one turn. Check by playing several records. If changer pre-trips, loosen screw (turn clockwise) slightly.

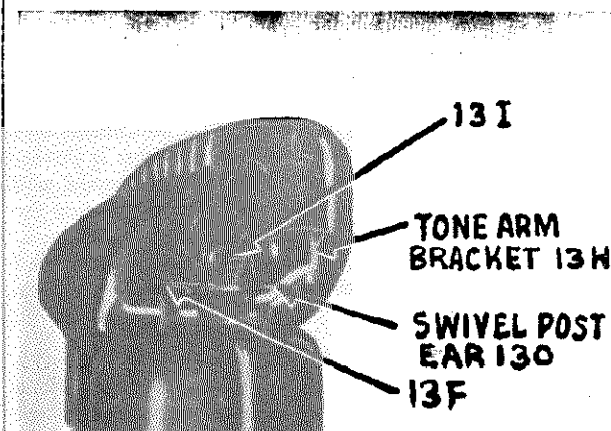


Figure 3.

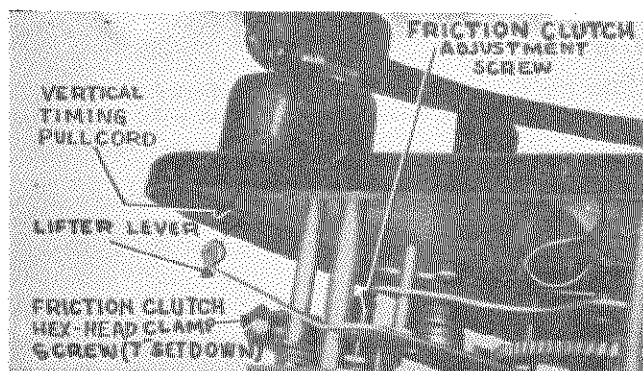


Figure 4.

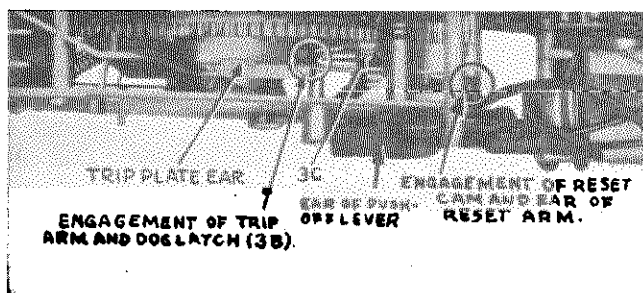


Figure 5.

LUBRICATION INSTRUCTIONS

Lubricants

Oil S.A.E. 20
Grease Texaco Motor Cup Grease (unless otherwise specified)

Parts Not To Be Lubricated

Drive Shaft
Motor Pulley
Drive Belt
Idler Tire
Dog Latch (on cam gear)
Lifting Lever (where dog rides)
Trip Plate Assembly
Friction Washer
Friction Finger
Spindle Latch (may be lubricated with powdered graphite)

Parts To Be Greased

1. Switch lever where it slides on motor board.
2. Slot where switch lever rides.
3. Slots where control link slides.
4. Control link slot.
5. Hole where record shelf shaft rides.
6. Detents for record shelf.
7. Hold-down assembly.
8. Hold-down shaft.
9. Setdown cam where eccentric stud rides.
10. Cam gear; all cam surfaces and gear teeth, except dog latch.
11. Ball bearing; if disassembled, as they are replaced in race.
12. Lifting lever; where lever contacts cam gear.
13. Pushoff lever; where end slides on bridge, where stud rides in slot of bridge, and at pivot pin.
14. Stud of friction clutch; grease ends of return lever and tone arm actuator where they engage stud of friction clutch assembly also stud where these two levers make contact.
15. Cam surface of of idler-wheel lifter.
16. Detent surfaces.
17. Guide slots of shelter plate.
18. Extension of idler shaft in contact with lower shifter plate.

Parts To Be Oiled

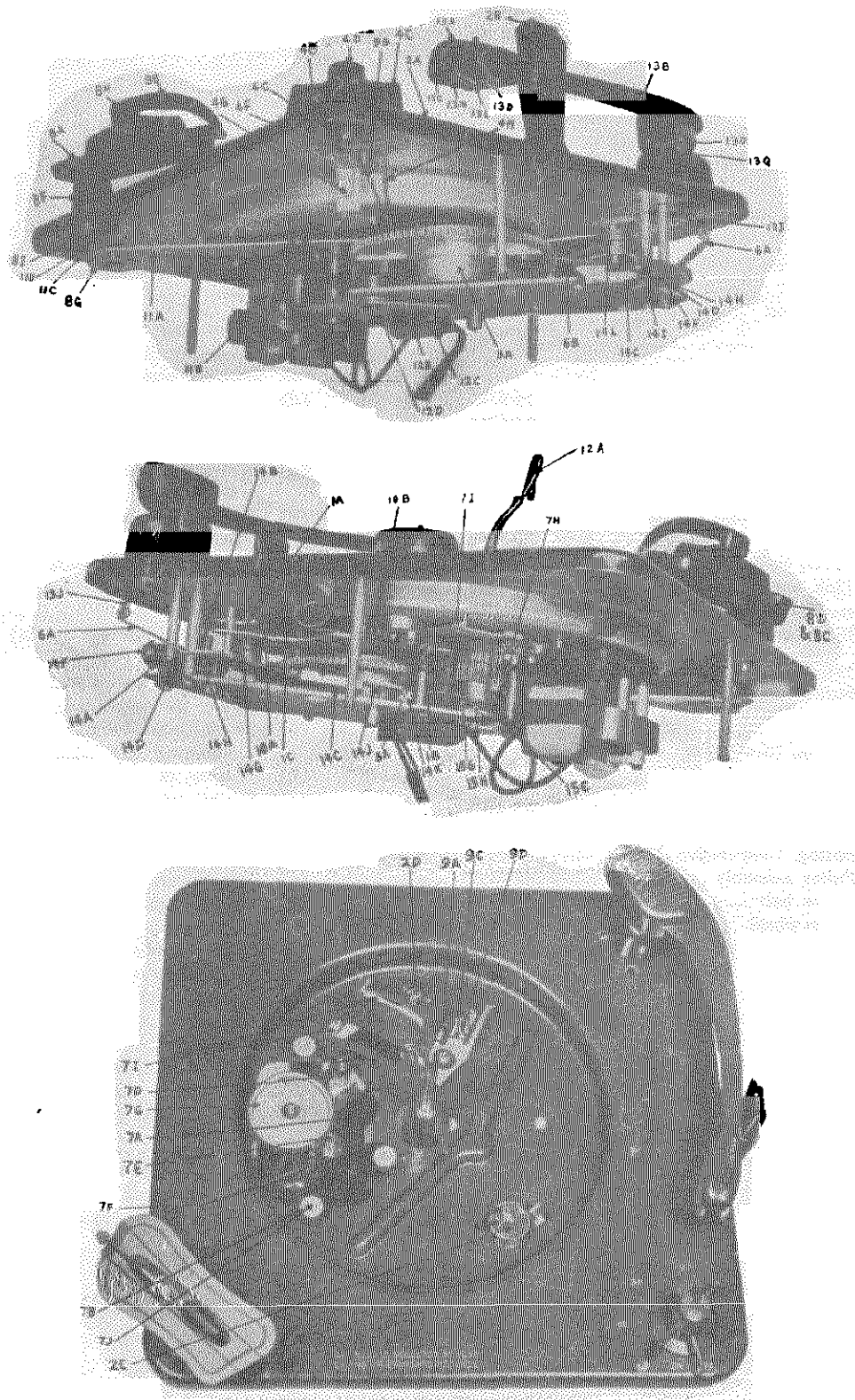
1. Cam Gear Spindle.
2. Trip plate assembly pivot; in bushing only.
3. Return lever roller.
4. Cam gear index lever roller.
5. Control knob shafts.
6. Tone arm shaft where it rotates in bridge.
7. Tone arm pivot pin where it goes through holes in bracket.
8. Turntable bearings; top and bottom.
9. Reject lever pivot.
10. Actuator spindle; oil spindle, assemble return lever after oil dimples where it rides on base plate, assemble washer, setdown lever, cam gear index lever, washer, and tone arm actuator; being sure oil is applied between bearing surfaces.
11. Idler support shaft.
12. Idler Shaft.
13. Slider bar; four points.
14. Two shift roller pins.
15. Pulley shaft.
16. Under pivot bushing of shifter plate.

Caution

When lubricating the motor, remove the rubber belt and idler wheel. When lubrication is completed, be sure the motor shaft and pulley are free from oil and grease. Failure to observe this precaution may result in slippage.

Dow Corning "DC-4"

Apply to the contacts of the cartridge contact plate, and to the dimple of the cartridge returning spring.



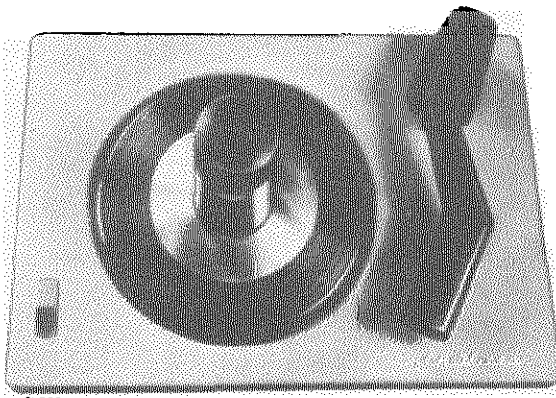
MODEL M-22

M-22 PARTS LIST

Description	Part No.	Description	Part No.
1. (a) Actuator, tone-arm	76-6502	10. (a) Return Lever	76-5893
(b) Spring, compression, actuator spindle	56-8087	(b) Spring, return lever	56-8092
(c) Spring, actuator	56-8095	11. (a) Setdown Lever	76-5894
2. (a) Base plate, tone-arm rest, and tone-arm stanchion	76-5892	(b) Spring, setdown (lever to bridge)	56-8093
(b) Bumper, tone-arm, rubber	54-8136	(c) Cam, setdown	56-8149
(c) Switch, motor power	42-1867	(d) Nut	56-7042
(d) Switch, pick-up	42-1873	12. (a) Spindle	76-5909
3. (a) Cam Gear	76-5905	(b) Spring, spindle	56-8131
(b) Dog latch	56-8138	(c) Push off lever assembly	76-5908
(c) Pin	56-8139	(d) Lever, spindle	56-8130
4. (a) Control Assembly		13. (a) Tone-arm Assembly (complete)	35-2710
(b) Knob, on-off	54-4786	(b) Tone-arm shell	35-2707
(c) Knob, speed control	54-4767	(c) Retainer plate, front	56-6795
(d) Knob assembly, Man., Aut., Rej.	76-5901	(d) Retainer plate, rear	56-8415
(e) Shaft and bar assembly, speed change	76-5899	(e) Spring, cartridge retaining	56-6796
(f) Shaft and crank assembly, Man., Aut., Rej.	76-5900	(f) Pin, shaft and swivel	56-7011
(g) Lever, on-off switch	56-8090	(g) Screw, shoulder, swivel mounting (3)	56-7408-1
(h) Link, speed change control	56-8091	(h) Bracket, mounting for shaft and swivel	56-8123
(i) Ring, retaining, reject shaft 1W42295FE7		(i) Spring, needle pressure	56-8124
(j) Ring, retaining, switch lever 1W42253FE7		(j) Pull-cord, vertical timing	76-2982-4
5. (a) Index Lever, cam gear	76-5895	(k) Contact plate	76-4647
(b) Spring, index lever	56-8094	(l) Cartridge (includes needle)	76-4649
6. (a) Lifter Lever	56-8132	(m) Needle	45-9588
(b) Spring, lifter lever	56-8133	(n) Needle, sapphire tips	45-9589
7. (a) Motor, 117v, 60c	35-1451	(o) Swivel assembly	76-5911
(b) Shock mount (3)	54-4501	(p) Shock-mount, swivel mounting (3)	54-4729
(c) Spacer, mounting (3)	56-4926-1FA3	(q) Washer, friction (plastic)	54-8103
(d) Spring, compression	56-8252	(r) Spring, tone arm shaft	56-8773
(e) Pulley assembly	45-6499	14. (a) Trip Arm Assembly	76-5910
(f) Drive belt	54-7939	(b) Screw, friction trip adjustment	56-8109
(g) Idler wheel	76-5267	(c) Trip finger, friction	56-8112
(h) Grommet, rubber, speed selector lever	27-4707	(d) Washer, friction clutch, (plastic) (2)	54-8142
(i) Plate, motor speed shift	56-8083	(e) Spring, friction trip adjustment	56-8111
(j) Screw, motor mounting (3) 1W21561FA3		(f) Nut, clamp screw	56-7042
*Motor, 117v, 60c	35-1452	(g) Spring, friction screw lock	56-8108
Idler Wheel	45-6559	(h) Plunger	56-8110
Pulley	45-6558	(i) Washer	56-8113
Shockmounts (3)	54-4501	(j) Trip plate assembly	76-5907
*Motor, 117v, 60c	35-1455	(k) Spring, trip plate	56-8117
Idler Wheel	45-6614	(l) Washer, lead (4)	8W52297
Pulley	45-6615	15. (a) Turntable	35-2711
Shockmounts (3)	54-4826	(b) Retainer, turntable	56-8097
8. (a) Record Shelf and Shaft Assembly	76-5914	(c) Washer, bearing (2)	56-8127
(b) Hold-down assembly	76-5897	(d) Retainer, ball, brass	56-8128
(c) Pin, record hold-down	56-8300	(e) Cover, ball	56-8129
(d) Shaft, record hold-down	56-8299	(f) Ball, 1/8" diam. (3)	5W2017
(e) Spring, hold-down	56-8164	(g) Reset cam, trip	54-8139
(f) Push-off saddle	56-8078	(h) Washer, neoprene	54-8140
(g) Washer, cupped	56-8089	(i) Ring, retaining	1W42311FE7
(h) Fulcrum arm, hold-down	56-8301	Changer Mounting	
(i) Spring, record shelf	56-8088	Spring, heavy (3)	56-7059FA9
9. (a) Reject Lever	56-8079	Spring, light (3)	56-7059-1FCP
(b) Link, reject	56-8084	Sleeve (3)	54-7798
(c) Spring, reject	56-8080	Speed nut (3)	W-2554FCP
(d) Spring, detent	56-8081		

* This motor not carried, order motor 35-1451. If motor 35-1455 is replaced by motor 35-1451 order (3) shockmounts, part number 54-4501.

MODELS RP-190,
RP-190-1, RP-190-2



Primarily RP190-1 and RP190-2 are the same excepting the pickup cartridge, pickup cable, power cable and plugs.

This mechanism will be used in the following instruments:

Group	Instruments
RP190-1.....	9Y510
RP190-1.....	45J2
RP190-2.....	A82
RP190-2.....	A91
RP190-2.....	A108
RP190-2.....	45W9

SPECIFICATIONS

Turntable speed.....	45 r.p.m.
Records used.....	RCA seven-inch fine groove
Record capacity.....	Up to 12 records
Pickup force.....	Approx. 5 grams
Stylus tip radius.....	.001 inch
Power supply.....	105-125 volts, 60 cycle, a.c.

CAUTION

1. Avoid handling the pickup arm when the mechanism is in cycle.
2. Do not use force to release a jam.
3. Do not try to remove the records on the turntable if the turntable is stopped in cycle.
4. If the separator knives protrude from the center post when the mechanism is out of cycle, push the "start-reject" knob to reject and the condition should be corrected automatically.

Function of Principal Parts

Trip Lever (77)

The trip lever is mounted on the bottom end of the pickup arm vertical pivot shaft. The function is to transfer the movement of the pickup arm to parts of the operating mechanism below the motor board. The end of the trip lever contacts stud on cycling cam thereby starts tripping action.

Pickup Arm Return Lever (70)

The function of the pickup arm return lever is to provide a force necessary to push the pickup into landing position. The end of the pickup arm return lever is curved so as to provide a stop for trip lever. This stop determines landing position of the pickup.

Reject Lever (22)

The function of the reject lever is to transfer the action of the control knob to the cycling cam thereby starting a change cycle.

Muting Switch (68)

The function of the muting switch is to short the pickup leads to prevent amplifying of mechanical noise, of the mechanism during change cycle.

Cycling Cam (85)

The cycling cam is mounted on the cycling slide. The function of the cam is to transfer the rotary motion of the turntable shaft into sliding motion of the cycling slide.

Stop Dog (82A)

The stop dog is mounted on the end of cycling slide. The function of the stop dog is to engage the ratchet wheel on the separator shaft and prevent it from rotating, at the exact moment during change cycle.

Ratchet Wheel (53)

The function of the ratchet wheel located on the end of the separator shaft is to keep the separator shaft stationary at the proper time, so as to actuate the separator mechanism inside the centerpost.

Cycling Slide (82)

The cycling slide is the main connecting medium between the various moving parts.

AUTOMATIC OPERATION

1. Place a stack of records over the center post, with the desired selections upward, the last record to be played on top.
2. Push the "start-reject" knob to "start" and let go. The mechanism will automatically play in sequence one side of each record stacked on the separator shelves.
3. To reject a record being played, push the "start-reject" knob.
4. At conclusion of playing and as the last record is being repeated, lift the pickup arm and place on its rest. Turn off the power to the drive motor by pulling forward on control knob.
5. Remove the stack of records by lifting them straight up.

LUBRICATION

A light machine oil (SAE No. 10) should be used to oil the bearings of the drive motor.

On all bearing surfaces, excepting the motor bearings, Houghton STA-PUT No. 320, or equivalent, should be used. On all other sliding surfaces, STA-PUT No. 512, or equivalent, is recommended. STA-PUT can be purchased from E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia, Pa.

(Do not oil or grease record separator shelves.)

It is important that the drive motor spindle and the rubber tire on the idler wheel be kept clean and free from oil or grease, dirt, or any foreign material at all times. Carbon tetrachloride or naphtha is satisfactory for cleaning these parts.

MODELS RP-190,
RP-190-1, RP-190-2

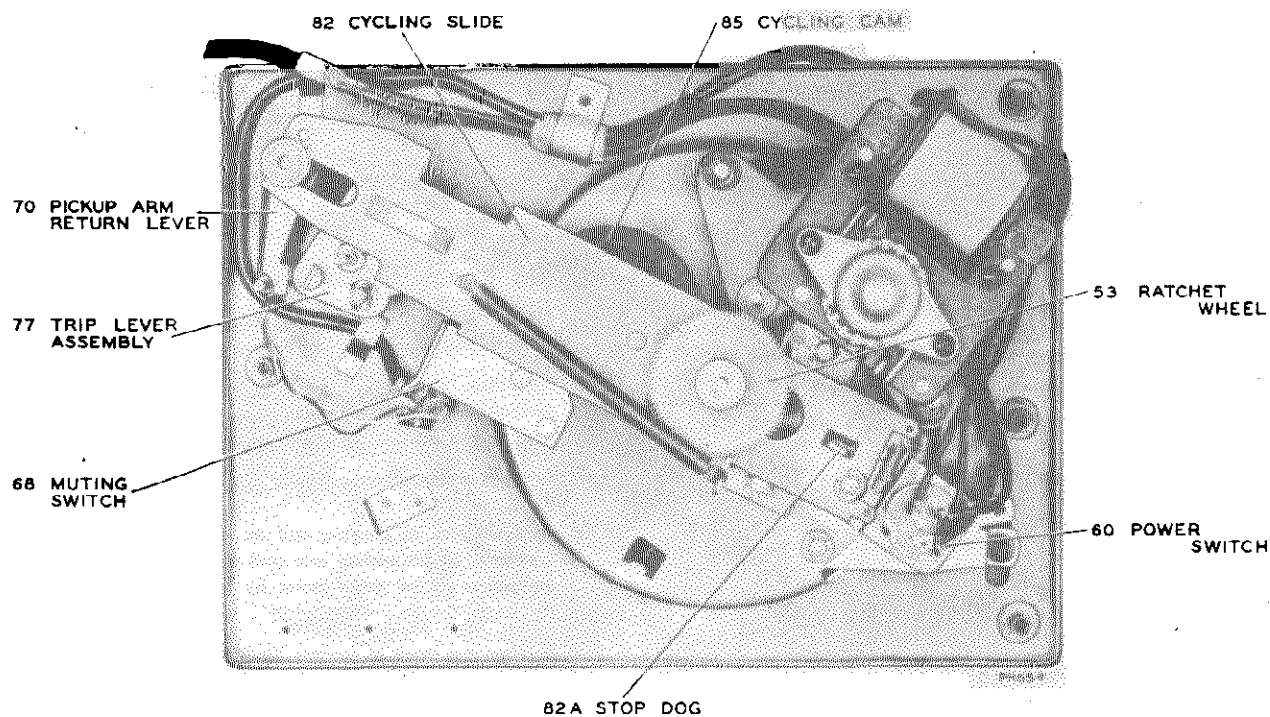


Fig. 1

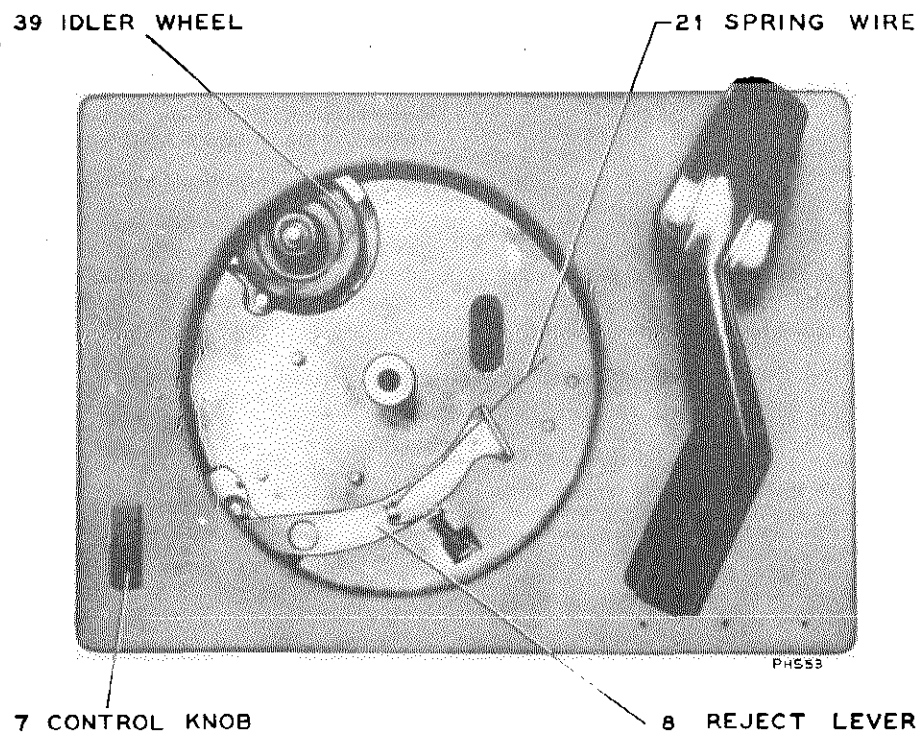
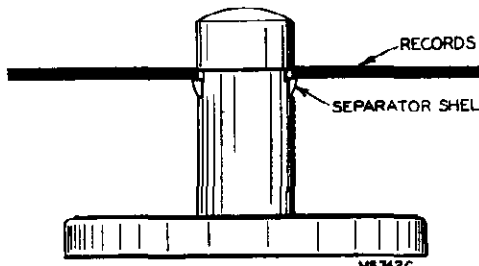
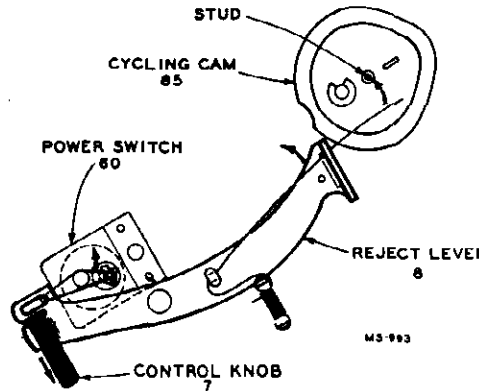
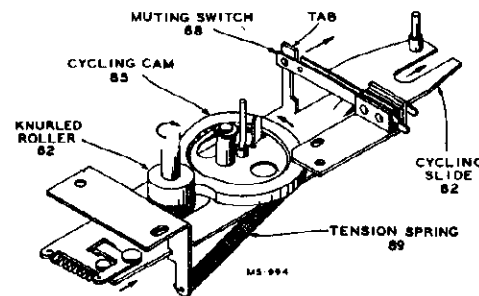
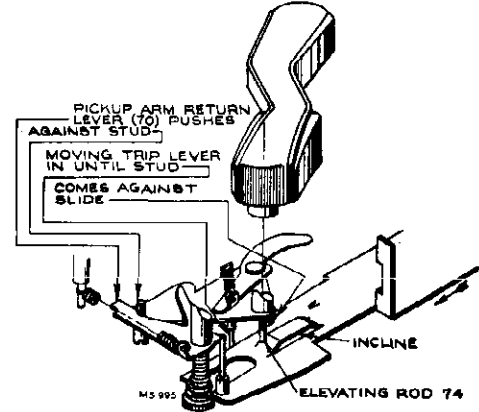
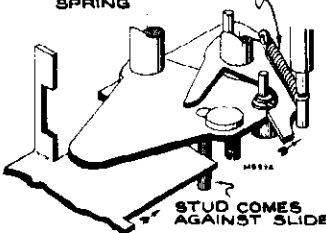


Fig. 2

Cycle of Operation

FUNCTION	EXPLANATION
Place a stack of records over centerpost.	<p>1. Records rest on separator shelves protruding from either side of the centerpost.</p>  <p style="text-align: right;">Fig. 3</p>
Push control knob to reject.	<p>1. The control first actuates the power switch applying power to the drive motor. This starts the turntable rotating.</p> <p>2. Further movement of the control knob actuates the reject lever assembly (8) which contacts the stud mounted on the eccentric cycling cam and moves it slightly.</p>  <p style="text-align: right;">Fig. 4</p>
Cycling starts.	<p>1. The slight movement of the eccentric cycling cam (85) is sufficient for engagement with the rotating knurled roller (62) mounted on turntable shaft.</p> <p>2. The eccentric cycling cam which is mounted on the cycling slide (82) pushes the slide in the direction of the pickup arm pivot. In so doing tension is increased on the slide return spring (89).</p> <p>3. The tab on the cycling slide moves back permitting muting switch to close.</p>  <p style="text-align: right;">Fig. 5</p>
Pickup raises from the rest.	<p>1. As the cycling slide continues to move in the direction of the pickup arm pivot the small incline pressed in the slide causes the elevating rod (74) to lift the pickup arm from the rest.</p> <p>2. The raised pickup arm moves inward slightly from the inward force of the pickup arm return lever (70), until the stud on the trip lever (77) assembly comes against edge of the cycling slide.</p> <p>3. The cycling slide continues to move further, which pushes the trip lever back. The eccentric landing adjustment stud (79) contacts and pushes the pickup arm return lever (70) against the tension of the return spring (69).</p>  <p style="text-align: right;">Fig. 7</p>  <p style="text-align: right;">Fig. 6</p>

MODELS RP-190,
RP-190-1, RP-190-2

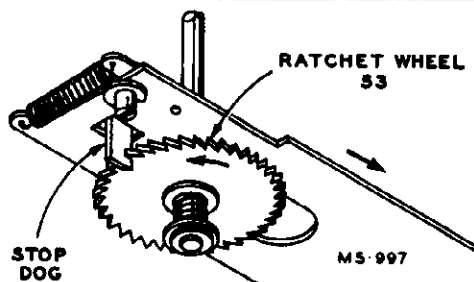


Fig. 8

Separator knives separate the lower record from the stack and the lower record drops to the turntable.

1. As the cycling slide reaches the limit in its movement in the direction of the pickup arm pivot, the stop dog mounted on the slide engages the rotating ratchet wheel (53).
2. The ratchet wheel and separator shaft (6) then remains stationary and the turntable continues to rotate.
3. The separator shelves and knives are coupled together in such a manner that the flattened end of the separator shaft pushes the knives out, which in turn pulls the opposite shelves in.
4. As the shelves recede, the separator knives mounted above the shelves move out and separate the lower record of the stack and support the remaining records while the lower record drops to the turntable.

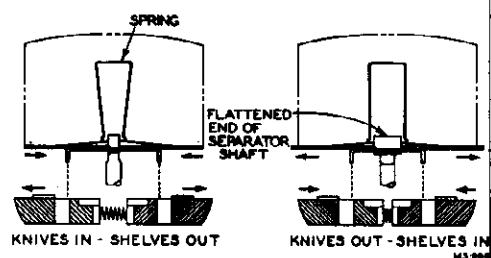


Fig. 9

Pickup moves in for landing.

1. The cycling slide moves away from the pickup arm pivot, due to the force produced by the tension spring (89) keeping the eccentric cycling cam against the rotating knurled roller (62). The knurled roller at this time is returning to the smaller diameter of the cam.
2. The stud on trip lever assembly follows the slide due to the force produced by the action of the pickup arm return lever.
3. After the slide has moved back a short distance the stud on the trip lever assembly no longer follows the slide since the landing adjustment stud comes against the curved stop on the end of the pickup arm return lever. At this moment the pickup is directly above the point of landing.
4. As the cycling slide completes the return movement the elevating rod slides down the incline which lowers the stylus on the record.

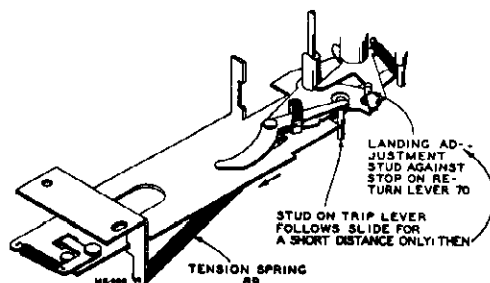


Fig. 10

Cycle completed and the record plays.

1. The tab on the cycling slide contacts and opens the muting switch.
2. The stud on the cycling slide pushes pickup arm return lever back to permit free motion of the pickup arm.
3. The change cycle is completed as the cycling slide comes against the stop bracket, at which time the knurled roller rotates in the cut away section of the cam.
4. As the record plays and the pickup arm moves inward.
5. When the stylus reaches the end of the selection the end of the trip lever contacts the stud on the cycling cam, and pushes it slightly.
6. The slight movement of the cycling cam causes engagement with the rotating knurled roller, thereby starting a change cycle.
7. The mechanism repeats the preceding sequence of operations until the last record of the stack has dropped and has been played. This selection will be repeated until the pickup is lifted and placed on the rest.

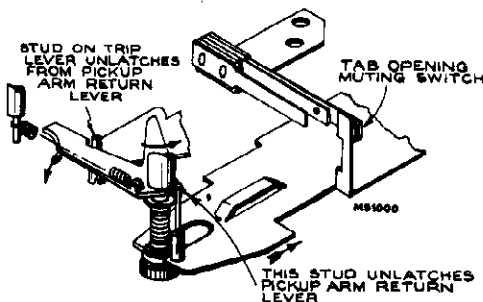


Fig. 11

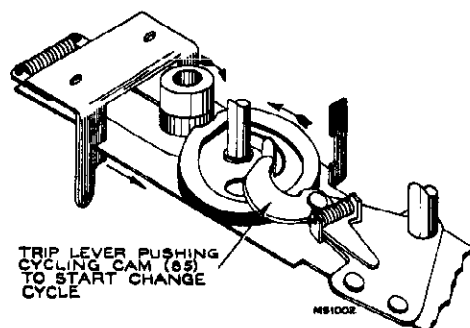


Fig. 13

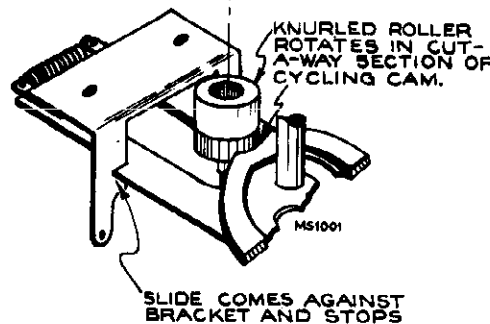


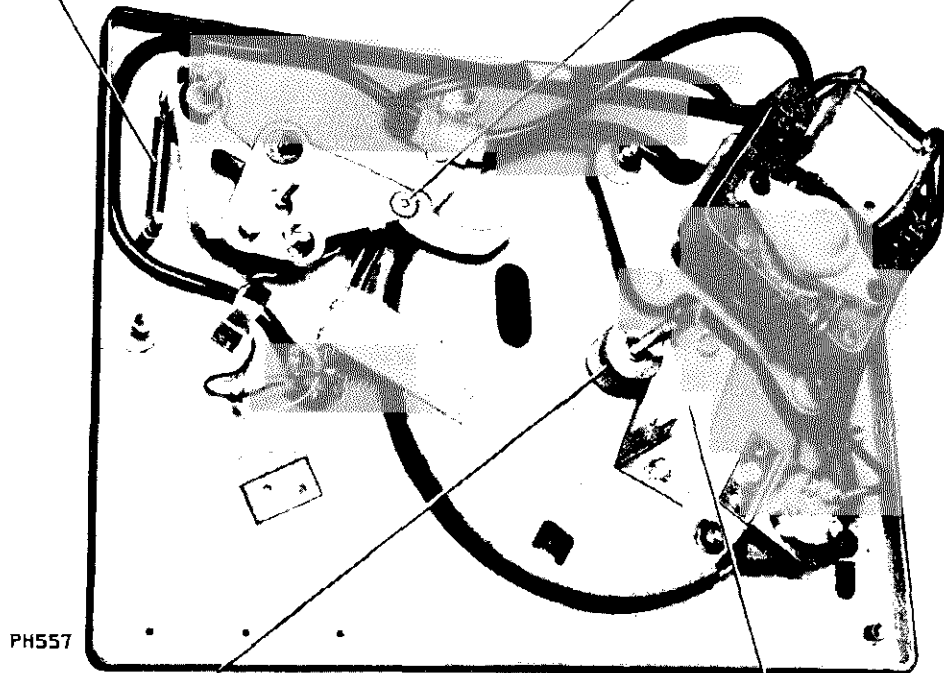
Fig. 12

MODELS RP-190,
RP-190-1, RP-190-2

DO YOU KNOW?

IF THIS SPRING IS LOOSE
OR MISSING, PICKUP WILL
NOT LAND PROPERLY

IF THERE IS A BIND IN THIS
PIVOT, MECHANISM MAY NOT
TRIP

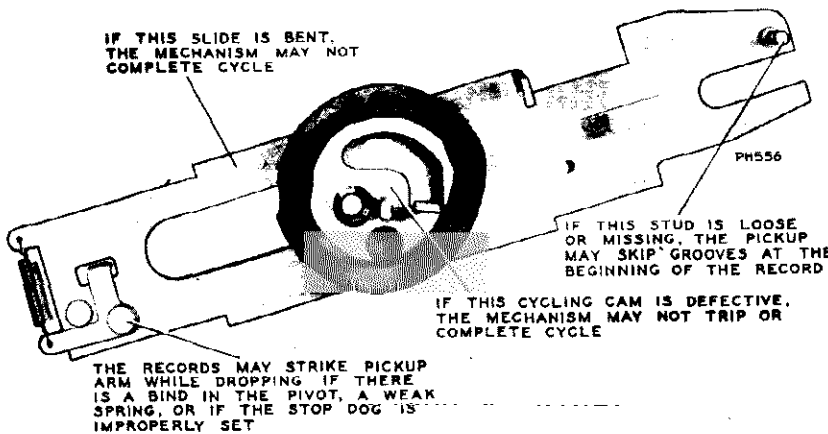


IF THIS KNURLED ROLLER IS
LOOSE, MECHANISM MAY FAIL
TO COMPLETE CYCLE

IF THIS BRACKET IS IMPROPERLY
ADJUSTED, THE CYCLING SLIDE MAY
BIND OR CONTINUOUS TRIPPING
MAY RESULT

Fig. 14

IF THIS SLIDE IS BENT,
THE MECHANISM MAY NOT
COMPLETE CYCLE

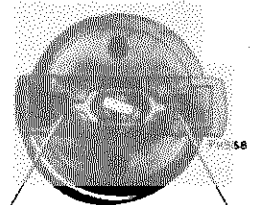


IF THIS STUD IS LOOSE
OR MISSING, THE PICKUP
MAY SKIP GROOVES AT THE
BEGINNING OF THE RECORD

IF THIS CYCLING CAM IS DEFECTIVE,
THE MECHANISM MAY NOT TRIP OR
COMPLETE CYCLE

THE RECORDS MAY STRIKE PICKUP
ARM WHILE DROPPING IF THERE
IS A BIND IN THE PIVOT, A WEAK
SPRING, OR IF THE STOP DOG IS
IMPROPERLY SET

Fig. 15



IF THE SHELVES ARE GREASED, FOREIGN
MATERIAL MAY COLLECT AND CAUSE
BINDING. TENSION SPRINGS MAY NOT
HAVE SUFFICIENT FORCE TO PUSH THE
SHELVES OUT.

Fig. 16

MODELS RP-190,
RP-190-1, RP-190-2

SERVICE HINTS

REJECT CONTROL FAILS TO OPERATE

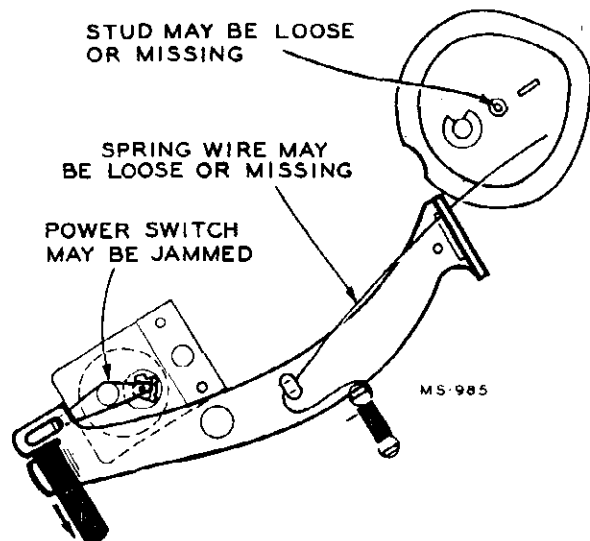


Fig. 17

MECHANISM FAILS TO SEPARATE RECORDS PROPERLY

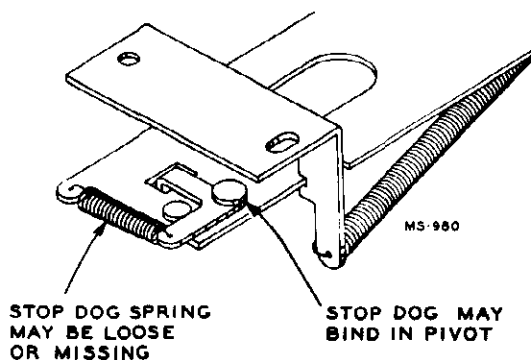


Fig. 18

RECORD STRIKES PICKUP ARM WHEN DROPPING

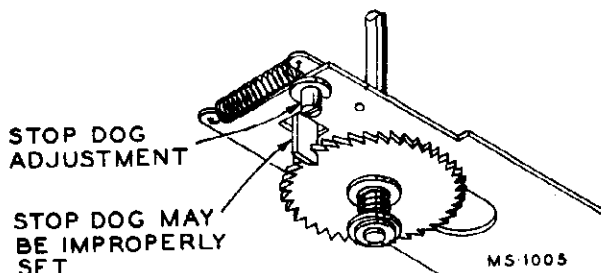
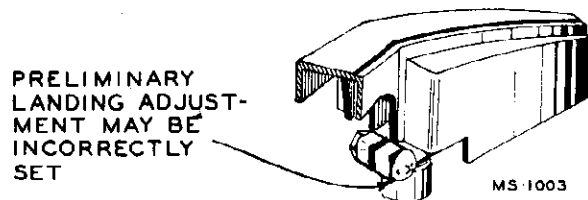


Fig. 21

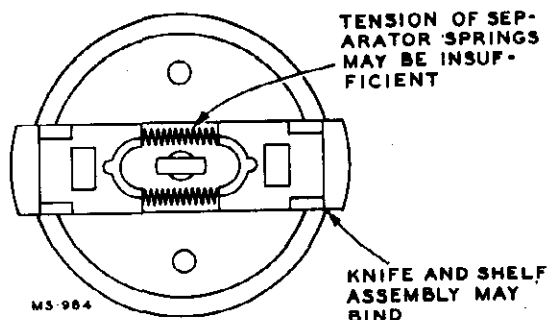


Fig. 19

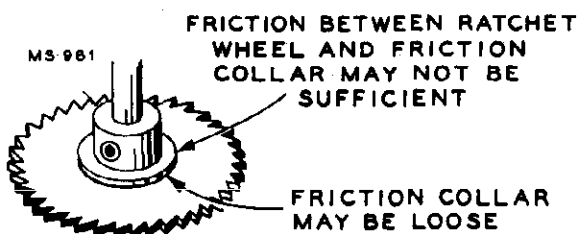


Fig. 20

PICKUP FAILS TO LAND PROPERLY

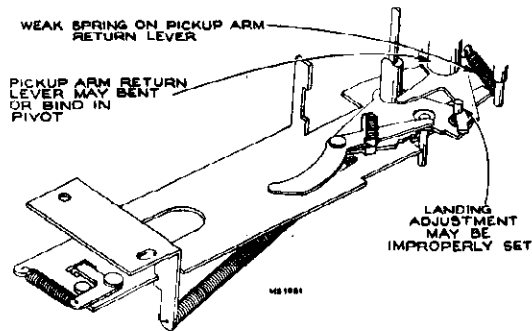


Fig. 22

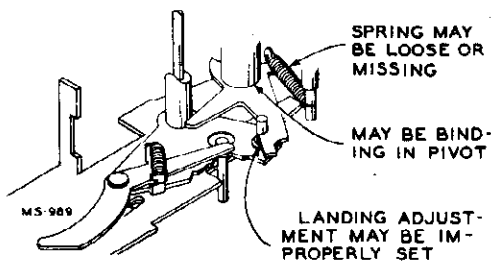


Fig. 23

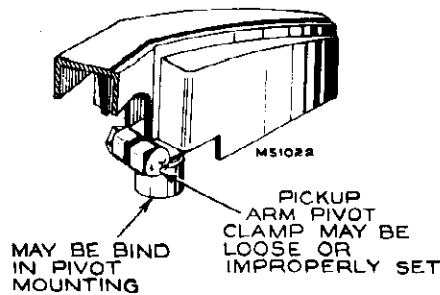


Fig. 24

DISTORTED OR NO OUTPUT

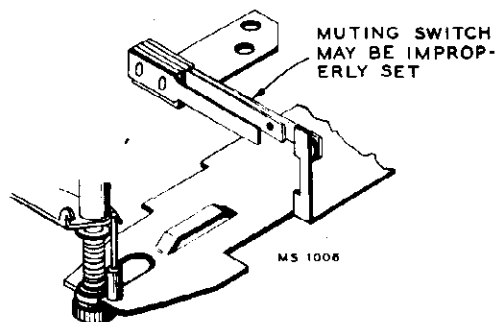


Fig. 28

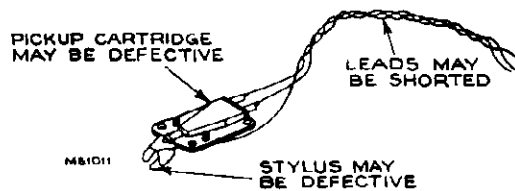


Fig. 29

PICKUP SKIPS GROOVES

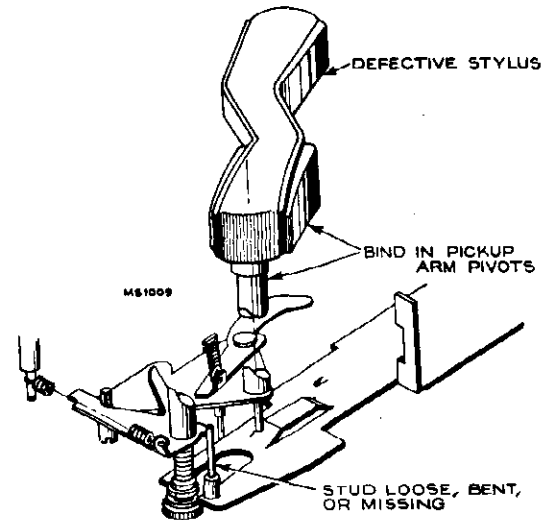


Fig. 25

MECHANISM FAILS TO TRIP

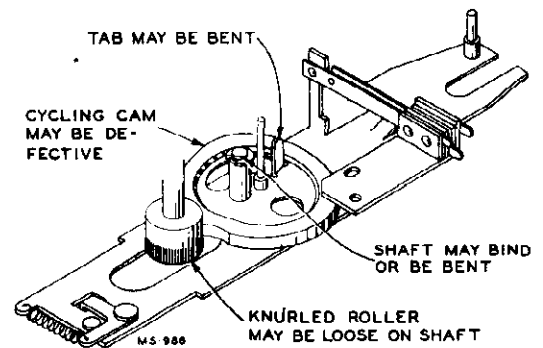


Fig. 26

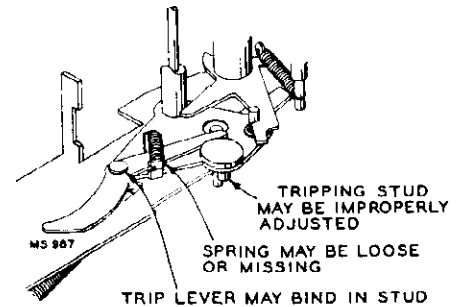


Fig. 27

PREMATURE TRIPPING

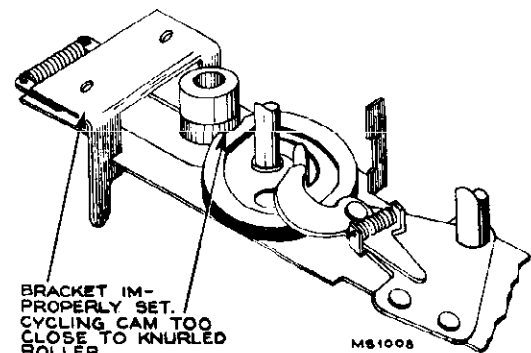


Fig. 30

MODELS RP-190,
RP-190-1, RP-190-2

"WOW" OR SPEED VARIATION

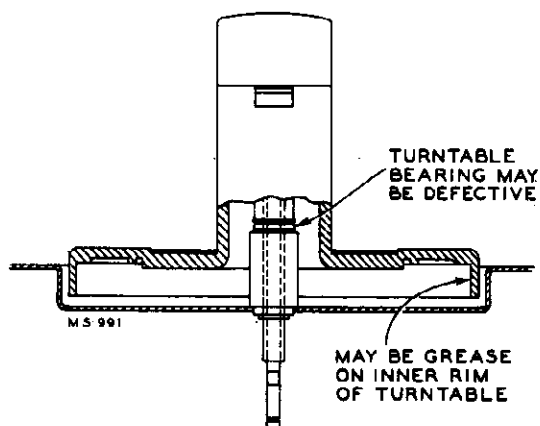


Fig. 31

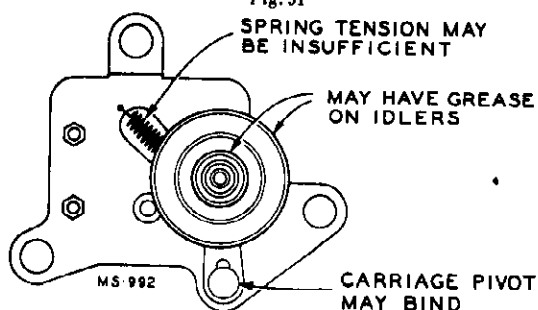


Fig. 32

CONTINUOUS TRIPPING

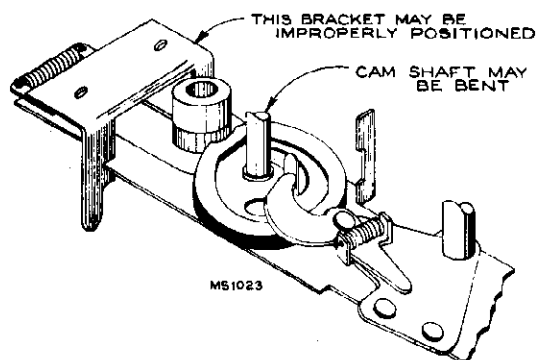


Fig. 34,

RUMBLE

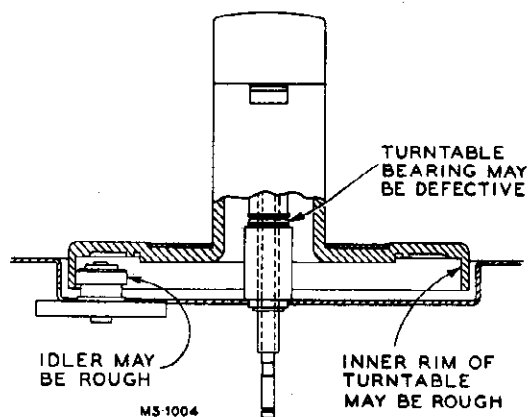


Fig. 33

MECHANISM FAILS TO COMPLETE CYCLE

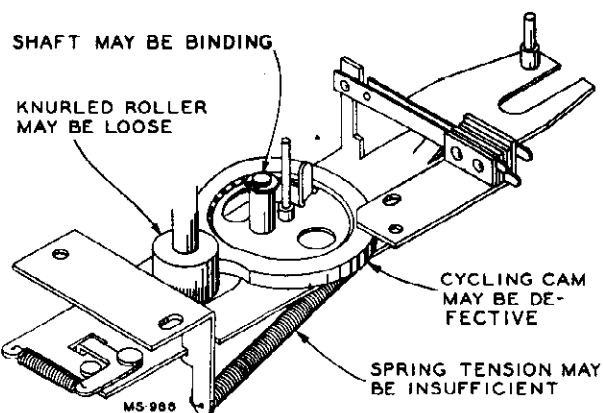


Fig. 35

ADJUSTMENTS

LANDING

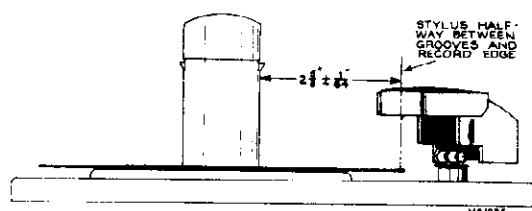


Fig. 36

TRIPPING

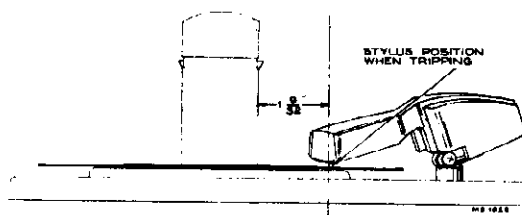


Fig. 37

MODELS RP-190,
RP-190-1, RP-190-2

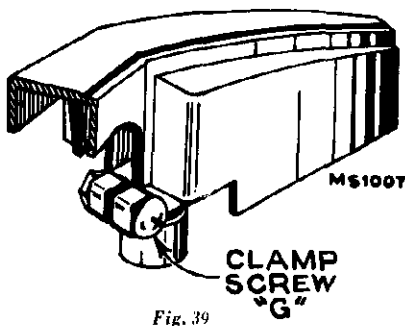
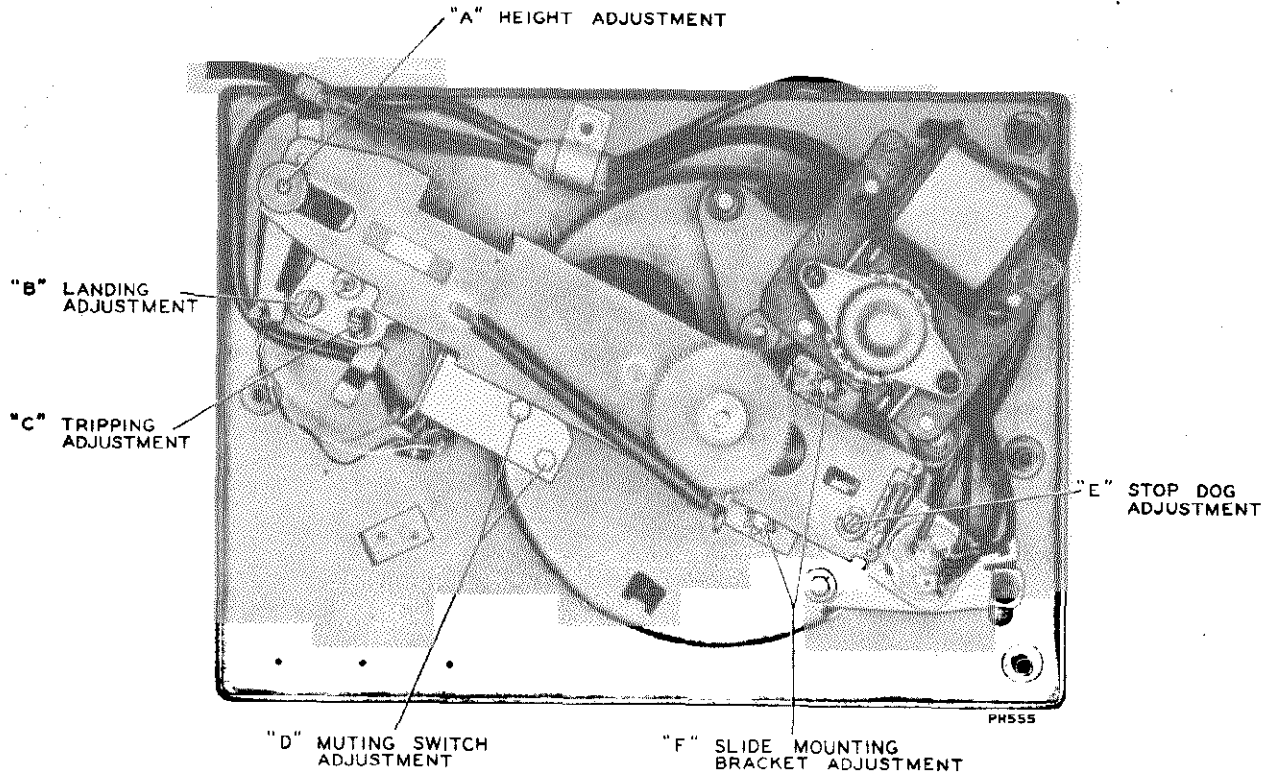


Fig. 39

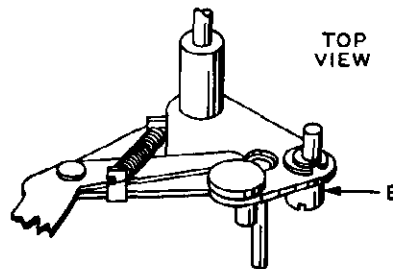


Fig. 40

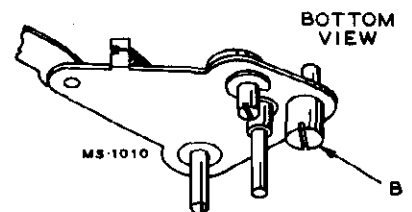


Fig. 41

Adjustments

Pickup Landing Adjustment:

Under ordinary conditions the landing adjustment is a screw-driver adjustment as shown. The adjustment of eccentric landing adjustment stud (B) gives approximately a $\frac{1}{4}$ " movement. (See Figs. 38, 40, 41.)

If, however, the pickup arm has been removed it is first necessary to make an approximate landing adjustment as follows:

1. With the mechanism out of cycle and the clamp screw (G) loose, place pickup arm on the rest and tighten clamp screw enough to prevent the clamp from slipping on the shaft.
2. Set the landing adjustment stud (B) as shown (mid-adjustment). (See Figs. 40, 41.)
3. With the power removed, push reject control to reject. Rotate turntable by hand in the correct direction until the pickup is about ready to land. See sketch.
4. Loosen clamp screw (G) and move pickup arm so the stylus is approximately $2\frac{3}{4}$ " from side of centerpost. Tighten clamp screw. (See Figs. 36, 39.)
5. Exact landing adjustment can now be made by a screw-driver on stud (B). (See Fig. 38.)

Pickup Height Adjustment (See Fig. 38):

Adjust knurled nut (A) until the distance (during change cycle) between the top of the turntable and the stylus point is approximately $1\frac{1}{8}$ ".

NOTE: If unable to adjust for sufficient height, it may be necessary to cut a few turns from the compression spring to allow more space on the shaft.

Tripping Adjustment (See Figs. 37, 38):

Adjust the eccentric tripping stud (C) until the mechanism trips when the stylus is $1\frac{9}{32}$ " from the side of the centerpost.

Mounting Bracket Adjustment (See Fig. 38):

Loosen the two screws (F) and move the bracket so it is as near perpendicular to the slide as possible. Move back or forward until the cut away section of the cycling cam clears the knurled roller approximately $1/16$ ". Tighten screws.

Muting Switch Adjustment (See Fig. 38):

Loosen the two screws (D) and adjust the position of the switch so the contacts are approximately $1/32$ to $1/16$ inches apart when the mechanism is out of cycle. If the mounting screws do not give sufficient adjustment, bend tab on slide slightly.

Stop Dog Adjustment (See Fig. 38):

Turn the eccentric screw (E) until the record drops to the turntable without striking the pickup arm.

MODELS RP-190,
RP-190-1, RP-190-2

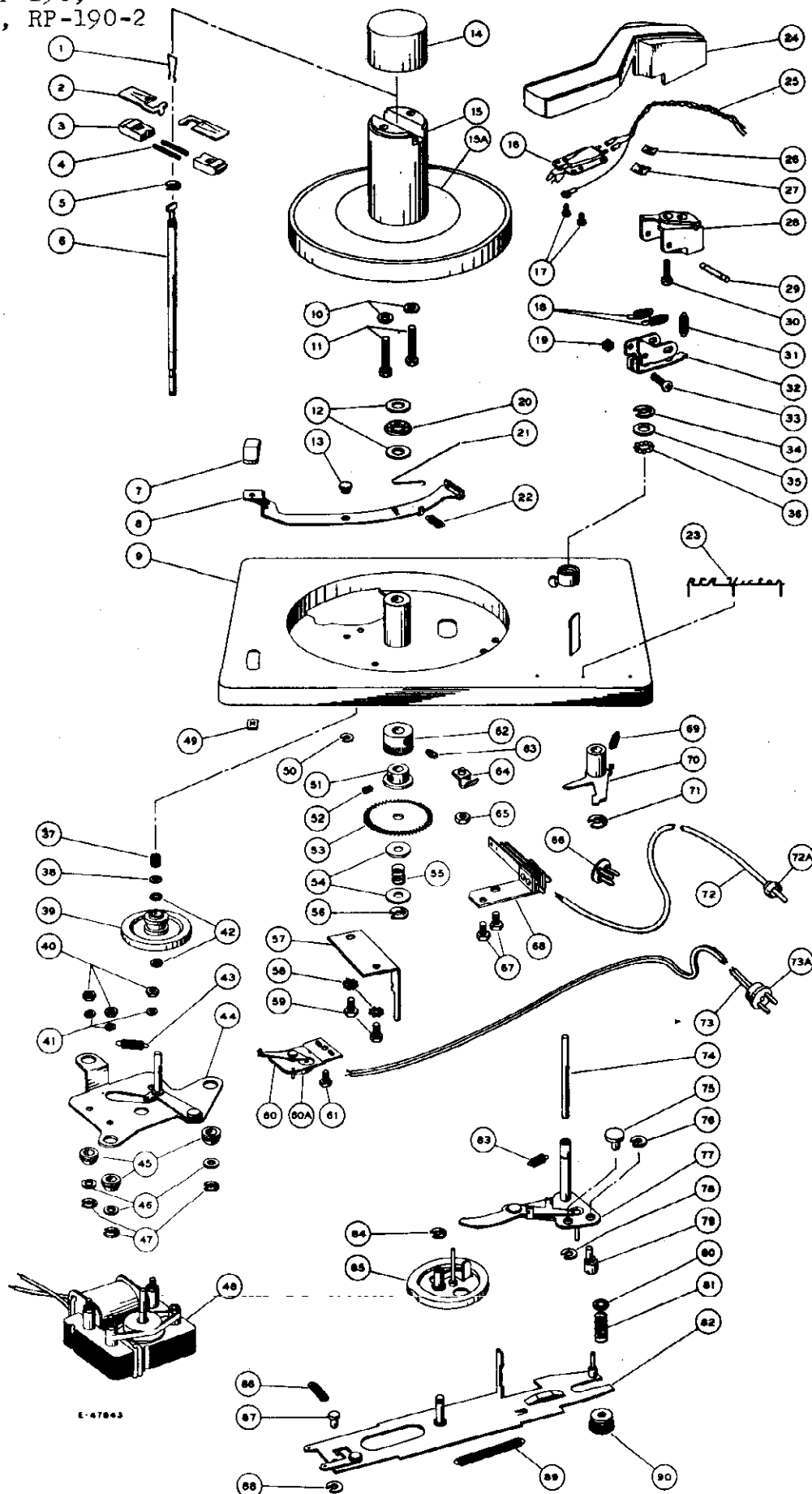


Fig. 42

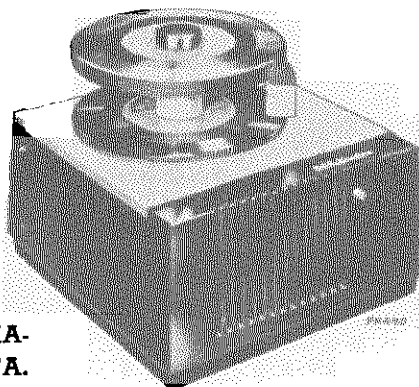
MODELS RP-190,
RP-190-1, RP-190-2

STOCK No.	ILL. No.	DESCRIPTION
75733	60A	Switch—On-Off switch
—	61	Screw—No. 8 x 1/4" self-tapping hex head screw to mount "On-Off" switch
75737	62	Roller—Kearfott roller
75751	63	Screw—No. 10-32 x 17/64" headless set screw—dog point—for knurled roller
—	64	Clamp—Cable clamp for audio cable
—	65	Nut—No. 8-32 hex nut to fasten cable clamp
74182	66	Connector—3 contact male connector for audio cable
—	67	Same as 61
75730	68	Switch—Mixing switch
75745	69	Spring—Pickup arm return lever spring (.185" O.D. x 1 1/4" — 66 turns)
75734	70	Lever—Return lever
35989	71	Washer—"C" washer to mount return lever
—	72	Cable—Shielded audio cable (see Service Data for various instruments)
31048	72A	Plug—Pin plug for audio cable
—	73	Power cord (see Service Data for various instruments)
30870	73A	Connector—2 contact male connector for power cable
75731	74	Rod—Elevating rod
75746	75	Stud—Tripping adjustment stud
74431	76	Washer—Spring washer for adjusting stud
75767	77	Lever—Trip lever assembly less spring and tripping and landing adjustment studs
74431	78	Washer—Spring washer for adjusting stud
75789	79	Stud—Landing adjustment stud
75749	80	Washer—Flat washer—metal (.0239" x .190" I.D. x 1/4" O.D.)—to mount submainboard
75746	81	Spring—Height adjustment spring (.282" O.D. x 13/16" — 8 turns)
75763	82	Slide—Cycling slide assembly complete with stop dog less cam wheel and stop dog adjusting stud
75742	83	Spring—Trip lever spring (.180" O.D. x .535" — 21 1/2 turns)
33726	84	Washer—"C" washer for cam wheel
75764	85	Wheel—Cam wheel and tire
75765	86	Spring—Stop dog tension spring (.185" O.D. x 1 1/16" — 24 1/2 turns)
75766	87	Stud—Adjusting stud for stop dog
74431	88	Washer—Spring washer for stop dog adjusting stud
75744	89	Spring—Slide assembly return spring (.1" O.D. x 2.23 32" — 90 turns)
75747	90	Nut—Knurled nut for height adjustment

STOCK No.	ILL. No.	DESCRIPTION
72765	27	Nut—Speed nut for cable in center of arm
75721	28	Weight—Counterbalance weight disc cast
75724	29	Pin—Pin for anchoring shock absorbing springs
75723	30	Screw—No. 6 x 1 1/16" filler head screw to fasten counterbalance
75986	31	Spring—Counterbalance spring (.180" O.D. x .500" — 30 turns)
75720	32	Swivel—Pickup arm swivel
75726	33	Screw—No. 8-32 x 3/4" cross recessed pan head machine screw to mount pickup arm
35969	34	Washer—"C" washer to mount trip lever
75732	35	Washer—Steel balls thrust washer
3858	36	Bolt—Steel bolt (.312 dia.)
74870	37	Recliner—Idle wheel retainer (spring sleeve type)
75987	38	Washer—Spring washer for idle wheel
74077	39	Wheel—Idle wheel
—	40	Nut—No. 8-32 hex nut for mounting motor to idler lever plate assembly
—	41	Lockwasher—No. 8 split lockwasher for No. 8-32 hex nut
74079	42	Washer—Dampening washer for idler wheel
75762	43	Spring—Idle wheel tension spring (.185" O.D. x 29/32" — 37 1/2 turns)
75759	44	Plate—Motor mounting plate complete with idler lever
75761	45	Grommet—Rubber grommet for motor mounting plate
75749	46	Washer—Flat washer—metal (.0239" x .190" I.D. x 1/4" O.D.)—for mounting motor
33726	47	Washer—"C" washer to mount motor assembly
75760	48	Motor—117 volt 60 cycle motor
74212	49	Nut—Control knob speed nut
74431	50	Washer—Spring washer to mount reject lever mounting stud
75738	51	Collar—Friction collar
14974	52	Screw—No. 8-32 x 3/16" hex socket head cup point—for friction collar
75738	53	Wheel—Bracket wheel
75750	54	Washer—Flat washer—metal (.0239" x .180" I.D. x 9/16" O.D.)—for racket wheel thrust spring
75743	55	Spring—Ratchet wheel thrust spring (.5/16" O.D. x 7/16" — 5 1/2 turns)
33726	56	Washer—"C" washer to mount ratchet wheel
75735	57	Bracket—Mounting bracket for slide assembly
—	58	Lockwasher—No. 8 external teeth lockwasher for cycling slide mounting bracket
74870	59	Screw—No. 8 x 1/4" self-tapping hex head screw to mount slide assembly bracket
75732	60	Housing—"On-Off" switch housing and lever less switch

STOCK No.	ILL. No.	DESCRIPTION
74882	1	Spring—Spindle nose spring—formed
74884	2	Separator—Separator knife
74885	3	Shelf—Separator shelf
75756	4	Spring—Separator shaft return spring (.118" O.D. x 1/4" — 15 turns)
33726	5	Washer—"C" washer to hold separator shaft and cam
75757	6	Shaft—Separator shaft with cam
75741	7	Knob—Control knob
75739	8	Lever—Reject lever complete with formed spring
75729	9	Board—Motorboard sub-assembly complete with welded and/or soldered studs and rest
74889	10	Washer—No. 6 flat washer for under head of screws No. 75758
75758	11	Screw—No. 6-32 x 1" filler head machine screw (holds nose to spindle)
74080	12	Washer—Thrust bearing washer
75748	13	Stud—Reject lever mounting stud
75755	14	Cap—Spindle nose cap—red
75753	15	Turntable—Turntable and shaft assembly complete with finished disc
75754	15A	Disc—Finished disc for turntable part of No. 75753
75678	16	Crystal—Crystal cartridge complete with stylus (RP190-1)
75575	16	Crystal—Crystal cartridge complete with stylus (RP190-2)
74819	16A	Guard—Stylus guard for (RMP 128-4) (RP190-2)
74085	16B	Screw—No. 2-55 x 3/16" filler head screw to mount guard (RMP 128-4) (RP190-2)
75770	16C	Stylus—Replacement stylus and holder assembly (yellow) for crystal (RMP 128-4) (RP190-2)
74290	16D	Washer—Washer and nut to mount replacement stylus (RMP 128-4) (RP190-2)
75722	17	Screw—No. 4 x 1/4" filler head screw to mount crystal
75727	18	Spring—Shock absorbing spring (.187" O.D. x 1/4")
75723	19	Nut—No. 8-32 hex nut to mount pickup arm
72349	20	Bearing—Thrust bearing
75740	21	Spring—Reject lever spring (formed; part of reject lever)
75742	22	Spring—Reject lever return spring (.180" O.D. x .535" — 21 1/2 turns)
74782	23	Emblem—"RCA Victor" emblem
75719	24	Arm—Pickup arm shell only
75728	25	Cable—3 wire twisted pickup arm cable complete with connectors
71095	26	Nut—Speed nut for cable in rear of arm

MODEL 45-EY



FOR RECORD CHANGER SERVICE INFORMATION—REFER TO RP-168 SERIES SERVICE DATA. ON PAGES RCD.CH.19-1 THROUGH RCD.CH.19-8.

Specifications

Tube Complement

1. RCA 12AV6 Amplifier
2. RCA 50C5 (in RS-132 or RS-132-A) Output
- RCA 50B5 (in RS-132-F) Output
3. RCA 35W4 Rectifier

Loudspeaker (92577-6W)

Size and type 4 in. P.M.
Voice coil impedance 3.2 ohms at 400 cycles

Dimensions (overall)

Height, 7 $\frac{3}{8}$ " Width, 9 $\frac{1}{8}$ " Depth, 9 $\frac{3}{8}$ "

Power Supply Rating

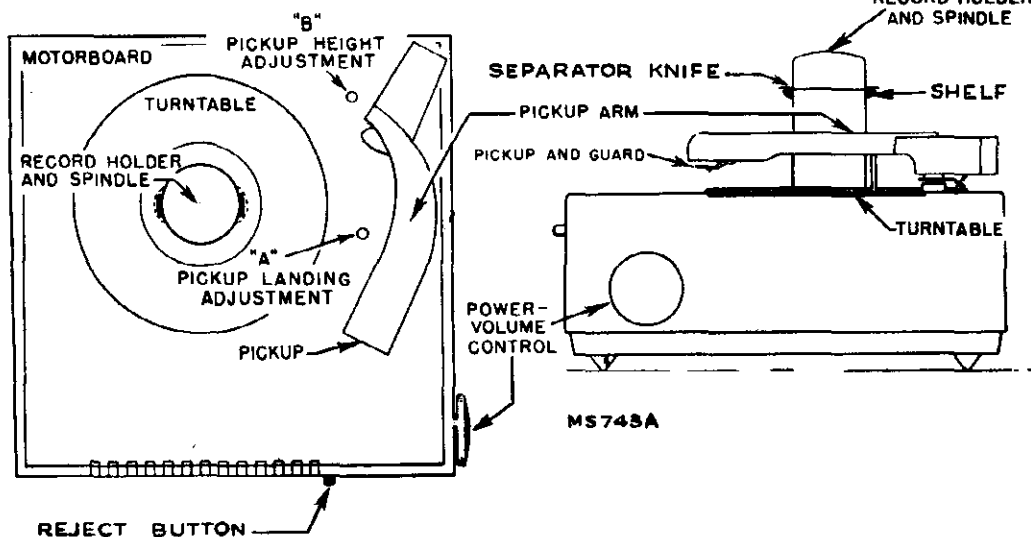
115 volts, 60 cycles A.C. 40 watts

Power Output

Undistorted 1.0 watt Maximum 1.25 watts

Record Changer

Turntable speed 45 r.p.m.
Records used RCA 7 in. fine groove
Record capacity up to 10 records
Pickup Crystal (medium output)
Pickup Stock No. 74067 used with RS-132 or RS-132-F
Pickup Stock No. 74625 used with RS-132-A



Pickup Landing Adjustment "A"

The pickup point should land half-way between the outer edge of the record and the first music groove.

If the pickup lands inside the starting grooves—turn screw "A" slightly clockwise. If pickup lands outside the starting grooves—turn screw "A" slightly counterclockwise.

Pickup Height Adjustment "B"

During cycle the pickup arm must rise high enough to clear a stack of ten records on the turntable, but not high enough to cause the top of the arm to touch records resting on the record supports.

If pickup does not clear a stack of ten records—turn screw "B" slightly clockwise. If pickup arm touches records on record supports—turn screw "B" slightly counterclockwise.

Record Separators

During service, the position of the star wheel on the underside of the record changer may be accidentally shifted; this may cause the separator knives to be extended when they should be concealed.

If the separator knives are thus extended—turn the power on so that the turntable is revolving, push the "start-reject" knob and allow the mechanism to complete a change cycle. If the knives remain extended—while the turntable is still revolving, gently press fingers against the extended knives until they disappear inside the center post—DO THIS ONLY WHILE MECHANISM IS OUT OF CYCLE.

To Remove Chassis

Remove the four screws at the corners of the bottom cover, separate the motor power plug and socket and remove the pickup cable from its socket on the amplifier chassis.

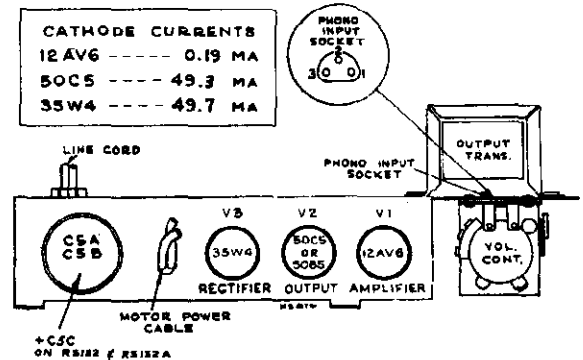
Elongated holes permit the speaker position to be adjusted. If the speaker should be replaced or its mounting bracket loosened, the speaker mounting bracket screws should not be tightened until after the bottom cover is assembled to the cabinet.

Amplifier Chassis

Three different amplifier chassis have been used in Model 45-EY.

Chassis No. RS-132 and RS-132-A use a 50C5 output tube. Chassis No. RS-132-F uses a 50B5 output tube.

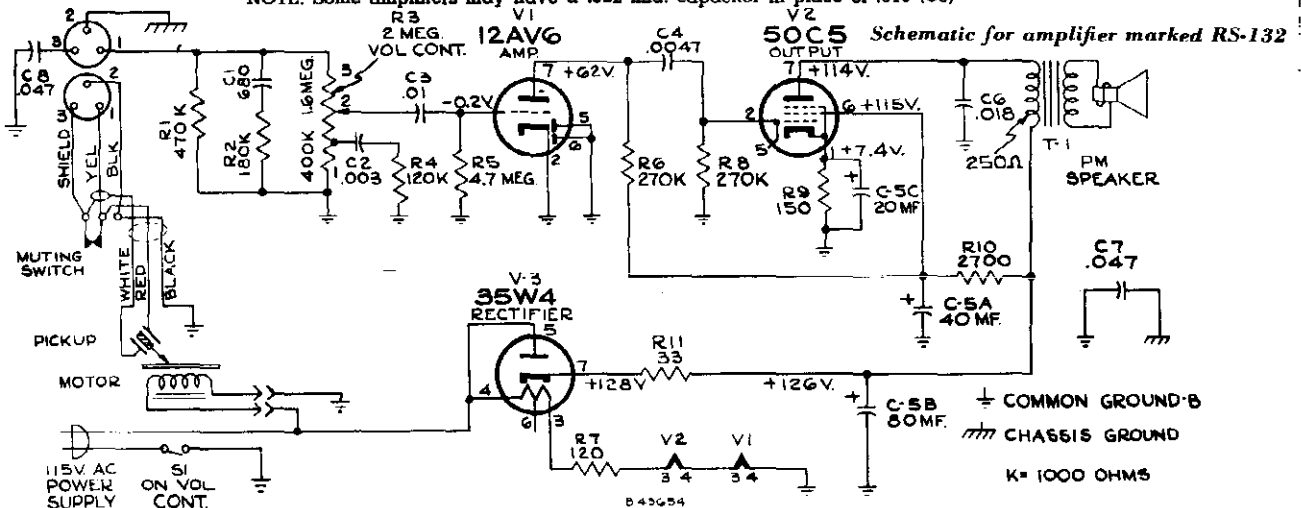
Crystal pickup Stock No. 74067 is used in instruments having chassis RS-132 or RS-132-F. Crystal pickup Stock No. 74625 is used in instruments having chassis RS-132-A.



REPLACEMENT PARTS (For instruments having amp. chassis marked RS-132)

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
AMPLIFIER ASSEMBLIES RS-132		73117	Socket—Tube socket
39648	Capacitor—Mica, 680 mmf. (C1)	36422	Socket—3 contact socket for phono input cable
73920	Capacitor—Moulded paper, .0047 mfd., 400 volts (C4)	72535	Transformer—Output transformer (T1)
73961	Capacitor—Tubular, .003 mfd., 200 volts (C2)	SPEAKER ASSEMBLIES	
71923	Capacitor—Tubular, .01 mfd., 200 volts (C3)	92577-6W—RL 108B4	
58476	Capacitor—Moulded paper, .018 mfd., 400 volts (C6)	74165	Speaker—4" P.M. speaker complete with cone and voice coil
73553	Capacitor—Moulded paper, .047 mfd., 400 volts (C7, C8)	MISCELLANEOUS	
72281	Capacitor—Electrolytic, comprising 1 section of 80 mfd., 150 volts; 1 section of 40 mfd., 150 volts; and 1 section of 20 mfd., 25 volts (C5A, C5B, C5C)	74135	Baffle—Speaker baffle
74133	Control—Volume control and power switch (R3, S1)	74793	Bottom—Cabinet bottom cover
28451	Cover—Insulating cover for electrolytic capacitor	74137	Bracket—Mounting bracket for reject button and shaft
73693	Grommet—Strain relief grommet (1 set) for power cord	74136	Bracket—Speaker mounting bracket
70391	Insulator—Phono input socket insulator	74138	Button—Reject button and shaft
30868	Plug—2 contact female plug for motor cable	Y2226	Cabinet—Plastic cabinet less bottom cover
73237	Resistor—Wire wound, 33 ohms, 150 ma. (R11)	74190	Cable—Shielded pickup cable complete with 3 prong male plug
72314	Resistor—Wire wound, 120 ohms, 5 watts (R7)	74193	Clamp—Spring clamp for reject button and shaft
	Resistor—Fixed, composition, 150 ohms $\pm 10\%$, $\frac{1}{2}$ watt (R9)	74782	Emblem—"RCA Victor" emblem
	Resistor—Fixed, composition, 2700 ohms $\pm 10\%$, $\frac{1}{2}$ watt (R10)	74623	Hardware—Set of mounting parts consisting of 3 flat washers, 3 spacers and 3 rubber grommets to mount record changer
	Resistor—Fixed, composition, 120,000 ohms $\pm 10\%$, $\frac{1}{2}$ watt (R4)	74666	Knob—Power switch knob
	Resistor—Fixed, composition, 180,000 ohms $\pm 10\%$, $\frac{1}{2}$ watt (R2)	74192	Plug—3 prong male plug for pickup cable
	Resistor—Fixed, composition, 270,000 ohms $\pm 10\%$, $\frac{1}{2}$ watt (R6, R8)	74734	Spring—Retaining spring for knob
	Resistor—Fixed, composition, 470,000 ohms $\pm 10\%$, $\frac{1}{2}$ watt (R1)	74139	Spring—Reject button and shaft return spring (.203" dia. x $1\frac{1}{2}$ "—21" turns)
	Resistor—Fixed, composition, 4.7 megohms $\pm 20\%$, $\frac{1}{2}$ watt (R5)	2917	Washer—"C" washer for reject button and shaft

NOTE: Some amplifiers may have a .022 mfd. capacitor in place of .018 (C6)

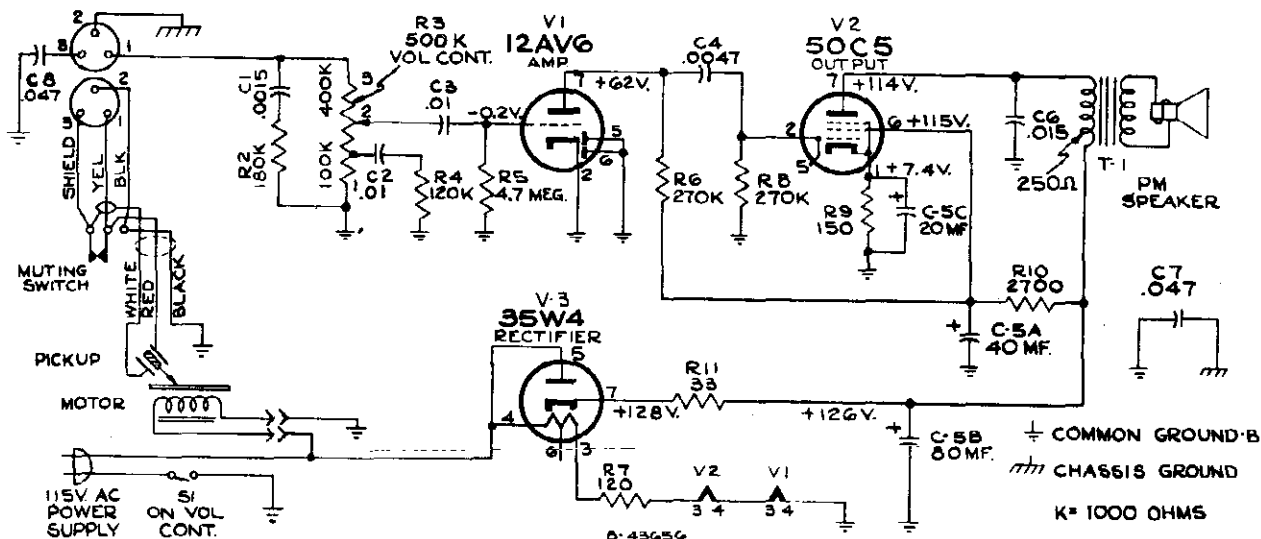


MODEL 45-EY

REPLACEMENT PARTS (For instruments having amp. chassis marked RS-132-A)

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
AMPLIFIER ASSEMBLIES RS-132-A		SPEAKER ASSEMBLIES 92577-6W	
72281	Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts; 1 section of 40 mfd., 150 volts; and 1 section of 20 mfd., 25 volts	74165	Speaker—4" P.M. speaker complete with cone and voice coil
71934	Capacitor—Tubular, paper, .0015 mfd., 600 volts (C1)	MISCELLANEOUS	
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 600 volts (C4)	74135	Baffle—Speaker baffle
71923	Capacitor—Tubular, paper, .01 mfd., 200 volts (C2, C3)	74793	Bottom—Cabinet bottom cover
73797	Capacitor—Tubular, paper, .015 mfd., 600 volts (C6)	74136	Bracket—Speaker mounting bracket
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C7, C8)	74137	Bracket—Mounting bracket for reject button and shaft
30868	Connector—2 contact female connector for motor cable	74138	Button—Reject button and shaft
36422	Connector—3 contact female connector for phono cable	Y2226	Cabinet—Plastic cabinet less bottom cover
38411	Control—Volume control and power switch	74190	Cable—Shielded pickup cable complete with 3 contact male plug
28451	Cover—Insulating cover for electrolytic	74193	Clamp—Spring clamp for reject button and shaft
73693	Grommet—Power cord strain relief grommet	74192	Connector—3 contact male connector for pickup cable
28452	Plate—Mounting plate for electrolytic	74782	Emblem—"RCA Victor" emblem
73237	Resistor—Fuse type, 33 ohms (R11)	74623	Hardware—Set of mounting parts consisting of 3 flat washers, 3 eyelets and 3 rubber grommets to mount changer
72314	Resistor—Wire wound, 120 ohms, 5 watts (R7) Resistor—Fixed, composition:— 150 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R9) 2700 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R10) 27,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R4) 180,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R2) 270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R6, R8) 4.7 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R5)	74666	Knob—Power switch knob
73117	Socket—Tube socket	74734	Spring—Retaining spring for knob
72535	Transformer—Output transformer	74139	Spring—Reject button and shaft return spring
		2917	Washer—"C" washer for reject button and shaft

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

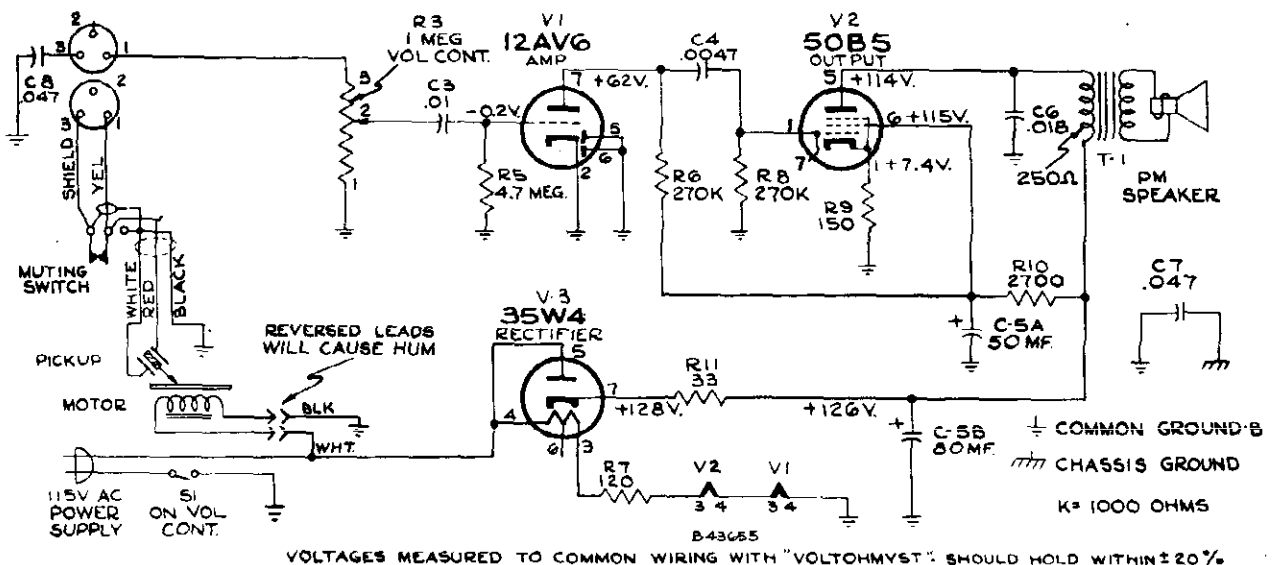


Schematic for amplifier marked RS-132A

REPLACEMENT PARTS (For instruments having amp. chassis marked RS-132-F)

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
AMPLIFIER ASSEMBLIES RS-132-F		SPEAKER ASSEMBLIES 92577-6W	
73520	Capacitor—Electrolytic comprising 1 section of 80 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C5A, C5B)	74165	Speaker—4" P.M. speaker complete with cone and voice coil
73920	Capacitor—Tubular, paper, oil impregnated, .0047 mfd., 800 volts (C4)	MISCELLANEOUS	
71923	Capacitor—Tubular, paper, .01 mfd., 200 volts (C3)	74135	Baffle—Speaker baffle
58476	Capacitor—Tubular, paper, oil impregnated, .018 mfd., 400 volts (C6)	74793	Bottom—Cabinet bottom cover
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C7)	74136	Bracket—Speaker mounting bracket
36422	Connector—3 contact female connector for phono cable (J1)	74137	Bracket—Mounting bracket for reject button and shaft
30868	Connector—2 contact female connector for motor cable (J2)	74138	Button—Reject button and shaft
74101	Control—Volume control and power switch (R3, S1)	Y2226	Cabinet—Plastic cabinet less bottom cover
73127	Cover—Insulating cover for electrolytic	74193	Clamp—Spring clamp for reject button and shaft
73693	Grommet—Power cord strain relief grommet (1 set)	74192	Connector—3 contact male connector for pickup cable
28451	Plate—Mounting plate for electrolytic	74782	Emblem—"RCA Victor" emblem
73237	Resistor—Fuse type, 33 ohms (R11)	74623	Hardware—Set of mounting parts consisting of 3 flat washers, 3 eyelets and 3 rubber grommets to mount changer
72314	Resistor—Wire wound, 120 ohms, 5 watts (R7) Resistor—Fixed, composition: 150 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R9) 2700 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R10) 270,000 ohms, $\pm 10\%$, $\frac{1}{2}$ watt (R6, R8) 4.7 megohm, $\pm 20\%$, $\frac{1}{2}$ watt (R5)	74668	Knob—Volume control and power switch knob
73117	Socket—Tube socket	74734	Spring—Retaining spring for knob
72535	Transformer—Output transformer (T1)	74139	Spring—Reject button and shaft return spring
		2917	Washer—"C" washer for reject button and shaft

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



Schematic for amplifier marked RS-132F

MODEL 45J

Specifications

Record Changer (RP-168)

Turntable speed 45 r.p.m.
 Records used RCA fine groove—7 in.
 Record capacity Up to 10 records
 Pickup RMP-128-1—Stock No. 74067.. Crystal (medium output)

Power Supply Rating

115 volts, 60 cycles A.C. 15 watts

Dimensions (overall)

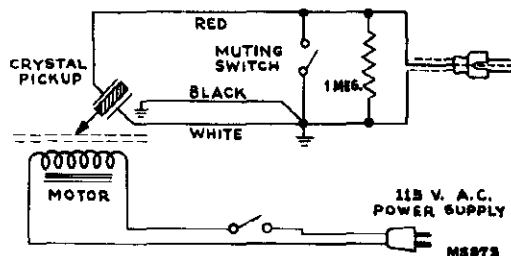
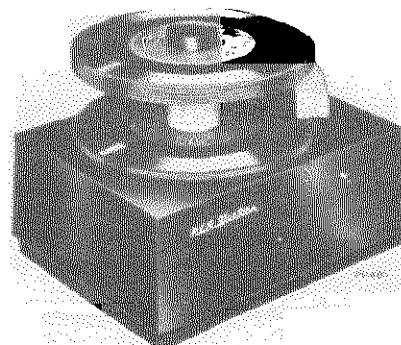
Height 6 $\frac{1}{8}$ " Width 9 $\frac{1}{8}$ " Depth 6 $\frac{1}{8}$ "

Record Separator

In the out of cycle position the record separator knives or discs are normally concealed inside the center post. During service, the position of the star wheel on the underside of the record changer may be accidentally shifted; this may cause the separator knives to be extended when they should be concealed.

If the separator knives are thus extended—turn the power on so that the turntable is revolving, gently press fingers against the extended knives until they disappear inside the center post—DO THIS ONLY WHILE MECHANISM IS OUT OF CYCLE.

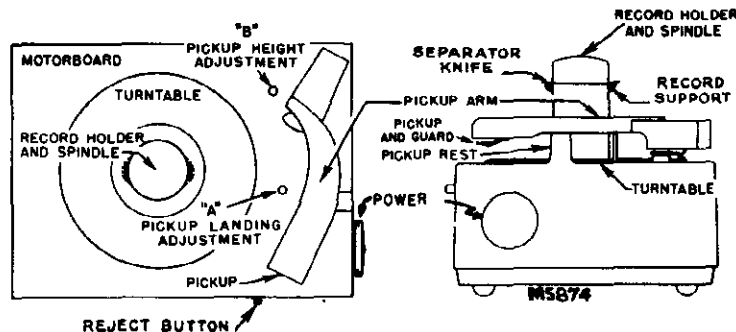
Note: This holds true only to mechanisms having the circular, rotating knives.



Schematic Diagram

Record Changer Mounting

The cabinet is used as the motorboard of the record changer. The record changer is attached with three screws and bushings. THE PICKUP ARM MUST BE REMOVED BEFORE THE RECORD CHANGER CAN BE REMOVED—REFER TO RP-168 SERIES SERVICE DATA.



