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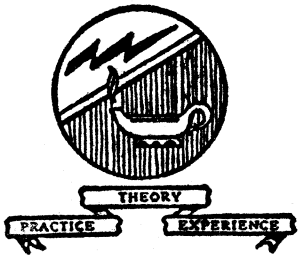
1961

VOLUME TV-18

Television

Servicing Information



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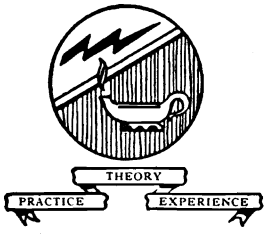

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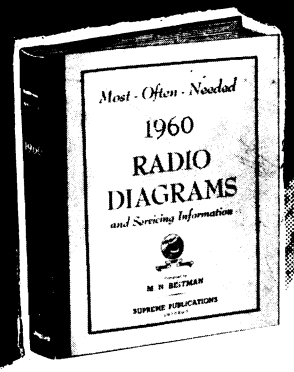

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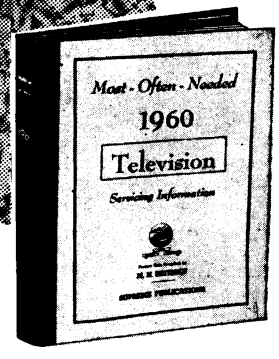

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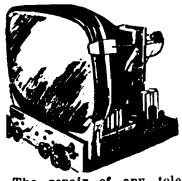

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15G1B and 15UG1B TV CHASSIS

(Diagram on pages 6-7 is exact for 15G1B. Chassis 15UG1B uses different tuners)

MODEL IDENTIFICATION CHART

MODEL NUMBER	TV CHASSIS	MODEL NAME	VHF TUNER	UHF TUNER	POWER TOWER ANTENNA
PL19J131 PL19J132 PL19J133 PL19J135	15G1B	THINMAN 19 CUSTOM	94E163-1	--------	YES
PL19J140		THINMAN	94E163-1	--------	YES
PL19J141		19	94E163-1	--------	YES
PL19J149		EXECUTIVE	94E163-1	--------	YES
PL19UJ131	15UG1B	THINMAN	94E163-10	94E173-1	YES
PL19UJ133		19	94E163-10	94E173-1	YES
PL19UJ135		CUSTOM	94E163-10	94E173-1	YES
PL19UJ140		THINMAN	94E163-10	94E173-1	YES
PL19UJ141		19	94E163-10	94E173-1	YES
PL19UJ149		EXECUTIVE	94E163-10	94E173-1	YES

CHANNEL ADJUSTMENT

Channel slug adjustments should be performed when receiver is installed and checked at every service call. For adjustments, refer to figure 1 and perform the following procedure:

1. Turn receiver on and allow 15 minutes warm up.

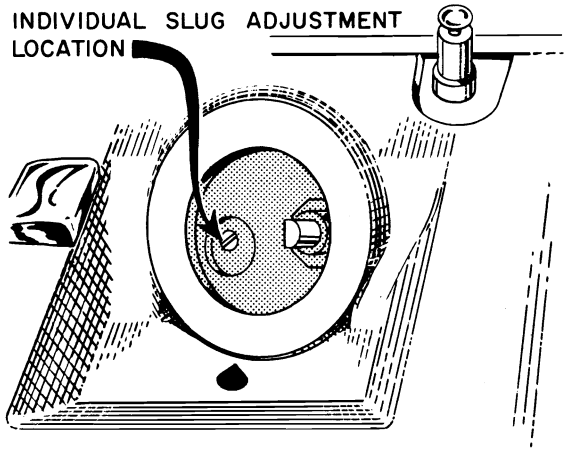


Figure 1. VHF Channel Slug Adjustment Location.

2. Select operating channel. Set other controls for normal sound and picture. Remove Channel selector and Fine Tuning knobs, and plastic well under these knobs.

3. Reinstall Fine Tuning knob and adjust until slug becomes visible through hole in tuner case. Remove Fine Tuning knob.

4. Using a non-metallic alignment tool with 3/32" blade (part number 98A30-22), carefully adjust channel slug for best picture. (NOTE: The sound is not loudest at this point.) Repeat procedure for each channel to be adjusted.

AGC CONTROL ADJUSTMENT

Improper AGC control adjustment may result in an overloaded picture. Picture overload can be recognized by bending and/or tearing of the picture or buzz in the sound output. Also, loss of the picture or a weak washed-out picture can result from improper AGC adjustment. However, these same conditions can be caused by other troubles in the set.

If adjustment is required, it should be performed exactly as described below:

1. Turn set on and allow 15 minutes to warm up.

(Continued on page 4)

ADMIRAL Chassis 15G1B and 15UG1B Service Information, Continued

2. Select strongest station in the area.

3. Set Contrast control for normal picture and Brightness control to maximum (fully to right).

4. Set AGC control (at rear of chassis) to minimum fully to left.

5. If picture has disappeared when AGC control is set to left, turn AGC to right until a weak picture is obtained. Adjust Horizontal Hold (at side of set) and Vertical Hold (at side of set) for a steady picture without bending of vertical lines at top of picture.

6. Very slowly turn AGC control to right until picture just begins to bend, tear, shift or until buzz is heard in sound. Then, slowly turn AGC control to left to a point at which overload of picture and/or buzz in sound is removed. Turn AGC control an additional 10 degrees (approx.) to left.

7. Check picture at maximum contrast on all channels. Picture should not overload and should reappear immediately after changing channels.

IMPORTANT: AGC adjustment should always be made on strongest TV station received.

HORIZONTAL SWEEP ADJUSTMENT

Make adjustment if picture "slips sideways" or "tears" when switching channels. If the Horizontal Oscillator tube V403 (6CG7) is replaced, the Horizontal Hold control may require adjustment.

1. Allow a few minutes for set to warm up. Tune in weakest station; set Brightness and Contrast controls for normal picture.

2. Adjust Horizontal Hold control to sync the horizontal sweep circuit. If the picture cannot be locked-in at approximately the mid-rotation setting of the Horizontal Hold control, perform the following steps for complete horizontal sweep circuit alignment.

3. Connect a jumper wire from junction of R452 (680K) and R453 (1 Meg) to ground to short out oscillator control voltage from Horizontal Phase Detector, CR401. Connect a jumper wire across C452 (.0039 MF) on Etched Circuit Board. This shorts out the Horizontal Lock coil L401.

   Adjust Horizontal Hold control until one horizontal blanking bar (from top to bottom of picture) appears on the screen. This bar may waver back and forth slightly which is normal. If this condition is not reached when Horizontal Hold control is at approximately mid-rotation, change the position of the built-in jumper that is connected between R458 and R469. Short R458 or R469 with jumper or leave both unshorted to obtain one horizontal blanking bar when Horizontal Hold control is set to approx. mid-rotation.

4. Remove jumper from C452 (.0039 MF). Adjust Horizontal Lock coil, L401, until the horizontal blanking bar appears on the screen. Remove remaining jumper wire. Picture will lock into sync. If picture does not lock-in, trouble shooting of horizontal circuitry is necessary to find source of trouble.

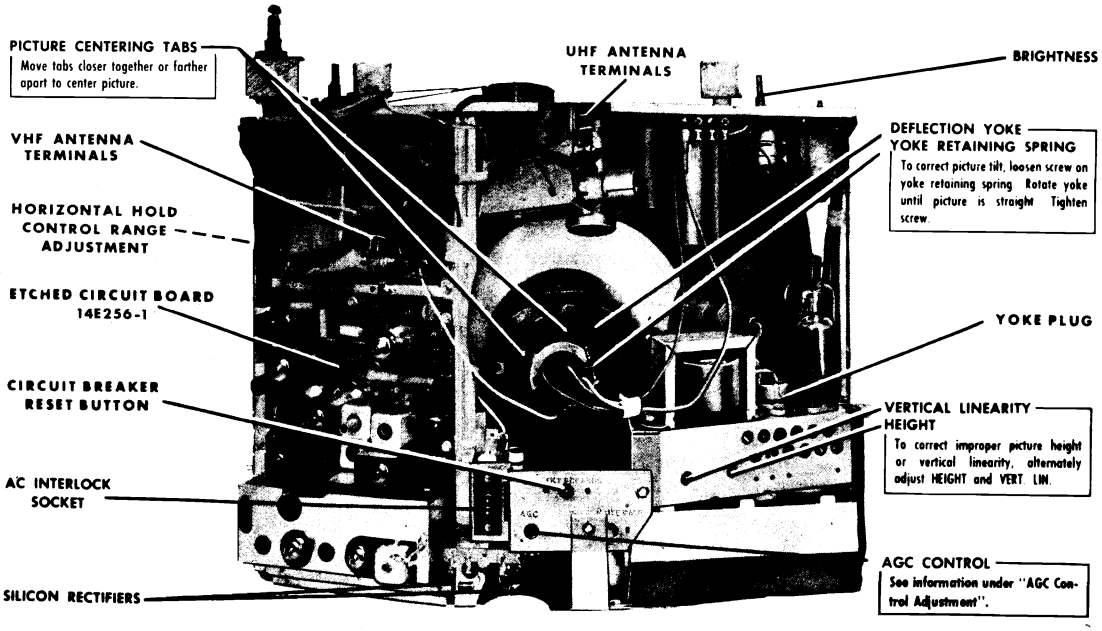
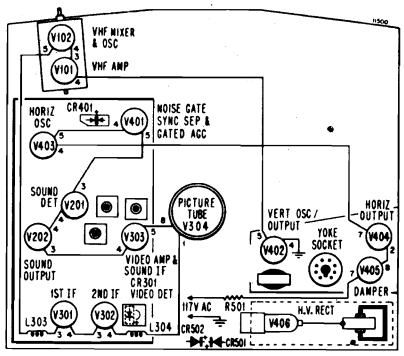


Figure 2. Rear View of Chassis 15UG1B Showing Adjustment Locations. Adjustment locations are the same for TV chassis 15G1B.

ADMIRAL Chassis 15G1B and 15UG1B Service Information, Continued



TUBE LOCATIONS CHASSIS 15G1B

TUBES AND CRYSTAL DIODES

V101...2CY5
V102...5CG8
V201...3DT6
V202...12CU5
V301...3BZ6
V302...3DK6
V303...6AW8A
V304...19XP4
V401...3BU8
V402...10DE7
V403...6CG7
V404...12DQ6A
V405...12AX4GTA/B
V406...1G3GT or 1K3GT
CR301...1N87 or 1N87A
CR401...93B5-6
CR501...93B12-1
CR502...93B12-1

CIRCUIT BREAKER

A circuit breaker incorporated into this receiver provides protection against damaging surges of current caused by fluctuating line voltage. If, after set is turned on or after set is operating, sound and picture disappear, press the red button located at the bottom center of the cabinet back. This button is marked "RESET"

PICTURE WINDOW CLEANING

Use a soft cloth dampened with water to clean the picture window. Do not allow water to drip down into the cabinet. Wipe dry with a soft lint-free cloth.

SCHEMATIC NOTES

②, ③, ... etc. indicate production changes covered by a Run number. Run numbers are stamped at the rear of the chassis. Brief description of Run changes given on schematic.

Ⓐ1, Ⓐ2, ..Ⓨ, Ⓩ, etc. indicate alignment points and connections.

Important: Before making waveform and voltage measurements, see instructions below.

Fixed resistor values shown in ohms ±10% tolerance, ½ watt, capacitor values shown in micromicrofarads ± 20% tolerance unless otherwise specified.

NOTE: K=x 1000, MEG=x 1,000,000, MF=microfarad.

CONDITIONS FOR OBSERVING WAVEFORMS

Warning: Pulsed high voltages are present at the caps of V404 and V406, and at pin 3 of V405. **Do not** attempt to observe waveforms at these points unless suitable test equipment is used.

- Set tuning controls for normal picture. Do not disturb **AGC** and **Horiz. Lock** adjustments. After receiver is set for normal picture, turn the **Contrast** control fully clockwise.
- Oscilloscope sweep is set at 30 cycles for vertical waveforms and at 7,875 cycles for horizontal waveforms to permit 2 complete cycles to be observed.
- Peak-to-peak voltages will vary from those shown on the schematic, depending on the input signal strength, test equipment employed and chassis parts tolerance.
- Waveforms were taken with a comparatively strong transmitted signal input to the television chassis.

CONDITIONS FOR MEASURING VOLTAGES

Warning: Pulsed high voltages are present at the caps of V404 and V406, and at pin 3 of V405. **Do not** attempt to measure voltages at these points without suitable test equipment. A VTVM with a high voltage probe should be used when measuring picture tube 2nd anode voltage.

- Set the **Channel Selector** on an unused channel. **Contrast** control fully clockwise. All other controls fully counterclockwise. Do not disturb **AGC** and **Horiz. Lock** adjustments.
- Antenna disconnected and terminals shorted together.
- Line voltage: 117 volts AC.
- DC voltages measured with a VTVM between tube socket terminals and chassis, unless otherwise indicated.
- All voltages measured with tubes in sockets. Use of adapter sockets is recommended.

PRODUCTION CHANGES

Production changes are coded RUN 10, RUN 11, etc., as given in the headings below. Run number (stamped on chassis) indicates that this chassis has the change(s) incorporated which are explained under that particular run number heading below, as well as all changes (lower run numbers) made prior to that time.

Run 11 in 15G1B and 15UG1B Chassis

INCREASED POWER SUPPLY PROTECTION

For increased power supply protection, "FOCUS" and B+ Boost circuit revised. R436 was 100K and was connected from Focus term. "C" to B+ 270V. C422 was connected from jct. of Focus term. "C" and B+ 270V to ground. C420 was connected across T401 secondary. Focus term. "A" was connected to jct. of pin 3 of V304, R462, and C459. C421 was 470 mmf and was connected from jct. of R416 and R422 to ground. R437 (2.7 megohms) added. R467 was 1.8 megohms, R461 was 150K, R463 was 470K, and R462 was 2.7 megohms. R468 (330K Ω) deleted. C464 voltage rating was 1KV.

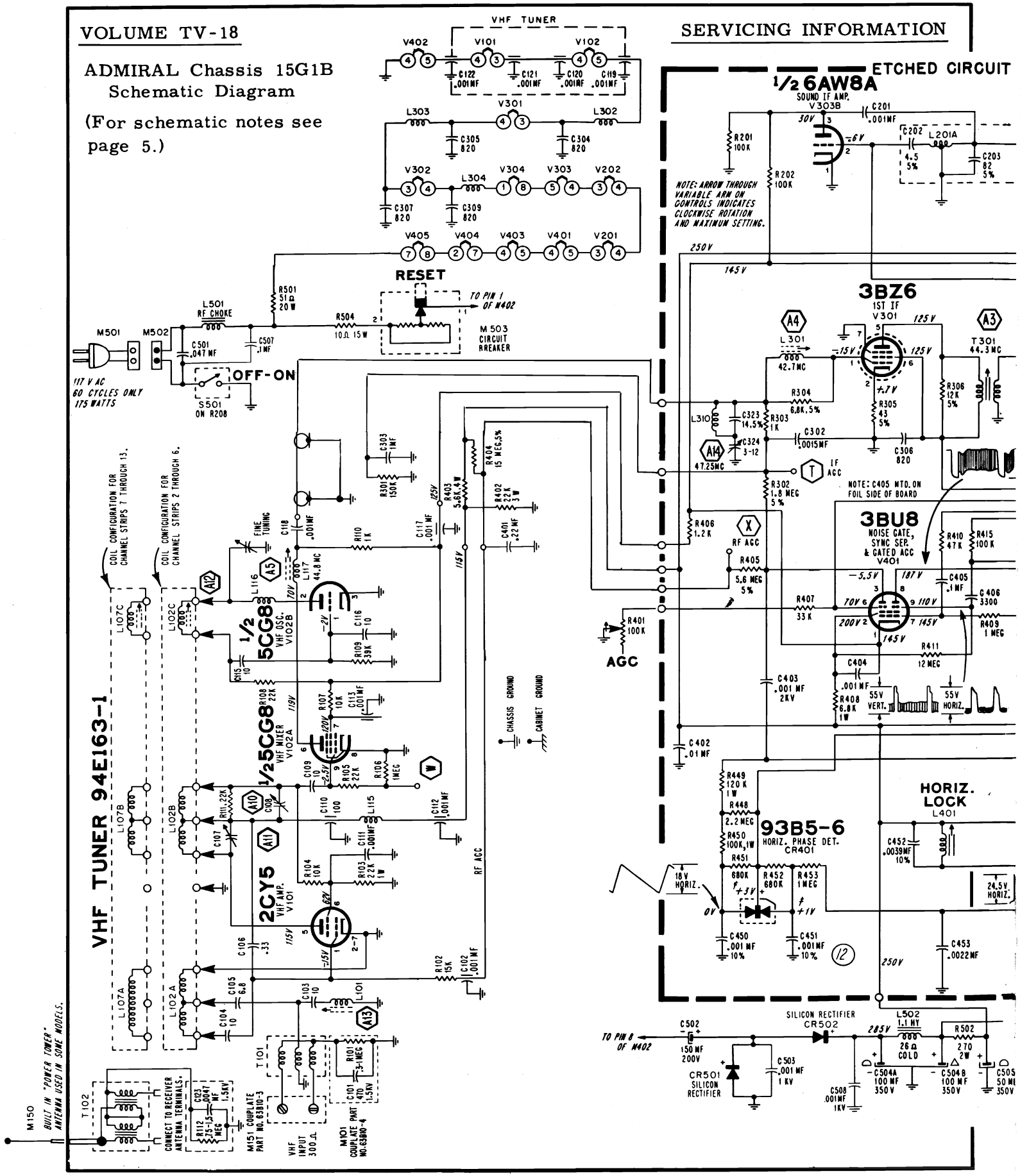
Run 12 in 15G1B and 15UG1B Chassis

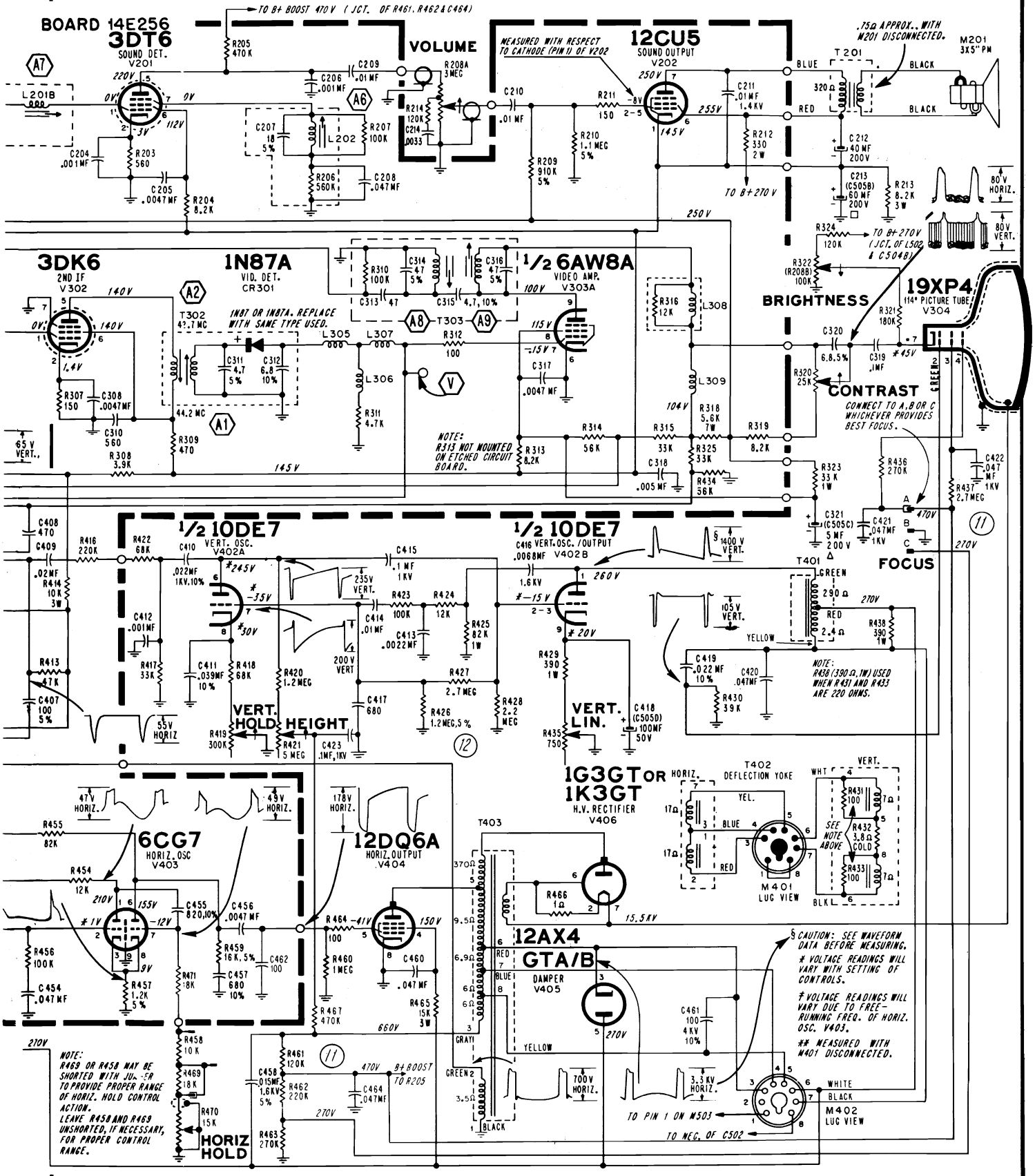
IMPROVED VERTICAL LOCK-IN RANGE CENTERING

To improve vertical lock-in range centering, R426 changed to 1.2 megohms, 5%. Also, C451 changed to 10% tolerance.

ADMIRAL Chassis 15G1B Schematic Diagram

(For schematic notes see page 5.)





Schematic Diagram of TV Chassis 15G1B Stamped Run 12.

ADMIRAL

20A7, 20A7B, 20UA7, 20UA7B, 20B7 and 20C7 TELEVISION CHASSIS

The group of chassis listed above are similar electrically and mechanically. Chassis 20A7 and 20A7B are manually tuned VHF receivers. Schematic diagram on pages 16-17 is exact for 20A7B, while this numbered chassis without a suffix uses a different tuner, but is identical in other respects. Reference to tuners used in all chassis of this group and a cross reference to models-chassis are given in Model Identification Chart on page 9.

Chassis 20UA7 and 20UA7B are manually tuned sets like 20A7B, but provide for VHF-UHF reception by utilizing somewhat different VHF turret tuners and a separate continuously tuned UHF tuner.

Chassis 20B7 is a VHF receiver operated by both push-bar manual tuning and Son-R remote control. Chassis 20C7 is a manually tuned VHF set with built-in AM or FM-AM radio tuner. This chassis has a stereo sound amplifier and is used in TV-radio-phono combinations.

The service material on pages 8 through 18, applies to all chassis described in the paragraphs above.

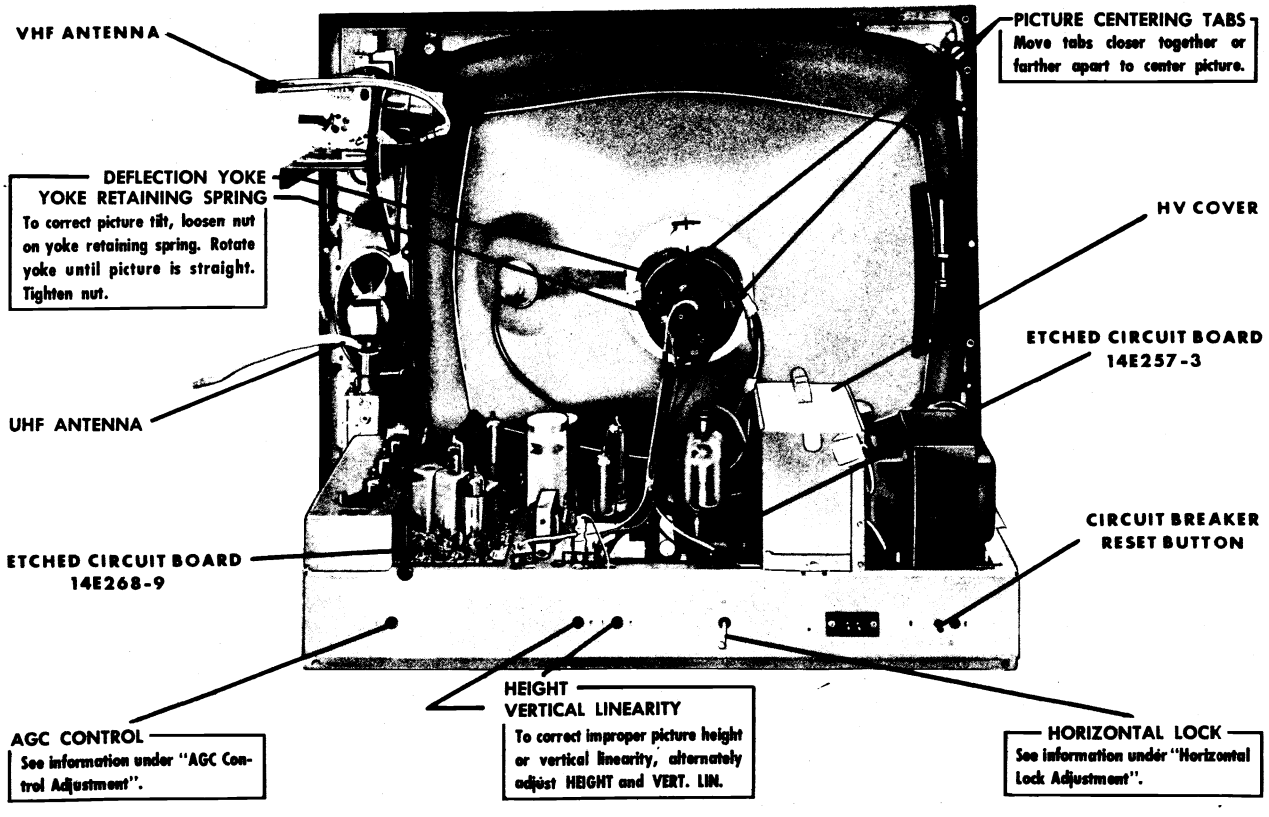


Figure 1. Rear View of 20A7, 20A7B, 20UA7 and 20UA7B Chassis Showing Adjustment Locations. VHF Tuner only in 20UA7 and 20UA7B Chassis.

ADMIRAL Chassis 20A7, -B, 20UA7, -B, 20B7, 20C7, Service Material, Continued

MODEL IDENTIFICATION CHART

MODEL NUMBER	TV CHASSIS	VHF TUNER
T24M 110, T24M 111, T24M 112, T24M 113	20A7 20A7B	94E 184-10 94E 188-1
T24UM 110, T24UM 111, T24UM 112, T24UM 113	20UA7 20UA7B	94E 164-11 94E 188-2
TS24M 120, TS24M 122, TS24M 123	20B7	94E 164-15
C24M 121, C24M 122, C24M 123	20A7 20A7B	94E 184-10 94E 188-1
C24UM 121, C24UM 122, C24UM 123	20UA7 20UA7B	94E 164-11 94E 188-2
C24M 131, C24M 132, C24M 133	20A7 20A7B	94E 184-10 94E 188-1
C24UM 131, C24UM 132, C24UM 133	20UA7 20UA7B	94E 164-11 94E 188-2
C24M 142, C24M 149	20A7 20A7B	94E 184-10 94E 188-1
C24UM 142, C24UM 149	20UA7 20UA7B	94E 164-11 94E 188-2
C24M 171, C24M 172, C24M 189	20A7 20A7B	94E 184-10 94E 188-1
C24UM 171, C24UM172, C24UM 189	20UA7 20UA7B	94E 164-11 94E 188-2
C24M 189	20A7 20A7B	94E 184-10 94E 188-1
C24UM 189	20UA7 20UA7B	94E 164-11 94E 188-2
CS24M 131, CS24M 132, CS24M 133	20B7	94E 164-15
CS24M 142, CS24M 149	20B7	94E 164-15
L24M 151, L24M 152, L24M 153	20A7 20A7B	94E 184-10 94E 188-1
L24UM 151, L24UM 152, L24UM 153	20UA7 20UA7B	94E 164-11 94E 188-2
L24M 161, L24M 169	20A7 20A7B	94E 184-10 94E 188-1
L24UM 161, L24UM 169	20UA7 20UA7B	94E 164-11 94E 188-2
LS24M 152, LS24M 159	20B7	94E 164-15
LS24M 161, LS24M 169	20B7	94E 164-15
STA24M 120, STA24M 121, STA24M 122, STA24M 123	20C7	94E 164-10
STF24M 151, STF24M 152, STF24M 153	20C7	94E 164-10
STF24M 162, STF24M 169	20C7	94E 164-10

REMOVING CHASSIS FROM CABINET

For servicing convenience, chassis including picture tube and front escutcheon are removable as a unit from in front of cabinet. Remove chassis as follows:

1. Remove cabinet back. Disconnect antenna and speaker.
2. Remove chassis mounting screws from bottom of cabinet.
3. From inside of cabinet, remove screws which mount front escutcheon to front of cabinet. Note: A 5/16" socket wrench with 20" long shank will be required for sets with metal cabinet.
4. Remove chassis from cabinet by securely grasping sides of front escutcheon.
5. To reinstall chassis in cabinet, very carefully guide chassis through front of cabinet. In metal cabinet models, the front edges of the cabinet must fit firmly into grooved surfaces of rear of metal escutcheon. In wood cabinet models, guide metal locating pins (at rear of escutcheon) into matching holes in cabinet.
6. After chassis and escutcheon are firmly seated in cabinet, reassemble screws mounting escutcheon to front of cabinet. Reassemble chassis mounting screws at bottom of cabinet. Reconnect antenna and speaker.

PICTURE TUBE REPLACEMENT

The picture tube of these receivers is mounted directly to the front escutcheon as shown in the figure below. To replace picture tube, proceed as follows:

1. Remove chassis, picture tube, yoke coil and front escutcheon as a unit from the front of the cabinet as instructed under "Removing Chassis From Cabinet".
2. Remove tuning knobs. Place chassis on a solid table with escutcheon face downward on a clean, soft cloth. Caution: To prevent damage to front tuning controls, place escutcheon on a table so that control shafts overhang edge of table.
3. Remove static charge from picture tube by discharging second anode well to chassis ground.
4. Disconnect yoke connector plug, picture tube socket and picture tube second anode lead. If dial light is used, disconnect dial light from mounting bracket.
5. Disconnect brackets mounting VHF tuner and front panel controls by removing bracket mounting screws.
6. Remove screws from brackets at each side of chassis.
7. Remove screws which support inside center of chassis to bracket at bottom of picture tube.
8. After removing chassis mounting screws, securely grasp chassis and carefully remove it from mounting brackets.
9. Remove deflection yoke from picture tube after loosening clamping nut on band at rear of yoke cap.
10. To remove picture tube from front escutcheon, loosen retaining screw on tube support wire. Remove screws mounting tube support straps.
11. To mount replacement tube, place tube on front escutcheon with second anode well located on same side as original tube. Reassemble support wire and mounting straps removed in step 10.
12. Reassemble deflection yoke to neck of picture tube.
13. Mount chassis to escutcheon brackets by assembling mounting screws removed in steps 6 and 7.
14. Mount VHF tuner and tuning control support brackets to escutcheon.
15. Connect deflection yoke plug, picture tube socket and second anode lead. Reassemble pilot light socket.
16. Turn receiver on and make picture adjustments.

ADMIRAL Chassis 20A7, -B, 20UA7, -B, 20B7, 20C7, Alignment Information, Continued

IF AMPLIFIER ALIGNMENT

- Connect negative of 3.0 volt bias supply through 10K resistor to test point "T" (IF AGC), see figures 12 and 13, positive to chassis.
- Connect generator high side to 6CG8 mixer-osc. insulated tube shield, see figure 7. Connect low side to chassis near tube shield.
- Connect VTVM high side to test point "V" through a decoupling filter, see figures 9, 12 and 13.
- Set Channel Selector to channel 12 or other unassigned high channel, to prevent interference during alignment.
- Connect a jumper wire across the antenna terminals.
- Set Contrast control fully to the right (clockwise).
- Set AGC control fully to the left (counterclockwise).
- Allow about 15 minutes for receiver and test equipment to warm up.
- Use a non-metallic alignment tool, part No. 98A30-12.

Step	Signal Gen. Freq.	Instructions	Adjust
Before proceeding, be sure to check the signal generator used in alignment against a crystal calibrator or other frequency standard for absolute frequency calibration required for this operation.			
1	45.3 MC	Use —3 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 2 volts.	A1 and A2 for max.
2	43.5 MC		A3 and A4 for max.
3	41.5 MC		A5 for maximum.
4	42.0 MC		A6 for maximum.
5	41.25 MC	If necessary, increase generator output and/or reduce bias to —1½ volts to obtain a definite indication on VTVM.	A7 for minimum.
6	39.75 MC		A8 for minimum.
7	47.25 MC		A9 for minimum.
8	43.5 MC	Same as "STEP 1".	A3 for maximum.

IF RESPONSE CURVE CHECK (Using sweep generator and oscilloscope)

Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Channel Selector on channel 3 or an unassigned low channel. Contrast control fully to the left. Connect negative of 3 volt bias supply to test point "T" (IF AGC); positive to chassis.	Connect high side to 6CG8 mixer-osc. insulated tube shield, see fig. 7. Connect low side to chassis near tube shield. Set sweep frequency to 43 MC, and sweep width approximately 7 MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" thru a decoupling filter, see figs. 9, 12 and 13.	Check curve obtained against ideal response curve in fig. 10. Note tolerances on curve. Keep marker and sweep outputs at very minimum to prevent overloading. A reduction in sweep output should reduce response curve amplitude without altering the shape of the response curve. If the curve is not within tolerance or the markers are not in the proper location on the curve, touch-up with IF slugs as instructed below.

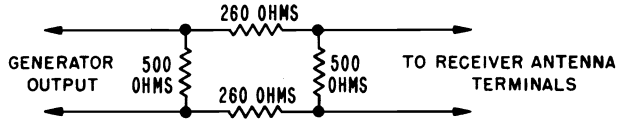


Figure 8. Circuit of 12 DB Attenuation Pad for Viewing Over-all VHF IF Response Curve.

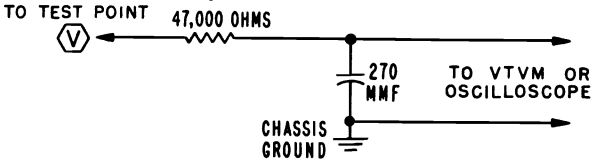


Figure 9. Decoupling Filter.

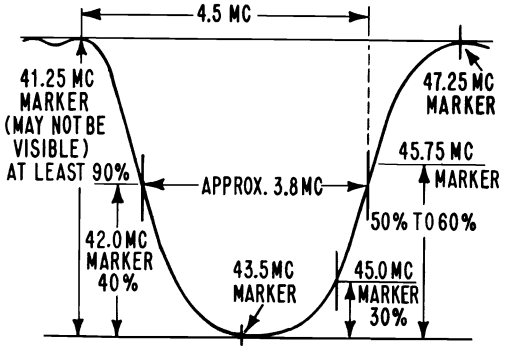


Figure 10. Ideal IF Response Curve.

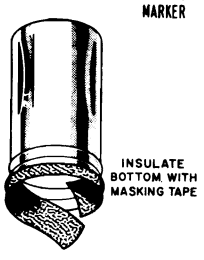


Figure 7. Special Tube Shield for IF Alignment and IF Response Curve Check.

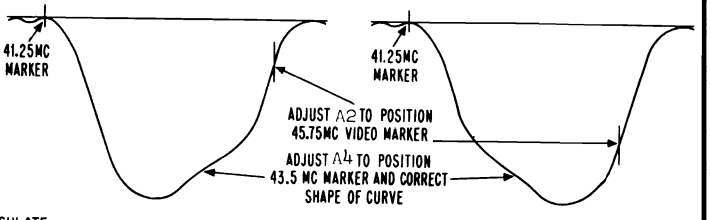


Figure 11. IF Response Curves, Incorrect Shape.

ADMIRAL Chassis 20A7, -B, 20UA7, -B, 20B7, 20C7, Alignment Data, Continued

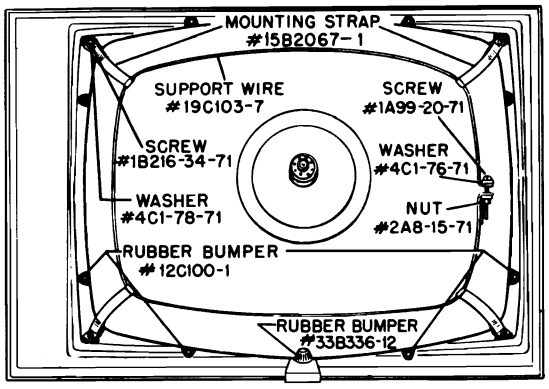


Figure 6. Rear View of Escutcheon with Picture Tube Mounted, Chassis Removed.

AGC CONTROL ADJUSTMENT

The **AGC** control is an AGC threshold control which is used solely to adjust the receiver for optimum operation under all signal conditions. This control is set at the factory and will not normally require field readjustment.

Improper **AGC** control adjustment may result in an overloaded picture. Picture overload can be recognized by bending and/or tearing of the picture or buzz in the sound output. Also, loss of the picture or a weak washed-out picture can result from improper **AGC** adjustment. However, these same conditions can be caused by other troubles in the set.

If adjustment is required, it should be performed exactly as instructed below:

1. Turn set on and allow 15 minutes to warm up.
2. Select strongest station in the area.
3. Set **Contrast** control for normal picture and **Brightness** control to maximum (fully to right).
4. Set **AGC** control (at rear of chassis) to minimum (fully to left).
5. If picture has disappeared when **AGC** control is set to left, turn AGC to right until a weak picture is obtained. Adjust **Horizontal Lock** (rear of set) and **Vertical Hold** (front of set) for a steady picture without bending of vertical lines at top of picture.
6. Very slowly turn **AGC** control to right until picture just begins to bend, tear, shift or until buzz is heard in sound. Then, slowly turn **AGC** control to left to a point at which overload of picture and/or buzz in sound is removed. Turn **AGC** control an additional 10 degrees (approx.) to left.

HORIZONTAL LOCK ADJUSTMENT

Make adjustment if picture "slips sideways" or "tears" when switching channels. Adjustment is made by rotating flexible shaft extending from rear of set. Adjust as follows:

1. Allow a few minutes for set to warm up. Tune in weakest station, set Brightness and Contrast controls for normal picture. Important: Before proceeding, be sure that the AGC control has been adjusted according to instructions.
2. Reduce Contrast to minimum. Very slowly turn Horizontal Lock adjustment to the right or left until picture is in sync. Interrupt the television signal by switching Channel Selector off and on channel. Picture should remain in sync. If picture bends or loses sync, adjust the Horizontal Lock so that picture remains in sync and bending of vertical lines does not appear at top of picture. Check adjustment on all channels; if necessary, repeat procedure.

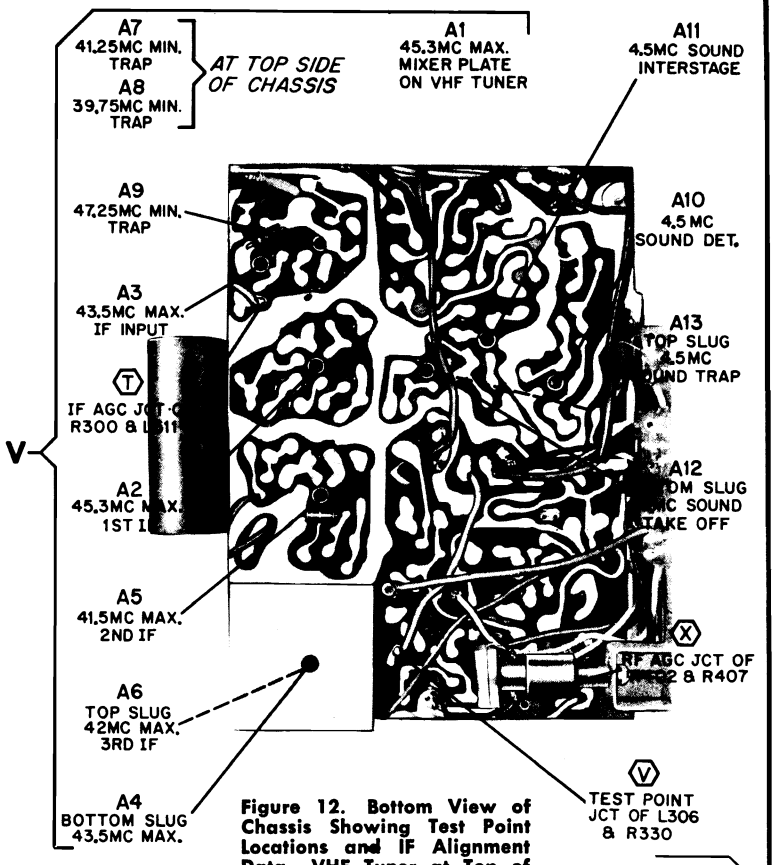


Figure 12. Bottom View of Chassis Showing Test Point Locations and IF Alignment Data. VHF Tuner at Top of Illustration.

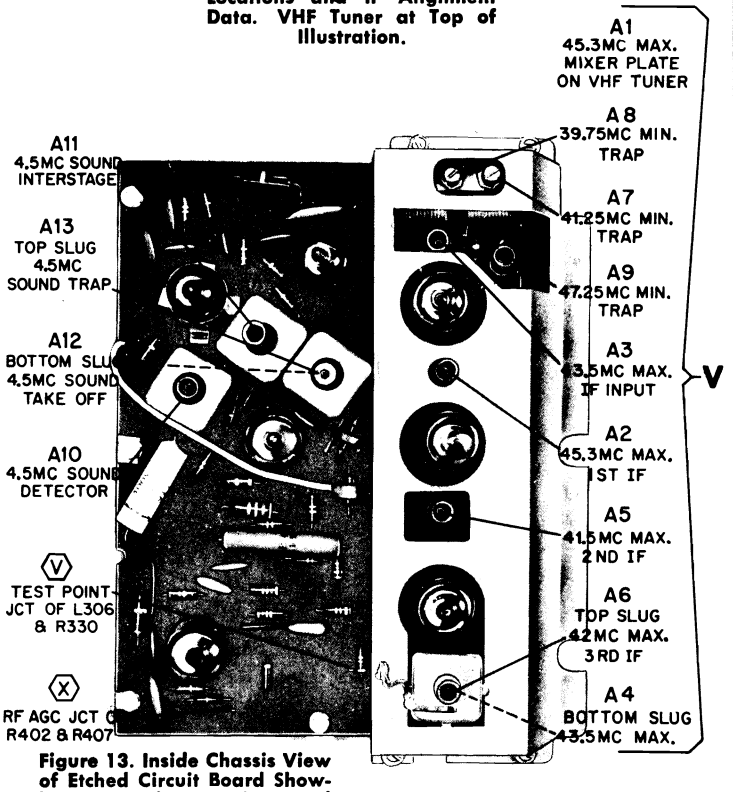


Figure 13. Inside Chassis View of Etched Circuit Board Showing Test Point Locations and IF Alignment Data.

ADMIRAL Chassis 20A7, -B, 20UA7, -B, 20B7, 20C7, Alignment Data, Continued

4.5 MC SOUND IF ALIGNMENT USING TELEVISION SIGNAL

For simplicity and required accuracy of the 4.5 MC signal frequency, the sound alignment procedure given in the manual uses a transmitted TV signal rather than test equipment.

Important: Note that step 3 of the sound IF alignment procedure requires the use of a strong transmitted TV signal. Steps 5 and 6 requires the use of a weak (attenuated) TV signal. Failure to use a television signal of the required level as instructed for each of the steps will cause incorrect alignment with resulting weak or distorted sound.

Make alignment adjustments as follows:

1. Remove cabinet back. Turn set on and allow 15 minutes for warm up.
2. Select the strongest TV station received. AGC control must be in proper adjustment, see procedure on page 11. Adjust other controls for normal operation. See figures 12 and 13 for adjustment locations.
3. Using a non-metallic alignment tool (for hexagonal core IF slugs, Admiral Part No. 98A30-12), very slowly turn slug "A10" several turns counterclockwise until a buzz is heard in the sound. Then turn it clockwise until the loudest and clearest sound is obtained. NOTE: There may be two points (approximately ½ turn part) at which sound is loudest. The slug should be set at the center range of the second point of loudest sound noted as the slug is turned in (toward etched circuit board).
4. Set Contrast control fully to the left (counterclockwise). Reduce the signal to the antenna terminals until there is a considerable amount of hiss in the sound. For best results, it is recommended that a step attenuator be connected between the antenna and the antenna terminals. The signal can also be reduced by disconnecting the antenna and placing it in close proximity of the antenna terminals or tuner antenna lead-in.
5. Carefully adjust slug "A11" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A11".
6. Carefully adjust slug "A12" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A12". Caution: Adjustment "A12" is slug nearest bottom of shield can; use care so as not to disturb slug nearest top of shield can.
7. If the above steps are correctly made, no further adjustment should be required. However, if sound remains distorted at normal volume level when receiver is tuned for best sound, repeat entire procedure.

Caution: Do not readjust slug "A10" unless sound is distorted. If "A10" is readjusted, all steps in alignment procedure should be repeated exactly as instructed above.

SERVICING ETCHED CIRCUITRY

A major portion of the circuit wiring of these receivers is contained in an etched circuit board. The etched circuit board contains tubes and components in the video IF, video detector, video amplifier, sound amplifier, AGC and sync separator circuits.

The servicing of etched circuitry is easy and less time consuming. The task of circuit tracing, locating and replacing a component is simplified, since components are mounted at the top side of etched circuit boards. Voltage and resistance measurements as well as parts replacement can generally be made from top side of etched circuit board, without need for removing the chassis from the cabinet.

VIEWS OF COMPONENT SIDE OF ETCHED CIRCUIT BOARDS

Pictorial views of the component (top side) of etched circuit boards are shown in figures 21, 23, and 27. The component side of all Admiral etched circuit boards are silk screened (printed) with a wiring outline, which is an exact facsimile of the etched circuitry contained at the bottom side of the etched circuit board. Schematic symbols of components, tube type numbers, test point locations and grid co-ordinate (letters and numbers) are also silk screened on the component side of the etched circuit boards. Use of grid co-ordinates for quickly locating components of etched circuit boards is given below.

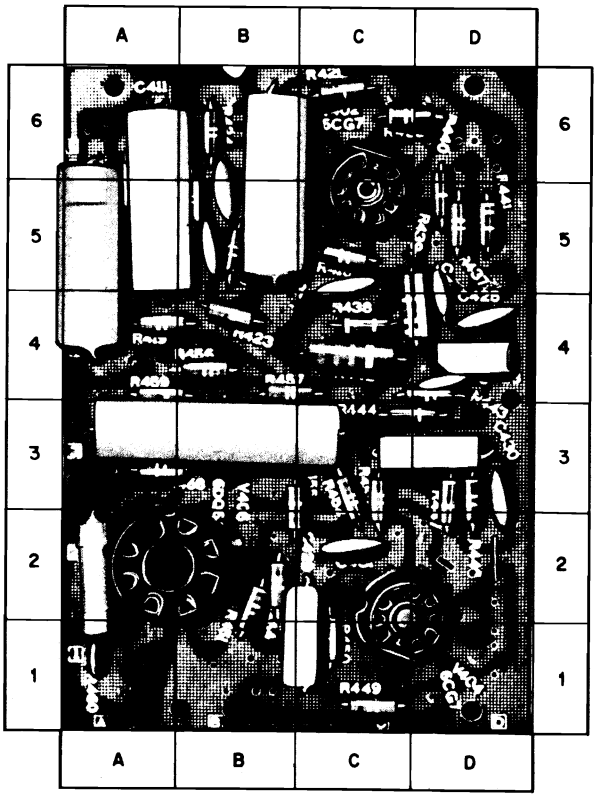


Figure 21. View of Component Side of Etched Circuit Board 14E257-3. Refer to Parts Location Table "A".

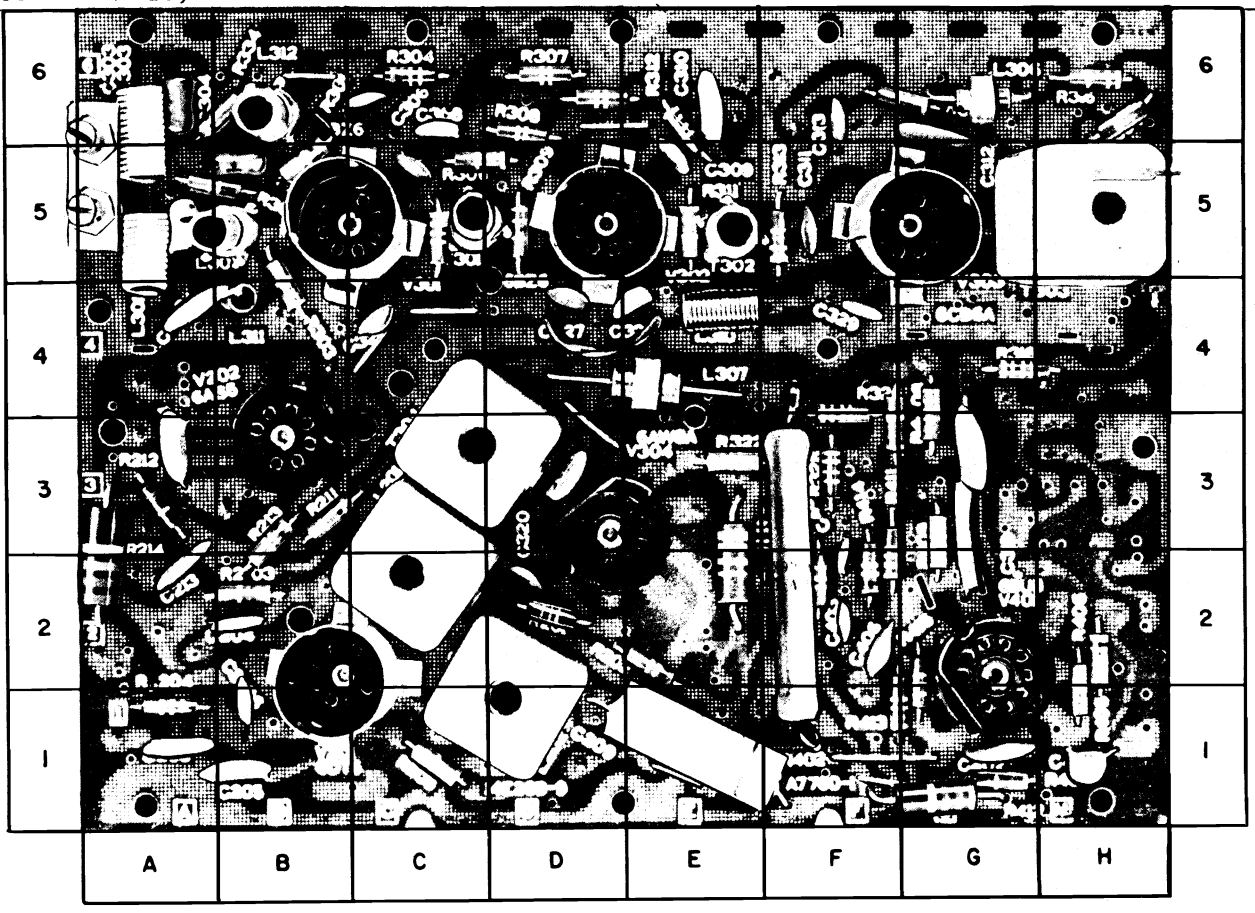


Figure 23. View of Component Side of Etched Circuit Board 14E268-9. Used in Models with Single Ended Sound Output. Refer to Parts Location Table "B".

PARTS LOCATION TABLE "A"			
Sym.	Loc.	Sym.	Loc.
C407	C4	R438	C4
C408	B5	R439	D4
C411	A5	R440	D5
C414	A5	R441	D5
C423	D4	R442	C4
C424	D4	R443	D3
C425	D4	R444	C3
C426	D3	R445	D3
C429	C1	R447	D3
C430	D3	R449	C1
C431	C2	R451	B2
C433	B3	R452	C3
R416	C5	R453	C3
R417	B5	R454	B2
R419	A4	R456	B4
R421	C6	R457	B4
R422	C6	R458	A3
R423	B4	R459	A4
R424	B6	R460	A2
R437	D5		

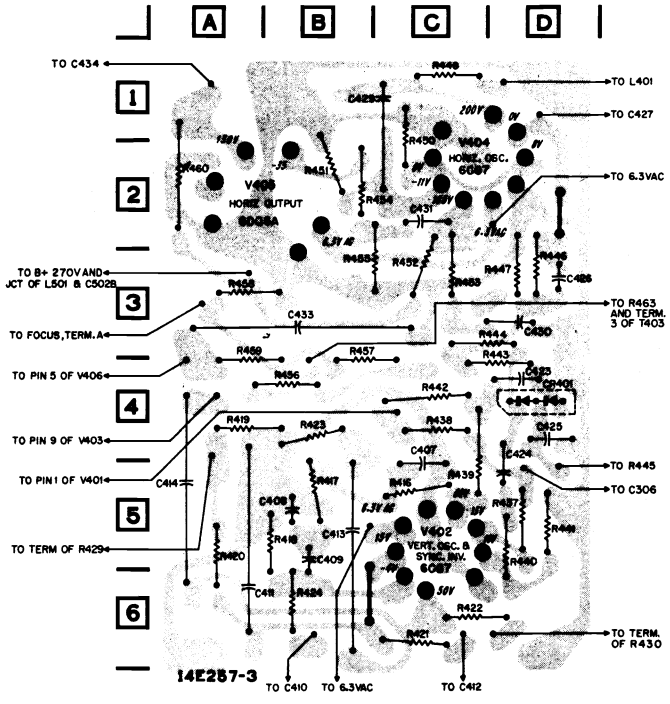


Figure 22. View of Etched Side of Etched Circuit Board 14E257-3. Refer to Parts Location table "A".

ADMIRAL Chassis 20A7, -B, 20UA7, -B, 20B7, 20C7, Service Material, Continued

VIEWS OF ETCHED SIDE OF CIRCUIT BOARDS

Views of the etched (bottom) side of etched circuit boards as shown in figures 22, 25, and 28. Note that the gray area represents the etched circuitry. Tube pin connections and numbers are shown in black circles along with tube type numbers and functions. Note also, that, components and wiring connections at opposite (component) side of the etched circuit board are shown as black lines or schematic symbols. Leads with black arrows extending from board, show connection of etched circuitry to external chassis wiring. Grid co-ordinate (letters and numbers) are indicated at sides of etched circuit views.

LOCATING COMPONENTS

Grid co-ordinates (numbers within horizontal lines and letters within vertical lines) are included in views of etched circuitry.

To quickly locate a component on etched circuit board from the schematic symbol number, refer to Parts Location Table for grid co-ordinate number and letter. Then referring to number at side and letter at top of illustration, follow these points to their intersection. The component is located in the square formed at the intersection of the lettered and numbered co-ordinate areas.

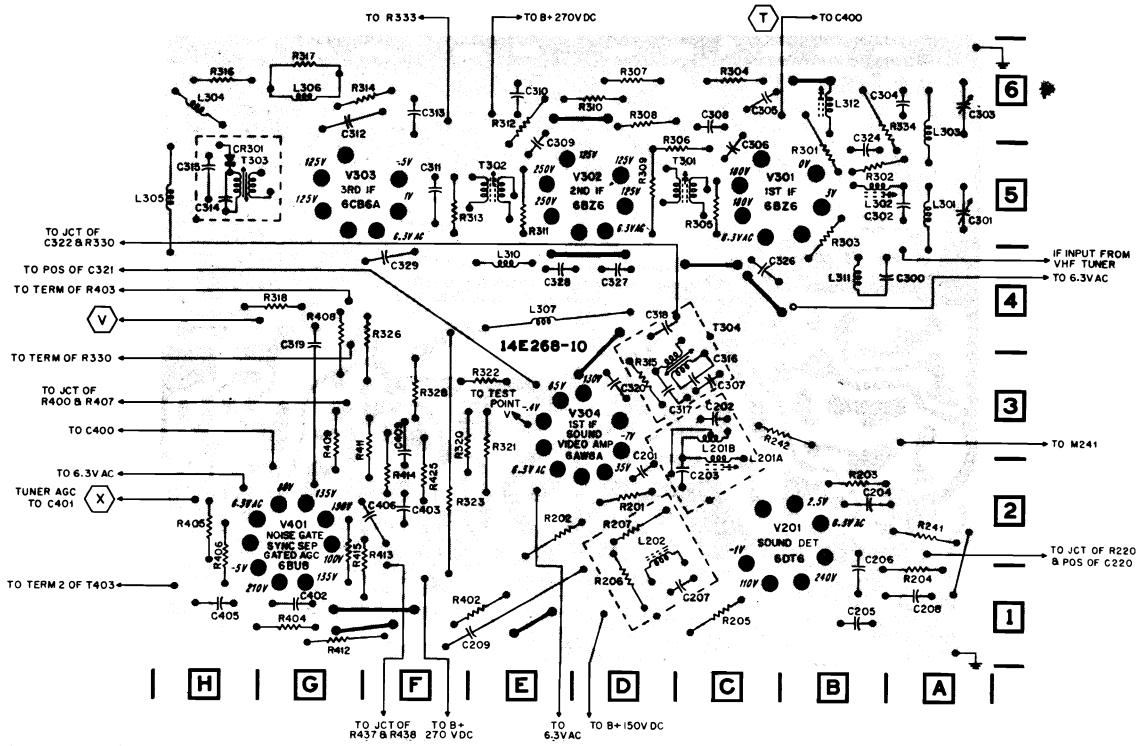


Figure 25. View of ETCHED SIDE of Etched Circuit Board 14E268-9. Used in Models with Single Ended Sound Output. Gray area represents etched circuitry; black symbols and lines represent components and connections on opposite side. Refer to Parts Location Table "B".

PARTS LOCATION TABLE "B"

Sym.	Loc.	Sym.	Loc.	Sym.	Loc.	Sym.	Loc.	Sym.	Loc.	Sym.	Loc.
C204	B2	C311	F5	R202	E2	R307	D6	R334	B6	L303	A6
C205	B1	C312	G6	R203	B2	R308	D6	R402	F2	L304	H6
C206	B1	C313	F6	R204	A1	R309	D5	R404	G1	L306	G6
C208	A1	C319	G3	R205	C1	R311	E5	R405	H2	L307	E4
C209	E1	C320	D2	R206	A1	R312	D6	R406	H2	L310	E4
C213	A2	C326	C4	R211	B3	R313	F5	R409	G3	L311	B4
C214	A3	C327	D4	R212	A3	F314	G6	R411	F2	L312	B6
C300	A4	C328	E4	R213	B3	R316	H6	R412	G1	T301	C5
C301	A5	C329	F4	R214	A2	R318	G4	R413	G3	T302	E5
C303	A6	C402	G1	R241	A2	R320	F2	R414	F2	T303	H5
C304	A6	C403	F3	R242	A3	R321	E2	R415	G2	T304	C3
C306	C6	C405	H1	R301	B5	R322	E2	L201	C2		
C308	C6	C406	F2	R303	B5	R326	F3	L202	D1		
C309	E5	C409	F2	R304	C6	R328	F3	L301	A5		
C310	E5	R201	D2	R306	C5	R330	A5	L302	A5		

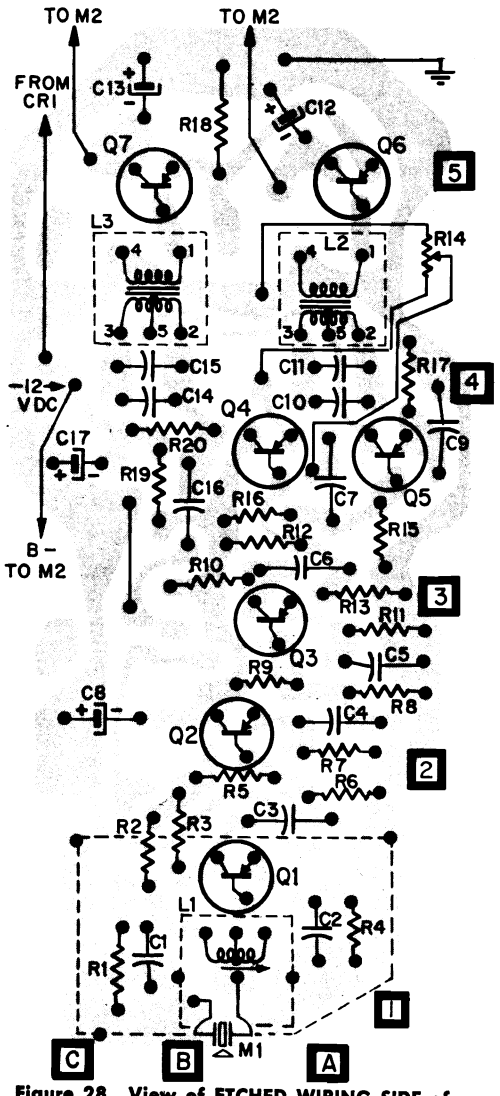


Figure 28. View of ETCHED WIRING SIDE of Etched Circuit Board 14E287-1. See Parts Location Table "C". Gray area represents etched wiring; black symbols and lines represent components and connections on opposite side.

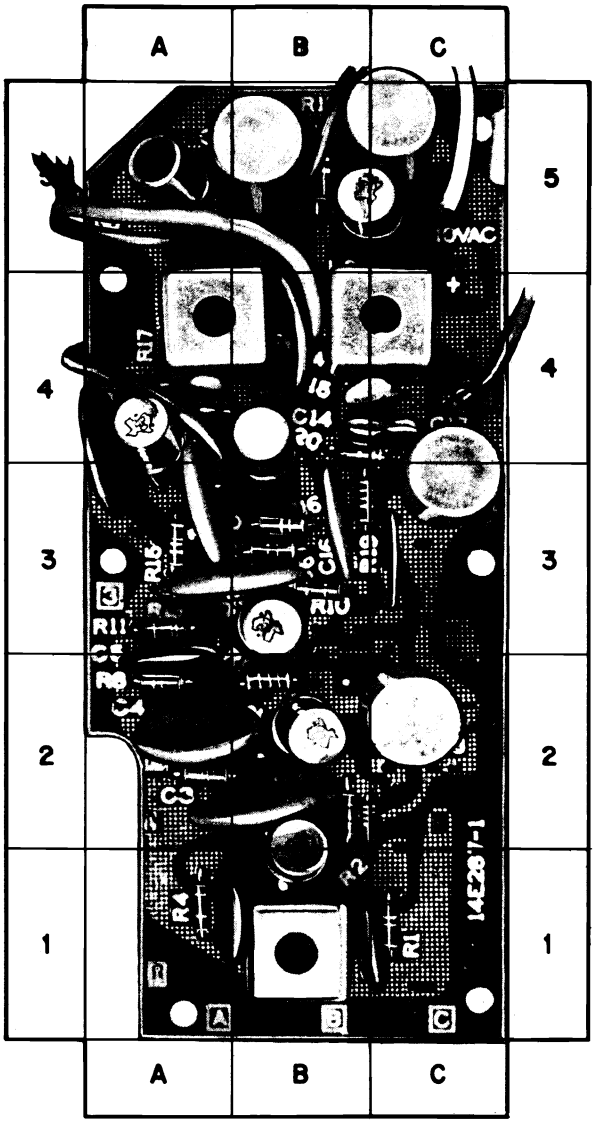


Figure 27. View of Component Side of Etched Circuit Board 14E287-1. See Parts Location Table "C".

PARTS LOCATION TABLE "C"

Sym.	Loc.	Sym.	Loc.	Sym.	Loc.	Sym.	Loc.	Sym.	Loc.	Sym.	Loc.
C1	B1	C9	A4	C17	C3	R8	A2	R17	A4	Q2	B2
C2	A1	C10	A4	R1	C1	R9	B2	R18	B5	Q3	B3
C3	B2	C11	A4	R2	B2	R10	B3	R19	B3	Q4	B4
C4	A2	C12	C5	R3	B2	R11	A3	R20	B4	Q5	A4
C5	A2	C13	B4	R4	A1	R12	B3	L1	B1	Q6	B5
C6	A3	C14	B4	R5	B2	R13	A3	L2	C4	Q7	A5
C7	A3	C15	B4	R6	A2	R15	A3	L3	A4		
C8	C2	C16	B3	R7	A2	R16	B3	Q1	B1		

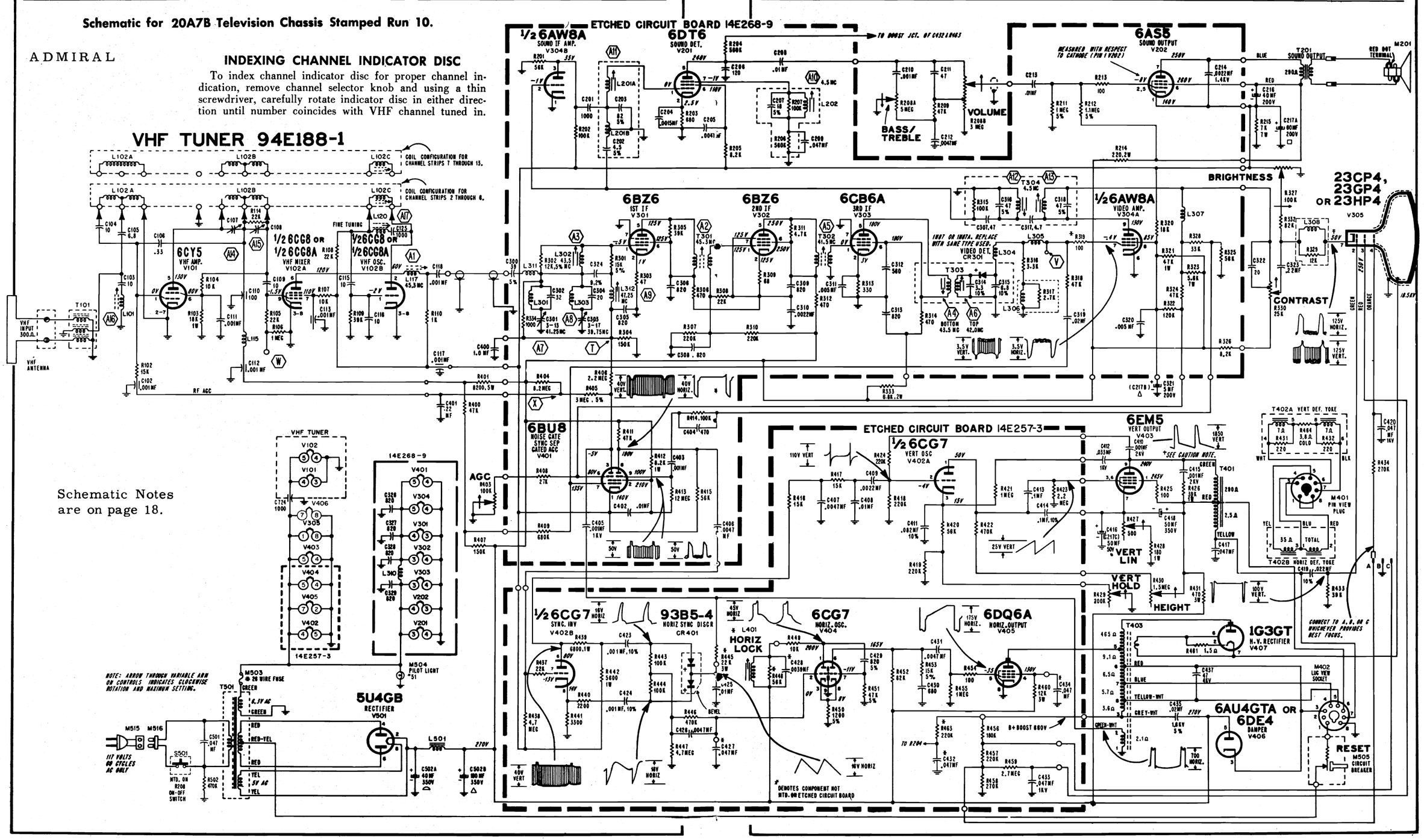
VOLUME TV-18, MOST-OFTEN-NEEDED 1961 TELEVISION SERVICING INFORMATION

Schematic for 20A7B Television Chassis Stamped Run 10.

ADMIRAL

INDEXING CHANNEL INDICATOR DISC

To index channel indicator disc for proper channel indication, remove channel selector knob and using a thin screwdriver, carefully rotate indicator disc in either direction until number coincides with VHF channel tuned in.



Schematic Notes are on page 18.

ADMIRAL Chassis 20A7, -B, 20UA7, -B, 20B7, 20C7, Service Material, Continued

SCHEMATIC NOTES

Numbers and letters inside hexagons indicate alignment points.

Fixed resistor values shown in ohms ± 10% tolerance, ½ watt; capacitor values shown in micromicrofarads ± 20% unless otherwise specified.

NOTE: K = x 1000, MEG = x 1,000,000, MF = microfarad.

CONDITIONS FOR OBSERVING WAVEFORMS

Warning: Pulsed high voltages are present at the caps of V405 and V407, and at pin 3 of V406. **Do not** attempt to observe waveforms at these points unless suitable test equipment is used.

- Set tuning controls for normal picture. Do not disturb **AGC** and **Horiz. Lock** adjustments. After the receiver is set for a normal picture turn the **Contrast** control fully clockwise.
- Oscilloscope sweep is set at 30 cycles for vertical waveforms and at 7,875 cycles for horizontal waveforms, to permit 2 complete cycles to be observed.
- Peak-to-Peak voltages will vary from those shown on the schematic depending on the input signal strength, test equipment employed and chassis parts tolerance.
- Waveforms were taken with a comparatively strong transmitted signal input to the television chassis.

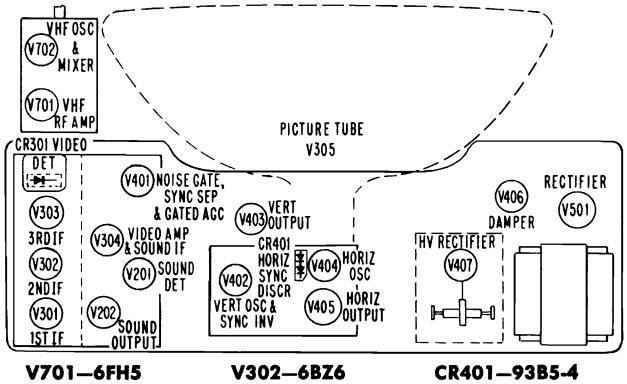
CONDITIONS FOR MEASURING VOLTAGES

Warning: Pulsed high voltages are present at the caps of V405 and V407, and at pin 3 of V406. **Do not** attempt to measure voltages at these points without suitable test equipment. A VTVM with a high voltage probe should be used when measuring picture tube 2nd anode voltage.

- Set the **Channel Selector** on an unused channel. **Contrast** control fully clockwise. Other controls fully counterclockwise. Do not disturb **AGC** and **Horiz. Lock** adjustments.
- Antenna disconnected and terminals shorted together.
- Line voltage 117 volts AC.
- DC voltages measured with a VTVM between tube socket terminals and chassis, unless otherwise indicated.
- All voltages measured with tubes in sockets. Use of adapter sockets is recommended.

B+ Circuit Breaker or Fuse: The B+ supply of these receivers are equipped with a thermal type circuit breaker (having a manual reset button). Allow a few minutes for circuit breaker to cool off before pressing reset button.

Heater Circuit Fuse: A one inch length of number 26 gauge bare annealed copper wire is used. Fuse wire is located at underside of chassis, adjacent to the power transformer.



V701—6FH5 in 20A7
V101—6CY5 in 20A7B
V702 or V102—6CG8 or 6CG8A
V201—6DT6
V202—6AS5
V301—6BZ6
V302—6BZ6
V303—6CB6A
CR301—1N87 or 1N87A (Crystal Diode)
V304—6AW8A
V305—23CP4, 23GP4 or 23HP4
V401—6BU8
CR401—93B5-4
V402—6CG7
V403—6EM5
V404—6CG7
V405—6DQ6A
V406—6AU4GTA or 6DE4
V407—1G3GT
V501—5U4GB

CHECKS WHEN SERVICING SON-R TUNERS

When servicing, note following checks, which are important for proper operation, see figures 36 and 37.

1. Bars must be centered within circular mounting holes in bracket.
2. Retaining springs must be perfectly seated in grooves at top and bottom of bars.
3. Ends of retaining springs must extend equally from both sides of bracket.

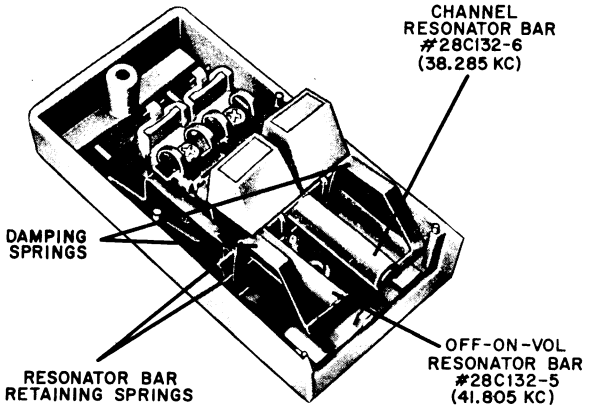


Figure 36. Top View of Son-r Tuner S121C Showing Location of Resonator Bars.

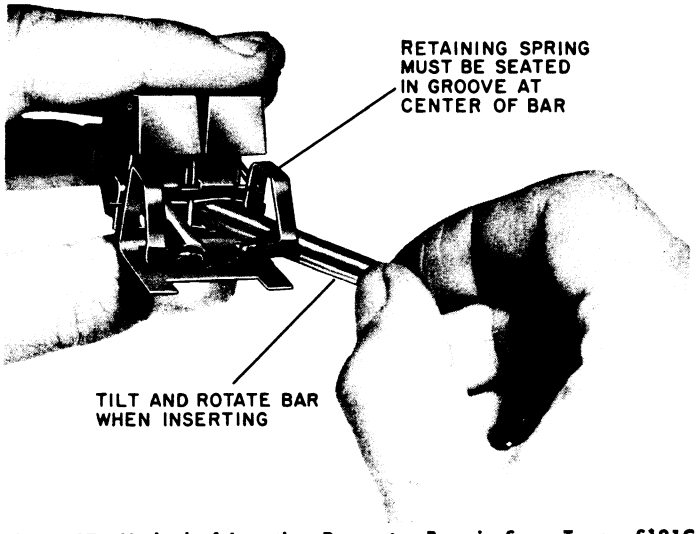


Figure 37. Method of Inserting Resonator Bars in Son-r Tuners S121C

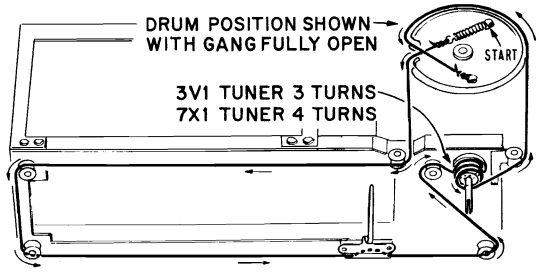


Figure 39. Dial Stringing Diagram for Radio Tuners.

ADMIRAL

CHASSIS 20K7, 20K7B, 20UK7, 20UK7B, 20L7

The group of chassis listed above are similar electrically and mechanically. Chassis 20K7 and 20K7B are manually tuned VHF receivers using different VHF tuners. The schematic diagram on pages 24-25 is exact for 20K7B sets. The 20UK7 and 20UK7B chassis are manually tuned VHF-UHF receivers, using VHF turret tuner and a separate, continuously tuned UHF tuner. The suffix "B" indicates that a different VHF tuner is used. The 20L7 chassis is similar to the VHF group, but has a built-in dual channel (stereo) amplifier for audio. This chassis is used for TV-phono combinations. The cross reference between chassis and models is given in the chart below. Service material on this group of sets is continued through page 26.

MODEL NUMBER	TV CHASSIS	VHF TUNER
TG24K120, TG24K122, TG24K123	20K7 20K7B	94E184-14 94E188-7
TG24UK120, TG24UK122, TG24UK123	20UK7 20UK7B	94E164-13 94E188-8
CG24K131, CG24K132, CG24K133	20K7 20K7B	94E184-14 94E188-7
CG24UK131, CG24UK132, CG24UK133	20UK7 20UK7B	94E164-13 94E188-8
STG24K131, STG24K132, STG24K133	20L7	94E164-14

REMOVING CHASSIS FROM CABINET

For servicing convenience, chassis including picture tube and front escutcheon are removable as a unit from in front of cabinet. Remove chassis as follows:

1. Remove cabinet back. Disconnect antenna and speaker.
2. Remove chassis mounting screws from bottom of cabinet.
3. From inside of cabinet, remove screws which mount front escutcheon to front of cabinet. Note: A $\frac{5}{16}$" socket wrench with 20" long shank will be required for sets with metal cabinet.
4. Remove chassis from cabinet by securely grasping sides of front escutcheon.
5. To reinstall chassis in cabinet, very carefully guide chassis through front of cabinet. In metal cabinet models, the front edges of the cabinet must fit firmly into grooved surfaces of rear of metal escutcheon. In wood cabinet models, guide metal locating pins (at rear of escutcheon) into matching holes in cabinet.
6. After chassis and escutcheon are firmly seated in cabinet, reassemble screws mounting escutcheon to front of cabinet. Reassemble chassis mounting screws at bottom of cabinet. Reconnect antenna and speaker.

AGC CONTROL ADJUSTMENT

Improper **AGC** control adjustment may result in an overloaded picture. Picture overload can be recognized by bending and/or tearing of the picture or buzz in the sound output. Also, loss of the picture or a weak washed-out picture can result from improper **AGC** adjustment. However, these same conditions can be caused by other troubles in the set.

If adjustment is required, it should be performed exactly as described below:

1. Turn set on and allow 15 minutes to warm up.
2. Select strongest station in the area.
3. Set **Contrast** control for normal picture and **Brightness** control to maximum (fully to right).
4. Set **AGC** control (at rear of chassis) to minimum (fully to left.)
5. If picture has disappeared when **AGC** control is set to left, turn AGC to right until a weak picture is obtained. Adjust **Horizontal Lock** (rear of set) and **Vertical Hold** (front of set) for a steady picture without bending of vertical lines at top of picture.
6. Very slowly turn **AGC** control to right until picture just begins to bend, tear, shift or until buzz is heard in sound. Then, slowly turn **AGC** control to left to a point at which overload of picture and/or buzz in sound is removed. Turn **AGC** control an additional 10 degrees (approx.) to left.
7. Check picture at maximum contrast on all channels. Picture should not overload and should reappear immediately after changing channels.

IMPORTANT: AGC adjustment should always be made on the strongest TV station received. If adjustment is made only on a weak station, AGC overload may occur when a strong TV station is tuned in.

ADMIRAL Chassis 20K7, -B, 20UK7, -B, 20L7, Alignment Information, Continued

IF AMPLIFIER ALIGNMENT

- Connect negative of 3.0 volt bias supply through 10K resistor to test point "T" (IF AGC), see figure 11, and positive to chassis.
- Connect generator high side to 6CG8 mixer-osc. insulated tube shield, see figure 5. Connect low side to chassis near tube shield.
- Connect VTVM high side to test point "V" through a decoupling filter, see figures 7, and 11.
- Set Channel Selector to channel 12 or other unassigned high channel, to prevent interference during alignment.
- Connect a jumper wire across the antenna terminals.
- Set Contrast control fully to the right (clockwise).
- Set AGC control fully to the left (counterclockwise).
- Allow about 15 minutes for receiver and test equipment to warm up.
- Use a non-metallic alignment tool, part No. 98A30-12.

Step	Signal Gen. Freq.	Instructions	Adjust
Before proceeding, be sure to check the signal generator used in alignment against a crystal calibrator or other frequency standard for absolute frequency calibration required for this operation.			
1	41.25 MC	If necessary, increase generator output and/or reduce bias to —1 ½ volts to obtain a definite indication on VTVM.	A1 for minimum.
2	47.25 MC		A2 for minimum.
3	42.3 MC	Use —3 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 2 volts.	A3 for maximum.
4	45.3 MC		A4 and A5 for max.
5	41.5 MC		A6 for maximum.
6	42.0 MC		A7 for maximum.
7	43.5 MC		A8 for maximum.
8	To insure correct IF alignment, make "IF Response Curve Check".		

IF RESPONSE CURVE CHECK (Using sweep generator and oscilloscope)

Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Channel Selector on channel 3 or an unassigned low channel. Contrast control fully to the left. Connect negative of 3 volt bias supply to test point "T" (IF AGC); positive to chassis.	Connect high side to 6CG8 mixer-osc. insulated tube shield, see fig. 5. Connect low side to chassis near tube shield. Set sweep frequency to 43 MC, and sweep width approximately 7 MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" thru a decoupling filter, see figs. 7, and 11.	Check curve obtained against ideal response curve in fig. 8. Note tolerances on curve. Keep marker and sweep outputs at very minimum to prevent overloading. A reduction in sweep output should reduce response curve amplitude without altering the shape of the response curve. If the curve is not within tolerance or the markers are not in the proper location on the curve, touch-up with IF slugs as instructed below.

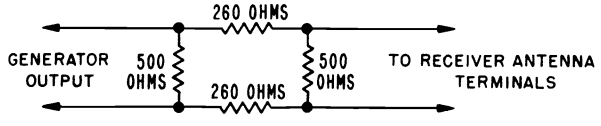


Figure 6. Circuit of 12 DB Attenuation Pad for Viewing Over-all VHF IF Response Curve.

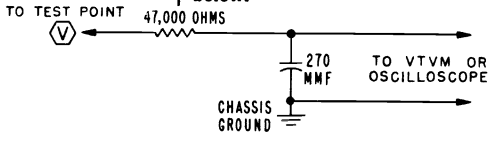


Figure 7. Decoupling Filter.

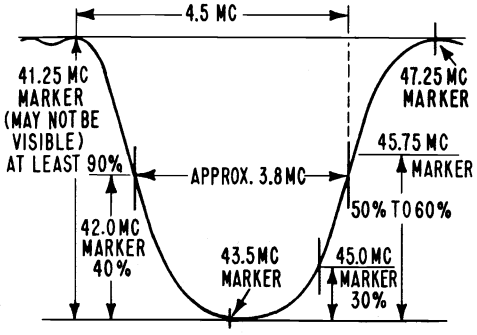


Figure 8. Ideal IF Response Curve.

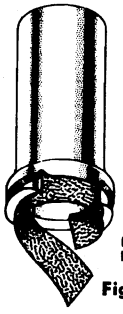


Figure 5. Special Tube Shield for IF Alignment and IF Response Curve Check.

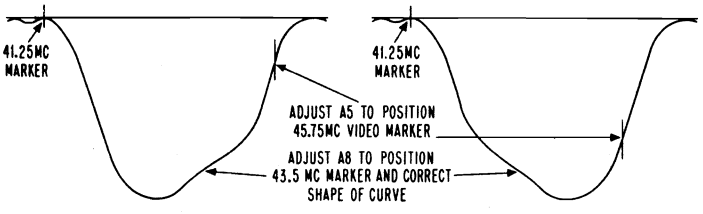


Figure 9. IF Response Curves, Incorrect Shape.

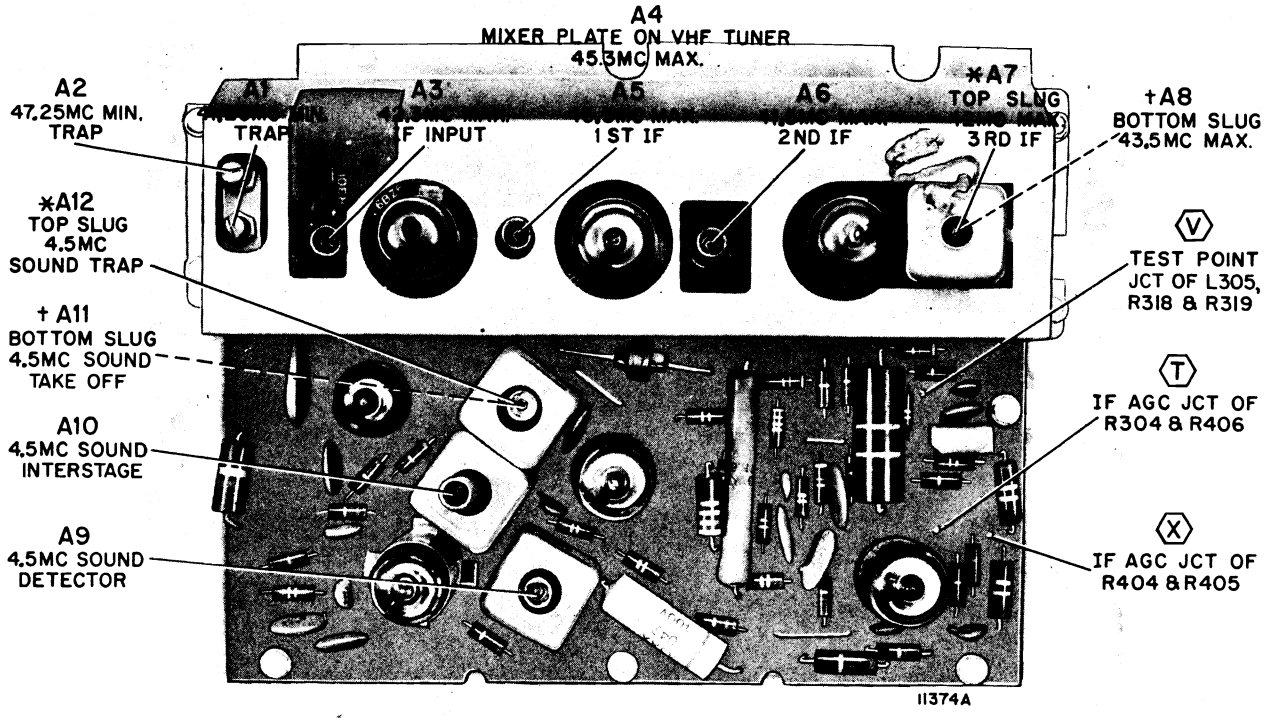


Figure 11. Inside Chassis View of Etched Circuit Board Showing Test Point Locations and IF Alignment Data.

4.5 MC SOUND IF ALIGNMENT USING TELEVISION SIGNAL

For simplicity and required accuracy of the 4.5 MC signal frequency, the sound alignment procedure given in the manual uses a transmitted TV signal rather than test equipment.

Important: Note that step 3 of the sound IF alignment procedure requires the use of a strong transmitted TV signal. Steps 5 and 6 requires the use of a weak (attenuated) TV signal. Failure to use a television signal of the required level as instructed for each of the steps will cause incorrect alignment with resulting weak or distorted sound.

Make alignment adjustments as follows:

1. Remove cabinet back. Turn set on and allow 15 minutes for warm up.
2. Select the strongest TV station received. AGC control must be in proper adjustment, see procedure on page 4. Adjust other controls for normal operation. See figure 11 for adjustment locations.
3. Using a non-metallic alignment tool (for hexagonal core IF slugs, Admiral Part No. 98A30-12), very slowly turn slug "A9" several turns counterclockwise until a buzz is heard in the sound. Then turn it clockwise until the loudest and clearest sound is obtained. NOTE: There may be two points (approximately ½ turn apart) at which sound is loudest. The slug should be set at the center range of the second point of loudest sound noted as the slug is turned in (toward printed circuit board).
4. Set Contrast control fully to the left (counterclockwise). Reduce the signal to the antenna terminals until there is a considerable amount of hiss in the sound. For best results, it is recommended that a step attenuator be connected between the antenna and the antenna terminals. The signal can also be reduced by disconnecting the antenna and placing it in close proximity of the antenna terminals or tuner antenna lead-in.
5. Carefully adjust slug "A10" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A10".
6. Carefully adjust slug "A11" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A11". Caution: Adjustment "A11" is slug nearest bottom of shield can; use care so as not to disturb slug nearest top of shield can.
7. If the above steps are correctly made, no further adjustment should be required. However, if sound remains distorted at normal volume level when receiver is tuned for best sound, repeat entire procedure.

Caution: Do not readjust slug "A9" unless sound is distorted. If "A9" is readjusted, all steps in alignment procedure should be repeated exactly as instructed above.

ADMIRAL Chassis 20K7, -B, 20UK7, -B, 20L7, Service Information, Continued

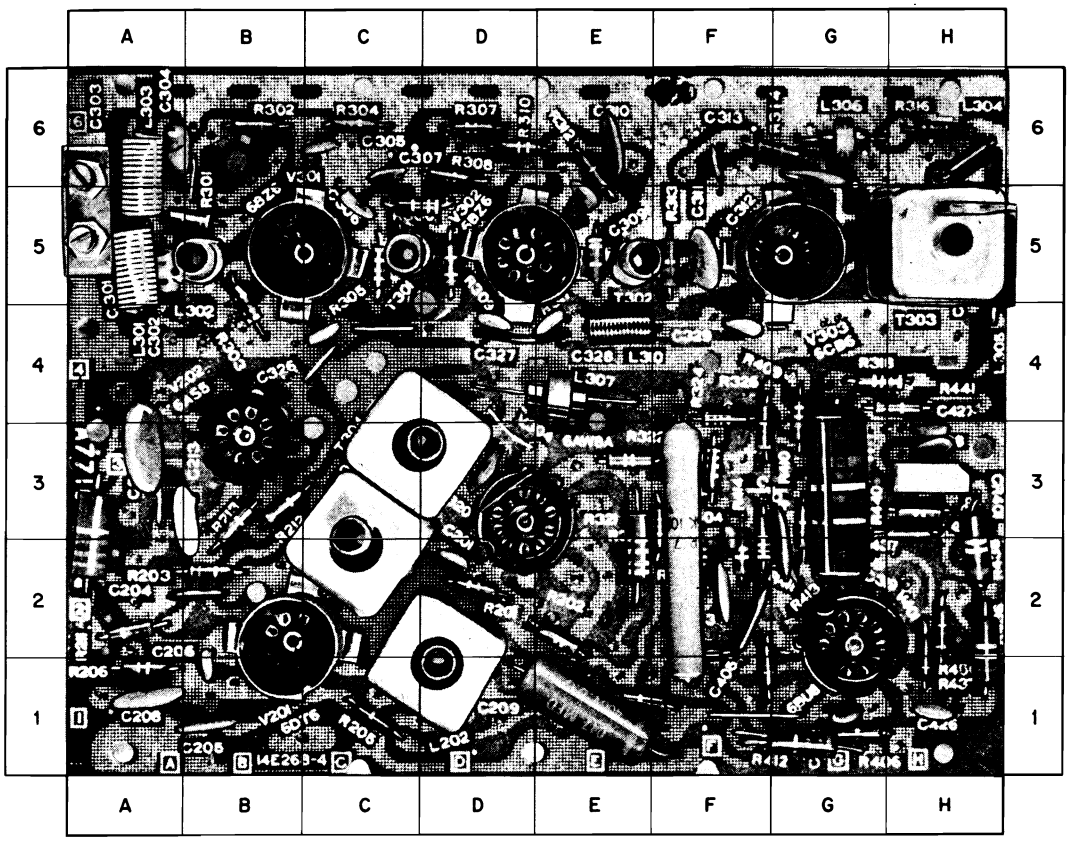


Figure 19. View of Component Side of Etched Circuit Board 14E268-11. Used in Models with Single Ended Sound Output. Refer to Parts Location Table "A".

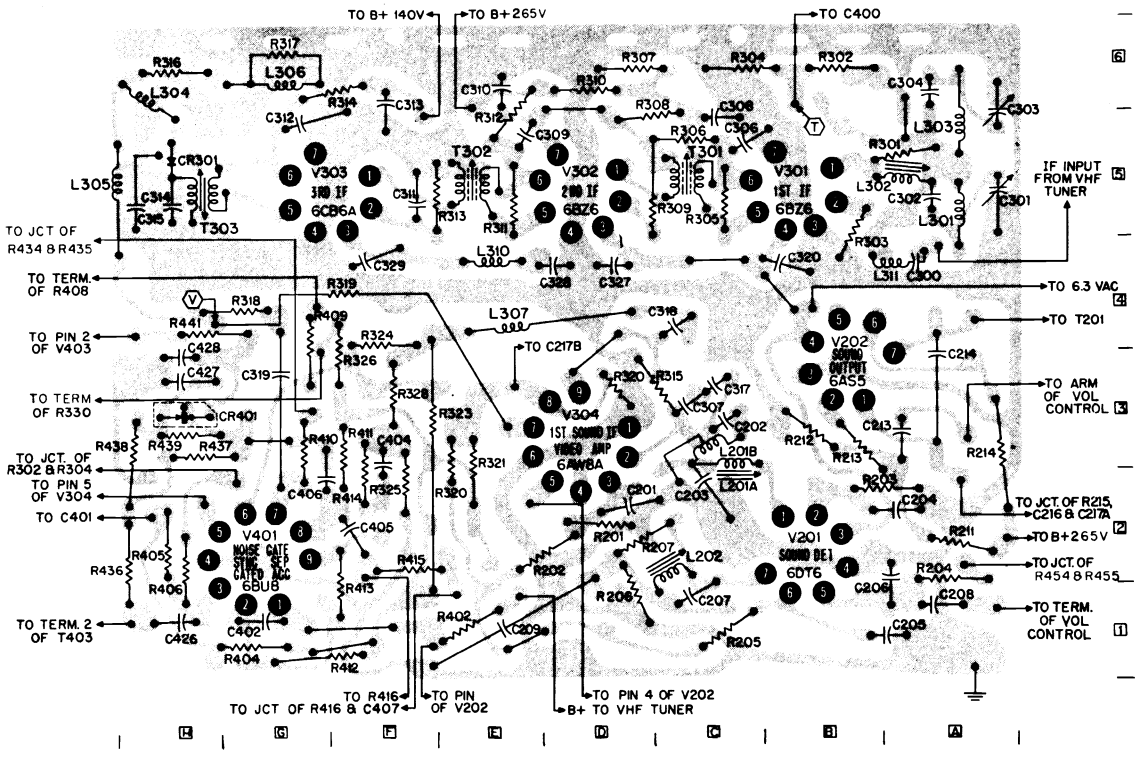


Figure 22. View of ETCHED SIDE of Etched Circuit Board 14E268-11. Used in Models with Single Ended Sound Output. Gray area represents etched circuitry; black symbols and lines represent components and connections on opposite side.

PARTS LOCATION TABLE "A"

Sym.	Loc.	Sym.	Loc.	Sym.	Loc.	Sym.	Loc.
C201	D2	C319	G3	R302	B6	R410	G3
C202	C2	C320	D3	R303	B5	R411	F3
C203	C2	C326	C4	R304	C6	R412	G1
C204	B2	C327	D4	R305	C5	R413	F1
C205	B1	C328	E4	R306	C5	R414	F2
C206	B1	C329	F4	R307	D6	R436	H1
C207	D1	C403	F2	R308	D6	R437	H2
C208	A1	C404	F3	R309	D5	R438	H2
C209	E1	C405	F2	R310	D6	R439	H3
C213	B3	C406	G2	R311	E5	R440	G3
C214	A3	C426	H1	R312	E6	R441	G4
C302	A5	C427	H3	R313	F5	R456	H2
C303	A6	C428	H3	R314	F6		
C304	A6	CR301	H5	R315	H6	L201	C2
C305	C6	CR401	H3	R316	H6	L202	D1
C306	C5			R318	G4	L301	A5
C307	C6	R201	E2	R320	E2	L302	B5
C309	E6	R202	E2	R321	E2	L303	A6
C310	E6	R203	B2	R322	E3	L304	H6
C311	F5	R205	C1	R323	F2	L305	H5
C312	G6	R206	D1	R324	F3	L306	G6
C313	F6	R207	D1	R325	F3	L307	E4
C314	H5	R211	A2	R326	F3		
C315	H5	R212	B3	R328	F3	T301	C5
C316	H6	R213	B3	R402	G1	T302	E5
C317	H6	R214	A3	R406	G1	T303	H5
C318	H6	R301	B5	R409	G4	T304	C3

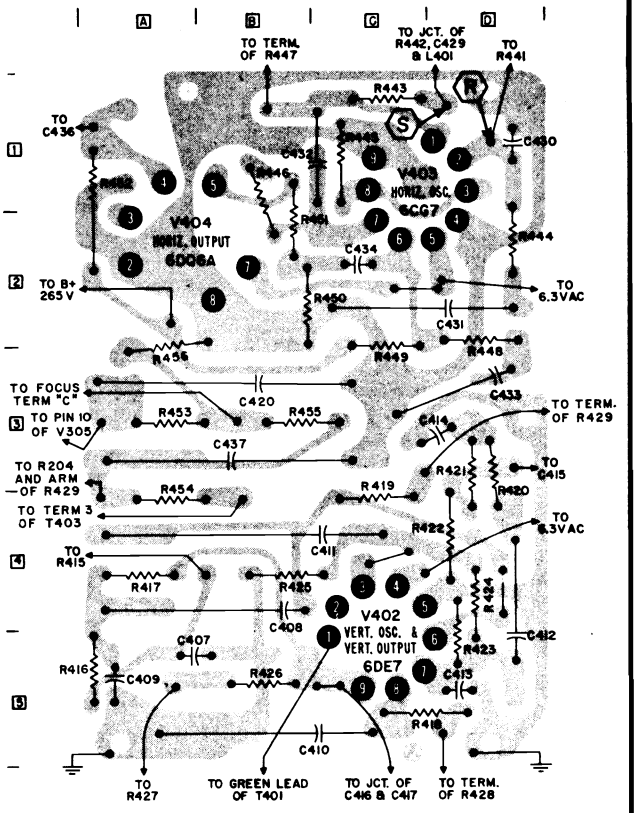


Figure 26. View of ETCHED SIDE of Etched Circuit Boards 14E257-4A and -5A used in Latest Production.

PARTS LOCATION TABLE "B"

Sym.	Loc.	Sym.	Loc.
C407	B5	R421	D3
C409	A5	R422	D4
C410	B5	R423	D4
C411	B4	R424	D4
C412	D4	R425	B4
C413	D5	R426	B5
C414	D3	R443	C1
C418	B4	R444	D2
C430	D1	R445	C1
C431	C2	R446	B1
C432	C1	R448	D2
C433	D3	R449	C2
C434	C2	R450	B2
C438	B3	R451	B2
R416	A4	R452	A1
R417	A5	R453	A2
R418	C5	R454	A3
R419	B4	R456	A4
R420	D3		

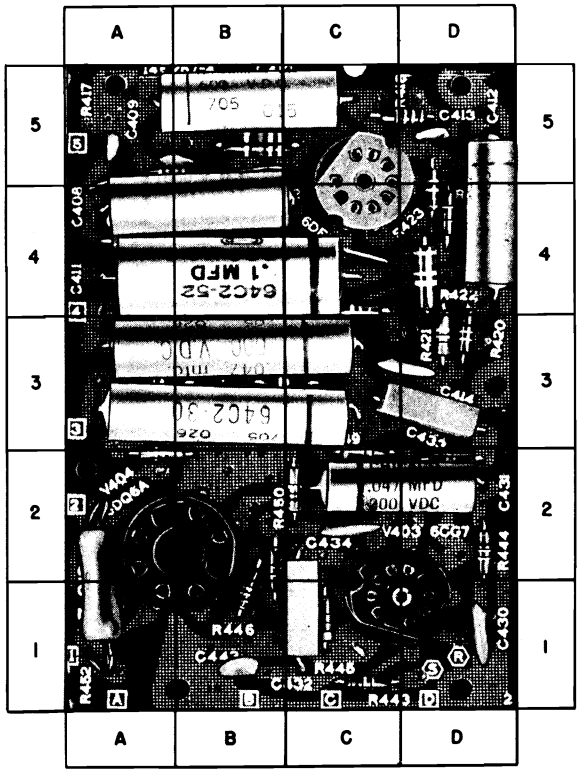


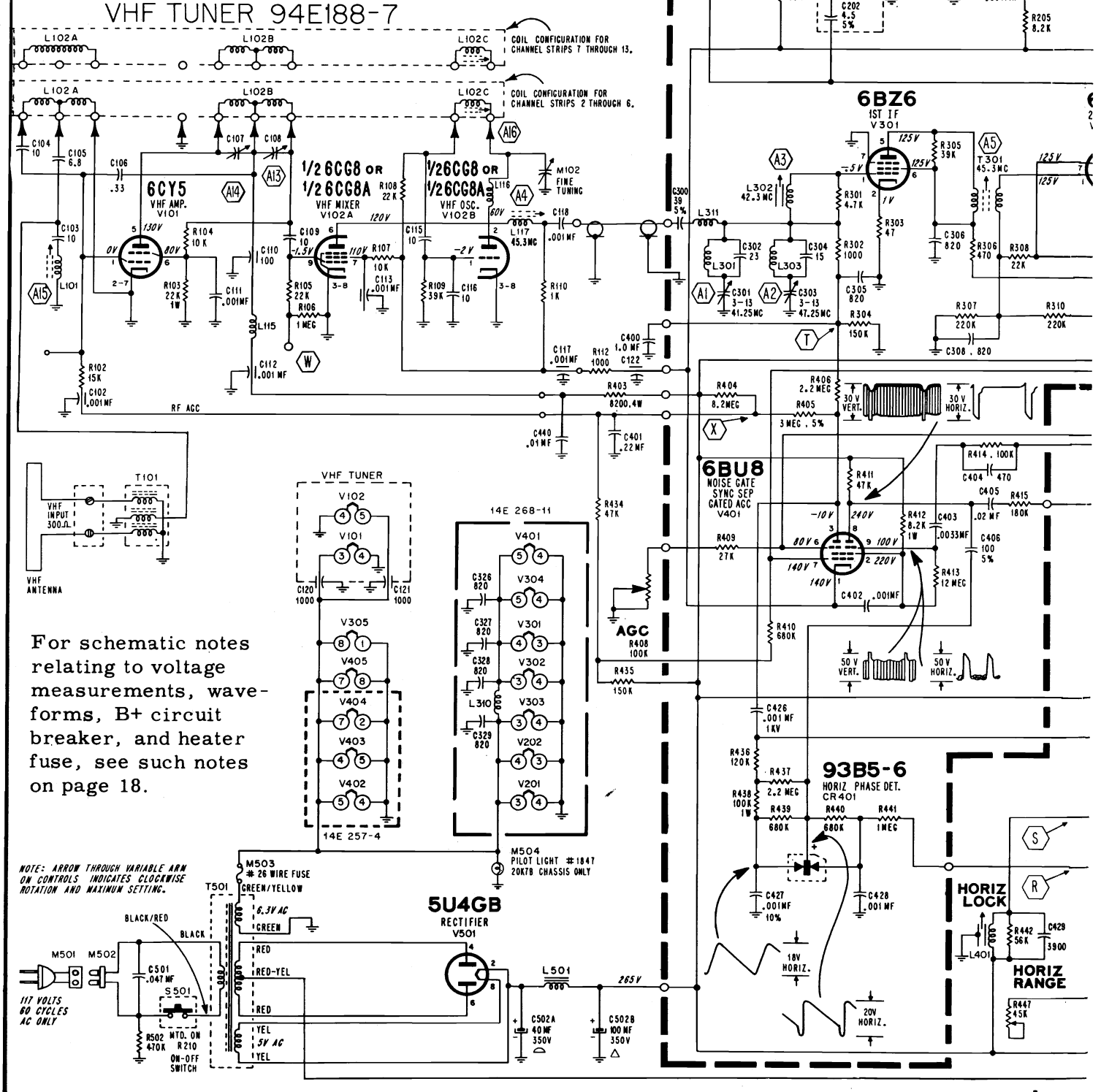
Figure 21. View of Component Side of Etched Circuit Boards 14E257-4 and 14E257-5. Refer to Parts Table "B".

Note: Etched circuit boards 14E257-1, -4 and -4A are used in sets with single ended sound output. Etched circuit boards 14E257-5 and -5A are used in sets with stereo (dual) sound output. The only difference between a 14E257-4 or -4A board and a 14E257-5 or -5A board, is that capacitor C437 is not used on the 14E257-5 or -5A board.

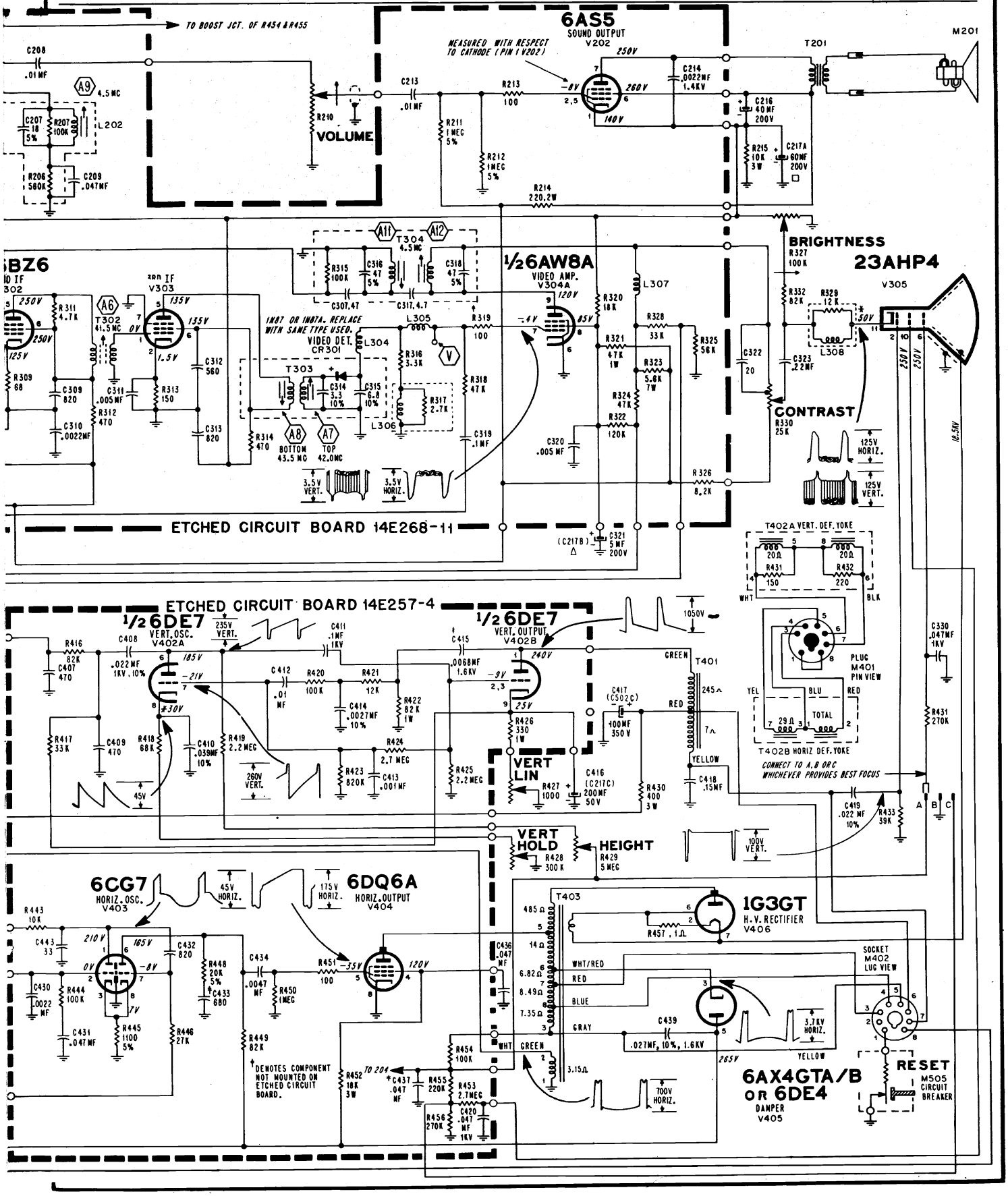
Admiral

Schematic for 20K7B Television Chassis Stamped Run 10.

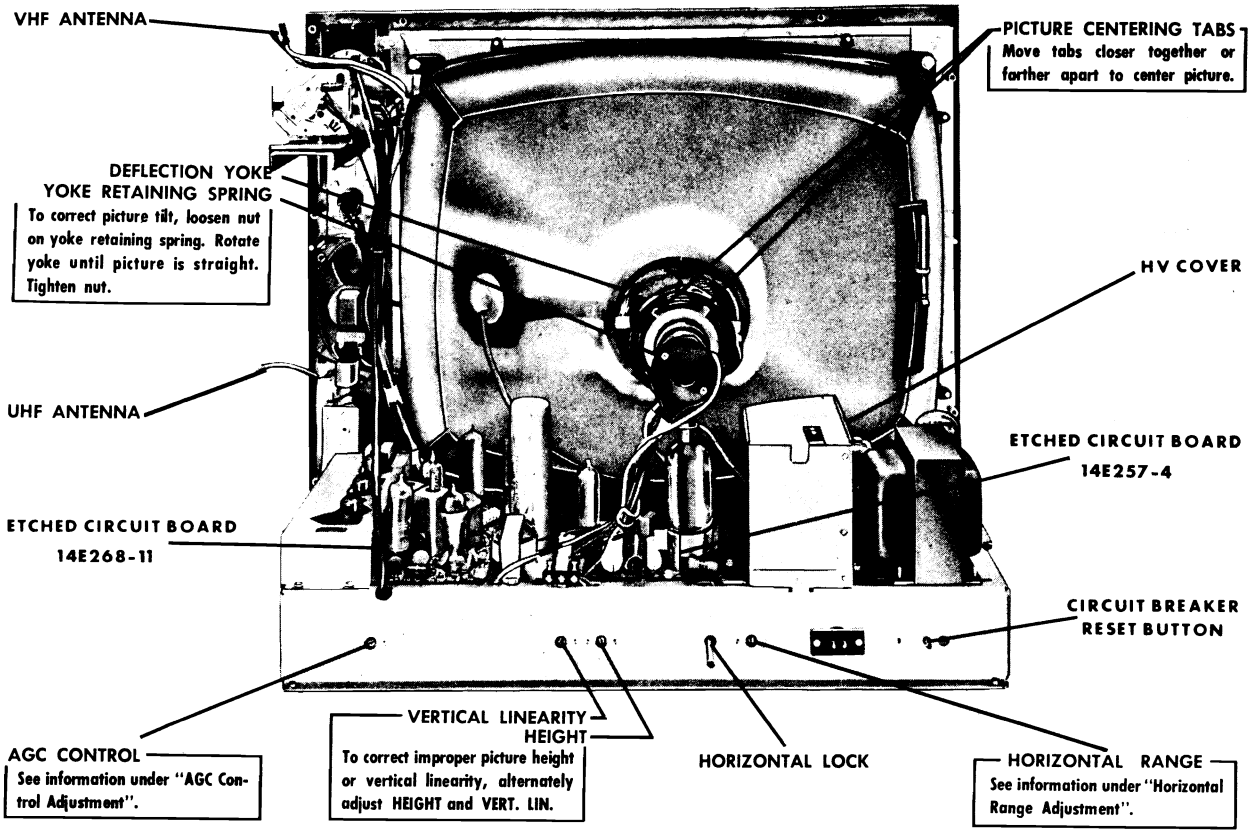
Warning: Pulsed high voltages are present at the caps of V404 and V406, and at pin 3 of V405. **Do not** attempt to measure voltage at these points without suitable test equipment. A VTVM with a high oltage probe should be used when measuring picture tube 2nd anode voltage.



For schematic notes relating to voltage measurements, waveforms, B+ circuit breaker, and heater fuse, see such notes on page 18.