Top and Side Views

REPLACEMENT PARTS

STOCK No.	DESCRIPTION
MISCELLANEOUS	
74097	Bottom—Cabinet bottom cover
74189	Bushing—Shoulder bushing to mount mechanism in cabinet (3 required)
74098	Button—Reject button
Y2151	Cabinet—Plastic cabinet less bottom cover
74296	Cable—Shielded pickup cable complete with pin plug
74674	Emblem—"RCA Victor" emblem
31051	Foot—Rubber foot (4 required)
73490	Knob—Power switch knob
—	Resistor—Fixed, composition: 1 megohm, $\pm 10\%$, $\frac{1}{2}$ watt
14270	Spring—Retaining spring for knob
74871	Switch—Power switch

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS.

FOR RECORD CHANGER SERVICE INFORMATION—REFER TO RP-168 SERIES SERVICE DATA. ON PAGES RCD.CH.19-1 THROUGH

Pickup Landing Adjustment "A" RCD.CH.19-8.

The pickup point should land half-way between the outer edge of the record and the first music groove.

If the pickup lands inside the starting grooves—turn screw "A" slightly clockwise. If pickup lands outside the starting grooves—turn screw "A" slightly counterclockwise.

Pickup Height Adjustment "B"

During cycle the pickup arm must rise high enough to clear a stack of eight records on the turntable, but not high enough to cause the top of the arm to touch records resting on the record supports.

If pickup does not clear a stack of eight records—turn screw "B" slightly clockwise. If pickup arm touches records on record supports—turn screw "B" slightly counterclockwise.

Connecting Record Changer Attachment to Radio Receivers

RCA Radios with Phono Jack

Plug male connector on the end of the "Phono" lead into the female connector on the receiver chassis. If set is provided with a phono switch, push or turn the "Phono" switch to "Phono" position, and operate the Record Changer Attachment according to instructions. If no switch is provided, use maximum setting of volume control on attachment, and minimum setting of radio volume control which will give acceptable volume, and tune receiver off frequency from any very strong station. In some instances the radio volume control will have the effect of a tone control.

RCA Type No. 202W1 Record Player Selector

This selector switch may be used for combined operation of two record players through one phono input jack. A choice of two types of input jacks and output cable plugs are provided.

Radio-Phonograph Combinations

Most radio-phonograph combinations use resistors and/or capacitors for tone compensation in the phono input circuit.

Where unsatisfactory reproduction is obtained with Model 45J connected into the phono jack of such instruments, we suggest that Model 45J be connected as indicated for radios which do not have a phono jack.

Radios Without Phono Jack

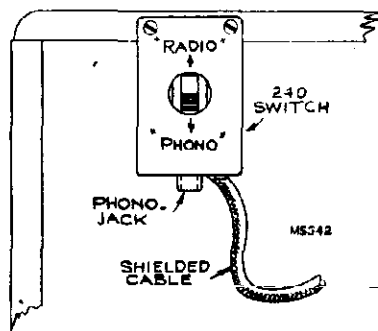
Methods of connecting the Record Changer Attachment to various types of audio systems are given in the accompanying text and illustrations. The data given requires that an RCA Type No. 240X1 (Formerly Stock No. 240) Radio-Phono switch be used for switching from radio to phonograph, as desired. For ease in connecting the "phono" lead to the switch, the male plug on the end of the lead matches the phono jack on the switch.

In general, the Record Changer Attachment must be used with radio receivers having at least two stages of high-gain audio amplification. The output of the Record Changer Attachment should be connected to the input of the first audio tube, and at the same time the output of the radio receiver portion of the chassis should be shorted or opened, to prevent radio signals being heard while the Record Changer Attachment is in operation.

Installation of Switch

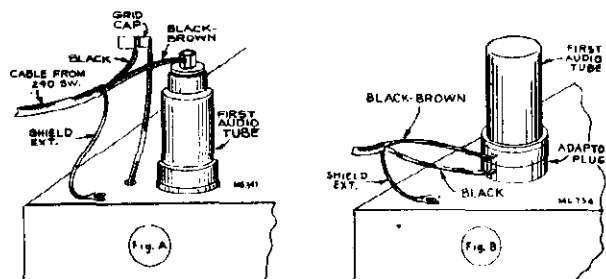
Fasten the bracket to the cabinet in such a position that the switch may be easily reached. For wooden cabinets, a suggested place is the upper rear edge of the cabinet. If the radio has a plastic cabinet, the bracket may be fastened to the chassis by self-tapping screws or soldering. In the case of a.c.-d.c. sets, the bracket should not be fastened to the chassis. In such cases, a wooden block may be fastened to the chassis and the bracket screwed to the wooden block, care being exercised that there is no metallic path from the bracket to the chassis.

Connect the braided shield extension to the radio chassis by either soldering or placing the spade lug under a mounting screw.



On a.c.-d.c. sets it is necessary to isolate the cable shield from the chassis. This is best done by connecting the shield to the chassis through a .25 mfd. 300-volt condenser. Care should be taken that the shield braiding and switch bracket do not come in contact with the chassis.

If the common-negative wiring in the a.c.-d.c. set is isolated from the set chassis, connect the cable shield, through a .25 mfd. capacitor, to the common-negative wiring, and not to the chassis.



Note:

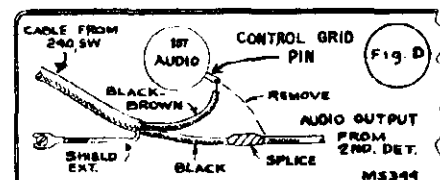
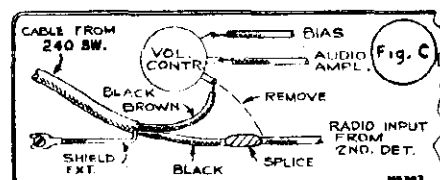
If late production models are connected to a radio set as shown in Fig. A & B, it will probably be necessary to substitute a volume control in place of the 1 meg. fixed resistor, since majority of sets do not have a volume control following the first audio tube.

For radio receivers in which the 1st-audio tube has a top grid cap—see Fig. A:

1. Disconnect the grid lead from the first audio tube.
2. Connect the cap on the black lead to the clip on the grid lead, as shown above.
3. Connect the clip on the black-brown lead to the grid cap at the top of the 1st-audio tube, bending the terminal if necessary to proper size for a metal tube cap.
4. Insert the plug on the end of the record player lead into the jack on the bracket.
5. Secure or position the connection cable assembly so that the cap and clip terminals are well separated from each other and other metal parts.

For radio receivers in which the 1st-audio tube is type 6SQ7, 6SR7, 12SQ7 or 12SR7—see Fig. B:

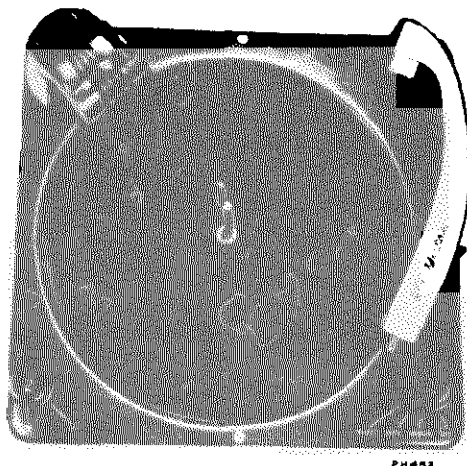
1. Use adaptor plug RCA Stock No. 37798.
2. Remove the 1st-audio tube.
3. Solder the switch leads to the adaptor plug terminals—black to bottom lug—black-brown to top lug.
4. Tape terminals to prevent short circuits when installed in set.
5. Insert the adaptor into the 1st-audio tube socket.
6. Insert the 1st-audio tube into the adaptor.
7. Insert the plug on the end of the record player lead into the jack on the bracket.



For other radio receivers in which the 1st-audio tube does not have a grid cap; connection to volume control input—see Fig. C. connection to 1st-audio tube control grid—see Fig. D:

1. Unsolder the lead from the volume control lug indicated in Fig. C or from the control grid pin indicated in Fig. D. It is usually necessary to remove the chassis from the cabinet to do this.
2. Solder the black-brown lead (remove clip) to the lug or pin disconnected in Step 1.
3. Solder the black lead (remove plug) to the lead disconnected in Step 1. Tape the joint to prevent short circuits.
4. Insert the plug on the end of the record player lead into the jack on the bracket.

MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5



IDENTIFICATION OF MODELS

Each record changer bears a label on the underside of the motorboard in accordance with the following:

960282-1

60 cycle version used in domestic instruments. Has Stock No. 75044 crystal pickup. Used in Models A55, A78, TA128 and TA129.

960282-2

50/60 cycle version used in instruments designed for export sale. Has Stock No. S-5652 ceramic pickup. Used in Models 9QV5 and 4QV8C.

960282-3

50/60 cycle version used in instruments designed for export sale. Has Stock No. 75044 crystal pickup. Used in early production of Model 9QV5.

960282-4

60 cycle version used in domestic instruments. Has Stock No. 75475 crystal pickup. Used in Models A82, 2T81 and 6T84 (mahogany and walnut).

960282-5

Identical to 960282-4 except for tan finish. Used in Models A82, 2T81 and 6T84 (blonde and lined oak).

Compensation:

Some of the above record changers have a resistor/capacitor combination on the pickup lead terminal board. This is to compensate for the differing frequency response of various instruments. Correct values of these resistors and capacitors are indicated in the Service Data for the instruments which use the record changer.

AUTOMATIC OPERATION

1. Lift the record stabilizing clamp.
2. Place a stack of records, ten inch if desired, over the center post leaving the edge of the stack resting on the ten-inch support.
When playing a stack of twelve-inch records, raise both the stabilizing clamp and the ten-inch record support before placing the stack over the center post. The twelve inch records will rest on the main support.
3. Lower the stabilizing clamp on the stack of records.
4. Turn the speed selector control for the proper speed.
5. Select the proper stylus by turning the knob at the front end of the pickup arm.

NOTE: The speed selector and the stylus selector controls must indicate the same when selecting for a certain type of record.

6. Turn the control knob in the right hand end of the motorboard to "reject" and release.
The mechanism will play one side of each record in the stack automatically. It will continue to repeat the last record of the stack until the pickup is raised from the record and placed on the rest.

7. To reject a record being played, turn the control knob to reject and release.
8. To remove records, place pickup arm on the rest, turn control knob to "off," raise stabilizing clamp and lift the entire stack.

NOTE: The pickup arm should only be handled when the control is in the manual position or before the pickup has played approximately $\frac{1}{4}$ the distance in, if playing automatically. The pickup arm can also be handled when the mechanism is stopped if it feels free to move.

FEATURES

1. This record changer is a center support, drop type, two speed (78-33 $\frac{1}{3}$ rpm) mechanism, designed to play automatically a series of twelve ten-inch, or ten twelve inch records of the standard 78 rpm type or of the long playing 33 $\frac{1}{3}$ rpm type.
2. The mechanism is equipped with a light weight, dual stylus pickup cartridge.
3. The automatic tripping device is of the acceleration type.
4. The two speeds of 78 or 33 $\frac{1}{3}$ rpm are controlled by a single knob.
5. The stylus selection is accomplished by a single knob.

MANUAL OPERATION

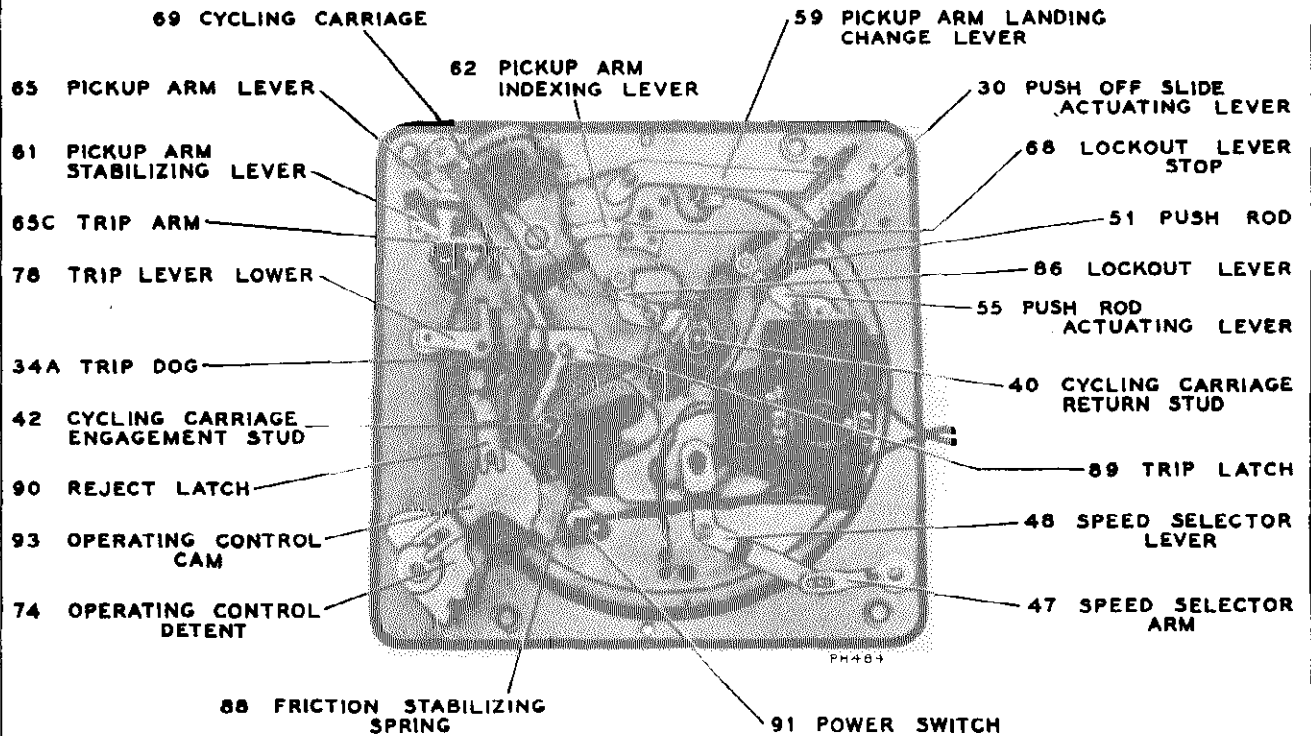
1. Raise both the stabilizing clamps and the ten-inch support shelf.
2. Place either a ten or twelve inch record on turntable.
3. Select the proper speed and stylus.
4. Turn control knob to manual.
5. Place pickup on start of the record.
6. When selection is completed, lift pickup arm and place it on the rest.
7. Turn control knob to "off".
8. Lift record straight up to remove.

HELPFUL SUGGESTIONS

Before servicing the mechanism, inspect the assembly to determine whether all levers, springs and parts are in place and not jammed or bent.

1. Never use force to start or stop the turntable or any part of the mechanism.
2. (a) If for any reason the mechanism becomes jammed, it may be released by pulling both the spiral engagement stud and the cycling carriage return stud downward. Then move the cycling carriage in a clockwise direction (viewed from the bottom).
(b) If the two studs cannot be pulled down, try to remove the turntable by lifting straight up.
3. Cracked or badly chipped records may damage the stylus.
4. Do not leave records on the mechanism for an extended period of time as a guard against warpage.

MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5



FUNCTIONS OF PRINCIPAL LEVERS

Push-off slide actuating lever 30

The actuating lever located inside the support post extends through the motor-board. The function is to transfer the movement of the push rod 51 to the 10 and 12 inch push-off slides.

Push-off slides 5, 10

The function of the slide is to push the records off the step in the center post.

Cycling Carriage 69

The cycling carriage forms the main tie link between the various levers. When the mechanism is tripped the cycling carriage engagement stud 42 raises and engages the cycling spiral channel located on the underside of the turntable. This engagement causes the cycling carriage to rotate about its pivot in a counterclockwise direction (Viewed from the bottom). The movement of the carriage continues in the same direction until the inclined portion of the spiral channel pushes the stud down to engage the latch (89). The next instant the cycling carriage return stud (40) becomes unlatched after which it raises and engages the spiral channel which returns the cycling carriage to the normal out of cycle position.

Cycling Carriage engagement Stud 42

The engagement stud forms a link between the cycling carriage and the cycling spiral on the under side of the turntable. This stud causes the cycling carriage to rotate in a counterclockwise direction (viewed from the bottom of the motorboard).

Cycling Carriage Return Stud 40

The return stud forms a link between the

cycling carriage and the cycling spiral. This causes the cycling carriage to return to the normal out of cycle position.

Push Rod 51

The push rod forms a link between the push rod actuating lever (55) and the push off slide actuating lever (30).

Elevating Rod 19

The elevating rod functions as a lift for the pickup arm.

Push rod actuating lever 55

Push rod actuating lever is a tie link between the push rod (51) and the cycling carriage (69). It also is provided with an adjustment to govern the travel of the push-off slides 5 and 10.

Friction stabilizing spring 88

This spring forms a wedge which holds the cycling carriage (69) from drifting when the mechanism is in the playing position. In its braking action it provides a means of slowing the movement of the pickup to provide a gentle landing.

Trip lever (upper) 34

As the pickup arm travels towards the center of the record, the trip lever is carried along by the inter-connecting levers. A small offset located on the turntable shaft rotating with the turntable contacts the end of the trip lever once with each revolution. On each contact the trip lever is pushed back slightly. This slight backward movement continues as long as the pickup is moving at a constant rate of speed. When the pickup enters the eccentric groove of the record, the movement is accelerated and thus allows the trip dog (34A) to drop

off the edge of the trip latch (89) before the turntable has made a revolution, therefore, the small offset on the turntable strikes the trip lever and in so doing, moves trip latch (89) and starts change cycle.

Trip Lever (lower) 78

The lower trip lever mechanically linked to the upper trip lever (34) transfers the action from the underside of the motorboard to the top of the motorboard.

Pickup Arm Landing Change Lever 59

The pickup arm landing change lever functions as a stop for the pickup indexing lever (62). The change lever position is altered depending upon the position of the 10 inch record support 4.

Pickup Arm Indexing Lever 62

The pickup arm lever engages one of the notches in the indexing lever and in so doing determines the landing position of the pickup.

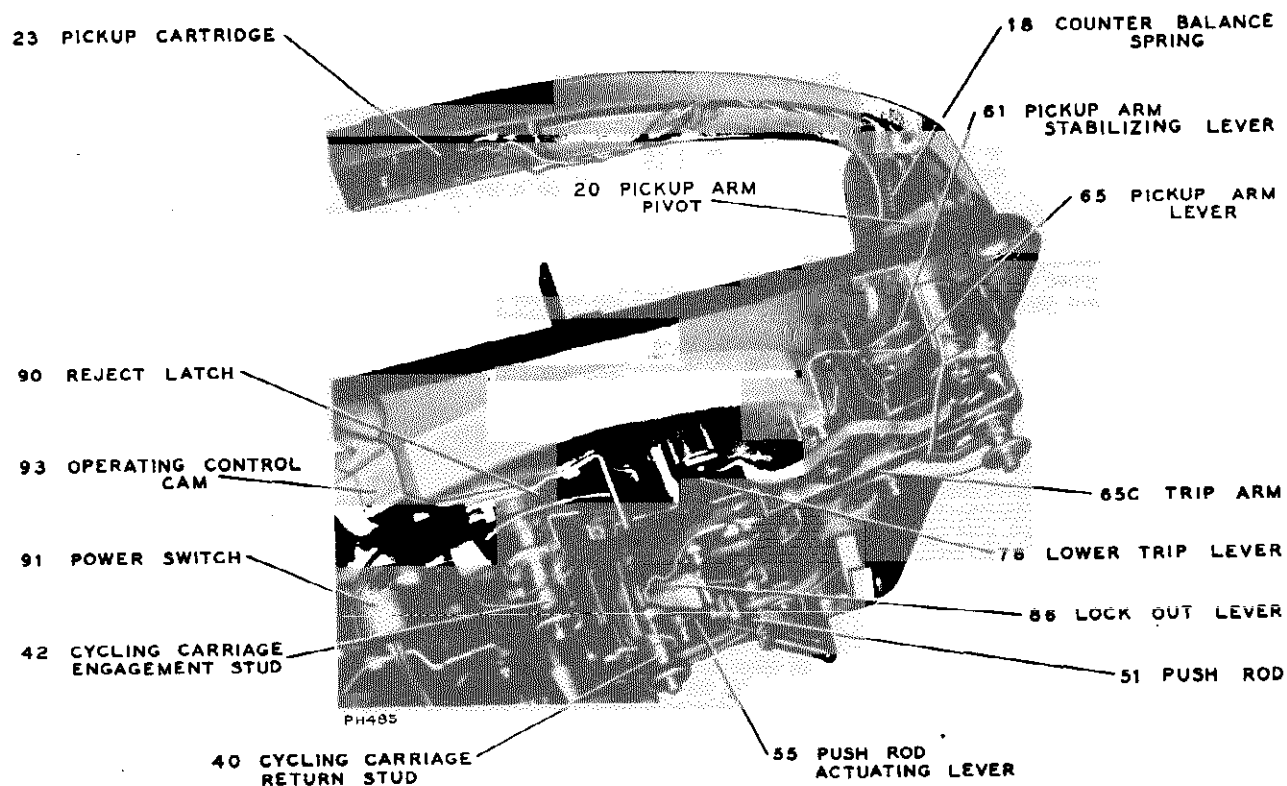
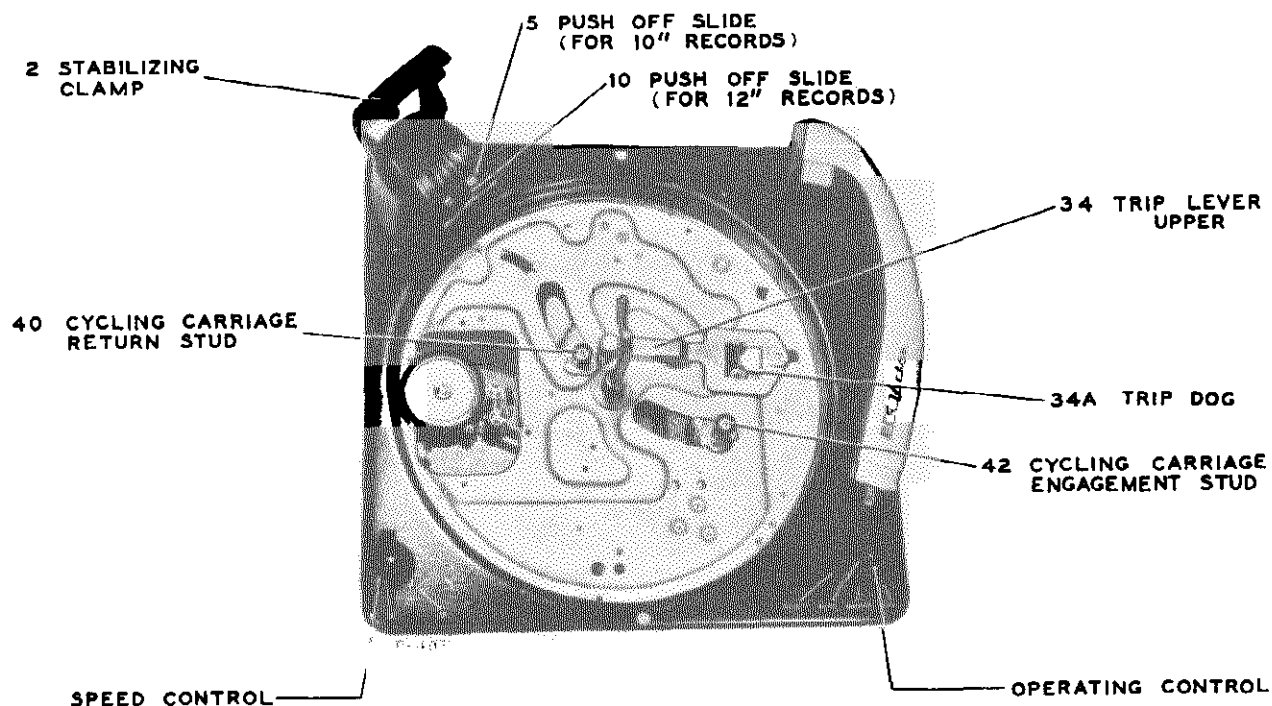
Pickup arm lever 65

The pickup arm lever is connected to the pickup arm through the pickup arm pivot (20). The inward motion of the pickup arm causes the tripping action as a result of the contact between the pickup arm lever and the lower trip lever.

Pickup Arm Stabilizing Lever 61

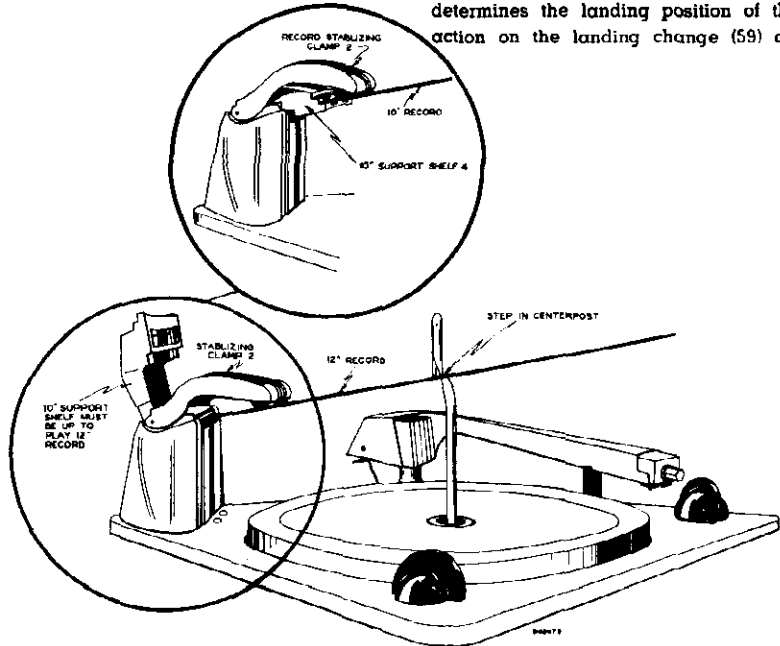
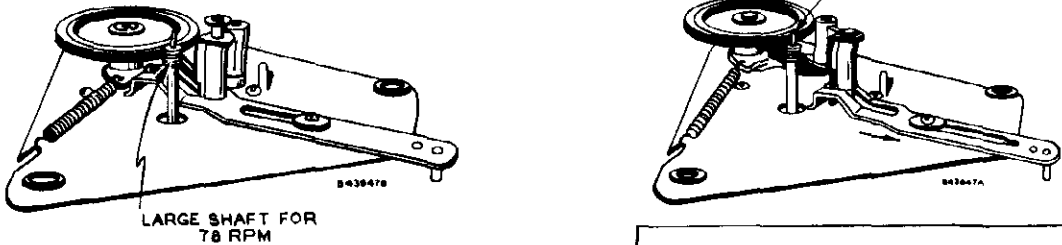
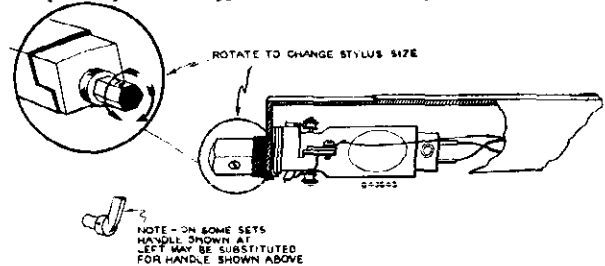
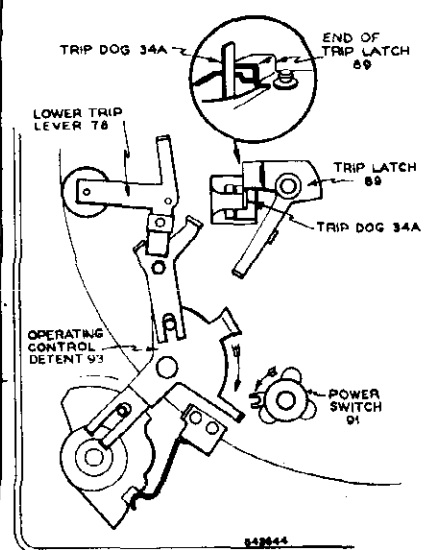
The pickup arm stabilizing lever is actuated by a small tab on the cycling carriage during the change cycle. The forward movement of this stabilizing lever permits contact with the stud (65A) on the pickup arm lever, thereby stabilizing the pickup arm during the change cycle of the mechanism.

MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5



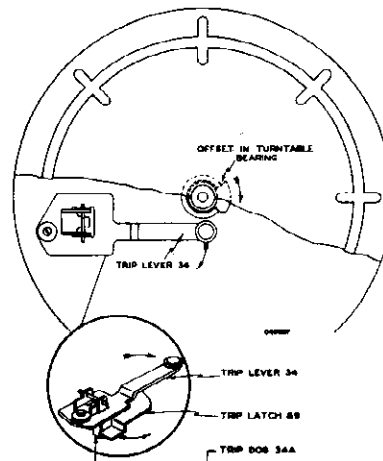
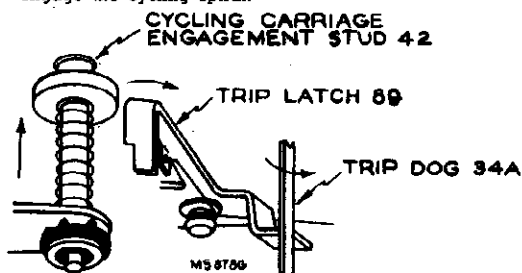
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

CYCLE OF OPERATION

Function	Description
Place a stack of 10 or 12 inch records over the center post. Lower the record stabilizing clamp.	<ol style="list-style-type: none"> The records are supported by notch or step in center post. The edge of the records rest on the separator shell. <div> <div>10 inch records on the 10 inch shelf (4)</div> <div>12 inch records on the 12 inch shelf (9)</div> </div> The position of the 10 inch support shelf (4) (up or down) determines the landing position of the pickup due to the action on the landing change (59) and index (62) levers. <div>  </div>
Turn speed selector knob to 78 or 33 1/3 rpm position (depending on type of record).	<ol style="list-style-type: none"> The motor has a turned down shaft providing a means of changing speed by raising or lowering the idler on the dual diameter shaft. <div>  </div>
Rotate stylus knob.	<ol style="list-style-type: none"> The rotation of the stylus knob selects the proper stylus depending on the type of record to be played. <div>  </div>
Push Control knob to reject position and release.	<ol style="list-style-type: none"> The Operating Control detent (74) mechanically connected to control knob engages and actuates the power switch (91) starting the turntable rotating. Further rotation of the control knob moves the lower trip lever (78) sufficiently to allow the trip dog (34A) to slide off the end of the trip latch (89). <div>  </div>

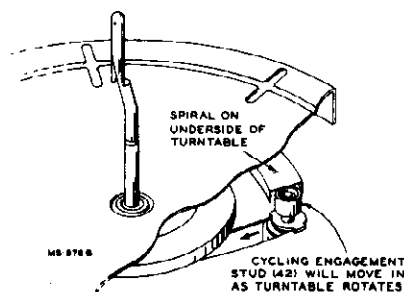
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

3. As the trip dog slides off the trip latch, the trip lever (34) has moved in sufficiently for the offset on the turntable shaft to contact the end of the trip lever and push it back.
4. The backward movement of the trip lever (34) unlatches cycling engagement stud (42) allowing it to raise and engage the cycling spiral.

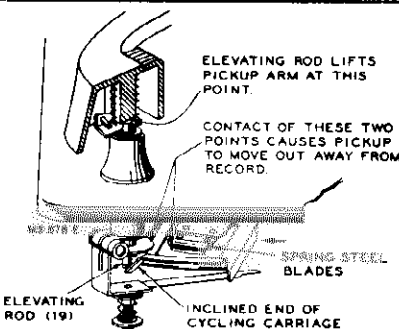


Cycling starts.

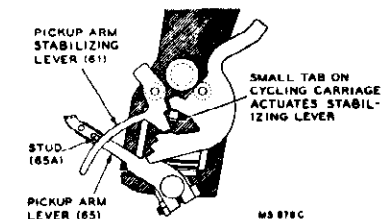
1. As the cycling carriage engagement stud (42) engages the spiral on the under side of the turntable, the carriage begins to move counterclockwise (viewed from the bottom of the motorboard) about its pivot.



2. The inclined end of the carriage located beneath the pickup arm pivot raises the elevating rod (19) lifting the pickup arm.
3. The same end of the cycling carriage has two spring steel blades forming a frictional connection between the cycling carriage and the pickup arm lever (65) by wedging the disc portion of the pickup arm lever between the two blades. This moves the pickup arm outward.



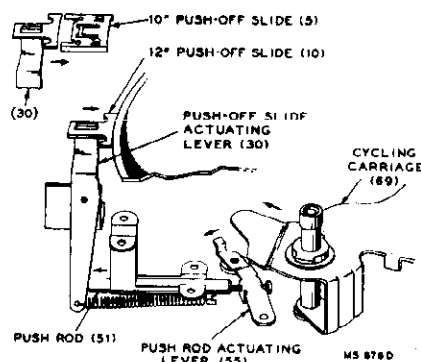
4. A small tab on the cycling carriage contacts and moves the pickup arm stabilizing lever (61) against the stud (65A) mounted on the tension spring incorporated in the pickup arm lever (65). This contact stabilizes the pickup arm in its movement during change cycle.



Record drops to the turntable.

1. As the cycling carriage continues to rotate, the end nearest the support post contacts push rod actuating lever (55), starting the action necessary to push the record off the center post.
2. The movement of the push rod actuating lever (55) through the linkage of push rod (51) push-off slide actuating lever (30) and push-off slide (5 or 10) pushes the record off the center post.
3. Record drops to turntable.

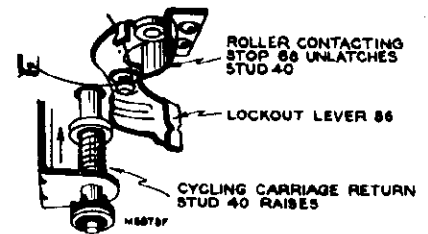
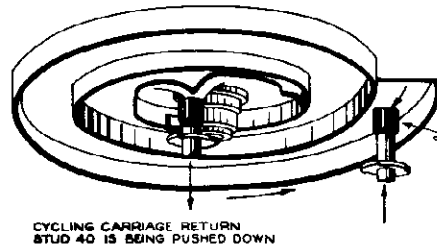
Note: The mechanism incorporates two push-off slides: one for ten inch (5) and one for twelve inch records (10).



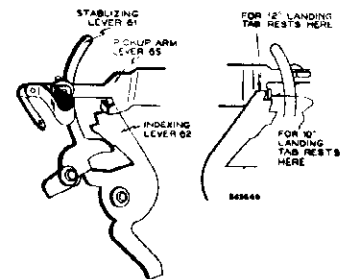
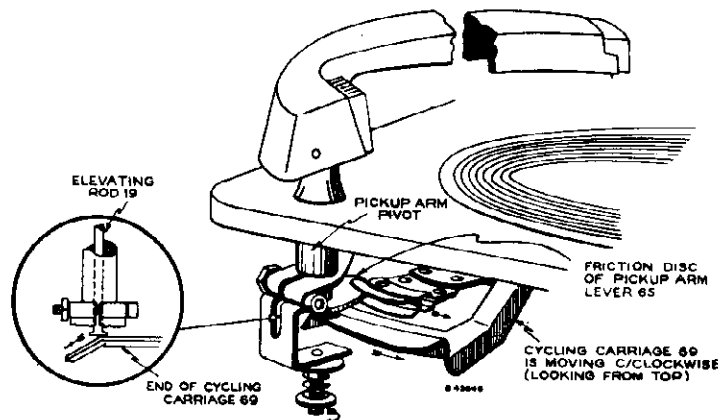
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

Pickup moves in
for landing.

- Up to this time the cycling carriage (69) is moving in a counterclockwise direction (viewed from the bottom). After the record is pushed off the center post the lock out lever (86) mounted on cycling carriage contacts the stop and in so doing unlatches the cycling carriage return stud (40).
- As the cycling carriage return stud (40) raises to engage the spiral on the underside of the turntable, the cycling engagement stud (42) is pushed down and latched by the action of the incline in the spiral tract, thereby disengaging it from the spiral.
- The cycling carriage is now moving clockwise (viewed from the bottom of the motorboard).



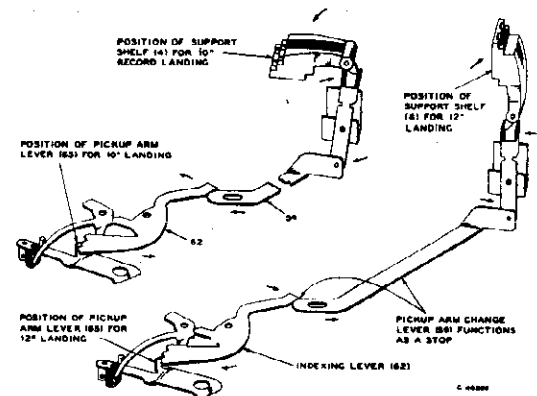
- The end of the cycling carriage beneath the pickup arm pivot again makes the frictional contact with the disc on the pickup arm lever (65). This contact moves the pickup arm in for landing.
- The pickup arm on its inward movement continues to be stabilized by the pickup arm stabilizing lever (61). This stabilizing continues until the tab on the pickup arm lever is against the ten or twelve inch landing notch in the indexing lever.
- At this point the pickup should be directly over the point of landing on the record.
- An instant later the small tab on the cycling carriage contacts the side of the pickup arm stabilizing lever, unlatching the indexing lever (62) and permitting free motion of the pickup arm.
- The elevating rod sliding down the small incline on the cycling carriage permits the pickup to land on the start of the record.



Note: It should be understood that the function of the indexing lever (62) is to determine the landing position of the pickup, both on ten and twelve inch records.

This is done by the pickup arm change lever (59) functioning as a stop for the indexing lever (62). The position of the pickup arm change lever in turn is governed by the position of the ten inch support shelf (4) (up or down).

- As the pickup is landing the cycling carriage has reached its starting position and the cycling carriage return stud (40) is pushed down by the incline in the cycling spiral and locked in position.



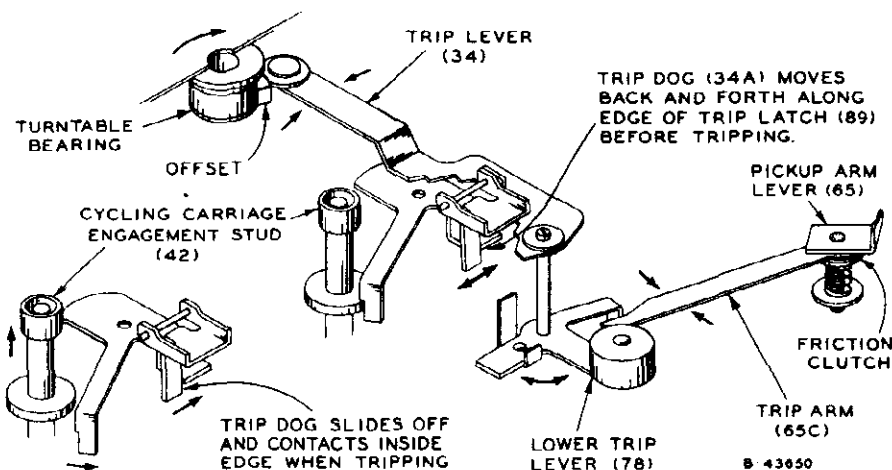
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

Cycling is completed and record plays.

1. While the record plays, the end of the trip lever (34) is slowly moving toward the center post due to the force produced by the pickup arm down through the linkage of the pickup arm lever (65) trip arm (65C) and the lower trip lever (78).
2. As the trip lever slowly (34) approaches the offset on the inner shaft of the turntable it is pushed back slightly with each revolution of the turntable.
3. The trip lever continues to be pushed back against the friction clutch of the trip arm (65C) as long as the pickup

arm moves in at a constant rate of speed.

4. When the pickup reaches the end of the selection the pickup moves into the eccentric groove quite rapidly. This rapid movement permits the trip dog (34A) to slide off the edge of the trip latch (89) before the offset on the turntable shaft has made one revolution. As the offset contacts the trip lever (34), it unlatches the trip latch (89) permitting the cycling carriage engagement stud (42) to raise and engage the cycling spiral starting a new cycle.



Pickup raises and moves out.

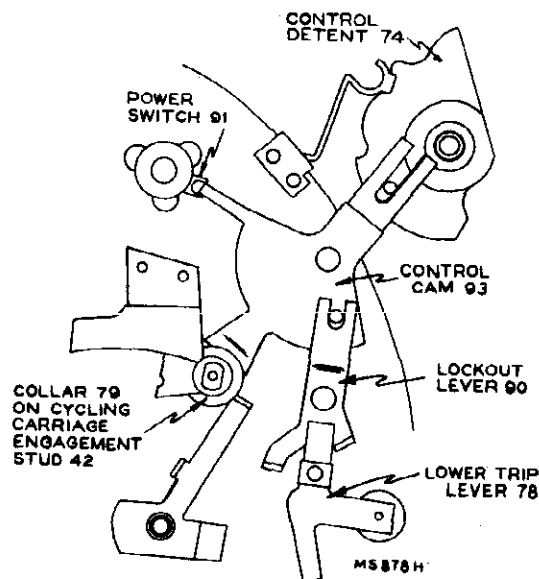
1. After the mechanism has been tripped the pickup arm moves out and rises by action of the cycling carriage (69) on the pickup arm lever (65) and the elevating rod (19).
2. The mechanism again follows the preceding sequence of dropping and playing records until the last record of this stack has been played. The mechanism is not provided with an automatic stop so the last selection is repeated until the pickup arm is placed on the rest and the power removed from the drive motor.

Note: The pickup arm can be raised and moved to the rest position any time after the mechanism has completed the change cycle, providing the pickup has not played more than approximately $\frac{1}{4}$ of the selection. If the pickup arm is moved after this time, the mechanism will go into change cycle and the pickup arm should not be retarded in its movement.

The pickup arm can also be handled when the mechanism is not in operation, providing the pickup arm has freedom of motion.

Turn function control knob to manual.

1. The control detent (74) which is mechanically connected to the control knob, actuates the power switch through the control cam (93). This action starts the turntable rotating.
2. One end of the control cam also slides under the collar (79) on the cycling carriage engagement stud (42). This prevents the stud from raising if the trip lever is disturbed.
3. The control cam also holds the manual lock out lever (90) in such a position that it locks the lower trip lever (78) to prevent tripping. In this position, the trip lever (34) is held away preventing contact with off-set on turntable shaft.

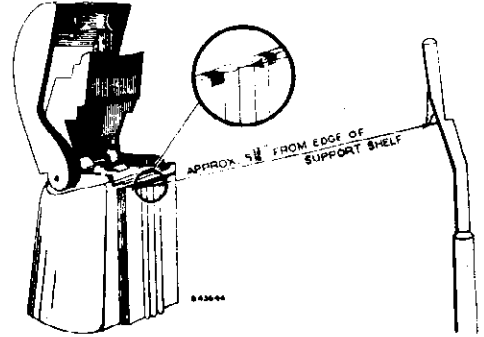


MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

ADJUSTMENTS

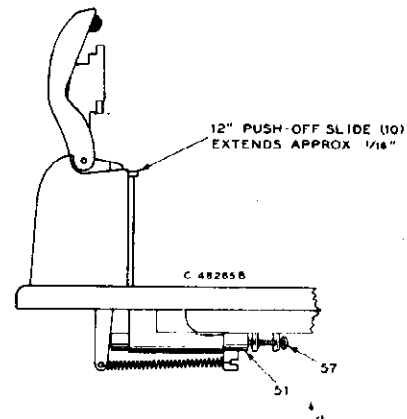
POSITION OF SUPPORT POST

1. Loosen three mounting screws at the base of the support post.
2. Slide support post to a position as indicated in accompanying drawing. The curvature of the shelf should conform with a 12" record.
3. After push-off slides have been adjusted, try a stack of both 10 and 12 inch records to determine the ease of separation. A compromise from the setting may be necessary due to differences in length of the 10 inch support shelf (4).



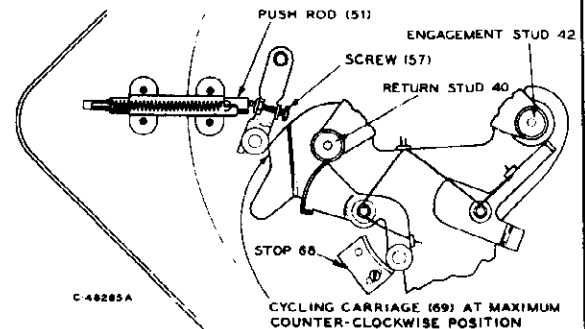
Adjustment of Push-Off Slides

1. Trip the mechanism and turn the turntable by hand until the cycling carriage has rotated counterclockwise. (Viewed from the bottom) to its limit.
2. Adjust screw 57 on push rod actuating lever until the 12 inch push-off slide is extending approximately $1\frac{1}{16}$ " over the edge of the shelf.
3. Turn lock nut to hold screw and try a stack of 10 and 12 inch records for ease in separation.



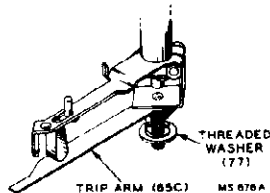
Adjust lock out lever stop (68)

The lock out lever stop (68) should be so adjusted that the cycling carriage return stud (40) raises an instant before the spiral engagement stud (42) is pushed down. If this timing is not properly made the mechanism will jam.



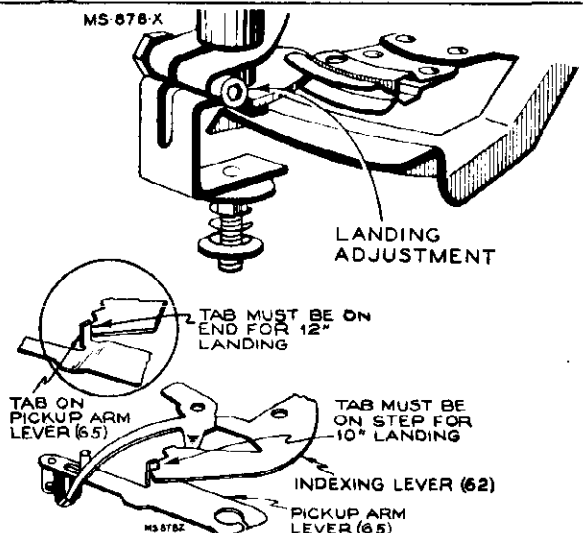
Adjustment of friction clutch on trip arm

1. Turn the threaded washer on the pickup arm lever to produce sufficient friction for trip arm so the mechanism will have positive tripping. Care must be exercised against excessive friction as it would cause premature wear on the side walls of the record or in many cases, actually jump the grooves.



Pickup Landing Adjustment

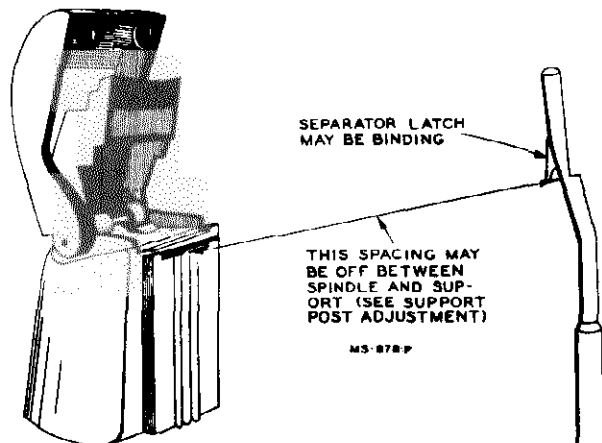
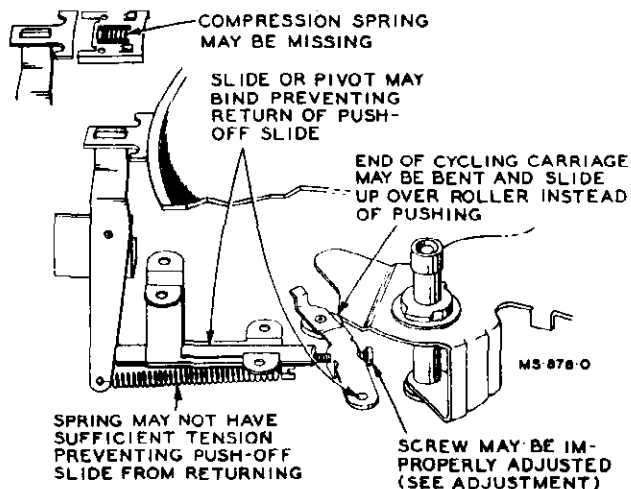
1. Disconnect power from mechanism.
2. Place a 10" record on turntable.
3. Turn the operating control to reject and release.
4. Rotate the turntable by hand until the tab on the pickup arm lever (65) is about ready to move away from the indexing lever. (The pickup will be a few inches above the record at this moment).
5. Loosen adjustment screw and hold the pickup arm lever in this position while moving the pickup arm directly above the point of landing. (Landing should be about half way between the edge of the record and the start of the recorded section. Approximately $4\frac{11}{16}$ " from the side of the center post for a 10" record).
6. Tighten adjustment screw, apply power and check the pickup landing on both 10 and 12 inch records. If mechanism fails to land properly on 12" records the tab may be bent. In that case bend slightly.



MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

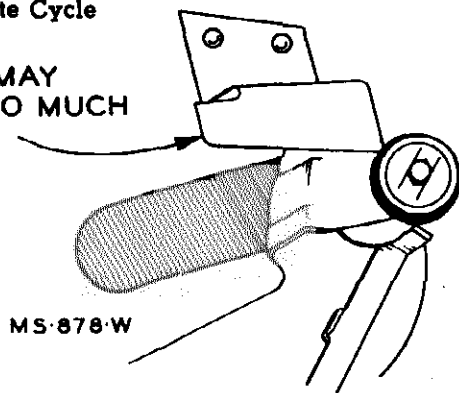
SERVICE HINTS

Fails To Separate Records Properly

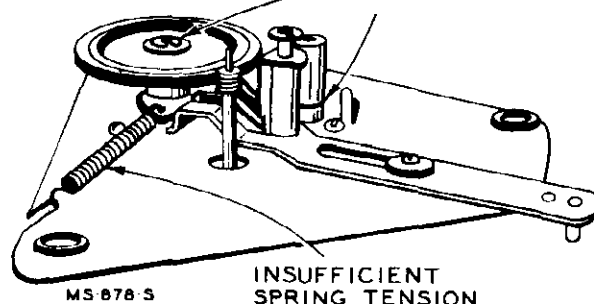


Fails To Complete Cycle

SPRING MAY HAVE TOO MUCH TENSION

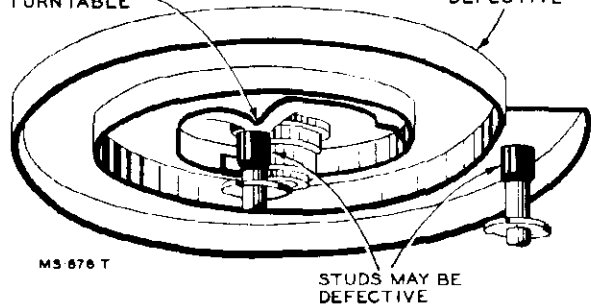


MAY BIND IN BEARING



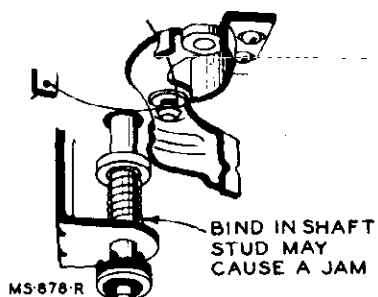
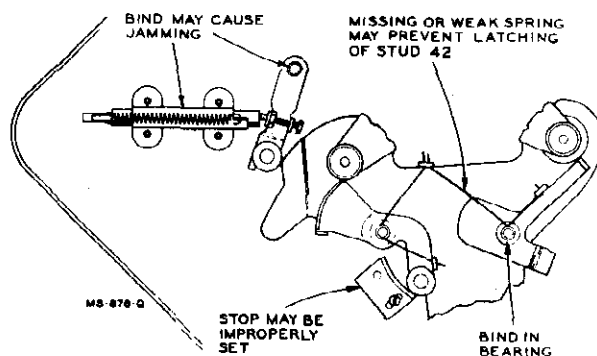
FAILURE IN THE LATCHING OF THE STUDS MAY BE CAUSED BY SHALLOW INCLINE OR IMPROPERLY SEATED TURNTABLE

SPIRAL MAY BE DEFECTIVE

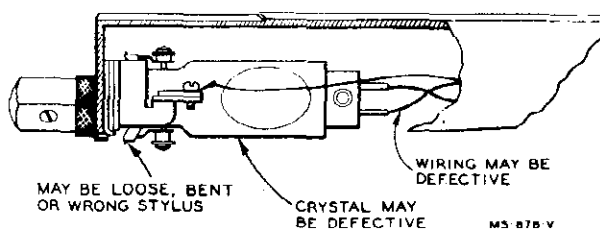


BIND MAY CAUSE JAMMING

MISSING OR WEAK SPRING MAY PREVENT LATCHING OF STUD 42



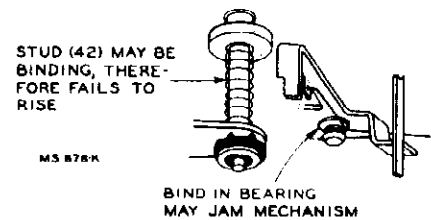
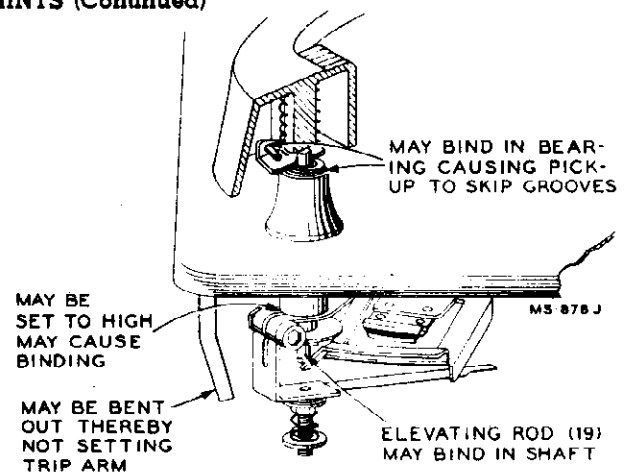
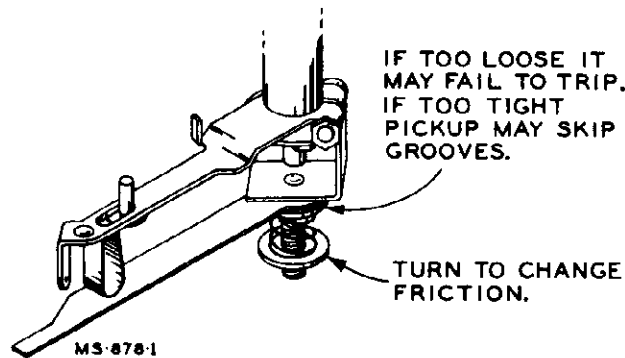
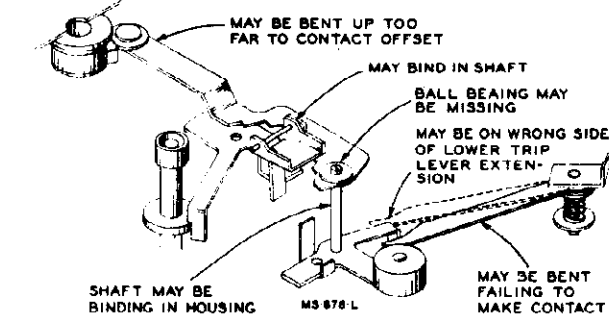
Weak-Distorted or No Output



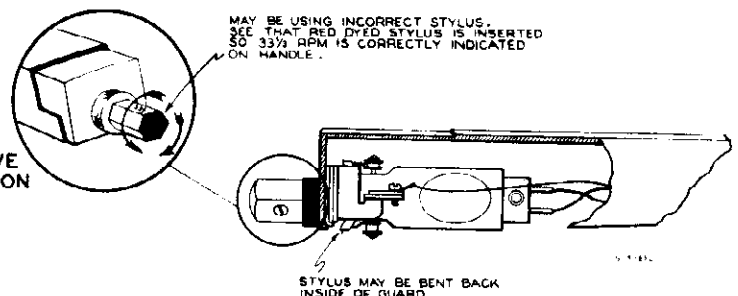
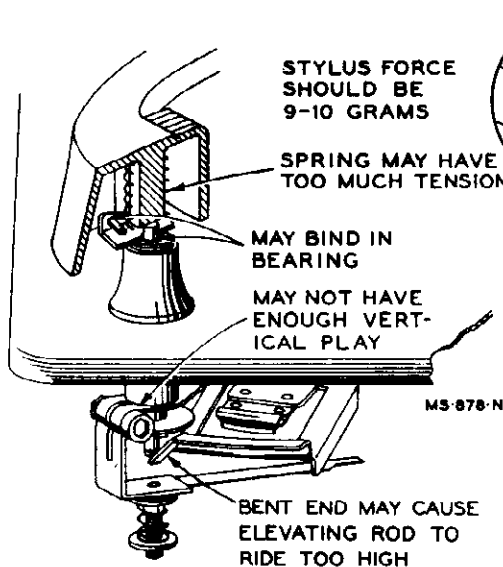
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

Fails to Trip

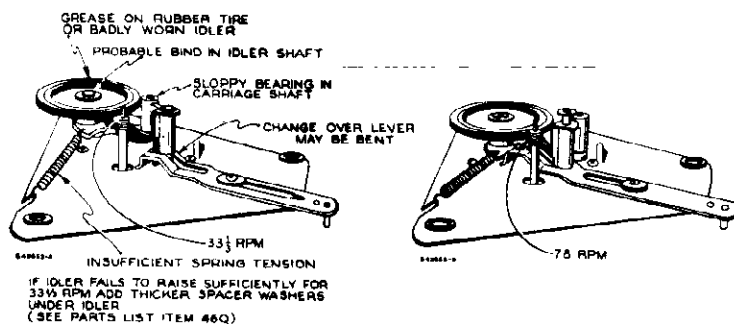
SERVICE HINTS (Continued)



Pickup Skips Grooves



Turntable Fails To Change Speed or "Wow"



TAB MAY BE BENT PREVENTING UN-LATCHING OF STABILIZING LEVER

PICKUP ARM LEVER (65)

STABILIZING LEVER (61)

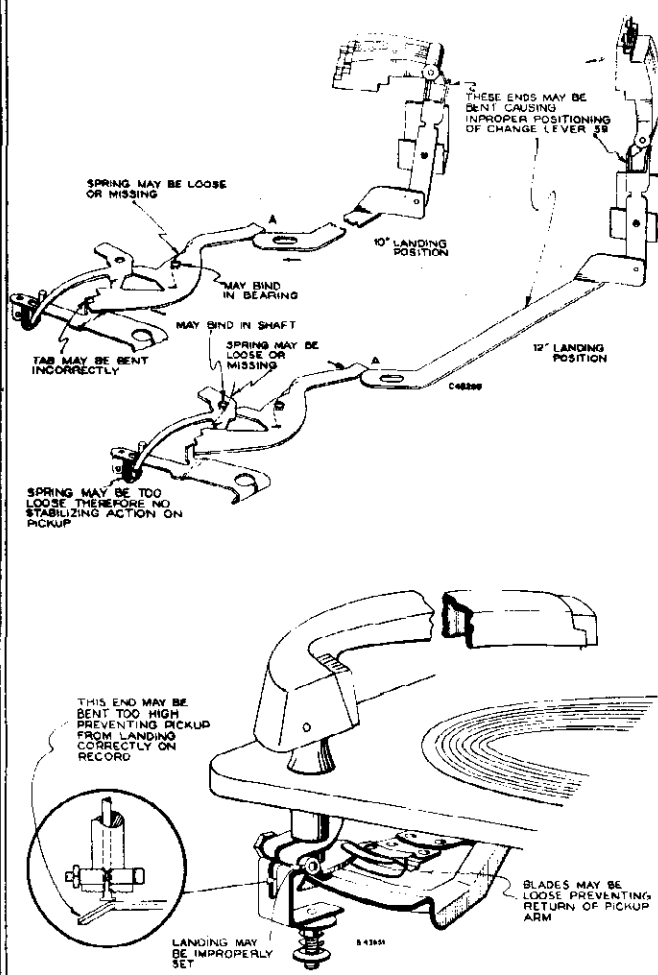
INDEXING LEVER (62)

MS 878-M

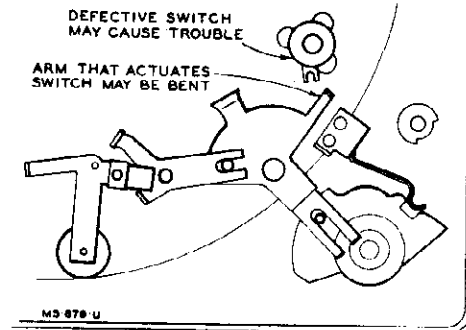
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

SERVICE HINTS (Continued)

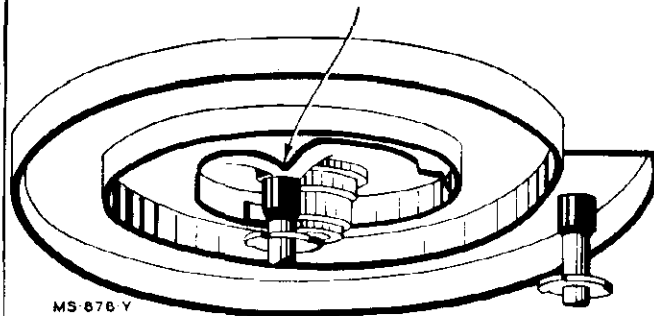
Fails To Land Properly



Turntable Fails To Rotate

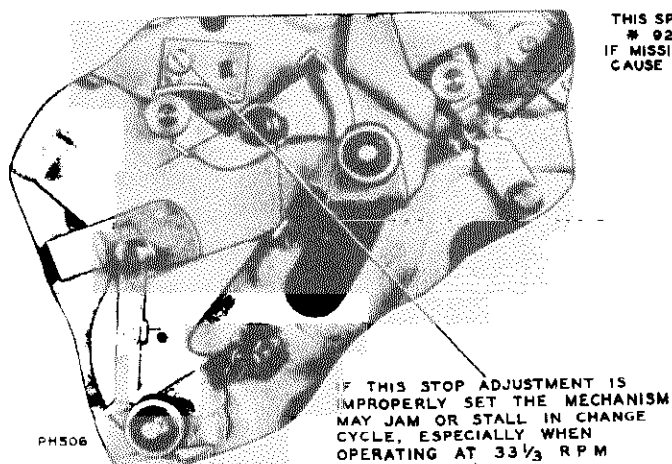


INCLINE IN SPIRAL MAY BE TOO SHALLOW THEREBY FAILING TO PUSH STUDS DOWN FAR ENOUGH CAUSING A JAM.
(BEND INCLINE AWAY FROM TURNTABLE SLIGHTLY)

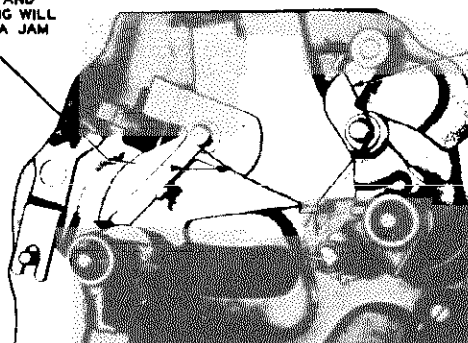


DO YOU KNOW?

(Jamming or Stalling)



THIS SPRING IS # 92 AND IF MISSING WILL CAUSE A JAM

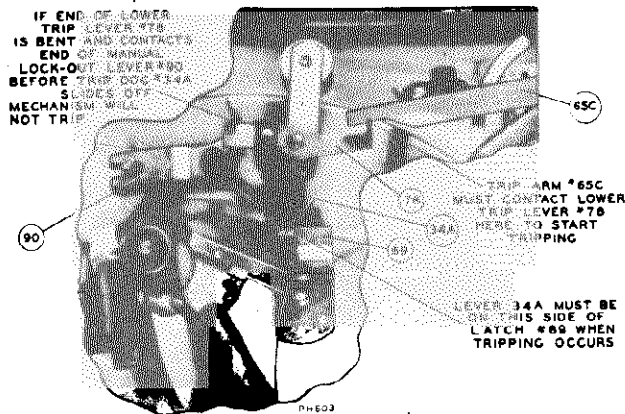


THIS SPRING IS # 87 AND IF MISSING STUD # 40 WILL REMAIN ENGAGED WITH CYCLING SPIRAL CAUSING A JAM

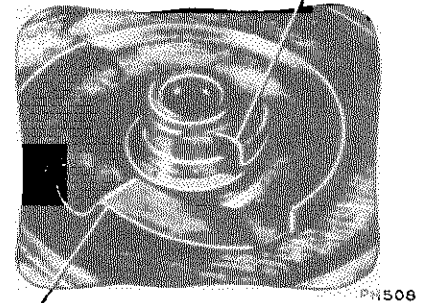
MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

DO YOU KNOW?

(Tripping)

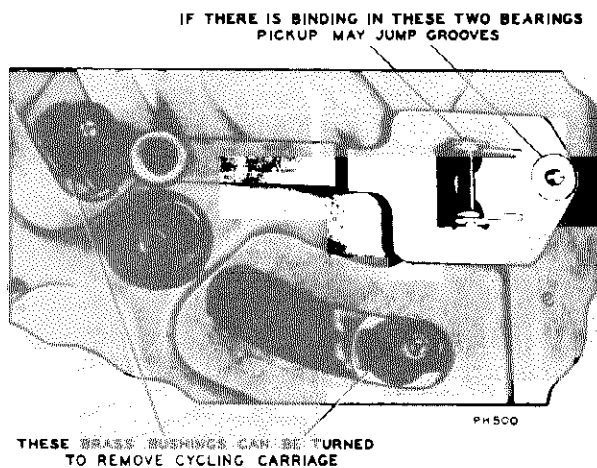


THIS OFFSET ACTUALLY TRIPS THE MECHANISM



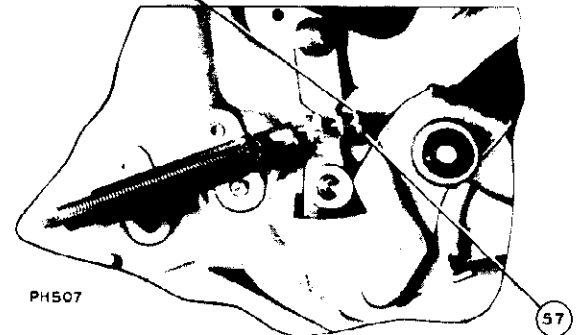
THIS INCLINE PUSHES STUDS #40 & 42 DOWN DURING CHANGE CYCLE

(Jumping grooves)

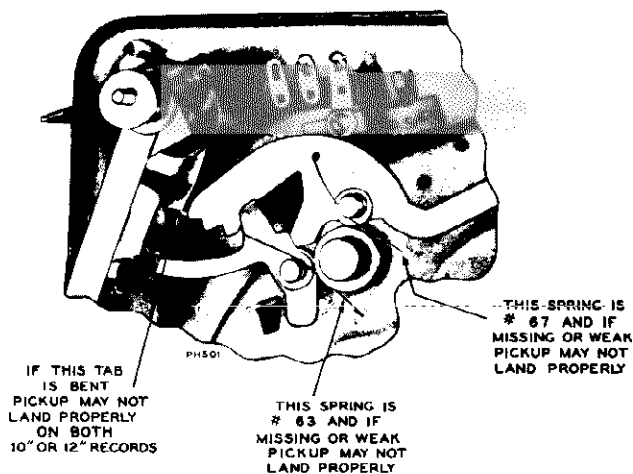


(Record separation)

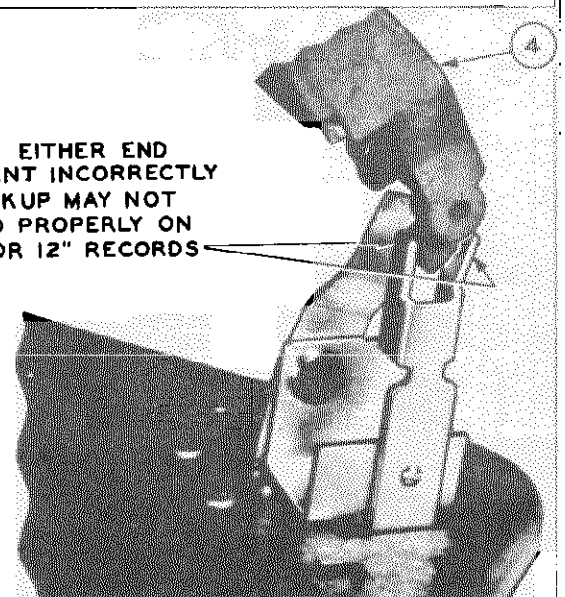
RECORDS WILL NOT SEPARATE PROPERLY IF THIS ADJUSTMENT IS NOT CORRECT. SEE PUSH-OFF SLIDE ADJUSTMENT (PAGE 8)



(Pickup loading)



IF EITHER END IS BENT INCORRECTLY PICKUP MAY NOT LAND PROPERLY ON 10" OR 12" RECORDS

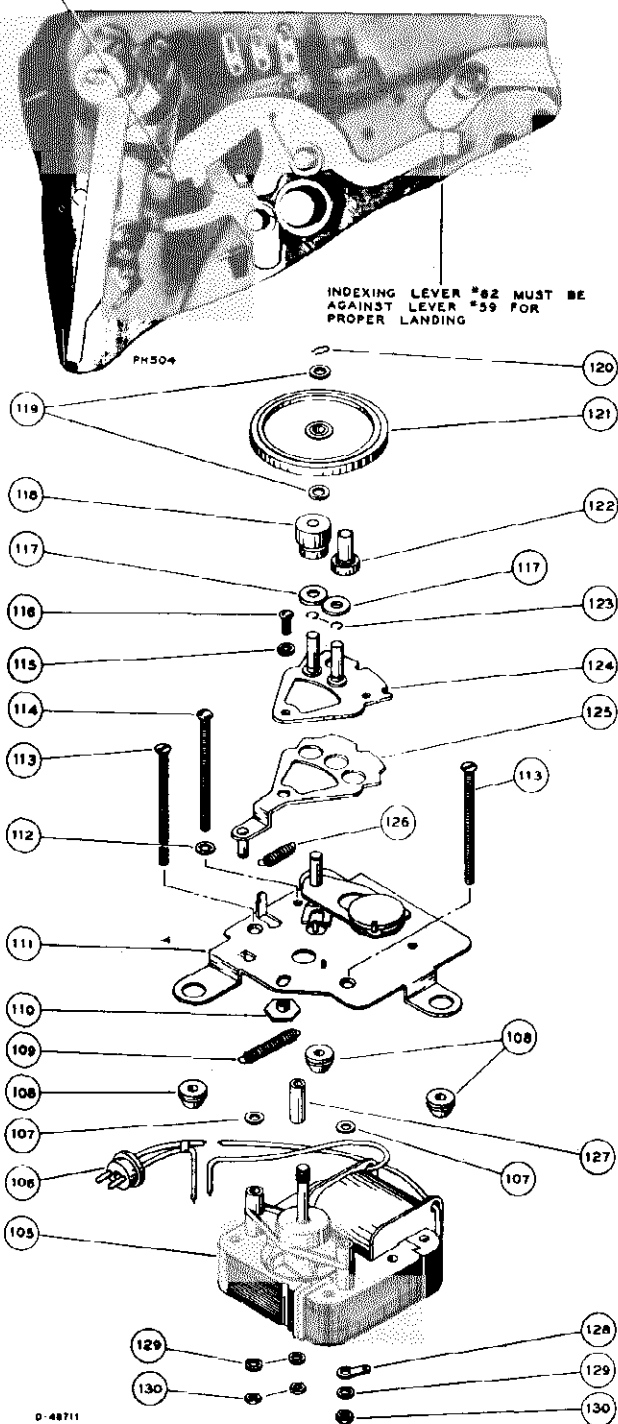


MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

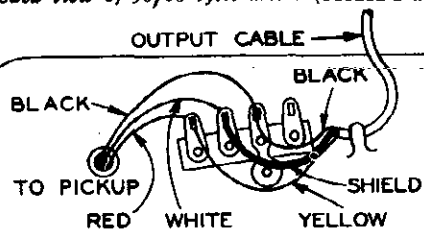
THIS TAB MUST MAKE CONTACT IN SECOND STEP AS SHOWN
FOR PICKUP TO LAND PROPERLY ON 10" RECORDS

DO YOU KNOW?

THIS TAB MUST MAKE CONTACT ON TOP EDGE AS SHOWN
FOR PICKUP TO LAND PROPERLY ON 12" RECORDS

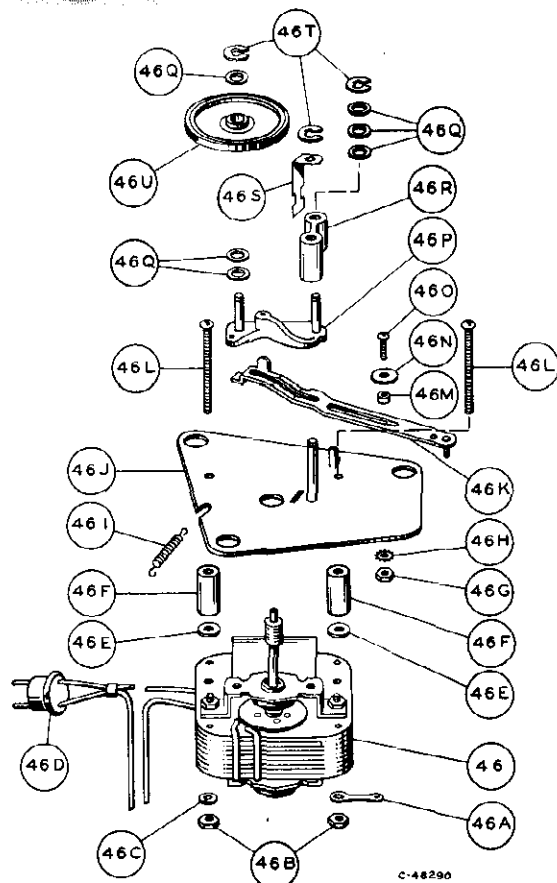
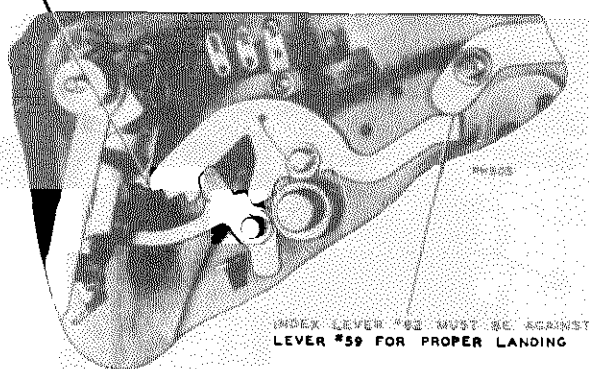


Exploded view of 50/60 cycle motor (960282-2 and -3)

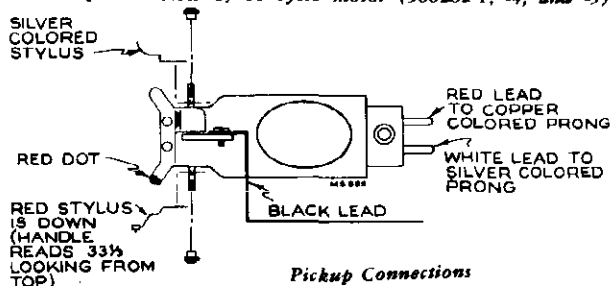


MS 1031

Pickup Lead Connections to Terminal Board
(Model A55 only)



Exploded view of 60 cycle motor (960282-1, -4, and -5)



Some record changers have a resistor/capacitor combination on the pickup lead terminal board. This is to compensate for the differing frequency response of various instruments. Correct values of these resistors and capacitors are indicated in the Service Data for the instruments which use the record changer.

PICKUP INFORMATION

MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5

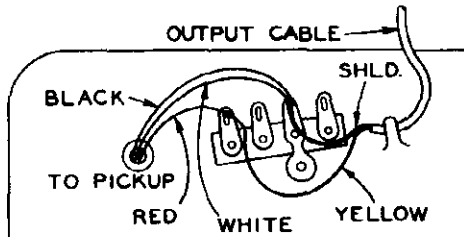
These record changers are used in instruments manufactured for RCA International Division.

They are identical to 960282-1 except for the following:

1. A motor is used which may be converted for operation on a 50 cycle power supply. Stock No. S-5637 motor includes mounting plate, grommets, idler wheel and change-over mechanism. A 50 cycle conversion spring is also included.
2. Two levers (Items #101 and #102) are different. (Order replacements by description and item number.)
3. A ceramic pickup cartridge is used only with 960282-2. Stock No. S-5652 ceramic cartridge complete, including styluses.
4. Stock No. 75044 crystal pickup is used with 960282-3.

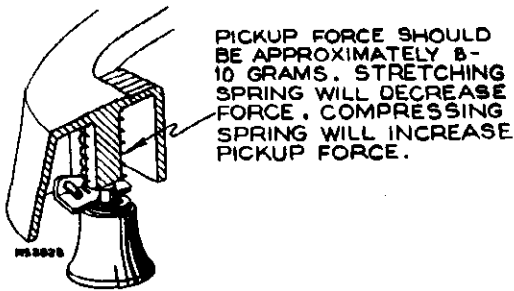
NOTE: For operation on a 50 cycle power supply. Remove original spring sleeve from motor shaft and replace with the 50 cycle conversion spring.

Replacements for items used only on 960282-2 and 960282-3 are stocked by RCA International Distributors but are not stocked in the U. S. A. Order parts giving full description.



MS-882A-1

Pickup Lead Connections to Terminal Board
(all instruments except Model A55)



Counterbalance Spring

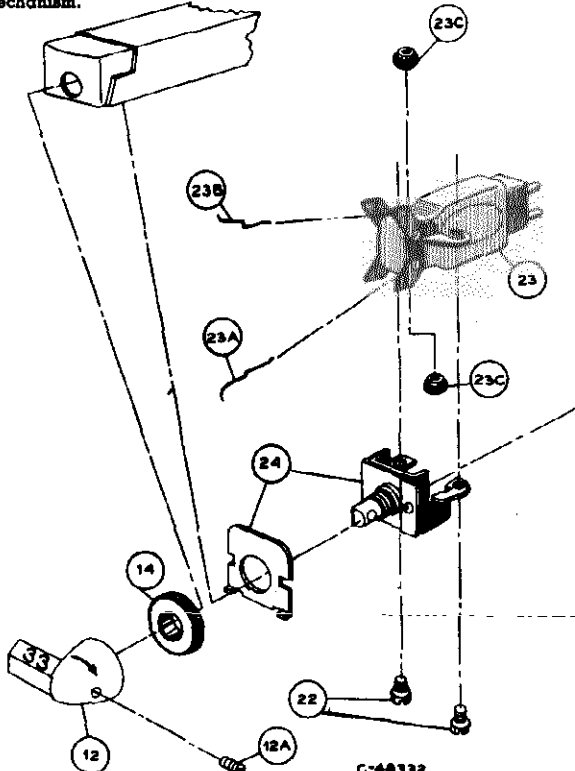
LUBRICATION

The motor bearings and all pivot bearings, excepting the pickup arm pivot, should be lubricated with S.A.E. 10 machine oil.

The pickup arm and the trip lever bearings are riding on ball bearings which should be packed sparingly with light grease, preferably STA-PUT #512. Use STA-PUT #512 or equivalent grease on the edges of all cams and pivots or sliding contacts including the spiral track and engagement stud.

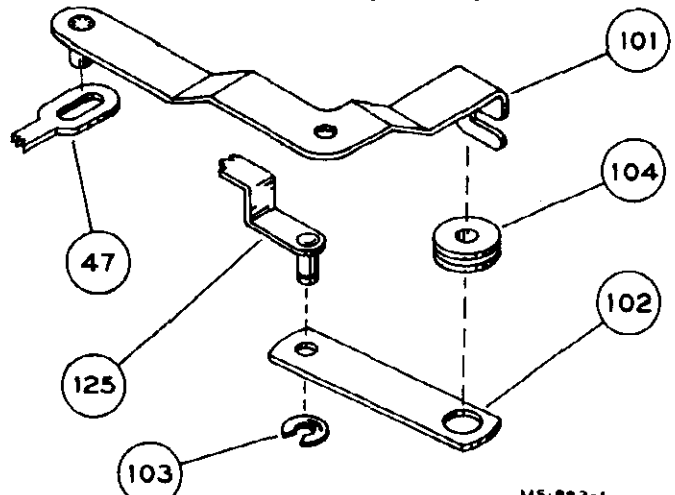
NOTE: Do not oil friction clutch or trip arm 65C, spring steel wedge on end of cycling carriage 69 or friction brake 88.

NOTE: Keep oil and grease from all rubber parts of the mechanism.



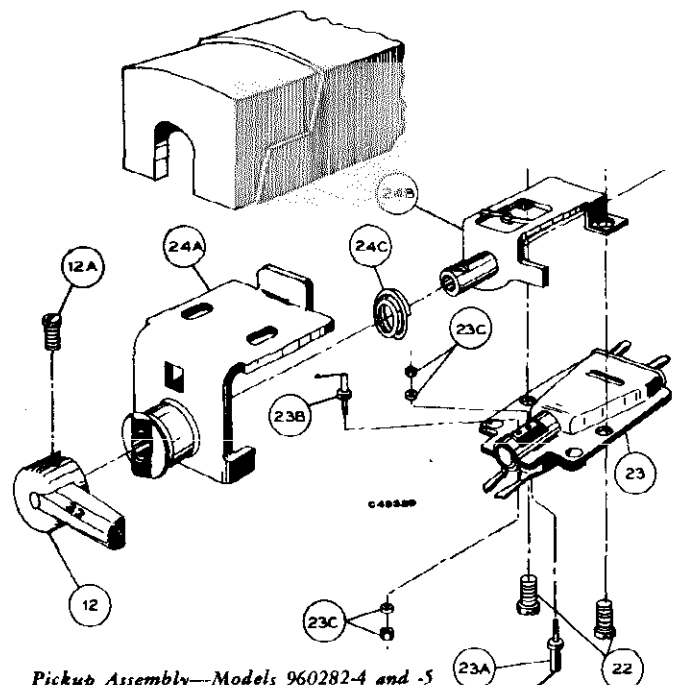
Note: The stylus are not replaceable in Stock No. S-5652 ceramic pickup used in 960282-2.

Pickup Assembly—Models 960282-1, -2 and -3



MS-883-1

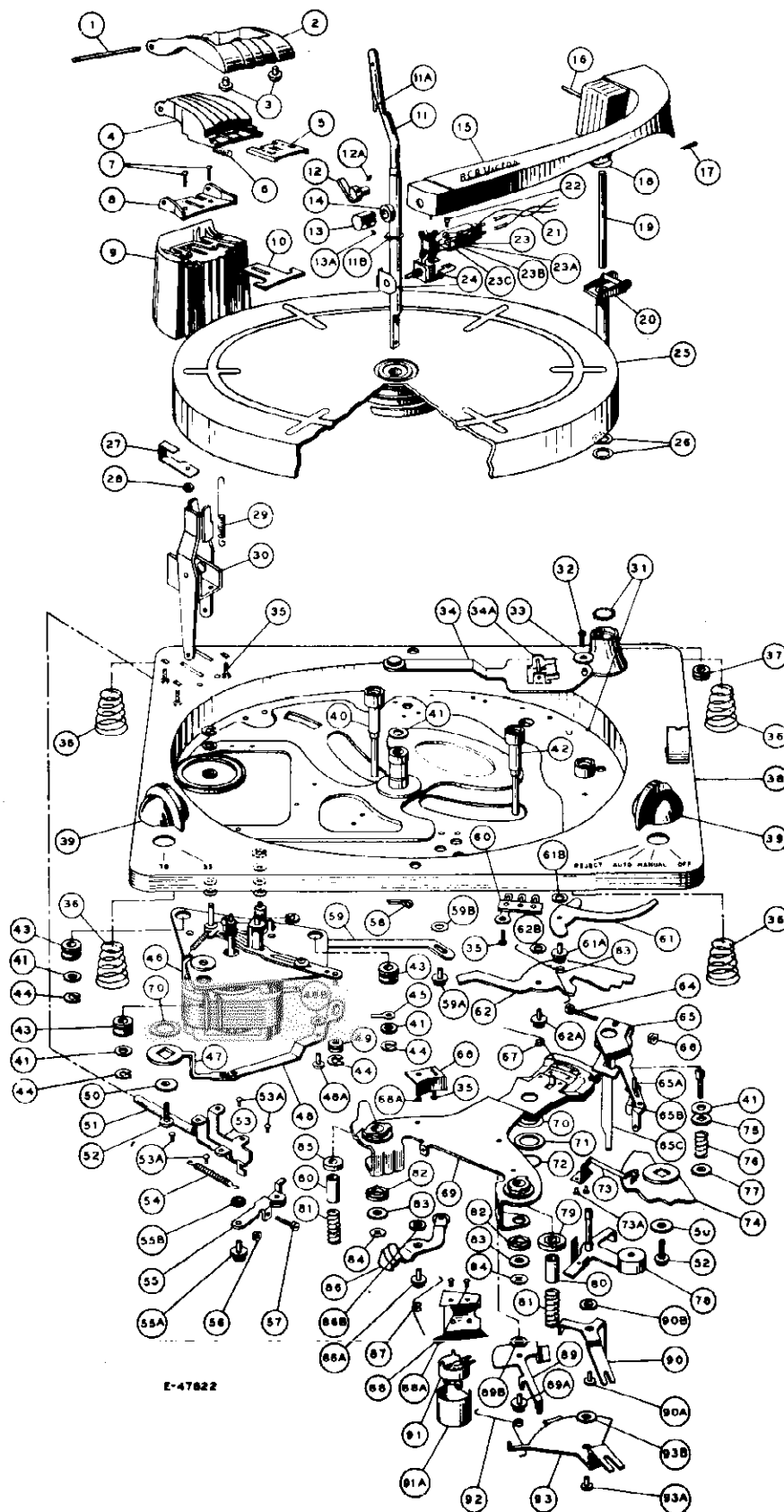
Speed control levers used in 960282-2 and 960282-3
(order by item No. from RCA International Distributors only)



Pickup Assembly—Models 960282-4 and -5

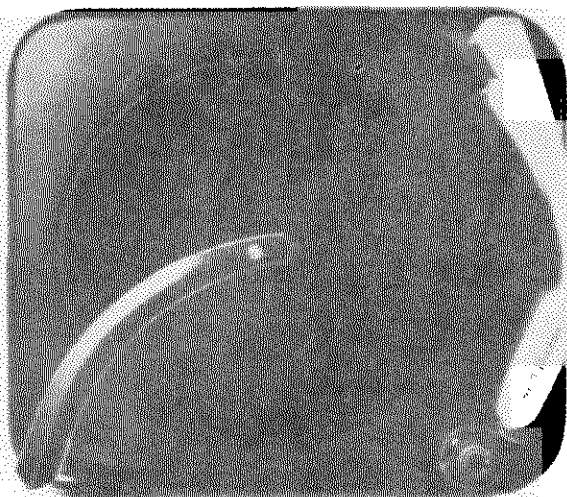
RCD.CH. PAGE 21-32 RADIO CORPORATION OF AMERICA

MODELS 960282-1, 960282-2,
960282-3, 960282-4, 960282-5



1	75254	Pin—Push-off box hinge pin	25	75275	Turntable—10" dia.	50	75304	Washer—Spacer washer (small) for speed selector arm (.059" x .180" I.D. x 1/4" O.D.)
2	75255	Clamp—Stabilizing clamp assembly including rubber bumpers—maroon—for 960282-1, -2, -3 and -4	26	75276	Washer—Spacing washer (2 req'd) (.008 x 13/32" I.D. x 9/16" I.D.—Phosphor Bronze)	51	75305	Rod—Push rod
3	75921	Clamp—Stabilizing clamp assembly including rubber bumpers—light brown—for 960282-5	27	75277	Spring—Pressure spring for 10" record support	52	75306	Screw—Mounting screw complete with lockwasher for control knobs (10-32 x 3/4" fillister head-special)
4	75256	Bumper—Rubber bumper for stabilizing clamp (2 req'd) (2 included)	28	75278	Nut—4-40 hex nut	53	75307	Housing—Push rod housing complete with four (4) rivets
5	75257	Support—10" record support—maroon—for 960282-1, -2, -3 and -4	30	75279	Spring—Tension spring for stabilizing clamp (.216" O.D. x 1 7/8"—20 turns)	54	75308	Spring—Tension spring for push rod
6	75922	Support—10" record support—light brown—for 960282-5	31	3658	Lever—Push-off slide actuating lever assembly	55	75309	Lever—Push rod actuating lever complete with mounting pivot stud and washer (includes Ill. 36 and 37)
7	75258	Slide—10" record push-off slide	32	75280	Ball—Steel ball (3/32" dia.)	56	—	Nut—26 hex nut for push rod travel adjusting screw (includes 75309, Ill. 55)
8	75259	Spring—Return spring for 10" push-off slide (.250" O.D. x 9/16"—5 turns)	33	75281	Screw—2-40 x 1/4" fillister head screw	57	—	Screw—Adjusting screw for push rod travel (#6-32 x 3/4" fillister head screw) (included in 75309, Ill. 55)
9	—	Screw—2-40 x 1/4" round head steel machine screw	34	28360	Washer—Steel washer (.031" x .125" x 1/2")	58	75310	Pin—Cotter pin for turntable spindle or centerpost
10	75260	Cover—12" record push-off slide cover	35	75040	Lever—Trip lever assembly including trip dog, Ill. 34A	59	75311	Lever—Pickup arm landing change lever complete with mounting pivot stud and washer
11	75261	Support—Main support casting for push-off mechanism—maroon—for 960282-1, -2, -3 and -4	36	75927	Screw—Screw to mount main support (3 req'd) (#6-32 x 3/4" thread cutting)	60	—	Board—Terminal board (3 contact)
12	75923	Support—Main support casting for push-off mechanism—light brown—for 960282-5	36	75282	Spring—Conical spring to mount record changer—4 required—for 960282-1, -2 and -3	61	75312	Lever—Pickup arm stabilizing lever complete with mounting pivot stud and washer
13	75262	Slide—12" record push-off slide	37	75282	Spring—Conical spring to mount record changer—3 required—for 960282-4 and -5	62	75313	Lever—Pickup arm indexing lever complete with mounting pivot stud and washer
14	75263	Spindle—Turntable spindle or centerpost (includes Ill. 11A)	38	—	Grommet—Rubber grommet for pickup cable exit	63	75314	Spring—Tension spring for stabilizing lever
15	75303	Ring—Turntable retainer ring	39	75283	Board—Motorboard complete with all riveted, staked and welded parts	64	75315	Screw—Screw to mount pickup arm lever (10-32 x 1" socket head cap screw)
16	75264	Knob—Stylus selector knob complete with set screw—level type—for 960282-1, -2 and -3	40	75283	Knob—Speed selector or function control knob—maroon—for 960282-1, -2, -3 and -4	65	75316	Lever—Pickup arm lever including trip arm, engagement stud and tension spring
17	75924	Knob—Stylus selector knob complete with set screw—level type—for 960282-4 and -5	41	75284	Knob—Speed selector or function control knob—light brown—for 960282-5	66	—	Nut—210 hex nut for pickup arm lever mounting screw
18	—	Screw—Screw for handle type control knob (included with Stock Nos. 75264 and 75924)	42	75284	Stud—Cycling carriage return stud including shaft, washer and cambric roller	67	75317	Spring—Tension spring for indexing lever (2 turns)
19	—	Knob—Stylus selector knob—hexagon—not used in actual production	43	75285	Washer—Friction spring washer for turntable and motor mounting. (.250" x .281" I.D. x .450" O.D.)	68	75318	Stop—Lockout lever stop complete with mounting rivet
20	75265	Screw—Screw for hexagon control knob	44	75286	Stud—Cycling carriage engagement stud including shaft, washer and cambric roller	69	75319	Carriage—Cycling carriage
21	75266	Collar—Threaded collar for pickup mounting assembly—for 960282-1, -2 and -3	45	75286	Grommet—Rubber grommet to mount motor (3 req'd)	70	75320	Washer—Mounting washer (thin) for cycling carriage
22	75267	Arm—Pickup arm shell complete with fibre guide—for 960282-1, -2 and -3	46	75287	Washer—"C" washer to mount motor (3 req'd)	71	75321	Washer—Mounting washer (thick) for cycling carriage
23	75925	Arm—Pickup arm shell for 960282-4 and -5	47	—	Lug—Terminal lug	72	75322	Washer—Mounting washer (split) for cycling carriage
24	75268	Pin—Pivot arm pin	48	75288	Motor—117 volt, 60 cycle motor complete with mounting plate, idler wheel and change-over mechanism—for 960282-1, -4 and -5. See illustration on page 13	73	75323	Spring—Lock spring for detent complete with (2) rivets
25	75269	Spring—Retaining spring (hair-pin) for pivot arm pin	49	S-5637	Motor—117 volt, 50/60 cycle motor complete with mounting plate, idler wheel and change-over mechanism—for 960282-2 and -3. See illustration on page 13	74	75324	Detent—Operating control detent
26	75269	Spring—Counterbalance spring for 960282-1, -2 and -3	46A	—	The following motor parts (46A to 46U) are for #75288 motor only	75	75325	Washer—Friction washer (square-hole) for trip arm (.060" x .189" square I.D. x 3/4" O.D.)
27	75929	Spring—Counterbalance spring for 960282-4 and -5	46B	—	Lug—Terminal lug	76	75326	Spring—Friction adjustment spring for trip arm (.360" O.D. x 33/64"—5 1/2 turns)
28	75270	Rod—Elevating rod	46C	—	Nut—26-32 hex nut to mount top plate (2 req'd)	77	75327	Washer—Threaded washer for adjusting trip arm friction (.0873 x .159" I.D. x 3/4" O.D.—.159" I.D. hole lapped #10-32)
29	75271	Arm—Pivot arm and shaft	46D	30870	Lockwasher—26 lockwasher (split) to mount top plate	78	75328	Lever—Lower trip lever
30	75272	Cable—Three wire pickup cable (12") complete with connectors	46E	—	Connector—2 contact male connector for motor leads	79	75329	Washer—Shouldered washer for cycling carriage engagement stud for Ill. 42
31	—	Screw—Mounting screw for pickup cartridge (4-40 x 1/8" fillister head) two required—for 960282-1, -2 and -3	46F	75290	Washer—Flat washer for under metal spacer (2 req'd)	80	75330	Spacer—Metal spacer for cycling carriage studs
32	75933	Screw—Mounting screw for pickup cartridge (2-56 x 1/8" fillister head) two required for 960282-4 and -5	46G	—	Spacer—Metal spacer for motor mounting (2 req'd)	81	75331	Spring—Tension spring for cam roller (.379" O.D. x 1-1/32"—7 turns)
33	75044	Pickup—Crystal pickup complete with two stylus—for 960282-1 and -3	46H	—	Nut—24 hex nut to mount idler riser slide	82	75332	Grommet—Rubber grommet for cycling carriage studs
34	S-5652	Pickup—Ceramic pickup complete with two stylus—for 960282-2	46I	75291	Lockwasher—24 (external) lockwasher to mount idler riser slide	83	75304	Washer—Stop washer for cam studs (.059" x .190" I.D. x 3/4" I.D.)
35	75475	Pickup—Crystal pickup complete with two stylus—for 960282-4 and -5	46J	75292	Spring—Tension spring for idler carriage	84	75334	Nut—Speed nut for cycling carriage studs
36	75045	Stylus—33 1/3 r.p.m. stylus—RED—for #75044 pickup cartridge	46K	75293	Plate—Motor top plate including stud for idler pivot link	85	75335	Washer—Engagement washer for cycling carriage return stud
37	75496	Stylus—33 1/3 r.p.m. stylus—RED—for #75475 pickup cartridge	46L	—	Slide—Idler riser slide	86	75336	Lever—Lockout lever complete with mounting pivot stud and washer
38	75046	Stylus—78 r.p.m. stylus—PLAIN—for #75044 pickup cartridge	46M	75294	Screw—26-32 x 1 1/4" head brass machine screw to mount top plate (2 req'd)	87	75337	Spring—Tension spring for lockout lever (2 turns)
39	75497	Stylus—78 r.p.m. stylus—PLAIN—for #75475 pickup cartridge	46N	—	Spacer—Metal spacer to mount idler riser slide	88	75338	Spring—Friction stabilizing spring for cycling carriage complete with two (2) rivets
40	74274	Nut—Stylus retaining nut—knurled—for #75044 pickup	46O	—	Washer—Flat washer to mount idler riser slide	89	75339	Latch—Trip latch complete with mounting pivot stud and washer
41	74230	Nut—Stylus retaining nut and washer—for #75475 pickup cartridge	46P	75295	Screw—Screw to mount idler riser slide (2-40 x 3/4" round head steel machine screw)	90	75340	Lever—Manual lockout lever complete with mounting pivot stud and washer
42	75273	Mount—Pickup cartridge mount assembly (2-piece assembly)—for 960282-1, -2 and -3	46Q	75296	Carriage—Idler carriage	91	75341	Switch—Power switch complete with cover
43	75931	Bracket—Bracket and bearing assembly (to mount #75932 rotor in #75925 arm)—for 960282-4 and -5	46R	75436	Washer—Fibre dampening washer .010 thick	92	75342	Spring—Trip latch tension spring—2 turns
44	75932	Rotor—Rotor bracket and shaft assembly (to mount #75475 pickup in #75931 bracket)—for 960282-4 and -5	46S	75297	Washer—Fibre dampening washer .020 thick	93	75343	Cam—Operating control cam complete with mounting pivot stud and washer
45	75930	Spring—Detent spring for rotor bracket assembly—#75932—for 960282-4 and -5	46T	75298	Link—Idler pivot link			
46	75975	Screw—3-48 x 1 1/8" truss head screw to mount #75931 bracket to #75925 pickup arm shell—for 960282-4 and -5	46U	75299	Guide—Idler riser slide guide			
			47	75300	Washer—"C" washer to mount idler carriage and idler wheel			
			48	75301	Wheel—Idler wheel			
			49	75302	Arm—Speed selector arm			
				75282	Lever—Speed selector lever complete with mounting pivot stud and washer—for 960282-1, -4 and -5. See page 18 for description of 960282-2 and -3			
					Grommet—Rubber grommet used in speed change assembly			

MODELS 960284-1,
960284-2



PH 536

Mechanism may be used in the following instruments:

Radio Combinations—A108	960284-1, -2
—A91	960284-1, -2
Television Combinations—9T89	960284-1, -2
—6T87	960284-1, -2

The difference between 960284-1 and 960284-2 is in color.
(See parts list.)

SPECIFICATIONS

Turntable speed	78-33 $\frac{1}{3}$ rpm
Record used	10" or 12" (intermixed)
Record capacity	Ten twelve-inch
.....	Twelve ten-inch
.....	Ten intermixed
Pickup force	Eight to 10 grams
Stylus radius .....	.001 inch for 33 $\frac{1}{3}$ rpm
.....	.003 inch for 78 rpm
Type pickup	Crystal
Power supply	105-125 volts, 60 cycles A-C

INDEX

	Page
Features	34
Operation	34
Function of Principal Levers	34-36
Cycle of Operation	37-41
Service Hints	41-43
Removing Stylus	43
Adjustments	44
Do You Know? (Service Hints)	44-45
Exploded View of Motor	47
Exploded View of Mechanism	46
Parts List	48-49
Lubrication	49

FEATURES

1. This record changer is a center support intermix mechanism designed to play automatically a series of records up to ten 12-inch, twelve 10-inch, or ten intermixed records of the standard 78 RPM type. It will also play a series of the long playing 33-1/3 RPM type of similar diameter.

2. The mechanism is equipped with a light weight dual stylus pickup cartridge. The proper stylus can be selected by turning a knob in the end of the pickup arm.
After the last selection of the stack has been played, the pickup arm will go to the rest position and the mechanism will stop automatically.
4. The automatic tripping device is of the acceleration type.
5. The speed change is accomplished by a single control mounted on the motorboard.

AUTOMATIC OPERATION

1. Lift and rotate the record support to one side.
2. Place a stack of records over the center post.
3. Rotate the record support to a position so the center post will extend through the hole in the end of the support.
4. Turn the speed control to select the proper speed.
5. Rotate the knob in the end of the pickup arm to the proper numeral corresponding to the turntable speed.
6. Turn the function control knob to reject and release. The mechanism will play one side of each record of the stack until the last selection has been played at which time it will stop automatically.
7. To reject a record being played, turn the function control knob to reject and release.
8. To remove records, lift and turn the record support to one side.
9. Lift the stack of records straight up.

MANUAL OPERATION

1. Lift and rotate the record support to one side.
2. Place the record to be played on the turntable (tilt slightly to slide over the step in the centerpost).
3. Set the speed and pickup cartridge controls properly.
4. Turn function control to reject and release.
5. After the pickup sits on the record, place the record support over the centerpost, permitting it to rest on the step in the centerpost.
6. The mechanism will play the record after which it will stop automatically.

FUNCTION OF PRINCIPAL LEVERS

See Fig. 1

Reject rod (56)

The function of the reject rod is to transfer the action from the control knob to the reject lever.

Trip slide (98)

The function of the trip slide is to transfer the movement of the pickup arm lever to the lower trip pawl. This action starts the change cycle.

Cycling gear (96)

The function of the cycling gears is to transfer the rotating motion of the turntable to the cycling mechanism.

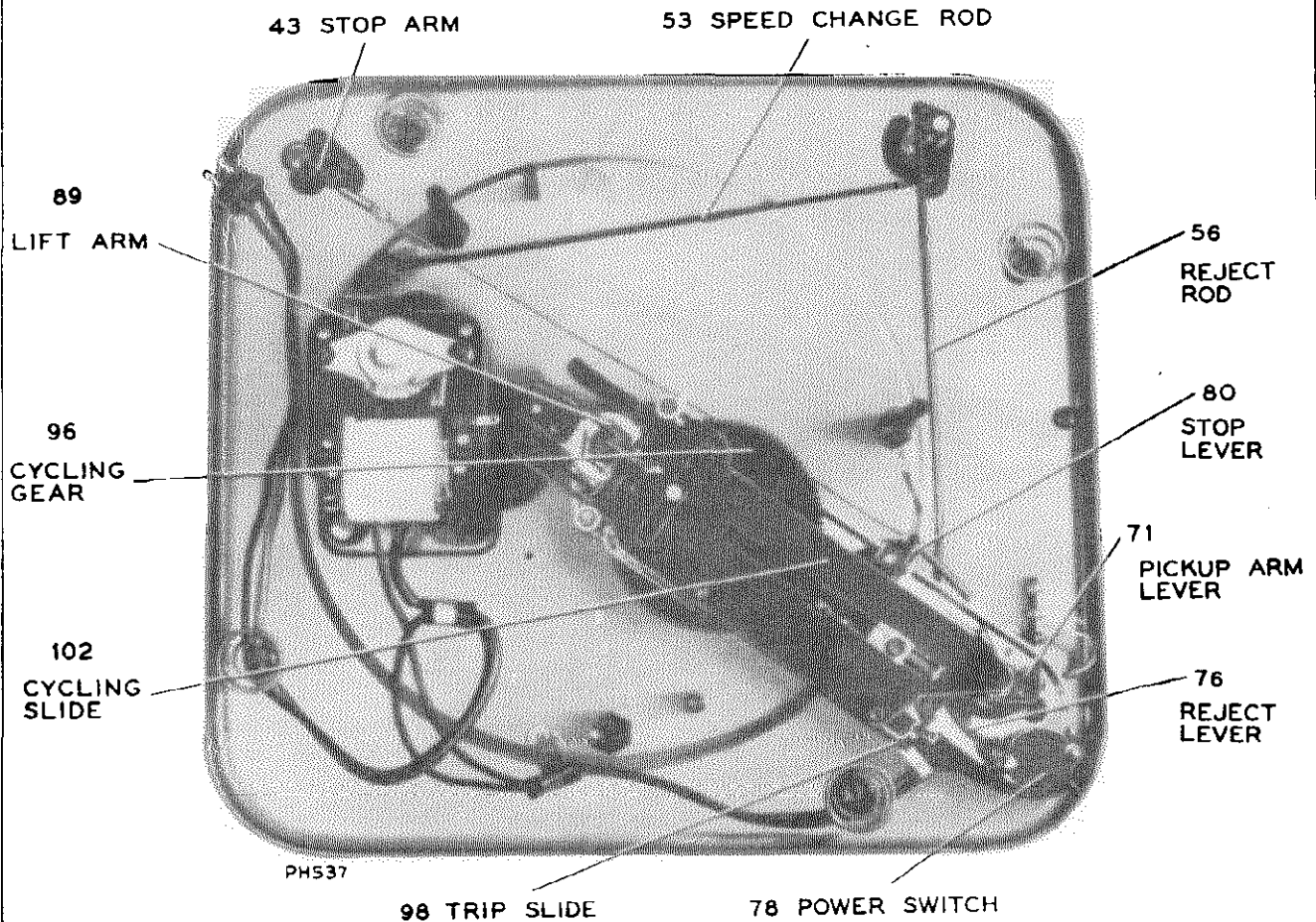


Fig. 1

Stop arm (43)

When the last record of the stack drops to the turntable, the record support arm drops. The lower end of the record support arm pivot actuates the stop lever thereby transferring the action for automatic stopping.

Lift arm (89)

The function of the lift arm is to transfer the movement of the cycling slide to the separator mechanism inside the centerpost.

Stop lever (80)

The function of the stop lever is to raise the trip slide and form a stop for pickup arm return lever. This results in the mechanism stopping automatically.

Cycling slide (102)

The function of the cycling slide is to transfer the action from the cycling gear to the other levers.

See Figs. 1 and 4

Pickup arm lever (71)

The function of the pickup arm lever is to transfer movement of the pickup arm to levers located beneath the motorboard. Other levers beneath the motorboard also counter react through the pickup arm lever thereby directing the movement of the pickup arm.

Reject lever (76)

The function of the reject lever is to actuate the power switch and trip slide.

See Fig. 2

Twelve-inch indexing lever (61)

After the completion of each change cycle of the mechanism, the pickup arm automatically is indexed for ten-inch records unless a twelve-inch record has dropped to the turntable. As a twelve-inch record drops to the turntable, it moves the twelve-inch indexing lever thereby directing the position of the selector lever.

See Fig. 3

Trip pawl (upper) (94)

The upper trip pawl functions as an actuating device for the cycling engagement pawl.

Cycling engagement pawl (96A)

The function of the cycling engagement pawl is to engage the off-set in the turntable shaft thereby starting change cycle.

See Fig. 4

Pickup arm return lever (68)

The function of the pickup arm return lever is to provide the force necessary to move the pickup into landing position.

Selector lever (83)

The function of the selector lever is to form a stop for the pickup arm return lever. The position of selector lever (up or down) determines whether the pickup lands on ten- or twelve-inch records.

Trip pawl (lower) (97)

The lower trip pawl transfers the action of the trip slide from the lower to the upper side of the cycling gear.

(See Exploded View—Fig. 6)

Record support (overarm) (1)

The function of the record support is to stabilize and hold the records in a horizontal plane which is parallel to the motorboard. After the last record of the stack drops to the turntable, the pivot of the record support drops down and actuates the automatic stopping device.

Center post (34)

The function of the center post is to support the stack of records. It also houses the separating mechanism.

MODELS 960284-1,
960284-2

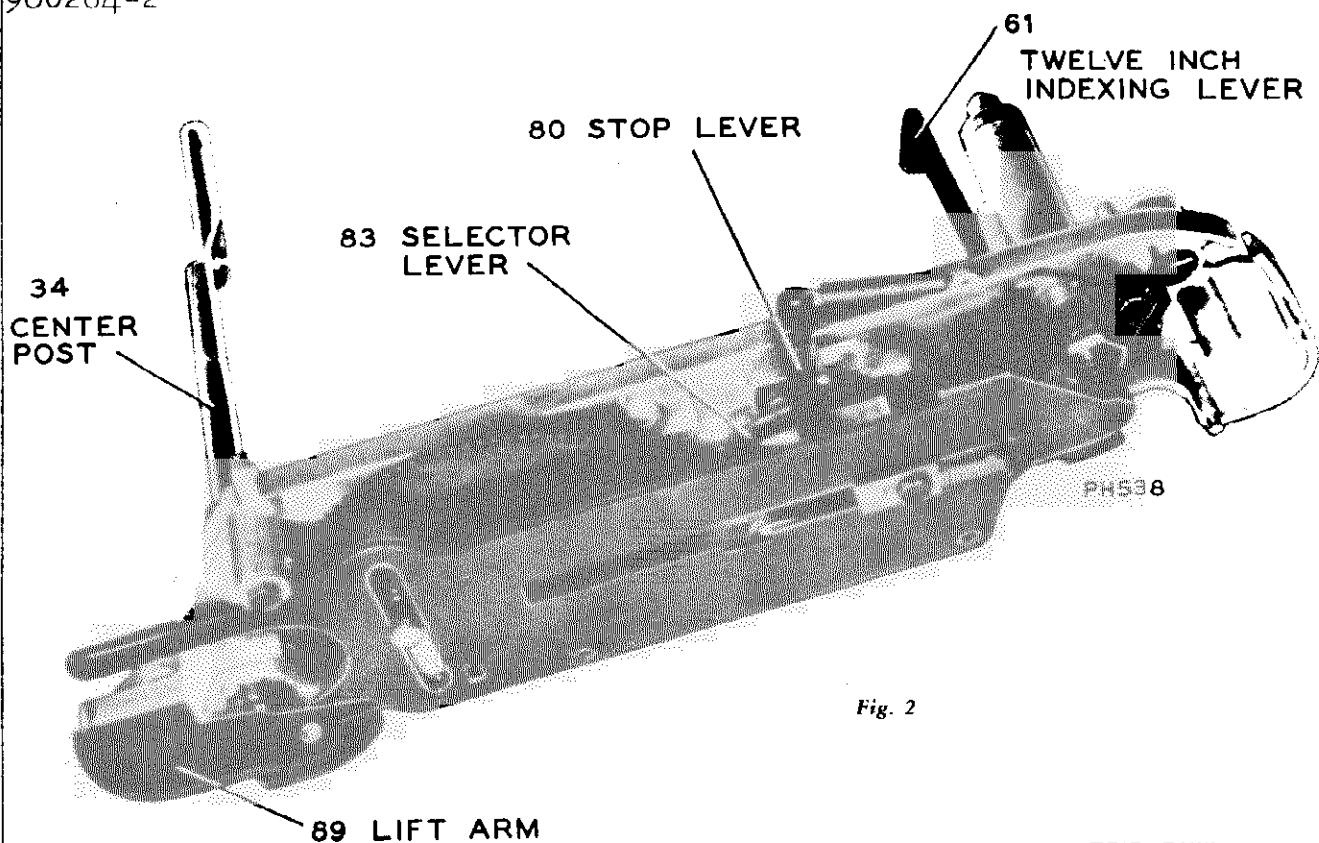


Fig. 2

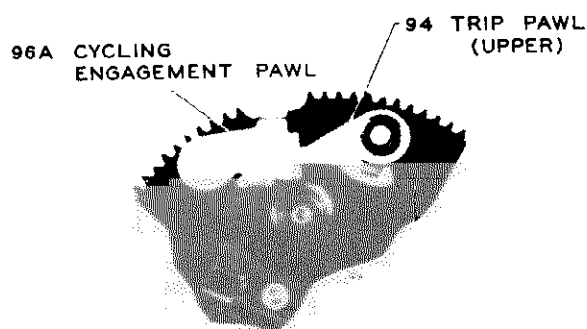


Fig. 3

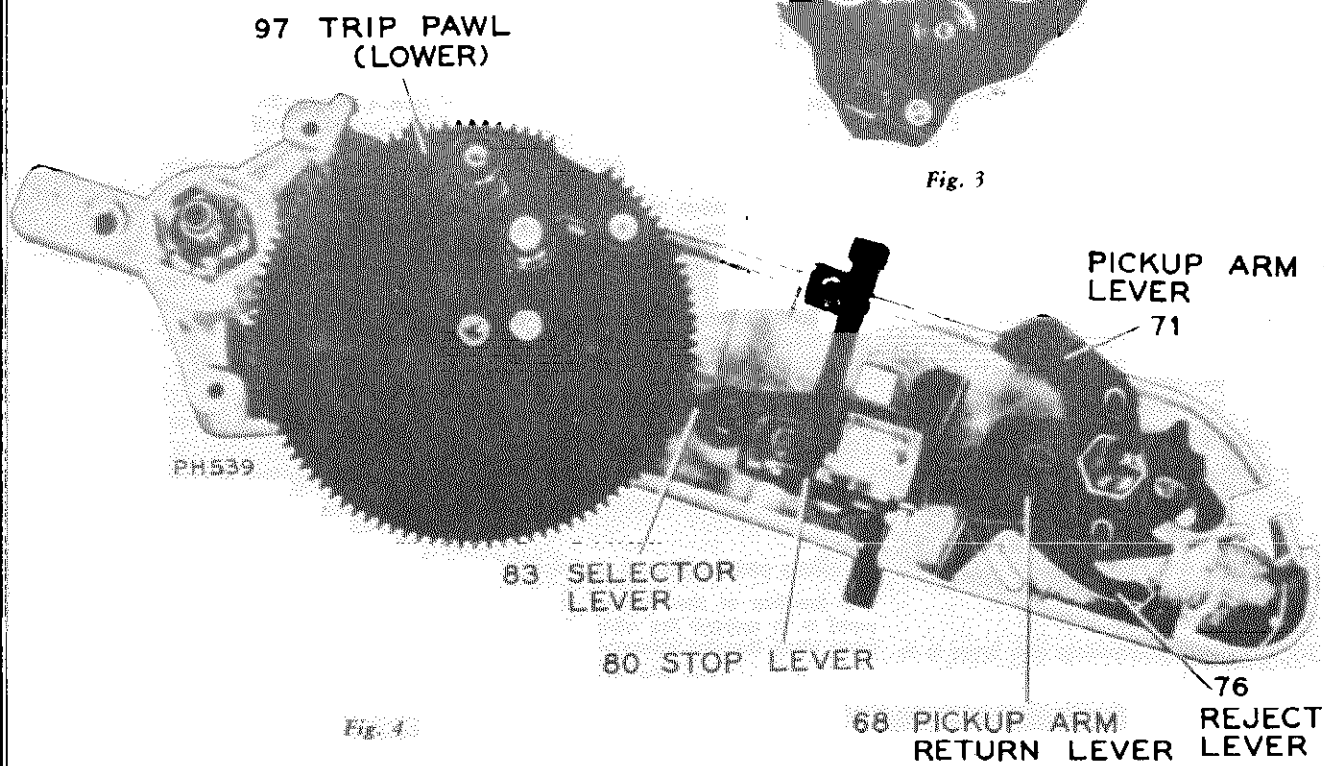
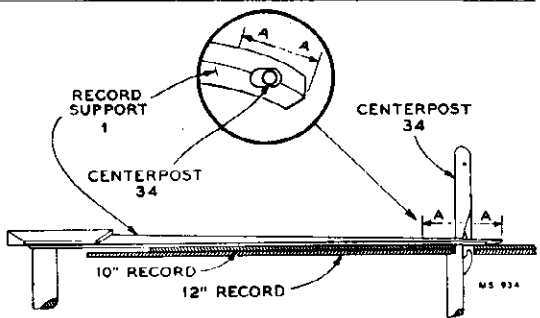
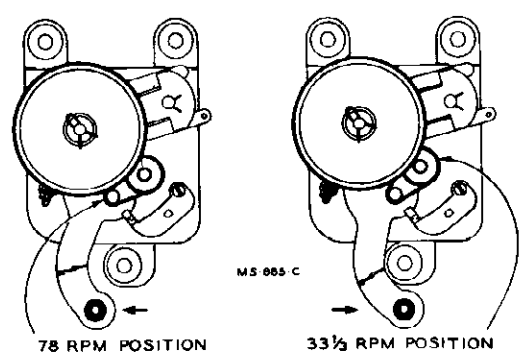
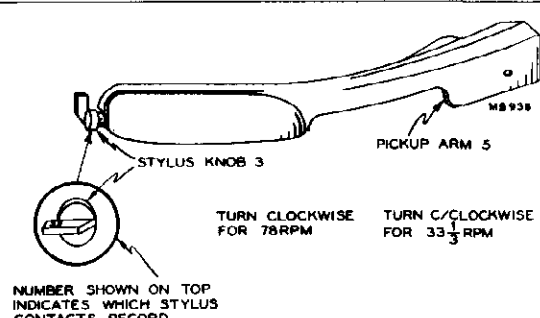
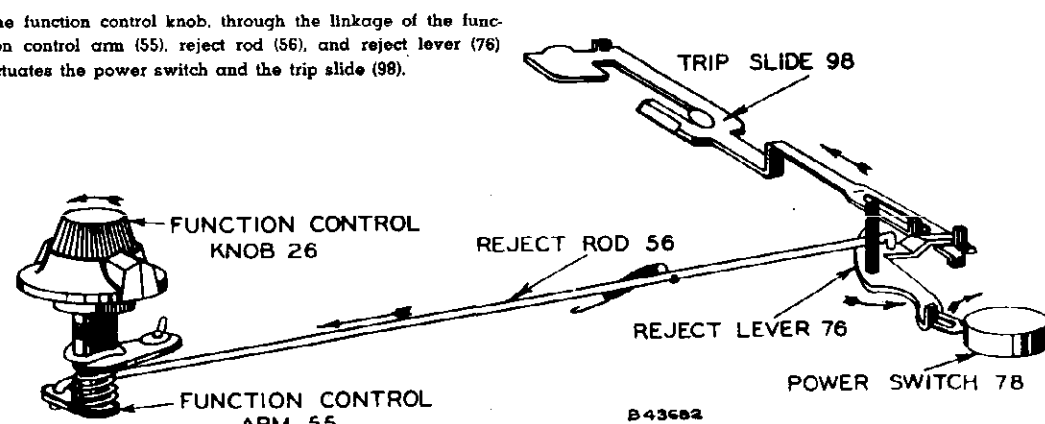


Fig. 4

MODELS 960284-1,
960284-2

CYCLE OF OPERATION

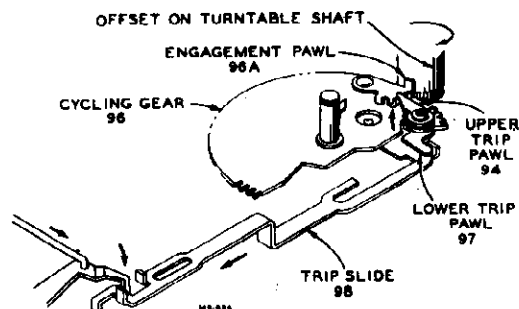
NOTE: In the cycle of operation it is assumed the mechanism has stopped automatically (out of cycle) with the pickup arm on the rest.

Function	Description
Place a stack of records over the center post (intermixed if so desired). Place the record support over the center post.	<ol style="list-style-type: none"> 1. The stack of records rests on the step in the centerpost (34). 2. The hole in the end of the record support (1) permits the end of the support to slide over the center post and rest on the stack of records. 
Turn the speed selector knob to 78 or 33-1/3 rpm position.	<ol style="list-style-type: none"> 1. The speed change is accomplished by shifting to either of two shafts on the motor assembly which are rotating at different speeds. The additional shaft is connected by a small rubber belt. 
Rotate the knobs to select the proper stylus.	<ol style="list-style-type: none"> 1. The rotation of the stylus knob (3) selects the proper stylus depending on the type of record to be played. 
Rotate function control knob to reject position and release.	<ol style="list-style-type: none"> 1. The function control knob, through the linkage of the function control arm (55), reject rod (56), and reject lever (76) actuates the power switch and the trip slide (98). 

MODELS 960284-1,
960284-2

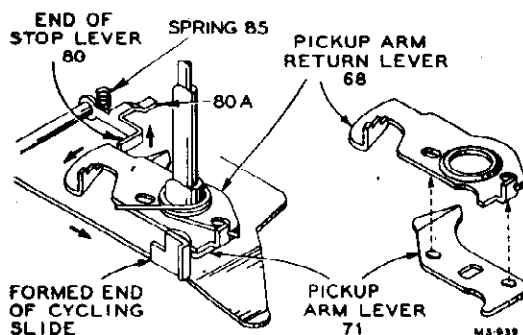
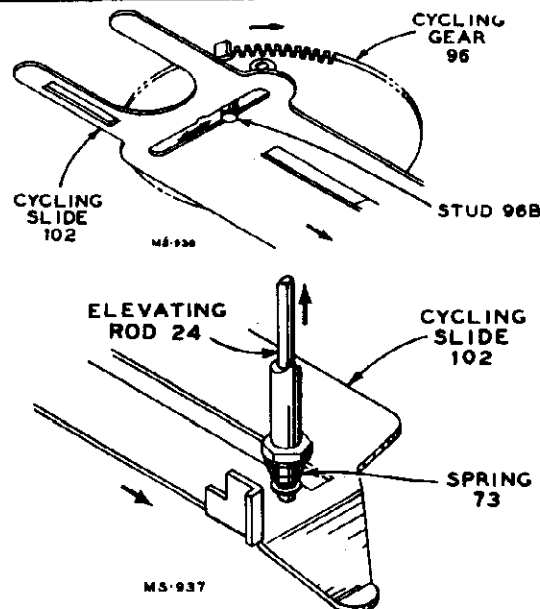
Cycling starts.

1. The closing of the power switch starts the turntable rotating.
2. The trip slide (98) in its movement contacts the lower trip pawl (97) and moves both the lower and the upper trip pawls which are tied together. The movement of the upper trip pawl (94) actuates the cycling engagement pawl (96A) sufficiently to cause engagement with the offset on the rotating turntable shaft.
3. The contact between the cycling engagement pawl (96A) and the offset on the turntable shaft gives the necessary push for the teeth in the cycling gear (96) to engage the teeth in the shaft of the turntable thereby starting change cycle.



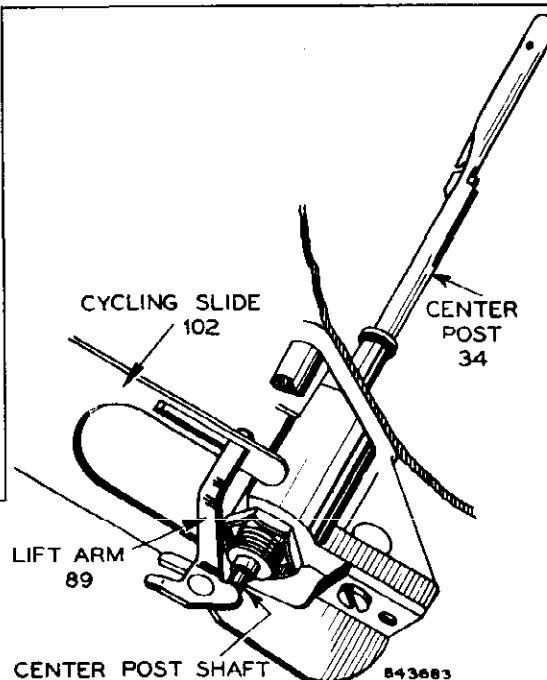
Pickup rises and remains outside turntable area.

1. As the cycling gear rotates, the stud (96B) mounted on the underside of the gear, rides inside a slot cut in the cycling slide (102).
2. The rotation of the cycling gear pushes the cycling slide back and forth.
3. As the slide moves away from the center post, an incline formed on the end of the slide causes the elevating rod (24) to raise and lift the pickup arm.
4. At the same time the elevating rod is pushed upward, the pickup arm lever (71) is also carried along from the force transferred through the spring (73). The raising of the pickup arm lever causes the two dimples formed in the pickup arm lever to engage the two holes in the pickup arm return lever (68) and couple them together. This stabilizes and directs the movement of the pickup arm during change cycle.
5. The cycling slide continues to move away from the center post until the formed end of the slide pushes against the pickup arm return lever. This relieves the force of pickup arm return lever against stop lever (80). This permits the stop lever return spring (85) to expand and return the stop lever to normal position.
6. The end (80A) of stop lever (80) pushes trip slide back ready for the next change cycle.



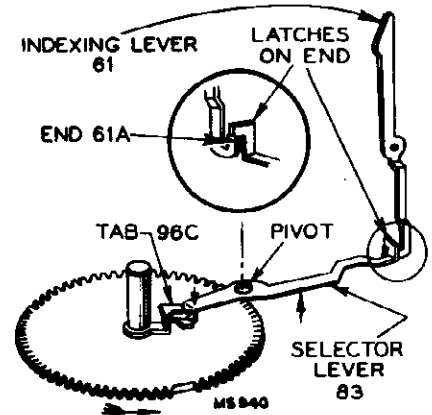
Record drops to turntable.

1. Further movement of the cycling slide causes the slot in the end of the cycling slide to actuate the lift arm (89).
2. The lift arm pushes up on the shaft extending from the bottom end of the center post. This shaft actuates the push off mechanism inside the center post, and the record drops to the turntable.



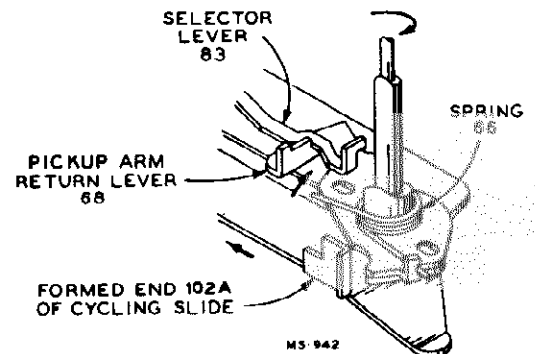
MODELS 960284-1,
960284-2

3. At this time the tab (96C) on cycling gear pushes down on one end of the selector lever (83) (which is pivoted in the center) thereby raising the other end causing it to latch on the edge (61A) of the twelve-inch indexing lever (61).



The pickup moves in for landing.

1. As the cycling slide returns, the formed edge (102A) on the slide moves back permitting the pickup arm return lever spring (66) to expand. This causes the pickup arm return lever (68) to move the pickup inward until the pickup arm return lever comes against the selector lever (83). The pickup is now directly above the point of landing.

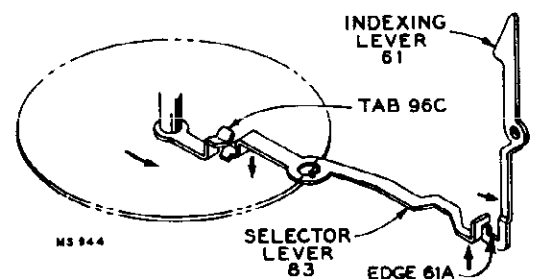
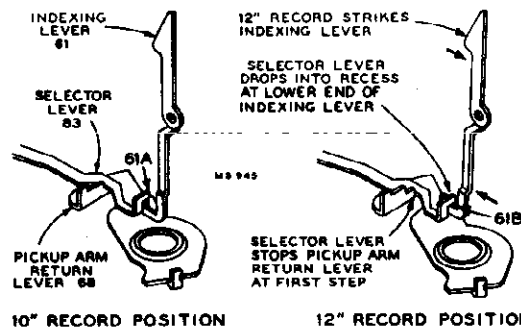
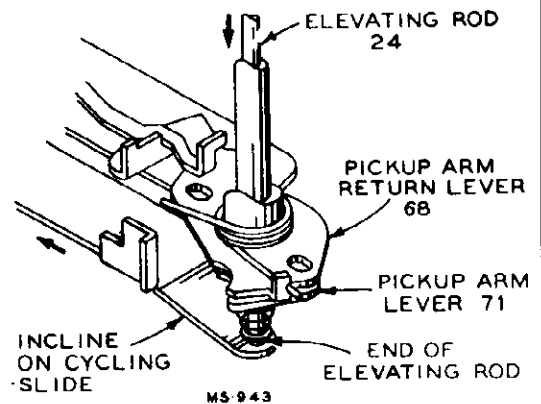


Pickup sits on record.

1. The elevating rod (24) slides down the incline on the slide permitting the pickup to sit on the start of the record.

NOTE:—12" indexing.

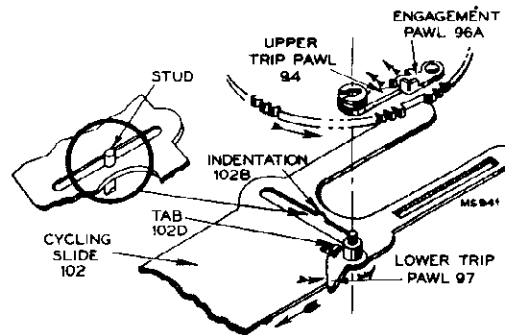
The mechanism automatically is indexed for the pickup to land on a ten-inch record, each time the mechanism goes through change cycle, unless a twelve-inch record contacts indexing lever (61) as its drops to the turntable. On each revolution of the cycling gear (complete change cycle) the tab (96C) pushes down on the selector lever (83) and the other end of the selector lever latches on the top edge (61A) of the twelve-inch indexing lever. Under these conditions the pickup will land correctly on a ten-inch record. On the other hand if a twelve-inch record drops to the turntable, it strikes the indexing lever on the way down. This permits the end of the selector lever (83) to drop down further into the recess (61B). The lower step of the pickup arm return lever makes contact with the selector lever and the pickup will land correctly on a twelve-inch record.



MODELS 960284-1,
960284-2

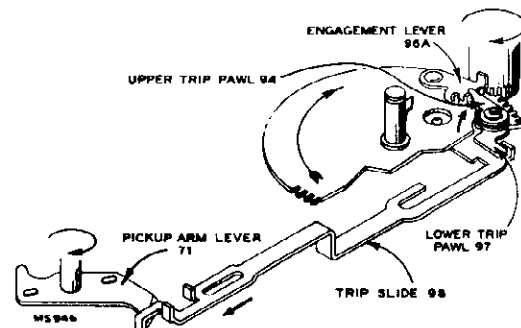
Mechanism com-
pletes cycle.

1. Just before the cycling gear completes cycle, a small tab (102D) on cycling slide makes contact with lower trip pawl (97) thereby moving upper trip pawl (94) and cycling engagement pawl (96A) back. This prevents the re-engagement with the off-set on the turntable shaft which would start a new change cycle.
2. The cycling gear comes to rest as the stud sliding in the cycling slide drops into a small indentation (102B) in the slide. The cut away section of the gear is in position so the gear on the turntable shaft is free to rotate.



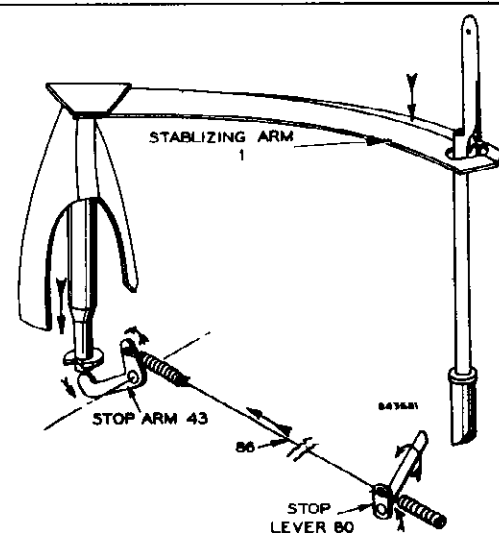
Record plays.

1. As the record plays, the pickup moves in toward the center of the record carrying the trip slide along. This is due to the contact made with the pickup arm lever which is rotating with the pickup arm pivot.
2. The trip slide contacts the lower trip pawl and both the lower and upper trip pawls and the cycling engagement pawls move slightly with each revolution of the record. This slight movement of the pawls is reversed each time the off-set on the turntable shaft comes in contact with the cycling engagement pawl. The back movement is taken up in the friction connection between the upper and lower trip pawls.
3. This action continues as long as the pickup moves in at a constant rate of speed. When the stylus leaves the recorded section of the record, the rapid acceleration results in the rapid movement of the cycling engagement pawl. The cycling engagement pawl assumes such a position that the off-set on the turntable shaft makes a positive contact and the cycling cam is pushed sufficiently for engagement between the teeth of the cycling gear and the teeth in the turntable shaft. This starts change cycle.



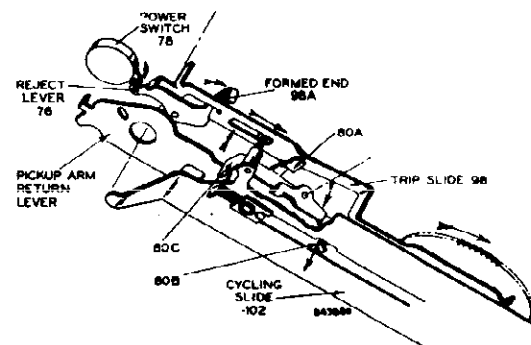
Pickup raises and
moves out.

1. After the mechanism has been tripped the pickup arm moves out from action of the cycling slide (102) on the pickup arm lever (71).
2. The mechanism again follows the preceding sequence of dropping and playing the records until the last record of the stack has been played.



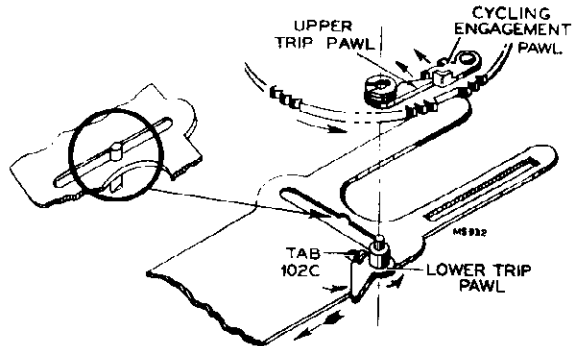
Mechanism stops
automatically.

1. After the last selection has been played and the mechanism again goes into change cycle, the record support drops and actuates stop arm (43).
2. The stop arm movement is transferred through a connecting wire (86) to stop lever (80) causing it to raise.
3. As the stop lever raises the end (80A) lifts one end of trip slide. The other end (80C) of stop lever rises and forms a stop for pickup arm return lever preventing the pickup from moving in for landing.
4. The cycling slide has moved away from the center post permitting the lower end (80B) of stop lever to drop down through a small square cut in the cycling slide. After the end of the stop lever drops through the square opening, it slides along a channel cut in the slide which prevents it from raising until the slide returns.



MODELS 960284-1,
960284-2

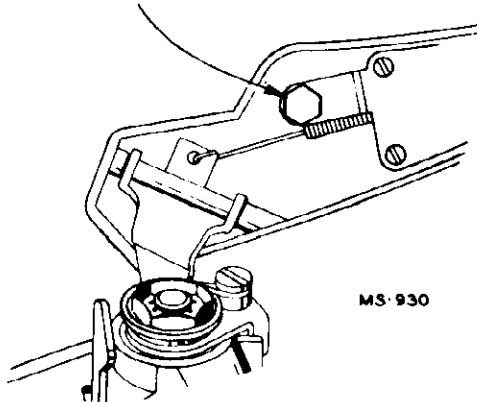
5. As the cycling slide moves back, it carries the raised trip slide along until finally the formed end (98A) of the trip slide (98) pushes reject lever which in turn actuates the power switch (78). This removes the power from the drive motor and mechanism stops.
6. The elevating rod (24) lowers the pickup arm to the rest.
7. As the cycling gear comes to rest, a small tab (102C) on cycling slide contacts and moves lower and upper trip pawls and cycling engagement pawl back to prevent engagement with off-set on turntable shaft. This prevents starting a change cycle if power would be applied to drive motor.



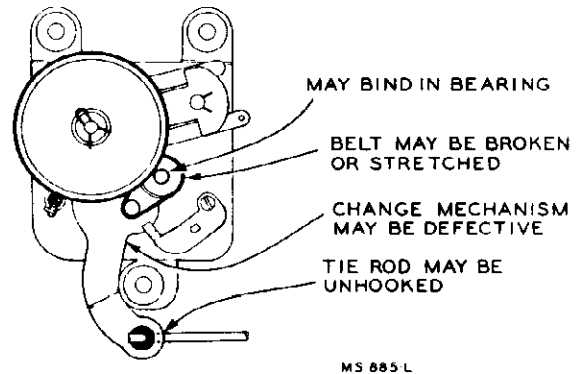
SERVICE HINTS

Pickup Arm Strikes Record on Center Post

PICKUP HEIGHT ADJUSTMENT SET TOO HIGH

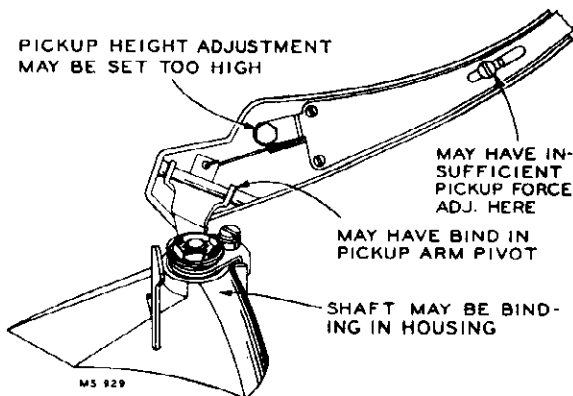


Speed Change Control Fails to Function

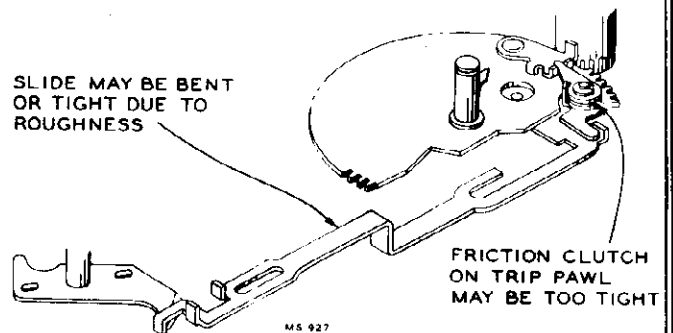


Pickup Skips Grooves

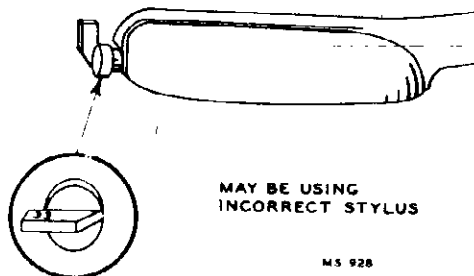
PICKUP HEIGHT ADJUSTMENT MAY BE SET TOO HIGH



SLIDE MAY BE BENT OR TIGHT DUE TO ROUGHNESS

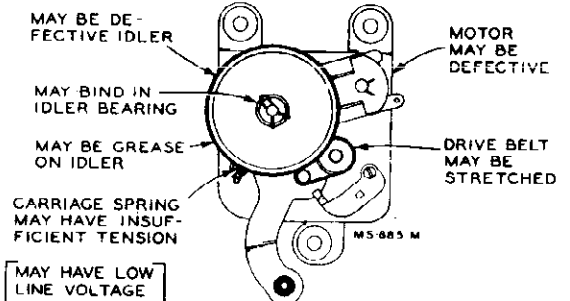


FRICTION CLUTCH ON TRIP PAWL MAY BE TOO TIGHT



MAY BE USING INCORRECT STYLUS

"Wow" or Speed Variation



MODELS 960284-1,
960284-2

Mechanism Fails to Trip

MAY JAM DUE TO DEFECTIVE TEETH

TRIP SLIDE MAY
BE BENT OR ROUGH
(PICKUP WILL PROBABLY
SKIP GROOVES)

PICKUP ARM
LEVER MAY BE
LOOSE ON SHAFT

FRICTION IN CLUTCH
BETWEEN TRIP PAWLS
MAY BE INSUFFICIENT

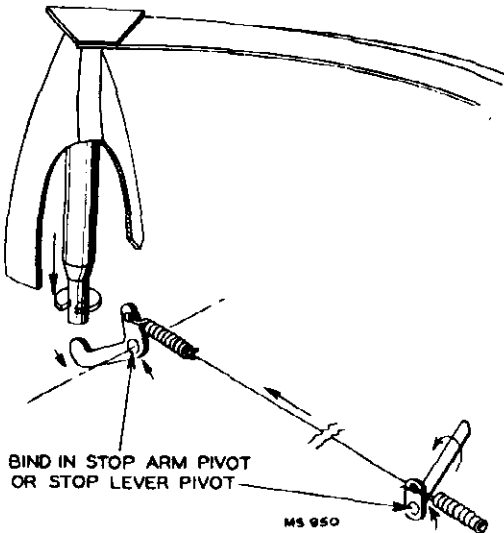
MS 931

Premature Tripping

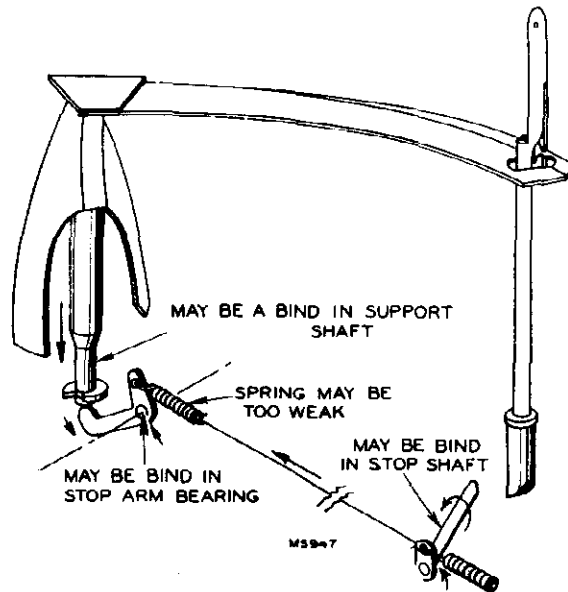
MAY HAVE TOO MUCH
FRICTION IN THE
CLUTCH BETWEEN
UPPER AND LOWER
TRIP PAWLS

MS 933

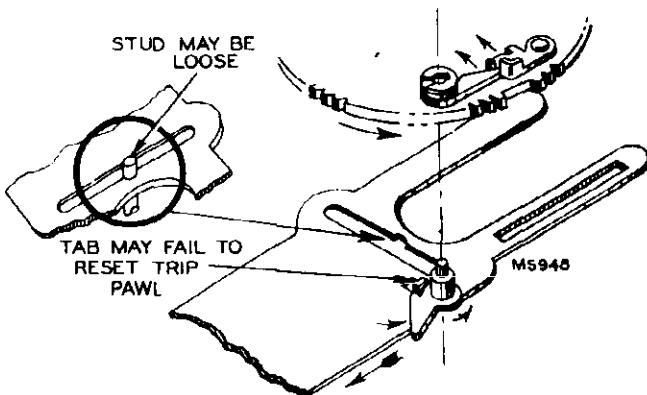
Pickup Sets Down on Rest Instead of Record



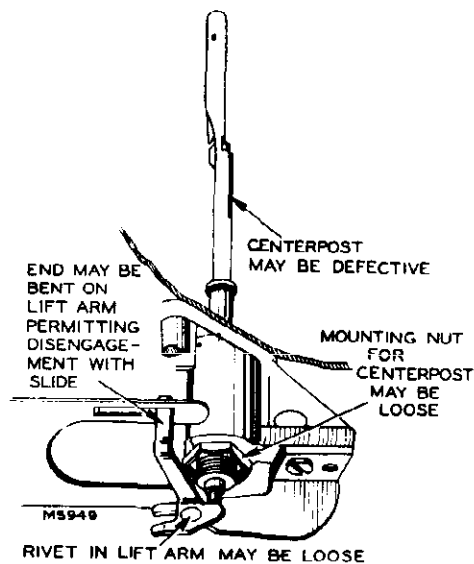
Mechanism Fails to Stop Automatically



Mechanism Trips Continuously

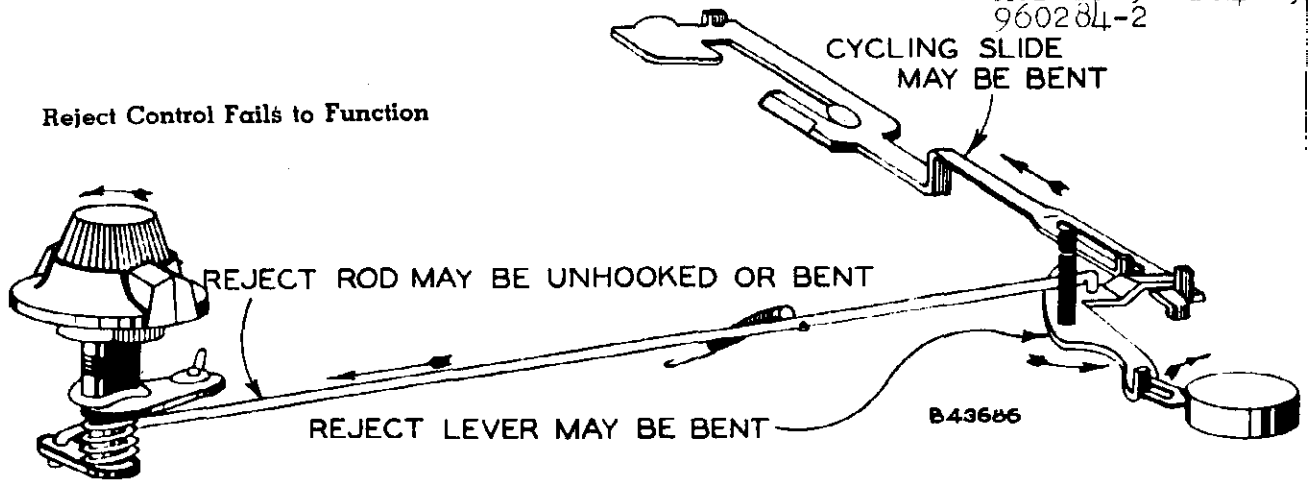


Failure to Separate Records Properly

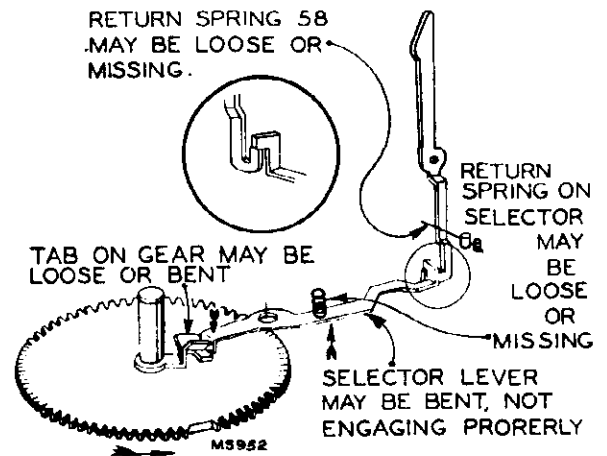
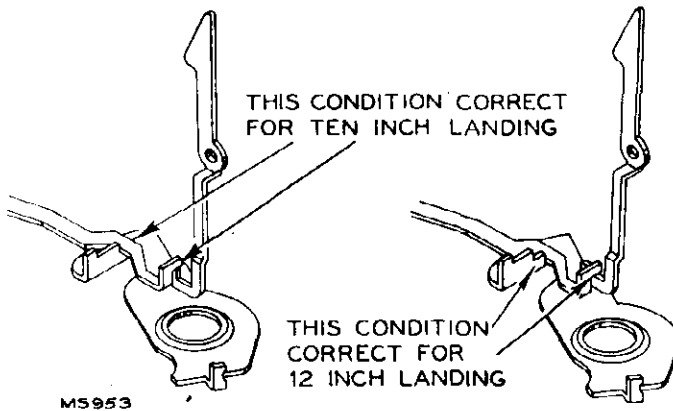
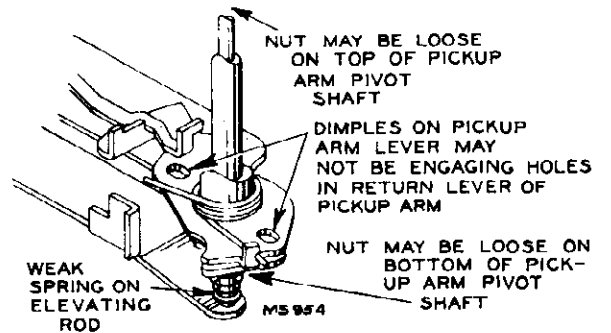
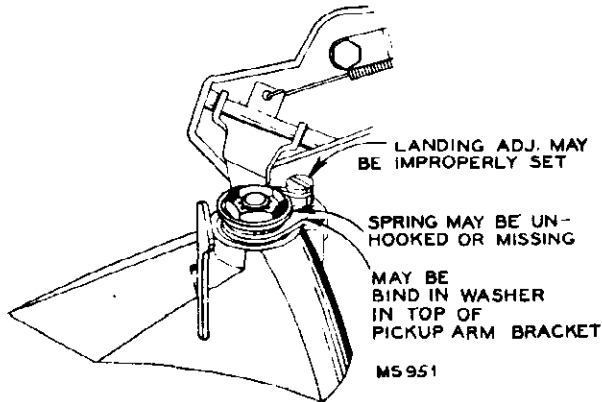


MODELS 960284-1,
960284-2

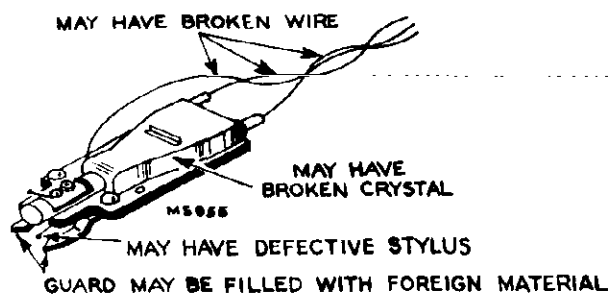
Reject Control Fails to Function



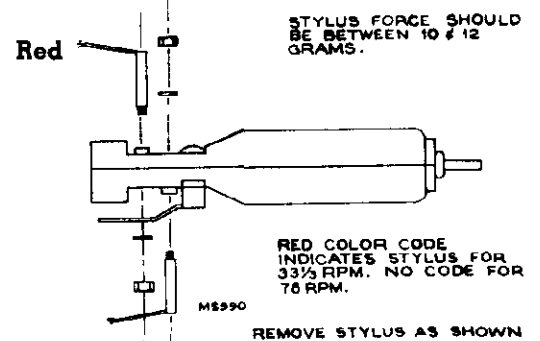
Pickup Fails to Land Properly



Distorted or No Output

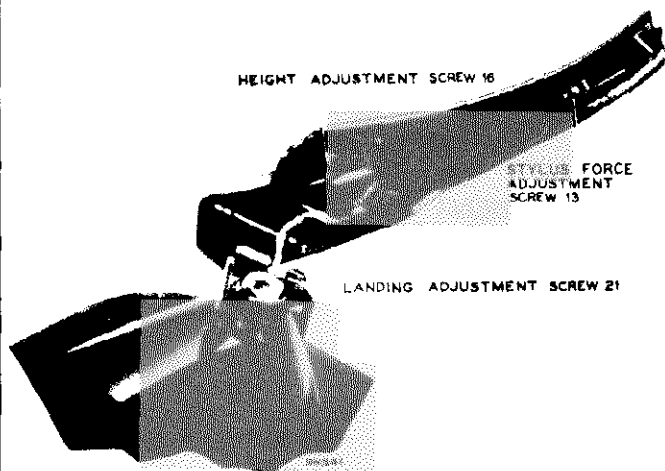


Removing Stylus



MODELS 960284-1,
960284-2

ADJUSTMENTS

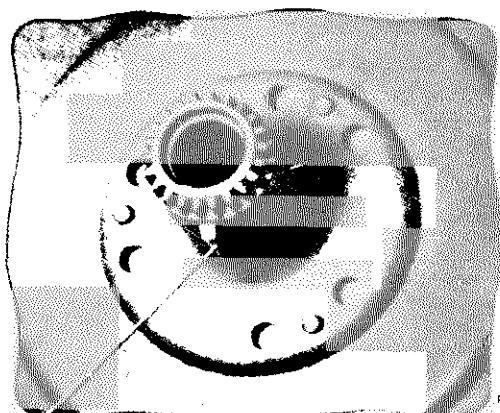


Landing Position—The landing position of the stylus is adjusted by means of the landing adjustment screw (21) mounted on the pickup arm support bracket assembly. Turn the screw for correct landing on 10" records and the 12" adjustment should automatically be correct.

Pickup Arm Height—The pickup arm height is adjusted by screw (16) located inside the pickup arm. To raise pickup arm turn screw counterclockwise to lower arm turn screw clockwise. The pickup arm height should be adjusted so that with a 1 1/8" stack of records the pickup arm lifts 1/4" straight up as the change cycle starts.

Stylus Force—Stylus force should be ten to twelve grams. Loosen screw (13) and move slide back and forth until the correct stylus force is obtained.

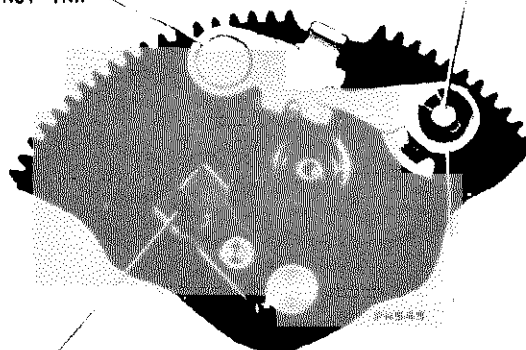
DO YOU KNOW?



THE "OFFSET" CONTACTS ENGAGEMENT PAWL #96A CAUSING THE GEARS OF THE TURNTABLE SHAFT AND CYCLING CAM TO ENGAGE AND CARRY THE MECHANISM THROUGH CYCLE

IF THERE IS BINDING IN THIS BEARING, MECHANISM MAY NOT TRIP

IF THERE IS BINDING IN THIS SHAFT, STYLUS MAY JUMP

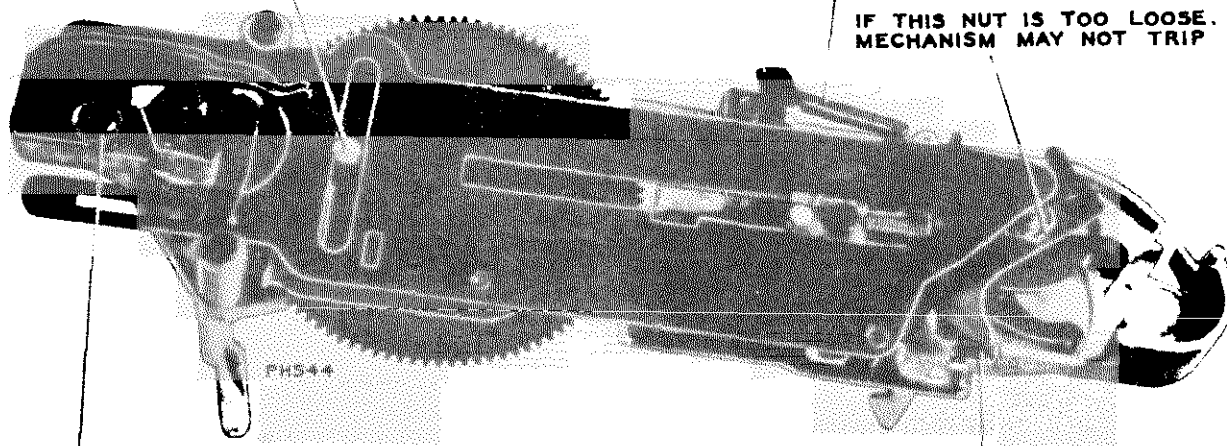


IF THIS TAB IS BENT INCORRECTLY, THE PICKUP LANDING WILL BE AFFECTED

IF TOO LOOSE, MECHANISM MAY FAIL TO TRIP

IF THIS STUD IS LOOSE, THE MECHANISM MAY CONTINUE TO CYCLE

IF THE TENSION OF THIS SPRING IS TOO GREAT, THE MECHANISM MAY NOT STOP AUTOMATICALLY



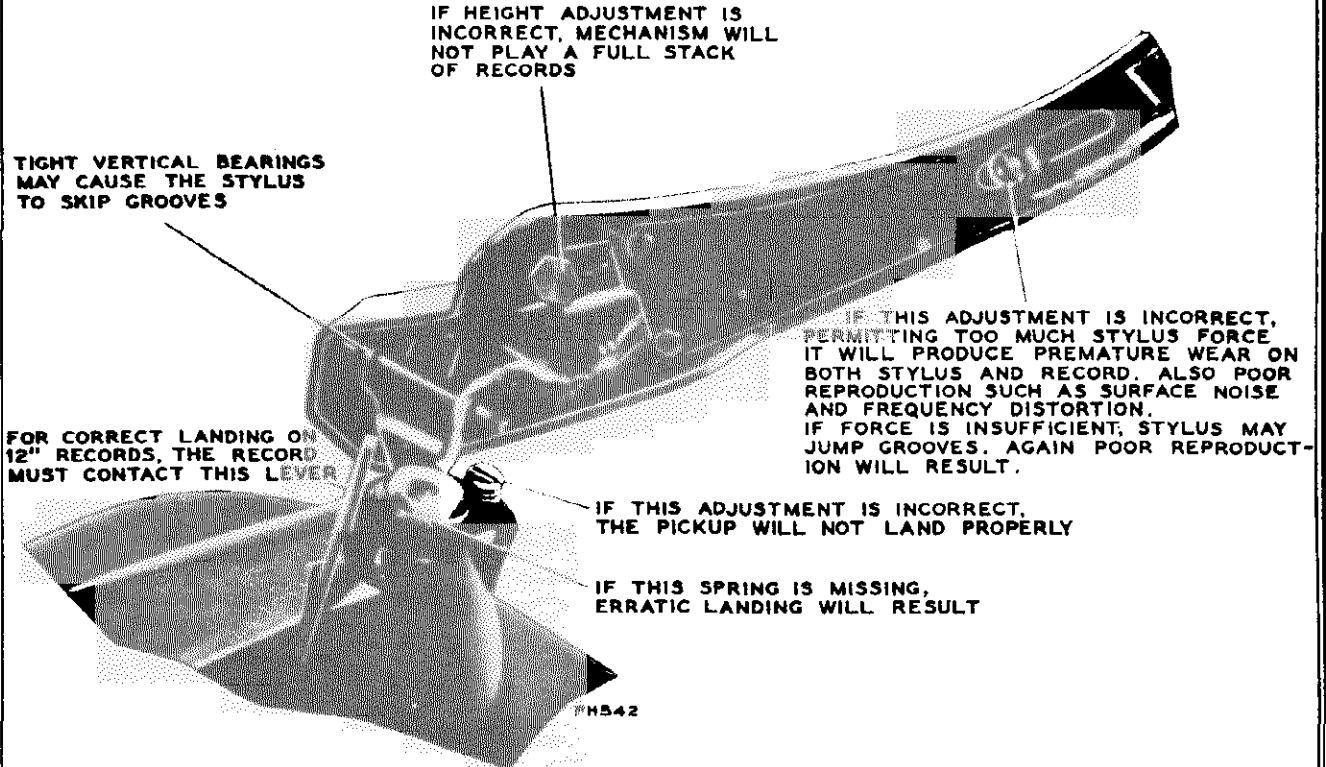
IF THIS NUT IS TOO LOOSE, MECHANISM MAY NOT TRIP

IF THIS SCREW IS LOOSE, THE RECORDS MAY NOT SEPARATE PROPERLY

PICKUP ARM LEVER MUST CONTACT TRIP SLIDE AS SHOWN, FOR MECHANISM TO TRIP

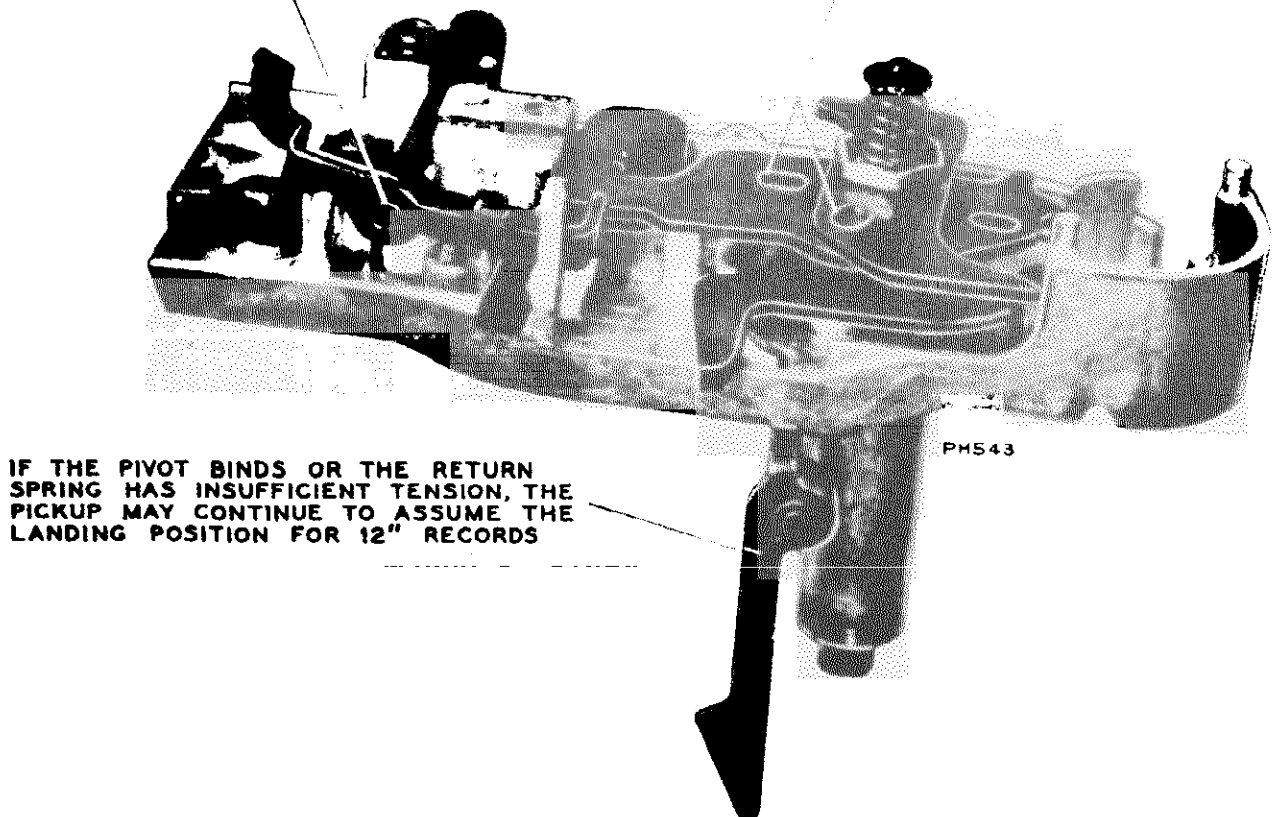
MODELS 960284-1,
960284-2

DO YOU KNOW?

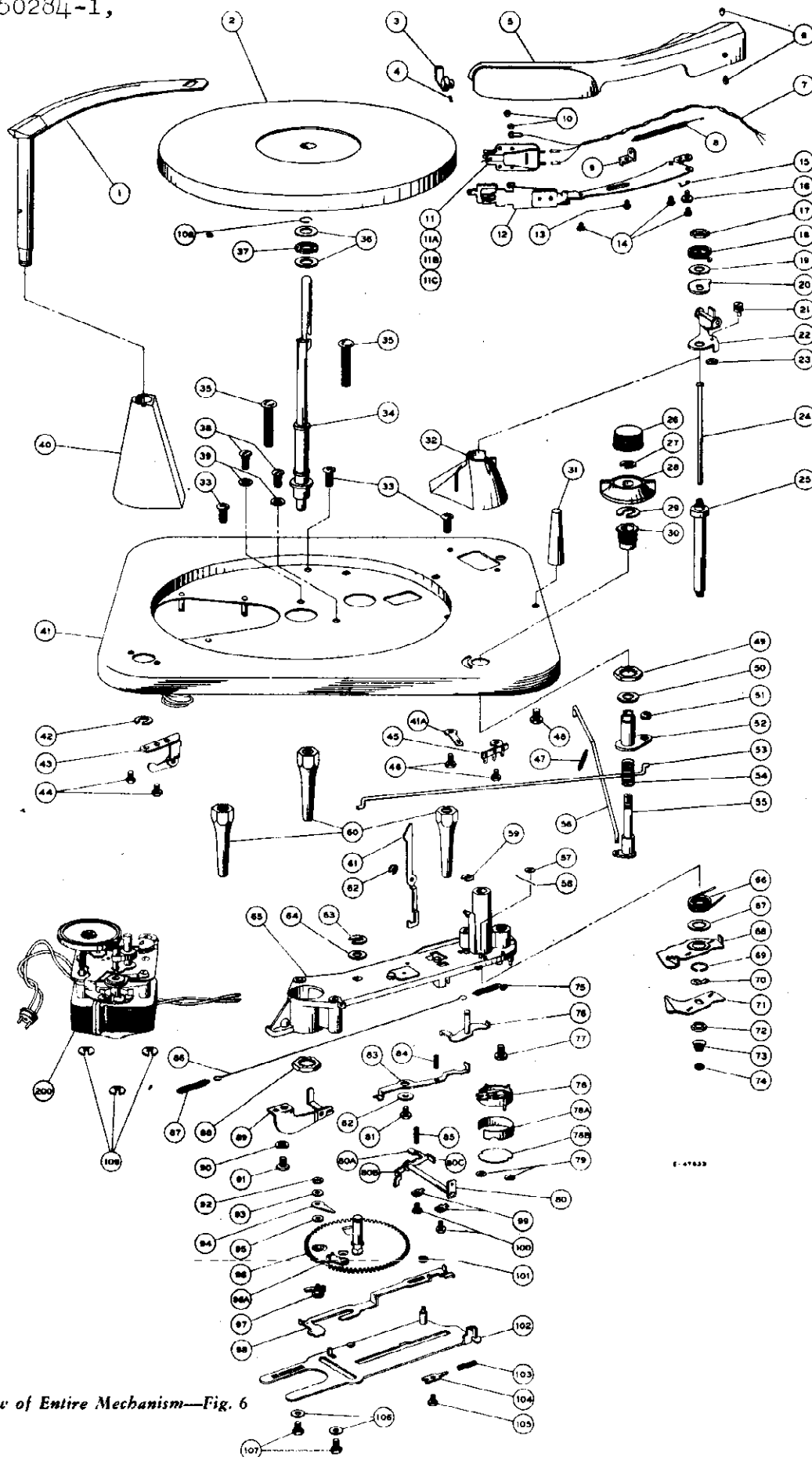


IF STOP LEVER BINDS, MECHANISM MAY STOP AUTOMATICALLY BEFORE STACK OF RECORDS HAS BEEN PLAYED

IF DIMPLES IN PICKUP ARM LEVER DO NOT ENGAGE HOLES IN PICKUP ARM RETURN LEVER, PICKUP LANDING WILL BE VERY ERRATIC

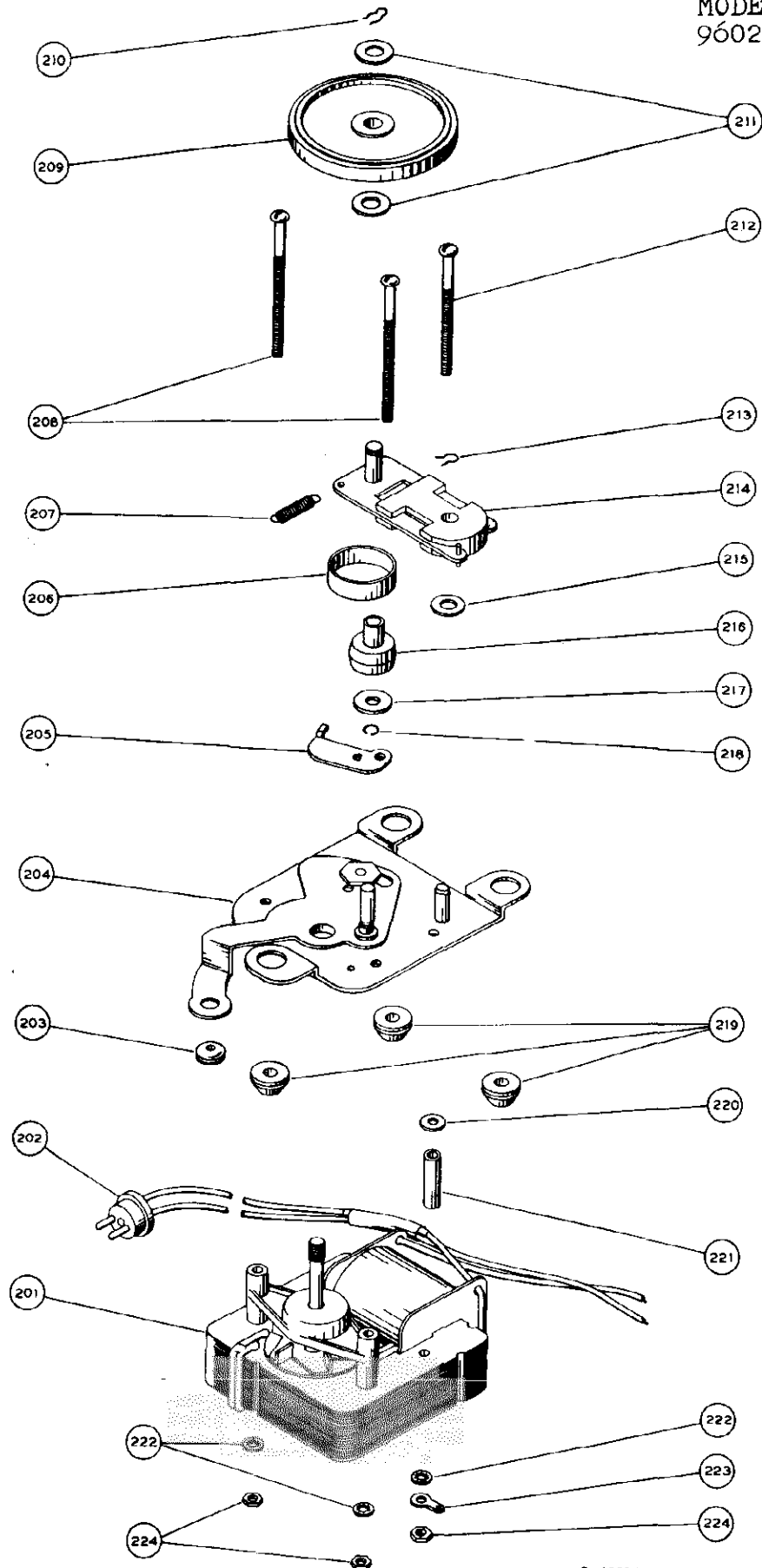


MODELS 960284-1,
960284-2



Exploded View of Entire Mechanism—Fig. 6

MODELS 960284-1,
960284-2



D-48864

Exploded View of Motor (60 cycles)—Fig. 5

MODELS 960284-1,
960284-2

REPLACEMENT PARTS

ILL. NO.	STOCK NO.	DESCRIPTION	ILL. NO.	STOCK NO.	DESCRIPTION
1	75802	Support—Record support complete with plastic cap (maroon) and pin for 960284-1	37	75355	Bearing—Thrust bearing
1	75803	Support—Record support complete with plastic cap (tan) and pin for 960284-2	38	—	Screw—#10-24 x $\frac{3}{16}$ " pan head machine screw to mount die-cast sub-assembly
1A	75804	Cap—Plastic cap (maroon) for record support assembly for 960284-1	39	—	Lockwasher—#10 internal tooth lockwasher to mount die-cast sub-assembly
1A	75805	Cap—Plastic cap (tan) for record support assembly for 960284-2	40	75832	Housing—Record support housing (plum hammertone) (die-cast) for 960284-1
2	75806	Turntable—Turntable and hub assembly	40	75874	Housing—Record support housing (light brown) (die-cast) for 960284-2
3	75264	Knob—Stylus selector knob complete with screw Ill. #4	41	—	Board—Motorboard (plum hammertone) complete with mounting springs, cable clamps and motor mounting studs for 960284-1
4	—	Screw—Screw for stylus selector knob (included in 75264, Ill. #3)	41	—	Board—Motorboard (light brown) complete with mounting springs, cable clamps and motor mounting studs for 960284-2
5	75807	Arm—Pickup arm shell only complete with "RCA Victor" emblem	41A	—	Lug—Terminal lug
6	75357	Pivot—Pickup arm pivot (2 required)	42	75385	Washer—"C" washer for record support shaft
7	75808	Cable—Three (3) wire pickup cable complete with connectors	43	75834	Arm—Stop arm assembly
8	75809	Spring—Pickup arm counterbalance spring (coil type)	44	—	Screw—#6 x $\frac{3}{16}$ " hex head self-tapping screw to mount record support housing and stop arm
9	75810	Bracket—Adjustment bracket for counterbalance spring	45	—	Board—Terminal board (3 contact)
10	—	Screw—Mounting screw for crystal	46	—	Screw—#6-32 x $\frac{1}{4}$ " hex head self-tapping screw to mount terminal board and pickup arm pivot housing
11	75475	Crystal—Two-way (33 $\frac{1}{3}$ /78 RPM crystal complete with styluses	47	75401	Spring—Reject rod return spring (coil type)
11A	75497	Stylus—Osmium tip stylus for 78 RPM section (not coded)	48	75830	Screw—#10 x $\frac{1}{2}$ " self-tapping cross-recessed head screw to mount arm rest
11B	75496	Stylus—Osmium tip stylus for 33 $\frac{1}{3}$ RPM section (coded "red")	49	—	Nut—Pal nut to mount threaded bushing Ill. #30
11C	74230	Nut—#00-112 nut and washer to mount stylus	50	75835	Washer—Bronze washer for control shaft
12	75811	Mount—Crystal mount and swivel assembly	51	75403	Grommet—Rubber grommet for motor speed control rod
13	—	Screw—#6-32 x $\frac{1}{8}$ " round head machine screw to mount counterbalance spring adjustment bracket	52	75836	Arm—Motor speed control arm and shaft assembly
14	71097	Screw—#4 x $\frac{1}{4}$ " self tapping screw for crystal mount and swivel assembly	53	75837	Rod—Motor speed control rod
15	75812	Spring—Lock spring (coil type) for height adjustment screw	54	75838	Spring—Compression spring for control lever shaft (coil type)
16	75813	Screw—Height adjustment screw (hex head)	55	75839	Arm—Function control arm and shaft assembly
17	—	Nut—Pal nut for mounting pickup arm bracket	56	75840	Rod—Reject rod
18	75814	Spring—Tension spring (coil type) for landing adjustment stud	57	75841	Nut—Speed nut for 12" indexing lever return spring
19	—	Washer—Metal (steel) washer for pickup arm pivot shaft ($\frac{1}{16}$ " x $\frac{1}{4}$ " I.D. x $\frac{1}{2}$ " O.D.)	58	75842	Spring—12" indexing lever return spring (formed)
20	75815	Cam—Landing adjustment cam	59	75392	Washer—"C" washer for mounting reject lever
21	75816	Stud—Landing adjustment stud (eccentric)	60	75843	Leg—Plastic leg
22	75817	Bracket—Pickup arm mounting bracket complete with pin	61	75844	Lever—12" indexing lever
23	75818	Nut—Speed nut for landing adjustment stud	62	75397	Washer—"C" washer for mounting 12" indexing lever
24	75819	Rod—Elevating rod	63	75373	Washer—"C" washer for mounting cycling gear
25	75820	Shaft—Pickup arm pivot shaft and sleeve	64	75845	Washer—Fibre washer for mounting cycling gear
26	75821	Knob—Function control knob (maroon) for 960284-1	65	75846	Casting—Main casting
26	75822	Knob—Function control knob (tan) for 960284-2	66	75847	Spring—Pickup arm return lever spring (coil type)
27	75399	Washer—"C" washer to mount function control arm and shaft assembly	67	75848	Washer—Fiber washer for pickup arm pivot shaft
28	75823	Knob—Motor speed control knob (maroon) for 960284-1	68	75849	Lever—Pickup arm return lever
28	75824	Knob—Motor speed control knob (tan) for 960284-2	69	75850	Retainer—Retainer ring for pickup arm return lever
29	75825	Washer—"C" washer to mount motor control arm and shaft assembly	70	75851	Washer—Spring washer for pickup arm pivot shaft
30	75826	Bushing—Threaded bushing for control shaft	71	75852	Lever—Pickup arm lever
31	75827	Rest—Pickup arm rest (maroon) for 960284-1	72	—	Nut—Pal nut to fasten pickup arm lever
31	75828	Rest—Pickup arm rest (tan) for 960284-2	73	75854	Spring—Thrust spring (coil type) for elevating rod
32	75829	Housing—Pickup arm pivot shaft housing (plum hammertone) (die-cast) for 960284-1	74	75397	Washer—"C" washer for elevating rod
32	75873	Housing—Pickup arm pivot shaft housing (light brown) (die-cast) for 960284-2	75	75855	Spring—Return spring (coil type) for stop lever
33	75830	Screw—#10 x $\frac{1}{2}$ self-tapping cross-recessed head screw to mount plastic legs	76	75856	Lever—Reject lever
34	75831	Spindle—Turntable spindle assembly	77	—	Screw—#10-24 x $\frac{5}{16}$ " round head machine screw and lockwasher
35	75377	Screw—Motorboard mounting screw ($\frac{1}{4}$ -20 x $\frac{1}{16}$ " round head—special)	78	75857	Switch—"On-Off" switch complete with insulating strip and cover
36	75354	Washer—Thrust washer for turntable bearing (2 required)	79	75841	Nut—Speed nut for fastening switch cover

MODELS 960284-1,
960284-2

REPLACEMENT PARTS

ILL. NO.	STOCK NO.	DESCRIPTION	ILL. NO.	STOCK NO.	DESCRIPTION
80	75858	Lever—Stop lever assembly (including 80A, B, C)	106	—	Washer—Brass washer for cycling slide
81	—	Screw—#6-32 x 1/4" hex head screw for selector lever	107	—	Screw—#6-32 x 1/2" hex head machine screw for mounting cycling slide
82	—	Washer—Flat washer (steel) for mounting selector lever	108	75353	Retainer—Turntable spindle thrust bearing assembly retainer
83	75859	Lever—Selector lever	109	75876	Washer—"C" washer for mounting motor
84	75860	Spring—Return spring (coil type) for selector lever	200	75333	Motor—117 volt. 60 cycle, complete with top plate, idler wheel and drive belt
85	75861	Spring—Return spring (coil type) for stop lever	202	30870	Connector—2 contact male connector for motor leads
86	75862	Link—Control link	203	75403	Grommet—Rubber grommet for motor speed change tie rod (2 req'd)
87	75863	Spring—Return spring (coil type) for stop arm	204	75426	Plate—Motor top plate including speed change carriage, 3 mounting grommets and 1 speed change lever grommet
88	—	Nut—Pal nut for spindle	205	75431	Plate—Friction guide plate
89	75864	Arm—Lift arm	206	75376	Belt—Rubber belt for motor drive shaft
90	—	Lockwasher—Internal teeth lockwasher (#10) for lift arm mounting screw	207	75383	Spring—Tension spring for idler wheel
91	—	Screw—#10-24 x 3/16" round head machine screw for lift arm	208	—	Screw—#6-32 x 2" round head machine screw to mount top plate to motor
92	75397	Washer—"C" washer for mounting trip pawl	209	75382	Wheel—Idler wheel
93	75396	Washer—Fibre washer for trip pawl shaft	210	75380	Spring—Hairpin spring for idler wheel
94	75865	Pawl—Trip pawl—upper	211	75433	Washer—Dampening washer for idler wheel (2 req'd)
95	75395	Washer—Spring washer for trip pawl shaft	212	—	Screw—#6-32 x 2 1/4" round head machine screw to mount top plate to motor
96	75866	Gear—Cycling gear complete with shaft and engagement lever	213	75432	Spring—Hairpin spring to mount idler carriage
96A	—	Lever—Engagement lever—part of Ill. 96	214	75430	Carriage—Idler carriage
97	75867	Pawl—Trip pawl—lower	215	75433	Washer—Fibre washer
98	75868	Slide—Trip slide	216	75429	Pulley—Drive pulley and shaft assembly for 33 1/3 RPM
99	75869	Strip—Bearing strip for stop lever shaft	217	75428	Washer—Felt washer
100	—	Screw—#4-40 x 1/4" hex head screw for mounting stop lever shaft bearing strips	218	75427	Retainer—Retainer ring for drive pulley and shaft
101	75397	Washer—"C" washer for mounting trip slide	219	75386	Grommet—Rubber grommet to mount motor (3 req'd)
102	75870	Slide—Cycling slide and cam assembly	220	—	Washer—Flat metal washer
103	75871	Spring—Stabilizing spring (coil type) for cycling slide	221	—	Spacer—Metal spacer to mount top plate to motor
104	75872	Plate—Bearing plate for cycling slide	222	—	Lockwasher—#6 internal teeth
105	—	Screw—#6-32 x 1/2" hex head machine screw for mounting cycling slide bearing plate	223	—	Luq—Terminal lug
			224	—	Nut—#6 hex nut

LUBRICATION

The mechanism is properly lubricated when it leaves the factory, so no lubrication should be necessary for a long period of time. If, however, the mechanism has unusual use or high operating temperatures, it may be necessary to add additional lubrication.

It is suggested to use Lubriplate or STA-PUT No. 512 to:

- Pickup arm pivot.
- Points of sliding contact with cycling slide, including:
 - elevating rod
 - lift arm
 - roller on cycling cam
 - pickup arm return lever
 - pickup arm lever
- End of selector lever contacting tab on cycling gear.
- Turntable thrust bearing.

- Sparingly on a trip slide.
- All points of sliding contact.

Apply a small quantity of light machine oil #10 or Singer Sewing machine oil to:

- Trip pawl pivot.
- Cycling engagement pawl pivot.
- Bearing of record support.
- Elevating rod.
- Bearing of lift arm.
- Bearing of reject lever.
- Bearing of stop lever.
- Bearing of cycling gear.
- Motor bearings.