6AS5
SOUND OUTPUT
V202
MEASURED WITH RESPECT TO CATHODE (PIN 1 V202)
TO BOOST JCT. OF R454 & R455
VOLUME
R240
C208 .01 MF
A9 4.5 MC
C207 18 5%
R207 100K
L202
R206 560K
C209 .047MF
C213 .01MF
R213 100
R211 1 MEG 5%
R212 1 MEG 5%
R214 220,2W
C214 .0022MF 1.4KV
T201
M201
C216 40 MF 200V
R215 10K 3W
C217A 60MF 200V
A11
A12
T304 4.5MC
R315 100K
C316 47 5%
C317 47 5%
C307,47
C317, 4.7
1/26AW8A
VIDEO AMP.
V304A
BRIGHTNESS
R327 100K
23AHP4
V305
L307
R320 18K
R328 33K
R321 47K 1W
R323 5.6K 7W
R324 47K
R322 120K
C320 .005 MF
R325 56K
C322 20
C323 .22MF
R329 12K
L308
R332 82K
CONTRAST
R330 25K
R326 8.2K
1K87 OR 1M87A. REPLACE WITH SAME TYPE USED.
VIDEO DET. CR301
L304
L305
T303
C314 3.3 10%
C315 6.8 10%
R316 3.3K
R317 2.7K
R318 47K
R319 100
C319 .1MF
L306
A8 BOTTOM 43.5 MC
A7 TOP 42.0MC
3.5V VERT.
3.5V HORIZ.
125V HORIZ.
125V VERT.
ETCHED CIRCUIT BOARD 14E268-11
(C217B) C321 5 MF 200V
T402A VERT. DEF. YOKE
20Ω
R431 150
R432 220
WHT
BLK
PLUG M401 PIN VIEW
YEL
BLU
RED
TOTAL
29Ω
T402B HORIZ DEF. YOKE
CONNECT TO A, B OR C WHICHEVER PROVIDES BEST FOCUS
C330 .047MF 1KV
R431 270K
ETCHED CIRCUIT BOARD 14E257-4
1/26DE7
VERT. OSC.
V402A
1/26DE7
VERT. OUTPUT
V402B
R416 82K
C407 470
C408 .022 MF 1KV, 10%
C411 .1MF 1KV
C412 .01 MF
R420 100K
R421 12K
R422 82K 1W
C414 .0027MF 10%
C415 .0068MF 1.6KV
R426 330 1W
C417 (C502C) 100MF 350 V
T401
245Ω
7Ω
GREEN
RED
YELLOW
C418 .15MF
R417 33K
C409 470
R418 68K
C410 .039MF 10%
R419 2.2 MEG
R424 2.7 MEG
R423 820K
C413 .001MF
R425 2.2 MEG
VERT LIN
R427 1000
C416 (C217C) 200MF 50V
R430 400 3W
C419 .022 MF 10%
R433 39K
A B C
VERT HOLD
R428 300 K
HEIGHT
R429 5 MEG
6CG7
HORIZ. OSC.
V403
6DQ6A
HORIZ. OUTPUT
V404
R443 10K
C443 33
R444 100 K
C430 .0022 MF
C431 .047 MF
R445 1100 5%
C432 820
R446 27K
R448 20K 5%
C433 680
C434 .0047 MF
R450 1 MEG
R449 82K
R451 100
T403
485Ω
14Ω
6.82Ω
8.49Ω
7.35Ω
WHT/RED
RED
BLUE
GRAY
WHT
GREEN
3.15Ω
C436 .047 MF
R454 100K
R452 18K 3W
C437 .047 MF
R455 220K
R453 2.7MEG
R456 270K
C420 .047 MF 1KV
TO 204
DENOTES COMPONENT NOT MOUNTED ON ETCHED CIRCUIT BOARD.
1G3GT
H.V. RECTIFIER
V406
R457 .1Ω
C439 .027MF, 10%, 1.6KV
3.7KV HORIZ.
700V HORIZ.
6AX4GTA/B OR 6DE4
DAMPER
V405
SOCKET M402 LUG VIEW
RESET
M505 CIRCUIT BREAKER

ADMIRAL Chassis 20K7, -B, 20UK7, -B, 20L7, Service Information, Continued

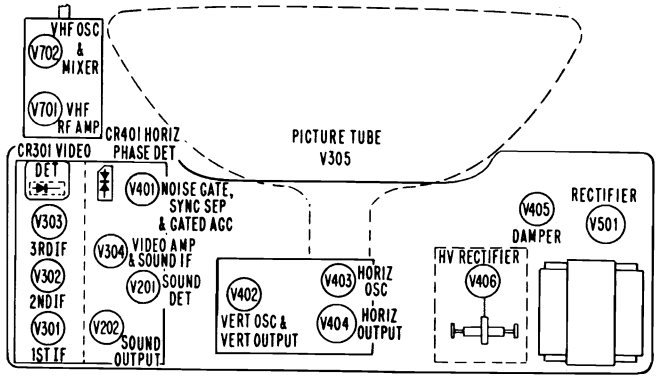


Rear View of 20K7, 20K7B, 20UK7 and 20UK7B Chassis Showing Adjustment Locations. UHF Tuner in 20UK7 and 20UK7B Chassis Only.

HORIZONTAL RANGE ADJUSTMENT

Caution: Before proceeding with adjustment, be sure that the picture will sync vertically, as lack of both vertical and horizontal sync indicates sync circuit trouble. Lack of only horizontal sync generally indicates trouble in the horizontal sync (phase detector) circuit.

1. Remove cabinet back. Connect interlock (jumper) cord.
2. Allow a few minutes for set to warm up. Tune in weakest station, set Brightness and Contrast controls for a normal picture. Important: Before proceeding, be sure that the AGC control has been adjusted according to instructions given in this manual.
3. Using a piece of hook-up wire, short test point "R" (pin 2 of V403, 6CG7) to chassis ground.
4. Connect a .22 mf. 400 volt capacitor from test point "S" (junction of horizontal lock coil L401 and resistor R443, 10,000 ohms) to chassis ground. Caution: To avoid B+ shock, turn receiver off when making this connection.
5. With picture in vertical sync, set Horizontal Range control at point where picture is in horizontal sync and almost remains stationary with tendency to shift to left or right.
6. Remove the .22 mf capacitor from the horizontal lock coil. Set horizontal lock coil at point where picture is in horizontal sync and almost remains stationary with tendency to shift to left or right.
7. Remove wire short from test point "R" (pin 2 of V403, 6CG7).
8. Set Channel Selector to weakest station. Switch Channel Selector on and off channel, picture should remain in horizontal sync. If necessary, adjust horizontal lock coil slightly to bring picture in sync.



TUBE COMPLEMENT

V701—6FH5 in 20K7
V101—6CY5 in 20K7B
V702 or V102—6CG8 or 6CG8A
V201—6DT6
V202—6AS5
V301—6BZ6
V302—6BZ6
V303—6CB6A
CR301—1N87 or 1N87A (Crystal Diode)
V304—6AW8A
V305—23AHP4
V401—6BU8
CR401—93B5-6 (Dual Selenium Diode)
V402—6DE7
V403—6CG7
V404—6DQ6A
V405—6DE4 or 6AX4GTA/GTB
V406—1G3GT
V501—5U4GB

Admiral

15E1, 15E1B, 15F1 and 15UE1 CHASSIS

The chassis listed above are similar electrically and mechanically. The 15E1 and 15E1B differ in the type of VHF tuner employed. Chassis 15UE1 use tuners for VHF and UHF reception. Chassis 15F1 uses a VHF tuner which is mechanically linked to a motor-driven tuning mechanism. This chassis uses 7E2 remote control amplifier. The material for these sets is on pages 27 through 34.

AGC CONTROL ADJUSTMENT

Improper **AGC** control adjustment may result in an overloaded picture. Picture overload can be recognized by bending and/or tearing of the picture or buzz in the sound output. Also, loss of the picture or a weak washed-out picture can result from improper **AGC** adjustment. However, these same conditions can be caused by other troubles in the set.

If adjustment is required, it should be performed exactly as described below:

1. Turn set on and allow 15 minutes to warm up.
2. Select strongest station in the area.
3. Set **Contrast** control for normal picture and **Brightness** control to maximum (fully to right).
4. Set **AGC** control (at rear of chassis) to minimum (fully to left.)
5. If picture has disappeared when **AGC** control is set to left, turn AGC to right until a weak picture is obtained: Adjust **Horizontal Lock** (rear of set) and **Vertical Hold** (side of set) for a steady picture without bending of vertical lines at top of picture.
6. Very slowly turn **AGC** control to right until picture just begins to bend, tear, shift or until buzz is heard in sound. Then, slowly turn **AGC** control to left to a point at which overload of picture and/or buzz in sound is removed. Turn **AGC** control an additional 10 degrees (approx.) to left.
7. Check picture at maximum contrast on all channels. Picture should not overload and should reappear immediately after changing channels.

IMPORTANT: AGC adjustment should always be made on strongest TV station received.

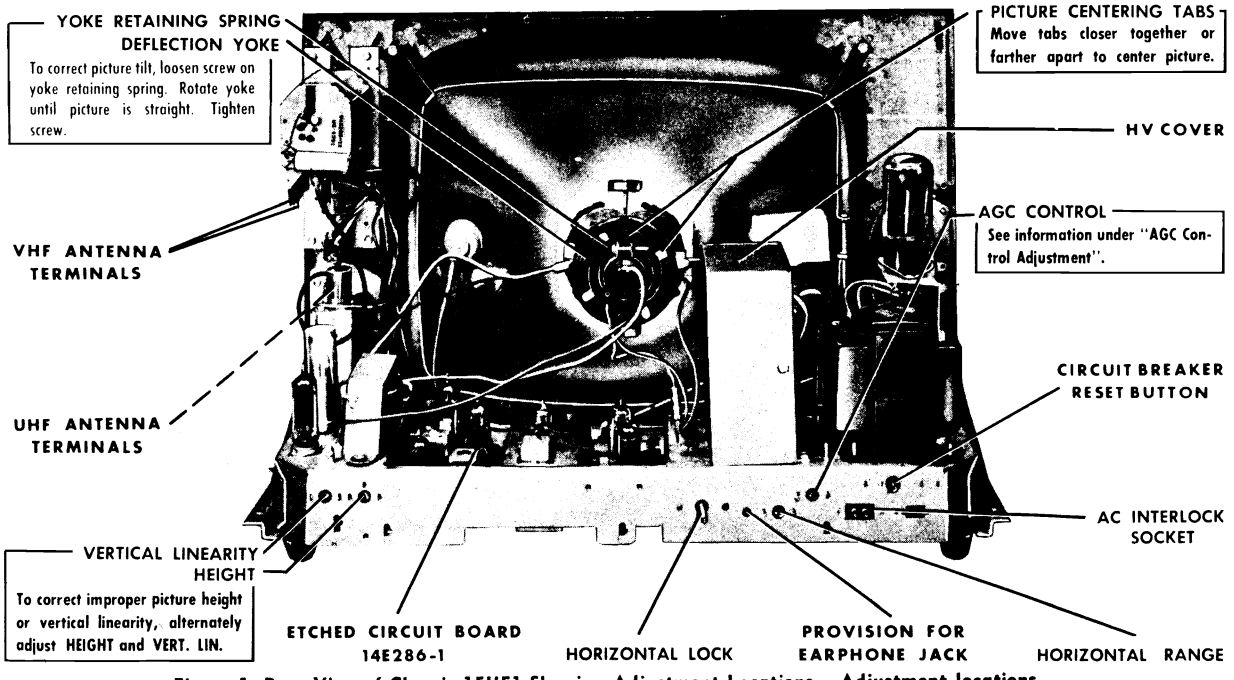


Figure 1. Rear View of Chassis 15UE1 Showing Adjustment Locations. Adjustment locations are the same for chassis 15E1 and 15E1B.

SERVICING ETCHED CIRCUITRY

A major portion of the circuit wiring of this receiver is contained on two etched circuit boards. Trouble shooting of etched circuitry is similar to that of conventionally wired sets. As an aid to circuit tracing, a picture of the etched circuit side of each board is included. Location, identification and connection of components are shown.

PARTS LOCATION TABLE
— ETCHED CIRCUIT BOARD 14E287-1 —

CAPACITORS			RESISTORS		COILS
SYM. LOC.	SYM. LOC.	SYM. LOC	SYM. LOC	SYM. LOC	SYM. LOC
C1 — B1	C9 — A4	C17 — C3	R7 — A2	R16 — B3	L3 — A4
C2 — A1	C10 — A4	RESISTORS	R8 — A2	R17 — A4	TRANSISTORS
C3 — B2	C11 — A4	R1 — C1	R9 — B2	R18 — B5	Q1 — B1
C4 — A2	C12 — C5	R2 — B2	R10 — B3	R19 — B3	Q2 — B2
C5 — A2	C13 — B4	R3 — B2	R11 — A3	R20 — B4	Q3 — B3
C6 — A3	C14 — B4	R4 — A1	R12 — B3	COILS	Q4 — B4
C7 — A3	C15 — B4	R5 — B2	R13 — A3	L1 — B1	Q5 — A4
C8 — C2	C16 — B3	R6 — A2	R15 — A3	L2 — C4	Q6 — B5
					Q7 — A5

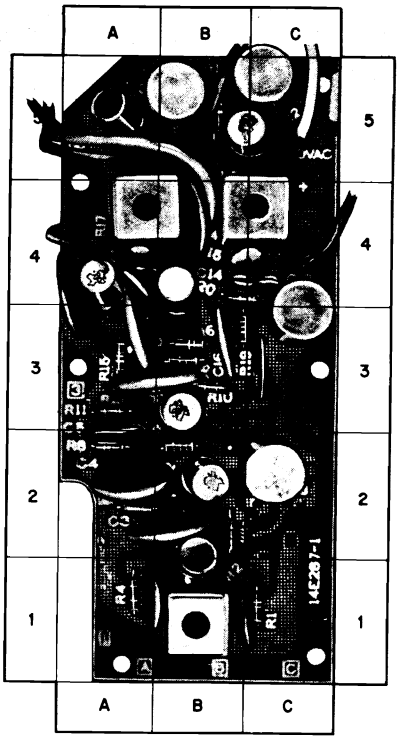


Figure 5. View of Component Side of Etched Circuit Board 14E287-1.

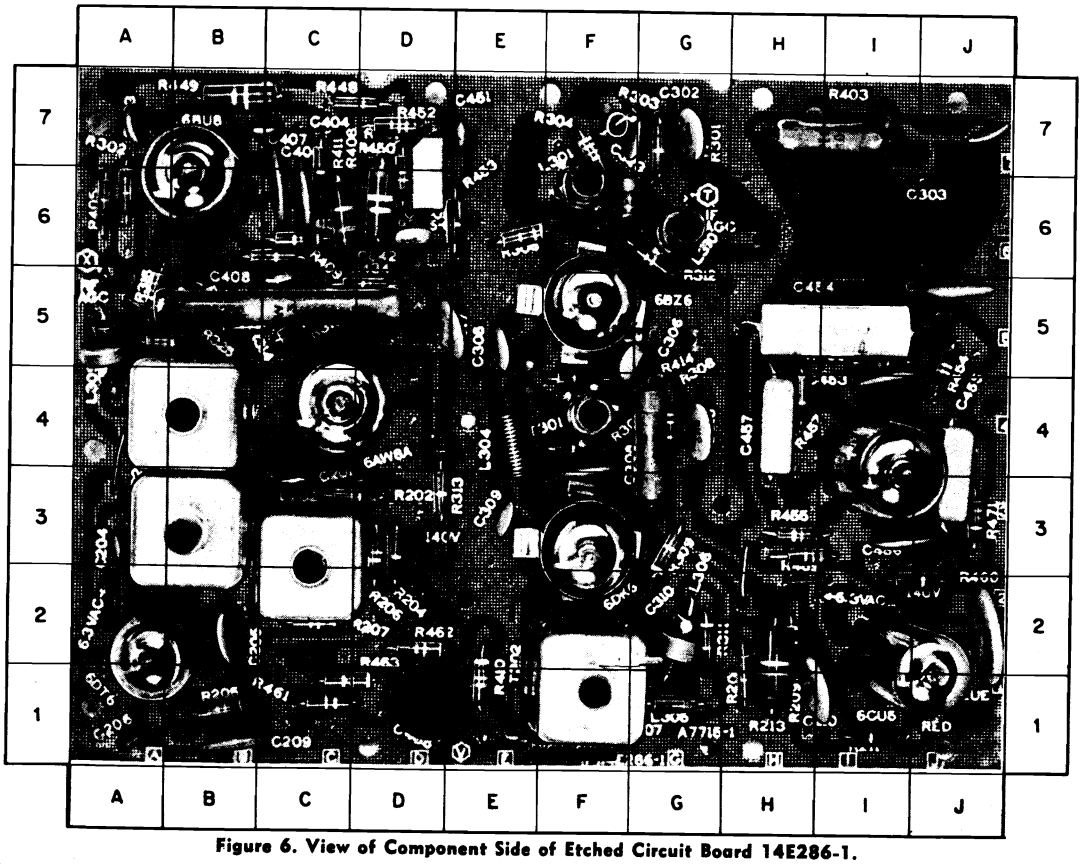


Figure 6. View of Component Side of Etched Circuit Board 14E286-1.

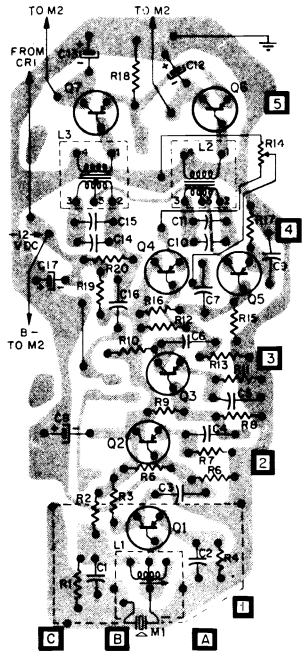


Figure 7. View of Etched Circuit Side of ETCHED CIRCUIT BOARD 14E287-1. Gray area represents etched circuitry; black symbols and lines represent components and connections on opposite side.

LOCATING PARTS ON ETCHED CIRCUIT BOARDS

Top views of etched circuit boards are given in figures 5 and 6. They show location of components and a grid coordinate system of lines used to locate the position of components on the boards. To find a component, determine its symbol number from the schematic diagram and refer to the applicable "Parts Location Table." The table will give a letter-number combination. This letter-number combination is used with the applicable top view to locate the component. The desired component will appear in the square identified by the letter-number combination. Example: Locate L306—Refer to table for letter-number combination of L306. It is G1. Now, follow the number "1" from either side of the picture (figure 6) to the area immediately above "G." Coil L302 is located in this area and can be picked-out by the silk-screened identification (symbol number) on the board.

PARTS LOCATION TABLE — ETCHED CIRCUIT BOARD 14E286-1

CAPACITORS						RESISTORS						COILS	
SYM.	LOC.	SYM.	LOC.	SYM.	LOC.	SYM.	LOC.	SYM.	LOC.	SYM.	LOC.	SYM.	LOC.
C201	C3	C309	E3	C408	C5	R210	H1	R315	A5	R450	D6	L301	F6
C202	B3	C310	G2	C450	D6	R211	I1	R318	C5	R451	D6	L304	E4
C203	B3	C311	F2	C451	E7	R213	H2	R319	C5	R452	D7	L305	G1
C204	A3	C312	F1	C453	I4	R301	G7	R325	B5	R453	D6	L306	G2
C205	B2	C313	B4	C454	I5	R302	A6	R403	I7	R454	J5	L307	F1
C206	A1	C314	B4	C455	J4	R303	G7	R405	A6	R455	H3	L309	A5
C207	C2	C315	B4	C456	I3	R304	F7	R407	B5	R456	I5	L310	G6
C208	C2	C316	B4	C457	H4	R305	E6	R408	C6	R457	H4	TRANS-FORMERS	
C209	B1	C317	D5	RESISTORS		R306	F4	R409	C6	R459	H3	T301	F4
C210	H1	C318	G4	R201	C3	R307	F4	R410	E1	R460	J2	T302	F2
C211	J2	C323	F6	R202	C1	R308	G4	R411	C6	R461	C1	T303	B4
C301	F7	C402	J5	R203	A3	R309	G3	R413	C6	R462	D2		
C302	G7	C403	A7	R204	D3	R310	B4	R414	G4	R463	C1		
C304	J7	C404	C7	R205	B1	R311	G2	R415	C5	R471	J3		
C305	E5	C405	D1	R206	D3	R312	G6	R434	D5	COILS			
C306	G5	C406	C6	R207	C1	R313	D3	R448	C7	L201	B3		
C308	F4	C407	C6	R209	H2	R314	B5	R449	B7	L202	C3		

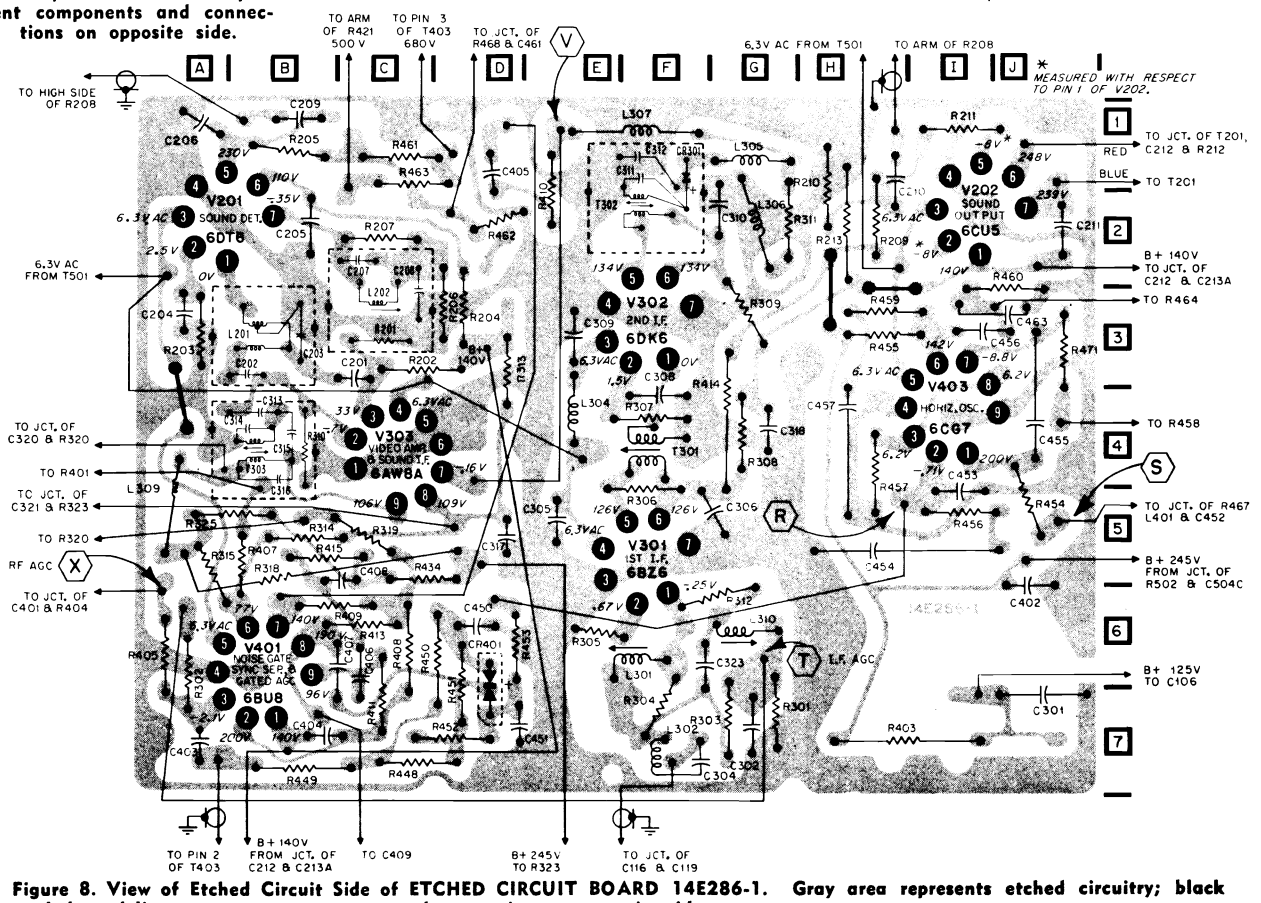
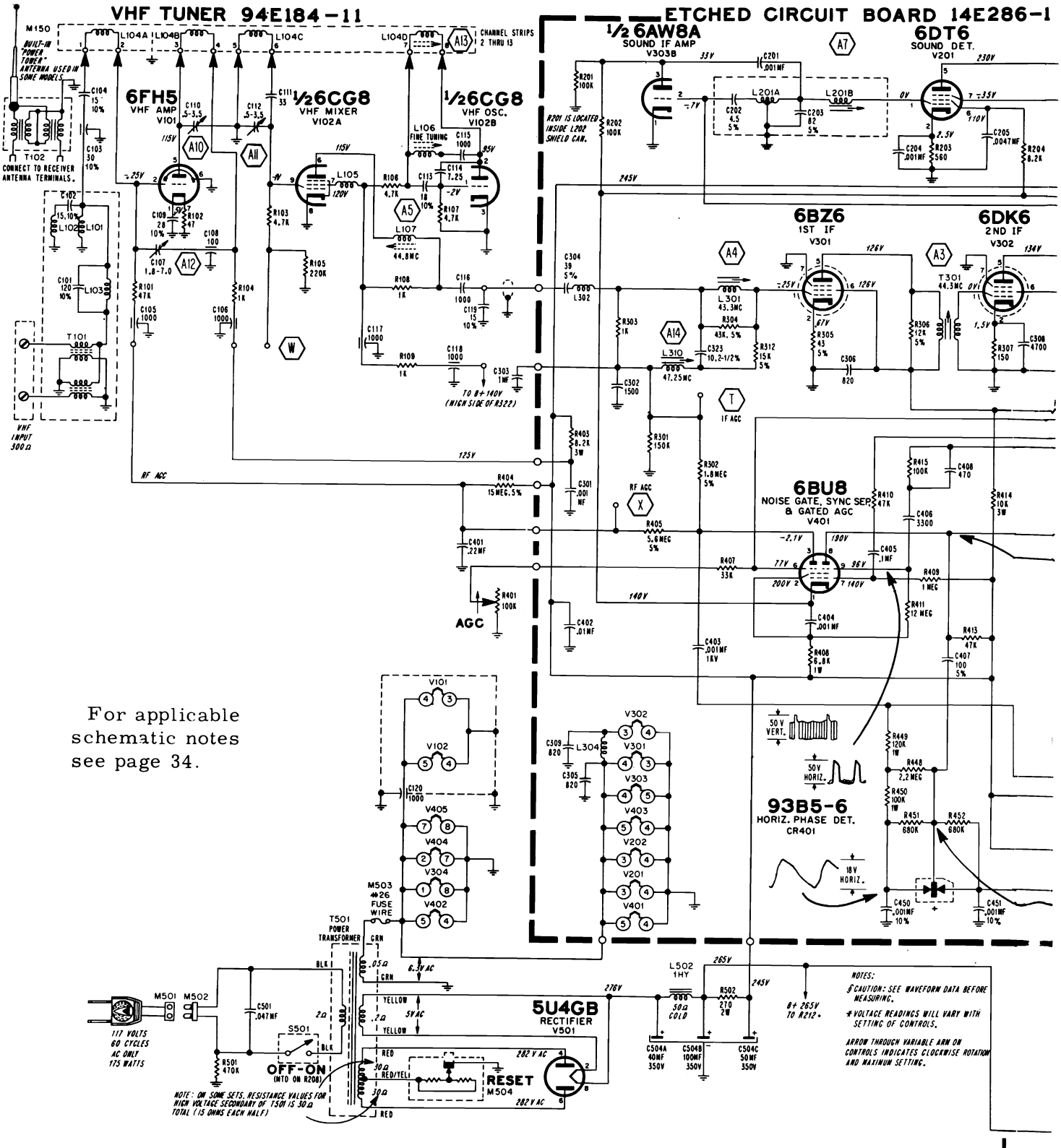


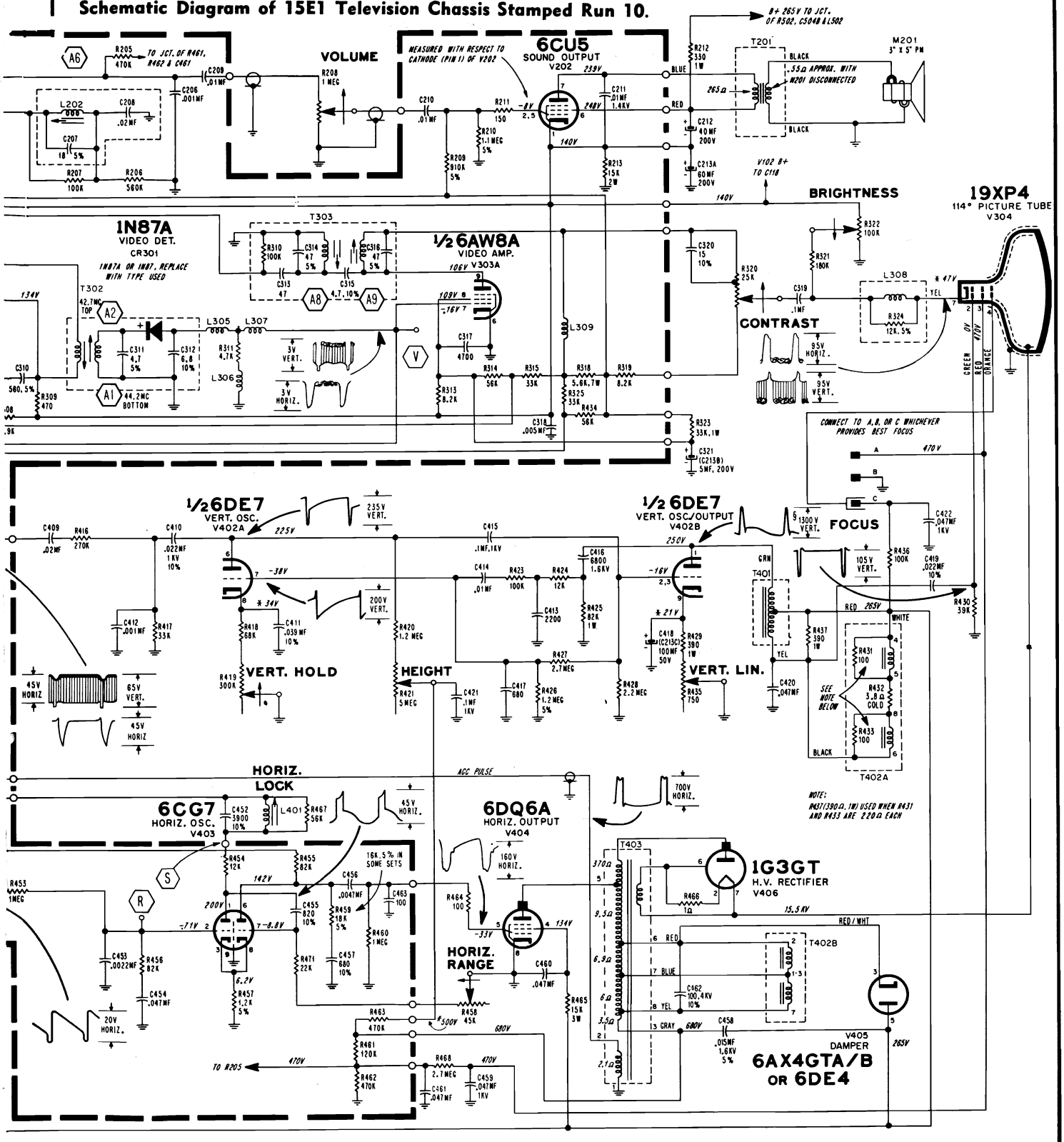
Figure 8. View of Etched Circuit Side of ETCHED CIRCUIT BOARD 14E286-1. Gray area represents etched circuitry; black symbols and lines represent components and connections on opposite side.

ADMIRAL **Schematic Diagram of 15E1 Television Chassis Stamped Run 10.**



For applicable schematic notes see page 34.

Schematic Diagram of 15E1 Television Chassis Stamped Run 10.



ADMIRAL Chassis 15E1, -B, 15F1, 15UE1, Alignment Information, Continued

IF AMPLIFIER ALIGNMENT

- Connect negative of 3 volt bias supply through 10K resistor to test point "T" (IF AGC) and "X" (RF AGC), see figure 23. Connect positive to chassis.
- Connect generator high side to 6CG8 mixer-osc. insulated tube shield, see figure 19. Connect low side to chassis near tube shield.
- Connect VTVM high side to test point "V" through a decoupling filter, see figure 21.
- Set Channel Selector to channel 12 to prevent interference during alignment.
- Connect a jumper wire across the antenna terminals.
- Set Contrast control fully to the right (clockwise).
- Set AGC control fully to the left (counterclockwise).
- Allow about 15 minutes for receiver and test equipment to warm up.
- Use a non-metallic alignment tool, part No. 98A30-13.

Step	Signal Gen. Freq.	Instructions	Adjust
Before proceeding, be sure to check the signal generator used in alignment against a crystal calibrator or other frequency standard for absolute frequency calibration required for this operation.			
1	42.7MC	If necessary, increase generator output and/or reduce bias to —1 ½ volts to obtain a definite indication on VTVM.	A2 for maximum
2	44.2MC		A1 for maximum
3	44.3MC	If necessary, keep reducing generator output so that VTVM reading will be 1.5 to 2.5 volts above the no-signal reading.	A3 for maximum
4	43.3MC		A4 for maximum
5	47.25MC		A14 for minimum
6	Place short jumper wire across L401.		
7	44.8MC		A5 for maximum
8	Remove short from across L401. Then, repeat "Step 4."		
9	To insure correct IF alignment, make "IF Response Curve Check."		

IF RESPONSE CURVE CHECK (Using sweep generator and oscilloscope)

Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set TV tuner on channel 12 and Contrast control fully to left. Connect negative of 3 volt bias supply to test points "T" (IF AGC) and "X" (RF AGC), positive to ground.	Use same connections as for procedure above. Set sweep frequency to 43MC, and set sweep width to approximately 7 MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" thru a decoupling filter, see figures 21 and 23.	Check curve obtained against ideal response curve in fig. 22. Note tolerances on curve. Keep marker and sweep outputs at very minimum to prevent over-loading. A reduction in sweep output should reduce response curve amplitude without altering the shape of the response curve. If the curve is not within tolerance or the markers are not in the proper location on the curve, touch-up with IF slugs as instructed below. Important: If curve changes shape with hand capacity, see section 1 of "Important Alignment Hints". If video IF carrier marker (45.75MC) does not fall at 50% (± 5%) on curve, position it properly with slight adjustment of A5. If curve is not symmetrical, make a slight adjustment of A2 to obtain symmetry on sides of curve.

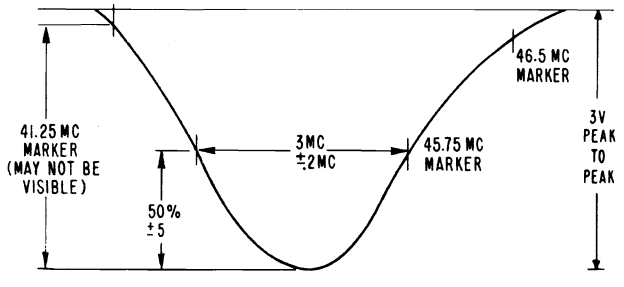


Figure 22. Ideal IF Response Curve.

ADMIRAL
15E1, -B, 15F1, 15UE1,
Alignment Information
(Continued)

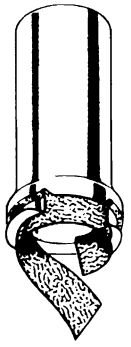


Figure 19. Special Tube Shield for IF Amplifier Alignment and IF Response Curve Check.

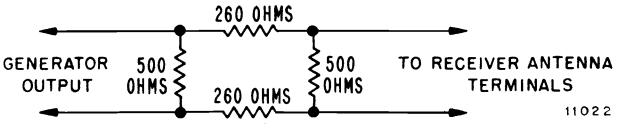


Figure 20. Circuit of 12DB Attenuation Pad for Viewing Overall VHF IF Response Curve.

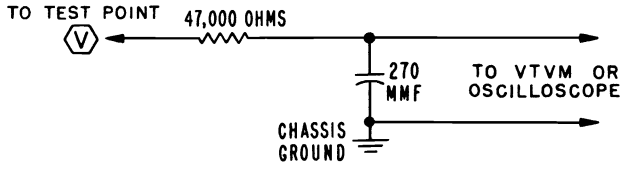


Figure 21. Decoupling Filter.

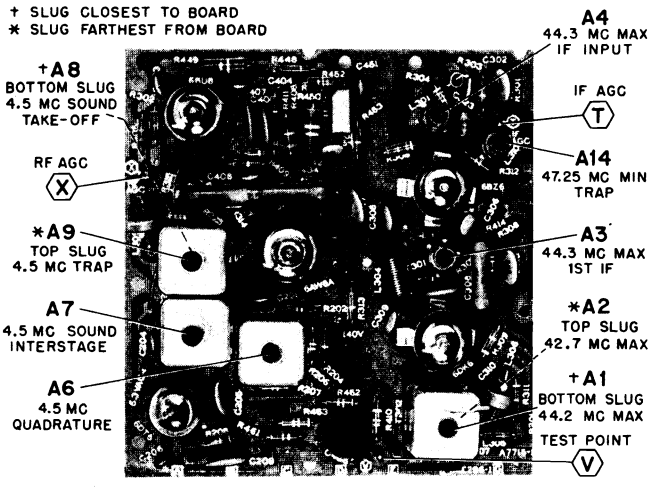


Figure 23. Top View of Etched Circuit Board 14E286-1 Showing Test Point Locations and IF Alignment Data.

ALIGNMENT OF 4.5 MC TRAP USING A TELEVISION SIGNAL

Beat interference (4.5 MC) appears in picture as very fine vertical or diagonal lines, very close together, having a "gauze-like" appearance, the pattern will vary with speech, forming a very fine herringbone pattern.

To align the 4.5 MC trap (slug adjustment A9), tune in a television station with beat interference pattern in picture. While closely observing the picture, adjust slug A9 for minimum interference pattern.

Important: A hexagonal non-metallic alignment tool (Admiral part number 98A30-12) is required for making adjustment. Note that adjustment A9 is top slug (nearest top of shield can); use caution so as not to disturb bottom slug (nearest etched circuit board) as sound IF alignment will be affected.

4.5 MC SOUND IF ALIGNMENT USING TELEVISION SIGNAL

For simplicity and required accuracy of the 4.5 MC signal frequency, the sound alignment procedure given in the manual uses a transmitted TV signal rather than test equipment.

Important: Note that step 3 of the sound IF alignment procedure requires the use of a strong transmitted TV signal. Steps 5 and 6 require the use of a weak (attenuated) TV signal. Failure to use a television signal of the required level as instructed for each of the steps will cause incorrect alignment with resulting weak or distorted sound.

Make alignment adjustments as follows:

1. Remove cabinet back. Turn set on and allow 15 minutes for warm up.
2. Select the strongest TV station received. Adjust set for normal operation. See figure 23 for adjustment locations.
3. Using a non-metallic alignment tool (for hexagonal core IF slugs, Admiral Part No. 98A30-12), very slowly turn slug "A6" several turns counterclockwise until a buzz is heard in the sound. Then turn it clockwise until the loudest and clearest sound is obtained. NOTE: There may be two points (approximately ½ turn apart) at which sound is loudest. The slug should be set at the center range of the first point of loudest sound noted as the slug is turned in (toward etched circuit board).
4. Set Contrast control fully to the left (counterclockwise). Reduce the signal to the antenna terminals until there is a considerable amount of hiss in the sound. For best results, it is recommended that a step attenuator be connected between the antenna and the antenna terminals. The signal can also be reduced by disconnecting the antenna and placing it in close proximity of the antenna terminals or tuner antenna lead-in.
5. Carefully adjust slug "A7" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A7".
6. Carefully adjust slug "A8" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A8". Caution: Adjustment "A8" is slug nearest bottom of shield can; use care so as not to disturb slug nearest top of shield can.
7. If the above steps are correctly made, no further adjustment should be required. However, if sound remains distorted at normal volume level when receiver is tuned for best sound, repeat entire procedure.

Caution: Do not readjust slug "A6" unless sound is distorted. If "A6" is readjusted, all steps in alignment procedure should be repeated exactly as instructed above.

ADMIRAL Chassis 15E1, -B, 15F1, 15UE1, Service Information, Continued

SCHEMATIC NOTES

②, ③, . . . indicate production changes covered by a Run number. Run numbers are stamped at the rear of the chassis. Brief description of Run changes given on schematic.

Ⓐ1, Ⓐ2, ... Ⓨ, Ⓩ, etc. indicate alignment points and connections.

Important: Before making waveform and voltage measurements, see instructions below.

Fixed resistor values shown in ohms ±10% tolerance, ½ watt, capacitor values shown in micromicrofarads ±20% tolerance unless otherwise specified.

NOTE: K=x 1000, MEG=x 1,000,000, MF=microfarad.

CONDITIONS FOR OBSERVING WAVEFORMS

Warning: Pulsed high voltages are present at the caps of V404 and V406, and at pin 3 of V405. **Do not** attempt to observe waveforms at these points unless suitable test equipment is used.

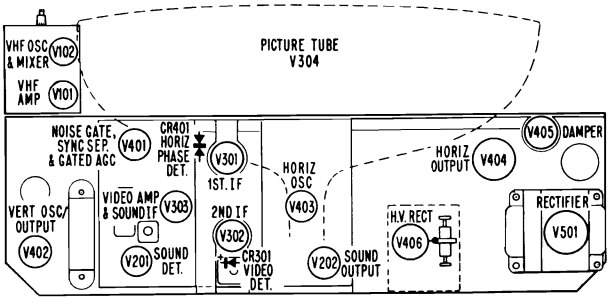
- Set tuning controls for normal picture. Do not disturb **AGC** and **Horiz. Lock** adjustments. After receiver is set for normal picture, turn the **Contrast** control fully clockwise.
- Oscilloscope sweep is set at 30 cycles for vertical waveforms and at 7,875 cycles for horizontal waveforms, to permit 2 complete cycles to be observed.
- Peak-to-peak voltages will vary from those shown on the schematic depending on the input signal strength, test equipment employed and chassis parts tolerance.
- Waveforms were taken with a comparatively strong transmitted signal input to the television chassis.

CONDITIONS FOR MEASURING VOLTAGES

Warning: Pulsed high voltages are present at the caps of V404 and V406, and at pin 3 of V405. **Do not** attempt to measure voltage at these points without suitable test equipment. A VTVM with a high voltage probe should be used when measuring picture tube 2nd anode voltage.

- Set the **Channel Selector** on an unused channel. **Contrast** control fully clockwise. All other controls fully counterclockwise. Do not disturb **AGC** and **Horiz. Lock** adjustments.
- Antenna disconnected and terminals shorted together.
- Line voltage: 117 volts AC.
- DC voltages measured with a VTVM between tube socket terminals and chassis, unless otherwise indicated.
- All voltages measured with tubes in sockets. Use of adapter sockets is recommended.

TUBE LOCATIONS
15E1 TV CHASSIS



TUBES AND SEMICONDUCTOR DIODES

V101—6FH5	**V304—19XP4**	**V406—1G3GT**
V102—6CG8	**V401—6BU8**	**V501—5U4GB**
V201—6DT6	**V402—6DE7**	**CR301—1N87 or 1N87A**
V202—6CU5	**V403—6CG7**	
V301—6BZ6	**V404—6DQ6A**	**CR401—93B5-6**
V302—6DK6	**V405—6AX4GTA/B or 6DE4**	
V303—6AW8A		

VHF CHANNEL SLUG ADJUSTMENT

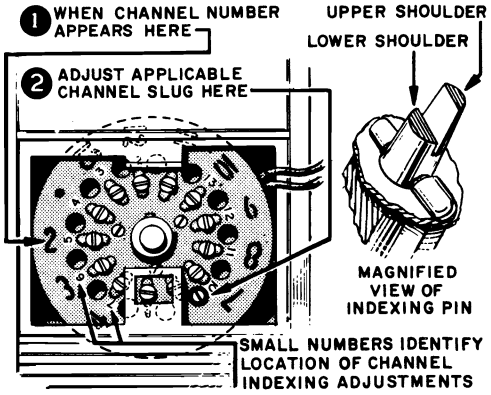


Figure 3. Partial Front View of Cabinet with Escutcheon Removed. VHF Channel Slug Adjustments and Channel Indexing Adjustments Shown. Note: Fine Tuning disc is located directly behind the program wheel.

Check channel slug adjustment for each station received. To check slugs, perform the following:

1. Turn set on and allow 15 minutes warm up. Select an operating channel and set Fine Tuning control to 1/3 rotation from maximum counterclockwise setting. On remote control sets, push downward on latch (between channel indicating window and Push Bar switch). Lift trim plate off and set aside. Set On-Vac switch (rear of set) to "ON". On non-remote control sets, remove Channel Selector knob. Check to see that adjustment slug is accessible (see figure 3 or 4). If necessary, readjust Fine Tuning slightly so that oscillator slug is accessible through hole in fine tuning disc.

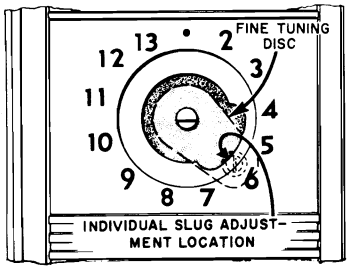


Figure 4. Partial Front View of Non-remote Control Sets Showing VHF Channel Adjustment Slug Location.

2. Insert a 3/32" blade, flexible, non-metallic alignment tool (part number 98A30-22) through hole in fine tuning disc and engage tuning slug. Carefully adjust slug for best picture. Note that sound is not loudest at this point.

   Caution: Only slight rotation of slug will be required.

3. Select other channels and repeat step 2.
4. After making adjustments, replace Channel Selector knob, or, on remote control sets, replace escutcheon on front of set and push latch upward until it locks.

Models Using Chassis 120517E, 519C, 525E 120526C, 518F, 520D

Emerson

TYPE	MODEL	TV CHASSIS	REMOTE CH.	STYLE	C R T	TUNER
VHF	1600	120517E	NONE	PORTABLE T.M.	17DTP4	471228
	1602	120525E	471235			
	1604	120517E	NONE	TABLE MODEL		
	1608	120519C				
	1610	120526C	471235			
	1612	120519C	NONE	LOBOY CONSOLE	21DAP4	471225
	1614	120526C	471235			
	1622	120519C	NONE			
	1624	120526C	471235			
UHF/VHF	1601	120518F	NONE	PORTABLE T.M.	17DTP4	471229 – VHF
	1605					471227 – UHF
	1609	120520D		TABLE MODEL		
	1613			LOBOY CONSOLE	21DAP4	471226 – VHF
	1623					471227 – UHF

DISASSEMBLY, 17 INCH SETS

To Remove Plastic Front:

1. Remove knobs from front control panel.
2. Remove 3 Phillips head screws from bottom edge of plastic front.
3. Pull bottom edge out slightly and remove entire front by lifting straight up.
4. Disconnect leads from speaker, noting their positions for proper re-connection during assembly.

To Remove CRT, follow steps 1 - 4 above, and

5. Remove cabinet back.
6. Remove socket from base of CRT.
7. Remove yoke-retaining clamp.
8. Disconnect high-voltage lead and short to chassis.
9. Remove four hex-head screws (used to mount CRT to cabinet) and remove CRT.

*To Remove Chassis, follow steps 1 - 8 above, and:

10. Remove hex-head screw used to secure VHF tuner to cabinet (located 2 inches above fine-tuning shaft).
11. Remove two hex-head screws used to mount remote control chassis to cabinet (remote sets only).
12. Remove screws used to mount UHF tuner to cabinet (UHF sets only).
13. Remove eight hex-head screws used to mount chassis and remove chassis from cabinet.
14. Re-assemble in reverse order.

*NOTE: The remote control receiver chassis can be serviced without disconnecting it from the circuit. Removing the two mounting screws will permit the chassis to be swung out to the rear, allowing removal of the bottom cover plate. All components within the chassis will then be readily accessible for any required service. It is not necessary to remove the TV receiver chassis to gain accessibility to the remote control receiver.

DISASSEMBLY, 21 INCH SETS

Note: Removal of safety glass requires only removal of the top-retaining trim strip at the cabinet front.

†To Remove Chassis and CRT:

1. Remove all knobs from cabinet front and back cover from rear of cabinet.
2. Loosen screws used to mount antenna terminal strip and free strip from cabinet.
3. Remove nut used to secure CRT harness ground strap to control mounting panel.
4. Remove four nuts used to mount control panel to cabinet.
5. Remove two hex-head screws used to secure rear tuner-mounting bracket to cabinet bracket.
6. Remove four screws used to mount UHF tuner to cabinet (UHF sets only).
7. Disconnect speaker leads at the speakers.
8. Remove socket and cable assembly from base of CRT. Remove yoke clamp from yoke.
9. Disconnect high voltage lead from CRT anode cavity and short lead to chassis.
10. Remove two screws used to secure top chassis-mounting brackets to cabinet.
11. Remove five chassis-mounting screws from bottom of cabinet and remove chassis by sliding out to rear.
12. CRT may now be taken out of cabinet by removing four mounting nuts from corners of CRT mounting harness.
13. Re-assemble in reverse order.

†NOTE: The remote control receiver chassis can be serviced without disconnecting it from the circuit. To accomplish this, remove the four mounting screws used to secure the remote receiver chassis to the cabinet bottom and lift the chassis out to the rear. All components within the remote receiver chassis will now be easily accessible for any required service.

SERVICE HINT, MODELS 1600, 1601, 1602, 1604, 1605 (17" Sets)

On 17" sets, both sides of the chassis can be serviced without removing it from the cabinet. To accomplish this remove the back cover, plastic front and the CRT, which is held in place by four self-tapping screws. Turn the yoke completely around so that it faces the back, re-insert the CRT from the REAR of the set (anode cavity must face UP), and re-connect the socket and cable assembly to the CRT base. The only remaining step is to connect the anode lead to the CRT anode cavity, using a standard high-voltage extension.

SPEAKER PHASING

The dual speaker system employed in these models (21" sets only) must be properly phased to insure against a loss of the higher frequencies, since this could result in a noticeable drop in volume. Therefore, when replacing a speaker, use the following method to check for proper phasing:

Place a 3-Volt battery across the speakers (connected in series) and note whether or not both cones move in the same direction at the same time. If they do, speakers are properly phased; if not, reverse connections at the speaker being replaced only.

(Continued on pages 36 through 42)

EMERSON Chassis 120517E, -18F, -19C, -20D, -25E, -26C, Alignment, Continued

GENERAL ALIGNMENT NOTES:

A. Set tuner to highest unused channel and allow both chassis and equipment to warm up for ten minutes or more.

B. Connect -3 volts bias through a 10K resistor to the AGC test point (junction of C-12, C-14 and R-11).

C. Maintain signal generator output no higher than necessary to produce a reading not to exceed two volts on VTVM and use insulated alignment tools for adjusting.

D. Video IF alignment requires the use of a shim for signal injection. This can be easily constructed by pasting a thin piece of metal foil, (approx. ½ x 2") on a slightly larger piece of heavy paper. Insert this shim between the tuner mixer tube and its shield in such a manner that the foil side faces the tube.

VIDEO IF ALIGNMENT

1. **Connect high side of signal generator to metal foil on shim, low side to chassis through a .001 mfd. capacitor.**
2. **Place a VTVM (-5 volt range) at video detector test point (junction of L-7A and L-7B), common lead to chassis.**
3. **Peak the following for MAXIMUM response at the frequencies specified:**
   T-5 at 44.25 MC, T-4 at 45.3 MC, T-3 at 42.6 MC
4. **Tune the following for MINIMUM response, increasing signal generator output as necessary:**
   L-4 at 41.25 MC, L-1 at 47.25 MC, L-3 at 45.0 MC
5. **Peak T-9 on tuner for MAXIMUM out put at 45.0 MC.**
6. **Set generator at 43.1 MC and re-tune L-3 for MAXIMUM output.**

To observe if the IF response curve, connect an oscilloscope, thru a 10,000 ohm isolation resistor, in place of the VTVM. Inject a sweep signal (40 to 50 MC) along with a loosely coupled marker generator at the mixer tube in the manner described above. Adjust the output of the sweep generator to produce about 2 volts peak to peak curve on the oscilloscope and reduce the marker signal so as not to upset the response curve. The 45.75 MC marker should appear between 55% and 65% down with respect to the peak.

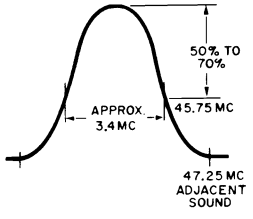


FIG. 1 – OVERALL I.F. RESPONSE CURVE

SOUND IF ALIGNMENT

1. Using a strong T.V. transmitted signal, adjust T-6, sound take-off transformer, bottom, and T-1, sound interstage transformer, top and bottom, for the loudest sound.
2. Adjust L-2, quadrature coil, for clearest and loudest sound. If two peaks are encountered, use the position where the slug is closer to the circuit board.
3. With the antenna loosely coupled to the set, (simulating a weak signal) repeat step No. 1, tuning for maximum volume and minimum distortion.
4. If a VTVM is available, measure the voltage across R-6, 560K resistor. Voltages should be between -3 and -10 volts and not vary by more than 3 volts between a strong and weak signal.
5. Check sound on all channels and repeat entire procedure if necessary.

4.5 MC VIDEO TRAP ALIGNMENT

1. Tune in a local station and adjust the fine-tuning control until a 4.5 MC beat is visible in the picture.
2. Adjust T-6 (top) for minimum 4.5 MC beat on screen.

HORIZONTAL OSCILLATOR ALIGNMENT

The horizontal oscillator can be aligned without removing the chassis from the cabinet. To accomplish this, tune the receiver to a known "good" channel, set the LOCAL-DISTANCE control (R-38) fully counterclockwise (local position), and proceed as follows:

PROCEDURE:

1. Disable sync by shorting test point Ⓔ to chassis.
2. Place a jumper across horizontal stabilizer coil L-10.
3. Set horizontal hold control to center of range.
4. Adjust frequency range trimmer CT-1 for momentary lock-in (picture will sway from side to side due to absence of sync).
5. Remove jumper from L-10.
6. Adjust L-10 for momentary lock-in (picture will sway from side to side due to absence of sync).
7. Remove short from test point Ⓔ.

The picture should now remain in sync when changing channels. Failure to do so indicates a defect in the horizontal oscillator, phase comparator or sync circuits.

ADJUSTMENT OF LOCAL-DISTANCE CONTROL (R-38)

Before adjusting, make sure the Horizontal Oscillator has been properly adjusted (see above).

Sets are shipped out from the factory with this control set to its "distant" position (maximum clockwise). This position provides best signal-to-noise ratio (minimum snow) and should not be changed unless overload (streaking in picture, poor sync stability, high distorted contrast, etc.) is noted on the stronger channels. If overload exists, set contrast control to max. clockwise and adjust "Local-Distance" control in a counter-clockwise direction to a point just under an overload condition.

HORIZONTAL SIZE ADJUSTMENT (R-80)

The chassis described in this service note have been designed to provide proper horizontal sweep under the normal variations usually encountered in line voltages. Should unusually low line voltage be encountered, it may be necessary to short out R-80 (3300 ohm, 1 watt) to provide sufficient sweep. Abnormally high line voltages may require the removal of the short across R-80 to prevent over-sweeping of the picture.

The above mentioned jumper can be placed across (or removed from) R-80 without removing the chassis from the cabinet, since it is mounted on a terminal strip just to the right of the horizontal output tube.

HORIZONTAL DRIVE ADJUSTMENT (R-79)

The horizontal drive control, located just below the horizontal output tube, should normally be in its most counterclockwise position (minimum resistance in circuit). If overdrive bars (indicated by white vertical lines in the raster) appear at this setting, slowly advance R-79 in a clockwise direction until the lines *just* disappear.

VERTICAL SIZE (R-63) AND LINEARITY (R-59) ADJUSTMENTS

Vertical size and linearity may be adjusted by inserting a fiber alignment tool into the hollow shafts of the brightness and vertical hold controls, respectively. Removal of the brightness and vertical hold control knobs is not necessary on 17" models, as the auxiliary control knobs used on these sets have central-access holes to permit insertion of an alignment tool. 21" models require the removal of the aforementioned knobs, since these are not equipped with central-access holes.

FOCUS ADJUSTMENT

Any one of four different voltages (available at the quadruple terminal strip mounted directly below the 6CG7 tube) may be utilized as a focus potential. Remove the insulated clip-lead connector (attached to one of the terminals on this strip) and alternately try connecting it to each possible terminal, leaving it connected to the one which gives the best overall focus.

EMERSON Chassis 120517E, -18F, -19C, -20D, -25E, -26C, Production Changes

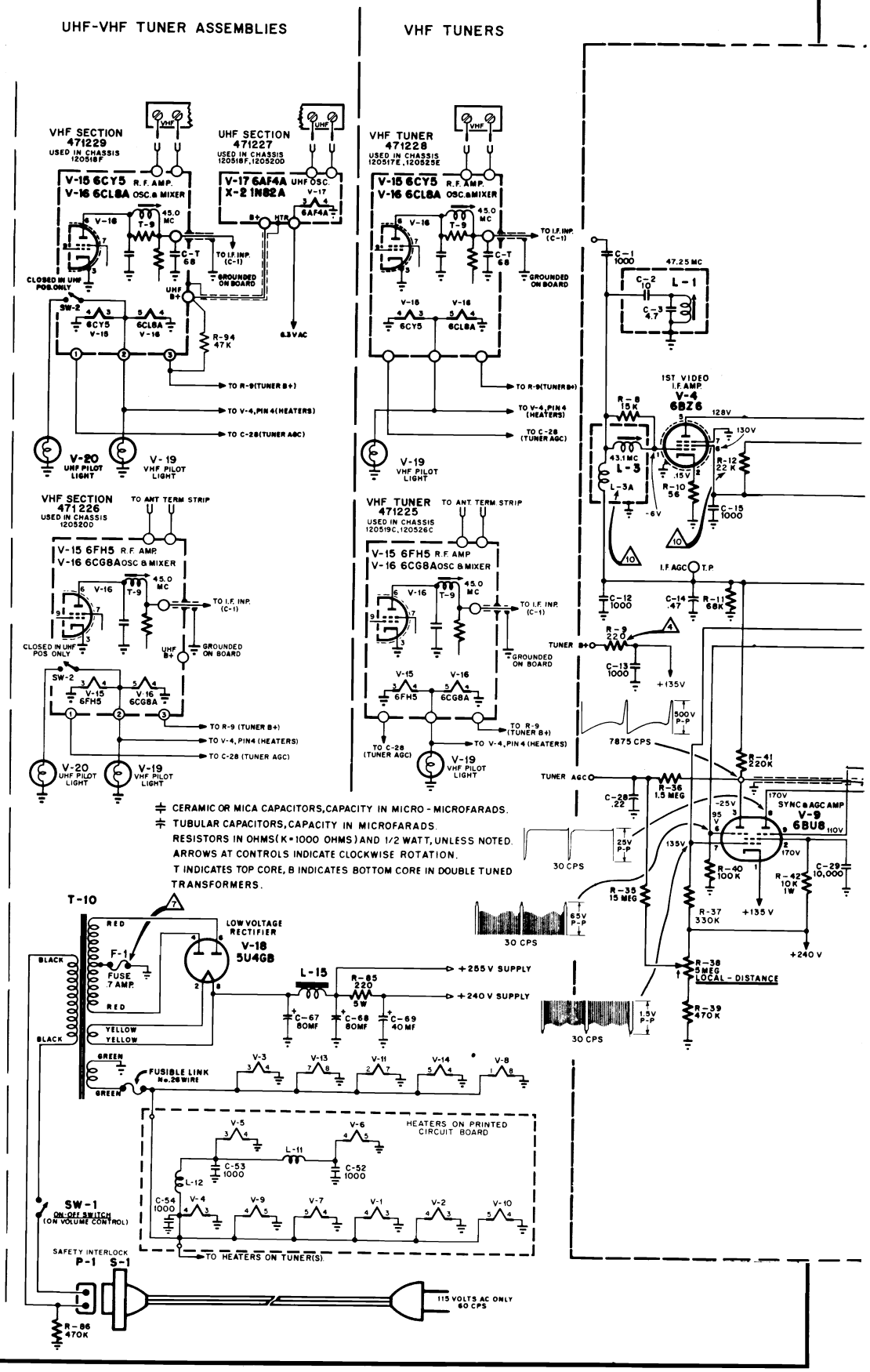
PRODUCTION CHANGES (SCHEMATIC PAGES 38-39)

The schematic diagram on pages 5, 6 is shown in its latest condition at time of this printing. Previous chassis may differ slightly, as some changes were incorporated during the course of production. The chart on page 8 lists all changes to date, as well as identifying the chassis concerned. It should be noted that any chassis marked with a triangle also contains all previous changes for that chassis. For example, a chassis marked △C will also have all modifications listed for that chassis under △A and △B ; a chassis marked △E will have all previous modifications (△A through △D) as listed for that chassis, etc.

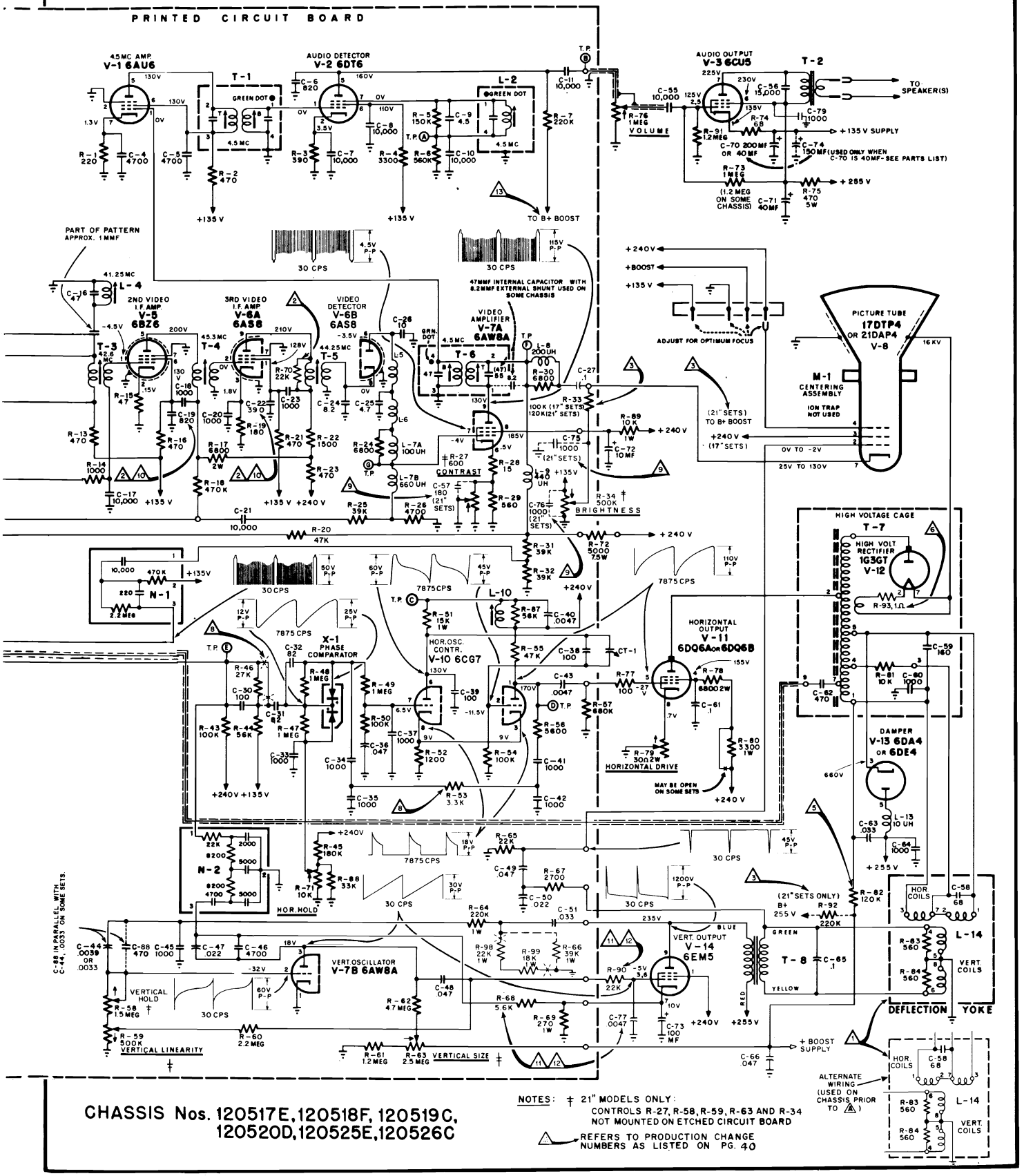
AREA INDICATED ON SCHEMATIC	MODIFICATIONS IN CHASSIS MARKED:	PURPOSE OF MODIFICATIONS	CHANGES EFFECTED
△1	21" △A (or higher) 17" △A (or higher)	To Improve Centering (All Chassis)	Deflection yoke rotated 180° on neck of tube. (For wiring changes involved, see schematic diagram, Fig. 3 on pages 5, 6.)
△2	21" △A (or higher) 17" △B (or higher)	To Improve IF Response	C-19 changed to 330mmf (was 820 mmf) C-22 changed to 270 mmf (was 220 mmf) R-70 (22K) added across primary of T-5.
△3	21" △A (or higher)	To Improve Peak Brightness	R-33 changed to 120K (was 100K) R-92 (220K) added between Boost and 255V B+ CRT screen (pin 3) connected to Boost (was at B+)
△4	21" △A (or higher) 17" △B (or higher)	To Increase Tuner B+	R-9 changed to 220Ω (was 470Ω)
△5	21" △A (or higher) 17" △B (or higher)	To Reduce Filtered Boost	R-82 changed to 120K (was 100K)
△6	21" △B (or higher) 17" △C (or higher)	To Reduce 1G3/GT Filament Voltage	Filament wire at Pin 2 rewired to Pin 6, R-93 (1Ω) added between Pins 1 and 6.
△7	21" △B (or higher) 17" △C (or higher)	Ease of Production	F-1 (.7 amp fuse) moved from B+ circuit (Pin 8 of V-18) to B- circuit (center-tap of power transformer secondary.
△8	21" △C (or higher) 17" △D (or higher)	To Increase Horizontal Hold Range	C-31 (82mmf) moved to Test Point E - previously connected to junction R-46, (27K) and R-44 (56K). R-53 changed to 3.3K (was 1K).
△9	21" △C (or higher)	To Improve Operation When Using Indoor Antenna	C-57 (180mmf) added across contrast control. C-75 (1,000mmf) added from center of brightness control to ground. C-76 (1,000mmf) added from B+ end of brightness control to ground.
△10	21" △C (or higher)	Increased Uniformity of I.F. Alignment	R-12 changed to 22K (was 47K) C-19 changed to 820 mmf (was 330 mmf) L-3A changed to part No. 705042 (was No. 705031) C-22 changed to 390 mmf (was 270 mmf)
△11	21" △C (or higher) 17" △E (or higher)	To Eliminate Possibility of Vertical Output Transformer Buzz (See also below)	R-90 changed to 10K (was 100Ω) C-77 (.01 mfd.) added from grid (Pin 6) of V-14 to ground. R-68 changed to 4.7K (was 3.3K)
△12	21" △D, △E (or higher) 17" △F, △G (or higher)	To Improve Vertical Lock-In Action (See also above)	R-90 changed to 22K (was 10K) C-77 changed to .0047 mfd. (was .01 mfd.) R-68 changed to 5.6K (was 4.7K)
△13	21" △F (or higher) 17" △H (or higher	To Improve Audio Response	R-7 (220K plate load for V-2, 6DT6) connected to B+ Boost (was at B+ 240V)

EMERSON

Chassis 120517E, 120518F, 120519C, 120520D, 120525E, and 120526C, Schematic Diagram



EMERSON Chassis 120517E, -18F, -19C, -20D, -25E, -26C, Schematic Diagram, Continued



CHASSIS Nos. 120517E, 120518F, 120519C, 120520D, 120525E, 120526C

NOTES: ‡ 21" MODELS ONLY: CONTROLS R-27, R-58, R-59, R-63 AND R-34 NOT MOUNTED ON ETCHED CIRCUIT BOARD

△ REFERS TO PRODUCTION CHANGE NUMBERS AS LISTED ON PG. 40

EMERSON Chassis 120517E, -18F, -19C, -20D, -25E, -26C, Service Data, Continued

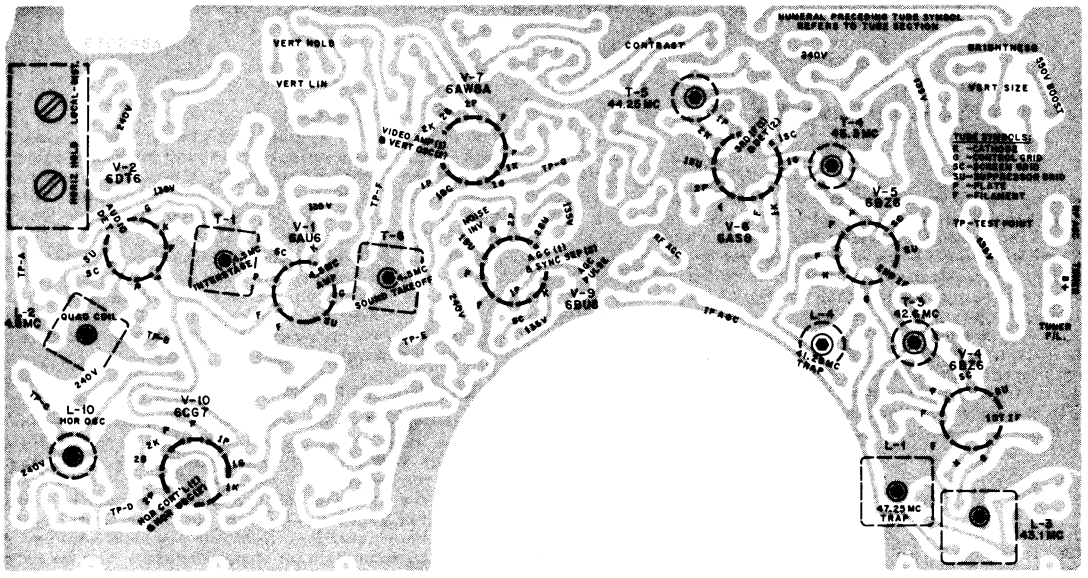


FIG. 2 – ETCHED PRINTED CIRCUIT BOARD, BOTTOM VIEW

CONDITIONS FOR CHASSIS READINGS

VOLTAGES AND WAVESHAPES were taken under actual operating conditions (normal picture and sound). AGC voltage developed at junction of C-12, C-14 and R-11 was minus six volts. Voltage and waveshape readings obtained may vary 20% in value due to component tolerances and strength of input signal to chassis under test.

RESISTANCE READINGS were taken with no power applied. Where readings are affected by control settings, both maximum and minimum values are given. All resistance readings may vary 10% due to normal component tolerances.

ALL MEASUREMENTS were taken between points indicated and chassis (unless otherwise noted), with line voltage maintained at 115 volts AC. A VTVM was used for all voltage and resistance measurements and a low capacity probe was used for all waveshapes shown.

RESISTANCE READINGS

SYM	TUBE TYPE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V- 1	6AU6	1.5	0	0	.1	*50K	* 50K	220	–	–
V- 2	6DT6	5	390	0	.1	* 300K	* 50K	560K	–	–
V- 3	6CU5	* 50K	1.2 M	.1	0	N.C.	* 50K	* 50K	–	–
V- 4	6BZ6	68K	56	0	.1	* 55K	* 55K	0	–	–
V- 5	6BZ6	69K	47	.1	0	* 50K	* 52K	0	–	–
V- 6	6AS8	* 48K	0	180	.1	0	4.5 K	0	0	* 44K
V- 7	6AW8	0	500K to 2 M	5.9M to 8.4 M	0	.1	20 to 300	4.5K	*48K	* 34K
V- 8	CRT	.1	22K	*46K-(17") 3.5M-(21")	0 to 3.5M	–	–	100K to 240K	0	–
V- 9	6BU8	* 50K	* 50K	270 K	.1	0	* 46K	250 K	* 70K	3M
V-10	6CG7	* 82K	100 K	1.2K	0	.1	* 50K	3M	1.2K	0
V-11	6DQ6	T.P.	0	N.C.	* 44K	680 K	T.P.	.1	0 to 30	–
V-12	1G3-GT	I	N	F	I	N	I	T	E	–
V-13	6DA4 6DE4	N.C.	N.C.	3.5M	N.C.	* 42K	N.C.	.1	0	–
V-14	6EM5	*40K	T.P.	N.C.	.1	0	2.3M-2.8M	270	N.C.	* 44K
V-18	5U4-GB	N.C.	* 40K	N.C.	20	N.C.	20	N.C.	* 40K	–

NOTES: All resistance readings given are in ohms, "K" is Kilohms, "M" is Megohms.
* Indicates varying resistance: allow 30 seconds for meter to settle.
N.C. Denotes no connection at terminal indicated.
T.P. Denotes connection used as terminal post.

EMERSON Chassis 120517E, -18F, -19C, -20D, -25E, -26C, Service Data, Continued

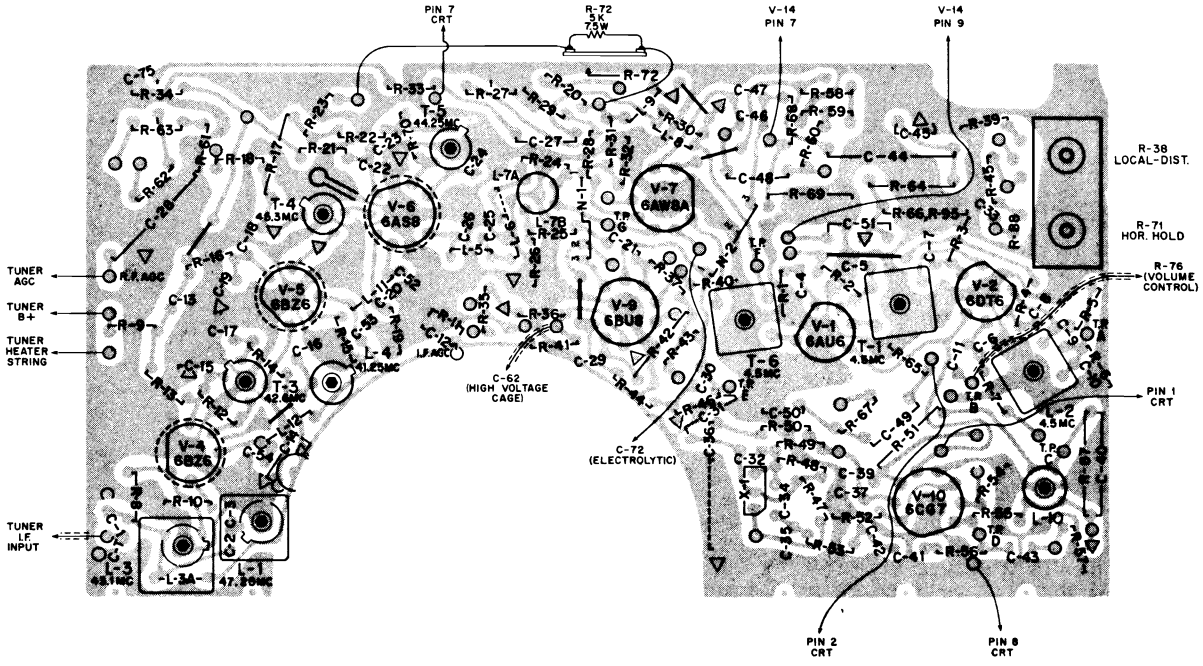
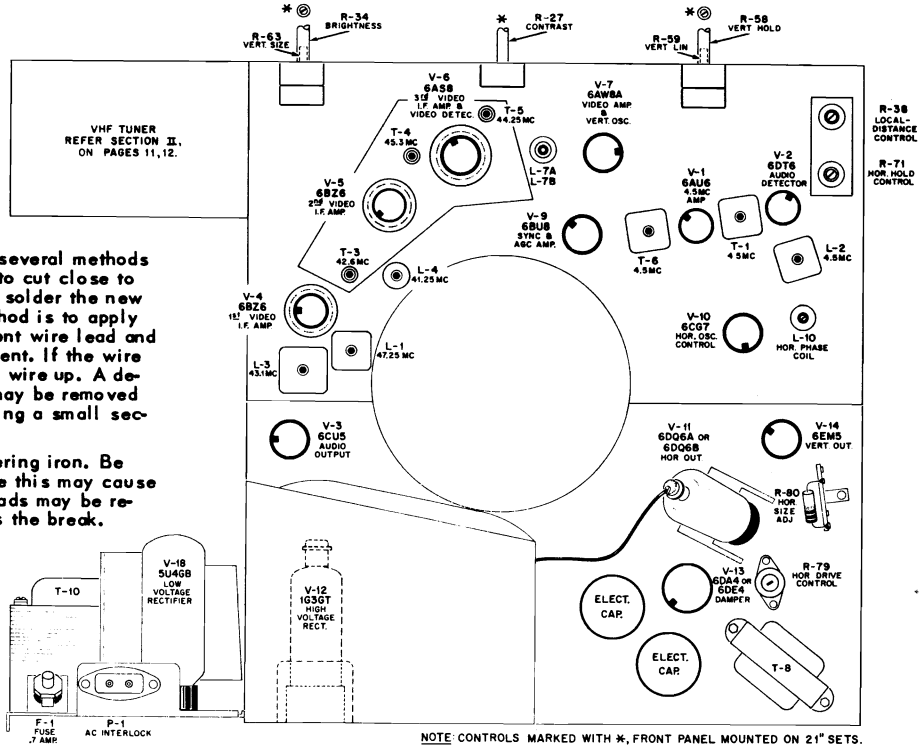


FIG. 4 – ETCHED PRINTED CIRCUIT BOARD, TOP VIEW

SERVICING OF PRINTED BOARDS

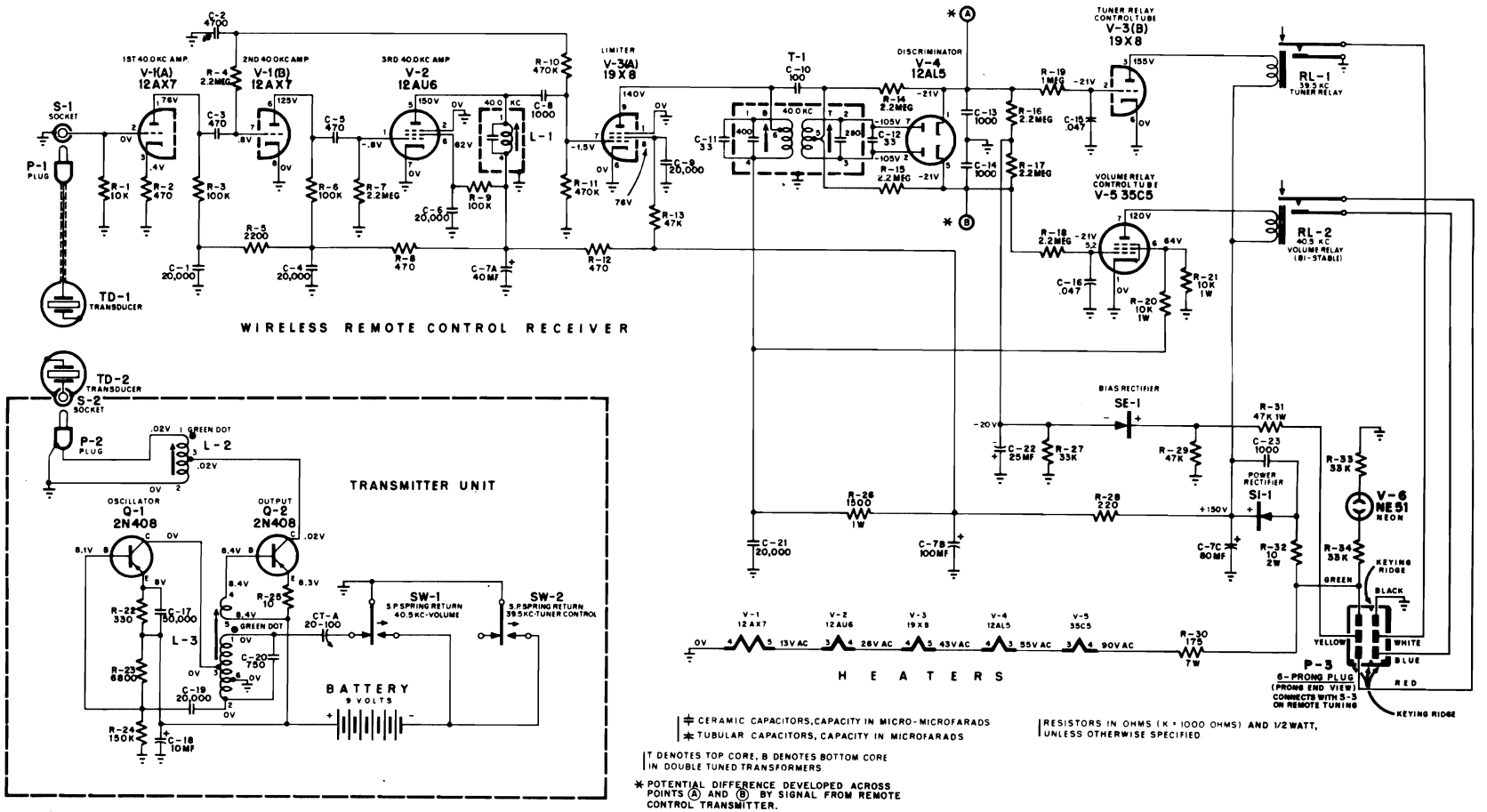
To remove defective components one of several methods may be used. A recommended method is to cut close to the body of the defective component and solder the new part to the remaining leads. Another method is to apply heat at the junction point of the component wire lead and the printed board and lift out the component. If the wire lead is bent over, first heat and pry lead wire up. A defective component with many terminals may be removed by clipping into several parts and removing a small section at a time.

Use a low wattage (20 to 30 watts) soldering iron. Be careful not to apply excessive heat since this may cause the printed foil to loosen. Broken foil leads may be repaired by soldering a hookup wire across the break.



NOTE: CONTROLS MARKED WITH *, FRONT PANEL MOUNTED ON 21" SETS.

FIG. 5 – TUBE LOCATION AND ALIGNMENT POINTS

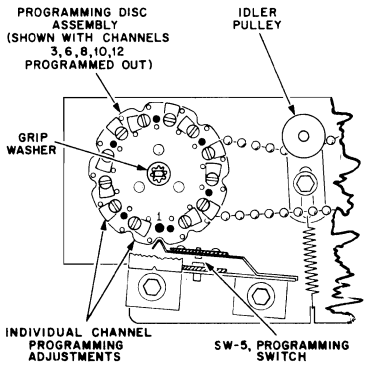


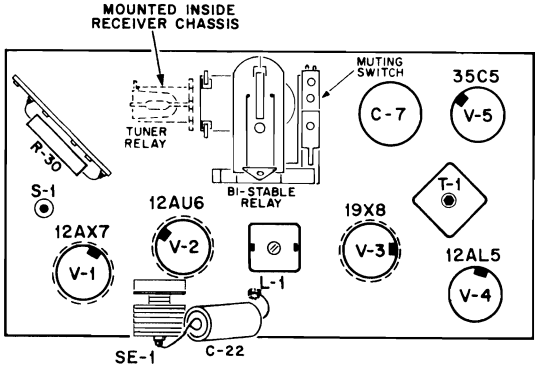
WIRELESS REMOTE CONTROL ASSEMBLY 471235

TO PRE-SET CHANNELS

This receiver is adjusted at the factory to stop at all channels (13 operating positions). Before utilizing the remote-control system, the programming wheel at the back should be pre-set to skip all the channels not operating in the area, using the following procedure:

1. With the set turned off by the front PRESS-ON-OFF switch, rotate the front channel selector knob manually to the lowest non-receivable channel number.
2. Insert a screwdriver into the hole in the cabinet back at the left top rear corner (as viewed from the back) and turn the accessible slotted screw one-quarter turn clockwise until it reaches its stop point. Repeat the same procedure for each non-receivable channel.
3. If it is later desired to receive a channel which had been previously set to be skipped, follow instructions in items 1 and 2, and turn the slotted screw one-quarter turn counter-clockwise instead of clockwise.





TUBE LOCATION, WIRELESS REMOTE CONTROL ASSEMBLY 471235

Emerson Television

TYPE	MODEL	TV CHASS.	STEREO AMPL.	AM/FM	REC.CHGR.	STYLE	CRT	TUNER
VHF R'C'V'R	1524	120507A	NOT USED IN THESE MODELS (TV ONLY)			PORTABLE	17BJP4	471212
	1526					TABLE MODEL		
	1528	120515C				CONSOLE	21CBP4A	471230
	1530					TABLE MODEL		
	1532	120541C	120535B	NONE	819159	LO BOY	23XP4	
	1534		120536B	120533B				
	1536		120535B	NONE				
	1538		*120534B					
UHF/VHF R'C'V'R	1525	120508B	NOT USED IN THESE MODELS (TV ONLY)			PORTABLE	17BJP4	471213 VHF SECT. 471220 UHF SECT.
	1529	120516D				CONSOLE	21CBP4A	471231 VHF SECT. 471220 UHF SECT.
	1531					TABLE MODEL		
	1533	120542D	120535B	NONE	819159	LO BOY	23XP4	
	1535		120536B	120533B				
	1537		120535B	NONE				
	1539		*120534B					

* Chassis 120534B is a combined stereo amplifier and AM tuner.

The models listed above utilize a new chassis featuring 3 stage IF, automatic noise inversion, gated AGC and a Local-Distance control. An aluminized CRT and glare-free face plate is used on all 17" and 21" sets. 23" LoBoy models (combination sets) employ the new square-cornered CRT with bonded faceplate, which serves to protect the tube as well as eliminating the "dust trap" commonly found on sets using a conventional type of picture tube. Therefore, when replacing the CRT, replace only with the same type as originally supplied. DO NOT ATTEMPT TO SUBSTITUTE ANY OTHER TYPE OF CRT.

Included in this preliminary service note are schematic diagrams for the TV, stereo amplifier and tuner chassis listed above, as well as information on stereo changer 819159 used in these models.

RECORD CHANGER
ADJUSTMENTS (RE: FIG. 1A,B)

Stylus Set-Down - Adjust screw indicated until stylus sets down on lead in groove (Use 7" record while adj.).

Tone Arm Height - Top of tone arm must clear bottom of records stacked on spindle by 1/8" during change cycle.

Tone arm limiting - Adjust screw indicated for 1/4" clearance between tip of stylus and base plate with changer out of cycle.

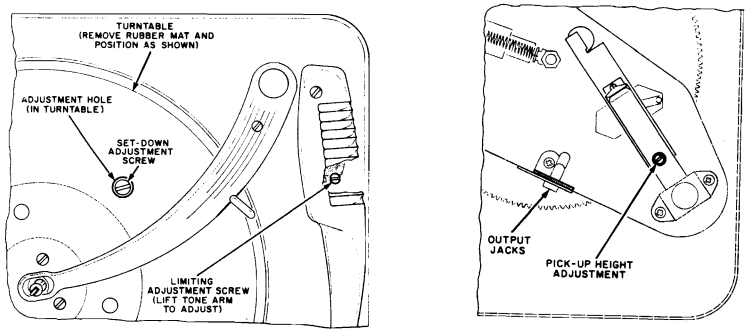
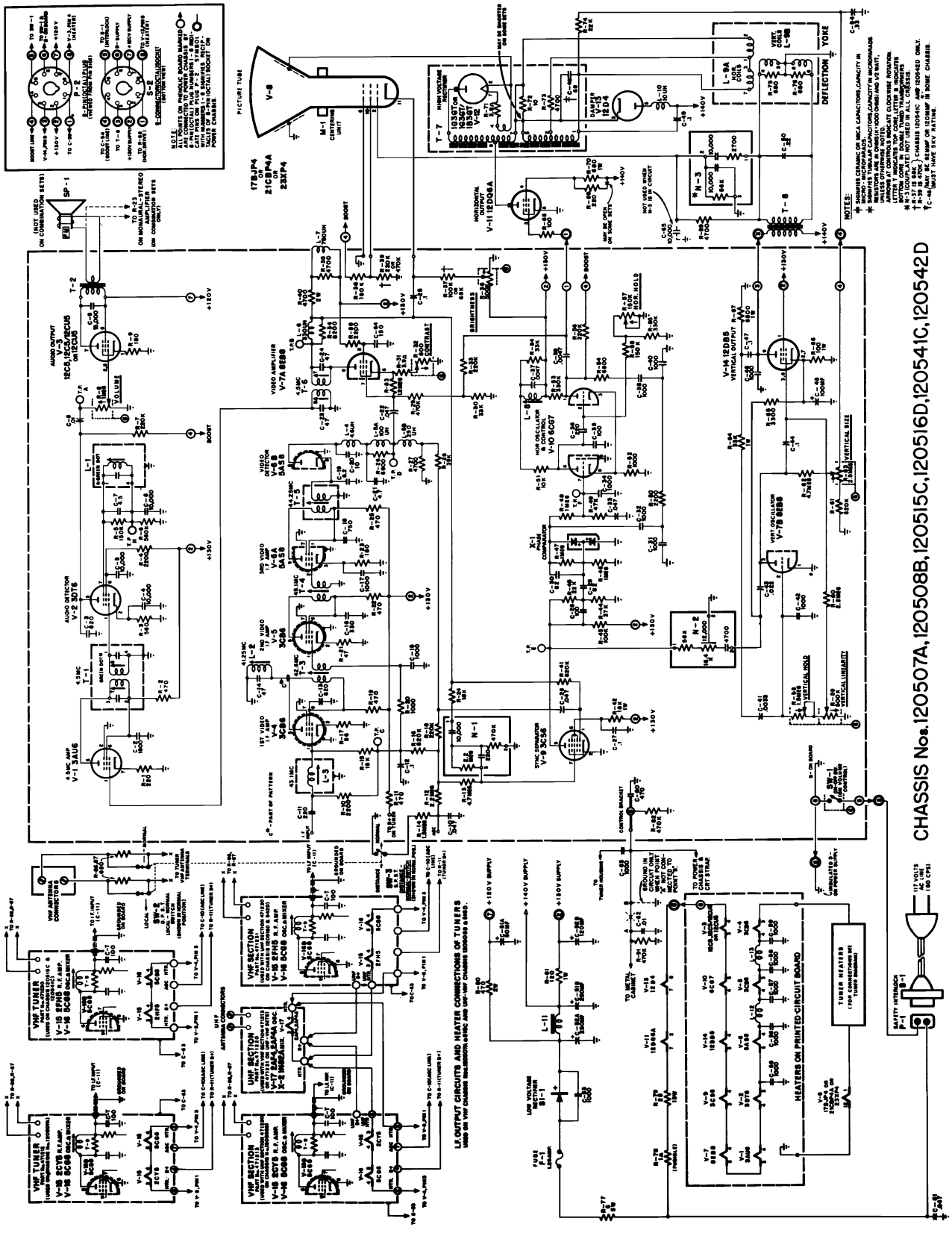
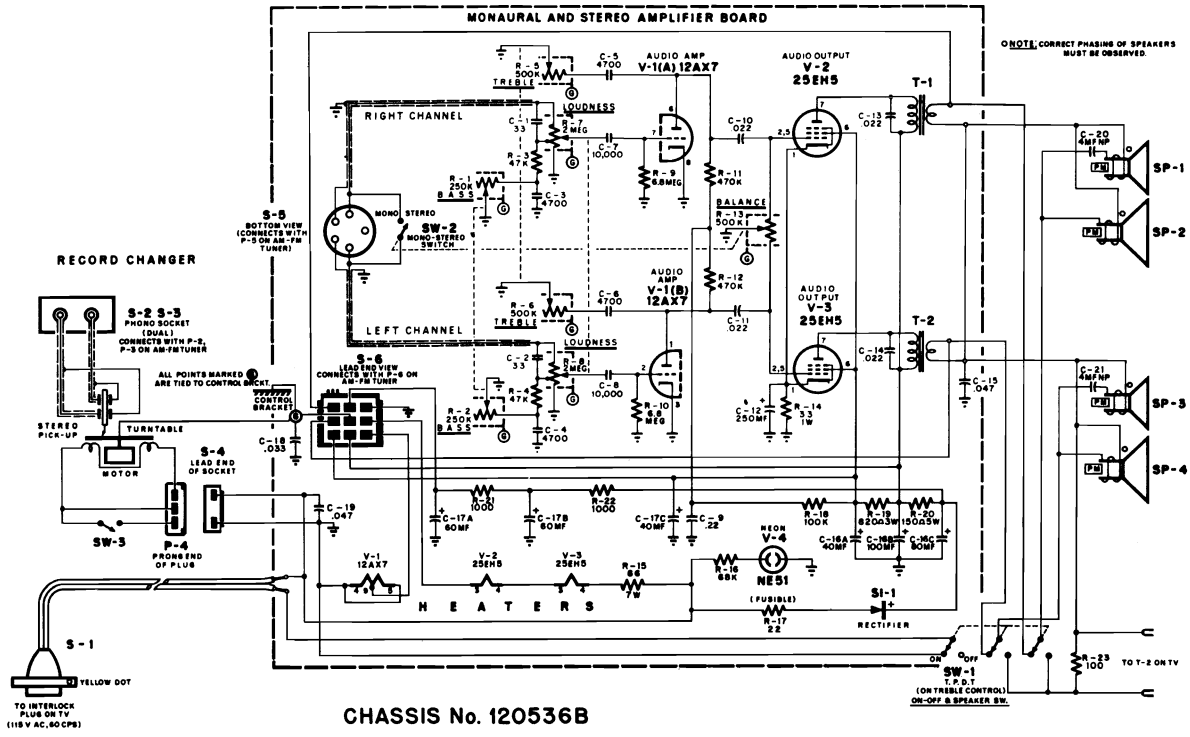


FIG. 1A,B RECORD CHANGER 819159, ADJUST. SETTINGS

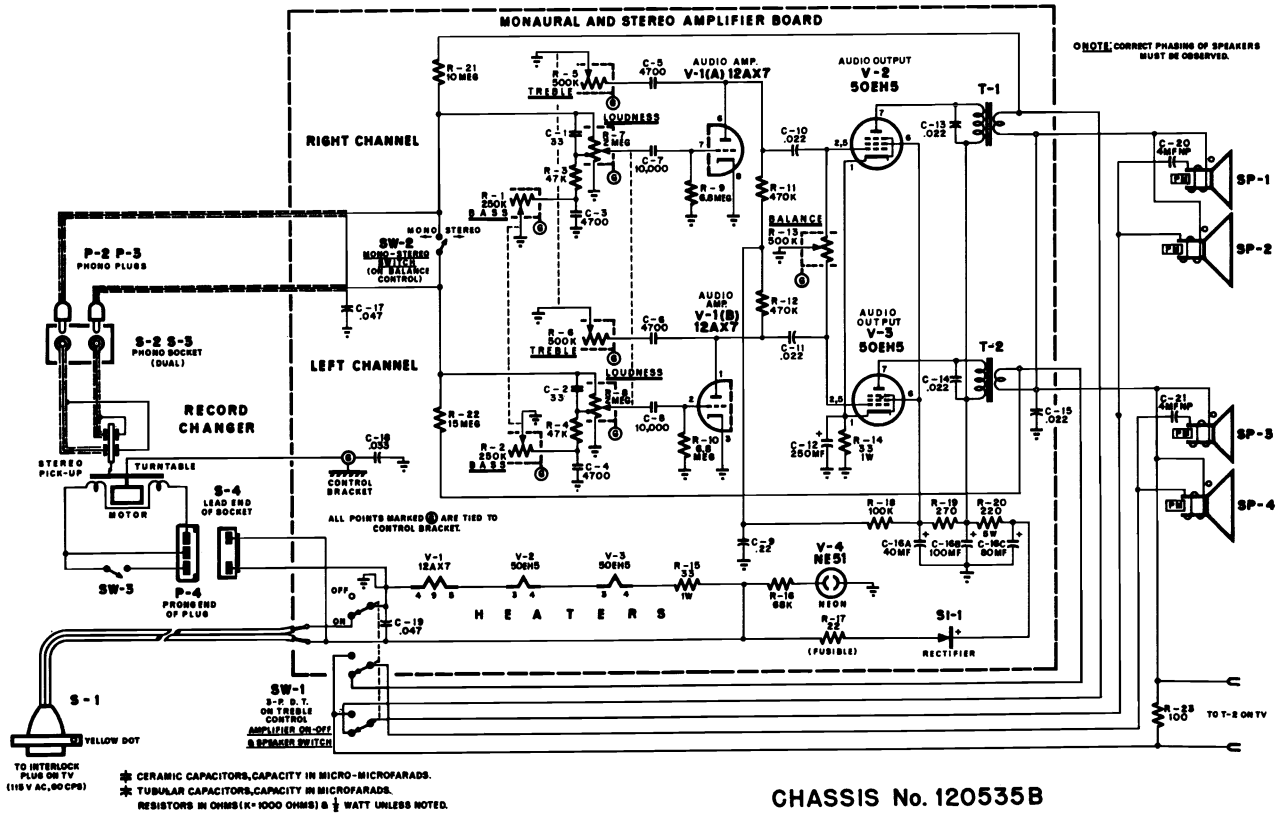
EMERSON Chassis 120507A, 120508B, etc., Main Schematic Diagram



EMERSON Chassis 120536B and 120535B Stereo Amplifiers Diagrams



CHASSIS No. 120536B

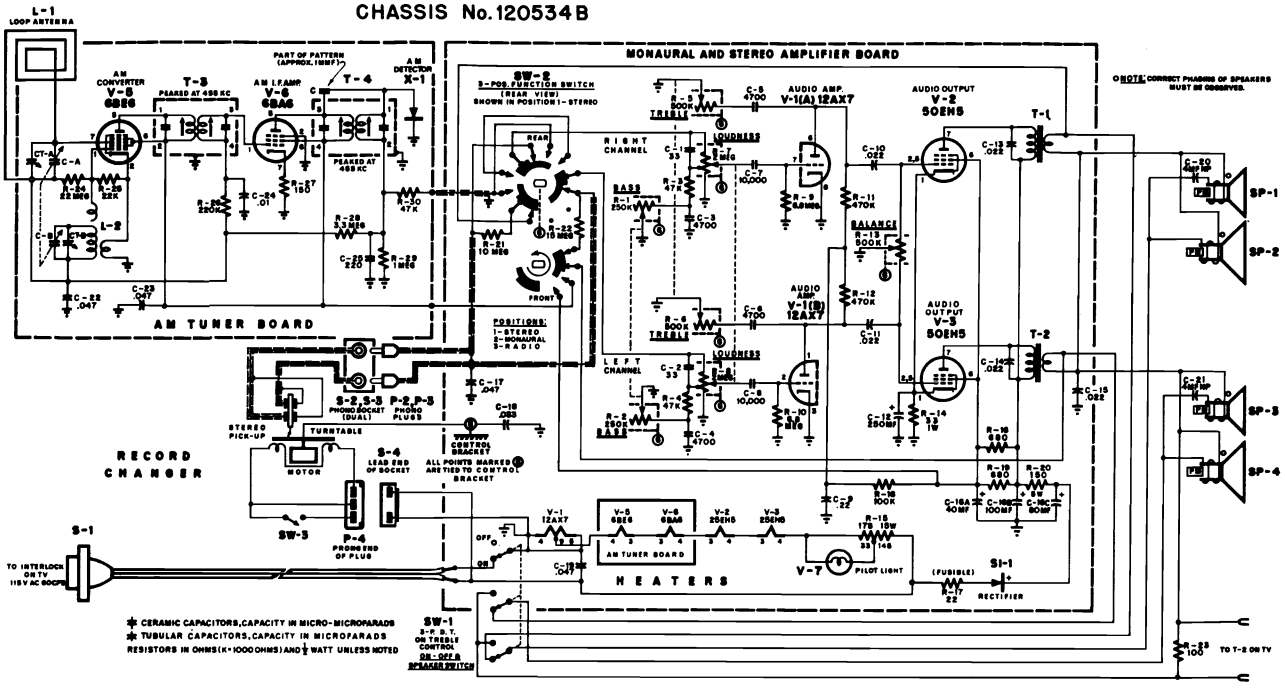


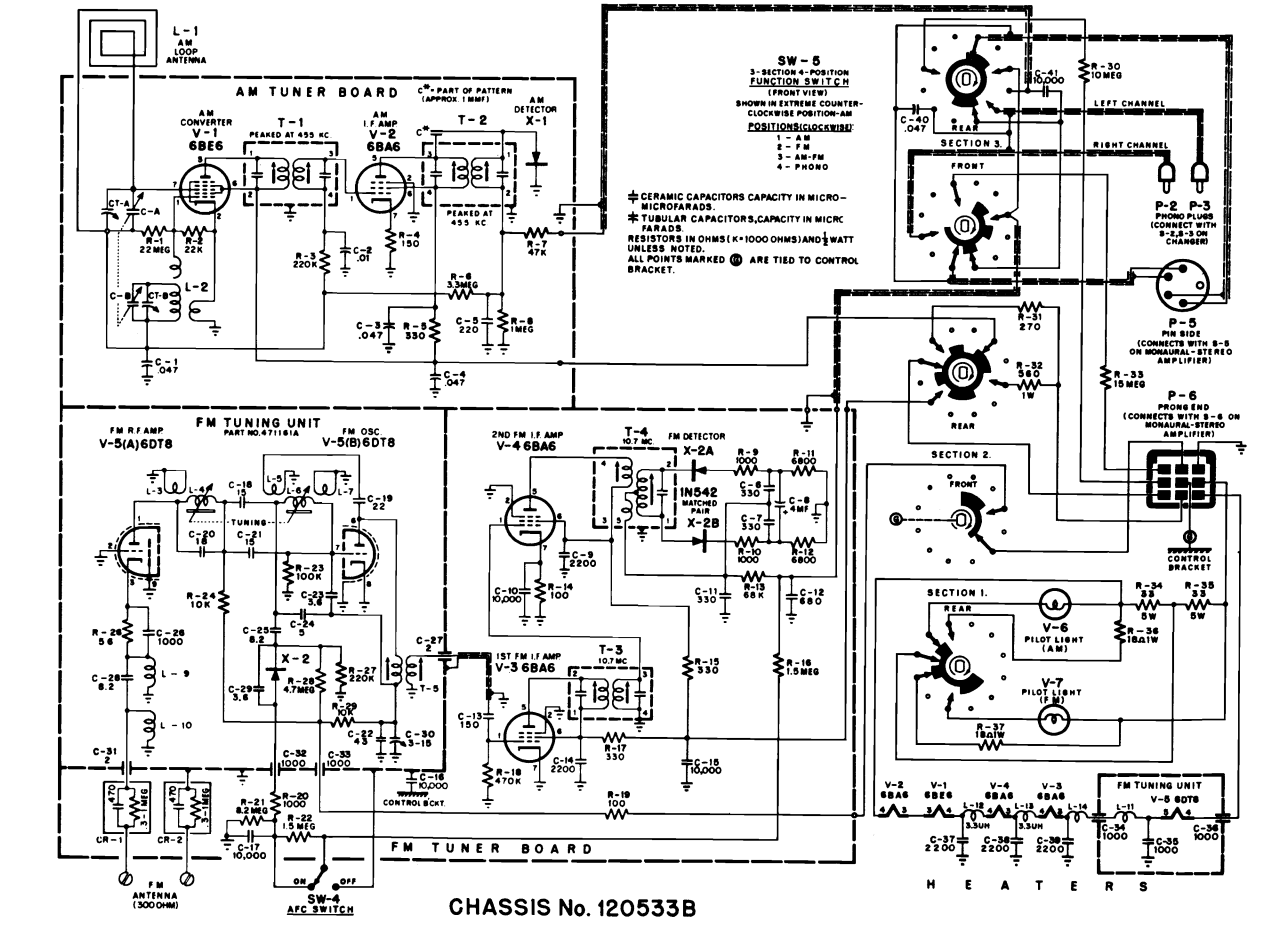
* CERAMIC CAPACITORS, CAPACITY IN MICRO-MICROFARADS.
* TUBULAR CAPACITORS, CAPACITY IN MICROFARADS.
RESISTORS IN OHMS (K=1000 OHMS) & ½ WATT UNLESS NOTED.

CHASSIS No. 120535B

EMERSON Chassis 120534B and 120533B Tuner and Amplifier Diagrams

CHASSIS No. 120534B





CHASSIS No. 120533B

GENERAL ELECTRIC

HORIZONTAL HOLD -

1. Remove the cabinet back as described below.
2. Tune the receiver to a week signal and adjust the controls for normal operation.
3. Short Test Point VI to chassis ground with a jumper wire.
4. Connect a 1000 ohm resistor from Test Point VIII to Test Point IX (in parallel with L251.)
5. Adjust horizontal hold potentiometer, R257, until picture just "Floats" back and forth across the screen. Leave R257 set in this position.
6. Remove the 1000 ohm resistor from Test Point VIII and Test Point IX. Adjust L251 stabilizer coil so that the picture again just " Floats" across the screen. Leave L251 set in this position.
7. Remove the jumper from Test Point VI and chassis ground.

PICTURE TUBE ADJUSTMENTS

YOKE POSITION - The yoke is secured to the neck of the picture tube by a "U" shaped clamp and spring, Figure 1. To adjust the yoke for picture tilt, loosen the clamp by squeezing points C and D with long nose pliers until the eye of the spring slides over the bend in the clamp. The yoke can now be adjusted for correct picture tilt. To secure the yoke, The pliers are used in the same manner between points A and B until the spring eye slides over the bend to its clamping position.

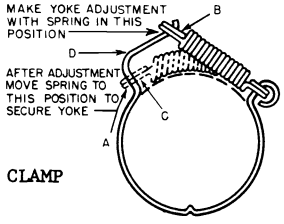


FIG.1 YOKE CLAMP

PICTURE CENTERING - The picture centering device is located on the rear of the yoke assembly, The centering device consists of two rings each of which may be rotated separately. Each ring has two taps with holes punched. The holes are provided so that an insulated alignment tool may be inserted in them to provide an easy means of rotating the rings. Rotate the rings so that the tabs move towards or away from each other to center the picture on the face of the tube

FOCUS - The proper focus potential for the tube was chosen at the time the set was manufactured. If it becomes necessary to install a new picture tube or change the focus potential, any one of five potentials may be chosen for best focus. The five connection points for focus potential are located on the small printed board behind the vertical linearity potentiometer. The lead from R219 in the picture tube socket may be connected to the proper point for best focus as follows:

1. Connect to Pin "B/1" near RC-201
2. Connect to Pin "B/3" behind the vertical linearity control.
3. Connect to Pin B/ boost next to the vertical linearity control.
4. Connect to Pin with ground symbol near Y251A/Y251B phase detector, or solder lug on chassis apron.
5. Connect to pin at the junction of R216, R217, and spark gap SG201.

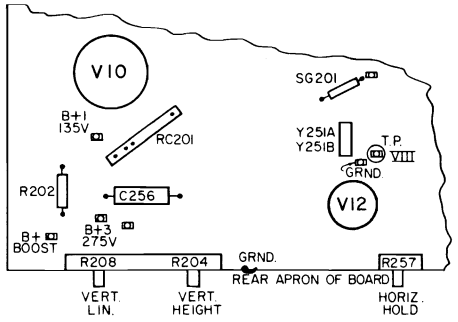


FIG.2 FOCUS POINTS

TO REMOVE THE CHASSIS FROM THE CABINET

1. Remove the knobs from the shafts at the front of the cabinet and disconnect any antenna leads connected to the antenna terminal board.
2. Remove the cabinet back by taking out the screws securing the back to the cabinet, the interlock bracket, and the antenna bracket.
3. On remote equipped receivers, unplug the remote power cable, the transducer cable, and the audio cable.
   Where the remote receiver is mounted directly behind the control panel, the remote receiver is removed in the following manner:
   (a) Remove the low voltage rectifier tube (VII)
   (b) Remove the 4 hex head remote receiver retaining screws. -Two screws are located at the bottom of the receiver and two screws hold the side mounting bracket to the TV chassis superstructure. (On model R738 the remote receiver is mounted on the cabinet chassis shelf by 4 screws. Remove these screws from the bottom of the shelf to remove the remote receiver.)
   (c) Lift the remote receiver up and, at the same time, tilt the top of the receiver toward the back of the TV receiver.
   (d) Disconnect the audio cable from the side of the remote receiver and completely remove the remote receiver from the TV cabinet.
4. Remove the speaker leads from the speaker. On some models it will be necessary to unsolder the speaker leads to remove them from the speaker.
5. Connect one end of a clip lead to the chassis and touch the other end to the anode of the picture tube to discharge it. Remove the anode lead from the picture tube by squeezing the clip and withdrawing it from the tube.
6. Remove the picture tube socket. Loosen the yoke clamp and slide the yoke back over the neck of the picture tube.
7. Remove the chassis retaining screws from the bottom of the cabinet and remove the control bracket retaining nuts(some models use screws). The control bracket assembly on the 21 and 23 inch models is detached from the main chassis superstructure, however, for ease of service, lances or tabs are provided on the side of the assembly so that it can be attached to or hung on the TV chassis superstructure. Attach the control assembly to the chassis and slide the chassis from the cabinet.

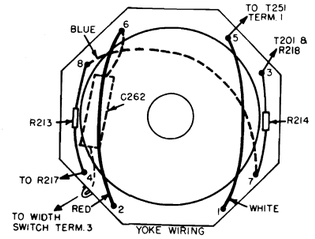
"M6" CHASSIS

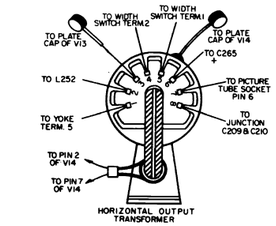
COVERS MODELS

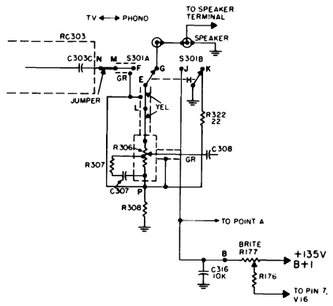
M304
M305
M306
M307
M308
M310
M311
M420
M421
M424
M426
M427
M430
M431
M432
M433
M734
M736
M737
M738
M739
M740
M741
M750
M751
R306
R310
R420
R432
R738
R740
R741
R750

With various suffix letters that refer to cabinet finishes.

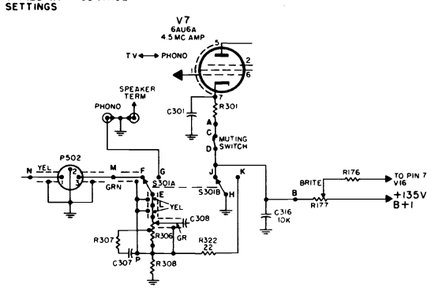
GENERAL ELECTRIC "M6" Chassis, Continued

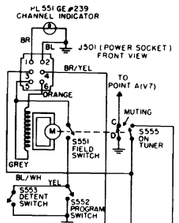




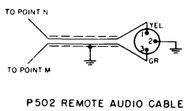


STEREO CONNECTION
NO POWER TUNING





POWER TUNING, NO STEREO



P502 REMOTE AUDIO CABLE
(REAR VIEW)

MAIN CHASSIS SCHEMATIC VARIATIONS

1. ALL VOLTAGE MEASUREMENTS MADE WITH A VACUUM TUBE VOLTMETER IN RESPECT TO CHASSIS GROUND, WITH RECEIVER CONTROLS SET FOR NORMAL OPERATIONS.
2. WITH LINE VOLTAGE MAINTAINED AT 117 VAC, MEASUREMENTS SHOWN MAY DEVATE ± 20 %.
3. VOLTAGES SHOWN IN BLACK MADE WITH THE SELECTOR KNOB SWITCHED TO A CHANNEL WITH NO SIGNAL AND THE ANTENNA TERMINALS SHORTED.
4. WHERE VOLTAGE IN RED IS NOT SHOWN, VOLTAGE IN BLACK IS MADE EITHER ON SIGNAL OR OFF SIGNAL.
5. RESISTANCE MEASUREMENTS MADE WITH COMPONENTS DISCONNECTED.

• VARIES WITH CONTROL SETTINGS

★ TO BE USED WITH THE 21" & 23" MODELS ONLY.

TO BE USED WITH THE 17" MODELS ONLY.

BOXED RESISTOR (R314 & R315) DENOTES MATCHED RESISTOR UNIT.

ON SIGNAL VOLTAGE & WAVE SHAPES SHOWN TAKEN WITH A NOISE FREE SIGNAL PRODUCING — 2.5 TO 3.5 VOLTS AGC AT VHF TUNER. FINE TUNING CONTROL ADJUSTED FOR MAXIMUM AGC.

ALL OTHER CONTROLS ARE ADJUSTED FOR NORMAL OPERATION.

** SCOPE SYNCED AT 1/2 VERT. FREQUENCY.

*** SCOPE SYNCED AT 1/2 HORIZ. FREQUENCY.

UNLESS OTHERWISE NOTED
K=1000 M=1,000,000
CAPACITORS MORE THAN 1 µµf
CAPACITORS LESS THAN 1 µµf
RESISTORS ARE 1/2 WATT

WIRE COLOR CODE
(USED IN MOST INSTANCES)
BROWN — FILAMENT
RED — HIGH B+
ORANGE — LOW B+
RED & WHITE — B+ BOOST
WHITE — AGC

GENERAL ELECTRIC "M6" Chassis Schematic Diagram

GENERAL ELECTRIC "M6" Chassis, Alignment Information (Continued)

VIDEO I-F SYSTEM

General Notes:

1. Allow receiver and alignment equipment at least 20 minutes of warm-up time before proceeding.
2. Turn the volume control fully counter clockwise and the contrast control fully clockwise.

Set the channel selector to Channel 9 or some other high band channel where oscillator influence is not noted as the fine tuning control is turned.

3. Short the antenna terminals together with a short jumper wire.
4. Connect oscilloscope to Test Point III thru a 22,000 ohm resistor not more than 2.5 inches away from Test Point III.
5. Connect -4 volts bias between Test Point II and the chassis with the negative side of the bias voltage on Test Point II.
6. Inject signals from a properly terminated AM signal generator or sweep generator through the network in Figure 4 to the I-F injection jack*.

Align the receiver to produce the response curve in Figure 5 under "Remarks".

*NOTE: The I-F injection jack is not a phono type receptacle. The connection is made by the end of the phono plug touching the contact inside the injection jack. The outside shell of the plug grips the injection jack firmly. Press the plug firmly into place without excess pressure. See Figure 4 for plug construction.

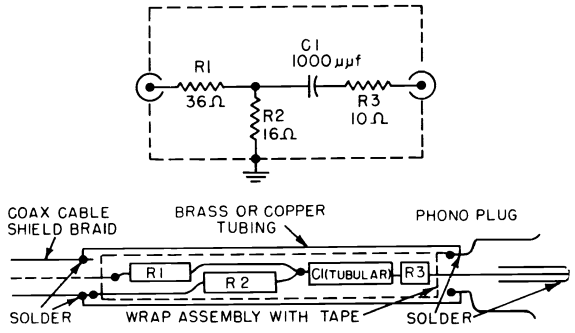


FIG. 4. I-F INJECTION PLUG CONSTRUCTION

VIDEO I-F ALIGNMENT CHART

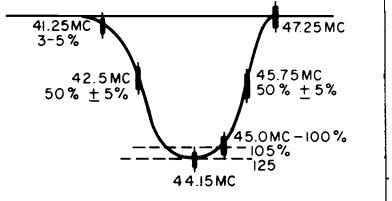
STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1.	47.25 MC AM	Adjust L150 for minimum scope deflection	Use maximum scope sensitivity and smallest possible signal for the 47.25 MC AM adjustments.
2.	38-48 MC sweep generator, scope calibrated 3 volts peak to peak for 2 inch deflection	L135 (converter plate) for maximum deflection of the 45.75 MC marker.	Do not retouch this adjustment.
3.	SAME	L151 (1st I-F grid) for maximum deflection of the 42.5 MC marker	
4.	SAME	T153 (Video Detector) for maximum deflection of the 44.15 MC marker	
5.	SAME	T152 (2nd I-F Plate) to place 42.75 MC marker properly on the curve.	
6.	SAME	T151 (1st I-F Plate) to place 42.5 MC marker properly on the curve.	Repeat 5, 6, and 7 if necessary.
7.	SAME	L151, T153 if necessary to shape the nose	Symmetry of the nose is important. No portion of the nose should be out of symmetry by more than 3%.

FIGURE 5. I-F RESPONSE CURVE

4.5 MC TRAP ALIGNMENT

1. Connect a -7.5V bias between Test Point II and chassis.
2. Turn contrast control fully clockwise.
3. Connect detector network (Figure 6) to Test Point IV. Connect an AC VTVM to the network.
4. Connect oscilloscope to speaker terminals.
5. Apply an accurate 4.5 MC AM signal through 001 MF to Test Point III.

NOTE: The top core of T154 has two positions showing minimum. The bottom core has two positions showing maximum. The correct position for each core is the position nearest the respective end of the coil.

6. Tune the top core of T154 for minimum deflection on the VTVM.
7. Turn up volume control. Tune the bottom core of T154 for maximum deflection on the oscilloscope.
8. Retouch the top core for minimum reading on the VTVM.

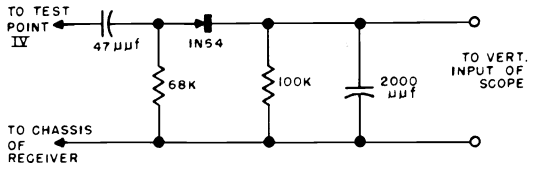
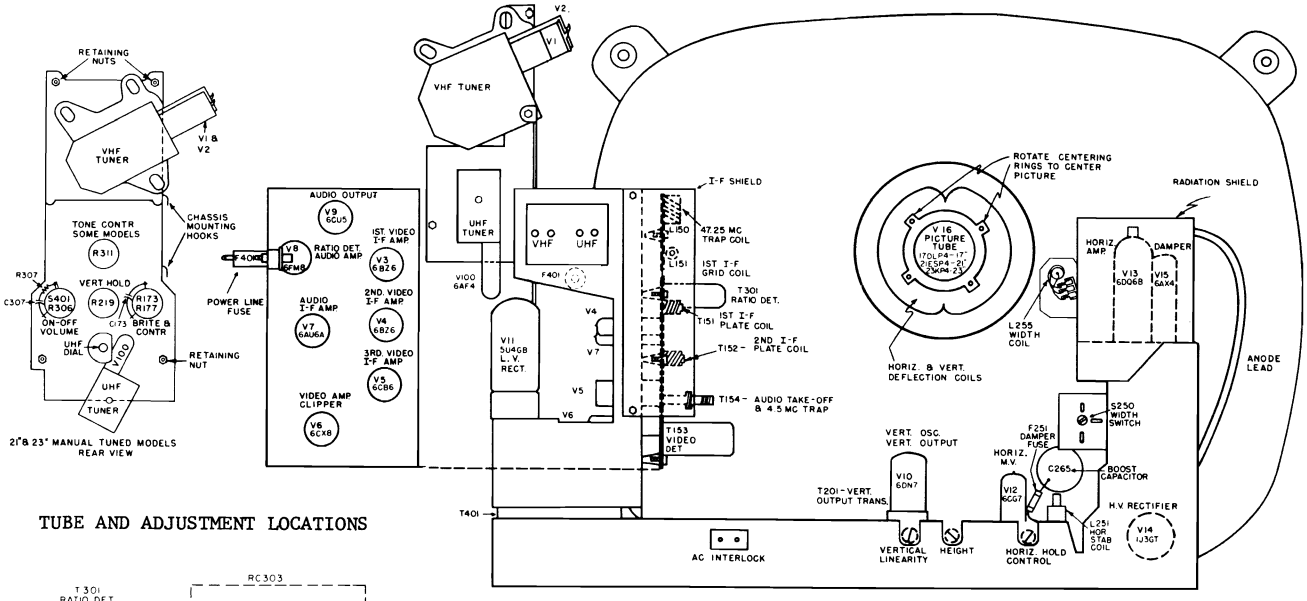


FIG.6 DETECTOR NETWORK

GENERAL ELECTRIC "M6" Chassis, Alignment Information, Continued



TUBE AND ADJUSTMENT LOCATIONS

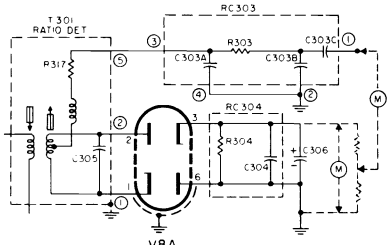


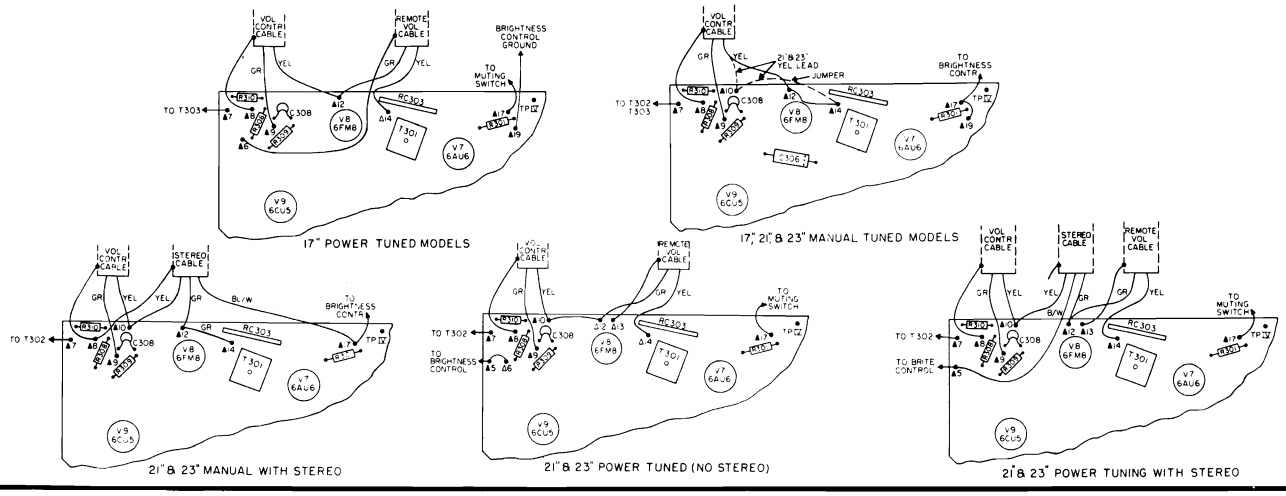
FIG.7 AUDIO ALIGNMENT CONNECTIONS

AUDIO I-F ALIGNMENT

1. Connect an antenna to the receiver and tune in a weak television signal. This will provide a 4.5 MC FM signal source for audio I-F alignment. Keep the volume control turned down unless the speaker is connected.
2. Connect two matched 100 000 ohm resistors in series between Pin No. 3 of V8 (6FM8) and chassis.
3. Follow instruction in Audio Alignment chart.

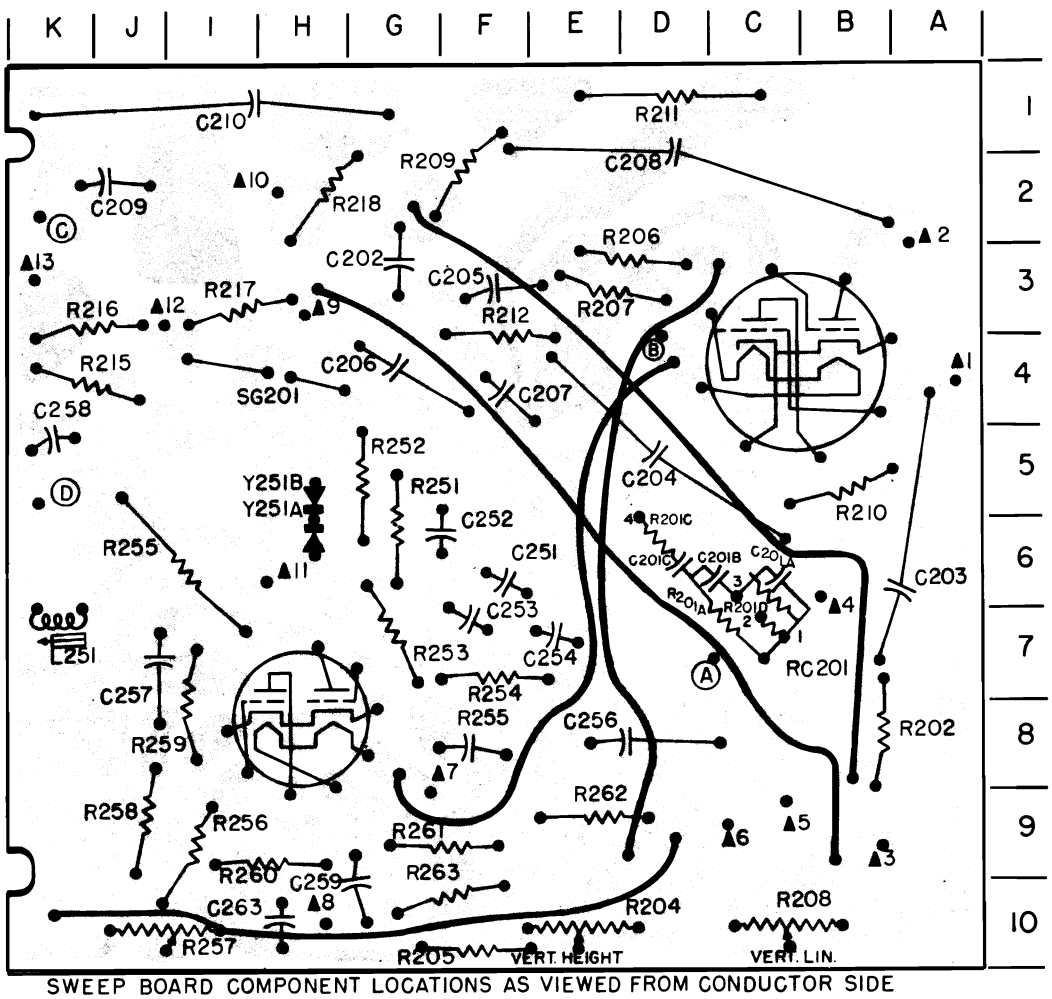
AUDIO ALIGNMENT CHART

STEP	CONNECT VTVM	ADJUST	METER INDICATION	REMARKS
1	Between Pin No. 3 of V8 and chassis	Bottom core T154	Adjust for the maximum deflection.	Repeat steps 1, 2 and 3 to assure proper adjustments. Each core has two positions. Select position for each core nearest respective end of the coil.
2		T301 primary (top)	Adjust for maximum deflection	
3	Between terminal 1 of RC-303 and the center of the two 100,000 ohm resistors.	T301 secondary (bottom)	Adjust for zero volts d-c output	



I-F BOARD AUDIO CABLE CONNECTION VARIATIONS

GENERAL ELECTRIC "M6" Chassis, Service Information, Continued



SWEEP BOARD COMPONENT LOCATIONS AS VIEWED FROM CONDUCTOR SIDE

ROMAN VIII NUMERALS

REPRESENT TEST POINTS

CIRCLED (A) LETTERS

REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

- (A) TO I-F BOARD (PIN 36CX8)
- (B) TO FIL FUSE & (PIN 46CX8) I-F BOARD
- (C) TO TERMINAL 8 ON T251
- (D) TO F251

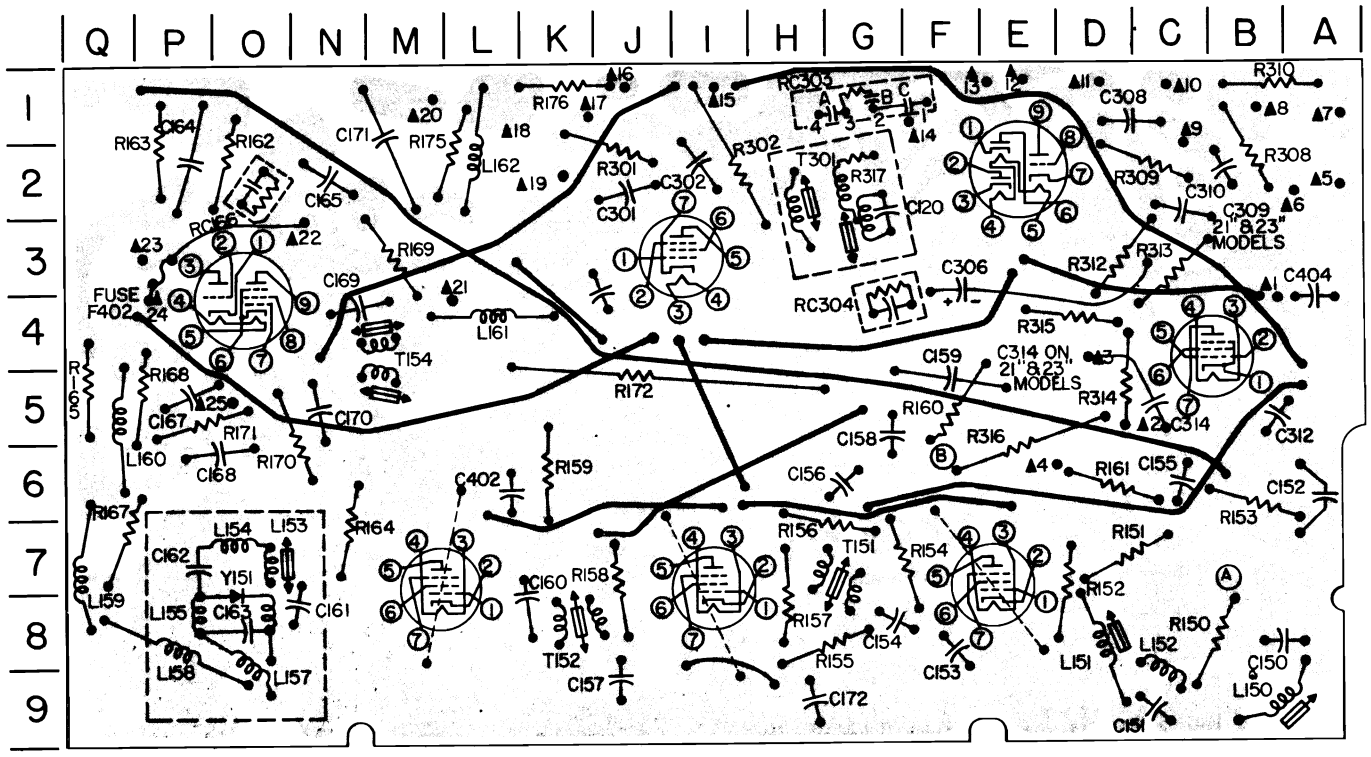
TRIANGLE (▲) NUMBERS

DENOTE WIREWRAP TERMINALS MOUNTED ON COMPONENT BOARD TO CONNECT WIRES FROM OTHER COMPONENTS.

- △1. TO R203-R219 VERT HOLD CONTROL
- △2 TO T201 (BLUE LEAD)
- △3 TO T201 (YELLOW LEAD)
- △4. TO C401C (+135V B+1)
- △5. TO C401B (+275V B+3)
- △6. TO R203, VERT. HOLD CONTROL
- △7. TO V16, PIN 1
  TO V13, PIN 7
- △8. TO R264
- △9. TO TERM. 4 OF YOKE; TO C265+
- △10. TO T201 (RED LEAD); TO TERM. 3 OF YOKE
- △11. GROUND TERM. FOR FOCUS JUMPER
- △12 TO V16, PIN 3
- △13 TO TERM. 7 ON T251
  TO V16, PIN 6

RESISTORS	CAPACITORS	DIODES	WIRE CONNECTIONS CONT'D
R202-B8	C202-G3	Y251A-H5	△7-G8
R204-E10	C203-A6	Y251B-H5	△8-H10
R205-F10	C204-D5		△9-H3
R206-D3	C205-F3	TUBES	△10-12
R207-E3	C206-G4		△11-H6
R208-C10	C207-F4	V10-C4	△12-J3
R209-F1	C208-D1	V12-H8	△13-K3
R210-B5	C209-J2		(A)-C7
R211-D1	C210-H1	SPARK GAP	(B)-D3
R212-F3	C251-F6		(C)-K2
R215-J4	C252-F6	SG201-H4	(D)-K5
R216-J3	C253-F7		
R217-I3	C254-E7	TEST POINTS	
R218-H2	C255-F8		
R251-G5	C256-D8	V1-6G	
R252-G5	C257-J7	VIII-6I	
R253-G7	C258-K4	IX-9B	
R254-F7	C259-G9		
R255-I6	C263-H10	WIRE CONNECTIONS	
R256-I9			
T257-I10	COILS		
R258-J9		△1-A4	
R259-I7	L251-K6	△2-A2	
R260-H9		△3-B9	
R261-F9	RC	△4-B6	
R262-E9	NETWORK	△5-C9	
R263-F10	RC201-6C	△6-C9	

GENERAL ELECTRIC "M6" Chassis, Service Information, Continued



IF BOARD LOCATIONS AS VIEWED FROM CONDUCTOR SIDE

PLUG INTO I-F BOARD WITH COMPONENTS FACING L158

RESISTORS	CAPACITORS	COILS & TRANSFORMERS	TUBES
R150-B8	C305-G2	L150-B9	V3-E7
R151-D7	C150-B8	L151-D8	V4-I7
R152-D7	C151-C9	L152-C9	V5-M7
R153-B6	C152-A6	L153-O7	V6-O3
R154-G7	C153-F8	L154-G8	V7-I3
R155-H8	C154-G8	L155-P8	V8-E2
R156-H7	C155-C6	L157-O8	V9-C4
R157-H8	C156-G6	L158-P8	WIRE CONNECTIONS
R158-J7	C157-J9	L159-Q7	△1-B3
R159-K6	C158-G5	L160-Q5	△2-C5
R160-F5	C159-F5	L161-L4	△3-D4
R161-D6	C160-L8	L162-L2	△4-E6
R162-01	C161-O8	T151-H7	△5-A2
R163-P1	C162-P7	T152-K8	△6-A2
R164-N6	C163-O8	T154-M4	△7-A1
R165-Q4	C164-P2	T301-H2	△8-B2
R167-Q6	C165-N2		△9-C1
R168-P4	C167-P5	RC NETWORKS	△10-C1
R169-M3	C168-O5		△11-D1
R170-O5	C169-N3	RC166-02	△12-E1
R171-P5	C170-N5	RC303-G1	△13-F1
R172-J4	C171-M1	RC304-G4	△14-F1
R175-L2	C172-H9		△15-I1
R176-K1	C301-J2	DIODES	△16-J1
R301-J2	C302-I2		△17-J1
R302-I2	C306-F3	Y151-07	△18-K1
R308-B2	C308-D1		△19-K2
R309-C2	C309-B2	TEST POINTS	△20-M1
R310-B1	C310-C2		△21-L3
R312-D3	C312-B5	II-Q1	△22-N3
R313-C3	C314-C5	III-Q6	△23-P3
R314-D5	C402-L6	IV-L1	△24-P3
R315-D4	C404-A4		△25-05
R316-E6	FUSE		Ⓐ -B7
R317-G2	F402-P3		Ⓑ -F6

CIRCLED Ⓐ LETTERS

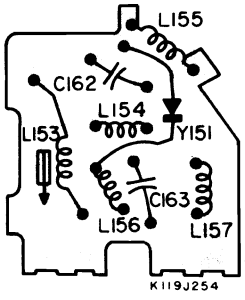
REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

Ⓐ TUNER IF LINK CABLE

Ⓑ TO C401B

ROMAN II NUMERALS

REPRESENTS TEST POINTS

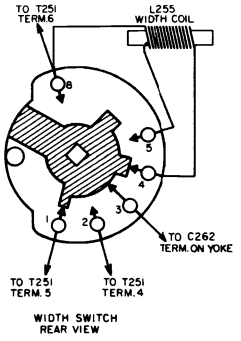


VIDEO DETECTOR BD. COMPONENT LOCATION AS VIEWED FROM CONDUCTOR SIDE

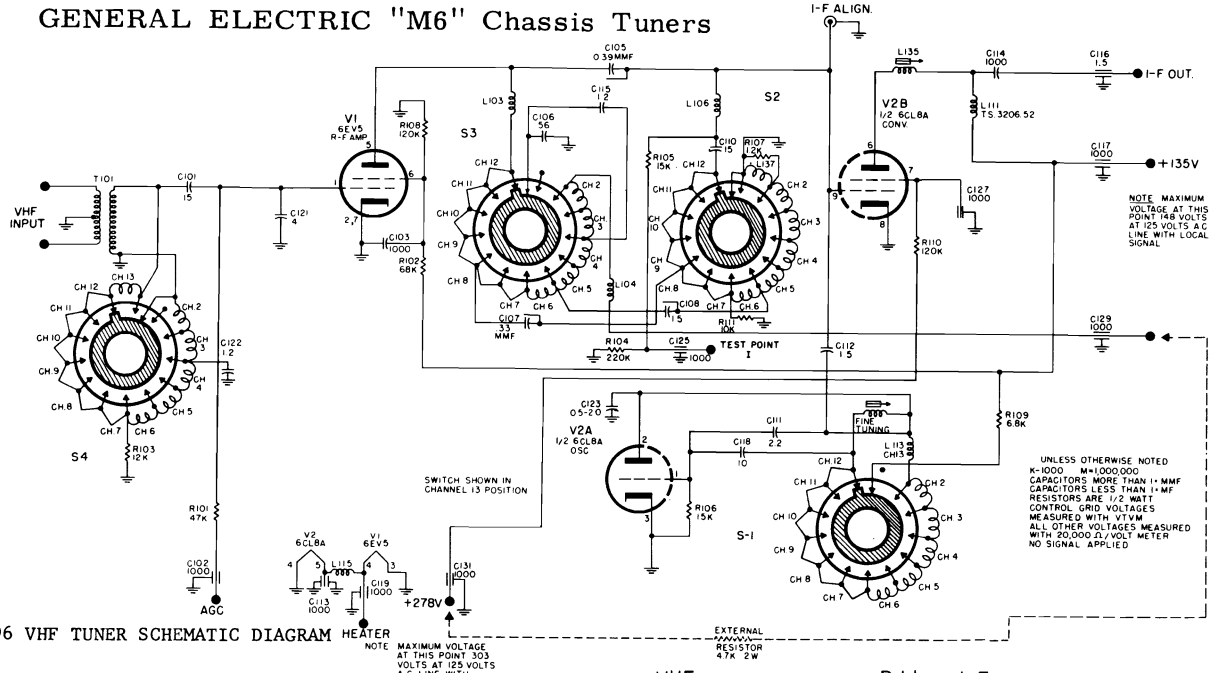
TRIANGLE (▲7) NUMBERS

DENOTE WIREWRAP TERMINALS MOUNTED ON COMPONENT BOARD TO CONNECT WIRES FROM OTHER COMPONENTS

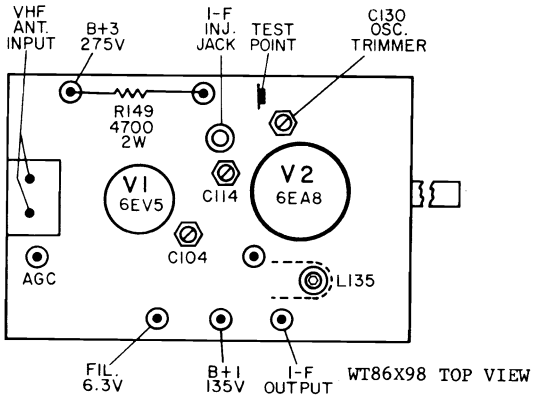
▲1. TO TUNER FILAMENT CONNECTION
▲2. TO AUDIO OUTPUT TRANSFORMER
▲3. TO C313+
▲4. TO TUNER AGC TERMINAL
▲5. THRU ▲14, ▲17 & ▲19, SEE AUDIO CABLE AND CONNECTION DRAWING VARIATIONS
▲15. TO C401C+ & C313−
▲16. TO BRIGHTNESS CONTROL ARM
▲18. TO PIN 7, V16 (CRT)
▲20. TO CONTRAST CONTROL ARM
▲21. TO CONTRAST CONTROL
▲22. TO POWER TRANSFORMER T401
▲23. TO Ⓐ ON SWEEP BOARD
▲24. TO Ⓑ ON SWEEP BOARD
▲25. TO C401D



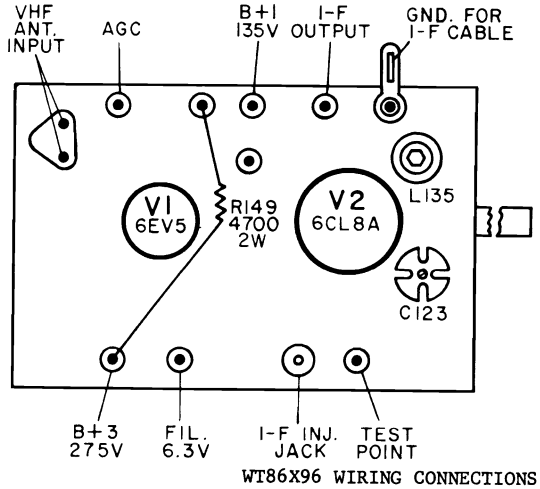
GENERAL ELECTRIC "M6" Chassis Tuners



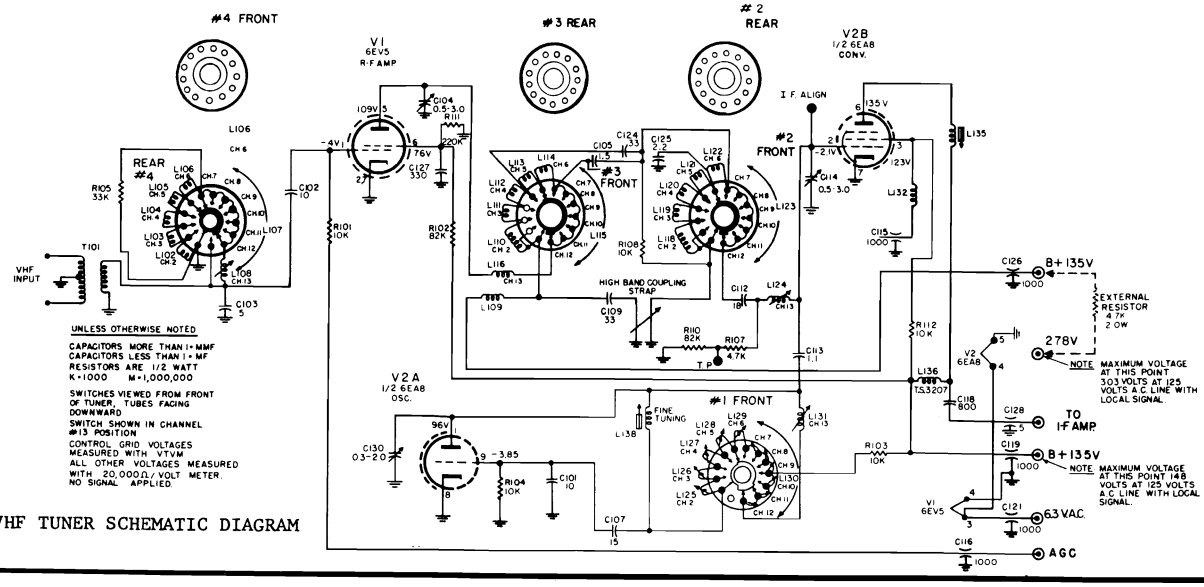
WT86X96 VHF TUNER SCHEMATIC DIAGRAM



WT86X98 TOP VIEW



WT86X96 WIRING CONNECTIONS



WT86X98 VHF TUNER SCHEMATIC DIAGRAM

CHASSIS 360

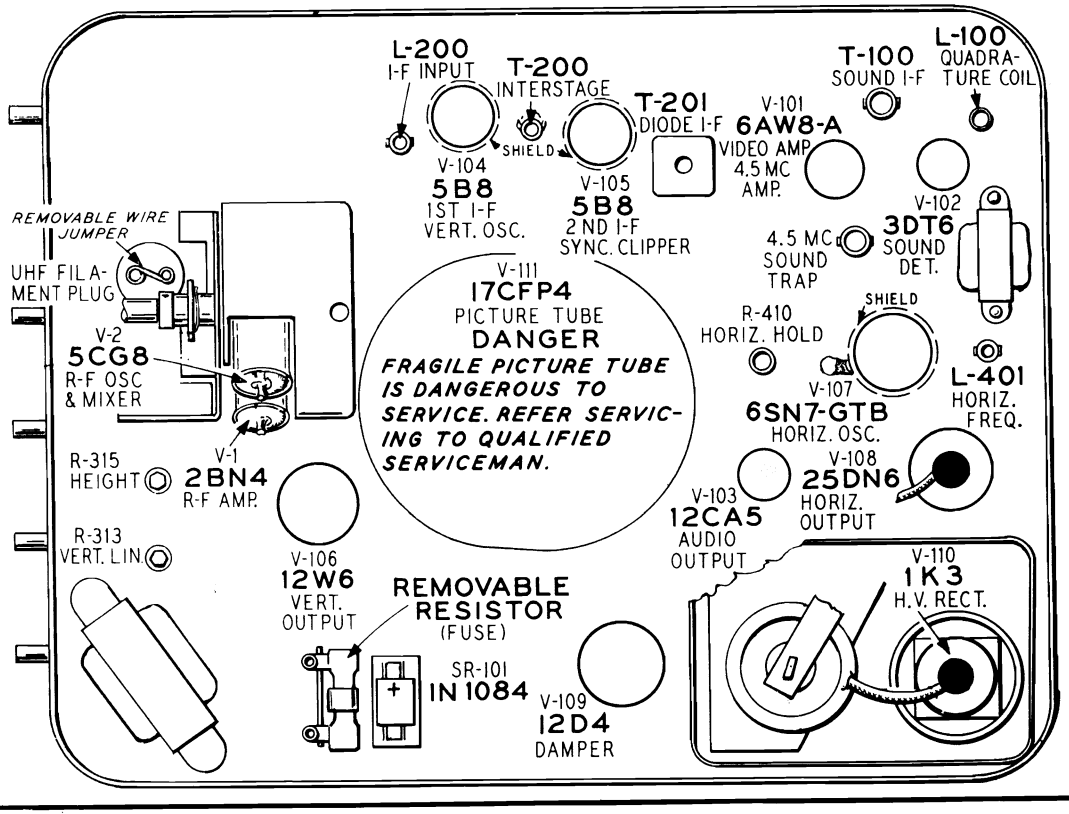
MODEL SERIES 1777

CHASSIS REMOVAL

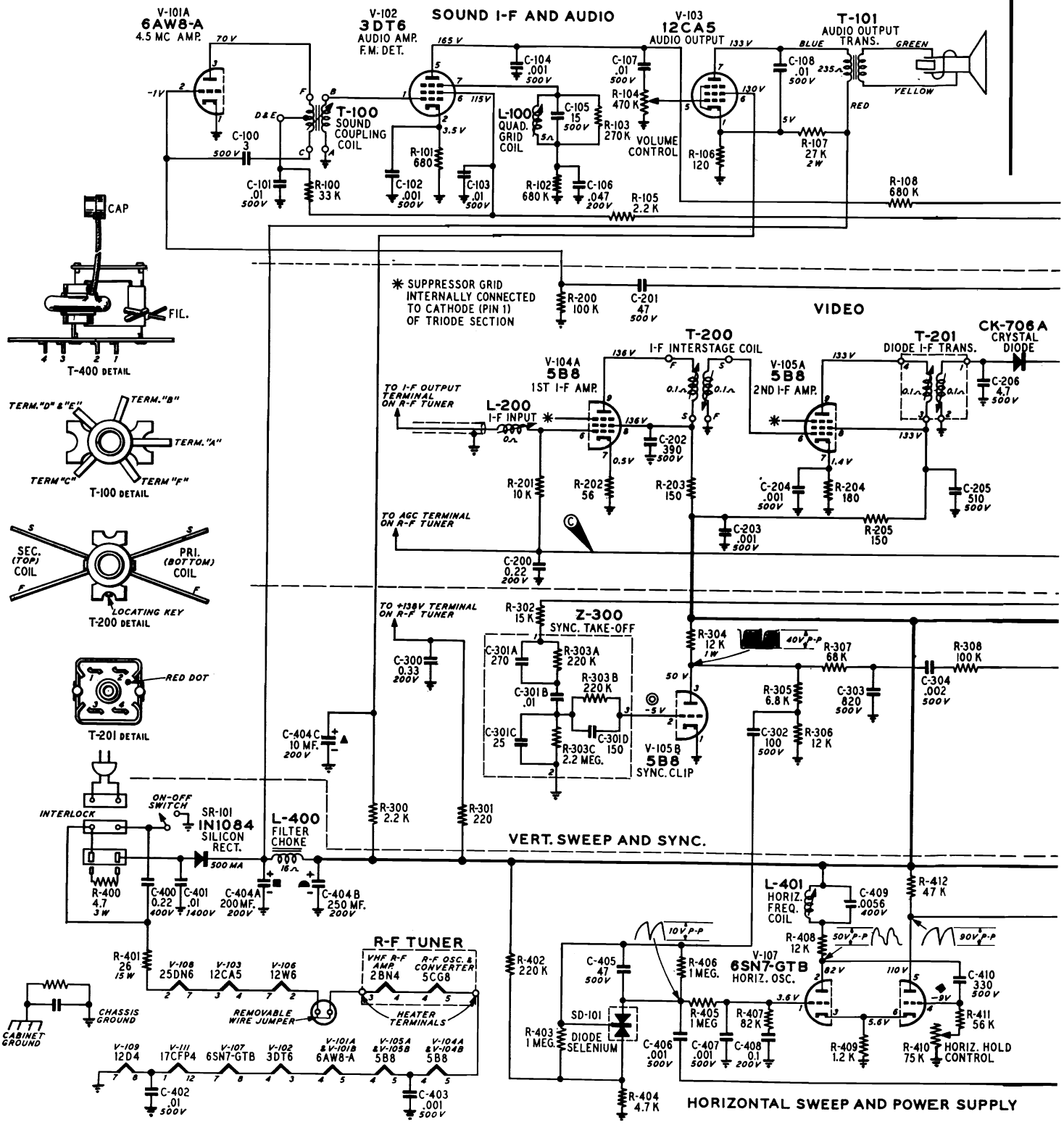
1. Remove all control knobs from receiver by pulling each one straight out.
2. Disconnect antenna leads and remove cabinet back.
3. Place receiver with back side up on any soft surface that will not mar safety glass.
4. Disconnect antenna and safety interlock bracket by removing two (2) screws at bottom rear of cabinet.
5. Disconnect speaker leads, yoke leads and pix tube socket.
6. Remove two (2) screws on bottom of cabinet and two (2) screws holding chassis on inside top of cabinet.
7. Pull chassis part way out and then reach in and disconnect 2nd anode lead and ground lead going to pix tube mtg. strap.
8. Lift chassis out of cabinet.

C. R. T. REMOVAL

1. Disconnect antenna leads and remove cabinet back.
2. Disconnect pix tube socket; loosen yoke clamp and remove deflection yoke.
3. Remove handle and dipole assembly (if used).
4. Remove two (2) screws on each side of cabinet, and one (1) screw at bottom of cabinet.
5. Carefully pull Escutcheon away from case (Pix Tube and safety glass will come out with it) a short distance to allow reaching in and disconnecting the 2nd anode lead and ground lead going to pix tube strap.
6. Remove Escutcheon and pix tube.
7. Place pix tube and Escutcheon on a soft surface, safety glass down, and remove pix tube strap assembly.
8. Lift pix tube off safety glass and escutcheon.



HOFFMAN Chassis 360, Model Series 1777, Schematic Diagram



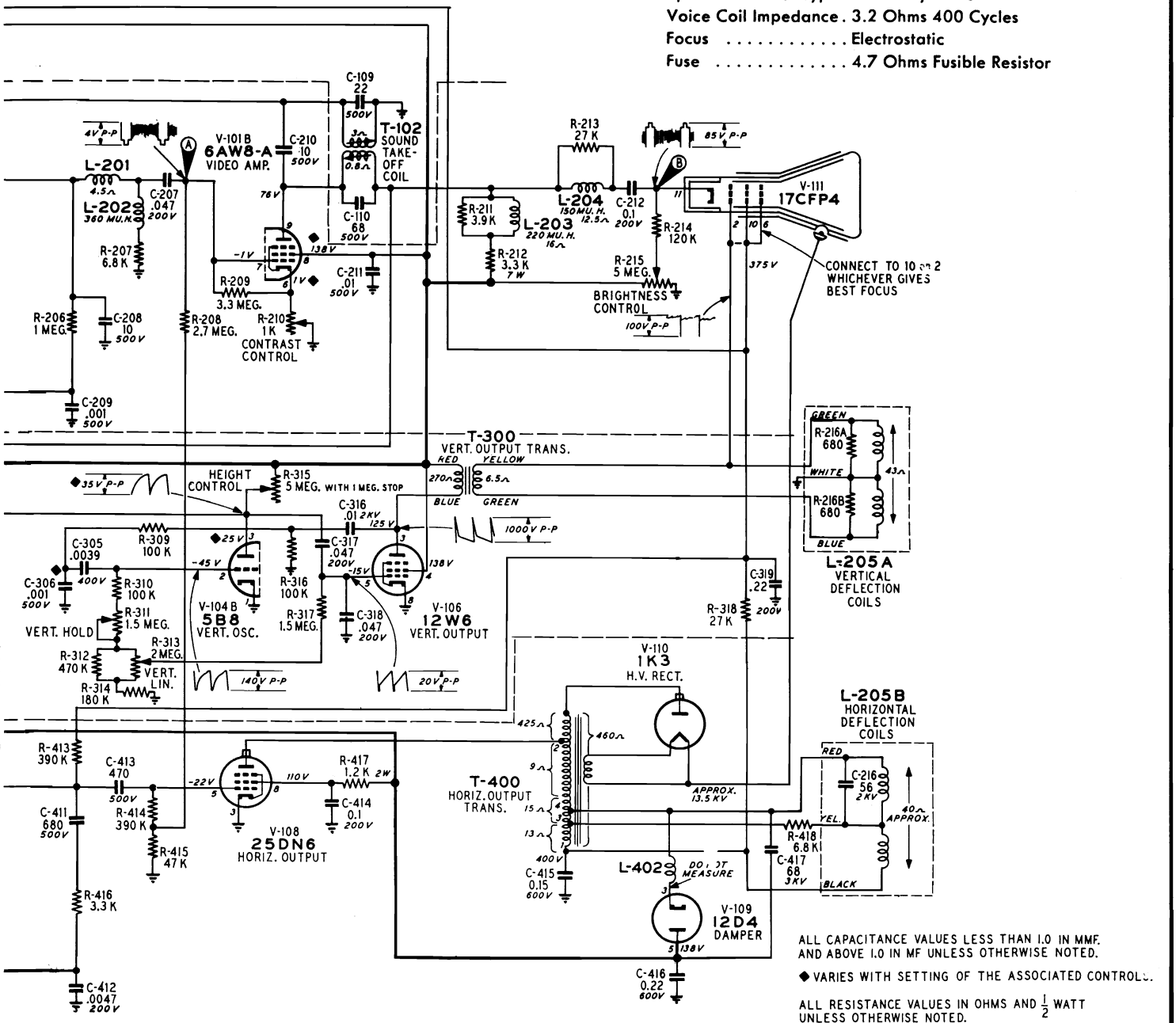
HOFFMAN CHASSIS 360 - MODEL 1777

HOFFMAN Chassis 360, Model Series 1777, SSchematic Diagram

To improve operational performance, check AC line cord for polarization. One side of AC line is connected directly to chassis. To polarize, use either a neon glow type tester or AC voltmeter. Check between chassis and AC ground (water pipe, etc.) to see if AC voltage is present. If AC voltage is present, reverse the AC line cord in the electrical power receptacle. If AC voltage is not present, the receiver is automatically polarized.

ELECTRICAL SPECIFICATIONS

Power Supply	117 Volts AC 60 cycles only
Power Consumption	140 Watts
Power Output	1.0 Watts (Max.)
	0.7 Watts (10% Distortion)
Intermediate Freq.	Picture—45.75 MC
	Sound—41.25 MC
Antenna Input Imp.	300 Ohms Balanced
Intercarrier Sound	4.5 MC
Speaker Size & Type	4" PM Dynamic
Voice Coil Impedance	3.2 Ohms 400 Cycles
Focus	Electrostatic
Fuse	4.7 Ohms Fusible Resistor



ALL CAPACITANCE VALUES LESS THAN 1.0 IN MMF. AND ABOVE 1.0 IN MF UNLESS OTHERWISE NOTED.

◆ VARIES WITH SETTING OF THE ASSOCIATED CONTROLS.

ALL RESISTANCE VALUES IN OHMS AND $\frac{1}{2}$ WATT UNLESS OTHERWISE NOTED.

K=1000

▲ ■ ⬬ INDICATES MULTIPLE SECTION CAPACITOR.

◎ VOLTAGE VARIES WITH SIGNAL LEVEL.

HOFFMAN Chassis 360, Model Series 1777, Alignment Information, Continued

I-F ALIGNMENT

ALIGNMENT PROCEDURE

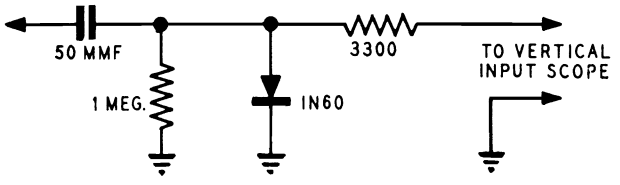
1. Connect sweep output to 2nd I-F grid (pin #6-V-105A), oscilloscope to diode load resistor (R-207). Set output of sweeper so that some output is indicated on oscilloscope. Adjust diode I-F transformer (T-201) primary (bottom) and secondary (top) simultaneously for maximum output and symmetry. Readjust sweeper output for 4.0V P-P on oscilloscope.

2. With approximately −4.0V bias on AGC line (junction of R-201 and C-200) connect sweeper to 1st I-F grid (pin #6-V-104A). Reduce sweeper output to compensate for additional gain of 1st I-F stage (4.0V P-P on oscilloscope). Adjust interstage transformer T-200 primary (top) and secondary (bottom) for maximum gain and symmetry with 45.75 MC marker at 55%.

3. With the VHF channel selector in UHF (blank) position (receivers with UHF tuner installed, set selector between channels) connect sweeper with very short leads through a 10K mmf disc ceramic capacitor to mixer grid (lead of a 10K ohm resistor which is accessible through a hole located on front of tuner). Readjust sweep output for 4.0V P-P, adjust mixer plate coil (L-9 primary) and input coil (L-200 secondary) for maximum gain and symmetry with 45.75 MC marker at 50%.

In all positions, final touch-up should be made with 4.0V P-P amplitude on oscilloscope. Once a stage has been adjusted, do not readjust with the sweeper connected to another stage. For instance, after adjusting the diode transformer output stage and moving the sweeper to the 1st grid to adjust interstage transformer, do not move the slugs in the diode transformer stage, etc.

In general, the position of the 45.75 MC marker should be set with the primary and the symmetry adjusted with the secondary. An approximate setting of the input grid coil may be obtained by adjusting for maximum amplitude of the 45.75 MC marker. This amplifier cannot be adjusted for bandwidth. In must be adjusted for maximum gain, symmetry and position of 45.75 MC marker.



Detector Test Circuit

SOUND ALIGNMENT

GENERATOR FREQ.	SCOPE CONNECTION	ADJUSTMENTS
1. 4.5 mc/30% 400 cps AM modulation	Detector ckt Point "B"	T-102 primary slug completely out of coil. T-102 secondary slug completely out of coil. T-102 primary slug into coil for minimum scope indication.
2. 4.5 mc/7.5 kc. deviation FM (output level below limiting)	Across secondary of audio output transformer.	L-100 slug out of coil and then in for maximum scope indication. T-100 slug into coil for maximum indication. T-102 secondary slug into coil for maximum indication.
3. Tune in station (signal strength must be sufficient to place signal level above limiting).	Same as Step 2.	Retouch L-100 slug for minimum buzz in speaker. Refine adjustments for L-100, T-100 and T-102 for maximum scope indication.

HORIZONTAL FREQUENCY ADJUSTMENT

If the Horizontal Hold Control fails to bring the picture into horizontal sync., proceed as follows:

1. Set the Horizontal Hold Control to mid-range.
2. Use a Hex head, non-magnetic alignment tool and adjust the horizontal frequency coil slug L-401 until the picture is in sync.

Thereafter any normal out of sync. condition in the horizontal sync. circuit can be corrected with the Horizontal Hold Control.

HOFFMAN

CHASSIS 355 - MODEL SERIES 1919

FOCUS CONTROL

Focus voltages for the picture tube are provided by a 3 lug terminal board. The focus anode lead from the picture tube socket has a spade lug on the end which can be pushed onto the lug on the terminal board which provides the optimum focus for the picture tube.

FRINGE AREA CONTROL

All models incorporate Keyed AGC, with an adjustable control. This control (area control) is adjusted at the time of installation to provide the best reception for all stations being received. Properly adjusted this control setting need not be changed unless tubes are replaced.

HORIZONTAL DRIVE CONTROL

All chassis incorporate a Horizontal Drive Control. This control is adjusted to remove bright vertical lines that appear just left of the center of the screen.

WIDTH CONTROL

All chassis incorporate a 4 step Width Control. Setting the width control to the maximum counter-clockwise position will give minimum width of the picture.

CIRCUIT BREAKER

All chassis are equipped with a circuit breaker in the AC line prior to the power transformer. The circuit breaker may be reset by pushing in on the Red button located near the AC power cord. Should the circuit breaker continue to trip out, a check should be made for a short circuit. Do not hold the Red button in since damage to the circuit breaker and/or the television receiver may result.

MONOPOLE ANTENNA

All models are equipped with a monopole antenna in place of the normal built-in antenna. The monopole antenna is a single element antenna and uses a balun to match the antenna to the balanced 300 ohm input to the tuner. When using an outside antenna, be sure to remove the monopole antenna leads from the receiver antenna terminal board before attaching the leads from the outside antenna.

DISASSEMBLY INSTRUCTIONS

Remove the Channel Selector, Fine Tuning, Off-On-Volume and Contrast knobs. Remove the 4 screws fastening the formed back to the cabinet. Remove the antenna clip leads from the top of the tuner before pulling the back completely free of the set. Failure to do so may result in damage to the balun and/or antenna terminals of the tuner.

All tubes are accessable with the back removed. The high voltage rectifier tube is located in the cage at the bottom right of the chassis.

The bottom side of the individual chassis is available when the wrap around cowl is removed.

To remove the wrap around cowl: Remove the 4 screws at the bottom of the cabinet and the 5 screws at the top rear of the chassis. Pull the bottom of the cowl out slightly, slide the cowl to the rear enough to clear the front frame and lift the cowl clear of the set.

The bottom side of the individual chassis containing the components can be reached on the sides as well as the top and bottom. The plate covering the bottom chassis has a single screw in the middle. The unit can be serviced without taking it completely apart.

PICTURE TUBE REMOVAL

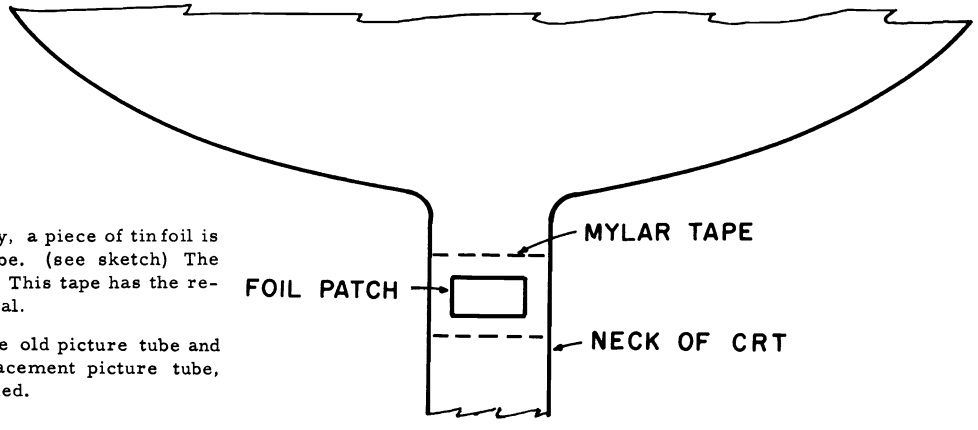
Remove the back and wrap around as previously explained. Lay the unit on its face, using a soft cloth to protect the face of the picture tube and the front frame.

Remove the 6 screws holding the chassis to the front frame and lift the chassis clear of the front frame and picture tube. Remove the 4 screws, one at each corner of the picture tube, that hold the picture tube retaining strap. Lift the picture tube clear of the front frame.

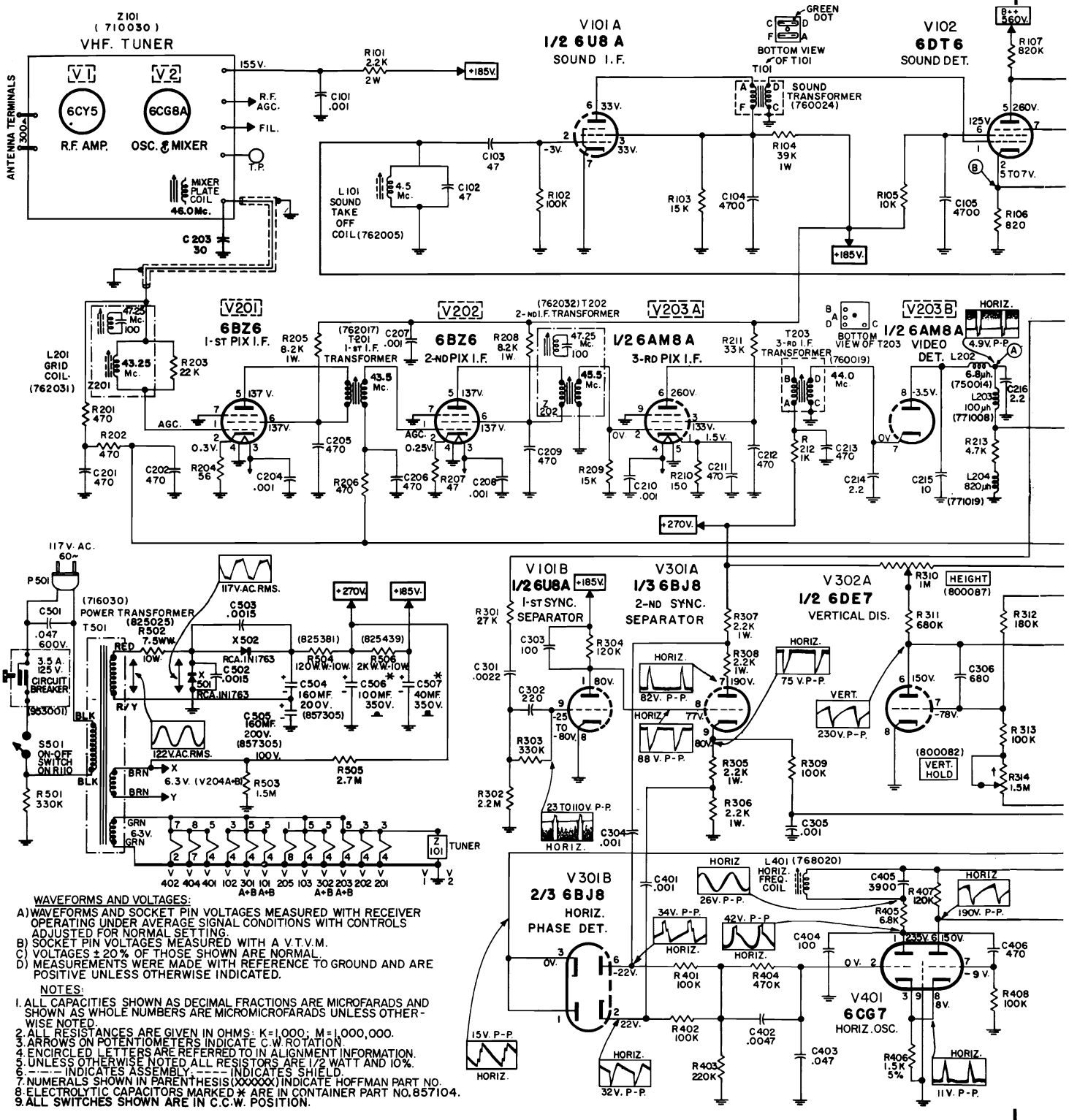
Reverse the above procedure to reassemble the unit.

To obtain optimum horizontal linearity, a piece of tin foil is attached to the neck of the picture tube. (see sketch) The foil is held in place with Mylar tape. This tape has the required high voltage breakdown potential.

The foil should be removed from the old picture tube and placed on the neck of the new replacement picture tube, before the replacement tube is installed.



HOFFMAN CHASSIS 355 – MODEL 1919



WAVEFORMS AND VOLTAGES:

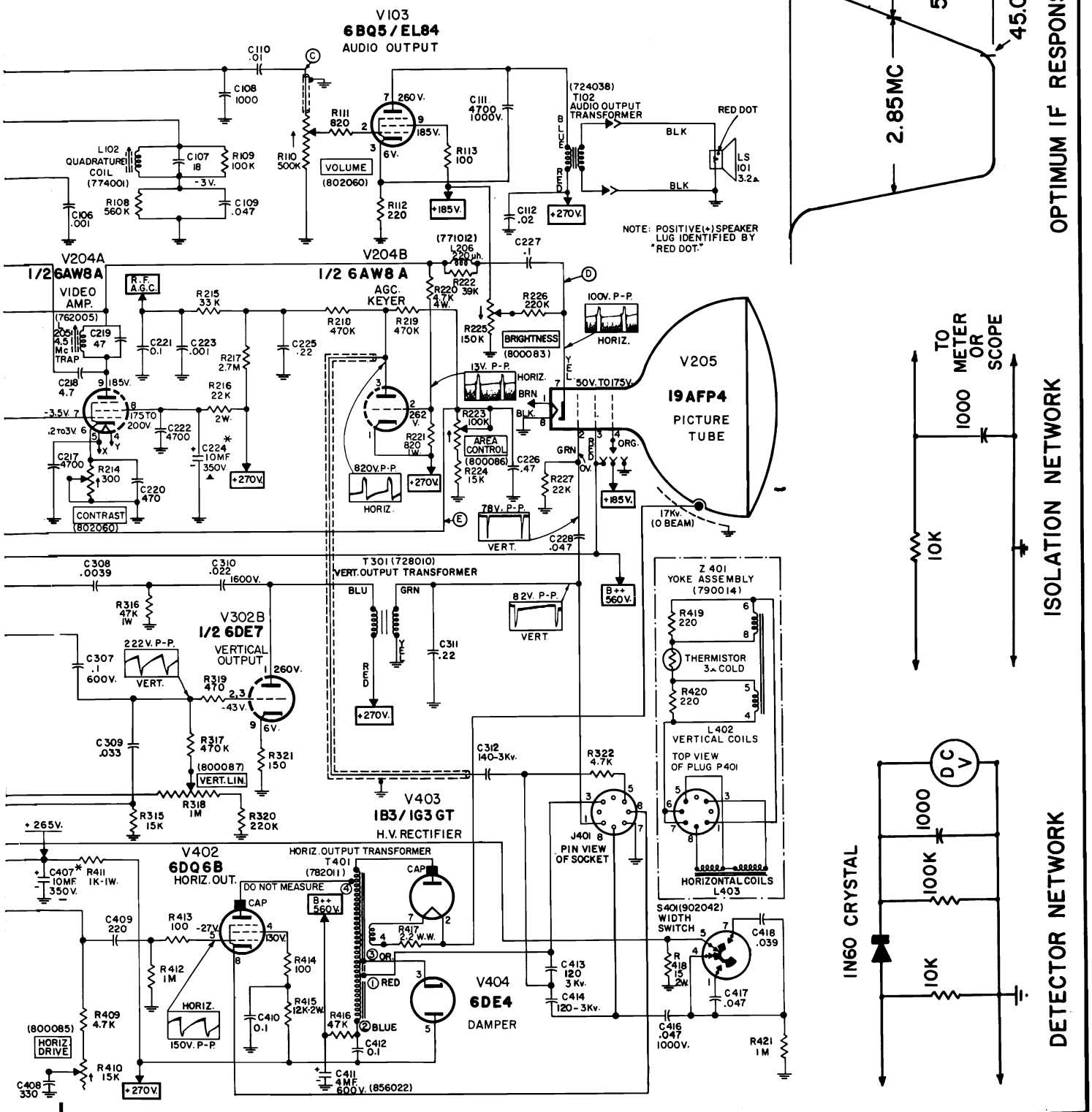
A) WAVEFORMS AND SOCKET PIN VOLTAGES MEASURED WITH RECEIVER OPERATING UNDER AVERAGE SIGNAL CONDITIONS WITH CONTROLS ADJUSTED FOR NORMAL SETTING.
B) SOCKET PIN VOLTAGES MEASURED WITH A V.T.V.M.
C) VOLTAGES ± 20% OF THOSE SHOWN ARE NORMAL.
D) MEASUREMENTS WERE MADE WITH REFERENCE TO GROUND AND ARE POSITIVE UNLESS OTHERWISE INDICATED.

NOTES:

1. ALL CAPACITIES SHOWN AS DECIMAL FRACTIONS ARE MICROFARADS AND SHOWN AS WHOLE NUMBERS ARE MICROMICROFARADS UNLESS OTHERWISE NOTED.
2. ALL RESISTANCES ARE GIVEN IN OHMS: K=1,000; M=1,000,000.
3. ARROWS ON POTENTIOMETERS INDICATE C.W. ROTATION.
4. ENCIRCLED LETTERS ARE REFERRED TO IN ALIGNMENT INFORMATION.
5. UNLESS OTHERWISE NOTED ALL RESISTORS ARE 1/2 WATT AND 10%.
6. ——— INDICATES ASSEMBLY; - - - - - INDICATES SHIELD.
7. NUMERALS SHOWN IN PARENTHESIS (XXXXXX) INDICATE HOFFMAN PART NO.
8. ELECTROLYTIC CAPACITORS MARKED * ARE IN CONTAINER PART NO. 857104.
9. ALL SWITCHES SHOWN ARE IN C.C.W. POSITION.

HOFFMAN Chassis 355, Model 1919, Schematic Diagram

The receiver should not be operated with the sweep circuits disabled and high voltage applied to the picture tube. Do not pull the sweep or sweep oscillator tubes without turning off the receiver.



OPTIMUM IF RESPONSE CURVE

ISOLATION NETWORK

DETECTOR NETWORK

HOFFMAN Chassis 355, Model 1919, Alignment Information, Continued

GENERAL SET UP CONDITIONS

Use a 117 volt AC power source.

Set the tuner between channels.

Bias the grid (pin 5) of the horizontal output tube with a -60 volt DC source. If this is not feasible, remove the 1B3 High Voltage rectifier or tape the end of the HV anode lead. UNDER NO CIRCUMSTANCES SHOULD THE YOKE PLUG BE PULLED TO KILL THE HIGH VOLTAGE. This would open the cathode of the horizontal output tube and raise the B+ voltages on the rest of the set, resulting in non-operative alignment conditions.

Adjust the CONTRAST CONTROL to its maximum clockwise rotation.

SOUND ALIGNMENT - QUADRATURE

Connect a VTVM between point "B" (Pin 2 of V102, 6DT6 sound detector) and chassis ground. Use a 10K, 1/2 watt composition resistor in series with the meter lead and point "B". Set the VTVM on the -10 Volt DC scale.

Apply an unmodulated 4.5MC signal to point "A" (grid of Video Amplifier tube). Use a .005MFD capacitor in series with the generator lead to point "A".

Detune the quadrature coil (L102) by adjusting the core to the maximum outward position (away from chassis).

Adjust the sound take-off coil (L101) and the sound transformer (T101) for maximum voltage reading on the VTVM. Reduce the generator output as necessary to keep the voltage at point "B" about 3-1/2 to 4-1/2 volts at all times.

Switch the VTVM to its -150 volt DC scale. Move the VTVM lead from point "B" to point "C" (Pin 5 of V102, 6DT6 sound detector).

Increase the generator output at 4.5MC to maximum. Adjust the core of the sound quadrature coil (L102) inward toward the chassis until the VTVM reads MINIMUM. Continue turning the core inward until the VTVM reads from +97 to +103 volts.

Tune in a TV station. If sound is distorted, tune the core of the quadrature coil slightly in and out until undistorted sound is obtained. In a weak signal area, tune the quadrature coil carefully to obtain the least amount of noise while keeping the sound free of distortion.

4.5 MC VIDEO TRAP

Same GENERAL SET UP CONDITIONS as before.

Connect a voltmeter across a detector network. An R. F. probe will also serve. Connect the other end of the detector network (or probe) to point "D" (Cathode lead to picture tube).

Apply an unmodulated 4.5MC signal to the control grid of the video amplifier (point "A") through a .005MFD capacitor.

Adjust the 4.5MC VIDEO TRAP in the plate circuit of the video amplifier tube for the MINIMUM reading on the voltmeter.

FREQUENCY	ADJUST
43.75 mc	3rd IF, T203 for max.
45.25 mc	2nd IF, T202 for max.
47.25 mc	Trap on T202, slug away from chassis for min.
43.25 mc	1st IF, T201 for max.
43.75 mc	Grid Coil, L201 for max.
47.25 mc	Trap on L201, slug away from chassis for min.
45.50 mc	Plate coil on tuner for max.

VIDEO IF ALIGNMENT

Connect a DC voltmeter to point "A" (Control grid of the Video amplifier tube) using a 10K, 1/2 watt composition resistor in series with the meter lead and a 1000 MMF capacitor across the meter leads (see diagram titled 'ISOLATION NETWORK"). Meter polarity will be negative.

Apply a -3 volt DC fixed bias (battery or bias supply) to the IF AGC bus at point "E".

Adjust the CONTRAST CONTROL to MINIMUM setting (fully counter-clockwise).

Apply an unmodulated RF signal as follows: Push down the shield on the 6CG8A mixer tube, and fit a tube shield over the top of the tube. Couple the output from the signal generator directly to this shield. Set the tuner in between channels. Other methods of coupling the signal can be used, capacative coupling to the mixer tube results in the least toward spurious oscillation. This method should be used whenever possible.

Set the generator frequency to 43.75MC and adjust the 3rd IF transformer to MAXIMUM reading. Keep the generator output setting so that the meter reads 2.5 volts or less.

Set the generator frequency to 45.25MC and adjust the 2nd IF transformer to MAXIMUM reading. Set the generator to 47.25MC and adjust the trap (coil away from chassis) to MINIMUM reading.

Set the generator frequency to 43.25MC and adjust the 1st IF transformer to MAXIMUM reading, keeping the meter reading below 2.5 volts.

Set the generator frequency to 43.75MC and adjust the grid coil to MAXIMUM. Set the generator 50 47.25MC and adjust the trap (coil away from chassis) to MINIMUM reading.

Set the generator frequency to 45.5MC and adjust the convertor plate coil on the tuner to MAXIMUM.

SWEEP ALIGNMENT

Connect the vertical input leads of an oscilloscope across the voltmeter leads. Set the horizontal frequency of the scope to 60 cycle sweep-locked to the line.

Turn OFF the unmodulated RF signal from the generator, and replace it with the signal from the SWEEP generator. Set the SWEEP control of the generator to zero sweep. Set the frequency of the sweep generator to 44MC and adjust the sweep generator output to provide a reading of about 1 volt on the meter. Next set the SWEEP control on the generator to 10 or 12MC sweep deviation. The meter reading should drop to about .25 volts, and an IF response curve should appear on the scope.

The optimum IF response curve should be as shown in the sketch. Slight touch up of the IF transformers T201, T202 and T203 may be necessary to approximate the optimum curve shown. If the rough alignment was carefully done, it should not be necessary to readjust the 47.25MC trap or converter plate coil or IF input coil. Be sure the marker output is kept below the point where the IF curve is affected.

HOFFMAN

CHASSIS 356, 357, 358, 359,

MODELS 3803, 3813, 3823, 3833, 3843, 3853

The chassis listed above are similar and are used in the models listed with various prefix letters, such as: B, BR, K, KR, M, MR, SP, SPR, W, WR. The diagram on the next two pages is exact for Chassis 356, 358. Chassis 357, 359, incorporate remote control units and have other minor circuit changes as are required. Alignment information is applicable to all sets.

GENERAL INFORMATION

The receiver should not be operated with the sweep circuits disabled and high voltage applied to the picture tube. Do not pull the sweep or sweep oscillator tubes without turning off the receiver.

The yoke assembly on each of the chassis covered in this Service Data Bulletin is of the plug in type. A jumper has been wired between Pins 6 and 7 of the male plug on the yoke leads. When the yoke is not plugged in, the cathode of the horizontal output tube is floating. This prevents high voltage from being developed while the yoke is unplugged. However, it is not advisable to unplug the yoke while the set is operating, because the high capacity dag coating will store high voltage for some time. With the horizontal sweep removed and high voltage present the picture tube phosphor could be damaged.

WATTAGE DATA - 110/120V AC @ 60 cycles

Chassis 356 = 230 watts
Chassis 357 = 230 watts
Chassis 358 = 230 watts
Chassis 359 = 250 watts

FRINGE AREA CONTROL

All models incorporate Keyed AGC, with an adjustable control. This control (area control) is adjusted at the time of installation to provide the best reception for all stations being received. Properly adjusted this control setting need not be changed unless tubes are replaced.

HORIZONTAL DRIVE CONTROL

All chassis incorporate a Horizontal Drive Control. This control is adjusted to remove bright vertical lines that appear just left of the center of the screen.

WIDTH CONTROL

All chassis incorporate a 4 step Width Control. Setting the width control to the maximum counter-clockwise position will give minimum width of the picture.

FOCUS CONTROL

All models incorporate a variable focus control. This control should be adjusted to provide optimum focus for the tube being used. This setting will normally not need changing unless the picture tube has been replaced.

CIRCUIT BREAKER

All chassis are equipped with a circuit breaker in the AC line prior to the power transformer. The circuit breaker may be reset by pushing in on the Red button located near the AC power cord. Should the circuit breaker continue to trip out, a check should be made for a short circuit. Do not hold the Red button in since damage to the circuit breaker and/or the television receiver may result.

UHF EQUIPPED MODELS

All NON-REMOTE models may be converted to receive UHF reception by the addition of a Standard Coil UHF PiggyBack Tuner. The Kit, No. 426023 is used for field conversion of these models.

CHASSIS REMOVAL

The chassis, picture tube and front frame are an assembly that can be removed from the cabinet as a single unit, when service is required. This unit will be referred to as a capsule in the following text.

Remove the backboard. Remove the two hex-head screws at the rear of the chassis. Remove the two hex-head shipping bolts from the bottom side of the cabinet. Loosen the screws holding the four clamps, two at the top and one on each side of the front frame. (From the inside of the cabinet) Turn the clamps 90° to clear the cabinet. Disconnect the speaker leads. The entire capsule can now be removed from the front of the cabinet.

Reverse the above procedure to replace the capsule into the cabinet.

PICTURE TUBE REMOVAL

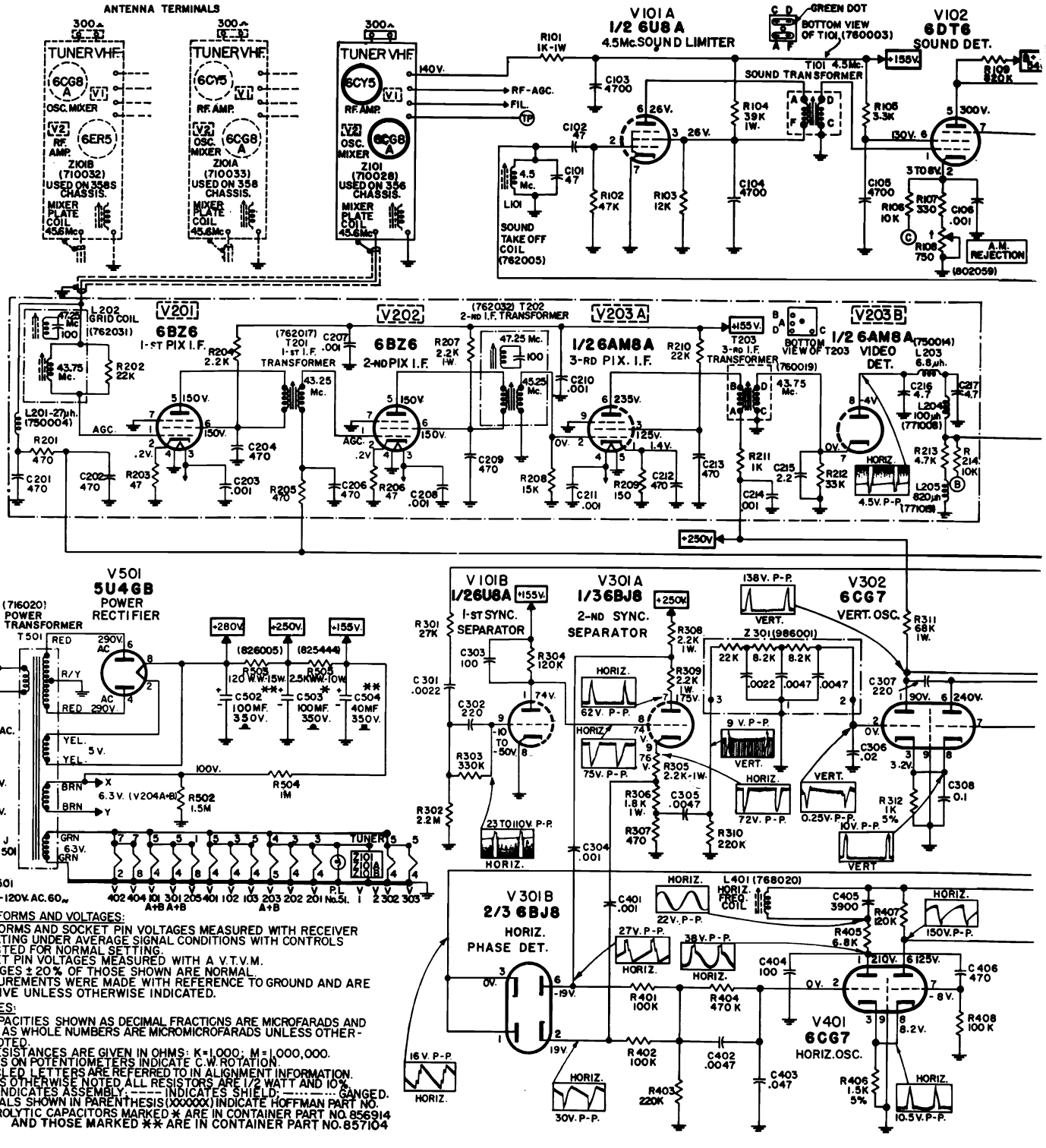
Remove the capsule assembly as explained under chassis removal.

Lay the capsule on its face, using a soft cloth to protect the front frame and the face of the picture tube from scratches.

Remove the 2 screws at the right hand side of picture tube, (side away from the tuner) which hold the CRT retaining strap. Remove the nut and bolt which tightens the retaining strap. Pull the retaining strap out of the way. Lift the picture tube slightly to clear the front frame and remove in the opposite direction from the tuner assembly.

Reverse the above procedure to install a new picture tube.

HOFFMAN CHASSIS 356, 358



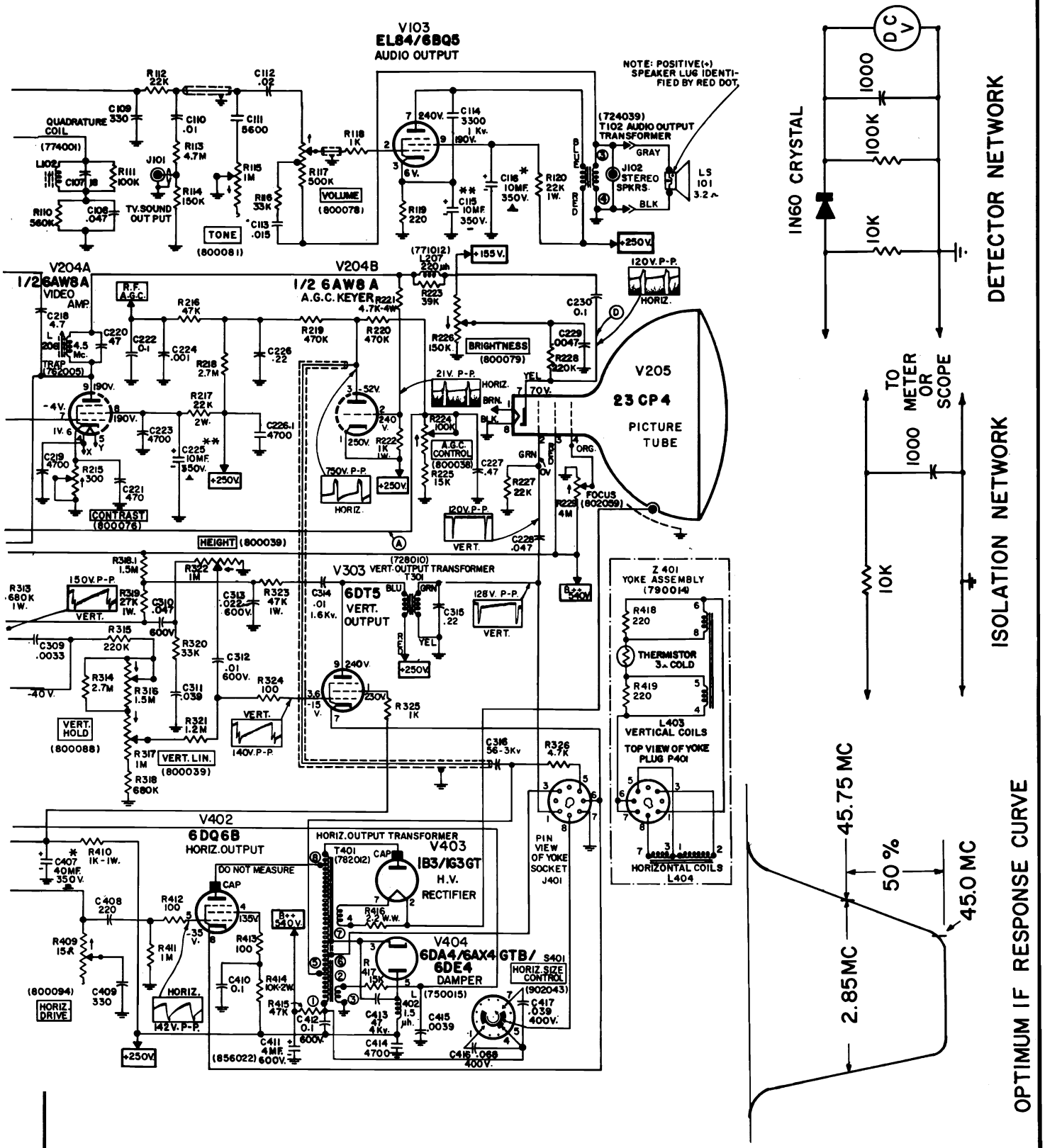
WAVEFORMS AND VOLTAGES:

A) WAVEFORMS AND SOCKET PIN VOLTAGES MEASURED WITH RECEIVER OPERATING UNDER AVERAGE SIGNAL CONDITIONS WITH CONTROLS ADJUSTED FOR NORMAL SETTING.
B) SOCKET PIN VOLTAGES MEASURED WITH A V.T.V.M.
C) VOLTAGES ± 20% OF THOSE SHOWN ARE NORMAL.
D) MEASUREMENTS WERE MADE WITH REFERENCE TO GROUND AND ARE POSITIVE UNLESS OTHERWISE INDICATED.

NOTES:

1. ALL CAPACITIES SHOWN AS DECIMAL FRACTIONS ARE MICROFARADS AND SHOWN AS WHOLE NUMBERS ARE MICROMICROFARADS UNLESS OTHERWISE NOTED.
2. ALL RESISTANCES ARE GIVEN IN OHMS: K=1,000; M=1,000,000.
3. ARROWS ON POTENTIOMETERS INDICATE C.W. ROTATION.
4. ENCIRCLED LETTERS ARE REFERRED TO IN ALIGNMENT INFORMATION.
5. UNLESS OTHERWISE NOTED ALL RESISTORS ARE 1/2 WATT AND 10%.
6. — — — INDICATES ASSEMBLY; ——— INDICATES SHIELD; ·····GANGED.
7. NUMERALS SHOWN IN PARENTHESIS (XXXXXX) INDICATE HOFFMAN PART NO.
8. ELECTROLYTIC CAPACITORS MARKED * ARE IN CONTAINER PART NO. 856914 AND THOSE MARKED ** ARE IN CONTAINER PART NO. 857104

HOFFMAN Chassis 356 and 358 Schematic Diagram, Continued



HOFFMAN Chassis 356, 357, 358, 359, Alignment Information, Continued

GENERAL SET UP CONDITIONS

Set the tuner between channels.

Bias the grid (pin 5) of the horizontal output tube with a -60 volt DC source. If this is not feasible, remove the 1B3 High Voltage rectifier or tape the end of the HV anode lead. UNDER NO CIRCUMSTANCES SHOULD THE YOKE PLUG BE PULLED TO KILL THE HIGH VOLTAGE. This would open the cathode of the horizontal output tube and raise the B+ voltages on the rest of the set, resulting in non-operative alignment conditions.

Adjust the CONTRAST CONTROL to its maximum clockwise rotation.

SOUND ALIGNMENT - QUADRATURE

Connect a VTVM between point "B" (Pin 2 of V102, 6DT6 sound detector) and chassis ground. Use a 10K, 1/2 watt composition resistor in series with the meter lead and point "B". Set the VTVM on the -10 Volt DC scale.

Apply an unmodulated 4.5MC signal to point "A" (grid of Video Amplifier tube). Use a .005MFD capacitor in series with the generator lead to point "A".

Detune the quadrature coil (L102) by adjusting the core to the maximum outward position (away from chassis).

Adjust the sound take-off coil (L101) and the sound transformer (T101) for maximum voltage reading on the VTVM. Reduce the generator output as necessary to keep the voltage at point "B" about 3-1/2 to 4-1/2 volts at all times.

Switch the VTVM to its -150 volt DC scale. Move the VTVM lead from point "B" to point "C" (Pin 5 of V102, 6DT6 sound detector).

Increase the generator output at 4.5MC to maximum. Adjust the core of the sound quadrature coil (L102) inward toward the chassis until the VTVM reads MINIMUM. Continue turning the core inward until the VTVM reads from +97 to +103 volts.

Tune in a TV station. If sound is distorted, tune the core of the quadrature coil slightly in and out until undistorted sound is obtained. In a weak signal area, tune the quadrature coil carefully to obtain the least amount of noise while keeping the sound free of distortion.

4.5 MC VIDEO TRAP

Same GENERAL SET UP CONDITIONS as before.

Connect a voltmeter across a detector network. An R. F. probe will also serve. Connect the other end of the detector network (or probe) to point "D" (Cathode lead to picture tube).

Apply an unmodulated 4.5MC signal to the control grid of the video amplifier (point "A") through a .005MFD capacitor.

Adjust the 4.5MC VIDEO TRAP in the plate circuit of the video amplifier tube for the MINIMUM reading on the voltmeter.

VIDEO IF ALIGNMENT

Same GENERAL SET UP CONDITIONS as before.

Connect a DC voltmeter to point "A" (Control grid of the Video amplifier tube) using a 10K, 1/2 watt composition resistor in series with the meter lead and a 1000 MMF capacitor across the meter leads (see diagram titled 'ISOLATION NETWORK"). Meter polarity will be negative.

Apply a -3 volt DC fixed bias (battery or bias supply) to the IF AGC bus at point "E".

Adjust the CONTRAST CONTROL to MINIMUM setting (fully counter-clockwise).

Apply an unmodulated RF signal as follows: Push down the shield on the 6CG8A mixer tube, and fit a tube shield over the top of the tube. Couple the output from the signal generator directly to this shield. Set the tuner in between channels. Other methods of coupling the signal can be used, capacative coupling to the mixer tube results in the least toward spurious oscillation. This method should be used whenever possible.

Set the generator frequency to 43.75MC and adjust the 3rd IF transformer to MAXIMUM reading. Keep the generator output setting so that the meter reads 2.5 volts or less.

Set the generator frequency to 45.25MC and adjust the 2nd IF transformer to MAXIMUM reading. Set the generator to 47.25MC and adjust the trap (coil away from chassis) to MINIMUM reading.

Set the generator frequency to 43.25MC and adjust the 1st IF transformer to MAXIMUM reading, keeping the meter reading below 2.5 volts.

Set the generator frequency to 43.75MC and adjust the grid coil to MAXIMUM. Set the generator to 47.25MC and adjust the trap (coil away from chassis) to MINIMUM reading.

Set the generator frequency to 45.5MC and adjust the convertor plate coil on the tuner to MAXIMUM. See sketch below.

FREQUENCY	ADJUST
43.75 mc	3rd IF, T203 for max.
45.25 mc	2nd IF, T202 for max.
47.25 mc	Trap on T202, slug away from chassis for min.
43.25 mc	1st IF, T201 for max.
43.75 mc	Grid Coil, L201 for max.
47.25 mc	Trap on L201, slug away from chassis for min.
45.50 mc	Plate coil on tuner for max.

SWEEP ALIGNMENT

Connect the vertical input leads of an oscilloscope across the voltmeter leads. Set the horizontal frequency of the scope to 60 cycle sweep-locked to the line.

Turn OFF the unmodulated RF signal from the generator, and replace it with the signal from the SWEEP generator. Set the SWEEP control of the generator to zero sweep. Set the frequency of the sweep generator to 44MC and adjust the sweep generator output to provide a reading of about 1 volt on the meter. Next set the SWEEP control on the generator to 10 or 12MC sweep deviation. The meter reading should drop to about .25 volts, and an IF response curve should appear on the scope.

The optimum IF response curve should be as shown in the sketch. Slight touch up of the IF transformers T201, T202 and T203 may be necessary to approximate the optimum curve shown. If the rough alignment was carefully done, it should not be necessary to readjust the 47.25MC trap or converter plate coil or IF input coil. Be sure the marker output is kept below the point where the IF curve is affected.

M O N T G O M E R Y W A R D

MODELS WG-4083A, WG-4093A, WG-4183A, WG-4193A, WG-5083A, WG-5084A, WG-5093A, WG-5183A, WG-5184A, WG-5193A.

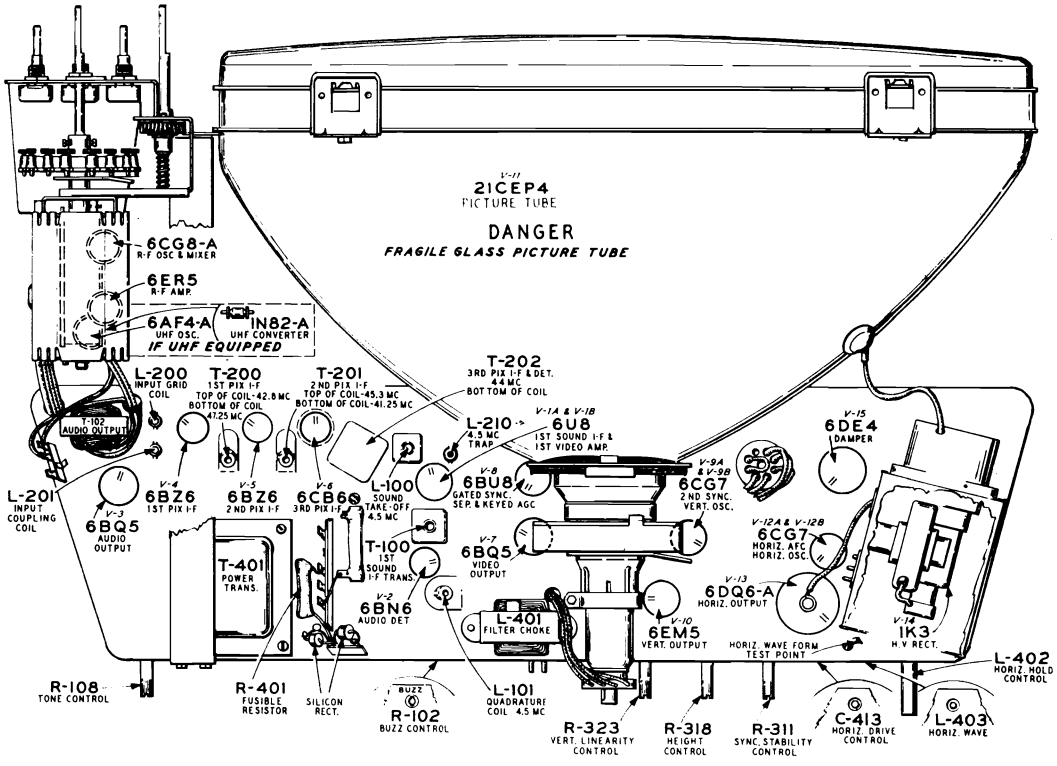


Fig. 1—Chassis Tube Layout and Trimmers

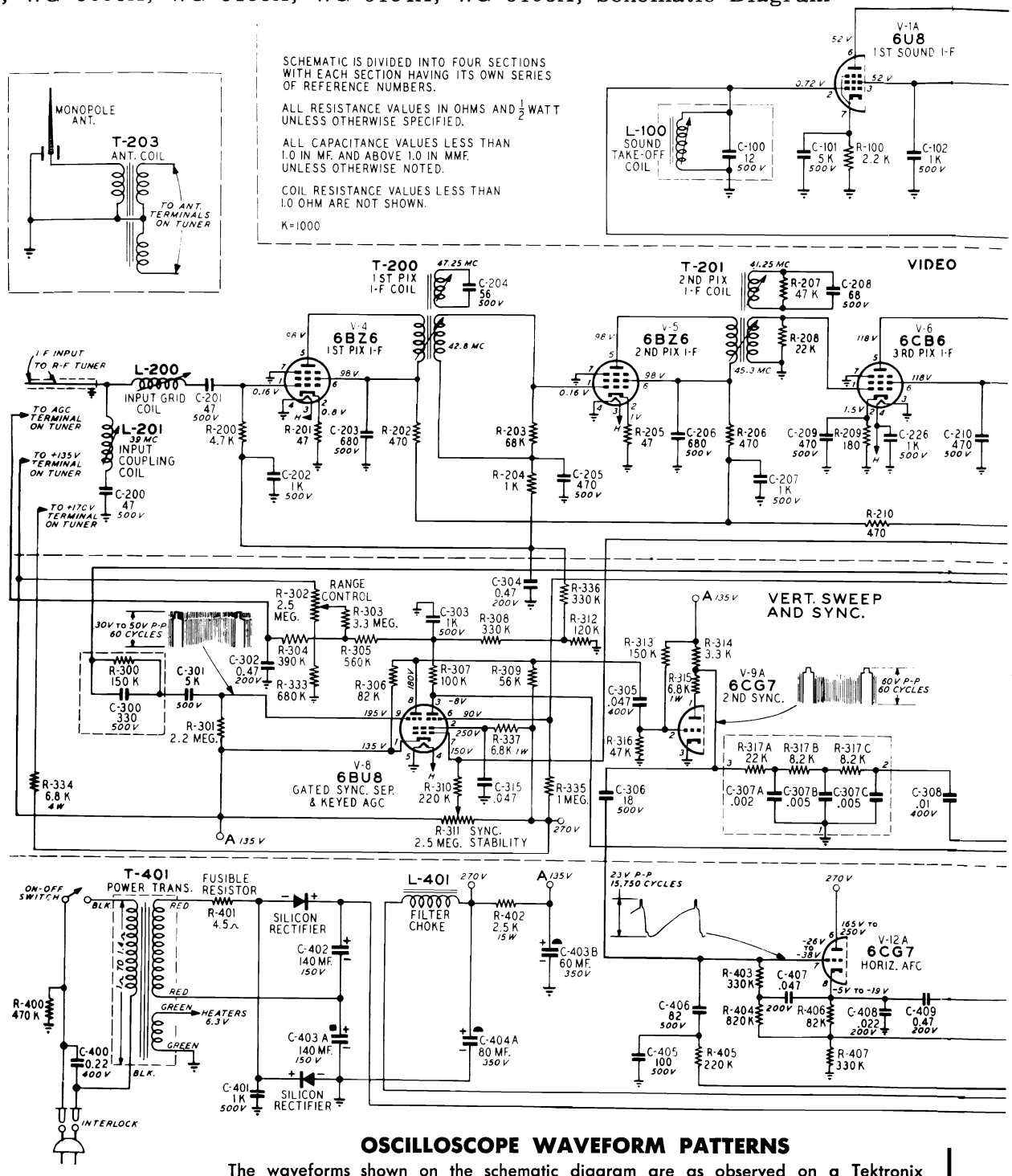
INSTRUCTIONS
CHASSIS ASSEMBLY REMOVAL

1. Remove the knobs, dial scale escutcheon, channel indicator and secondary control knobs in the order listed.
2. Disconnect the speaker leads.
3. Remove the antenna terminal board assembly from side of cabinet.
4. Remove four screws holding top pix tube anchor brackets to top of cabinet frame.
5. Remove screws holding the rear tuner bracket to the cabinet.
6. Reach inside the top left hand portion of the cabinet and remove the pilot light socket assembly from the bracket.
7. There are four chassis mounting screws located underneath the chassis. Two screws are accessible through the holes in the perforated bottom panel and the other screws are located at the end of each chassis rail. Remove the four screws and carefully remove the chassis assembly.

ADJUSTMENT OF RANGE CONTROL—Tune the receiver to the strongest station in the area in which the receiver will be used. While observing the picture and listening to the sound, turn the control clockwise until signs of overloading (buzz in sound washed-out picture, sync instability) appear. Then turn the control a few degrees counter-clockwise from the point at which overloading occurs. (The stronger the signal input, the more counter-clockwise this setting will be.) In areas where the strongest signal does not exceed 1000 MV the setting will usually be maximum clockwise. With the control set correctly, the AGC will automatically adjust the bias on the R-F and I-F amplifiers so that the best possible signal to noise ratio (minimum snow) will be obtained for any signal input to the receiver.

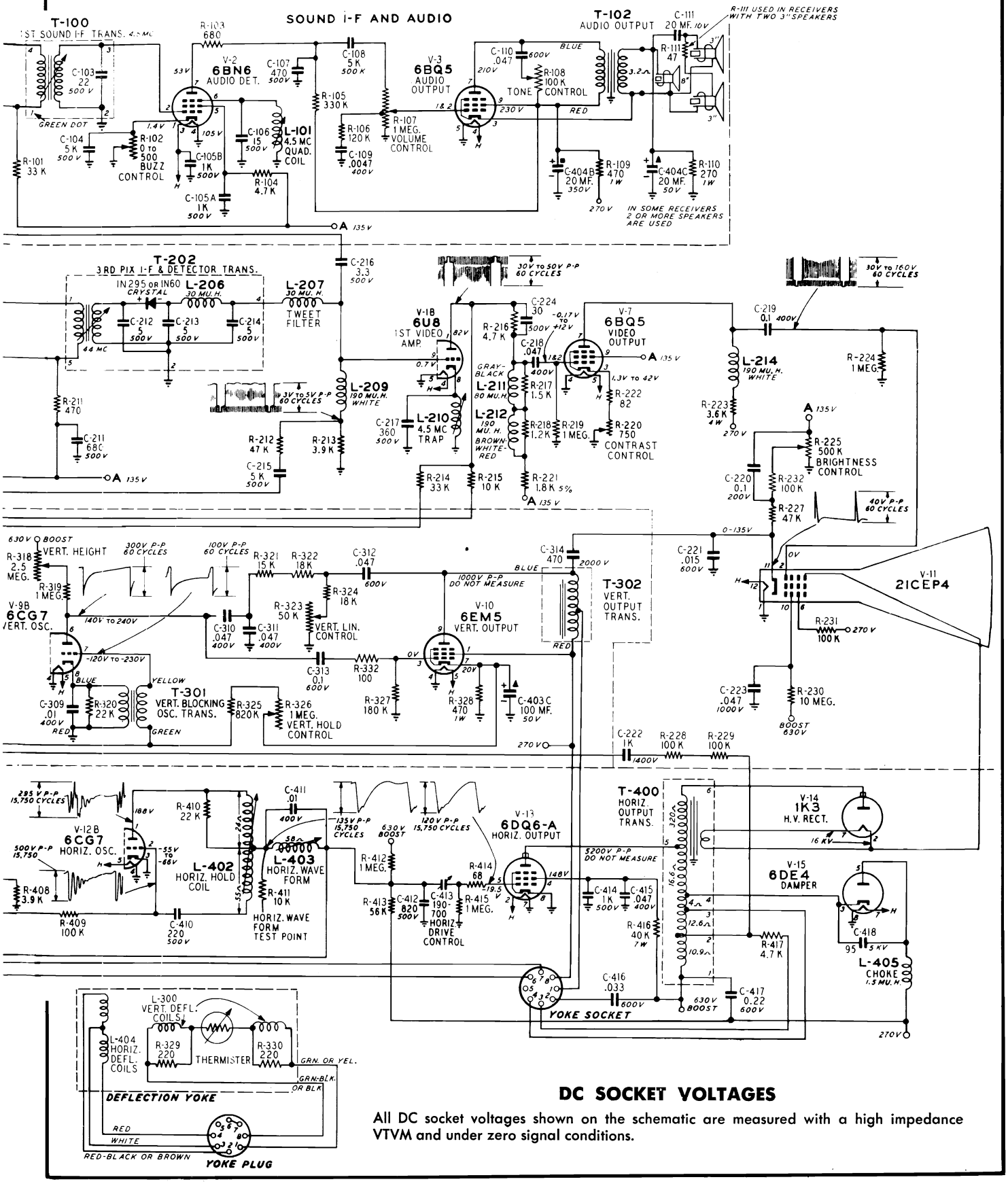
ADJUSTMENT OF SYNC STABILITY CONTROL — When receiving strong (500 MV or more) signals, set hold controls so that the picture is locked in. Turn the sync control slowly clockwise until bending or sync instability occurs. Then turn the control slightly counter-clockwise until bending or sync instability disappears. If the control is set incorrectly, bending, tearing, etc., will be present and when switching from channel to channel the picture will not lock in quickly. In weak signal areas the control should be set for maximum picture stability.

Montgomery Ward Models WG-4083A, WG-4093A, WG-4183A, WG-4193A, WG-5083A, WG-5084A, WG-5093A, WG-5183A, WG-5184A, WG-5193A, Schematic Diagram



OSCILLOSCOPE WAVEFORM PATTERNS

The waveforms shown on the schematic diagram are as observed on a Tektronix type 524D wide band television oscilloscope with the receiver tuned to a reasonably strong signal and a normal picture. The voltages shown on each waveform are the approximate peak to peak amplitudes. The frequency accompanying each waveform indicates the repetition rate of the waveform not the sweep rate of the oscilloscope. If the waveforms are observed on the oscilloscope with a poor high frequency response, the corners of the pulses will tend to be more rounded than those shown on the schematic diagram and the amplitude of any high frequency pulse will tend to be less.



DC SOCKET VOLTAGES

All DC socket voltages shown on the schematic are measured with a high impedance VTVM and under zero signal conditions.

MONTGOMERY WARD Models WG-4083A, WG-4093A, WG-4183A, etc., Continued

ALIGNMENT PROCEDURE

40 Mc I-F ALIGNMENT—Connect sweeper with very short leads through a 1 K mmf disc ceramic capacitor to mixer grid test point on timer. With short leads connect crystal diode detector (Fig. 4) to plate of 1st I-F tube. Connect—1.5V to A.G.C. line (Junction of C-304 & R-336). Connect oscilloscope to detector output. Adjust sweep output to give adequate deflection.

A.	FREQUENCY	ADJUST
1.	47.25 Mc	1st Pix I-F Coil (T-200 Bottom of Coil) to center notch over 47.25 Mc marker.
2.		Converter Plate Coil L-7 (Top of Tuner) Input Grid Coil (L-200) and Input Coupling Coil (L-201) to give the response shown in figure 5.

The converter plate and input grid coils control the shape of the top. The input coupling coil controls the position of the 41.25 marker. This adjustment must be made accurately or the sound rejection will not be correct (41.25 Mc 31 to 36 db down from top of overall P.I.F. response). 45.75 Mc marker must be set exactly on peak or the position of the 44.5 Mc marker in the overall response curve will not be correct.

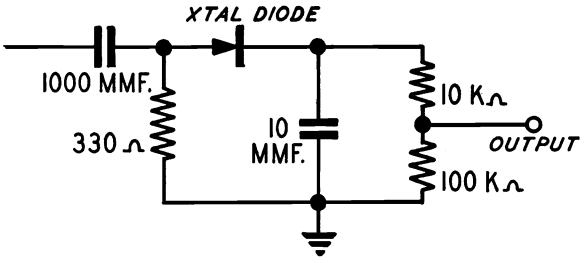


Fig. 4—Crystal Diode Detector

B. When the input circuit is aligned place —4.5V bias on the AGC line. (Junction of C-304 & R-336). Remove the crystal detector and connect oscilloscope and VTVM to the 2nd pix detector load resistor R-213. Adjust sweep output to give 2.0 VDC at detector.

	FREQUENCY	ADJUST
1.	42.8 Mc	1st Pix I-F Coil (T-200, Top of Coil) for maximum height of 42.8 Mc marker.
2.	41.25 Mc	2nd Pix I-F Coil (T-201, Bottom of Coil) for minimum height of 41.25 Mc marker.
3.	45.3 Mc	2nd Pix I-F Coil (T-201, Top of Coil) for maximum height of 45.3 Mc marker.

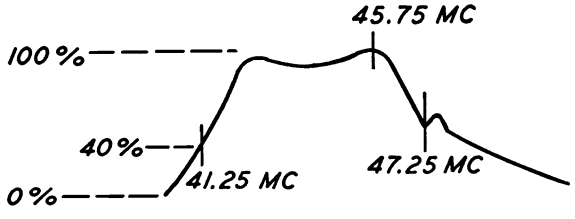


Fig. 5—Input Circuit Response

4.	44.0 Mc	3rd Pix I-F Coil (T-202, Bottom of Coil) for maximum height of the 44.0 Mc marker.

These adjustments may be made with a single frequency generator if it is more convenient to do so.

C. After these adjustments have been made recheck the peak to peak output on the oscilloscope. If the shape of the curve is not as shown in figure 6, it will be necessary to retouch the adjustments. A small fraction of a turn is all that is necessary if the strip is operating correctly. The position of the 44.5 Mc marker is critical (98%). The 44.0 Mc transformer (3rd I-F) controls the symmetry of the top. The 45.3 Mc transformer (2nd I-F) controls the height of the 45.75 Mc marker. The 42.8 Mc transformer (1st I-F) controls the height of the 42.4 Mc marker. This adjustment will very seldom need retouching.

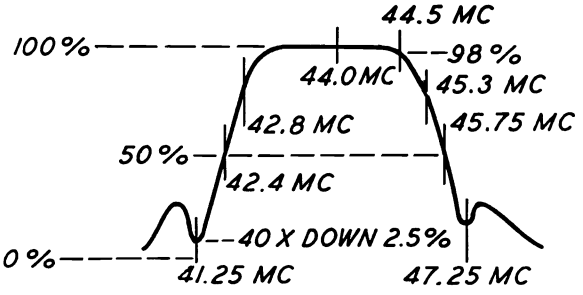


Fig. 6—Overall Response Curve

DO NOT RETOUCH the converter plate coil or the input grid coil. These coils MUST be adjusted correctly with the diode detector. Recheck position of 41.25 Mc and 47.25 Mc markers. Reset if necessary.

VIDEO

With 4.5 Mc unmodulated signal into grid of the video amplifier tube and VTVM on picture tube cathode, tune 4.5 Mc trap for minimum response. VTVM on 0-10 V AC scale. This adjustment can also be made while observing a picture from a station. Tune trap for least 4.5 Mc beat (grainy appearance) in picture.

AUDIO

1. Tune in a TV station and reduce signal strength at antenna terminals by use of an attenuator or similar device until a "hiss" acompanies the sound.
2. Adjust sound take-off coil (L-100), sound I-F transformer T-100, quadrature coil (L-101) and buzz control (R-102) for maximum undistorted sound and minimum buzz.
3. If "hiss" disappears during step 2, further reduce signal strength.

MONTGOMERY WARD

MODELS

WG-4601A	WG-5204A	WG-5304A
WG-4606A	WG-5206A	WG-5306A
WG-4611A	WG-5207A	WG-5307A
WG-4701A	WG-5208A	WG-5308A
WG-4706A	WG-5212A	WG-5312A
WG-4711A	WG-5217A	WG-5317A
WG-5202A	WG-5302A	

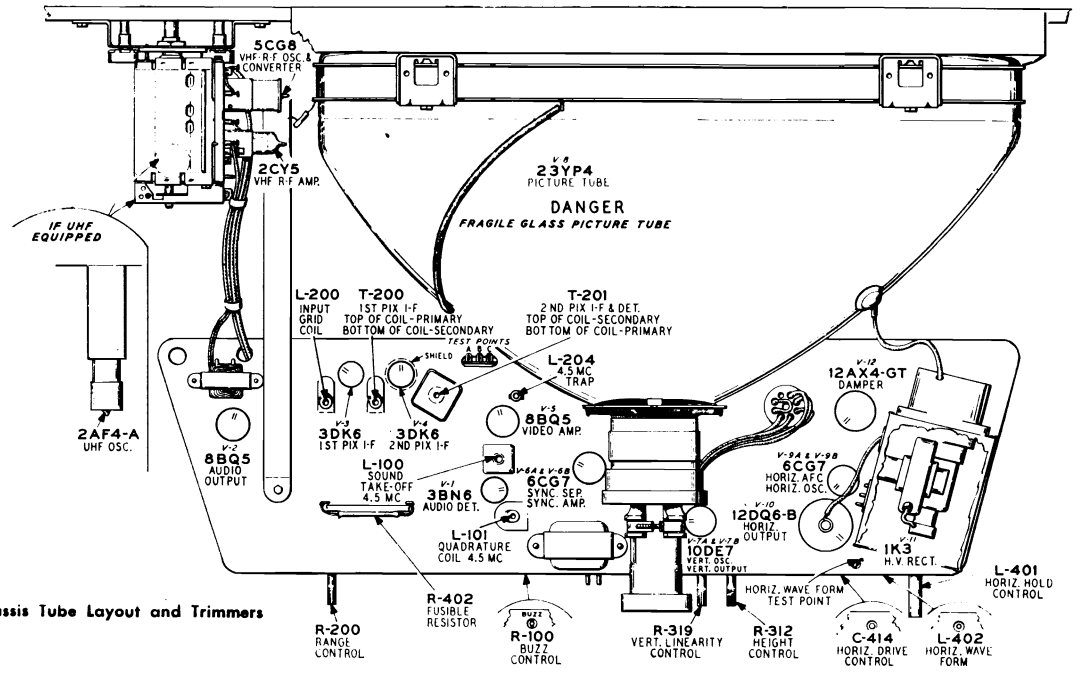


Fig. 1—Chassis Tube Layout and Trimmers

CHASSIS REMOVAL

1. Remove all the knobs from front of cabinet.
2. Remove cabinet back. Disconnect the yoke plug, pix tube socket, anode lead, beam aligner (if used), lead between chassis and pix tube ground spring and ground between tube harness and tuner assembly.
3. Disconnect the speaker leads. (In some models two speakers are used.)
4. Disconnect the antenna leads from the tuner.
5. Remove screws holding the tuner assembly to the cabinet and grounding strap to chassis.
6. For models with plastic cabinet backs. There are four chassis mounting-screws located underneath the chassis. Two screws are accessible through the holes in the perforated bottom panel and the other screws are located at the end of each chassis rail. Remove the four screws and carefully remove the chassis assembly.
7. For models with masonite backs. There are four chassis mounting screws located underneath the chassis. Two screws are accessible through the holes in the rear cabinet rail and the other two screws are accessible through the holes in the perforated bottom panel located closest to the rear cabinet rail. Remove the four screws and carefully remove the chassis assembly.

SERVICE SUGGESTIONS

RASTER ON TUBE BUT NO PICTURE OR SOUND—This condition can be caused by:

1. Defective pix I-F tubes V-3 or V-4.
2. Defective pix detector crystal or video amplifier tube V-5. Check tube, crystal and their associated circuits.
3. Defective R-F amplifier or oscillator mixer tube in the tuner.

WRINKLES ON LEFT SIDE OF RASTER—This condition can be caused by:

1. Defective yoke.
2. V-12 defective.
3. R-419 or C-417 defective.

SMALL RASTER—This condition can be caused by:

1. Low +B or line voltage. Check silicon rectifiers.
2. Insufficient output from V-10. Replace tube.
3. Insufficient output from V-7 and V-9. Replace tubes.
4. Incorrect setting of horizontal drive control.
5. V-12 defective.

BUZZ IN SOUND

1. Check buzz control setting.
2. Check sound I-F alignment.
3. V-1 defective.

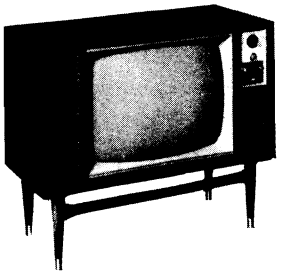
BENDING OR S-ING

1. Check capacitors C-403A & C-404A.
2. V-9 or V-10 tubes defective.
3. Check V-5 & V-6 tubes.

POOR HORIZONTAL LINEARITY—If adjustment of the horizontal drive control does not correct this condition, check the following:

1. Check or replace V-10 & V-12.
2. Check capacitor C-418 for defects.
3. Horizontal deflection coils defective.

MONTGOMERY WARD Models WG-4601A, WG-4606A, and others, Continued



WG-5217A (VHF), WG-5317A (UHF-VHF) } OAK

WG-5208A (VHF), WG-5308A (UHF-VHF) } WALNUT

NOTE—Oak models are similar to walnut models except for grille cloth in front panel areas.

OSCILLOSCOPE WAVEFORM PATTERNS

The waveforms shown on the schematic diagram are as observed on a Tektronix type 524D wide band television oscilloscope with the receiver tuned to a reasonably strong signal and a normal picture. The voltages shown on each waveform are the approximate peak to peak amplitudes. The frequency accompanying each waveform indicates the repetition rate of the waveform not the sweep rate of the oscilloscope. If the waveforms are observed on the oscilloscope with a poor high frequency response, the corners of the pulses will tend to be more rounded than those shown on the schematic diagram and the amplitude of any high frequency pulse will tend to be less.

DC SOCKET VOLTAGES

All DC socket voltages shown on the schematic are measured with a high impedance VTVM and under zero signal conditions.

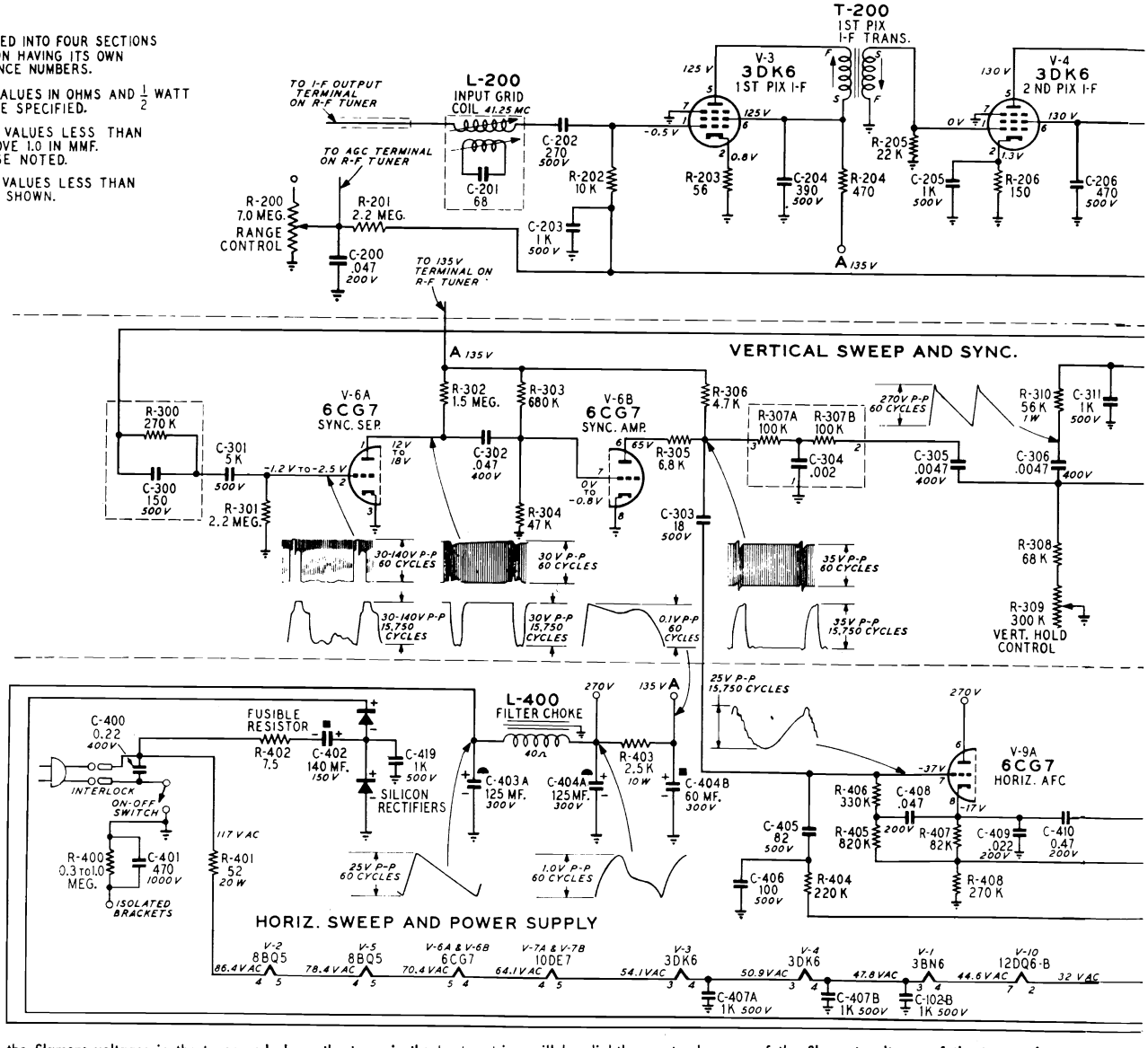
SCHEMATIC IS DIVIDED INTO FOUR SECTIONS WITH EACH SECTION HAVING ITS OWN SERIES OF REFERENCE NUMBERS.