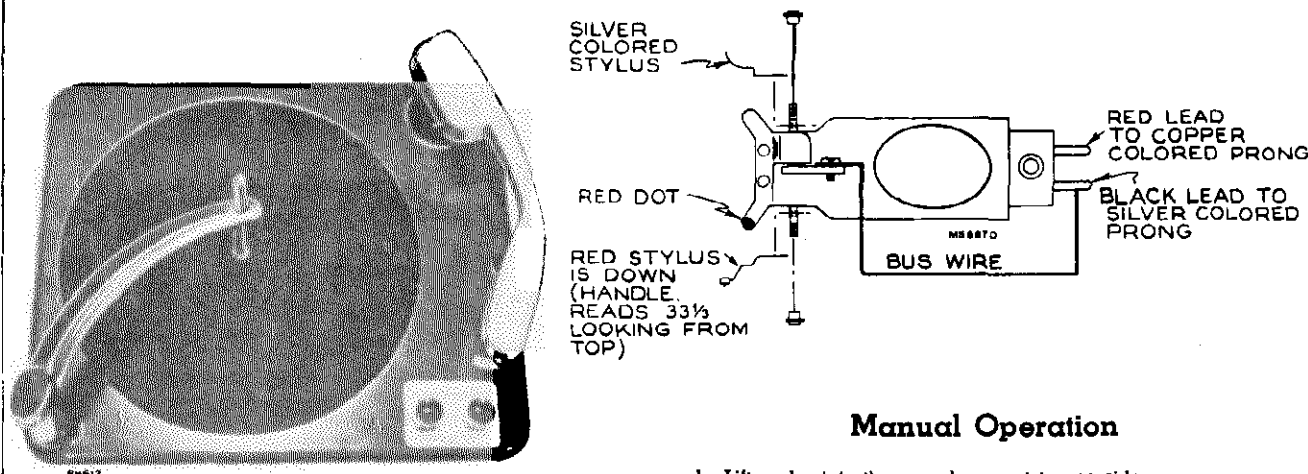
NOTE: Keep oil or grease away from all rubber parts.

MODEL 960285-1

PICKUP INFORMATION

Pickup force should be approximately 8 to 10 grams. This force is determined by the design of the pickup and arm assembly.

However, a tight vertical bearing in the pickup arm will tend to have the same effect as insufficient pickup force.



Features

1. This record changer is a center support intermix mechanism designed to play automatically a series of records up to ten 12-inch, twelve 10-inch, or ten intermixed records of the standard 78 RPM type. It will also play a series of the long playing 33-1/3 RPM type of similar diameter.
2. The mechanism is equipped with a light weight dual stylus pickup cartridge which can be selected by turning a knob in the end of the pickup arm.
3. The mechanism will automatically stop and the pickup arm return to the rest position after the mechanism has played the last selection of the stack.
4. The automatic tripping device is of the acceleration type.
5. The speed change is accomplished by a single control mounted on the motorboard.

Automatic Operation

1. Lift and rotate the record support to one side.
2. Place a stack of records over the center post.
3. Rotate the record support so the center post will extend through the hole in the end of the support.
4. Turn the speed control to select the proper speed.
5. Rotate the knob in the end of the pickup arm to the proper numeral corresponding to the turntable speed.
6. Turn the function control knob to reject and release. The mechanism will play one side of each record of the stack until the last selection has been played at which time it will stop automatically.
7. To reject a record being played, turn the function control knob to reject and release.
8. To remove records, lift and turn the record support to one side.
9. Lift the stack of records straight up.

Manual Operation

1. Lift and rotate the record support to one side.
2. Place the record to be played on the turntable (tilt slightly) to slide over the stop in the center post.
3. Set the speed and pickup cartridge controls properly.
4. Turn function control to reject and release. (Allow mechanism to complete cycle.)
5. Place the record support (2) over the spindle, permitting it to rest on the step of the spindle.
6. The mechanism will play the record after which it will stop automatically.

Lubrication

The mechanism is properly lubricated when it leaves the factory, so lubrication should not be necessary for a long period of time. If, however, the mechanism has unusual use or high operating temperatures, it may be necessary to add additional lubrication.

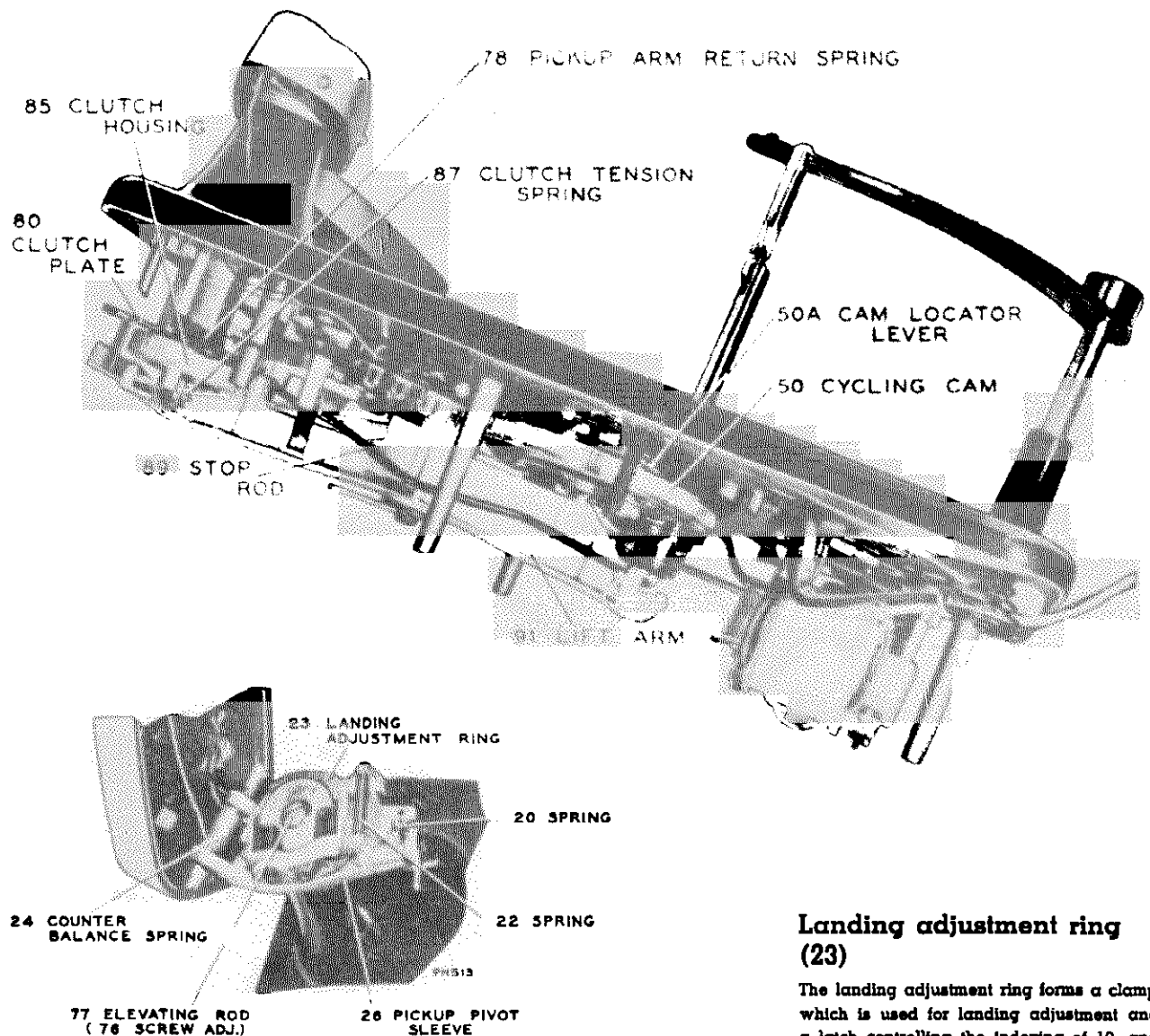
It is suggested to use Lubriplate or STA-PUT No. 512 to:

1. Pickup pivot bushing (27).
2. Frictional contact on the clutch assembly.
3. Lift arm bearing and cam faces.
4. Spring contact on stop rod (89).
5. Channel on cycling cam (50).
6. Roller on end of center post (39), ball bearing races 5-6-7.
7. Trip slide (71).
8. All frictional contacts and gears in general.

Apply a small quantity of light oil No. 10 or Singer Sewing machine oil to:

1. Trip dog (52).
2. Motor bearings.
3. Control levering bearing (59).
4. Record support bearing (2).

NOTE: Keep oil or grease away from all rubber parts.



Functions of Principal Levers

Control lever (59A)

The function of the control lever is to actuate both the reject rod (40) and the power switch (66). It is also engaged by the stop rod (89) causing the mechanism to stop automatically after the last selection has been played.

Trip slide (71)

The trip slide consists of a long thin piece of brass which actuates the lower trip dog to start automatic tripping.

Stop rod (89)

The stop rod consists of a long rod running lengthwise along the side of the lift arm (91). The function of the stop rod is to engage the control lever and stop the mechanism after the last selection has been played.

Lift arm (91)

Lift arm functions as a main tie between the cycling cam (50) and the other parts of the mechanism. It also directs the separation of the records and the movement of the pickup arm.

Centerpost (39)

The center post functions as a support for the stack of records and also provides a means of record separation by the mechanism inside the center post.

Record support (2)

The record support performs the function of stabilizing the stack of records. It also clamps the push off mechanism built inside the center post which in turn controls the stopping of the mechanism after the last selection has been played.

Landing adjustment ring (23)

The landing adjustment ring forms a clamp which is used for landing adjustment and a latch controlling the indexing of 10- and 12-inch records.

Reject rod (40)

The reject rod forms a tie between trip dog and control lever (59A).

Upper trip dog (52)

The trip dog consists of a small piece of hardened steel mounted on the main cycling cam. The contact between the off-set on the turntable shaft and the trip dog cause the teeth of the cam and the teeth of the turntable shaft to engage thereby starting change cycle.

Lower trip dog (60)

The lower trip dog is in contact with trip slide (71) when tripping. It is connected by friction to the shaft of upper trip dog thereby providing the necessary take up to prevent the pickup from skipping grooves when tripping starts.

MODEL 960285-1

71 TRIP SLIDE

60 LOWER TRIP
DOC

PH516

75 SPEED CHANGE ROD

59A CONTROL LEVER

66 AC SWITCH

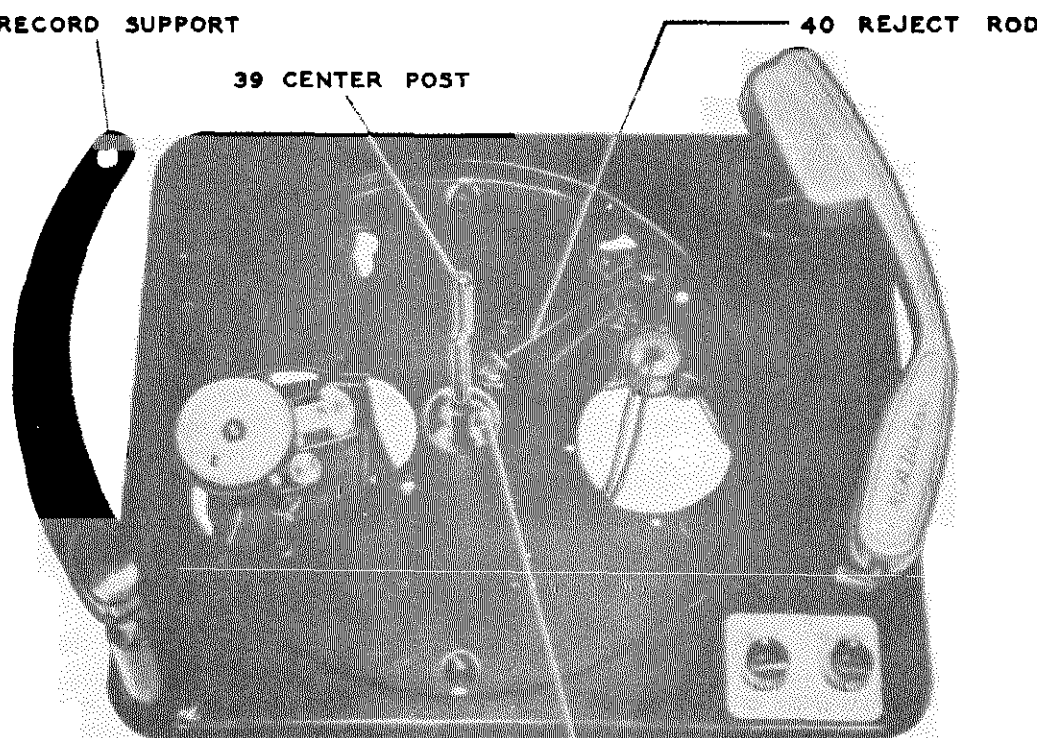
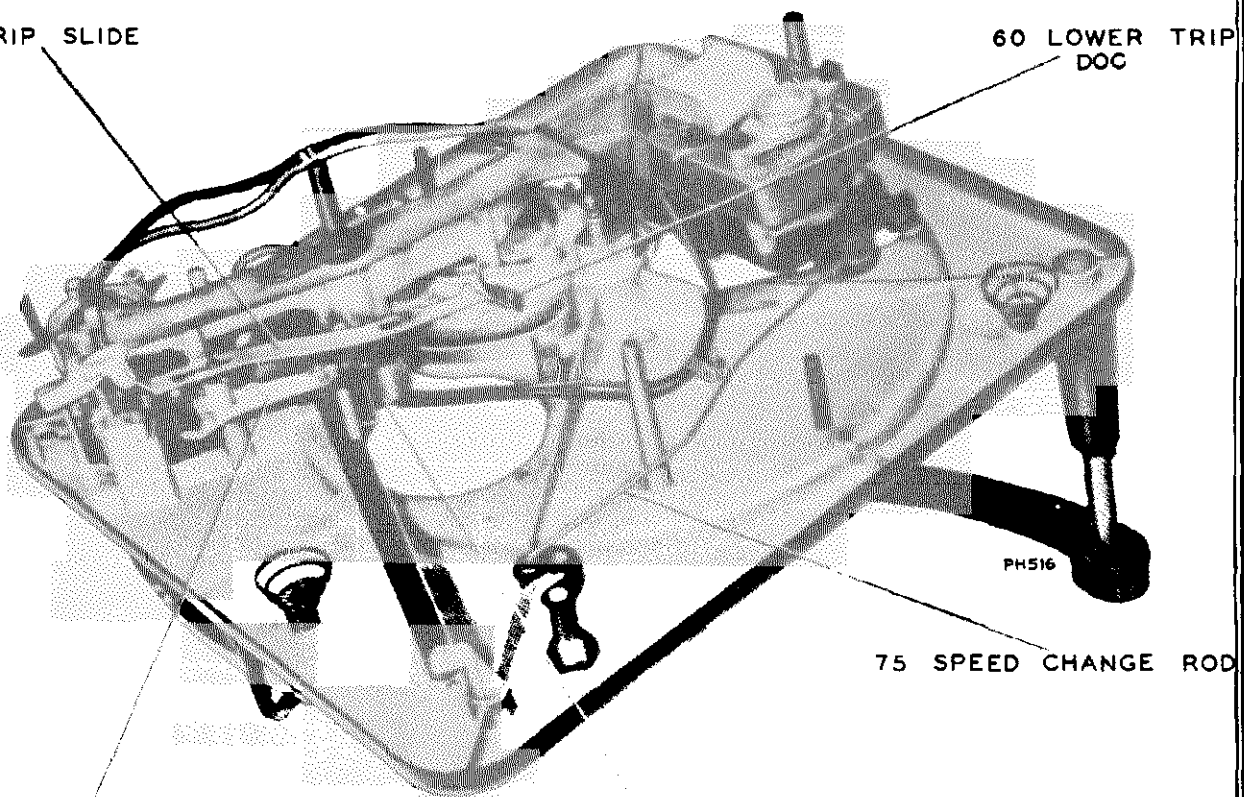
2 RECORD SUPPORT

39 CENTER POST

40 REJECT ROD

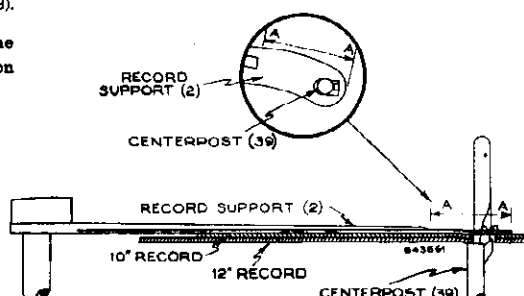
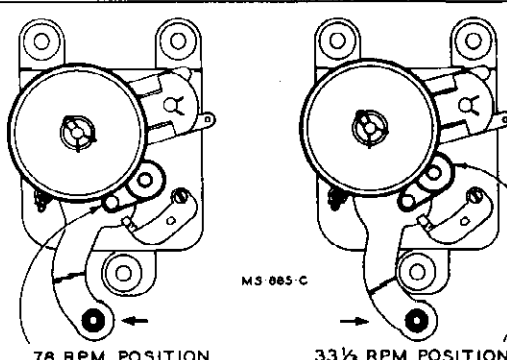
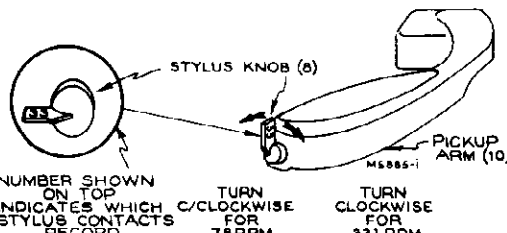
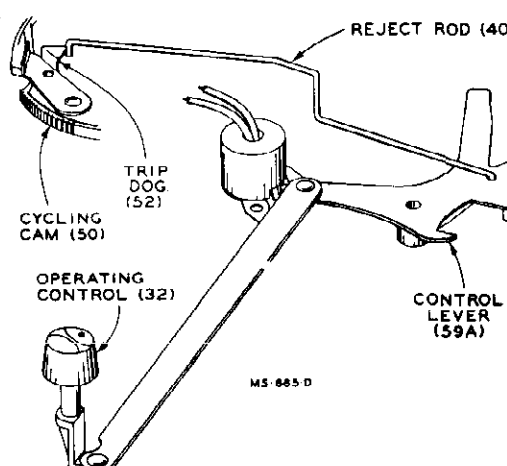
PH514

52 TRIP DOG



Cycle of Operation

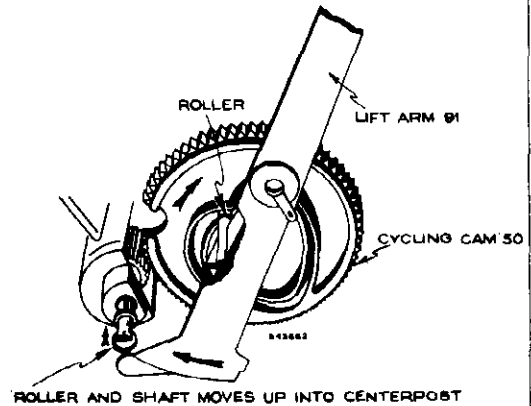
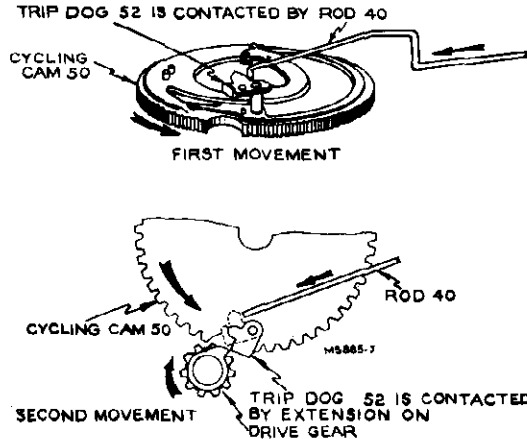
NOTE: In the cycle of operation it is assumed the mechanism has stopped automatically with the pickup arm on the rest.

FUNCTION	DESCRIPTION
Place a stack of records over the center post (intermixed if so desired). Place the record support over the center post.	<ol style="list-style-type: none"> 1. The stack of records rest on the step in the center post (39). 2. The hole in the end of the record support (2) permits the end of the support to slide over the center post and rest on the stack of records. This stabilizes the records. 
Turn the speed selector knob to 78 or 33-1/3 rpm position.	<ol style="list-style-type: none"> 1. The speed change is accomplished by shifting to either of two shafts on the motor which are rotating at different speeds. The additional shaft is connected by a small rubber belt (36). 
Rotate the knob to select the proper stylus.	<ol style="list-style-type: none"> 1. The rotation of the stylus knob (8) selects the proper stylus depending on the type of record to be played. 
Rotate control knob to reject position and release.	<ol style="list-style-type: none"> 1. The operating control actuates control lever (59A) which in turn actuates the power switch. This starts the turntable rotating. 2. Further rotation of the control knob moves the reject rod (40) sufficiently to actuate the trip dog (52) which starts change cycle. 

MODEL 960285-1

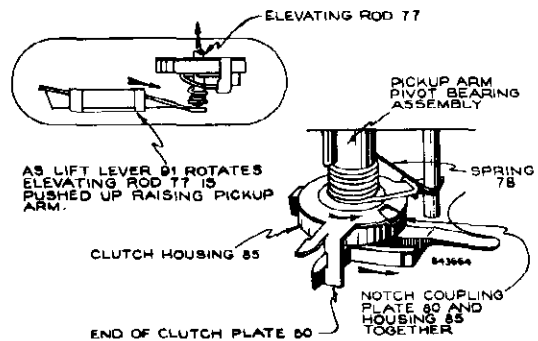
Cycling starts.

1. The reject rod (40) has moved the trip dog (52) sufficiently for the off-set in the rotating turntable shaft to engage and tend to push it away.
2. Since the trip dog (52) is mounted on the edge of the cycling cam (50) the movement rotates the cam and in so doing, causes engagement between the teeth in the turntable shaft and the cycling cam. This engagement starts change cycle.
3. As the cycling cam rotates, a small roller mounted on the lift arm (91) follows the track formed in the cycling cam (50). This engagement causes the lift arm (91) to start rotating in a clockwise direction (viewed from the bottom).
4. The rotation of the lift arm (91) also causes contact with the small roller connecting the push-off mechanism inside the center post. This contact pushes the small roller and shaft upward.



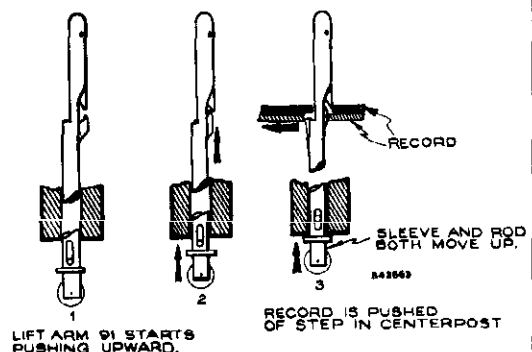
The pickup rises and remains outside turntable area.

1. While the lift arm (91) is rotating the end directly under the pickup arm pivot engages the elevating rod (77) and raises the pickup.
2. The pickup has been setting on the rest so it moves out very little when the lift arm (91) is rotating in a clockwise direction (viewed from bottom).
3. At this same time the extended end of the lift arm (91) contacts end of clutch plate (80) rotating it in a clockwise direction (viewed from bottom) against the tension of spring (78).
4. Since both the clutch plate (80) and housing (85) are rotated to the extreme clockwise direction, the clutch plate is engaged in a notch in the clutch housing which couples the two together.



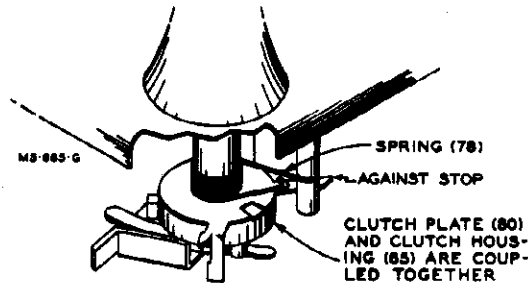
Record drops to turntable.

1. The upward movement of the push-off mechanism actuates the small lever embedded in the center post to engage the center hole of the record and push the record off the step permitting it to drop to the turntable.

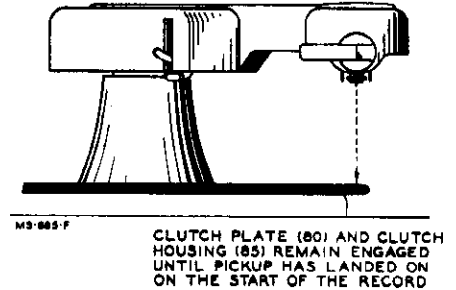


The pickup moves in for landing.

1. The next instant the lift arm (81) starts rotating in a counter-clockwise direction (viewed from bottom) returning to normal out of cycle position. The separator mechanism returns to normal, and the pickup arm is pushed in by the force produced by the expanding spring (78).



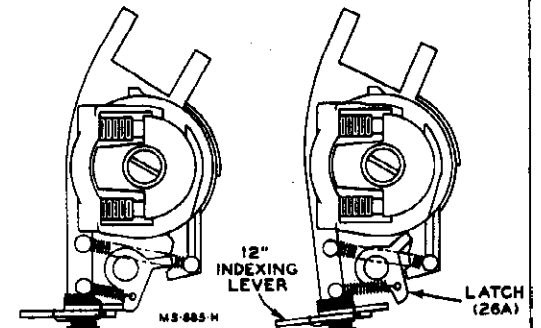
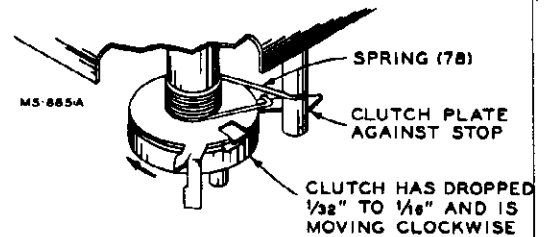
2. The pickup arm continues to be pushed in until the end of the clutch plate (80) comes against the stop. At this instant the pickup is directly over the landing point on the record.



The pickup lands.

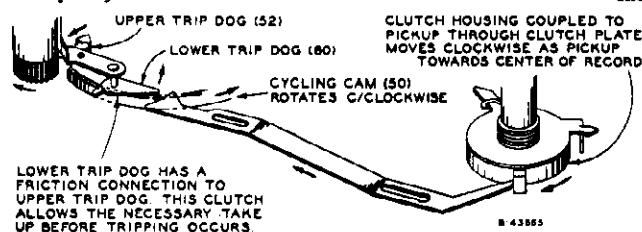
1. The clutch housing (85) is lowered slightly unlatching the clutch plate (80). This unlatching permits free movement of the pickup arm.
 2. The pickup is at this moment landing on the record.
- NOTE: It should be made clear at this time that the pickup arm, landing adjustment ring (23), pivot sleeve (26), bushing (27), pivot (82) and clutch assemblies (78 to 88) move horizontally as one unit inside the pivot housing on the motorboard. In addition the pickup pivot sleeve (26) rotates in respect to the bushing (27) in approximately a 5 or 10 degree arc. This movement determines the difference in the landing position on ten- or twelve-inch records.

As the pickup arm is moved out with each change cycle, the landing adjustment ring (23) is latched to the pickup pivot sleeve (26) through the latch (26A). If a ten-inch record drops to the turntable, the latch remains engaged and the pickup lands on the ten-inch record. On the other hand, if a twelve-inch record drops to the turntable, the edge of the record contacts the small lever at the side of the pickup arm and unlatches the pickup adjustment ring (23). This unlatching allows the pickup to position for landing on twelve-inch records.

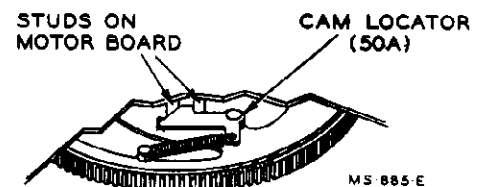


Change cycle is completed and record plays.

1. The change cycle is completed as the cam locator lever (50A) engages the two studs extending from the bottom of the motor board. This permits the drive gear on the turntable shaft to rotate in the cut away section of the cycling cam.
2. As the record plays, the pickup moves in toward the center of the record carrying the trip slide (71) along because of the contact made with the projection on the clutch housing which is rotating with the pickup arm pivot.
3. The trip slide (71) moves the trip dog (52) slightly with each revolution of the record, but this movement is reversed each time the off-set on the turntable shaft comes in contact with the trip dog (52). The back movement is taken up in the friction connection between the upper and lower trip dog.



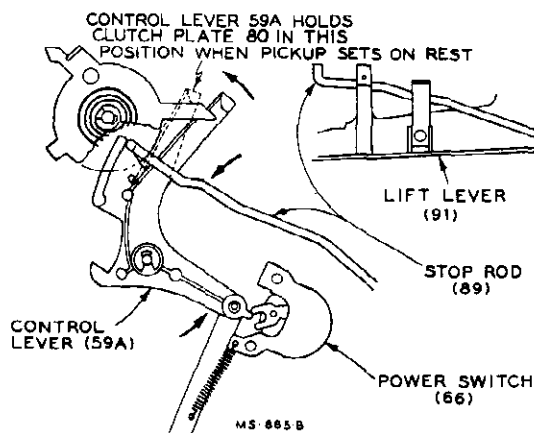
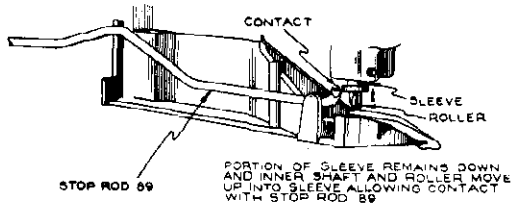
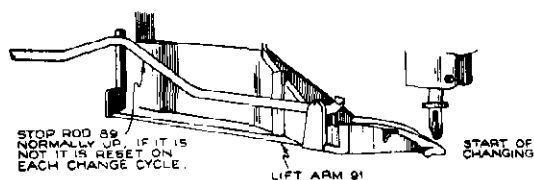
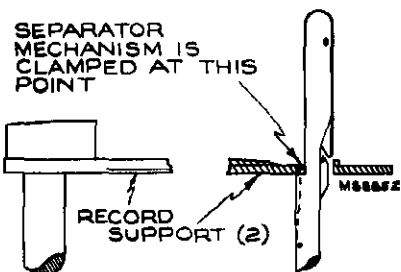
4. The trip dog (52) is mounted on the edge of the cycling cam (50) at such an angle that as long as the pickup moves in at a constant rate of speed the projection contacts the trip dog (52) along the side and pushes it back. When the pickup leaves the recorded section of the record, the rapid acceleration results in the rapid movement of the trip dog (52). The dog assumes such an angle that the off-set on the turntable shaft contacts the end and rotates the cycling cam sufficiently to cause engagement between the teeth of the cycling cam and teeth in the turntable shaft. This starts change cycle.



MODEL 960285-1

Pickup raises and moves out.

1. After the mechanism has been tripped, the pickup moves out from action of the lift arm on the clutch assembly which is linked to pickup arm.
2. The mechanism again follows the preceding sequence of dropping and playing records until the last record of the stack has been played.
3. After the last selection has been played and the mechanism again goes into change cycle, the support post (2) has dropped sufficiently for the hole in the end to clamp and stop the push-off action built in the center post.
4. Since the push-off action is blocked and the lift arm (91) tends to push up on the separator mechanism, the shaft mounting the small roller moves up into the brass sleeve instead of the entire assembly moving up.
5. The brass sleeve remaining down forming a stop for the end of the stop rod (89) which is mounted on the side of the lift arm (91). This contact causes it to rotate when the lift arm moves by.
6. The bent-up end of the stop rod (89) nearest the pickup arm pivot engages the control lever (59A).
7. The engagement between the stop rod (89) and the control lever (59A) turns the power switch off and also holds one end of the clutch plate causing the pickup to set down on the rest instead of the record.
8. The cycle is completed when the cycling cam becomes disengaged from the gear on the turntable shaft. This is accomplished by a cut-away section of the cam.



ADJUSTMENTS

Approximate Landing Adjustment (if pickup arm assembly has been removed).

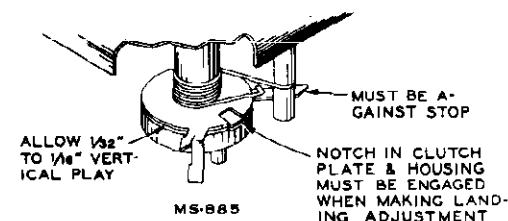
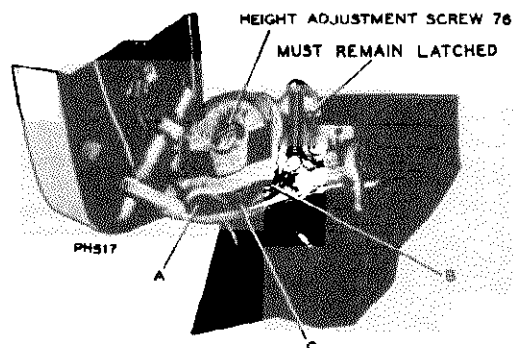
1. Remove power from mechanism.
2. Place a ten inch record on turntable.
3. Rotate turntable by hand until the pickup is just ready to land. Make sure the notch in the clutch plate remains engaged with clutch housing. The end of the clutch plate must be against stop also.
4. Hold the clutch and plate assembly. Loosen the set screw "C" and move the pickup into the approximate landing position.
5. Allow approximately $1/32"$ to $1/16"$ vertical play in pickup pivot shaft. (This vertical play is critical.)
6. Tighten set screw "C."

Exact Landing Adjustment.

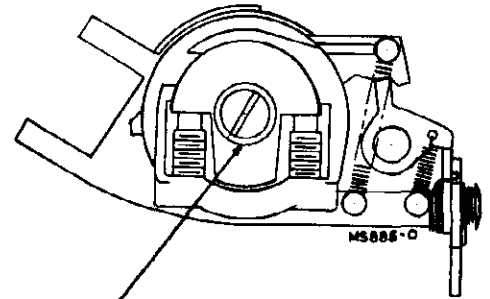
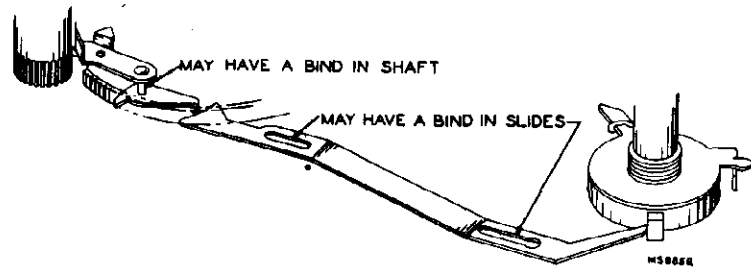
1. Remove power from mechanism.
2. Place a ten inch record on turntable.
3. Rotate turntable by hand until pickup is about ready to land.
4. To move pickup in, loosen set screw "A" a few turns and tighten "B."
5. To move the pickup out, loosen set screw "B" a few turns and tighten "A."

Pickup Arm Height.

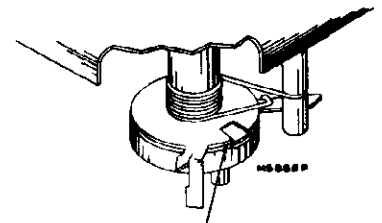
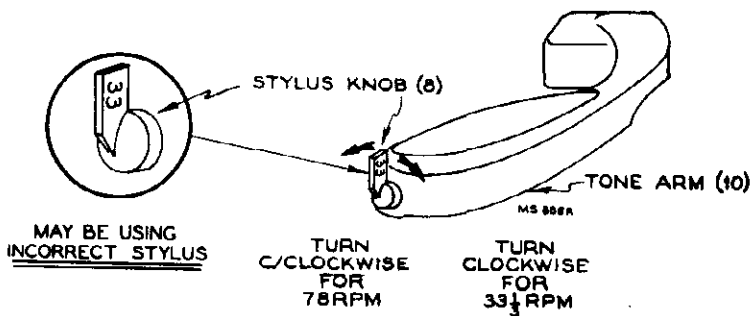
Adjust screw (76) in the end of the elevating rod so the under side of pickup arm clears the rest by $1/8"$ to $3/16"$ during change cycle.



PICKUP SKIPS GROOVES

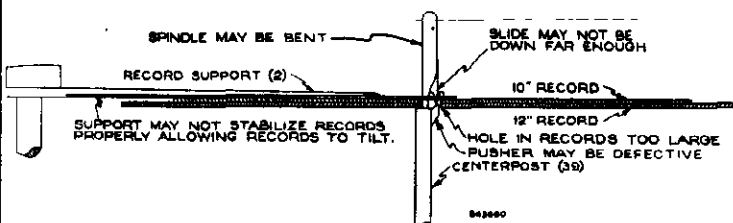
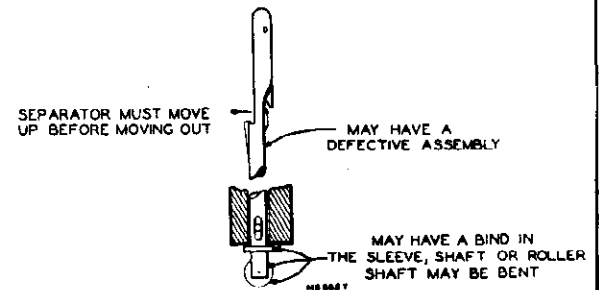
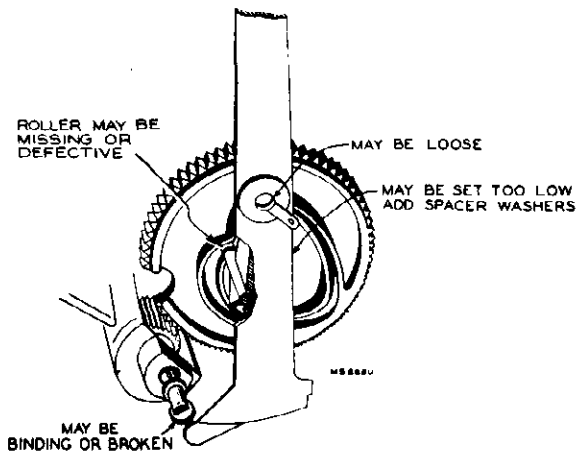


ELEVATING ADJUSTMENT
MAY BE SET TOO HIGH

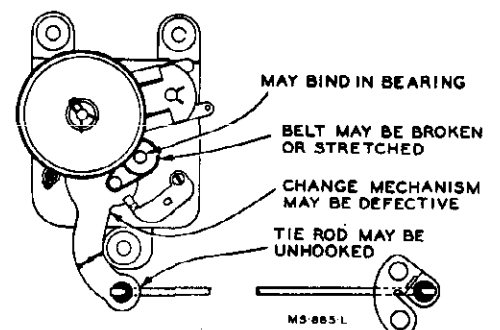


INSUFFICIENT VERTICAL PLAY
IN PICKUP PIVOT SHAFT MAY
PREVENT UNLATCHING OF CLUTCH,
SKIPPING OF GROOVES MAY RESULT

FAILURE TO SEPARATE RECORDS PROPERLY

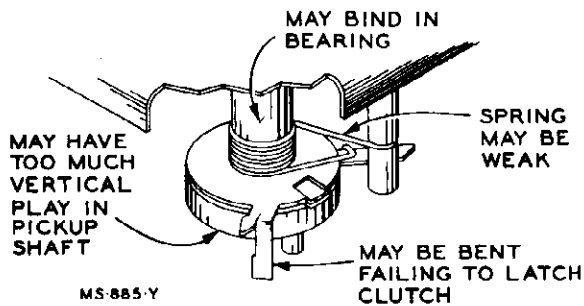


FAILS TO CHANGE SPEED

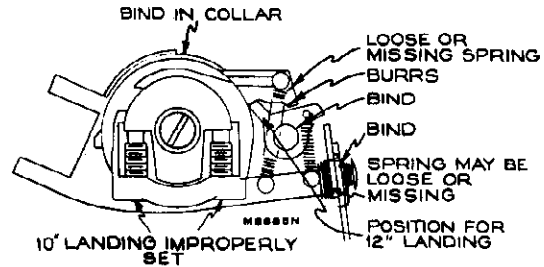


MODEL 960285-1

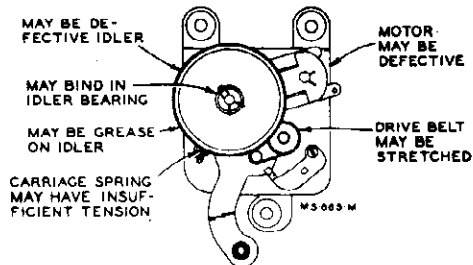
PICKUP FAILS TO LAND PROPERLY



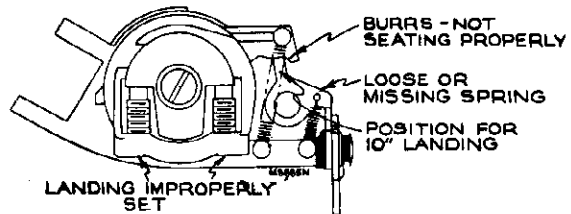
PICKUP FAILS TO LAND CORRECTLY ON 12" RECORDS



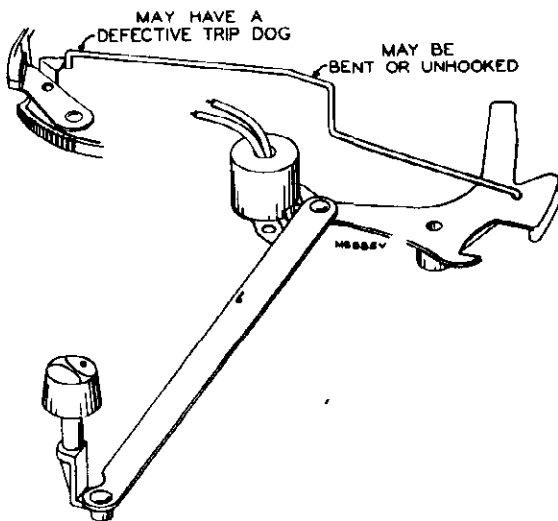
"WOW" OR SPEED VARIATION



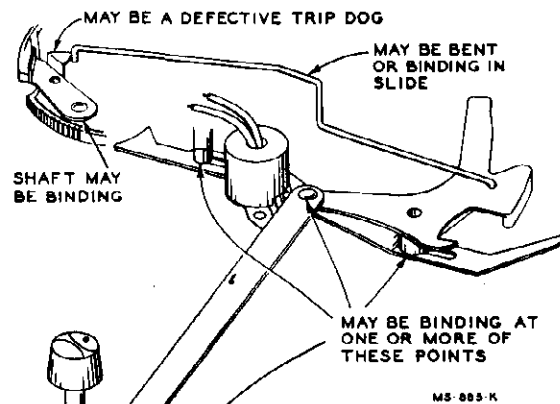
PICKUP FAILS TO LAND CORRECTLY ON 10" RECORDS



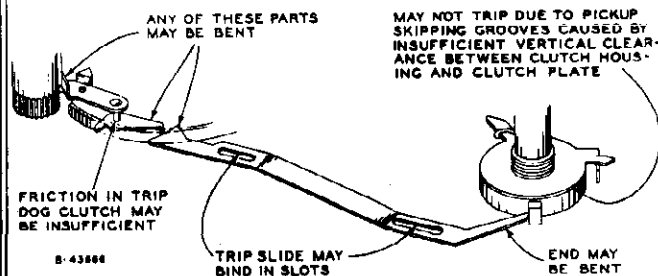
REJECT CONTROL DOES NOT FUNCTION



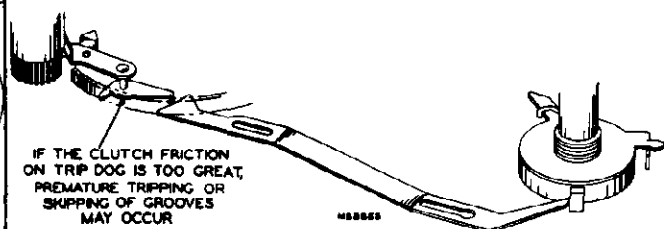
CONTINUOUS TRIPPING



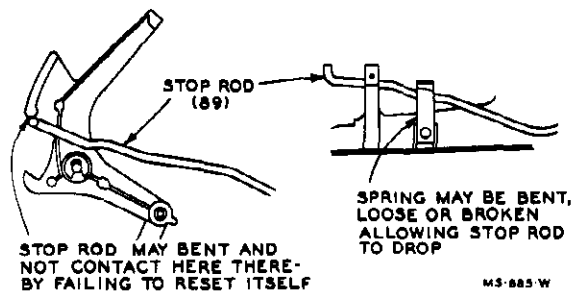
FAILURE TO TRIP



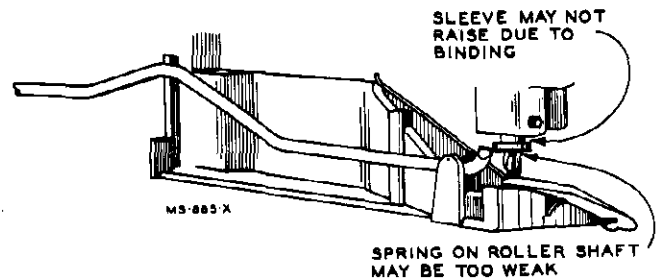
PREMATURE TRIPPING



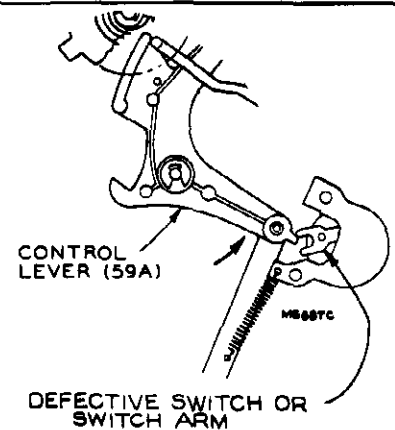
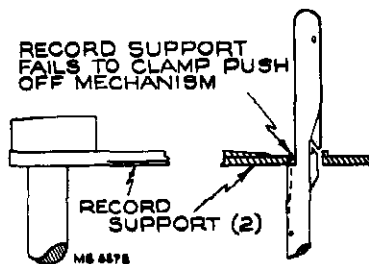
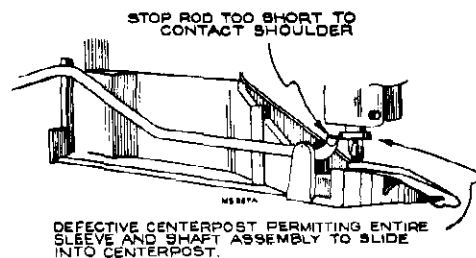
PICKUP SETS DOWN ON REST INSTEAD OF RECORD



MECHANISM SHUTS OFF PREMATURELY



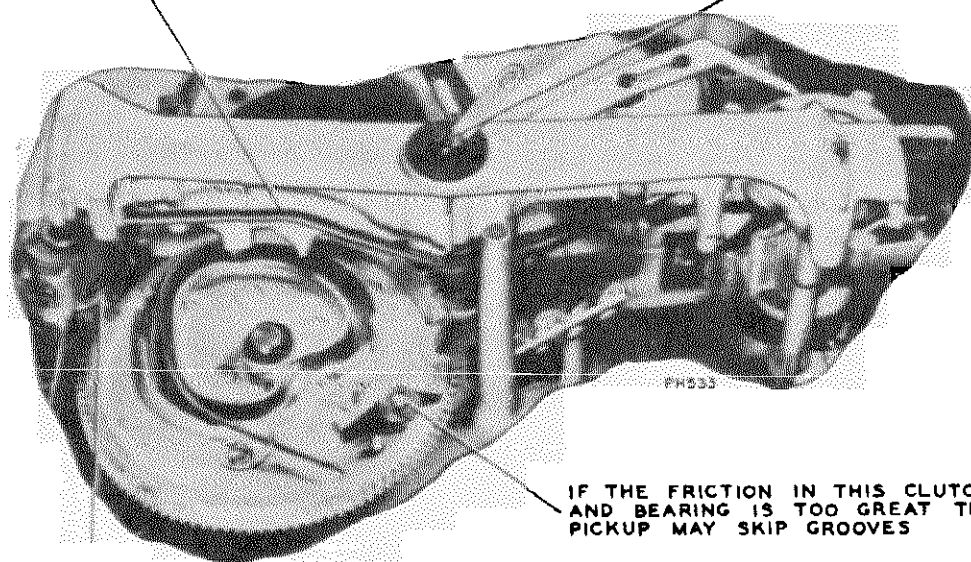
MECHANISM FAILS TO STOP AUTOMATICALLY



DO YOU KNOW?

THE STOP ROD MUST REMAIN DOWN AS SHOWN FOR THE PICKUP TO LAND ON AND PLAY THE RECORD

IF THIS SCREW IS LOOSE THE MECHANISM WILL FAIL TO SEPARATE RECORDS PROPERLY AND ALSO THE PICKUP WILL FAIL TO LAND PROPERLY



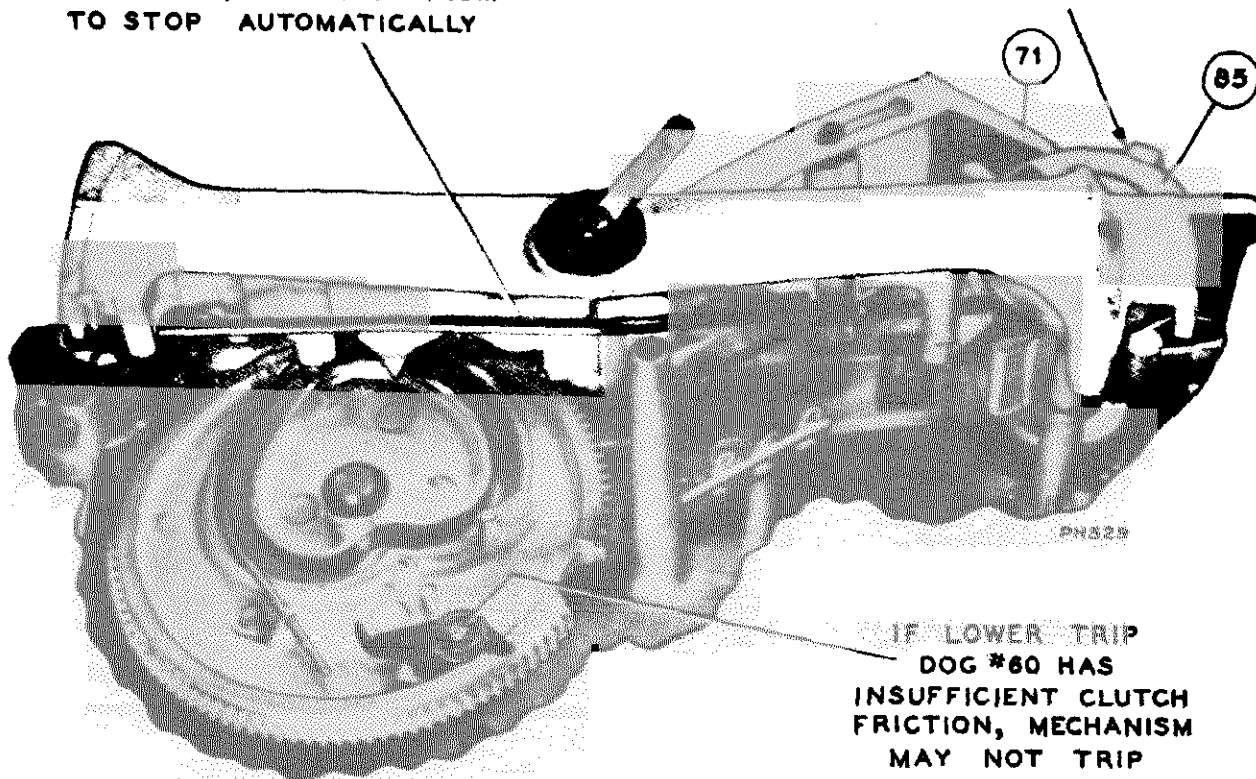
IF THE FRICTION IN THIS CLUTCH AND BEARING IS TOO GREAT THE PICKUP MAY SKIP GROOVES

IF THE THRUST BEARING IS DEFECTIVE RUMBLE OR "WOW" MAY RESULT

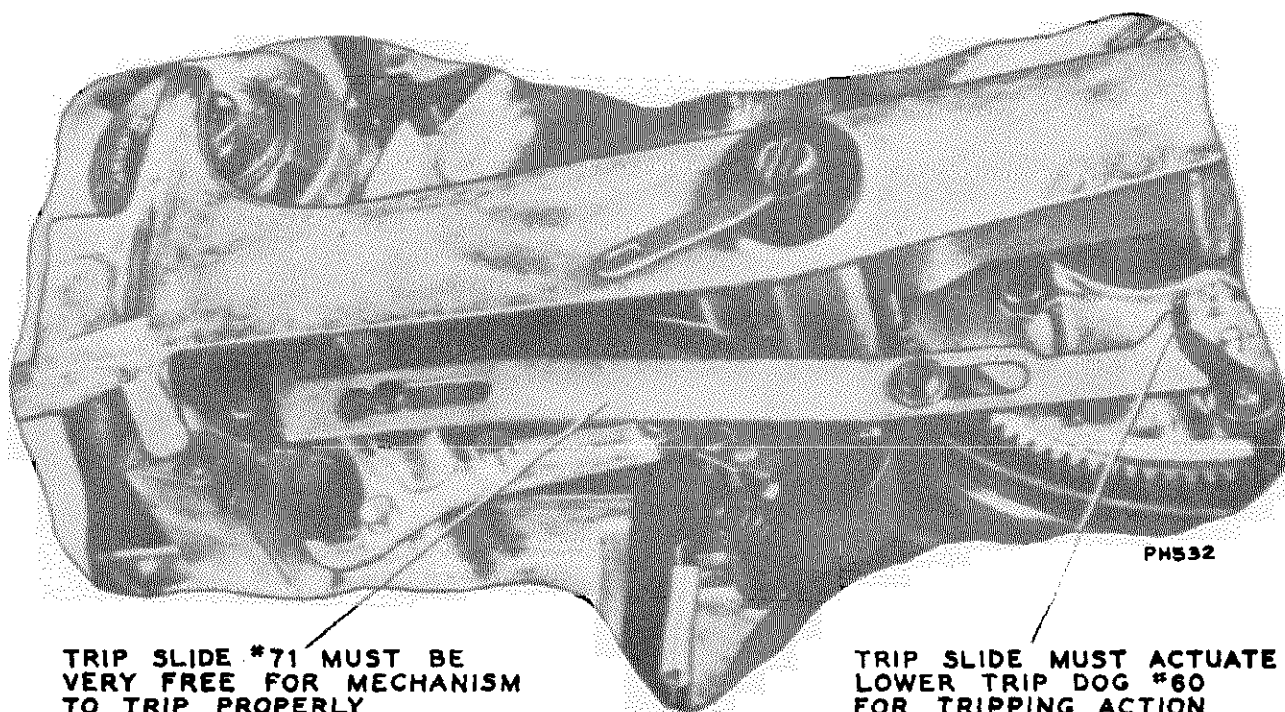
MODEL 960285-1

THIS STOP ROD *89 MUST BE UP
AS SHOWN, FOR MECHANISM
TO STOP AUTOMATICALLY

IF END OF TRIP SLIDE
*71 IS BENT IT MAY NOT
CONTACT HERE THEREFORE
MECHANISM WILL NOT TRIP



IF LOWER TRIP
DOG *60 HAS
INSUFFICIENT CLUTCH
FRICTION, MECHANISM
MAY NOT TRIP

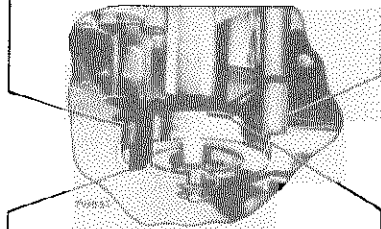


TRIP SLIDE *71 MUST BE
VERY FREE FOR MECHANISM
TO TRIP PROPERLY

TRIP SLIDE MUST ACTUATE
LOWER TRIP DOG *60
FOR TRIPPING ACTION

IF THERE IS INSUFFICIENT VERTICAL PLAY BETWEEN CLUTCH PLATE AND CLUTCH HOUSING THE PICKUP MAY SKIP GROOVES

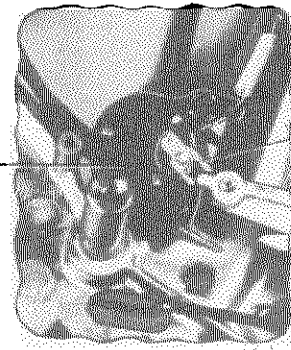
THIS END OF CLUTCH PLATE MUST BE AGAINST STUD WHEN THE PICKUP IS DIRECTLY ABOVE THE POINT OF LANDING



IF THIS END OF CLUTCH PLATE IS BENT CLUTCH HOUSING AND PLATE MAY NOT LATCH CAUSING ERRATIC LANDING

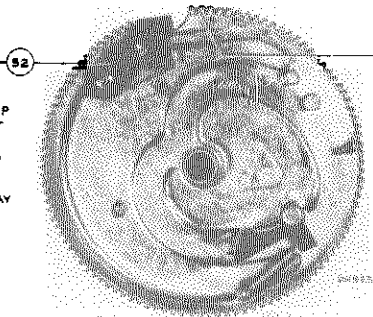
THE NOTCH IN CLUTCH PLATE #80 MUST ENGAGE CLUTCH HOUSING #85 DURING CHANGE CYCLE AND REMAIN ENGAGED UNTIL THE PICKUP SETS ON THE RECORD

SWITCH NO. 66



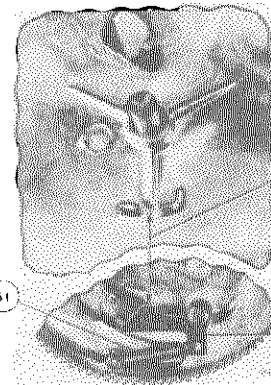
IF THIS ARM IS BENT OR BROKEN TURNTABLE MAY NOT START OR STOP

IF THIS TRIP DOG IS BENT OR THE BEARING IS BINDING OR LOOSE MECHANISM MAY NOT TRIP



IF THESE TEETH ARE DEFECTIVE MECHANISM MAY NOT GO INTO CYCLE OR MAY CAUSE A JAM

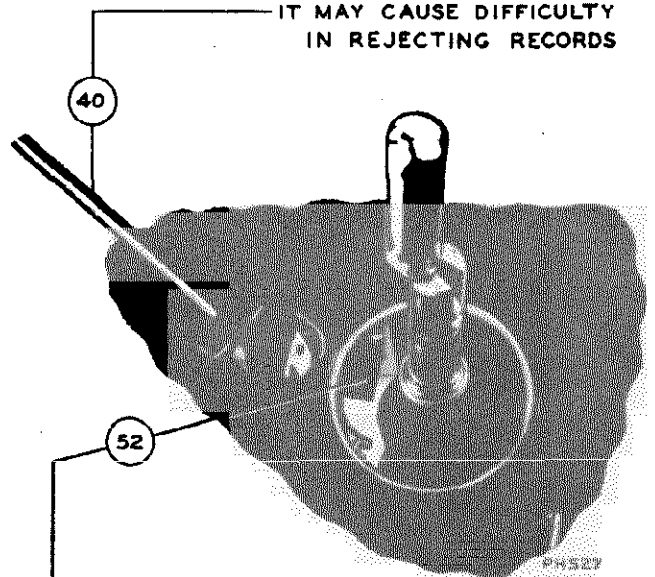
IF THIS SPRING IS LOOSE OR MISSING MECHANISM MAY CONTINUE TO CYCLE



CAM LOCATOR LEVER ENGAGES BETWEEN THESE 2 POINTS FOR LOCATION OF CAMS IN THE OUT-OF-CYCLE POSITION

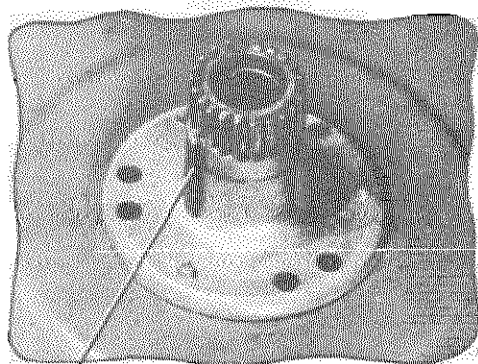
IF THIS CAM LOCATOR LEVER IS BENT OR BEARING IS BINDING MECHANISM MAY CONTINUE TO CYCLE

IF THIS REJECT ROD BINDS IT MAY CAUSE DIFFICULTY IN REJECTING RECORDS

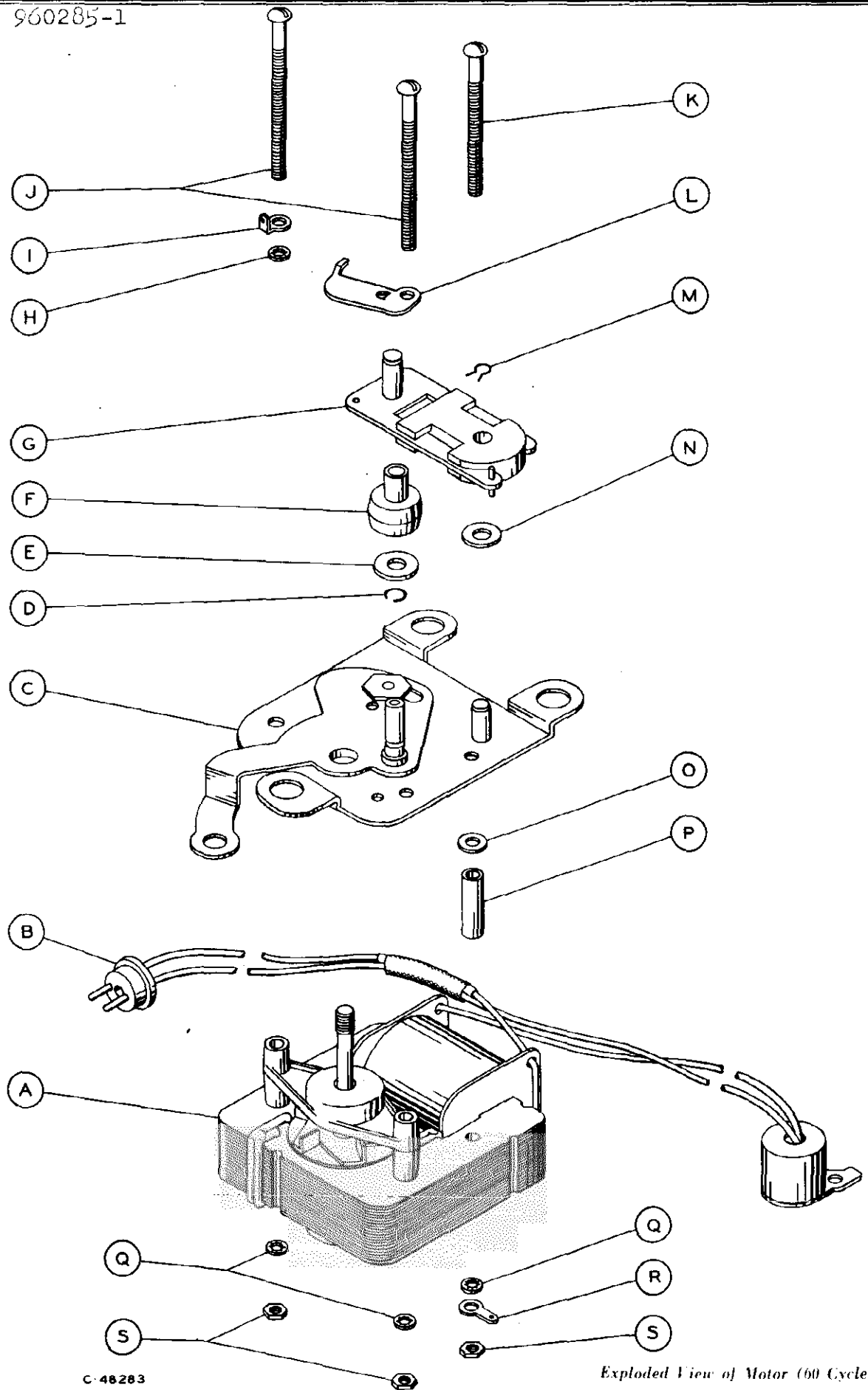


IF THIS TRIP DOG IS BENT, LOOSE OR BINDING IN THE BEARING MECHANISM MAY NOT TRIP

THE "OFFSET" ACTUATES TRIP DOG #52 CAUSING THE GEARS OF THE TURNTABLE SHAFT AND CYCLING CAM TO ENGAGE AND CARRY THE MECHANISM THROUGH CYCLE

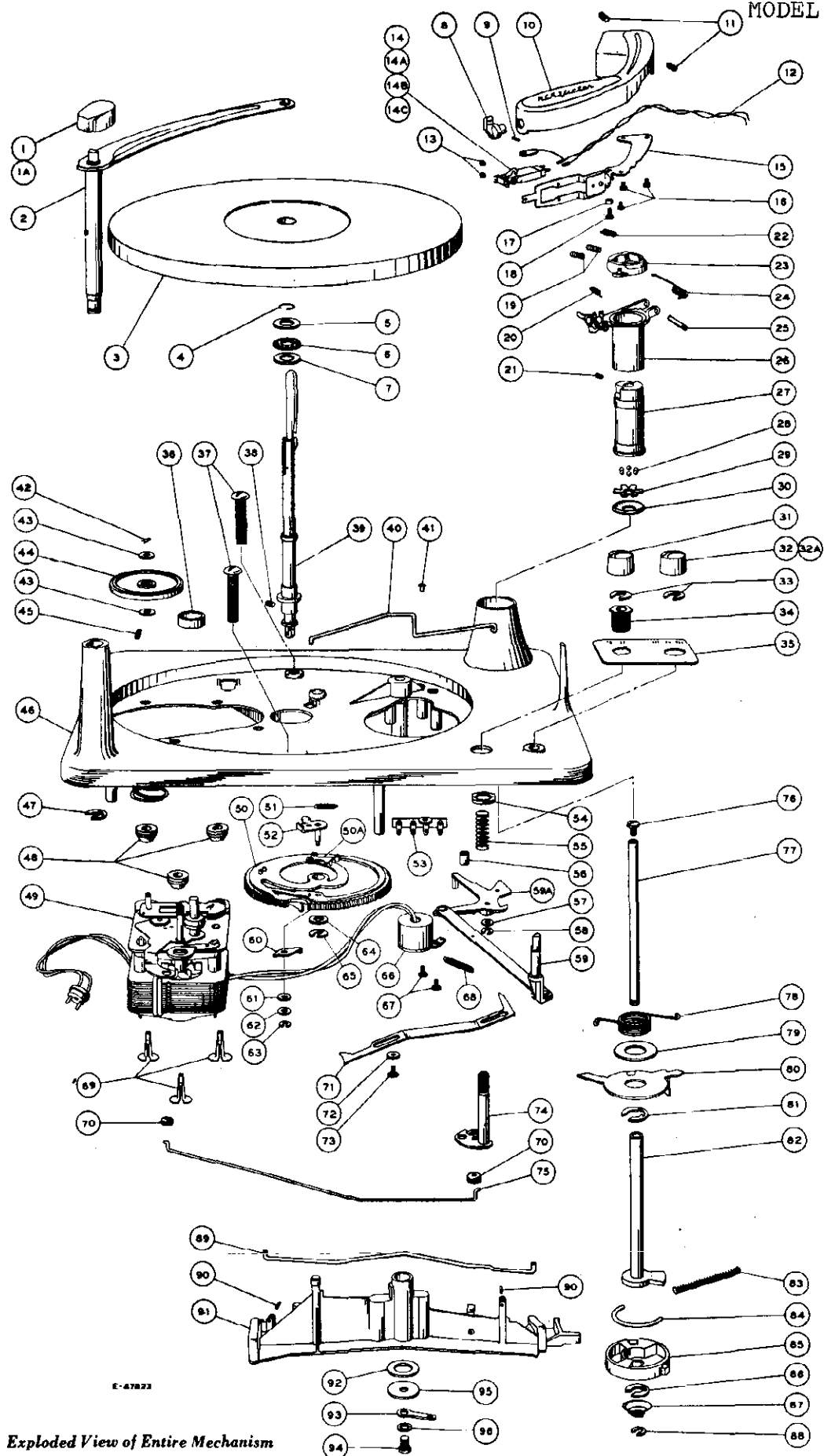


MODEL 960285-1



C-48283

Exploded View of Motor (60 Cycle)



E-47823

Exploded View of Entire Mechanism

MODEL 960285-1

REPLACEMENT PARTS

ILL. No.	STOCK No.	DESCRIPTION	ILL. No.	STOCK No.	DESCRIPTION
1	75350	Knob—Record support knob	48D	75427	Retainer—Retainer ring for drive pulley and shaft
1A	—	Spring—Retaining spring for record support knob	49E	75428	Washer—Felt washer
2	75351	Support—Record support	49F	75429	Pulley—Drive pulley and shaft assembly for 33-1/3 RPM
3	75352	Turntable	49G	75430	Carriage—Idler carriage
4	75353	Retainer—Turntable spindle thrust bearing assembly retainer	49H	—	Lockwasher—No. 6 internal teeth
5	75354	Washer—Thrust washer for turntable bearing	49I	—	Terminal lug
6	75355	Bearing—Thrust bearing	49J	—	Screw—No. 6-32 x 2" round head machine screw to mount top plate to motor
7	75354	Washer—Thrust washer for turntable bearing	49K	—	Screw—No. 6-32 x 2 1/8" round head machine screw to mount top plate to motor
8	75264	Knob—Stylus selector knob (handle type) complete with screw	49L	75431	Plate—Friction guide plate
9	—	Screw—Screw for stylus selector knob (included in 75264, ILL. 8)	49M	75432	Spring—Hairpin spring to mount idler carriage
10	75356	Arm—Pickup arm shell only (plastic)	49N	75433	Washer—Fibre washer
11	75357	Pivot—Pickup arm pivot (2 required)	49P	—	Spacer—Metal spacer to mount top plate to motor
12	75358	Cable—Three wire pickup cable complete with connectors	49Q	—	Lockwasher—No. 6 internal teeth
13	—	Screw—Mounting screw for crystal (2 required) (No. 4-40 x 1/8" round head screw)	49R	—	Terminal lug
14	75044	Crystal—Replacement crystal complete with styluses	49S	—	Nut—No. 6 hex nut
14A	75045	Stylus—Stylus only (red) for 33 RPM section	50	75387	Cam—Main cam (including wire spring)
14B	75046	Stylus—Stylus only (plain) for 78 RPM section	51	75388	Spring—Cam locator lever spring
14C	75274	Nut—Mounting nut (knurled) for stylus	52	75389	Pawl—Trip pawl
15	75359	Mount—Crystal cartridge mount and swivel assembly	53	—	Board—Terminal board
16	71097	Screw—Mounting screw for crystal mount (3 required) (No. 4 x 1/4" self-tapping)	54	—	Nut—Locknut for speed control crank threaded bushing
17	75360	Spacer—Metal spacer for crystal mount screw, ILL. 18	55	75390	Spring—Spacer spring for speed control crank
18	75002	Screw—Mounting screw for crystal mount (No. 4 x 3/8" self-tapping)	56	—	Bumper—Rubber bumper not stocked
19	75361	Screw—Landing adjustment screw (2 required) (No. 10 x 1/2" headless—special)	57	75391	Washer—Fibre washer for control lever shaft
20	75362	Spring—Tension spring for indexing latch	58	75392	Washer—"C" washer for mounting control lever
21	31085	Screw—Pickup pivot bushing screw (No. 8 x 1/8" Allen head set screw)	59	75393	Lever—Function control crank, link and lever assembly
22	75363	Spring—Tension spring for landing adjustment ring	60	75394	Pawl—Lower trip pawl
23	75364	Ring—Landing adjustment ring	61	75395	Washer—Bronze washer (3/8" O.D.) for trip pawl shaft
24	75365	Spring—Counterbalance spring for pickup arm	62	75396	Washer—Steel washer (1/4" O.D.) for trip pawl shaft
25	75366	Pin—Pivot pin for counterbalance spring	63	75397	Washer—"C" washer for trip pawl
26	75367	Sleeve—Pickup arm pivot sleeve, including latch and two springs	64	75398	Washer—Fibre washer (1/2" O.D.) for mounting main cam
27	75368	Bushing—Pickup arm pivot sleeve bushing	65	75399	Washer—"C" washer for mounting main cam
28	10941	Ball—Steel ball (1/8" diameter)	66	75400	Switch—Power switch (includes cover)
29	75369	Retainer—Ball bearing retainer	67	—	Screw—Power switch mounting screw (No. 6-32 x 1/4" hex head)
30	75370	Cup—Ball race cup	68	75401	Spring—Return spring for control lever link
31	75371	Knob—Speed control knob	69	75402	Fastener—Push fastener to mount motor (3 required)
32	75372	Knob—Function control knob complete with spring	70	75403	Grommet—Rubber grommet for motor speed change tie rod (2 required)
32A	—	Spring—Retaining spring for function control knob (included in 75372, ILL. 32)	71	75404	Lever—Trip slide lever
33	75373	Washer—"C" washer for control knob (2 required)	72	75405	Washer—Metal washer to mount trip slide
34	75374	Bushing—Threaded bushing for speed control crank	73	—	Screw—Mounting screw to mount trip slide lever (No. 4 x 1/4" hex head self-tapping)
35	75375	Escutcheon—Index escutcheon	74	75406	Crank—Speed control crank
36	75376	Belt—Rubber belt for motor drive shaft	75	75407	Rod—Motor speed change tie rod
37	75377	Screw—Motorboard mounting screws (2 required) (No. 1/4-20 x 1 3/8" round head—special)	76	75408	Screw—Pickup height adjusting screw (No. 6-32 x 1/4" pan head brass)
38	30006	Screw—Set screw for turntable centerpost (No. 8 x 3/8" Allen head set screw)	77	75409	Rod—Elevating rod
39	75378	Spindle—Turntable spindle or centerpost	78	75410	Spring—Return spring for pickup arm
40	75379	Rod—Reject rod	79	75411	Washer—Spring washer for clutch plate
41	—	Rivet—Mounting rivet for terminal board, ILL. 53	80	75412	Plate—Clutch plate
42	75380	Spring—Hairpin spring for idler wheel	81	75413	Washer—"C" washer for pickup arm pivot
43	75433	Washer—Dampening washer for idler wheel (2 required)	82	75414	Shaft—Pickup arm pivot shaft
44	75382	Wheel—Idler wheel	83	75415	Spring—Clutch safety spring
45	75383	Spring—Tension spring for idler wheel	84	75416	Guide—Clutch safety spring guide
46	75384	Board—Motorboard complete with four mounting springs, pivot arm housing, record support housing, terminal board (ILL. 53) and mounting studs	85	75417	Housing—Clutch housing
47	75385	Washer—"C" washer for record support pivot shaft	86	75392	Washer—"C" washer for clutch housing
48	75386	Grommet—Rubber grommet to mount motor (3 required)	87	75418	Spring—Conical spring for elevating rod
49A	75393	Motor—117 volt, 60 cycle, complete with top plate, idler wheel and drive belt	88	75419	Washer—"C" washer for elevating rod
49B	30870	Connector—2 contact male connector for motor leads	89	75423	Rod—Lift arm stop rod complete with pins, ILL. 90
49C	75426	Plate—Motor top plate including speed change carriage, 3 mounting grommets and 1 speed change lever grommet	90	—	Pin—Mounting pin for stop rod (included in 75423—ILL. 89)
			91	75420	Arm—Lift arm assembly complete with stop rod and stop rod mounting pins (includes ILL. 89 and ILL. 90)
			92	75421	Washer—Fibre washer for lift arm shaft
			93	—	Lug—Terminal lug
			94	—	Screw—Mounting screw for lift arm assembly (No. 8-32 x 3/8" pan head screw)
			95	75422	Washer—Retainer washer for lift arm shaft
			96	—	Lockwasher—No. 8 lockwasher (internal teeth)

OPERATING INSTRUCTIONS

PLACING RECORDS ON THE CHANGER: Raise the Record Support Arm straight up until it clears the Center Post. Then, turn this arm to the position shown in Fig. 1 so that it will not interfere with record loading.

Place records on the Center Post so that center of record rests on the "shoulder" or off-set in the post and hold them level in that position. While holding the records in this manner, turn Record Support Arm back over the records until the hole in the tip of the arm is over the Center Post. Then, lower the Support Arm and push it down gently until records are held parallel with Turntable (see Fig. 2). This completes the loading procedure and changer is now ready for automatic operation.

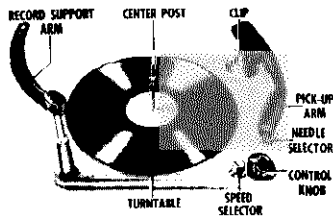


FIG. 1

SETTING NEEDLE SELECTOR AND SPEED SELECTOR: Complete instructions for the proper setting of these controls are given in the chart at the bottom of this page.

STARTING THE CHANGER: Turn on the receiver before attempting to start the changer and be sure that controls on receiver control panel are properly set for phonograph operation.

To start the changer, turn the Control Knob (on changer) clockwise to the "ON" position. This will turn motor on and Turntable will start rotating. Continuing to turn Control Knob clockwise to "REJ." position starts the changing mechanism (do not attempt to hold the knob in

this position; a momentary turn is all that is required). All records which are loaded on the changer will then be played in sequence. After last record has been played the Pick-up Arm returns to its rest position and the changer will turn off automatically.

CONTROLLING THE VOLUME:

Use the volume control on the receiver control panel to adjust the volume of the phonograph.

CONTROLLING THE TONE: Use the tone control on the receiver control panel to select most pleasing tone.

REJECTING A RECORD: If you wish to stop playing a record and start playing the next one, merely turn Control Knob to "REJ." position.

STOPPING THE CHANGER: This record changer will stop automatically after last record is played. If you desire to stop the changer at any other time, merely turn Control Knob to "OFF" position. Then lift Pick-up Arm from record and place it on the Rest Post.

UNLOADING RECORDS: If some records remain above the off-set shoulder on the Center Post, it will be necessary to hold them steady before disturbing the Record Support Arm. Then raise the Support Arm straight up until it clears the Center Post and turn it to the position shown in Fig. 1. Records can now be removed by lifting them off the Turntable.

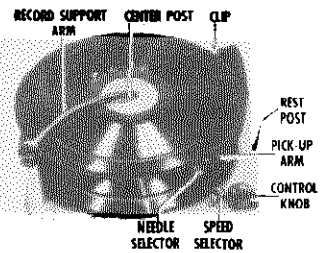


FIG. 2

SETTING THE NEEDLE SELECTOR AND SPEED SELECTOR CONTROLS FOR VARIOUS TYPES OF RECORDS

TYPE OF RECORD TO BE PLAYED	NEEDLE SELECTOR	SPEED SELECTOR	**RECORD CAPACITY
	Raise Pick-up Arm slightly and turn Needle Selector all the way (in the direction indicated by the arrow on Needle Selector Knob) to the position shown below:	Turn Speed Selector so that dot is opposite position shown below:	Maximum number of records to be played at one loading.
10" or 12" 78 R.P.M. STANDARD	"78" should face up	White dot opposite "78"	Ten when intermixed; or ten 12"; or twelve 10"
10" or 12" 33½ R.P.M. "MICROGROOVE— LONG PLAYING"	"33-45" should face up	White dot opposite "33-45"	Ten when intermixed; or ten 12"; or twelve 10"
7" *45 R.P.M. "FINE GROOVE"	"33-45" should face up	White dot opposite "45"	Twelve 7"
7" 33½ R.P.M. "MICROGROOVE— LONG PLAYING"	"33-45" should face up	White dot opposite "33-45"	Twelve 7"

* Insert adapter disc in center hole of this record. See envelope containing discs for instructions.

Do not intermix "Standard"—78 R.P.M. with "Long Playing" (Microgroove) 33½ R.P.M. records.

Do not intermix "Standard"—78 R.P.M. with "Fine Groove"—45 R.P.M. records.

Do not intermix "Long Playing" (Microgroove) 33½ R.P.M. with "Fine Groove"—45 R.P.M. records.

Do not intermix 7" records with 10" or 12" records.

MODEL VM-508222

DESCRIPTION OF CYCLE

In order to observe the operation of the changer mechanism, it is advisable to remove the Record Changer from the cabinet. This may be done by first disconnecting the Phono Motor Cable and Phono Pick-up Cable from the radio chassis. Then lift turntable off and note two hold down screws (See Fig. 16). Remove these screws by turning

counter-clockwise. Unit is now free and may be lifted out from record changer compartment.

To observe the action of the changer mechanism as it progresses through a complete cycle of operation, turn the Control Knob to the "REJ." position and release it. As the turntable is rotated clockwise by hand, the motion of all parts of the changer can now be examined.

Numbers which appear after parts mentioned in text refer to parts shown in illustrations on pages 123, 124 and 125 unless otherwise indicated.

FUNCTION	EXPLANATION
SETTING FOR DESIRED NEEDLE AND NEEDLE PRESSURE	<ol style="list-style-type: none"> When the Needle Selector Knob (2) is turned so that the number "78" appears at the top, the Crystal Cartridge (6) is rotated, allowing the point of the correct Needle (4) to face down and contact the record. Rotating the Needle Selector Knob (2) counter-clockwise 180° so that the numbers "33-45" appear at the top, turns the Crystal Cartridge (6) over, allowing the tip of the "Microgroove" Needle (5) to face down and contact the record. <p>Rotating the Needle Selector Knob (2) in the counter-clockwise direction also draws up on Chain (9) which exerts a pull on Counter-Balance Pressure Spring (10). This spring is connected to Hinge Bracket (13) at rear of Pick-up Arm (1).</p> <p>The pulling action on Hinge Bracket (13) causes a pushing action against Hinge Assembly (16). This pushing action develops a counter-balance, allowing on 6 1/2 to 9 1/2 grams pressure of the needle on the record.</p>
SETTING FOR DESIRED SPEED "Turret" Type Motors (See Page 123 for Illustration of Motors.)	<ol style="list-style-type: none"> When the Speed Knob (88) is in either "33-7" or "33-10"-12" position, the motor shaft contacts small diameter Idler Pulley (64) which in turn contacts Idler Wheel (63). The wheel in this position drives Turntable (48) at 33 1/3 R.P.M. Turning Speed Selector Knob (88) counter-clockwise to the "78" position causes attached Speed Selector Rod (90) to actuate idler pulley mounting bracket. This bracket moves the large diameter Idler Pulley (65) so that it contacts motor shaft and Idler Wheel (63). The wheel in this position drives Turntable (48) at 78 R.P.M. A further rotation of Speed Selector Knob (88) counter-clockwise to the "45" position causes attached Speed Selector Rod (90) to actuate and idler pulley mounting bracket so that the intermediate size Idler Pulley (66) contacts motor shaft and Idler Wheel (63). The wheel in this position drives Turntable (48) at 45 R.P.M.
SETTING FOR DESIRED SPEED "Belt" type motor (See Page 123 for Illustrations of Motor.)	<ol style="list-style-type: none"> When the Speed Selector Knob (88) is in the "78" position, motor shaft makes direct contact with Idler Wheel (63). The wheel in this position drives Turntable (48) at 78 R.P.M. Turning Speed Selector Knob (88) clockwise to the either "33-7" or "33-10"-12" position causes attached Speed Selector Rod (90) to actuate idler pulley mounting bracket. This bracket moves the large Idler Pulley (64) so that it pushes Idler Wheel (63) away from motor shaft. The lower Drive Belt (68) transfers power from the motor shaft to Idler Pulley (64). With Idler Wheel in this position, it drives Turntable (48) at 33 1/3 R.P.M. Turning Speed Selector Knob (88) counter-clockwise all the way to the "45" position causes attached Speed Selector Rod (90) to actuate idler pulley mounting bracket. This bracket moves large Idler Pulley (64) out of engagement with Idler Wheel (63). As the bracket completes its movement, it brings small Idler Pulley (66) into contact with Idler Wheel (63). The upper Drive Belt (68) transfers power from the motor shaft to Idler Pulley (66). With Idler Wheel (63) in this position, it drives Turntable (48) at 45 R.P.M.
STARTING Turn Control Knob (52) to the "ON" position.	<ol style="list-style-type: none"> Actuates Control Link Assembly (54). Power Switch (61) is turned on. Motor (62) operates Idler Wheel (63), to rotate Turntable (48) and attached gear at hub.
CYCLING Turn Control Knob (52) to "REJ." position.	<ol style="list-style-type: none"> Actuates Control Link Assembly (54). Control Lever (57) and attached Manual Trip Rod (33) pushes Clutch Pawl (79). Clutch Pawl (79) engages a projection on hub of Turntable (48). Main Cam Assembly (81) is rotated so that its teeth engage gear on hub of Turntable (48).
FUNCTION OF MAIN CAM ASSEMBLY (81)	<ol style="list-style-type: none"> The heart-shaped groove in the Main Cam Assembly (81) directs and coordinates the motion of the Lift Arm Assembly (83). <p>While the Main Cam Assembly (81) makes one half of a revolution, it swings Lift Arm Assembly (83) in one direction. During the remaining half of the revolution it swings the Lift Arm Assembly (83) in the opposite direction until the arm returns to its starting position.</p> <ol style="list-style-type: none"> During the revolution of Main Cam Assembly (81), the Clutch Pawl (79) is reset due to wiping action of Trip Pawl (76) against the hub of the Lift Arm Assembly (83). At the completion of the revolution of Main Cam Assembly (81), the Stop Pawl (75) fits between two locating pins on under side of Base Plate (25). This holds cam in a position so that its open periphery is adjacent to the gear on the hub of the Turntable (48).
DISPLACEMENT OF A RECORD	<ol style="list-style-type: none"> As the Lift Arm (83) goes through its swing, an inclined plane on the arm, pushes up Center Post Roller (44) and attached push-up rod inside Center Post (43). Ejector Lever (45) moves up and then out, pushing bottom record off shoulder of the Center Post (43) and allowing it to drop to the Turntable (48). As the Lift Arm Assembly (83) makes its return swing, the incline plane lowers Center Post Roller (44) and attached push-up rod. Ejector Lever (45) moves down, while still in the ejected position, thus gently lowering the remainder of stack of records.

DESCRIPTION OF CYCLE (Continued)

FUNCTION	EXPLANATION
PICK-UP ARM MOVEMENT	<ol style="list-style-type: none"> 1. As the Lift Arm Assembly (83) goes through its swing, an inclined plane on the opposite end of the arm from the Center Post (43) pushes up on Lift Rod (37), causing the Pick-up Arm (1) to rise. 2. Height of Pick-up Arm (1) may be changed by shifting the Height Adjustment Screw (36) — for complete adjustment details, see section of "Trouble Shooting Chart" entitled "Pick-up Arm Lift is too high or too low." 3. Lift Arm (83) also controls lateral motion of Pick-up Arm (1) by engaging a stud on lower part of Locator Housing (35).
Function of Safety Spring (32).	<ol style="list-style-type: none"> 1. Pick-up Arm (1) is attached to Hinge Assembly (16). Hinge Locking Ring (11) holds Hinge Assembly (16) and Hinge Bearing (22) in their proper positions by a pair of Adjustment Screws. Hinge Bearing (22) and Pick-up Arm Locator Assembly (30) are held by Set Screw (21). The lower end of Pick-up Arm Locator (30) fits into the Locator Housing (35) and is held against a stop by Safety Spring (32). 2. If Pick-up Arm (1) is held during a change cycle, the Safety Spring (32) will allow Locator Housing (35) to move without damage to the changer mechanism.
Set Down Point; 7" or 10" Record.	<ol style="list-style-type: none"> 1. Setting of Speed Selector Knob (88) actuates Index Rod (96) which positions Locator Cam (97). 2. As Lift Arm (83) reaches its maximum forward excursion, it contacts and pushes on the bent down projection of Set Down Locator (28). This moves locator around so that a dimple on its face fits into a detent on Locator Housing (35). 3. Half way through the return sweep, the Lift Arm (83) disengages from stud on lower part of Locator Housing (35). The Return Spring (26) forces over the Set Down Locator (28) and Locator Housing (35) until a projection on Set Down Locator (28) contacts Locator Cam (97), as shown in Figs. 13 and 17. Fig. 13 shows Set Down Locator (28) contacting Locator Cam (97) for 10" operation while Fig. 17 shows these parts in proper position for 7" operation. As movement of Pick-up Arm (1) is coordinated with Locator Housing (35), the arm is swung over the record to the correct set down point. 4. The completion of the return swing of Lift Arm (83) lowers Lift Rod (37), thus allowing needle to set down on the record. 5. Locator Housing (35) and Set Down Locator (28) are separated. The clearance between these two parts permits Pick-up Arm (1) to track across the record. 6. Set down point of Pick-up Arm (1) may be changed by shifting the position of Hinge Assembly (16) with respect to Hinge Bearing (22). This position may be changed by turning Adjustment Screws in Hinge Locking Ring (11) — for complete adjustment details see section of "Trouble Shooting Chart" entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
Set Down Point; 12" Record.	<p>For 12" operation, Speed Selector Knob (88) must be in either "33-10"-12" or "78" position, depending upon the type of record to be played.</p> <ol style="list-style-type: none"> 1. As a 12 inch record drops to the turntable it passes and hits Trip Lever (17) at rear of Pick-up Arm (1). 2. Index Cam (18) is actuated. This in turn changes the position of Index Lever (20) and holds the lever in this new position. 3. Leg of Index Lever (20) slides into "12 inch Stop" (see Fig. 8) as Ratchet Arm (35) turns Hinge Locking Ring (11) counter-clockwise until position of Fig. 6 is assumed. 4. This provides the correct position of Pick-up Arm (1) with respect to Set Down Locator (28) for proper 12" operation.
CHANGING A RECORD Action of Trip mechanism during playing portion and at end of record.	<ol style="list-style-type: none"> 1. During the playing portion of the record, Pick-up Arm (1) proceeds laterally across the record. A projection on side of Locator Housing (35) contacts and exerts a constant pressure on Automatic Trip Link (34). This pressure is transferred to the Trip Pawl (76) (see Fig. 17) which in turn controls the Clutch Pawl (79) thru the "friction grip" action of Spring Washer (77). 2. As the needle proceeds across the record, the lateral movement per revolution is only equal to the space between two playing grooves. This amount of movement is insufficient to bring the Clutch Pawl (79) into engagement with the projection on hub of Turntable (48). Instead, the projection has a wiping action to push the Clutch Pawl (79) away from the hub. 3. When the needle enters the spiral groove, at the end of a record, the rate of advance of Pick-up Arm (1) toward the Center Post (43) is greatly accelerated. This increase in rate of lateral movement is sufficient to bring Clutch Pawl (79) into engagement with projection on hub of Turntable (48), thus causing "CYCLING." 4. Any movement of the Pick-up Arm (1), that causes a lateral movement greater than the space between two playing grooves, such as raising the arm and moving toward the Center Post (43), will cause tripping action.
REJECTING A RECORD Turn Control Knob (52) to "REJ." position.	<ol style="list-style-type: none"> 1. This starts the change cycle as described in preceding section entitled "CYCLING" and permits next record to be played.
AUTOMATIC SHUT-OFF	<ol style="list-style-type: none"> 1. Dropping of the last record onto the turntable lowers the Record Support Arm (40) so that it rests on the off-set shoulder of the Center Post (43). The hole in tip of Support Arm (40) is small enough to prevent Ejector Lever (45) from pushing all the way out on the next change cycle. 2. The brass bushing just above Center Post Roller (44) does not go all the way up as in a normal change cycle but is in the path of one end of the Automatic Shut-Off Rod (86). This rod is attached to Lift Arm Assembly (83) and therefore as arm swings in, the tip of the rod contacts the brass bushing and is turned 90°. See Fig. 14. 3. The other end of the rod is also turned 90° and is in a position so that it will engage and push Control Lever (57) when Lift Arm Assembly (83) makes its return sweep. 4. Control Lever (57) actuates Switch (61), shutting off the record changer. 5. Control Lever (57) also engages Set Down Locator (28) and holds it as shown in Fig. 5. This causes the Pick-up Arm (1) to set down on the rest post.
STOPPING Turn Control Button (52) to "OFF" position.	<ol style="list-style-type: none"> 1. Turns Switch (61) to off position and Motor (62) stops.

TROUBLE SHOOTING CHART

Numbers which appear after parts mentioned in text refer to parts shown in illustrations on pages 123, 124 and 125 unless otherwise indicated.

SYMPTOM	CAUSE	REMEDY
Control Knob (52) cannot be turned to "ON" position.	1. Changer was shut off while changing a record.	Rotate Turntable (48) one turn clockwise by hand and turn Control Knob (52) on again.
Turntable fails to start after turning Control Knob (52) to the "ON" position.	1. Changer was shut off while changing a record. 2. No power. 3. Speed Selector Knob (88) set midway between any of its four "indexed" positions. The above does not apply to changer equipped with the belt type motor. 4. Idler Wheel (63) not engaging Turntable (48). 5. Defective On-Off Switch (61). 6. Defective Motor. 7. Grease on Idler Wheel (63), Idler Pulleys (64), (65) or (66), (or Drive Belts (68)) or rim of Turntable (48). 8. Binding in changer mechanism.	Rotate Turntable (48) one turn clockwise by hand. Check to determine if there is power at the wall outlet by disconnecting receiver power cord and connecting a lamp to same outlet. While changing from one speed to another, there is a position where the motor shaft momentarily does not contact any of the Idler Pulleys (64), (65), or (66), and if the Speed Selector Knob (88) is left in this position, Turntable (48) will not rotate. Be sure that knob is correctly "indexed" to the desired setting. Check for any binding action of lever on which Idler Wheel (63) is mounted. Also be sure that Springs (72) which pulls Idler Wheel (63) against Turntable (48) is hooked to motor frame and has sufficient tension. Check continuity across switch contacts. Replace switch if necessary. Remove Turntable (48) so that there will be no load on Motor and check to see if Idler Wheel (63) rotates. Replace Motor (62) if found defective. Clean with carbon tetrachloride. For analysis of fault see symptom entitled "Changer stops while changing a record."
Changer refuses to cycle when Control Knob (52) is turned to "REJ." position.	1. Manual Trip Rod (33) not contacting Clutch Pawl (79). 2. Clutch Pawl (79) binding on face of Main Cam Assembly (81). 3. Lift Arm (83) not turning during cycle.	Check to see that Manual Trip Rod (33) is hooked into hole in Control Lever (57) and that it is contacting Clutch Pawl (79) on Main Cam Assembly (81). Check for burrs or foreign matter lodged between Clutch Pawl (79) and cam. Do not oil. Check for broken roller on Lift Arm Assembly (83); roller is located on end of Lift Arm which engages Cam assembly (81). If this is the case, replace Lift Arm Assembly (83).
Changer stops while changing a record.	1. Idler Wheel (63) not engaging Turntable (48) properly. 2. Grease on Idler Wheel (63), Idler Pulleys (64), (65) or (66), (or Drive Belts (68)) or rim of Turntable (48). 3. Turntable (48) and Bearing Race (50) binding. 4. Operating temperature too low. 5. Low line voltage. 6. Binding in drive mechanism.	Be sure that Spring (72) which pulls Idler Wheel (63) against Turntable (48) has sufficient tension. Clean with carbon tetrachloride. Remove Turntable (48). Check to see if Turntable Washer (49) and Bearing Race (50) are free to rotate. If binding does occur remove Center Post (43) by loosening Set Screw (47) and withdrawing Center Post (43) from the top. Binding of Bearing Race (50) may now be released. Before replacing Turntable (48) clean bearing surfaces. If changer has been stored in a cold place or operated in surroundings at a temperature of less than 60° F., the turntable speed may be too slow. Line voltage should not be less than 105 volts. To check for binding proceed as follows: a. Remove Lift Arm Assembly (83) by taking out Screw (85). b. Remove Idler Wheel (63). c. Turn Control Knob (52) to "REJ." position and rotate Turntable very slowly by hand through one change cycle, checking for any binding action. If binding occurs check for: foreign matter in the gear teeth of Main Cam Assembly (81); bent main cam bearing; bent center post bushing. Also check for clearance between Main Cam (81) and Automatic Trip Link (34). A projection on the hub of Main Cam Assembly (81) should contact and push Automatic Trip Link (34). Thus the link is reset for the next playing cycle. There should be no binding during this action. Binding of Automatic Trip Link (34) may be required. If no binding occurs proceed as follows: d. Remove "C" Washer (39) and Spring (38). e. Raise Pick-up Arm (1) and withdraw Lift Rod (37). f. Replace Lift Arm Assembly (83). g. Loosen Set Screw (47) so that inclined plane of Lift Arm Assembly (83) will push up the complete Center Post (43). h. Turn Control Knob (52) to "REJ." position and rotate Turntable very slowly by hand through one change cycle, checking for binding action. If binding does occur check lift arm bearing for freedom of movement and lift arm roller to be sure it is not bent, causing binding in the heart-shaped groove in the Main Cam Assembly (81).

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
	<p>7. Binding between Lift Rod (37) and inclined plane of Lift Arm Assembly (83).</p> <p>8. Center Post Roller (44) being compressed too far.</p> <p>9. Weak Motor (62).</p>	<p>To check for this action proceed as follows:</p> <ol style="list-style-type: none"> Replace Lift Rod (37) and Spring (38) taken off in steps 6d and 6e. Leave Center Post (43) in same position as in step 6g. Turn Control Knob (52) to "REJ." position and rotate Turntable (48) by hand until Lift Arm Assembly (83) has moved in one direction as far as it will go and is about to return. Raise Lift Rod (37) by pulling up. It may still be contacting the inclined plane of Lift Arm Assembly (83) but it should not bind. If binding does occur, check for bent lift arm bearing shaft. It may be necessary to remove Fibre Washer (84), which may be under Lift Arm Assembly (83), to lower the arm. <p>To check for this action proceed as follows:</p> <ol style="list-style-type: none"> Replace Center Post (43) released for steps 6g and 7b. Turn Control Knob (52) to "REJ." position and rotate Turntable very slowly by hand until Center Post Roller (44) reaches position on inclined plane of Lift Arm Assembly (83) illustrated in Fig. 3. It will be noted that "Brass Bushing" has also risen but at this point stops. A further movement of Lift Arm Assembly (83) causes roller shaft to move up into "Brass Bushing" a distance not to exceed $\frac{1}{16}$". Should the latter movement exceed this, it may cause the Lift Arm Assembly (83) to bind due to excessive pressure. In that event check the following: <ol style="list-style-type: none"> Bearing for Lift Arm Assembly must be square with the changer Base Plate (25). Remove any fibre washer between metal washer and bottom of Lift Arm Assembly (83). Center Post may be too long. The critical $1\frac{3}{8}$" dimension shown in Fig. 9 should not be exceeded. <p>After checking the preceding eight items and relieving any binding action, replace Idler Wheel (63). Should the changer then continue to stop during a change cycle, it may be assumed that the motor is weak (has low torque) and should therefore be replaced.</p>
Changer cycles continuously.	<ol style="list-style-type: none"> Control Link Assembly (54) in reject position. Stop Pawl (75) not engaging projections in Base Plate (25). Trip Pawl (76) binding. Insufficient "friction grip" between Clutch Pawl (79) and Trip Pawl (76). 	<p>Check for loose, unhooked or missing Reject Spring (58).</p> <p>Check for loose, unhooked Stop Pawl Spring (74).</p> <p>Check for burrs or foreign matter lodged between Trip Pawl (76) and face of Main Cam (81). Do not oil.</p> <p>The "friction grip" between Clutch Pawl (79) and Trip Pawl (76) should be sufficient so that the slightest movement of the Trip Pawl (76) causes a corresponding movement in the Clutch Pawl (79). This is especially true during the change cycle where the Trip Pawl (76) is being reset to the playing position. See Item 2 in section entitled "Function of Main Cam Assembly (81)" on page 115. It may be necessary to add a thin washer between "C" Washer (78) and Spring Washer (77) to increase this "friction grip".</p>
Changer cycles before record is finished playing.	<ol style="list-style-type: none"> Hole in record too large. Binding between Clutch Pawl (79) and Trip Pawl (76). External lateral movement of Pick-up Arm (1). 	<p>Record with badly worn center hole may cause playing grooves to rotate with an eccentric motion thus effecting an oscillating movement of the Pick-up Arm (1). The "friction grip" between Clutch Pawl (79) and Trip Pawl (76) should be sufficient so that the slightest movement of either one would cause a corresponding movement in the other. Yet, this "friction grip" or binding between these two parts must not be so great as to prevent a "slipping" or clutch action. As the constant tripping pressure is applied to the Trip Pawl (79) by the Trip Lever (76) there should be enough clutch action to permit the projection of the hub of the Turntable (48) to move Clutch Pawl (79) away from hub. For a complete description of this action refer to "CHANGING A RECORD" in section entitled "DESCRIPTION OF CYCLE" on page 116.</p> <p>Anything that might cause the Pick-up Arm (1) to move laterally more than the distance between two playing grooves of a record, such as a sudden jar, could start the change cycle.</p>
Changer fails to cycle after playing a record.	<ol style="list-style-type: none"> Record has no eccentric groove. Needle (6) jumping out of eccentric groove. Movement of Locator Housing (35) not following lateral movement of Pick-up Arm (1). Automatic Trip Link (34) not making contact. 	<p>Old style records which do not have this spiral tripping groove cannot be played automatically.</p> <p>Eccentric groove too shallow. Check with a record which is known to have a good groove.</p> <p>Needle badly worn or bent. Replace.</p> <p>Check for loose Hinge Bearing Set Screw (21). Retighten this screw after repositioning Hinge Bearing (22) as outlined in Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."</p> <p>Check to see that, as Pick-up Arm (1) approaches spiral tripping groove of record, one end Automatic Trip Link (34) is making contact with projection on side of Locator Housing (35) and other end is contacting Trip Pawl (76) as illustrated in Fig. 17. Bend Automatic Trip Link (34) to proper shape or replace with new link.</p>

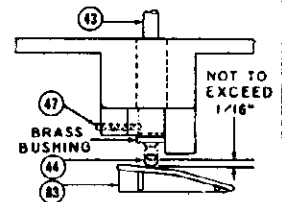


FIG. 3

MODEL VM-508222

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
	5. Clutch Pawl (79) binding on face of Main Cam Assembly (81).	Check for burrs or foreign matter lodged between the Clutch Pawl (79) and cam. Do not oil.
Pick-up Arm lift is too high or too low; OR Needle fails to contact first record; OR Top of Pick-up Arm strikes stack of records while changer is cycling; OR Pick-up Arm strikes Rest Post.	1. Height Adjustment Screw (36) is incorrectly set.	To adjust height proceed as follows: a. Turn Control Knob (52) to the "REJ." position and rotate Turntable (48) clockwise by hand until Pick-up Arm (1) swings over the Rest Post. b. Raise Pick-up Arm (1) and note Height Adjustment Screw (36). (See Fig. 4.) c. Hold Lift Rod (37) steady and turn adjustment screw clockwise to lower Pick-up Arm and counter-clockwise to raise the arm. d. Raise or lower Pick-up Arm (1) as required until lower edge of Pick-up Arm (1) is $\frac{1}{4}$ " above the top of the Rest Post.
Pick-up Arm (1) sets down at wrong starting point when playing 10" records. NOTE: If set down point is erratic or differs occasionally, then see symptom and analysis entitled "Pick-up Arm does not set down at same position consistently."	1. Improper setting of Pick-up Arm. 2. Improper Adjustment of Pick-up Arm (1). 3. Hinge Bearing (22) not in proper position with respect to Locator Housing (35). 4. Broken or loose Return Spring (26).	Before checking for proper set down point of Pick-up Arm (1), be sure Speed Selector Knob (88) is set to either "33-10"-12" or "78" position and that Locator Cam (97) is in the position shown in Fig. 13. If cam is improperly set, refer to Item 1 in section entitled "Pick-up Arm (1) sets down in 7" position when playing 10" or 12" records." Place a 10" record on Turntable. Turn Control Knob (52) to "REJ." position. Rotate Turntable by hand until tip of Needle (4) is within $\frac{1}{4}$ " of top of record. Raise Pick-up Arm (1) and be sure that leg of Index Lever (20) is in the first step of the Hinge Locking Ring (11) as shown in Fig. 4. If this is not set correctly, see Item 2 in section entitled "Pick-up Arm (1) sets down in 12" position when playing 10" records." If Index Lever (20) is properly positioned in the first step of Hinge Locking Ring (11) then proceed as follows: a. If needle is setting too far out on edge or off record, loosen the back "Adjustment Screw" about $\frac{1}{4}$ turn and tighten front screw to lock adjustment in place. b. If needle is setting too far in on the record, loosen the front "Adjustment Screw" about $\frac{1}{4}$ turn and tighten back screw. To reset Hinge Bearing (22) to proper position, proceed as follows: a. With power disconnected, swing point of Set Down Locator (28) and engage it with arm of Control Lever (57) as shown in Fig. 5. b. Lift Pick-up Arm (1) and loosen Set Screw (21) (see Fig. 4). Note: It may be necessary to line up hole in Hinge Locking Ring (11), by moving "Adjustment Screws" to gain access to Set Screw (21). c. Turn Locator Housing (35) until dimple on face of Set Down Locator (28) is opposite detent in Locator Housing (35). d. Place a $\frac{1}{32}$ " shim between Locator Housing (35) and Set Down Locator (28). Take up all the play between the parts by pressing up on the bottom of Locator Housing (35) and down on the top of Hinge Bearing (22). Be sure that Hinge Bearing (22) is turned counter-clockwise as far as it will go. Now tighten Set Screw (21). e. Recheck set down point of Pick-up Arm (1) by referring to adjustments described in Items 2a and b above. Check for broken or unhooked Return Spring (26). Replace or rehook into position as shown in Fig. 5, with one end of spring hooked around Set Down Locator (28) and other end of spring hooked around leg of Base Plate (25).
Pick-up Arm (1) sets down at wrong point when playing 12" records.	1. Record too small. 2. Record wobbles and fails to hit Trip Lever (17) when dropping. 3. Trip Lever (17) above its normal horizontal position and record does not hit lever.	Before checking for proper set down point of Pick-up Arm (1), be sure Speed Selector Knob (88) is set to either "33-10"-12" or "78" position and that Locator Cam (97) is in the position shown in Fig. 13. If cam is improperly set, refer to Item 1 in section entitled "Pick-up Arm (1) sets down in 7" position when playing 10" or 12" records." As a 12" record drops off the off-set in the Center Post (43) it should hit Trip Lever (17) as it passes the Pick-up Arm. Standard 12" records should be used. They should have a diameter of $11\frac{3}{16}$ " plus or minus $\frac{1}{32}$ ". Check Items 1, 2 and 3 in section entitled "12" record drops and wobbles, failing to hit Trip Lever (17)." Check to see if spring on Trip Lever (17) is loose or broken and rehook or replace in position as shown in Fig. 4.

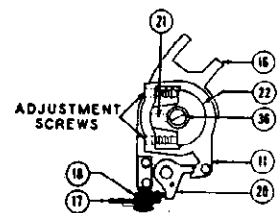


FIG. 4

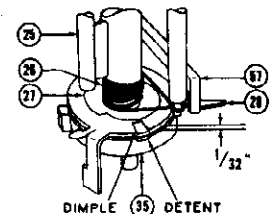
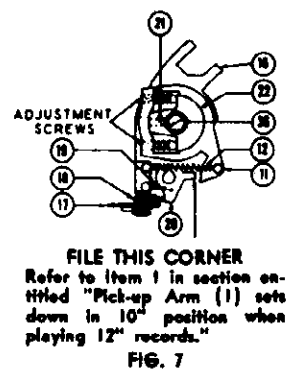
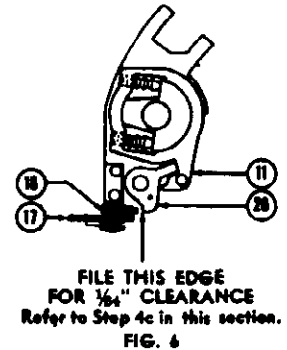


FIG. 5


TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
	<p>4. Trip Lever (17) below its normal horizontal position and record does not hit lever.</p> <p>5. Record with too large a center hole.</p> <p>6. Loose or missing Index Spring (19).</p> <p>7. Pick-up Arm not properly adjusted.</p>	<p>To check this condition proceed as follows:</p> <ol style="list-style-type: none"> Turn Control Knob (52) to "REJ." position and rotate Turntable (48) by hand until Pick-up Arm is about to start return toward the record. Depress Trip Lever (17) momentarily. There should be a slight shift in the position of Pick-up Arm (1). Raise Pick-up Arm (1) and check to see if there is a clearance of about $\frac{3}{64}$" between Index Lever (20) and Index Cam (18) as shown in Fig. 6. Should the clearance be insufficient, file the edge of Index Lever (20) closest to the Index Cam (18). Should the space be adequate, check for loose or broken spring on Index Cam (18) and replace or rehook as shown in Fig. 6. <p>This will produce the same effect as an undersize record, described in Item 1 above.</p> <p>Check for loose or missing Index Spring (19) and replace or rehook in position as shown in Fig. 7.</p> <p>If 12" record hits Trip Lever (17) properly and Pick-up Arm lands at wrong starting point, Pick-up Arm may not be properly positioned. This adjustment must be made while changer is set for 10" operation. Refer to Items 2a and b in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."</p>
Pick-up Arm (1) sets down at wrong point when playing 7" records.	<p>1. Locator Cam (97) improperly set.</p> <p>2. Pick-up Arm (1) not properly adjusted.</p>	<p>Before checking for proper set down point of Pick-up Arm (1) be sure Speed Selector Knob (88) is set to either "33-7"" or "45" position and that Locator Cam (97) is in the position shown in Fig. 17. If cam is improperly set, refer to Item 1 in section entitled "Pick-up Arm (1) sets down in 7" position when playing 10" or 12" records."</p> <p>If Locator Cam (97) is correctly set and Pick-up Arm (1) lands at wrong starting point, Pick-up Arm may not be properly positioned. This adjustment must be made while changer is set for 10" operation. Refer to Items 2a and 2b in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."</p>
Pick-up Arm (1) sets down in 10" position when playing 12" records.	1. Index Lever does not slide down incline and assume the position shown in Fig. 6.	<p>Be sure that record has hit Trip Lever (17) as it dropped past Pick-up Arm. Also check Items 2, 3 and 5 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 12" records."</p> <p>Should the above fail to correct the condition, file about $\frac{3}{64}$" bevel on corner of Index Lever (20) (see Fig. 7 for location). Be careful not to round off end.</p>
Pick-up Arm (1) sets down in 12" position when playing 10" records.	<p>1. Index Spring (19) broken or missing.</p> <p>2. No clearance between Hinge Locking Ring (11) and Index Lever (20). This may be due to one of the following:</p> <ol style="list-style-type: none"> Hinge Bearing (22) not in proper position with respect to Locator Housing (35). Projection on Hinge Assembly (16) defective. 	<p>Check for broken or missing Index Spring (19) and replace or rehook in position as shown in Fig. 7.</p> <p>In order to check for proper clearance, first turn Control Knob (52) to "REJ." position and rotate Turntable (48) by hand until Lift Arm Assembly (83) has moved in one direction as far as it will go and is about to return. Now raise Pick-up Arm (1) and check to see if there is a clearance of about $\frac{3}{64}$" between Index Lever (20) and Hinge Locking Ring (11). (See Fig. 7 for location.)</p> <ol style="list-style-type: none"> If this gap is not present, it will be necessary to check the setting of the Hinge Bearing (22) by referring to Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records." Should the above remedy fail to provide the required gap it will be necessary to check the projection at base of Hinge Assembly (16). Also check for binding between Hinge Bearing (22) and body of Hinge Assembly (16). This may be accomplished by disassembling Pick-up Arm mechanism as described under heading "Top Assembly" in section entitled "Procedure for Removal and Replacement of Major Parts."
<p>Pick-up Arm (1) sets down in 7" position when playing 10" or 12" records.</p> <p>OR</p> <p>Pick-up Arm (1) sets down in 10" position when playing 7" records.</p>	1. Locator Cam (97) not in proper position with respect to Speed Selector Knob (88).	<p>When Speed Selector Knob (88) is set to either the "78" or "33-10"-12" position, the Locator Cam should be so placed that the projection on Set Down Locator (28) contacts cam as shown in Fig. 13. With Speed Selector Knob (88) set to either "45" or "33-7"" position, the Locator Cam (97) should be so placed that the projection on Set Down Locator (28) contacts the shaft of the cam as shown in Fig. 17. If this is not the case check the following:</p> <ol style="list-style-type: none"> Index Rod (96) not properly connected to Locator Cam (97). Index Rod (96) not properly shaped. See Fig. 17 for shape. Arm at base of Speed Selector Shaft (89) not properly staked.



MODEL VM-508222

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
<p>Pick-up Arm (1) sets down correctly for 7" and 10" records but incorrectly for 12" records.</p> <p>OR</p> <p>Pick-up Arm (1) sets down correctly for 12" records but incorrectly for 7" and 10" records.</p>	<p>1. Distance, that controls 10" and 12" indexing, is incorrect.</p>	<p>Be sure that Pick-up Arm (1) has been properly adjusted as described under Items 2a and b in section entitled "Pick-up Arm sets down at wrong starting point when playing 10" records." Now, with a 12" record in place, operate changer as described in Instruction Section.</p> <p>If the Pick-up Arm (1) approaches the record, but lands too far on the record, it will be necessary to file the "12" stop" deeper. (See Fig. 8.)</p> <p>If the Pick-up Arm (1) approaches the record, but lands to the right of it, it will be necessary to file the "10" stop" deeper. (See Fig. 8.)</p> <p>After each filing operation, carefully readjust set down point as described in Items 2a and b in section entitled "Pick-up Arm sets down at wrong starting point when playing 10" records."</p> <div>  <p>12" STOP 10" STOP</p> <p>THIS DISTANCE CONTROLS INDEXING OF 10" AND 12" RECORDS.</p> <p>FIG. 8</p> </div>
<p>Pick-up Arm (1) does not set down at same position consistently.</p>	<p>1. Ring Spring (12) broken or missing.</p> <p>2. Binding between Safety Spring (32) and Locator Housing (35).</p> <p>3. Broken or loose Return Spring (26).</p> <p>4. Locator Cam (97) not in proper position with respect to Speed Selector Knob (88).</p>	<p>Check for broken or missing Ring Spring (12) and replace or rehook in position as shown in Fig. 7.</p> <p>To check for binding between these parts it will first be necessary to disassemble Pick-up Arm mechanism as described under heading "Bottom Assembly" in section entitled "Procedure for Removal and Replacement of Major Parts."</p> <p>Binding may now be checked by holding shaft of Pick-up Arm Locator (30) in one hand and turning Locator Housing (35) with other. Check to see that locator is returned all the way to the stop in Locator Housing (35).</p> <p>A further check may be made by removing Safety Spring (32) and by rotating Pick-up Arm Locator (30) and again checking for any binding action. Remove all burrs and sharp edges on both locator and spring.</p> <p>After reassembling be sure to properly set position of Locator Housing (35) in manner described in Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."</p> <p>Check for broken or unhooked Return Spring (26). Replace or rehook into position as shown in Fig. 5 with one end of spring hooked around Set Down Locator (28) and other end of spring hooked around leg of Base Plate (25).</p> <p>Check Item 1 in section entitled "Pick-up Arm (1) sets down in 7" position when playing 10" or 12" records."</p>
<p>Pick-up Arm remains on Rest Post after changing a record.</p>	<p>1. Hinge Bearing (22) not in proper position with respect to Locator Housing (35).</p> <p>2. Bent down projection of Set Down Locator (28) not properly shaped.</p>	<p>Check Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."</p> <p>Check to be sure that bent down projection of Set Down Locator (28) is pointing straight down as shown in Figs. 5 and 14. To determine the correct action of Set Down Locator, refer to "Description of Cycle," Item 2 in section entitled "Set down point; 7" or 10" records." If necessary, reshape the bent down projection or replace with new Set Down Locator (28).</p>
<p>Improper "tracking" of needle on record—needle slips out of grooves and skips portions of record.</p>	<p>1. Incorrect setting of Needle Selector Knob (2).</p> <p>2. Foreign matter in record grooves.</p> <p>3. Needle (4) or (5) not contacting record grooves.</p> <p>4. Badly worn records due to one of the following:</p> <ol style="list-style-type: none"> Deep Scratches on the record. Needle Selector Knob (2) improperly set. Broken or unhooked Chain (9) and/or Counter Balance Pressure Spring (10). 	<p>Setting of Needle Selector Knob (2) to the correct position to correspond with type of record being played is vitally important—the knob should be turned so that the numbers "78" appear at the top when playing standard (78 R.P.M.) type records; it should be turned so that numbers "33-45" appear at the top when playing "Long Playing" (microgroove—33½ R.P.M.) or "Fine groove" (45 R.P.M.) records.</p> <p>Clean record with record brush or camel's hair brush.</p> <p>Be sure that front part of Pick-up Arm (1) is not contacting record. Should this be the case, it will be necessary to slightly bend needle so that its tip protrudes beyond Crystal Cartridge (6). Do not bend needle while mounted in Crystal Cartridge (6). Remove Needle (4) or (5) as outlined in section entitled "Procedure for Removal and Replacement of Major Parts" on Page 128.</p> <p>To check for these conditions proceed as follows:</p> <ol style="list-style-type: none"> Examine record for scratches that may have destroyed continuity of grooves. If records had been played with Needle Selector Knob (2) set improperly (for correct setting see Item 1 in this section), the needle may have destroyed the continuity of the grooves to such an extent that they can no longer be used. The action of parts may be observed by raising Pick-up Arm (1) and turning Needle Selector Knob (2). As knob is turned counter-clockwise toward the "33-45" position, Chain (9) is pulled up around hub on Pivot Assembly (8). This pull should be transmitted to the Counter Balance Pressure Spring (10) which is attached to Hinge Bracket (13). <p>Should it become necessary to replace or rehook the Chain (9) or Spring (10) it may be accomplished by first taking out the four screws that retain the Pivot Assembly (8).</p> <p>In reassembling Pivot Assembly (8), care should be exercised to properly route Chain (9) to insure smooth operation of Needle Selector Knob (2). With the Needle Selector Knob (2) set so that the numbers "33-45" appear at the top, Chain (9), which is attached to hook on hub of Pivot Assembly (8), should go around hub in a clockwise direction, around projection in Pick-up Arm (1) and along side of the arm.</p>

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
	5. Needle pressure too light when playing "Long Playing" (micro-groove) records. 6. Badly worn or bent Needle (4) or (5). 7. Locator Housing (35) not disengaging from the Set Down Locator (28) when a change cycle is complete. 8. Binding between Hinge Bearing (22) and Hinge Assembly (16). 9. Shallow eccentric groove.	<p>If needle skips grooves while playing "Long Playing" (microgroove) or "Fine groove" records, it may be due to Pick-up Arm (1) not having enough pressure—less than 6½ grams. Should this pressure be found to be too light after checking it with a sensitive gram scale, the leg of Hinge Bracket (13) on which the Counter Balance Pressure Spring (10) is hooked, should be bent backward.</p> <p>CAUTION: Bend slowly and carefully as only a slight change is required. Too much pressure can cause excessive record wear.</p> <p>Examine needle for worn or bent tip and replace if necessary. To replace needle refer to section entitled "Procedure for Removal and Replacement of Major Parts."</p> <p>There should be a space of approximately $\frac{1}{32}$" between these parts at the end of a change cycle. If this space is lacking, see Fig. 5 as well as Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."</p> <p>Check for binding between Hinge Bearing (22) and body of Hinge Assembly (16) by disassembling Pick-up Arm mechanism as described under heading "Top Assembly" in section entitled "Procedure for Removal and Replacement of Major Parts."</p> <p>Try a record which is known to have a good groove.</p>
Pick-up Arm does not return to Rest Post after last record has been played.	1. Control Lever (57) not engaging Set Down Locator (28). 2. Hinge Bearing (22) not in proper position with respect to Locator Housing (35).	<p>On return sweep of Lift Arm (83) the upturned end of Automatic Shut-off Rod (86) should contact and actuate Control Lever (57) so that leg on lever engages Set Down Locator (28) as shown in Fig. 5.</p> <p>If Automatic Shut-off Rod (86) does not contact Control Lever (57) try bending rod or replacing it if necessary.</p> <p>If leg on Control Lever (57) is defective, replace entire Control Link Assembly (54).</p> <p>To check for correct position refer to Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."</p>
Record fails to drop off the off-set on the Center Post.	1. Pusher shaft inside of Center Post (43) is broken. 2. Ejector Lever (45) does not move out far enough. 3. Ejector Lever (45) pushes up entire stack of records. 4. Lift Arm (83) not turning during cycle.	<p>Should pusher shaft be broken, the Center Post Roller (44) and "Brass Bushing" will drop out of Center Post (43). If this is the case replacement of the entire Center Post (43) will be required and may be accomplished as follows:</p> <ol style="list-style-type: none"> Locate Set Screw (47) by referring to Fig. 14. Loosen screw, and Center Post (43) may be withdrawn from top of changer. Replace with new Center Post (43) making sure Set Screw (47) engages "Locating Hole" at bottom of Center Post (43) (see Fig. 9.) <p>Check to see if Screw (85) is loose. (See Fig. 13 for location.) Retighten screw.</p> <p>This lever should first rise inside the slot in the Center Post (43) then move forward pushing one record off the shoulder of Center Post (43). This action may be observed by proceeding as follows:</p> <ol style="list-style-type: none"> Place a record on the off-set of the Center Post (43) and then lower Record Support Arm (40) into place. Turn Control Knob (52) to "REJ." and rotate Turntable (48) by hand. While Turntable is being revolved observe the action of the Ejector Lever (45). Should it push forward prematurely, the Center Post (43) is defective and will have to be replaced. <p>Check for broken roller on Lift Arm Assembly (83). Replace Lift Arm Assembly (83).</p>
More than one record drops at a time.	1. Center Hole in record too large or badly worn. 2. Record changer not level. 3. Improper setting of Record Support Arm (40).	<p>Records with badly worn center holes will not rest properly on off-set Center Post (43) and these should not be used when using the changer for automatic operation.</p> <p>Record changer must be set in a level position in order for record to rest properly and securely on its supports.</p> <p>See paragraph entitled "Placing Records on Changer" in Operating Instruction section. The Record Support Arm (40) must be able to slide down under its own weight. If this support does not follow the records down as they are being lowered to the Turntable (48) multiple dropping of records will result. While this occurs, it is</p>

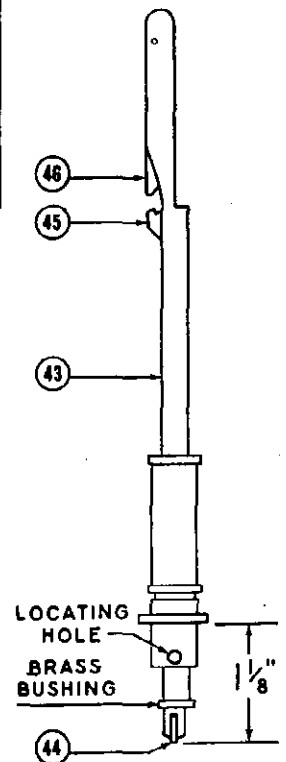


FIG. 9

MODEL VM-508222

TROUBLE SHOOTING CHART (Continued)

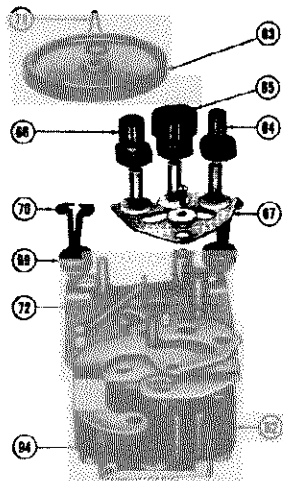
SYMPTOM	CAUSE	REMEDY
	4. Slide (46) in upper part of Center Post (43) not all the way down.	<p>generally due to binding between the Record Support Arm (40) and Center Post (43) and may be checked as follows:</p> <ol style="list-style-type: none"> See if Center Post (43) is straight. Carefully straighten. Tip of Record Support Arm (40) is slightly bent up. Straighten so that tip of arm rests on offset shoulder of Center Post (43) when shaft of Support Arm is properly seated. If after checking the above steps, hole in tip of Record Support Arm (40) is not centered over Center Post (43), raise support arm up as far as it will go and with heel of your hand, bend shaft slightly until hole is centered over Center Post (43). Now lower Record Support Arm (40) until locating pin in shaft enters base plate. There should be an equal amount of play on each side of the hole in tip of the arm. Bend to correct position. If Record Support Arm (43) is loose on its shaft, replace. <p>Relieve any binding so that Slide (46) will not stick at any point.</p> <p>CAUTION: When records are placed on the Center Post (43) be sure the Slide (46) is all the way down.</p>
Record drops and lands on Pick-up Arm (1); OR 12" records drops and wobbles, failing to hit Trip Lever (17).	<ol style="list-style-type: none"> Ejector Lever (45) does not move out far enough. Ejector Lever (45) extending out too far. Hinge Bearing, not in proper position with respect to Locator Housing (35). 	<p>Check to see if Screw (85) is loose. (See Fig. 13 for location.) Retighten screw.</p> <p>To check this condition proceed as follows:</p> <ol style="list-style-type: none"> Turn Control Knob (52) to "REJ." position and rotate turntable by hand until Ejector Lever (45) has reached its maximum outward position. With a new record as a gauge, check to see if any binding occurs. Should there be any binding action, it may be removed by using a fine file to remove the high or binding spots. <p>To check for this condition see Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."</p>
Record changer fails to shut off automatically after last record has been played.	<ol style="list-style-type: none"> Improper setting of Record Support Arm (40). Changer stalls during change cycle. Automatic Shut-off Rod (86) not being properly set for automatic shut-off operation. This may be due to one of the following: <ol style="list-style-type: none"> Improperly set Record Support Arm (40). Set Screw (47) not fitting properly in locating hole of Center Post (43). Screw (85), that holds Lift Arm (83) in place, is loose. Bent up end of Automatic Shut-off Rod (86) too short. Automatic Shut-off Rod (86) not actuating Control Lever (57). 	<p>See Item 3 in section entitled "More than one record drops at a time."</p> <p>See section entitled "Changer stops while changing a record."</p> <p>On the change cycle following the playing of the last record, and as Lift Arm Assembly (83) swing in, tip of Automatic Shut-off Rod (86) should contact "Brass Bushing" at base of Center Post (43). (See Fig. 14.) If tip of Automatic Shut-off Rod (86) is not contacting "Brass Bushing" check the following:</p> <ol style="list-style-type: none"> After last record has been dropped, tip of Record Support Arm (40) should be resting on off-set of Center Post (43). If this is not the case see Item 3 in section entitled "More than one record drops at a time." Be sure that Set Screw (47) is properly positioned in "Locating Hole" at base of Center Post (43). (See Figs. 9 and 14 for location of hole and screw.) Tighten Screw (85). (See Fig. 13 for location.) If bent-up end of Automatic Shut-off Rod (86) is still not contacting "Brass Bushing," try placing either a $\frac{1}{16}$" or $\frac{3}{16}$" Fibre Washer (84) between bottom of Lift Arm Assembly (83) and metal washer. Should the rod still not contact bushing properly it will be necessary to replace entire Automatic Shut-off Rod (86). <p>CAUTION: When inserting Fibre Washer (84) care should be exercised that other end of rod does not bind against Control Lever (57).</p> <p>After Automatic Shut-off Rod (86) has contacted "Brass Bushing" and has been turned 90°, the Lift Arm Assembly (83) makes its return sweep and the other end of the rod should contact and actuate Control Lever (57), thus shutting off Switch (61). Bending or replacing of Automatic Shut-off Rod (86) may be required.</p>
Record changer shuts off before last record has been played.	<ol style="list-style-type: none"> Center Post Roller (44) moves up too far. Record too thick. Automatic Shut-off Rod (86) not being reset. 	<p>To check this condition refer to Item 8 in section entitled "Changer stops while changing a record."</p> <p>Old style records which are $\frac{1}{16}$" thick will shut off the changer instead of being dropped. Do not use this type of record for automatic operation.</p> <p>On the change cycle following a cycle in which the changer was automatically shut off, the Automatic Shut-off Rod (86) should return to its original position. On the in-sweep, the bent-up part of the rod engages the Control Lever (57) which turns the rod 90°. It is held against a stop on the Lift Arm Assembly (83) by a flat Spring (87). If Automatic Rod is not reset, check the following:</p> <ol style="list-style-type: none"> Check tension of Spring (87). Should it be insufficient it would allow the Automatic Shut-off Rod (86) to be out of position, thus turning off changer prematurely.

TROUBLE SHOOTING CHART (Continued)

SYMPTOM	CAUSE	REMEDY
	4. Hinge Bearing not in proper position with respect to Locator Housing (35).	<p>b. Lubricate the bearing of the Automatic Shut-off Rod (86) and Spring (87) with Lubriplate.</p> <p>* c. In normal operation there should be a clearance between Control Lever (57) and Automatic Shut-off Rod (86) when the latter is turned fully down. Bending of rod may be necessary.</p> <p>If Locator Housing (35) is so positioned that projection on base of housing rides on incline plane of Lift Arm Assembly (83) while the latter is swinging thru its cycle, it would cause other end of Lift Arm Assembly (83) to rise and allow Automatic Shut-off Rod (86) to contact "Brass Bushing." This in turn would cause changer to shut off automatically as previously described. Should this be the case Locator Housing will have to be repositioned as described in Item 3 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."</p>
Slow Turntable Speed.	<p>1. Idler Wheel (63) not engaging Turntable properly.</p> <p>2. Grease on Idler Wheel (63) on Idler Pulley (64), (65), (66) (or Drive Belt (68)) or rim of Turntable (48).</p> <p>3. Turntable and Bearing Race (50) binding.</p> <p>4. Operating temperature too low.</p> <p>5. Low line voltage.</p> <p>6. Defective Motor (62).</p>	<p>Be sure Speed Selector Knob (88) is indexed properly to either of the four positions. Check to be sure that Spring (72) which pulls Idler Wheel (63) against Turntable (48) has sufficient tension.</p> <p>Clean with carbon tetrachloride.</p> <p>Remove Turntable (48). Check to see if Turntable Washer (49) and Bearing Race (50) are free to rotate. If binding does occur, remove Center Post (43) by loosening Set Screw (47) and withdraw Center Post (43) from the top. Binding of Bearing Race (50) may now be released.</p> <p>Before replacing Turntable (48) clean bearing surface.</p> <p>If changer has been stored in cold place or operated in surroundings at a temperature of less than 60° F., the turntable speed may be too slow.</p> <p>Line voltage should not be less than 105 volts.</p> <p>If, after checking the above 5 items, the turntable speed is still slow, it may be assumed that the motor is weak (has low torque) and should be replaced.</p>
Noisy operation during playing cycle such as: 1. Rumble or "wow."	<p>a. Changer does not float freely on its mounting springs</p> <p>b. Improper motor mounting.</p> <p>c. Worn tire on Idler Wheel (63).</p> <p>d. Worn or missing Grommet (73).</p>	<p>Be sure the two hold down screws (see Fig. 16) have been loosened sufficiently to allow the entire unit to float freely.</p> <p>Be sure that Motor (62) is mounted on rubber bushings and that frame of Motor (62) is not contacting Base Plate (25).</p> <p>Examine Idler Wheel (63) for flat spots on tire and replace entire wheel if required.</p> <p>Be sure that rubber Grommet (73) at end of Speed Selector Rod (90) is not worn or missing. There should be no metal contact at end of Speed Selector Rod (90) and bracket that controls position of Idler Pulleys (64), (65) and (66).</p>
2. Rapid thumping sound.	Flat spot on Idler Wheel (63), or rubber tire of Idler Pulley (64), (65) or (66).	Examine Idler Wheel (63) as well as Idler Pulleys (64), (65) and (66) for flat spots on rubber tire and replace entire wheel or pulley where required. See section entitled "Procedure for Removal and Replacement of Major Parts" for instructions on replacement of Pulleys (64), (65), or (66).
3. Scraping sound while Turntable (48) revolves.	<p>a. Turntable warped.</p> <p>b. Idler Wheel (63) bent.</p> <p>c. Wires beneath turntable rubbing.</p>	<p>This may be checked by noting a serious rise and fall in Turntable as it revolves. Check for warped Turntable or bent bearing. Replace Turntable (48).</p> <p>Replace with new Idler Wheel (63) or new Motor (62) if support shaft is bent.</p> <p>Dress wires away from Turntable (48).</p>
4. Squeaking sounds.	Lack of lubrication.	See section entitled "Lubrication."
5. A "ticking" sound once every revolution of turntable (48).	<p>a. Bent Clutch Pawl (79).</p> <p>b. "Block type" Clutch Pawl (79).</p>	<p>If this is the case, projection on hub of Turntable (48) will catch edge of Clutch Pawl (79) instead of wiping smoothly along curved surface of pawl during playing cycle.</p> <p>A complete description of this action is outlined in Item 2 in section entitled "Changing a Record" on page 116. Reshape pawl or replace with a new one.</p> <p>Some Clutch Pawls (79) were made with a block of metal at the point of contact. This type is more critical to adjust. If loud "ticking" still persists after bending adjustment, try replacing with a new one.</p>
Noisy operation during change cycle such as: 1. Clicking noise. 2. Grinding sounds.	<p>Changing mechanism.</p> <p>Worn or defective parts, or lack of lubricant.</p>	<p>There is a certain amount of clicking noise as the mechanism goes through its cycle. If there are any extra loud sounds check for binding and insufficient clearance of parts.</p> <p>Check for worn or defective parts or a lack of lubricant.</p>
Excessive Record wear when playing "Long Playing" (microgroove) records.	1. Improper pressure of Pick-up Arm (1).	<p>This pressure should not exceed 12 grams. Should the pressure be found to be too heavy after checking it with a sensitive gram scale, the leg of the Hinge Bracket (13), on which the Counter Balance Pressure Spring (10) is hooked, should be bent forward.</p> <p>CAUTION: Bend slowly and carefully as only a slight change is required. Too little pressure can cause "mistracking."</p>

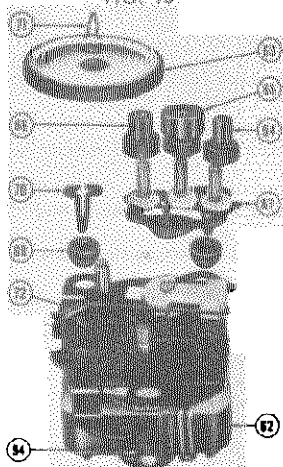
MODEL VM-508222

ALTERNATE TYPES OF MOTORS



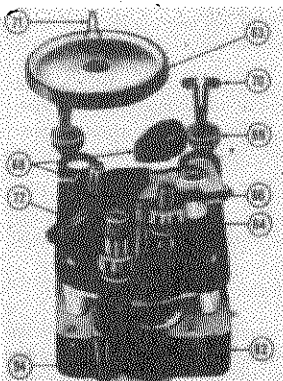
This "turret type" motor is identified by a letter "R" or "3211" stamped on motor.

FIG. 10



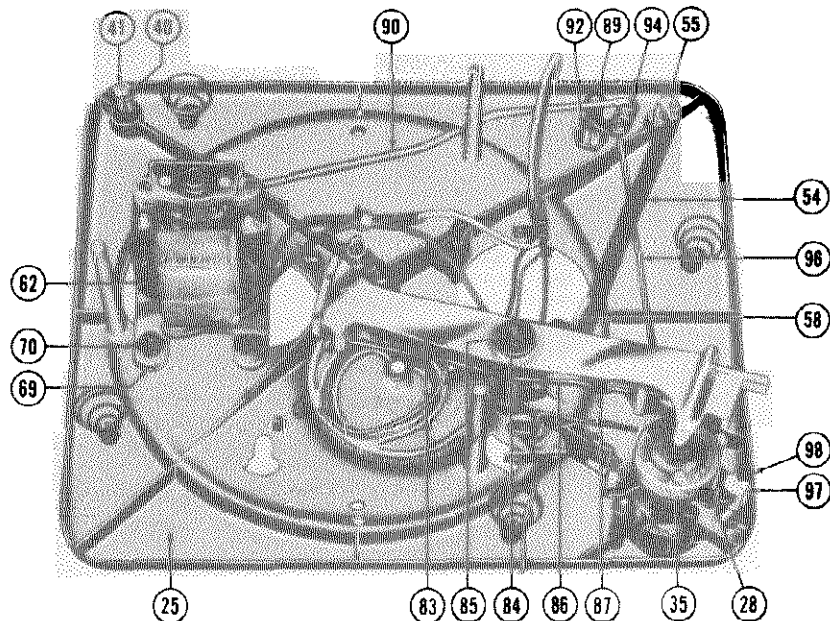
This "turret type" motor is identified by a "GI" on bearing or "3129" stamped on motor.

FIG. 11



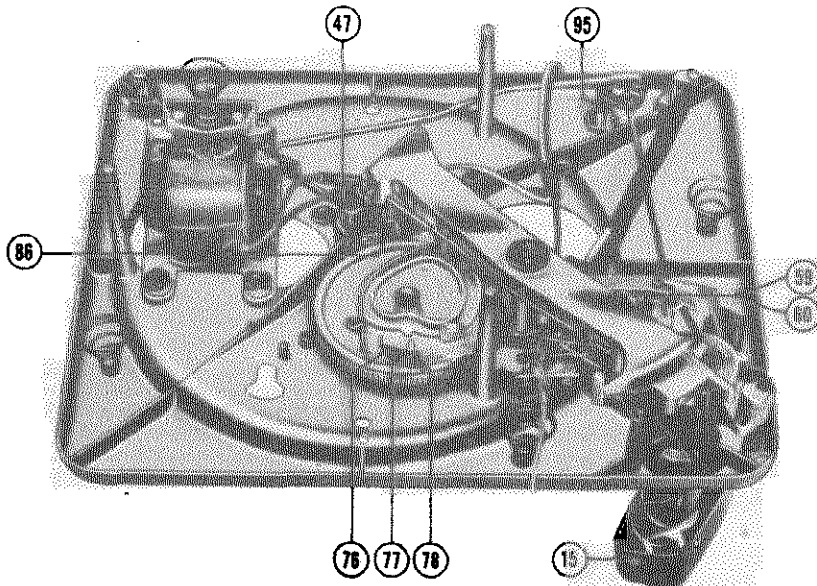
This "belt type" motor is identified by a "GI" on bearing or "2727" stamped on motor.

FIG. 12



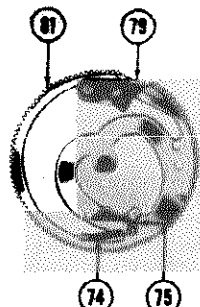
Bottom view of Changer.

FIG. 13



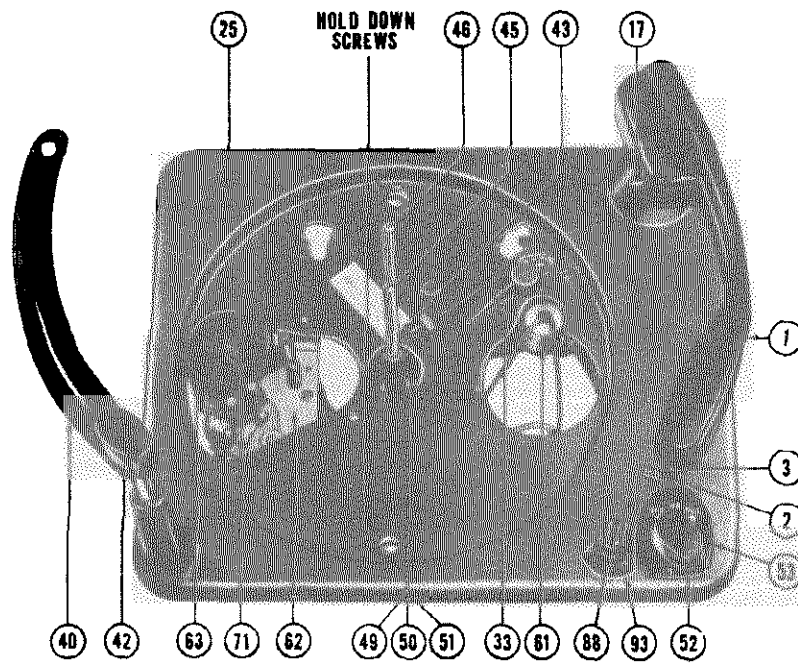
Bottom view of Changer with Automatic Shut-off Rod (86) contacting "Brass Bushing" on Center Post (43) for Automatic Shut-off operation.

FIG. 14

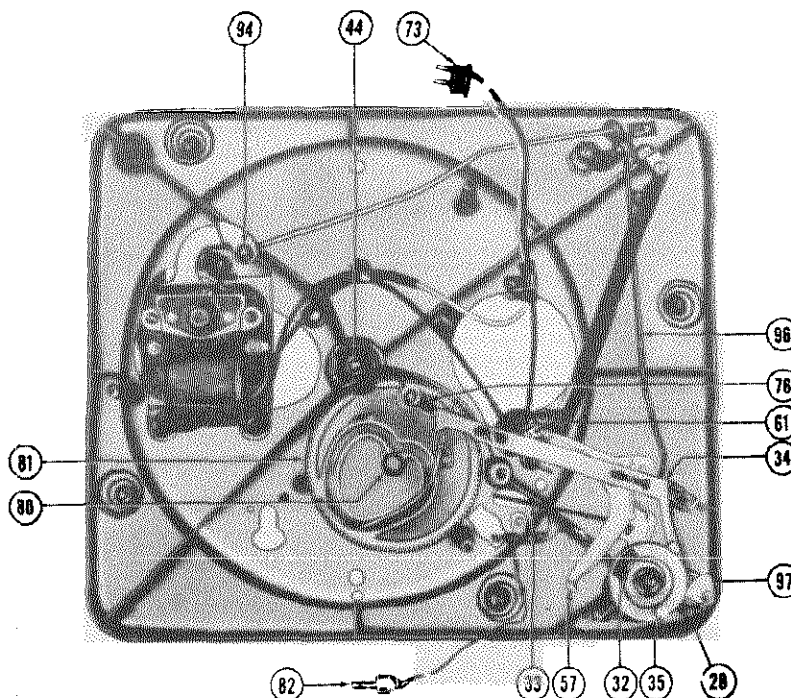


Top view of Main Cam Assembly (81).

FIG. 15



Top view of Changer.
FIG. 16



Bottom view of Changer with Lift Arm Assembly (83) removed.
FIG. 17

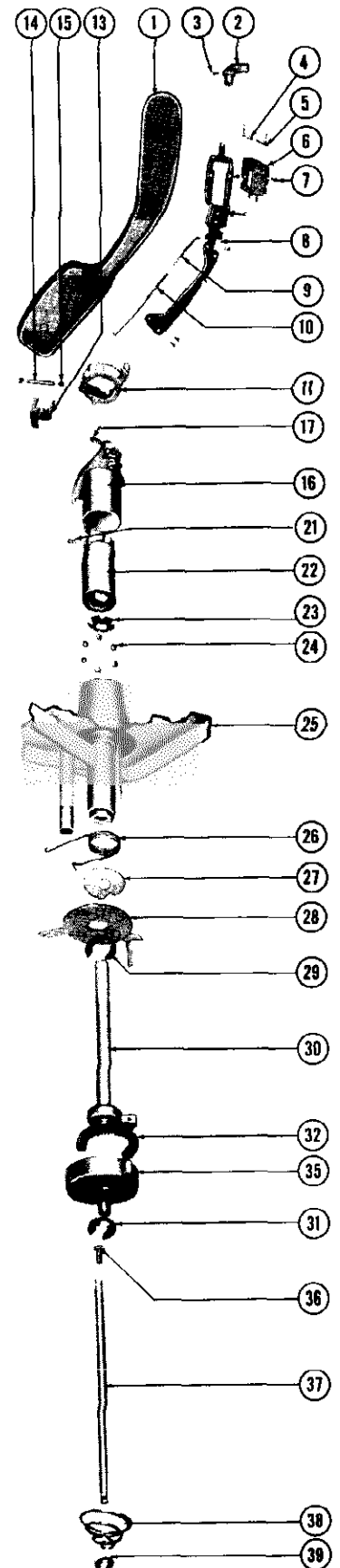


FIG. 18

MODEL VM-508222

PROCEDURE FOR REMOVAL AND REPLACEMENT OF MAJOR PARTS

NAME OF ITEM	METHOD OF REMOVING OR REPLACING
Needle (4) or (5).	To remove Needle (4) or (5), turn Needle Selector Knob (2) so that needle to be replaced faces down. To withdraw needle, merely grasp it between thumb and forefinger and pull straight downward. When inserting a new Needle (4) or (5) place it so that tip faces forward and push shank of Needle all the way in. CAUTION: When replacing both needles be sure that the fine (.001") tipped Needle (5) is placed in the correct side of the Cartridge (6). A distinct color identifies correct side of cartridge and corresponding Needle (5).
Crystal Cartridge (6).	To remove this part, first turn Needle Selector Knob (2) until the numbers "33-45" appear at the top. Now raise Pick-up Arm (1) and take out Screws (7) and withdraw Cartridge (6) from arm. Do not attempt to unsolder lead connections—merely slip the "quick disconnect" electrical connectors off prongs at rear of Cartridge (6). To replace Cartridge (6), proceed in the reverse order outlined above. CAUTION: Care should be taken, when placing cartridge in Pick-up Arm (1), that side with identifying color faces down.
Center Post (43) and Bearing Race (50).	To remove Center Post (43) loosen Set Screw (47) and withdraw post from top of changer. Turntable Washers (49) and Bearing Race (50) are held in place by Retaining Ring (51). To replace Center Post (43) first be sure that Turntable Washers (49) and Bearing Race (50) are in place. Next, insert Center Post (43) from top of changer and tighten Set Screw (47) making sure screw enters "Locating Hole" at base of Center Post (43) [see Fig. 9 and 14.]
Disassembly of Pick-up Arm Mechanism.	The support which holds and locates the Pick-up Arm (1) is made of an upper and lower major assembly. These assemblies are held together by Set Screw (21). (For location see Fig. 7.) It may be necessary to line up hole in Hinge Locking Ring (11) by moving Adjusting Screws. Before attempting to work on top assembly, it will be necessary to unsolder and disconnect the cartridge lead at the terminal strip on underside of Base Plate (25). Then withdraw lead from hole in Base Plate (25) and proceed as follows to disengage top assembly: 1. Loosen Set Screw (21). Top assembly may now be lifted straight out. 2. Pick-up Arm (1) may be taken off Hinge Assembly (16) by first unhooking Counter Balance Pressure Spring (10) from Hinge Bracket (13). Then loosen Pivot Screws (15) at rear of arm. 3. Disconnect one end of Ring Spring (12), being careful not to break the peened-over stud around which it is fastened. 4. Loosen adjustment screws on Hinge Locking Ring (11). The major assembly may now be separated into three assemblies: Hinge Locking Ring (11), Hinge Bearing (22) and Hinge Assembly (16). Care should be exercised not to lose the six Ball Bearings (24) and Ball Bearing Spacer (23) resting in ball cup on Base Plate (25). BOTTOM ASSEMBLY. Before attempting to work on bottom assembly, it will be necessary to take off Lift Arm Assembly (83) by removing Screw (85). To remove and disassemble bottom assembly, proceed as follows: 1. Loosen Set Screw (21). Bottom assembly may now be withdrawn. 2. If a further breakdown is required, it may be done in the following manner: Take off "C" Washer (39) and withdraw Lift Rod (37). Take out Safety Spring (32). Remove "C" Washer (31). Locator Housing (35) and Pick-up Arm Locator (30) may now be separated.
Replacing Pick-up Arm Mechanism.	The Pick-up Arm mechanism should be reassembled by reversing the procedure given in the preceding paragraphs, exercising the following precaution: 1. When replacing cartridge lead in Pick-up Arm (1) care should be exercised so that lead coming out of hole in Base Plate (25) passes around Hinge Pin (14). It should then be laid in special recesses around inside edge of Pick-up Arm (1), routed under Pivot Assembly (8) and passed thru hole at point of pivot. For final setting of Set Screw (21) and adjustment of Pick-up Arm (1), reference should be made to items 3c, d and e on Page 119 in section entitled "Pick-up Arm (1) sets down at wrong starting point when playing 10" records."
Replacing Lift Arm Assembly (83).	When replacing Lift Arm Assembly (83), observe the following precautions: a. Rotate Main Cam Assembly (81) until it comes to rest and is held by Stop Pawl (75). b. Replace Lift Arm Assembly on the bearing shaft and be sure that Automatic Shut-off Rod (86) fits under Automatic Trip Lift Link (34). c. Be sure roller on Lift Arm Assembly (83) fits into heart-shaped groove in Main Cam Assembly (81).
Idler Pulleys (64), (65), or (66). (Turret type motor.)	To remove an individual Idler Pulley (64), (65) or (66), first set Speed Selector Knob (88) to a position where the particular Idler Pulley to be removed does not make a contact with anything. While holding the Motor (62) steady in one hand, pull Idler Pulley straight up until it releases from its shaft. When replacing Idler Pulleys (64), (65) or (66), they must be slipped over their respective shafts and pressed down firmly until they "snap" into position. It is important that these pulleys be properly seated.
Idler Pulley (64) or (66). (Belt type motor.)	Before removal of Idler Pulley (64) can be accomplished it will be necessary to take off Drive Belt (68). In the case of Idler Pulley (66) it will be necessary to remove both Drive Belts (68). Removal of Idler Pulley (64) or (66) can then be accomplished as outlined in first paragraph of preceding section on turret type motor. When replacing Idler Pulley (64) or (66), exercise care to press the pulley down on its shaft until it snaps into position.

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use or high operating temperature, it may require lubrication.

The recommended lubricants and points of lubrication are as follows:

A. LUBRIPLATE (apply with small brush):

1. Hinge Bearing (22).
2. Locator Housing (35) and Set Down Locator (28).
3. Inclined Planes of Lift Arm Assembly (83), lift arm bearing, and bearings for Automatic Shut-off Rod (86).
4. Between Automatic Shut-off Rod (86) and Spring (87).
5. Heart-shaped groove in Main Cam Assembly (81) and main cam bearing.

6. At lower section of Center Post (43) where the "Brass Bushing" and support of Center Post Roller (44) enter body of Center Post (43).

7. Between Turntable Washer (49) and Bearing Race (50).
8. Bearing for Automatic Trip Link (34).

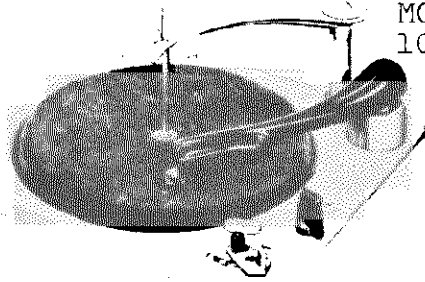
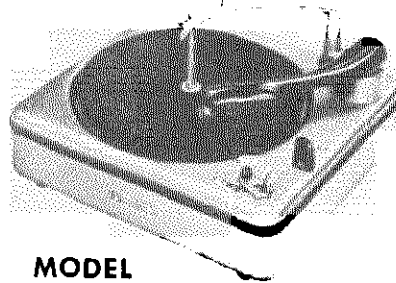
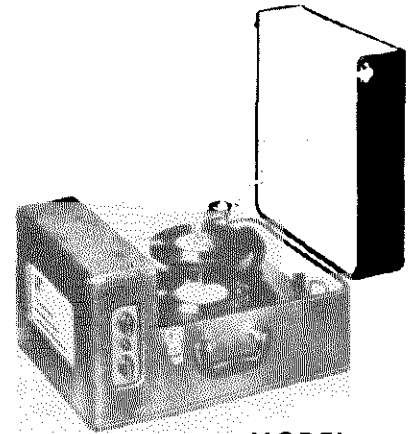
B. LIGHT MINERAL OIL (apply with small oil can or medicine dropper):

1. Pick-up Arm Locator (28) inside of Locator Housing (35) and their bearing surfaces.
2. Ball Bearings (24) inside pick-up arm housing in Base Plate (25).
3. Bearings for Control Link Assembly (54).

PARTS LIST

REF. No.	PART No.	DESCRIPTION	REF. No.	PART No.	DESCRIPTION
1	507600	Pick-up Arm (less pivot assy. and cartridge)		508905	Idler Pulley for 78 R.P.M.; used on Motor identified with "R" or "3211" stamped on Motor
2	508579	Knob — Needle Selector	65	508906	Idler Pulley for 78 R.P.M.; used on Turret Type Motor identified with "GI" on bearing or "3129" stamped on Motor
3	507602	Screw — Set; for Needle Selector		508907	Idler Pulley for 45 R.P.M.; used on Motor identified with "R" or "3211" stamped on Motor
4	508433	Needle — Phonograph for Standard records	66	508908	Idler Pulley for 45 R.P.M.; used with Turret Type Motor identified with "GI" on bearing or "3129" stamped on Motor
5	508434	Needle — Phonograph for "Fine Groove" and "Microgroove" records		508909	Idler Pulley for 45 R.P.M.; used with Belt Type Motor identified with "GI" on bearing or "2727" stamped on Motor
6	508432	Crystal Cartridge (incl. both needles)	67	508910	Bracket, Idler Pulley Mounting; used on Motor identified with "R" or "3211" stamped on Motor
7	508577	Screw #4-40 x 3/8"; for mtg. cartridge		508911	Bracket, Idler Pulley Mounting; used on Motor identified with "GI" on bearing surface or "3129" stamped on Motor
8	508578	Pivot assembly and cartridge mtg. brkt.			
9	507605	Chain			
10	507606	Spring — Counter Balance Pressure			
11	505243	Hinge Locking Ring (incl. adjustment screws)			
12	505244	Ring Spring			
13	507607	Hinge Bracket			
14	507608	Hinge Pin for Pick-up Arm			
15	507609	Pivot Screw for Hinge Pin			
16	507610	Hinge Assembly (incl. trip lever, index cam, index spring, index lever)			
17	*	Trip Lever (part of Item 16)			
18	*	Index Cam (part of Item 16)			
19	*	Spring, Index (part of Item 16)			
20	*	Index Lever (part of Item 16)			
21	505246	Screw, Set #8-32 x 3/16"; for Hinge Bearing	68	508139	Drive Belt for Motor; used on Motor identified with "GI" on bearing surface or "2727" stamped on Motor
22	505245	Hinge Bearing			
23	508113	Ball Bearing Spacer	69	508912	Rubber Bushing for Mounting Motor; used on Motor identified with "R" or "3211" stamped on Motor
24	505252	Ball Bearing		508123	Rubber Bushing for Mounting Motor; used on Motor identified with "GI" on bearing surface or either "2727" or "3129" stamped on Motor
25	508580	Base Plate			
26	505256	Return Spring	70	508122	Clip, Motor Mounting
27	507612	Washer — Set Down Locator Clutch	71	505267	"C" Washer for Mounting Idler Wheel
28	508115	Set Down Locator		508913	Spring, Idler Wheel Tension; used with Motor identified with "R" or "3211" stamped on Motor
29	506787	"C" Washer for Set-Down Locator			
30	505247	Pick-up Arm Locator	72	508914	Spring, Idler Wheel Tension; used on Motor identified with "GI" on bearing surface or either "2727" or "3129" stamped on Motor
31	505248	"C" Washer for Pick-up Arm Locator			
32	505249	Spring, Safety			
33	508138	Rod, Manual Reject			
34	508130	Automatic Trip Link			
35	508116	Locator Housing			
36	505291	Height Adjusting Screw			
37	505289	Lift Rod			
38	505292	Spring, Lift Rod	73	501031	Plug for Phono. Motor Cable
39	505267	"C" Washer for Lift Rod	74	508137	Spring for Stop Pawl
40	505832	Record Support Assembly	75	*	Pawl, Stop (part of Item 81)
41	506788	"C" for Record Support Arm	76	508133	Pawl, Trip
42	506770	Knob for Record Support Arm	77	508135	Spring Washer for Trip Pawl
43	506772	Center Post	78	508134	"C" Washer for Trip Pawl
44	*	Center Post Roller (part of Item 43)	79	508136	Pawl, Clutch
45	*	Ejector Lever (part of Item 43)	80	505284	"C" Washer for Main Cam
46	*	Slide (part of Item 43)	81	508132	Main Cam Assembly (incl. Clutch Pawl, Trip Pawl, Stop Pawl and Spring)
47	506782	Screw, set; for center post	82	500966	Plug for Phono. Pick-up Cable
48	508117	Turntable	83	505285	Lift Arm Assembly (incl. Automatic Shut-off Rod and Spring)
49	508582	Turntable Washer			
50	508581	Turntable Bearing	84	506781	Washer, Fiber; 3/64" thick
51	507616	Retaining Ring for Turntable Washers		506780	Washer, Fiber; 3/64" thick
52	506770	Control Knob	85	505288	Screw for Lift Arm
53	507617	Escutcheon — "OFF-ON-REJ."	86	505286	Automatic Shut-off Rod
54	508119	Control Link Assembly (incl. Control Crank and Control Lever)	87	505287	Spring, Automatic Shut-off Rod
55	*	Control Crank (part of Item 54)	88	507622	Knob for Speed Selector
56	505266	"C" Washer for Control Crank	89	508124	Speed Selector Shaft and Arm
57	*	Control Lever (part of Item 54)	90	508126	Speed Selector Rod
58	505268	Spring, Reject	91	505266	"C" Washer for Speed Selector Shaft
59	506786	Washer, Fiber; for Control Lever	92	507624	Bushing for Speed Selector Shaft
60	505267	"C" Washer for Control Lever	93	508127	Escutcheon — Speed Selector
61	505269	Switch — "ON-OFF"	94	508125	Rubber Bushing for Speed Selector Rod
62	508120	Motor — 115 volt, 60 cyc.	95	508131	Spring, Speed Selector Shaft
	508901	Idler Wheel for Motor identified with "R" or "3211" stamped on Motor	96	508128	Index Rod
63	508121	Idler Wheel; used on Motor identified with "GI" on bearing surface or either "2727" or "3129" stamped on Motor	97	508129	Locator Cam
	508902	Idler Pulley for 33 1/3 R.P.M.; used on Motor identified with "R" or "3211" stamped on Motor	98	505279	"C" Washer for Locator Cam
	508903	Idler Pulley for 33 1/3 R.P.M.; used on Turret Type Motor identified with "GI" on bearing or "3129" stamped on Motor		508533	Inserts for 45 R.P.M. records (pkg. of 12)
64	508904	Idler Pulley for 33 1/3 R.P.M.; used with Belt Type Motor identified with "GI" on bearing or "2727" stamped on Motor			

* Not supplied as replacement part

MODELS 100, 100-55,
100-62, 100-64, 100-557MODEL
100MODEL
100-64MODEL
100-55
100-557MODEL
100-62

SERVICE INSTRUCTIONS

WEBSTER-CHICAGO MODEL 100 RECORD CHANGER

DESCRIPTION

Model 100 is a three speed Automatic record changer. Simple in design and operation, it provides automatic playing of up to a 1" stack of 7-inch, 10-inch or 12-inch records at speeds of $33\frac{1}{3}$, 45 or 78 rpm.

Model 100 features Automatic adjustment for any diameter record stack, an Automatic "manual" position, a "flat" record drop, an improved spindle that carefully lowers the unplayed record stack to the spindle step, ready for the next record change cycle.

Model 100 returns the Pickup Arm to the Rest position after playing the last record; the motor continues to revolve until the Speed Selector Lever is moved to the nearest "OFF" position. The idler wheel is also pulled away from the motor shaft when the Speed Control Lever is in an "OFF" position, eliminating the possibility of a flat spot developing in the rubber wheel. Two "OFF" positions are available for ease of operation.

Model 100 features the Webster-Chicago Velocity-Trip Mechanism which gives an unusually fast record change. The Pickup Arm is not actuated by "lead-in" springs so there is almost no lateral pressure. The arm travels freely in either direction. This lack of lateral pressure adds immeasurably to the life of records and is considered to be as important as extra-light vertical pressure. The free floating arm permits "home recordings" or "inside out" records up to 12" size to be played manually.

Model 100 will change warped or rough-edged records, at the same time assuring maximum protection to the finest disc.

The basic Model 100 Mechanism is used in the following models:

Model 100-1 is the basic record changer chassis with a Crystal pickup cartridge and replaceable needle. The needle and cartridge have high compliance so they will play both standard groove and microgroove records at low needle pressure.

Model 100-27 is the same basic mechanism as above with special pickup arm and interchangeable plug-in heads designed for the G. E. Variable Reluctance Cartridges.

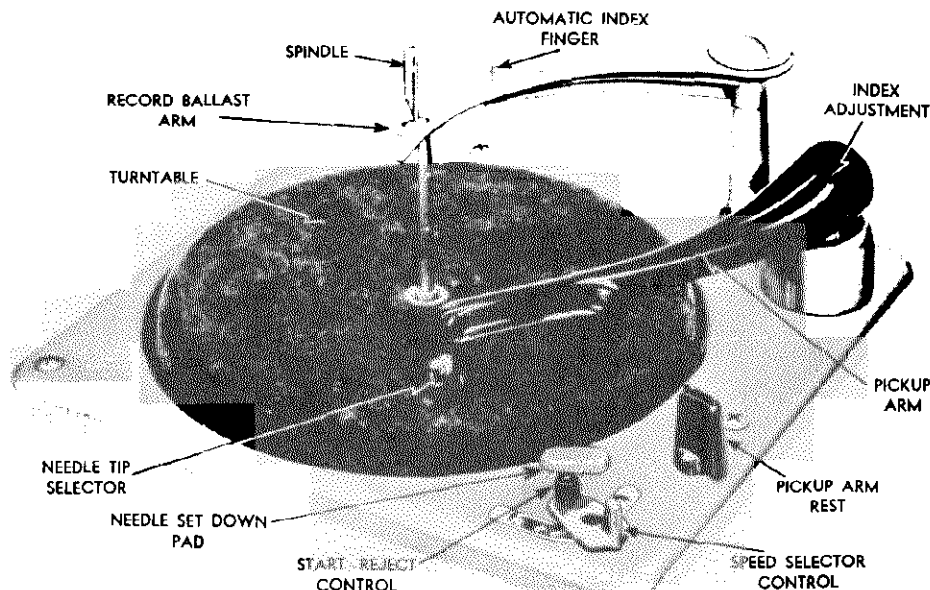
Model 100-55, Model 100-557 are models 100-1 and 100-27 respectively mounted on an attractive metal base to fully enclose and protect the mechanism.

Model 100-62 is a complete portable phonograph with the Model 100-1 record changer, an amplifier and speaker mounted in an attractive burgundy leatherette carrying case.

Model 100-64 is the basic Model 100 mechanism mounted in an attractive burgundy leatherette carrying case for portable use. An output receptacle is provided especially for the Model 66 and Model 166 portable amplifiers. A special cord and plug assembly is also provided to facilitate connecting Model 100-64 to a radio receiver or P.A. amplifier and speaker.

MODELS 100, 100-55,
100-62, 100-64, 100-557

OPERATION



A.C. POWER CONNECTIONS

Most models are designed for 105-120 volt operation. Special models may be designed for 210-240 volt operation.

Always check the production tag on the underside of the mainplate to determine the correct voltage and current required by your particular changer mechanism.

If it is desired to operate the changer on 50-cycle current, a special motor shaft sleeve must be used in order to drive the turntable at the required speed.

Do not under any circumstances connect the changer to a source of direct current (DC) or alternating current of any other frequencies.

The motor switch is part of the Speed Control Lever. The power is off when the lever is in an "OFF" position.

The following instructions regarding the changer controls apply to all models. Special instructions regarding the Model 100-62 amplifier controls are given in the printed operating instructions.

FOR "AUTOMATIC" RECORD CHANGE

1. Lift the Record Ballast Arm and swing it away from the spindle until it "latches" with a light snap. The Automatic Index Finger will follow.
2. Place up to a 1-inch stack of any one size of records on the Spindle and swing the Record Ballast Arm back to the spindle allowing it to drop in position with the spindle in the hole. The Automatic Index Finger will remain away from the record until the change cycle starts. It will then move in to feel the diameter of the record and automatically index the pickup needle to the proper playing position.

3. Then turn Needle Tip Selector to correct position for records being played. Move the Speed Selector Lever to the correct speed for the records being played and push the START-REJECT control.

4. To reject any record while playing in the Automatic Position, push the Reject control.

After the last record has been played, the entire stack may be removed from the turntable at one time. The simplest procedure is as follows:

- a. Lift and turn the Record Ballast Arm weight out of position until it latches. Be sure the pickup arm is on the pickup arm rest.
- b. Place the fingers of both hands under opposite edges of the bottom record. Do not apply pressure to the top record but keep your thumbs free, and lift the stack of records straight up, following the contours of the spindle. This permits the stack of records to follow the curve of the spindle without binding.

FOR "MANUAL" RECORD CHANGE

1. Lift the Record Ballast Arm and swing it and the Automatic Index Finger away from the spindle. The changer is then automatically in "manual" until the Record Ballast Arm is moved in and placed over the spindle. The pickup arm can be moved in or out without tripping the Velocity Trip automatic mechanism so long as the Record Ballast Arm and Automatic Index Finger are left in this position.
2. Turn Needle Tip Selector to correct position for record being played. Place a record on the turntable. Move the Speed Control Lever to the correct speed for the record being played and then place the needle gently on the record. To stop the mechanism at any time turn the Speed Selector Lever to an "OFF" position.

SERVICE INFORMATION

All units are accurately adjusted, lubricated and tested at the factory. However, service repairs and adjustments sometimes become necessary. This bulletin should be studied carefully before making any adjustments or replacing parts.

Service parts are available from your Webster-Chicago distributor. All parts must be ordered by piece part number as given in the parts list on page 11 and by model and production number, stamped on the underside of the main plate.

The functions and most probable misadjustments of the main assemblies are as follows (reference numbers refer to the exploded views on page 10).

FAILS TO CHANGE RECORDS AUTOMATICALLY

The Main Cam Assembly (61) drives the mechanism associated with the action of the Pickup Arm (23) and the Record Selector assemblies. It, in turn is driven by the gear train (9) and the Turntable which is rim driven by the phonograph motor.

The Cam Drive Gear (56) is put in motion or "tripped" by means of the "Velocity Trip" (57) or by the manually operated "reject" trip (25). When the movement of the Pickup Arm toward the spindle is greater than $\frac{1}{8}$ " in $\frac{1}{2}$ revolution of the turntable, the Velocity Trip Arm (76) trips the Velocity Trip (57). This releases the Actuating Pawl on the Main Cam Assembly (61), allowing it to engage the Cam Drive Gear (56) and driving it through the change cycle. The pressure from the Velocity Trip Arm required to actuate the trip mechanism is negligible.

The Velocity Trip Arm (76) follows the movement of the Pickup Arm through a weighted friction clutch (75). This clutch must be kept free of oil and grease. If the clutch does not cause the Velocity Trip Arm to trip the mechanism, clean the clutch parts with carbon tetrachloride. This clutch should operate the trip mechanism without placing undue drag on the movement of the pickup arm.

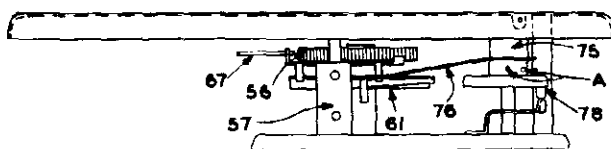


Fig. 1

Also check for:

1. Velocity Trip (57) binding on its mounting Pin (J of 69).
2. Slight burr on end of the Actuating Pawl or on the underside of the hook end of the Velocity Trip (57).
3. Actuating Pawl stuck (part of Main Cam Assembly (61) engaged by the hook end of the Velocity Trip (57)).
4. Velocity Trip Arm (76) bent and not hitting the Velocity Trip (57).
5. Velocity Trip Arm (76) fails to touch the Velocity Trip.
6. Velocity Trip (57) rubbing on the underside of the Cam Drive Gear (56).
7. No velocity lead-in groove or eccentric groove in the center of record.
8. Foreign matter in record groove.
9. Badly worn record.
10. Badly bent or worn needle.
11. Spindle out of adjustment. (See "Does not push off records, page 7).

CHANGES RECORDS PREMATURELY

At the completion of the change cycle, the Actuating Pawl (part of 61), is disengaged from the Cam Drive Gear (56) by the hook end of the Velocity Trip (57), which has been returned to its normal position by the reset points on the Cam Drive Gear (56).

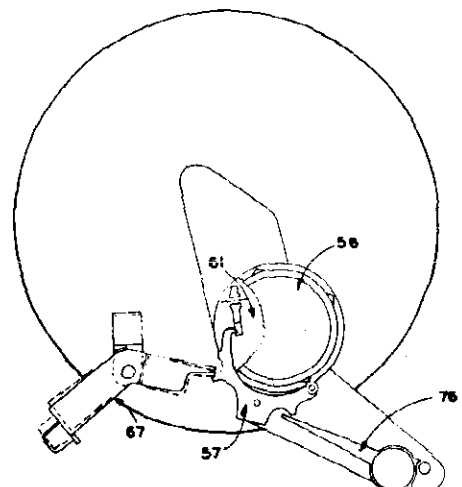


Fig. 2

MODELS 100, 100-55,
100-62, 100-64, 100-557

If the vertical clearance between the lip on the Velocity Trip Lever and the edge of the Main Cam is too small, it will prevent the hooked end of the Velocity Trip Lever from engaging the trigger. Adjust the clearance between the lip on the Velocity Trip Lever and the Main Cam to be within $\frac{1}{32}$ " and $\frac{1}{64}$ " when the roller is contacting the point of one of the reset points on the Cam Drive.

Also check for:

1. Velocity Trip (57) rubbing on Cam Drive Gear (56).
2. Manual Trip Lever (67) binding.
3. "Disengage Roller" broken on the Velocity Trip (57).

PICKUP ARM DOES NOT CLEAR 1" RECORD STACK

The vertical movement of the pickup arm is controlled by the angle of the pickup arm raising lever (62 and Fig. 3). The needle should approach the top record of a full 1" stack of records on the turntable with approximately $\frac{1}{16}$ " clearance.

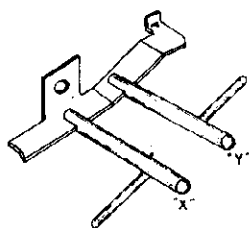
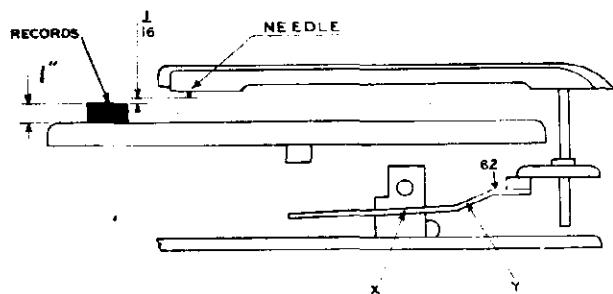


Fig. 3

To adjust:

1. Put a full 1" stack of records ON THE TURN-TABLE.
2. Trip the "Reject" control and rotate the turntable clockwise until the pickup arm reaches its highest point.
3. Be sure the center or 10" notch in the pickup arm raising disc engages the pickup arm raising lever.

4. If the needle does not clear the top record or if it raises too high, adjust by holding the pickup arm raising lever (62) at point X and bending at Y as indicated in Fig. 3.

CAUTION: All adjusting bends should be made slowly, using slight but firm, easy pressure. Be careful to bend only up and down, not across the lever.

Be sure the set screws in the Pickup Arm Raising Disc (78A) are not loose and are properly positioned in the alignment holes as explained in the paragraph on Needle Setdown position.

NEEDLE SET DOWN POINT INCORRECT

The pickup arm should set the needle down at or just outside the "lead-in" groove of the record, regardless of the size of the record. The group of parts illustrated in Fig. 4 are all inter-related so it is advisable to follow a set routine when checking for the proper needle set down positioning. At the factory the following routine is followed:

1. Adjust for pickup arm height. This should be done before the needle set down positioning is adjusted because the pickup arm raising lever (62) sometimes has to be bent in order to adjust the pickup arm higher and this bending may affect the position of the edge of the lever in the notches of the pickup arm raising disc (78) later. See the paragraph above for this adjustment.

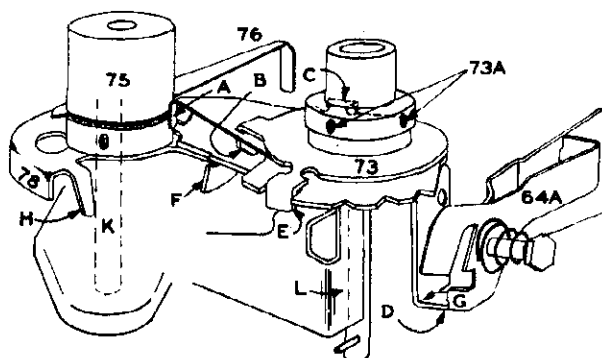


Fig. 4

2. Check the adjustment of the positioning ear (H of 78). To do this, place a 7" record on the spindle or hold the index finger out in the 7" position while you trip the change mechanism and revolve the turntable by hand until the

MODELS 100, 100-55,
100-62, 100-64, 100-55

pickup arm goes out over the pickup arm rest as far as it will go. At the extreme limit of its movement the pickup arm raising lever (62) should engage the 7" notch of the pickup arm raising disc (78). If it does not engage the notch, bend the ear (H of 78) so that the ear just touches the mounting stud K and forces the lever to engage the notch properly. (NOTE: This ear was used on previous record changer models to adjust the pickup arm and assure its setting down on the pickup arm rest.)

Now that you are certain that the pickup arm raising lever (62) is properly engaging the notch of the pickup arm (78), check the actual Needle Setdown Point. Put a 10" record on the spindle, trip the mechanism and revolve the turntable by hand until the needle almost touches the record. If the needle is not about to touch the record at the proper position, use two No. 6 Bristol wrenches to adjust the screws 78A and properly position the pickup arm.

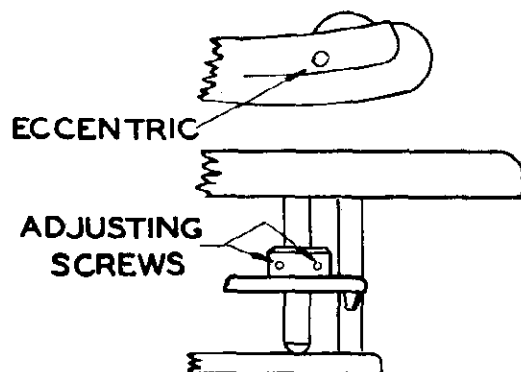


Fig. 5

These screws have pointed ends which fit into the "off center" holes in the shaft (21C). NOTE: The slot in the eccentric adjustment (21D), reached through the hole in the top of the pickup arm, should point along the pickup arm and not across it.

A vernier adjustment for the 12" set down point is provided by the screw (78B) which holds the ear on the pickup arm raising disc in position. With the mechanism "in cycle", the pickup arm out over the rest button (11) as far as it will go, and with the pickup arm raising lever (62) in the 12" notch of the raising disc (78), loosen

the adjusting screw (78B) and move the adjusting ear so it just touches the 12" index adjusting ear (B of 73). See Fig. 4. Tighten the adjusting screw (78B) to hold the ear in this position.

3. Check the adjustment of the record ballast arm. It should drop over the spindle when it is swung into position. If necessary, bend the ear L of the stop bracket (69) so that the record ballast arm will drop over the spindle easily.

In most all cases you will find that most of these adjustments are perfect. With a little experience you will learn what to watch and can breeze through them rapidly only stopping when some misadjustment is evident. However it is important that this routine be followed for proper final results.

ERRATIC NEEDLE SETDOWN POSITIONING

If all adjustments to assure a correct needle set down seem all right and the needle still sets down at odd and wrong positions, check:

1. Lip (D of 73, Fig. 4) should engage G of 64A by only about $\frac{3}{32}$ ". If it is difficult for G to clear D, the movement of the pickup arm will not be properly controlled and erratic "Indexing" will result. Bend D, if necessary, to permit smooth, easy separation of these two parts.

CANNOT "REJECT" RECORDS

Pushing the Reject button (25) causes the Trip Lever Arm (67) to contact the Velocity Trip mechanism (57), putting the change mechanism in cycle.

If you cannot "Reject" records, check the perpendicular ear of the Velocity Trip mechanism. It may be bent so the Trip-Lever Arm cannot touch it.

CANNOT PLAY RECORDS "MANUALLY" OR ONE AT A TIME

The changer is automatically in "manual" whenever the Record Ballast Arm (1A) and the Index

MODELS 100, 100-55,
100-62, 100-64, 100-557

Finger (IC) are turned out as far as they will go, as tho you were loading a stack of records. The finger D of (73) holds the finger G of (64A), causing finger A of (73) to hold the velocity trip arm away from the change mechanism as long as the Index Finger is "out" away from the spindle.

If the mechanism "trips" with the Index Finger in the Manual position check for:

1. No detent in end of finger D of (73). (See Fig. 4.)
2. Dirt in the detent.
3. Finger A of (73) bent so it does not stop and hold the velocity trip arm.

DOES NOT PUSH OFF RECORDS

The action of the vertical cam of (64) on the bent lever plate (71) forces the actuating rod (A) up into the spindle (3) to move the record push off finger forward, pushing off the bottom record of the unplayed stack.

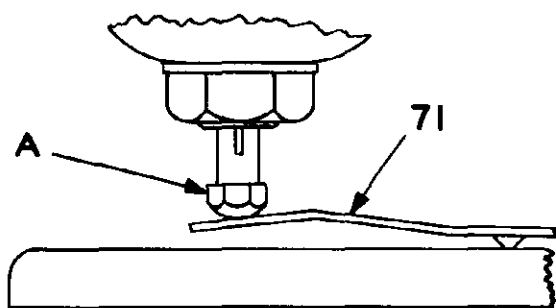


Fig. 6

If the push off finger fails to release the record:

1. Put a full 1" stack of 12" records on the spindle, turn on the A.C. power and trip the Reject button. If the bottom record is not pushed off:
2. Turn the Adjusting nut (A) $\frac{1}{4}$ turn counter-clockwise out of the spindle to make the actuating rod slightly longer.

If the bottom record still does not drop, continue turning the adjusting nut counter-clockwise, $\frac{1}{4}$ turn at a time, until the record is pushed off.

CAUTION: If the actuating rod is turned out too far, the cam of (64) will not be able to com-

plete its motion and the changer will stall in cycle. When a change cycle has been completed there should be very slight play at both ends of the rocker lever (71).

STALLS DURING CHANGE CYCLE

1. See above.
2. Check for low line voltage.

MORE THAN ONE RECORD IS DROPPED DURING A CHANGE CYCLE

The floating latch at the top of the Record Spindle is so spaced that only one record at a time can slide between the heel of the latch and the step of the spindle. The hole in the latch is elongated so that the latch can slip into the spindle recess when records are being removed.

If more than one record is dropped at a time, it will be found to be due to:

1. Foreign matter in spindle recess causing the latch to stick.
2. Exceptionally thin records.
3. Bent spindle.

INCORRECT TURNTABLE SPEED

The three speed mechanism and the motor are one assembly. The Drive Wheels (31, 32 and 33) are mounted on a movable metal plate (35) in such a way that moving the Speed Selector Lever (27) moves the correct wheel into position between the motor shaft and the Turntable drive idler (79). The tongue of the detent spring (53) fits into an indentation in the edge of the metal plate to index the speed selector wheels and hold them firmly in the desired position.

"OFF" indentations between each speed position hold the drive wheels away from the motor shaft and the Turntable idler when the Speed Selector Lever is in an "off" position.

If the Turntable speed is incorrect, check for:

1. Turntable Idler (79) cocked at an angle. Bend the wheel and shaft to straighten wheel.

MODELS 100, 100-55,
100-62, 100-64, 100-557

CAUTION: Do not bend idler (79) toward the drive wheels (31, 32, 33). Bend only sideways or away from the wheels.

2. The drive wheel mounting assembly (part of motor assembly (44)) must not bind. There should be at least $\frac{1}{64}$ " play at point "A". Bend the raised metal stop if more clearance is needed.
3. The entire motor assembly (44 plus 35, etc.) should be free floating. There should be slight play of the Speed Control Lever (27) between the "78" and "33" positions and the stops at the end of the speed selector dial.
4. Defective drive wheels (31, 32, 33).

ERRATIC SPEED (wow)

Remove any dirt or excess flocking from the inside rim of the turntable. Check the rubber part of the drive wheels for a flat spot or "out of round". If the rubber part of either Drive wheel becomes slick and shiny — Replace.

GLIDE-IN ON 12" RECORDS

The term "glide-in" is used to describe the action of the pickup arm and needle when the needle does not sit down smoothly in the first groove of the record, despite accurate indexing adjustments, but seems to glide over the first two or three grooves before seating itself properly. If glide-in occurs:

1. The pickup cord may be dressed too tight or in

such a manner that it interferes with the free movement of the pickup arm. Make certain there is sufficient play in the pickup cord.

SLIDE-IN OR NEEDLE JUMPS GROOVES

Slide-in describes the condition where the needle will touch the first groove of the record properly but will jump the grooves forward or back as though the needle pressure was too light.

To correct slide-in, check for:

1. Incorrect needle tip. The standard ("78") tip will be especially likely to jump grooves of a microgroove record. Be certain the "micro" or "33-45" tip is used for either the $33\frac{1}{3}$ or 45 rpm microgroove records.
2. Chipped or damaged needle.
3. Tight pickup cord.
4. Needle pressure too light. See page 9.

CHANGE CYCLE STARTS BEFORE END OF RECORD

If the Trip Assembly chatters while the changer is running or if the changer cycles before the entire record is played, there is probably insufficient clearance between the hook end of the Velocity Trip (57) and the actuating gear (56). This clearance should be adjusted to be within $\frac{1}{32}$ " to $\frac{1}{64}$ " by bending the lever.

REPLACEMENT OF PARTS

TO REPLACE THE PICKUP ARM

1. Unhook the pickup arm hinge clip (21A) and raise the arm to a vertical position.
2. Remove the two mounting screws. Remove the pickup arm.
3. Attach the new arm.

The weight of the arms is uniform so the needle pressure adjustments should be left alone.

REPLACE PICKUP ARM BRACKET AND SHAFT ASSEMBLY

1. Loosen Bristol screws in Pickup Arm Raising Disc (78A).
2. Remove the felt disc (77), Automatic Trip Arm (76) and Clutch (75) by sliding them off the bottom of the Pickup Arm Shaft (21C). Pull the shaft out of the changer.

To replace, reverse the procedure and adjust the

MODELS 100, 100-55,
100-62, 100-64, 100-557

Pickup Arm Raising Disc set screws for proper needle set down as explained on page 6.

TO REPLACE THE NEEDLE

1. Loosen the needle set screw, or thumb nut if used.
2. Remove the needle.
3. Insert the new needle and tighten the set screw or thumb nut.

Some needles are simply forced into a socket, no set screw or thumb nut being required. Just pull the old one out and force the new one in.