ALL RESISTANCE VALUES IN OHMS AND $\frac{1}{2}$ WATT UNLESS OTHERWISE SPECIFIED.

ALL CAPACITANCE VALUES LESS THAN 1.0 IN MF. AND ABOVE 1.0 IN MMF. UNLESS OTHERWISE NOTED.

COIL RESISTANCE VALUES LESS THAN 1.0 OHM ARE NOT SHOWN.

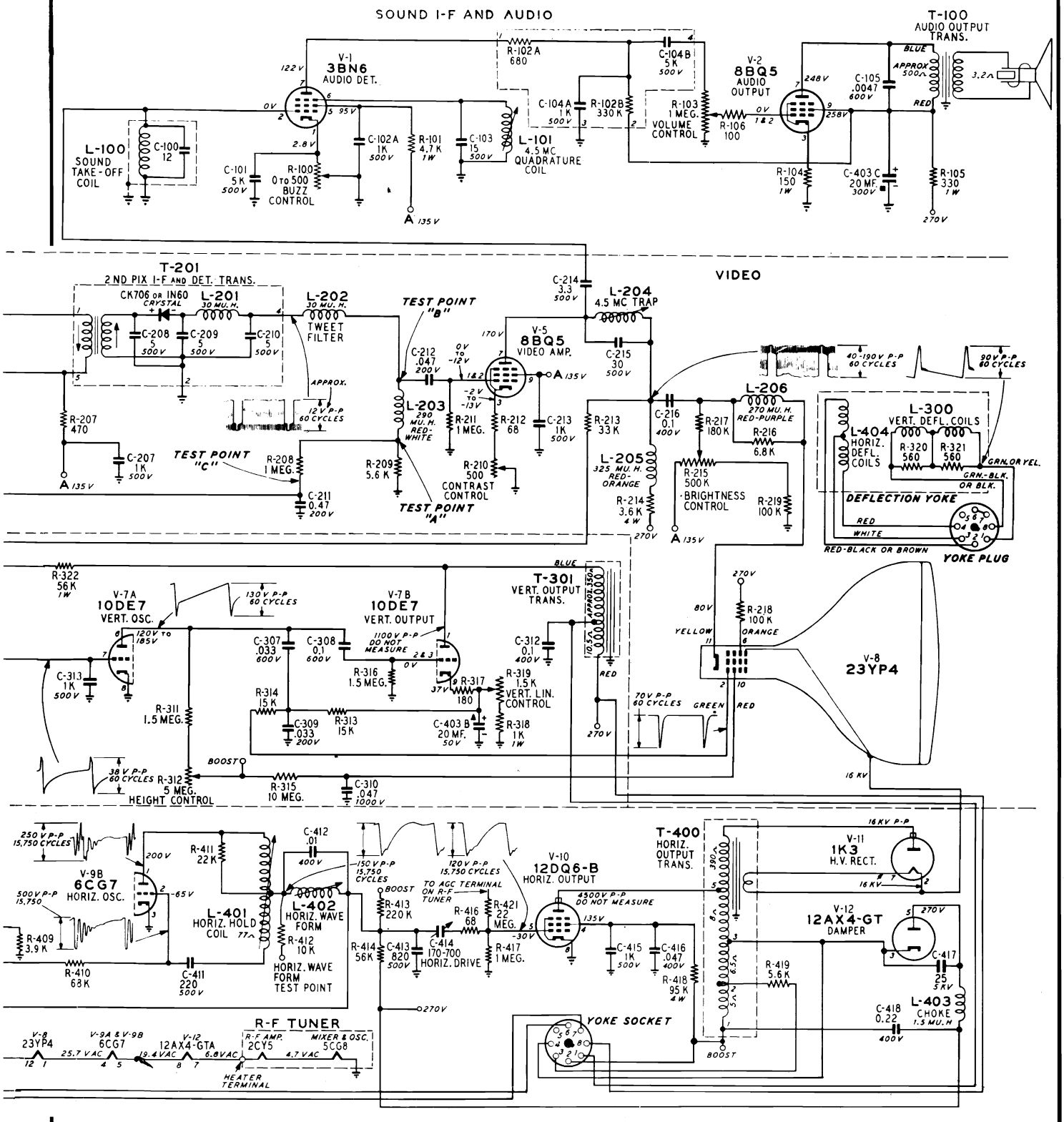
K=1000



NOTE—In UHF receivers the filament voltages in the tuner and above the tuner in the heater string will be slightly greater because of the filament voltages of the tuner tubes.

CENTERING OF 23" RECEIVERS

These Receivers using the 92° picture tubes are more subject to pin cushion and linearity problems when not properly centered than are the 90° type sets. Should you experience any difficulty with either of these problems, a careful check of centering should be made. Exact centering and adjustment of the height and linearity controls will result in an improved picture in nearly all cases.



MONTGOMERY WARD Models WG-4601A, WG-4606A, etc., Alignment, Continued

CENTERING ADJUSTMENT — If horizontal or vertical centering is required, adjust each ring in the centering device until proper centering is obtained. If a clamp type centering device is used, rotate the device to the left or right and turn the knob located at the top of the device until the picture is centered correctly.

PICTURE ADJUSTMENT — For further adjustments, obtain a test pattern on the receiver. When a test pattern is obtained, it may be necessary to slightly readjust the fine tuning control for clearest picture.

ALIGNMENT PROCEDURE

1. Connect sweep output to 2nd I-F grid (pin #1-V4), oscilloscope to diode load resistor R-209 (Test Point "A"). Set output of sweeper so that some output is indicated on oscilloscope. Adjust 2nd PIF transformer (T-201) primary (bottom) and secondary (top) simultaneously for maximum output and symmetry. Readjust sweeper output for 4.0V P-P on oscilloscope. Touch-up to give the waveform shown in figure 4.

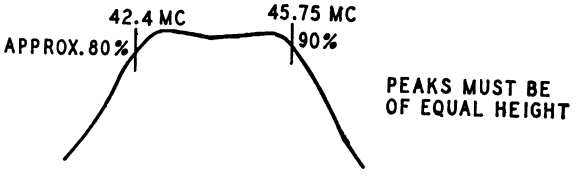


Fig. 4—2nd Pix I-F Response

2. With approximately —5.5V bias on AGC line junction of R-208 and C-211 (Test Point "C") connect sweeper to 1st I-F grid (Pin #1-V3). Reduce sweeper output to compensate for additional gain of 1st stage (4.0V. P-P on oscilloscope). Adjust 1st I-F transformer primary (top) and secondary (bottom) for maximum gain and symmetry with 45.75 mc marker. (See Figure 5.)

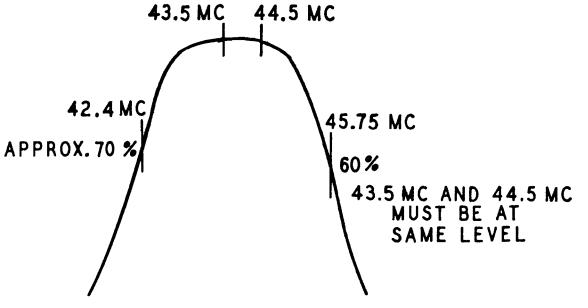


Fig. 5—Pix I-F Response From 1st Pix I-F Grid

3. Set channel selector to Channel 13. Connect sweeper with very short leads through a 10 K mmf disc ceramic capacitor to mixer grid (I-F test point—see figure 7). Readjust sweep output for 4.0V P-P, adjust 41.25 mc trap (bottom of L-200) so that notch is at marker, adjust mixer plate coil (L-18 primary) and input grid coil (top of L-200) for maximum gain and symmetry with 45.75 mc marker at 50%. (Figure 6.)

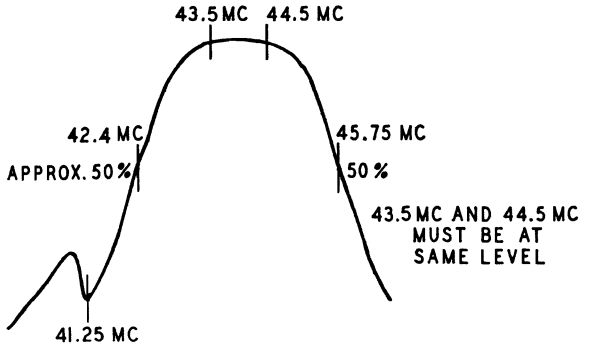


Fig. 6—Overall Pix I-F Response Curve

In all positions, final touch up should be made with 4.0V. P-P amplitude on oscilloscope. Once a stage has been adjusted, do not readjust with the sweeper connected to another stage. For instance, after adjusting the output stage and moving the sweeper to the 1st grid to adjust 1st I-F transformer, do not move the slugs in the output stage, etc.

In general, the position of the 45.75 mc marker should be set with the primary and the symmetry adjusted with the secondary. An approximate setting of the input grid coil may be obtained by adjusting for maximum amplitude of the 45.75 marker. This amplifier **cannot** be adjusted for bandwidth. It must be adjusted for maximum gain, symmetry and position of 45.75 marker.

VIDEO

With 4.5 Mc unmodulated signal into grid of the video amplifier tube (Test Point "B") and VTVM on picture tube cathode, tune 4.5 Mc trap for minimum response. VTVM on O-10 V AC scale. This adjustment can also be made while observing a picture from a station. Tune trap for least 4.5 Mc beat (grainy appearance) in picture.

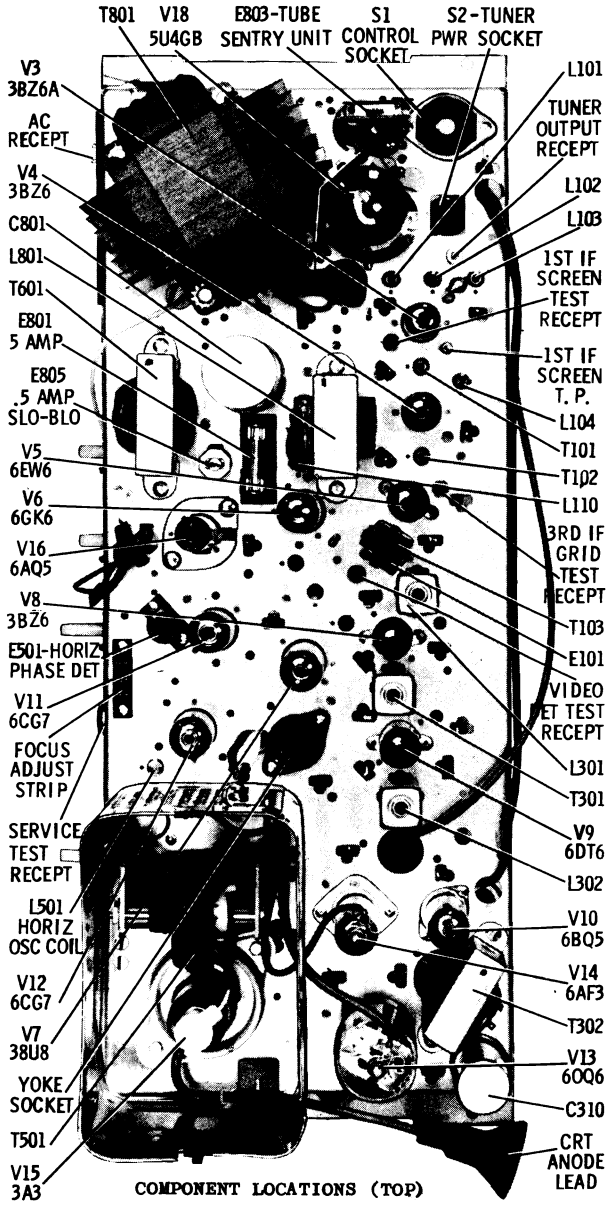
AUDIO

1. Tune in a TV station and reduce signal strength at antenna terminals by use of an attenuator or similar device until a "hiss" accompanies the sound.
2. Adjust sound take-off coil (L-100) quadrature coil (L-101) and buzz control (R-100) for maximum undistorted sound and minimum buzz.
3. If "hiss" disappears during step 2, further reduce signal strength.

MOTOROLA

MODEL BREAKDOWN CHART

Model	Type	Chassis	VHF Tuner	UHF Tuner
23T2B	Table	RTS-568	ROPTT-130	-
Y23T2B	Table	RTS-568Y	ROPTT-130Y	WTT-601
23T2BZ	Table	RTS-568	ROPTT-130	-
Y23T2BZ	Table	RTS-568Y	ROPTT-130Y	WTT-601
23T2CH	Table	RTS-568	ROPTT-130	-
Y23T2CH	Table	RTS-568Y	ROPTT-130Y	WTT-601
23T2M	Table	RTS-568	ROPTT-130	-
Y23T2M	Table	RTS-568Y	ROPTT-130Y	WTT-601
23T2W	Table	RTS-568	ROPTT-130	-
Y23T2W	Table	RTS-568Y	ROPTT-130Y	WTT-601
23C4B	Consolette	RTS-568	ROPTT-130	-
Y23C4B	Consolette	RTS-568Y	ROPTT-130Y	WTT-601
23C4M	Consolette	RTS-568	ROPTT-130	-
Y23C4M	Consolette	RTS-568Y	ROPTT-130Y	WTT-601
23C4W	Consolette	RTS-568	ROPTT-130	-
Y23C4W	Consolette	RTS-568Y	ROPTT-130Y	WTT-601
23C5CW	Consolette	RTS-568	ROPTT-130	-
Y23C5CW	Consolette	RTS-568Y	ROPTT-130Y	WTT-601
23C6B	Consolette	TS-568	OPTT-130	-
Y23C6B	Consolette	TS-568Y	OPTT-130Y	TT-601
23C6M	Consolette	TS-568	OPTT-130	-
Y23C6M	Consolette	TS-568Y	OPTT-130Y	TT-601
23C7CW	Consolette	TS-568	OPTT-130	-
Y23C7CW	Consolette	TS-568Y	OPTT-130Y	TT-601
23K28B	Console	RTS-568	ROPTT-130	-
Y23K28B	Console	RTS-568Y	ROPTT-130Y	WTT-601
23K28M	Console	RTS-568	ROPTT-130	-
Y23K28M	Console	RTS-568Y	ROPTT-130Y	WTT-601
23K28W	Console	RTS-568	ROPTT-130	-
Y23K28W	Console	RTS-568Y	ROPTT-130Y	WTT-601
23K29B	Console	RTS-568	ROPTT-130	-
Y23K29B	Console	RTS-568Y	ROPTT-130Y	WTT-601
23K29M	Console	RTS-568	ROPTT-130	-
Y23K29M	Console	RTS-568Y	ROPTT-130Y	WTT-601
23K29W	Console	RTS-568	ROPTT-130	-
Y23K29W	Console	RTS-568Y	ROPTT-130Y	WTT-601
23K30B	Console	TS-568	OPTT-130	-
Y23K30B	Console	TS-568Y	OPTT-130Y	TT-601
23K30M	Console	TS-568	OPTT-130	-
Y23K30M	Console	TS-568Y	OPTT-130Y	TT-601
23K31CW	Console	TS-568	OPTT-130	-
Y23K31CW	Console	TS-568Y	OPTT-130Y	TT-601
23K32M	Console	TS-568	OPTT-130	-
Y23K32M	Console	TS-568Y	OPTT-130Y	TT-601
23K32W	Console	TS-568	OPTT-130	-
Y23K32W	Console	TS-568Y	OPTT-130Y	TT-601
23K33B	Console	TS-568	OPTT-130	-
Y23K33B	Console	TS-568Y	OPTT-130Y	TT-601
23K33M	Console	TS-568	OPTT-130	-
Y23K33M	Console	TS-568Y	OPTT-130Y	TT-601
23K33W	Console	TS-568	OPTT-130	-
Y23K33W	Console	TS-568Y	OPTT-130Y	TT-601
23K34CW	Console	TS-568	OPTT-130	-
Y23K34CW	Console	TS-568Y	OPTT-130Y	TT-601



COMPONENT LOCATIONS (TOP)

CHASSIS DESCRIPTION

TS-568 Golden M chassis is a horizontally mounted type containing 17 tubes plus a 23TP4 picture tube, germanium plug-in type video detector, miniature dual selenium plug-in type horizontal phase detector, and transformer-type power supply. UHF models contain one additional UHF tuner tube. All models feature the Golden Tube Sentry System.

RTS-568 Golden M chassis is identical to the TS-568 except for the type of tuner and control mounting bracket used.

The TS-568Y and RTS-568Y are equipped with a factory-installed, "continuous tuning" UHF tuner.

(Material continued on pages 76 through 84)

PICTURE CENTERING

Position the magnetic centering device arms together (minimum field strength) and so they lie in a horizontal plane. Then simultaneously separate the arms of the device to center the picture vertically. Best adjustment is usually with minimum field strength. Adjust horizontal centering by rotating the magnetic centering device, as a unit, one way or the other.

PIN CUSHION CORRECTOR MAGNETS ADJUSTMENT

The pin cushion corrector magnets, found on each side of the deflection yoke, are used to straighten the sides of the raster. To adjust, reduce raster size so that its sides are just visible. Move corrector magnets forward, backward, or loosen the screws holding magnet mountings and tilt magnets until raster distortion is eliminated. When satisfactory, re-tighten screws holding magnet mountings.

MOTOROLA Chassis RTS-568, TS-568, Service Information, Continued

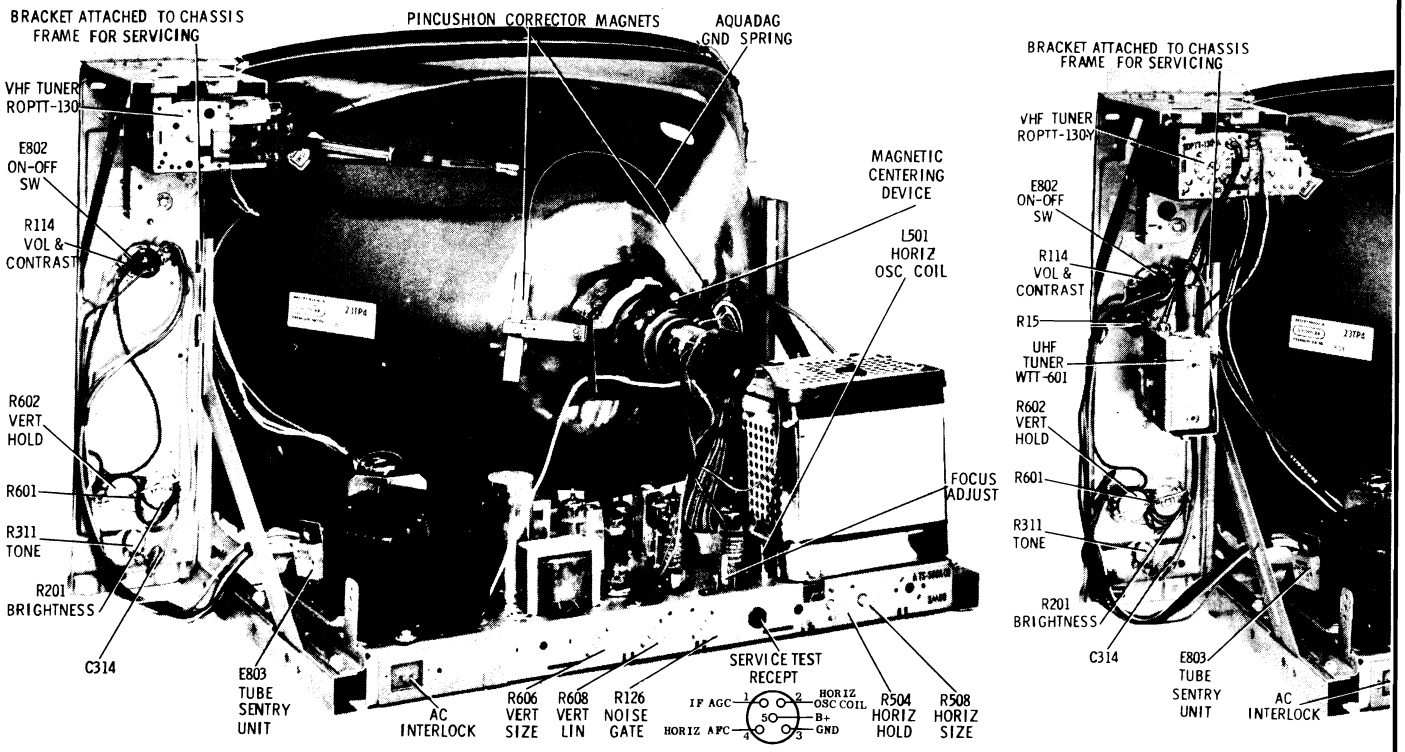
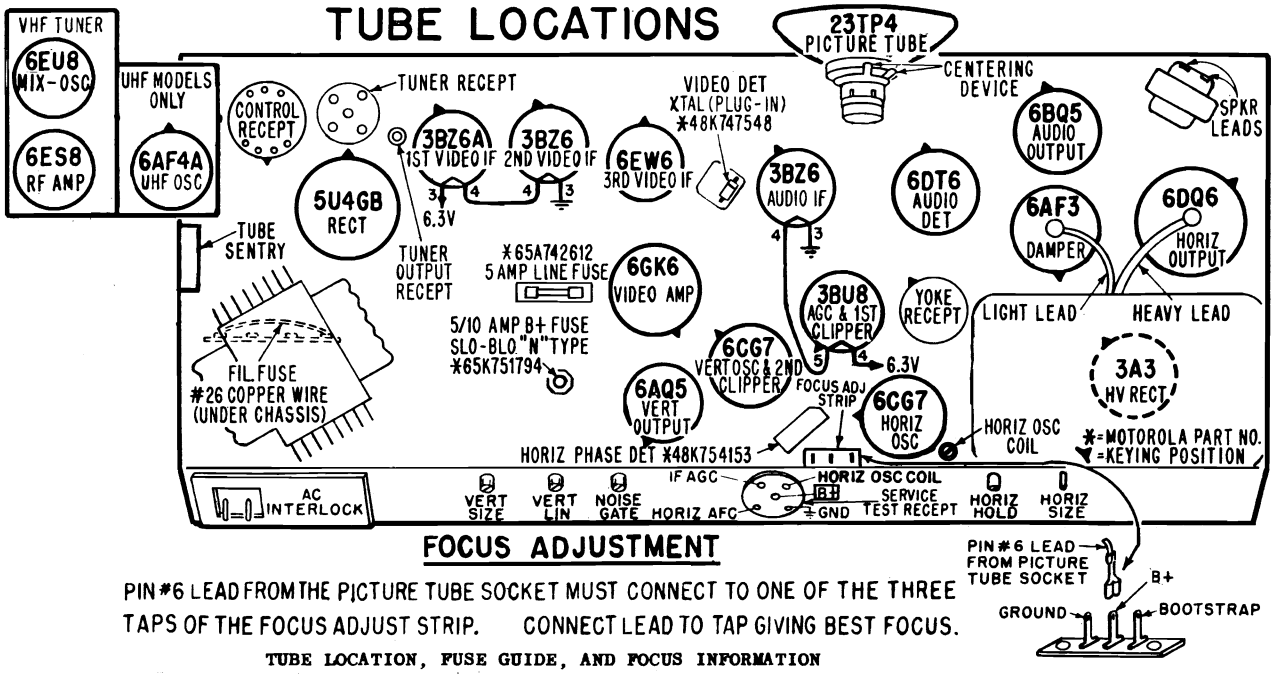


FIGURE 5. CHASSIS RTS-568 REAR CONTROLS AND SERVICING SET-UP **CHASSIS RTS-568Y**

HORIZONTAL OSCILLATOR ADJUSTMENT

The Horizontal Hold Control should have a sync range of approximately 30 degrees. If the control is too critical, or if the Horizontal sync system seems unusually susceptible to noise, adjust the Horizontal Oscillator as follows:

Adjust the receiver for a normal picture, then short out the AFC voltage by connecting a clip lead from pin #4 (Service Test Recept) to chassis and disable the oscillator coil by connecting a .1 mfd 400 volt capacitor from pin #2 (Service Test Recept) to chassis.



TUBE LOCATION, FUSE GUIDE, AND FOCUS INFORMATION

MOTOROLA Chassis RTS-568, TS-568, Service Information, Continued

Adjust the Horizontal Hold so picture is as close to horizontal sync as possible, then remove the .1 mfd capacitor and adjust the Horizontal Oscillator Coil so the picture is as close to horizontal sync as possible.

Remove the clip lead from pin #4 and chassis.

NOISE GATE CONTROL

The Noise Gate Control is located at the back and is used to adjust the receiver for the signal strength in various areas. To adjust, tune in a channel that receives a satisfactory picture. Turn the Noise Gate Control counterclockwise (when viewed from rear of receiver) until picture becomes unstable (rolls, bounces, flip-flops, etc.). Then turn control clockwise until picture returns to normal. Check all channels; if any are unstable, continue turning control in a clockwise direction until the picture is normal on all channels.

FINE TUNING ADJUSTMENTS

The Fine Tuning Control is a semi-permanent adjustment and requires one setting only for each channel. Each usable channel should be adjusted at the time of initial installation of the TV receiver and may require slight touch-up after a period of break-in operation. No further adjustments should then be required until after a prolonged period of usage necessitating compensation for mechanical wear and aging of the tuner tubes. Adjust fine tuning during first 3 minutes after turning on cold set.

To adjust the fine tuning, turn the Channel Selector to a usable channel. Push the fine tuning knob towards the cabinet and rotate slightly until the pre-set screw actuator engages with the pre-set fine tuning screws. (The fine tuning mechanism is illustrated in Figure 8.) Hold the knob in this engaged position and rotate to obtain the clearest and most stable picture with sound (tune towards "burble" of picture and back off). After desired picture and sound have been obtained, release knob. Repeat this procedure on all usable channels. DO NOT FORCE THE KNOB; WHEN IT BECOMES HARD TO TURN, START BACK IN THE OPPOSITE DIRECTION.

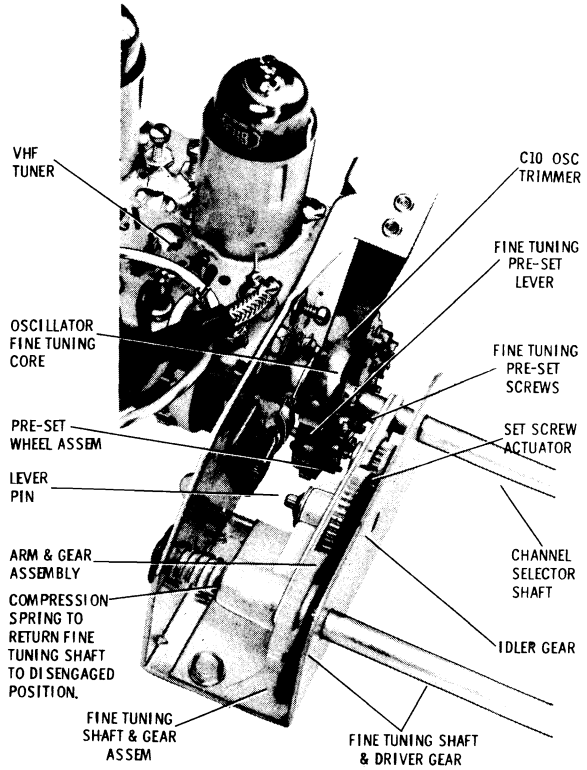


FIGURE 8. FINE TUNING SYSTEM

If for any reason the fine tuning is out of range on the high channels only, check adjustment of C-10 (oscillator trimmer adjust).

C-10 can be adjusted from the front of the receiver (use G-C #8988 or equivalent non-metallic alignment tool). To adjust, remove the Channel Selector knob. Set the fine tuning pre-set screw of the channel concerned to the mechanical mid-point and adjust C-10. On receivers using the TS-568 chassis, it is necessary to push the VHF projection light out of the way with the alignment tool in order to gain access to C-10. A notch in the projection light shield is provided for this purpose. The projection light will have to be reorientated after adjusting C-10.

TO REMOVE CHASSIS FROM CABINET

Disconnect chassis cables from other TV components and remove the four (4) bolts holding the chassis to the metal framework; two (2) on either side. To operate the chassis, the control power plug, tuner power plug, and deflection yoke should be connected.

TO REMOVE TUNER AND CONTROL MOUNTING BRACKET - CHASSIS TS-568

Remove all front control knobs except the Brightness and Vertical Hold. Disconnect the control power plug, tuner power plug, and tuner output cable from chassis. Remove two (2) mounting screws from lower bracket. Remove three (3) mounting screws from upper bracket, and lift bracket up and out of cabinet.

TO REMOVE TUNER AND CONTROL MOUNTING BRACKET - CHASSIS RTS-568

Remove all front control knobs except the Brightness and Vertical Hold. Disconnect the control power plug, tuner power plug, and tuner output cable from chassis. Retract the Brightness and Vertical Hold control knobs by rotating the associated potentiometers counterclockwise as an assembly from rear of cabinet. Remove three (3) mounting screws and pull bottom end of bracket toward rear of cabinet until the Brightness and Vertical Hold knobs are clear of openings. Slide out of flange at upper left-hand corner and remove bracket from cabinet.

TO REMOVE CHASSIS AND PICTURE TUBE ASSEMBLY FROM CABINET

The entire chassis and picture tube assembly can be rapidly removed, as a working unit, from the cabinet for servicing.

Remove tuner and control mounting bracket (see "To Remove Tuner and Control Mounting Bracket" for chassis concerned). Disconnect speaker lead and remove four (4) retaining bolts located below chassis shelf. Carefully slide assembly from cabinet.

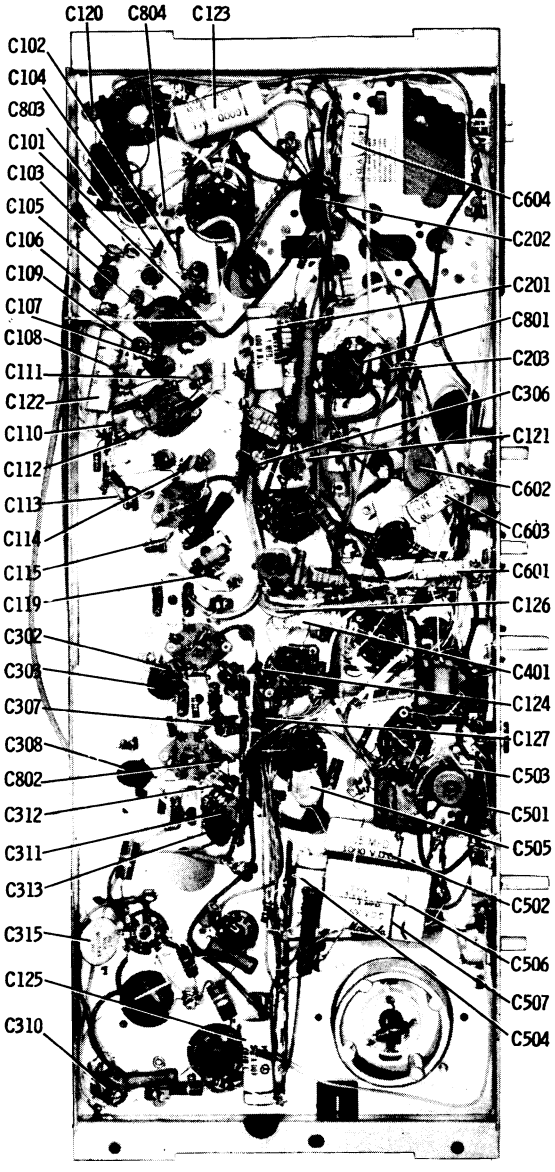
SERVICING THE ENTIRE CHASSIS OUT OF CABINET

The control and tuner mounting bracket can be attached to the chassis frame (picture tube assembly) when servicing the entire unit by means of two (2) slots at the side of the bracket and two (2) flanges located approximately halfway up the chassis frame. On chassis TS-568 the small bracket which mounts the Brightness and Vertical Hold controls can be attached to the tuner and control mounting bracket instead of hanging loosely.

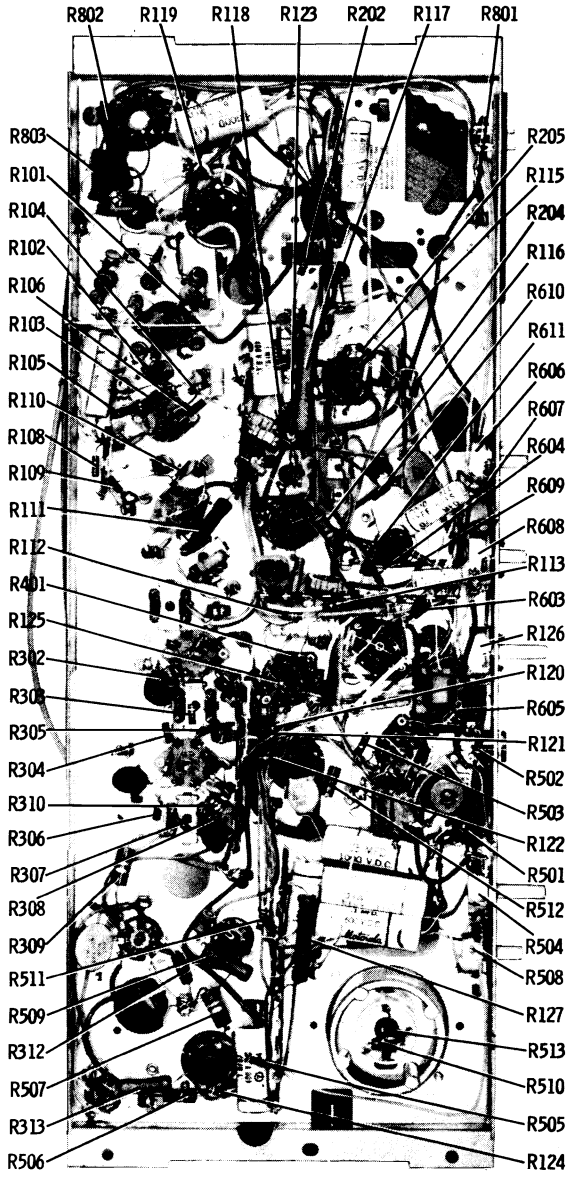
PICTURE TUBE REPLACEMENT

1. Refer to "To Remove Chassis and Picture Tube Assembly" and remove complete assembly. Then disconnect and remove the picture tube socket, second anode lead, and deflection yoke. (To remove deflection yoke, unplug yoke from chassis socket, compress the ends of the yoke wedge clamp, and move clamp and rubber retainer away from deflection yoke. Slide yoke from picture tube neck.) Remove four (4) picture tube retaining clips (one in each corner) by spreading one end of each clip. Loosen the picture tube mounting bolts at the upper right and left-hand corners of the mounting

MOTOROLA Chassis RTS-568, TS-568, Service Information, Continued



CHASSIS TS-568A-00 AND RTS-568A-00
CAPACITOR LOCATIONS (BOT)



CHASSIS TS-568A-00 AND RTS-568A-00
RESISTOR LOCATIONS (BOT)

strap while supporting the picture tube with one hand. Carefully remove the picture tube.

2. Working with the new replacement picture tube (use type 23TP4 only), place cloth tape (Motorola Part No. 11M129959) of approximately the same length at the same points as that on the original picture tube. Stick two pieces of gummed paper (preferably gummed on both sides) on the new picture tube neck, at the flare, to keep the yoke from slipping about.

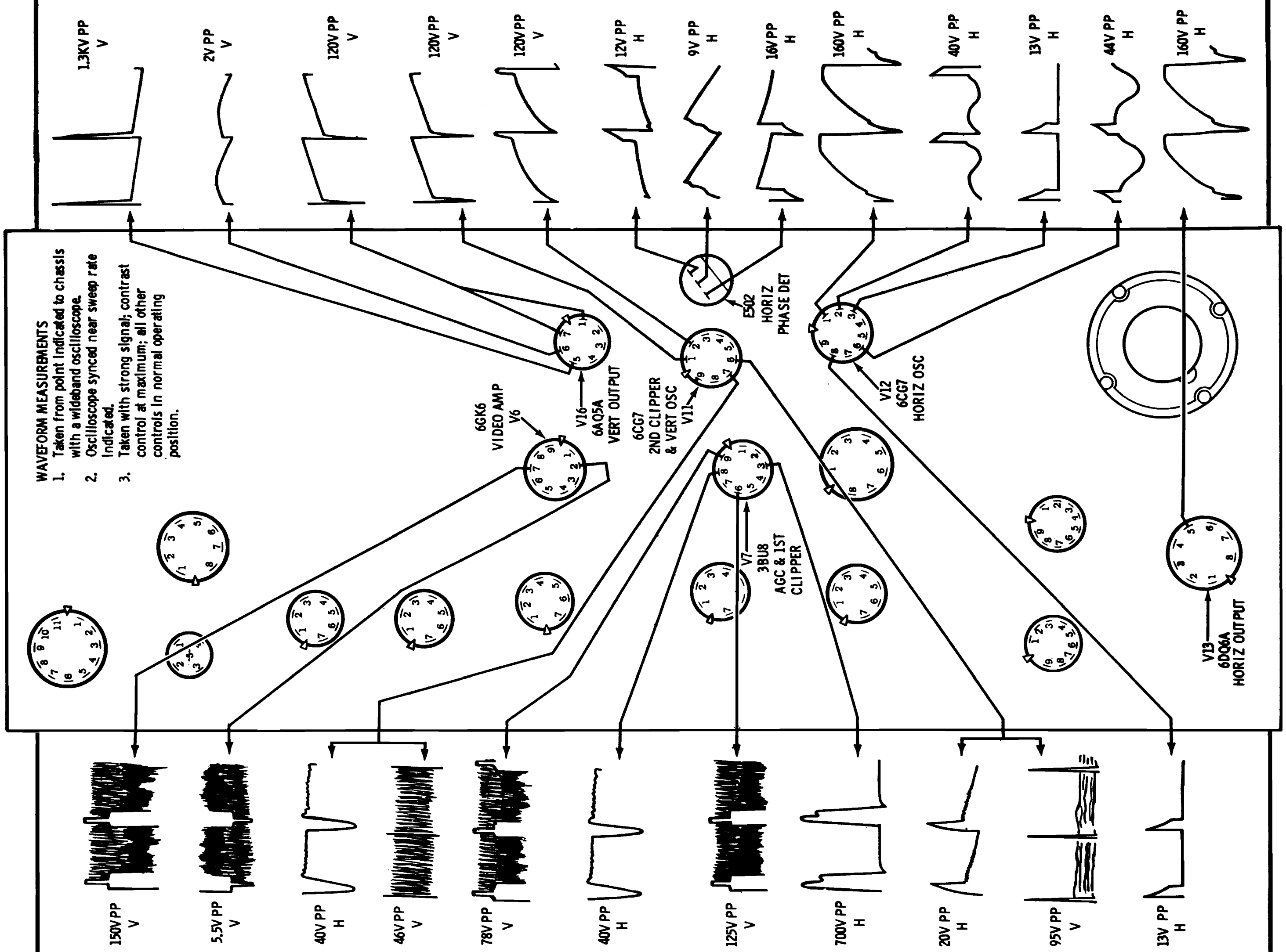
3. Place picture tube into correct position. Tighten mounting bolts and replace retaining clips. Replace the deflection yoke, picture tube socket, and the second anode connector. Connect the deflection yoke to the chassis socket. Attach the control and tuner mounting bracket to the chassis assembly and plug in all power cables from bracket.

4. Apply power with service line cord, and check receiver operation. Adjust the yoke position for proper operation, adjust the centering device, and adjust focus. Replace entire assembly into cabinet.

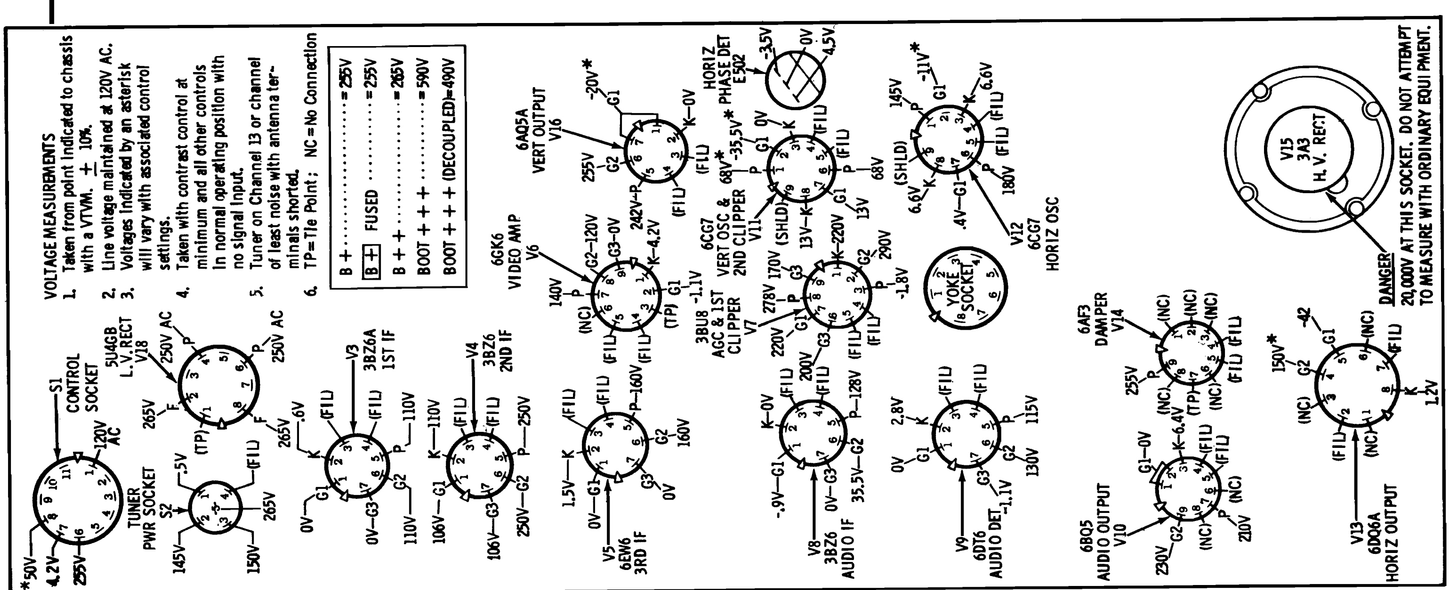
MODULE REPAIR

It is not necessary to replace an entire module merely because the module contains a defective component. It is an easy matter to remove the defective module component from the circuitry by cutting the appropriate leads and then substituting conventional capacitors or resistors back into the circuitry. When this method is used, it is always desirable to replace the circuitry in such manner that the defective module component is removed entirely from the system. In other words, do not bridge the defective component with the replacement unit. This is to avoid any detrimental effect that the defective component might inject into the system. An example of this would be an open coupling or bypass capacitor, which you would normally think could be bridged by an external capacitor with no ill effects. However, you should keep in mind that it is possible for the modular capacitor to intermittently cure itself causing the total capacity to intermittently double. On the other hand, it is just as possible for the defective capacitor to short-out in the near future.

MOTOROLA Chassis RTS-568, TS-568, Service Information, Continued



CHASSIS TS-568A-00 AND RTS-568A-00
WAVEFORM MEASUREMENTS



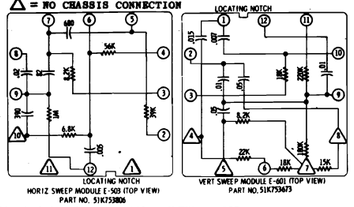
CHASSIS TS-568A-00 AND RTS-568A-00
VOLTAGE MEASUREMENTS

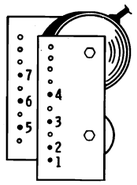
VOLUME TV-18, MOST-OFTEN-NEEDED 1961 TELEVISION SERVICING INFORMATION

MOTOROLA **TELEVISION CHASSIS TS & RTS-568A-00**

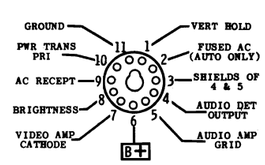
MODULE COMPONENT INFORMATION

△ = NO CHASSIS CONNECTION

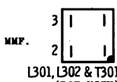




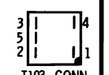
T501 CONN



S1
11 PIN RECEPT
(BOT VIEW)



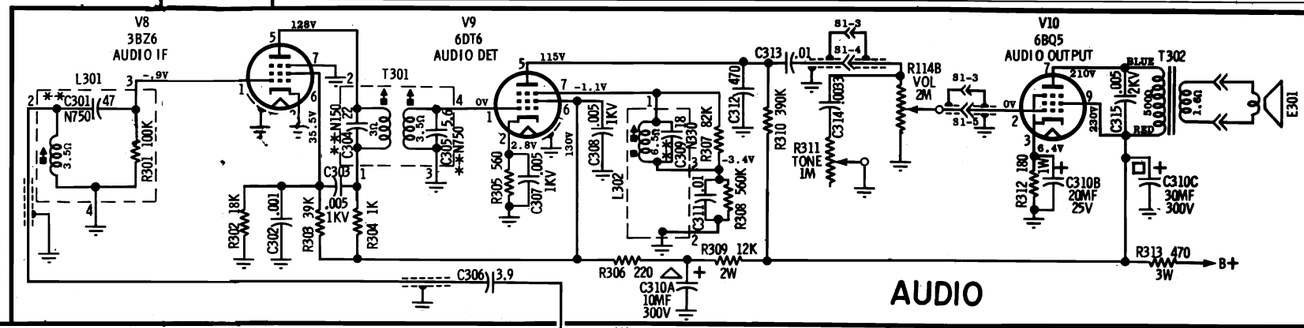
L301, L302 & T301 CONN
(BOT VIEW)

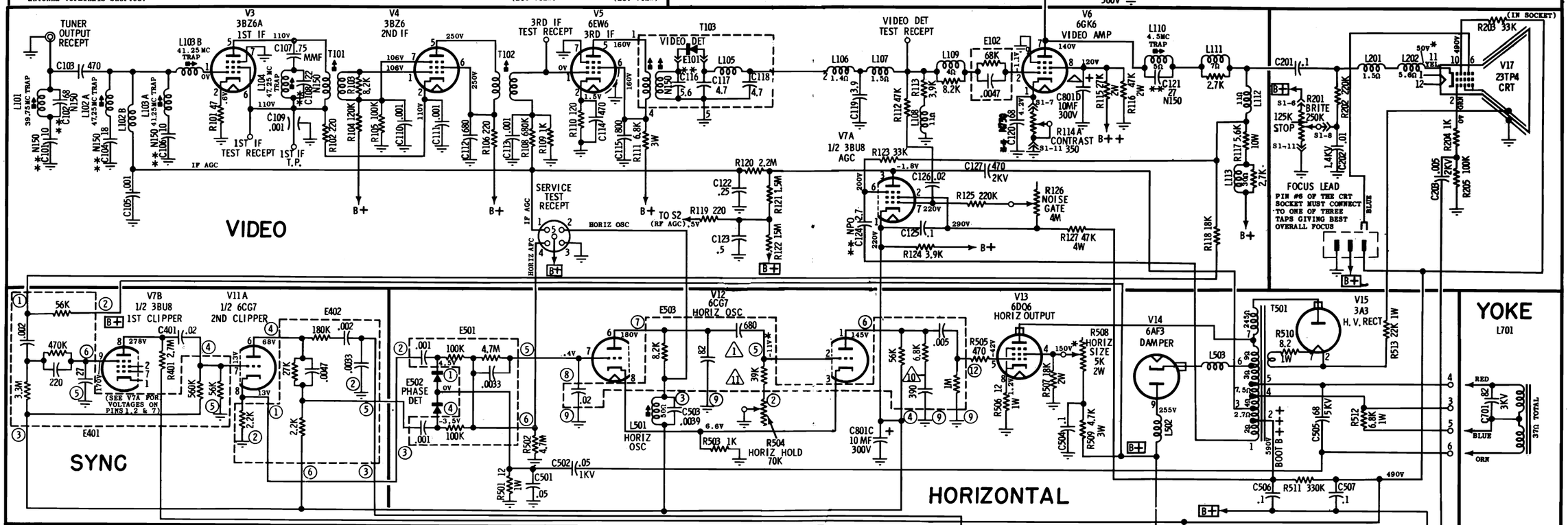


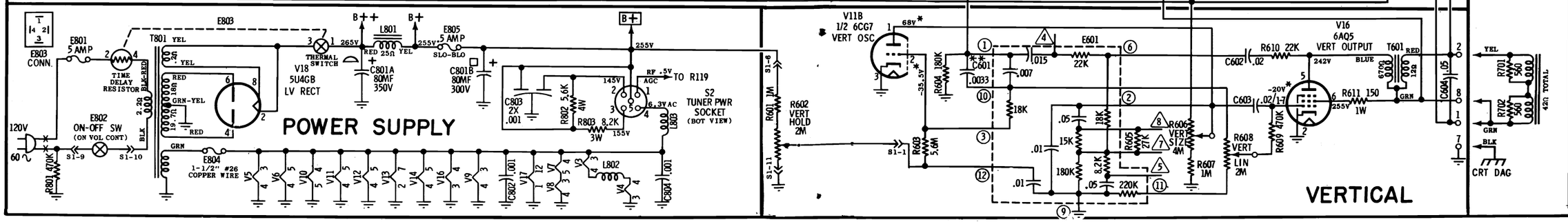
T103 CONN
(BOT VIEW)

VOLTAGE MEASUREMENTS
1. Taken from point indicated to chassis with a VTVM. ± 10%.
2. Line voltage maintained at 120V AC.
3. Voltages indicated by an asterisk will vary with associated control settings.
4. Taken with contrast control at minimum and all other controls in normal operating position with no signal input.
5. Tuner on Channel 13 or channel of least noise with antenna terminals shorted.

CAPACITORS:
Unless otherwise specified, values less than one in MF; all others in MMF.
**Indicates special capacitor. See Replacement Parts List for proper replacement part number.







MOTOROLA Chassis RTS-568, TS-568, Alignment Information, Continued

PRE-ALIGNMENT INSTRUCTIONS

Before alignment of the video IF section is attempted, it is advisable to thoroughly check the system. If alignment is attempted on an IF section in which a faulty component exists, successful alignment will probably be impossible and the entire procedure will have to be repeated when the real cause of the trouble is corrected. Preliminary tests of the system should include voltage and resistance measurements, routine checks for bad soldering connections, and visual inspection of the circuits for overheated components as well as for obvious wiring defects.

VIDEO IF & MIXER ALIGNMENT

Pre-Alignment Steps

1. Maintain line voltage at 120 with variac.
2. Remove the deflection yoke plug to eliminate RF interference radiation.
3. Disable oscillator by shorting point (L) located near mixer-oscillator tube V-2, to chassis. See Figure 16.
4. Apply the negative lead of a 4.5 volt bias supply to pin #1 (IF AGC) of the SERVICE TEST RECEPTACLE and the positive lead to pin #3 (chassis ground).
5. All coil slug tuning positions, in relation to chassis, are given in the procedure chart and in the separate detail of Figure 17.
6. Set channel selector on channel #13 and connect a 1500 ohm 50W voltage normalizing resistor from B+ to chassis. Use pins #5 (B+) and #3 (ground) of the SERVICE TEST RECEPTACLE.
7. Set the contrast control at minimum (extreme counterclockwise position).
8. Short across tuner input terminals.
9. Maintain 2 to 5 volts peak-to-peak at the diode load (VIDEO DET TEST RECEPT) except when specific values are given in the procedure chart.
10. Refer to Video IF & Sound Alignment Detail for component and test point locations (Figure 16).

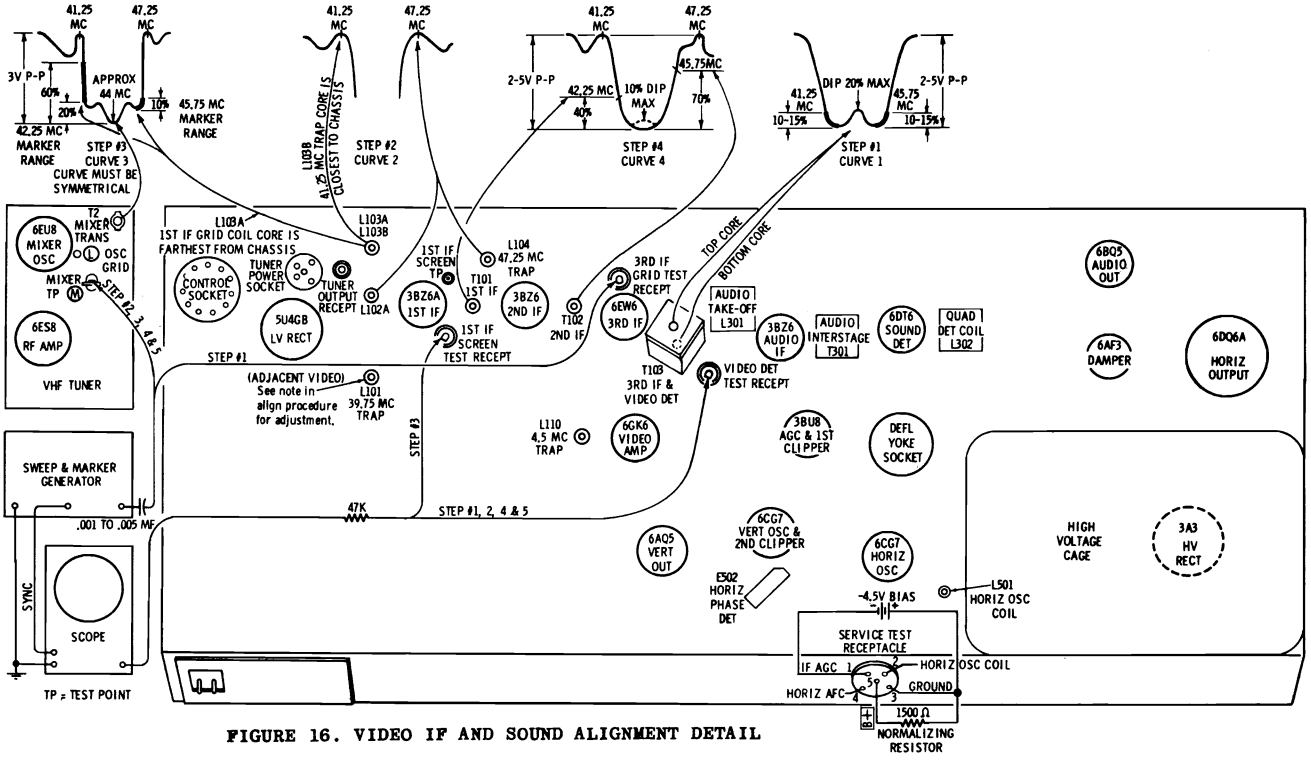


FIGURE 16. VIDEO IF AND SOUND ALIGNMENT DETAIL

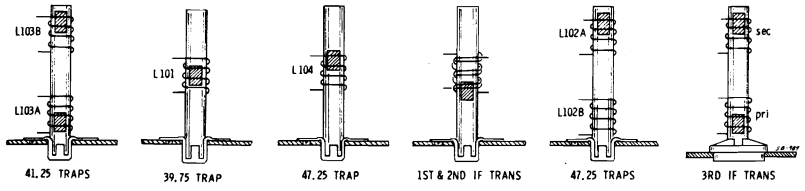


FIGURE 17. COIL CORE POSITIONS

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GEN AND MARKER	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
1.	To 3rd IF grid test recept thru a .001 mf capacitor. Set sweep approx. to 44 Mc markers as required	Scope thru a 47K ohm resistor to Video Det test recept	Both slugs of 3rd IF coil (T-103)	Equal peaks and 45.75 Mc marker as shown on curve #1. Note: Slug at crystal end can be reached by inserting tool through unobstructed slug. Tune both slugs near the ends of their respective coils. See detail for slug position. Note: Temporary removal of bias or increased generator input may be required to see traps.

VIDEO IF & MIXER ALIGNMENT PROCEDURE (Contd.)

STEP	SWEEP GEN AND MARKER	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
2.	To mixer TP thru .001 mf capacitor. (Terminal adjacent to mixer. See Fig 16.) Set sweep to approx. 44 Mc.	Scope connection same as step #1		
	a. Set marker to 47.25 Mc		a. 47.25 Mc trap (L-102A)	a. Minimum response (tune slug at end of coil away from chassis)
	b. Set marker to 41.25 Mc		b. 41.25 Mc trap (L-103A)	b. Minimum response (tune slug at end of coil toward chassis) See curve #2 for above responses.
3.	Generator connection same as step #2, except set output for 3V P-P on scope	Scope to 1st IF plate. "Pin #5 of tube" NOTE: Connect a jumper lead from pin #5 (plate) to pin #6 (screen) of the 1st IF tube when adjusting T-2 and L-103B.	a. Mixer trans, located on tuner (T-2) b. 1st IF grid coil (L-103B) slug located away from chassis	Tune both T-2 & L-103B for curve shown in curve #3, step #3 of Fig. 16. T-2 affects the center peak and L-103B affects the 2 outside peaks. As part of alignment, adjust L-101 for max. Lower frequency about 38.5 Mc (this trap is tuned to 39.75 Mc when evidence of strong adjacent video interference is present) to make sure it does not interfere in the response curve.* Tune both coil slugs at end of coil away from chassis.
4.	Generator connection same as step #2. Reset for 2-5V P-P on scope.	Scope thru a 47K ohm resistor to Video Det test recept	1st IF trans (T-101) 2nd IF trans (T-102)	Proper 42.25 Mc marker placement (tune slug at end of coil toward chassis) Proper 45.75 Mc marker placement (tune slug at end of coil toward chassis). See curve #4 of Fig. 16.
5.	Same as step #4.	Same as step #4		If a tilt occurs, readjust the mixer coil (T-2 on tuner) and if necessary touch up the 1st and 2nd IF trans (T-101 & T-102) for response shown in curve #4.

* The 39.75 Mc trap (Adjacent Video) may be adjusted without removing the back cover from the receiver. This trap, for the table model, is accessible thru a hole provided underneath the cabinet; while for the console model, the hole is located in the chassis ventilation screen underneath the chassis shelf.

SOUND ALIGNMENT (Station Signal Method)

The sound system used in the TS-568 receiver consists of an audio IF amplifier stage, a quadrature grid detector, and an output stage. Since this type of sound system is extremely sensitive, relatively small input signal voltage will cause grid current to flow in both the IF amplifier and the detector stages. Grid current through the tuned coils will load them down making the adjustment extremely broad and alignment impossible. For this reason, it is necessary to use a very weak signal when aligning the driver and the detector input coils. Actually, the signal should be well down into the noise level for proper tuning action.

Preliminary Steps

1. Tune in a strong TV station.
2. Adjust all controls for normal picture and sound.
3. Refer to Video IF & Mixer Alignment Detail for coil and test point locations (Figure 16).

SOUND ALIGNMENT PROCEDURE

STEP	STATION	INDICATOR	ADJUST	REMARKS
1.	Strong signal	VTVM to jct of R-307 (82K) and R-308 (560K) located on L-302 (under chassis).	L-302 (quad coil)	Maximum deflection (coarse adj). Of two possible maximum tuning points, use that giving the largest voltage reading.**
2.	"	Listening test	"	Maximum sound with minimum distortion (fine adj).
3.	Weak signal*	"	T-301 (interstage)	Maximum sound with minimum distortion (maintain hiss level). **
4.	"	"	L-301 (take-off)	Maximum sound with minimum distortion.

If sound is not clear at this point, repeat the above procedure as necessary.

* The signal must be weakened considerably either by disconnecting one side of the antenna lead, or connecting low value resistors across the antenna terminals until a pronounced hiss appears in the sound. The hiss level must be maintained for proper alignment.

** The purpose of the top pre-set core is to enable the adjustable core to make the tuning range required while reducing the physical length. If the pre-set core should be misadjusted by previous service work, merely re-set near top end of coil and tune for maximum.

4.5 MC TRAP ADJUSTMENT

1. Carefully tune receiver to local station and advance contrast control.

2. Adjust local oscillator (with fine tuning control) to bring 4.5 Mc interference strongly into the picture.

3. ADJUST sound trap (L-110) to find the two point of adjustment at which the sound beat is just noticeable on the picture tube screen. Rotate the core toward center of the two points. Use minimum amount of inductance (core out of coil) that will result in no apparent beat interference.

MOTOROLA Chassis RTS-568, TS-568, Service Information, Continued

SERVICE AID CHART

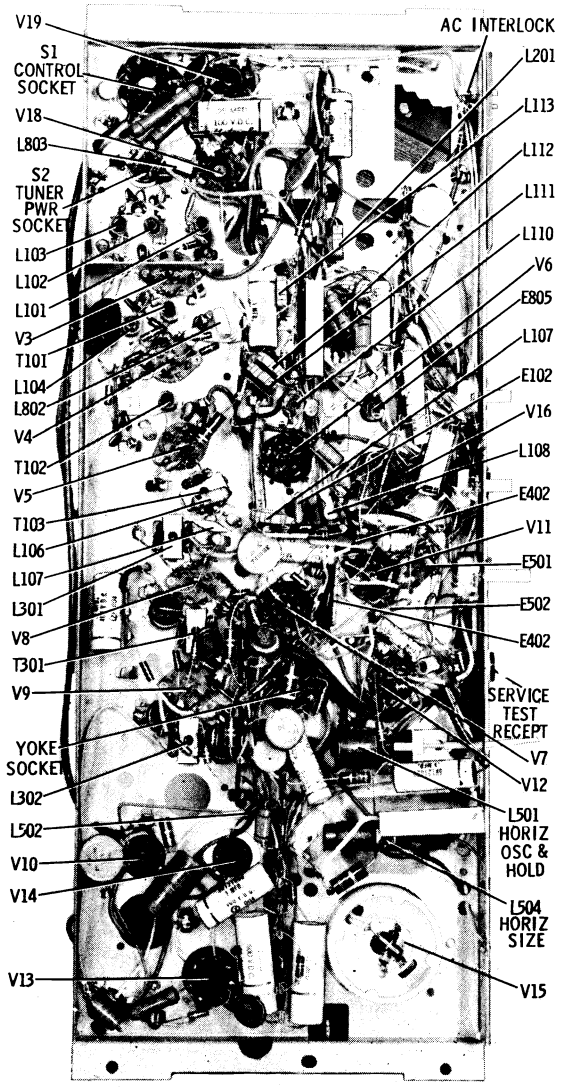
SYMPTOM	CONTROLS	CHECK OR ADJUST	TUBES	MISCELLANEOUS CHECKS
WEAK PICTURE (Insufficient contrast)	Contrast.Fine tuning. Channel selector on correct channel?	Antenna connections (see chart). Booster and/or ant. dist. systems (if used)	V-1,2,3,4,5,6,7. RF, osc-mix 1st,2nd, & 3rd IF, sync & video amp.	AGC voltage. Contrast control. RF, IF, mixer & AGC stages. Video amp.
LOW BRIGHTNESS OR NO RASTER	Brightness		V-12,13,14,15,17 Horiz. osc, horiz amp, damper, high volt rect, picture tube	High voltage at picture tube anode. Drive voltage, pin 5 V-13. Bootstrap voltages. Solder connections at base of CRT. Voltages & waveforms in V-12 & V-13 circuits. Horizontal output transformer & deflection yoke. Power fuse E-805.
POOR VERTICAL LINEARITY AND/ OR SIZE. HORIZ. WHITE LINE (no vert. sweep)	Vertical size.Vert lin. Reduce brightness & return to normal when trouble is cleared.		V-11 & V-16 Vert osc & output	Bootstrap voltage. Voltages in V-11 & V-16. Vertical output transformer & deflection yoke.
VERTICAL INSTABILITY, PICTURE ROLLS	Vertical hold. Vert lin, size & hold. Noise gate		V-7 & V-11 1st & 2nd clipper, vert osc.	Voltages in V-7 & V-11 circuit. Interference. Sync clipping at video amp. Refer to tests under WEAK PICTURE. Abnormal power supply ripple. Insufficient bootstrap filtering. Video detector.
LOSS OF VERTICAL AND HORIZ HOLD	Horiz hold. Vert hold. Noise gate.	Weak signal. Antenna and lead-in (see chart on antennas)	V-7 & V-11 AGC, 1st & 2nd clipper.	B+voltages. AGC voltage. Refer to test under VERTICAL INSTABILITY & NO HORIZ HOLD.
NO HORIZ HOLD OR CRITICAL HORIZ HOLD	Horiz hold. Noise gate.	Horiz osc coil	V-7,11,12, E-502 AGC, 1st & 2nd clipper, horiz osc,phase det.	Waveforms at E-502,V-7,V-11&V-12 circuits. Refer to tests under WEAK PICTURE.
INSUFFICIENT HORIZ SIZE	Horiz size	Picture centering	V-12,13,14 Horiz osc, horiz amp, damper.	Bootstrap voltage. Drive voltage, pin 5, V-13. Deflection yoke and horiz output transformer.
PICTURE NORMAL, NO SOUND OR WEAK SOUND	Fine tuning. Volume.		V-8,9,10 Audio IF, audio det, audio output.	Speaker & speaker plug. Output transformer. Voltages of V-9 & V-10. Sound alignment.
BUZZ IN SOUND	Fine tuning. Contrast.	Excessive signal	V-8,9,10 Audio IF, audio det, audio output.	Sync clipping in video section. Power supply filter & sweep circuit bypass capacitors. Heater-cathode shorts in sound tubes. Sound alignment.
VHF-NO UHF	UHF tuning.	Antenna connections	UHF osc 6AF4A	Tuner contacts. B+ at UHF tuner.
MICROPHONICS VISUAL AND AUDIBLE		Binding knobs & control shafts		Tap tubes - look & listen for microphonics.
INSUFFICIENT PICTURE SIZE, HORIZ & VERT.		Check AC line voltage	V-18 LV rectifier	Power supply voltages.
EXCESSIVE CONTRAST, NEGATIVE PICTURE	Contrast Noise Gate.		V-1,2,3,4,5,7,17 RF amp, osc-mix, 1st, 2nd, 3rd IF, video amp, picture tube, AGC tube.	AGC voltage and AGC circuit. Video det. Video det-load resistor. Leakage between pri & sec in video IF coils. Proper pulse from horiz. output to AGC tube. Pulse coupling capacitor to AGC plate. RF AGC delay resistors.
WIDE HORIZ BAR OR GRADUATION IN SHADING, VERTCALLY (Set may have poor vert sync)			V-1,2,3,4,5,6 RF amp, osc-mix, 1st,2nd & 3rd IF, video amp, picture tube.	Heater-cathode short in any video circuit. Excessive power supply ripple (may have hum in audio). Picture tube.

MOTOROLA

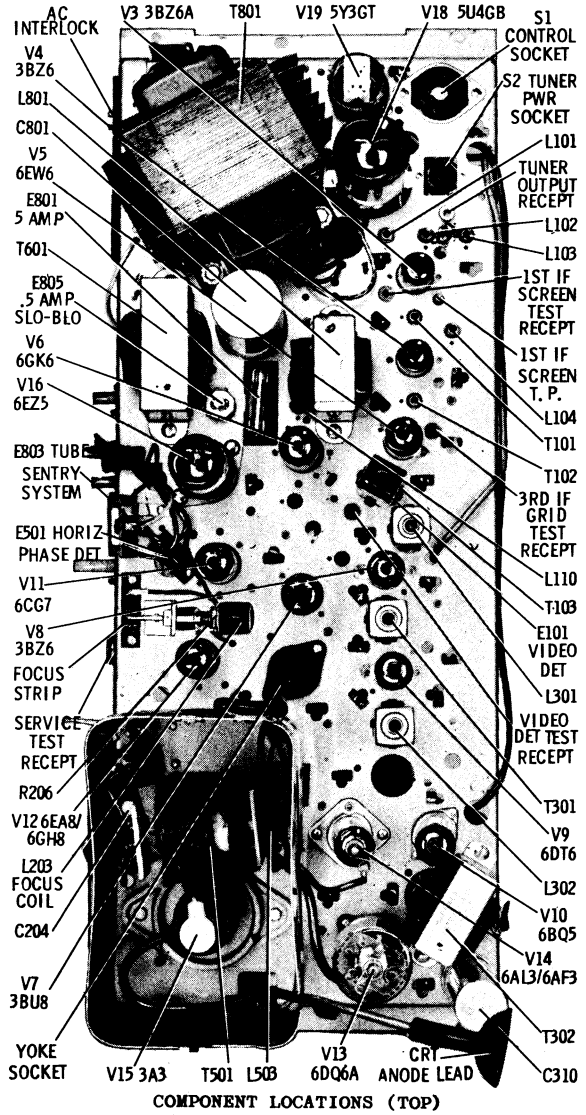
MODEL BREAKDOWN CHART

Model	Type	Chassis	VHF Tuner	UHF Tuner
23K40CW	Console	VTS-569	LOPTT-130	-
Y23K40CW	Console	VTS-569Y	LOPTT-130Y	VTT-601
23K41W	Console	VTS-569	LOPTT-130	-
Y23K41W	Console	VTS-569Y	LOPTT-130Y	VTT-601
23K42W	Console	VTS-569	LOPTT-130	-
Y23K42W	Console	VTS-569Y	LOPTT-130Y	VTT-601
23K43W	Console	VTS-569	LOPTT-130	-
Y23K43W	Console	VTS-569Y	LOPTT-130Y	VTT-601
23K44W	Console	VTS-569	LOPTT-130	-
Y23K44W	Console	VTS-569Y	LOPTT-130Y	VTT-601
23K45W	Console	VTS-569	LOPTT-130	-
Y23K45W	Console	VTS-569Y	LOPTT-130Y	VTT-601
23K46MB	Console	VTS-569	LOPTT-130	-
Y23K46MB	Console	VTS-569Y	LOPTT-130Y	VTT-601

Chassis VTS-569, VTS-569Y, are very similar to the group of Chassis TS-568, etc., described in the previous section on pages 75 through 84. Refer to that section for alignment facts, waveforms, service hints, and adjustments. Schematic diagram for VTS-569 is on pages 86-87, other service material is below, and tuner information is on page 88.



MISCELLANEOUS COMPONENT LOCATIONS (BOT)



COMPONENT LOCATIONS (TOP)

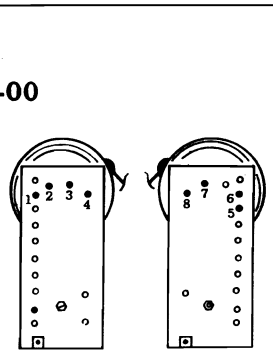
MOTOROLA

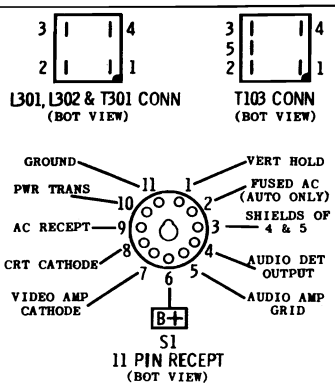
TELEVISION CHASSIS VTS-569A-00

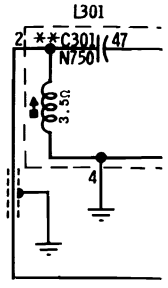
VOLTAGE MEASUREMENTS
1. Taken from point indicated to chassis with a VTVM. ± 10%.
2. Line voltage maintained at 120V AC.
3. Voltages indicated by an asterisk will vary with associated control settings.
4. Taken with contrast control at minimum and all other controls in normal operating position with no signal input.
5. Tuner on Channel 13 or channel of least noise with antenna terminals shorted.

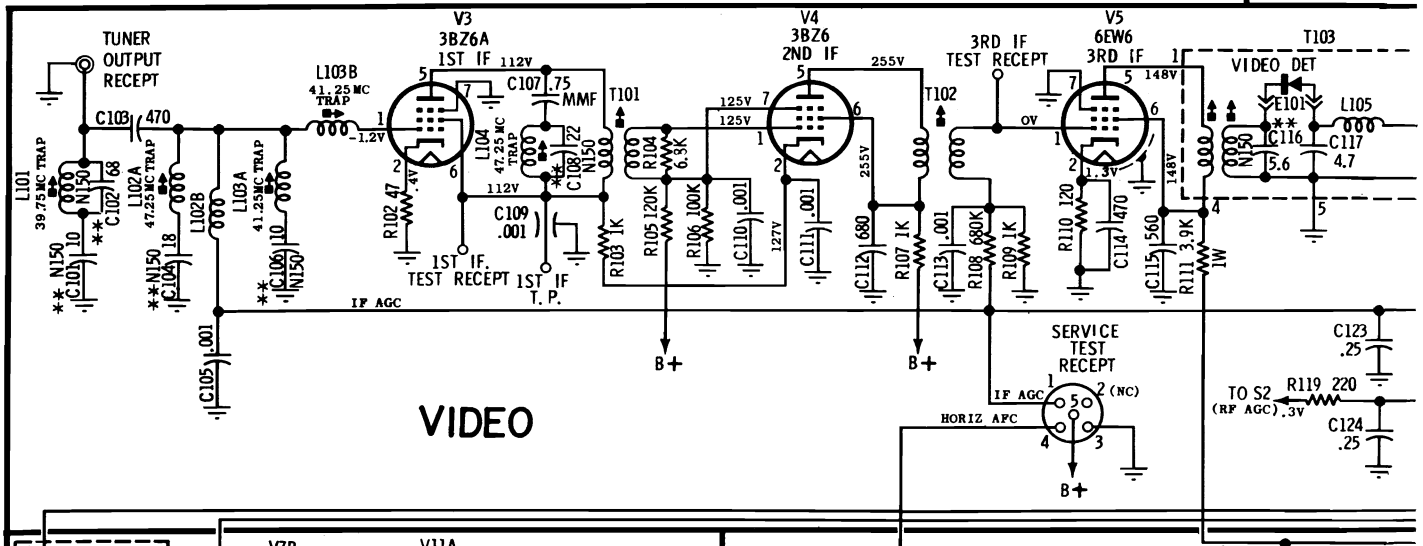
CAPACITORS: Unless otherwise specified, values less than one in MF; all others in MMF.

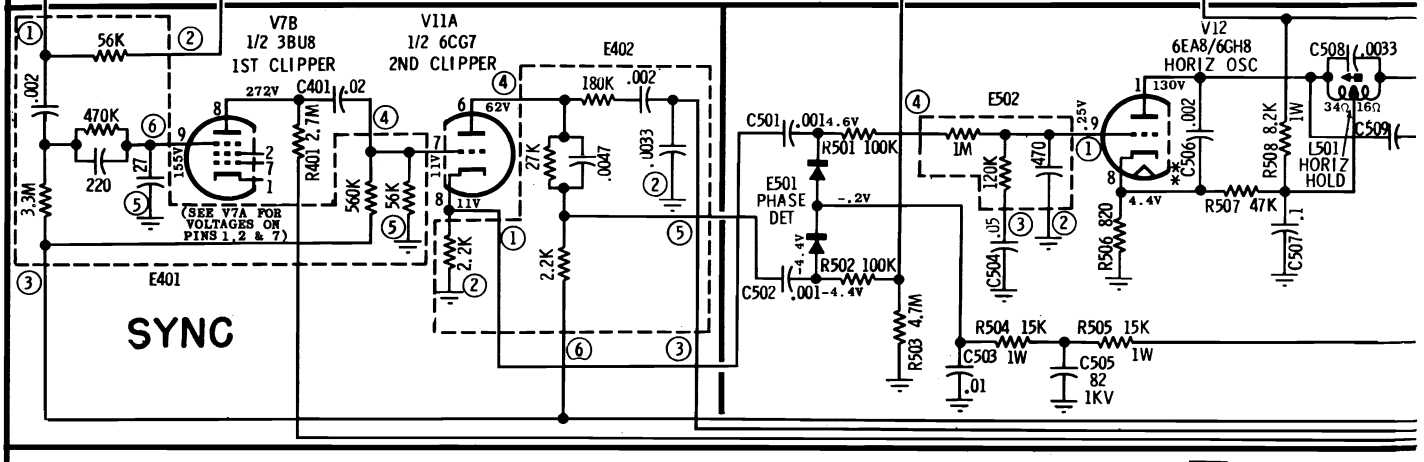
** Indicates special capacitor. See Replacement Parts List for proper replacement part number.

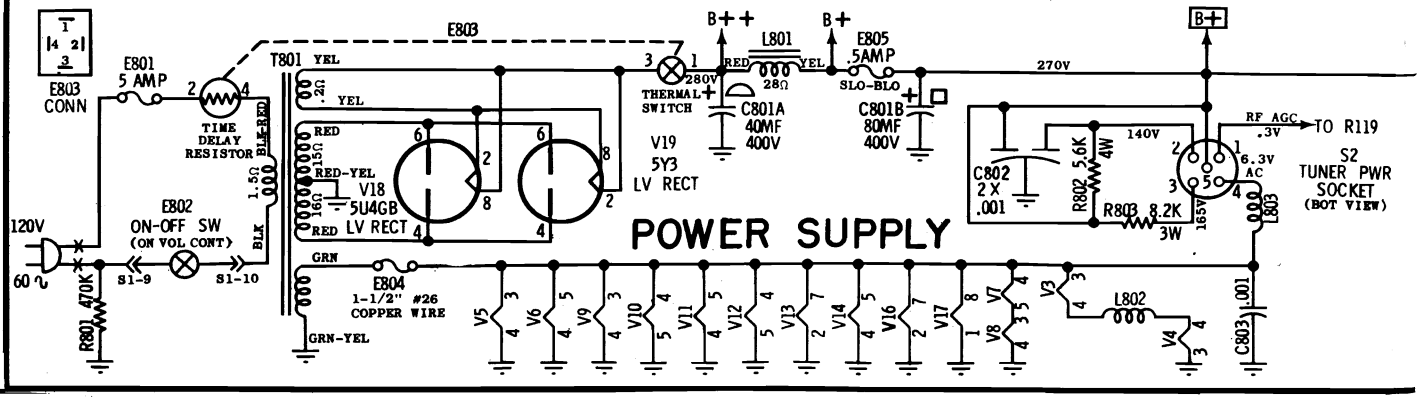


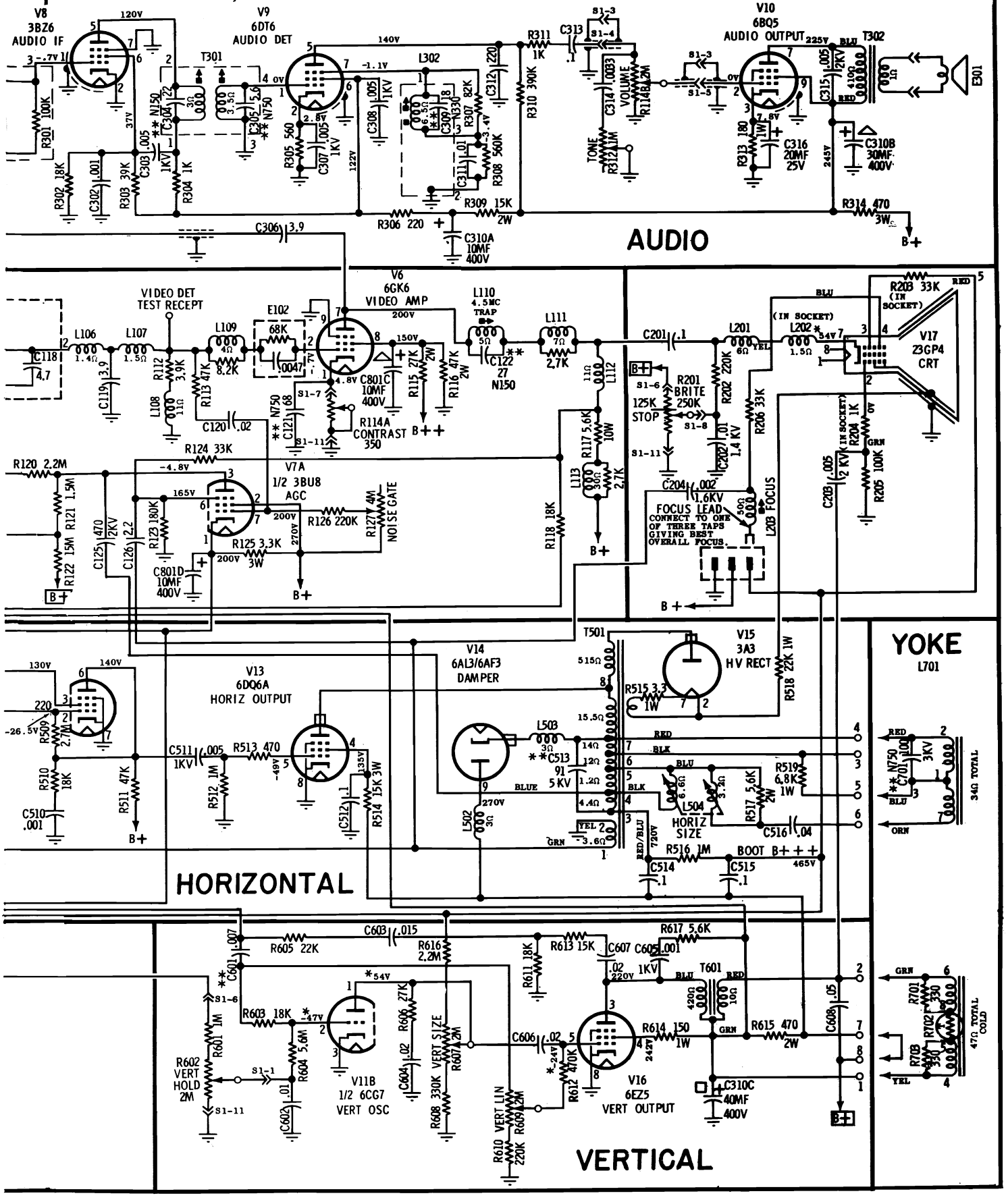











AUDIO
HORIZONTAL
VERTICAL
YOKE
L701
V8 3BZ6 AUDIO IF
V9 6DT6 AUDIO DET
V10 6BQ5 AUDIO OUTPUT
V6 6GK6 VIDEO AMP
V7A 1/2 3BU8 AGC
V11B 1/2 6CG7 VERT OSC
V13 6DQ6A HORIZ OUTPUT
V14 6AL3/6AF3 DAMPER
V15 3A3 HV RECT
V16 6EZ5 VERT OUTPUT
V17 23GP4 CRT
T301
T302
T501
T601
L302
L503
L504
L701
E101
E102
VIDEO DET TEST RECEPT
R114A CONTRAST 350
VOLUME R314 1M
TONE R312 1M
BRITE 250K
125K STOP
FOCUS LEAD
CONNECT TO ONE OF THREE TAPS GIVING BEST OVERALL FOCUS.
HORIZ SIZE
VERT HOLD 2M
VERT SIZE
VERT LIN
BOOT B+++
B+
B++
34Ω TOTAL
47Ω TOTAL COLD

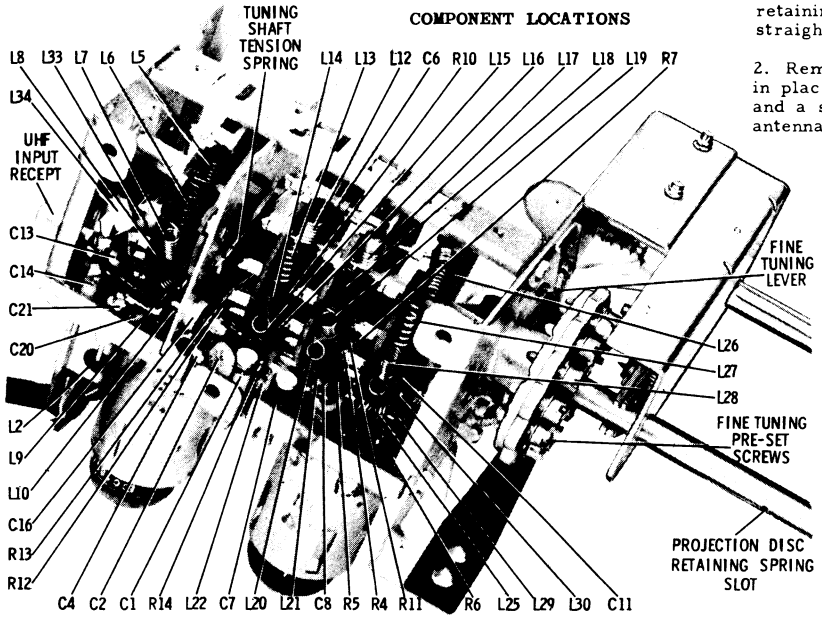
MOTOROLA Chassis VTS-569, Service Information, Continued

SERVICING WAFERS

The VHF tuner has been provided with removable wafers for the tuning sections. The major component parts comprising the actual tuning circuits are mounted to the appropriate wafer and changing the wafer replaces most of the components that will affect the tuning.

The wafers make electrical contact to the remainder of the tuner components by means of solder connections. The wafers are held in place by means of slots in the tuner chassis, a wafer retaining bar, and the tuning shaft. The tuning shaft is secured by means of a retaining "C" washer located at the rear of the tuner and a shaft tension spring located on the shield between the antenna and RF primary wafers.

Should the tuner be disassembled for some reason, it is important to replace the tuning shaft in the proper rotational position; it can be replaced in two positions. One position is correct to give correct readings of the knob indicator; the other will throw all channel numbers off by 180 degrees.



To remove the tuner wafers, it is necessary to pull the channel selector shaft out the front of the tuner to the extent that the shaft clears the wafer to be replaced or removed for service. However, the fine tuning shaft and its gear assembly make it impossible to remove the channel selector shaft without first removing this assembly. To remove the fine tuning shaft and gear assembly, remove the fine tuning shaft retaining "C" washer located at the rear of the tuner front mounting plate. Then remove two (2) hex head screws that secure the fine tuning shaft and gear assembly bracket to the tuner front mounting plate.

REMOVING DEFECTIVE WAFERS

The following procedure is based on the assumption that the tuner has been removed from the tuner mounting bracket, and that the tuner shield, and fine tuning shaft and gear assembly have been removed from the tuner:

1. Set the tuner on channel one (1): this gives an easy identification point for the rotor positions of each wafer. Note: A small identifying "notch" in the shaft opening of each wafer will aid in locating positions. Also the projection disc retaining spring notch on the channel selector shaft is straight up when on channel one (1).

2. Remove the bottom wafer retaining bar. The bar is held in place by one (1) hex head screw at the front of the tuner and a solder connection at the shield which is between the antenna and RF primary wafers.

NOTE. The retaining bar may be crimped to each wafer. The bar must be lifted from each wafer by using a pair of long-nose pliers so as not to damage the wafers.

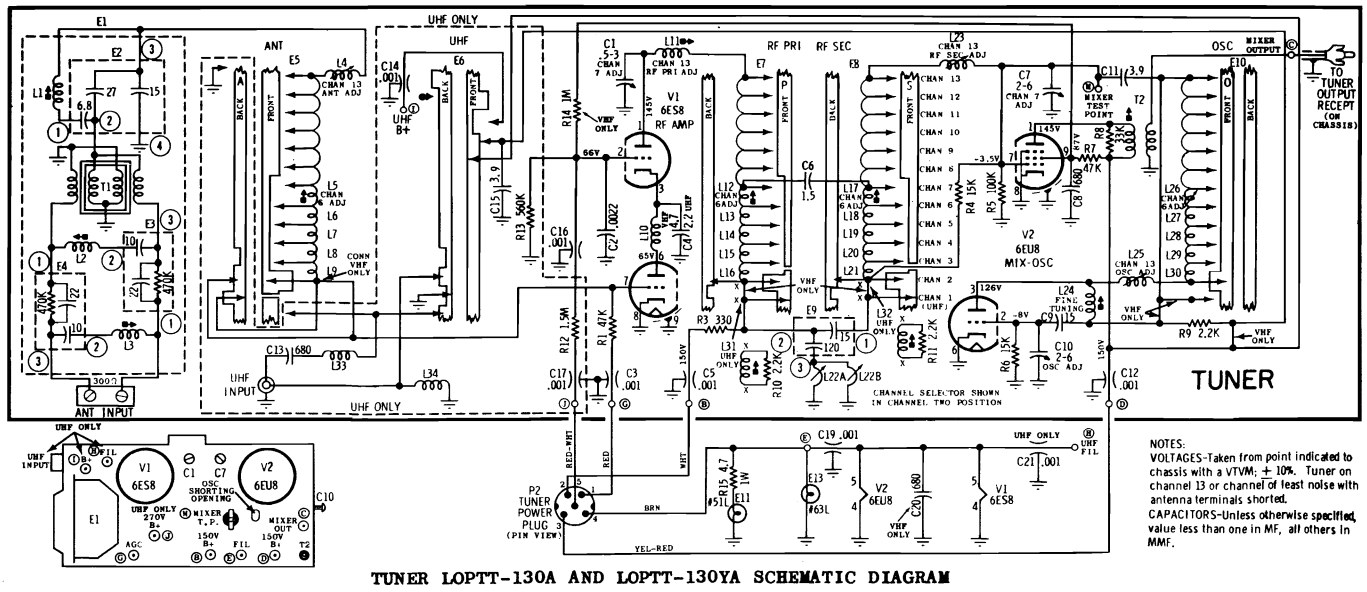
3. Remove the channel selector shaft tension spring located on the same shield.

4. Remove the shaft retaining "C" washer from rear of tuner. Be sure to replace the flat and spring washers on shaft when reassembling tuner.

5. Slowly pull the tuning shaft out the front of the tuner; remove shaft only to the extent to free the particular wafer desired.

6. Carefully unsolder all connections at the tuner base from components mounted to the wafer. Note the dressing of leads, components, etc.

7. The wafer can now be pulled up and out of tuner.



TUNER LOPTT-130A AND LOPTT-130YA SCHEMATIC DIAGRAM

MOTOROLA

MODEL BREAKDOWN CHART

Model	Type	TV Chassis	VHF Tuner	UHF Tuner
21T73B	Table	TS-567	CPTT-129	-
Y21T73B	Table	TS-567Y	CPTT-129Y	TT-600
21T73M	Table	TS-567	CPTT-129	-
Y21T73M	Table	TS-567Y	CPTT-129Y	TT-600
21T73W	Table	TS-567	CPTT-129	-
Y21T73W	Table	TS-567Y	CPTT-129Y	TT-600
21K150B	Console	TS-567	CPTT-129	-
Y21K150B	Console	TS-567Y	CPTT-129Y	TT-600
21K150M	Console	TS-567	CPTT-129	-
Y21K150M	Console	TS-567Y	CPTT-129Y	TT-600
21K150W	Console	TS-567	CPTT-129	-
Y21K150W	Console	TS-567Y	CPTT-129Y	TT-600
21K151B	Console	TS-567	CPTT-129	-
Y21K151B	Console	TS-567Y	CPTT-129Y	TT-600
21K151M	Console	TS-567	CPTT-129	-
Y21K151M	Console	TS-567Y	CPTT-129Y	TT-600
21K151W	Console	TS-567	CPTT-129	-
Y21K151W	Console	TS-567Y	CPTT-129Y	TT-600
21K152CW	Console	TS-567	CPTT-129	-
Y21K152CW	Console	TS-567Y	CPTT-129Y	TT-600
21K153B	Console	TS-567	CPTT-129	-
Y21K153B	Console	TS-567Y	CPTT-129Y	TT-600
21K153M	Console	TS-567	CPTT-129	-
Y21K153M	Console	TS-567Y	CPTT-129Y	TT-600
21K153W	Console	TS-567	CPTT-129	-
Y21K153W	Console	TS-567Y	CPTT-129Y	TT-600
21K154CW	Console	TS-567	CPTT-129	-
Y21K154CW	Console	TS-567Y	CPTT-129Y	TT-600

(Service material continued below and on the next six pages.)

HORIZONTAL OSCILLATOR ADJUSTMENT

No special adjustment is needed for the horizontal oscillator coil (L-501) as the coil is used for horizontal hold lock-in purposes. Merely set for most stable horizontal sync conditions.

NOISE GATE CONTROL

The Noise Gate Control is located at the back and is used to adjust the receiver for the signal strength in various areas. To adjust, tune in a channel that receives a satisfactory picture. Turn the Noise Gate Control counterclockwise until picture becomes unstable (rolls, bounces, flip-flops, etc.). Then turn control clockwise until picture returns to normal. Check all channels; if any are unstable, continue turning control in a clockwise direction until the picture is normal on all channels.

FINE TUNING ADJUSTMENTS

The fine tuning control is a semi-permanent adjustment and requires one setting only for each channel. If it is desired to check the adjustment, or re-set it, use the following procedure:

Turn the Channel Selector to the channel you wish to adjust. Push the fine-tuning-knob into the cabinet and rotate slightly until you feel it engage with the mechanism internally. Hold the knob in this engaged position and rotate to obtain the clearest and most stable picture with sound. Do not force knob; when it becomes hard to turn, start back in the opposite direction. Obtain desired picture and sound. Then release knob. Repeat this procedure on all channels you wish to re-set.

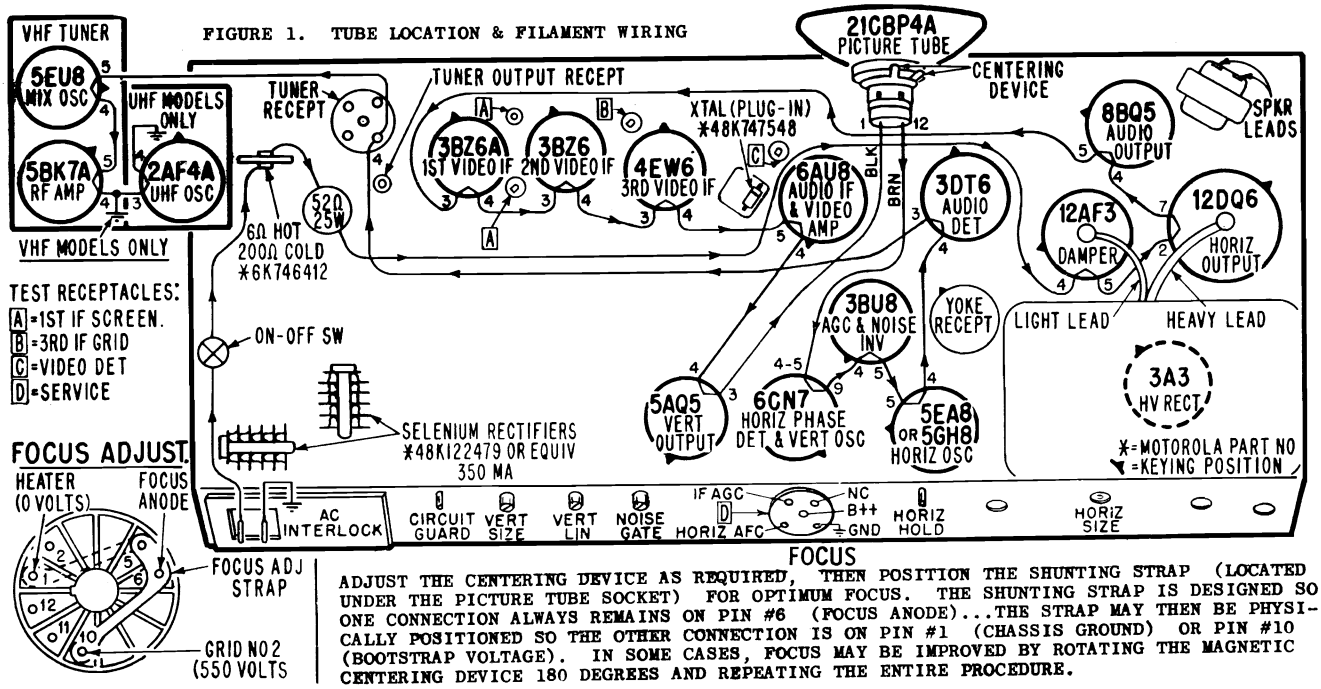
If for any reason the fine tuning is out of range on the high channels only, check setting of osc trim C-10 before deciding realignment of tuner is necessary.

C-10 can be adjusted (use G-C #8988 or equivalent non-metallic alignment tool) from the front of the receiver by:

1. Removing the tuner knobs
2. Setting the fine tuning of the particular channel concerned to the mechanical mid-point (see figure 6D for mid-point setting)
3. Adjusting C-10.

If this adjustment does not bring the high channels into range, realignment of tuner will be necessary.

FIGURE 1. TUBE LOCATION & FILAMENT WIRING



FOCUS

ADJUST THE CENTERING DEVICE AS REQUIRED, THEN POSITION THE SHUNTING STRAP (LOCATED UNDER THE PICTURE TUBE SOCKET) FOR OPTIMUM FOCUS. THE SHUNTING STRAP IS DESIGNED SO ONE CONNECTION ALWAYS REMAINS ON PIN #6 (FOCUS ANODE)...THE STRAP MAY THEN BE PHYSICALLY POSITIONED SO THE OTHER CONNECTION IS ON PIN #1 (CHASSIS GROUND) OR PIN #10 (BOOTSTRAP VOLTAGE). IN SOME CASES, FOCUS MAY BE IMPROVED BY ROTATING THE MAGNETIC CENTERING DEVICE 180 DEGREES AND REPEATING THE ENTIRE PROCEDURE.

MOTOROLA Chassis TS-567, TS-567Y, Service Information, Continued

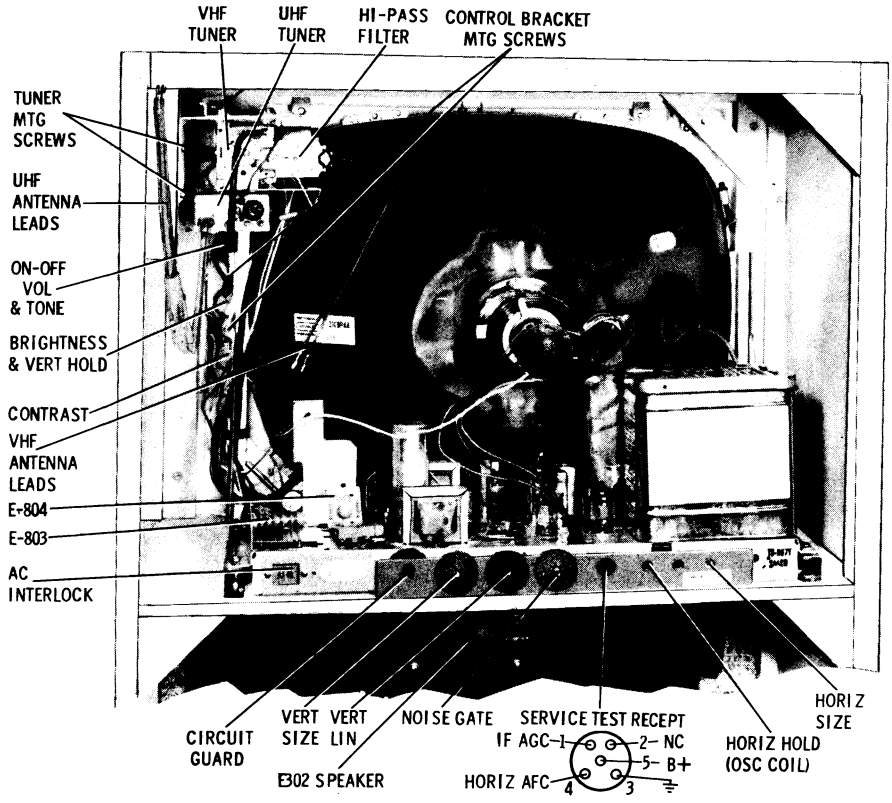


FIGURE 2B. REAR VIEW OF CONSOLE MODELS

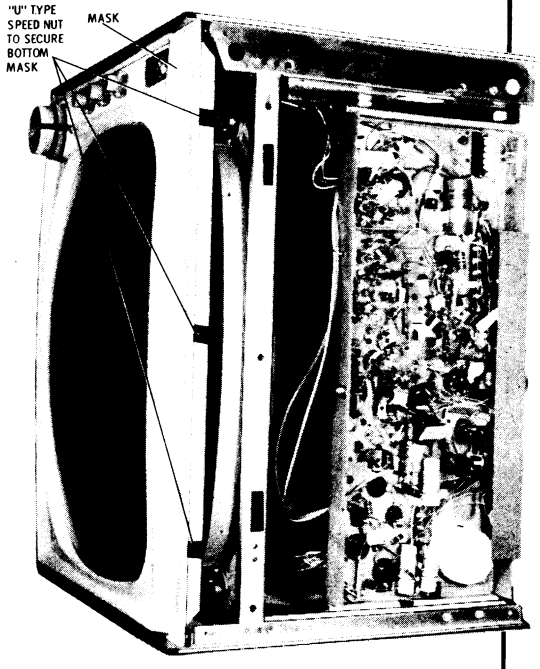
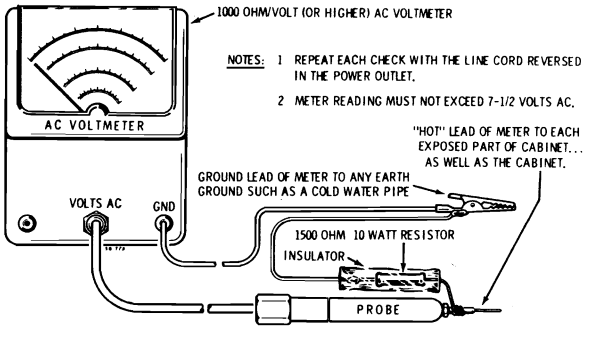


FIGURE 3A

THE CIRCUIT GUARD

The Circuit Guard is a thermal cut-out type of overload-relay; it is in series with the low voltage power supply for protection against shorts in the B + system.

The Circuit Guard will remain in the "closed circuit" state when the current requirements are in the neighborhood of 1.8 amps. In the event of a continuous, high current overload, the bi-metallic elements of the unit will become heated to the extent of "opening" the contacts and disconnecting the B + power supply. After the bi-metallic elements have cooled, the Circuit Guard may be re-set by depressing the plastic re-set button.



VOLTMETER HOOK-UP FOR SAFETY CHECK

REMOVING THE BACK COVER

To facilitate servicing, the antenna terminals (on the console models only) are attached to the cabinet. When removing back cover slide back cover downward and away from the antenna terminals. When replacing, slide back cover carefully over the antenna terminal section.

TO REMOVE TUNER

1. Remove tuner knobs.
2. Remove two (2) screws holding tuner bracket to cabinet.
3. Slide tuner with bracket out from back.

MODEL 21T73

SERVICING CHASSIS IN CABINET is easy, since entire bottom panel comes off by removal of nine (9) retaining screws in bottom panel. Voltages and waveforms can be taken and all chassis components are accessible. Observe all electrical safety precautions when working on the exposed chassis. (See Figure 3A.)

CLEANING OF PICTURE TUBE SCREEN and safety glass (Model 21T73) is accomplished by removal of front mask. Screw in upper right-hand corner (on inside of cabinet) locks mask in place. After locking screw is out and the three (3) retaining screws in bottom panel are removed (or the entire bottom panel removed, if desired), pull off the front knobs. Remove the mask by pulling bottom of mask out from cabinet and then downward to disengage top retainers. It is not necessary to unscrew control bracket (which is mounted to mask) because the connecting leads are long enough to swing mask out of the way. If picture tube or mask is to be replaced, the control bracket can be removed from the mask by removing two (2) retaining screws from rear of mask.

WARNING: When mask is replaced, inside locking screw must be replaced so untrained personnel cannot gain access to front of set. (See Figures 3A and 3B.)

DISASSEMBLY OF CABINET WRAPAROUND is continued by removing the two (2) screws at upper left-hand corner which holds tuner bracket to side panel. Speaker leads should be unplugged at this time. (See Figure 3B.)

CABINET WRAPAROUND REMOVAL is completed by pulling off the side UHF tuning knob (on UHF models only) and unscrewing eight (8) screws; three on each side of the cabinet side panels and two at bottom of cabinet-front-frame. (When removing screws, avoid twisting cabinet, since this will bind screws making removal difficult.) The cabinet wraparound can now be slipped up and off of the complete chassis assembly. (See Figure 3C.)

MOTOROLA Chassis TS-567, TS-567Y, Service Information, Continued

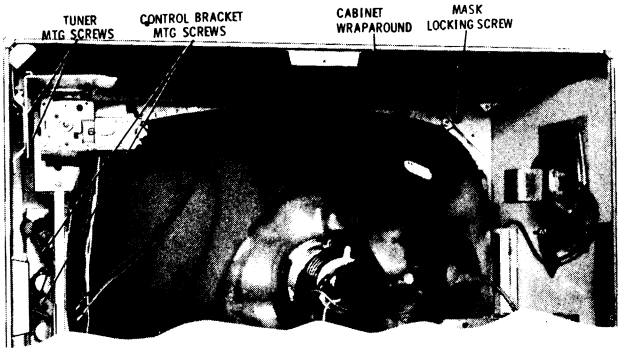


FIGURE 3B

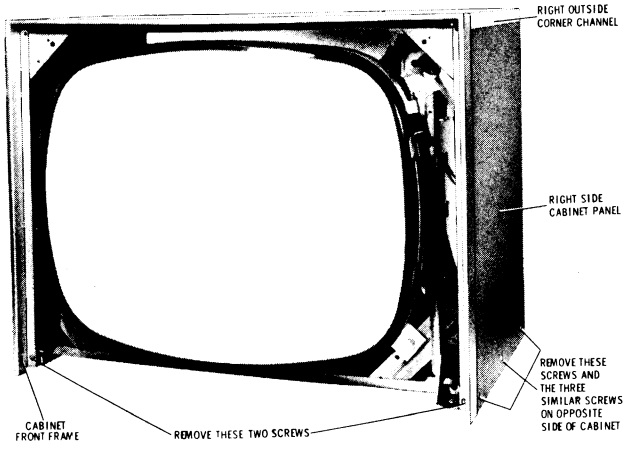


FIGURE 3C

ASSEMBLY OF CABINET WRAPAROUND illustrates how the cabinet side-panels are held to the cabinet top-panel by five (5) screws in each inside corner channel. These screws tighten into the outside corner channels shown in Figure 3C, which match the cabinet color. The cabinet-front-frame is secured to the corner channels by four (4) screws, two in each corner channel. (See Figure 3D.)

PICTURE TUBE REPLACEMENT - MODEL 21T73

1. Remove the entire wraparound, as illustrated in Figures 3A, 3B, and 3C; also remove the control bracket from the mask. Then disconnect the second anode connector, picture tube socket and deflection yoke cable. Remove yoke wedge clamp by compressing the ends and moving clamp and rubber retainer to rear. Slide yoke from picture tube neck. Loosen the picture tube mounting bolts at the upper left and right-hand corners of the mounting strap. Carefully remove picture tube.

2. Working with the new replacement picture tube, place cloth tape (Motorola Part No. 11M121682) of approximately the same size at the same points as that on the original picture tube. Stick two pieces of gummed paper (preferably gummed on both sides) on the new picture tube neck, at the flare, to keep the yoke from slipping about.

3. Replace picture tube into correct position. Tighten mounting bolts; replace the deflection yoke, picture tube socket, and the second-anode connector. Connect the deflection yoke to the chassis receptacle.

4. Apply power with service line cord and check receiver operation. Adjust the yoke position for proper operation and adjust the centering device. Reassemble cabinet to chassis assembly.

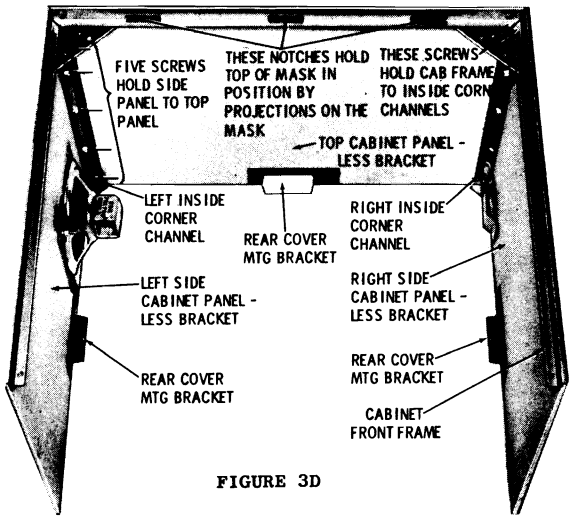


FIGURE 3D

CONSOLE MODELS

TO REMOVE CHASSIS FROM CABINET - CONSOLE MODELS

Disconnect chassis cables from other TV components, remove front panel control bracket from mask, and remove the four bolts holding the chassis to the metal framework: two (2) on either side. To operate the chassis, the tuner, deflection yoke, and picture tube (series filament) should be connected.

NOTE: When transporting or servicing the chassis, the control bracket can easily be secured to the chassis.

TO REMOVE CHASSIS & PICTURE TUBE ASSEMBLY FROM CABINET - CONSOLE MODELS

The entire chassis and picture tube assembly can be rapidly removed as a working unit from the cabinet for easy servicing.

Remove all knobs, disconnect speaker lead, remove the two (2) screws holding control bracket assembly to rear of mask, and remove two (2) screws holding rear tuner mounting bracket to side of cabinet. (See Figure 2B for all screw locations.) Next, remove four (4) retaining bolts located below chassis shelf. Slide entire working assembly from rear of cabinet.

PICTURE TUBE REPLACEMENT - CONSOLE MODELS

1. Refer to "TO REMOVE CHASSIS & PICTURE TUBE ASSEMBLY FROM CABINET - CONSOLE MODELS" and remove complete assembly. Then disconnect and remove the picture tube socket, second anode lead, and deflection yoke. (To remove deflection yoke, unplug yoke from chassis receptacle, compress the ends of the yoke wedge clamp, and move clamp and rubber retainer away from deflection yoke. Slide yoke from picture tube neck.) Loosen the picture tube mounting bolts at upper right and left-hand corners of the mounting strap while supporting the picture tube with one hand. Carefully remove the picture tube.

2. Working with the new replacement picture tube, place cloth tape (Motorola Part No. 11M121682) of approximately the same size at the same points as that on the original picture tube. Stick two pieces of gummed paper (preferably gummed on both sides) on the new picture tube neck, at the flare, to keep the yoke from slipping about.

3. Replace picture tube into correct position. Tighten mounting bolts; replace the deflection yoke, picture tube socket, and the second-anode connector. Connect the deflection yoke to the chassis receptacle.

4. Apply power with service line cord, and check receiver operation. Adjust the yoke position for proper operation and adjust the centering device. Replace entire assembly into cabinet.