TO REPLACE THE CARTRIDGE

Special mounting brackets are required for the cartridges supplied by the different manufacturers. When replacing a cartridge it is advisable to leave the bracket attached to the pickup arm and remove the cartridge from the bracket. The mounting bracket is not included in the replacement cartridge package. Webster Electric's A7M-1 cartridge assembly is one exception.

Webster Electric, Astatic, Shure Bros. and Electro Voice "turnover" type cartridges are all approved for use in W/C changers. Replacements should be ordered from your radio service technician or your radio parts supplier. Order by the manufacturers part number but accept a substitute number at your dealers recommendation. Some cartridge manufacturers have two sets of part numbers for the same unit. For example Shure Bros. P-76, sold only to changer manufacturers, is identical with their W-22AB, sold only to radio parts stores.

TO REPLACE THE MOTOR

It is not necessary to replace the entire Three Speed mechanism when replacing the motor. However, it is necessary to remove the entire assembly from the main plate, and then remove the motor from the assembly.

1. Remove the entire assembly by removing mounting screws (52) and tension clip (40 part of 38).
2. Remove and save the Turntable Drive Wheel (79) the detent spring (53) and tension spring (54).

3. Remove and save the three Speed mechanism plate assembly (37) by removing clip and washer (34) and (35). Do not remove the small drive wheels (31, 32, 33) from the plate.
4. Reassemble new motor to the Three Speed Mechanism plate and the entire assembly to the main plate.
5. It may be necessary to adjust the play of the Three Speed Mechanism mounting plate "C" (part of the motor 44), so there is proper play between the sliding stop and the metal stop at point "A" (see page 10). The mounting plate should be free, approximately $\frac{1}{64}$ " clearance between the sliding stop and point "A".

TO REPLACE THE TRIP MECHANISM

1. Remove screw (55) from the top of the Main Actuating Gear (56). Remove the three screws holding the main plate to the subplate mounting posts "K" of 69.
2. Lower the sub plate (69) and lift the Main Actuating Gear (56) and lift the Trip Mechanism (57) from the mounting post (J of 69).
3. Replace the new parts in reverse order.

TO REPLACE PICKUP ARM RAISING LEVER

1. Follow steps 1 and 2 above.
2. Remove "C" clip (59) and washers (58 and 60). Lift the Main Cam Assembly (61) and remove the pickup arm raising lever assembly (62).
3. Replace the new parts in reverse order.

TO ADJUST NEEDLE PRESSURE

1. Unsnap the pickup arm hinge (21A) and raise the arm to a vertical position.
2. Insert a small steel rod in the holes A of the spring mounting stud (21B). Turn the mounting stud downward to increase or upward to decrease the needle pressure.

CAUTION: A slight movement of the stud is usually enough. An accurate gauge is necessary to insure correct needle pressure. Most cartridges require 7 to 10 grams for proper tracking and best reproduction.

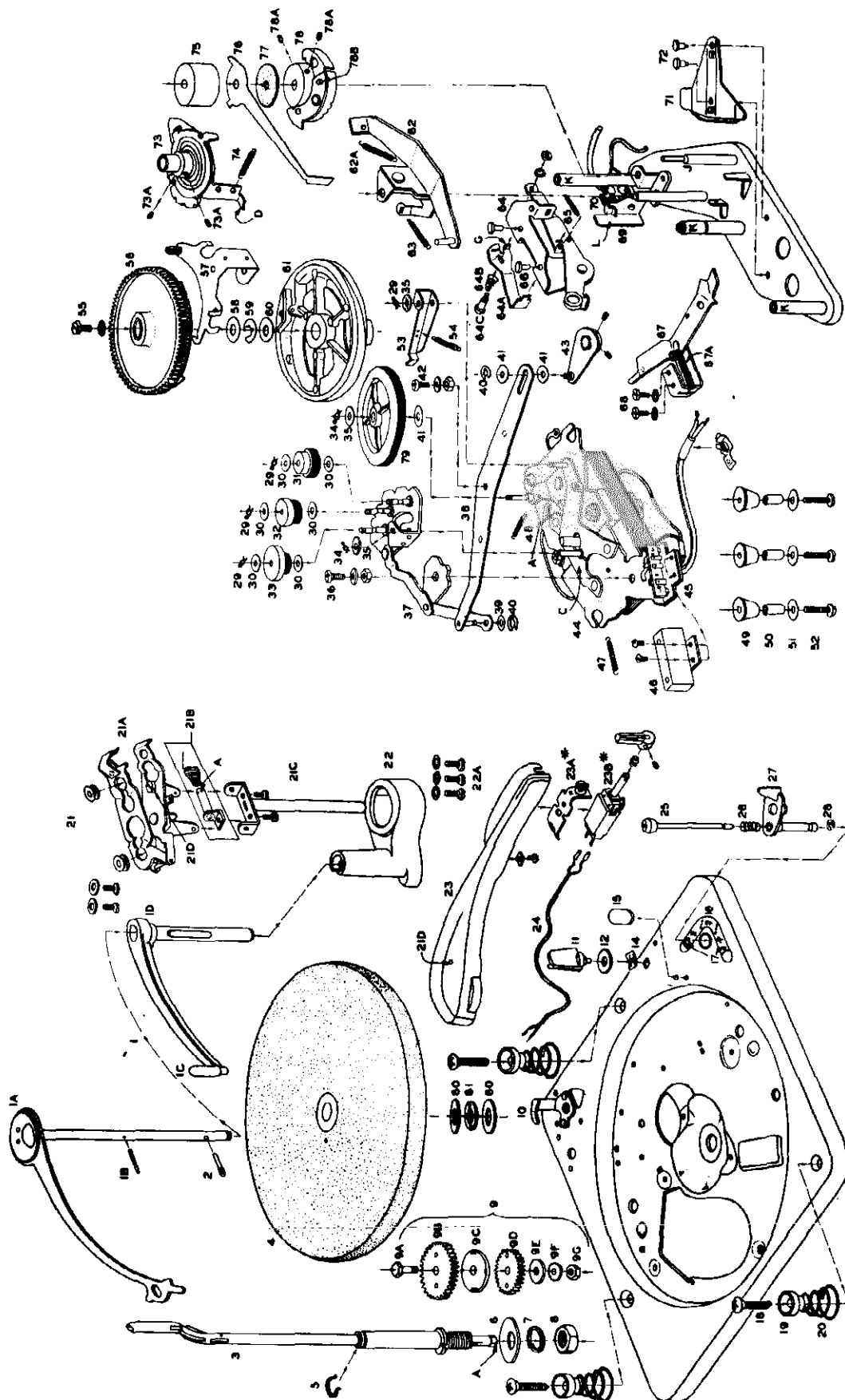


Fig. 7
Exploded View above Main Plate

Fig. 8
Exploded View below Main Plate

MODELS 100, 100-55,
100-62, 100-64, 100-557

LUBRICATION

Model 100 Record Changers leave the factory completely oiled and lubricated. Under normal conditions this should be sufficient for approximately one year or 1,000 hours of operation. When operated under extreme conditions of dust or heat, they should be oiled more frequently, as required.

Do not permit oil or grease to get on the rubber Idler Drive Wheel or the Motor Sleeve, on Turntable Drive Rim or on the Automatic Trip Arm clutch. Any oil or grease on these points should be removed using Carbon Tetrachloride. The recommended lubricants and points of lubrication are as follows:

A — No. 10 OIL (Apply With Small Oil Can or Medicine Dropper)

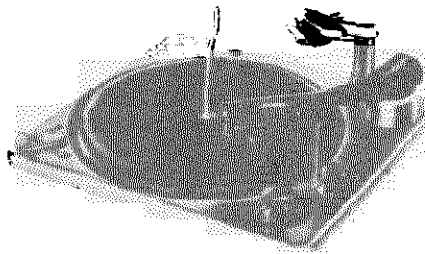
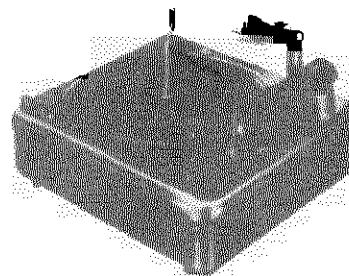
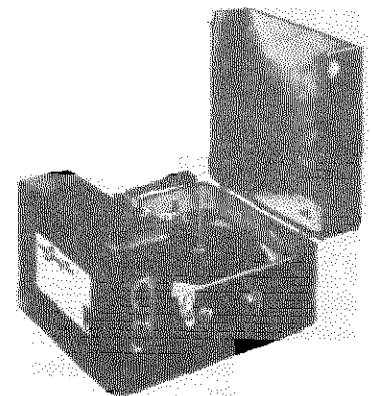
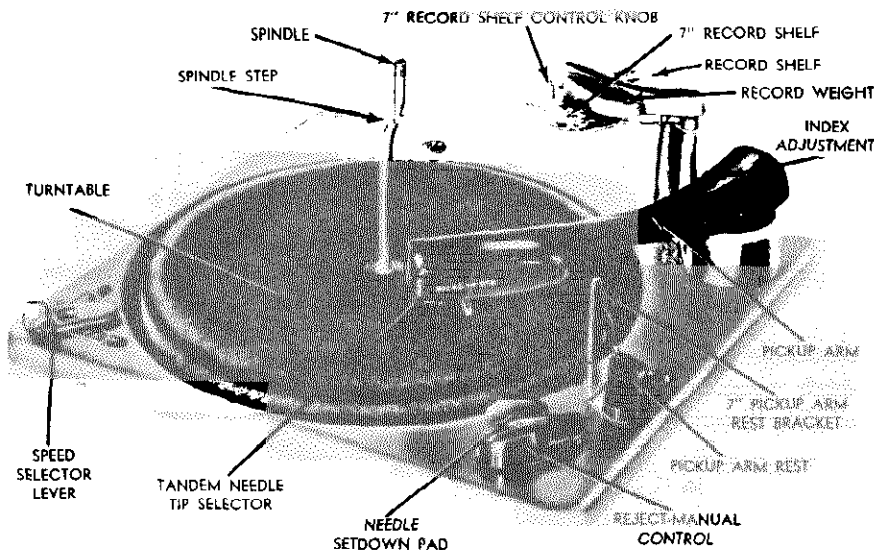
1. Motor Bearings.

2. Pickup Arm Shaft.
3. Ball Bearing Assembly.
4. Idler Wheel Felt.

B — A NON FLUID LUBRICANT (Apply With Small Brush)

1. Idler Wheel Link.
2. Turntable Shaft Stud.
3. Pickup Arm Hinge Pins.
4. Knife edge of Pickup Arm Raising Lever.
5. Teeth of Main Cam Actuating Gear.
6. Track of Main Cam Gear.
7. Teeth of Large and Small idler gears.
8. Raising lever Bracket bearing surface.
9. Spindle adjusting nut at bottom.

Figure Number	Part Number	Description	Figure Number	Part Number	Description
1	11X550	Record Ballast Arm and Index Finger Assembly —	34	50P125	Retaining Clip
1A	11X549	Record Ballast Arm	35	25P030	Felt Washer
1B	41P731	Knurled Pin for 11X550	36	41P673	Shoulder Screw — Switch Cam
1C	24P048	Index Finger Cushion	37	17X481	Drive Wheel Mounting Plate and Cam
1D	42X218	Index Finger Arm	38	11X539	Speed Selector Arm
2	41P743	Knurled Pin for 11X549	39	25P030	Felt Washer for 11X539
3	11X558	Spindle	40	25P439	"C" Washer for 11X539
4	11X138	Turntable	41	25P046	Fibre Washer
5	50P221	Retainer for Turntable	42	41P747	Shoulder Screw for 11X539
6	25P289	Cup Washer — Spindle Mounting	43	11X540	Speed Selector Link and Hub
7	25P403	Lock Washer — Spindle Mounting	44	17X467	Motor and Top Bridge Assembly
8	26P687	Nut — Spindle Mounting	45	32P054	A.C. Switch
9	11X132	Idler Gear Assembly	46	45P819	Switch Cover
9A	41P333	Shoulder Screw	47	46P139	Tension Spring — Index Plate
9B	47P024	Idler Gear — Large	48	46P134	Tension Spring — Idler Link
9C	45P342	Coupler — for 11X132	49	25P363	Motor Mount Grommet
9D	47P023	Idler Gear — Small	50	41P592	Motor Mount Sleeve
9E	25P284	Washer — for 11X132	51	25P367	Motor Mount Washer
9F	25P222	Lock Washer — for 11X132	52	26P110	Motor Mount Screw
9G	26P046	Nut — for 11X132	53	45P817	Speed Selector Lock Lever
10	45P191	Stop Bracket for Pickup Arm	54	46P187	Tension Spring — Lock Lever
11	49P099	Pickup Arm Rest	55	26P748	Screw — Main Plate to Sub Plate Assembly
12	25P388	Washer	56	11X032	Main Actuating Gear
14	26P554	Speed Nut	57	11X320	Velocity Trip
15	24P004	Needle Pad	58	25P343	Washer — for 11X545
16	78P508	Speed Indicator Dial	59	25P342	"C" Washer — for 11X545
17	27P205	Rivet for Indicator Dial	60	25P083	Washer — for 11X545
18	26P740	Mounting Screw	61	11X545	Main Cam Assembly
19	24P007	Mounting Grommet	62	11X553	Pickup Arm Raising Lever
20	46P116	Mounting Spring	62A	46P022	Tension Spring — Raising Lever
21	21X282	Pickup Arm Hinge and Shaft Assembly	63	46P221	Tension Spring — Raising Lever
21A	21X283	Pickup Arm Hinge	64	11X546	Cam Lever and Bracket — Complete
21B	11X386	Pickup Arm Counter Balance	64A	45P921	Cycle Stop Arm
21C	11X385	Pickup Arm Shaft	64B	46P218	Compression Spring
22	42P219	Housing	64C	41P746	Shoulder Screw for 11X546
22A	26P747	Housing Mounting Screw	65	46P017	Tension Spring for 11X546
23	49X123-X	Pickup Arm	66	27P072	Rivet for Cam Lever Mounting
The mounting bracket required will depend upon the cartridge used. Order exact replacement cartridges from your parts distributor by the cartridge manufacturer's part number, stamped on the cartridge. The mounting bracket need not be replaced when replacing the cartridge. Nor is the bracket usually included in the replacement cartridge package.			67	11X542	Reject Trip Lever
23A	20X1363-1	Pickup Cord and Lug Assembly	67A	46P219	Tension Spring — Trip Lever
23B	49X135	Reject Button	68	26P747	Screw — Trip Lever Mounting
24	46P226	Compression Spring — Reject Button	69	45P926	Positioning Plate
25	42X217	Speed Selector Lever	70	70P045	Standoff Lug Assembly
26	25P447	"C" Retainer for Reject Button	71	45P909	Spindle Actuating Lever
27	50P034	Reainer Clip	72	27P217	Rivet for Mounting 45P909
28	25P406	Fibre Washer	73	11X547	Set Down Disc Assembly
29	11X456	Drive Wheel — 33 R.P.M.	74	46P225	Tension Spring — Set Down Disc
30	11X458	Drive Wheel — 45 R.P.M.	75	41P576	Clutch Weight
31	11X460	Drive Wheel — 78 R.P.M.	76	45P935	Velocity Trip Arm
			77	23P009	Felt Washer — Velocity Trip
			78	11X552	Pickup Arm Raising Disc
			79	11X366	Idler Wheel
			80	25P269	Washer — Bearing Race
			81	11X058	Turntable Bearing

MODELS 346,
355, 362, 364**MODEL 346****MODEL 355****MODEL 364****MODEL 362**

DESCRIPTION

The Webster-Chicago Model 346-1 basic mechanism is a three speed, single post, spring cushioned spindle, automatic record changer. Simple in design and operation it provides automatic playing of up to a 1" stack of 7", 10" or 12" records at speeds of 33 $\frac{1}{3}$, 45 or 78 rpm.

Model 346 returns the pickup arm to the rest position after playing the last 10" or 12" record, although the motor continues to revolve until the Speed Selector Lever is moved to the nearest "OFF" position. Two "OFF" positions are available for ease of operation. The idler wheel is also pulled away from the motor shaft when the Speed Control Lever is in an "OFF" position, eliminating the possibility of a flat spot developing on the rubber wheel.

The last 7" record of a stack continues to play until the Speed Selector Lever is moved to one of the "OFF" positions and the Pickup Arm moved from the record to the Rest Position.

Automatic playing of 7" records is made possible by a simple, ingenious 7" record shelf which is easily placed on the Record Selector Post and by a movable 7" Pickup Arm Rest which can be swung into or out of position.

Model 346 also features the exclusive Webster-Chicago Velocity-Trip Mechanism. The pickup arm is not actuated by "lead-in" springs and there is a minimum of lateral pressure. The arm travels freely in either direction. This lack of lateral pressure or inertia adds immeasurably to the life of records and is considered to be as important as extra-light vertical pressure. The

freefloating arm permits "home recordings" or "inside out" records up to 12" size to be played manually.

Model 346 will change warped or rough-edged records, at the same time assuring maximum protection to the finest discs.

Model 362 automatic phonograph is a Model 346 mechanism mounted in an attractive burgundy leatherette case, together with an amplifier and speaker. The circuit diagram of Model 362 is included in the operating instructions.

Model 364 is a Model 346 mounted in an attractive burgundy leatherette carrying case.

Model 355 is a Model 346 mounted on an attractive metal base.

These service instructions apply to all four models, 346-1, 355, 362 and 364.

PICKUP CARTRIDGE

The special pickup cartridge of Model 346 has a replaceable Tandem-Tip Needle. The lever on the cartridge is moved to "Std" or "Micro", as indicated on the pickup arm, to lower the proper point into playing position. All 78 rpm and some 33 $\frac{1}{3}$ rpm records including "Books for the Blind", require the "Standard" point. The 33 $\frac{1}{3}$ rpm Microgroove and 45 rpm records require the "Micro" point.

The special cartridge has been designed to play 78 rpm as well as 45 rpm and 33 $\frac{1}{3}$ rpm records at very light needle pressures.

MODELS 346,
355, 362, 364

OPERATION

MOTOR

Connect the motor cord to a source of 105-115 volt 60 cycle current only. If it is desired to operate the changer on 50-cycle current, a special motor shaft sleeve must be used in order to drive the turntable at the required speed.

Do not under any circumstances connect the motor to a source of direct current (DC) or alternating current of any other frequencies.

The motor switch is part of the Speed Control Lever. The power is off when the lever is in an "OFF" position.

FOR AUTOMATIC RECORD CHANGE

1. Move the Tandem-Tip Selector Lever to "Std" or "Micro" as explained in the description of the pickup cartridge above.
2. Turn the Record Shelf forward or back for ten- or twelve-inch records. For 7-inch records, turn the Record Shelf forward to the 10-inch position. Place the 7-inch Record Shelf in position with the Record Selector Knob turned to "45" or "33" as required. Move the Pickup Arm to the Spindle, then raise the 7-inch Pickup Arm Rest straight up and return the Pickup Arm to the 7-inch Rest position.
3. With the record ballast weight lifted and turned forward out of position, place up to a 1" stack of records on the spindle so that the bottom record rests on the step of the spindle and on the Record Shelf.
4. Turn the record ballast weight and lower it until it rests on the top record or the 7" Record Shelf.
5. Move the Speed Control Lever to "33 $\frac{1}{3}$ ", "45" or "78", as required by the record being played. This also turns the motor power on.
6. Move the "Manual-Reject" Control Knob to the "Reject" position, and release it. The control will then drop back into the automatic playing position and the mechanism will continue to operate automatically until the last record is completed. The Pickup Arm will then return to the "Rest" position and the motor will continue to revolve until the Speed Control Lever is turned to an "OFF" position. Seven-inch records will continue to play until the Speed Control Lever is moved to an "OFF" position and

the Pickup Arm is lifted to the 7-inch Rest position.

7. To reject any record while playing in the automatic position, move the control knob momentarily to the REJECT position and release.

After the last record has been played, the entire stack may be removed from the turntable at one time. The simplest procedure is as follows:

- a. Place the Pickup Arm on the Pickup Arm Rest.
- b. Lift and turn the record ballast weight out of position.
- c. Place the fingers of both hands under opposite edges of the bottom record.
- d. Do not apply pressure to the top record (Keep your thumbs free.)
- e. Lift the stack of records straight up, following the contours of the spindle. This permits the stack of records to follow the curve of the spindle without binding and greatly facilitates the removal of the stack.

FOR "MANUAL" RECORD CHANGE

1. Turn the Record Shelf to the "12" position. (This is not essential but permits more clearance in loading and unloading records.)
2. Move the Tandem-Tip Selector Lever to "Std" or "Micro" as required. See the paragraph "Pickup Cartridge".
3. Place a record on the turntable.
4. Move the "Manual-Reject" Control Knob toward the spindle to the "Manual" position, as indicated by the arrow on the Control Knob. No harm will result if the knob is accidentally moved to the "Reject" position. If a twelve-inch record is on the turntable, the arm will automatically index to the edge of the record. If a ten-inch record is on the turntable, the needle will be set down gently on the rubber pad and the arm may be moved to the edge of the record.
5. Move the Speed Control Lever to the proper position as required by the record being played.
6. Place the needle gently on the edge of the record.
7. To stop the mechanism at any time, turn the Speed Control Lever to an "OFF" position.

MODELS 346,
355, 362, 364

SERVICE INFORMATION

All units are accurately adjusted, lubricated and tested at the factory. However, service repairs and adjustments sometimes become necessary. This bulletin should be studied carefully before making any adjustments or replacing parts.

Service parts are available from your Webster-Chicago distributor. All parts must be ordered by piece part number and also record changer model and production number, stamped on the under side of the main plate.

The functions and most probable misadjustments of the main assemblies are as follows (reference numbers refer to the exploded views on pages 12 and 14):

THE AUTOMATIC TRIP FAILS TO FUNCTION

The Main Cam Assembly (32) and Actuating Gear (31) are the heart of the record changer. The Main Cam Assembly drives the mechanism associated with the action of the Pickup Arm (7) and the Record Selector assemblies. It, in turn, is driven by the gear train (28, 29, 30) and the Turntable which is rim driven by the phonograph motor.

The Main Cam Assembly and Actuating Gear is put in motion or "tripped" by means of the "automatic" trip or by the manually operated "reject" trip. When the movement of the Pickup Arm toward the spindle is greater than $\frac{1}{8}$ " in $\frac{1}{2}$ revolution of the turntable, the Automatic Trip Arm (35) trips the Velocity Trip and Roller Assembly (33). This releases the Actuating Pawl on the Main

Cam Assembly (32), allowing it to engage the Main Cam Actuating Gear (31) and driving it through the change cycle. The pressure from the Automatic Trip Arm required to actuate the trip mechanism is negligible.

The Automatic Trip Arm follows the movement of the Pickup Arm through a weighted friction clutch (34). This clutch must be kept free of oil and grease. If the clutch does not cause the Automatic Trip Arm to trip the mechanism, clean the clutch parts with carbon tetrachloride. This clutch should operate the trip mechanism without placing undue drag on the movement of the pickup arm.

Also check for:

1. Velocity Trip and Roller Assembly (32) binding.
2. Slight burr on end of the Actuating Pawl or on the underside of the hook end of the Velocity Trip and Roller Assembly.
3. Actuating Pawl stuck (part of Main Cam Assembly (32) engaged by the hook end of the Velocity Trip and Roller Assembly (33).
4. Automatic Trip Arm (35) bent and not hitting the Velocity Trip and Roller Assembly (33).
5. Automatic Trip Arm (35) fails to touch the Velocity Trip and Roller Assembly.
6. Velocity Trip and Roller Assembly (33) rubbing on the underside of the Main Cam Actuating Gear (31).
7. No velocity lead-in groove or eccentric groove in the center of record.

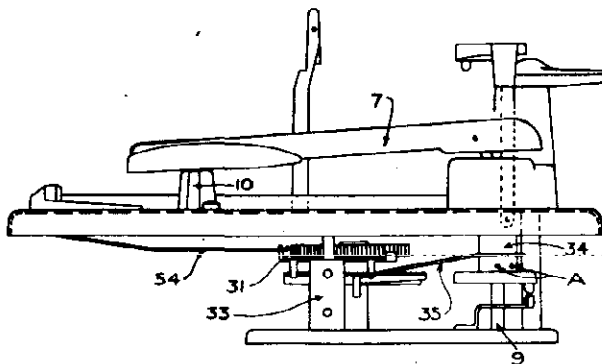
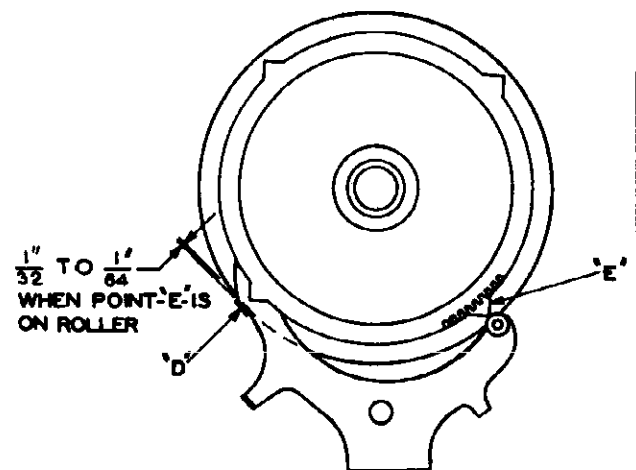


Fig. 1



ADJUST IF NECESSARY BY BENDING AT POINT "D"

Fig. 2

MODELS 346,
355, 362, 364

8. Foreign matter in record groove.
9. Badly worn record.
10. Badly bent or worn needle.

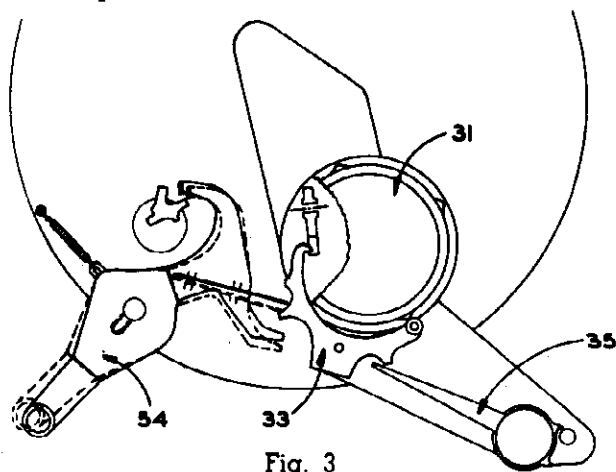


Fig. 3

IF THE "REJECT" TRIP FAILS TO FUNCTION

When the control knob is moved to the extreme REJECT position, the hair spring of the Reject Trip Lever Arm (54) actuates the Velocity Trip and Arm Assembly, putting the change mechanism in cycle. See Fig. 3.

Check for:

1. "Reject" trip hair spring of Lever 54 bent or broken.
2. Velocity Trip and Roller Assembly (33) binding.
3. Actuating Pawl (32) stuck (part of Main Cam Assembly).

IF THE MECHANISM CONTINUES TO CYCLE

At the completion of the change cycle, the Actuating Pawl is disengaged from the Main Cam Assembly Actuating Gear by the hook end of the Velocity Trip and Roller Assembly, which has been returned to its normal position by the reset points on the Main Cam Drive Gear, Fig. 2.

If the clearance between the lip on the Velocity Trip Lever and the edge of the Main Cam is too small, it will prevent the hooked end of the Velocity Trip Lever from engaging the trigger. Adjust the clearance between the lip ("D" of Fig. 2) on the Velocity Trip Lever and the Main Cam to be within $\frac{1}{32}$ " and $\frac{1}{64}$ " when the roller is contacting the point of one of the reset points on the Actuating Gear.

Also check for:

1. Velocity Trip and Roller Assembly (33) rubbing on Main Cam Actuating Gear (31).
2. Manual Trip Lever (54) binding.
3. "Disengage Roller" broken on Velocity Trip and Roller Assembly (33).

PICKUP ARM LIFT TOO HIGH OR TOO LOW

The vertical movement of the pickup arm is controlled by the angle of the pickup arm raising lever (37 and Fig. 4). The needle should approach the top record of a full 1" stack of records on the turntable with approximately $\frac{1}{16}$ " clearance.

To adjust:

1. Put a full 1" stack of records ON THE TURN-TABLE.
2. Trip the "Reject" control and rotate the turntable clockwise until the needle clears the top record of the stack by about $\frac{1}{16}$ ".
3. Be sure the front or 10" notch in the pickup arm raising disc engages the pickup arm raising lever.
4. If the needle does not clear the top record or if it raises too high, adjust by holding the pickup arm raising lever (37) at point X and bending at Y as indicated in Fig. 4.

CAUTION: All adjusting bends should be made slowly, using slight but firm, easy pressure.

Be sure the set screws in the Pickup Arm Raising Disc (36) are not loose and are properly positioned in the alignment holes as explained in the paragraph on Needle Setdown Indexing.

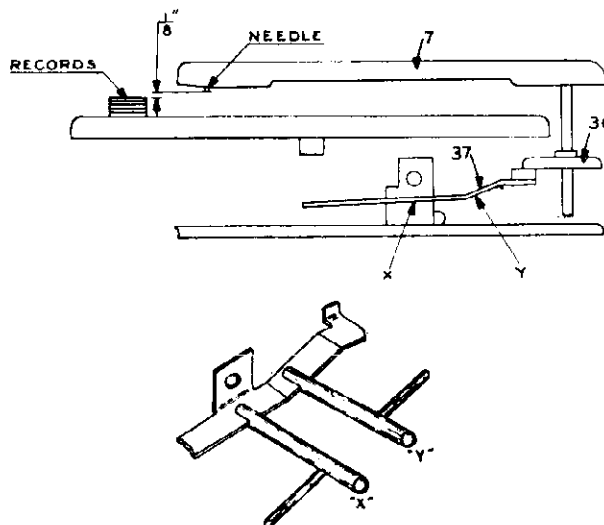


Fig. 4

MODELS 346,
355, 362, 364

NEEDLE SET DOWN POINT INCORRECT

The pickup arm should set the needle down just outside the "lead-in groove" of the record.

The horizontal movement of the pickup arm (7) is controlled by the eccentric excursion of the Pickup Arm Raising Lever (37) moving the Pickup Arm Raising Disc (36) when actuated by the Main Cam Assembly (32). The eccentric screw (part of 8) accessible through the top of the pickup arm (7), should take care of any normal position adjustment. Turn this screw clockwise to index the needle in toward the spindle and counter-clockwise to index the needle out away from the spindle.

Should further adjustment be necessary, proceed as follows:

1. Set the eccentric screw, just mentioned, to a middle position.
 2. Set the Record Shelf (4) to the 10" position.
 3. Operate the mechanism by revolving the turntable manually until the needle drops to within $\frac{1}{8}$ " of a ten-inch record on the turntable.
 4. Be sure the notch in the Pickup Arm Raising Disc (36) engages the Pickup Arm Raising Lever (37).
 5. The No. 8 Bristol set screws "A" of the Pickup Arm Raising Disc (36, Fig. 1) have pointed ends which fit into the off center holes in the Pickup Arm Shaft (9). Alternately loosen one screw and tighten the other until the needle rests above the record lead-in groove at the desired point. Be sure that both set screws are tight when this adjustment is completed.
 6. Complete the change cycle of the mechanism and place the pickup arm on the Pickup Arm Rest (10). The tongue of the Pickup Arm Raising Disc (36) should now rest against the post which supports the sub plate assembly. If the pickup arm does not rest in the proper position on the pickup arm rest, bend the tongue closer to or away from this post until the pickup arm is correctly positioned.
- REMEMBER:** Always slight but firm, easy bends!
7. Turn the Record Shelf to 12" and check the needle drop on a twelve-inch record. Make any additional adjustments with the eccentric screw mentioned previously.
 8. Move the pickup arm to the center of the turntable, trip the mechanism and turn the turntable by hand. Move the pickup arm until the outside or 7" notch of the pickup arm raising disc (36) engages the pickup arm raising lever (37). Continue to revolve the turntable

until the arm reaches the end of its outward movement. Raise the 7" pickup arm rest (77) and bend it in or out until it just touches the side of the arm. This adjusts the 7" needle set down point.

ERRATIC INDEXING

Whether the needle sets down in the 10" or the 12" position is controlled through the presence or absence of pressure from the Compression Spring (45), on the Pickup Arm Raising Lever bracket. Pressure forces the stud to travel the inside edge or the outside edge of the groove in the bottom of the Main Cam. The compression on this spring is changed as the Record Shelf is changed from the 10" to the 12" position. Improper adjustment of the spring tension will result in erratic indexing.

In the 12" position, the spring should be just free. In the 10" position the compression of the spring holds the stud of the Pickup Arm Raising Lever against the outside edge of the groove. If the compression tension needs adjustment:

Bend the Metal finger, through which the spring arm (45) fits, to give a "sloppy" fit of spring "45" when the Record Shelf is in the "back" or "12" position.

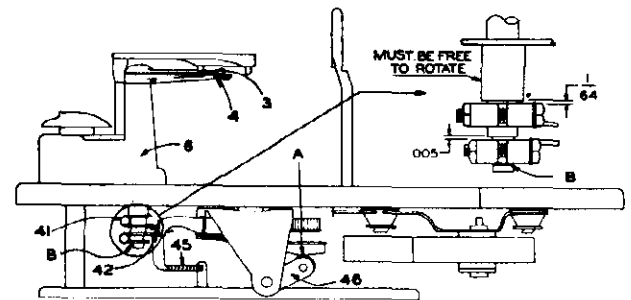


Fig. 5

MORE THAN ONE RECORD IS DROPPED DURING A CHANGE CYCLE

The floating latch at the top of the Record Spindle is so spaced that only one record at a time can slide between the heel of the latch and the step of the spindle. The hole in the latch is elongated so that the latch can slip into the spindle recess when records are being removed.

If more than one record is dropped at a time, it will be found to be due to:

1. Foreign matter in spindle recess causing the latch to stick.
2. Exceptionally thin records.

MODELS 346,
355, 362, 364

CHANGE CYCLE STARTS WHEN NEEDLE TOUCHES RECORD (10" or 7" Records)

1. The velocity trip arm (35) may be too close to lip "B" of velocity trip (33) at the instant of contact of the needle with the record. There should be at least $\frac{1}{64}$ " clearance between the velocity trip arm and the velocity trip. Carefully bend lip "B" in to provide proper clearance. However, do not in any way bend the velocity trip at any other point. Improper bending may cause binding and constant tripping of the mechanism.

TO ADJUST SPEED SELECTOR LEVER POSITION

1. Loosen set screw of coupling (69).
2. Move idler assembly (67) to 45 rpm position.
3. With the Speed Selector Lever opening over "45" tighten the set screw.

INCORRECT TURNTABLE SPEED

The three speed mechanism and the motor are one assembly. The speed selector idlers (64, 65 and 66) are mounted on a movable metal plate (67) in such a way that moving the Speed Selector Lever (74) moves the correct idler into position between the motor shaft and the Turntable drive idler (78). The tongue of the detent spring (68) fits into indentations in the edge of the metal plate to index the speed selector idlers and hold them firmly in the desired position.

"OFF" indentations between each speed position hold the idlers away from the motor shaft and the Turntable idler when the Speed Selector Lever is in an "off" position.

If the Turntable speed is incorrect, check for:

1. Turntable Idler (78) cocked at an angle. Bend the wheel and shaft to straighten wheel.
CAUTION: Do not bend idler (78) toward the speed selector idlers (64, 65, 66). Bend only sideways or away from the small idlers.
2. The idler mounting assembly (part of motor assembly 49) must not bind. There should be at least $\frac{1}{64}$ " play at point "A". Bend the raised metal stop if more clearance is needed.
3. The entire motor assembly (49 plus 67, etc.) should be free floating. There should be slight play of the Speed Control Lever (70) between the "78" and "33" positions and the stops at the end of the speed selector dial. If there is any binding, loosen set screw of coupling (69) and retighten with the tongue of the detent spring (68) in the proper position.

ERRATIC SPEED (WOW)

Remove any dirt or excess flocking from the in-

side rim of the turntable. Check the rubber idler wheel for a flat spot or "out of round".

If the rubber part of either Drive wheel becomes slick and shiny — Replace.

STALLS DURING CHANGE CYCLE

See Above.

GLIDE-IN ON 12" RECORDS

The term "glide-in" is used to describe the action of the pickup arm and needle when the needle does not sit down smoothly in the first groove of the record, despite accurate indexing adjustments, but seems to glide over the first two or three grooves before seating itself properly. If glide-in occurs:

1. Check tension of compression spring (45). The spring should be free in 12" position at the moment the needle sets down on the record.
2. Remove any cause of friction in index lever (45) by bending the "eye" of (37).
3. On Model 355, pulling the metal base up snug to the main plate may put too much tension on the compression spring (45). Be certain spring (45) is very free.
4. The pickup cord may be dressed too tight or in such a manner that it interferes with the free movement of the pickup arm. Make certain there is sufficient play in the pickup cord.

SLIDE-IN OR NEEDLE JUMPS GROOVES

Slide-in describes the condition where the needle will touch the first groove of the record properly but will jump the grooves forward or back as though the needle pressure was too light.

To correct slide-in, check for:

1. Incorrect needle tip. The standard tip will be especially likely to jump grooves of a micro-groove record. Be certain the "micro" tip is used for either the $33\frac{1}{3}$ or 45 rpm microgroove records.
2. Chipped or damaged needle.
3. Tight pickup cord.

RECORD FAILS TO DROP

The record must leave the spindle step just prior to or at least by the time it leaves the record shelf. If the spindle is too far from the record shelf, the record will hang up on the spindle step and fail to drop.

To adjust.

With a rubber mallet, hit the part of the housing (6) which covers the push-off assembly (3 and 4) hard enough to jar it nearer or farther away from the spindle. With a record on the spindle and record shelf there should be about $\frac{1}{16}$ " clearance between the push-off blade (3) and the record.

MODELS 346,
355, 362, 364**CHANGE CYCLE STARTS BEFORE
END OF RECORD**

If the Trip Assembly chatters while the changer is running or if the changer cycles before the entire record is played, there is probably insufficient clearance between the hook end of the Velocity Trip and Roller Assembly and the actuating gear. This clearance should be adjusted to be within $\frac{1}{32}$ " to $\frac{1}{64}$ " by bending the lever at point "C" as shown in Fig. 6.

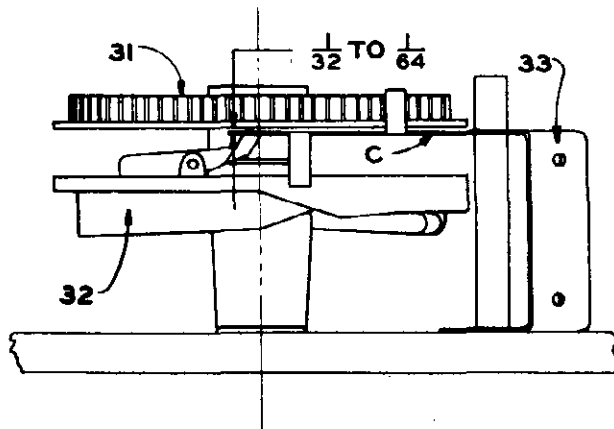


Fig. 6

LAST RECORD REPEATS

The weight of the records on the Spindle keeps the Automatic Shut Off Lock Lever (59) from dropping and engaging the Pickup Arm Raising Disc. The dropping of the last record releases the Automatic Shut Off Lock Lever, permitting it to engage the Pickup Arm Raising Disc and prevent the Pickup Arm from moving onto the record. The Pickup Arm then comes to rest on the Rest Button.

If the last record continues to play:

1. Check the Spindle to be sure that it moves up and down freely.
2. With no records on the Spindle, and with the mechanism at rest, the hook "D" of the Automatic Shut Off Lock Lever (59) should clear the top of the Pickup Arm Raising Disc by $\frac{1}{32}$ ". Adjust, if necessary, by bending the Automatic Shut Off Lock Lever slightly.

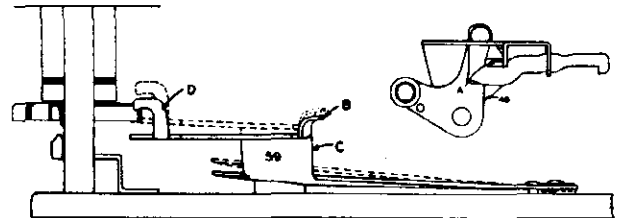


Fig. 7

LAST RECORD WILL NOT PLAY

As explained above, the weight of records on the spindle prevents the Automatic Lock Lever (59) from dropping. As the Cam Lever and Bracket assembly (46) moves forward to engage the Push-off Blade Actuating Lever (42), Fig. 5, point A of the Cam Lever (46), Fig. 7 should also move forward under point B of the Automatic Shut Off Lock Lever (59) to make certain it does not drop until the last record has dropped to the turntable and the Pickup Arm is in position to play. If point A does not engage point B, the Lock Lever (59) will drop to engage the Pickup Arm Raising Disc (36) and the Pickup Arm will return to the rest position without playing the last record.

To adjust, bend B so they engage properly. It may be necessary to bend (46) at point C, then readjust point D so it engages the Pickup Arm Raising Disc (36) correctly.

REPLACEMENT OF PARTS**TO REPLACE THE PICKUP ARM**

1. Unhook the pickup arm hinge clip (8) and raise the arm to a vertical position.
2. Remove the two mounting screws. Remove the pickup arm.
3. Attach the new arm.

The weight of the arms is uniform so the needle pressure adjustments should be left alone.

**REPLACE PICKUP ARM BRACKET
AND SHAFT ASSEMBLY**

1. Loosen Bristol screws in Pickup Arm Raising Disc (36).

2. Remove Disc washer (55), Automatic Trip Arm (35) and Clutch (34) by sliding them off the bottom of the Pickup Arm Shaft (9) and pull shaft out of changer from above.

To replace, reverse the procedure and adjust the Pickup Arm Raising Disc for proper indexing as explained on page 7.

TO REPLACE THE CARTRIDGE

1. Remove the two mounting screws, one on each side of the cartridge, and carefully remove pickup cord tips from cartridge pins.
2. Remove the old cartridge and replace with the new one.

Be certain the cartridge is parallel with the side of the pickup arm.

TO REPLACE THE NEEDLE

1. Loosen the needle set screw, using a small screw driver.
2. Remove the needle.
3. Insert the new needle with the flat side of the needle toward the set screw. Be sure the needle shank is all the way in to the bottom of the needle hole.
4. Tighten the set screw. The needle point should be parallel to the sides of the needle slot and evenly spaced between the walls of the slot.

TO REPLACE THE MOTOR

It is not necessary to replace the entire Three Speed mechanism when replacing the motor. However, it is necessary to remove the entire assembly from the main plate and then remove the motor from the assembly.

1. Remove the entire assembly by removing mounting screws (53) and retaining clip (23, part of 69).
2. Remove the Turntable Drive Wheel (78), the detent spring (68) and tension spring (74).
3. Remove the Three Speed mechanism plate assembly (67). Do not remove the small idler wheels (64, 65, 66) from the plate.
4. Reassemble new motor to the Three Speed Mechanism plate and the entire assembly to the main plate.
5. It may be necessary to adjust the play of the Three Speed Mechanism mounting plate "C" (part of the motor 49), so there is proper play between the sliding stop and the metal stop at point "A" (see page 13). The mounting plate should be free, approximately $\frac{1}{16}$ " clearance between the sliding stop and point "A". The Speed Selector Lever (74) should be in the "78" position when making this adjustment. See paragraph 2 of "Incorrect Turntable Speed"

Model 346 Record Changers leave the factory completely oiled and lubricated. Under normal conditions this should be sufficient for approximately one year or 1,000 hours of operation. When operated under extreme conditions of dust or heat, this operation should be performed more frequently as required.

Do not permit any oil or grease to get on the rubber Idler Drive Wheel or the Motor Sleeve, on Turntable Drive Rim or on the Automatic Trip Arm clutch. Any oil or grease on these points should be removed using Carbon Tetrachloride. The recommended lubricants and points of lubrication are as follows:

A — No. 10 OIL (Apply With Small Oil Can or Medicine Dropper)

1. Motor Bearings.
2. Pickup Arm Shaft.

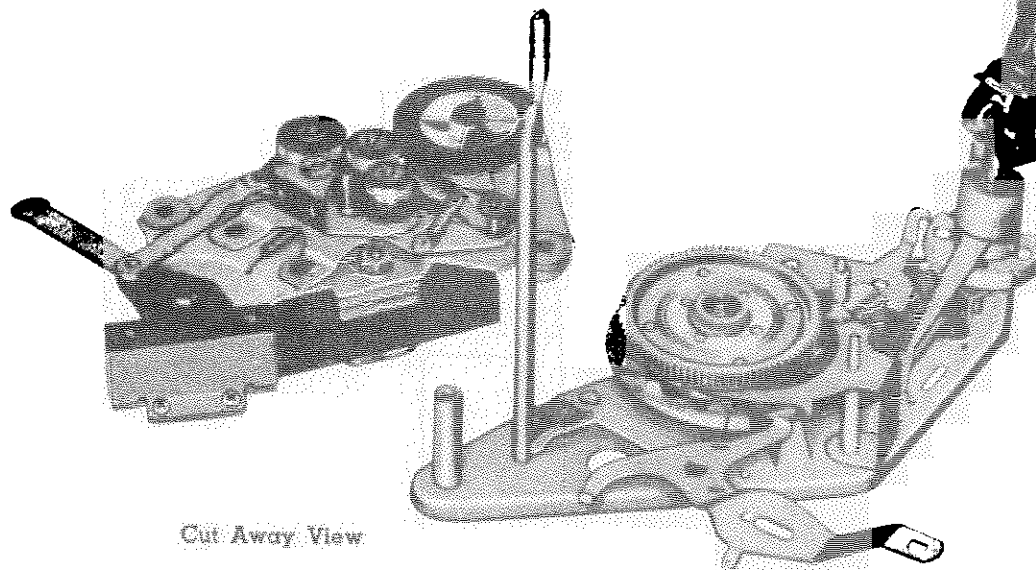
LUBRICATION

3. Ball Bearing Assembly.
4. Idler Wheel Felt.

B — A NON FLUID LUBRICANT (Apply With Small Brush)

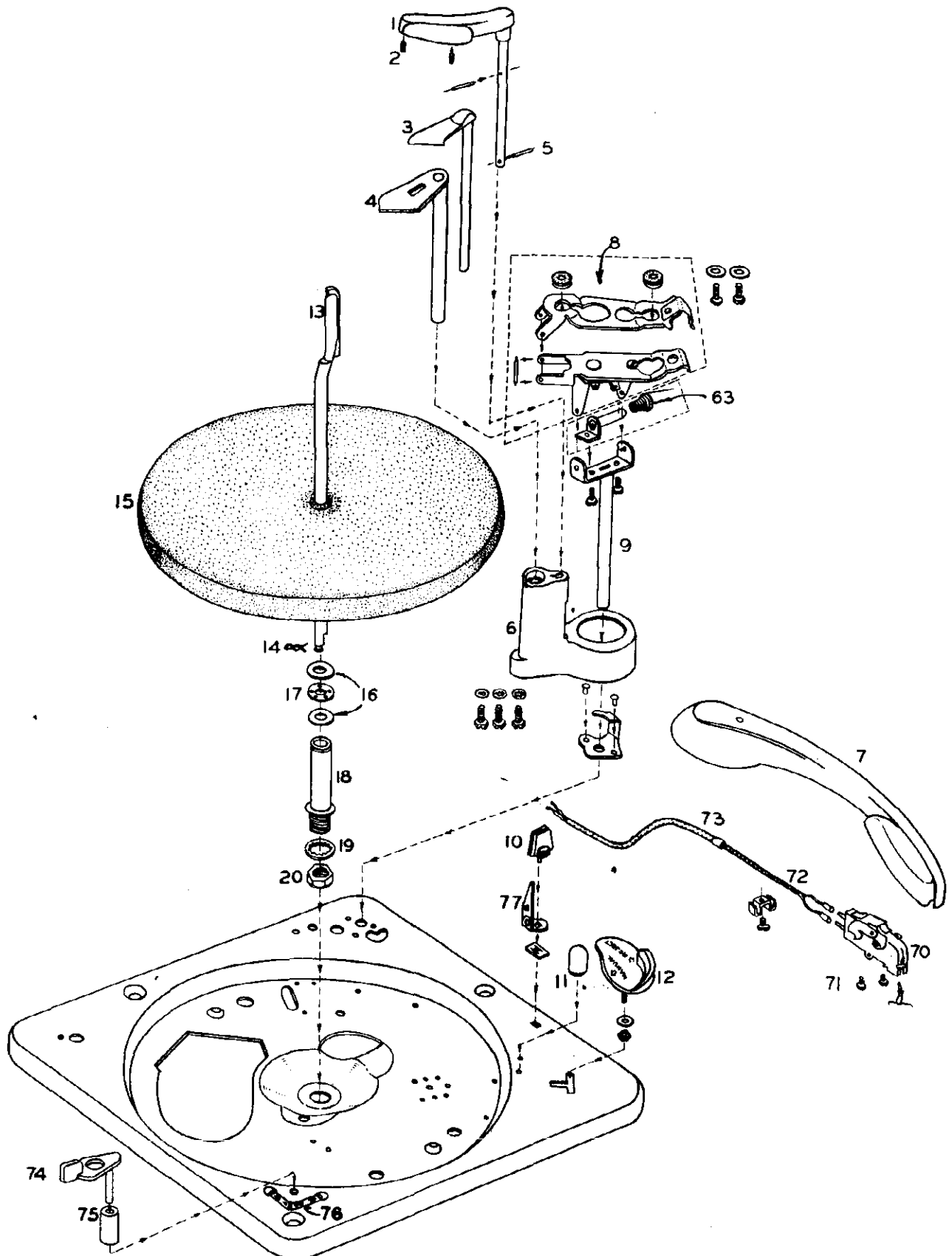
1. Idler Wheel Link.
2. Turntable Shaft Stud.
3. Pickup Arm Hinge Pins.
4. Knife edge of Pickup Arm Raising Lever.
5. Main Cam Bearing. (It is necessary to remove the sub-plate assembly to lubricate this bearing.)
6. Teeth of Main Cam Actuating Gear.
7. Track of Main Cam Gear.
8. Teeth of Large and Small idler gears.
9. Raising lever Bracket bearing surfaces.

AVOID EXCESSIVE LUBRICATION



MODELS 346,
355, 362, 364

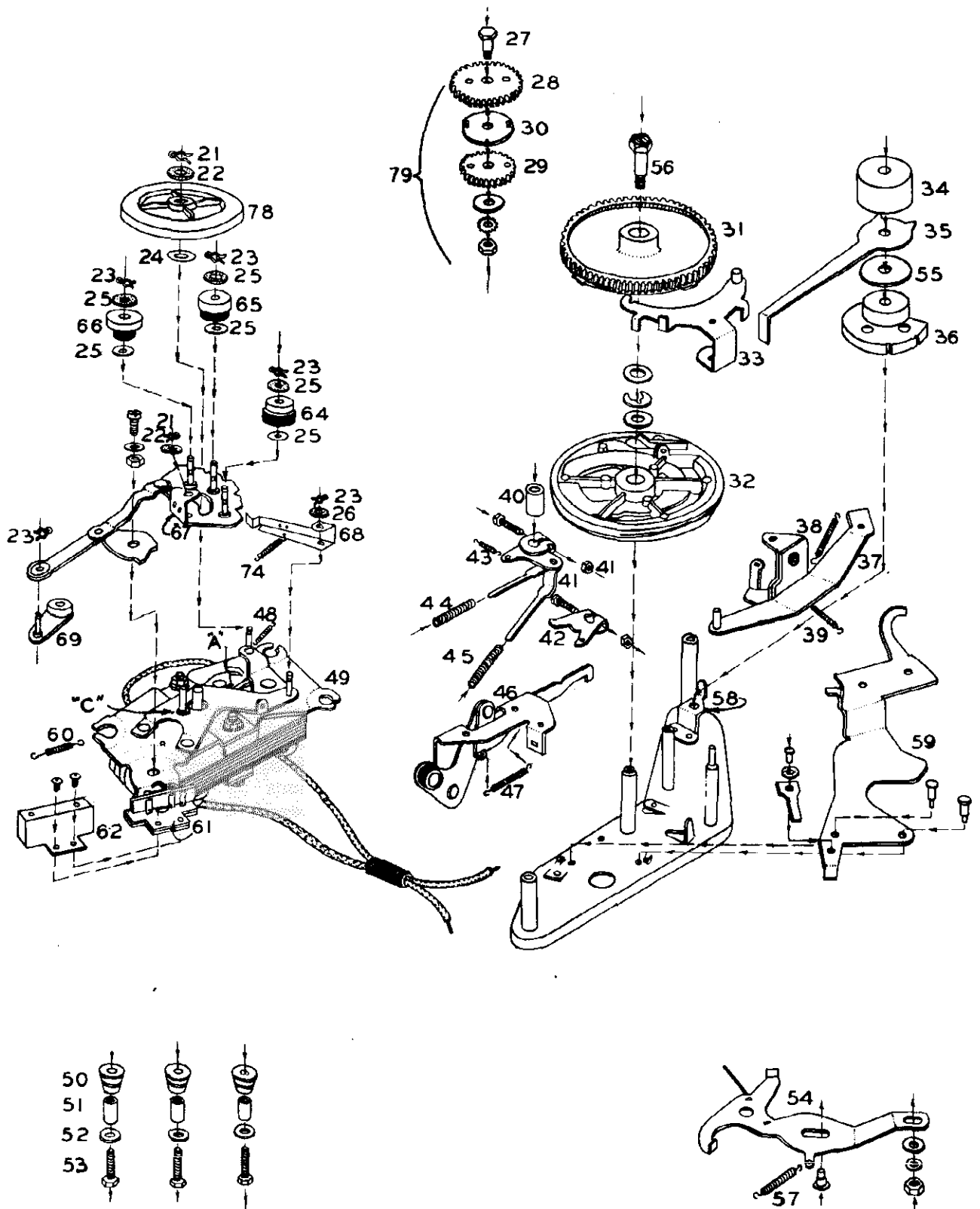
MODELS 346,
355, 362, 364



MODELS 346,
355, 362, 364**REPLACEMENT PARTS LIST**

<i>Illustration No.</i>	<i>Part No.</i>	<i>Description</i>
1	42X196	Record Weight Assembly
2	24P013	Record Weight Cushion
3	42X183	Push Off Blade
4	42X184	Record Shelf
5	27P157	Record Weight Groove Pin
6	42P199	Housing
7	49X123	Pickup Arm
8	21X283	Pickup Arm Hinge Assembly
9	11X385	Pickup Arm Shaft
10	49P099-C	Pickup Arm Rest
11	24P004-C	Needle Pad
12	49X089-C	"Reject-Manual" Lever
13	11X358	Spindle
14	50P204	Spindle Retainer Clip
15	11X292-C	Turntable
16	25P269	Bearing Race Washer
17	11X058	Bearing Race
18	41P414	Turntable Bearing
19	25P333	Turntable Bearing Lock Washer
20	26P687	Turntable Bearing Nut
63	11X386	Pickup Arm Counterbalance Spring
70		Cartridge
71	26P474	Cartridge Mounting Screw
72	20X1264-4	Light Pickup Cord Assembly — Internal
73	20P811-60	Heavy Pickup Cord Assembly — External
74	42X205	Speed Selector
75	41P669	Bushing
76	78P454	Speed Indicator
77	11X481	7" Rest Assembly

MODELS 346,
355, 362, 364

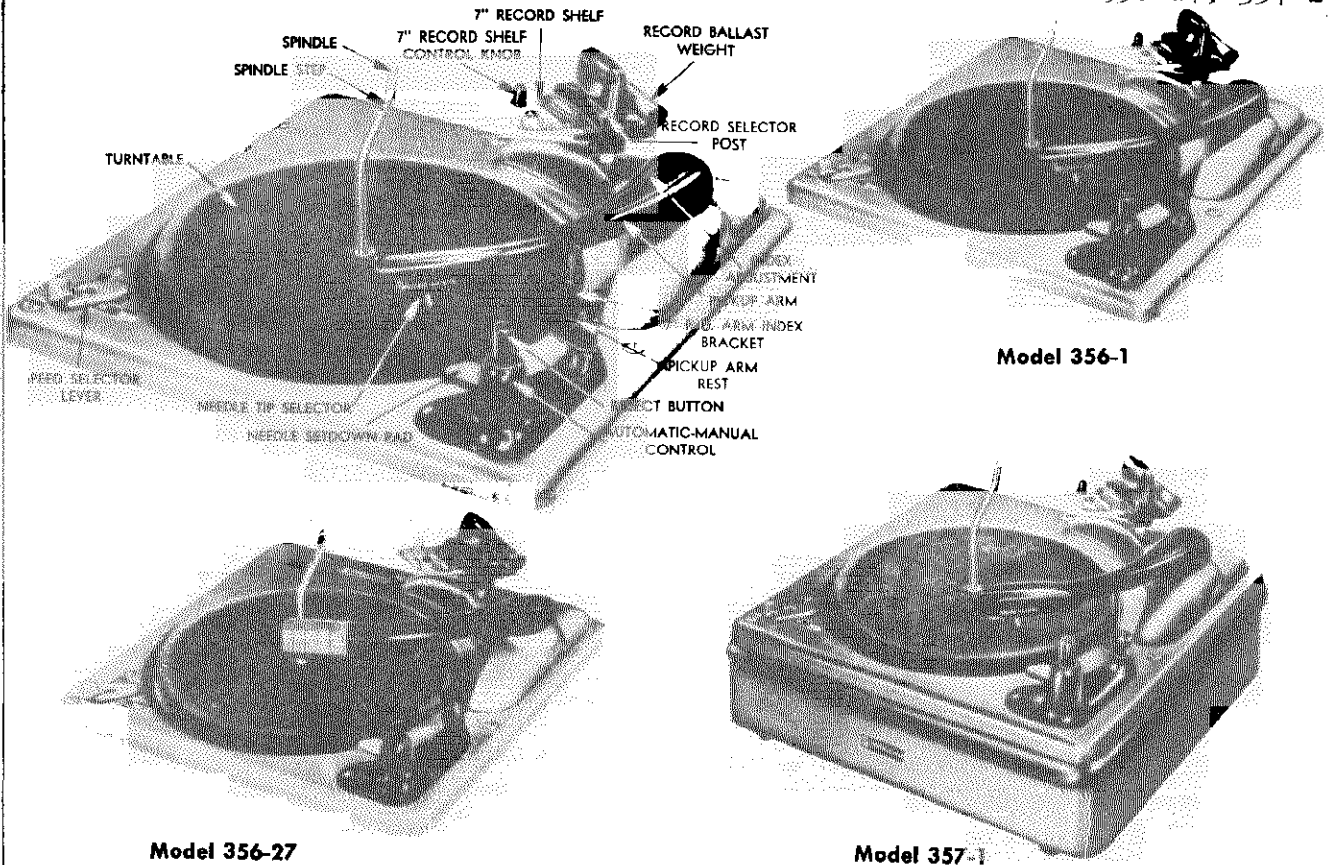


Exploded View below Main Plate

MODELS 346,
355, 362, 364

REPLACEMENT PARTS LIST

Illustration No.	Part No.	Description
21	50P125	Spring Clip
22	25P030	Felt Washer
23	50P034	Spring Clip
24	25P046	Fibre Washer
25	25P406	Fibre Washer
26	25P407	Felt Washer
27	41P333	Shoulder Screw
28	47P024	Large Idler Gear
29	47P023	Small Idler Gear
30	45P342	Idler Gear Coupler
31	11X032	Trip Resetting Gear Assembly
32	11X033	Cam and Trigger Assembly
33	11X320	Velocity Trip
34	41P576	Velocity Trip Clutch Weight
35	45P568	Automatic Trip Arm
36	11X227	Pickup Arm Raising Disc
37	11X046	Pickup Arm Raising Lever
38	46P044	Tension Spring
39	46P139	Tension Spring
40	41P607	Spacer
41	11X287	Lever and Toggle Assembly
42	11X312	Push-off Blade Actuating Lever
43	46P162	Tension Spring
44	46P151	Compression Spring
45	46P152	Compression Spring
46	11X319	Cam Lever and Bracket Assembly
47	46P158	Tension Spring
48	46P134	Idler Link Tension Spring
49	17X467	Motor and Top Bridge Assembly
50	25P363	Motor Shock Mounts
51	41P592	Motor Mount Sleeve
52	25P367	Motor Mount Washer
53	26P110	Motor Mount Bolt
54	11X291	Trip Lever and Wire Assembly
55	23P009	Friction Disc
56	41P333	Stud Mounting Screw
57	46P117	Tension Spring
58	45P347	Pickup Arm Pivot Bracket
59	11X316	Automatic Shut Off Lock Lever
60	46P139	Tension Spring
61	32P054	Switch and Bracket Assembly
62	45P819	Switch Cover
64	11X456	Drive Wheel — 33 $\frac{1}{2}$ R.P.M.
65	11X458	Drive Wheel — 45 R.P.M.
66	11X460	Drive Wheel — 78 R.P.M.
67	17X464	Index Plate and Cam Assembly
68	45P817	Index Lock Lever
69	17X466	Hub and Lever Assembly
78	11X366	Idler Wheel
79	11X132	Complete Gear Assembly
80	50P221	Turntable Retaining Ring

MODELS 356-1,
356-27, 357-1

DESCRIPTION

The Webster-Chicago Model 356-1 basic mechanism is a three speed, single post, spring cushioned spindle, automatic record changer. Simple in design and operation it provides automatic playing of up to a 1" stack of 7", 10" or 12" records at speeds of 33 $\frac{1}{3}$, 45 or 78 rpm.

Model 356 returns the pickup arm to the rest position after playing the last 10" or 12" record, although the motor continues to revolve until the Speed Selector Lever is moved to the nearest "OFF" position. Two "OFF" positions are available for ease of operation. The idler wheel is also pulled away from the motor shaft when the Speed Control Lever is in an "OFF" position, eliminating the possibility of a flat spot developing on the rubber wheel.

The last 7" record of a stack continues to play until the Speed Selector Lever is moved to one of the "OFF" positions and the Pickup Arm moved from the record to the Rest Position.

Automatic playing of 7" records is made possible by a simple, ingenious 7" record shelf which is easily placed on the Record Selector Post and by a movable 7" Pickup Arm Rest which can be swung into or out of position.

Model 356 also features the exclusive Webster-Chicago Velocity-Trip Mechanism. The pickup arm is not actuated by "lead-in" springs and there is a minimum of lateral pressure. The arm travels freely in either direction. This lack of lateral pressure or inertia adds immeasurably to the life of records and is considered to be as important as extra-light vertical pressure. The free-floating arm permits "home recordings" or "inside out" records up to 12" size to be played manually.

Model 356 will change warped or rough-edged records, at the same time assuring maximum protection to the finest discs.

Model 356-27 is the same as Model 356-1 except for the pickup arm. The special pickup arm on this model is provided with two interchangeable plug-in Heads in which the General Electric Variable Reluctance Cartridges can be mounted. The Brown head and the brass weight are for use with the RPX-040 General Electric Cartridge. The Red head is for use with the RPX-041 General Electric Cartridge. Use the RPX-041 for the 33 $\frac{1}{3}$ rpm and 45 rpm records.

Model 357 is a Model 356 mounted on an attractive metal base.

These service instructions apply to all three models.

PICKUP CARTRIDGE

The special pickup cartridge of Model 356-1 and Model 357 has a replaceable Tandem-Tip Needle. The lever on the cartridge is moved to "Std" or "Micro", as indicated on the pickup arm, to lower the proper point into playing position. All 78 rpm and some 33 $\frac{1}{3}$ rpm records including "Books for the Blind", require the "Standard" point. The 33 $\frac{1}{3}$ rpm Microgroove and 45 rpm records require the "Micro" point.

The special cartridge has been designed to play 78 rpm as well as 45 rpm and 33 $\frac{1}{3}$ rpm records at very light needle pressures.

Model 356-27 uses the General Electric cartridges as previously explained in the Description.

MODELS 356-1,
356-27, 357-1

OPERATION

MOTOR

Connect the motor cord to a source of 105-120 volt 60-cycle current only. If it is desired to operate the changer on 50-cycle current, a special motor shaft sleeve must be used in order to drive the turntable at the required speed.

Do not under any circumstances connect the motor to a source of direct current (DC) or alternating current of any other frequencies. The motor switch is part of the Speed Control Lever. The power is off when the lever is in an "OFF" position.

FOR AUTOMATIC RECORD CHANGE

1. Move the Tandem Tip Needle Selector to "Std" or "Micro" or plug-in the correct Head as explained in the description of the pickup cartridge above.
2. Turn the Record Selector Post to "10" or "12" for the ten- or twelve-inch records. The Record Selector Post is pivoted and turns in a counter-clockwise direction to the 10" position as indicated by the arrows. Do not use the Ballast Weight (see Illustration, Page 1) as a handle to turn the post. Turn by grasping the head of Record Selector Post with the thumb and forefingers. For 7" records, turn the Record Selector Post to "10". Move the pickup arm toward the center of the record until it touches the spindle. Move the 7" pickup arm rest into position and return the pickup arm to the 7" rest position. Place the 7" record shelf on the record selector post, as illustrated, with the control knob of the record shelf turned to "45" or "33" as required.
3. Turn the Manual-Automatic Switch (sleeve of Reject button) to AUTOMATIC.
4. With the Record Ballast Weight turned back, place up to a 1" stack of records on the spindle so that the bottom record rests on the step of the spindle and the shelf of the Record Selector Post or 7" Record Shelf.
5. Turn the Record Ballast Weight forward to rest on the top record or the 7" adapter.
6. Move the Speed Selector Lever to "33 $\frac{1}{3}$ ", "45" or "78", as required by the record being played. This also turns the power on.
7. Press the Reject button to start the changer.

To reject any record while playing in the AUTOMATIC position, press the Reject button.

NOTE: After the last record has been played, the Pickup Arm should not be touched until it has come to rest on the "Rest" button or has dropped to a normal playing position on the record.

8. After the last record has been played, the entire stack may be removed from the turntable at one time. The simplest procedure is as follows:
 - a. Turn the Record Ballast Weight back out of position.
 - b. Place the fingers of both hands under opposite edges of the bottom record.
 - c. Do not apply pressure to the top record. (Keep your thumbs free.)
 - d. Lift the stack of records straight up, following the contours of the spindle. This permits the stack of records to follow the curve of the spindle without binding and greatly facilitates the removal of the stack.

FOR "MANUAL" RECORD CHANGE

1. Turn the Record Selector Post to the "12" position. (This is not essential but permits more clearance in loading and unloading records.)
2. Turn the Selector Switch (sleeve of Reject Button) to MANUAL.
3. Place a record on the turntable. It may facilitate this operation if 10" and 12" records are placed over the spindle at an angle, with one edge of the records held below the level of the Record Selector Post Shelf. Records may be removed in the same manner.
4. Move the Speed Selector Lever to the proper position as required by the record being played.
5. Move the Tandem-Tip Selector to "Std" or "Micro" as explained in the description of the pickup cartridge.
6. Place the needle gently on the edge of the record. Do not lift the pickup arm too high as this will cause it to catch in the Automatic Stop Lock position.
7. To stop the mechanism at any time, turn the Speed Selector Lever to an "OFF" position.

SERVICE INFORMATION AND ADJUSTMENTS

All units are accurately adjusted, lubricated and tested at the factory. However service repairs and adjustments sometimes become necessary. This bulletin should be studied carefully before making any adjustments or replacing parts.

Service parts are available from your Webster-Chicago distributor. All parts must be ordered by piece part number and also record changer model and production number, stamped on the under side of the main plate.

The functions and most probable misadjustments of the main assemblies are as follows (reference numbers refer to the exploded view on pages 12 and 14):

THE AUTOMATIC TRIP FAILS TO FUNCTION

The Main Cam Assembly (38) and Actuating Gear (36) are the heart of the record changer. The Main Cam Assembly drives the mechanisms associated with the action of the Pickup Arm (5) and the Record Selector assemblies. It, in turn, is driven by the gear train (29, 30, 31) and the Turntable which is rim driven by the phonograph motor.

The Main Cam Assembly and Actuating Gear is put in motion or "tripped" by means of the "automatic" trip or by the manually operated "reject" trip. When the movement of the Pickup Arm toward the spindle is greater than $\frac{1}{8}$ " in $\frac{1}{2}$ revolution of the Turntable, the Automatic Trip Arm (33) trips the Velocity Trip and Roller Assembly (37). This releases the Actuating Pawl on the Main Cam Assembly (38), allowing it to engage the Main Cam Actuating Gear (36) and driving it through the change cycle. The pressure from the Automatic Trip Arm required to actuate the trip mechanism is negligible.

The Automatic Trip Arm (33) follows the movement of the Pickup Arm through a weighted friction clutch (32). This clutch must be kept free of oil and grease. Should it become necessary,

clean the clutch parts with carbon tetrachloride. This clutch should operate the trip mechanism without placing undue drag on the movement of the pickup arm.

Also check for:

1. Velocity Trip and Roller Assembly binding.
2. Slight burr on end of the actuating pawl on the underside of the Velocity Trip hook.
3. Actuating Pawl stuck (part of Main Cam Assembly (38) engaged by the hook end of the Velocity Trip and Roller Assembly (37).
4. Automatic Trip Arm (33) bent and not hitting the Velocity Trip and Roller Assembly (37).
5. Automatic Trip Arm (33) fails to touch the Velocity Trip and Roller Assembly.
6. Velocity Trip and Roller Assembly (37) rubbing on the underside of the Main Cam Actuating Gear (36).
7. No velocity lead-in groove or eccentric groove in the center of record.
8. Foreign matter in record groove.
9. Badly worn record.
10. Badly bent or worn needle.

IF THE "REJECT" TRIP FAILS TO FUNCTION

When the "On" button is pressed, the hair spring of the "reject" trip lever arm (65), actuates the Velocity Trip and Arm Assembly, putting the change mechanism in cycle.

Check for:

1. "Reject" trip hair spring of Lever (65) bent or broken.
2. Velocity Trip and Roller Assembly (37) binding
3. Actuating Pawl (part of Main Cam Assembly (38) stuck.

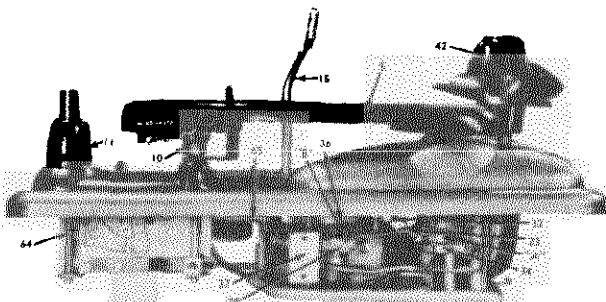


Fig. 1

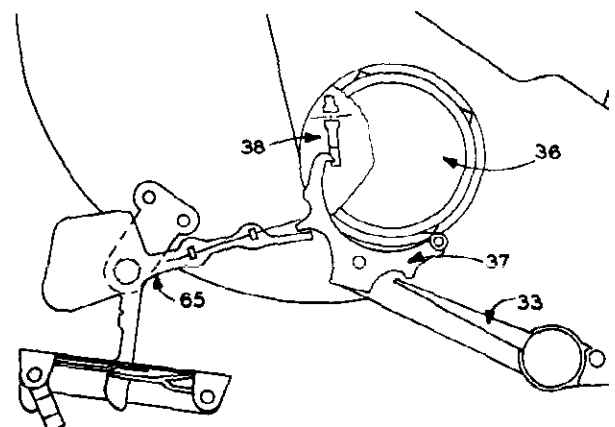


Fig. 2

MODELS 356-1,
356-27, 357-1

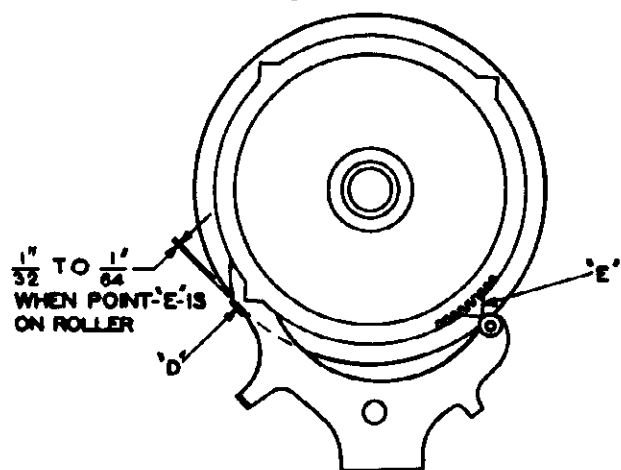
IF THE MECHANISM CONTINUES TO CYCLE

At the completion of the change cycle, the Actuating Pawl is disengaged from the Main Cam Assembly Actuating Gear (36) by the hook end of the Velocity Trip and Roller Assembly (37) which has been returned to its normal position by the reset points on the Main Cam Drive Gear (Fig. 3). This hook should be adjusted for about $\frac{1}{64}$ " clearance from the bottom of the Main Cam Drive Gear (36), Fig. 1. Greater clearance may permit the pawl to bounce past the hook and re-engage, causing the mechanism to continue to cycle.

If the clearance between the lip on the Velocity Trip Lever and the edge of the Main Cam is too small, it will prevent the hook end of the Velocity Trip Lever from engaging the trigger. Adjust the clearance between the lip (D, Figs. 3 and 5) on the Velocity Trip Lever of the Main Cam to be within $\frac{1}{64}$ " when the roller is contacting the point of one of the protrusions on the Actuating Gear.

Also check for:

1. Velocity Trip and Roller Assembly (37) rubbing on Main Cam Actuating Gear (36).
2. Manual Trip Lever (65) binding.
3. "Disengage Roller" broken on Velocity Trip and Roller Assembly (37).



ADJUST IF NECESSARY BY BENDING AT POINT "D".

Fig. 3

PICKUP ARM LIFT TOO HIGH OR TOO LOW

The vertical movement of the pickup arm is controlled by the angle of the Pickup Arm Raising Lever (40), Fig. 4. The needle should approach the top record of a full stack of 10" records on the turntable with approximately $\frac{1}{16}$ " clearance. To adjust:

1. Put a full stack of 10" records ON THE TURN-TABLE.
2. Press the "On" button and rotate the Turntable clockwise until the needle clears the top record of the stack by about $\frac{1}{16}$ ".

3. Be sure the notch in the Pickup Arm raising disc (34) engages the pickup arm raising lever (40).
4. If the needle does not clear the top record or if it raises too high, adjust by bending the pickup arm raising lever at the point indicated in Fig. 4 Y.

CAUTION: All adjusting bends should be made slowly, using slight but firm, easy pressure.

Be sure the set screws (A of Fig. 1) of the pickup arm raising disc are not loose and are properly positioned in the alignment holes as explained in the paragraph on Needle Setdown Indexing.

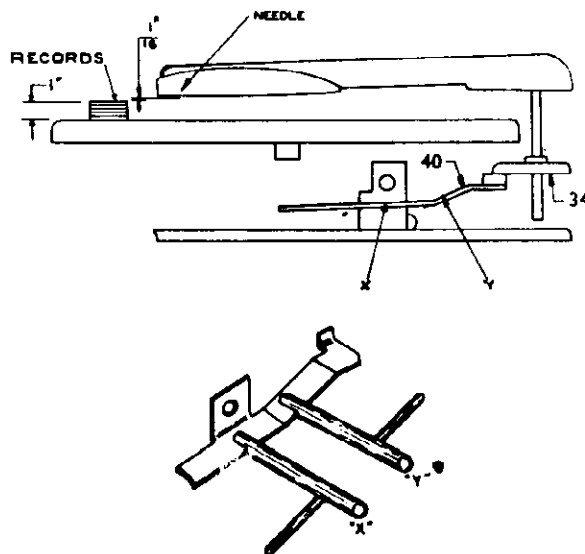


Fig. 4

NEEDLE SET DOWN INDEXING INCORRECT

The horizontal movement of the pickup arm (5) is controlled by the eccentric excursion of the Pickup Arm Raising Lever (40) moving the Pickup Arm Raising Disc (34) when actuated by the Main Cam Assembly (38). The eccentric screw (part of 6), accessible through the top of the pickup arm (5), should take care of any normal position adjustment. Turn this screw clockwise to index the needle in toward the spindle and counter-clockwise to index the needle out away from the spindle.

Should further adjustment be necessary, proceed as follows:

1. Set the eccentric screw, just mentioned, to a middle position.
2. Set the Record Selector Post (42) to the 10" position.
3. Operate the mechanism by revolving the Turntable manually until the needle drops to within $\frac{1}{8}$ " of a 10" record on the turntable.
4. Be sure the notch in the Pickup Arm Raising Disc (34) engages the Pickup Arm Raising Lever (40).

MODELS 356-1,
356-27, 357-1

5. With a No. 8 Bristol wrench in each of the set screws of the Pickup Arm Raising Disc (35) as indicated in A, Fig. 1, alternately loosen one screw and tighten the other until the needle rests above the record lead-in groove at the desired point.
6. Complete the change cycle of the mechanism and position the Pickup Arm on the rest button (10). If necessary, bend the tongue of the Pickup Arm Raising Disc closer to or away from the Base Plate Post until the Pickup Arm is correctly seated on the rest button when the tongue is touching the Base Plate Post.

NOTE: All adjusting bends should be slight but firm, easy bends.

CHANGE CYCLE STARTS BEFORE END OF RECORD

If the trip assembly chatters while the changer is running, or if the changer cycles before the entire record is played, there is probably insufficient clearance between the hook end of the Velocity Trip and Roller Assembly (37) and the Actuating Gear (36). This clearance should be adjusted to be within $\frac{1}{32}$ " to $\frac{1}{64}$ " by bending the lever at point "C" shown in Fig. 5.

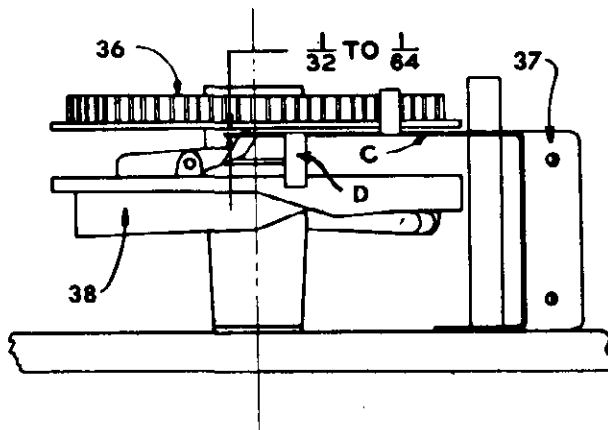


Fig. 5

MORE THAN ONE RECORD IS DROPPED DURING A CHANGE CYCLE

The floating latch at the top of the Record Spindle is so spaced that only one record at a time can slide between the heel of the latch and the step of the spindle. The hole in the latch is elongated so that the latch can slip into the spindle recess when records are being removed.

If more than one record is dropped at a time, it will be found to be due to:

1. Foreign matter in spindle recess causing the latch to stick.
2. Exceptionally thin records.

RECORD DROPS ON PICKUP ARM

As the change cycle is started, the first motion of the inclined outer bottom surface of the Main Cam (38) causes the Record Selector Post (42) to move toward the Spindle about $\frac{3}{32}$ inch. This position is maintained until the Pickup Arm has made its full outward lateral excursion at which time the Record Selector Post again moves toward the spindle, causing the bottom record to drop into playing position.

If the Record Selector Post (42) has been bent back, away from the Record Spindle, it is possible for a standard record to rest on the spindle step with its edge just over the edge of the Record Selector Post shell. Then as the change cycle is started, the record is pushed off the spindle by the initial movement of the Record Selector Post, so that it drops on the Pickup Arm.

To correct this condition, the Rocker Arm Assembly must be adjusted so that the Record Selector Post is brought nearer to the spindle. This adjustment is made in the following manner:

1. With the mechanism at rest, remove the Turntable and replace the Record Spindle. Set the Record Selector Post to the position for playing 12-inch records and place a 12-inch record on the Record Spindle.
2. Insert a short screwdriver through the motor-board opening into the screw slot as shown at "A" in Fig. 6. Clockwise rotation of the screw will increase the distance between the Record Spindle and the Record Selector Post; counter-clockwise rotation will decrease it.

It is recommended that the distance between the edge of the record and the step of the Record Selector Post be held to just over $\frac{1}{32}$ of an inch so that records with rough or sharply beveled edges will not catch on the outer edge of the Record Selector Post.

CAUTION: Be certain that a standard size record is used in making this adjustment. A standard 10" record measures $9\frac{7}{8}$ " \pm $\frac{1}{32}$ " diameter. A standard 12" record measures $11\frac{7}{8}$ " \pm $\frac{1}{32}$ " diameter.

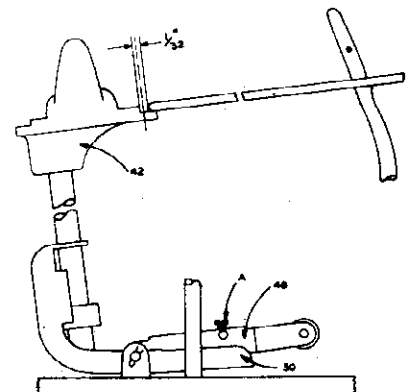


Fig. 6

MODELS 356-1,
356-27, 357-1

PUSH OFF POST ANGLE INCORRECT

The Record Selector Post should be adjusted so that the curve of the shell matches the curve of the record. See Fig. 7.

To adjust this angle:

1. Turn the Record Selector Post to the "10" position.
2. Place a ten-inch record on the Spindle in the normal position for automatic playing.
3. With a No. 8 Bristol wrench in each of the set screws (point A, Fig. 7), alternately loosen one and tighten the other until the Record Selector post angle is correct. Be sure that both set screws are tight at the completion of this adjustment.

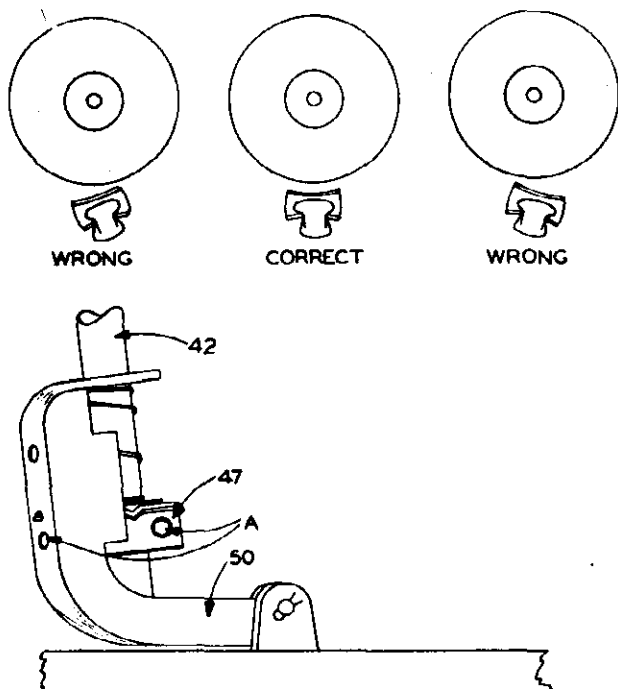


Fig. 7

ERRATIC INDEXING

Indexing in the 10" or the 12" position is controlled through the presence or absence of pressure from the Compression Spring (47A) on the Pickup Arm Raising Lever (40). The compression on this spring is changed as the Record Selector Post (42) is changed to the 10" or 12" position. Improper adjustment of the spring tension will result in erratic indexing. In the 12" position, the spring should be just free. In the 10" position, the compression of the spring holds the stud of the Pickup Arm Raising Lever (40) against the outside edge of the groove, forcing the stud to travel the inside edge or the outside edge of the groove in the bottom of the Main Cam (38).

To adjust:

Bend the slotted arm (part of 40) for proper tension and smooth clearance of the spring guide arm (47).

LAST RECORD DOES NOT PLAY

The weight of the records on the Spindle keeps the Automatic Shut Off Lock Lever (44) from dropping and engaging the Pickup Arm Raising Disc (38), thus permitting the mechanism to continue to cycle.

The Push Off Post (50) moves forward slightly at the beginning of each change cycle. The bracket "B" on this post is then underneath the elevated hook "A" on the Automatic Shut Off Lock Lever (44). This forward movement takes place before the last record drops so the change cycle should continue. However the dropping of the last record releases the Automatic Shut Off Lock Lever, permitting it to drop and shut off the mechanism when the change cycle starts after the last record.

If the last record does not play:

1. Bend the elevated hook "A", Fig. 8 forward so that it will overlap the Push Off Post bracket "H" about $\frac{1}{32}$ " with a record on the spindle.

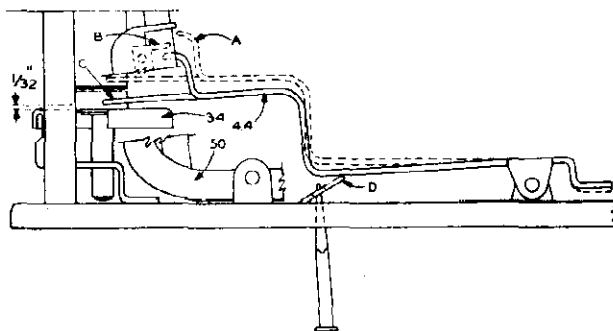


Fig. 8

LAST RECORD CONTINUES TO PLAY (10" or 12" Records)

1. Check the record spindle to be sure that it moves up and down freely.
2. With no records on the spindle, check the Automatic Shut Off Lock Lever (44). The lower hook end of this arm "C" should catch the Pickup Arm Raising Disc (34) at the beginning of the cycle to prevent travel of the Pickup Arm, causing it to drop on the OFF button. With no records on the Spindle and with the mechanism at rest, this hook should clear the top of the Pickup Arm Raising Disc by $\frac{1}{32}$ ". Adjust if necessary, by inserting a screw driver in the hole in the bottom base plate and bending lip "D". Never attempt to move the Pickup Arm Raising Disc up or down.
3. The elevated hook "A" on the Automatic Shut Off Lock Lever will sometimes lock with the bracket "B" on the Record Selector Post (50) if the drop of the record is delayed. More clearance can be obtained by bending the elevated hook "A" away from the bracket.

MODELS 356-1,
356-27, 357-1**GLIDE-IN ON 12" RECORDS**

The term "glide-in" is used to describe the action of the pickup arm and needle when the needle does not sit down smoothly in the first groove of the record, despite accurate indexing adjustments, but seems to glide over the first two or three grooves before seating itself properly. If glide-in occurs:

1. Check tension of compression spring (47A). The spring should be free in 12" position at the moment the needle sets down on the record.
2. Remove any cause of friction in index lever (47) by bending the "eye" of 40.
3. On Model 357, pulling the metal base up snug to the main plate may put too much tension on the compression spring (47A). Be certain spring (47A) is very free.
4. The pickup cord may be dressed too tight or in such a manner that it interferes with the free movement of the pickup arm. Make certain there is sufficient play in the pickup cord.

SLIDE-IN OR NEEDLE JUMPS GROOVES

Slide-in describes the condition where the needle will touch the first groove of the record properly but will jump the grooves forward or back as though the needle pressure was too light.

To correct slide-in, check for:

1. Incorrect needle tip. The standard tip will be especially likely to jump grooves of a micro-groove record. Be certain the "micro" tip is used for either the 33 $\frac{1}{3}$ or 45 rpm microgroove records.
2. Chipped or damaged needle.
3. Tight pickup cord.

CHANGE CYCLE STARTS WHEN NEEDLE TOUCHES RECORD (10" or 7" Records)

1. The velocity trip arm (33) may be too close to lip "B" of velocity trip (37) at the instant of contact of the needle with the record. There should be at least $\frac{1}{16}$ " clearance between the velocity trip arm and the velocity trip. Carefully bend lip "B" in to provide proper clearance. However, do not in any way bend the velocity trip at any other point. Improper bending may cause binding and constant tripping of the mechanism.

TO ADJUST SPEED SELECTOR LEVER POSITION

1. Loosen set screw of coupling (62).
2. Move Idler assembly (67) to 45 rpm position.
3. With the Speed Selector Lever opening over "45", tighten the set screw.

INCORRECT TURNTABLE SPEED

The three speed mechanism and the motor are one assembly. The speed selector idlers (24, 26 and 27) are mounted on a moveable metal plate (67) in such a way that moving the Speed Selector Lever (70) moves the correct idler into position between the motor shaft and the Turntable drive idler (91). The tongue of the detent spring (73) fits into indentations in the edge of the metal plate to index the speed selector idlers and holds them firmly in the desired position.

"Off" indentations between each speed position hold the idlers away from the motor shaft and the Turntable idler when the Speed Selector Lever is in an "off" position.

If the Turntable speed is incorrect, check for:

1. Turntable Idler (91) cocked at an angle. Bend the wheel and shaft to straighten wheel.
CAUTION: Do not bend idler (91) toward the speed selector idlers (24, 26, 27). Bend only sideways or away from the small idlers.
2. The idler mounting assembly (part of motor assembly 54) must not bind. There should be at least $\frac{1}{16}$ " play at point "A". Bend the raised metal stop if more clearance is needed.
3. The entire motor assembly (54 plus 67, etc.) should be free floating. There should be slight play of the Speed Control Lever (70) between the "78" and "33" positions and the stops at the end of the speed selector dial. If there is any binding, loosen set screw of coupling (62) and retighten with the tongue of the detent spring (73) in the proper position.

ERRATIC SPEED (WOW)

Remove any dirt or excess flocking from the inside rim of the turntable. Check the rubber idler wheel for a flat spot or "out of round".

If the rubber part of either Drive wheel becomes slick and shiny—Replace.

STALLS DURING CHANGE CYCLE

See Above.

REPLACEMENT OF PARTS TO REPLACE THE PICKUP ARM

1. Unhook the pickup arm hinge clip (6) and raise the arm to a vertical position.
2. Remove the two mounting screws. Remove the pickup arm.
3. Attach the new arm.

The weight of the arms is uniform so the needle pressure adjustments should be left alone.

REPLACE PICKUP ARM BRACKET AND SHAFT ASSEMBLY

1. Loosen Bristol screws in Pickup Arm Raising Disc (34).
2. Remove Disc washer (43), Automatic Trip Arm (33) and Clutch (32) by sliding them off the bottom of the Pickup Arm Shaft (7) and pull shaft out of changer from above.

To replace, reverse the procedure and adjust the Pickup Arm Raising Disc for proper indexing as explained.

TO REPLACE THE CARTRIDGE

1. Remove the two mounting screws, one on each side of the cartridge, and carefully remove pickup cord tips from cartridge pins.
2. Remove the old cartridge and replace with the new one.

Be certain the cartridge is parallel with the side of the pickup arm.

TO REPLACE THE NEEDLE

1. Loosen the needle set screw, using a small screw driver.
2. Remove the needle.
3. Insert the new needle with the flat side of the needle toward the set screw. Be sure the needle shank is all the way in to the bottom of the needle hole.
4. Tighten the set screw. The needle point should be parallel to the sides of the needle slot and evenly spaced between the walls of the slot.

REPLACE RECORD POST AND ROCKER ARM ASSEMBLY

1. Remove the Pickup Arm Assembly.
2. Remove the four nuts under the main plate which hold the Crescent Assembly.

3. Unhook the Rocker Arm Return Spring.
4. Remove the Rocker Arm Pivot Pin.
5. Lift out the Record Selector Post, Rocker Arm and Crescent Assembly as a unit.
6. In replacing the Rocker Arm Assembly, note paragraph "Replacing the Sub-Plate Assembly".

TO REPLACE THE MOTOR

It is not necessary to replace the entire Three Speed mechanism when replacing the motor. However, it is necessary to remove the entire assembly from the main plate and then remove the motor from the assembly.

1. Remove the entire assembly by removing mounting screws (58) and retaining clip (23).
2. Remove the Turntable Drive Wheel (91), the detent spring (73) and tension spring (74).
3. Remove the Three Speed mechanism plate assembly (67). Do not remove the small idler wheels (24, 26, 27) from the plate.
4. Reassemble new motor to the Three Speed Mechanism plate and the entire assembly to the main plate.
5. It may be necessary to adjust the play of the Three Speed Mechanism mounting plate "C" (part of the motor 54), so there is proper play between the sliding stop and the metal stop at point "A". The mounting plate should be free, approximately $\frac{1}{64}$ " clearance between the sliding stop and point "A". The Speed Selector Lever (70) should be in the "78" position when making this adjustment. See paragraph 2 of "Incorrect Turntable Speed".

LUBRICATION

Webster-Chicago Record Changers leave the factory completely oiled and lubricated. Under normal conditions this should be sufficient for approximately one year or 1,000 hours of operation. When operated under extreme conditions of dust or heat, this operation should be performed more frequently as required.

Do not permit any oil or grease to get on the rubber Idler Drive Wheels or the Motor Sleeve, on Turntable Drive Rim or on the Automatic Trip Arm clutch. Any oil or grease on these points should be removed using Carbon Tetrachloride.

The recommended lubricants and points of lubrication are as follows:

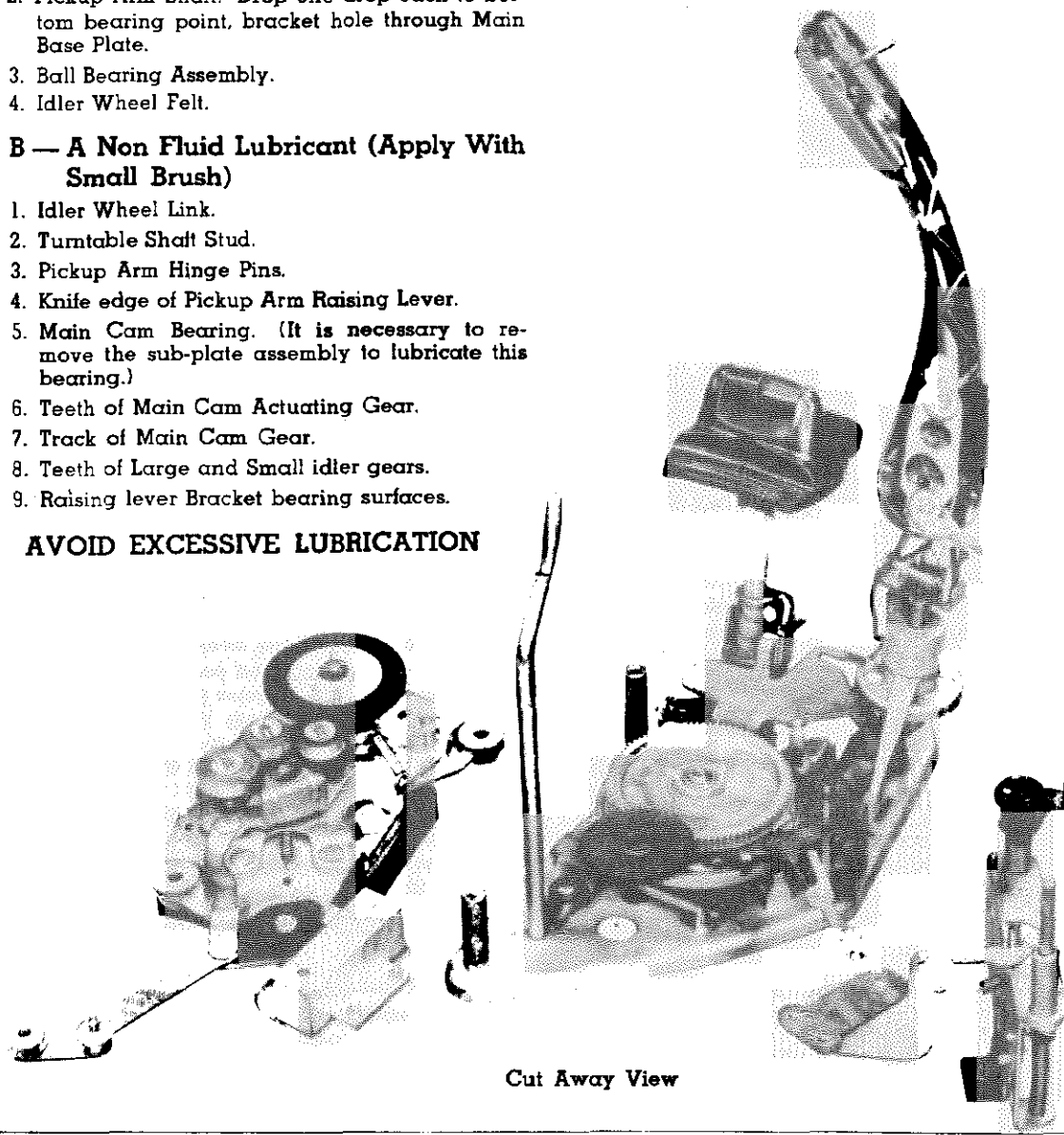
A — No. 10 OIL (Apply With Small Oil Can or Medicine Dropper)

1. Motor Bearings.
2. Pickup Arm Shaft. Drop one drop each to bottom bearing point, bracket hole through Main Base Plate.
3. Ball Bearing Assembly.
4. Idler Wheel Felt.

B — A Non Fluid Lubricant (Apply With Small Brush)

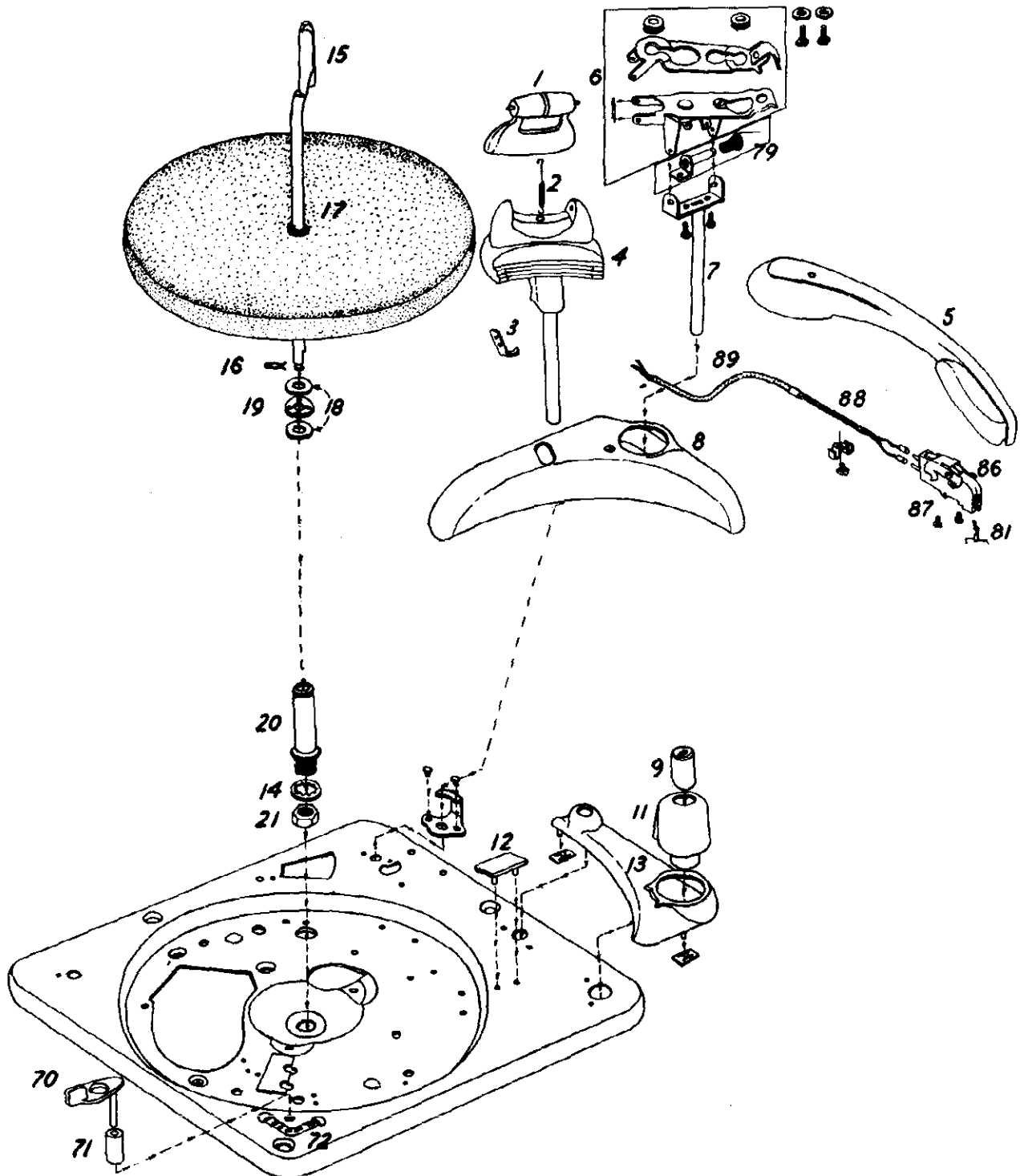
1. Idler Wheel Link.
2. Turntable Shaft Stud.
3. Pickup Arm Hinge Pins.
4. Knife edge of Pickup Arm Raising Lever.
5. Main Cam Bearing. (It is necessary to remove the sub-plate assembly to lubricate this bearing.)
6. Teeth of Main Cam Actuating Gear.
7. Track of Main Cam Gear.
8. Teeth of Large and Small idler gears.
9. Raising lever Bracket bearing surfaces.

AVOID EXCESSIVE LUBRICATION



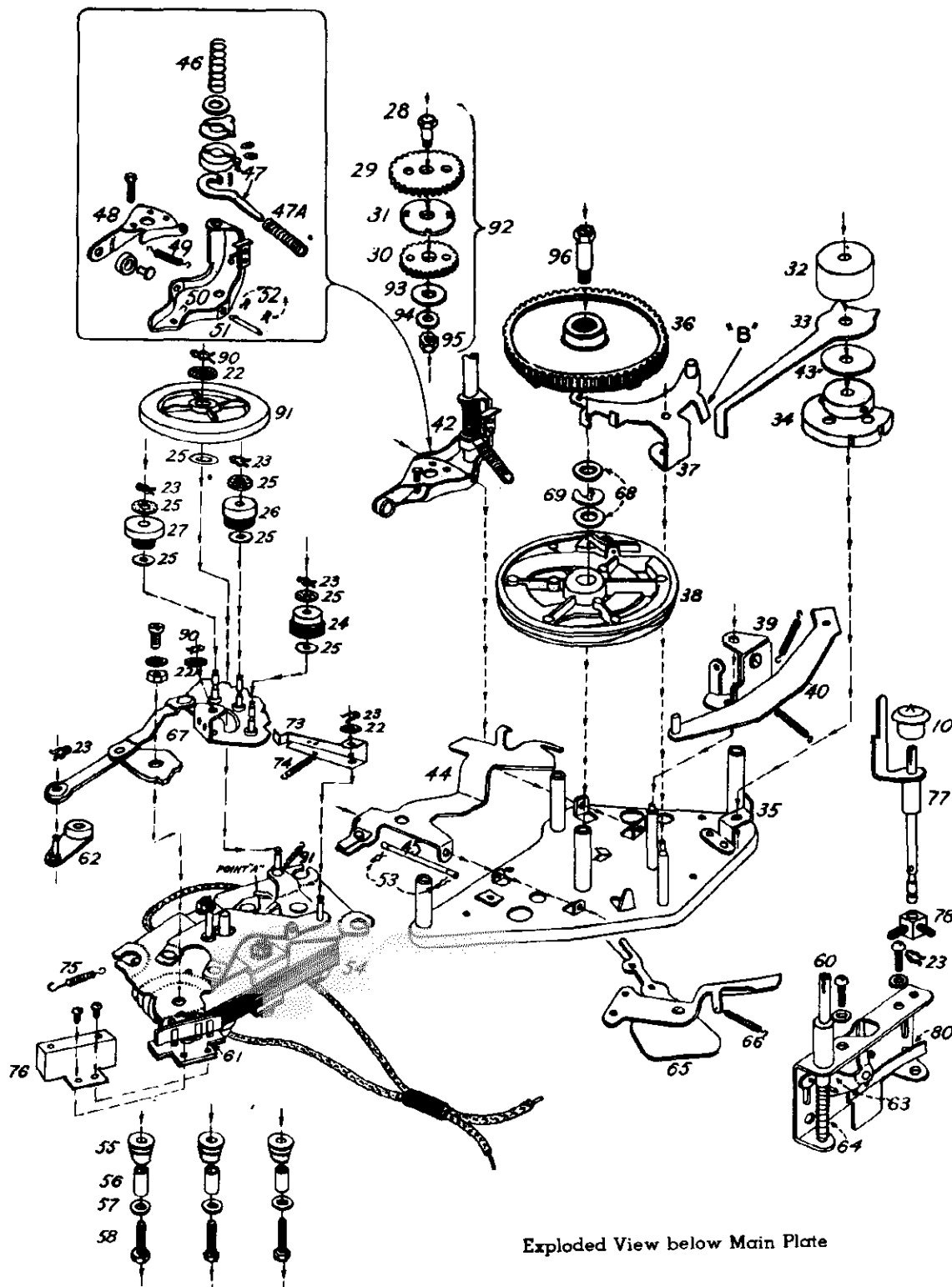
Cut Away View

MODELS 356-1,
356-27, 357-1



Exploded View above Main Plate

MODELS 356-1,
356-27, 357-1



PARTS LIST

Illustration No.	Part No.	Description
1	49X074	Record Stabilizer
2	46P126	Tension Spring
3	45P464	Spring Retainer

PARTS LIST

Illustration No.	Part No.	Description
4	49X029	Selector Post
5	49X124-1C	Pickup Arm
6	21X283	Pickup Arm Mounting Hinge
7	11X385	Pickup Shaft Assembly
8	45P350	Crescent Plate
9	49P111	Reject Button
10	49P125	Pickup Arm Rest
11	11X139	Control Knob and Set Screw
12	24P022	Needle Pad
13	49P027	Escutcheon
14	25P333	Lock Washer
15	11X133	Spindle
17	11X289	Turntable
18	25P269	Washer Bearing Race
19	11X058	Bearing Race Assembly
20	41P414	Turntable Bearing
21	26P687	Bearing Nut
70	42X205	Speed Selector
71	41P669	Bushing
72	78P454	Speed Indicator
87	26P474	Screw — Cartridge Mounting

16	50P204	Spindle Clip
22	25P407	Felt Washer
22A	25P030	Felt Washer
23	50P034	Clip
24	11X456	Drive Wheel — 33 $\frac{1}{8}$
25	25P046	Fibre Disc
26	11X458	Drive Wheel — 45
27	11X460	Drive Wheel — 78
28	41P333	Shoulder Screw
29	47P024	Large Fibre Gear
30	47P022	Small Fibre Gear

Illustration No.

31
32
33
34
36
37
38
39
40
41
43
44
45
46
47
47A
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
73
74
75
76
77
78
79
80
88
89
90
91
92
93
94
95
96
97

Part No.

45P342
41P576
45P568
11X227
11X032
11X320
11X033
46P139
11X046
46P022
23P009
11X079
41P443
46P012
11X049
46P011
11X141
46P017
11X142
41P421
50P125
50P125
17X467
25P363
41P592
25P367
26P110
11X470
41P444
32P054
17X466
45P361
46P123
11X158
46P117
17X464
25P343
25P342
45P817
46P187
46P139
45P819
11X472
41P704
11X386
45P872
20X1264-4
20P811-60
50P125
11X366
11X132
25P284
25P222
26P046
26P748
46P134

Description

Idler Gear Coupler
Weight
Auto Trip Arm
Tone Arm Raising Disc
Trip Reset Gear
Velocity Trip
Cam and Trigger Assembly
Tension Spring — Index Plate
Raising Arm Lever
Tension Spring
Friction Disc
No-Record Lever
Pin
Compression Spring
Selector Lever and Collar
Compression Spring
Rocker and Roller Assembly
Compression Spring
Rocker Arm Lever
Retaining Pin
Clip
Clip
Motor and Top Bridge Assembly
Rubber Shock Motor Mount
Motor Mount Sleeve
Motor Mount Washer
Motor Mount Bolt
Automatic Manual Control Assembly
Switch Shaft
Switch
Hub and Lever Assembly
Switch Lever
Compression Spring
Trip Lever and Wire
Tension Spring — Trip Lever
Index Plate and Cam Assembly
Washer
"C" Washer
Index Lock Lever
Tension Spring — Lock Lever
Tension Spring — Index Plate
Switch Cover
7" Adapter Rest
Positioning Cam
Pickup Counter Balance
Leaf Spring
Pickup Cord — Internal
Pickup Cord — External
Clip
Idler Wheel
Idler Gear Assembly
Coupling Washer
Lock Washer
Nut
Shoulder Screw
Tension Spring — Idler Link

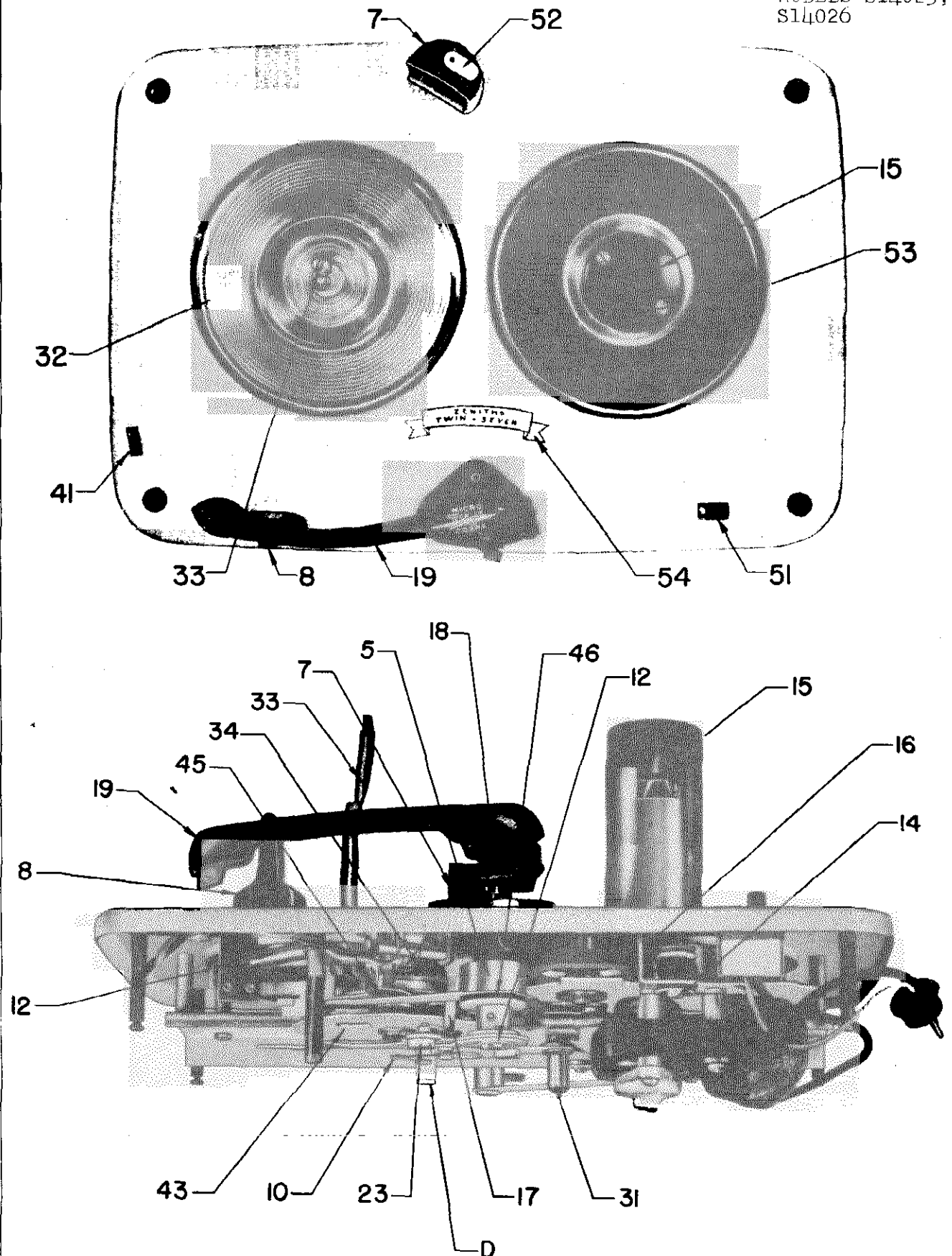


Fig. 2 Side View

MODELS S14023,
S14026

GENERAL

The Zenith Model S14023 and S14026 Record Changers are designed to automatically play 7" 33 1/3 RPM and 7" 45 RPM Micro Groove records. With a few minor exceptions, these two changers are alike both electrically and mechanically. The only actual difference between the two changers is in the AC power cable to the record changer and the connecting cable from the Cobra Tone Arm to the phono pre-amp. These changers will play either a stack of twelve 7" 33 1/3 RPM records or twelve 7" 45 RPM records. However, these records cannot be played simultaneously and neither can they be intermixed. These changers employ two turntables, one rotating at 45 RPM and the other rotating at 33 1/3 RPM. There is but a single tone arm and this is to be used for either turntable. To move it from the 33 1/3 RPM playing position to the 45 RPM turntable playing position, all that is required is to grasp it and lift it high enough to clear the 33 1/3 RPM spindle then swing it to the right until it snaps into the 45 RPM playing position. Thus indexed, it is ready for 45 RPM operation. These changers do not turn off after the last record has been played. They will repeat the final record until the record player is turned

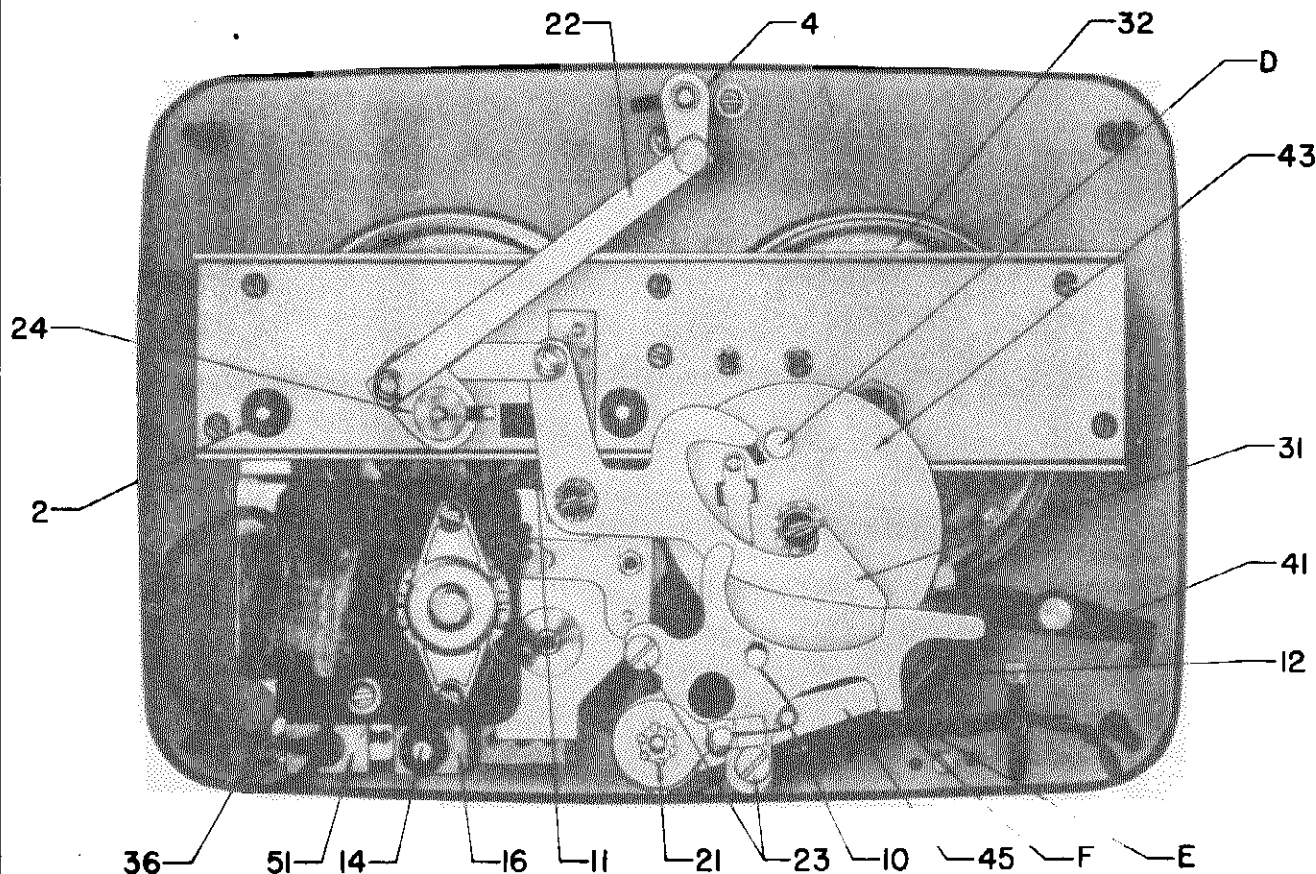
off manually. Connect this changer only to an outlet supplying 117 volts 60 cycle. Power consumption is 25 watts.

SHIPPING BOLTS

Before placing the record changer in operation, the machine must be floated freely on the mounting springs. During shipping the mechanism is secured by means of four shipping bolts. To float the changer, use a wide blade screw driver and turn the four mounting bolts clockwise until the heads are flush with the mounting plate which allows the changer to float on its shock mounts. (See Fig. 1)

LEVELLING THE RECORD CHANGER

It is essential to have the changer absolutely level. Use a torpedo or similar type level on the record changer base plate, use adequate shims to level the record changer pan or combination cabinet to achieve perfect level.



CYCLING

Fig. 3 Bottom View

The Motor shaft drives the turntable through the media of idler wheels. The motor shaft drives the fast idler wheel (48) which in turn drives the slow speed idler wheel (37) which then simultaneously rim-drives the 45 RPM and 33 1/3 RPM turntables. (See Fig. 9) The changer can be cycled either manually or automatically. The record changer cycles automatically in the following manner. As the tone arm moves towards the center of the record, the friction between the felt washer (46) and trip actuator stud assembly (45) created by the brass

weight (5) carries the trip actuator and stud assembly (45) in towards trip lever (47) (See Fig. 2). When the nylon stud on (45) contacts surface (C) on trip lever (47), the entire trip lever is rotated (direction B) around axis (A). This swings trip actuator in (direction B) and allows pawl (44) to rise and engage the upper clutch plate assembly (35). (See Figs. 4 & 5) The upper clutch plate assembly (35) is continually rotating and this places the changer in cycle.

When the clutch pawl (44) mechanically connects the upper clutch assembly to the lower clutch assembly, the entire clutch assembly rotates. As the lower clutch plate assembly (43) rotates, the nylon bushing (D) contacts throwout cam and lever assembly (21) thus moving the tone arm from the record finish position to a position over the tone arm captivator. (See Figs. 2 & 3) As the lower clutch assembly continues to rotate, the nylon bushing (D) contacts the inside surface of throwout cam and lever assembly thus returning the tone arm to record start position. Simultaneously the bushing (D) on the lower clutch assembly (43) contacts the ejector cam assembly (31) and a new record is dropped on the turntable. This actuates the 33 1/3 RPM ejector cam and at the same time actuates the ejector mechanism on the 45 RPM spindle. The ejector shaft and plate assembly (26) in the 45 RPM spindle rotates (See Fig. 8) automatically inserting record separators (29) between the bottom record and the record stack and then retracts the record supports (28) from beneath the last record, dropping this record. The record ejector shaft (26) turns again placing the record supports (28) out under the record stack and the record separators (29) retract, thus lowering the record stack on the record support plates. At the same time the eccentric shaped lower clutch assembly (43) actuates the tone arm lift lever and pin assembly (17) thus raising and lowering the tone arm in the proper sequence.

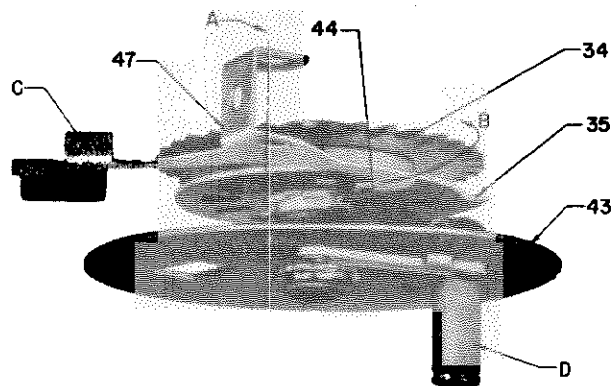


Fig. 4 Clutch Assembly with Pawl (44) Disengaged

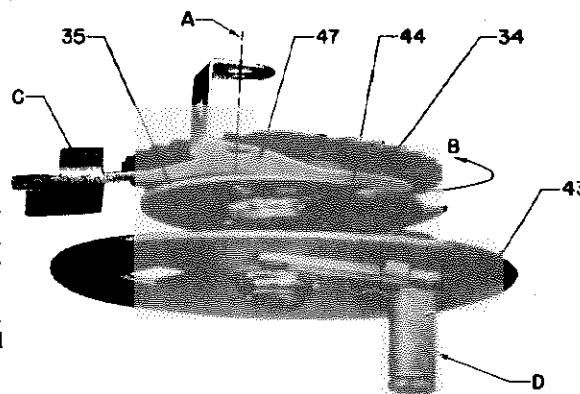


Fig. 5 Clutch Assembly with Pawl (44) Engaged

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use, or high operating temperature, the changer should be lubricated as follows

Lubricate the following places with #10 light machine oil:

1. 33 1/3 RPM ejector shaft (4) near base plate.
2. Rivet and shoulder stud on 33 1/3 ejector shaft (22).
3. Rivet and shoulder stud on 45 RPM ejector link (24).
4. 45 RPM ejector shaft spindle mounting plate (26).
5. Trip lever (47) in two places on its pivot shaft.
6. Reject lever (41) at the reject lever pivot.
7. Link lever (17) on the shaft pivot.

TOPE ARM HEIGHT ADJUSTMENT

The tone arm height adjustment determines vertical rise of the tone arm. If the tone arm does not rise sufficiently it will not play a full stack of twelve records. (See Fig. 6) On the other hand, if the tone arm raises too high it may hit the records resting on the record shelf. Set the tone arm height adjustment screw (6) so that the needle clears twelve unwarped records on the turntable. The tone arm housing must not hit the under side of the records on the record shelf when the changer is cycled after adjustment.

TOPE ARM SET-DOWN ADJUSTMENT

With the tone arm locked in the tone arm captivator, the gap between surface (E) on throwout cam and lever assembly (21) and aligning stud (F) should be adjusted so it is 1/4". (See Fig. 3) Adjusting stud (23) on the 33 1/3 RPM side should be in as far an outward position as possible during this operation. When the gap is 1/4", the slab head screws should be tightened on the tone arm shaft. Then the adjusting studs (23) can be rotated for final minor indexing of 33 1/3 and 45 RPM tone arm set-down positions.

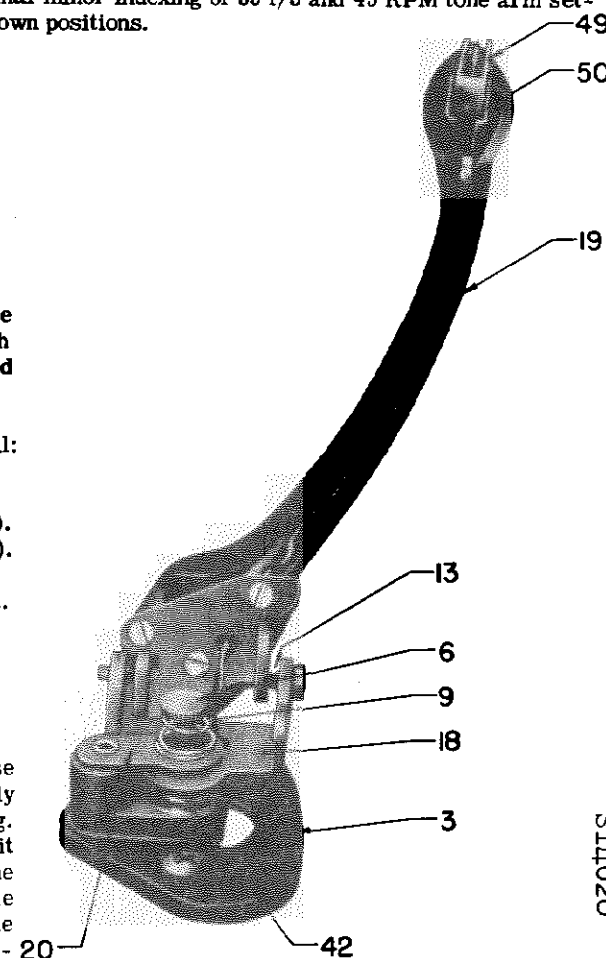


Fig. 6 Tone Arm & Hinge Assembly

MODELS S14023,
S14026

TONE ARM HINGES

The tone arm hinge adjustment must be made in the following manner. (See Fig. 6) Insert an Allen wrench into special set screw (13) and hold it in this position. With a hex head wrench loosen the hex nut around this set screw. Then tighten set screw to a point where the tone arm moves freely in the vertical position but still does not have any lateral motion. Hold the set screw (13) firmly in this position with the Allen wrench, and then tighten the hex head nut.

SLAB HEAD SCREWS

For maximum rigidity the tone arm shaft and 45 RPM spindle shaft are locked into position with slab head screws. The slab head set screw wrench is available as part number 68-8.

MANUAL TRIP ADJUSTMENT

The manual trip with the brass spring should be adjusted so there will be $1/8"$ clearance between the spring and surface (C) on trip lever (47). (See Fig. 4) There should also be .020 to .040 clearance between trip lever (47) and the top surface of the lower plate of the lower clutch assembly (43).

THEORY OF THE COBRA RADIONIC PICKUP

The operation of the Cobra pickup is considerably different from Crystal and Dynamic pickups. These pickups generate audio power, while the Cobra controls power generated by a radio frequency oscillator, detector and audio amplifier. The oscillator operates at a frequency of 2.5 Mc. Modulation is accomplished by changing the energy losses in tuned circuit. These losses may be represented by an equivalent resistance in series with the reactance of the coil. The ratio of the resistance to the reactance determines the efficiency of Q of the coil. The amplitude of the RF voltage developed across this coil by an oscillator will vary with changes in Q.

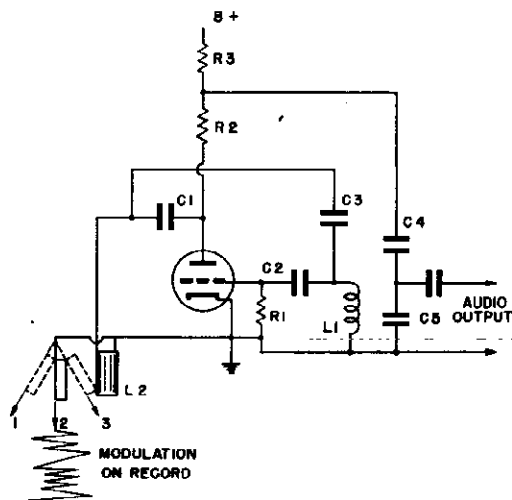


Fig. 7 Simplified Circuit of Oscillator

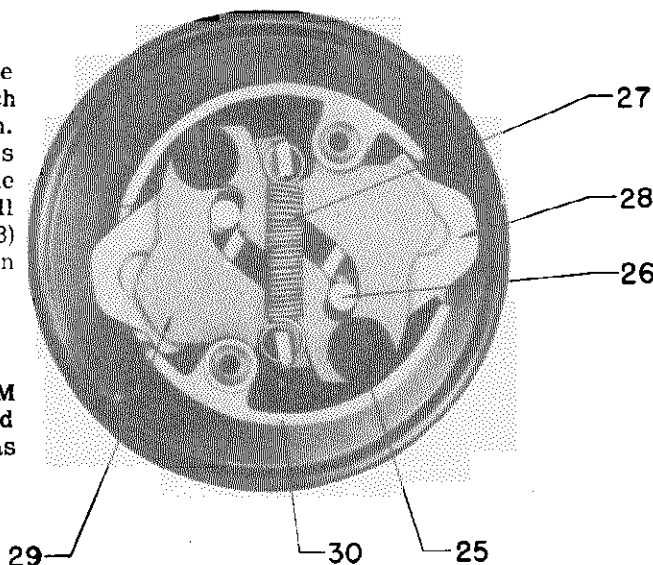


Fig. 8 45 RPM Spindle Assembly

The grid coil L1 and other components of the oscillator are mounted in the oscillator pre-amp chassis, while the plate coil L2 is in the needle cartridge with the vane and needle assembly. The coil is fixed and has 40 turns of No. 40 wire (approximate DC resistance $2\frac{1}{2}$ ohms). The stainless steel vane, which is in the field of the coil, is spot welded to the osmium-iridium tipped stylus.

Any movement of the stylus will cause a corresponding movement of the vane. As the stylus and vane follow the modulations in the record, changes in the mutual inductance between the vane and coil occur (See Fig. 7) In position 2 the vane is at rest, and a constant RF voltage appears across the plate coil. As the vane is set in motion and reaches position 1, it is at its greatest outward swing from the coil, resulting in low mutual inductance, low reflected resistance, higher Q, and a higher RF voltage across the coil. In position 3 it is at its greatest inward swing; resulting in a high mutual inductance, high reflected resistance, lower Q and a lower RF voltage. It can be seen that the amplitude of the RF voltage which appears across the coil will vary with changes in Q, satisfying the condition for amplitude modulation. The position of the vane changes both the Q and L of the coil. Changes in L shift the frequency slightly, and a certain amount of frequency modulation is present, but since there is no frequency discrimination it remains undetected. Since the grid and plate coils are part of a single tuned circuit any variations of amplitude of the RF voltage brought about by the changes in Q across the plate coil will also appear across the grid coil L1, causing a shift in the average plate current through the plate load resistor across which the audio output voltage is developed. Plate bend detection takes place since only the positive half of the grid swing causes an increase in the average plate current. These changes in the average plate current appear as audio voltage across the plate load resistor.

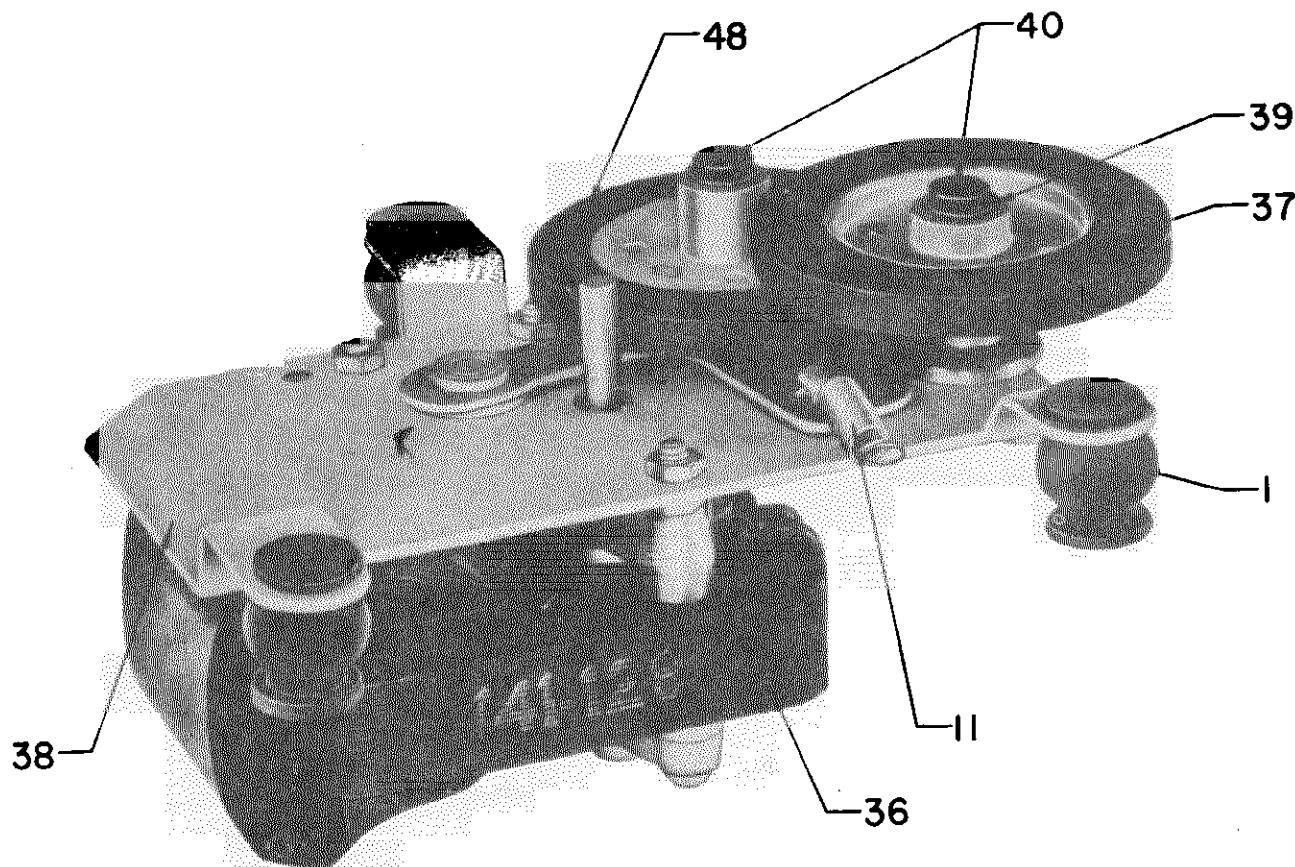
MODELS S14023,
S14026

Fig. 9 Motor & Idler Wheel Assembly

The 2.5 Mc RF voltage and the audio voltage both appear at the plate (pin 6) of the oscillator triode. R2, C4 and C5 filter out the RF voltage allowing only the audio component to the grid (pin 4) of the amplifier triode where it is amplified, fed through a shielded lead to the audio amplifier of the receiver and reproduced by the loud-speaker.

NEEDLE DOES NOT TRACK ACROSS RECORD PROPERLY.

- a. Clean foreign material from around needle.
- b. Check needle to see if the tip is bent or broken. Replace needle.
- c. Hinge bearing binds. Check lateral movement of tone arm. It must move freely without binding.
- d. Excessive vibration while playing an LP record. Any vibration caused by (1) unsteady mounting, (2) floor vibration, or (3) passing of heavy vehicles may cause the pickup to glide across the record grooves.

MECHANISM STARTS SLOWLY AND MOTOR GETS HOT.

- a. Check line voltage and frequency.
- b. Check lubrication.
- c. Motor windings damaged.
- d. Room temperature abnormally low.

MOTOR FAILS TO RUN EVEN WHEN IT IS DISCONNECTED FROM CHANGER AND PROPER VOLTAGE AND FREQUENCY APPLIED DIRECTLY TO THE TWO INPUT LEADS OF THE WINDING.

- a. Open windings.
- b. Damaged or frozen bearings.
- c. Lower Rear Support Bracket bent. Remove and straighten bracket --Re-center armature.

NEEDLE SETS DOWN PROPERLY ON RECORD BUT SLIDES OVER THE RECORD GROOVES.

- a. Cabinet tilted.
- b. Badly worn or broken needle cartridge.

MODELS S14023,
S14026

TONE ARM FALLS OFF RECORD.

- Check Tone Arm set-down adjustment.
- Check Tone Arm Pivot Bracket.
- Changer not level.

SQUEAKS OR NOISES DURING PLAYING OF RECORDS.

- Friction between the records on the turntable and the spindle will occasionally cause squeaks. A thin coat of wax applied to the spindle will remedy this condition.
- Check lubrication.

RECORD IS NOT HEARD ALTHOUGH CHANGER OPERATES.

- See that the Band switch is on Phono.
- Check receiver audio by listening to radio.
- Check the phono oscillator tube.
- Check Needle Cartridge.
- Check Tone Arm Housing for broken leads.

RUMBLE AND MICROPHONICS DURING REPRODUCTION.

- Changer not "floated" properly. Remove packing Strip. Loosen mounting bolts.
- Motor leads pulled too tight preventing motor from "floating" freely.

- Noisy phono oscillator tube.
- Impression on Idler Wheel.

NEEDLE FAILS TO CLEAR MAXIMUM LOAD OF RECORDS ON THE TURNTABLE.

- Check Tone Arm height adjustment.

TONE ARM SETS DOWN TOO FAR IN OR OUT ON RECORD.

- Check Tone Arm set-down adjustment.

TONE ARM SET-DOWN VARIES.

- Tone Arm pivots loose.

CHANGER CONTINUES TO CYCLE.

- Check the trip switch adjustment.
- Trip Pawl sticks.

CHANGER WILL NOT CYCLE UPON COMPLETION OF RECORD.

- Be certain that the record has an eccentric center groove.
- Check trip pawl.

RECORD BINDS ON OPPOSITE TURNTABLE.

- If 33 1/3 RPM records rub on 45 RPM turntable, remove 33 1/3 turntable and raise it by placing washers between 33 1/3 RPM mounting and turntable. This will raise the level of the 33 1/3 records so they will clear the 45 RPM turntable.

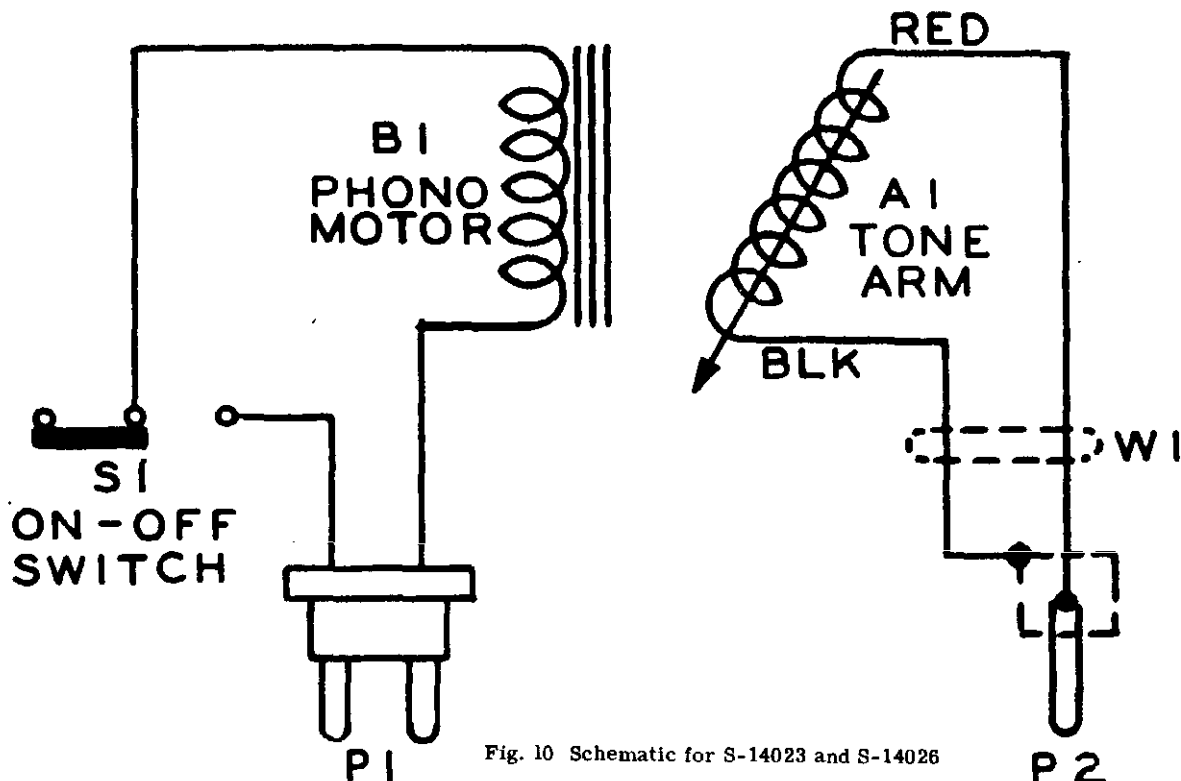


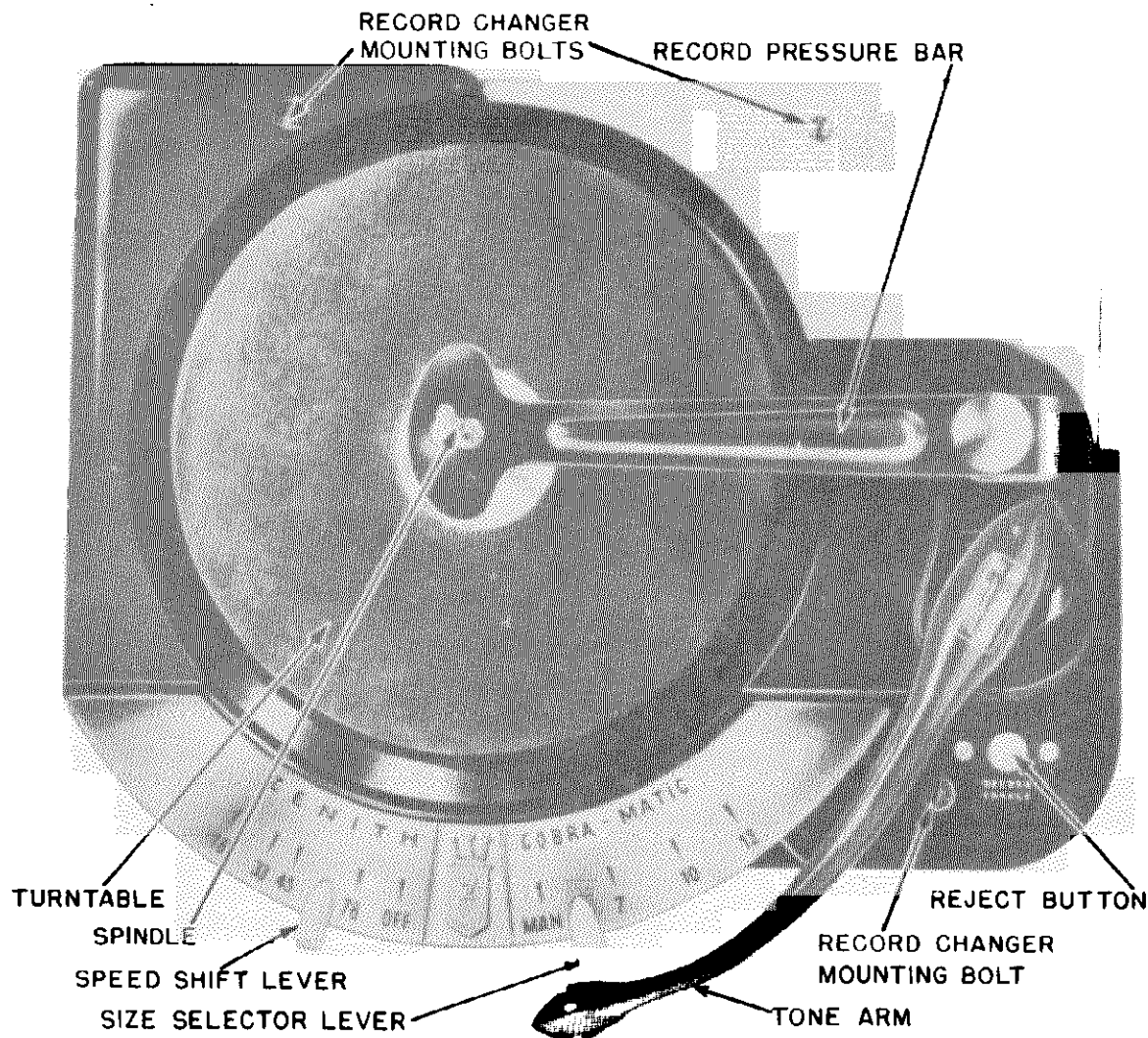
Fig. 10 Schematic for S-14023 and S-14026

MODELS S14023,
S14026

PARTS LIST

DIAG. PART NO. NO.	DESCRIPTION	PART. NO.	DESCRIPTION
1-125-77	Motor Mtg. Grommet (3 used)	12-1659	Tone Arm Brkt.
2- 93-1018	Motor Mtg. Washer (Bakelite) (6 used)	19-123	Record Changer Mtg. Clip
3-199-123	Tone Arm Sleeve	54-62	Hex Nut for 45 RPM Spindle Bushing
4-199-122	Ejector Shaft Sleeve	54-299	4-40x3/16 A.F. x 1/16" thk. Hex Nut Steel-Stat. Br.
5-135-15	Weight	54-300	Hex Nut for 33 1/3 RPM Spindle Sleeve
6-112-778	Adj. Screw (Lift Pin)	56-275	Lift Pin
7- 84-72	Record Support	58-75	Single Contact Plug
8- 84-73	Tone Arm Rest	58-86	Two Prong Plug
9- 80-750	Adj. Spring (Lift Pin)	69-108	#6-32x1/4 R.H.M.S. Brass-Plain (used on S-16069)
10-80-752	Tone Arm Positioning Spring	73-70	8-32x1/2" Allen Hd. Set Screw Cuppoint (used on S-16067)
11-80-753	Idle Wheel Tension Spring	73-112	8-32x1/2 Slab Hd. Set Screw Cuppoint (1 ea. used on S-16070, S-16071, 2 ea. on 76-560)
12-80-754	Reject Lever Return Spring	73-124	6-32x3/8" lg. Slab Hd. Set Screw Conept. (2 used on S-16076)
13-73-121	Special Set Screw	76-560	Spindle Shaft (45 RPM)
14-56-277	Grommet Retaining Pin	80-748	Reject Lever Spring
15-15-93	Spindle Cap (Red)	80-751	Lift Pin Return
16-12-1661	Motor Mtg. Brkt.	93-143	Shakeproof Lock washer for 45 RPM Spindle Bushing
17-S-16080	Lift Lever & Pin Assem.	93-1011	Turntable Retaining Washer (used on S-16065)
18-S-16074	Swivel Brkt. & Shaft Assem.	93-1012	Shakeproof Lock washer for 33 1/3 Spindle Sleeve
19-S-16073	Tone Arm Assem. (Complete less Cart.)	93-1013	Thrust Washer (1 ea. used on S-10665 and S-16104)
20-S-16075	Lift Pin & Plate Assem.	93-1014	Lift Pin Washer
21-S-16076	Throw-Out Cam & Lever Assem.	93-1035	Retaining Washer
22-S-16071	Ejector Lever Link & Bushing Assy.	94-682	45 RPM Spindle Bushing
23-97-357	Adjusting Stud	94-684	33 1/3 RPM Spindle Sleeve
24-S-16070	Ejector Lever & Bushing Assem.	112-573	#2-32x1/4 R.H.S.T. Screw Shakeproof Cad.
25-112-776	Shoulder Screw (2 used on S-16067)	112-777	#4-40x3/4 Oval Phill. H. M.S. Steel Stat. Br. (2 used on 15-93)
26-S-16066	Ejector Shaft & Plate Assem.	112-779	6-32x3/8 Phill. B. H. M. S. Stat. Br. (1 ea. used on 12-1661, 2 ea. used on 199-123)
27-80-749	Record Support Spring	113-21	Hex Head Screw for Mtg. Lower Clutch Assem.
28-57-1555	Record Support (2 used on S-16067)	114-253	6-20x3/8 Hex Hd. Sl. S. T. Screw (1 used on 84-73, 2 used on 84-72)
29-83-1666	Record Separator	125-76	Rubber Grommet
30-76-557	Upper Spindle	148-119	Tone Arm Only
31-S-16069	Ejector Cam & Bushing Assem.	188-128	Retaining Ring (5 used)
32-S-16065	Turntable & Bearing Assem. (33 1/3 RPM)	188-129	Retaining Ring (3 used Motor Mtg.)
33-S-16061	Spindle & Dog Assem. (33 1/3 RPM)	S-16060	Spindle Mtg. Plate Assem.
34-34-196	Clutch Gear	S-16067	Upper Spindle Assem. (45 RPM)
35-S-16063	Clutch Plate Assem. (Upper)	S-16091	Plug & Wire Assem.
36-141-128	Motor 115V 60 Cycles	S-16505	Cable Assembly (S-14026)
37-61-142	Idle Wheel - Slow		
38-S-16058	Motor Mtg. Plate & Lever Assem.		
39-93-678	Fish Paper Washer		
40-76-561	Idle Wheel Shaft (2 Used)		
41-S-16057	Reject Lever & Spring Assem.		
42-93-1015	Thrust Washer (used on S-16074)		
43-S-16064	Clutch Plate Assem. (Lower)		
44-60-21	Pawl		
45-S-16079	Trip Actuator & Stud Assem.		
46-93-1017	Felt Washer (used on S-16079) - - -		
47-117-180	Trip Lever		
48-61-143	Idle Wheel - Fast		
49-S-15222	Cobra Tone Arm Cartridge		
50-12-1658	Cartridge Retaining Brkt.		
51-85-471	Switch		
52-S-16072	Ejector Shaft & Plate Assem.		
53-S-16104	Turntable & Ring Assem. (45 RPM)		
54-102-626	Decal		

MODELS S14028, S14029,
S14030, S14031, S14036



GENERAL DESCRIPTION

The Zenith Models S-14028, S-14029, S-14030, S-14031 and S-14036 Record Changers are designed to play standard 78, 45 and 33 1/3 RPM records of standard commercial dimensions. With few minor exceptions these five changers are alike electrically. The basic changer for S-14029, S-14030 and S-14031 is the S-14028. The addition of cable assemblies for tone arm and AC connections are the determining factors between S-14029, S-14030 and S-14031. The only difference in these cables is lead length and plugs. S-14036 Record Changer is basically identical to S-14028 except it uses a 50-60 cycle motor and is used primarily for the export market. The other difference is the tone arm and AC connecting cables.

Features of these changers include playing and automatically changing as many as ten 12" or ten 10" records. Ten inch and twelve inch records of the same type cannot be intermixed.

A full stack of 7" 33 1/3 RPM, or a full stack of 7" 45 RPM records (with adapter inserted in the records) can also be played on this changer. This changer does not shut off after the last record, however, all that is required to turn the changer off is to move the speed change lever (18) to OFF position.

Connect this changer only to an outlet supplying 117 volt 60 cycle A.C. unless specified otherwise. Power consumption is 25 watts.

MODELS S14028, S14029,
S14030, S14031, S14036

SHIPPING BOLTS

Before placing the changer in operation, the machine must be floated freely on the mounting springs. During shipment, the changer is secured to the changer base pan by means of three mounting bolts. To float the changer, take a wide-blade screw driver and turn down these bolts until they are flush with the record changer base plate. During shipment the motor and motor mounting plate (65) (66) is bolted to the changer base plate. Before the record changer can be operated, motor mounting screw (9) must be removed. As you can see, fastening the motor mounting plate (66) with motor mounting screw (9) to the record changer base plate prevents the motor drive shaft from contacting the rubber surface of drive wheel assembly (36) and prevents a possibility of damage to drive wheel assembly from rough handling during shipment.

LEVELING THE RECORD CHANGER

It is essential to have the record changer absolutely level. Use either a torpedo or similar type level on the record changer base plate. Use adequate shims to level the record changer pan or the combination cabinet to achieve perfect level.

LOADING THE RECORD CHANGER

1. Pull straight up on the record pressure arm knob (12) until the record pressure arm clears the spindle. Swing the record pressure arm to the right until pins in pressure arm shaft (14) drop into locating slot on record pressure arm housing (1).

2. Changer will automatically play ten 12" either standard or Long Play, ten 10" either standard or Long Play or ten 7" Long Play or Fine Groove records

NOTE: Standard, Fine Groove and Long Play records cannot be played in the same stack of records. Speed change lever (18) must be re-set for each type of recording.

3. Place records on spindle and lower them to offset shelf. Level records and replace record pressure arm (14) over spindle and lower this until it rests on the top of the record stack.

To play standard 78 RPM recordings:

1. Motor speed control lever (18) must be set to 78 position. This will set the record changer to proper speed position and cause the turntable to rotate.
2. Set-up lever (17) must be moved to the size records being played.

3. Place the changer in cycle by depressing reject switch knob (73). The changer will play the remaining records automatically. The changer will continue to play the last record until speed change lever (18) is moved to OFF position.

To play 33 1/3 RPM records:

1. Motor speed change lever (18) must be in 33 1/3 position.
2. Set-up lever (17) should then be moved to either 12", 10" or 7" position depending on the size record being played.

To play Fine Groove (45 RPM) records:

1. Speed change lever (18) should be moved to 45 position and set-up lever (17) should be in 7" position. It must be remembered that these records are manufactured with a 1 1/2" spindle hole so it is essential that a record adapter be inserted into each 45 RPM record to be played. This is necessary to reduce the spindle hole to conventional size.

REJECTING

To reject a record anytime, while the changer is operating, depress reject switch button (73) and release. This will automatically cause the record changer to go through cycle and begin playing the next record.

STOPPING

To turn off the record changer all that is required is to move the speed shift lever (18) to OFF position.

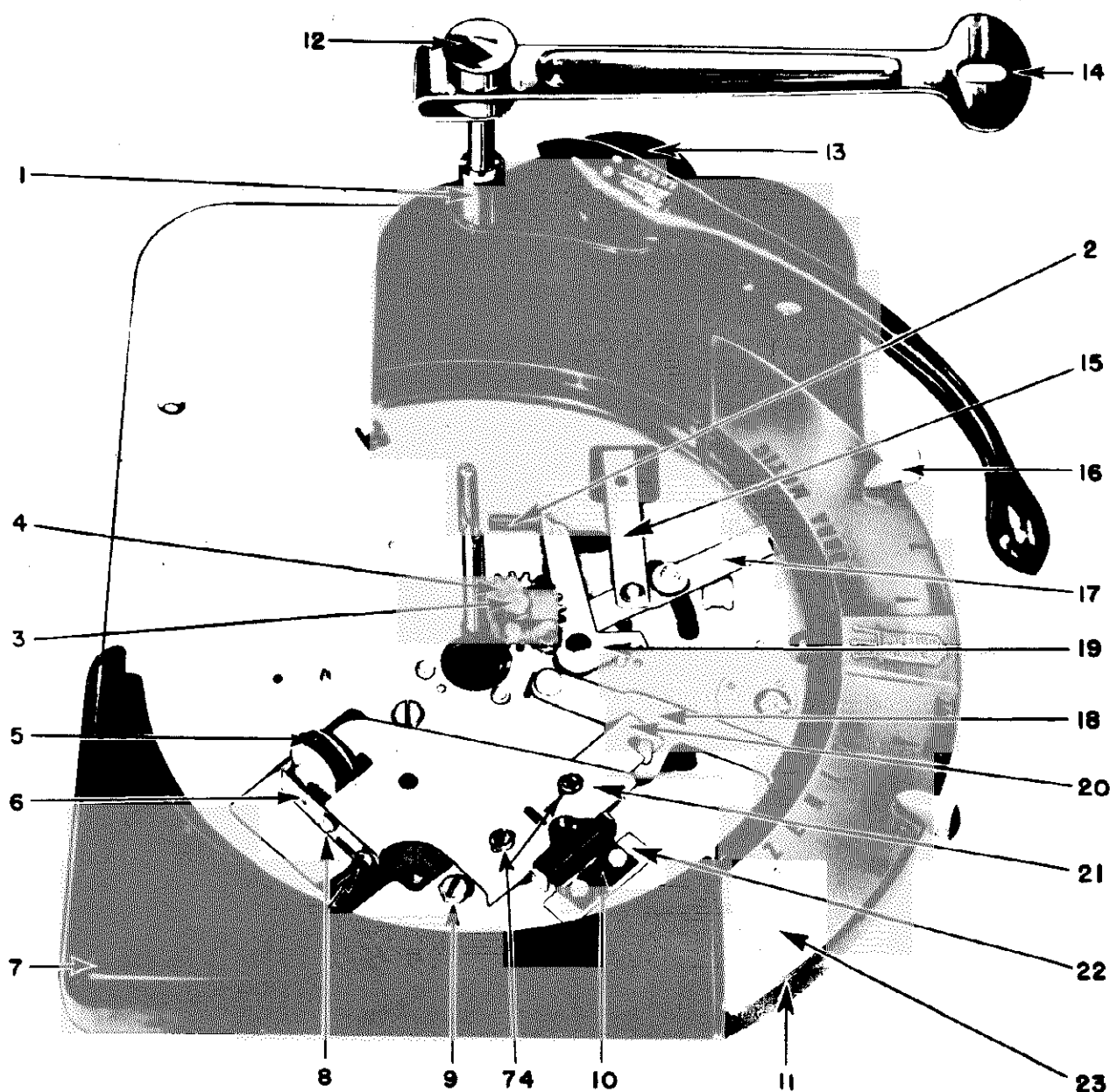
UNLOADING

Lift the record pressure arm (14) and swing it to the right until the pin on the shaft drops into the locating groove on record pressure arm shaft housing (1). Lift stack of records straight up on spindle.

MANUAL OPERATION

To play single records or home recordings, lift up the record pressure arm and turn it to the right. Place record on spindle and lower to the spindle shelf. Gently push record towards record pressure arm shaft and lower to turntable. Move speed change lever (18) to proper speed for type of record being played and move set-up lever (17) to manual position. Pick up tone arm and place the needle on the lead-in groove of the record.

MODELS S14028, S14029,
S14030, S14031, S14036



Record Changer Top View with Turntable Removed

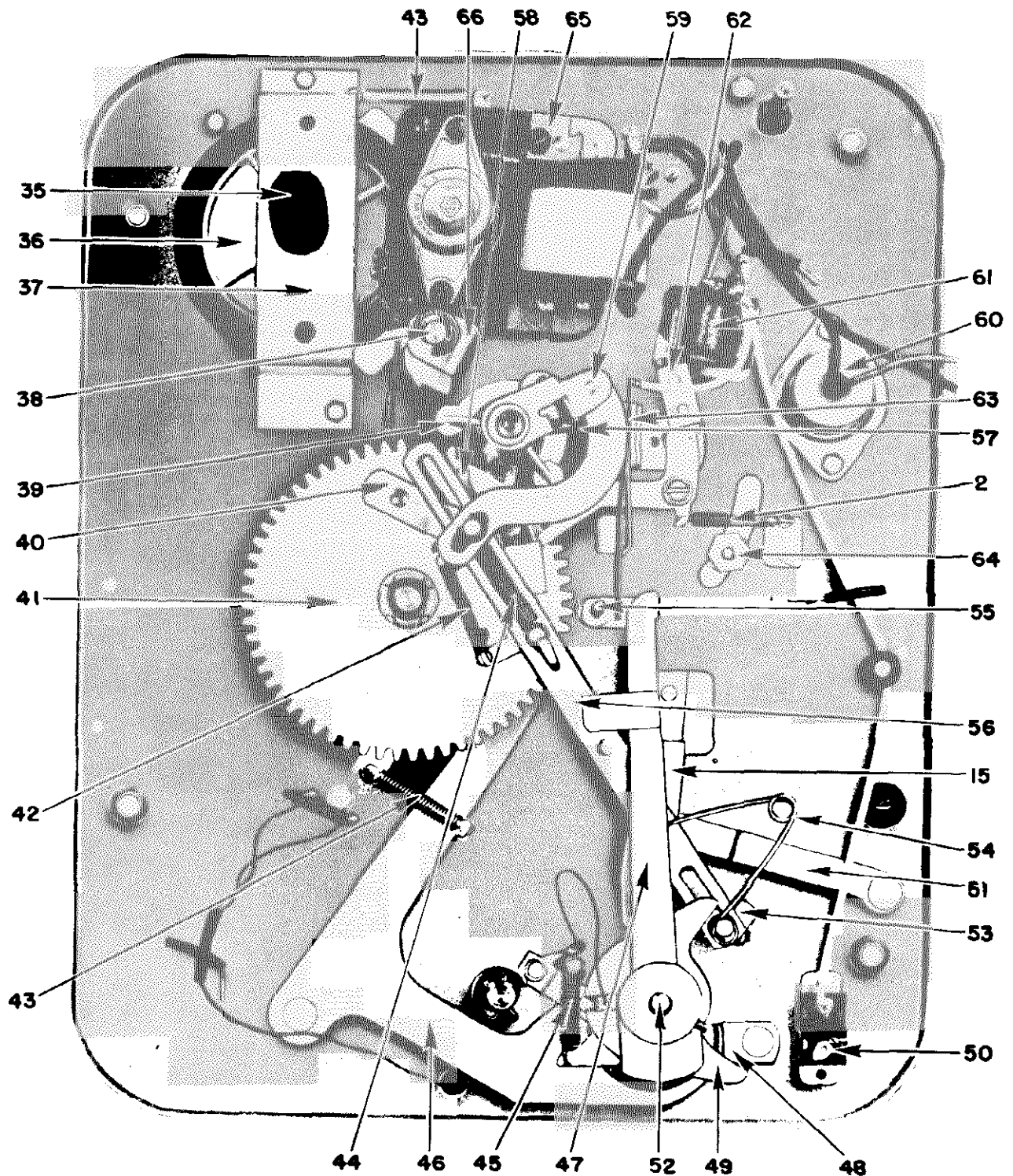
CAUTION

When changing needles be certain that only a Red-Green cartridge is used, S-15780. This will accommodate 78, 45 and 33 1/3 RPM records.

DESCRIPTION OF CYCLING

The motor shaft contacts drive wheel assembly (36) and causes it to rotate by friction contact with its rubber surface. Drive wheel assembly (36) drives idler wheel (5). The underside of the turntable is in contact with idler wheel (5) and is driven in this manner. Speed of the turntable is controlled by changing the position of the idler wheel (5) on drive wheel (36). When idler wheel is moved to the center of drive wheel (36) it will rotate more slowly than

when moved to the outer edge of this drive wheel (36). In this manner the turntable can be driven at any speed from 10 to 85 RPM. Minor adjustments for proper tonal pitch can be made by simply moving speed change lever (18) back and forth to compensate for turntable speed which may vary due to line voltage changes. When reject button (73) is depressed it energizes solenoid (61) which then attracts trip pawl assembly (62). The same thing occurs when the forward movement of the tone arm causes friction lever and weight assembly (47) to contact the copper bronze contact on trip switch assembly (63). When gear segment (58) is released, gear pawl spring (42) causes the gear segment (58) to engage the rotating pinion gear (25) under the turntable thus causing clutch assembly (41) to rotate.

MODELS S14028, S14029,
S14030, S14031, S14036

Record Changer Bottom View

As clutch assembly (41) rotates, tone arm lift lever (46) swings in such a manner that it contacts tone arm lift pin and raises the tone arm. Simultaneously, tone arm link and stud assembly (56) slides towards, and contacts one finger of tone arm lever assembly (49) forcing the tone arm towards the outer edge of the turntable and then on its return swing contacts the

other finger of tone arm lever assembly (49) swinging the tone arm back over the records. The position to which it swings the tone arm over the records is determined by the position of record size discriminator (51). There are three steps on the record size discriminator (51) which determines set-down position for 7", 10" and 12" records. The tone arm lift lever

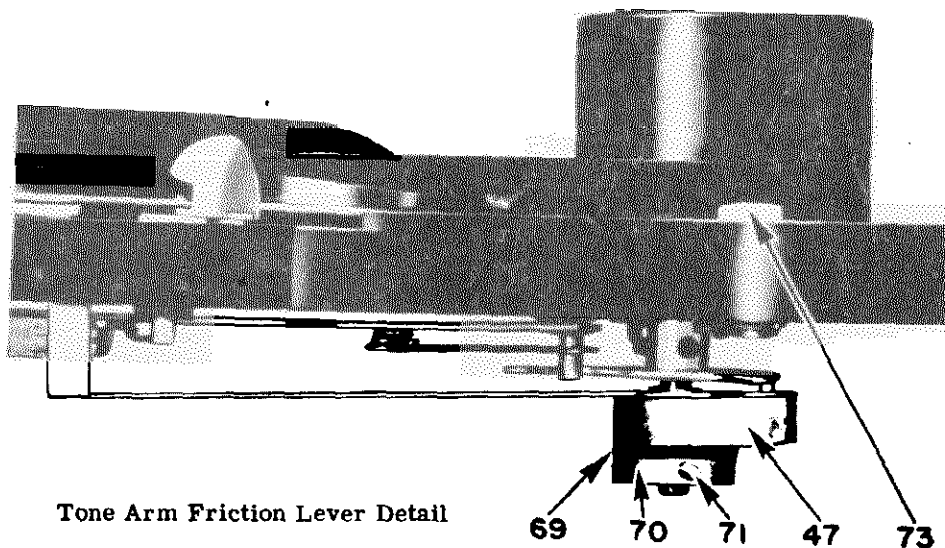
MODELS S14028, S14029,
S14030, S14031, S14036

(46) returns and releases brake lever assembly (48) which keeps the tone arm from moving erratically during cycle. Simultaneously, ejector lever and link assembly (59) rotates and this in turn causes spindle shaft (30) to rotate and ejector cam (29) to push the record off the spindle shelf. Operation of the tone arm set-down adjustment can be observed by raising the tone arm so the adjustment mechanism can be viewed.

VELOCITY TRIP

This changer is provided with what is commonly known as a velocity trip rather than a ratchet and positive trip mechanism. A velocity trip depends for the tripping action on the rate of forward motion of the pickup arm with respect to the turntable rotation. The changer will trip only when the tone arm advances more in one revolution of the turntable than the distance between normal grooves in a record. Only records having fast finishing grooves will operate the velocity trip. During the normal playing cycle, friction lever and weight assembly (47) continually moves forward toward the copper bronze contact on trip switch assembly (63).

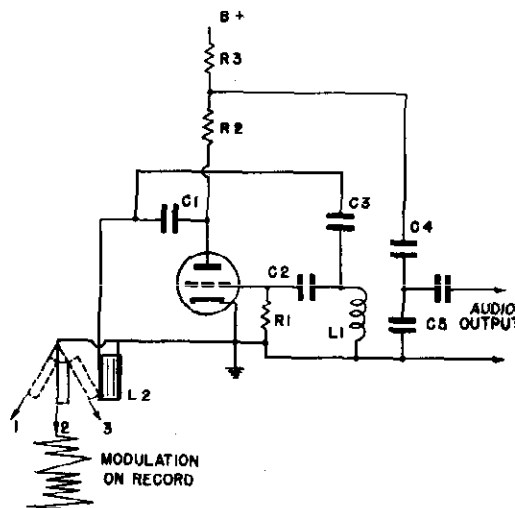
On normal forward advance, the friction lever and weight assembly (47) is kept from contacting the copper bronze contact by a wiping action from oscillating lever stud assembly (55). The oscillation of oscillating lever and stud assembly is produced by eccentric motion of oscillating gear (4) which is driven by the pinion gear (25) on the lower portion of the turntable. Oscillating gear (4) is mounted off-center so it will describe an eccentric action as it is being driven by the turntable gear. The tone arm moves in towards the center of the record and the repeated action of oscillating lever (55) keeps friction lever and weight assembly (47) from coming in contact with the copper bronze strip on trip switch assembly (63) as the pickup arm moves slowly towards the spindle and lead-in grooves. During the first revolution of the turntable, in the eccentric cycling grooves, the pickup arm advances rapidly and friction lever and weight assembly (47) is moved forward fast enough so that oscillating lever (55) does not halt its progress, therefore, friction lever and weight assembly (47) contacts the copper bronze trip contact on trip switch assembly (63) grounding it and making a complete circuit. This actuates solenoid (61) causing the changer to cycle.



Tone Arm Friction Lever Detail

THEORY OF THE COBRA RADIONIC PICKUP

The operation of the Cobra pickup is considerably different from Crystal and Dynamic pickups. These pickups generate audio power, while the Cobra controls power generated by a radio frequency oscillator, detector and audio amplifier. The oscillator operates at a frequency of 2.5 Mc. Modulation is accomplished by changing the energy losses in a tuned circuit. These losses may be represented by an equivalent resistance in series with the reactance of the coil. The ratio of the resistance to the reactance determines the efficiency or Q of the coil. The amplitude of the RF voltage developed across this coil by an oscillator will vary with changes in Q.



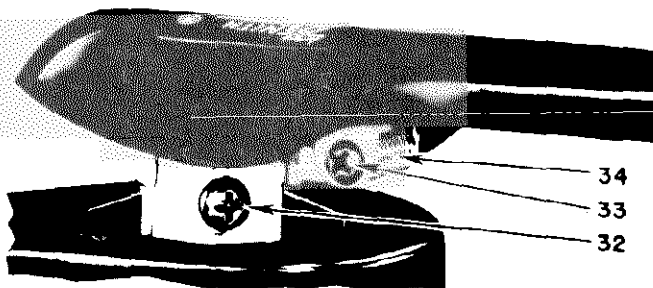
Simplified Circuit of Oscillator

MODELS S14028, S14029,
S14030, S14031, S14036

The grid coil L1 and other components of the oscillator are mounted in the oscillator pre-amp chassis, while the plate coil L2 is in the needle cartridge with vane and needle assembly. The coil is fixed and has 40 turns of No. 40 wire (approximate DC resistance 2 1/2 ohms). The stainless steel vane, which is in the field of the coil, is spot welded to the osmium-iridium tipped stylus.

Any movement of the stylus will cause a corresponding movement of the vane. As the stylus and vane follow the modulations in the record, changes in the mutual inductance between the vane and coil occur. In position 2 the vane is at rest, and a constant RF voltage appears across the plate coil. As the vane is set in motion and reaches position 1, it is at its greatest outward swing from the coil, resulting in low mutual inductance, low reflected resistance, higher Q, and a higher RF voltage across the coil. In position 3 it is at its greatest inward swing, resulting in a high mutual inductance, high reflected resistance, lower Q and a lower RF voltage. It can be seen that the amplitude of the RF voltage which appears across the coil will vary with changes in Q, satisfying the condition for amplitude modulation. The position of the vane changes both the Q and L of the coil. Changes in L shift the frequency slightly, and a certain amount of frequency modulation is present, but since there is no frequency discrimination it remains undetected. Since the grid and plate coils are part of a single tuned circuit, any variations of amplitude of the RF voltage brought about by the changes in Q across the plate coil will also appear across the grid of coil L1, causing a shift in the average plate current through the plate load resistor across which the audio output voltage is developed. Plate bend detection takes place since only the positive half of the grid swing causes an increase in the average plate current. These changes in the average plate current appear as audio voltage across the plate load resistor.

The 2.5 Mc RF voltage and the audio voltage both appear at the plate (pin 6) of the oscillator triode. R2, C4 and C5 filter out the RF voltage allowing only the audio component to the grid (pin 4) of the amplifier triode where it is amplified, fed through a shielded lead to the audio amplifier of the receiver and reproduced by the loud speaker.



Tone Arm Set-Down & Height Adjustments

SET DOWN ADJUSTMENT

When adjusting the tone arm for proper set-down on the edge of the record, move set-up change lever to 7" position, place a 7" record on the turntable, turn the record changer through cycle by rotating the turntable by hand. Watch closely where the needle point of the Cobra cartridge lands on the record and adjust tone arm set-down adjustment screw (33) until proper landing position is obtained.

TONE ARM HEIGHT ADJUSTMENT

The tone arm height adjustment determines vertical rise of the tone arm. If the tone arm does not rise sufficiently it will not play a full stack of twelve records. On the other hand, if the tone arm raises too high it may hit the records resting on the record shelf. Set the tone arm height adjustment screw (32) so that the needle clears twelve unwarped records on the turntable. The tone arm housing must not hit the under side of the records on the record shelf when the changer is cycled after adjustment.

SLAB HEAD SCREWS

For maximum rigidity many components are locked into position with slab head screws. This type set screw provides a more positive grip. The slab head set screw wrench is available as part number 68-8.

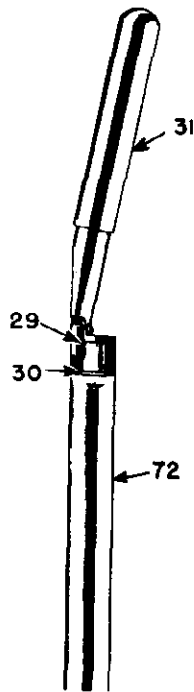
SPEED INDICATOR ADJUSTMENT

It is possible that the speed of the record changer may not conform to the speed stop on escutcheon (23). Proper adjustments can be made in the following manner. Put a stroboscopic disc on the turntable, adjust speed change lever (18) until the turntable is turning at exactly 78 RPM. Stop the record changer by pulling the AC plug, remove the turntable, loosen the two adjusting screws (74) and move speed change lever (18) so that the point on the control knob indexes exactly at the 78 mark on the escutcheon (23). Then re-tighten adjusting screws (74) and replace the turntable. The turntable should now rotate at exactly 78 RPM, however, as a precaution, again check with the stroboscopic disc.

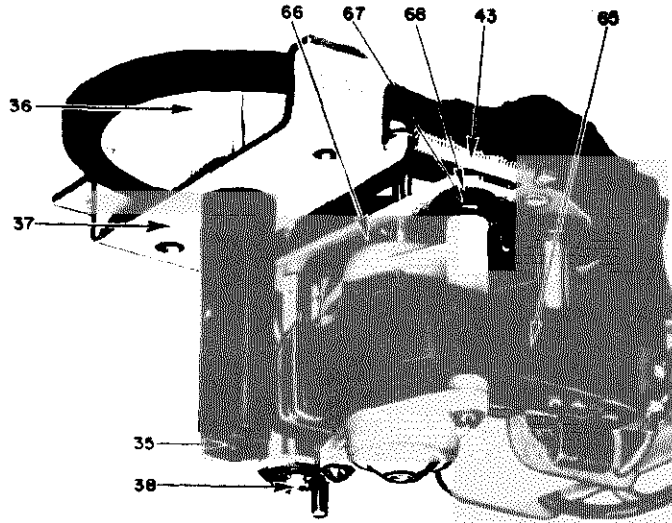
SPINDLE

The spindle on this record changer is composed of five separate parts. Spindle shaft (30) and ejector cam (29) are pressure-fit together and if either breaks, they cannot be replaced since the assembly operation is a machine operation. The spindle housing is composed of two separate portions which once again are pressure-fit together and require a machine operation for assembly. It is possible that spindle cap (31) may be pulled off spindle assembly (72) and if this does occur, it can easily be replaced by sliding a new spindle cap down over the spindle and then pressing in on the detent portion, which acts as a stop to keep the spindle cap from sliding off spindle (72). If breakage occurs other than loss of the spindle cap (31), the entire spindle assembly (72) must be replaced.

MODELS S14028, S14029,
S14030, S14031, S14036



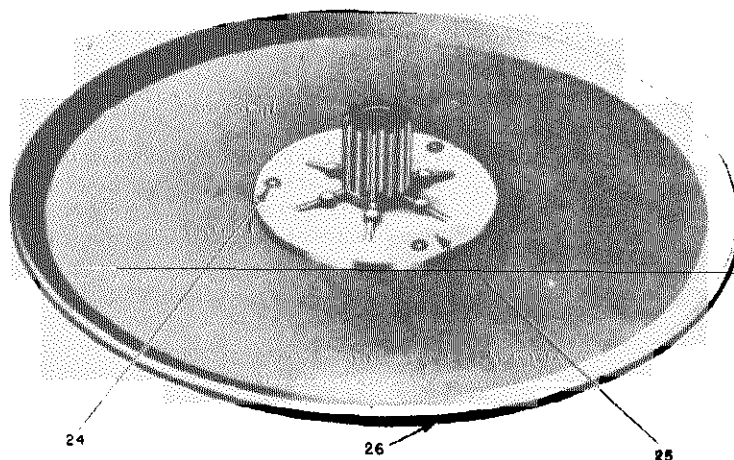
Spindle S-17424



MOTOR AND MOUNTING MECHANISM

The motor (65) is shock mounted by the means of rubber grommets (68) and fibre washers (67) to mounting plate and stud assembly (66). The entire motor (65) and motor mounting plate (66) revolve about motor mounting stud (38). The point at which motor mounting stud (38) passes through motor mounting plate should be well lubricated to allow free action of the motor. The motor drive shaft is kept in contact and in constant pressure with drive wheel assembly (36) by the means of motor tension spring (43). This insures the proper friction con-

tact between the motor drive shaft and drive wheel (36). The drive wheel (36) is firmly mounted in drive wheel bracket and bearing assembly and is pivoted on bearings at two points eliminating possible lateral motion. This reduces the possibility of WOWS. When the record changer is in shipment, the entire motor and bracket assembly (66) (65) is fastened to a second point by motor mounting screw (9). This eliminates the possibility of indentations forming in drive wheel (36) as a result of constant pressure and pounding of the motor drive shaft during shipment.



TURNTABLE

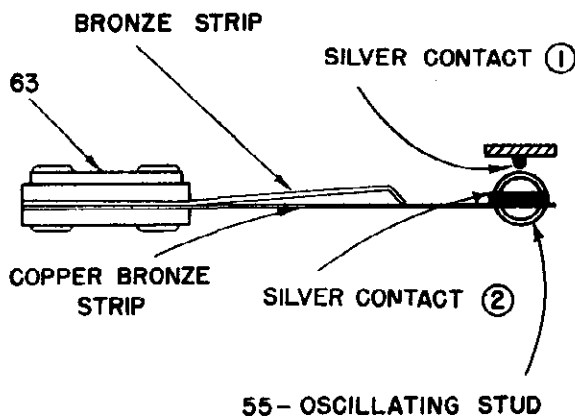
MODELS S14028, S14029,
S14030, S14031, S14036

There is little possibility of any damage occurring to the turntable through normal usage. However, it is possible the turntable may be removed and dropped, thus damaging pinion and bearing assembly (25) so that it would have to be replaced. Replacement is quite simple. All that is required is to drill out the three rivets (24) on pinion bearing (25). When removing the rivets from the turntable plate or disc, be certain not to excessively disturb the flocking. Then obtain three new rivets (24) and re-rivet pinion bearing assembly (25). If the flocking is scraped or damaged or discolored it can be replaced by spraying the scraped portion with clear lacquer. Dip the entire turntable disc into a box of flocking, then brush off the excess.

TRIP CONTACT ASSEMBLY

For proper automatic rejecting, silver contact #2 on trip switch assembly (63) should be in proper relation to silver contact #1 on friction lever (47). The adjustment should be made with the record changer resting on the side nearest to the idler wheel and trip assembly (36). The turntable should be rotated sufficiently to move oscillating lever stud (55) to its maximum upward travel. The distance between the silver contact #1 on the friction lever (47) and silver contact #2 on trip switch (63) should be $1/16"$. If the distance is greater or less than $1/16"$, the support for the copper bronze strip on trip switch assembly (63) should be bent until this $1/16"$ gap is attained.

SUPPORT FOR COPPER



Trip Contact Adjustment LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use or high operating temperatures the changer should be lubricated as follows:

All shoulder rivets which hold moving parts, all stud shoulder mounting points on which moving parts operate and all C washers should be lubricated with a few drops of fine instrument oil.

The other moving surfaces should be coated either with Sta-Put Grease or Sta-Put Oil as indicated in the following two illustrations. The purpose of using the extremely fine instrument oil is its ability to penetrate into the moving metal parts. These saturated materials then act similarly to self-lubricated oilite bearings.

TROUBLE SHOOTING

NEEDLE DOES NOT TRACK ACROSS RECORD PROPERLY

- Clean foreign material from around needle.
- Check needle to see if the tip is bent or broken. Replace needle.
- Hinge bearing binds. Check lateral movement of tone arm. It must move freely without binding.
- Excessive vibration while playing an LP record. Any vibration cause by (1) unsteady mounting, (2) floor vibration, or (3) passing of heavy vehicles may cause the pickup to glide across the record grooves.

MECHANISM STARTS SLOWLY AND MOTOR GETS HOT

- Check line voltage and frequency.
- Check lubrication.
- Motor windings damaged.
- Room temperature abnormally low.

MOTOR FAILS TO RUN EVEN WHEN IT IS DISCONNECTED FROM CHANGER AND PROPER VOLTAGE AND FREQUENCY APPLIED DIRECTLY TO THE TWO INPUT LEADS OF THE WINDING

- Open windings.
- Damaged or frozen bearings.
- Lower rear support bracket bent. Remove and straighten bracket--re-center armature.

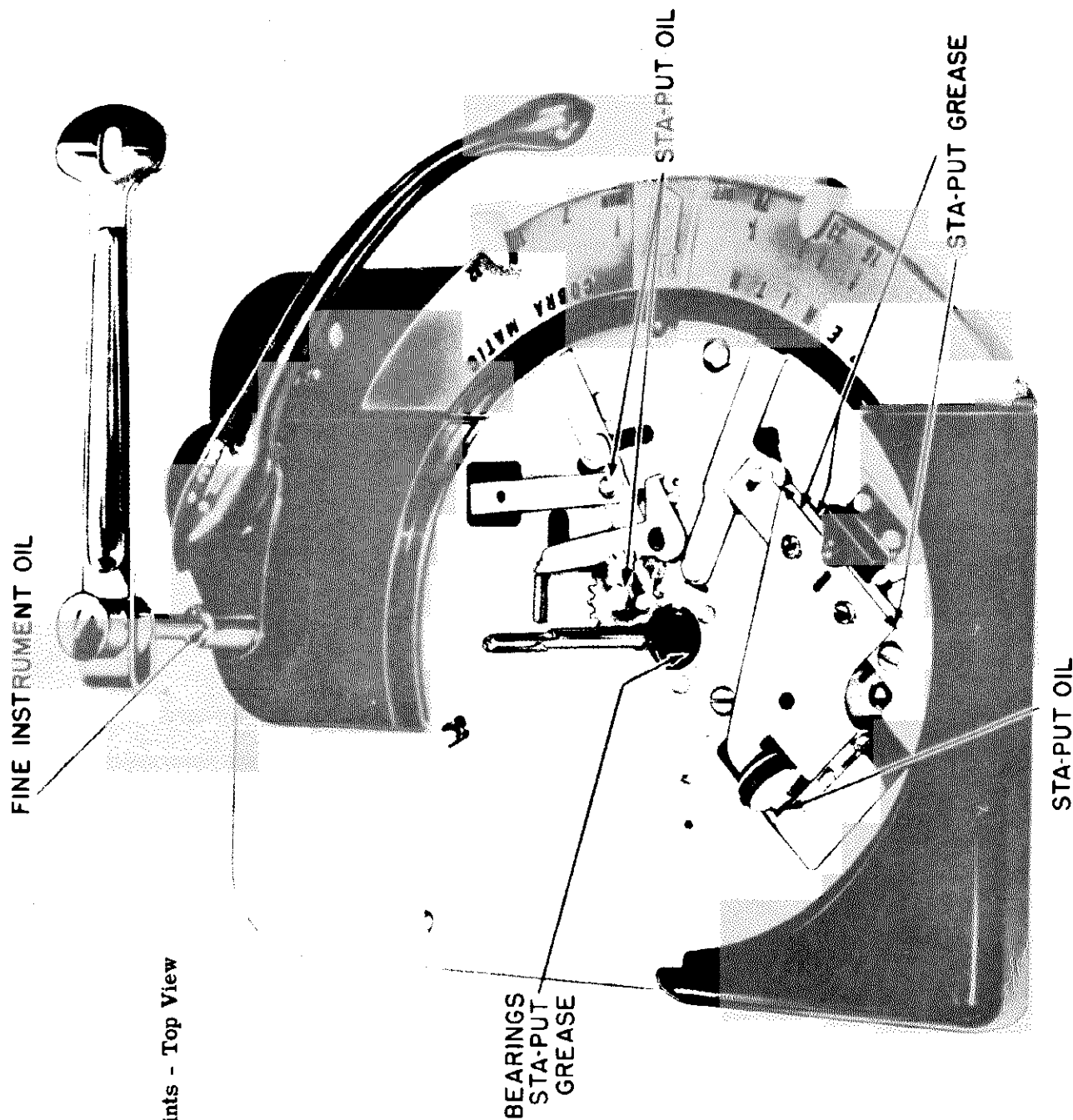
NEEDLE SETS DOWN PROPERLY ON RECORD BUT SLIDES OVER THE RECORD GROOVES

- Cabinet tilted.
- Badly worn or broken needle cartridge.