MOTOROLA Chassis TS-567, TS-567Y, Alignment Information, Continued

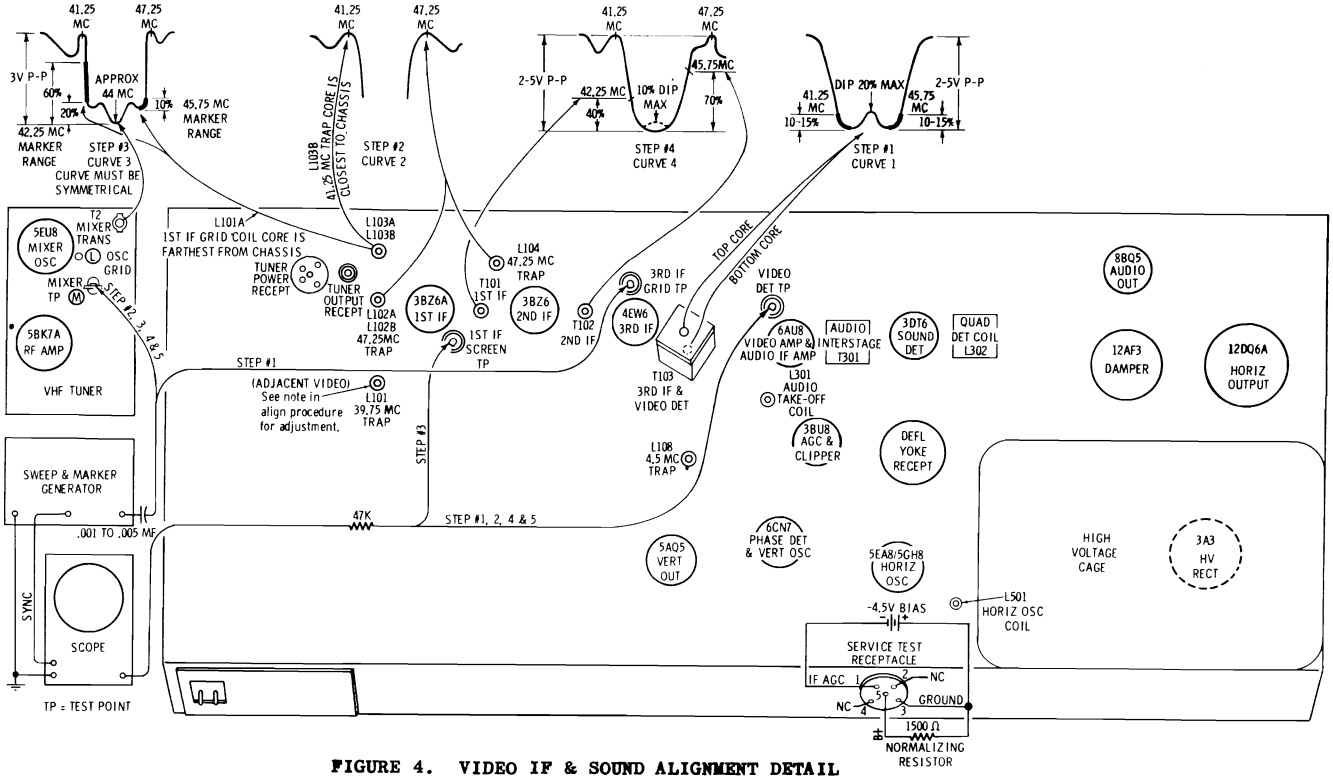


FIGURE 4. VIDEO IF & SOUND ALIGNMENT DETAIL

VIDEO IF & MIXER ALIGNMENT

Pre-Alignment Steps

1. Maintain line voltage at 120 with variac.
2. Remove the deflection yoke plug to eliminate RF interference radiation.
3. Disable oscillator by shorting point "L" located near mixer-oscillator tube V-2, to chassis. See Figure 4.
4. Apply the negative lead of a 4.5 volt bias supply to pin #1 (IF AGC) of the SERVICE TEST RECEPTACLE and the positive lead to pin #3 (chassis ground).
5. All coil slug tuning positions, in relation to chassis, are given in the procedure chart and in the separate detail of Figure 5.
6. Set channel selector on channel #13 and connect a 1500 ohm 50W voltage normalizing resistor from B+ to chassis (use pins #5 (B+) and #3 (ground) of the SERVICE TEST RECEPTACLE.
7. Set the contrast control at minimum (extreme counter-clockwise position).
8. Short across tuner input terminals.
9. Maintain 2 to 5 volts peak-to-peak at the diode load (Det TP) except when specific values are given in the procedure chart.
10. Refer to Video IF & Sound Alignment Detail for component and test point locations (Figure 4).

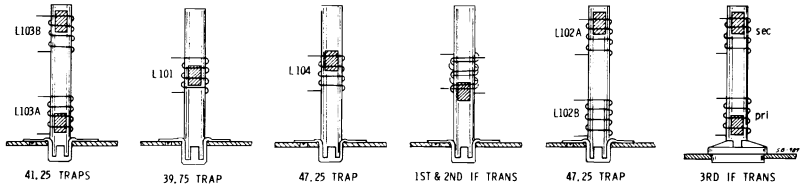


FIGURE 5. COIL CORE POSITIONS

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GEN AND MARKER	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
1.	To 3rd IF grid test recept thru a .001 mmf capacitor. Set sweep approx. to 44 Mc markers as required	Scope thru a 47K ohm resistor to Video Det test recept	Both slugs of 3rd IF coil (T-103)	Equal peaks and 45.75 Mc marker as shown on curve #1. Note: Slug at crystal end can be reached by inserting tool through unobstructed slug. Tune both slugs near the ends of their respective coils. See detail for slug position. Note: Temporary removal of bias or increased generator input may be required to see traps.

MOTOROLA Chassis TS-567, TS-567Y, Alignment Information, Continued

VIDEO IF & MIXER ALIGNMENT DETAIL (Contd.)

STEP	SWEEP GEN AND MARKER	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
2.	To mixer TP thru .001 mf capacitor. Set sweep to approx. 44 Mc.	Scope connection same as step #1		
	a. Set marker to 47.25 Mc		a. 47.25 Mc trap (L-102)	a. Minimum response (tune slug at end of coil away from chassis)
	b. Set marker to 41.25 Mc		b. 41.25 Mc trap (L-103B)	b. Minimum response (tune slug at end of coil toward chassis) See curve #2 for above responses.
3.	Generator connection same as step #2, except set output for 3V P-P on scope	Scope to 1st IF screen test recept or test point. "Pin #6 of tube"	a. Mixer trans, located on tuner (T-2)	Tune both T-2 & L-103A for curve shown in curve #3, step #3 of Fig. 4. The pri affects the center peak & the sec affects the 2 outside peaks. As part of alignment, adjust L-101 for max. Lower frequency about 38.5 Mc (this trap is tuned to 39.75 Mc when evidence of strong adjacent video interference is present) to make sure it does not interfere in the response curve.*
			b. 1st IF grid coil (L-103A) slug located away from chassis	If a suck-out (trap effect) occurs, detune 1st IF transformer (T-101) Tune both coil slugs at end of coil away from chassis.
4.	Generator connection same as step #2. Reset for 2-5V P-P on scope.	Scope thru a 47K ohm resistor to Video Det test recept	1st IF trans (T-101)	Proper 42.25 Mc marker placement (tune slug at end of coil toward chassis)
			2nd IF trans (T-102)	Proper 45.75 Mc marker placement (tune slug at end of coil toward chassis). See curve #4 of Fig.4
5.	Same as step #4.	Same as step #4		If a tilt occurs, readjust the mixer pri coil (T-2 on tuner) & if necessary touch up the 1st and 2nd IF trans (T-101 & T-102) for response shown in curve #4.

* NOTE: The 39.75 Mc trap (Adjacent Video) may be adjusted without removing the back cover from the receiver. This trap, for the table model, is accessible thru a hole provided underneath the cabinet; while for the console model, the hole is located in the chassis ventilation screen underneath the chassis shelf.

SOUND ALIGNMENT (Station Signal Method)

The sound system used in the TS-567 receiver consists of an audio IF amplifier stage, a quadrature grid detector, and an output stage. Since this type of sound system is extremely sensitive, relatively small input signal voltage will cause grid current to flow in both the IF amplifier and the detector stages. Grid current through the tuned coils will load them down making the adjustment extremely broad and alignment impossible. For this reason, it is necessary to use a very weak signal when aligning the driver and the detector input coils. Actually, the signal should be well down into the noise level for proper tuning action.

Preliminary Steps

1. Tune in a strong TV station.
2. Adjust all controls for normal picture and sound.
3. Refer to Video IF & Mixer Alignment Detail for coil and test point locations (Figure 4).

SOUND ALIGNMENT PROCEDURE

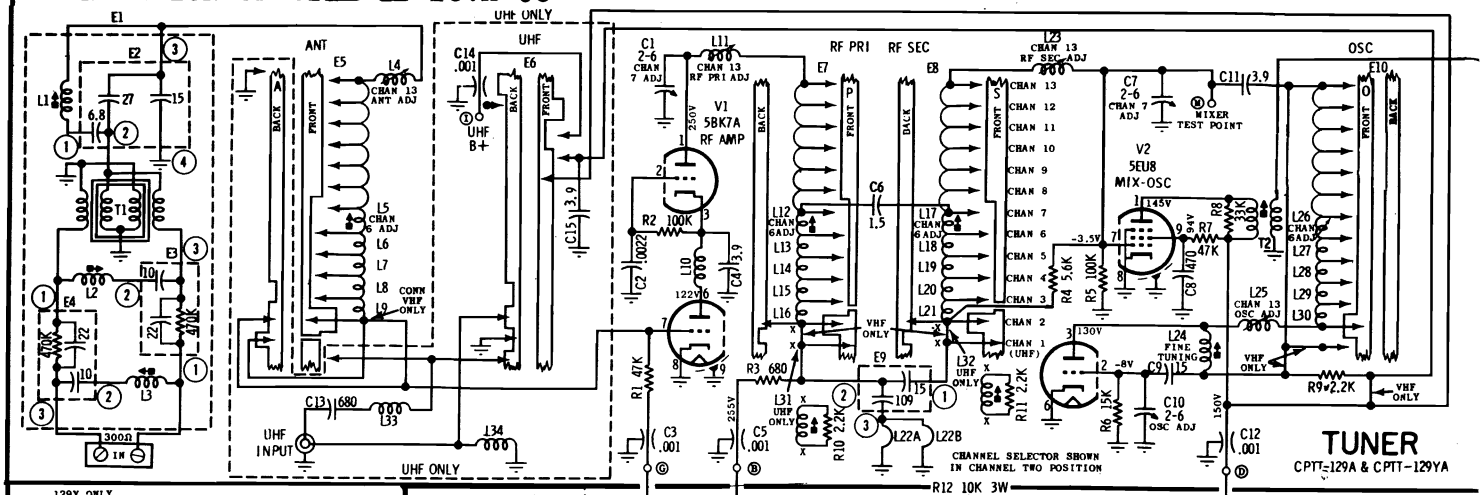
STEP	STATION	INDICATOR	ADJUST	REMARKS
1.	Strong signal	VTVM to jct of R-307 (82K) and C-308 (.01) located on L-302 (under chassis).	L-302 (quad coil)	Maximum deflection (coarse adj). Of two possible maximum tuning points, use that giving the largest voltage reading.**
2.	"	Listening test	"	Maximum sound with minimum distortion (fine adj).
3.	Weak signal*	"	T-301 (interstage)	Maximum sound with minimum distortion (maintain hiss level). **
4.	"	"	L-301 (take-off)	Maximum sound with minimum distortion.

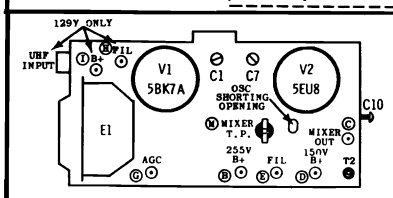
If sound is not clear at this point, repeat the above procedure as necessary.

* The signal must be weakened considerably either by disconnecting one side of the antenna lead, or connecting low value resistors across the antenna terminals until a pronounced hiss appears in the sound. The hiss level must be maintained for proper alignment.

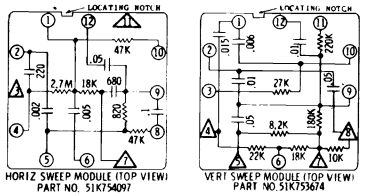
** The purpose of the top pre-set core is to enable the adjustable core to make the tuning range required while reducing the physical length. If the pre-set core should be misadjusted by previous service work, merely re-set near top end of coil and tune for maximum.

TELEVISION CHASSIS TS-567A-00

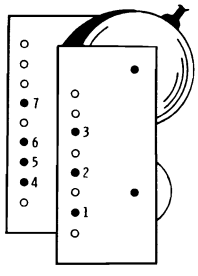




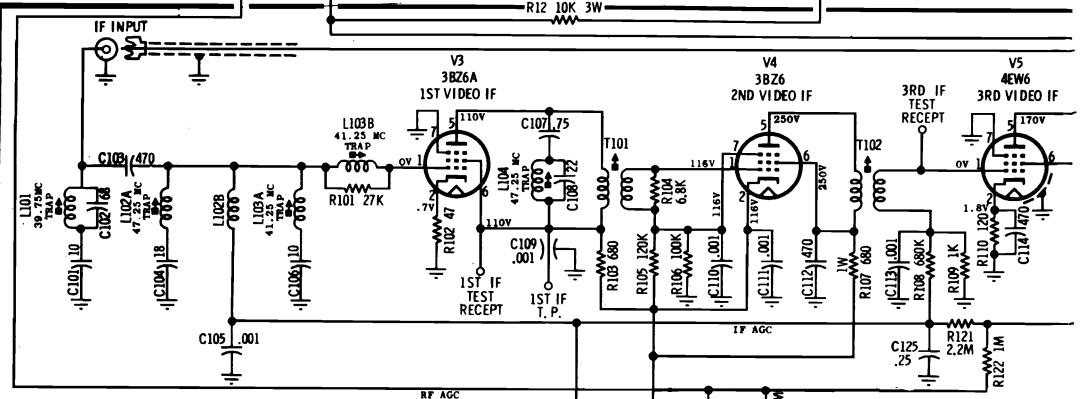
MODULE COMPONENT INFORMATION

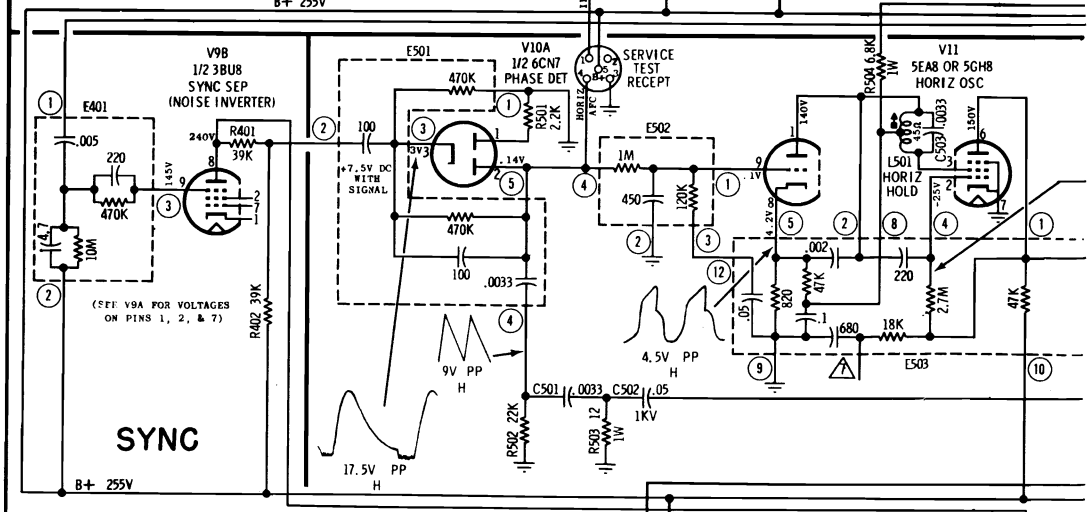


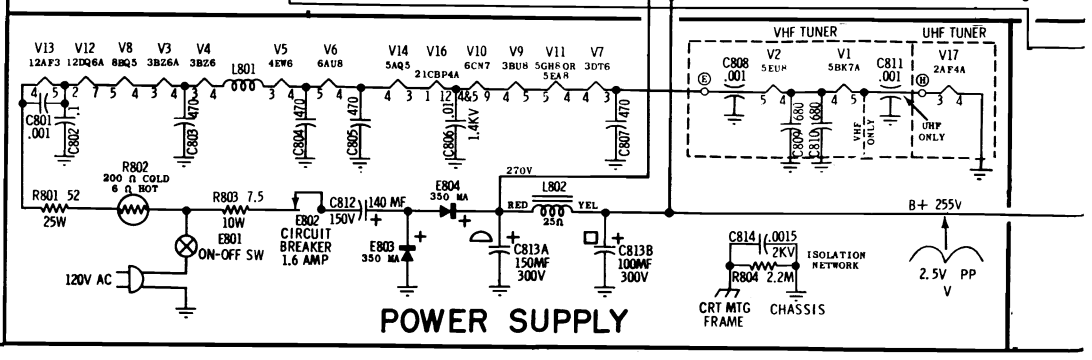
△ = NO CHASSIS CONNECTION



T501 CONN







NOTES:

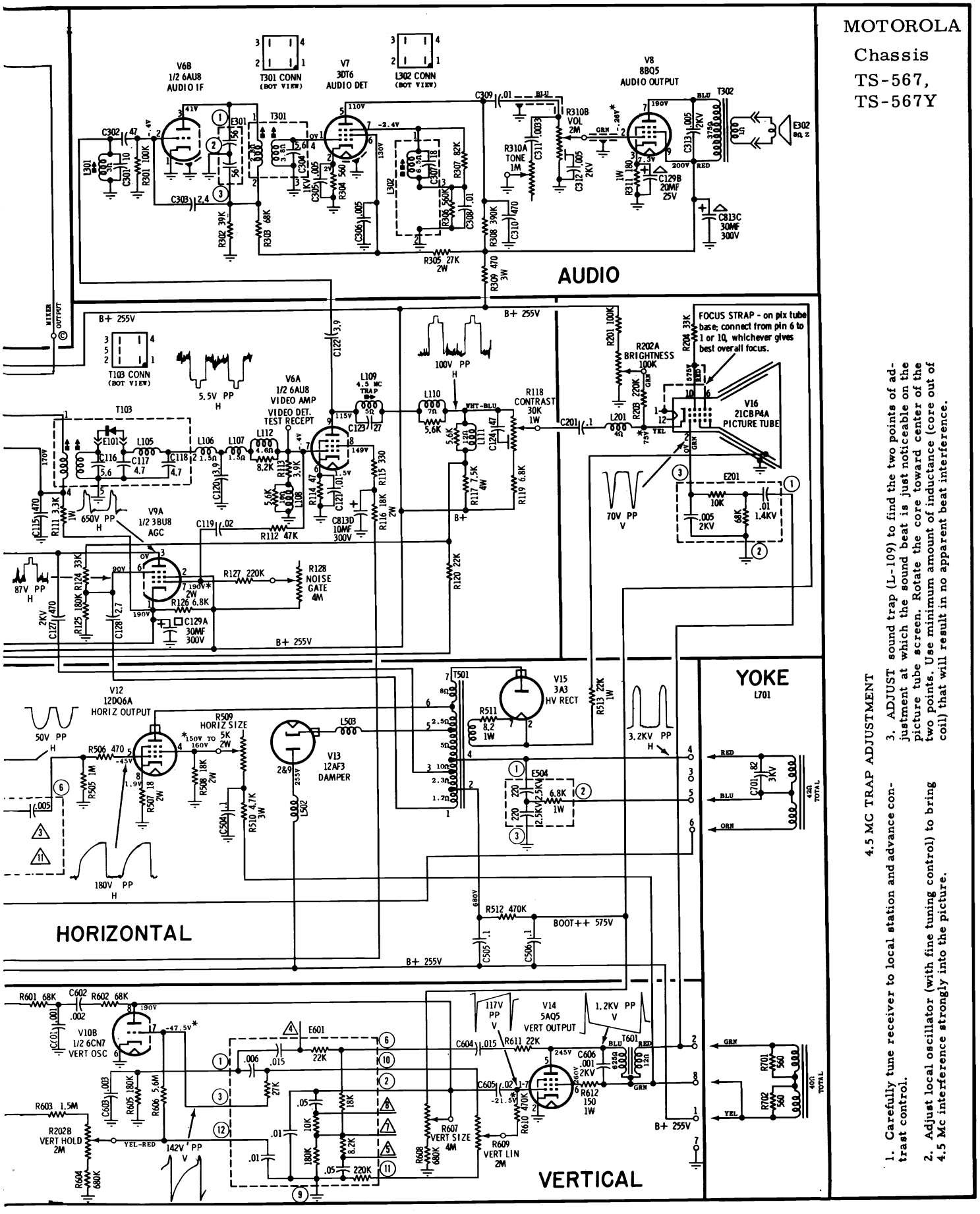
VOLTAGE MEASUREMENTS

1. Taken from point indicated to chassis with a VTVM, ± 10%.
2. Line voltage maintained at 120V AC.
3. Voltages indicated by an asterisk will vary with associated control settings.
4. Taken with contrast control at minimum and all other controls in normal operating position with no signal input.
5. Tuner on Channel 13 or channel of least noise with antenna terminals shorted.

WAVEFORM MEASUREMENTS

1. Taken from point indicated to chassis with a wide-band oscilloscope.
2. Oscilloscope synced near sweep rate indicated.
3. Taken with strong signal; contrast control at maximum; all other controls in normal operating position.

CAPACITORS - Unless specified, values less than one in MF; all others in MMF.


MOTOROLA
Chassis
TS-567,
TS-567Y
AUDIO
HORIZONTAL
VERTICAL
YOKE
L701
V6B
1/2 6AU8
AUDIO IF
V7
3DT6
AUDIO DET
V8
8BQ5
AUDIO OUTPUT
T301 CONN
(BOT VIEW)
L302 CONN
(BOT VIEW)
T302
R310B
VOL
2M
R310A
TONE
1M
C129B
20MF
25V
C813C
30MF
300V
R305 27K
2W
R309 470
3W
T103 CONN
(BOT VIEW)
V6A
1/2 6AU8
VIDEO AMP
VIDEO DET.
TEST RECEPT
L109
4.5 MC
TRAP
R118
CONTRAST
30K
1W
R202A
BRIGHTNESS
100K
FOCUS STRAP - on pix tube base; connect from pin 6 to 1 or 10, whichever gives best overall focus.
V16
21CBP4A
PICTURE TUBE
E201
V9A
1/2 3BU8
AGC
C129A
30MF
300V
R128
NOISE
GATE
4M
C813D
10MF
300V
V12
12DQ6A
HORIZ OUTPUT
R509
HORIZ SIZE
5K
2W
V13
12AF3
DAMPER
V15
3A3
HV RECT
E504
R512 470K
BOOT++ 575V
V10B
1/2 6CN7
VERT OSC
E601
V14
5AQ5
VERT OUTPUT
T601
R607
VERT SIZE
4M
R609
VERT LIN
2M
R202B
VERT HOLD
2M
B+ 255V
4.5 MC TRAP ADJUSTMENT
1. Carefully tune receiver to local station and advance contrast control.
2. Adjust local oscillator (with fine tuning control) to bring 4.5 Mc interference strongly into the picture.
3. ADJUST sound trap (L-109) to find the two points of adjustment at which the sound beat is just noticeable on the picture tube screen. Rotate the core toward center of the two points. Use minimum amount of inductance (core out of coil) that will result in no apparent beat interference.

Muntz TV

MODEL NUMBER	CHASSIS NUMBER
21CM 21CB 21CW 21TM 21TB 21TW 21LBM 21LBB 21LBW 21CP-1M 21CP-1B 21CP-1W 21CP-2M 21CP-2B 21CP-2W 21CP-3M 21CP-3B 21CP-3W 21CP-4M 21CP-4B 21CP-4W 21CP-5XM 21CP-5XB 21CP-5XW 21CP-5M 21CP-5B 21CP-5W 21CP-6M 21CP-6B 21CP-6W	T37L05 T37L06 T37L07
21CM82 21CB82 21CW82 21TM82 21TB82 21TW82 21LBM82 21LBB82 21LBW82 21CP-1M82 21CP-1B82 21CP-1W82 21CP-2M82 21CP-2B82 21CP-2W82 21CP-3M82 21CP-3B82 21CP-3W82 21CP-4M82 21CP-4B82 21CP-4W82 21CP-5XM82 21CP-5XB82 21CP-5XW82 21CP-5M82 21CP-5B82 21CP-5W82 21CP-6M82 21CP-6B82 21CP-6W82	T37L04U T37L07U
S17PS 17PS	T37M05 T37M07 T37M06
S17PS82	T37M04U T37M07U
S17PD	T37005 T37006 T37007
S17PD82	T37004U T37007U
24CM 24CB 24CW 24TM 24TB 24TW 24CFP 24LBM 24LBB 24LBW	T37P05 T37P07 T37P06
24CM82 24CB82 24CW82 24TM82 24TB82 24TW82 24CFP82 21LBM82 24LBB82 24LBW82	T37P04U T37P07U
21TS	T37Q05 T37Q06 T37Q07
21TS82	T37Q04U T37Q07U
24TS 24CS	T37R05 T37R06 T37R07
24TS82 24CS82	T37R04U T37R07U
21CS	T37S05 T37S06 T37S07
21CS82	T37S04U T37S07U
23CXM 23CXB 23CXW	T37U06 T37U07
23CXM82 23CXB82 23CXW82	T37U07U
17PL	T37T06 T37T07
17PL82	T37T07U

An "E" prefix before model number indicates U.L. approved sets. An "S" prefix indicates set was manufactured prior to formal U.L. approval.

OBSERVE THE FOLLOWING PRECAUTIONS

1. Antenna isolation networks are located on terminal strips for all VHF tuners. This network consists of 330K OHM ± 10%, ½ Watt resistors in parallel with 470MMFD ± 10%, 1500VAC capacitors. One pair is installed in series with *each* antenna lead. These are for protection of the user against shock hazard. If any work is done on tuners, always check antenna terminals to chassis for resistance. This must be 330K OHM ± 10%. UHF tuners have built in isolation networks but should also be checked for failure of this protective circuit.
2. The volume control, picture tube supports and all metal parts which the customer can touch are protected by isolation networks. Do not, under any circumstances, defeat these networks when you service the sets.
3. The crystals in the audio circuit should be replaced as matched pairs.

All models listed at left are very similar electrically. The schematic diagram included in this section is exact for Chassis T37Q04U, T37Q05, T37R04U, T37R05. See pages 90-91 in TV-17, 1960 Television Servicing Information manual for exact diagram for Chassis T37L04U, T37L05, T37P04U, T37P05, T37S04U, T37S05. For alignment information also see TV-17, page 92. Additional service material is included below and on page at right. Production changes are explained on the page following the schematic.

CAUTION

The receiver chassis is connected to one side of the power line. Do not connect test equipment to any part of the receiver or do not ground the chassis unless an isolation transformer is used between the power line and the set.

FOCUS

On portable models a connecting wire is available at the base of the CRT to obtain best focus and line detail. This wire connects between Pin 6 and Pin 2 or 10. On all 110° sets, focusing anode (Pin No. 4-Orange Wire) is connected at the factory to a B+ point. Some tubes may focus better at a different voltage. This can be determined experimentally by connecting the orange focus lead mentioned above to the boost voltage or ground.

CENTERING

Two beam adjuster rings are provided on the yoke cover for centering purposes. Rotate the rings individually until the picture is properly centered.

TILT

If picture tilt exsits, compress yoke holding spring and rotate yoke until the tilt is eliminated. Be sure that the yoke is seated as far forward on the neck of the CRT as possible, before releasing yoke holding spring.

FUSIBLE RESISTOR

This protective device for the B+ circuits of the set is a 5 OHM fusible resistor and is located in front of the Vertical output transformer. It is of the plug-in type for your convenience.

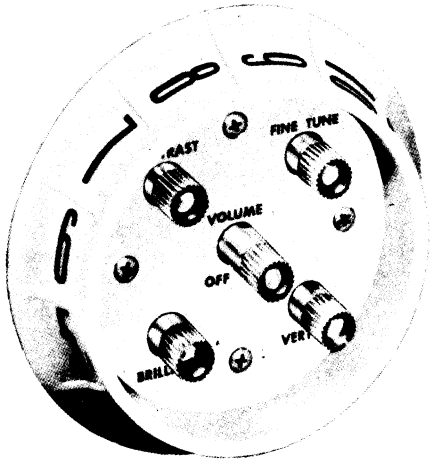
MUNTZ TV Service Information on 1961 Sets, Continued

ION TRAP

Some sets may have a low Gauss Ion Trap. These traps are used only to sharpen the focus on certain tubes.

ON-OFF VOLUME CONTROL

Push knob in to turn set on or off. Turn knob clockwise to increase volume and counterclockwise to decrease volume. (On a few economy models this knob will not be a push type. Set will be turned on by a clockwise rotation of this knob.)



FINE TUNING CONTROL

Turn control for sharpest picture obtainable without going into sound beat. In extreme fringe areas, adjust for compromise between best picture and sound.

HORIZONTAL HOLD CONTROL

This control is located on the back of the chassis and is used only when the picture falls out of Horizontal syncronization. The picture should stay in syncronization over 50% of the range of this control.

LOCAL-FRINGE SWITCH

This switch is most effective in good signal areas and is used to prevent overload of the set when the incoming signal is excessively strong. Under extreme fringe conditions the set will operate at maximum sensitivity regardless of the switch position.

VERTICAL LINEARITY AND HEIGHT CONTROLS

With the Height control, located nearer the center of the chassis, bring picture down so that is covers about three-quarters of the total vertical screen area. With the Vertical Linearity control, set for the most linear picture which can be obtained. Then fill in screen with Height control. If set is cold, overscan the picture tube screen by approximately one inch at the bottom.

CHASSIS REMOVAL: Console and Table Model Sets

1. Remove 4 Phillips Head Screws in escutcheon of channel selector knob.
2. Remove channel selector knob, escutcheon and 5 small control knobs.
3. Remove screws holding cabinet back in place.
4. Remove wing nuts holding speaker and nuts holding tube to front of cabinet.
5. Remove 4 bolts from the bottom and slip chassis out of cabinet.
6. When replacing channel knob on these sets, set the same channel number next to the marker on the cabinet as that which appears in the center of the gear edge area exposed through the round hole in the cabinet.

   On 12 position tuner knobs, use numbers on gear that are *not* enclosed in circle. On 13 position tuner knobs (UHF), use numbers on gear that *are* enclosed in circles.

CHASSIS REMOVAL: Portable Sets

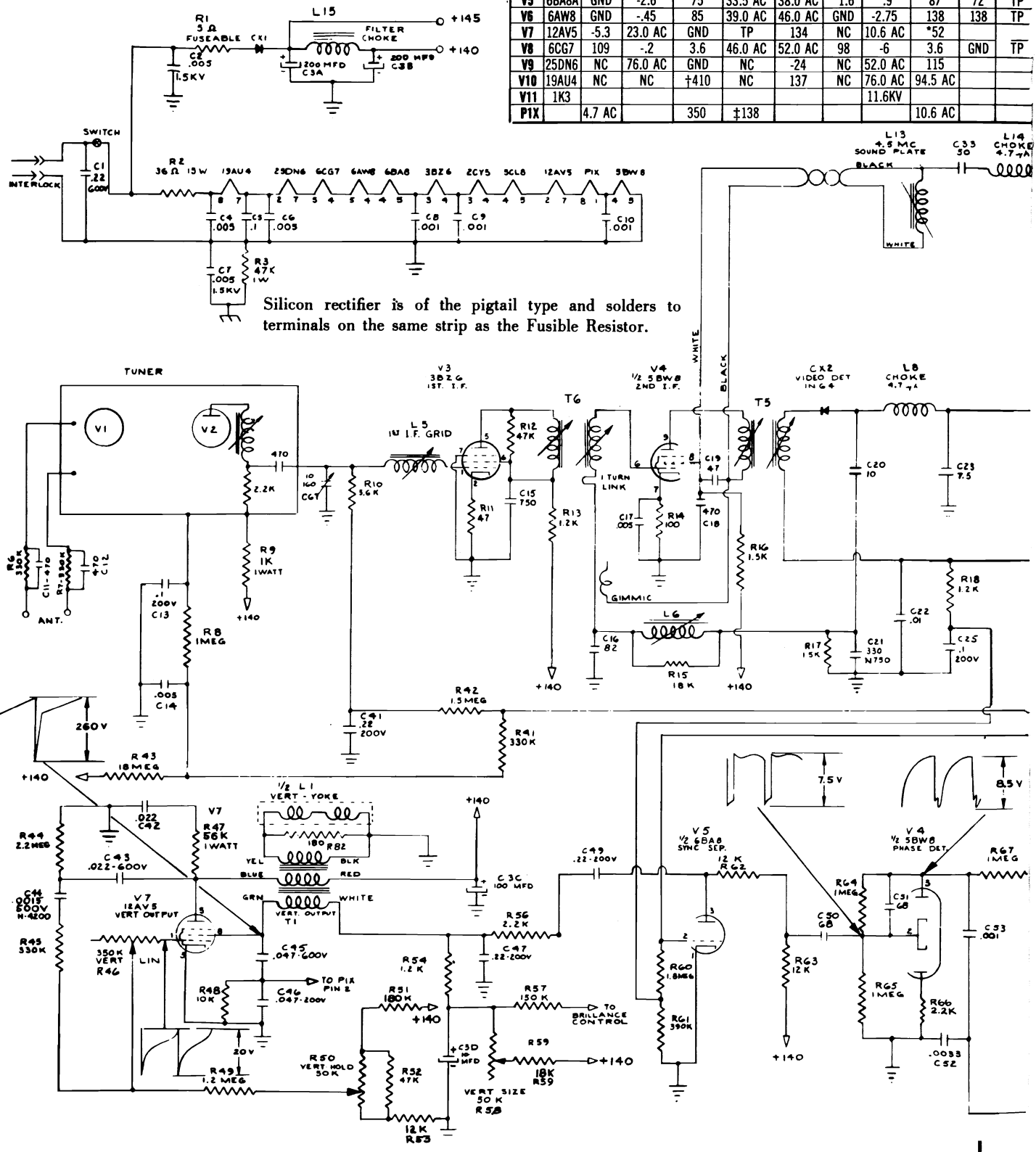
1. Remove 4 Phillips Head Screws in escutcheon of channel selector knob.
2. Remove channel selector knob, escutcheon, 5 small control knobs, and screw holding tuner stabilizer bracket to top of cabinet.
3. Remove screws holding cabinet back in place.
4. On deluxe models, remove handle by holding nut while removing Phillips screw in handle. Slip handle towards front of cabinet and it will be free.
5. Remove speaker from top by unscrewing wing nuts.
6. Remove screws holding cabinet top and slip top off.
7. Remove high voltage lead and deflection yoke from picture tube.
8. Remove 4 screws from the bottom and slip chassis out.
9. When replacing channel knob on portable sets, set the channel number directly over the same number that appears in the center of the gear edge area exposed through the round hole in the cabinet. In this manner, the proper channel number will be facing the front of the cabinet.

   On 12 position tuner knobs, use numbers on gear that are *not* enclosed in circle. On 13 position tuner knobs (UHF), use numbers on gear that *are* enclosed in circles.

MUNTZ TV **CHASSIS NO.** T37Q05 T37R05 T37Q04U T37R04U

VOLTAGE MEASUREMENTS

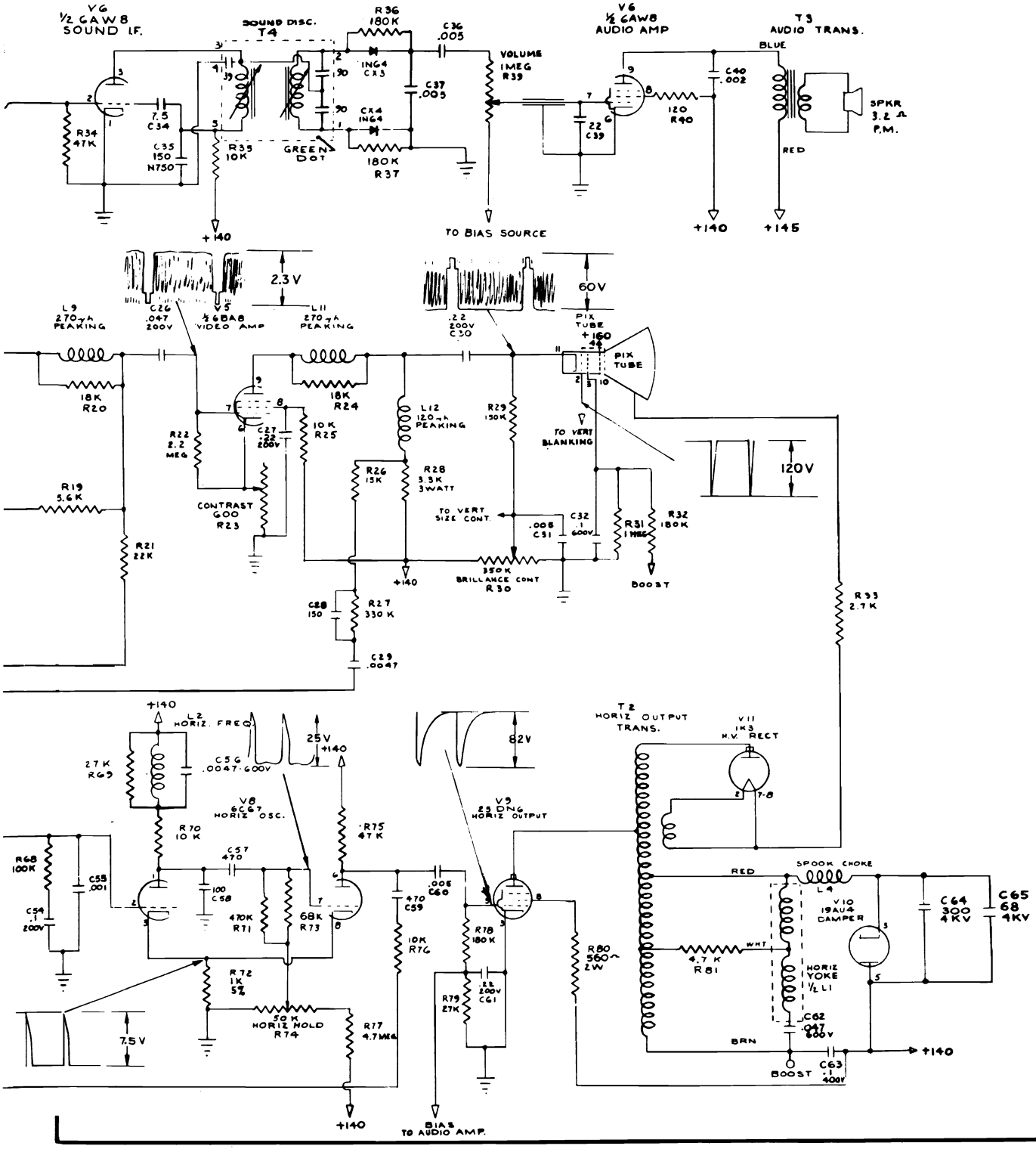
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9	Pin 10
V3	3BZ6	-.1	.67	33.5 AC	33.0 AC	122	122	GND			
V4	5BW8	GND	3.3	-.2	4.7 AC	GND	0	1.25	118	118	TP
V5	6BA8A	GND	-2.6	75	33.5 AC	38.0 AC	*1.6	*.9	87	72	TP
V6	6AW8	GND	-.45	85	39.0 AC	46.0 AC	GND	-2.75	138	138	TP
V7	12AV5	-5.3	23.0 AC	GND	TP	134	NC	10.6 AC	*52		
V8	6CG7	109	-.2	3.6	46.0 AC	52.0 AC	98	-6	3.6	GND	TP
V9	25DN6	NC	76.0 AC	GND	NC	-24	NC	52.0 AC	115		
V10	19AU4	NC	NC	†410	NC	137	NC	76.0 AC	94.5 AC		
V11	1K3							11.6KV			
P1X		4.7 AC		350	‡138				10.6 AC		



MUNTZ TV Chassis T37Q04U, T37Q05, T37R04U, T37R05, Schematic Diagram

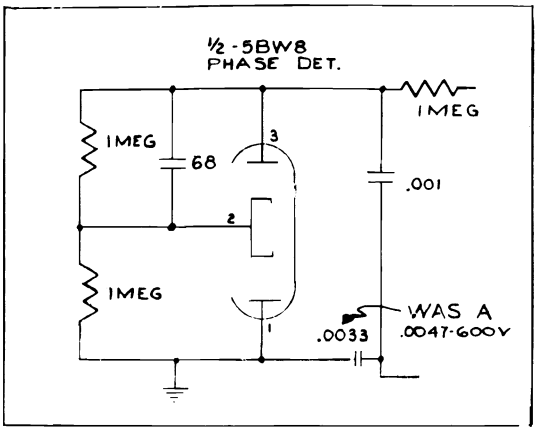
NOTES

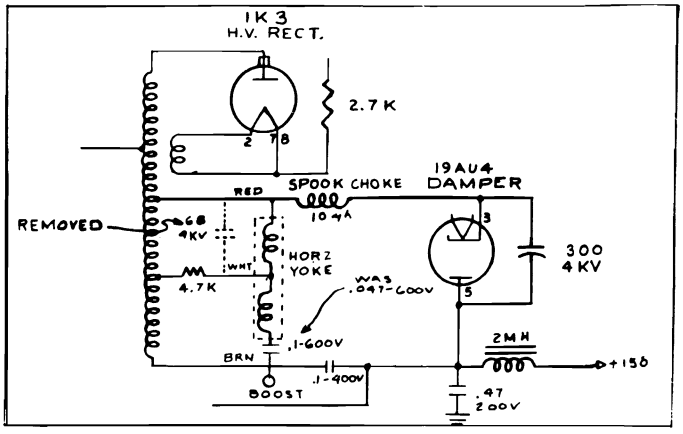
1. All voltages D.C. unless otherwise noted. Reading taken with a VTVM.
2. All readings taken at 117 VAC line.
3. All readings taken to chassis gnd. No signal applied and local-distant switch in local position.
4. All readings subject to 20% variations.
5. *Voltage varies with setting of controls.
6. †Measure boost voltage on terminal strip at junction of 180K OHM resistor, .luf 600V and .luf 400V capacitors.
7. ‡See focus instructions



MUNTZ TV Production Changes of Early 1961 Sets

TO INCREASE WIDTH IN 110° 21" SETS





FILAMENT DROPPING RESISTOR

All portables that have a 30 OHM ± 10% 15 Watt Wire Wound Resistor in the filament. Change to a 36 OHM ± 10% 15 Watt Wire Wound Resistor. This is to eliminate possible hum on Horizontal Sync. Since our portables have no pilot light this is needed to lower the filament.

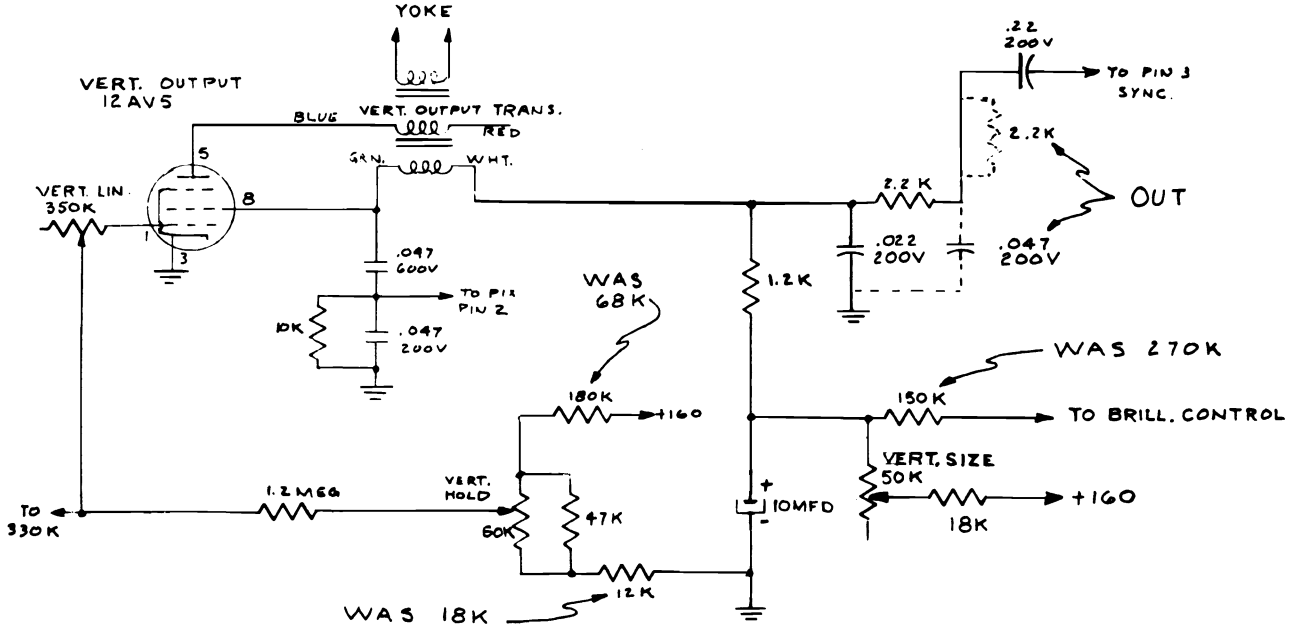
To Improve Vertical Staibility In The 110° Sets

In the feedback circuit of the vertical stage, change the 1.5 Meg OHM resistor to a 2.2 Meg OHM. This resistor is located on the terminal strip at the front of the chassis. Also change the .0022 microfarad capacitor to a .0015 microfarad N4200 capacitor at 600 Volts. This is located on the same terminal strip as the resistor. Change the 270K OHM resistor that connects from the center arm of the vertical linearity control to a 330K OHM resistor.

Note: Be certain that the aquadag contact spring has sufficient tension against the picture tube.

Change the integrating network to increase the Vertical Sync. This is done by removing the 2.2K OHM resistor and the .047 MFD capacitor. See diagram.

Change the Vertical Hold network to stabilize the control voltage to the grid of the 12AV5. This is accomplished by changing the 68K OHM resistor on the Vertical Hold control to a 180K OHM and connecting it to the B+. The B+ point is available at the Brightness control. It is recommended that sleeving be used on these leads so that no shorts will develop. The 18K OHM resistor from the Vertical Hold control to ground is changed to 12K OHM. The 270K OHM resistor from the center of the Brightness control is changed to a 150K OHM. See diagram.



PACKARD BELL

MODELS 21DC16, 23DC5, AND 23DC6

CONTROLS AND CONTROL SETTINGS:

Operating controls located on BOTH the wireless remote transmitter and the front panel are: VOLUME w/ON-OFF switch and CHANNEL SELECTOR (HI or LO).

Other operating controls on the front panel are VERTICAL HOLD, BRIGHTNESS, and TONE.

Controls located at the rear of the cabinet are: PICTURE FIDELITY, PHONO VOLUME, AGC, ANI, CONTRAST, FOCUS, HZ DRIVE, HZ HOLD, VT HOLD, HEIGHT, VT LINEARITY, PHONO-TV switch, and "Powerminder" switch.

Operation of controls not mentioned below is considered self-explanatory.

PICTURE FIDELITY control is normally set fully clockwise. This position yields the sharpest picture. However this control, like an audio tone control, should be adjusted to suit the individual viewer.

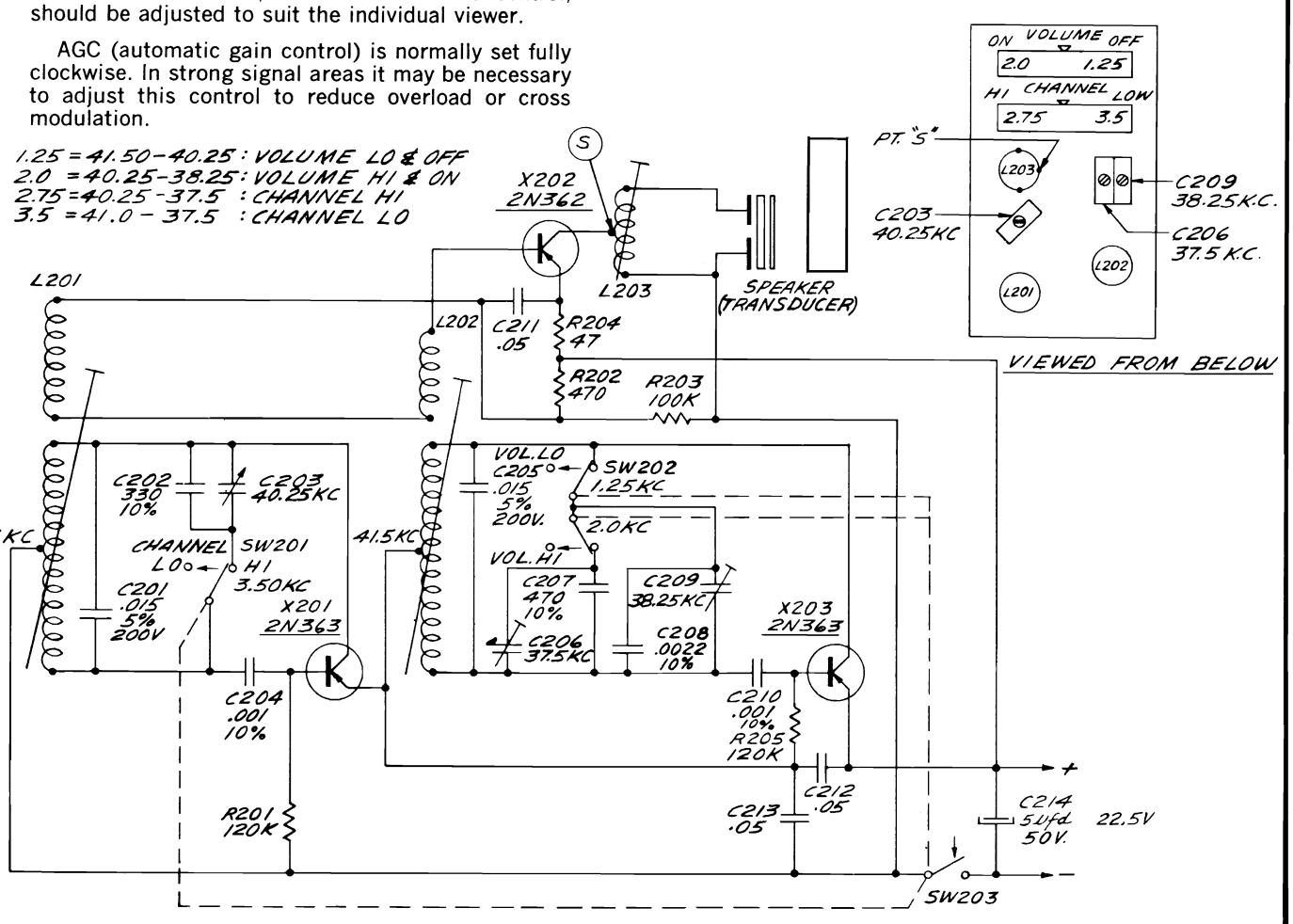
AGC (automatic gain control) is normally set fully clockwise. In strong signal areas it may be necessary to adjust this control to reduce overload or cross modulation.

ANI (automatic noise inverter) control is turned clockwise until the picture tears, then set back to a point located just before tearing begins. Check the setting on all channels to be received. In areas of good reception where there are no problems with sync stability the control may be set fully counterclockwise.

HORIZONTAL DRIVE is turned counterclockwise until drive bar appears and then clockwise until drive bar just disappears.

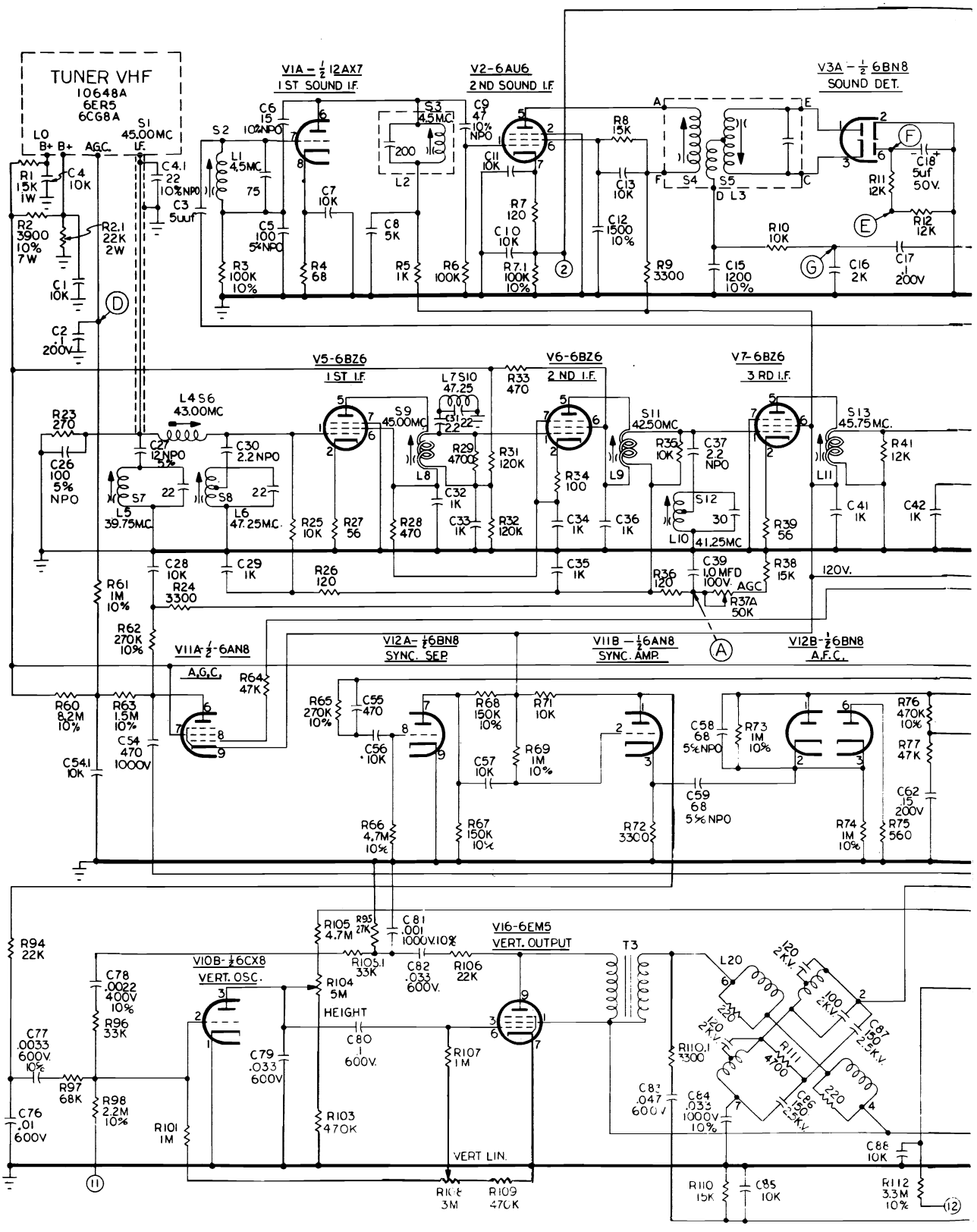
HORIZONTAL HOLD is adjusted so that picture remains in sync when switching from channel to channel.

VERTICAL LINEARITY and HEIGHT controls are adjusted for proper scanning and best linearity. When adjusting these controls it may be necessary to adjust the VERTICAL HOLD because of interaction between the controls.



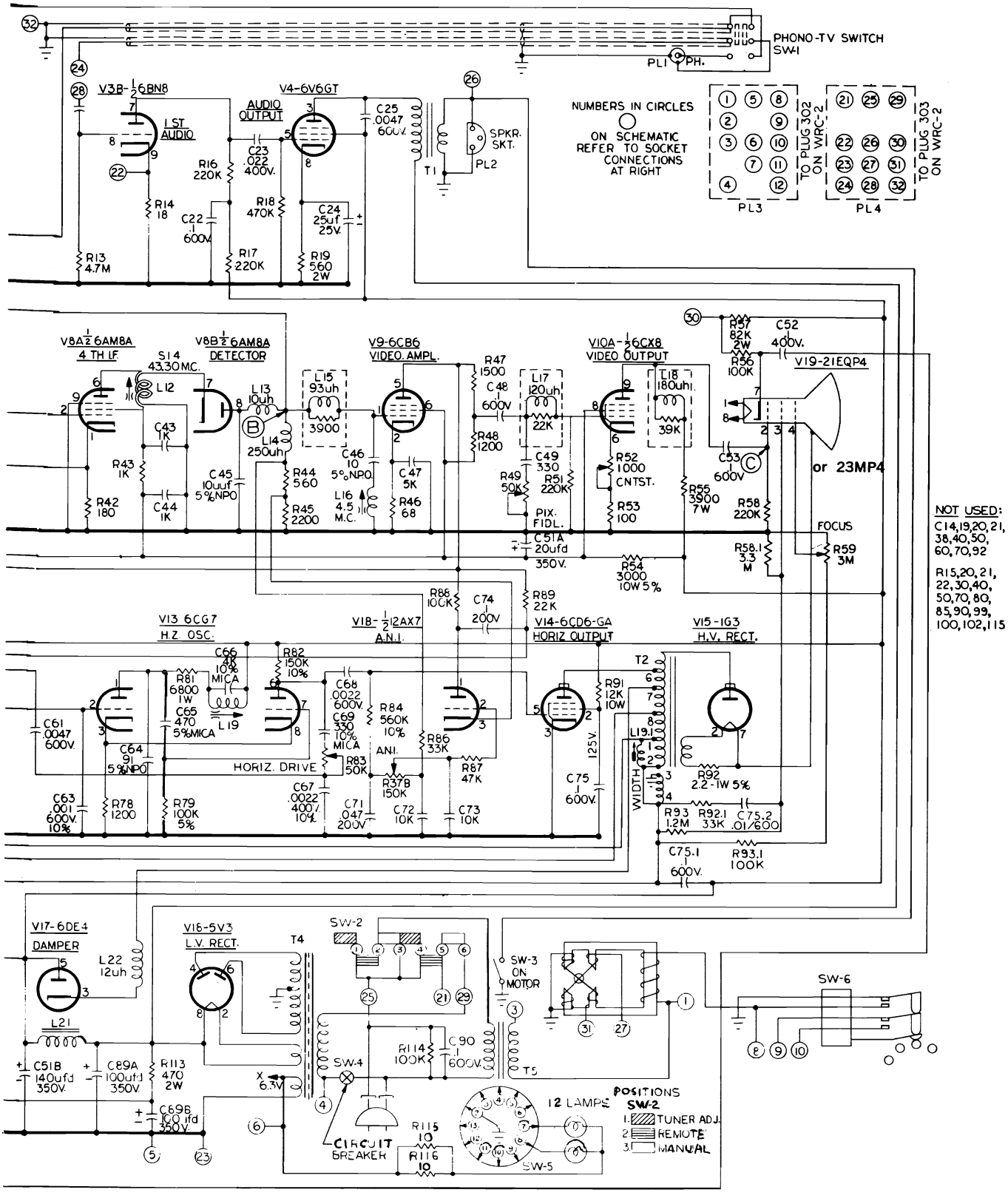
Schematic, Wireless Remote Transmitter WRT-2.

PACKARD BELL Models 21DC16, 23DC5, 23DC6, Chassis 98D6, Diagram



Schematic, Main TV Chassis 98D6.

PACKARD BELL Models 21DC16, 23DC5, 23DC6, Chassis 98D6, Diagram



PACKARD BELL Models 21DC16, 23DC5, 23DC6, Chassis 98D6, Service Material

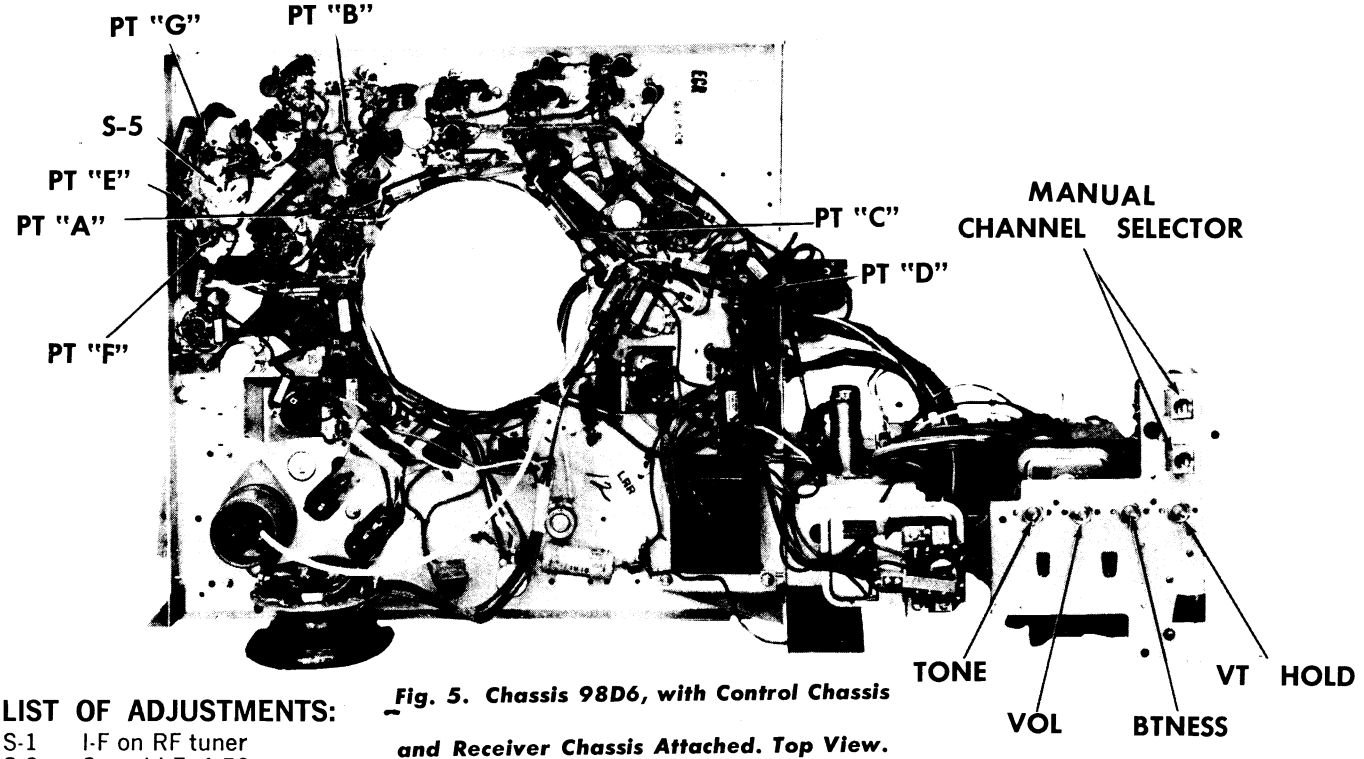


Fig. 5. Chassis 98D6, with Control Chassis and Receiver Chassis Attached. Top View.

LIST OF ADJUSTMENTS:

S-1	I-F on RF tuner
S-2	Sound I-F, 4.50 mc
S-3	Sound I-F, 4.50 mc
S-4	Ratio detector primary
S-5	Ratio detector secondary
S-6	1st picture I-F
S-7	Trap, 39.75 mc
S-8	Trap, 47.25 mc
S-9	2nd picture I-F
S-10	Trap, 47.25 mc
S-11	3rd picture I-F
S-12	Trap, 41.25 mc
S-13	4th picture I-F
S-14	5th picture I-F
S-15	Trap, 4.50 mc
S-16	Horizontal hold

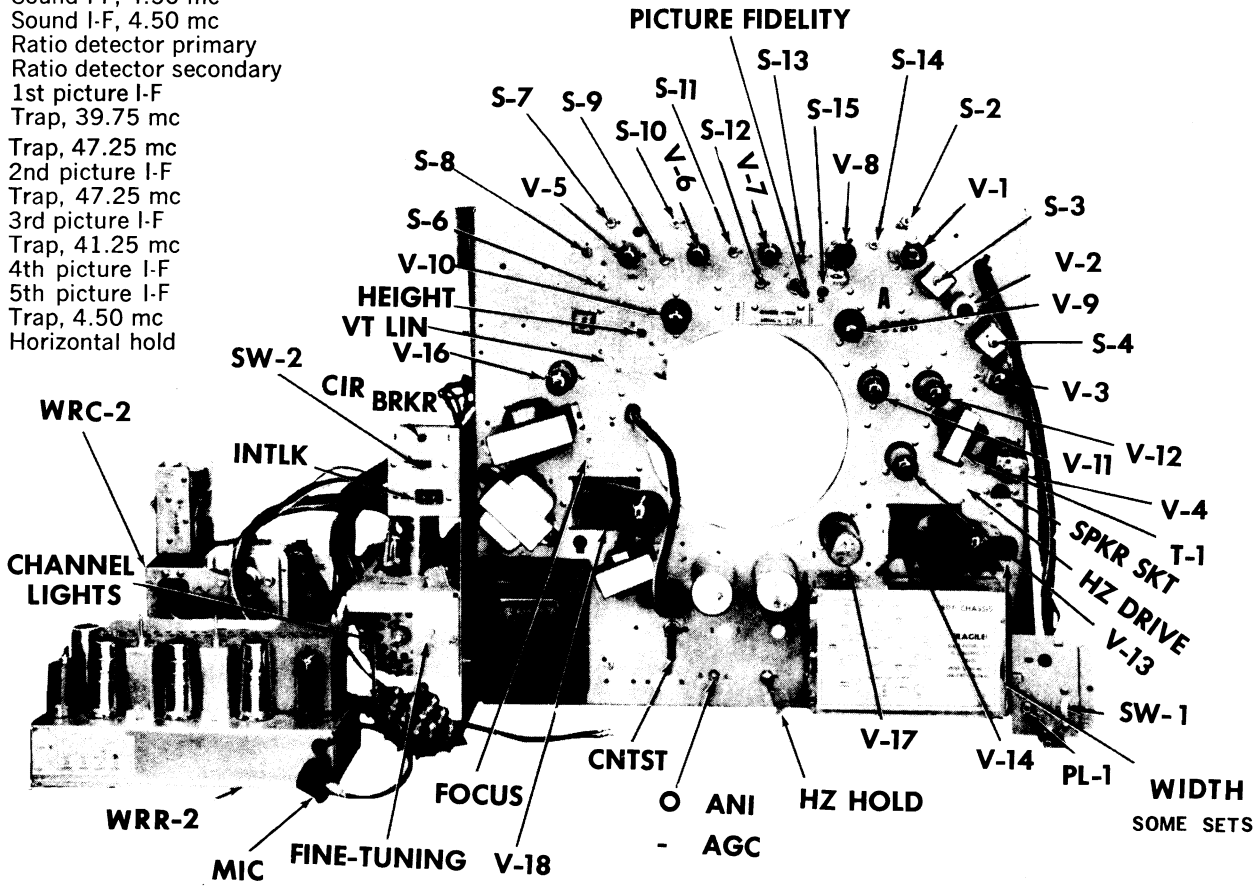


Fig. 6. Chassis 98D6, with Control Chassis and Receiver Chassis Attached. Bottom View.

PHILCO

11N50 SERIES

Description of Chassis Types

11N51 is the basic chassis with 19ABP4.

11N51A has deflection circuits value changes for 23CP4 CRT.

11N52 has remote control installed.

11N52A as above, modified for 23CP4.

11N53 is a Delux chassis with 23CP4.

11N54 as above with remote control.

11N56 similar to above, used in combinations, provisions for AM-FM radio, addition of remote control.

SPECIFICATIONS

Intermediate Frequencies

Video Carrier	45.75 MC
Sound Carrier, V.I.F.	41.25 MC
S.I.F.	4.5 MC
Transmission Line	300 ohm input, twin wire lead
Operating Voltage	108 to 128 volts, 60 cycle, AC
Power Consumption at 120 volt line 11N51	195 watts

Tuner

T104A	Twelve position incremental, VHF only
T105A	Thirteen position incremental, 12 channels plus UHF
T28J	Continuous tuning UHF

PICTURE TUBE REMOVAL

1. Remove chassis.
2. Remove tape dust seal from edge of CRT.
3. Remove 2—¼″ hex screws from right side of CRT mounting bracket.
4. Pull mounting ring back.
5. Remove CRT.

TUNER REMOVAL

To remove the tuner in J3702, 3704, 3706 type models proceed as follows:

1. Remove selector and fine tuning knobs.
2. Remove 2 Phillips screws in channel selector bezel and remove bezel.
3. Remove 2—¼″ hex screws located under tuner shaft.
4. Remove 2—¼″ hex screws located on rear tuner mounting bracket near top of left side panel.
5. Remove tuner.

CHECKING THE HORIZONTAL PHASE COMPARER SELENIUM DIODE (DS ON V.O.S. PANEL)

When servicing television receivers where the dual selenium diode phase comparer is suspected, a fast and efficient method of checking them is this:—

A 20,000 ohm/volt meter is employed. On the 10K scale the forward resistance (meter connected in the same polarity as the diode) should be a maximum of 6000 ohms. The ratio of the forward resistances of the two diodes should be less than 2 to 1. On the 100K scale the back resistance (meter connector in reverse polarity to the diode) should be a minimum of 2 megohms.

The center conductor of the phase comparer unit is the common negative.

11N51 RANGE LOCK (NOISE CONTROL, VR2) SET-UP

The "Noise Control", VR2, listed on the schematic diagram as "Range Lock" adjusts the bias of the noise-inverter stage for optimum performance at all signal levels. The procedure for adjustment is as follows:

1. Adjustments to be made with weak signal. If necessary disconnect antenna from set to obtain weak signal.
2. Shunt the noise control with an 18,000 ohm resistor.
3. Adjust the fine tuning control until slight sound beat appears in picture.
4. Adjust the noise control until the picture appears watery. This condition is due to the noise inverter stage passing some inverted sync signal.
5. Back off the noise control slightly until picture is steady. Then remove 18,000 ohm shunt resistor.

HORIZONTAL OSCILLATOR ADJUSTMENT

Allow set to warm up. Tune in a picture.

1. Short out the horizontal ringing coil, T6, by placing a jumper across C36 by jumping L36 and L39.
2. Set the horizontal hold control, VR5, to the center of its range.
3. Adjust the horizontal hold centering control, VR1B, to set the oscillator to the correct horizontal line frequency (to stop the picture; it will not be stable).
4. Remove the shorting jumper from across C36 and adjust the ringing coil T6 core for stable picture sync.

VIDEO I-F ALIGNMENT 11N51

AM Alignment

1. Connect tuner to receiver.
2. Remove 6BY8 gate tube.
3. Apply—2VDC to tuner AGC bus. (L45) VOS panel.
4. Apply—6V to I-F AGC bus. (L7) I-F panel.
5. Connect scope through 10K to I-F output. (L1) I-F panel.
6. Apply a.m. signal to mixer grid through .001 capacitor.
7. With a.m. signal, 400 cycle a.m. modulated 30% make the following I-F trap and pole adjustments. Input level should keep signal out of overload:
   a. 41.25MC—null with VC3 (bias may be lowered).
   b. 47.25MC—null with VC2 and VC4 (bias may be lowered).
   c. Repeat "B" to insure max. rejection.
   d. 42.75MC—maximize with VC1 and T_2.
   e. 45.0MC—maximize with T3.
   f. 45.75MC—maximize with T_1T (on tuner).
   g. 44.3MC—maximize wtih T1.
   h. Adjustment of all cores should be made from top of coil downward.

PHILCO Chassis 11N50, Alignment Information, Continued

Sweep Alignment

1. Repeat steps 1 to 5 inclusive in a.m. padding procedure.
2. Inject R-F sweep at channel 4 (R-F response should meet tuner specifications). Connect generator to antenna terminals.
3. Set detected sweep level at 3V P.P.
4. Adjust local oscillator for zero beat between R-F pix carrier and 45.75MC I-F pix carrier.
5. Observe sweep response (Figure 1-3) and make the following touch up adjustments:
   a. 45.75MC position adjusted with T_3.
   b. 42.5MC position adjusted with VC1 and T_2.
      If 42.5MC is high, adjust with VC1.
      If 42.5MC is low, adjust with T_2.
   c. Tilt curve tieh T_1.
6. Do not make any adjustments with T1T.

Picture Quality Adjustment

1. Repeat steps 1 to 5 inclusive in a.m. padding procedure.
2. Apply 45.5MC a.m. signal, 400 cycle A.M. 30% modulated to mixer grid through .001 capacitor and make the following adjustment, making sure signal is out of overload:
   a. Maximize with T1T (on tuner).
      NOTE: Due to the broadness of the mixer pole, it may be necessary to use a d.c. meter at the I-F output. Retuning the mixer from 45.75MC to 45.5MC will represent approximately ¼ turn of T1T core downward.
3. Repeat steps 1 to 4 inclusive in Sweep Alignment procedure.
4. Observe sweep response at padding bias (figure 1-4).
5. Remove I-F and tuner bias (replace 6BY8 gate tube) and observe sweep response (figure 1-5). Det. level 1.V P.P.
6. Make no additional adjustments.

4.5 MC TRAP ALIGNMENT

1. Inject 4.5 MC AM signal into L43 or use station signal.
2. Connect 4.5 MC detector (see circuit figure 1-2) to L31 (pin 7 of CRT).
   NOTE: Preliminary padding of 4.5 MC test detector—Connect detector to an accurate source of 4.5 MC signal and pad core of transformer for maximum DC output voltage.
   NOTE: When using generator, calibrate by zero beating with sound I-F developed from station signal.
3. Connect 20,000 ohms/volt meter, set to 2.5 volt range, to detector output.
4. Turn contrast control fully clockwise (to maximum).
5. Adjust 4.5 MC trap (bottom core of T7) for minimum indication.

SOUND I-F ALIGNMENT

NOTE: The sound I-F alignment is based upon a properly aligned video I-F strip.

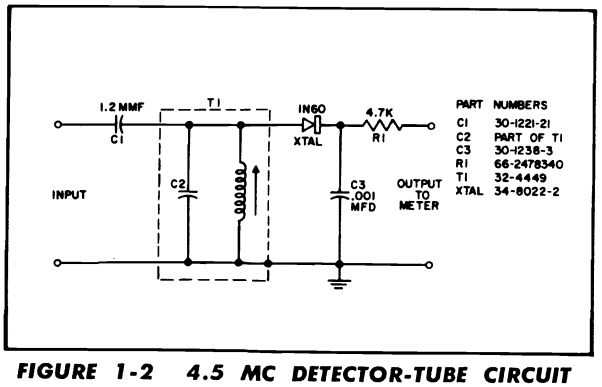


FIGURE 1-2 4.5 MC DETECTOR-TUBE CIRCUIT

1. With a weak station signal (antenna disconnected) tune receiver for best possible picture. Do not readjust fine tuning control during balance of procedure.
2. With a strong signal (antenna connected) adjust the quadrature coil T4, for maximum sound.
3. Connect a VTVM to the audio test point, L28. Be sure volt meter probe contains an isolation resistor. (If it is required to add a probe isolating resistor, use a value of 10,000 ohms or more). Using a weak station signal (antenna disconnected), adjust the sound take-off coil (top core of T7) and the sound interstage transformer. T5 (both pri. and sec. cores), for maximum. The station signal employed should not be too weak for this adjustment.
4. If any signs of intercarrier buzz or noise interference occur, a very slight adjustment of T5 and/or the top core of T7 may be made to minimize the noise. Neither core should be adjusted more than ¼ turn; if more adjustment appears necessary, re-check the sound alignment.

TUNER, OSCILLATOR ALIGNMENT T-100 & T-101

AM GENERATOR: Connect to receiver antenna-input terminals (no matching network is required). Use 30% modulated signal.
PRE-SET: Fine tuning control to middle of its range.
OSCILLOSCOPE: Connect to L43, video detector output, on V.O.S. panel.
NOTE: This procedure uses the traps of the video I-F channel. Proper oscillator adjustment is therefore dependent upon an accurately aligned I-F strip.

STEP	AM. GEN. FREQ.	TUNER POSITION	ADJUST FOR MIN.
1	209.75 mc	Channel 13	T7T
2	203.75 mc	Channel 12	VC9
3	197.75 mc	Channel 11	VC8
4	191.75 mc	Channel 10	VC7
5	185.75 mc	Channel 9	VC6
6	179.75 mc	Channel 8	VC5
7	173.75 mc	Channel 7	VC4
8	81.75 mc	Channel 6	T6T
9	75.75 mc	Channel 5	T5T
10	65.75 mc	Channel 4	T4T
11	59.75 mc	Channel 3	T3T
12	53.75 mc	Channel 2	T2T

UHF CROSSOVER NETWORK

A UHF-VHF antenna crossover network is available for use with the 11N51 series chassis sets. This network should be ordered through your Philco Distributor by part no. 426-3034.
This UHF-VHF crossover kit is complete with mounting hardware and installation instructions.

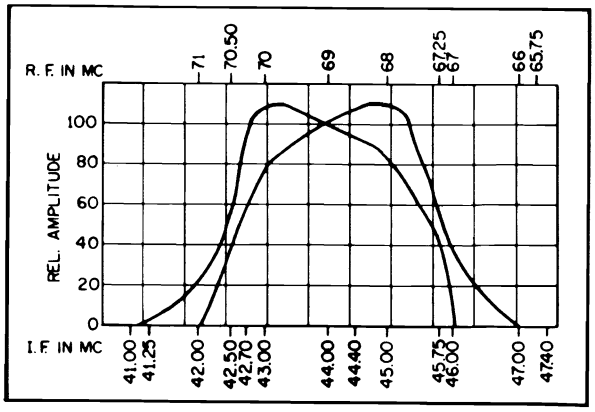


FIGURE 1-3 OVERALL R-F, I-F RESPONSE CURVE, CHANNEL 4

PHILCO Chassis 11N50, Alignment Information, Continued

TUNER BANDPASS ALIGNMENT TABLE

SWEEP (FM) GENERATOR: Connect to receiver antenna input circuit through an antenna-input matching network (generator to 300 ohm antenna).

SCOPE: Connect a high gain scope to L6T (mixer screen by-pass). Connect the ground lead to a convenient tuner ground near the test point.

RANGE SWITCH: Set to "NORMAL" position.

BIAS: Inject—1.5 volts to L34 (tuner A.G.C. terminal on the video-sound panel).

TUNER CIRCUIT ALTERATION: De-tune tuner I-F pole (T3T) by shunting with a condenser (approx. 10 to 20 mmf) or by swamping T3T with a resistor (approx. 470-1000 ohms) shunted across the coil.

STEP	SWEEP (FM) GENERATOR		RECEIVING TUNING	ADJUST	REMARKS
	SWEEP DIAL SETTING	MARKER DIAL SETTING			
1	Channel 13 (213 mc. with 10-mc. sweep width)	Set first to 210 mc. and note position of marker on response curve. Then set to 216 mc. and note position of marker on response curve.	Channel 13	Adjust antenna coil T25T for maximum output. When interstage is set properly, antenna coil should just reach curve. Once this is set proceed with interstage adjustments.	Use osciloscope gain as high as possible with respect to hum level and "bounce." Pips fix channel limits on curve. Response curve should be flat between limits (See figure 1-4). If not, proceed with step 2.
2	Channel 13	213 mc.	Channel 13	Adjust T19T and T13T for symmetrical bandpass. Then adjust gimmick until bandpass agrees with figure 3A.	CAUTION: Care must be taken not to unscrew core far enough to make it drop out of the coil.
3	Channel 7 (177 mc. with 10-mc. sweep. width)	Set first to 174 mc. and note position of marker on response curve. Set to 180 mc. and note position of marker on response curve.	Channel 7		Note curve with respect to tilt and center frequency. Curve should be centered in pass band and symmetrical. If not, proceed with step 4.
4	Channel 7	174 mc. and 180 mc.	Channel 7	VC1 and VC2 to obtain correct tilt on top of curve.	VC-1 and VC-2 compensate for the tuning effect of Channel 13 adjustment upon Channel 7
5	Channel 13	213 mc.	Channel 13	Retouch T19T of WS3 and T13T of WS2 for symmetrical response, centered about 213 mc. markers.	To retouch, only turn cores slightly.
6	Channel 7	174 mc. and 180 mc.	Channel 7	Repeat step 4.	Check response curve for correct center frequency and symmetry.
7				Repeat steps 5 and 6.	Repeat Channel 13 and Channel 7 adjustments alternately until favorable curves are obtained on both.
8	Channel (85 mc. with 10-mc. sweep width)	Set first to 82 mc. and note position of marker on response curve. Then set to 88 mc. and note position of marker on response curve.	Channel 6		Sound carrier should be equal to or less than video carrier but no greater than 30% down.
9	Channel 6	85 mc.	Channel 6	T12T of WS2 counterclockwise until single peak appears.	CAUTION: Care must be taken not to unscrew core far enough to make it drop out of the coil.
10	Channel 6	85 mc.	Channel 6	T8T of WS3 until peak falls on 85 mc. marker.	It may be necessary to increase sweep-generator output.
11	Channel 6	85 mc.	Channel 6	T24T of WS4 for maximum curve height and symmetry of single peak.	
12	Channel 6	85 mc.	Channel 6	Retouch T8T of WS3 and T12T of WS2 for symmetrical response centered about 85 mc. marker.	To retouch, only turn cores slightly.
13	UHF I-F (43.5 mc., AM)		UHF	T30T for a flat response.	Connect generator to UHF input cable. Tuner T101 only.

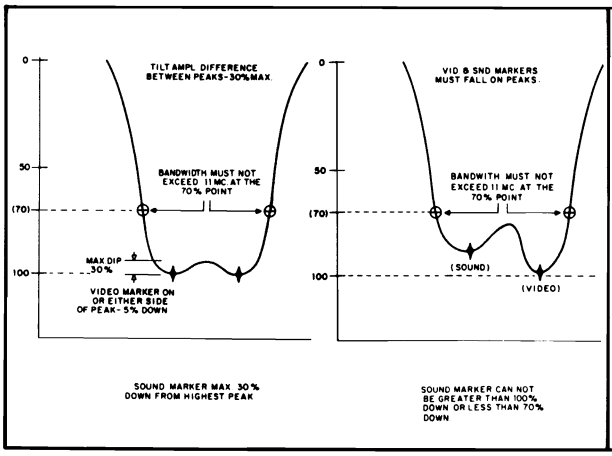


FIGURE 1-4 TUNER RESPONSE CURVE, SHOWING BANDPASS LIMITS

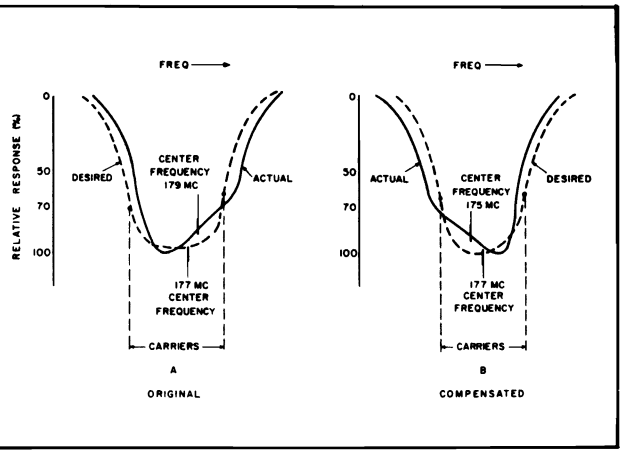
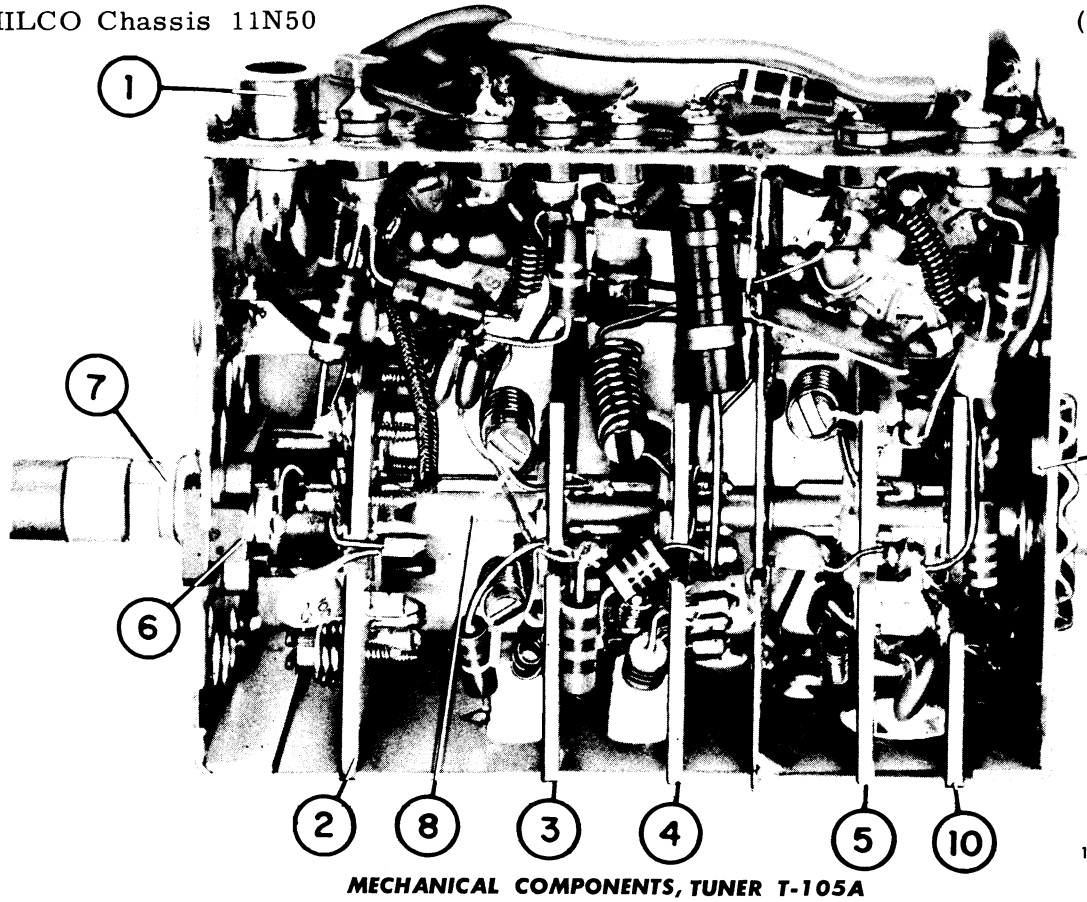


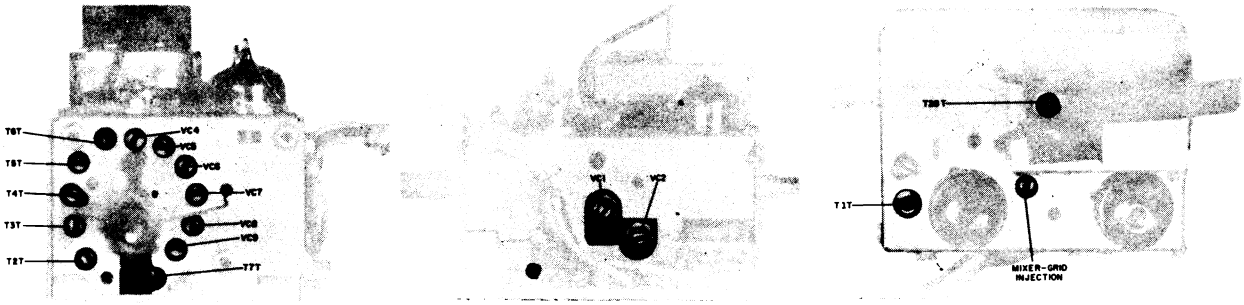
FIGURE 1-5 TUNER RESPONSE CURVE, SHOWING TRACKING COMPENSATION, CHANNEL 7

PHILCO Chassis 11N50 (Continued)

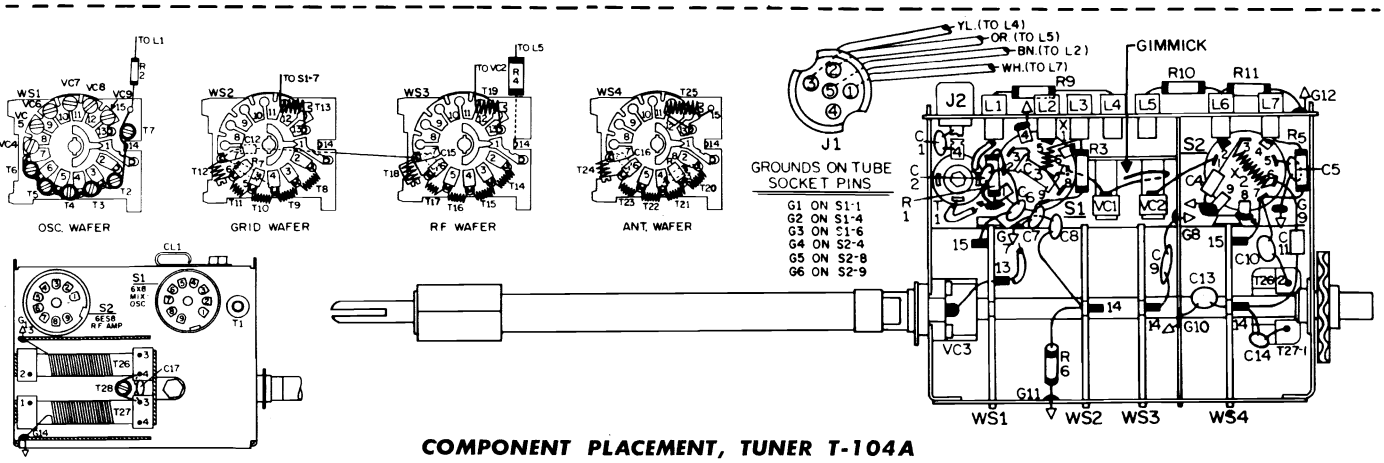


1 Connector I-F output
2 Oscillator wafer WS1
3 Mixer grid wafer WS2
4 R-F plate wafer WS3
5 Antenna wafer WS4
6 Fine tuning assembly
7 Shaft, fine tuning
8 Shaft, and detent
9 Detent ball
10 Auxiliary wafer

MECHANICAL COMPONENTS, TUNER T-105A

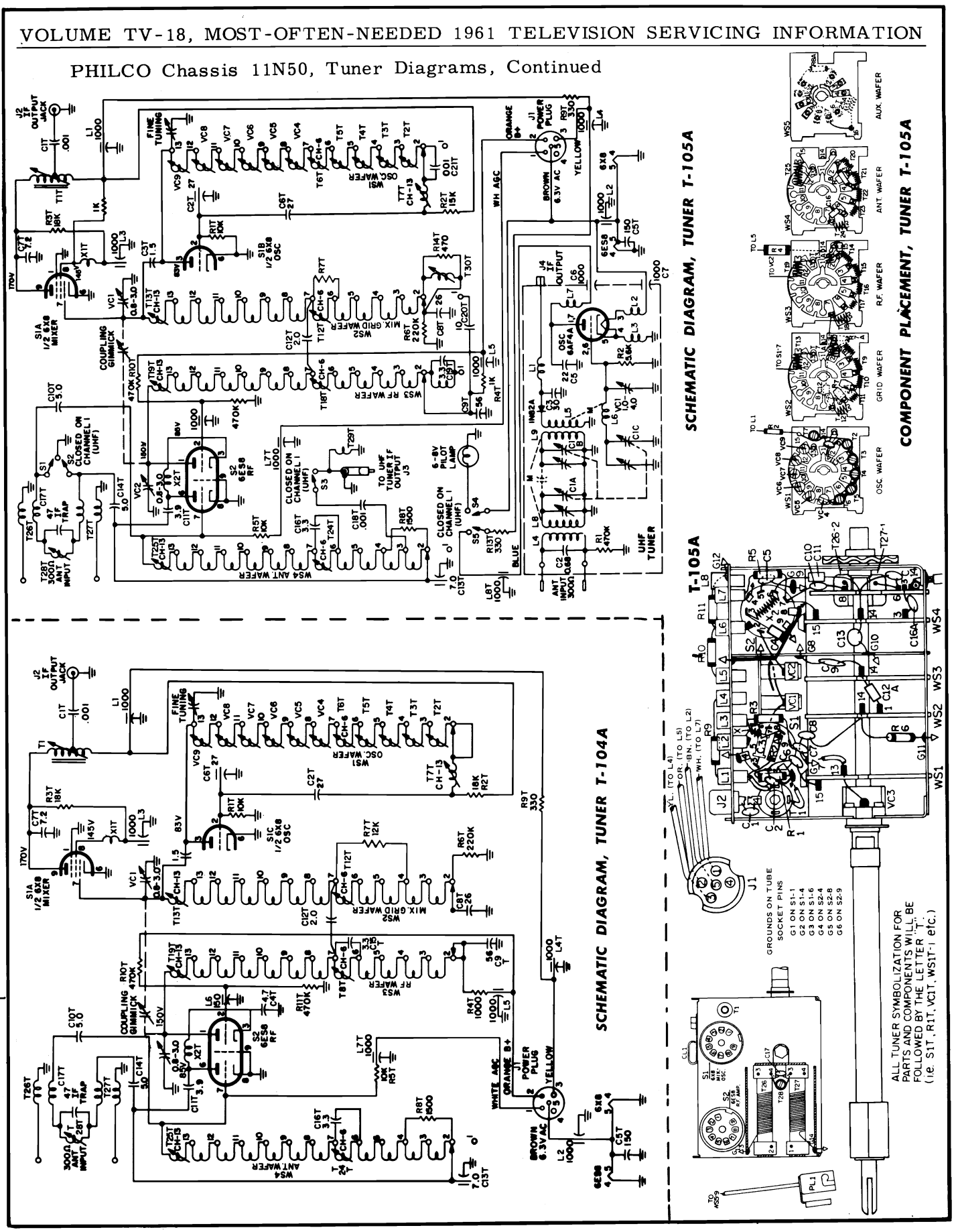


ADJUSTMENT LOCATIONS, TUNER T-104A & T-105A



COMPONENT PLACEMENT, TUNER T-104A

PHILCO Chassis 11N50, Tuner Diagrams, Continued



PHILCO Chassis 11N50, Service Information, Continued

CRITICAL LEAD DRESS

A. To Prevent Corona

1. S-13 socket must be free of solder points and sharp wire ends.
2. Lead from S13 caps must be at least ¾" from any metal of H.V. cage.
3. Filament leads from H.O.T. to S13 must have slack (if any) dress down toward base away from glass bulb of 1G3 tube.
4. All leads from H.O.T. coil to Y.S. must be free of each other and dress away from any metal parts.
5. Lead from S12 cap must be dressed at least ½" away from H.O.T. winding.
6. Leads from Y.S. 8 & 9 and brown damper lead must be dressed under lugs CL15 & CL16 away from winding of H.O.T.
7. Leads from lugs 4 & 5 on H.O.T. panel must dress under CL17 and away from winding of H.O.T.
8. All leads must be dressed clear of L49 & S11-3.
9. Leads from S12 and S13 caps must be at least ½" apart.

B. To Prevent Pinched Leads

1. Leads from L1, L2, L3, L5 & L7 must dress thru nearest cutouts provided in I-F shield.
2. All leads from H.O.T. must be dressed thru cut-outs provided in H.V. cage.
3. All leads in region between I-F panel and H.V. cage must dress between F.C. & I-F panel under dress lugs CL3 & CL4.
4. All leads from secondary controls, on-off-volume and contrast control must dress thru CL11 except leads from on-off switch which should be twisted together and taped to volume control cable just before it goes thru CL11. All other leads must dress under CL7, CL6, CL5, CL2, & CL1 to respective wiring points.
5. Leads from L5 & L7 must dress thru slots C & D to clear foot of I-F shield.

C. To Prevent Lead Burning and 4.5 Beat

1. All leads must be dressed away from hot resistor WR1, WR2, WR3, WR4, F1, & R62. R62, WR2, WR3, & WR4 must dress on VOS panel side of panel B4 and all wires on opposite side of panel B4.
2. All leads which wire to lugs in middle of VOS panel must be dressed so as not to touch WR1, R16, R22, R31, R37, R39, & R49.
3. Leads to L33, & L35 must dress between VOS panel and B1, T7 & L41 to wiring points.
4. Brown lead from CRTS must dress thru slots "B" & "A" under CL1 and along front edge of VOS panel to wiring point at B1-5. (11N51 & 11N52 only).
5. All CRTS leads should dress thru slots "B" & "A" under CL1 to wiring points.
6. Leads to L15 must dress between L10 & C19.
7. Lead from E2-1 to L41 should dress down on VOS panel away from R49.
8. Brown lead from H.O.T. #8 must dress along front edge of chassis under CL7, CL6, CL5, & CL2 to L13.
9. Lead to L27 must not touch R31.
10. Fuse F2 must be dressed above all wires and B1.
11. WR1 must have crimped leads and body must not touch VOS panel.
12. Red lead from VR4-3 to L21, orange lead from L29 to L25 & CRTS cable must dress thru slots "B" & "A" and under CL1 to wiring points.

D. To Prevent Pickup

1. Tuner power cable must dress under CL8, CL9 & CL10.
2. Bare portion of I-F link to tuner must be clamped under dress lug CL12 provided at end of I-F shield.
3. Green C.W. from L1 to L43 should be free from all other leads and away from subbase.
4. Leads from VR9-4 & 5 must be twisted together for approximately 8 twists in length from VR9-4 & 5, to CL11.
5. Yellow CRTS lead should be free from all other leads.

E. To Protect Rectifiers and Underwriters Requirements

1. Body of D2 & D3 must be dressed away from subbase and B2-2 & 4 by ¼" and all leads must be at least ¼" away from D2 & D3.

G. To Prevent Depading of Sound

1. All leads must be dressed clear of quad coil T4 and condenser C20 across quad coil.

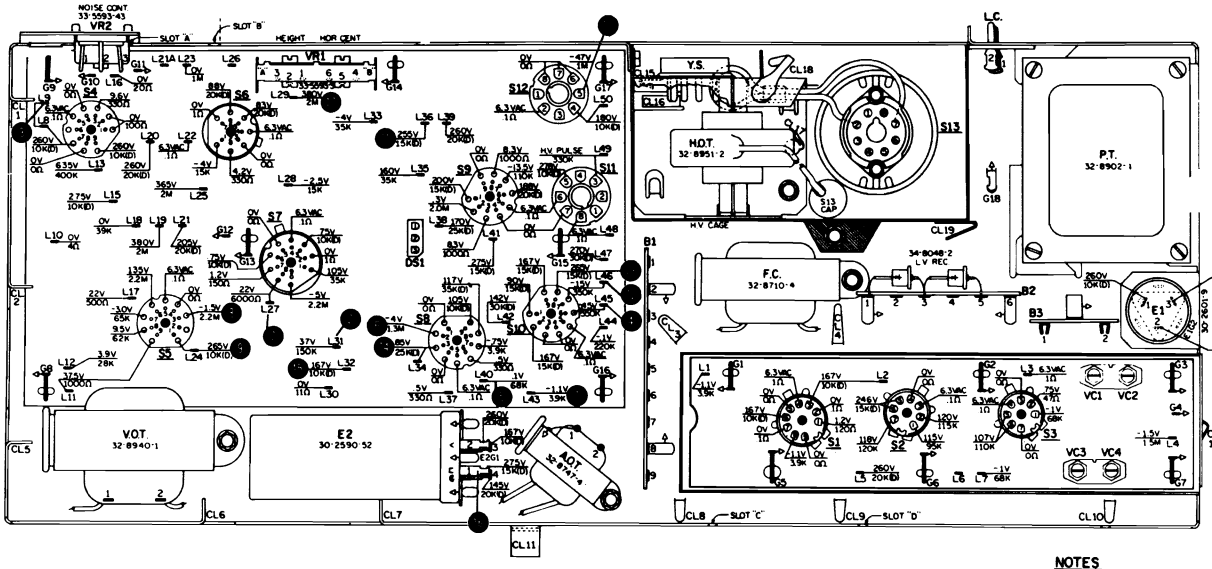
H. To Facilitate Mounting of Secondary Control Bracket. (11N51 & 11N52)

1. All leads from secondary controls must dress under CL13 and must dress clear of bracket mounting holes.

J. Miscellaneous

1. Tuner power cable and tuner link cable must dress under lug on front of tuner mounting bracket.
2. Speaker cable & volume control cable must dress under lug on volume control bracket.
3. Slack of volume control cable and secondary control cable must dress along front edge of chassis between chassis and under CRT.
4. Dress anode lead and yoke cable under CL18 on top of H.V. cage with slack if any under CL18 and on top of H.V. cage.
5. Twin lead from tuner must dress thru fishpaper strain relief piece on tuner from back to front with lugs pointing into cabinet so that lead cannot touch any hot parts.
6. CRT cable must dress under lug CL20 so that lug grounds aluminum tape on CRT cable. Aluminum tape on CRT cable must not touch lug on vertical lin. pot. (VR3).
7. Yellow lead of CRTS must be dressed free of all leads and away from 6DQ6B horizontal output tube.

PHILCO Chassis 11N50, Service Information, Continued



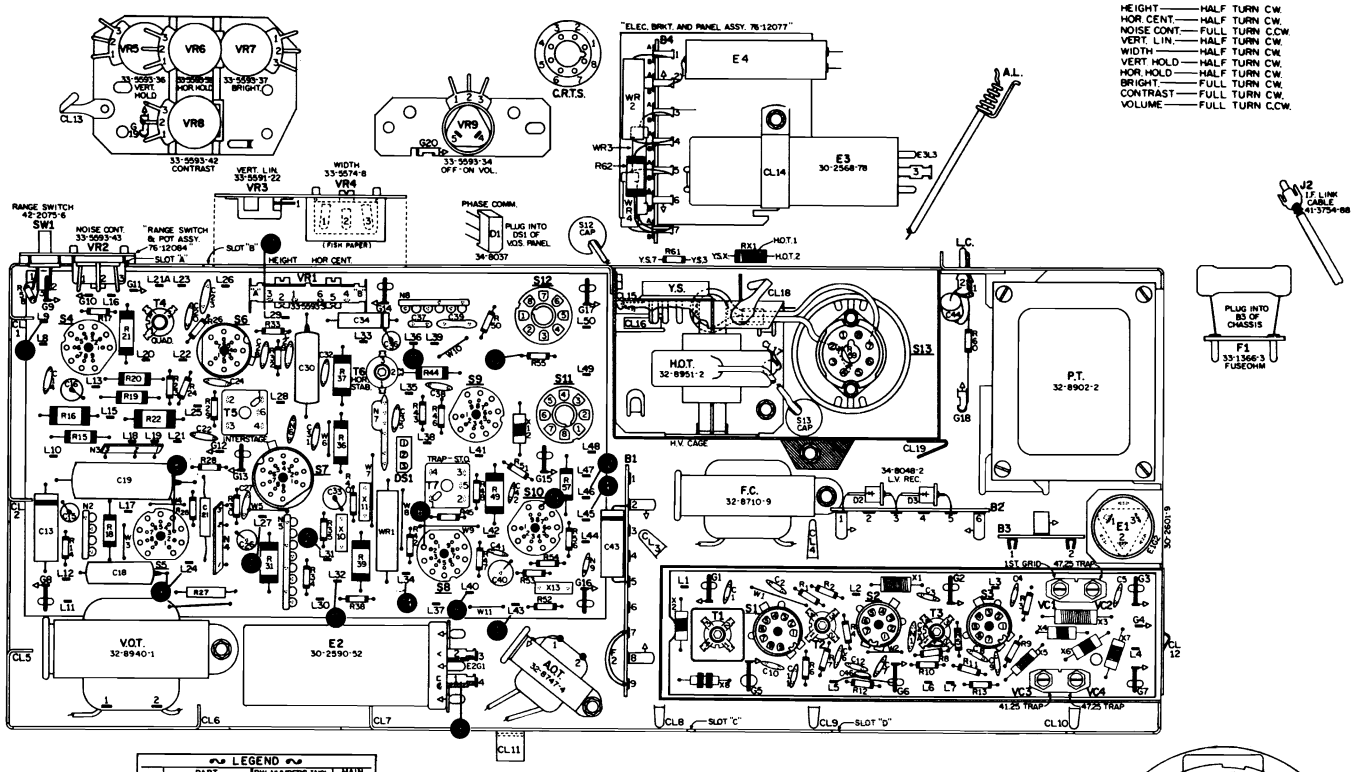
VOLTAGE & RESISTANCE READINGS, TELEVISION CHASSIS 11N51

NOTES

ALL VOLTAGE AND RESISTANCE MEASUREMENTS SHOWN ON THIS DRAWING, ARE MADE WITH NO SIGNAL ON ANTENNA AND THE YOKE PLUGGED INTO (Y.S.) YOKE SOCKET.

VOLTAGE READINGS ARE TAKEN UNDER THE FOLLOWING CONDITIONS, USING A V.T.V.M. WITH 11MEGOHM INPUT RESISTANCE.

HEIGHT — HALF TURN C.W.
HOR CENT — HALF TURN C.W.
NOISE CONT — FULL TURN C.CW.
VERT. LIN. — HALF TURN C.W.
WIDTH — HALF TURN C.W.
VERT HOLD — HALF TURN C.W.
HOR HOLD — HALF TURN C.W.
BRIGHT. — FULL TURN C.W.
CONTRAST — FULL TURN C.W.
VOLUME — FULL TURN C.CW.



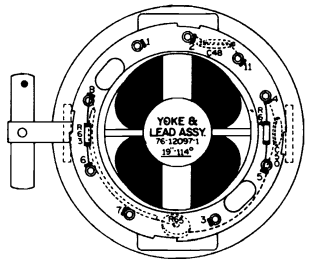
LEGEND

CODE	PART DESCRIPTION	PW. NUMBERS INCL. V.I.F.	PW. NUMBERS INCL. V.O.S.	MAIN CHASSIS NOS. INCL.
B	WIRING PANEL	-	-	1 TO 5
C	CAPACITOR	1 TO 12	13 TO 42	43 TO 50
CL	CLIP OR CLAMP	-	-	1 TO 19
D	DIODE	-	1	2 TO 3
DS	DIODE SOCKET	-	1	-
E	ELECTROLYTIC	-	-	1 TO 3
F	FUSE	-	-	1 TO 2
G	GROUND	1 TO 7	8 TO 17	18 TO 20
L	UNGROUNDED LUG	1 TO 7	8 TO 50	-
N	NETWORK	1	2 TO 9	-
R	RESISTOR	1 TO 13	14 TO 57	58 TO 65
RX	RESISTOR CHOKE	-	-	1
S	TUBE SOCKET	1 TO 3	4 TO 12	13
T	COIL	1 TO 3	4 TO 7	-
VC	VARIABLE CAPACITOR	1 TO 4	-	-
VR	VARIABLE RESISTOR	-	1	2 TO 9
W	STRAP WIRE	1 TO 2	3 TO 11	-
WR	WIREWOUND RES.	-	1	2 TO 4
X	CHOKE	1 TO 8	9 TO 13	-

TUBE COMPLEMENT

TUBE SOCKET	TUBE TYPE	USED IN	USAGE
S1	6HJ8	V.I.F.	3RD I.F. & DET.
S2	6DK6	V.I.F.	2ND. I.F.
S3	6BZ6	V.I.F.	1ST I.F.
S4	6BQ5	V.O.S.	AUDIO OUT.
S5	6DR7	V.O.S.	VERT. OSC. & VERT. OUT.
S6	6CS6	V.O.S.	SOUND DET.
S7	6EA8	V.O.S.	R.F. & 4.5 AMP.
S8	6AW8A	V.O.S.	S.S. & VID. OUT.
S9	6CG7	V.O.S.	HOR. OSC.
S10	6BY8	V.O.S.	A.G.C. GATE
S11	6DE4	V.O.S.	DAMPER
S12	6DQ6B	V.O.S.	HOR. OUT.
S13	1G3GT	Chassis	H.V. REC.

J1 41-4269-14 TUNER POWER CABLE



COMPONENT PLACEMENT, TELEVISION CHASSIS 11N51

PHILCO

SCHEMATIC DIAGRAM, TELEVISION CHASSIS 11N51

VIDEO IF PANEL

VOS PANEL

IF PANEL

BOTTOM VIEW

VIDEO I-F PERMA-CIRCUIT PANEL

OSCILLOSCOPE WAVEFORM PATTERNS

1. These waveforms were taken with the receiver adjusted for an approximate peak-to-peak output of 4.0 volts at the video detector. The voltages given are approximate peak-to-peak values. The frequencies shown are those of the waveforms—not the sweep rate of the oscilloscope. They were taken with an oscilloscope having good high-frequency response. With oscilloscopes having poorer response, the peaks of the horizontal waveforms will be more rounded than those shown, and the peak-to-peak voltages will differ.
2. Voltage readings taken with rastar just filling screen.
3. Contrast maximum—all other controls midrange.

VIF PANEL

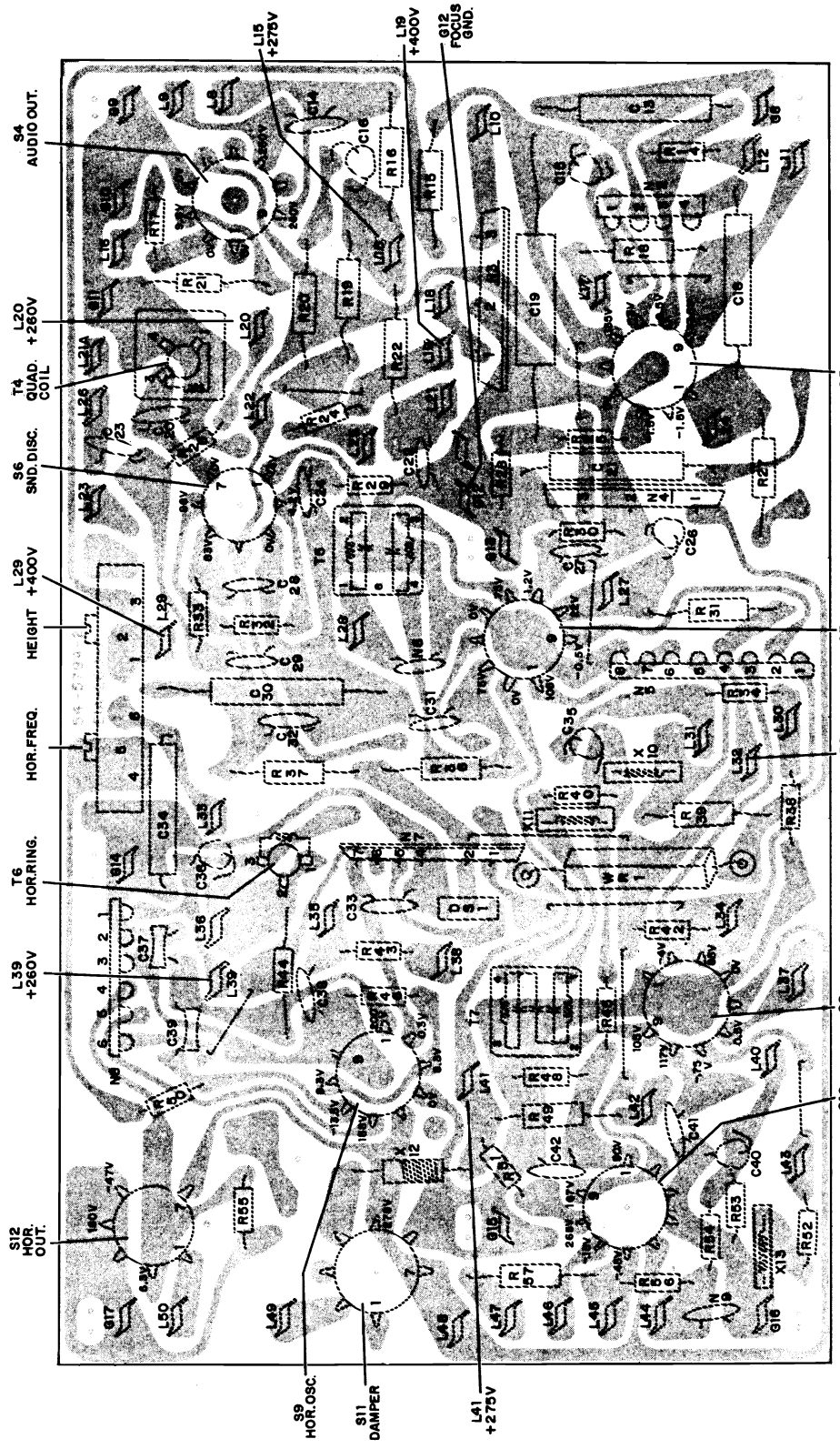
- L1 Lead to L43 VOS panel, white with green tracer
- L2 Lead to terminal strip B4-1B, white with orange tracer
- L3 Lead to terminal strip B1-9, white with brown tracer
- L4 I-F output
- L5 Lead to electrolytic capacitor E2-2, white wire with blue tracer
- L6 No connection
- L7 White wire to L40 VOS panel

PHILCO Chassis 11N50, Service Information, Continued

PANEL LUG CONNECTIONS

VOS PANEL

L8 Red wire to A.O.T.
L9 Blue wire to A.O.T.
L10 Lead to V.O.T., white with green tracer
L11 White lead to E1-3
L12 Lead to VR5-2, white with yellow tracer
L13 Lead to P8, horizontal yoke, white with brown tracer
L15 Lead to E2-1, white with red tracer
L16 Green wire to VR9-2
L17 White wire to VR3-1
L18 Leads to CRT socket, white with green tracer to pin 3, white with red tracer to pin 4
L19 Lead to L29, white with orange tracer, lead to E4-1, white with orange tracer
L20 Lead to E2-2, white with blue tracer
L21 Lead to VR4-3, white with red tracer
L22 Lead to B1-9, white with brown tracer
L23 Blue lead to VR9-3
L24 Blue lead to V.O.T.
L25 Lead to CRT socket, white with orange tracer, pin 5
L26 No connection
L27 Lead to VR2-2, white with red tracer
L28 No connection
L29 Lead to L19, white with orange tracer
L30 Lead to VR7-2, white with orange tracer
L31 Lead to CRT socket, white with yellow tracer, pin 7
L32 Lead to E2-3, white with yellow tracer
L33 Lead to VR6-3, white with blue tracer
L34 No connection
L35 Lead to VR7-1, white with green tracer
L36 No connection
L37 Lead to VR8-2 & 3, white with blue tracer
L39 Lead to B4-7B, white with blue tracer
L40 White wire to L7 VIF panel
L41 Lead to L47, white with black tracer
L42 Lead to E1-2, white with orange tracer
L43 Lead to L1 VIF panel, white with green tracer
L44 White lead to gate-winding, 680K resistor to B1-2
L45 White lead to B1-5, white lead to J1-1
L46 Lead to gate-winding, white with blue tracer
L47 Lead to L41, white with black tracer; lead to B4-3B, white with red tracer
L48 Lead to B1-9, white with brown tracer
L49 Brown lead to horizontal yoke
L50 Lead to VR4-2, white with orange tracer



MODEL-CHASSIS CROSS REFERENCE

MODEL	CHASSIS	TUNER	CRT
J3049L	11H25	76-11971-1	17DRP4
UJ3049L	11H25U	76-12004-1	17DRP4
J3208	11J27	76-11971-1	19APB4
J3210PL	11J27	76-11971-1	19APB4
UJ3210PL	11J27U	76-12004-1	19APB4
UJ3210PL	11J27	76-11971-1	19APB4
J3212AQ	11J27	76-11971-1	19APB4
UJ3212AQ	11J27U	76-12004-1	19APB4
J3212G	11J27	76-11971-1	19APB4
UJ3212G	11J27U	76-12004-1	19APB4
J3212GL	11J27	76-11971-1	19APB4
UJ3212GL	11J27U	76-12004-1	19APB4
J3214SG	11J27	76-11971-1	19APB4
J3214WL	11J27	76-11971-1	19APB4
UJ3216SG	11J27U	76-12004-1	19APB4
UJ3216WL	11J27U	76-12004-1	19APB4

11J27 CHASSIS AND CRT REMOVAL

1. Remove back—7 screws, four at top and three at bottom.
2. Remove front (safety window, bezel and CRT), disconnect yoke socket, CRT socket and anode lead. (Remove five drive screws).