TONE ARM FALLS OFF RECORD

- Check tone arm set-down adjustment.
- Check tone arm pivot bracket.
- Changer not level.

MODELS S14028, S14029,
S14030, S14031, S14036



Lubrication Points - Top View

Lubrication Points - Bottom View

COVER SLIDING SURFACES
WITH STA-PUT GREASE

STA-PUT
GREASE
ON BRAKE
SURFACE

STA-PUT
GREASE
BETWEEN
LIFT LEVER &
LIFT BRACKET.

COVER SLIDING SURFACES
WITH STA-PUT GREASE

STA-PUT GREASE ON
ARM BETWEEN GEAR

MODELS S14028, S14029,
S14030, S14031, S14036

MODELS S14028, S14029,
S14030, S14031, S14036

SQUEAKS OR NOISES DURING PLAYING OF RECORDS

- a. Friction between the records on the turntable and the spindle will occasionally cause squeaks. A thin coat of wax applied to the spindle will remedy this condition.
- b. Check lubrication.

RECORD IS NOT HEARD ALTHOUGH CHANGER OPERATES

- a. See that the receiver is set for Phono.
- b. Check receiver audio by listening to radio.
- c. Check the phono oscillator tube.
- d. Check needle cartridge.
- e. Check tone arm housing for broken leads.

RUMBLE, WOW AND MICROPHONICS DURING REPRODUCTION

- a. Changer not "floated" properly. Remove packing strip. Loosen mounting bolts.
- b. Motor leads pulled too tight preventing motor from "floating" freely.
- c. Noisy phono oscillator tube.
- d. Impression on idler wheel.
- e. Check rubber motor shock mounts.
- f. Check the motor drive shaft and be certain the plane of the shaft's diameter is parallel to the rubber surface of drive wheel assembly (36).

NEEDLE FAILS TO CLEAR MAXIMUM LOAD OF RECORDS ON THE TURNTABLE

- a. Check tone arm height adjustment.

tone arm sets down too far in or out on record

- a. Check tone arm set-down adjustment.

tone arm set down varies

- a. Tone arm pivots loose.

CHANGER CONTINUES TO CYCLE

- a. Check the trip switch adjustment.
- b. Trip pawl sticks.

CHANGER WILL NOT CYCLE UPON COMPLETION OF RECORD

- a. Be certain that the record has an eccentric center groove.
- b. Check velocity trip mechanism.

CHATTER OF TRIP PAWL ASSEMBLY

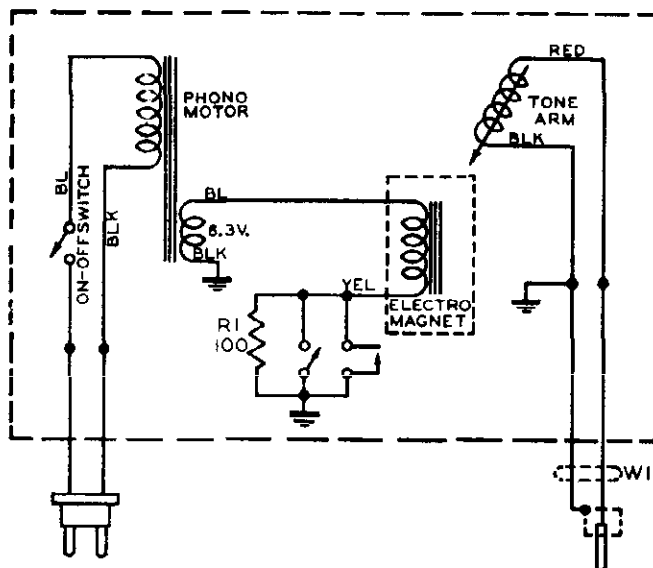
- a. Remove mounting bolt which fastens trip pawl assembly (82) to shoulder stud. Then load shoulder stud with Sta-Put Grease and replace and fasten trip pawl assembly.

ELECTRICAL NOISE WHEN TONE ARM IS MOVED

- a. Check ground wire from metal tone arm stiffener to ground terminal used to terminate ground wire from the Cobra Cartridge.
- b. Stud on oscillating lever and stud assembly (55) should be covered with vinylite tubing to prevent contact with friction lever and weight assembly (47).
- c. Friction lever (47) at its most outward swing may contact wire guide stud on changer base plate. Cover this stud with vinylite tubing.

FRICITION LEVER (47) FAILS TO MOVE WITH TONE ARM

- a. Check felt washer (69) for proper friction surface. If worn, replace.



Wiring Diagram

PARTS LIST for

MODELS S14028, S14029,
S14030, S14031, S14036S-14028, S-14029, S-14030, S-14031 and S-14036
Variable Speed Record Changers

Diag. Parts		Tone Arm Assembly		Diag. Parts		Description
No.	No.	Description		No.	No.	
					57-1650	Switch Mtg. Plate
				23	57-1654	Escutcheon
33	12-1658	Cartridge Retaining Brkt.		58	60-16	Gear Segment Pawl
	69-261	Tone Arm Set-Down Adj. Screw			63-1744	100 ohm 1/2W Ins. Res 20%
34	80-609	Landing Adj. Spring		24	64-3	Rivet 1/8 dia.x9/32 lg Tubular (3 used on Turntable)
	83-1636	Contact Support Strip			64-6	Rivet 1/8 dia.x3/16 lg. Tubular (used on S-16912)
	91-1225	Red-Black Tone Arm Wire			64-430	Shoulder Rivet (8 used)
	112-573	#2-32x1/4 R. H. S.T. (Cartridge Ret. Brkt. Mtg. Screw)	3		64-431	Shoulder Rivet (used on S-16918)
	112-619	#2-32x5/16 R.H.S.T. (3 used to Mt. Hinge Plate)			69-43	8-32x3/8 R.H.M.S. Steel (Mts. S-13913)
	127-68	Cartridge Contacts			69-262	8-32x1/2" Phill. R.H.M.S. Steel St. Br. (Tone Arm Height Adj.)
	127-69	Cartridge Contacts	32		73-99	8-32x1/4" Slab Hd. Set Screw (2 used on S-16908)
	148-125	Cobra Tone Arm Only			73-112	8-32x1/2" Slab Hd. Set Screw (used on 94-723)
	S-15780	Red-Green Cobra Cartridge		71	73-121	Special Set Screw (Tone Arm & Lift Pin)
	S-16905	Tone Arm Assem. (Complete) (Less Cartridge)			73-123	8-32x1/4" Allen Hd. Set Screw (used with 46-865)
	S-16986	Hinge Plate & Brkt. Assem.			73-131	6-32x3/8" Slab Hd Set Screw (used on S-16917)
		Miscellaneous			80-582	Trip Lever Spring (2 used)
	6-59	Spindle Bearing		2	80-613	Tone Arm Lift Lever & Motor Tension Spring (2 used)
	6-61	Compression Spring Bearing		43	80-645	Tone Arm Height Adj. Spring
	6-64	Tone Arm Bearing		42	80-698	Gear Segment Pawl Spring
22	12-1742	Guide Brkt. (Idler Wheel)			80-807	Spindle Compression Spring (used on S-16913)
31	15-81	Cap (Spindle)		10	80-808	Idler Brkt. Retaining Spring
	23-22	A.C. Connector (used on S-14028-30-31)		45	80-809	Brake Spring
60	24-550	Switch Lead Cover		6	80-810	Idler Wheel Spring
4	34-172	Osc. Gear (Part of S-16918)			80-811	Tone Arm Swivel Spring
13	43-187	Record Post Housing		44	80-812	Tone Arm Link Spring
11	43-188	Front Housing		54	80-813	Tone Arm Toggle Spring
7	43-189	Decorative Housing		57	80-814	Ejector Lever Spring
12	46-865	Record Shaft Knob (Gold)			80-816	Compression Spring (used with S-16922)
73	46-866	Reject Switch Knob			83-1574	Two Lug Terminal Strip
16	46-867	Speed & Record Size Control Knobs (2 Used)			85-482	ON-OFF Switch
	54-280	4-40x3/16x1 1/16" Hex Nut Steel N.P. (used on Lift Pin Assem.)		50	85-483	Reject Switch
	54-282	Spring Nut (used on Lift Pin Assem.)			93-53	1/32x11/64x3/8 Steel Washer (used on S-15505)
	56-284	Groove Pin 1/16" dia. (used on S-16913)(or 56-287)			93-416	1/32 thk.x13/64 I.D. x 5/8O.D. (used on Motor Mtg.)
	56-285	Groove Pin 3/32" dia.x3/8" lg. (used on S-16927)			93-781	#8 Split Lockwasher Steel N.P. (used on S-13913)
	57-1613	Emblem Plate				
20	57-1649	Speed Adj. Plate				

MODELS S14028, S14029,
S14030, S14031, S14036

Diag. No.	Parts No.	Description	Diag. No.	Parts No.	Description
	93-784	Spring Washer (used on 94-722)		188-140	pressure arm & shaft Assy.)
	93-876	Fibre Washer (used on S-13913)	1	199-134	Retaining Ring (used on Clutch Gear Assem.)
67	93-900	Fibre Washer (3 used on Motor Mtg.)	61	S-13913	Record Pressure Arm Shaft Sleeve
	93-903	Steel Washer (3 used on motor Mtg.)	62	S-15505	Magnet Coil Assem.
	93-968	.046 thk x .171 I.D. x 1/2" O.D. Steel Washer (used on 94-722)	51	S-16900	Trip Pawl Assem.
69	93-1055	Felt Washer (used on S-16910)	18	S-16901	Discriminator Lever & Stud Assem.
	93-1056	Felt Washer (used on Idler Wheel)	17	S-16902	Speed Change Lever & Stud Assem.
	93-1070	Bearing Washer (2 used on 6-59)	53	S-16903	Set-Up Change Lever & Stud Assem.
	93-1071	Bearing Washer (2 used on 6-64)		S-16904	Actuating Lever & Pin Assem.
64	94-722	Friction Bushing	52	S-16907	Tone Arm Brkt. & Lift Pin Assem.
70	94-723	Friction Lever Retaining Bushing (used on S-16910)	49	S-16908	Tone Arm Shaft Assem.
38	97-391	Motor Mtg. Stud	47	S-16910	Tone Arm Lever & Bushing Assem.
55	97-393	Osc. Lever Stud	40	S-16911	Friction Lever & Weight Assem.
	112-544	Record Changer Mtg. Screw	41	S-16912	Brkt. & Stud Assem. (used on S-16912)
35	112-804	Compression Spring Retaining Screw (used on S-16922)	39	S-16913	Clutch Gear Assem.
	112-805	4-40x1/2" Truss Hd. W. S. Steel Stat Br. (2 used to Mt. 85-483)	59	S-16917	Gear Housing & Sleeve Assy.
	112-806	#4x3/8" Binding Hd S.T. Screw (1 used on ea. 46-867)	19	S-16918	Ejector Lever & Link Assy.
	113-9	8-32x1/4 Hex Hd Sl. M.S. (1 ea. used on S-15505 & 94-722)	21	S-16919	Osc. Gear & Lever Assem.
8	114-217	#8x1/4" Hex Hd. Sl. S.T. (7 used)	5	S-16921	Idler Wheel Brkt. & Shaft Assy
	114-248	6-20x5/16" Hex Hd. Sl. S. T. (2 used 43-187 & 189 - 3 Used 43-188)	36	S-16922	Idler Wheel Assem.
	114-297	#6x1/4" Hex Hd. Sl. S. T. Screw (2 used 85-482 & 1 used on 83-1574)	37	S-16923	Drive Wheel Assem.
9	114-345	10-32x3/8" Hex Hd. Sl. M.S. Steel (used on Motor Mtg.)	66	S-16924	Drive Wheel Brkt. & Bearing Assem.
74	114-347	#8-32x3/8 Hex Hd. (2 used on S-16919)	14	S-16927	Motor Mtg. Plate & Stud Assy.
	114-348	8-32x5/16 Hex Hd. S. T. (3 used on S-16913 & 2 used 199-134)	25	S-16929	Pressure Arm & Shaft Assy.
	114-357	#10-32x3/8 Hex Hd. Sl. M. S. Red Finish (used on Motor Mtg. in Shipping)			Turntable Pinion & Bearing Assem.
46	117-145	Tone Arm Lift Lever	26	S-16930	Turntable Assem. (Complete)
15	118-58	Set Up Link	63	S-16933	Trip Switch Assem.
68	125-61	Rubber Grommet (3 used on --- Motor Mtg.)	48	S-17166	Brake Lever Assem.
	135-16	Tone Arm Lift Pin Weight	56	S-17391	Tone Arm Link & Stud Assy.
65	141-129	Motor	72	S-17424	S-14029 Plug & Shielded Lead Assy. (Plug 58-75) Plug & Wire Assy. (Plug 58-192)
65	141-131	Motor 50-60 cycle export			S-14030 Cable & Plug Assy. (Plug 58-166), S-14031
	184-14	1/8" dia. Steel Ball			S-16940 Twisted Wire & Plug Assy. (Plug 58-75)
	188-128	Retaining Ring (9 used)			S-16988 Plug & Wire Assy. (Plug 58-192) S-14036
	188-131	Retaining Ring (used on Motor Mtg.)			S-17028 Plug & Shielded Lead (Plug 58-75)
	188-137	Retaining Ring (used on			S-17029 Plug & Wire Assem. (Plug 58-192) A-C Connector

MODEL C710,
Ch. 133**SPECIFICATIONS**

The Hoffman Model C710 DraweRECORDER is a drawer-mounted disc recorder unit comprising a recording table and cutting arm for 78 rpm inside-out disc recording up to 10" diameter, and a self-contained amplifier and microphone preamplifier. The unit is normally used as a recorder only, and as such is installed in the record storage compartment of Hoffman radio-phonograph combinations. However, it may also be modified for use as a self-contained recorder and playback unit by the addition of a speaker and playback arm. (See Service Data No. 30, Chassis 133.)

APPLICATION

The Hoffman Model C710 DraweRECORDER may be installed in the following Hoffman receivers produced prior to the issuance of this data:

C506	C510	D522	900	912
C507	C515	D524	901	913
C509	C516	C530	902	C1006

In ordering Model C710, be sure to specify the model number of the set in which it is to be installed.

METHOD OF INSTALLATION

1. If the receiver cabinet has 13/16" side panels or 3/8" side panels with a cleat on the inside of the record compartment, locate and drill the mounting holes for the DraweRECORDER shelf per the instructions on the template furnished with the shelf.
2. If the receiver cabinet has 3/8" thick side panels with no cleat in the record compartment, it will be necessary to provide additional support for the outer end of the shelf. Glue a 1/2" thick by 3" wide by approximately 12" long wood cleat on the inside cabinet side panel of the record compartment, centering it at the hole location given on the template.
3. Locate and drill holes in the center partition of the receiver cabinet per the instructions on the template.
4. Mount the shelf using the wood screws at the outer end and the machine screws at the center through the partition.
5. Install the DraweRECORDER and adjust the slides as necessary for free operation.

ELECTRICAL AND MECHANICAL DATA**AMPLIFIER**

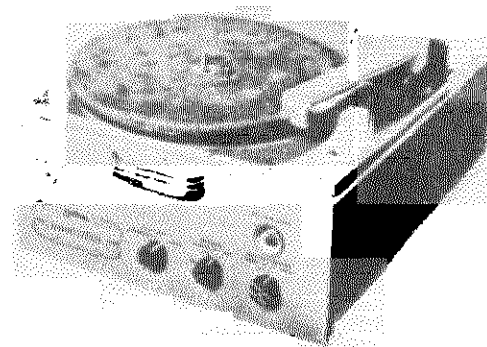
Average required input levels (0 db = 6 MW across 500 ohms):

Microphone jack	-49 db
Radio-phonograph cable	+ 3.2 db

Power Source—117 volts AC, 60 cycles, 70 watts

RECORDER

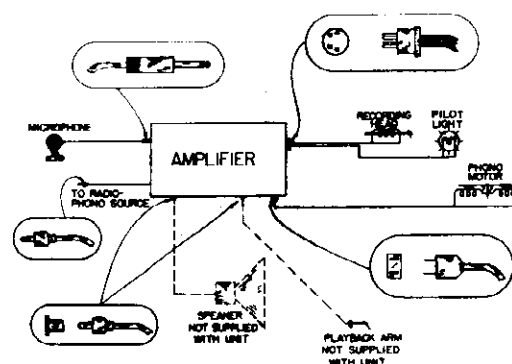
Motor—4 pole synchronous type
 Recording head—Magnetic, impedance 3.2 ohms at 400 cycles
 Recording direction: Center to Outside
 Maximum time of recording (one side of disc):
 10"—5.0 Min.
 8"—3.5 Min.
 6"—2.0 Min.



6. Plug the AC lead from the DraweRECORDER into the receptacle on the receiver, and the audio lead into the jack marked "television" or "recorder." The Model C710 may be used to record signals from any type of home receiver by the addition of a connection in the audio circuit, ahead of the volume control and by making provision for the AC to the recorder.

MAJOR COMPONENTS

Amplifier and Recorder Chassis	133 (See Service Data No. 30)
Microphone	Part No. 9014
Drawer	Part No. 6540
Shelf	(Specify receiver model No. when ordering)

BLOCK DIAGRAM

MODEL C710,
Ch. 133

TUBE COMPLEMENT

1	12SJ7	Mike Preamplifier	1	35L6GT	Power Output
1	12SQ7	First Audio Amplifier	1	50Y6GT	Rectifier
1	12SQ7	Second Audio Amplifier	1	6AB5/6N5	Volume Indicator

SOCKET VOLTAGES

Tube	Function	1	2	3	4	5	6	7	8
12SJ7	Preamp.	0	0*	10	0	10	25	11.8AC*	59
12SQ7	1st Audio	0	-.35	0	0	-.4	75	11.5AC*	11.5AC*
12SQ7	2nd Audio	0	0	1.2	0	0	105	11.5AC*	11.5AC*
35L6GT	Output	0	32AC*	200	130	0	NC	32AC	8
6AB5/6N5	Indicator	5.5AC*	20	-.2	110	0	5.5AC*	—	—
50Y6GT	Rectifier	NC	45AC*	0	125	125	NC	45AC*	235

*All AC heater voltages are measured between tube heater pins.

All voltages measured to chassis except as noted.

Line voltage 117 volts.

DC voltages measured with 20,000 ohm/volt meter.

AC voltages measured with 1000 ohm/volt meter.

All voltages DC except as noted.

Both volume controls in minimum position—no signal input.

Selector switch in "playback" position.

OPERATING INSTRUCTIONS

OPERATING THE RECORDER MECHANISM

Turn the ON-OFF switch on the radio to the ON position. This switch turns all of the equipment ON or OFF. Turn the RECORD RADIO-PHONO VOLUME switch on the recorder unit to the ON position. The recorder motor may now be started by turning the three-position switch on the recorder unit to either the RECORD or PLAYBACK position. To stop the recorder motor, place the switch in the STANDBY position.

DESCRIPTION OF OPERATING CONTROLS

A brief description of the various controls on the DraweRE-CORDER is given below. For location of these controls, see Figure 1.

1. VOL. INDICATOR. An eye type of indicator is used with this equipment. It enables the operator to maintain the proper volume level when recording either on radio or microphone.

CAUTION: NEVER RECORD SO THAT THE LOUDEST SOUNDS OVERLAP THE PATTERN ON THE VOLUME INDICATOR. IF THE RECORDING LEVEL IS TOO HIGH THE RECORDING WILL BE RUINED. See paragraph on RECORDING LEVEL INDICATOR.

2. RECORD-MICRO. PORT. PLAYBACK VOLUME. The microphone intensity is regulated by this control when using a microphone with the recorder. The microphone should be plugged into the jack marked MICROPHONE. This control is also used as a volume control during playback when the unit is used as a portable instrument.
3. RECORD RADIO-PHONO VOLUME. This control is used for adjusting the intensity of the program material to be recorded from the radio or phonograph.

4. SWITCH. The knob to the left is a three-position switch with the following functions:

- a. STANDBY position—In standby position the amplifier tubes are heated and ready for immediate action, but the recorder is inoperative and the recorder motor is not running. This position is provided to enable the user to make an instantaneous recording of news flashes or other program material the user may wish to record at the spur of the moment.
- b. PLAYBACK position—The switch should be in this position when playing back a recording if the recorder mechanism is equipped with a playback arm. The auxiliary playback arm is not supplied as standard equipment. If it is desired to install a playback arm on the recorder unit, see the paragraph on PORTABLE USE.
- c. RECORD position—The switch should be placed in this position when making a recording.

MICROPHONE RECORDING

When recording with the microphone proceed as follows:

1. Plug the microphone into the MICROPHONE jack.
2. Place a recording blank on the turntable. Be sure the drive pin of the turntable is engaged in the drive pin hole of the recording blank.
3. Place the three-position switch in the RECORD position.
4. Adjust the RECORD-MICRO. PORT. PLAYBACK VOLUME control until the volume indicator almost closes when speaking into the microphone.
5. Move the recorder arm to the extreme left (toward the center of the recording blank) and lower the recording arm so that the needle starts cutting the blank. The recorder cuts from the inside to the outside, or opposite from a commercial record. This simplifies the problem of disposing of the thread.

6. After the recording has been started, make certain that the thread falls free of the cutting needle and toward the center of the record. It may be necessary to start the thread toward the center of the recording blank with the finger, but after a few revolutions of the turntable the thread will lie flat and no further attention will be required.
7. At the conclusion of the recording, cut a few blank grooves before lifting the recording head from the record.

RADIO RECORDING

When it is desired to record a radio program, follow the procedure given above for MICROPHONE RECORDING but use the RECORD RADIO-PHONO VOLUME control to regulate the intensity of the program material to be recorded instead of the microphone volume control. The program being recorded can be heard on the speaker during the recording process. This feature is provided so that the radio volume and recorder-volume controls may be operated independently without any interaction. Similarly, the tone controls on the radio panel may be operated to obtain the most pleasing effects for the listener without affecting the quality of reproduction from the recorder.

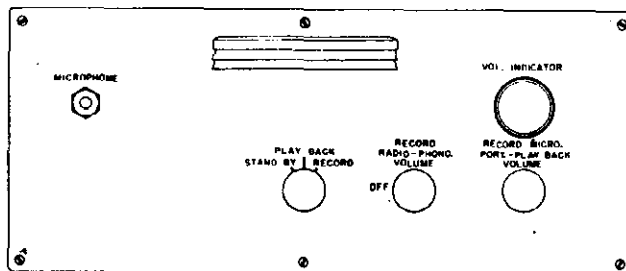


Fig. 1—HOFFMAN DRAWER RECORDER, PANEL VIEW
RECORDING MICROPHONE AND RADIO SIMULTANEOUSLY

If the RECORD RADIO-PHONO VOLUME control and the RECORD-MICRO PORT-PLAYBACK VOLUME controls of the recorder are operated simultaneously, a combination recording of both radio and microphone may be obtained. When making this type of recording, the procedure described under RADIO RECORDING AND MICROPHONE RECORDING should be followed.

RECORDING PHONOGRAPH RECORDS

To make a copy of a phonograph record proceed as follows:

1. Place the switch on the radio panel in the PHONO position.
2. Turn the RECORD RADIO-PHONO VOLUME control to ON.
3. Start the record changer, which should be operated manually, and adjust the RECORD RADIO-PHONO VOLUME control on the DrawerRECORDER until the volume indicating eye almost closes on the loudest sounds. The volume level is now properly adjusted to make the recording.

4. Place the recording blank on the recording turntable. Be sure the drive pin of the turntable is engaged in the drive pin hole of the recording blank.
5. With the record player motor running, place the record player arm on its rest.
6. Start the recorder motor by placing the three-position switch in the RECORD position.
7. Move the recorder arm to the extreme left (towards the center of the recording blank), and lower the recording arm so that the needle starts cutting the recording blank.
8. Place the record player arm on the first groove of the record to be recorded.
9. When the recording has played through, back off the RECORD RADIO-PHONO VOLUME control on the DrawerRECORDER and remove the recording arm from the record.
10. Stop the record changer.

ADJUSTMENT OF THE CUTTING HEAD

The depth of cut which the cutting needle makes on the surface of the recording blank is adjusted by turning the thumb screw on the cutting arm. The thread left by the cutting needle should be about the size of a human hair. To determine if the depth of cut is correct proceed as follows.

1. Start the recorder and cut a few grooves in a recording blank.
2. Note the size of the thread.
3. Raise the recorder arm and remove the arm from the turntable.
4. If the thread is too large, turn the adjusting screw on the cutting arm towards the next lower number to decrease the pressure of the cutting head. Various makes of recording blanks may require different adjustments to produce the same size thread.

INSTALLATION OF THE CUTTING NEEDLE

Loosen the needle set screw at the front of the cutting head. Place the new needle in the hole in the bottom of the recording head, and make certain that the set screw is tightened against the flat side of the cutting needle. Lower the recording arm to the rest position.

PORTABLE USE

Chassis 133 recorder may be converted to independent portable operation as follows:

1. Select a standard single-hole-mount playback arm with a crystal cartridge capable of .5 to 1.0 volt output and mount the arm in the hole just behind and to the left of the turntable.

MODEL C710,
Ch. 133

2. Using a standard phono plug, attach the playback arm cable to the "playback" phono input receptacle. (See Figure 2.)
3. Using a second standard phono plug, attach a 3.2 ohm PM dynamic speaker to the "speaker" jack. (See Figure 2.)

RECORDING LEVEL INDICATOR

For proper recording level operation, the VOLUME indicator must be adjusted so that the eye just closes when approximately $\frac{1}{2}$ watt of power is applied to the recording head. One-half watt of power produces good quality home recordings and allows a margin of safety to prevent overloading on high amplitude peaks. This recording level produces records with a playback level slightly lower than a commercial record, so that the volume control on a phonograph must be advanced farther than with a commercial record.

Use a constant 400 cycle source such as an audio oscillator for a reference signal. Connect the RADIO-PHONO INPUT wire to the signal source. Set the RECORD RADIO-PHONO VOLUME at about one-third of its clockwise rotation. Connect an AC voltmeter across the recording head. A convenient place to make this connection is from the ground to the white wire under the chassis at the recorder receptacle. Adjust the 400 cycle source output to produce 1.3 volts across the recording head. Approximately .5 volt signal input will be required. Set the VOLUME INDICATOR ADJUSTMENT, R26, located on the rear of the chassis, so that the tuning eye just begins to close with the 1.3 volt recording level.

The VOLUME INDICATOR is now adjusted so that proper recording level will be obtained from microphone or radio.

RECORDER MECHANISM

1. MAINTENANCE REPAIRS

Following is a list of symptoms and remedies for mechanical difficulties in the recorder mechanism.

- A. Mechanical rumble or "thump" (usually evidenced by a "moire" or "spoke" pattern in the recordings).
 1. Flat spots or dents in the drive wheel tire. Remove turntable and drive wheel and resurface the tire by clamping the wheel in a drill press and holding a sandpaper or emery block against the tire. If this treatment will not remedy the trouble, it may be necessary to replace the drive wheel. Even though a new wheel is installed, it still may be necessary to surface the tire as above.
 2. Dirt or foreign matter on the inner rim of the turntable. Remove table, and polish the inner rim with fine emery or crocus cloth.
 3. Faulty motor mount grommets. Replace.
 4. Bent motor shaft. Replace armature.
- B. Uneven groove spacing on recordings ("gathering").
 1. Dirt or foreign matter in the lead screw thread grooves. Clean the lead screw thoroughly with carbon tetrachloride and coat lightly with a good quality light grease.

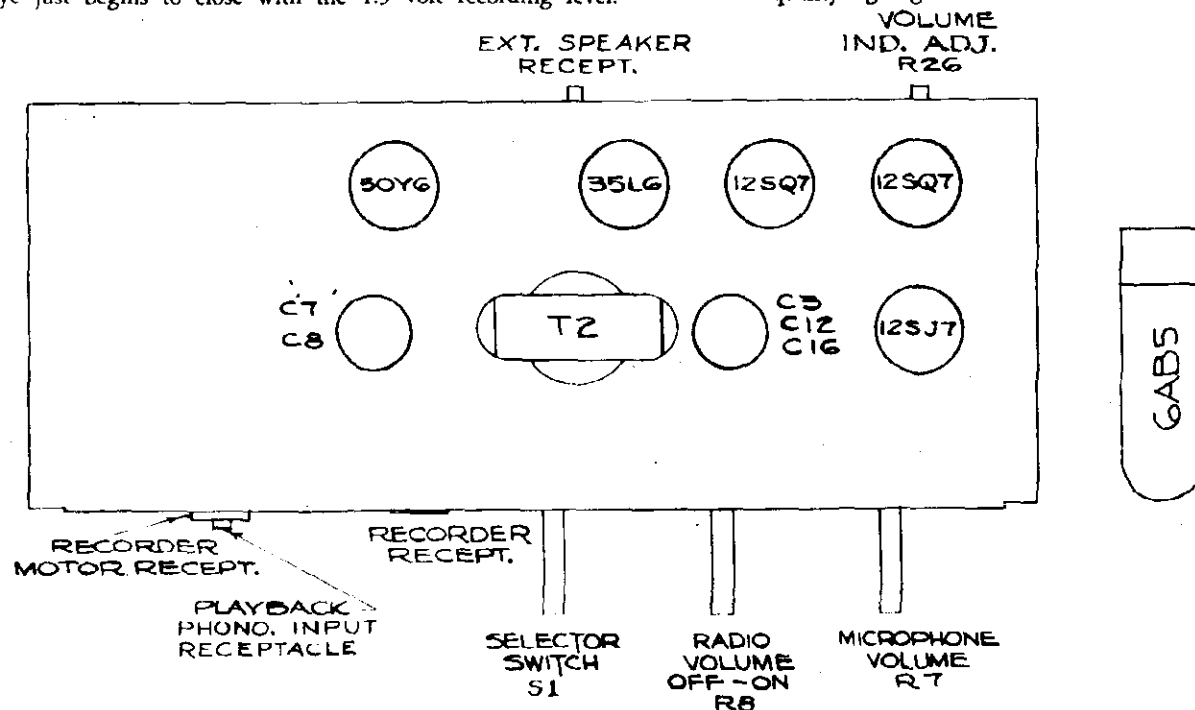


Fig. 2—TUBE LOCATION AND PARTS LAYOUT

TOP VIEW CHASSIS 133

2. Lead screw follower "riding up" on the lead screw threads. See MAINTENANCE ADJUSTMENTS below for the remedy for this condition.
3. Bent lead screw or faulty spur gear on lead screw. Replace lead screw.

C. "Wow" or uneven speed in recording.

1. Oil or grease on rubber drive tire or on inner rim of turntable. Remove turntable and clean drive wheel and inner rim of table thoroughly with carbon tetrachloride.
2. Drive wheel engagement spring too weak. If adjustments will not correct, replace the spring. CAUTION: If this spring is too strong, it will cause flats or dents to be formed in the rubber drive tire.
3. Disc center drive pin missing. Replace.
4. Faulty motor field. Replace motor.

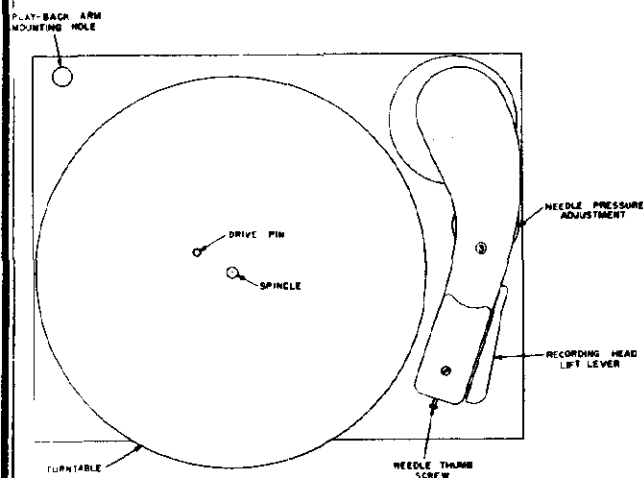


Fig. 3—RECORDER MECHANISM, TOP VIEW

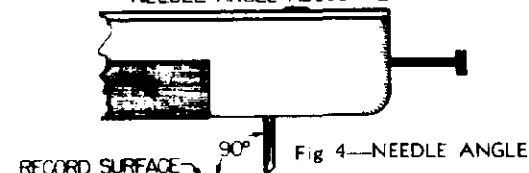
2. MAINTENANCE ADJUSTMENT

- A. Groove depth. This adjustment is a knurled wheel located at the bottom of the recording arm. (See Figure 3.) Rotating the wheel in a clockwise direction increases the depth of cut, while counterclockwise rotation decreases it.

The ideal setting for depth of cut is one that will give the 60-40 groove land ratio. However, for practical purposes it is satisfactory to gauge the depth of cut by the size of the chip thread, which should be approximately that of a human hair. In gauging depth of cut adjustments, always use a fresh disc and a sharp cutting needle.

- B. Needle angle. This adjustment is a Phillips head screw located on the recording arm swivel post, just above the motor board. Clockwise rotation of this screw decreases the needle angle, while counterclockwise rotation increases it. The adjustment should be set so D. that the needle is at 90° to the recording disc surface. A convenient method of checking this is to set the needle on an uncut recording blank and set the adjustment so that the needle and its reflection form a straight line when viewed from the side. (See Figure 4.)

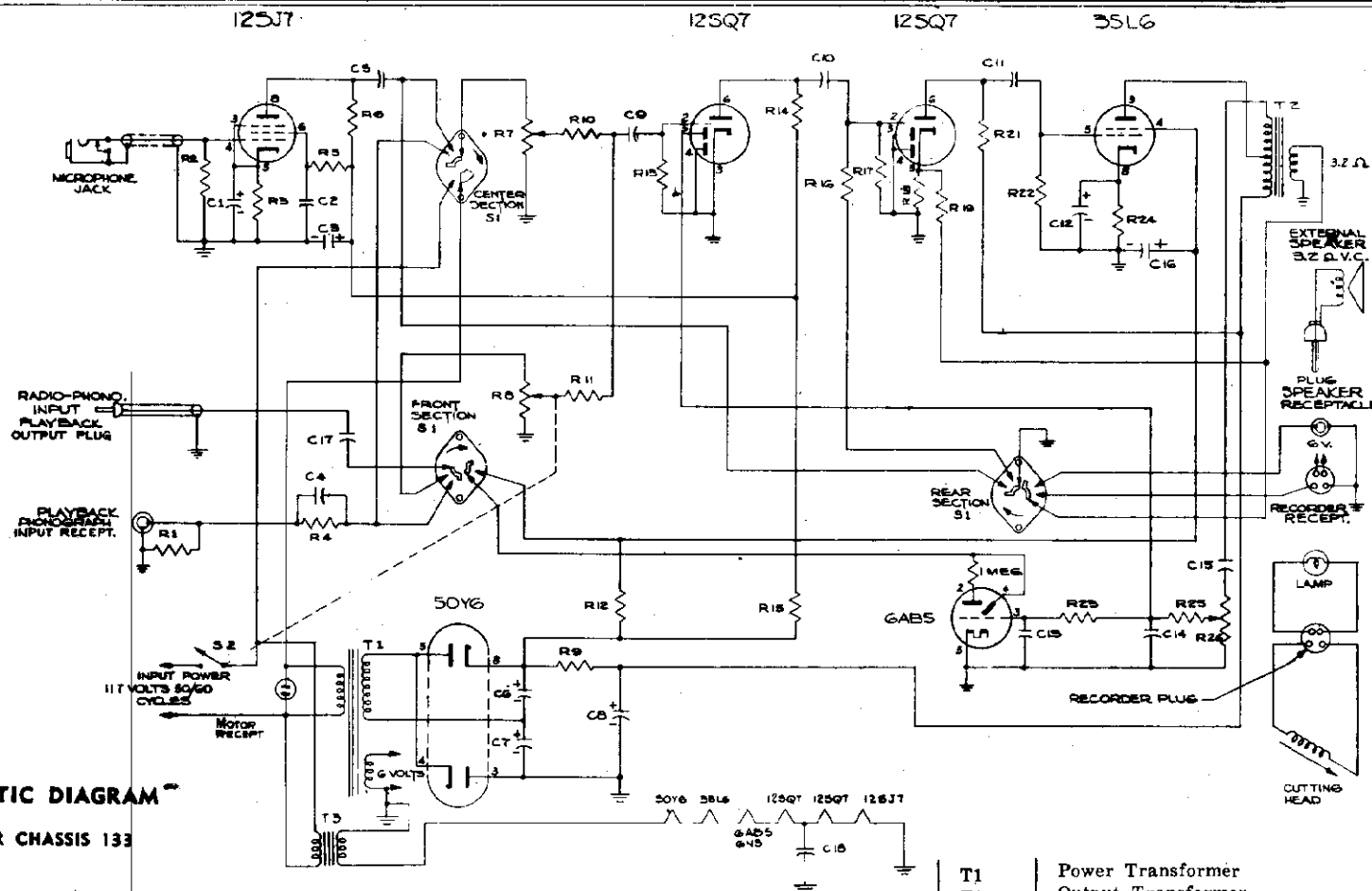
NEEDLE ANGLE ADJUSTMENT



- C. Lead screw follower engagement. The lead screw follower linkage is so designed that the follower should remain at 90° to the lead screw throughout the useful arc of travel of the recording arm. Adjustment of this angle is obtained by sliding the die-cast arm drive bar in or out in its socket at the base of the arm swivel. A set screw is provided to lock this adjustment in position. Maladjustment of the follower engagement will cause riding up of the follower and "gathering" in the recordings made on the machine.
- D. Lead screw end play adjustment. This adjustment is a large set screw and lock nut at the spindle end of the lead screw. With the worm spindle drive assembly well lubricated, this adjustment should be set tight enough so that the end play in the lead screw is negligible, and yet not tight enough to cause binding. A practical way of accomplishing this is to tighten the large set screw until it seats against the end of the lead screw, then back it out about 3/4 of a turn, and lock in position.

PARTS LIST

Symbol	Description			Hoffman Part No.
C1	25 Mf	25V	Electrolytic	4205
C2	.05 Mf	200V	Paper	4100
C3, C12, C16	20/20/20 Mf	450/450/25V	Electrolytic	4200
C4, C14	100 Mmf	20%	Mica	4000
C5, C11, C13	.02 Mf	400V	Paper	4106
C6	50 Mf	150V	Electrolytic	4210
C7, C8	50/50 Mf	150/300V	Electrolytic	4208
C9	.005 Mf	600V	Paper	4102
C10	.002 Mf	600V	Paper	4118
C15	.01 Mf	400V	Paper	4112
C17	.1 Mf	200V	Paper	4111
C18	.05 Mf	400V	Paper	4101



SCHEMATIC DIAGRAM

RECORDER CHASSIS 133

R1, R22	470,000 ohm	½ W Carbon	4506
R2, R6, R10, R11, R14, R16, R21	220,000 ohm	½ W Carbon	4500
R3	1200 ohm	½ W Carbon	4523
R4, R25	2.2 Meg.	½ W Carbon	4502
R5, R17, R23	1 Meg.	½ W Carbon	4513
R7	500,000 ohm potentiometer		4804
R8	500,000 ohm potentiometer with SPST Switch (S2)		4802
R9	470 ohm	1 W Carbon	4525
R12, R15	47,000 ohm	½ W Carbon	4504
R13	4.7 Meg.	½ W Carbon	4544
R18, R19	10,000 ohm	½ W Carbon	4515
R24	220 ohm	1 W Carbon	4594
R26	500,000 ohm potentiometer		4811
S1	Selector Switch		6006
S2	SPST Power Switch (Part of R8)		

NOTE
SELECTOR SWITCH "S1" SHOWN
IN "STAND-BY" POSITION

T1	Power Transformer	5013
T2	Output Transformer	5111
T3	Isolation Transformer	5014
	Motor (General Industries No. 22700)	9512
	Motor Bushing	1026
	Motor Armature	9580
	Motor Grommets	3548
	Drive Wheel	9530
	Drive Wheel Spring	9522
	Lead Screw Assembly	9523
	Recording Arm Assembly	9526
	Recorder and Pilot Light Plug	6207
	Recording Disc Locating Pin	1056
	Microphone	9014
	Recording Head	9540
	Turntable Retaining Clip	9533
	Drive Wheel Retaining Clip	9531
	Turntable (General Industries No. 12761)	9527

MECHANICAL ASSEMBLY ADJUSTMENTS

These adjustments are listed in the order in which they would be performed on a machine which is completely out of adjustment. Changing one adjustment will often affect succeeding adjustments and units should be carefully checked for proper adjustment after repairs have been made. If caution is used in dismantling units for repair, it is possible to avoid a great deal of labor.

A: Motor mounting. To replace drive roller (A-181) remove four screws (S-115) from rubber mounting points, lift out motor without disconnecting leads from switch terminals. Remove screw (S-118), immerse drive roller in Acetone solvent until adhesive bond softens. Remove drive roller from shaft.

B: Control knob should be set on transfer shaft with setscrew against the flat and the detect lever (A-109) setscrews should be tightened so that knob is vertical when the lever is in trough of detent slide (M-107), i.e. in "Stop" setting.

C: Tighten setscrews of motor transfer lever (A-110) when drive lever (A-181) is midway between rewind drive pulley (R-348) and flywheel (A-101) when control is in "Stop" position, (i.e. the travel should be equal in either direction). To check, operate brake lever (M-110). Clearance of brake shoe should be the same on either Forward or Rewind.

D: The motor power switch (P-119) is set in "Stop" position so that contacts are opened by biasing action of switch blade against bakelite pin in motor swing plate. The Erase "Safety" Switch is mounted in the "Stop" position so that contacts are open and a gap of approx. 1/16" appears between motor mounting assembly (A-112) and insulating bushing on switch. Switch is adjusted to make firm contact when control lever is in "Forward" position.

E: Forward stop lug (M-109) should be set so motor mounting assembly (A-112) comes to rest against it as soon as drive roller (A-181) makes firm contact with flywheel (A-181). Excessive pressure against flywheel prevents motor from starting when control lever is "snapped" into "Forward" position. Insufficient pressure results in slippage and "Wow". Best is to adjust forward stop lug (M-109) 1/16" from edge of swing plate at point where drive roller begins to touch flywheel.

F: There is no rewind-stop adjustment, however, rewind drive pulley is located in a hanger adjustable by bending stop lug (M-111) against the swing plate bushing, allowing a clearance between drive roller and rewind pulley in "Stop" position which allows drive roller to engage drive pulley in "Rewind" position. In this position, the rewind drive pulley hanger (A-111) is away from the stop, pressing drive roller by means of the torsion spring which needs no adjustment.

G: Set the pressure lever (A-113) so that it is vertical when the control knob is in the PLAY-RECORD position. Set the arm adjusting plate (M-105) so that it clears the pressure arm (M-104) by 1/64" when in this position. Normally adjusted, the tape guide (A-105) will move slightly or not at all, when control is turned from Off to Rewind.

H: The brake spring (P-115) should be adjusted so that brake (A-114) clears take-up pulley (R-348) and allows it to turn freely in forward or rewind positions. The in Off or Stop positions should be sufficient to prevent "coasting" of the reel. If brake clearance is unequal in forward or rewind, adjustment "G" is incorrect.

I: The tape guide block (A-105) is self locating. Tape pressure pads (A-103) located in this block are pressed forward by phosphor bronze pressure springs. These springs exert 15 grams pressure when not against the tape, and a maximum of 30 grams when in operating position with tape against the springs in guide block.

J: Adjust head pressure with two screws in slotted holes in head bracket (P-116). Both record head (A-106) and erase head (A-107) are adjusted into the tape guide block until the pressure pads on the reverse side show a movement slightly less than 1/32". This will give the 30 grams head pressure against the shoe for each head. "Wow" will result if too much pressure is used at this point.

K: Lateral movement of the heads is effected by moving them in desired direction by means of the screws in slotted holes that hold heads to head bracket. They should be positioned so there is no hanging up of the tape pressure guide when control lever is turned to stop position. Final adjustment on record head is made by turning head so that air gap in lamination is at right angles to direction of tape pressure. This is best accomplished with the aid of a pre-recorded, constant 3000 cycle note. Adjustment is made by rotating head for maximum response on an output meter.

L: Open record or erase heads must be replaced completely. Worn out or damaged head lamination can be replaced as follows: Remove head and (P-116) bracket assembly without disturbing the individual heads. On record head (A-106) remove lamination (P-127) by prying with screw driver. Press in new lamination with fingers until it bottoms on yoke. Erase head (A-107) lamination (P-128) is replaced in same way. It is important to replace laminations with steel section uppermost in tape guide.

SERVICE TIPS

1. RECORDER "WOW"

- Felt pressure pad (A-103) worn.
- Dirt on drive roller (A-181) or pressure roller (A-183)
- Head pressure too great. Loosen screws holding head mounting bracket (M-116) and lower head slightly. Adjustment "L". Do not disturb head alignment adjustment "H".
- Insufficient pressure on pressure roller (A-183). Tighten spring (P-114) or replace roller.
- Drive or pressure roller eccentric.
- Motor shaft binding. Shaft should turn freely when rotated by hand with control at "Off". If necessary realign bearings by tapping motor lightly with wooden mallet.

2. MOTOR RUNS BUT MECHANISM WILL NOT OPERATE

- Motor stop improperly adjusted. See adjustment "G".
- Drive roller worn or defective. Replace

3. MECHANISM RUNS FORWARD BUT WILL NOT REWIND OR VICE-VERSA

- Rewind belt (P-112) or take-up belt (P-113) broken or off pulleys. Replace.
- Motor stop improperly adjusted. See adjustment "G".
- Pressure roller interferes with panel at Rewind. Remove roller and chamfer its bottom edge 1/16" x 45°.

4. TAKE-UP REEL DOES NOT TURN OR DRAGS

- Brake dragging. See adjustment "H".
- Take-up belt (P-113) broken, or off pulley. Replace belt.

5. MECHANISM DOESN'T OPERATE WHEN CONTROL IS "SNAPPING" INTO PLAY/RECORD OR REWIND

- Motor stop improperly adjusted. See adjustment "G".
- Housing screw hangs up lever arm on Rewind. Check screw length. Should be 15/16"

6. CONTROL KNOB TURNS BUT MOTOR ASSEMBLY DOES NOT SWING

- Motor transfer lever (A-110) set screws loose. Tighten screws. See adjustment "C".
- Lever loose at hub. Replace.

7. MOTOR ASSEMBLY SWINGS. MECHANISM OPERATES, BUT NO DETENT OPERATIONS

8. SLOW SPEED

- Pressure arm spring (P-114) weak. Replace.
- Head pressure too great. Raise head slightly. See adjustment "J".
- Flywheel shaft binding. Check tightness of screws holding front and rear plates. Check plates for warpage.
- Motor shaft binding. Realign bearings.

9. HIGH BACKGROUND NOISE (HISS)

- Check tape
- Defective Record-Playback head. Replace.
- Record head magnetized. Demagnetize with 60 cycle A.C. Air core coil.

10. INCOMPLETE ERASE

- Erase voltage too low.
- Erase head open.
- Poor contact on Play-Record switch.

11. POOR HIGH FREQUENCY RESPONSE

- Head gap not at right angles to tape. See adjustment "K".
- Defective head or worn lamination. See adjustment "L".
- Poor head contact due to worn felt pressure pad. See adjustment "J".

AMPLIFIER SERVICE NOTES

MICROPHONIC OR NOISY ON PLAYBACK: Check 6J7 tube for noise by tapping. Replace. Microphonic checks should be made with the instrument fully warmed up.

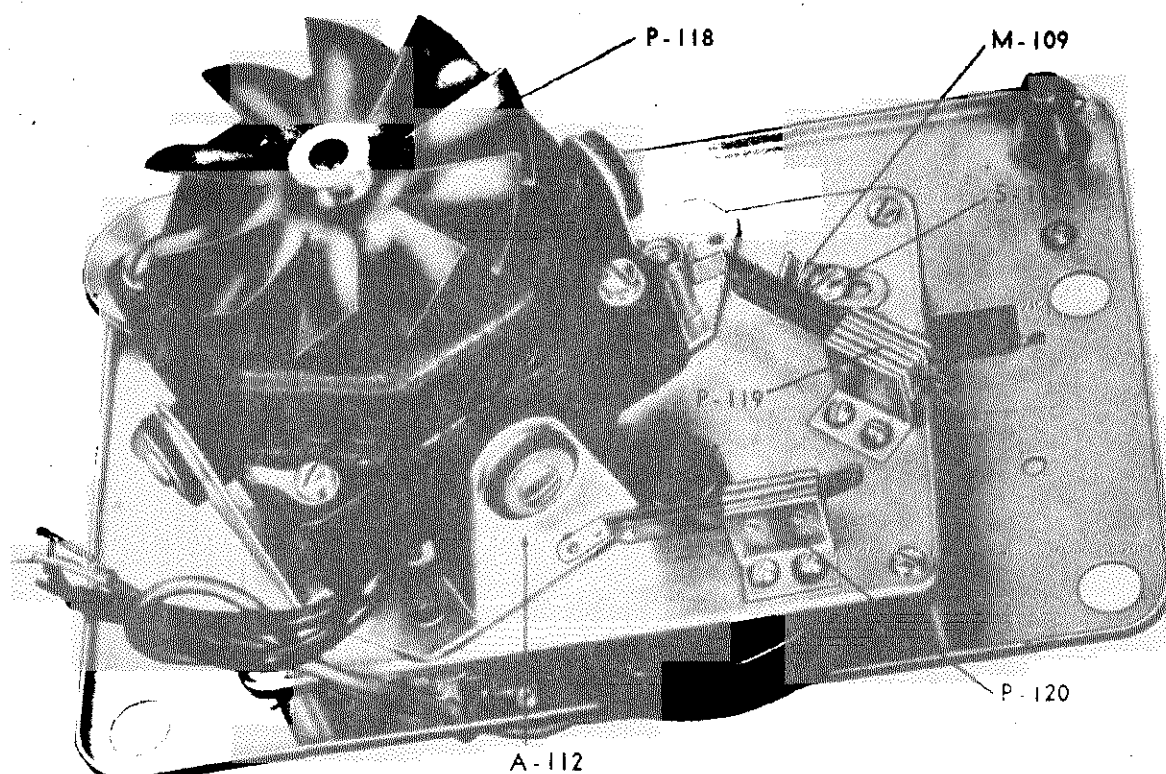
DISTORTION ON PLAYBACK

- Check all tubes.
- Be sure when recording that recording light is barely flashing. An overloaded signal will cause distortion on playback.
- Tone control should be at full treble when recording. Adjust only on playback.
- Check all record and erase voltages as indicated on circuit diagram.
- Be sure to check microphone plug for shorts, breakage or grounding.

MODELS C-2, T-3

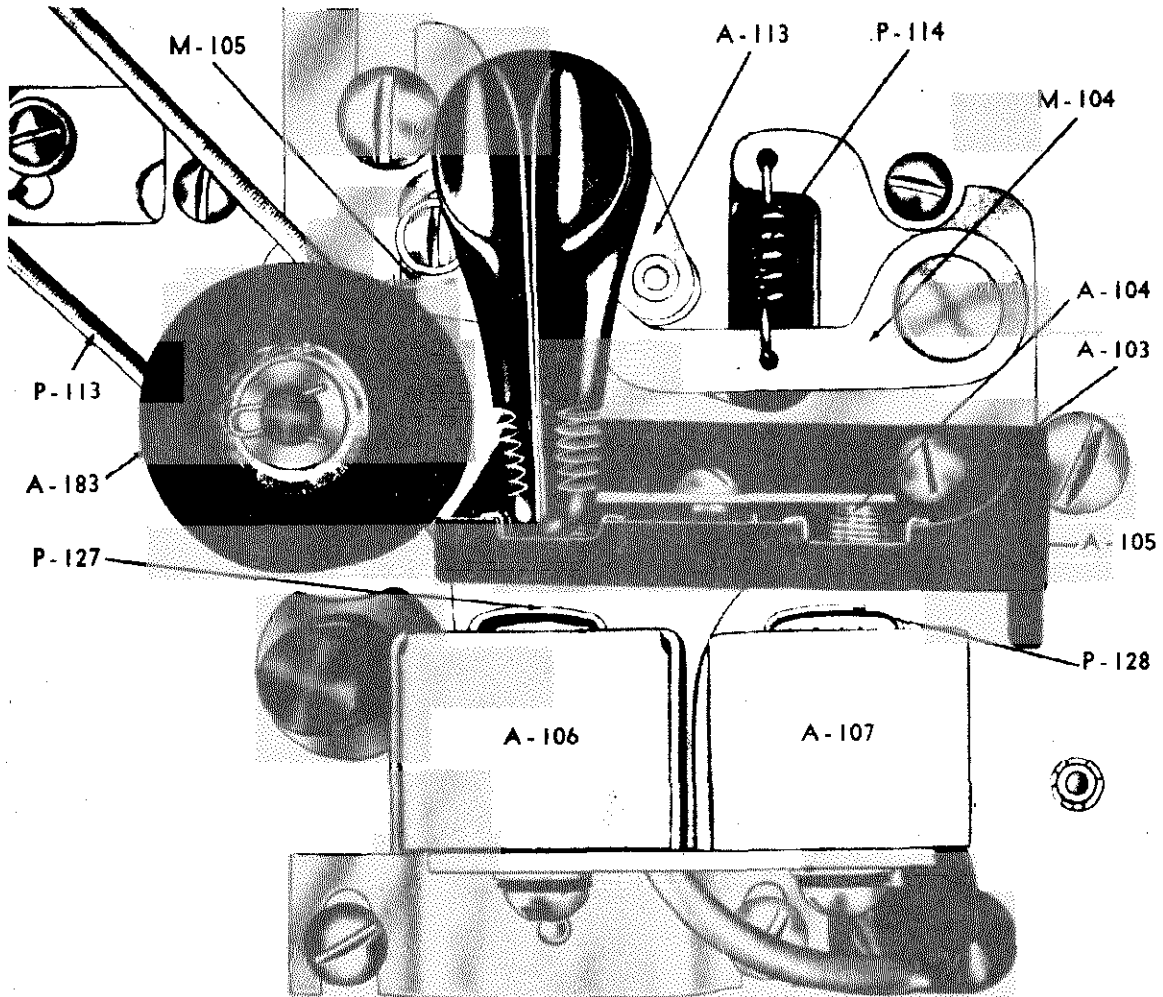
MECHANICAL ASSEMBLY PARTS LIST

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
R 305	Pressure Arm Stud	R 437	Rewind Pulley	M 112	Motor Mounting Bracket
R 306	Roller Stud	R 500	Rewind Shaft	M 113	Motor Mounting Bracket (Special Slot)
R 309	Lever Bushing	R 501	Pivot Stud	M 114	Motor Swing Plate
R 310	Lifter Stud	R 502	Rewind Stud	M 115	Switch Mounting Plate
R 311	Roller	R 503	Rewind Spindle	M 116	Head Bracket
R 314	Transfer Shaft Bearing	R 504	Take-Up Spindle	M 117	Spring Bracket
R 319	Flywheel Shaft	R 505	Spindle Collar	M 118	Pressure Pad
R 320	Plate Spacer	R 506	Grommet Spacer	P 101	Insulator
R 324	Driver Hub	R 507	Motor Plate Spacer	P 102	Leather Brake Shoe
R 325	Pressure Roller Hub	M 101	Front Plate	P 103	Fly Wheel Bearing
R 329	Pressure Plate Spacer	M 102	Rear Plate	P 104	Reel Bearing
R 331	Motor Transfer Shaft	M 103	Roller Plate	P 105	Plain Bearing
R 344	Motor Transfer Stud	M 104	Pressure Arm	P 106	Steel Washer
R 345	Motor Transfer Roller	M 105	Arm Adjusting Plate	P 107	Linen Washer
R 348	Rewind Drive Pulley	M 106	Lever	P 108	Varnished Cambric
R 356	Reel Drive Pin	M 107	Detent Slide	P 109	Bakelite Washer
R 360	Insulator Pin	M 108	Bearing Cup	P 110	Felt Washer
R 367	Motor Pivot Bushing	M 109	Motor Stop Lug	P 111	Felt Washer
R 419	Shouldered Nut	M 110	Brake Lever	P 112	Rewind Drive Belt
R 436	Take-Up Pulley	M 111	Rewind Arm		

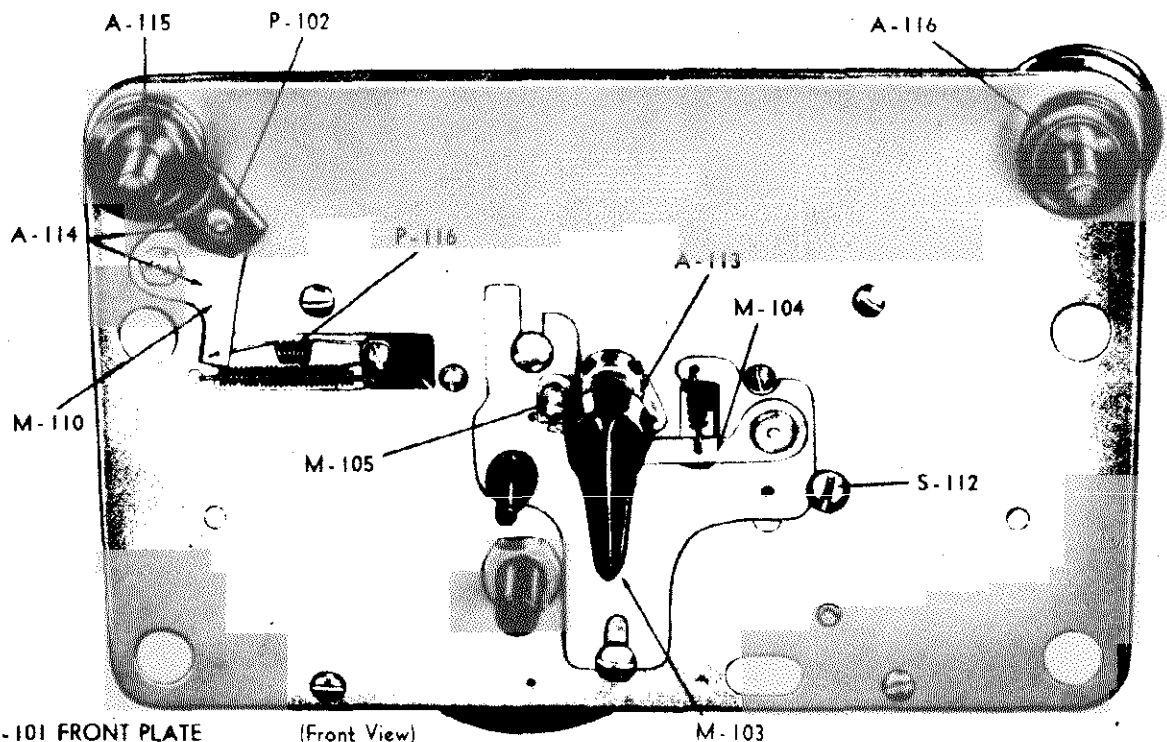


A-100 MECHANISM (Rear View)

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
P 113	Take-Up Drive Belt	S 105	6-32 x 1/8" Allen Head	A 102	Motor Swing Plate Assembly
P 114	Pressure Arm Spring	S 106	8-32 x 3/16" Allen Head	A 103	Pressure Pad and Felt Assembly
P 115	Detent Spring	S 107	5-40 x 5/16" Screws	A 104	Spring Bracket and Pressure Coil Spring Assembly
P 116	Brake Spring	S 108	6-32 x 1/4" F.H. Screws	A 105	Tape Guide Assembly
P 117	Rewind Bracket Spring	S 109	6-32 x 3/16" Binder Head	A 106	Record Head
P 118	Motor Fan	S 110	3/8" Washer 3/16" Hole	A 107	Erase Head
P 119	Stack Switch Motor	S 111	#5 Shakeproof Lock	A 108	Record & Erase Head Mounting Assembly
P 120	Stack Switch Erase	S 112	8-32 x 3/16" Truss Head	A 109	Detent Lever Assembly
P 121	Ball Bearing	S 113	5-40 x 3/8" Screw	A 110	Motor Transfer Lever
P 122	Control Knob	S 114	5-40 x 1/4" Screw	A 111	Re-wind Pulley Assembly
P 123	Rubber Grommets	S 115	8-32 x 3/8" Binder	A 112	Motor Mounting Assembly
P 124	Bakelite Guide	S 116	3/8" Washer #8 Hole	A 113	Pressure Lever Assembly
P 125	Motor	S 117	3/8" Washer #5 Hole	A 114	Brake Assembly
P 126	Pressure Coil Spring	S 118	5-40 x 1/2" R.H.M.S.	A 115	Take-up Shaft Assembly
P 127	Record Head Lamination	S 119	9/32" Washer #8 Hole	A 116	Re-wind Shaft Assembly
P 128	Erase Head Lamination	S 120	1/4" Washer .315" Hole	A 181	Rubber Driver
P 129	Inter-lock Switch	S 121	.125 x 7/32 Brass Rivet	A 183	Pressure Roller
S 101	Cotter Pin	S 122	3/8" Washer 7/32" Hole		
S 102	Hairpin Clip	A 100	Mechanism		
S 103	Hairpin Clip	A 101	Fly Wheel Assembly		
S 104	5-40 x 1/4" Screws				



HEAD AND TAPE GUIDE DETAIL

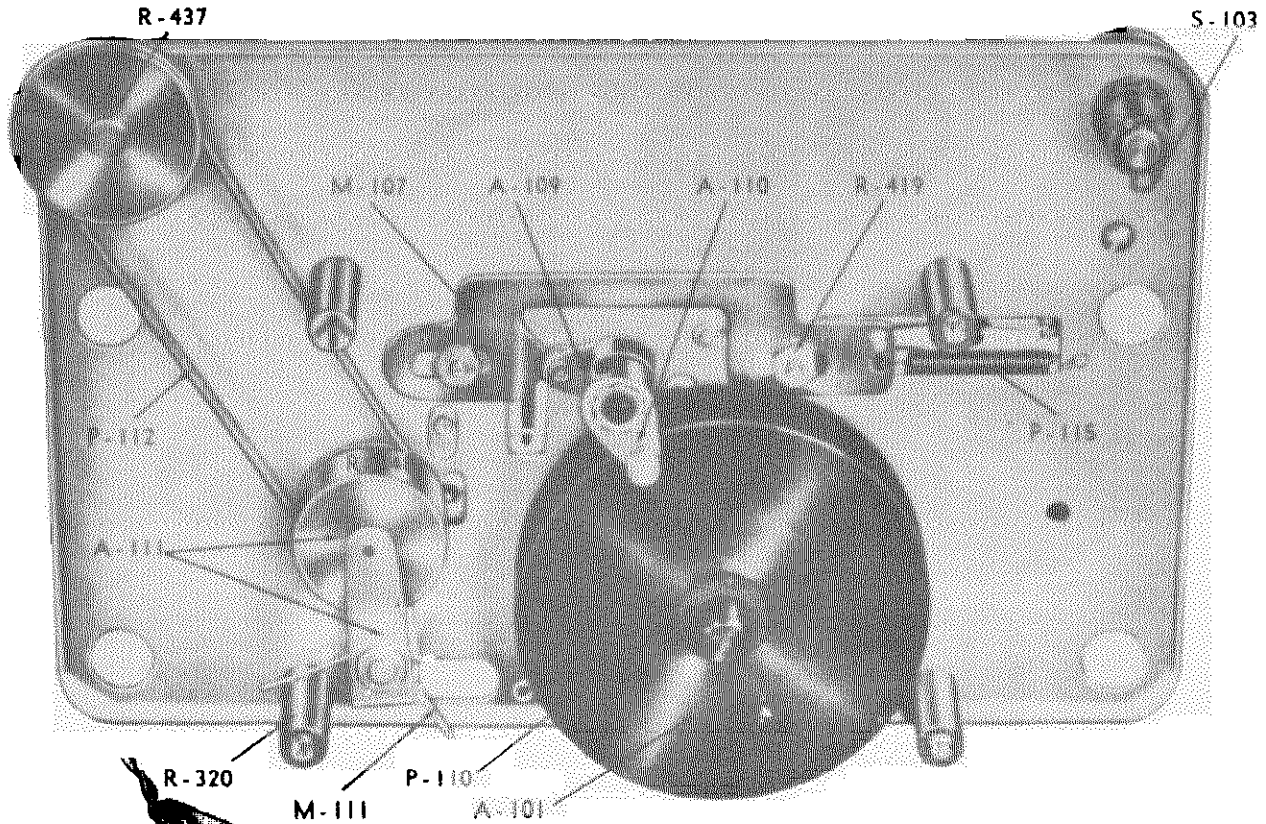


M-101 FRONT PLATE

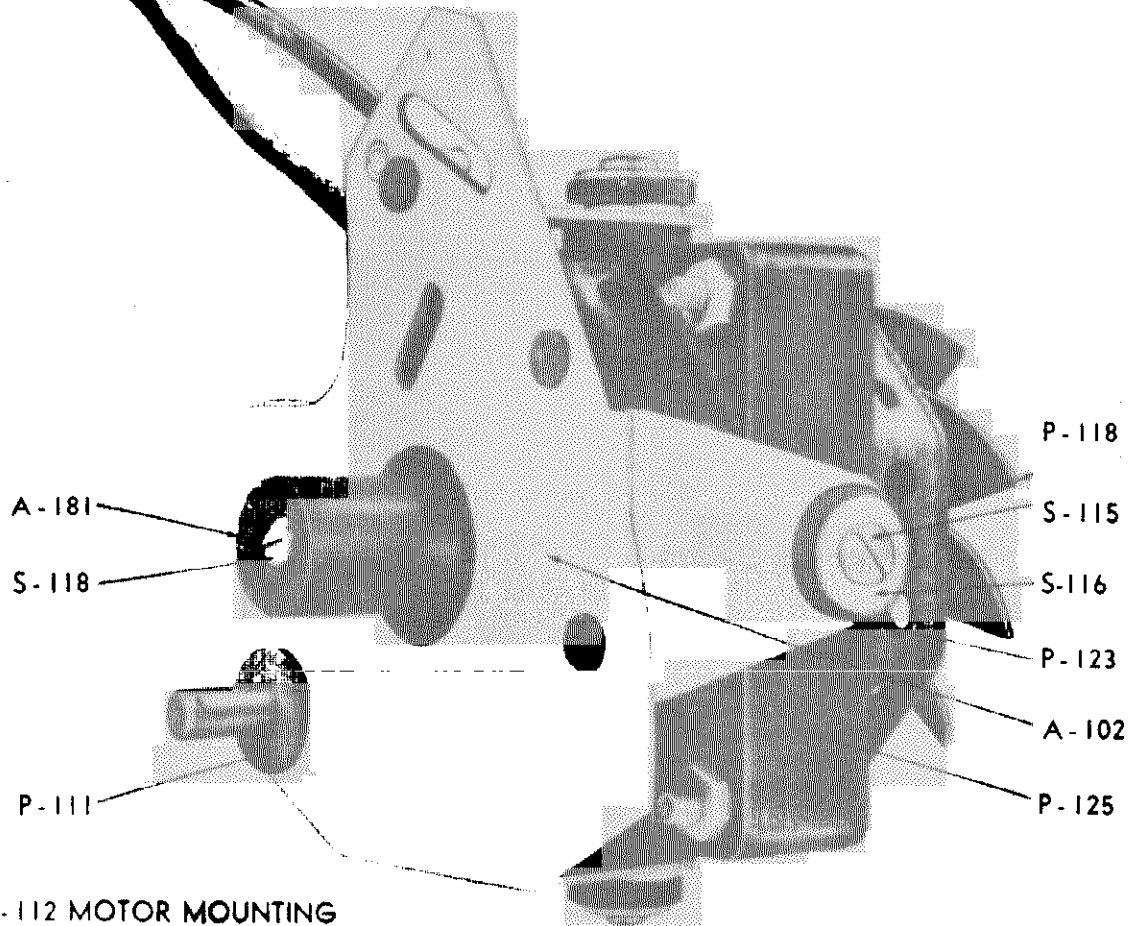
(Front View)

M-103

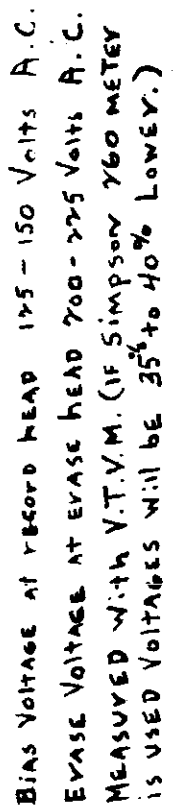
MODELS C-2, T-3

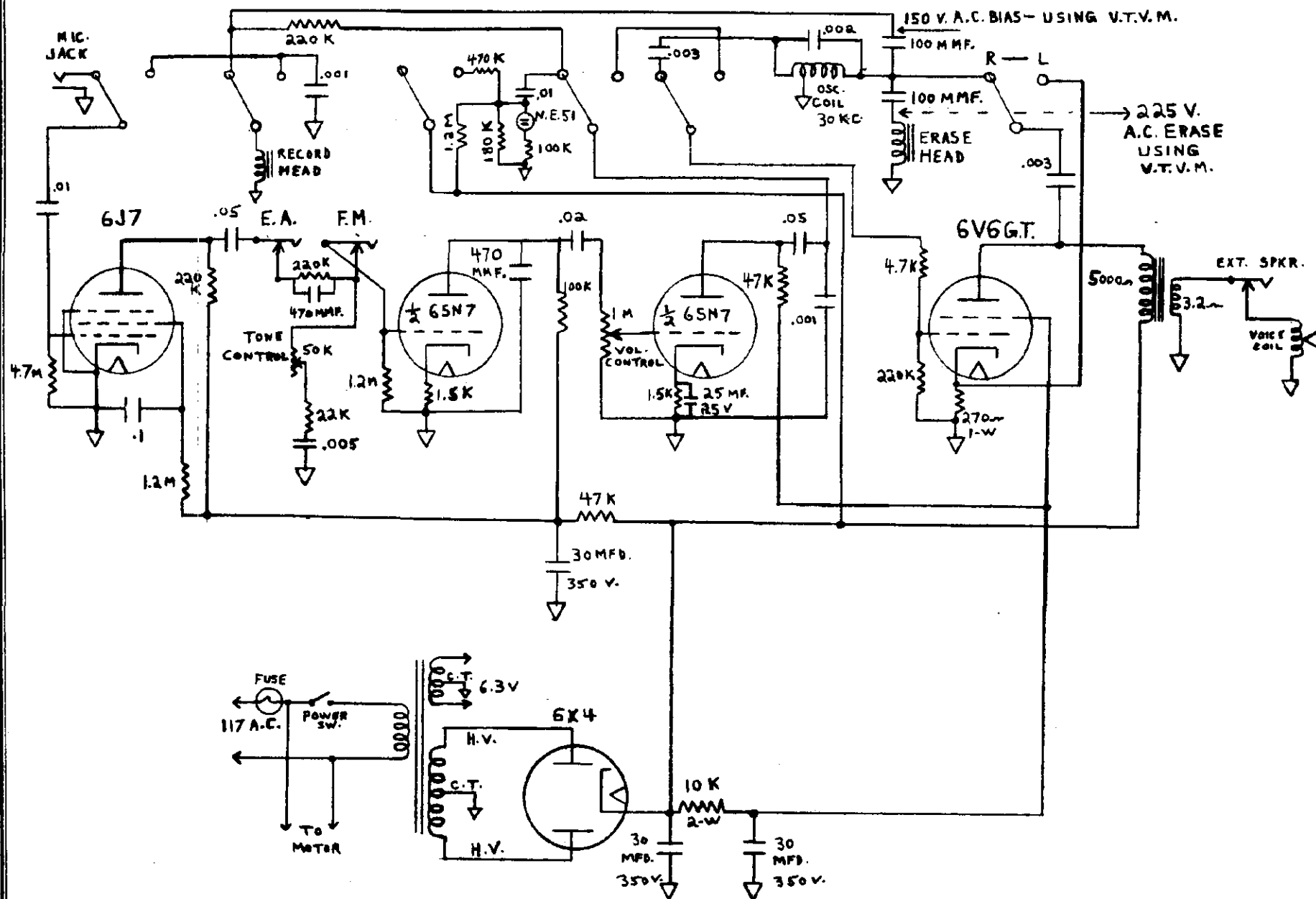


M-101 FRONT PLATE (Rear View)



A-112 MOTOR MOUNTING





OPERATING INSTRUCTIONS FOR SONAR TAPE RECORDER MODEL T-10

The Sonar Tape Recorder Model T-10 is high fidelity equipment composed of four basic units; namely the RPA-10 Amplifier, the PS-300 Power Supply, the Tape Mechanism and the Infinite Impedance Speaker System.

The T-10 Recorder is designed for 117 volt 60 cycle operation. Before applying power, be sure current is as outlined above.

CAUTION:

Toggle switch on the front panel marked "disc-tape" should be in "Disc" position until the operator is thoroughly familiar with the operation of the amplifier.

OPERATION:

Plug the two cables found in the rear of recorder case into the matching receptacles of power supply and speaker enclosure, respectively. Turn the control marked "speaker-gain" until a click is heard. This is the main power switch. When the power is on, the "Listen" indicator light will glow. If the "Record" indicator light is on, turn the "Listen-Record" switch to the "Listen" position. Permit the amplifier to warm up for one minute before using.

Remove the red wing screw on top of the tape unit before using. This wing screw should be re-inserted when carrying the recorder and removed when put in operation.

INPUTS:

There are four inputs on the front panel designated as LG1 (low gain 1), LG2 (low gain 2), "Mike 1" and "Mike 2". Control marked "Gain 1" controls LG1, counter-clockwise rotation from "0"; and "Mike 1", clockwise rotation. Control marked "Tape Gain" controls LG2, counter-clockwise rotation from "0"; playback of

tape, clockwise rotation. When the "Listen-Record" switch is in the "Record" position, clockwise rotation of "Tape Gain" control then controls "Mike 2" input. Control marked "Speaker Gain" is completely independent of "Gain 1" control and "Tape Gain" control, and may be set to any desired level for playback or monitoring while recording.

When using LG1 and LG2, a wide range of impedances from 100 ohms to 500,000 ohms may be used without the need of a matching transformer. Microphone inputs are high impedance and will handle a microphone signal from -65DB. When using low impedance microphones, a cable transformer should be employed.

Any combination of inputs such as FM-AM radio, phonograph, etc., should be fed to LG1 or LG2. Microphones or Reluctance pickups should be fed to Mike 1 or Mike 2. Any combination of the above may be electronically mixed.

A fifth input located on top of the chassis, as noted in Figure 1, titled "Dubbing", is to connect two or more tape recorders together for simultaneous recording. Dubbing one tape to another, or playing two tape machines simultaneously, may be achieved. A low gain signal, such as a radio having its own volume control, may be fed to this fifth input without having to use any of the front panel mixing controls.

Frequency equalization for the recording amplifier is fixed. The "Bass" and "Treble" controls only affect the reproduced signal as heard through the speaker system. The bass control will boost 20DB and cut 20DB. The treble control will boost 15DB and cut 15DB.

For so-called flat frequency response, the bass control should be set to #2 and the treble control to #3. The operator, however, could set these equalizers to suit his particular desires.

MODEL T-10

OPERATION OF TAPE MECHANISM:

Place empty tape reel on left hand spindle, keyed side down, so that key fits in drive pin on spindle.

Place loaded tape reel on right hand spindle, keyed side down, so that key fits in drive pin on spindle. Tape must come off reel, clockwise, with coated surface out. (Black side of paper tape is the coating. - Dull side of plastic tape is the coating.) If coating is inside, put a half twist in the tape before threading. When loaded tape reel is wound up on the take-up reel, rethread the right hand reel with coating outside.

Place left control knob, which controls the threading of tape, toward rear of case. This leaves the tape slot in the escutcheon open for threading. (See Control Sketch, Figure 2.)

Slowly draw several feet of tape off the loaded reel, through the slot in the escutcheon, keeping it taut against the drag of clutch, and allowing enough tape to thread and wrap on the unloaded reel. - See that tape is not twisted.

Pull left control knob toward front of case. This threads the tape against the capstan and tape guides. It also holds the tape in place while the balance of the operation is completed, that is, winding a couple of wraps on the empty reel. Tape is inserted in slot in reel center and wrapped on clockwise by rotating the reel by hand. - Care must be taken to insure that the tape is not twisted.

RECORDING:

Plug in a microphone in either Mike 1 or Mike 2, or a low level signal, such as a radio, to LG1 or LG2. Set toggle switch from Disc to Tape and adjust the gain control corresponding to the input being used so the V.U. Meter will move with program material and will read a peak value of "0" once every few seconds to a minute, depending upon the nature of the program being recorded. Adjust "Speaker Gain" control to desired monitoring level. If a microphone is used, care should be taken to prevent a howl. Set the "Listen-Record" switch to the "Record" position.

Start tape in forward position by pushing right hand control forward (toward rear of case).

To record on the lower track, pull the right hand control toward the front of the case.

LISTENING:

Set the "Listen-Record" switch in the "Listen" position. Shut the V.U. Meter off. Adjust tape-gain control to #3, clockwise rotation. Start the tape machine as outlined under Recording, and adjust speaker-gain control and equalizer to desired volume and tone, respectively. The V.U. Meter may be used to read the playback level on the tape. Adjust tape gain control so that the V.U. Meter does not read above + 3 V.U.

ERASING TAPE:

When recording, the tape is automatically erased. However, to erase a certain section of tape on either track, set controls marked "Gain 1" and "Tape Gain" to "0", and put the "Listen-Record" switch in the "Record" position. Start tape in motion dependent on track to be erased. Forward direction erases top track. - Reverse direction erases bottom track.

REWINDING TAPE AT HIGH SPEED:

If it is desired to rewind the tape before completing one channel in playback or recording, all that is necessary is to first reverse the direction of tape, and then unthread the capstan and tape guides by moving the left hand control toward the rear of the case, or into the unload position. This releases the drag on the tape and the clutches pick up speed.

When tape is completely rewound, or rewound to the point desired, place the right hand control in neutral or STOP position.

NOTE: When rewinding in the reverse direction, it may be necessary to rotate the right hand take-up reel by hand when the reel is three quarters loaded. This is normal, since the clutches are set to give accurate timing at 7.5" per second, in record and playback of tape on both tracks.

CAUTION:

When tape mechanism is not in use, make sure the left hand control is towards the rear of case. This is to prevent the record playback head from resting on the capstan, causing "flats". Before engaging the left hand control, take up tape slack by rotating either reel by hand.

AUTOMATIC REWIND:

Wind the tape in the forward or clockwise direction onto the left hand reel where the program on the tape ends. Place a one inch piece of $\frac{1}{4}$ " wide aluminum foil adhesive tape on the back (uncoated side) of tape.

Rewind tape in reverse direction back onto right hand reel. The machine is now ready for playing or recording two tracks automatically. The aluminum foil actuates a solenoid switch which is composite with the first tape guide at the right end of the forward escutcheon.

SINGLE TRACK OPERATION:

The Sonar T-10 Tape Recorder will play tapes made on single track machines when operated in the forward direction. Single track recordings made on the T-10 Recorder, forward direction, may be played on any other single track recorder.

MONITORING:

A jack mounted on the front panel titled "Monitor", is designed to feed a pair of earphones, high or low impedance. The monitor output can also feed a booster amplifier or a telephone line when fed to a matching transformer having impedances of 100,000 ohm Pri. and 600 ohm Sec. The speaker gain control has no effect on the monitor level. The monitor level is controlled by controls marked "Gain I" and "Tape Gain".

DISC RECORDING:

Since the RPA-10 Amplifier is a high fidelity unit, having a conservative rating of 10 watts output with exceptionally low harmonic distortion, it can be used for disc recording. The power output may be fed to a magnetic disc recording head. Simply determine the cutter impedance and connect to the power output having the corresponding impedance. The

output transformer in the RPA-10 Amplifier is wired for 10 ohms and 500 ohms output, as noted in the schematic. However, any other impedance may be obtained since the secondary is of the multi-impedance type. The V.U. Meter may also be used as a cutting level indicator, by connecting the unused side of the toggle switch through a high resistance to the 500 ohm line. The exact value of resistance will be determined by finally obtaining the proper recording level on the disc and then setting the resistor so the meter reads "0" V.U. Do not disturb the V.U. Calibration control on top of the chassis.

AMPLIFIER DESCRIPTION:

As will be noted from the schematic diagram, the RPA-10 Amplifier has 11 tubes, five of which are dual purpose triodes. The pre-amplifier section uses two 12SJ7 tubes and one 12SC7 tube. These three tubes have D.C. voltage on their filaments, obtained from the cathodes of the 6L6 output tubes. The three tubes in the high gain pre-amplifier and low gain input circuits are purposely operated at reduced filament voltage to give a better signal-to-noise ratio.

The 6SJ7 tube is the tape recording amplifier having the necessary equalization in the grid circuit. This stage gets the signal from the plates of the 12SC7 tube. The 12SC7 tube also feeds the 6SN7 tube used as a volume indicator stage working the V.U. Meter. The 6SL7 stage also gets its signal from the 12SC7 tube. This 6SL7 stage is a voltage amplifier that feeds the high and low frequency equalizers. The other half of the tube feeds the monitor. The output of the equalizer feeds one half of the 6SN7 tube which is directly coupled to the second half of the tube, functioning as a plate cathode phase inverter, driving the 6L6's in push-pull. Inverse feedback is employed between the 500 ohm output winding and the 6SN7 driver tube. This feedback enables large power output with good regulation and low harmonic distortion.

The bias and erase circuits use a 6SN7 tube as the 70 K.C. oscillator and bias amplifier. Bias amplifier has an

MODEL T-10

adjustable control mounted on the rear skirt of the chassis. The erase amplifier circuit uses a 6V6 tube to insure better than 55DB erasure.

POWER SUPPLY:

The power supply uses a 5U4G rectifier tube feeding two separate filter sections, as noted in the schematic diagram.

There are two B+ outputs, one for the 6L6 plates, the other for the voltage amplifiers and bias oscillator and amplifier. The power supply delivers 200 mls at approximately 370 volts out of the single choke section filter, and approximately 360 volts out of the two section choke filter. A 6.3 volt filament supply at 5 Amps. and 5 volts at 3 Amps.

Power supply has an A.C. outlet mounted on the side of the chassis to feed a tuner, or where an A.C. outlet may be required that is controlled from the amplifier A.C. switch. A 5 amp. type 3AG fuse is included in the power supply for line protection.

MAINTENANCE:

B+ voltage fed to the primary center tap of the output transformer is 370 volts. B+ measured from the screens of the 6L6 tubes is 360 volts. These voltages are measured with the "Listen-Record" switch in the "Listen" position. With the "Listen-Record" switch in the "Record" position, the voltages will be 350 and 320, respectively.

The erase voltage, with the tape machine running and the "Listen-Record" switch in the "Record" position, is 250 volts.

The bias voltage is set for 125 volts.

With the 6SN7 oscillator tube removed, feed a 5000 cycle tone into the amplifier, adjust the gain control for 75 volts, measured at the record playback head. Then adjust the V.U. Meter Control for "0" V.U. deflection.

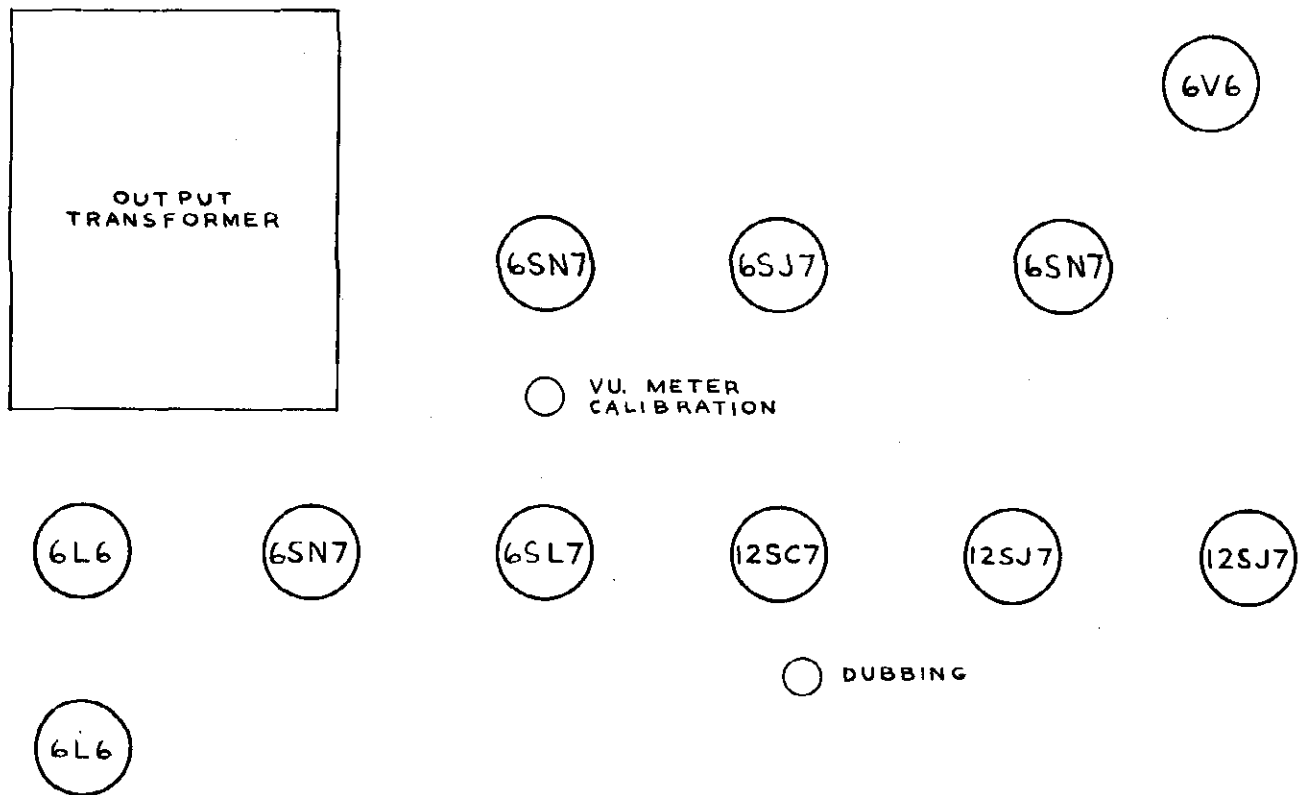
All voltages are measured with a V.T.V.M. The bias and erase voltages are measured with a probe feeding the V.T.V.M.

Sonar Tape Recorder, Model T-10, occasionally will require minor adjustments to the tape mechanism. Depending on the use of this machine, it is advisable that the capstan be cleaned once a month with 3/0 sand paper. This is to insure proper traction at all times. One method of checking the traction between the capstan and the tape is to load the machine as outlined under "Operation of Tape Mechanism". Running in the forward direction, gently grab the right-hand spool. This will cause the left-hand knob to move forward, indicating proper tension.

The slipping clutches employed in this mechanism should be set and maintained to produce 3 to 4 ounces tape tension. This tension is measured with a vest pocket type postal scale. Fasten the leader coming from the tape to the scale, keeping the mechanism in the "Off" position, and draw the scale until the reel starts to turn. This will show the amount of tension on the tape. To increase or decrease this tension, there is provided a locking nut mounted directly on the bottom of each slipping clutch. Turning the nut counter-clockwise increases tension, clockwise rotation decreases tension.

Approximately once every three months, the two erase heads and the record playback head should be cleaned by dipping a pipe cleaner into carbon tetrachloride and swabbing the gaps free of oxide that will normally accumulate. Permit the heads to dry for at least five minutes before using. Do not put carbon tet on the capstan.

It is also advisable, approximately once every month, to clean the flywheel with a rag soaked in carbon tet, and also the two rear discs representing the slipping clutches.



TUBE LAYOUT
FIGURE 1

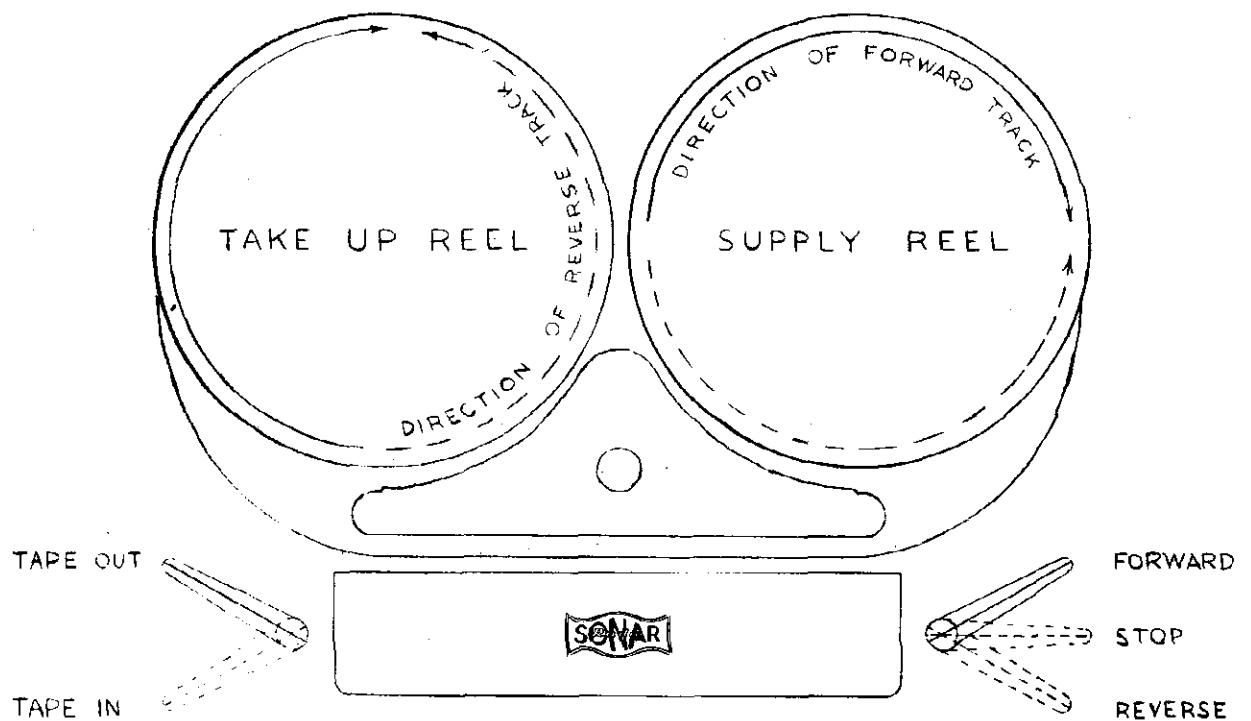


FIGURE 2