NOTE: CRT is mounted to front and must come out when front is removed.

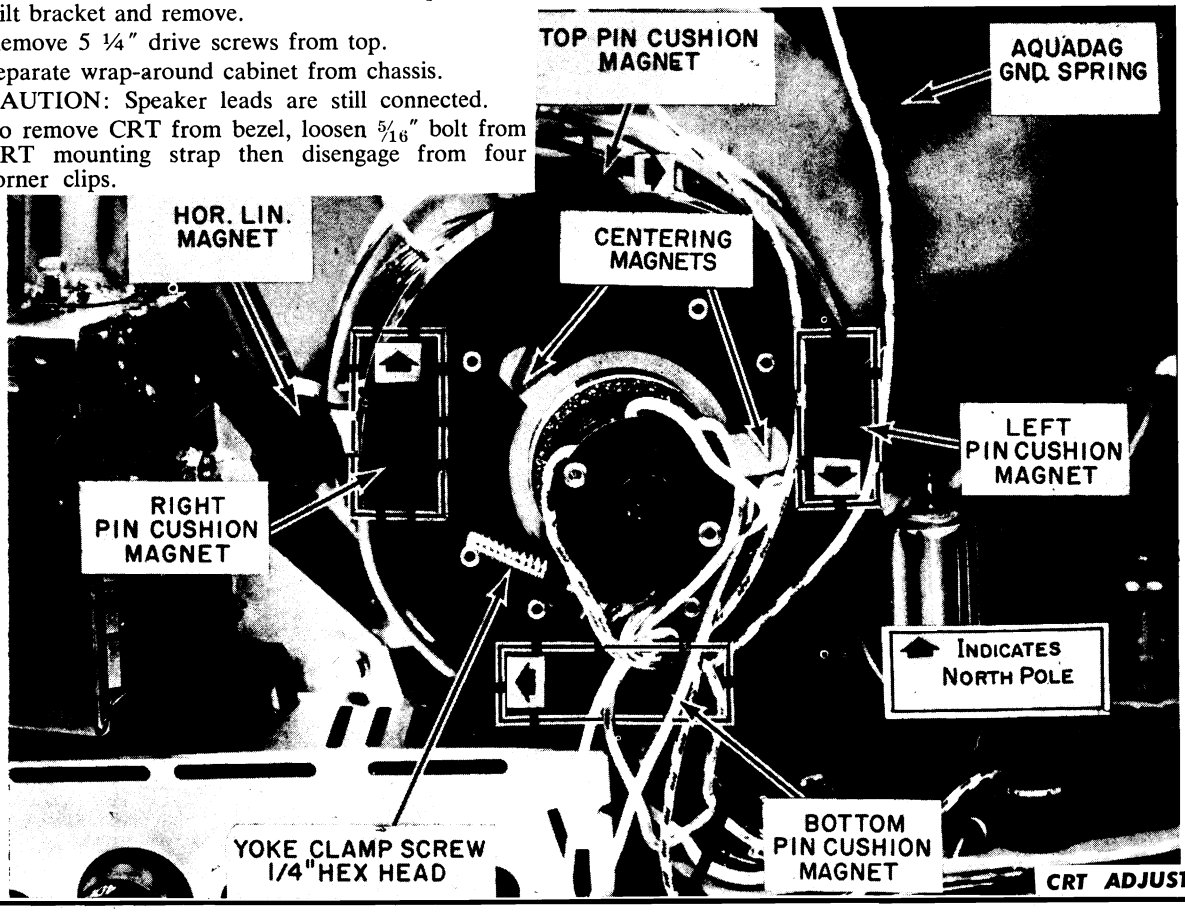
3. Remove Knobs.
4. Remove the five $\frac{5}{16}$" drive screws from cabinet bottom.
5. Remove one ¼" drive screw from right rear side and one ¼" drive screw from left rear side.
6. Remove two ¼" drive screws from rear top bracket. Tilt bracket and remove.
7. Remove 5 ¼" drive screws from top.
8. Separate wrap-around cabinet from chassis.
   CAUTION: Speaker leads are still connected.
9. To remove CRT from bezel, loosen $\frac{5}{16}$" bolt from CRT mounting strap then disengage from four corner clips.

PHILCO

11H25 CHASSIS AND CRT REMOVAL

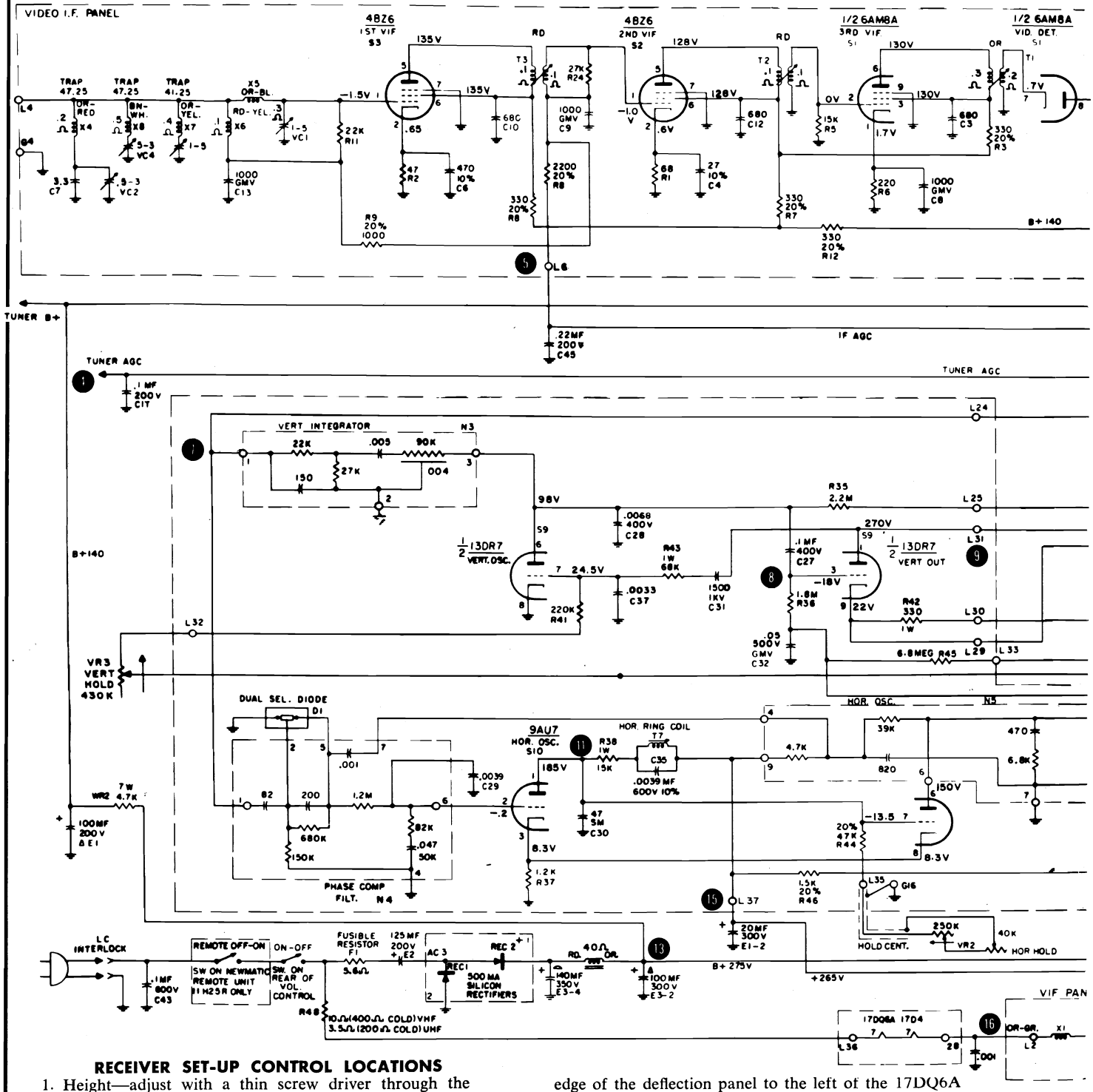
1. Remove back—7 screws, four at top and three at bottom.
2. Remove front (safety window and bezel) five screws, one on each side and three at bottom. Free front from bottom and then disengage from top.
3. Remove Knobs.
4. Remove the five $\frac{5}{16}$" drive screws from cabinet bottom.
5. Remove one ¼" drive screw from right rear side and one ¼" drive screw from left rear side.
6. Remove two ¼" from rear top bracket. Tilt bracket and remove.
7. Remove five ¼" drive screws from front top.
8. Separate wrap-around cabinet from chassis.
   CAUTION: Speaker leads are still connected.
9. Disconnect anode lead and CRT socket.
10. Remove four ¼" drive screws from front that mounts CRT bracket to chassis frame.
11. Remove CRT assembly from front.
    CAUTION: Yoke leads are still connected.

NOTE: CRT may be removed from front without removing back.



CRT ADJUSTMENTS

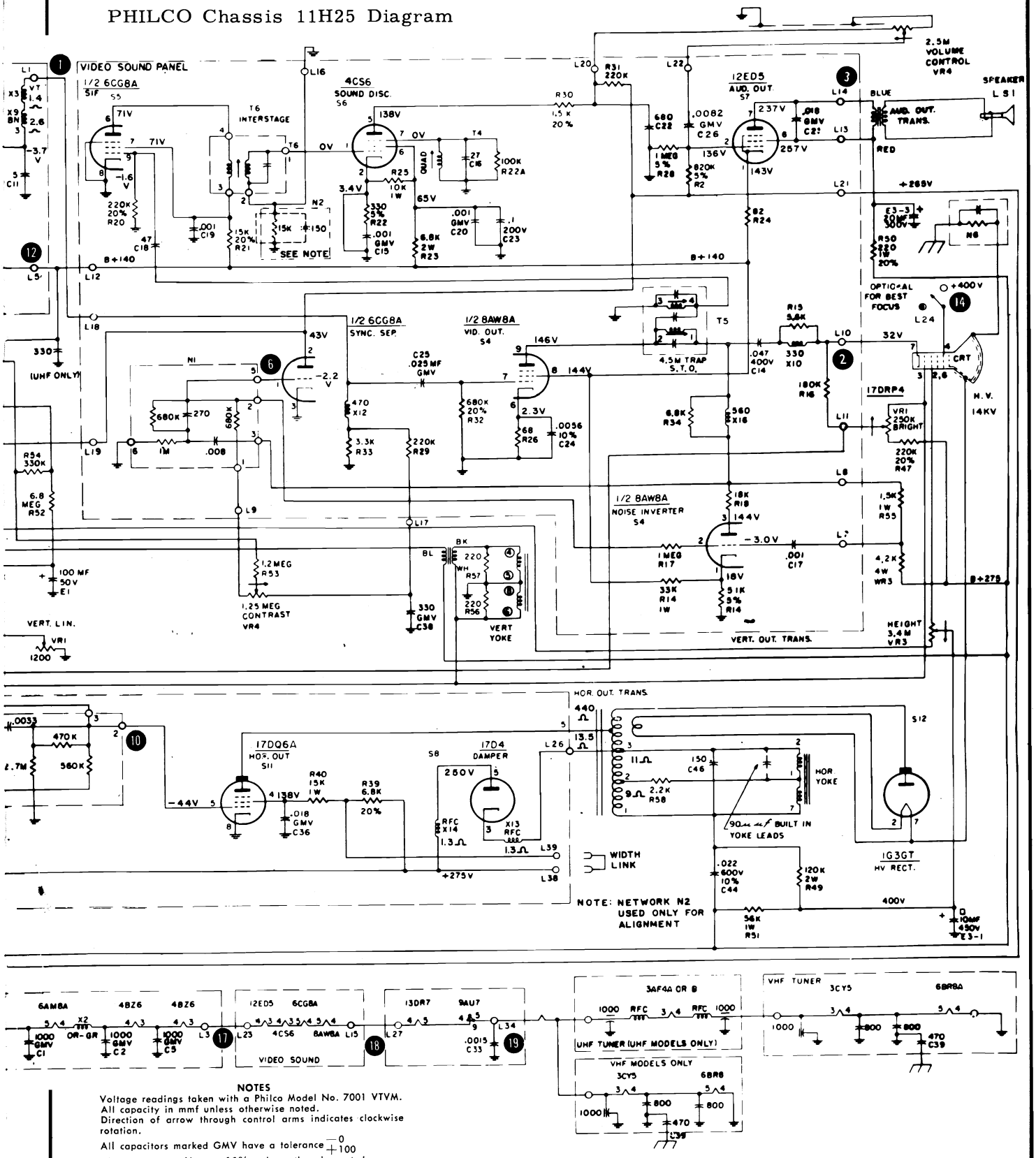
PHILCO Chassis 11H25 Schematic Diagram



RECEIVER SET-UP CONTROL LOCATIONS

1. Height—adjust with a thin screw driver through the hollow knob and vertical hold shaft.
2. Horizontal hold centering—adjust with a thin screw driver through the hollow horizontal hold shaft and knob.
3. Vertical Linearity — adjust with a thin screw driver through hollow shaft of brightness control and knob.
4. Width adjustment (11H25)—remove cabinet back. A jumper across deflection panel lugs L38 to L39 is used when necessary. These lugs are the two along the rear edge of the deflection panel to the left of the 17DQ6A horizontal output tube. Width is increased with jumper.
5. Width adjustment (11J27)—remove volume & contrast knobs, the width control VR5 can be adjusted through the opening.
6. Fusible B+ Resistor—Remove cabinet back. Resistor is a plug-in unit at top right corner.
7. Tubes—All tubes (except CRT) are accessible after removing back. 1G3GT, high voltage rectifier, is in cage.

PHILCO Chassis 11H25 Diagram

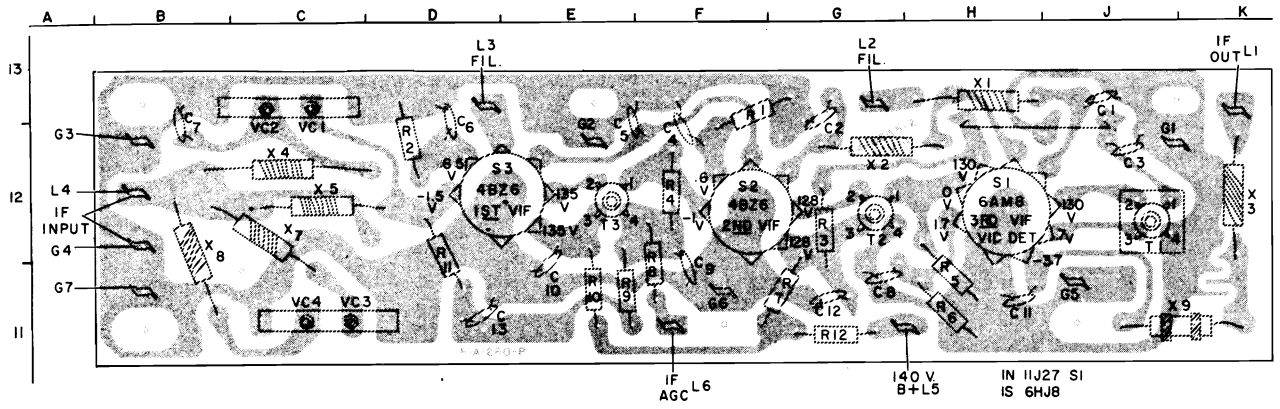


NOTES

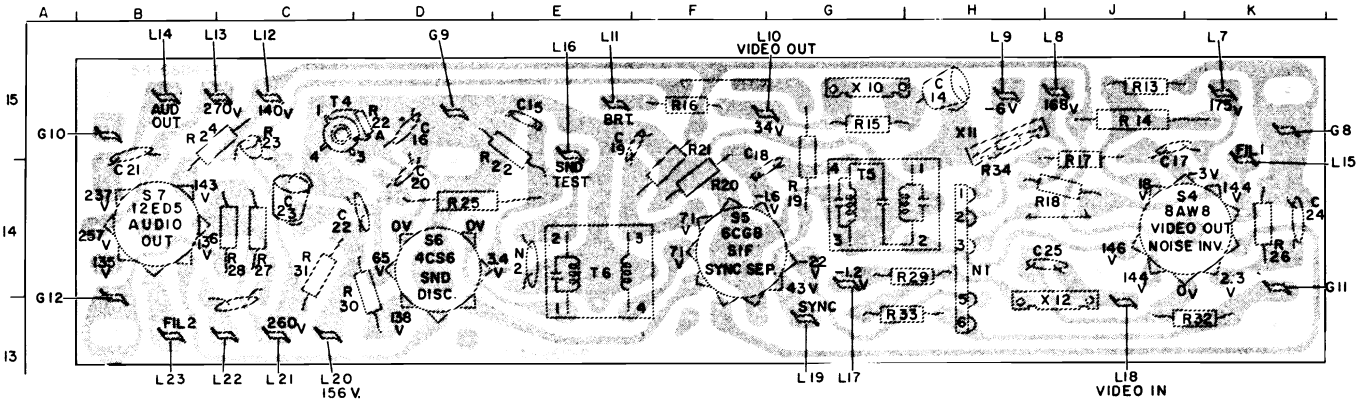
Voltage readings taken with a Philco Model No. 7001 VTVM.
All capacity in mmf unless otherwise noted.
Direction of arrow through control arms indicates clockwise rotation.
All capacitors marked GMV have a tolerance $^{-0}_{+100}$
All resistors are ½ watt 10% unless otherwise noted.
Resistance values noted for coil and transformer windings, are dc readings.
Mica and ceramic capacitors are ±10% unless otherwise noted.

VOLTAGE & RESISTANCE READINGS, TELEVISION CHASSIS 11H25

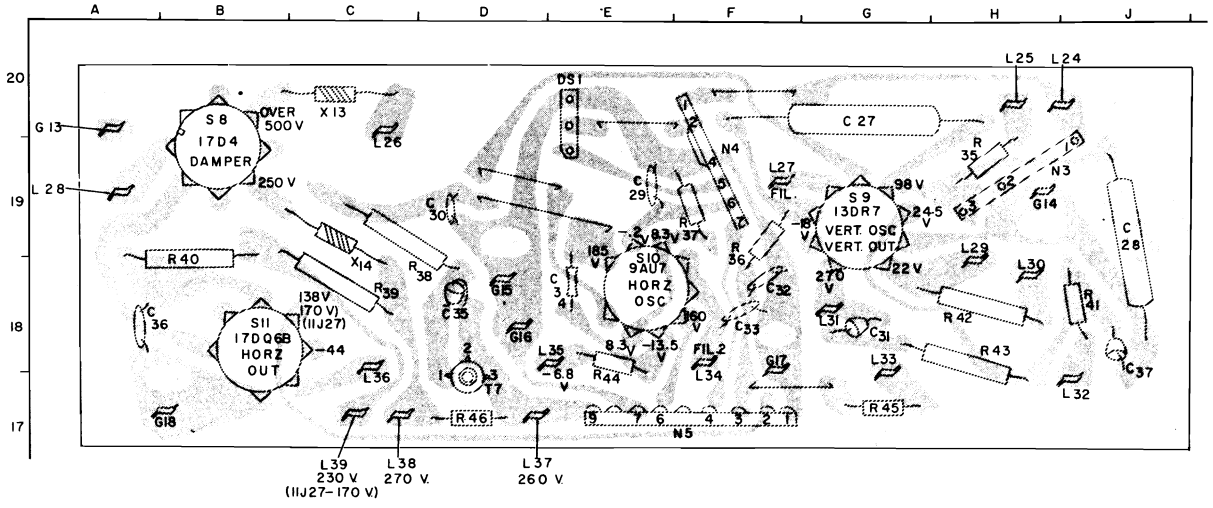
PHILCO Chassis 11H25 and 11J27 Service Information, Continued



VIDEO I-F PERMA-CIRCUIT PANEL

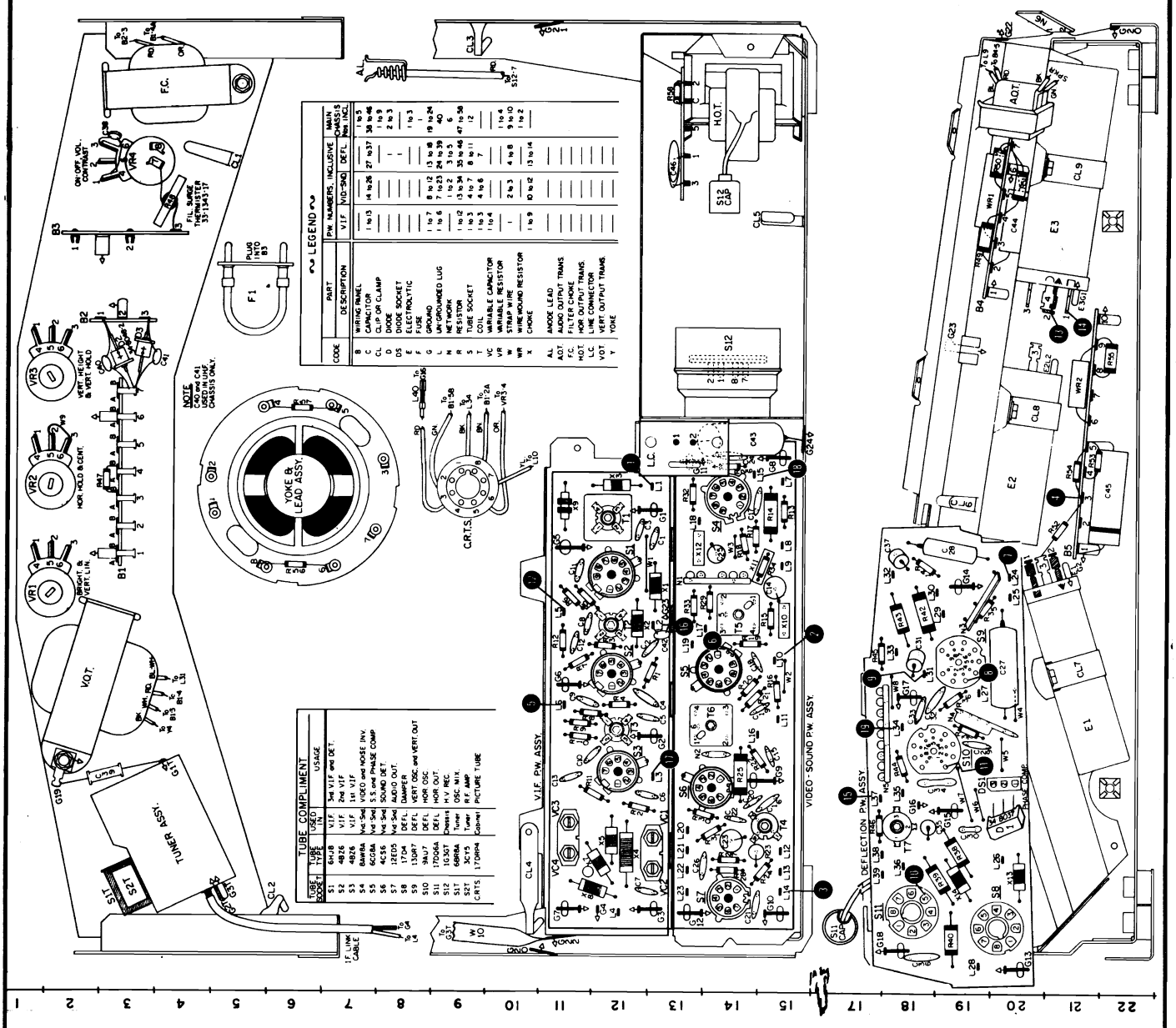


VIDEO-OSCILLATOR-SOUND PERMA-CIRCUIT PANEL



DEFLECTION PERMA-CIRCUIT PANEL 11H25

PHILCO Chassis 11H25 and 11J27 Service Information, Continued



PANEL LUG CONNECTIONS

Terminal Lug Identification—I-F Panel

- L1 Video output from video 2nd detector
- L2 Filament input from L27 of deflection panel
- L3 Filament output from L23 of video sound panel
- L4 I-F input link from tuner
- L5 140V B+ lead
- L6 I-F A.G.C.
- G4 Shield braid of I-F link

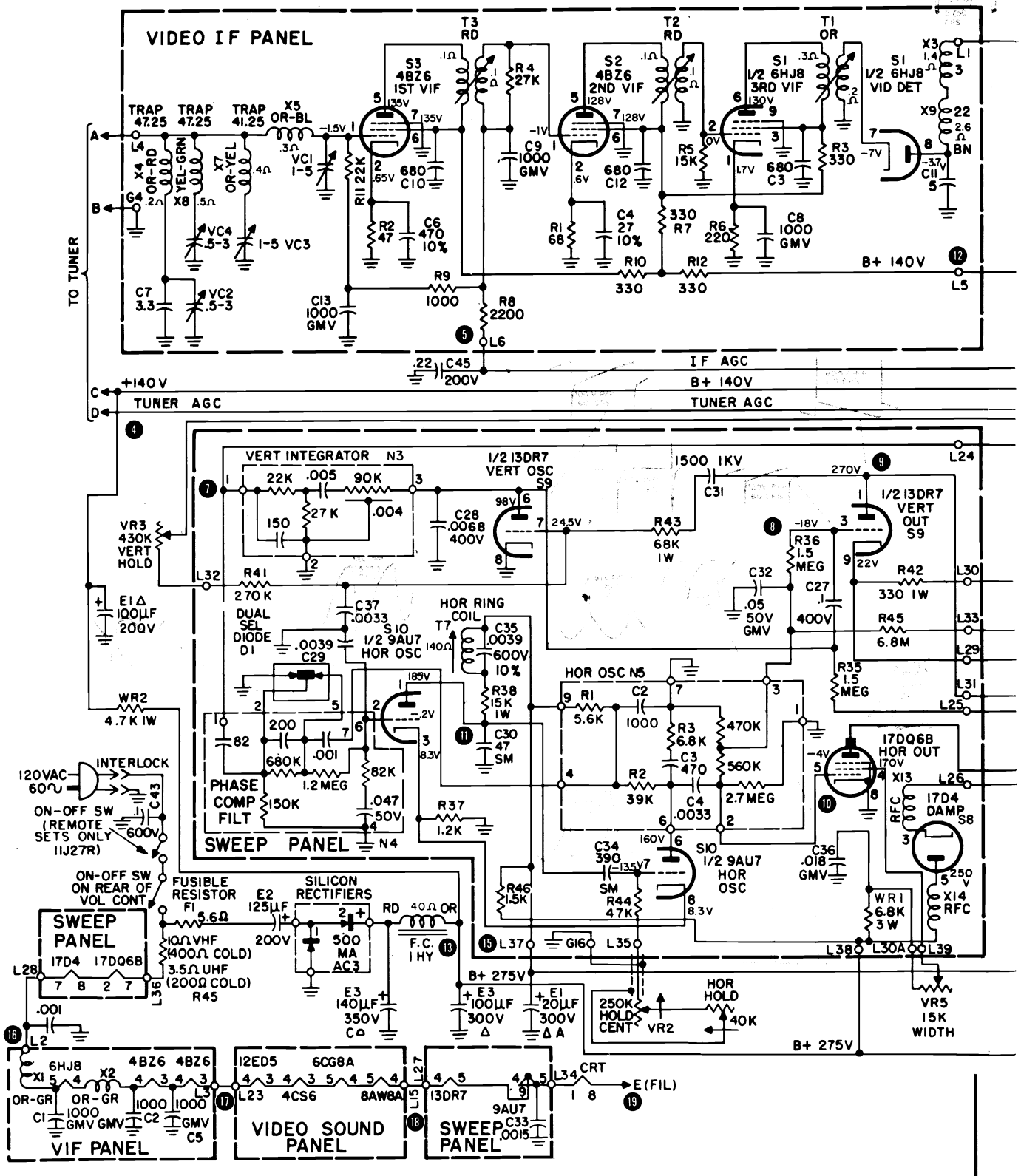
Terminal Lug Identification—Video Sound Panel

- L7 Lead from noise inverter grid coupling (C17) to junction of R55 and WR3
- L8 Lead from video plate supply R55
- L9 Lead to lug #1 of VR4, the contrast control
- L10 Video output to CRT cathode, pin 7
- L11 Lead to center lug of brightness control, VR1
- L12 140V B+ lead
- L13 Red lead of A.O.T. and B+ to audio output screen
- L14 Blue lead of A.O.T. to audio output plate
- L15 Filament lead to L27 of sweep panel
- L16 Test point lead from RC network N2 (shorted to gnd)
- L17 Lead to contrast control VR4
- L18 Video input from video det., L1 of VIF panel
- L19 Sync output to L24 of sweep panel
- L20 Shielded lead to top of volume control VR6
- L21 265V B+ lead
- L22 Shielded lead from arm of volume control VR6
- L23 Filament lead from L3 of V.I.F. panel

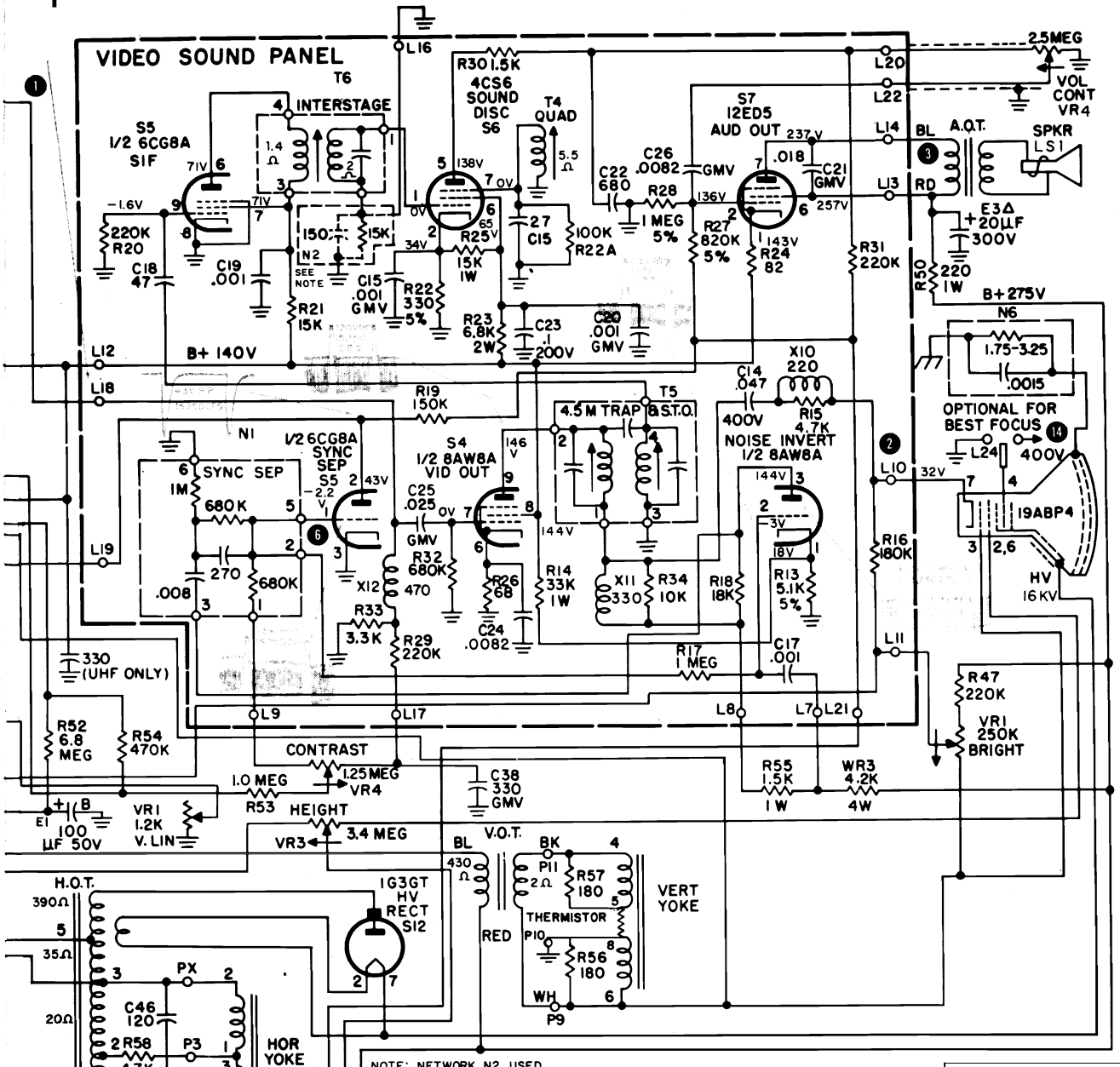
Terminal Lug Identification—Deflection Panel

- L24 Sync input from video sound panel L19
- L25 Lead to top of height control VR3
- L26 Lead from damper cathode to H.O.T. terminal #3 and pin 2 of yoke
- L27 Filament lead to 13DR7 pin 4 from L15 of video sound panel
- L28 Filament lead from 17D4 pin 7 to V.I.F. panel lug, L2
- L29 Vertical output cathode, lead to E1 bypass electrolytic
- L30 Lead to center tap of vertical linearity control VR1
- L30A Lead to center tap of width control VR5 (model 11J27 only)
- L31 Vertical output plate, blue lead of V.O.T.
- L32 Lead to top of vertical hold control VR3
- L33 Vertical output bias, lead to video sound panel (L11)
- L34 Filament lead from pins 4 & 5 of 9AU7 to CRT pin 1
- L35 Shielded lead to horizontal hold centering control VR2
- L36 Filament lead from surge resistor to 17DQ6A pin 7
- L37 De-coupled B+, 265V
- L38 275V B+
- L39 Lead from top of width control VR5

PHILCO Chassis 11J27 Schematic Diagram



SCHEMATIC DIAGRAM, TELEVISION CHASSIS 11J27

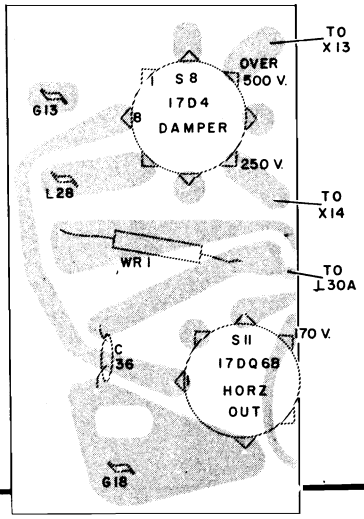


HORIZONTAL OSCILLATOR ADJUSTMENT

Allow set to warm up. Tune in a picture.

1. Short out the horizontal ringing coil, T7 by placing a jumper across terminals 1 and 3.
2. Set the horizontal hold control, VR2 shaft, to the center of its range.
3. Adjust the horizontal hold centering control, VR2 screw driver adjustment, to set the oscillator to the correct horizontal line frequency (to stop the picture; it will not be stable). Bring picture into sync from high frequency side (black bars sloping up to the left).
4. Remove the shorting jumper from across T-7 and adjust the ringing coil core for stable picture sync. Bring picture into sync from high frequency side.

3-3A PERMA-CIRCUIT DIFFERENCE ON 11J27 DEFLECTION PANEL



PHILCO Chassis 11H25 and 11J27 Alignment Information, Continued

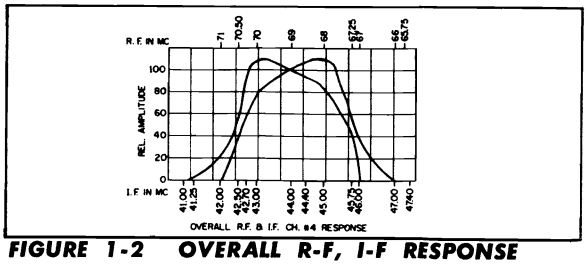


FIGURE 1-2 OVERALL R-F, I-F RESPONSE CURVE, CHANNEL 4

VIDEO I-F ALIGNMENT

AM Alignment

CONTRAST CONTROL: Set for maximum.
CHANNEL SELECTOR: Set tuner to channel 4 position.
SIGNAL INJECTION: To tuner feed-thru capacitor in mixer grid circuit.
BIAS: —4.0 volts to lug 6 on VIF panel.
SCOPE: Connect to L1 on video I-F panel, video detector output.
OUTPUT LEVEL: Not to exceed 1.0 volt peak-to-peak during pole & sweep alignment. Not less than .2 volts peak-to-peak as null, during trap alignment, is approached.

1. Adjust tuner pole, T2T for maximum at 47.25 mc. This is a temporary setting for trap alignment.
2. Adjust trap VC3 for minimum at 41.25mc*.
3. Adjust traps VC2 and VC4 for minimum at 47.25mc.*
4. Repeat steps 2 and 3. Bias may be reduced as trap minimum is approached.
5. (11H25 adjust tuner pole, T2T (tuner) for maximum at 45.0mc.
   (11J27) adjust tuner pole, T2T (tuner) for maximum at 45.75mc.
6. Adjust VC1 and T2 for maximum at 42.7mc.
7. (11H25) adjust T3 for maximum at 45.75mc.
   (11J27) adjust T3 for maximum at 45.0mc.
8. Adjust T1 for maximum at 44.4mc.

*These traps are sharp. During adjustment, the generator output frequency may change with generator setting. This may be compensated for at the generator.

Sweep Alignment

SIGNAL INJECTION: To Antenna terminals through matching network (generator to 300 ohms)
CHANNEL SELECTOR, BIAS, SCOPE AND OUTPUT LEVEL: Same as AM alignment.

1. Inject 65.75mc, AM, 30% modulated signal, into antenna adjust fine tuning control for minimum output. Do not disturb fine tuning during balance of I-F adjustment.
2. Inject channel 4 sweep signal (69mc with 6mc sweep width) into antenna. If necessary, adjust the following poles to bring the curve within limits.
   a. Tuner I-F pole, T2T, to set carrier level.
   b. T1, 3rd VIF pole, and VC1, 1st grid pole.
   c. T2, 2nd VIF pole, and VC1, 1st grid pole to adjust 42.5mc (sound side) slope
   d. T3, 1st VIF pole, to adjust carrier level.
   e. (11J27 only) detune tuner pole ¼ turn lower in frequency.

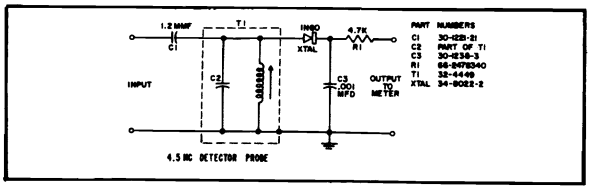


FIGURE 1-3 4.5 MC DETECTOR-TUBE CIRCUIT

4.5MC TRAP ALIGNMENT

1. Inject 4.5mc AM signal into L1 or use station signal.
2. Connect 4.5mc detector to L10 (pin 7 of CRT).
   NOTE: Preliminary padding of 4.5mc test detector—connect detector to an accurate source of 4.5mc signal and pad core of transformer for maximum dc output voltage.
   NOTE: When using generator calibrate by zero beating with sound I-F developed from station signal.
2. Connect 20,000 ohms/voltmeter, set to 2.5 volt range, to detector output.
4. Turn contrast control fully clockwise (to maximum).
5. Adjust 4.5mc trap (T5 bottom) for minimum indication.

1-6 SOUND I-F ALIGNMENT

NOTE: The sound I-F alignment is based upon a properly aligned video I-F strip.

1. With a strong signal (antenna connected) adjust the quadrature coil, T4, for maximum sound.
2. Remove short from sound test point L16 and add parallel combination 15K resistor and 150 mmf capacitor to ground (see Note 2).
3. First rotate fine tuner into maximum smear (maximum clockwise) to reduce signal. Adjust T5, (top) sound takeoff coil and sound interstage transformer both cores for maximum negative d-c at L16.
4. Retouch quadrature coil for maximum sound.

NOTE 1: The quadrature coil, T4, will peak at two points. The correct peak is the first peak reached as the core is backed out from the full in position. If this coil is misadjusted, weak and distorted output will result and the other coils will not tune properly.
NOTE 2: Early production sets will include network N2 (15K & 150 mmf) which is used only for alignment. Normal operation requires network N2 to be shorted out with a jumper wire.
NOTE 3: Misadjustment of the sound take off, T5 (top) and the sound interstage, T6, will cause either weak sound or an excessively high noise level, or both.

CRITICAL LEAD DRESS INFORMATION

A. To prevent corona:
   1. S-12 socket must be kept free of points or sharp edges due to wiring and soldering.
   2. Body of C46 capacitor must dress flat against panel of H.O.T. and must not touch hi-voltage cage.
   3. *Horizontal Output Transformer:*
      (a) All internal leads breaking out of the transformer coil must be dressed up and away from all metal parts with special emphasis on the wrapping lugs. This dress must be completed prior to chassis test, and after the hi-voltage tubes have been seated.

B. To Reduce Channel (8) Beat:
   1. Coil X13 must dress away from metal shield around T1 at least 1/16 of an inch.
   2. Dress scan-tenna lead so that there is 1″ of slack as it comes from scan-tenna bushing.

C. To prevent lead burning and minimize heat dissipation:
   1. All leads must dress ½″ clear of WR-1 and WR-2.
   2. The anode lead must be captivated in the anode lead restrainer with the slack dress toward bottom of chassis when lead is connected to CRT.
   3. The blue V.O.T. lead must be dressed away from S9.
   4. The brown lead from B1-2 to the UHF tuner must be captivated behind the UHF tuner link cable.
   5. Orange lead from VR1 to L32 must be dressed down and under deflection panel.
   6. Dress wire to L11, L8, L7 and L15 on the video-sound panel around C24 along outside edge of panel away from 8AW8A tube.
   7. The green, brown and orange wires from the CRT cable, the red wire to the yoke must be taped together above the yoke.
   8. Dress R48 free of all components and metal parts.
   9. X15 choke (UHF only) must dress clear of S4.

RCA VICTOR

KCS130 CHASSIS SERIES

MODEL AND CHASSIS REFERENCE

CHASSIS	TUNER MOUNTING ASSEMBLY	TUNER ASSEMBLY	MODELS
KCS130F	———	KRK70U	171-A-040 171-A-042 171-A-044 171-A-047 171-A-061 171-A-062 171-A-067 171-A-068
KCS130H	———	KRK71W KRK66AE	171-A-040U 171-A-042U 171-A-044U 171-A-047U 171-A-061U 171-A-062U 171-A-067U 171-A-068U
KCS130K	TMA11A	KRK87L	°171-AR-044
KCS130M	TMA11A	KRK87L	†171-AR-062 †171-AR-067

°This model also includes a KRS24A Remote Control Amplifier chassis and a KRT1A Remote Control Transmitter assembly.

†These models also include a KRS24B Remote Control Amplifier chassis and a KRT1B Remote Control Transmitter assembly.

MODEL	CHASSIS	TUNER
171-A-032X	KCS130N	KRK70M
171-A-034	KCS130A	KRK70M
171-A-034U	KCS130B	KRK71N/KRK66U
171-A-043	KCS130F	KRK70U
171-A-043U	KCS130H	KRK71W/KRK66AE

MODEL	CHASSIS	TUNER
171-A-052	KCS130YF	KRK96K
171-A-052U	KCS130YH	KRK97K/KRK66AE
171-A-054	KCS130YF	KRK96K
171-A-054U	KCS130YH	KRK97K/KRK66AE

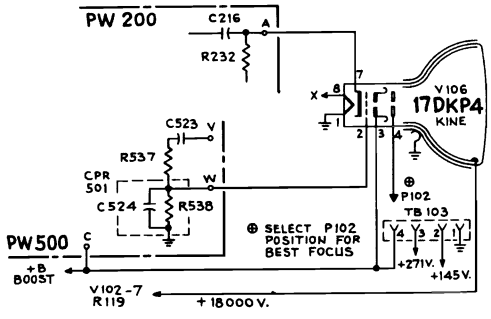


Figure 1—Kinescope and Focus Anode Connections for Model 171-A-032X

Three different voltages are provided to permit proper focusing of the 17DKP4 kinescope. The focusing anode lead should be connected to the terminal, on terminal board TB103, which gives best overall focus with the brightness control set at normal operating level. TB103 is located directly above the yoke on the rear of the chassis.

CENTERING ADJUSTMENT

Centering is accomplished by means of two discs with adjusting tabs on the back of the yoke. By alternately rotating one disc with respect to the other, then rotating both discs simultaneously around the neck of the tube, proper centering of the picture will be obtained.

DEFLECTION YOKE ADJUSTMENT

If the lines of the raster are not horizontal or squared with the picture mask, rotate the deflection yoke until this condition is obtained. Tighten the yoke clamp scre

FOCUS

An electrostatic focus type kinescope is employed in these receivers. The receivers operate with fixed focus, having a fixed voltage applied to the focusing electrode.

CHECK OF HORIZONTAL OSCILLATOR ADJUSTMENT

Turn the horizontal hold control to the extreme clockwise position. The picture should be out of sync, with a minimum of eight bars slanting downward to the left. Turn the control counter-clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 1½ to 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional counter-clockwise rotation of the control. The picture should remain

HIGH VOLTAGE WARNING

OPERATION OF THESE RECEIVERS OUTSIDE THE CABINET OR WITH THE COVERS REMOVED, INVOLVES A SHOCK HAZARD FROM THE RECEIVER POWER SUPPLIES. WORK ON THE RECEIVERS SHOULD NOT BE ATTEMPTED BY ANYONE WHO IS NOT THOROUGHLY FAMILIAR WITH THE PRECAUTIONS NECESSARY WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVERS WITH THE HIGH VOLTAGE COMPARTMENT SHIELD OPENED.

RCA Victor KCS-130 Chassis Series, Service Information, Continued

in sync for approximately three-quarters of a full turn of additional counter-clockwise rotation of the control. Continue counter-clockwise rotation until the picture falls out of sync. Rotation beyond fall out position should produce a minimum of 2 bars before end of rotation or a minimum of 7 bars before interrupted oscillation "motorboat" occurs.

ADJUSTMENT OF HORIZONTAL OSCILLATOR

If in the above check the receiver failed to hold sync for three-quarters of a turn of counter-clockwise rotation of the control from the pull-in point, it will be necessary to make the following adjustments.

The width and drive adjustments should be properly set, as explained in the paragraph below, before adjusting the sine wave coil.

Connect a short jumper across the terminals of the sine wave coil L501-A on PW500 deflection board. Also short the grid of the sync output tube, pin 9 of V501, to ground with a small screwdriver or jumper.

Adjust the horizontal hold to obtain a picture with the sides vertical (picture may drift slowly sideways). Remove the jumper on the sine wave coil L501-A and adjust L501-A to again obtain a picture with the sides straight. When the sine wave coil is properly adjusted, alternate shorting and no short should not cause a change in frequency, only a slight sideways shift should occur.

Remove the short on the grid of the sync output. The horizontal hold should now perform as outlined above under "CHECK OF HORIZONTAL OSCILLATOR ADJUSTMENT."

WIDTH AND DRIVE ADJUSTMENTS

Set the horizontal control at the "pull-in" point. Set the width coil maximum counter-clockwise and adjust horizontal drive trimmer counter-clockwise until a bright vertical line appears in the middle of the picture then clockwise until the bright line just disappears. If no line appears set the drive trimmer at maximum counter-clockwise position.

At normal brightness adjust the width coil L101 to obtain ¾" overscan at each side with normal line voltage.

Readjust the drive trimmer C101 as was done previously.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENTS

Adjust the height control (R528 on chassis rear) until the picture overscans approximately ⅝" at both top and bottom. Adjust vertical linearity (R531 on chassis rear) until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. Adjust centering to align the picture with the mask.

AGC CONTROL ADJUSTMENT

To check the adjustment of the AGC Control, tune in a strong signal and sync the picture. Momentarily remove the signal by switching off channel and then back. If the picture reappears immediately, the receiver is not overloading due to improper setting of R509. If the picture requires an appreciable portion of a second to reappear, or bends excessively, R509 should be readjusted.

Turn R509 fully clockwise. The raster may be bent slightly. This should be disregarded. Turn R509 counter-clockwise until there is a very slight bend or change of bend in the picture. Then turn R509 clockwise just sufficiently to remove the bend or change of bend.

VHF R-F OSCILLATOR ADJUSTMENT

Tune in all available stations to assure that the receiver r-f oscillator is adjusted to the proper frequency on all channels. If adjustments are required, these should be made by the method outlined in the alignment procedure on pages 10 or 12.

On all models except 171-AR-044 and 171-AR-062 & 7, adjustments for channels 2 through 12 are available through the individual holes on the front of the tuner. Adjustment for channel 13 is on top of the tuner chassis. Remove the channel selector knob to make adjustments. Pull knob outward off shaft. See "A" of Figure 4. Set Fine Tuning to mechanical center of its range.

Models 171-AR-044 and 171-AR-062 & 7

Set the fine tuning to the center of its range then remove the fine tuning knob by pulling the knob outward off its shaft. Remove the screw holding the escutcheon plate for the channel window and touch bar. Take off the plate.

Rotate the channel selector to the individual channels, in any order, by depressing the channel touch bar, and adjust the oscillator slug for all channels to be used. The aperture for adjustment is in the same location for all channels as shown in Figure 4B. Do not change the setting of the fine tuning during adjustment of the oscillator slugs.

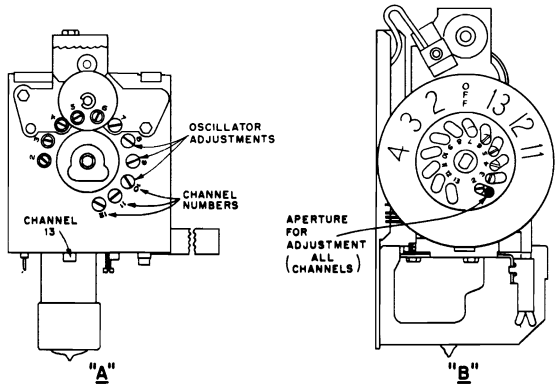


Figure 4—VHF Oscillator Adjustments

KINESCOPE AND SAFETY WINDOW CLEANING

The front safety window may be removed to allow for cleaning of the kinescope faceplate and the safety window if required.

Remove the front control knobs. Remove the three screws under the bottom of the front mask assembly. Take off the rear cover and remove the two screws at the upper corners of the cabinet. Unplug the speaker cable. Pull the bottom of the mask out ½" to ¾" only and lift the mask up and off the cabinet. Refer to Figure 5.

KINESCOPE REMOVAL AND REPLACEMENT

Remove the rear panel and front mask as shown in Figure 5. Unplug the kinescope socket. Disconnect the high voltage anode lead. Loosen the yoke clamp and slide the yoke off the kinescope neck.

Loosen the clamp around the kinescope bell and remove the kinescope. Install the new kinescope and tighten the clamp. Reassemble the receiver by reversing the above procedure.

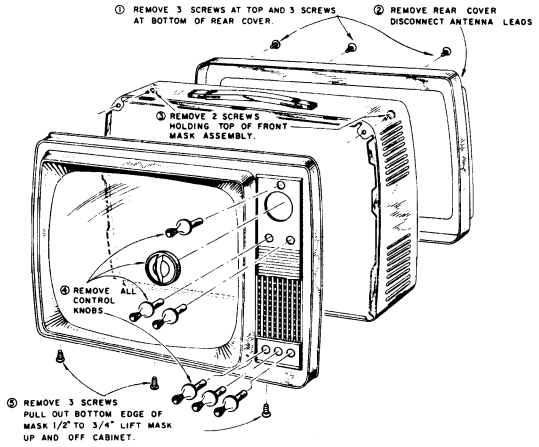


Figure 5—Safety Window and Mask Removal

RCA Victor KCS-130 Chassis Series, Alignment Information, Continued

PICTURE I-F TRANSFORMER AND TRAP ADJUSTMENTS

TEST EQUIPMENT CONNECTIONS:

BIAS ..... Ground the I-F AGC bus at terminal "N" of PW200.

OSCILLOSCOPE ..... Connect to 2nd Detector output at test point TP204. Set scope for 5v. p-p.

SIGNAL GENERATOR ..... Connect to mixer grid, at strap on S1B for KRK70 and KRK71 series tuners or to test point TP2 for KRK87 series tuners, in series with 1500 mmf. capacitor (see below).

SWEEP GENERATOR ..... Connect to the grid of the 3rd picture I-F amplifier, pin 1 of V206, through hole in board. Use shortest leads possible. (See below.)

VACUUM TUBE VOLTMETER.... Connect to 2nd Detector output at test point TP204. Use DC probe.

STEP		SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
1	Peak 2nd pix. I-F transformer	——	45.5 mc.	T207	Peak T207 and T206 on frequency for max. output on meter. Adjust generator for 3 volts on meter when finally peaked.
2	Peak 1st pix. I-F transformer	——	43.0 mc.	T206	
3	Adjust 3rd pix. I-F transformer	40-50 mc. (I-F)	41.25 mc. 45.75 mc.	T208 (top & bottom cores)	Adjust for maximum with response below. Use 5v. p-p on scope.
4	Adjust 47.25 mc. trap	——	47.25 mc.	T205	Adjust for minimum output indication on meter.

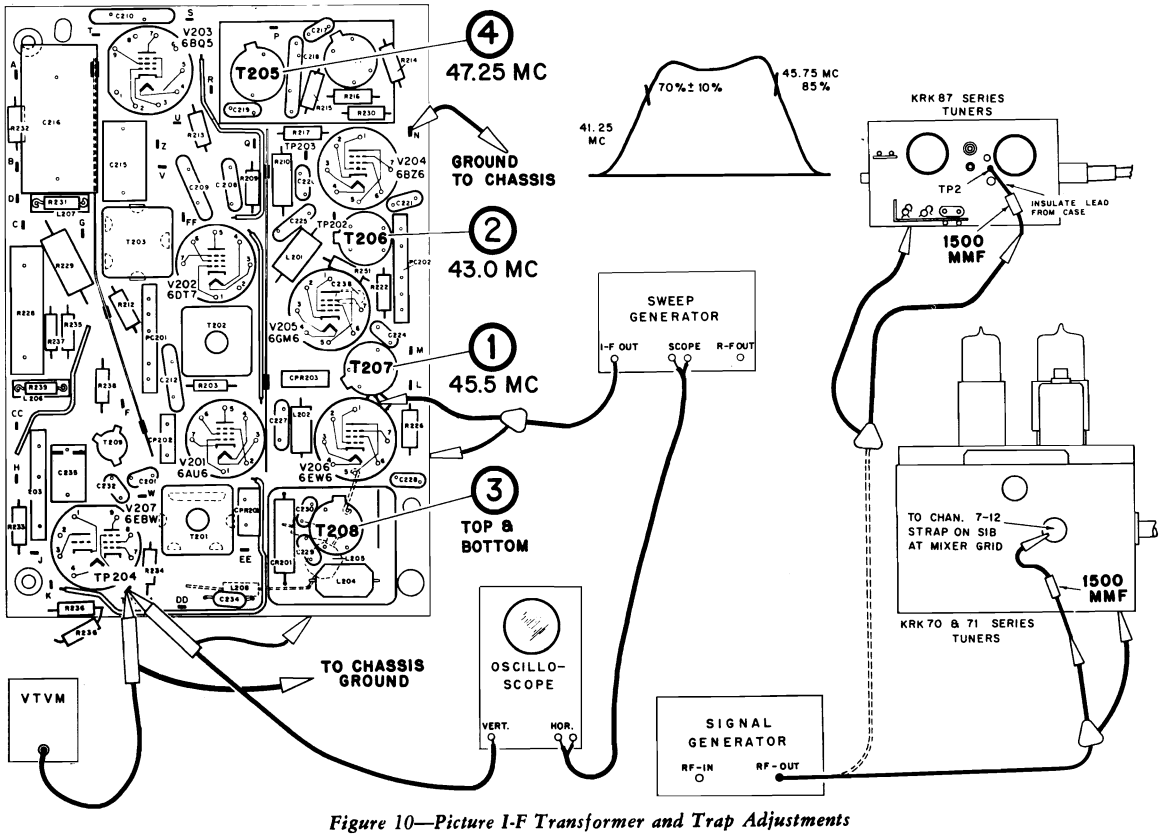


Figure 10—Picture I-F Transformer and Trap Adjustments

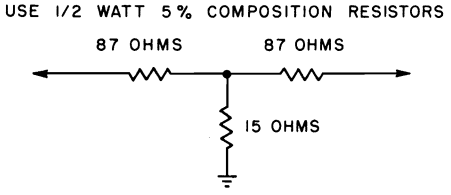


Figure 7—Sound Attenuation Pad

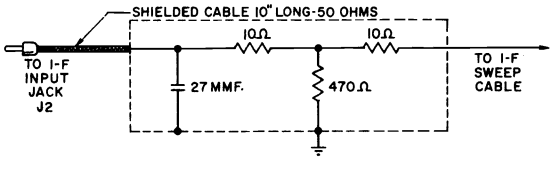


Figure 8—Tuner I-F Input Head

RCA Victor KCS-130 Chassis Series, Alignment Information, Continued

SWEEP ALIGNMENT OF PICTURE I-F

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Set for 0.0 volts on I-F AGC bus at terminal "N" of PW200, and —3.5 volts to tuner AGC terminal.

OSCILLOSCOPE ..... Connect a .001 mf. capacitor in series with a 180 ohm resistor from TP202 to ground, with the capacitor connected to TP202. Connect oscilloscope to the junction of the resistor and capacitor, using diode probe. (See below.)

SWEEP GENERATOR ..... Connect in series with 1500 mmf. to S1B (or TP2 on KRK87) at mixer grid. Use shortest leads possible.

SIGNAL GENERATOR ..... Couple loosely to sweep output cable to provide markers.

VACUUM TUBE VOLTMETER.... Connect to 2nd Detector output at test point TP204. Use DC probe.

STEP		SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
Set channel selector to channel 4 for KRK 70 & 71 Tuners. Use any channel from 7 to 13 for KRK87 tuners.					
1	Adjust mixer plate coil	40 - 50 mc. (I-F)	42.5 mc. 45.75 mc.	L11—KRK87 L56—KRK70 L56—KRK71	Sweep output set for 0.5 v. P-P on scope. Adjust for max. gain and response "A" below. Max. allow. tilt 20%.
2	Adjust I-F input	40 - 50 mc. (I-F)	42.5 mc. 45.75 mc.	T204	
Remove 180 ohm, .001 capacitor and scope from TP202. Connect scope to test point TP204, using direct probe. Set bias supply for —6 volts at terminal "N" of PW200.					
3	Retouch I-F transformers	40 - 50 mc. (I-F)	42.5 mc. 45.0 mc. 45.75 mc.	T208 T207 T206	Adjust for response "B". Use 5 v. P-P on scope.
Remove sweep from mixer grid. Couple signal generator to mixer, in series with pad shown in Figure 7. Set generator to 45.75 mc. and adjust output for exactly one and one-half (1½) volts on the "VoltOhmyst". Remove the pad and connect generator direct to mixer grid. Do not change generator output in step 4.					
4	Set 41.25 mc. attenuation	—	41.25 mc.	T206 & T208	Adjust for 1.2 to 1.5 volts on VTVM with response "B".
5	Connect sweep generator to antenna terminals using pad shown in Figure 9.				
	Check overall	Chans. 13 to 2	42.5 mc., 45.0 mc. 45.75 mc.	T207 & T208	Retouch slightly to correct overall tilt. Maintain response "B".

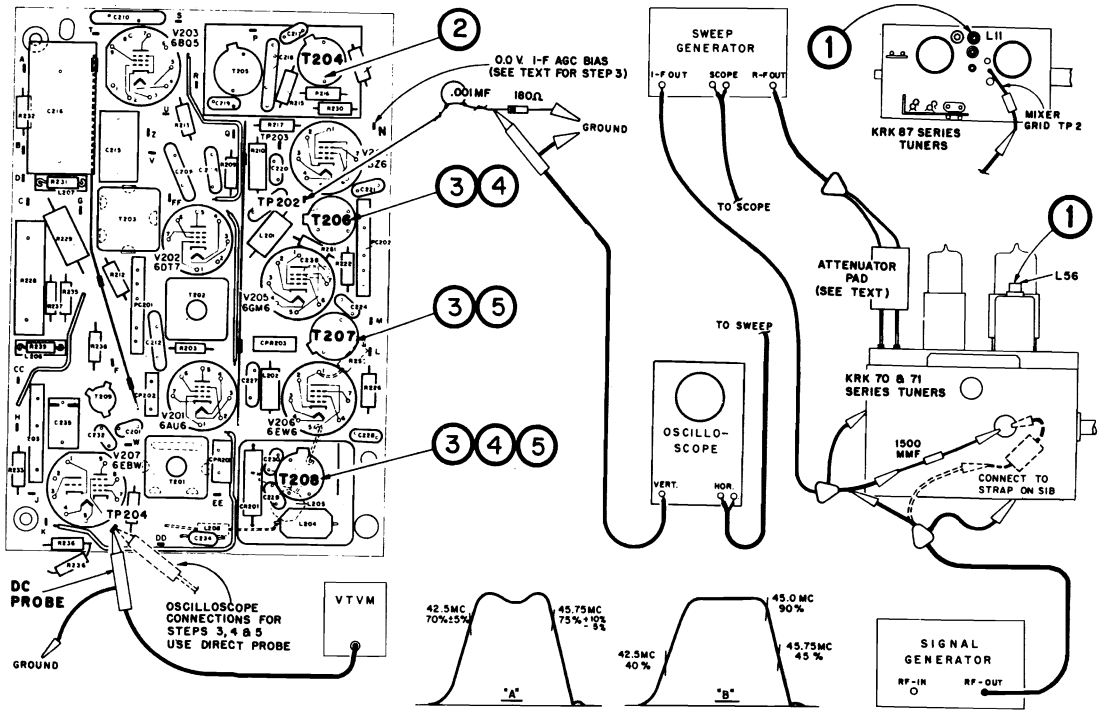


Figure 11—Sweep Alignment from Mixer Grid

RCA Victor KCS-130 Chassis Series, Alignment Information, Continued

KRK71W TUNER I-F ALIGNMENT

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Apply —2.5 volts bias to AGC terminal on the tuner. Ground the positive lead to the tuner case.
OSCILLOSCOPE ..... Connect a 330 mmf. capacitor and a 180 ohm resistor in series from pin 6 of V2 to ground. Connect the capacitor to pin 6 and the resistor to ground. Connect the oscilloscope to the junction of the resistor and capacitor using the diode probe. (See below.)
SWEEP GENERATOR .... Connect to I-F input jack J2 using the input head shown in Figure 8.
SIGNAL GENERATOR ... Couple loosely to oscilloscope diode probe to provide markers.

STEP		SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
Set channel selector to UHF position between 2 and 13.					
1	Adjust I-F input coil	40-50 mc. (I-F)	41.25 mc. 45.75 mc.	L57	L57 for max. gain and response "A". Generator set for 0.5 v. p-p or less on scope.
2	Adjust I-F interstage coil	40-50 mc. (I-F)	41.25 mc. 45.75 mc.	L60	Adjust L60 for response "A" in conjunction with L57 in step 1.
Connect UHF sweep generator to UHF terminals. Couple VHF signal generator to grid of 1st picture I-F amplifier as shown below. Remove input head from J2 and connect the cable from the UHF tuner to J2. Connect the oscilloscope to the 2nd detector output at terminal TP204 using the direct probe. Use 5 volts p-p on oscilloscope.					
3	Retouch I-F interstage coils for overall response	Tune entire UHF range	42.5 mc. 45.0 mc. 45.75 mc.	L57/L60	Retouch for response "B" below.
NOTE:—Adjustment of L57 affects the setting of the VHF oscillators requiring readjustment after L57 is adjusted. L57 should not be touched after final oscillator set-up has been made. Do not retouch any other I-F adjustments.					

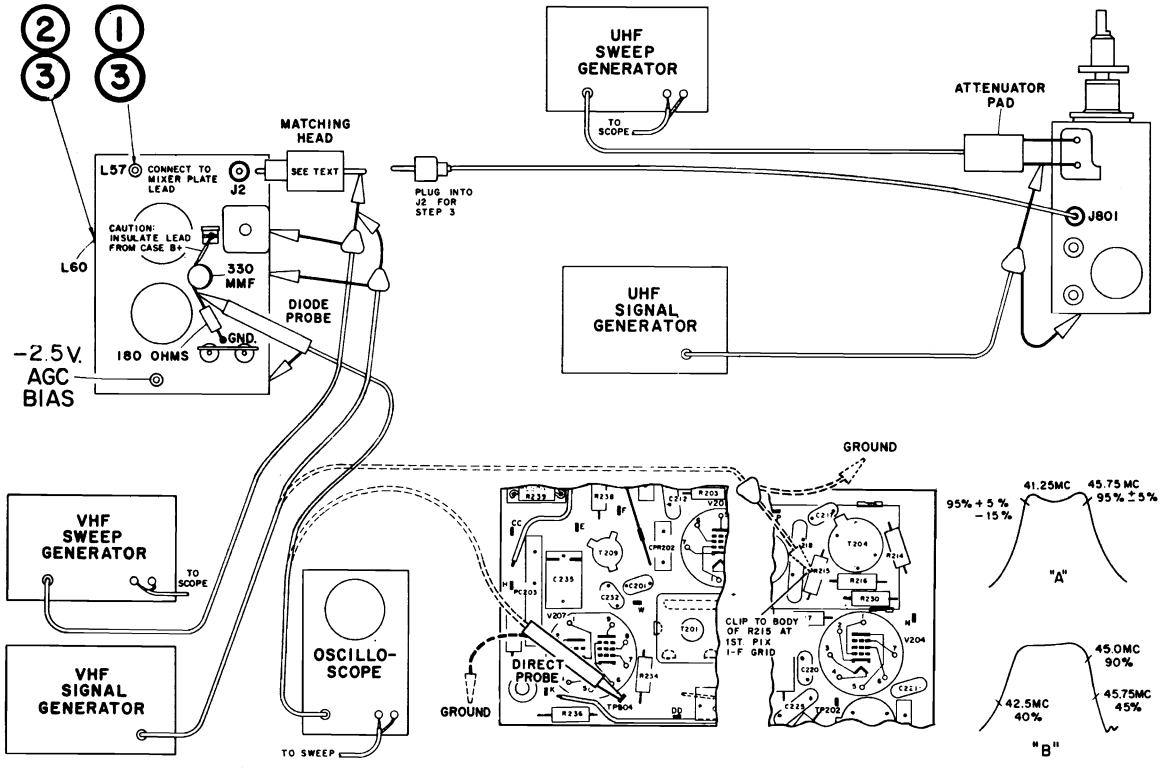


Figure 12—KRK71W Tuner I-F Alignment

RCA Victor KCS-130 Chassis Series, Alignment Information, Continued

SOUND I-F, SOUND DETECTOR AND 4.5 MC TRAP ALIGNMENT

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY .....Apply —10 volts to the I-F AGC bus at terminal "N" on PW200.
OSCILLOSCOPE .....Connect across speaker voice coil.
SIGNAL GENERATOR .....Connect to test point TP204 on PW200.
VACUUM TUBE VOLTMETER....Connect to output of diode detector shown below. Set meter for negative voltage readings.
MISCELLANEOUS .....Connect test diode detector, as shown below, to pin 7 of V202.

	STEP	SIGNAL GENERATOR	ADJUST	REMARKS
	Set contrast control maximum clockwise.			
1	Adjust Driver Transformer Primary and Secondary	4.5 mc.	T202 (top & bottom)	Adjust T202 top & bottom for maximum on meter. Set generator for 1.0 to 1.5 volts when peaked. Peak cores at open end of coils.
2	Adjust Sound Take-Off Trans.	4.5 mc.	T201	Adjust T201 for maximum negative DC on meter. Set generator for 1.0 to 1.5 volts on meter.
3	Disconnect the diode test detector. Turn off signal generator and tune in strongest signal in area adjusting volume control for normal volume (approx. ¼ turn from c.c.w.). Turn core of T203 flush with top of coil form.			
4	Adjust Sound Detector Trans.	Observing oscilloscope and listening to audio output adjust T203 clockwise to a peak. Continue clockwise to second louder peak and adjust for maximum on this peak.		
	Move the oscilloscope to terminal "A" on PW200. Use the diode probe. Set the contrast control to maximum clockwise position.			
5	Adjust 4.5 mc. trap	4.5 mc., A-M Mod., 400 Cycles	T209	Adjust for minimum 400 cycle indication on oscilloscope.
	Alternate Method Using Generators With F-M Modulation Provided.			
1	Same as step 1 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation.			
2	Same as step 2 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation.			
3	Adjust Sound Detector Trans.	4.5 mc., 400 cycle F-M Mod., 7½ kc. Dev.	T203	Adjust T203 for max. 400~ output on scope using max. amplitude peak. Set volume control for .70 v. p-p on scope when peaked. See response below.
4	Retouch Driver and Sound Take-Off. Trans. for breakout	4.5 mc., 400 cycle F-M Mod., 7½ kc. Dev.	T201 & T202	Decrease input to minimum usable signal. Retouch T201 & T202 for symmetrical breakout. Response below.
	Move the oscilloscope to terminal "A" on PW200. Use the diode probe. Set the contrast control to maximum clockwise position.			
5	Adjust 4.5 mc. trap	Same as step 5 above. Adjust for minimum 400 cycle indication on oscilloscope.		

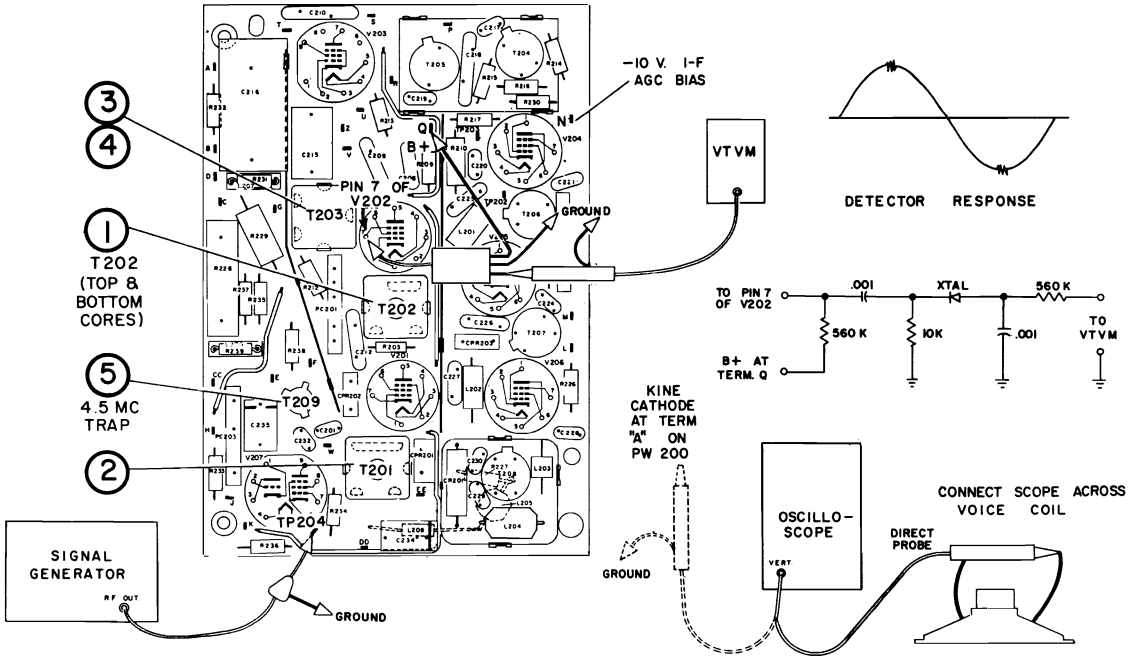


Figure 16—Sound I-F, Sound Detector and 4.5 mc. Trap Alignment

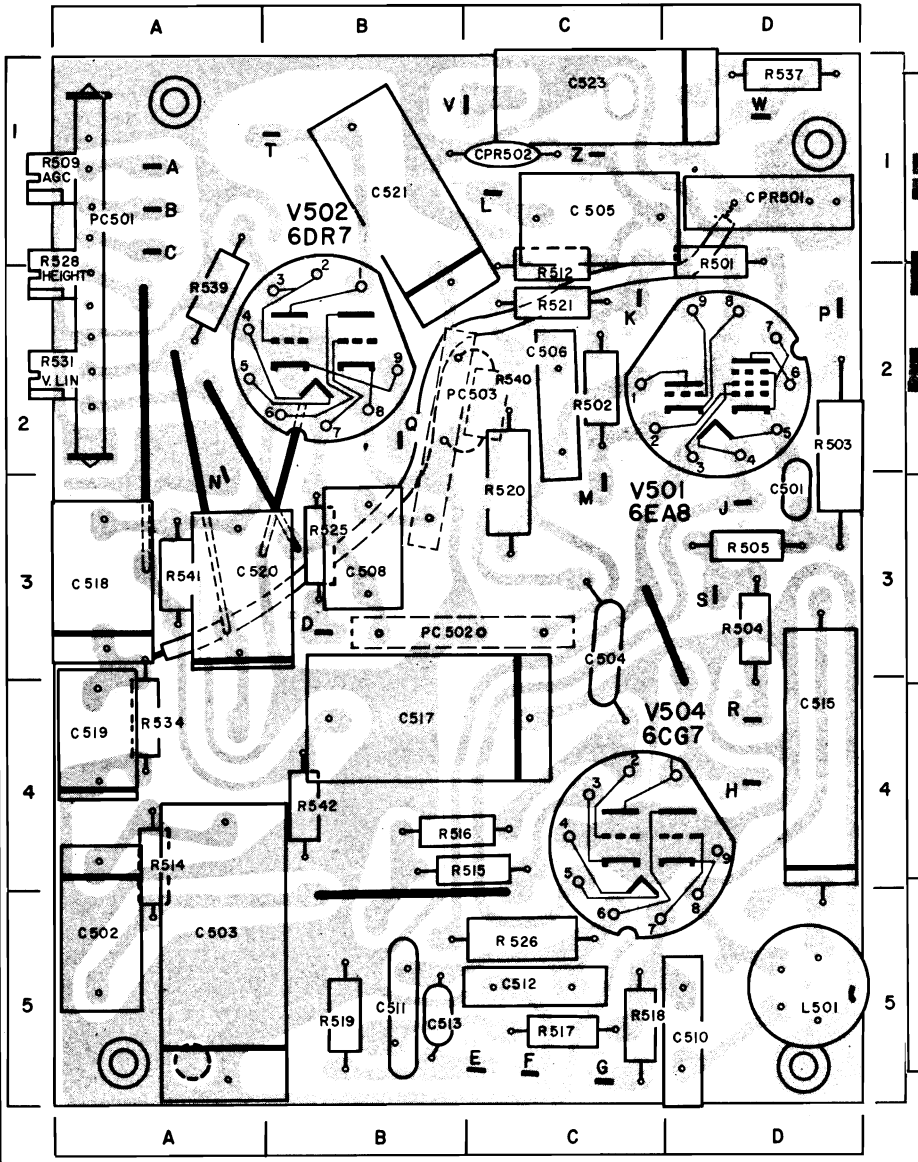


Figure 27—PW500 Sealed Circuit Deflection Assembly Composite Diagram

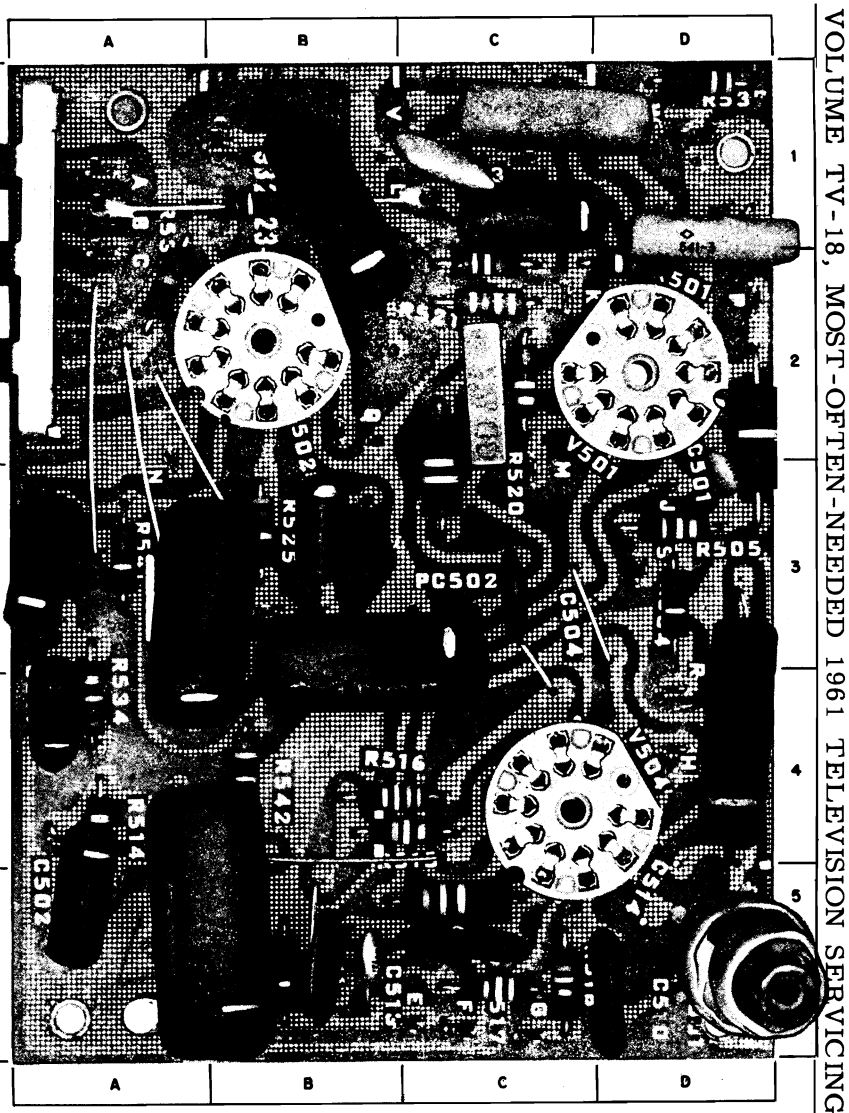


Figure 28—PW500 Sealed Circuit Deflection Assembly Component View

PW500 COMPONENT LOCATION GUIDE

C501 ....D3	C508 ....B3	C517 ....B4	CPR501 ..D1	PC502 ....C3	R504 ....D3	R517 ....C5	R526 ....C5
C502 ....A5	C510 ....D5	C518 ....A3	CPR502 ..C1	PC503 ....B2	R505 ....D3	R518 ....C5	R534 ....A4
C503 ....A5	C511 ....B5	C519 ....A4			R512 ....C2	R519 ....B5	R537 ....D1
C504 ....C3	C512 ....C5	C520 ....A3	L501 ....D5	R501 ....D2	R514 ....A4	R520 ....C3	R539 ....A2
C505 ....C1	C513 ....B5	C521 ....B1		R502 ....C2	R515 ....C4	R521 ....C2	R541 ....A3
C506 ....C2	C515 ....D4	C523 ....C1	PC501 ....A2	R503 ....D2	R516 ....B4	R525 ....B3	R542 ....B4

RCA Victor KCS-130 Chassis Series Service Information, Continued

RCA Victor KCS-130 Chassis Series, Service Information, Continued

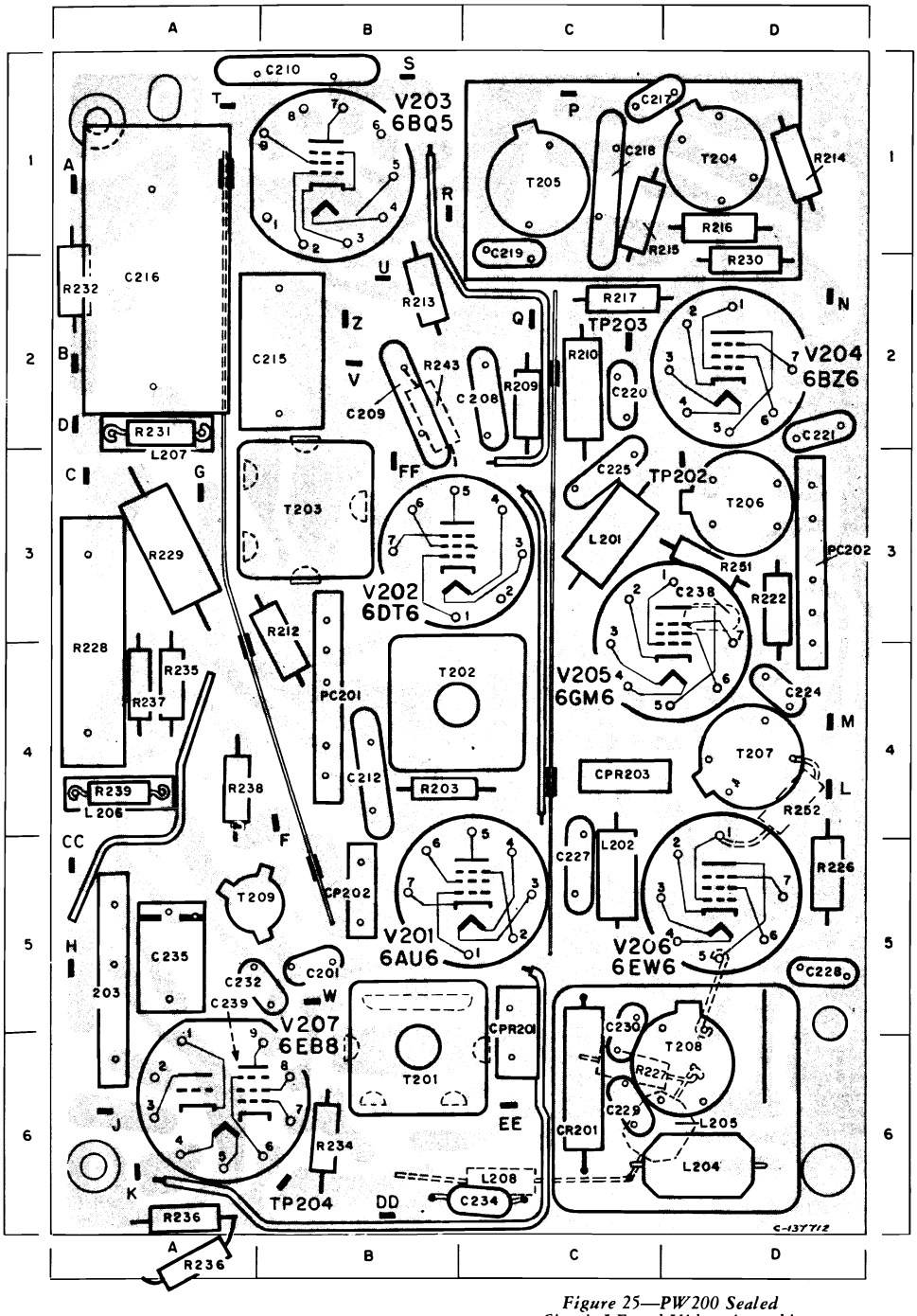


Figure 25—PW200 Sealed Circuit I-F and Video Assembly Composite Diagram

PW200 COMPONENT LOCATION GUIDE

C201	B5
C208	C2
C209	B2
C210	B1
C212	B4
C215	B2
C216	A1
C217	C1
C218	C1
C219	C1
C220	C2
C221	D2
C224	D4
C225	C3
C227	C5
C228	D5
C229	C6
C230	C5
C232	B5
C234	C6
C235	A5
C238	D3
C239	A6
CPR201	C5
CPR202	B5
CPR203	C4
CR201	C6
L201	C3
L202	C5
L204	D6
L205	D6
L206	A4
L207	A2
L208	C6
PC201	B4
PC202	D3
PC203	A5
R203	B4
R209	C2
R210	C2
R212	B3
R213	B2
R214	D1
R215	C1
R216	D1
R217	C2
R222	D3
R226	D5
R227	C6
R228	A4
R229	A3
R230	D1
R231	A2
R232	A2
R234	B6
R235	A4
R236	A6
R237, R238, R239	A4
R243	B2
R251	D3
R252	D4
T201	B6
T202	C4
T203	B3
T204	D1
T205	C1
T206	D3
T207	D4
T208	D6
T209	A5

The printed wiring, on the reverse side of the circuits is duplicated in the white printing on the component side, along with identification of the components. This is seen in the photographs of the circuits shown in Figures 26 and 28.

Figures 25 and 27 are diagrammatic views of the circuits showing the printed wiring in a "phantom" view superimposed on the component layout. These presentations, in conjunction with the photographs, provide for rapid circuit tracing while referring to only the component side of the assemblies.

The coordinate letters and numbers, shown at the sides of the assembly views, are provided for rapid location of components. Reference to the location guide will show the location of any given component. The desired component location will be found in the area designated by the particular letter/number combination indicated.

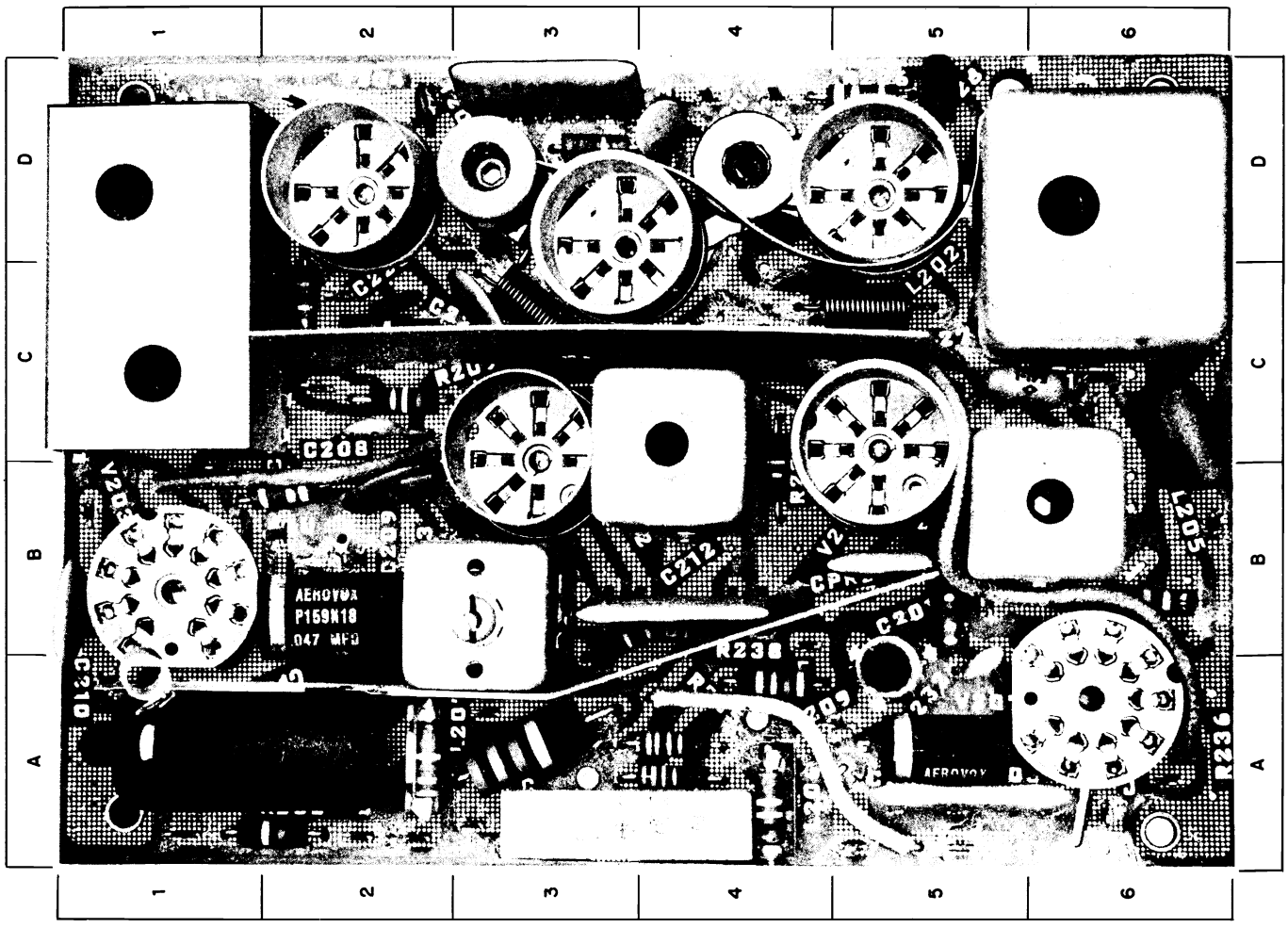


Figure 26—PW200 Sealed Circuit I-F and Video Assembly Component View

CHASSIS REAR VIEW

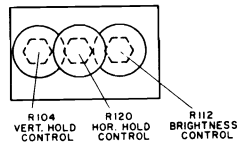
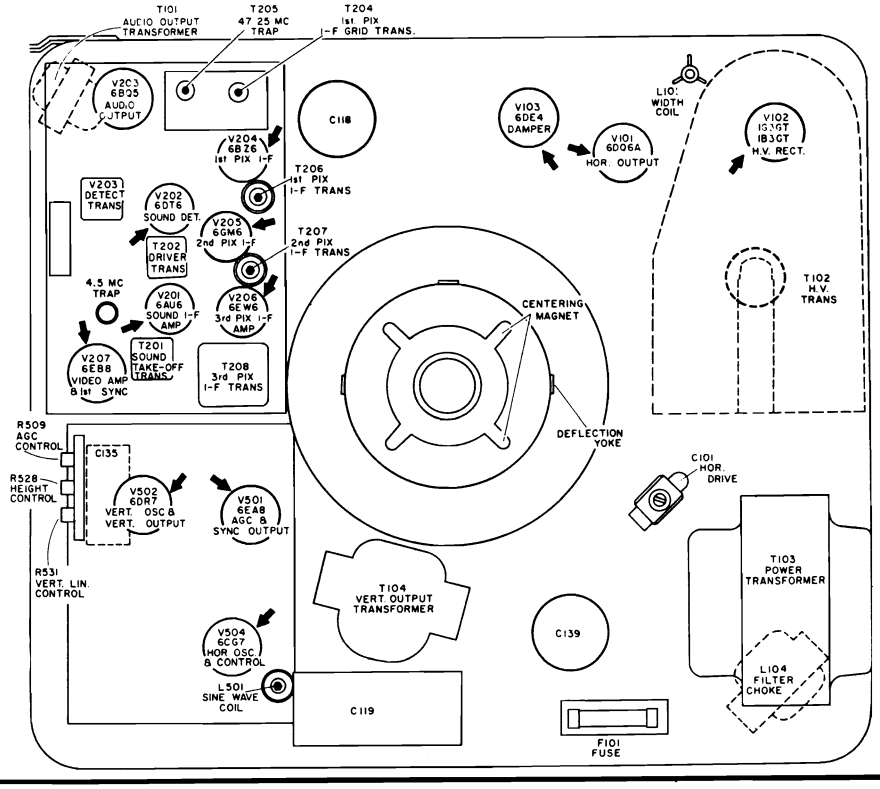


Figure 29—Chassis Rear View



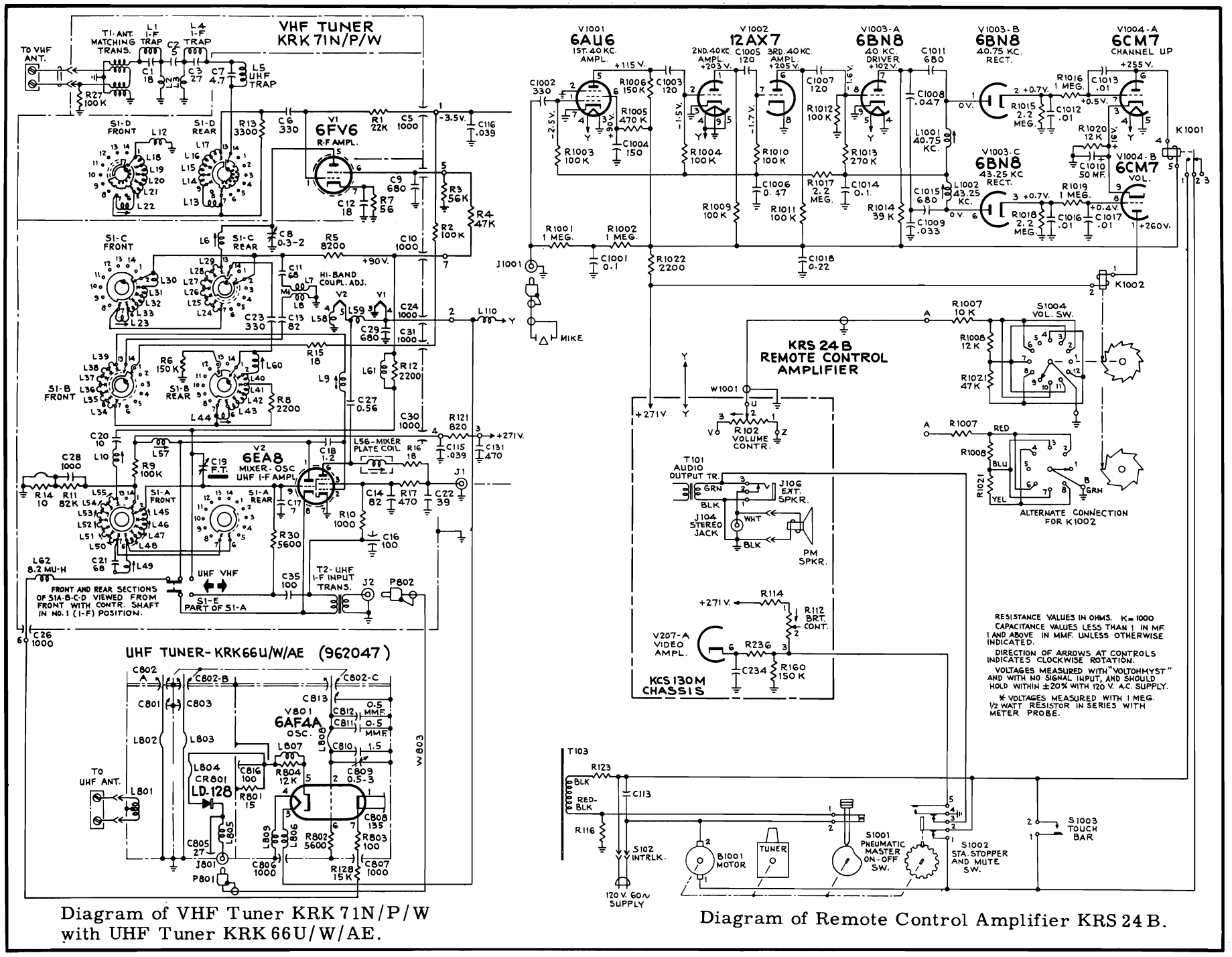


Diagram of VHF Tuner KRK 71N/P/W with UHF Tuner KRK 66U/W/AE.

Diagram of Remote Control Amplifier KRS 24 B.

The diagram below and on the page at left are exact for chassis listed in lower left hand corner. Other chassis of this series use tuners shown on the next page, over, or may use 17DKP4 picture tube, or another type of remote control unit.

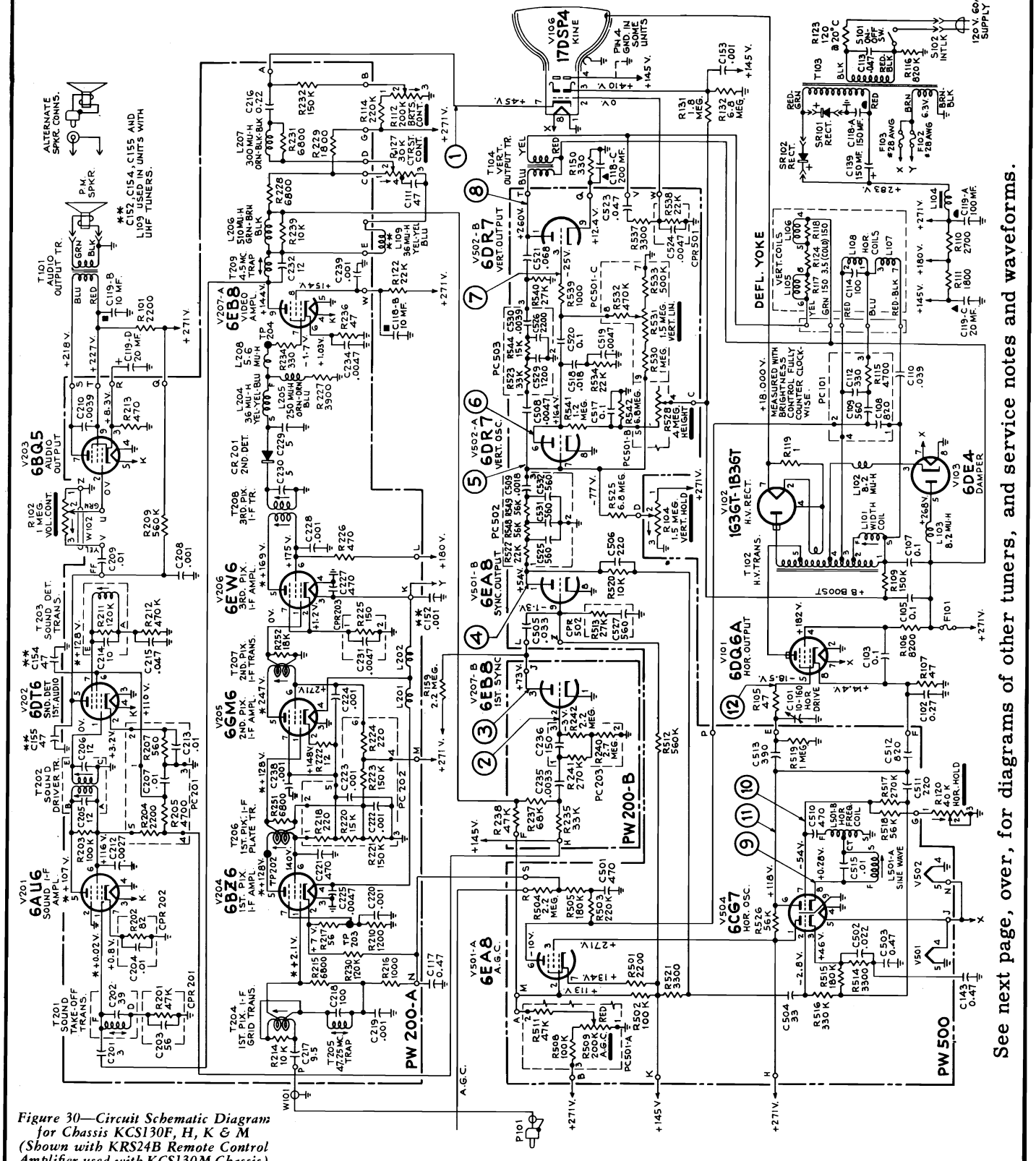


Figure 30—Circuit Schematic Diagram for Chassis KCS130F, H, K & M (Shown with KRS24B Remote Control Amplifier used with KCS130M Chassis)

RCA Victor KCS-130 Chassis Series, Diagrams and Data, Continued

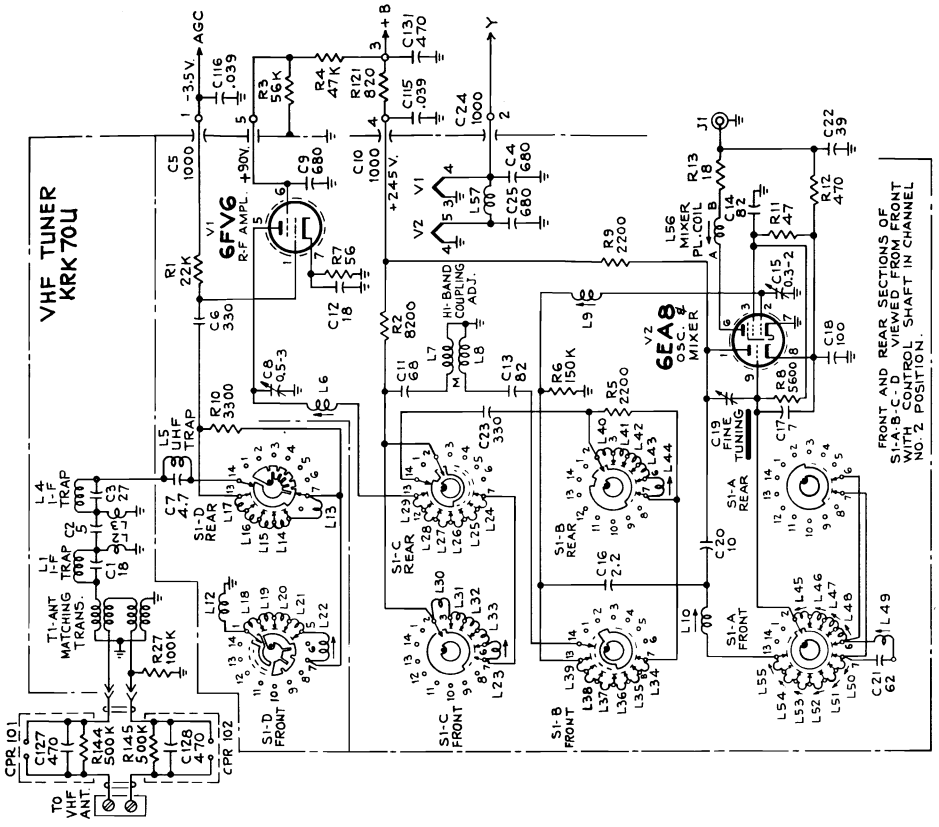


Figure 22—KRK70U VHF Tuner Schematic Diagram for KCS130F Chassis

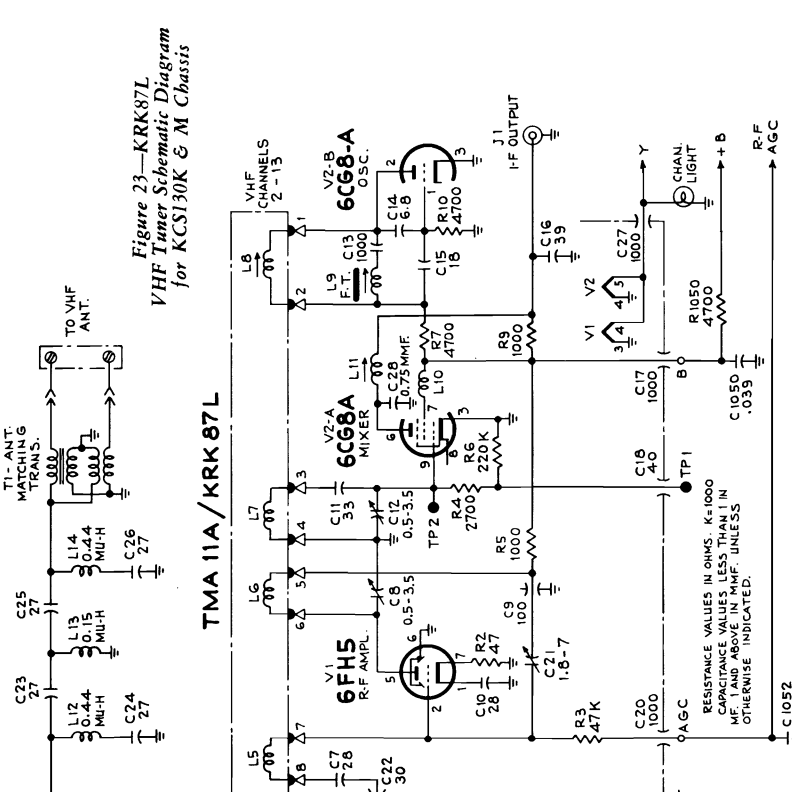


Figure 23—KRK87L VHF Tuner Schematic Diagram for KCS130K & M Chassis

All schematics are shown in the latest condition at the time of printing.

All resistance values in ohms. K = 1000.

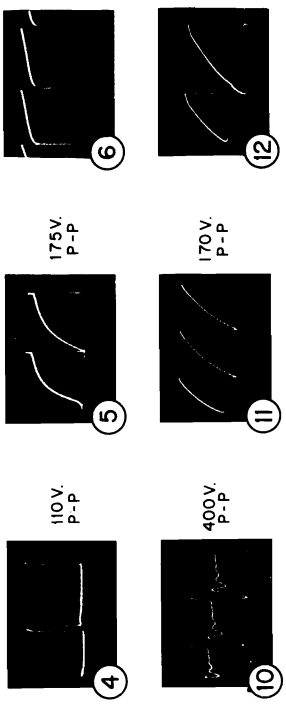
All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted.

Direction of arrows at controls indicates clockwise rotation.

All voltages measured with "Volt-Ohmyst" and with no signal input. Voltages should hold within ±20% with 120 v, a-c supply.

*Measured with 1 megohm, ½ watt resistor in series with meter probe.

Balloons ① ② etc., shown on schematic indicate points of observation of the waveforms shown below the schematic.



RCA VICTOR

KCS134 CHASSIS SERIES

MODEL AND CHASSIS REFERENCE

MODEL	CABINET TYPE	CHASSIS	TUNER MOUNTING ASSEMBLY	TUNER	DEFLECTION	KINESCOPE
191-B-242 & 4	Table	KCS134A	TMA19A	KRK96P	114°	19AFP4
191-B-242U & 4U	Table	KCS134B	TMA19B	KRK97P KRK66AE	114°	19AFP4
191-B-255, 6 & 7	Table	KCS134A	TMA19A	KRK96P	114°	19AFP4
191-B-255U, 6U & 7U	Table	KCS134B	TMA19B	KRK97P KRK66AE	114°	19AFP4
*191-BR-254	Table	KCS134C	TMA16A	KRK87AC	114°	19AFP4

The final numeral in the model number designates the cabinet finish, as follows:—2-BLACK, 4-IVORY, 5-MAHOGANY, 6-WALNUT, and 7-OAK. The suffix "U" in the model number identifies instruments with provision for UHF channel reception.

* This model incorporates a KRT1B (2 Button) Remote Control Transmitter and a KRS24C Remote Control Amplifier.

Model 191-S-256 has been added to this series of "19 inch" black and white television receivers. This model is identical to Model 191-B-256 except that the cabinet antenna is omitted. The receiver employs a KCS 134A chassis with a KRK 96P VHF tuner.

This group of sets of KCS-134 Series are similar to KCS-130 Chassis Series covered in detail in the preceding section. Refer to that material for alignment, waveforms, diagram notes, and some tuner diagrams. The same PW200 and PW500 printed circuit assemblies are used. Since the main diagram is somewhat different, it is shown on the next page, over. See notes under KCS-130. Other needed service information is given below.

VHF R-F OSCILLATOR ADJUSTMENT

On all models except 191-BR-254 adjustments for channels 2 through 12 are available through the individual holes on the front of the tuner. Adjustment for channel 13 is on top of the tuner chassis. Remove the channel selector knob to make adjustments. Pull knob outward off shaft. Set Fine Tuning to mechanical center of its range. See "A" of Figure 2.

Model 191-BR-254

This model incorporates remote control and the escutcheon plate must be removed. Remove the screw below the channel touch-bar and pull the escutcheon outward to remove.

There are thirteen gear and cam assemblies around the disc on the tuner face. Push in on the fine tuning knob and turn clockwise a minimum of six turns then counter-clockwise three full turns. Repeat this procedure for each channel to be used. This places the fine tuning capacitor at the center of its mechanical range for each channel. Refer to Figure 2B.

Rotate the channel selector with the touch-bar to the individual channels, in any order, and adjust the oscillator slug for all channels to be used. The aperture for adjustment is in the same location for all channels as shown in Figure 2B.—CAUTION: The small numerals on the dial face do *not* designate oscillator adjustments, they refer to the channel programming screws behind the dial. The single aperture for all oscillator adjustments is behind the programming drum, in the front plate of the tuner.

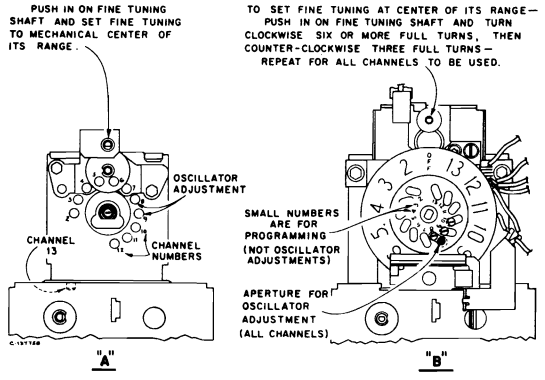


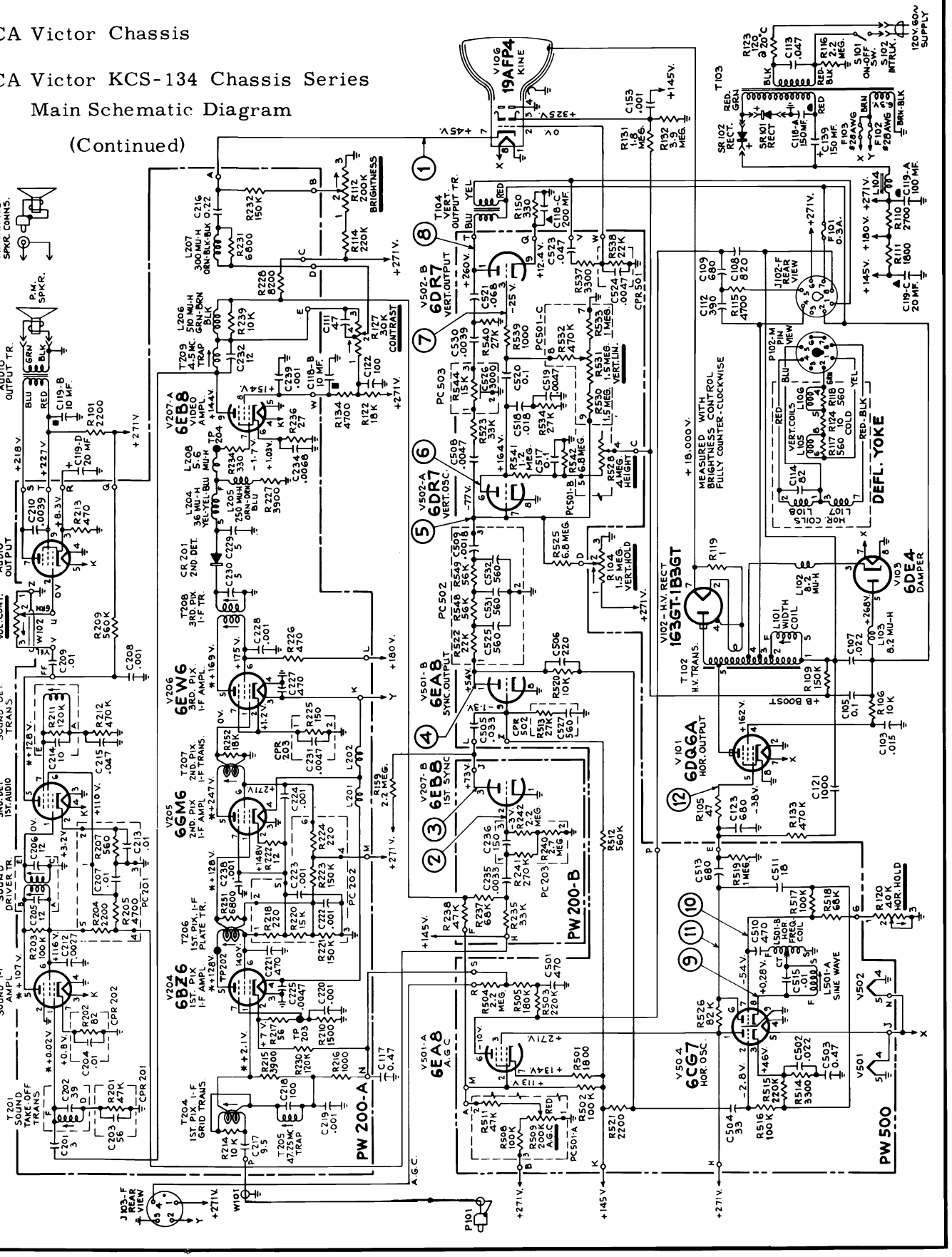
Figure 2—VHF Oscillator Adjustments

RCA Victor Chassis

RCA Victor KCS-134 Chassis Series

Main Schematic Diagram

(Continued)



RCA VICTOR

KCS131 & KCS132 CHASSIS SERIES

(Cross reference of chassis and models is on pages 138 and 139.
Other service material below and on pages following through page 152.)

SPECIFICATIONS

ANTENNA INPUT IMPEDANCE	300 ohms balanced
AUDIO POWER OUTPUT RATING	2.2 watts max.
FOCUS	Electrostatic
POWER INPUT	120 Volts AC, 60~
POWER RATING	245 watts
Remote Control Models	285 watts
SWEEP DEFLECTION	Magnetic
INTERMEDIATE FREQUENCIES	
Picture I-F Carrier Frequency	45.75 mc.
Sound I-F Carrier Frequency	41.25 mc.
VIDEO RESPONSE	To 3.2 mc.

ANTENNA INPUT

VHF Models

The tuner units in these models are designed for VHF reception only, with a 300 ohm antenna input provided.

UHF/VHF Models

The tuner units in these models are designed for UHF-VHF reception with separate 300 ohm inputs provided for UHF and VHF use. When using a UHF or VHF antenna only, or both, connect the transmission line(s) to the proper antenna terminals at the rear of the receiver.

When a combination UHF/VHF antenna is to be used, having a single transmission line, a stub arrangement, such as shown in Figure 1A, or a crossover network (RCA Part #78444) as shown in Figure 1B, may be used to match the single transmission line to the two inputs.

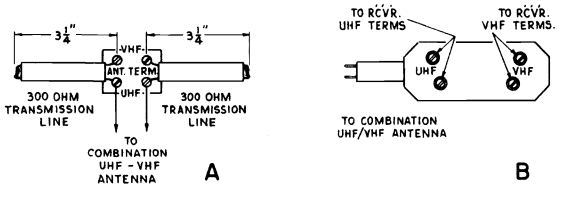


Figure 1—Combination UHF/VHF Antenna Matching

CENTERING ADJUSTMENT

Centering is accomplished by means of two levers on the back of the yoke. By alternately rotating one magnet with respect to the other, then rotating both simultaneously around the neck of the tube, proper centering of the picture can be obtained.

DEFLECTION YOKE ADJUSTMENT

If the lines of the raster are not horizontal or squared with the picture mask, rotate the deflection yoke until this condition is obtained. Tighten the yoke clamp screw.

FOCUS

A focus control is provided to permit proper focusing of the kinescope. This control is R149 located on the chassis rear and should be adjusted to give best overall focus with brightness set at normal operating level.

HORIZONTAL OSCILLATOR ADJUSTMENT

Turn the horizontal hold control to the extreme clockwise position. The picture should be out of sync, with a minimum of eight bars slanting downward to the left. Turn the control counter-clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 1½ to 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional counter-clockwise rotation of the control. The picture should remain in sync for approximately one full turn of additional counter-clockwise rotation of the control. Continue counter-clockwise rotation until the picture falls out of sync. Rotation beyond fall out position should produce a minimum of 2 bars before end of rotation or a minimum of 12 bars before interrupted oscillation "motorboat" occurs.

Connect a short jumper across the terminals of the sine wave coil L501-A on PW500 deflection board, between test points TP501 and TP502, see Figure 31. Also short the grid of the sync tube, pin 1 of V502, to ground with a small screwdriver or jumper.

Adjust the horizontal hold control to obtain a picture with the sides vertical (picture may drift slowly sideways). Remove the short on the sine wave coil L501-A. The frequency should not change by more than one-half bar when the sine wave coil is properly adjusted.

If in the above check the frequency changed more than one-half bar L501-A should be adjusted. With the short removed, adjust the sine wave coil L501-A to again obtain a picture with the sides vertical. When properly adjusted, alternate shorting or no short should not cause a change in frequency, only a slight sideways shift of the picture should occur.

WIDTH ADJUSTMENT

The width adjustment is L101 and is located on top of the chassis, between the damper and low voltage rectifier tubes.

The width of the picture should be adjusted to fill the mask with a line voltage of 108V. With normal voltage of 120V, the picture should overscan the tube at each side by approximately ¾ inch. The adjustment should be made with the Brightness control set at normal operating position.

VERTICAL SIZE AND LINEARITY ADJUSTMENTS

Adjust the vertical size control R530 until the picture overscans approximately ⅝" at both top and bottom. Adjust vertical linearity R147 until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. Adjust centering to align the picture with the mask.

MODEL AND CHASSIS REFERENCE

MODEL	CABINET TYPE	CHASSIS	TUNER MOUNTING ASSEMBLY	TUNER	DEFLECTION	KINESCOPE
211-B-312	Table	KCS131ZD	TMA13A	KRK96A	90°	21DSP4
211-B312U	Table	KCS131ZE	TMA13B	KRK97A/KRK66AC	90°	21DSP4
211-B-312SU	Table	KCS131ZF	TMA13P	KRK87R	90°	21DSP4
211-B-325, 6 & 7	Table	KCS131C	TMA13C	KRK96D	90°	21DSP4
211-B-325U, 6U & 7U	Table	KCS131D	TMA13D	KRK97D/KRK66AC	90°	21DSP4
211-B-325SU & 6SU	Table	KCS131E	TMA13E	KRK87M	90°	21DSP4
211-D-405, 6, 7 & 9	Console	KCS131T	TMA13J	KRK96B	90°	21DSP4
211-D-406U	Console	KCS131U	TMA13K	KRK97B/KRK66AC	90°	21DSP4
211-D-406SU	Console	KCS131W	TMA13L	KRK87P	90°	21DSP4
211-D-40C4	Console	KCS131T	TMA13J	KRK96B	90°	21DSP4
211-D-485, 6 & 7	Console	KCS131T	TMA13J	KRK96B	90°	21DSP4
211-D-505, 6 & 7	Console	KCS131T	TMA13J	KRK96B	90°	21DSP4
211-D-505U, 6U & 7U	Console	KCS131U	TMA13K	KRK97B/KRK66AC	90°	21DSP4
211-D-505SU, 6SU & 7SU	Console	KCS131W	TMA13L	KRK87P	90°	21DSP4
231-D-635, 6 & 7	Console	KCS132K	TMA13T	KRK96J	110°	23EP4
231-D-635U, 6U & 7U	Console	KCS132L	TMA13N	KRK97J/KRK66AF	110°	23EP4
231-D-635SU, 6SU & 7SU	Console	KCS132M	TMA13U	KRK87W	110°	23EP4
231-D-655, 6, 7 & 9	Console	KCS132K	TMA13T	KRK96J	110°	23EP4
231-D-655U, 6U, 7U & 9U	Console	KCS132L	TMA13N	KRK97J/KRK66AF	110°	23EP4
231-D-655SU & 6SU 231-D-657SU & 9SU	Console	KCS132M	TMA13U	KRK87W	110°	23EP4
*231-DR-655, 6 & 7	Console	KCS132N	TMA15A	KRK87N	110°	23EP4
231-D-665, 6 & 9	Console	KCS132ZC	TMA13J	KRK96B	110°	23EP4
231-D-665U, 6U & 9U	Console	KCS132ZD	TMA13K	KRK97B/KRK66AC	110°	23EP4
231-D-66C4	Console	KCS132ZC	TMA13J	KRK96B	110°	23EP4
231-D-66C4U	Console	KCS132ZE	TMA13M	KRK97B/KRK66AC	110°	23EP4
231-D-66N6	Console	KCS132ZC	TMA13J	KRK96B	110°	23EP4
231-D-66N6U	Console	KCS132ZE	TMA13M	KRK97B/KRK66AC	110°	23EP4
†231-DR-665 & 6	Console	KCS132ZF	TMA3N	KRK87T	110°	23EP4
231-D-667	Console	KCS132ZC	TMA13J	KRK96B	110°	23EP4
231-D-667U	Console	KCS132ZD	TMA13K	KRK97B/KRK66AC	110°	23EP4
231-D-694, 5 & 6	Console	KCS132R	TMA13T	KRK96J	110°	23EP4
231-D-694U, 5U & 6U	Console	KCS132T	TMA13N	KRK97J/KRK66AF	110°	23EP4
231-D-695SU & 6SU	Console	KCS132W	TMA13U	KRK87W	110°	23EP4
*231-DR-695 & 6	Console	KCS132ZA	TMA15A	KRK87N	110°	23EP4
231-D-716 & 9	Console	KCS132AC	TMA13W	KRK96D	110°	23EP4
231-D-716U & 9U	Console	KCS132AD	TMA13R	KRK97D/KRK66AF	110°	23EP4
†231-DR-716 & 9	Console	KCS132AA	TMA3N	KRK87T	110°	23EP4
231-D-730 & 4	Console	KCS132AC	TMA13W	KRK96D	110°	23EP4

The final numeral in the model number designates the cabinet finish, as follows:—2-BLACK, 4-MAPLE, 5-MAHOGANY, 6-WALNUT, 7-OAK and 9-CHERRY. The suffix "U" or "SU" in the model number identifies instruments with provision for UHF channel reception.

* These models incorporate a KRT1B (2 Button) Remote Control Transmitter and a KRS24C Remote Control Amplifier.

† These models incorporate a CRK3E (3 Button) Remote Control Transmitter and a CTP9B Remote Control Amplifier.

RCA Victor KCS-131, KCS-132 Chassis Series, Service Information, Continued

MODEL AND CHASSIS REFERENCE CONTINUED

MODEL	CABINET TYPE	CHASSIS	TUNER MOUNTING ASSEMBLY	TUNER	DEFLECTION	KINESCOPE
231-DE-665 & 6 231-DE-667	Console	KCS132ZN	TMA20D	KRK98B	110°	23EP4
231-DE-665U & 6U 231-DE-667U	Console	KCS132ZP	TMA20E	KRK99B KRK66AC	110°	23EP4
231-DV-115 & 6	Console	KCS132ZAC	TMA20M	KRK102J	110°	23EP4
231-DV-125 & 6 231-DV-146	Console	KCS132U	TMA9B	KRK102D	110°	23EP4

AGC & SYNC STABILIZER CONTROL ADJUSTMENTS

Select the channel with the strongest signal and turn the fine tuning to obtain a 4.5 mc. beat, then back approximately 20° from the point where the beat occurs. Turn the horizontal hold control until the picture falls out of sync then back to where it just pulls into sync. Turn the AGC control R113 and the Sync Stabilizing control R515 fully counter-clockwise. Turn the vertical linearity control to bring the top edge of the picture into view.

Slowly advance the AGC control clockwise until a slight bend appears at the top of the picture, then turn the control counter-clockwise 45° from this point. Turn the Sync Stabilizing control clockwise to produce a slight bend at the top of the picture, then counter-clockwise 15° to 20° from this point. In high noise areas turn counter-clockwise 10° from point of bend.

Readjust the horizontal hold and vertical linearity controls for correct setting.

VHF R-F OSCILLATOR ADJUSTMENTS

Tune in all available stations to assure that the receiver r-f oscillator is adjusted to the proper frequency on all channels.

Models 211-B-312 & U, 211-D-405-6-7-9 & 6U, 211-D-40C4, 211-D-485-6 & 7, 211-D-505-6-7 & U, 231-D-635-6-7 & U, 231-D-655-6-7-9 & U, 231-D-665-6-9 & U, 231-D-66C4 & U, 231-D-66N6 & U and 231-D-694-5-6 & U

On these models adjustments for channels 2 through 12 are available through the holes on the front of the tuner. Adjustment for channel 13 is on top of the tuner chassis. Remove the channel selector knob to make adjustments. Pull knob outward off shaft. See Figure 2A. Set Fine Tuning to mechanical center of its range.

Models 211-B-312SU, 211-D-406SU, 211-D-505SU-6SU, & 7SU, 231-D-635SU-6SU & 7SU, 231-D-655SU-6SU-7SU & 9SU and 231-D-695 SU & 6SU

On these models adjustments for all channels are available through the single hole on the front of the tuner. Remove the channel selector knob to make adjustments. Pull knob outward off shaft. See "B" of Figure 2. Set Fine Tuning to mechanical center of its range.

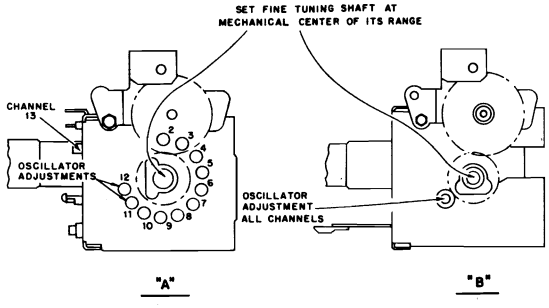


Figure 2—Oscillator Adjustments ("Off-Set" Fine Tuning)

Models 211-B-325-6-7 & U and 231-D-716-9 & U

Remove the channel selector knob by pulling the knob outward off its shaft. There are twelve gear and cam assemblies around the disc on the tuner face, one for each channel from 2 through 13.

Depress the fine tuning knob and set each gear with the index mark on the gear facing counter-clockwise around the outer edge of the disc as shown in Figure 3A. With the gears in this position, the fine tuning capacitor will automatically position to its mechanical center for each channel. On some models, the channel selector must be rotated to bring each gear into view through the opening in the tuner mounting plate.

Switch to channel 13 and, if necessary, adjust the channel 13 slug on top of the tuner. Progress counter-clockwise from channel 13 downward to channel 2, adjusting the oscillator slug, if required, on each channel. Do not change the setting of the fine tuning cams during adjustment of the oscillator slugs. The proper slug for each channel will become accessible through the opening in the front disc as the channel selector is switched to the desired channel.

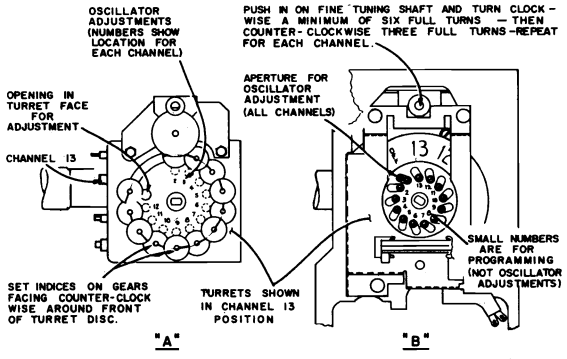


Figure 3—Oscillator Adjustments ("One Set" Fine Tuning)

Models 211-B-325SU, 231-DR-655-6 & 7, 231-DR-665 & 6, 231-DR-695 & 6 and 231-DR-716 & 9

On Model 211-B-325SU remove the channel selector knob by pulling the knob outward off its shaft. All other models incorporate remote control and for these models the escutcheon plate must be removed. Remove the screw below the channel touch-bar and pull the escutcheon outward to remove.

There are thirteen gear and cam assemblies around the disc on the tuner face. Push in on the fine tuning knob and turn clockwise a minimum of six turns then counter-clockwise three full turns. Repeat this procedure for each gear. This places the fine tuning capacitor at the center of its mechanical range for each channel. Refer to Figure 3B.

Switch the channel selector to the individual channels, in any order, and adjust the oscillator slug for all channels to be used. The aperture for adjustment is in the same location for all channels as shown in Figure 3B.

RCA Victor KCS-131, KCS-132 Chassis Series, Service Information, Continued

KINESCOPE AND SAFETY GLASS CLEANING

All 23" Models

The front safety glass for the 23EP4 kinescope used in these models is sealed to the face of the kinescope, being a part of the kinescope itself. The front face of the safety glass is all that requires cleaning for these instruments.

REMOTE CONTROL PROGRAMMING

Two Button Transmitter Models

The motor-driven tuner assembly employed in these models is equipped with a programming selector drum which will stop the channel selector automatically at any channels preset on the programming drum. The drum also provides for selection of any unused channel as a "standby" position. The position between channels 13 and 2 is employed as the "off" position and the tuner will stop in this position, each time the position is reached. If the selector is allowed to remain in "off" position, without the channel selector bar or the remote transmitter being actuated, for a period longer than five seconds, the receiver will be turned off completely.

The programming drum, by which the desired channels and the "standby" channel are selected, is located at the front of the tuner and is fastened to the channel selector shaft as shown in Figure 5. Channel selection is made in the following manner — Remove the fine tuning knob and the screw below the channel selector bar. Remove the escutcheon plate, making the front of the tuner with the programming drum accessible through the opening behind the escutcheon. There are twelve cams around the front of the drum, one for each channel 2 through 13, with a solid metal stud for the "off" position between channels 13 and 2.

Rotate the channel selector to the "off" position. Select each desired channel by turning the corresponding cam for that channel fully clockwise. The correct cam for a particular channel is denoted by the small number next to the opening in the channel dial as indicated in Figure 5. The cams for all unwanted channels should be turned fully counter-clockwise. The cam for the channel selected for "standby" should be turned so the slot in the screw head of the cam for that channel points to the center of the channel selector shaft as shown in Figure 5.

Three Button Transmitter Models

Set cams for all desired channels fully clockwise and for all unwanted channels fully counter-clockwise as explained above for two button transmitter models. The "standby" cam adjustment is not used on these models. The cam between channels 13 and 2 should be turned fully counter-clockwise to by-pass this unused position.

The "standby" and "off" functions for these models are performed with the on/off volume control on the receiver, or remotely by use of the "Off-Vol. Down" button on the transmitter. Counted-clockwise rotation of the control will first turn the receiver to "standby", further rotation will turn the receiver off completely.

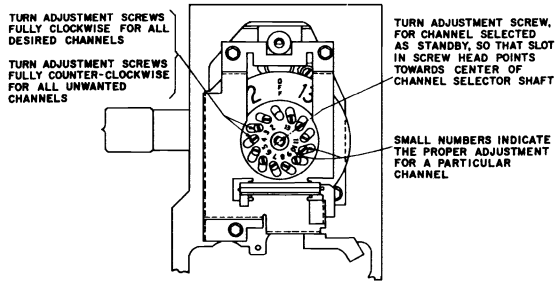


Figure 5—Remote Control Programming

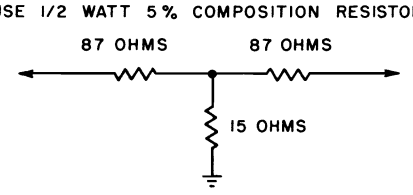


Figure 6—Sound Attenuation Pad

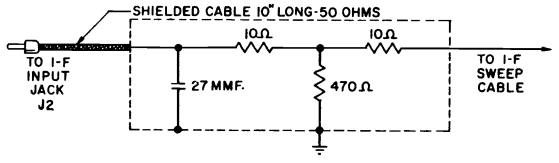


Figure 7—Tuner I-F Input Head

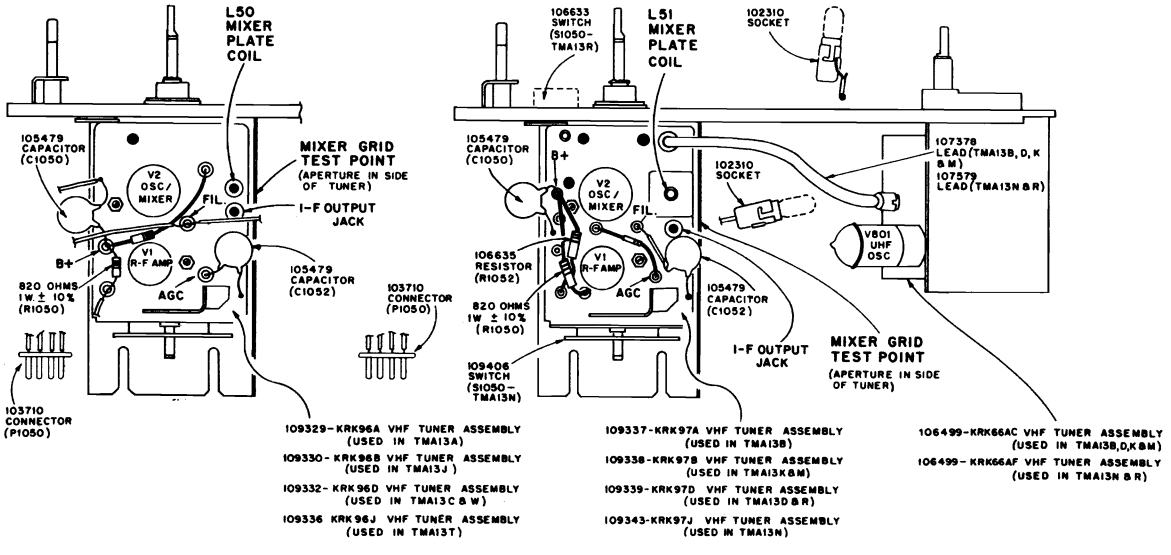


Figure 21—TMA13A, B, C, D, J, K, M, N, R, T & W Tuner Mounting Assembly Parts Identification

RCA Victor KCS-131, KCS-132 Chassis Series, Alignment Information, Continued

PICTURE I-F TRANSFORMER AND TRAP ADJUSTMENTS

TEST EQUIPMENT CONNECTIONS:

BIAS ..... Ground the I-F AGC bus at terminal "N" of PW200.
OSCILLOSCOPE ..... Connect to 2nd Detector output at test point TP204. Set scope for 5v. p-p.
SIGNAL GENERATOR ..... Connect to mixer grid, at strap on S1B for KRK96 and KRK97 series tuners or to test point TP2 for KRK87 series tuners, in series with 1500 mmf. capacitor. See Figure 21.
SWEEP GENERATOR ..... Connect to the grid of the 3rd picture I-F amplifier, pin 1 of V206, through hole in board. Use shortest leads possible. (See Figure 31.)
VACUUM TUBE VOLTMETER .... Connect to 2nd Detector output at test point TP204. Use DC probe.
MISCELLANEOUS ..... Refer to Figure 31 for adjustment locations.

STEP		SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
1	Peak 2nd pix. I-F transformer	——	45.5 mc.	T207	Peak T207 and T206 on frequency for max. output on meter. Adjust generator for 3 volts on meter when finally peaked.
2	Peak 1st pix. I-F transformer	——	43.0 mc.	T206	
3	Adjust 3rd pix. I-F transformer	40-50 mc. (I-F)	41.25 mc. 45.75 mc.	T208 (top & bottom cores)	Adjust for maximum with response shown in Figure 9. Use 5v. p-p on scope.
4	Adjust 47.25 mc. trap	——	47.25 mc.	T205 (bottom)	Adjust for minimum output indication on meter.
5	Adjust 39.25 mc. trap	——	39.25 mc.	T205 (top)	Adjust for minimum output indication on meter.
6	Adjust 41.25 mc. trap	——	41.25 mc.	T204	Adjust for minimum output indication on meter.

SWEEP ALIGNMENT OF PICTURE I-F

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Set for 0.0 volts on I-F AGC bus at "N" of PW200, and —3.5 volts to tuner AGC terminal.
OSCILLOSCOPE ..... Connect a .001 mf. capacitor in series with a 180 ohm resistor from TP202 to ground, with the capacitor connected to TP202. Connect oscilloscope to the junction of the resistor and capacitor, using diode probe. (See Figure 31.)
SWEEP GENERATOR ..... Connect in series with 1500 mmf. to S1B (or TP2 on KRK87 series tuners) at mixer grid. Use shortest leads possible. See Figure 21.
SIGNAL GENERATOR ..... Couple loosely to sweep output cable to provide markers.
VACUUM TUBE VOLTMETER .... Connect to 2nd Detector output at test point TP204. Use DC probe.
MISCELLANEOUS ..... Refer to Figures 21 and 31 for adjustment locations.

STEP		SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
Set channel selector to channel 4.					
7	Adjust mixer plate coil	40 - 50 mc. (I-F)	42.5 mc. 45.75 mc.	L11—KRK87 L50—KRK96 L51—KRK97	Sweep output set for 0.5 v. P-P on scope. Adjust for max. gain and response "A" in Figure 10. Max. allow. tilt 20%.
8	Adjust I-F input	40 - 50 mc. (I-F)	42.5 mc. 45.75 mc.	T204	
Repeat step 4 above, if necessary, for minimum output at 47.25 mc. Remove 180 ohm, .001 capacitor and scope from TP202. Connect scope to test point TP204, using direct probe. Set bias supply for —6 volts at terminal "N" of PW200.					
9	Retouch I-F transformers	40 - 50 mc. (I-F)	42.5 mc. 45.0 mc. 45.75 mc.	T208 T207 T206	Adjust for response "B" in Figure 10. Use 5 v. P-P on scope.
Remove sweep from mixer grid. Couple signal generator to mixer, in series with pad shown in Figure 6. Set generator to 45.75 mc. and adjust output for exactly one and one-half (1½) volts on the "VoltOhmyst". Remove the pad and connect generator direct to mixer grid. Do not change generator output in step 10.					
10	Set 41.25 mc. attenuation	——	41.25 mc.	T206 & T208	Adjust for 1.2 to 1.5 volts on VTVM with response "B".
11	Connect sweep generator to antenna terminals using pad shown.				
	Check overall	Chans. 13 to 2	42.5 mc., 45.0 mc. 45.75 mc.	T207 & T208	Retouch slightly to correct overall tilt. Maintain response "B".

RCA Victor KCS-131, KCS-132 Chassis Series, Alignment Information, Continued

SOUND I-F, SOUND DETECTOR AND 4.5 MC TRAP ALIGNMENT

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Apply —10 volts to the I-F AGC bus at terminal "N" on PW200.
OSCILLOSCOPE ..... Connect across speaker voice coil.
SIGNAL GENERATOR ..... Connect to test point TP204 on PW200.
VACUUM TUBE VOLTMETER .... Connect to output of diode detector shown in Figure 12. Set meter for negative voltage readings.
MISCELLANEOUS ..... Connect test diode detector, see Figure 12, to pin 7 of V202. Refer to Figure 31 for adjustment locations.

STEP		SIGNAL GENERATOR	ADJUST	REMARKS
Set contrast control maximum clockwise.				
12	Adjust Driver Transformer Primary and Secondary	4.5 mc.	T202 (top & bottom)	Adjust T202 top & bottom for maximum on meter. Set generator for 1.0 to 1.5 volts when peaked. Peak cores at open end of coils.
13	Adjust Sound Take-Off Trans.	4.5 mc.	T201	Adjust T201 for maximum negative DC on meter. Set generator for 1.0 to 1.5 volts on meter.
14	Disconnect the diode test detector. Turn off signal generator and tune in strongest signal in area adjusting volume control for normal volume (approx. ¼ turn from c.c.w.). Turn core of T203 flush with top of coil form.			
15	Adjust Sound Detector Trans.	Observing oscilloscope and listening to audio output adjust T203 clockwise to a peak. Continue clockwise to second louder peak and adjust for maximum on this peak.		
Move the oscilloscope to the kinescope cathode. Use the diode probe. Set the contrast control to maximum clockwise position.				
16	Adjust 4.5 mc. trap	4.5 mc., A-M Mod., 400 Cycles	T209	Adjust for minimum 400 cycle indication on oscilloscope.
Alternate Method Using Generators With F-M Modulation Provided.				
12	Same as step 12 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation.			
13	Same as step 13 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation.			
14	Adjust Sound Detector Trans.	4.5 mc., 400 cycle F-M Mod., 7½ kc. Dev.	T203	Adjust T203 for max. 400~ output on scope using max. amplitude peak. Set volume control for .70 v. p-p on scope when peaked. See response in Figure 11.
15	Retouch Driver and Sound Take-Off. Trans. for breakout	4.5 mc., 400 cycle F-M Mod., 7½ kc. Dev.	T201 & T202	Decrease input to minimum usable signal. Retouch T201 & T202 for symmetrical breakout. response in Figure 11.
Move the oscilloscope to the kinescope cathode. Use the diode probe. Set the contrast control to maximum clockwise position.				
16	Adjust 4.5 mc. trap	Same as step 16 above. Adjust for minimum 400 cycle indication on oscilloscope.		

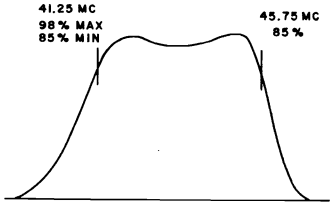


Figure 9—T208 3rd Pix I-F Response

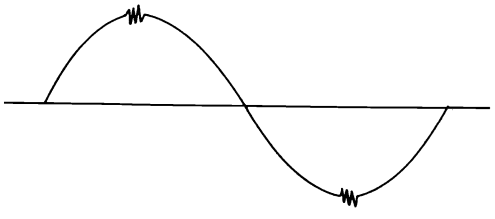


Figure 11—Sound Detector Response

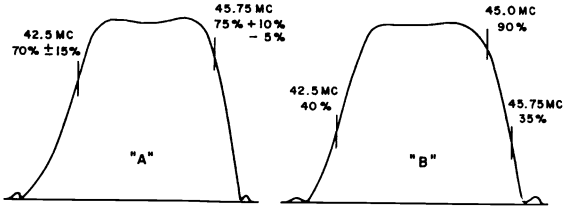


Figure 10—Mixer Plate and Overall I-F Responses

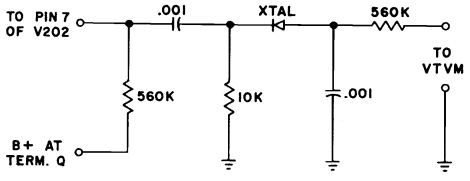


Figure 12—Sound Diode Detector

RCA Victor KCS-131, KCS-132 Chassis Series, Alignment Information, Continued

KRK97 TUNER SERIES I-F ALIGNMENT

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Apply —2.5 volts bias to AGC terminal on the tuner. Ground the positive lead to the tuner case.
OSCILLOSCOPE ..... Connect a 330 mmf. capacitor and a 180 ohm resistor in series from pin 6 of V2 to ground. Connect the capacitor to pin 6 and the resistor to ground. Connect the oscilloscope to the junction of the resistor and capacitor using the diode probe. (See below.)
SWEEP GENERATOR .... Connect to I-F input jack J2 using the input head shown in Figure 7.
SIGNAL GENERATOR ... Couple loosely to oscilloscope diode probe to provide markers.

STEP		SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
Set channel selector to UHF position 1 between channels 2 and 13.					
1	Adjust I-F input coil	40-50 mc. (I-F)	41.25 mc. 45.75 mc.	L50	L50 for max. gain and response "A". Generator set for 0.5 v. p-p or less on scope.
2	Adjust I-F interstage coil	40-50 mc. (I-F)	41.25 mc. 45.75 mc.	L28	Adjust L28 for response "A" in conjunction with L50 in step 1.
Connect UHF sweep generator to UHF terminals. Couple VHF signal generator to grid of 1st picture I-F amplifier as shown below. Remove input head from J2 and connect the cable from the UHF tuner to J2. Connect the oscilloscope to the 2nd detector output at terminal TP204 using the direct probe. Use 5 volts p-p on oscilloscope.					
3	Retouch I-F interstage coils for overall response	Tune entire UHF range	42.5 mc. 45.0 mc. 45.75 mc.	L50/L28	Retouch for response "B" below.
NOTE:—Adjustment of L50 affects the setting of the VHF oscillators requiring readjustment after L50 is adjusted. L50 should not be touched after final oscillator set-up has been made. Do not retouch any other I-F adjustments.					

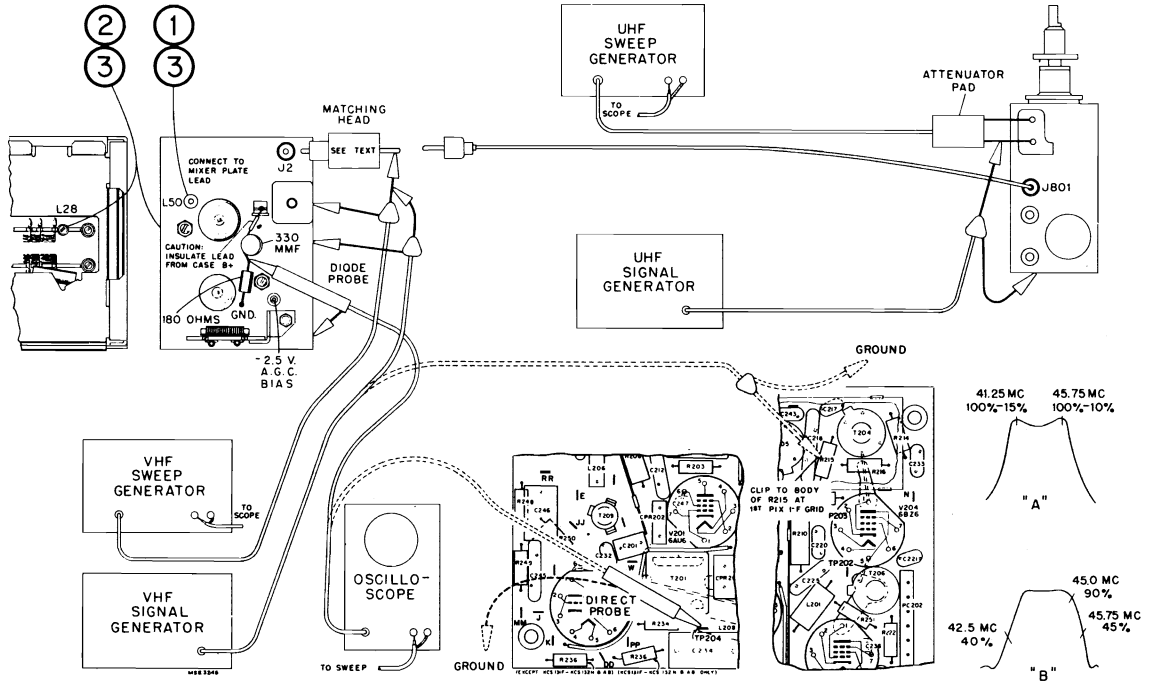


Figure 14—KRK97 Tuner Series I-F Alignment

RCA Victor KCS-131, KCS-132 Chassis Series, Tuner Diagrams, Continued

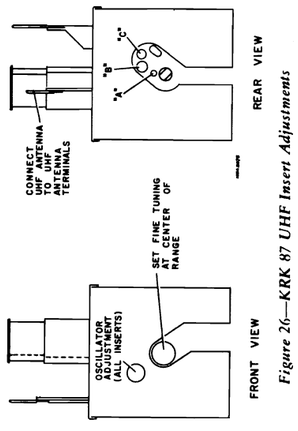


Figure 26—KRK 87 UHF Insert Adjustments

KRK87N & T VHF TUNER SCHEMATIC DIAGRAM

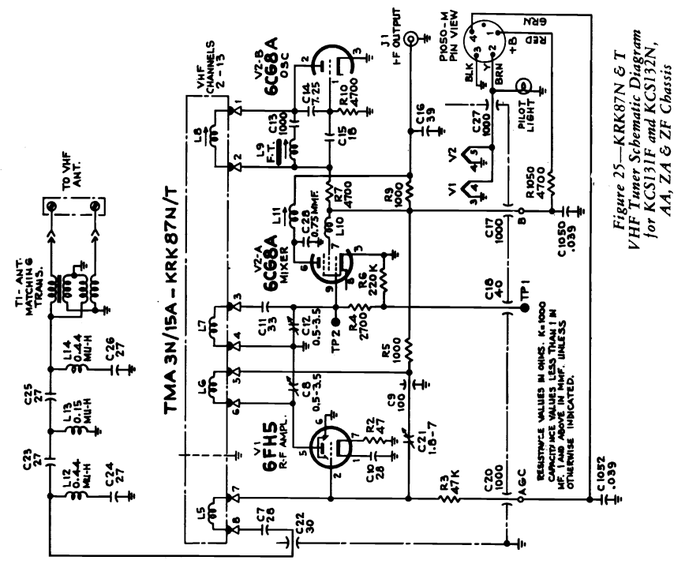


Figure 25—KRK87N & T VHF Tuner Schematic Diagram for KCS131F and KCS132N, AA, ZA & ZF Chassis

KRK96 VHF TUNER SERIES SCHEMATIC DIAGRAM

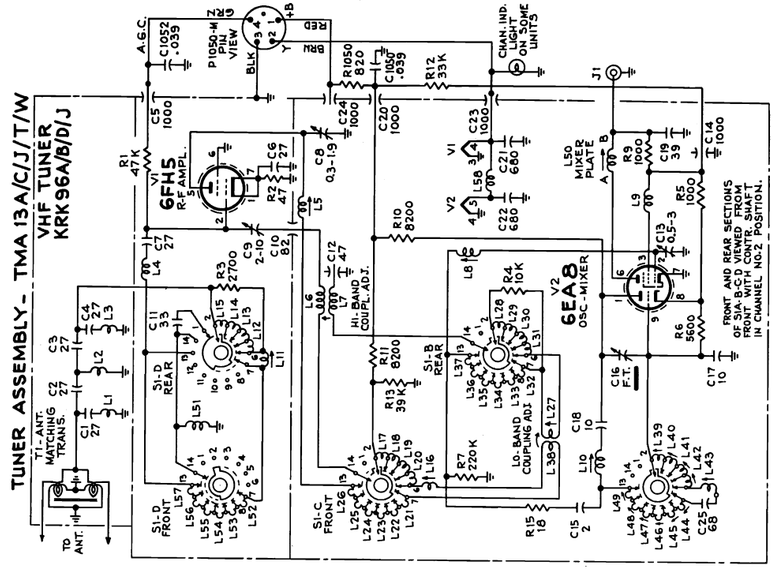


Figure 24—KRK96 VHF Tuner Series Schematic Diagram for KCS131C, T & ZD Chassis and KCS132K, R, AC & ZC Chassis

Refer to Figures 32 and 33 for main schematics used with these tuners.

RCA Victor Remote Control KRS 24C used with Chassis KCS-132N, -ZA, Continued

KRS24C REMOTE CONTROL AMPLIFIER SCHEMATIC DIAGRAM

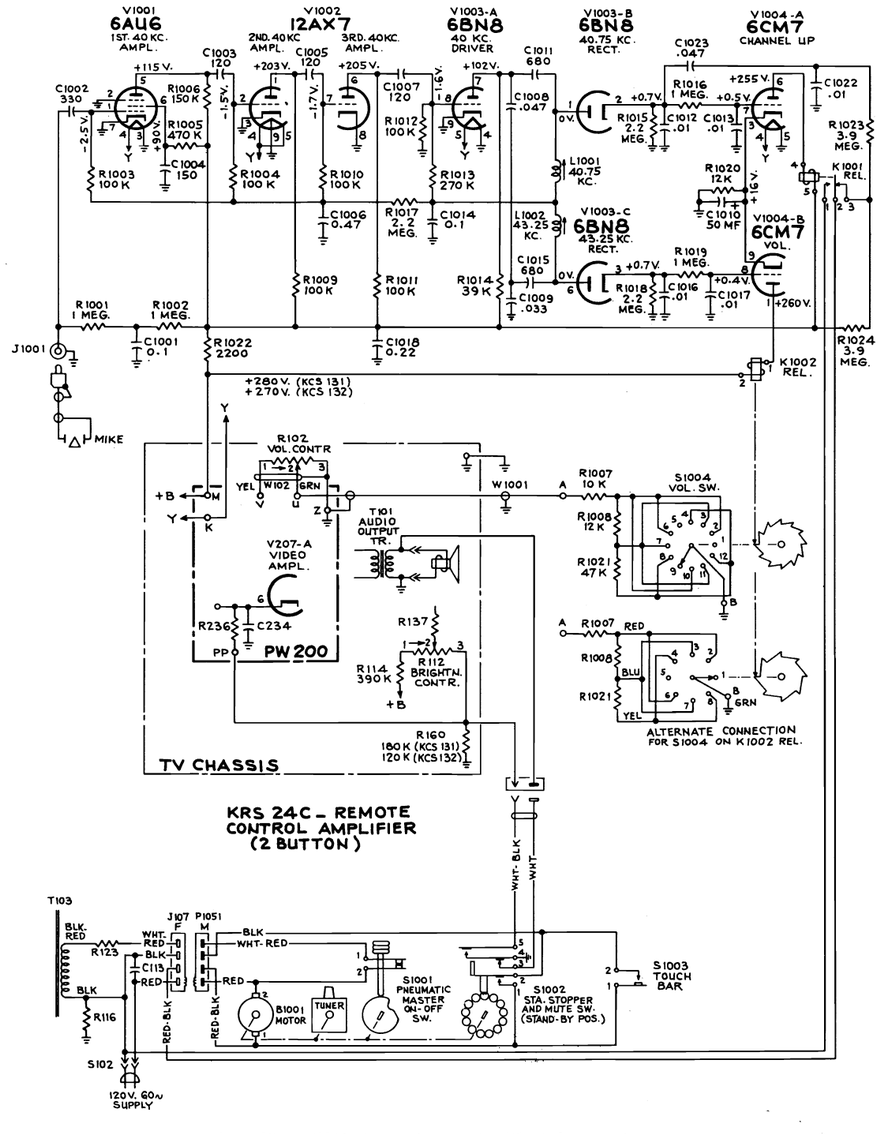
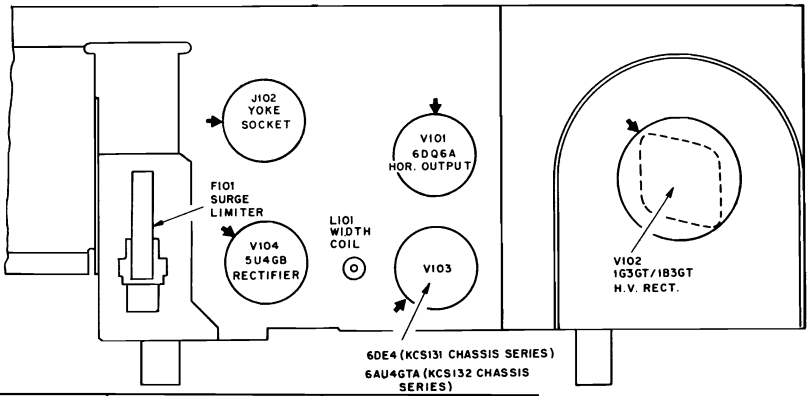


Figure 28—KRS24C Remote Control Amplifier Schematic Diagram— Used with KCS131F Chassis and KCS132N & ZA Chassis

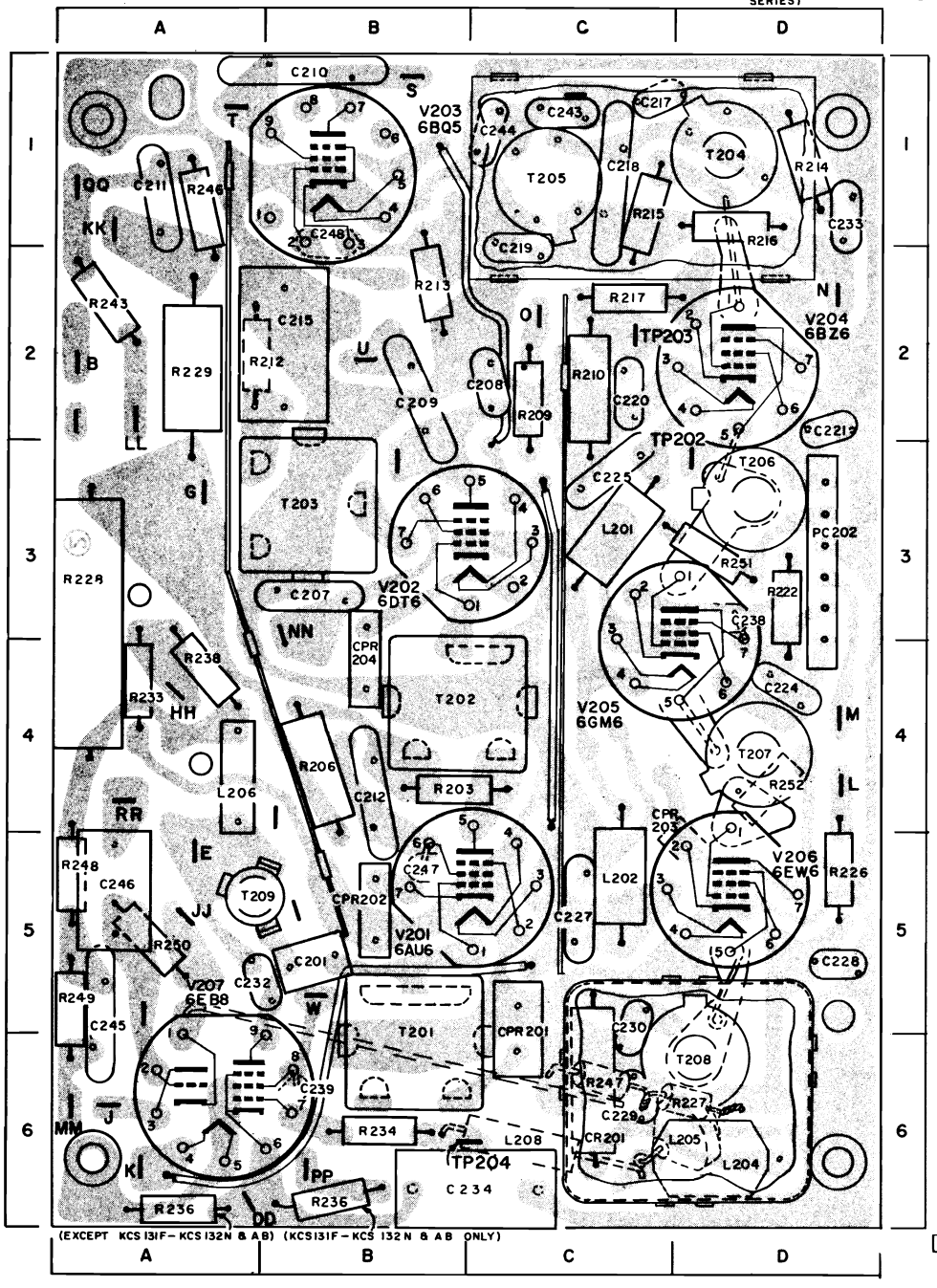
RCA Victor KCS-131 and KCS-132 Chassis Series, Service Data, Continued



PW200 COMPONENT LOCATION GUIDE

C201	B5
C207	B3
C208	C2
C209	B2
C210	B1
C211	A1
C212	B4
C215	B2
C217	C1
C218	C1
C219	C1
C220	C2
C221	D2
C224	D4
C225	C3
C227	C5
C228	D5
C229	C6
C230	C5
C232	A5
C233	D1
C234	C6
C238	D3
C239	B6
C243	C1
C244	C1
C245	A5
C246	A5
C247	B5
C248	B1
CPR201	C5
CPR202	B5
CPR203	D5
CPR204	B4
CR201	C6
L201	C3
L202	C5
L204	D6
L205	D6
L206	A4
L208	C6
PC202	D3
R203	B4
R206	B4
R209	C2
R210	C2
R212	A2
R213	B2
R214	D1
R215	C1
R216	D1
R217	C2
R222	D3
R226	D5
R227	D6
R228	A3
R229	A2
R233	A4
R234	B6
*R236	A6
*R236	B6
R238	A4
R243	A2
R246	A1
R247	C6
R248	A5
R249	A5
R250	A5
R251	D3
R252	D4
T201	B6
T202	B4
T203	B3
T204	D1
T205	C1
T206	D3
T207	D4
T208	D6
T209	A5

*See note on illustration.



The coordinate letters and numbers, shown at the sides of the assembly views, are provided for rapid location of components. Reference to the location guide will show the location of any given component. The component will be found in the area designated by the particular letter/number combination indicated.

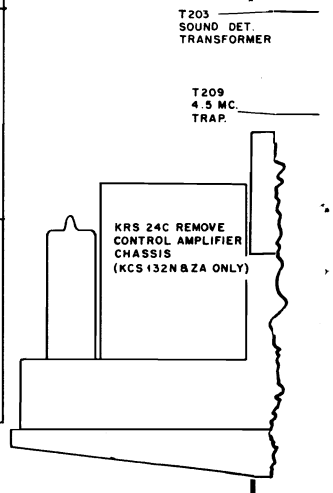


Figure 29—PW200 Sealed Circuit I-F and Video Assembly Composite Diagram

RCA Victor KCS-131, KCS-132 Chassis Series, Service Information, Continued

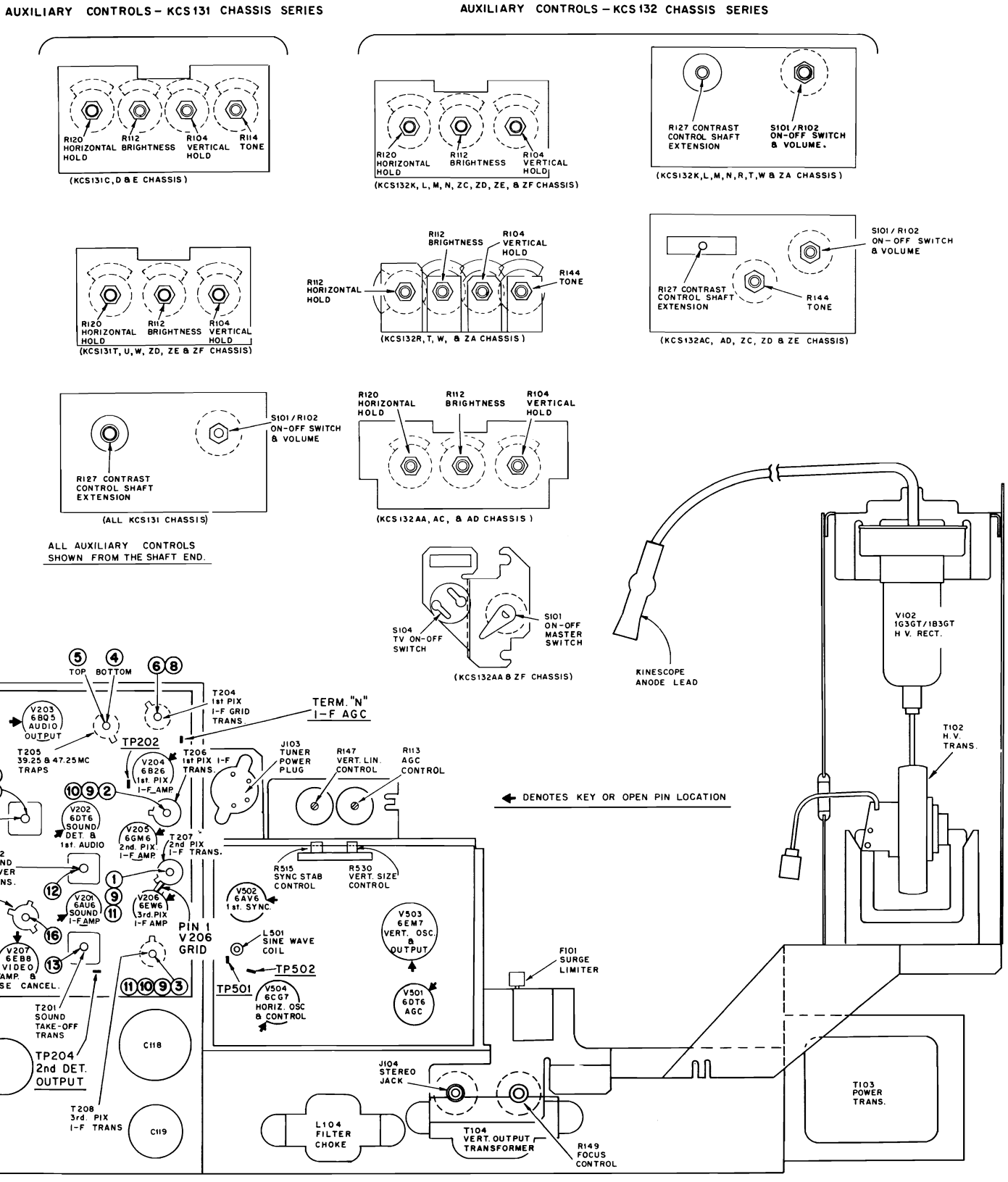
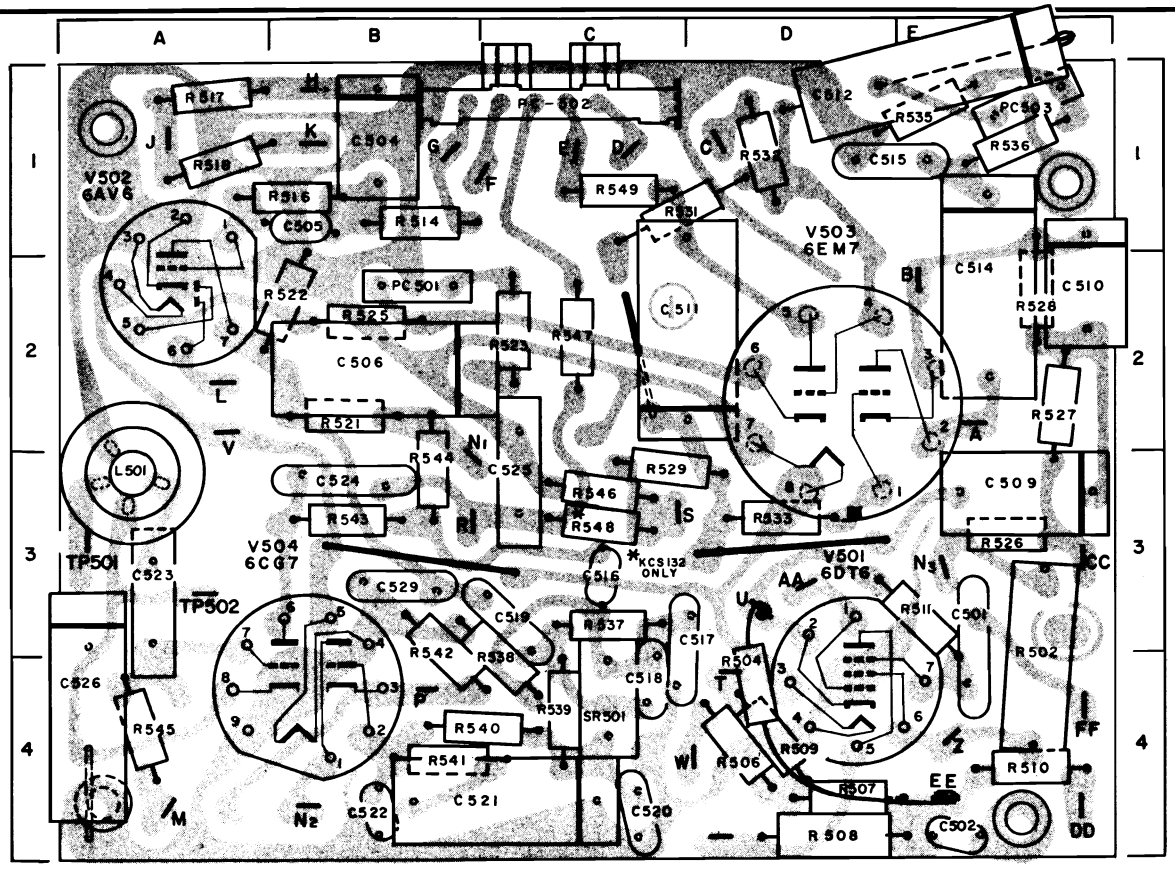


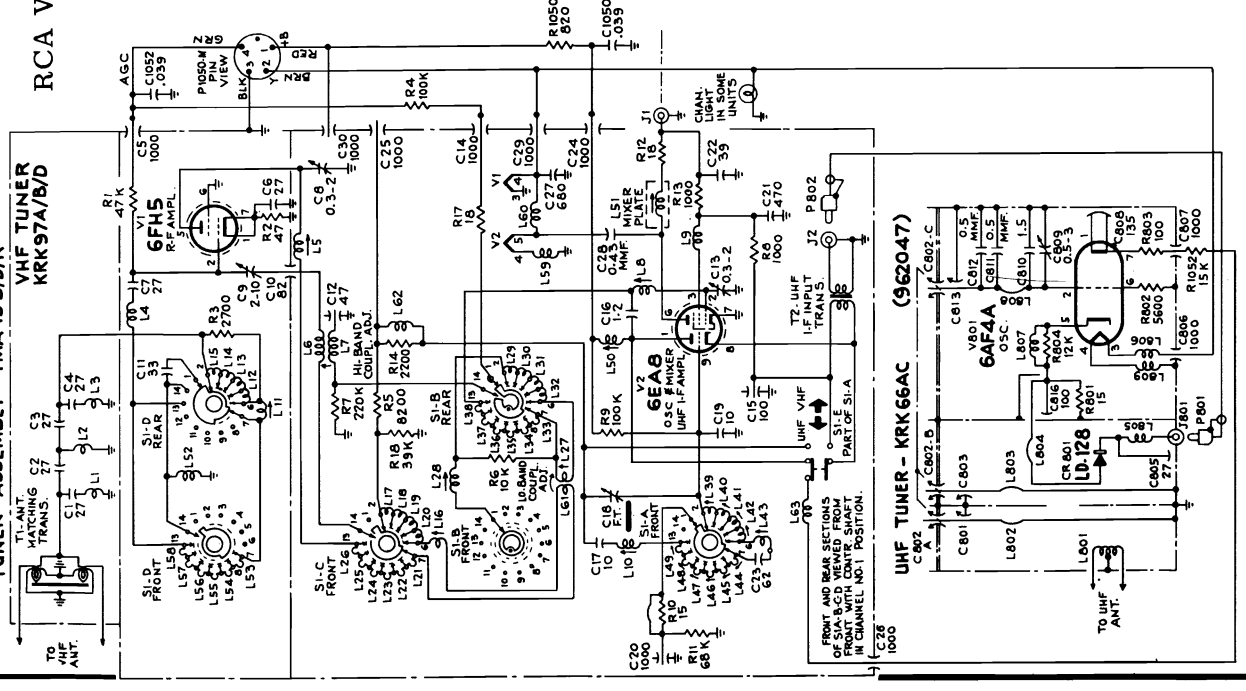
Figure 31—KCS131 & KCS132 Chassis Rear View



PW500 COMPONENT LOCATION GUIDE

C501 ..... E3	C514 ..... E2	C523 ..... A3	PC502 ... C1	R510 ..... E4	R525 ..... B2	R536 ..... E1	R545 ..... A4
C502 ..... E4	C515 ..... D1	C524 ..... B3	PC503 ... E1	R511 ..... E3	R526 ..... E3	R537 ..... C3	R546 ..... C3
C504 ..... B1	C516 ..... C3	C525 ..... C3		R514 ..... B1	R527 ..... E2	R538 ..... C3	R547 ..... C2
C505 ..... B1	C517 ..... C3	C526 ..... A4	R502 ..... E3	R516 ..... B1	R528 ..... E2	R539 ..... C4	°R548 ..... C3
C506 ..... B2	C518 ..... C4	C529 ..... B3	R504 ..... D4	R517 ..... A1	R529 ..... C3	R540 ..... B4	R549 ..... C1
C509 ..... E3	C519 ..... C3		R506 ..... D4	R518 ..... A1	R531 ..... C1	R541 ..... B4	
C510 ..... E2	C520 ..... C4	L501 ..... A3	R507 ..... D4	R521 ..... B2	R532 ..... D1	R542 ..... B3	SR501 ... C4
C511 ..... C2	C521 ..... C4		R508 ..... D4	R522 ..... B2	R533 ..... D3	R543 ..... B3	
C512 ..... E1	C522 ..... B4	PC501 ... B2	R509 ..... D4	R523 ..... C2	R535 ..... E1	R544 ..... B3	°KCS132 only

Figure 30—PW500 Sealed Circuit Assembly Composite Diagram



Diagrams of VHF Tuner KRK 97A/B/D and UHF Tuner KRK 66AC.

CIRCUIT SCHEMATIC DIAGRAM FOR KCS131C, D, E, F, T, U, W, ZD, ZE & ZF CHASSIS

(See Figure 24 for VHF Tuner used with KCS131C, T & ZD Chassis)—(See Figure 25 for VHF Tuner used with KCS131F Chassis)
(See Figure 27 for UHF/VHF Tuner used with KCS131E, W & ZF Chassis)

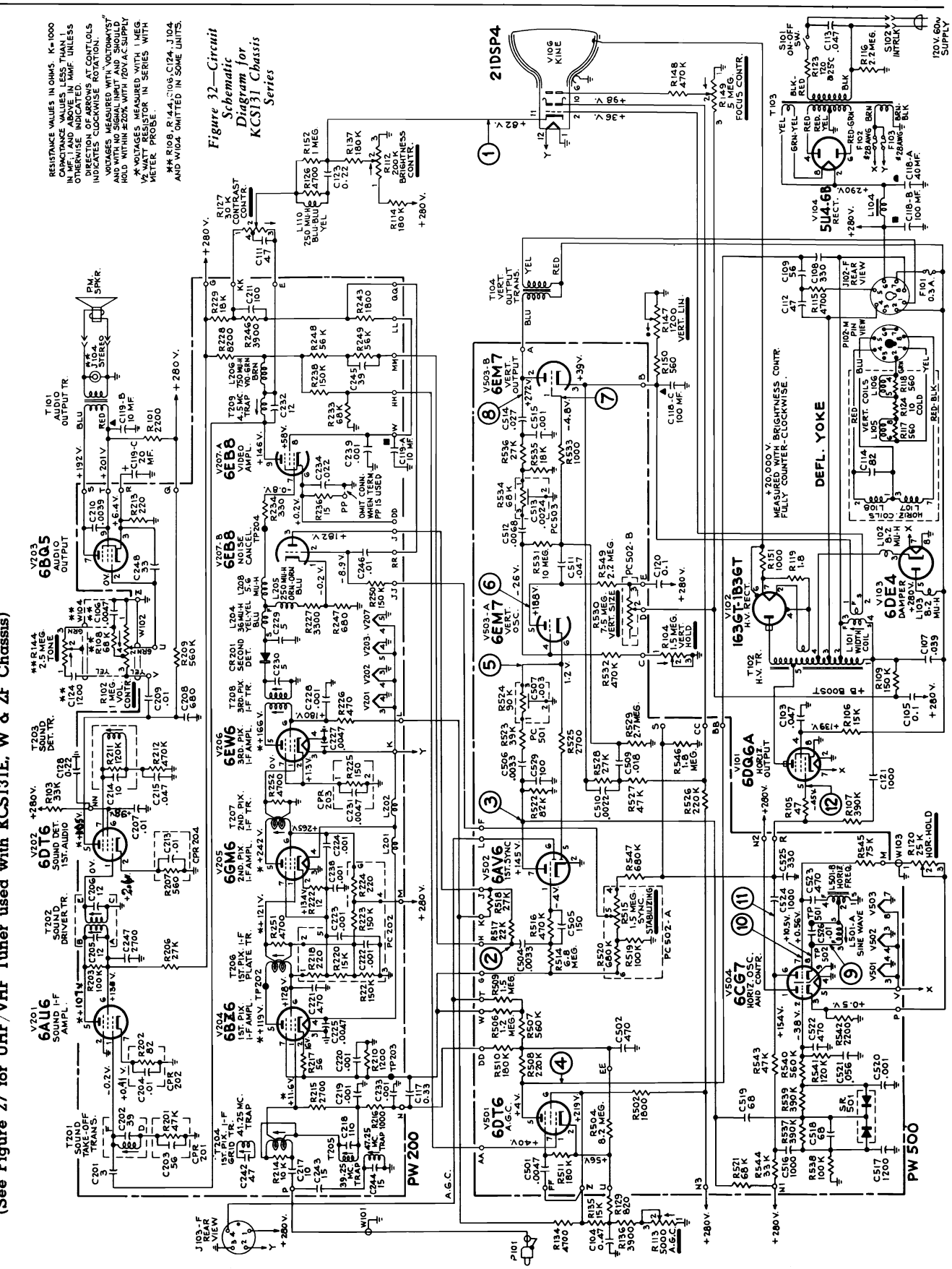
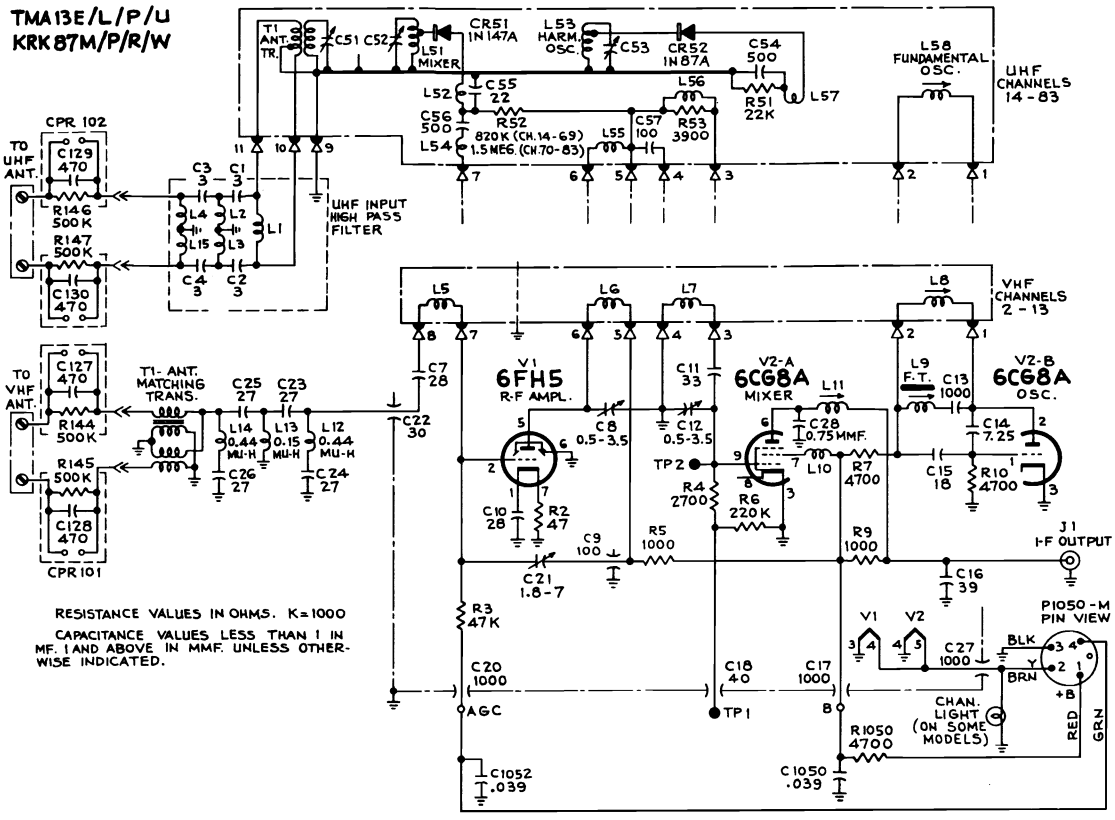


Figure 32—Circuit Schematic Diagram for KCS131 Chassis Series

RCA Victor KCS-131, KCS-132 Chassis Series, Service Information, Continued

KRK87M, P, R & W UHF/VHF TUNER SCHEMATIC DIAGRAM
(Used in KCS131E, W & ZF and KCS132M & W Chassis)



All voltages measured with "Volt-Ohmyst" and with no signal input. Voltages should hold within ±20% with 120 v, a-c supply.

*Measured with 1 megohm, ½ watt resistor in series with meter probe.

Balloons ① ② etc., shown on schematic indicate points of observation of the waveforms shown.

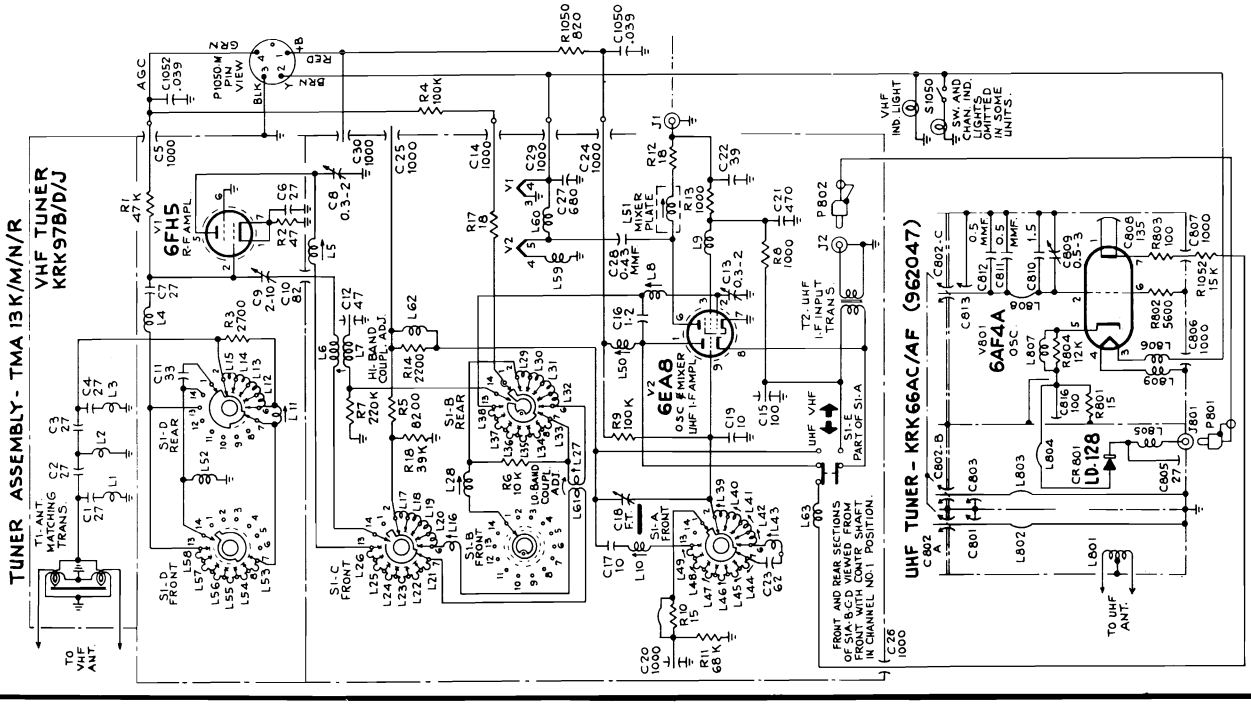
The schematic is shown in the latest condition at the time of printing.

All resistance value in ohms. K = 1000.

All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted.

Direction of arrows at controls indicates clockwise rotation.

Figure 27—KRK87M, P, R & W UHF/VHF Tuner Schematic Diagram



Diagrams of VHF Tuner KRK 97B/D/J and UHF Tuner KRK 66AC/AF.

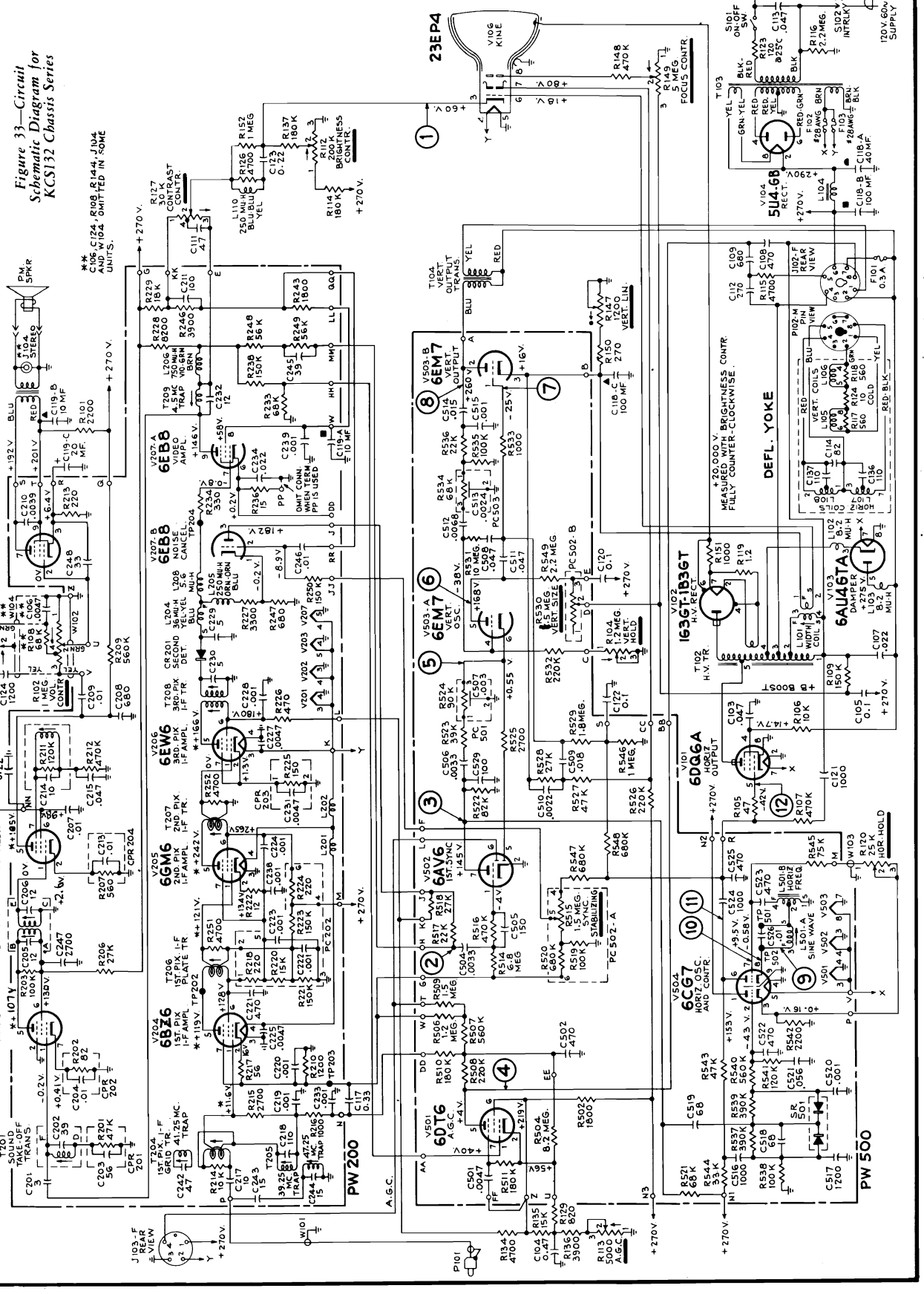
CIRCUIT SCHEMATIC DIAGRAM FOR KCS132K, L, M, N, R, T, W, AA, AC, AD, ZA, ZC, ZD, ZE & ZF CHASSIS

(See Figure 24 for VHF Tuner with KCS132K, R, AC & ZC Chassis) — (See Figure 25 for VHF Tuner used with KCS132N, AA, ZA & ZF Chassis)

(See Figure 27 for UHF/VHF Tuner used with KCS132M & W Chassis)

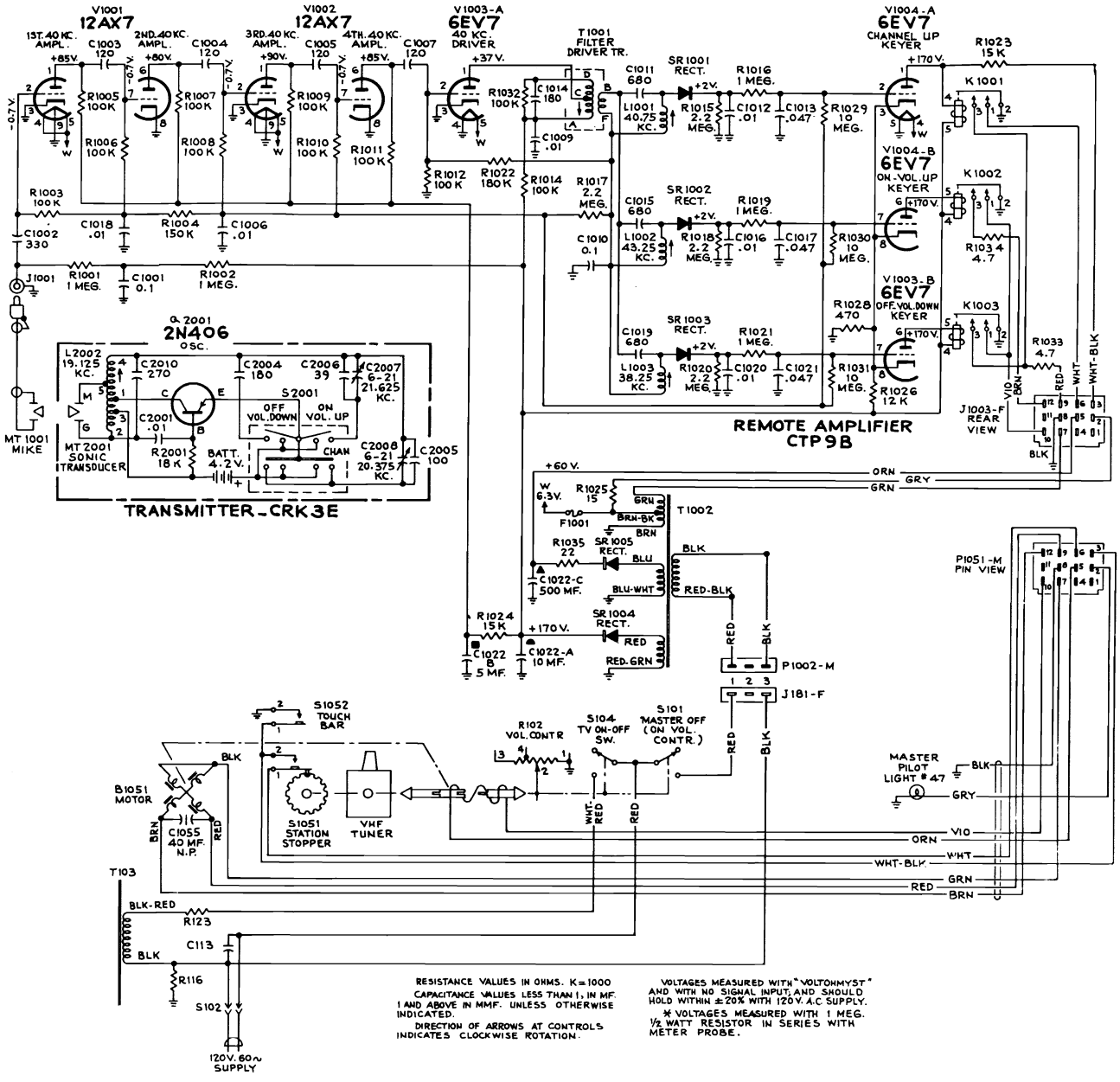
Refer to Figure 28 for Schematic Diagram of KRS24C Remote Control Unit used with KCS132N & ZA Chassis

Figure 33—Circuit Schematic Diagram for KCS132 Chassis Series

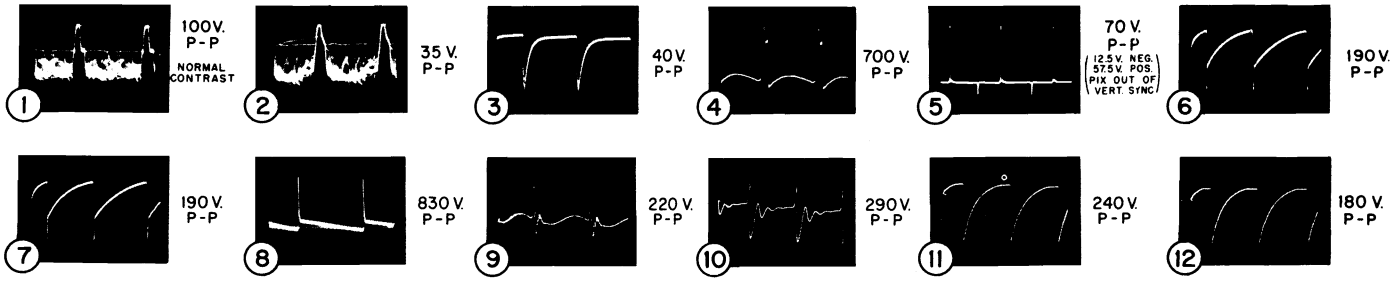


(Diagrams of Remote Control Units CTP9B and CRK3E used with KCS-132AA & -ZF Chassis is on the next page, over)

RCA Victor KCS-131, KCS-132 Chassis Series, Service Information, Continued



Diagrams of Remote Amplifier CTP 9B and Transmitter CRK 3E



Waveforms applicable to main schematics, Figs. 32 and 33. (See applicable notes.)

RCA VICTOR

The additional sets listed in the table below were added after the initial group of sets covered in the preceding section under KCS-132 Chassis Series. Except for tuners employed and some minor circuit differences, the material of the previous section is directly applicable. Required tuner material is printed below and on the next page, over.

MODEL AND CHASSIS REFERENCE

MODEL	CABINET TYPE	CHASSIS	TUNER MOUNTING ASSEMBLY	TUNER	DEFLECTION	KINESCOPE
231-B-612 & 5 231-B-616 & 7	Table	KCS132D	TMA13T	KRK96J	110°	23EP4
231-B-612U & 5U 231-B-616U & 7U	Table	KCS132E	TMA13N	KRK97J KRK66AF	110°	23EP4
231-B-612SU & 7SU	Table	KCS132F	TMA13U	KRK87W	110°	23EP4
*231-BR-615 & 6 *231-BR-617	Table	KCS132H	TMA15A	KRK87N	110°	23EP4
231-D-645 & 6 231-D-647	Console	KCS132K	TMA13T	KRK96J	110°	23EP4
231-D-645U & 6U 231-D-647U	Console	KCS132L	TMA13N	KRK97J KRK66AF	110°	23EP4
231-BE-625 & 6 231-BE-627	Table	KCS132ZH	TMA20A	KRK98A	110°	23EP4
231-BE-625U & 6U 231-BE-627U	Table	KCS132ZJ	TMA20B	KRK99A KRK66AF	110°	23EP4
231-BE-625SU	Table	KCS132ZK	TMA20C	KRK102C	110°	23EP4
*231-BER-625 & 6 *231-BER-627	Table	KCS132ZL	TMA15B	KRK102A	110°	23EP4
†231-HR-776 †231-HR-788 & 9 †231-HR-797 & 9	Console	KCS132ZM	TMA3P	KRK102B	110°	23EP4

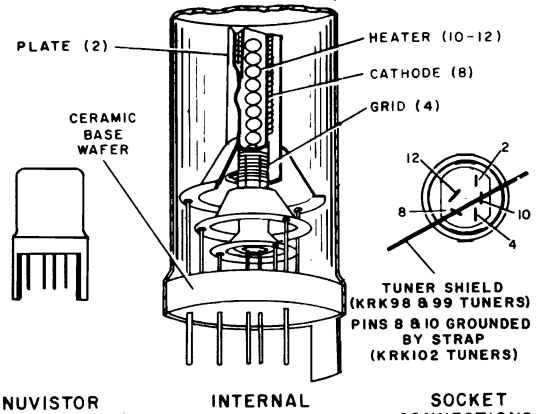
The final numeral in the model number designates the cabinet finish, as follows:—5-MAHOGANY, 6-WALNUT, 7-OAK (7-MOONSTONE for Model 231-HR-797 only), 8-STONE BEIGE and 9-ANTIQUE FRUITWOOD.

* These models incorporate a KRT1B (2 Button) Remote Control Transmitter and a KRS24C Remote Control Amplifier.

† These models incorporate a CRK3E (3 Button) Remote Control Transmitter and a CTP9B Remote Control Amplifier.

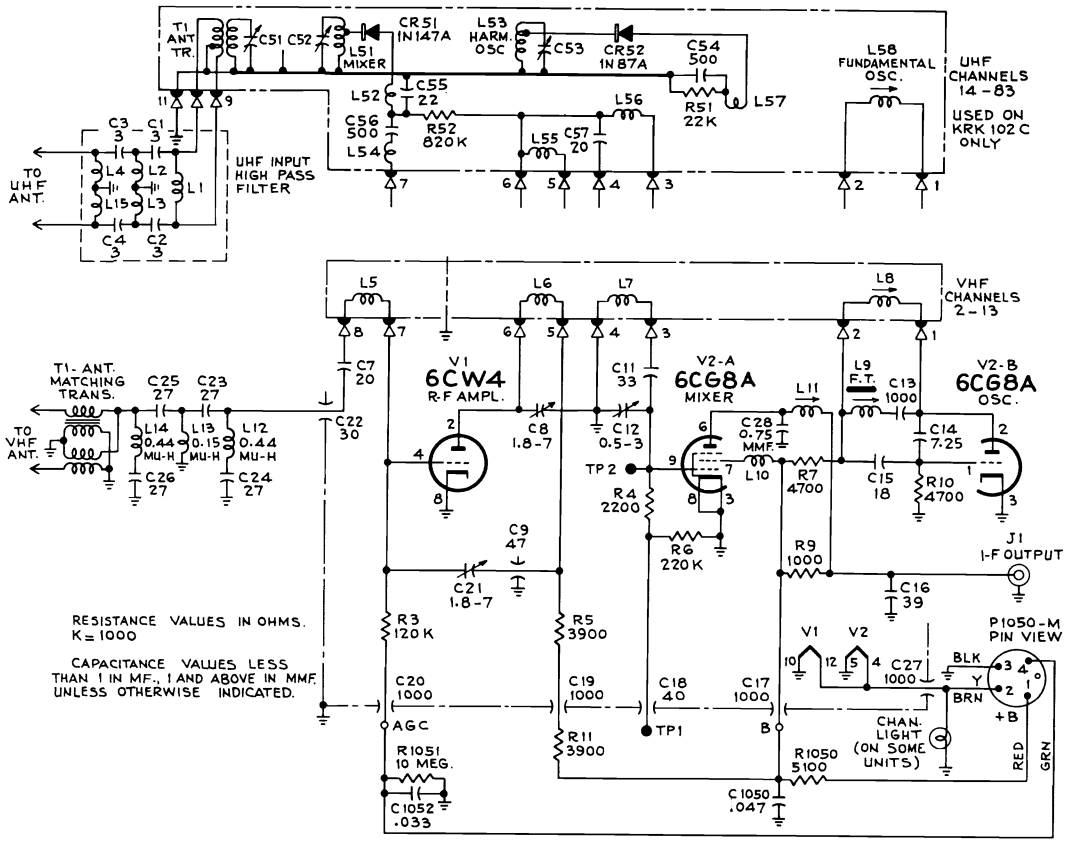
The KRK98A, KRK99A and KRK102A, B & C tuners used in these models are new designs that are referred to as the RCA "NEW VISTA" tuners. These tuners use a new electron tube type called a Nuvistor. The RCA type 6CW4 Nuvistor used in the R-F amplifier circuit of the new tuners is representative of a new development in receiving tube design.

The outstanding characteristics of the Nuvistor electron tube are due mainly to the method of manufacture, small size and the materials employed. The metal and ceramic materials used in the fabrication of this new tube result in extremely rugged construction. As shown in figure 1, the cylindrical electrodes are supported on short, tripod-like structures fastened to a ceramic wafer which serves as a support and a part of the tube envelope. This unique cylindrical construction permits all but two of the tube parts to be assembled on a simple jig. This method of manufacture makes it easier to control the dimensions between the close-spaced elements.

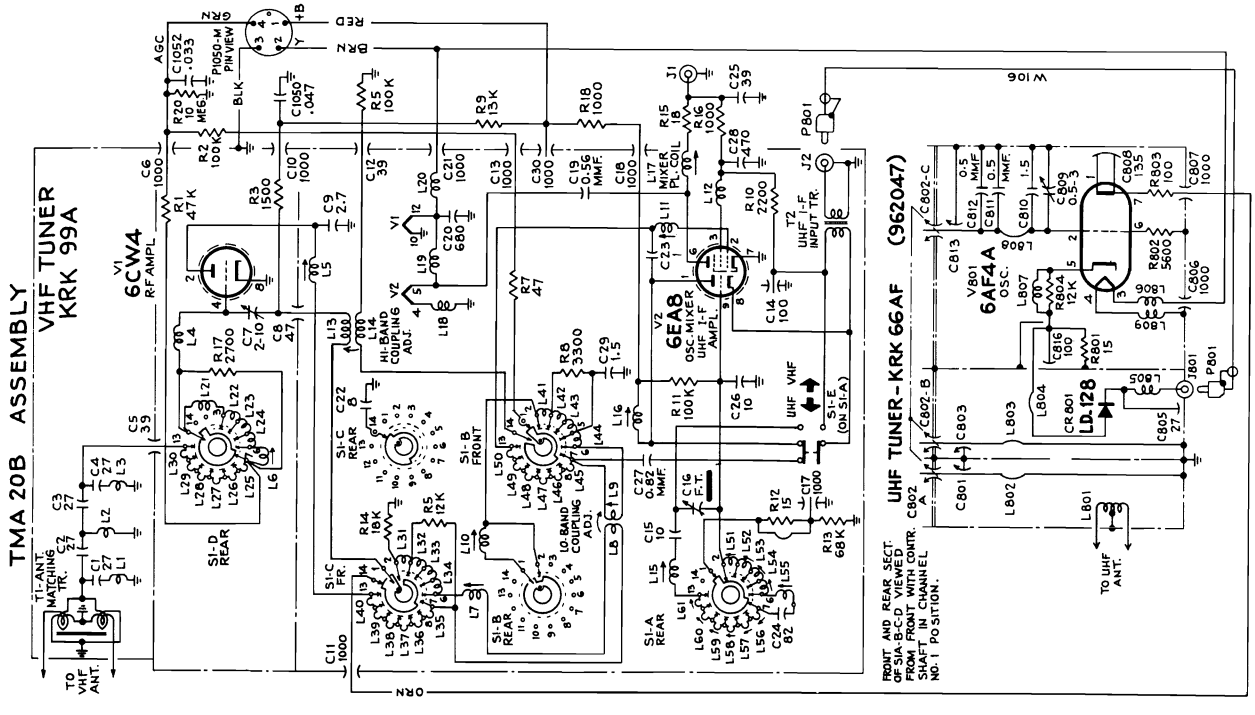


6CW4 Nuvistor Tube and Socket Details

RCA Victor Additional Tuners used with KCS-132 Chassis Series (Continued)



KRK102A, B & C UHF/VHF TUNER SCHEMATIC DIAGRAM

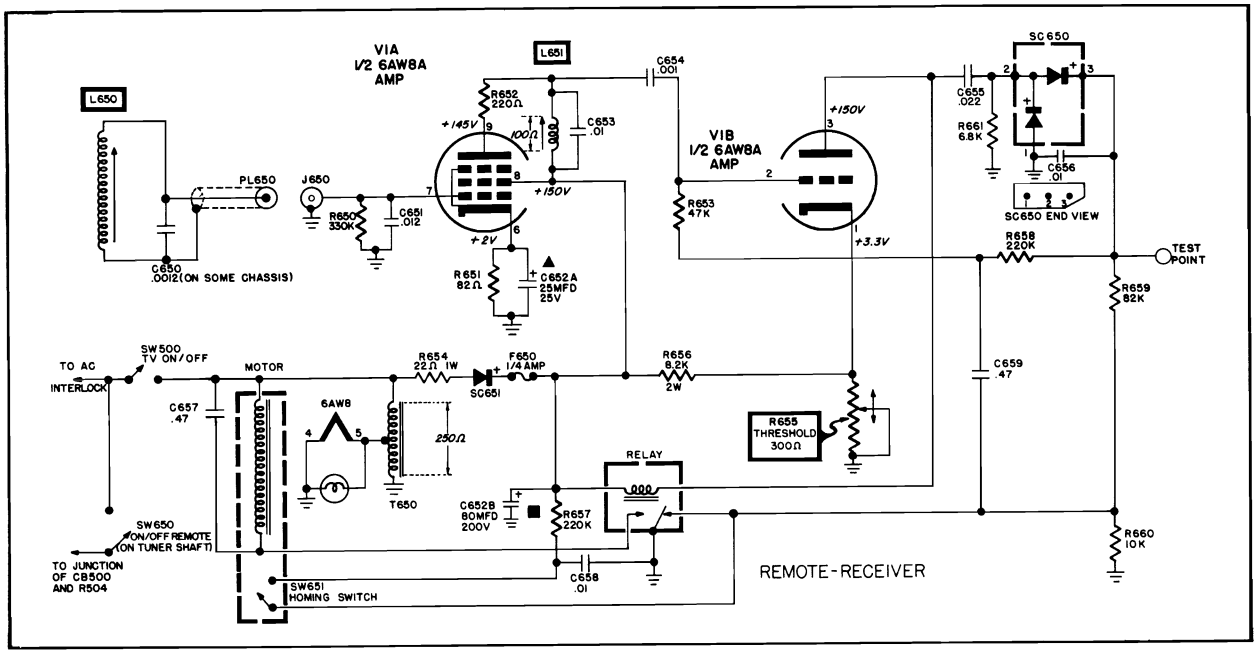


TMA 20B Tuner Assembly using VHF Tuner KRK 99A and UHF Tuner KRK 66AF.

SYLVANIA

CHASSIS: 548-1 through 548-7

MODELS: 17D13R, T, 17D14W, 17D15R, T, 17D17R, W, 17D18T, W, 17D19G, S



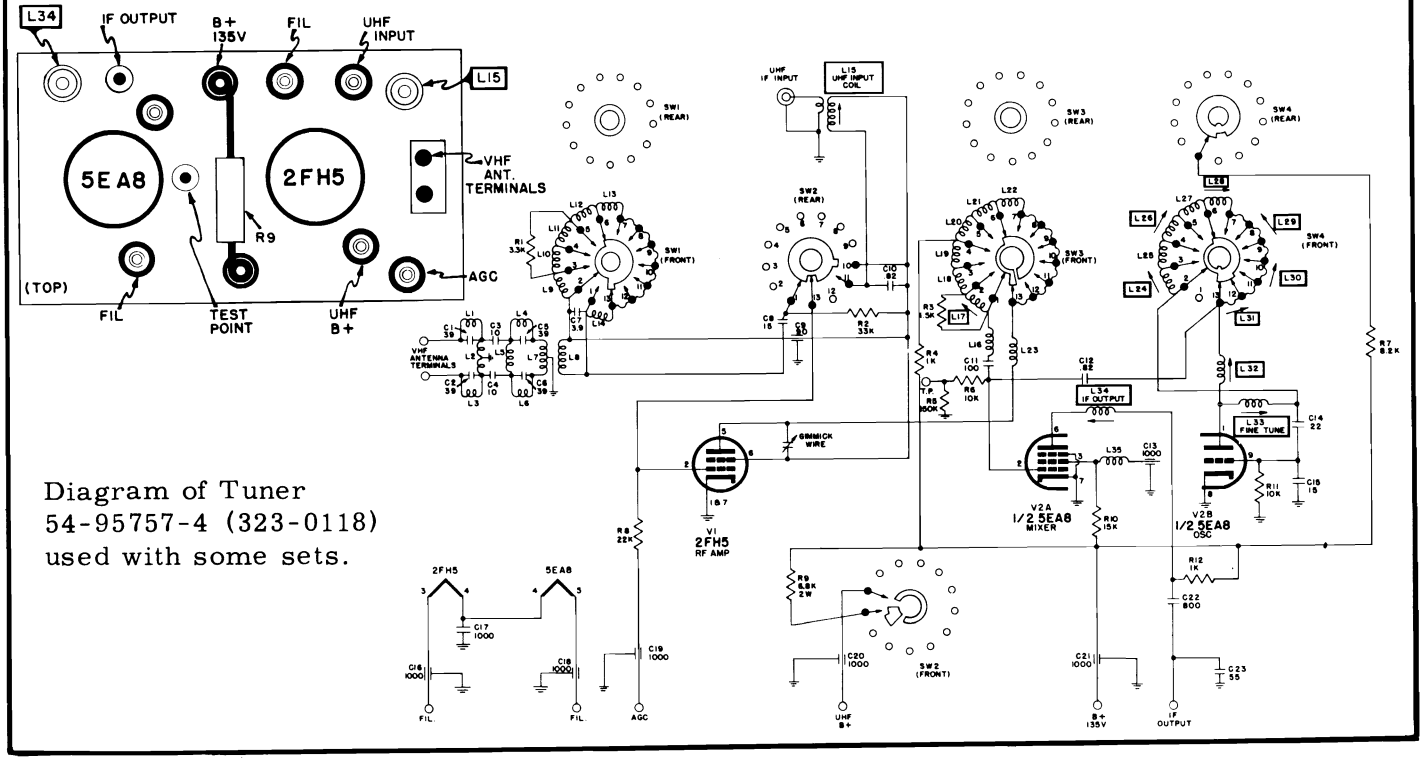
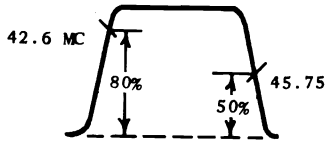


Diagram of Tuner
54-95757-4 (323-0118)
used with some sets.

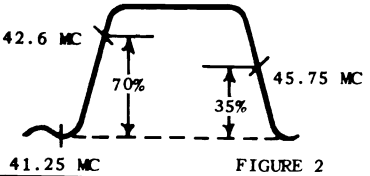
SYLVANIA Chassis 548-1 thru -7, Alignment Information, Continued

VIDEO IF, SOUND IF AND 4.5MC TRAP ALIGNMENT PROCEDURES

VIDEO IF ALIGNMENT

STEP	ALIGNMENT SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1.	Set VHF tuner to a free channel that does not disturb the response curve. Detune tuner converter coil by turning core fully counter-clockwise. Connect -3.5V DC source (–) term to point (A), (+) term. to chassis. Connect -25V DC source (–) term. to point (D), (+) term. to chassis.	SWEEP GENERATOR - through a .0047 Mfd capacitor to point (B). Set generator to 43.5 MC with 10 MC sweep. SIGNAL GENERATOR - loosely coupled as a marker to sweep generator lead. OSCILLOSCOPE - connected to test point (C).  FIGURE 1	a. Adjust L210 for maximum response at 44.0 MC. b. Adjust T202 for maximum response at 45.3 MC. c. Adjust T200 for maximum response at 42.7 MC. Repeat steps A, B, C to obtain response curve shown in figure 1. Adjust L210 to remove tilt. Adjust T202 to position 45.75 MC marker. Adjust T200 to position 42.6 MC marker. (See Fig. 1)
2.	Same as step 1.	SWEEP GENERATOR - through a .0047 Mfd capacitor to a jig shield on mixer tube of tuner. Do not allow shield to short to tuner frame. SIGNAL GENERATOR - loosely coupled to jig shield. OSCILLOSCOPE - Same as Step 1.	a. Set signal generator at 47.25 MC. Detune L204 then adjust trap L206 (top core) for maximum dip. Adjust L204 for maximum dip at 47.25 MC. b. Set signal generator at 41.25 MC and adjust L202 for maximum dip. Note: to observe results it may be necessary to disconnect the -3.5V DC source to point (A).

ALTERNATE STEP 2 - Remove -3.5V DC source from point (A). Connect a VTVM on — DC scale to point (C). 1. Insert 47.25 MC CW signal from signal generator into jig shield. Adjust L206 (top core) and L204 for minimum DC reading on meter. 2. Insert 41.25 MC CW signal to jig shield and adjust L202 for minimum DC reading on meter.

3.	Same as Step 1.  FIGURE 2	SWEEP GENERATOR - Same as Step 2. SIGNAL GENERATOR - Same as Step 2. OSCILLOSCOPE - Same as Step 2.	a. Adjust converter coil in tuner and L206 (bottom core) to position 42.6 and 45.75 markers as shown in Fig. 2. Note: If 42.6 marker will not position properly, adjust T200 and L210 slightly. DO THIS ONLY IF NECESSARY.

(Continued on page 157, at right)

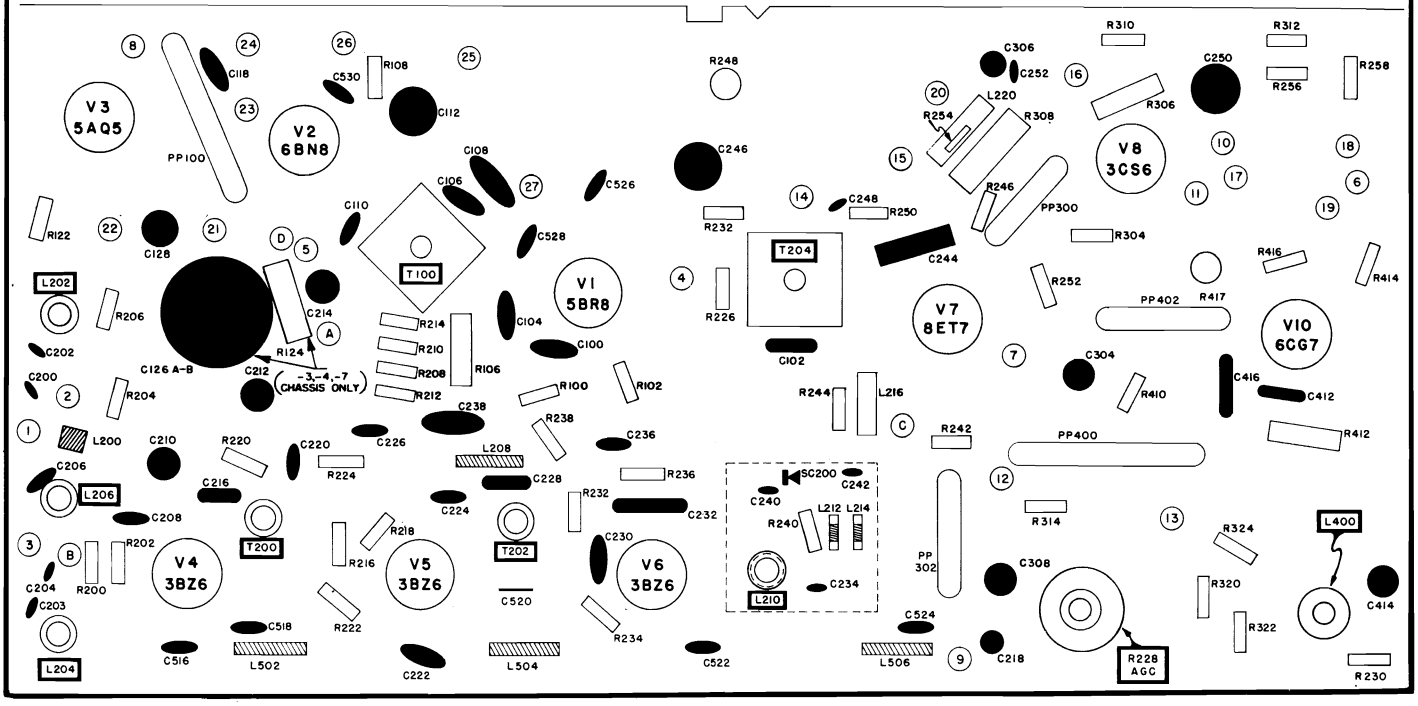
4.5 MC TRAP, SOUND IF AND RATIO DETECTOR ALIGNMENT

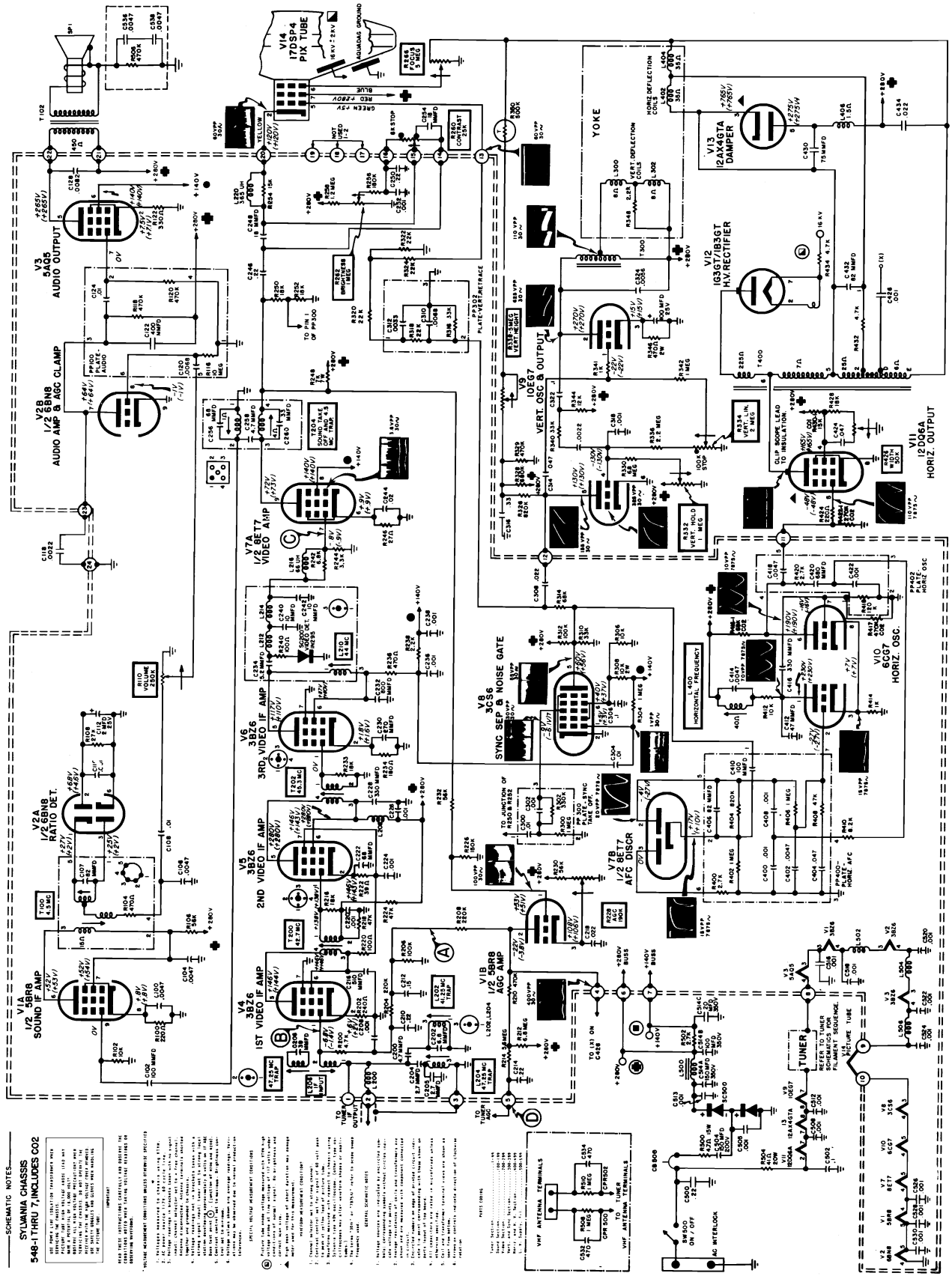
STEP	ALIGNMENT SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1.	Set contrast control to maximum and brightness control to minimum. Connect -30 volts DC source (−) term. to test point (A) and (+) term. to chassis. Connect a 4.5 MC series tuned circuit between yellow cathode lead of picture tube and ground.	VTVM - Ground or "common" lead to junction of two matched 100K resistors connected in series across R108 (27K). DC probe through 100K resistor to terminal 4 of T100. Isolate VTVM from ground. SIGNAL GENERATOR - to test point (C). Set signal generator to 4.5 MC preferably crystal calibrated or controlled.	For MAXIMUM neg. reading: T100 (Top core) T100 (Bottom core) T204 (Bottom core) T204 (Top core) Note: Use peak resulting in greatest separation of cores.
2.	Same as Step 1.	VTVM - RF probe connected across coil of series tuned 4.5 MC circuit. SIGNAL GENERATOR - Same as step 1.	For MINIMUM reading. T204 (Bottom core) Using lowest signal generator output level, repeat step 1 except T204 (bottom core).
3.	Same as Step 1.	Same as step 1.	For zero reading: T100 (Top core) Set VTVM to zero reading using lowest meter scale. At correct setting for T100 (top core), a slight turn of core will give a reading either up or down the scale.

ALTERNATE 4.5 MC TRAP ALIGNMENT

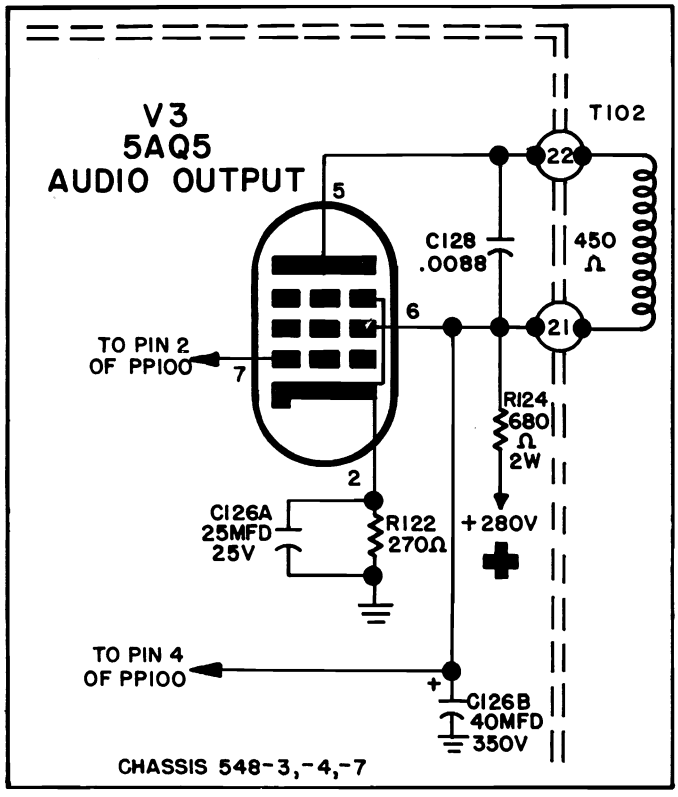
Connect a good antenna to the receiver and properly tune in a strong station. Adjust (T204 bottom core) for minimum 4.5 MC interference in the picture. This interference takes the form of a "grainy" appearance or a fine line pattern through the picture.

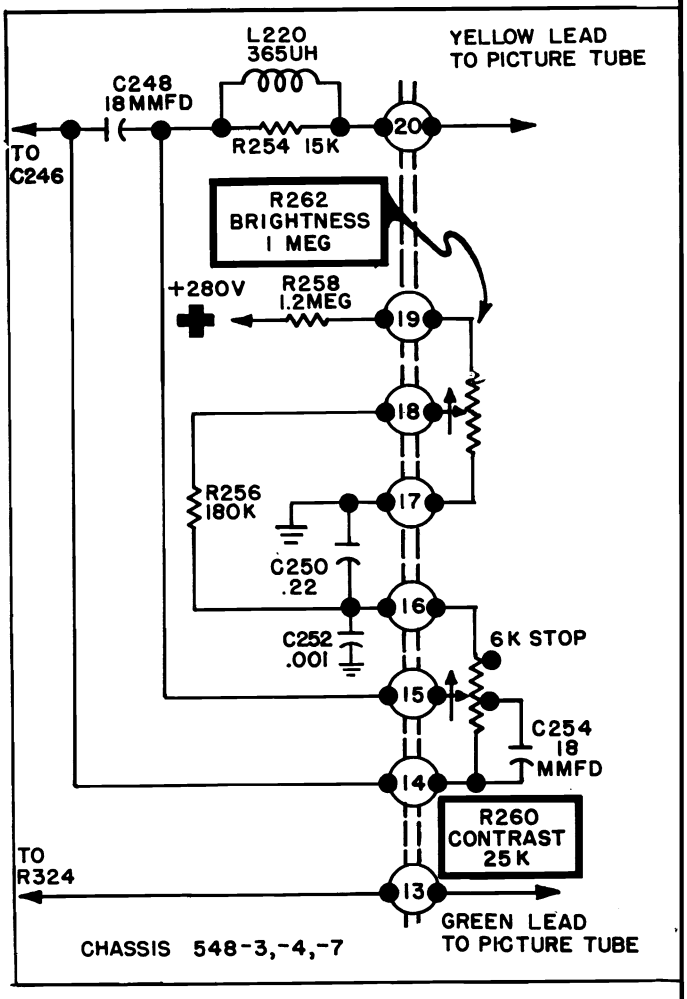
TOP DECK-PRINTED BOARD ASSEMBLY

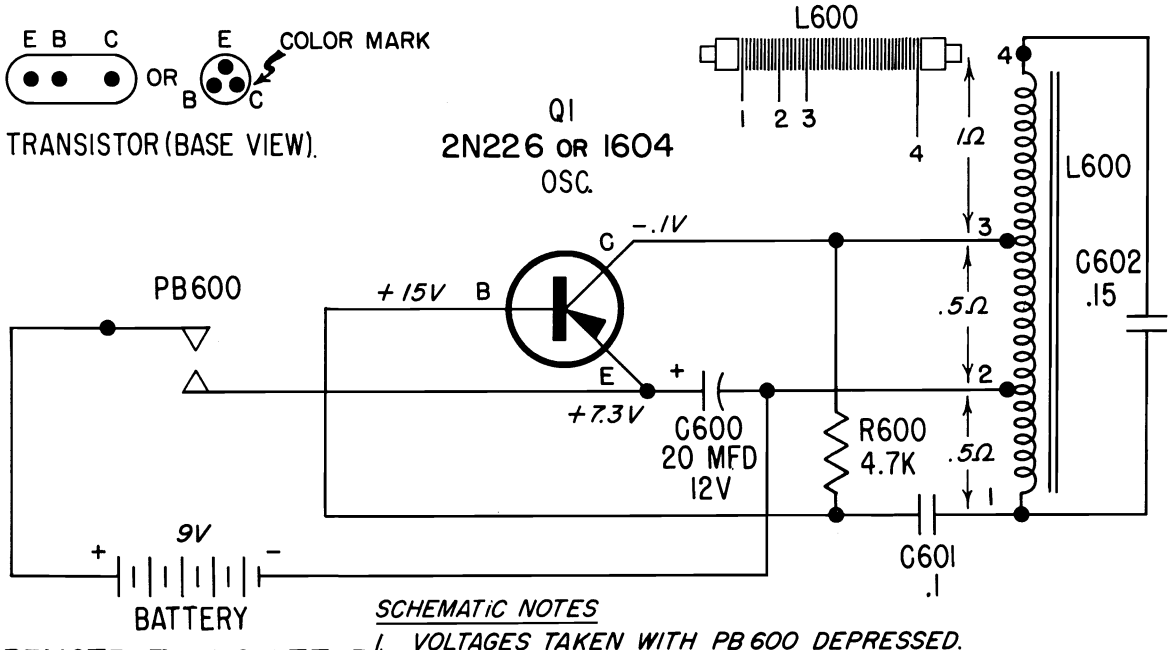



SCHEMATIC NOTES
SYLVANIA CHASSIS
548-1 THRU 7, INCLUDES CO2
V1A 1/2 5BR8 SOUND IF AMP
V2A 1/2 6BN8 RATIO DET.
V2B 1/2 6BN8 AUDIO AMP & AGC CLAMP
V3 5AQ5 AUDIO OUTPUT
V4 3BZ6 1ST VIDEO IF AMP
V5 3BZ6 2ND VIDEO IF AMP
V6 3BZ6 3RD VIDEO IF AMP
V7A 1/2 8ET7 VIDEO AMP
V7B 1/2 8ET7 AFC DISCR
V8 3CS6 SYNC SEP & NOISE GATE
V9 10EG7 VERT. OSC & OUTPUT
V10 6CG7 HORIZ. OSC.
V11 12D06A HORIZ. OUTPUT
V12 1G3GT/1B3GT H.V. RECTIFIER
V13 12AX4GTA DAMPER
V14 17DSP4 PIX TUBE
V1B 1/2 5BR8 AGC AMP
YOKE
TUNER
VHF ANTENNA TERMINALS
SYLVANIA Chassis 548-1 through -7, Schematic Diagram

SYLVANIA Chassis 548-1 thru -7,
Service Information
(Continued)







REMOTE-TRANSMITTER

SCHEMATIC NOTES

1. VOLTAGES TAKEN WITH PB 600 DEPRESSED.
2. RESISTANCE READING TAKEN WITH COMPONENTS IN CIRCUIT

SYLVANIA Chassis 548-1 thru -7, Service Information, Continued

REMOTE CONTROL ADJUSTMENTS

Read these instructions completely before proceeding with the following adjustments. An isolation transformer with adequate capacity (250 watts minimum) MUST be used when making all electrical adjustments.

I. THRESHOLD ADJUSTMENT

A. Turn receiver on and allow normal warm-up time.

B. Rotate THRESHOLD CONTROL [R655] counter-clockwise until tuner drive motor runs continuously.

C. While motor is running, slowly rotate control clockwise until motor stops.

D. Momentarily depress button on transmitter. Motor should advance to next pre-set position and stop. Repeat this several times.

E. If motor skips any pre-set positions, advance the threshold control a little more clockwise. Repeat steps D and E until motor stops consistently on all pre-set channels.

Note: If the threshold control is not advanced sufficiently in the clockwise direction, the tuner may skip some of the pre-selected channel stops. If it is advanced too far the effective operating range of the remote control receiver will be adversely affected.

F. If proper operation cannot be obtained by this adjustment, or if a replacement transmitter other than that originally supplied with the unit is used, perform steps II, III.

II. TUNING ADJUSTMENT

A. With TV receiver switch in the "OFF" position, disconnect picture tube socket from picture tube.

B. Ground either the green or blue lead on the Homing Switch to the chassis by means of a jumper wire.

C. Turn TV receiver "ON" and allow to warm up.

D. Using a small screwdriver rotate threshold control [R655] counter-clockwise until tuner motor runs continuously, then rotate slowly clockwise to the point where turner motor just stops.

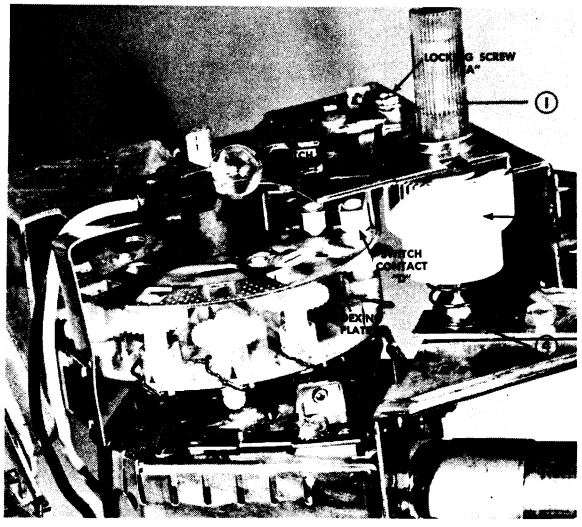
E. Connect "Hot" lead of a D.C. VTVM to test point on remote receiver, ground lead to chassis. Set VTVM on +5 volt scale.

F. With remote transmitter approximately five (5) feet from cabinet, depress button and simultaneously adjust TUNING COIL [L651] on remote receiver for a peak voltage. As adjustment is being made and meter reading keeps increasing, increase the distance between transmitter and receiver (cabinet) so that the meter reading does not exceed 2½ volts.

Peak ANTENNA COIL [L650] in the same manner, repeating both adjustments until a peak reading is obtained.

NOTE: Certain receiver-transmitter combinations require a .001 MFD 10% capacitor across the antenna coil for proper alignment, while others do not. If it is not possible to correctly peak the antenna coil, add or remove this capacitor as required.

G. Turn receiver off by switch on control panel. Remove test equipment, jumper wire, and reconnect picture tube socket.



ITEM NO.	SERVICE PART NO.	DESCRIPTION
1	740-0275	KNOB - FINE TUNE
2	484-0039	GEAR - FINE TUNE
3	496-0237	SPRING - COMPRESSION
4	493-0183	SHAFT - FINE TUNE

FIGURE "B"

III. CAM ADJUSTMENT

A. Rotate Channel Selector to "OFF" position.

B. Loosen locking screw "A" and slide switch assembly forward or backward until Switch Contact "B" rides on cam "C" at highest point and Switch Contact "D" drops into hole of indexing plate and opens Switch Contacts. See Figure B.

C. Turn receiver on and by means of the remote control operate the receiver through all pre-selected channel and OFF positions. If tuner "hangs-up" (stops between any channel position) repeat step B.

CLOCK REMOVAL PROCEDURE

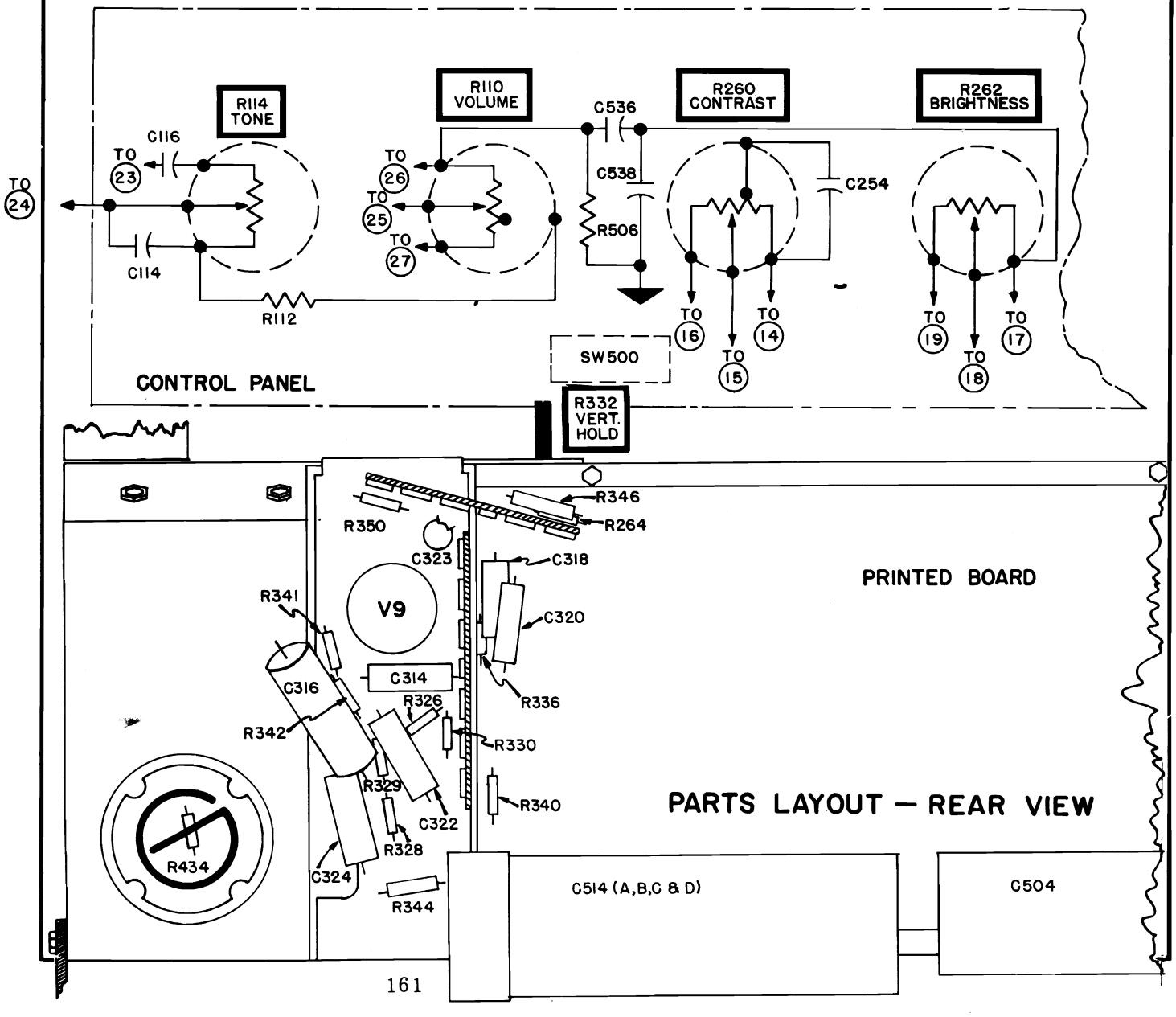
1. Disconnect AC power cord and antenna connections; remove rear interlock cover by removing three (3) screws on each side and two (2) screws on rear of interlock.
2. Turn receiver on its side so clock is in the up position. Remove screw securing plastic cover protecting bottom of clock mechanism.
3. Remove clock control knobs by pulling straight outward.
4. Unscrew brass collar surrounding clock control shafts.
5. Remove clock through inside of cabinet.
6. Identify and unsolder leads to clock.
7. To replace clock reverse the above procedure making certain all leads are soldered in their correct position.

SYLVANIA

CHASSIS: 549-1 through -9, and 552-1, -2, -9

MODELS: 19T01 Series, and 21C07, 21C09, 23C08, 23C09, 23C10, 23C11, 23C18, 23C20, 23C26, 23C27, 23C28, 23C29, 23M101, 23T09, 23T10, 23T11, 23T12, 23T13, 23T14, and 823

These chassis are similar to Chassis 548-1 through -7, described in the preceding section and most of this material is applicable. The same alignment procedure may be used. Diagrams of the printed panel and remote control units are the same. Since the circuits of the two groups of chassis differ in some respects, the circuit diagram for this additional group of sets is printed on the next page.



CHASSIS 549-1 thru 9 (Includes CO3)

VOLTAGE MEASUREMENT CONDITIONS UNLESS OTHERWISE SPECIFIED

1. Voltages measured to chassis using VTVM.
2. AC power source 117V, 60 cycle line.
3. Voltage readings in brackets taken with no signal input; channel selector set to a free channel. Antenna disconnected. Antenna terminals shorted together and grounded to chassis.
4. Voltage readings not in brackets taken with a strong signal input; tuner set to strong local station developing approximately 6 volts on IF AGC Buss test point (A), (junction of R206 and R208).
5. Contrast control set to maximum. Brightness control set to minimum.
6. Voltage values shown are average readings. Variations may be observed due to normal production tolerances.

SPECIAL VOLTAGE MEASUREMENT CONDITIONS

(◪) Picture tube anode voltage measured with VTVM high voltage probe at line voltage of 117 volts under conditions of normal signal. No brightness and correct scan size.

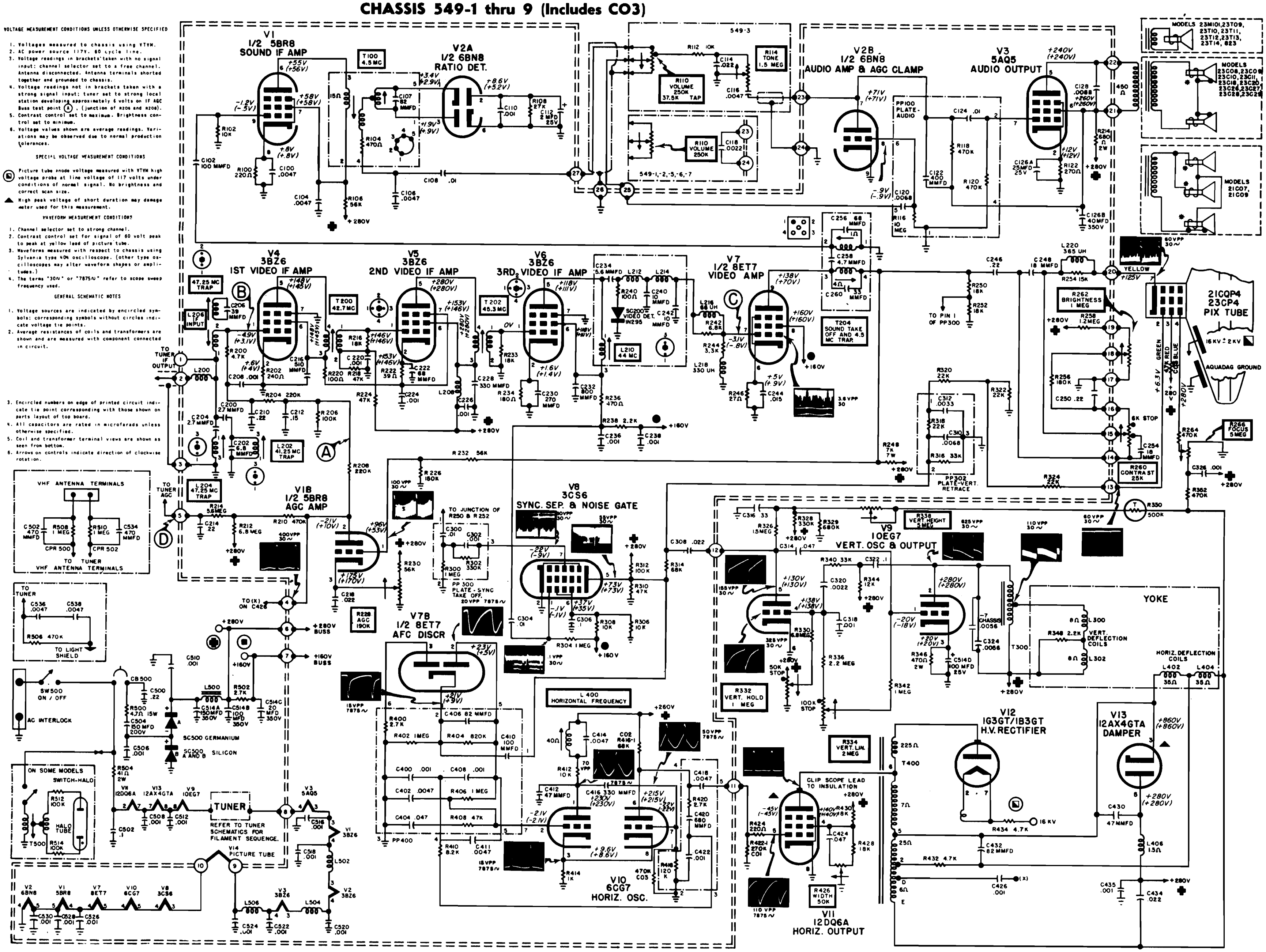
▲ High peak voltage of short duration may damage meter used for this measurement.

WAVEFORM MEASUREMENT CONDITIONS

1. Channel selector set to strong channel.
2. Contrast control set for signal of 60 volt peak to peak at yellow lead of picture tube.
3. Waveforms measured with respect to chassis using Sylvania type 404 oscilloscope. (other type oscilloscopes may alter waveform shapes or amplitudes.)
4. The terms "30∿" or "7875∿" refer to scope sweep frequency used.

GENERAL SCHEMATIC NOTES

1. Voltage sources are indicated by encircled symbols; corresponding symbols without circles indicate voltage tie points.
2. Average resistances of coils and transformers are shown and are measured with component connected in circuit.
3. Encircled numbers on edge of printed circuit indicate tie point corresponding with those shown on parts layout of top board.
4. All capacitors are rated in microfarads unless otherwise specified.
5. Coil and transformer terminal views are shown as seen from bottom.
6. Arrows on controls indicate direction of clockwise rotation.



SYLVANIA Chassis 549-1 through -9, and 552-1, -2, -9, Schematic Diagram

SYLVANIA

CHASSIS: 550-1, -2, -3, -7, -8, -9

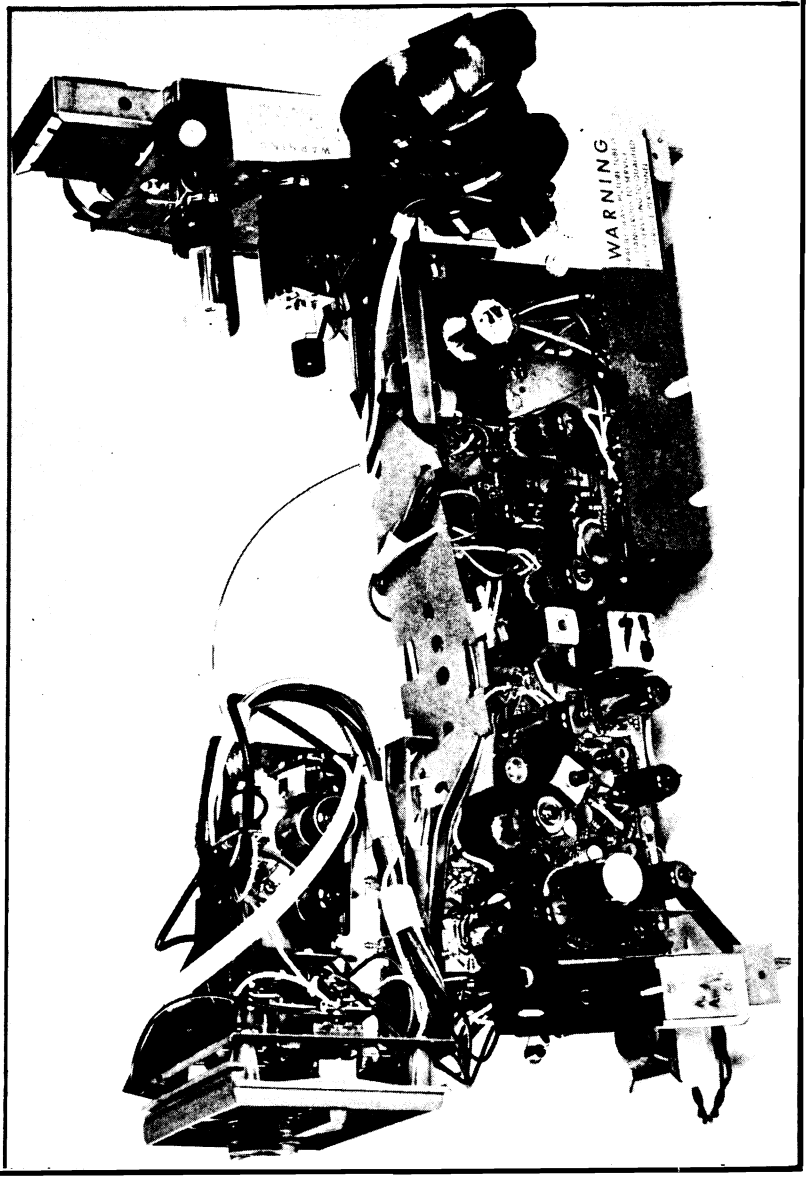
MODELS: 23C30B, M, W, 23C31B, F, M, 23C32B, F, M, W, 23C33B, M, W, 23C34B, M, W, 23C35B, F, M, W, 23C36B, M, W, 23C37F, 23C38F, W, 23C39F, 23T15E, 23T16B, M, W, 23T17B, M, W,

These chassis are similar to Chassis 548-1, etc. and 549-1, etc. covered in preceding two sections. Most of this material is directly applicable to these additional chassis. Since the circuits of these groups of chassis do vary in some minor ways, the circuit diagram for this additional group of sets is printed on the next page, over. Additional removal instructions are given below. Do not operate these sets with speaker leads disconnected.

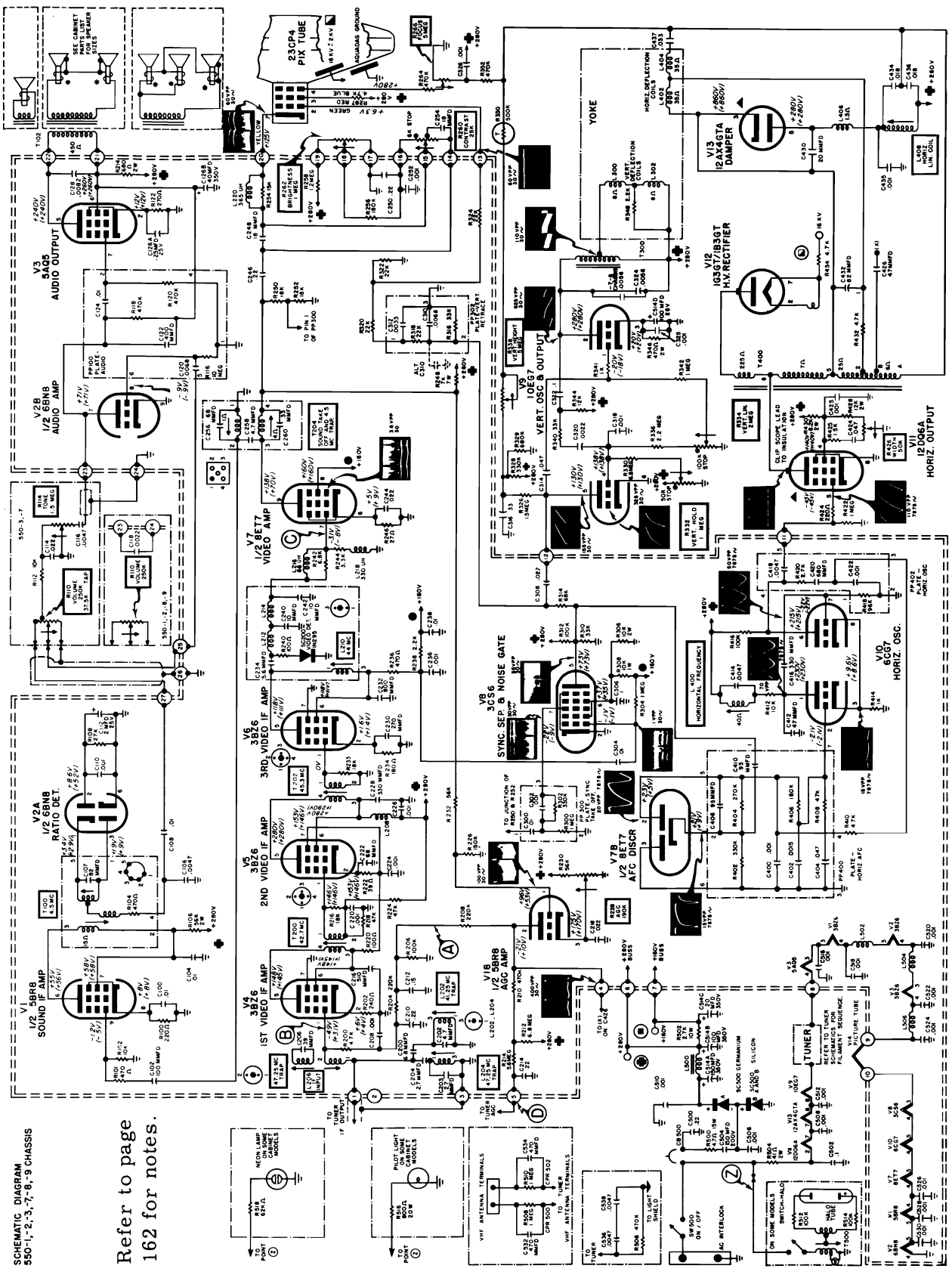
CHASSIS REMOVAL

1. Disconnect AC power cord and antenna connections. Remove interlock cover.
2. Unplug HaloLight leads at upper right side of chassis (on some models). Remove screws securing antenna board to cabinet.
3. Disconnect speaker leads at speaker, high voltage lead, picture tube socket, and extension shaft from vertical hold control.
4. Remove two screws locking chassis feet and disengage feet from slots by sliding chassis to rear and up.
5. Remove deflection yoke retaining spring. Remove yoke and hang on hook provided, near horizontal output tube.
6. While supporting tuner assembly remove the two (2) screws securing tuner assembly to plate, mounted to cabinet.
7. Grasp chassis near vertical hold control and remove chassis and tuner assembly from cabinet.

NOTE: For convenience in handling and servicing, the tuner and control plate may be secured to the left side of the chassis by inserting the ears on left side of chassis plate into slot of tuner assembly. Lower tuner assembly to chassis and join with snap provided. (See Figure "A")



CHASSIS, YOKE AND TUNER ASSEMBLY MOUNTED FOR TRANSPORTATION



SCHEMATIC DIAGRAM
550-1,-2,-3,-7,-8,-9 CHASSIS

Refer to page 162 for notes.

SYLVANIA Chassis 550-1, -2, -3, -7, -8, 9, Schematic Diagram

WESTERN AUTO SUPPLY CO.

STOCK NOS. 2DC1130A, 2DC1132A, 2DC1134A
(UHF MODELS 2DC1131A, 2DC1133A, 2DC1135A)

INSTRUCTIONS FOR CHASSIS ASSEMBLY REMOVAL

1. Remove knobs from front of cabinet.
2. Remove cabinet back and disconnect the yoke plug, pix tube socket, anode lead and lead between chassis and pix tube ground spring.
3. Disconnect the leads from the speaker.
4. Disconnect the antenna leads from the tuner.
5. Remove screws holding the tuner assembly to the cabinet and grounding strap to chassis.
6. There are four chassis mounting screws located underneath the chassis. Two screws are accessible through the holes in the rear cabinet rail and the other two screws are accessible through the holes in the perforated bottom panel located closest to the rear cabinet rail.

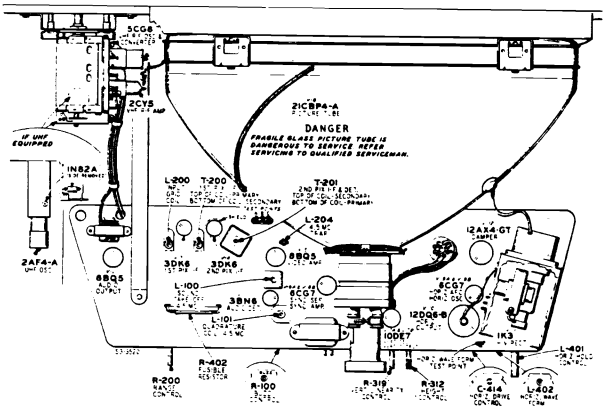


Fig. 1 - Tube Layout & Trimmers

PICTURE TUBE REMOVAL

1. Remove the four screws (two at each side) marked "D" from the top of the cabinet.

2. Carefully remove the two screws marked "D" holding the pix tube harness to the bottom of the cabinet and place the entire harness assembly on a cushioned surface.

3. Remove old picture tube by loosening the two screws marked "E" and install new tube reversing the steps outlined, keeping the following in mind.
   a. There is a mold match line on the picture tube. Assemble the harness to the picture tube, centering the mold match line on picture tube. Holes are provided in harness to check the centering. Then tighten the screws marked "E" until the picture tube is firmly in place in harness.

CAUTION

This chassis is connected directly to one side of the 117 volt AC line. Use an isolation transformer between the line cord plug and power receptacle when servicing this chassis.

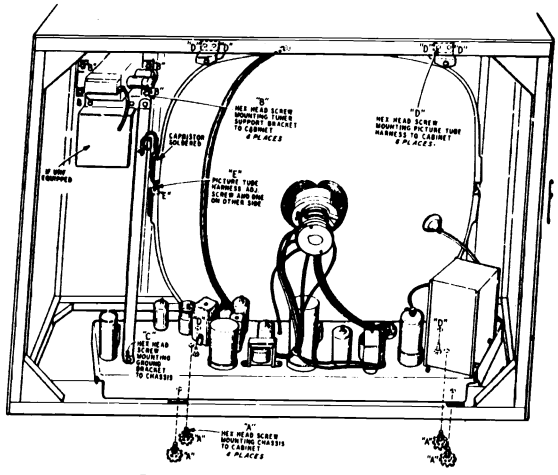


Fig. 2 - Picture Tube Removal

SERVICE ADJUSTMENTS

MAGNET ADJUSTMENT - The picture tube used on these receivers is of the electrostatic type, and occasionally, to bring about best focus, it is necessary to use a beam aligner. The beam aligner fits on the neck of the picture tube and appears to be an ion trap. In many cases, the beam aligner is not needed to properly focus the tube and therefore is not mounted on the tube. However, if a replacement picture tube is ever needed, it may be necessary to purchase a beam aligner to bring about satisfactory focusing adjustment.

DEFLECTION YOKE ADJUSTMENT - The deflection yoke should be positioned as far forward on the neck of the tube as the bell will allow. Then, if the lines of the raster are not horizontal or squared with the picture mask, rotate the deflection yoke until this condition is obtained. Upon completion of this adjustment, tighten the clamp at the rear of the deflection yoke.

CENTERING ADJUSTMENT - If horizontal or vertical centering is required, adjust each ring in the centering device until proper centering is obtained. If a clamp type centering device is used, rotate the device to the left or right and turn the knob located at the top of the device until the picture is centered correctly.

PICTURE ADJUSTMENT - For further adjustments, obtain a test pattern on the receiver. When a test pattern is obtained, it may be necessary to slightly readjust the fine tuning control for clearest picture.

ADJUSTMENT OF RANGE CONTROL - Tune the receiver to the strongest station in the area in which the receiver will be used. While observing the picture and listening to the sound, turn the control clockwise until signs of overloading (buzz in sound washed-out picture, sync instability) appear. Then turn the control a few degrees counter-clock-

WESTERN AUTO Models 2DC1130A through 2DC1135A, Service Information, Continued

wise from the point at which overloading occurs. (The stronger the signal input, the more counter-clockwise this setting will be.) In areas where the strongest signal does not exceed 1000 MV the setting will usually be maximum clockwise. With the control set correctly, the AGC will automatically adjust the bias on the R-F and I-F amplifiers so that the best possible signal to noise ratio (minimum snow) will be obtained for any signal input to the receiver.

CHECK HORIZONTAL OSCILLATOR ALIGNMENT. Turn the horizontal hold control to the extreme counter-clockwise position. The picture should remain in horizontal sync. Momentarily remove the signal by switching off channel and then back. Normally the picture may be out of sync. Turn the control slowly clockwise. The number of diagonal bars will be gradually reduced and when only 2 to 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional clockwise rotation of the control.

At the extreme clockwise position, the picture should be just starting to pull out of sync.

If the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned.

HORIZONTAL DRIVE ADJUSTMENT. While receiving a signal from a station (with picture locked in sync) turn contrast control fully counter-clockwise, turn the brightness control up so that the picture appears washed out. Turn the horizontal drive control clockwise until white bars appear in the left center portion of the raster, then turn counter-clockwise until the white bars just disappear. This adjustment will allow the horizontal system to operate at maximum efficiency.

HORIZONTAL WAVE FORM ADJUSTMENT. This is a factory adjustment and it should not be necessary to readjust unless the setting has been disturbed. However, if it is found that readjustment is required, follow this procedure: With the picture in sync connect an oscilloscope to the horizontal wave form test point. Adjust the horizontal wave form until the two peaks on the wave form shown in figure 3 are equal.

NOTE -- Picture must be in sync during this adjustment.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENT. Adjust the height control until the picture fills the mask vertically. Adjust the vertical linearity control until the picture is symmetrical from top to bottom. Adjust the picture centering device to align picture with the mask. Adjustment of any control will require a re-adjustment of the other control.

OSCILLOSCOPE WAVEFORM PATTERNS

The waveforms shown on the schematic diagram are observed on a Tektronix type 524D wide band television oscilloscope with the receiver tuned to a reasonably strong signal and a normal picture. The voltages shown on each waveform are the approximate peak tp peak amplitudes. The frequency accompanying each waveform indicated the repetition rate of the waveform not the sweep rate of the oscilloscope. If the waveforms are observed on the oscilloscope with a poor high frequency response, the corners of the pulses will tend to be more rounded than those shown on the schematic diagram and the amplitude of any high frequency pulse will tend to be less.

DC SOCKET VOLTAGES

All DC socket voltages shown on the schematic are measured with a high impedance VTVM and under zero signal conditions.

CHECK OF R-F OSCILLATOR ADJUSTMENTS. The oscillator is preset at the factory and normally needs no adjustment. However, if adjustments are required, they can be made without removing the chassis from the cabinet. Remove the channel selector and fine tuning knobs from the front of the cabinet.

TEST PROCEDURE.

1. Set channel selector to receive desired station.
2. Set fine tuning control in center of its range.
3. Adjust oscillator slug (See figure 7), with a bakelite type screwdriver, for best picture resolution.
4. Repeat steps 1, 2 and 3 on all channels used.

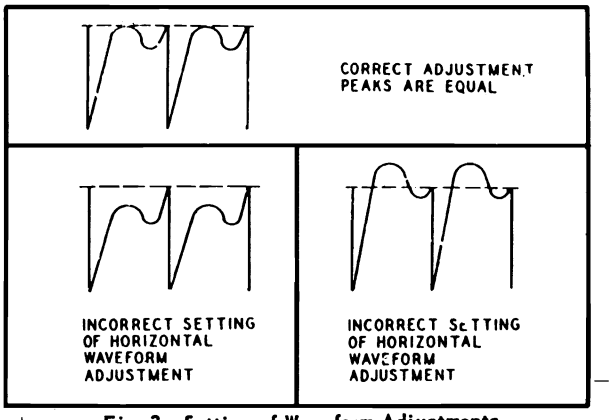
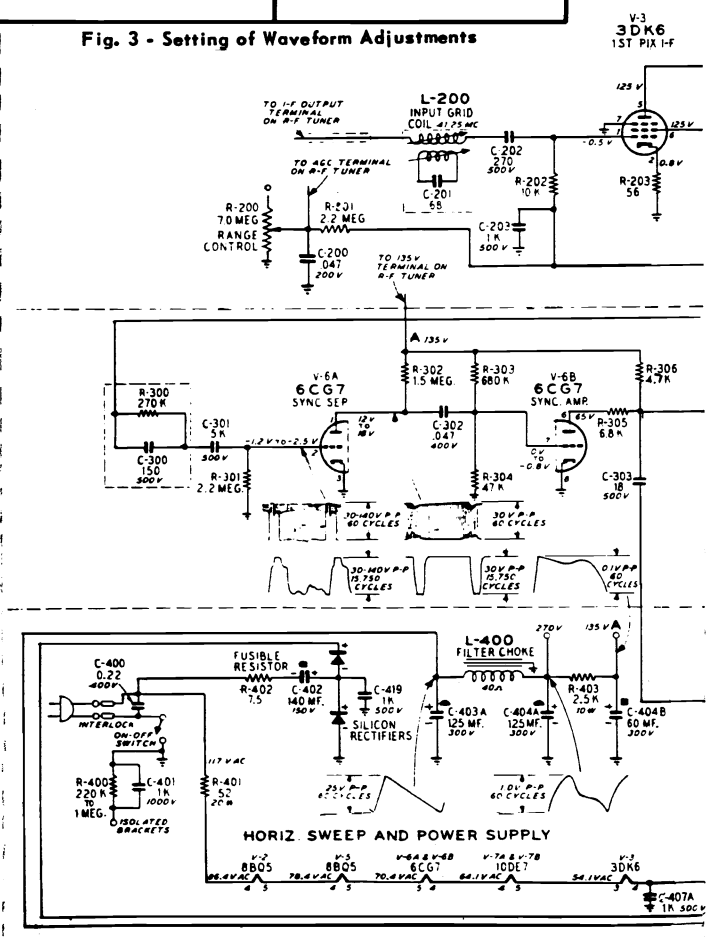


Fig. 3 - Setting of Waveform Adjustments



WESTERN AUTO Models 2DC1130A through 2DC1135A, Schematic Diagram, Continued

SERVICE SUGGESTIONS

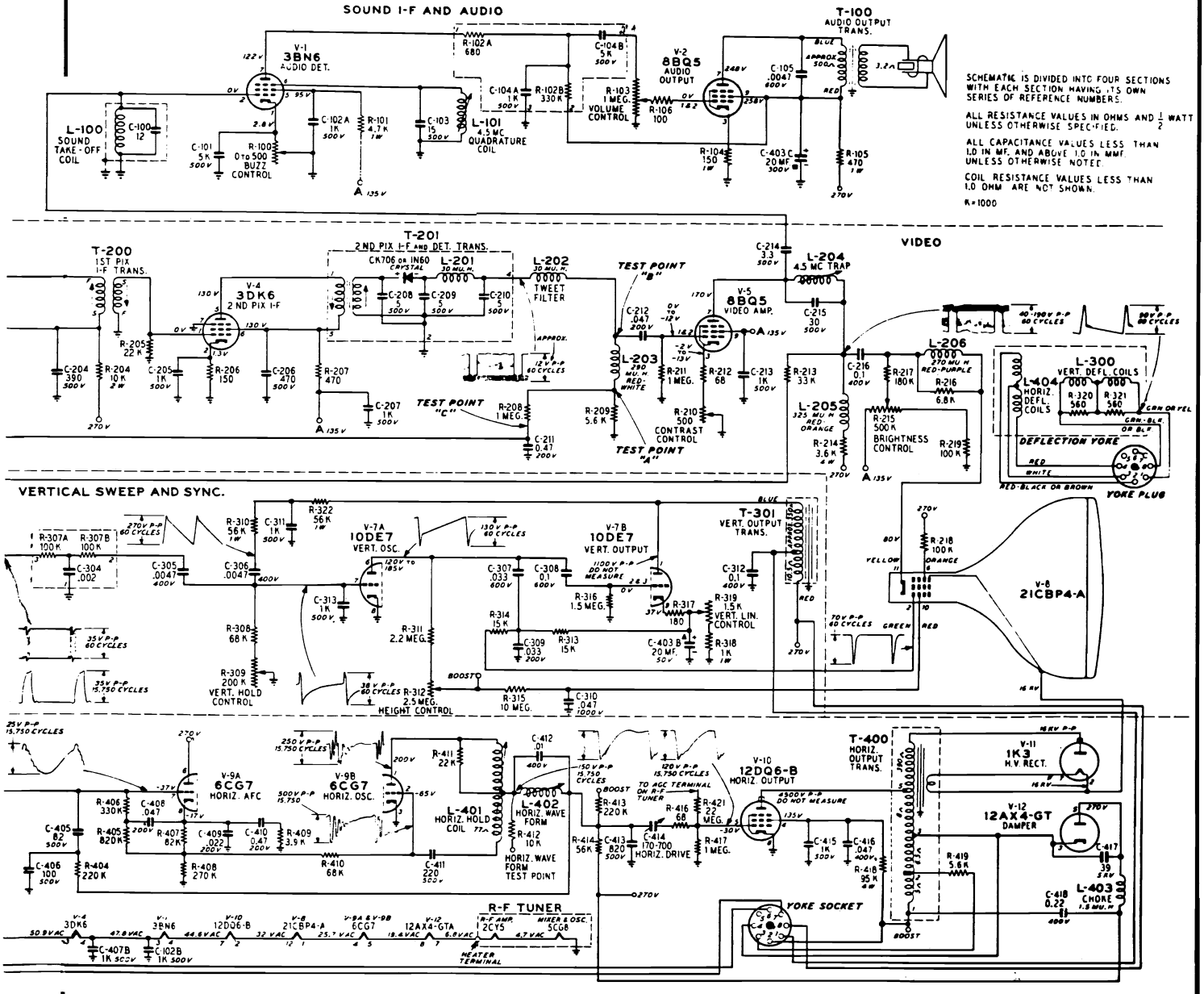
RECEIVER COMPLETELY INOPERATIVE - This condition may be caused by the following:
1. Tube filaments may be open.
2. No + B voltage.

NO RASTER ON PICTURE TUBE - If raster cannot be obtained, check below for the possible causes:
1. Magnet adjustment is incorrect.
2. No + B voltage. Check fusible resistor. Replace if defective. If fusible resistor continually burns out, check:
   a. For short in + B.
   b. Silicon rectifiers.
   c. Check DC resistance of horizontal output transformer.
3. No high voltage. Check V-9, V-10, V-11 and V-12 tubes and circuits. If horizontal deflection circuits are operating as evidenced by the correct voltage (600 V) measured

WRINKLES ON LEFT SIDE OF RASTER - This condition can be caused by:
1. Defective yoke.
2. V-12 defective.
3. R-419 or C-417 defective.

SMALL RASTER - This condition can be caused by:
1. Low + B or line voltage. Check silicon rectifiers.
2. Insufficient output from V-10. Replace tube.
3. Insufficient output from V-7 and V-9. Replace tubes.
4. Incorrect setting of horizontal drive control.
5. V-12 defective.

RASTER: NO IMAGE, BUT ACCOMPANYING SOUND - This condition can be caused by:
1. No signal on picture tube grid. Check V-5 tube and associated circuits.
2. Bad contact to picture tube grid (lead to socket broken).



WESTERN AUTO Models 2DC1130A through 2DC1135A, Alignment Procedure

ALIGNMENT PROCEDURE

1. Connect sweep output to 2nd I-F grid (pin #1-V4), oscilloscope to diode load resistor T.P. "A" (R-209). Set output of sweeper so that some output is indicated on oscilloscope. Adjust 2nd PIF transformer (T-201) primary (bottom) and secondary (top) simultaneously for maximum output and symmetry. Readjust sweeper output for 4.0 V P-P on oscilloscope. Touch-up to give the waveform shown in figure 4.
2. With approximately —5.5V bias on AGC line T.P. "C" (junction of R-208 and C-211) connect sweeper to 1st I-F grid (Pin #1-V3). Reduce sweeper output to compensate for additional gain on 1st stage (4.0V. P-P on oscilloscope). Adjust 1st I-F transformer primary (top) and secondary (bottom) for maximum gain and symmetry with 45.75 mc marker. (See Figure 5.)

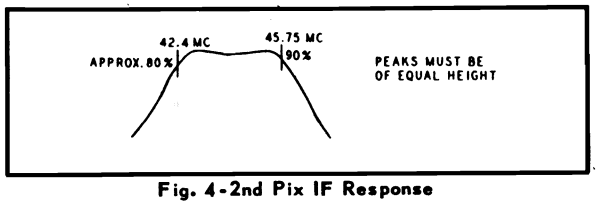


Fig. 4-2nd Pix IF Response

3. Set channel selector to Channel 13. Connect sweeper with very short leads through a 10 K mmf disc ceramic capacitor to mixer grid (I-F test point, see figure 7). Readjust sweep output for 4.0V P-P, adjust 41.25 mc trap (bottom of L-200) so that notch is at marker, adjust mixer plate coil (L-18 primary) and input grid coil (top of L-200) for maximum gain and symmetry with 45.75 mc marker at 50%. (Figure 6.)

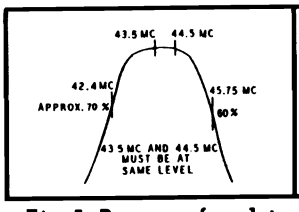


Fig. 5-Response from 1st Pix IF Grid

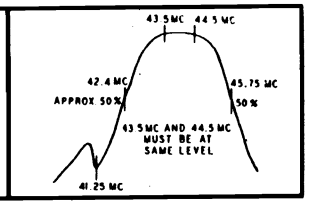


Fig. 6-Overall Pix IF Response Curve

In all positions, final touch up should be made with 4.0V. P-P amplitude on oscilloscope. Once a stage has been adjusted, do not readjust with the sweeper connected to another stage. For instance, after adjusting the output stage and moving the sweeper to the 1st grid to adjust 1st I-F transformer, do not move the slugs in the output stage, etc.

In general, the position of the 45.75 mc marker should be set with the primary and the symmetry adjusted with the secondary. An approximate setting of the input grid coil may be obtained by adjusting for maximum amplitude of the 45.75 marker. This amplifier cannot be adjusted for bandwidth. It must be adjusted for maximum gain, symmetry and position of 45.75 marker.

VIDEO

With 4.5 Mc unmodulated signal into grid of the video amplifier tube T.P. "B" and VTVM on picture tube cathode, tune 4.5 Mc trap for minimum response. VTVM on 0-10 V AC scale. This adjustment can also be made while observing a picture from a station. Tune trap for least 4.5 Mc beat (grainy appearance) in picture.

AUDIO

1. Tune in a TV station and reduce signal strength at antenna terminals by use of an attenuator or similar device until a "hiss" accompanies the sound.
2. Adjust sound take-off coil (L-100) quadrature coil (L-101) and buzz control (R-100) for maximum undistorted sound and minimum buzz.
3. If "hiss" disappears during step 2, further reduce signal strength.

25A1192 TUNER ALIGNMENT

A. Sweep generator with balanced 300 ohm output to antenna terminals. Marker generator output to antenna terminals. Oscilloscope to R-F "test point" on tuner. Connect -2.5 V bias thru 10 K ohm resistor to R-F AGC terminal on tuner.

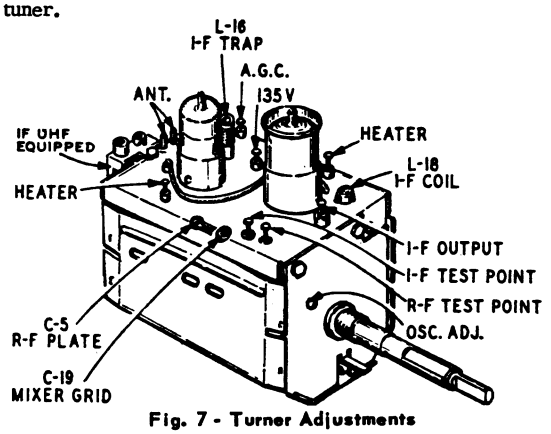


Fig. 7 - Turner Adjustments

B. RF AND CONVERTER ADJUSTMENT

1. With channel selector on Channel 11, adjust C-5 and C-19 for maximum symmetrical response with respect to pix and audio markers.
2. Adjust Antenna Coil (L1 & L3 or L2 & L4 on strip) for maximum height between carriers (this adjustment is made by knifing the coils.)
3. Readjust C-5 and C-19 for symmetrical response.
4. Check R-F passband on other channels as per figure 8.

C. OSCILLATOR ADJUSTMENT

1. Apply -4.5 volts on I-F AGC line at junction of R-208 and C-211.
2. Connect oscilloscope to output of video detector. Place fine tuning in center of range. Check response on all channels. Sound marker should be in notch and picture marker at 50%. (See Overall Response Curve.) See Fig. 6.
3. If markers are off, individual oscillator coil slugs will require adjustment. Adjust each channel slug with a non-metallic screwdriver to bring sound marker to correct position.
4. Some types of R-F interference may be reduced by tuning L-16 for minimum interference.

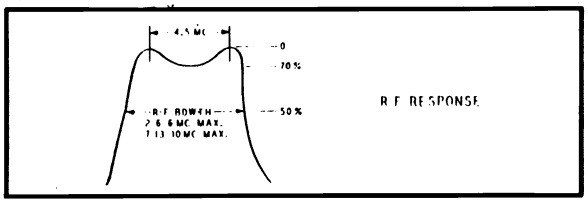


Fig. 8-Pix and Audio Markers

Westinghouse

MODEL AND CHASSIS CHART

VHF ONLY MODELS

MODELS	CHASSIS	TUNERS	TUNER TUBES
H–P3210	V–2384–5	470V065H02 Alternate	RF AMP: 3EA5 OSC–MIX: 6CL8A
H–P3211			
H–P3150	V–2384–14	470V067H01	RF AMP: 3ER5 OSC–MIX: 6CG8A

VHF/UHF MODELS

MODELS	CHASSIS	TUNERS	TUNER TUBES
H–P3210U	V–2384–6	VHF TUNER 470V066H01 470V066H02	RF AMP: 3EA5 OSC–MIX: 6CL8A
H–P3211U			
H–P3150U	V–2384–15	UHF TUNER 472V035H01	OSC: 3AF4A CRYSTAL: IN82A

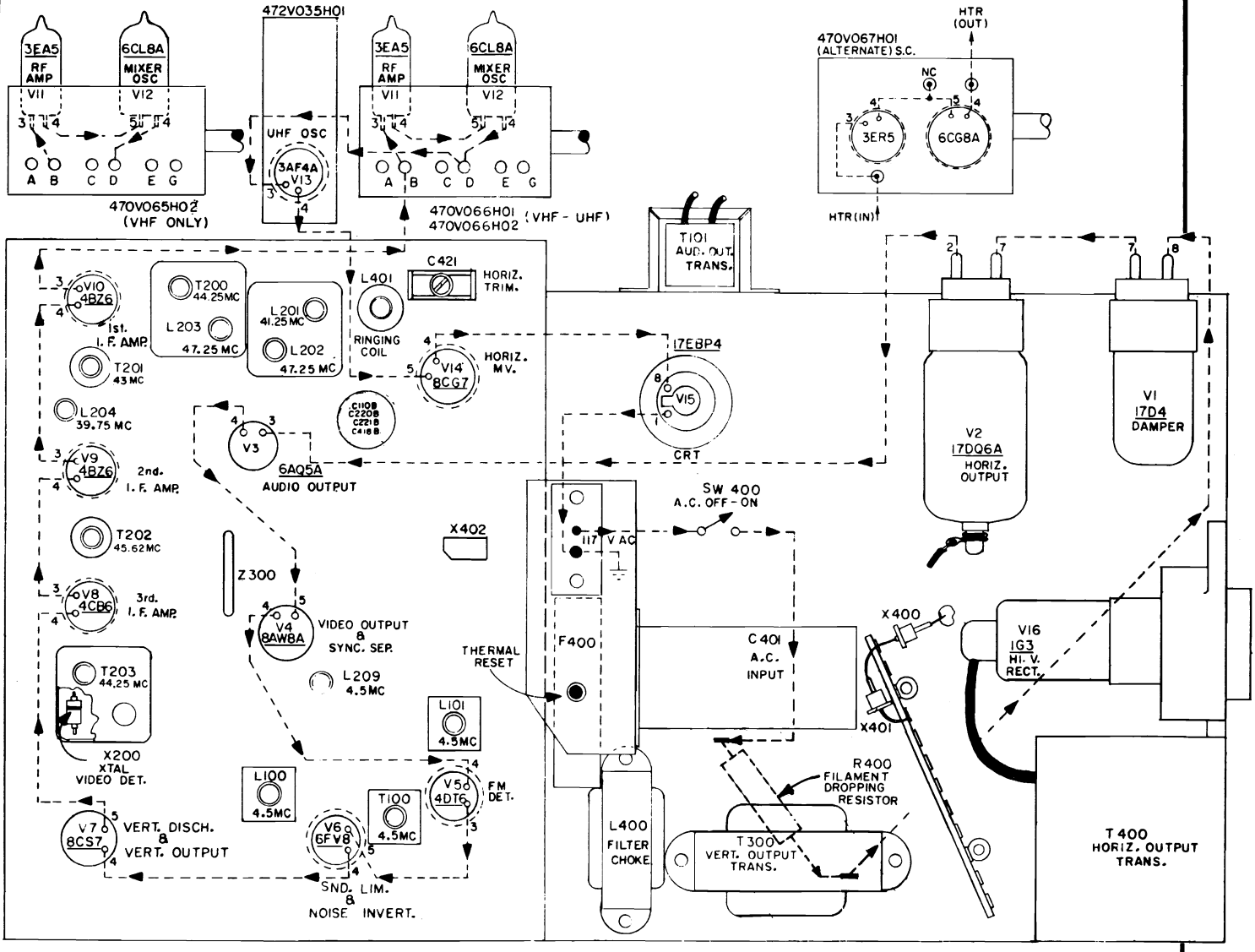


Figure 5 – Top View of Chassis

THERMAL RESET BUTTON

A reset button for the thermal circuit-breaker is located on back of receiver. This button is red in color. When circuit breaker is set, red button is flush with cabinet back. When circuit-breaker is open red button will project about 1/8" from back cover. To reset, turn off receiver, push in button, then turn receiver back on.

WESTINGHOUSE Chassis V-2384-5, -6, -14, -15

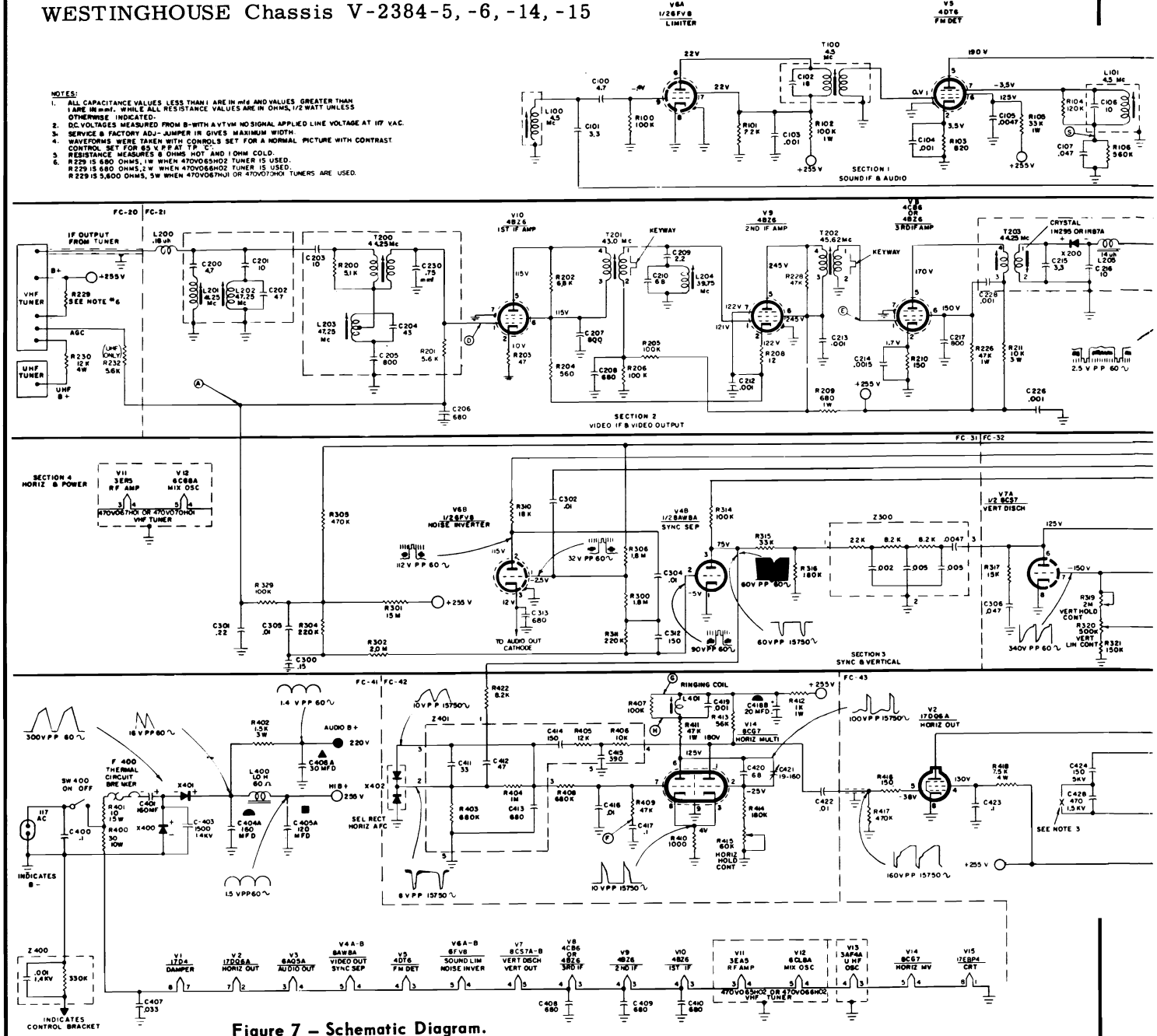


Figure 7 – Schematic Diagram.

CENTERING

The centering rings, located at the rear of the deflection yoke, should be rotated to center the raster.

DEFLECTION YOKE

The deflection yoke should be as far forward as possible (touching the bell of the CRT). Rotation of the deflection yoke is used to level the raster.

HORIZONTAL RINGING COIL

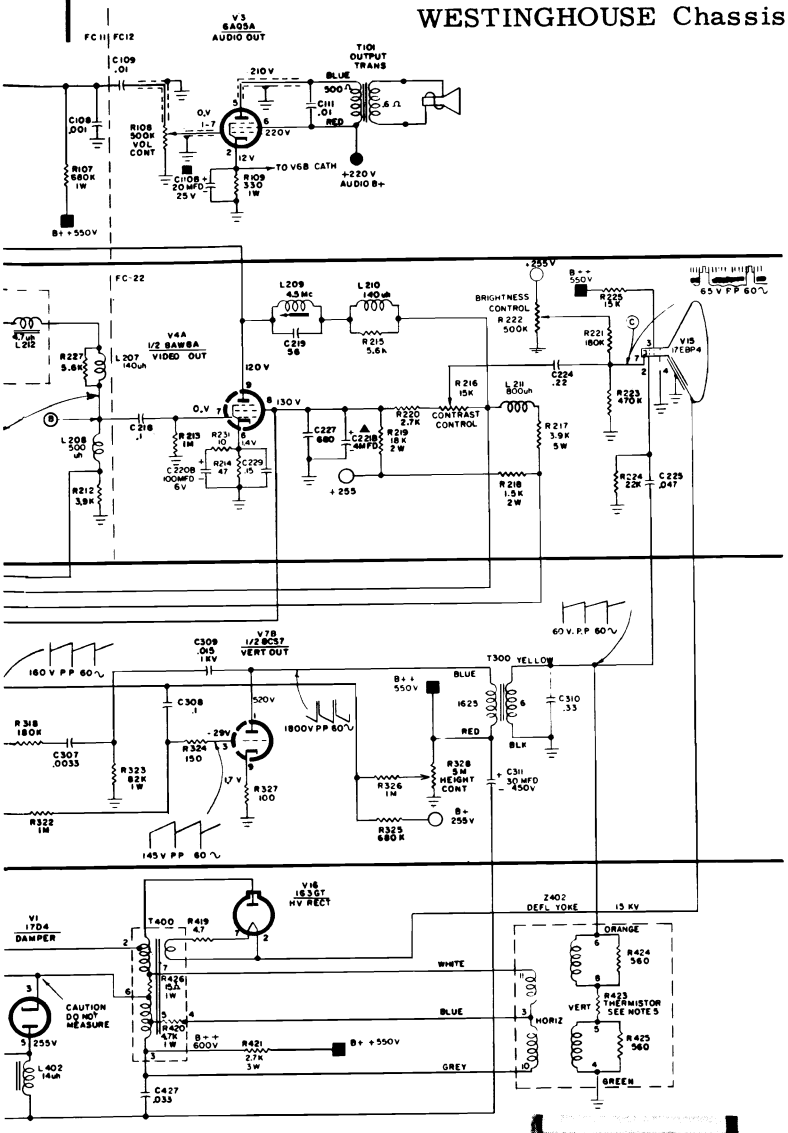
The ringing coil (L401) should be adjusted as follows:

1. Short out the ringing coil with a jumper wire.
2. Set the horizontal hold control to the center of its range. Do not change this setting during the steps that follow.
3. Connect a VTVM to TP (F) for measuring the DC voltage between TP (F) and B–.
4. With the receiver tuned to a station of normal signal strength, adjust C421 for 0 volts DC on the meter.
5. Remove the jumper from the ringing coil.
6. Adjust the ringing coil for 0 volts DC on the meter. Check the adjustment by switching to another channel and back again. The receiver should pull into horizontal sync on all channels.

HEIGHT AND VERTICAL LINEARITY

The HEIGHT AND VERT. LIN. controls are accessible through two holes in the front escutcheon, just below the Channel Selector knob, with HEIGHT on the left and VERT. LIN. on the right. With a narrow screwdriver, adjust them alternately until a picture of proper height and linearity is obtained.

WESTINGHOUSE Chassis V-2384-5, -6, -14, -15, Schematic Diagram



CHASSIS REMOVAL

1. Remove control knobs.
2. Remove back cover and disconnect antenna lead-in.
3. Remove screw holding metal brace behind tuner and swing brace out of the way.
4. Unsolder speaker leads at output transformer.
5. Remove six screws holding chassis to cabinet bottom.
6. Remove three screws holding chassis to cabinet front.
7. Ease the tuner out past the cabinet. Then, grasping the chassis with the left hand at the point shown in Figure 4, pull the tuner side out as far as it will go. Tip the chassis forward slightly and it will slide out, tuner end first. Caution: Be extra careful not to break off feed-thru capacitor on tuner.

PICTURE TUBE REMOVAL

1. Remove chassis as described under CHASSIS REMOVAL.
2. Remove High Voltage lead, CRT socket and yoke. Discharge High Voltage button.
3. Loosen rear picture tube wire strap. Loosen and remove front picture tube wire strap.
4. Remove picture tube from front of chassis. Force metal corners outward slightly to pass tube. It should not be necessary to remove corners.

PC BOARD ACCESSIBILITY

To provide easy access to the PC board while the set is in operation, the CRT assembly can be partially disassembled (see Figure 2). This is accomplished as follows:

1. Remove the chassis from the cabinet.
2. Remove the 4 screws shown in Figure 1, labelled, "Remove."
3. Remove the 4 screws shown in Figure 2, labelled, "Removed Screws."
4. Move the CRT assembly out and to the left. Connect a jumper from the aquadag coating to chassis ground. CAUTION: Be careful that the HV anode lead does not short or arc to the frame.

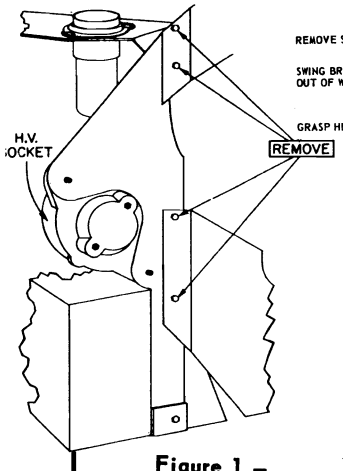


Figure 1 – Bracket Removal.

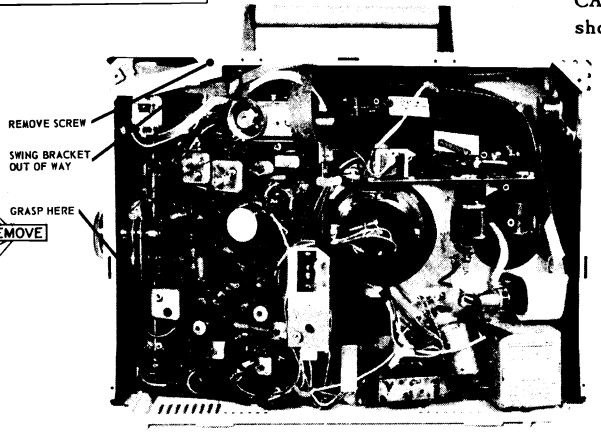


Figure 4 – Chassis Removal

JUMPER

A jumper is used to shunt C428. This jumper is sometimes cut to decrease width. Whether the jumper is to be cut is determined at the factory; normally no changes should be made in the field.

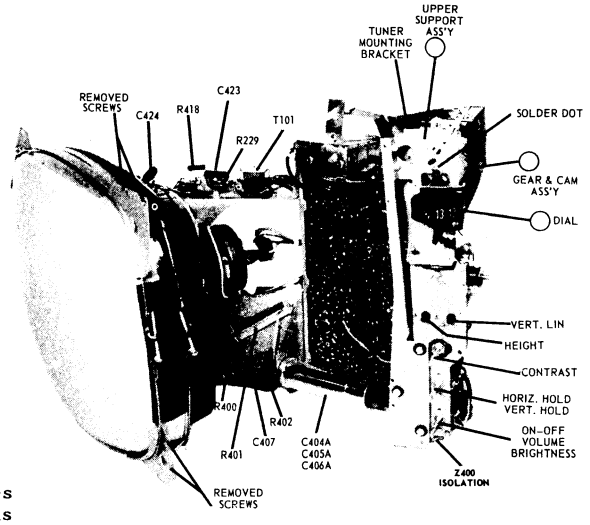
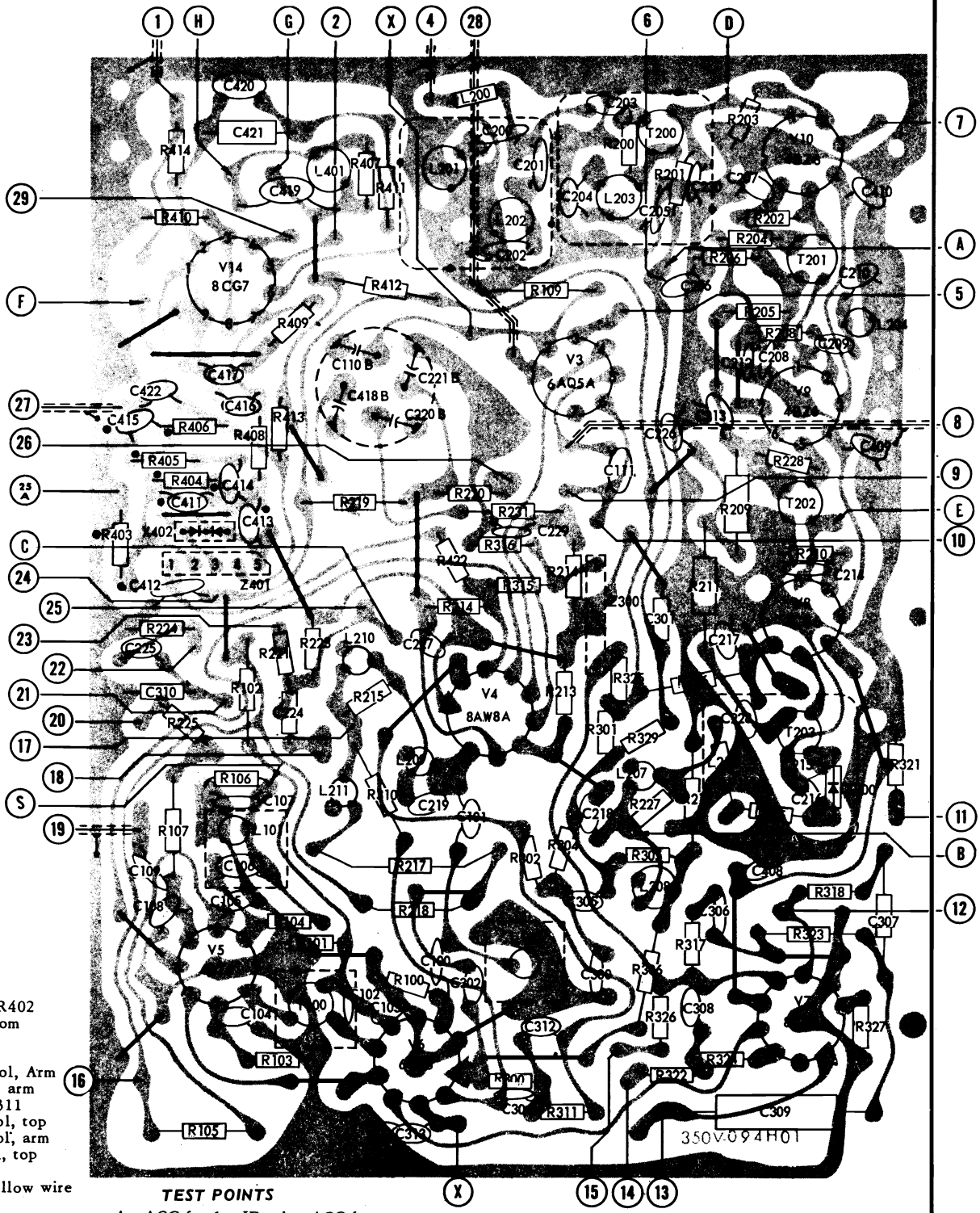


Figure 2 – PC Board Accessibility (V-2384-6)

WESTINGHOUSE Chassis V-2384-5, -6, -14, -15, Service Information, Continued



KEY TO FIGURE

1. Horiz Hold R415
2. Tuner filament
4. Tuner to IF input
5. Pin 2 of 17DQ6A
6. Tuner AGC
7. Tuner filament
8. T101 primary
9. Audio B+
10. Junction of C406A, R402
11. R320, Vert Lin, bottom
12. R319 Vert Hold
13. T300 Vert output
14. R320 Vert Lin Control, Arm
15. R328 Height control, arm
16. Junction of C427, C311
17. R216 Contrast control, top
18. R216 Contrast control, arm
19. R108 Volume control, top
20. CRT pin #3
21. T300 Vert output, yellow wire
22. CRT pin #2
23. R222 Brightness control, arm
24. R222 Brightness control, top
25. CRT pin #7
25A CRT pin #4
26. R216 Contrast control, bottom
27. R416 grid of Horiz output
28. R108 Volume control, arm
29. CRT pin #8

TEST POINTS

A. AGC for 1st IF: also AGC for tuner
B. Video detector
C. CRT cathode
D. 1st IF input
E. 3rd IF grid
F. Horiz MV
G. Ringing coil
H. Ringing coil
S. FM sound

● USED WHEN Z401 IS OMITTED
Ⓧ JUMPER WIRE

Figure 8 – Bottom view of PC board showing location of top components in solid outlines. Tube pin numbering is for bottom of socket.

WESTINGHOUSE Chassis V-2384-5, -6, -14, -15, Alignment Information, Continued

ALIGNMENT

SOUND ALIGNMENT

EQUIPMENT: VTVM

PROCEDURE:

1. Select the strongest station available (preferably with test pattern and test tone) and adjust the MEMORY FINE TUNING for best reception. Adjust the VOLUME control so that the station sound is audible.
2. Adjust the quad coil (L101) for maximum sound from the speaker.
3. Disconnect the antenna. Use a jumper wire to short TP (B) to B-.
4. Connect the VTVM to TP (S).
5. Adjust interstage transformer T100 for maximum negative voltage on the VTVM.
6. Remove the jumper wire used to short TP (B) to B-.
7. Place the antenna input close to the antenna terminals so that the signal is loosely coupled to the receiver and the picture is barely visible. A pronounced noisiness (hiss) should accompany the sound.
8. Adjust the limiter input coil (L100) for maximum negative voltage on the VTVM. If the VTVM indicates a broad response while making this adjustment, the receiver input signal is too strong. When the signal coupling described in step 7 is at the necessary low point, no limiting takes place and the VTVM will indicate a sharp response to the limiter input coil adjustment.

4.5 MC TRAP ALIGNMENT

Disconnect the antenna and turn contrast control to maximum clockwise. Inject a 4.5 MC CW signal through a .001mf capacitor to TP (B). Connect a .001mf capacitor to a demodulation probe tip. Connect the other end of the probe to a VTVM and the capacitor to TP (C). Set the VTVM to 1.5-2V DC range. Turn the set on and allow five minutes for warmup. Then adjust L209 for minimum on the VTVM.

IF ALIGNMENT

EQUIPMENT

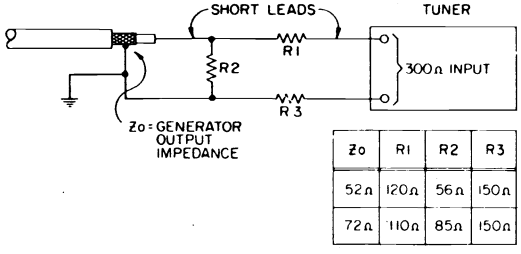
1. **Sweep Generator** with a 10 MC wide sweep at center frequencies from 10 MC to 90 MC and 170 MC to 216 MC.
2. **CW (Marker) Generator** which accurately produces the IF and RF frequencies from 4.5 MC to 216 MC.
3. **Oscilloscope** with good low frequency response characteristics.
4. **VTVM**
5. **Bias Supply** of -4 volts.
6. **Standard Alignment Tool** with a 3/32" hexagonal tip. (long enough to reach bottom slugs)

TERMINATION AND ADJUSTMENT OF EQUIPMENT

These instructions on termination and adjustment of equipment will apply throughout the IF Alignment procedure. All test equipment cables and leads should be as short and direct as possible.

Oscilloscope and VTVM – Use a low-capacitance direct probe terminated with the decoupling network shown in Figure 11. Keep the oscilloscope calibrated for 2 volts peak to peak (P-P). Use a VTVM range suitable for measuring -1.5 volts.

Generators – Except where otherwise noted, all signal generating equipment should be terminated as shown in Figure 10. Connect the signal cable ground near the ground of the stage where the signal is injected. Adjust the CW generator output so that: (1) When the VTVM is being used its reading remains near the -1 volt point. (2) When the oscilloscope is being used the marker frequencies do not distort the response curve.



Zo	R1	R2	R3
52Ω	120Ω	56Ω	150Ω
72Ω	110Ω	85Ω	150Ω

Figure 9 – Impedance matching network.

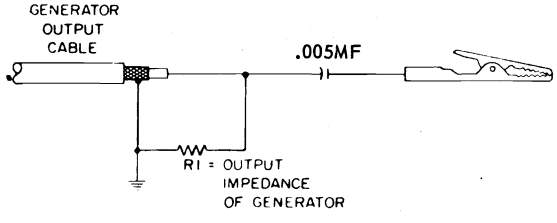


Figure 10 – Generator cable termination.

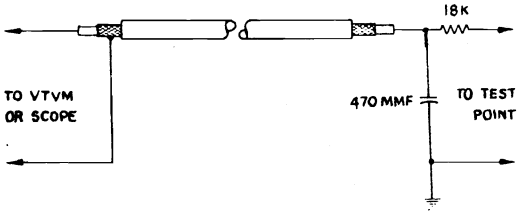


Figure 11 – VHF Decoupling network.

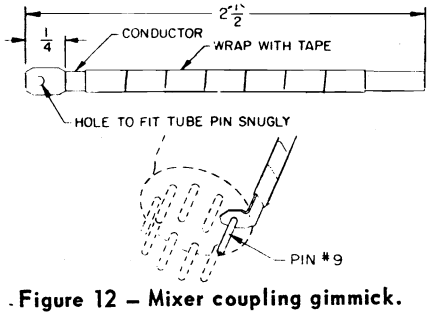


Figure 12 – Mixer coupling gimmick.

WESTINGHOUSE Chassis V-2384-5, -6, -14, -15, Alignment Information, Continued

IF ALIGNMENT

STEP	TEST EQUIPMENT AND CONNECTION	ADJUSTMENT
1.	–4 Bias to TP (A)	Channel selector to channel 10
2.	Oscilloscope and VTVM to TP (B) IF sweep generator with CW Marker at 44.25 MC to TP (E)	Short antenna terminals. T203 primary (bottom slug): Maximum amplitude T203 secondary (top slug): Rocking symmetrical response (see Figure 13)
3.	CW generator to TP (D) at: a. 45.62 MC b. 39.75 MC c. 43.00 MC	 T202: Maximum amplitude L204: Minimum amplitude T201: Maximum amplitude
4.	Sweep generator at 44.25 MC to TP (D). Couple CW marker generator to sweep generator cable. Keep marker amplitude at minimum to avoid distorting response.	T201, T202, T203: slight retouching may be necessary. See Figure 14 for typical response curve with correctly placed markers. If curve cannot be obtained, traps listed in step 5 may be badly mistuned.
5.	CW generator to TP (M) (for 470V065H02, 470V066H01 and 470V066H02 tuners, see Figures 17 & 18; for 470V067H01 tuner, use gimmick shown in Figure 12) at: a. 44.25 MC b. 44.25 MC c. 41.25 MC d. 47.25 MC } It may be necessary to increase e. 47.25 MC } generator output and/or decrease bias.	 Tuner mixer output coil: Maximum on VTVM T200: Maximum on VTVM L201: Minimum on VTVM L202: Minimum on VTVM L203: Minimum on VTVM
6.	Connect sweep generator to TP (M) at 44.25 MC. Couple CW generator with marker at 44.25 MC to sweep generator cable. Keep marker amplitude low to avoid distorting response. Adjust scope for 2V-PP.	Mixer output coil and T200: Rocking symmetrical response. Tune for maximum amplitude with waveshape and markers as shown in Figure 15.
7.	CW generator to TP (M) at 47.25 MC.	L203: Minimum amplitude (wave shape should be as shown in Figure 15)
8.	Oscilloscope, 2V-PP. Sweep generator thru impedance matching network (See Figure 9) to antenna terminals. Set pix marker at 211.25 MC Channel 13. Inject 45.75 MC marker into IF section by connecting CW output cable to outer shield of IF link Cable.	Fine tuning to center of range. Channel selector to Channel 13. Oscillator slug setting: Picture carrier should fall at 45.75 MC (±400KC) marker on scope. (See Figure 16).
9.	Repeat step 8 for all channels.	

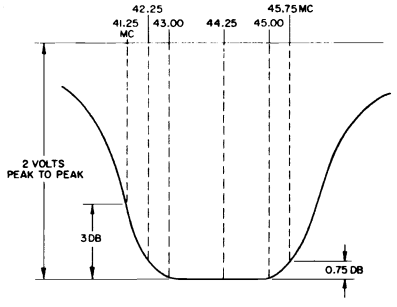


Figure 13 – Typical IF response, 3rd IF Amp grid to 2nd Det.

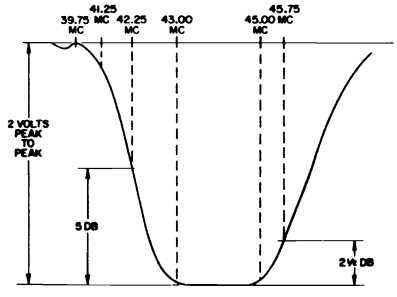


Figure 14 – Typical IF response, 1st IF Amp grid to 2nd Det.

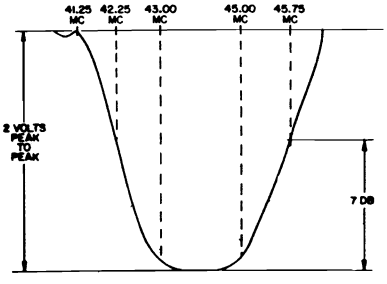


Figure 15 – Typical IF response, Mixer Amp grid to 2nd Det.

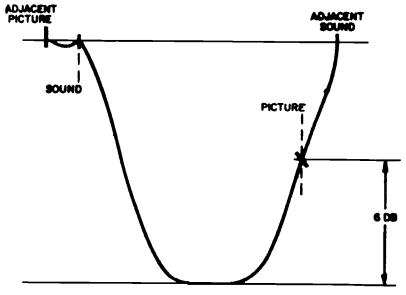


Figure 16 – Typical RF-IF response

Westinghouse

MODEL AND CHASSIS CHART

Models	Chassis	Tuner Used	Tuner Tubes
H-K4910 H-K4911 H-K4912 H-K4913	V-2389-1	VHF: 470V064H01	RF Amp: 6ER5 Mix-Osc: 6CG8A
H-K4910U H-K4911U H-K4912U H-K4913U	V-2389-2	VHF: 470V063H02 UHF: 472V034H02	RF Amp: 6EA5 Mix-Osc: 6CL8A UHF Osc: 6AF4A
H-K4410 H-K4511 H-K4411 H-K4512 H-K4412 H-K4513 H-K4413 H-K4514 H-K4515	V-2389-3 V-2405-1 V-2406-1 Remote Director	VHF/UHF: 470V064H01 Power Tuned	RF Amp: 6ER5 Mix-Osc: 6CG8A

CHASSIS ASSEMBLIES

VHF only

V-2389-1 MANUAL

VHF-UHF

V2389-2 MANUAL

V-2389-3 POWER

114° CRT - 23FP4

CRT REMOVAL

1. Remove chassis from cabinet.
2. Remove CRT socket, yoke clamp, width control and second anode lead.
3. Loosen bolt at top of CRT to release strap.
   NOTE: Observe CRT handling instructions detailed in *"Warning."*
4. Remove CRT.

FRONT PLATE REMOVAL

1. Remove the three screws that secure the front glass top retaining strip.
2. Remove the two side retaining strips and carefully remove glass.

CHASSIS REMOVAL

1. Remove control knobs.
2. Remove back cover and antenna terminal bracket.
3. Remove the five screws which secure control panel and tuner brackets to cabinet front.
4. Remove the four screws which secure chassis to cabinet.
5. Remove speaker leads from terminal lugs on chassis.
6. On receivers having Remote Director, remove remote receiver plug.
7. Carefully slide chassis out from cabinet.

TUBE COMPLEMENT AND RESISTANCE MEASUREMENTS

Tube	Type	Tube Function	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX4GTB	Damper	NC	NC	7.5M*	-	23 *	-	fil	fil	
V2	12DQ6B	Horiz Out	NC	fil	NC	18K*	1M	NC	fil	0	
V3	12DT5	Vert Out	470*	NC	NC	fil	fil	1.4M	220	NC	750*
V4	6BZ6	1st IF Amp	336K	47	fil	fil	inf	inf	0		
V5	6BZ6	2nd IF Amp	56K	inf	fil	fil	490*	490*	inf		
V6	6DK6	3rd IF Amp	.1	150	fil	fil	10K*	47K*	0		
V7	6BZ6	Keyed AGC	37K*	13K*	fil	fil	2.2M	23*	13K*		
V8	23FP4	CRT	fil	120K	7M	0	NC	NC	220K	fil	
V9	6FV8	Sync Amp & Noise Inv	3.5M	37K*	5.6K	fil	fil	15K*	19K*	0	950
V10	6CG8A	Tuner Osc-Mix	3.6K	14K*	0	fil	fil	5.6K*	22K*	0	220K
V11	6ER5	Tuner RF Amp	0	1.5M	fil	fil	5.6K*	0	0		
V12	6AF4A	UHF Osc	12.8K*	5.6K	fil	fil	.1	5.6K	12.8K*		
V13	6BQ5	Audio Out	500K	500K	270	fil	fil	NC	1K*	NC	1.5K
V14	6CG7	Horiz MV	57K*	220K	1K	fil	fil	48K*	2M	1K	0
V15	6DT6	FM Det	3.5	820	fil	fil	8M	47K*	560K		
V16	6FV8	Limiter & Vert Disch	1.2M	7M	0	fil	fil	150K*	15K	0	470K
V17	6EB8	Video Out & Sync Sep	0	2.5M	75K*	fil	fil	350	1M	27K*	5.4K*
V18	1G3GT	HV Rect	Infinite								cap 7M
V19	5U4GB	LV Rect	NC	15K	NC	15	NC	15	NC	15K	

All resistances in ohms from tube pin to chassis ground (except *). Controls set for normal picture and sound.
*Resistances measured from tube pin to pin #8 of V19.

WESTINGHOUSE Chassis V-2389-1, -2, -3 Main Schematic Diagram

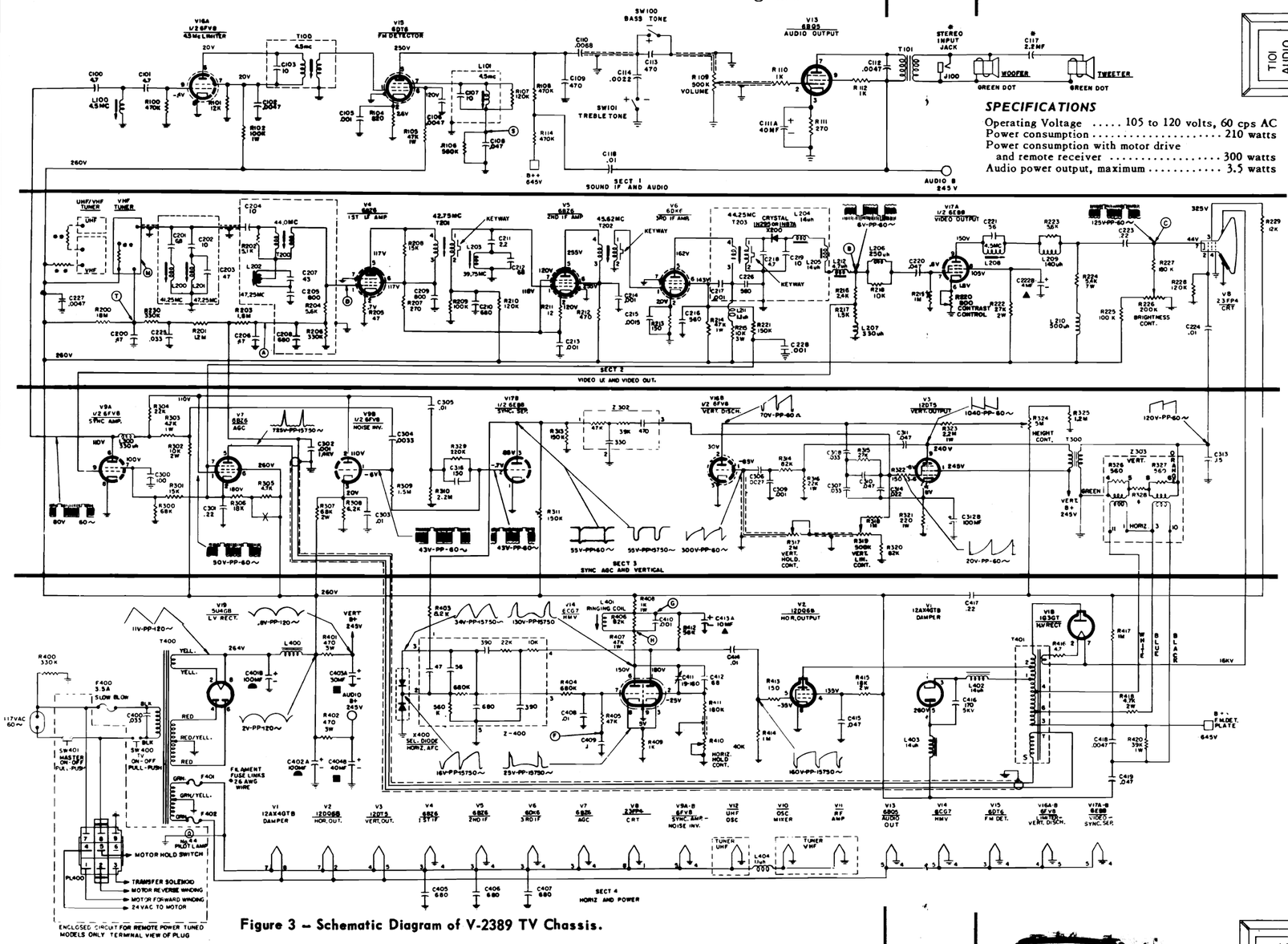


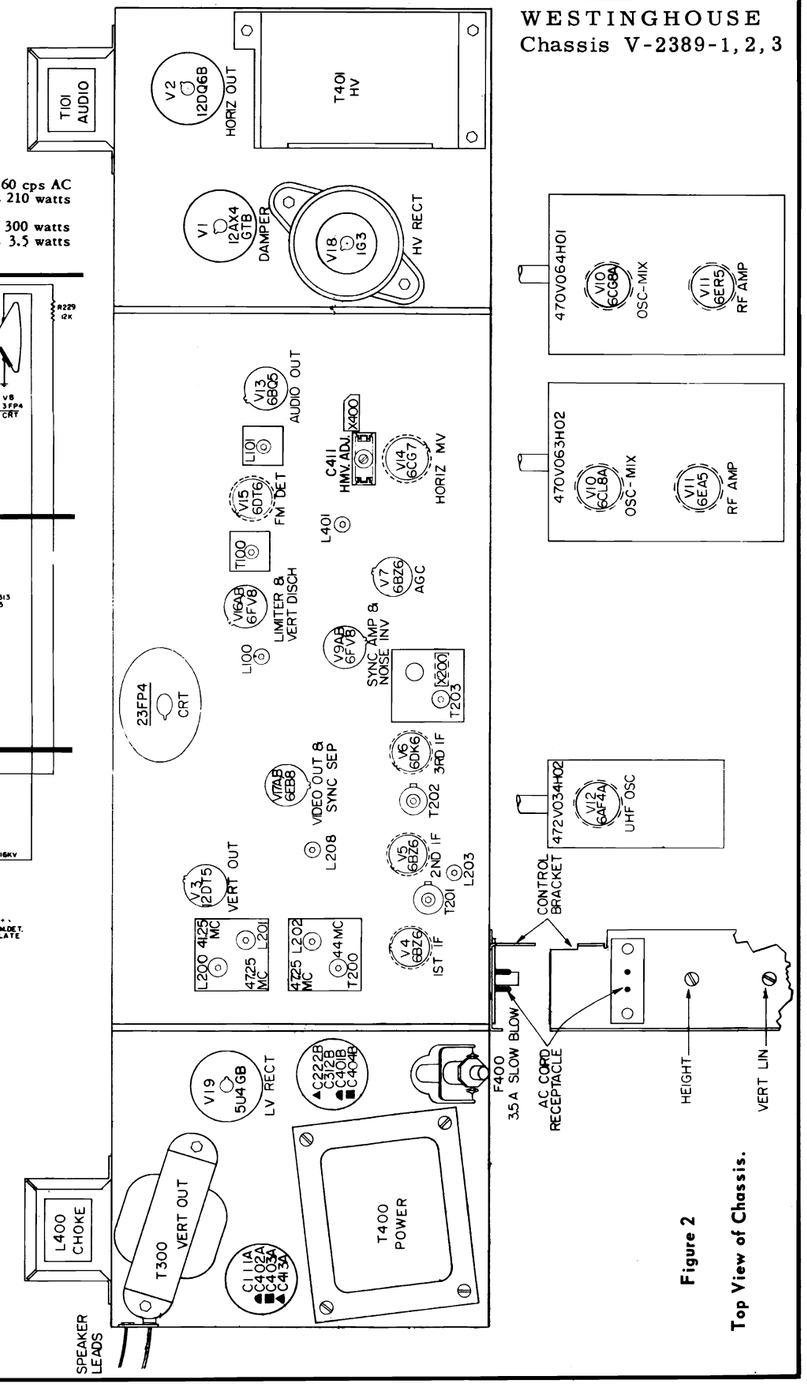
Figure 3 – Schematic Diagram of V-2389 TV Chassis.

FUSE INFORMATION – The power supply fuse is located on top of the chassis in the low voltage section near the power transformer. The fuse is a flange type plug in, 3.5 amp, 125V, slo-blo type and is 1 7/16" long.

Two one inch pieces of # 26 wire are used as fuse links F401 and F402. They are wired into the secondary of the power transformer to protect it from shorts in tube filaments. If one of these fuse links blows, a group of tubes will fail to light.

Refer to Figure 3 to determine which tubes are fed by each fuse link. CAUTION: After replacing fuse link, check for shorted tube before set is turned on.

WESTINGHOUSE Chassis V-2389-1, 2, 3



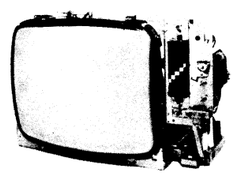
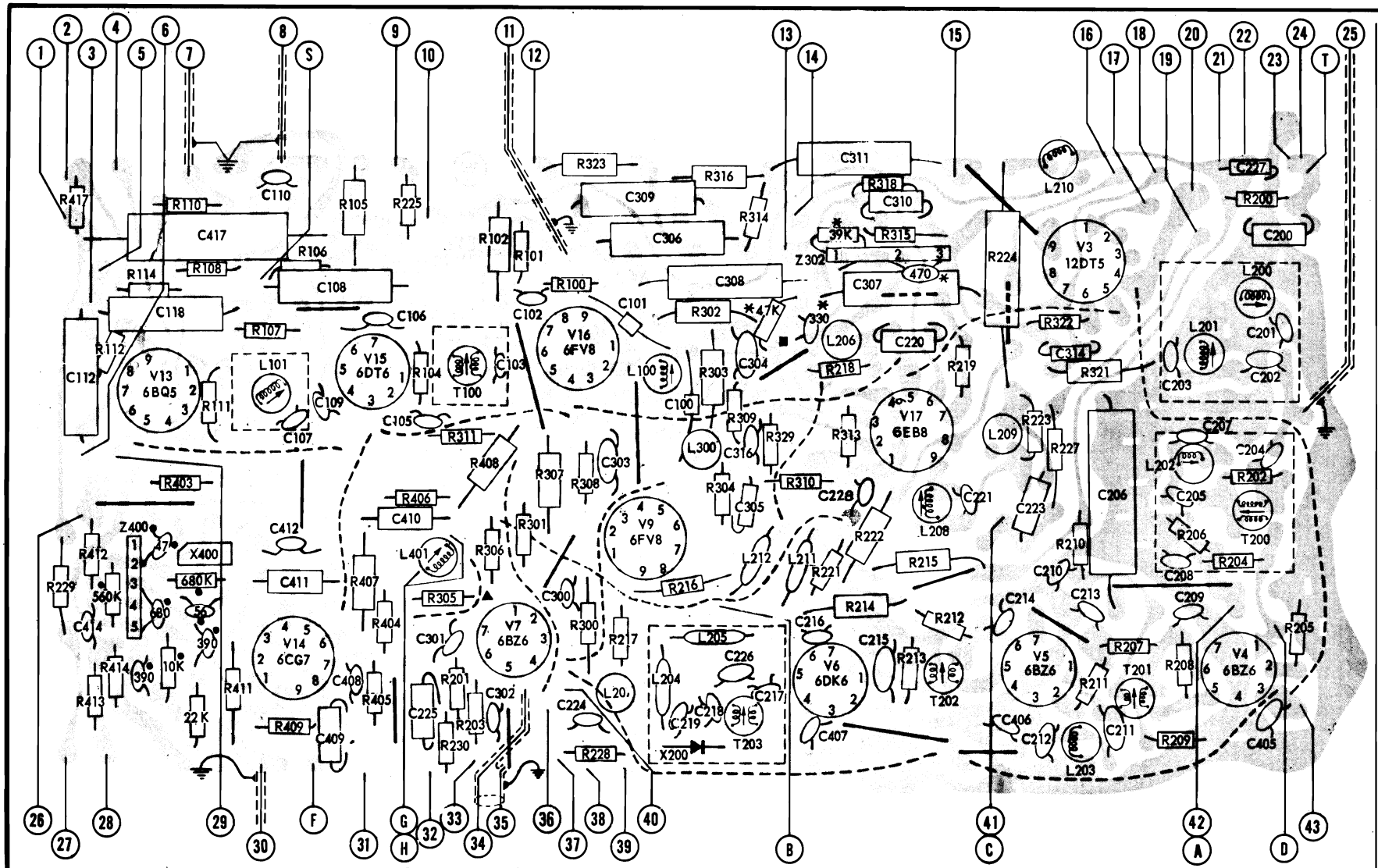


Figure 2 Top View of Chassis.



✱ = COMPONENT VALUES WHEN Z 302 IS NOT USED
● = COMPONENT VALUES WHEN Z 400 IS NOT USED
▲ = AGC JUMPER ■ = CUT TRACK WHEN Z 302 IS NOT USED

SERVICING THE PRINTED CIRCUIT

1. All tube pins are marked, not with the number, but with letters designating the elements to which they're attached (e.g. P for plate, G1 for control grid, H, heater etc.) As in tube manuals, KT means cathode of triode, PP-plate of pentode etc. It is no longer necessary to count pins. But if you do want to count pins, pin one is always triangular shaped while the others are round, giving you a good starting point.
2. Voltage supply lines are identified by the symbol (B+) along with the voltage at that point (e.g. 120V).
3. Special sizes of resistors and capacitors are indicated (e.g. 2 watt resistor, 2KV capacitor).
4. Jumpers are indicated by solid lines with no components in the middle. These jumpers are wires on top of the chassis, generally used to distribute B+ voltages. A big advantage of such jumpers is that they can be disconnected for easy checking of B+ branches in case of a short in the B+ system. It should be kept in mind that the jumpers do not short the printed circuit tracks they cross. Jumpers merely connect the two tracks adjacent to their ends.

Figure 4 – Bottom view of PC board showing location of top components in solid outlines. Tube pin numbering is for bottom socket.

WESTINGHOUSE Chassis V-2389-1, -2, -3, Alignment Information, Continued

SOUND ALIGNMENT

EQUIPMENT: VTVM

PROCEDURE:

1. Select the strongest station available (preferably with test pattern and test tone) and adjust the FINE TUNING for best reception. Adjust the VOLUME control so that the station sound is audible.
2. Adjust the quad coil (L101) for maximum sound from the speaker.
3. Use a jumper wire to short the control grid of the 3rd IF amplifier to chassis ground.
4. Connect the VTVM to TP (S).
5. Adjust interstage transformer T100 for maximum negative voltage on the VTVM.
6. Remove the jumper wire used to short the control grid of the 3rd IF amplifier.
7. Disconnect the antenna input and place it close to the antenna terminals so that the signal is loosely coupled to the receiver and the picture is barely visible. A pronounced noisiness (hiss) should accompany the sound.
8. Adjust the limiter input coil (L100) for maximum negative voltage on the VTVM. If the VTVM indicates a broad response while making this adjustment, the receiver input signal is too strong. When the signal coupling described in step 7 is at the necessary low point, no limiting takes place and the VTVM will indicate a sharp response to the limiter input coil adjustment.

4.5 MC TRAP ALIGNMENT

Inject a 4.5 MC CW signal through a .001mf capacitor to T.P. (B). Couple a .001mf capacitor to a demodulation probe tip. Connect the other end of the probe to a VTVM and the capacitor to T.P. (C). Set the VTVM to 1.5 - 2V scale. Turn the set on and allow five minutes for warmup. Then adjust L208 for minimum on the VTVM.

IF ALIGNMENT

EQUIPMENT

1. *Sweep Generator* with a 10 MC wide sweep at center frequencies from 10 MC to 90 MC and 170 MC to 216 MC.
2. *CW (Marker) Generator* which accurately produces the IF and RF frequencies from 4.5 MC to 216 MC.
3. *Oscilloscope* with good low frequency response characteristics.
4. *VTVM.*
5. *Bias Supplies* of -4 volts and -2.5 volts.
6. Standard Alignment Tool with a 3/32" hexagonal tip.

KEY TO FIGURE 4

The leads identified by letters and numbers in Figure 4 connect to the following points:

1. High side of HEIGHT CONTROL
2. Junction of C418, R417, R420
3. T101 primary, connect to red wire
4. C111A
5. Junction of C404A & R402
6. T101 primary, connect to blue wire
7. Wiper arm of VOLUME CONTROL (black)
8. Junction of C113, C114 (white)
9. High side of BRIGHTNESS control
10. Junction R415, C419, L403
11. High side of VERTICAL HOLD control
12. Arm of HEIGHT control
13. Wiper arm of VERTICAL LINEARITY control
14. High side & wiper arm of CONTRAST control
15. T300 primary, blue wire
16. C222B
17. Junction C403A & R401
18. C312B
19. Wiper arm of BRIGHTNESS control
20. Tuner filament point
21. Tuner B+
22. C402A, R401, R402 Junction point
23. Jumper to (32)
24. Tuner AGC point
25. Tuner IF output point

26. C413A
27. Pin 3 of CRT
28. Pin 5 of V2
29. Pin 8 of V1
30. High side of HORIZONTAL HOLD control
31. Junction R415, L403 and C419
32. Jumper to (23)
33. Jumper to (42)
34. T401, terminal T (White)
35. T401 terminal S, (Black)
36. Pin 4 of CRT
37. Pin 1 of CRT
38. T300 secondary, orange wire & C313
39. Pin 2 of CRT
40. Pin 8 of CRT
41. Pin 7 of CRT
42. Jumper to (33)
43. Junction of F401 and brown wire to V1 pin 7

TEST POINTS

(A) AGC for IF
(B) Video detector
(C) CRT cathode
(D) 1st IF input
(F) Horiz MV
(G) } Ringing Coil
(H) }
(S) Quad coil
(T) AGC for tuner

TERMINATION AND ADJUSTMENT OF EQUIPMENT

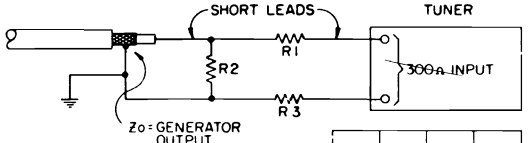
These instructions on termination and adjustment of equipment will apply throughout the IF Alignment procedure.

All test equipment cables and leads should be as short and direct as possible.

Oscilloscope and VTVM — Use a low-capacitance direct probe terminated with the decoupling network shown in Figure 7. Keep the oscilloscope calibrated for 2 volts peak to peak (P-P). Use a VTVM range suitable for measuring -1.5 volts.

Generators — Except where otherwise noted, all signal generating equipment should be terminated as shown in Figure 6. Connect the signal cable ground near the ground of the stage where the signal is injected.

Adjust the CW generator output so that: (1) When the VTVM is being used its reading remains near the -1 volt point. (2) When the oscilloscope is being used the marker frequencies do not distort the response curve.



Zo	R1	R2	R3
52Ω	120Ω	56Ω	150Ω
72Ω	110Ω	85Ω	150Ω

Figure 5 — Impedance matching network.

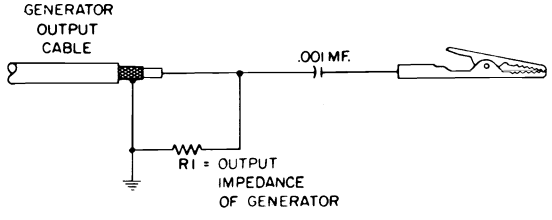


Figure 6 — Generator cable termination.

(Continued on page 180)

WESTINGHOUSE Chassis V-2389-1, -2, -3, Alignment Information, Continued

Step	*Test Equipment and Connection*	*Adjustment*
1.	-4V bias to T.P. (A) and -2.5V bias to T.P. (T)	Channel selector to #10
2.	VTVM to T.P. (B) and CW generator to T.P. (D) Set generator at: a. 44.25 MC b. 45.62 MC c. 39.75 MC d. 42.75 MC	 T203: Maximum on VTVM T202: Maximum on VTVM L203: Minimum on VTVM T201: Maximum on VTVM
3.	Oscilloscope to T.P. (B) and sweep generator at 43 MC to T.P. (D) Couple CW marker generator to sweep generator.	T201, T202, T203, slight retouching may be necessary. See Figure 9 for typical response curve.
4.	VTVM to T.P. (B) and CW generator to T.P. (M) See Figures 18, 19 (on 470V064H01 tuner use gimmick, see Figure 12). Set CW generator to: a. 44.25 MC b. 44.25 MC c. 41.25 MC d. 47.25 MC } It may be necessary to increase signal level and remove IF bias during this step in order to obtain dip on VTVM e. 47.25 MC }	 Mixer output coil: Maximum on VTVM - See Figures 18,19 T200: Maximum on VTVM L200: Minimum on VTVM L201: Minimum on VTVM L202: Minimum on VTVM
5.	Oscilloscope to T.P. (B) and sweep generator at 44 MC center to T.P. (M) adjust for approximately 2V-PP. Couple CW marker generator to sweep gen.	Mixer output coil: Maximum amplitude T200: Rocking symmetrical response at approximately the center of the passband so that the mixer carrier (45.75 MC) is placed 7DB down from the peak response. See Figure 10.
6.	CW generator at 47.25 MC to T.P. (M) oscilloscope to T.P. (B)	L202: Minimum amplitude on oscilloscope. This step is necessary because there is a one way interaction inherent in trap design, therefore tuning the IF input transformer will change the frequency response of the trap.
7.	Oscilloscope, 2V-PP to T.P. (B) Sweep generator thru impedance matching network (see Figure 5) to the antenna terminals. Set picture marker at: a. 211.25 MC, channel 13 (for 470V063H02 tuner) b. 193.25 MC, channel 10 (for 470V064H01 tuner) Inject 45.75 MC marker into IF section by connecting CW output cable to outer shield of IF link cable at a point close to chassis. Keep marker amplitude at minimum to avoid distorting response.	Fine tuner screw to center of range. Channel selector to #13 Channel selector to #10 Oscillator slug setting: picture should fall at 45.75 MC (±400 KC) marker on oscilloscope. See Figure 11.
8.	Repeat step 7 for all channels	NOTE: On 470V063H02 tuners, maximum fine tuner screw engagement gives maximum oscillator frequency. For 470V064H01 tuners, maximum screw engagement gives minimum oscillator frequency.

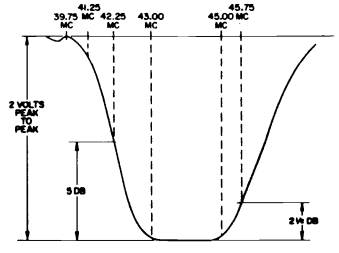


Figure 9 – IF Response, 1st IF Amp. Grid to 2nd Det.

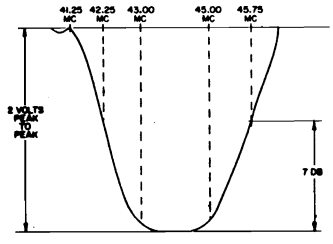


Figure 10 – IF Response, Mixer Grid to 2nd Det.

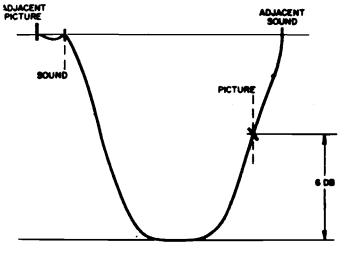


Figure 11 – Typical RF-IF Response.

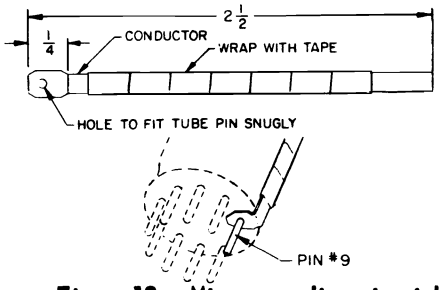


Figure 12 – Mixer coupling gimmick.

ZENITH RADIO CORPORATION

CHASSIS 16F23, 16F23Q, 16F25, -Q, -T, 16F26, -Q, -T, 16F28, 16F28Q

MODEL AND CHASSIS INFORMATION

MODEL	SPACE COMMAND	TYPE	CHASSIS	TUNER	PICTURE TUBE
F1805C,L		Table	16E25 - 16F25 - 16F26	Bandswitch	17DQP4
F1806B,L		Table	16F25 - 16F26	Bandswitch	17DQP4
F1807C,L		Table	16F25 - 16F26	Target Turret	17DQP4
F2010C	"300"	Table	16F25Q - 16F26Q	Target Turret	17DQP4
F2105C		Table	16F25 - 16F27**	Bandswitch	19AJP4
F2110B,G		Table	16F25 - 16F27**	Target Turret	19AJP4
F2111L,P		Table	16F25 - 16F27**	Target Turret	19AJP4
F2112J,W		Table	16F25T - 16F27T**	Target Turret	19AJP4
F2120E,M,R,W		Console	16F25 - 16F27**	Target Turret	19AJP4
F2214L	"300"	Table	16F25Q - 16F27Q**	Target Turret	19AJP4
F2215J,L	"300"	Table	16F25Q - 16F27Q**	Target Turret	19AJP4
F2230E,M,R,W	"300"	Console	16F25Q - 16F27Q**	Target Turret	19AJP4
F2710Y		Table	16F23	Target Turret	23ANP4
F2712E,R,W		Table	16F23	Target Turret	23ANP4
F2735E,R,W		Console	16F23	Target Turret	23ANP4
F2737E,R,W		Console	16F23	Target Turret	23ANP4
F2738E,M,R,W		Console	16F23	Target Turret	23ANP4
F2739E,R,W		Console	16F23	Target Turret	23ANP4
F2740E,R,W		Console	16F23	Target Turret	23ANP4
F2752R,W,Y		Console	16F23	Target Turret	23ANP4
F2755H,M,R,W		Console	16F23	Target Turret	23ANP4
F2756E,R,W		Console	16F23	Target Turret	23ANP4
F2786E,R,W,		Comb	16F23/4F20/7F20	Target Turret	23ANP4
F2858R,W		Console	16F28	Bull's Eye Turret	AR23ANP4
F2860M,R		Console	16F28	Bull's Eye Turret	AR23ANP4
F2862W		Console	16F28	Bull's Eye Turret	AR23ANP4
F3310E,R,W	"300"	Table	16F23Q	Target Turret	23ANP4
F3311R,W,Y	"400"	Table	16F23Q	Target Turret	23ANP4
F3342E,R,W	"300"	Console	16F23Q	Target Turret	23ANP4
F3348R,W	"400"	Console	16F23Q	Target Turret	23ANP4
F3350E,R,W	"400"	Console	16F23Q	Target Turret	23ANP4
F3353W	"400"	Console	16F23Q	Target Turret	23ANP4
F3354H,M,R	"400"	Console	16F23Q	Target Turret	23ANP4
F3360W,Y	"400"	Console	16F28Q	Bull's Eye Turret	AR23ANP4
F3364W,Y	"400"	Console	16F28Q	Bull's Eye Turret	AR23ANP4
F3368M,R	"400"	Console	16F28Q	Bull's Eye Turret	AR23ANP4
F3370W	"400"	Console	16F28Q	Bull's Eye Turret	AR23ANP4
F3375L	"400"	Console	16F28Q	Bull's Eye Turret	AR23ANP4
F3380W,Y	"400"	Console	16F28Q	Bull's Eye Turret	AR23ANP4
F3385H	"400"	Console	16F28Q	Bull's Eye Turret	AR23ANP4
F3388W	"400"	Comb.	16F23Q/5F29/7F20	Target Turret	23ANP4

Suffix "Q" following the chassis number identifies a receiver equipped with Zenith's Space Command remote control.

Suffix "U" is added to the chassis and model number if the receiver is factory equipped with a UHF continuous tuner.

**** Later Release**

AGC ADJUSTMENT

Tune in a strong TV signal and slowly turn the delay control until a point is reached where the picture distorts and buzz is heard in the sound. The control should then be backed down from this position and set at a point comfortably below the level of intercarrier buzz, picture distortion and improper sync. This setting will correspond to approximately 3 V. peak to peak output from the video detector.

CAUTION: Misadjustment of the AGC control can result in a washed-out picture, distorted picture, buzz in the sound or complete loss of picture and sound.

ZENITH Chassis 16F23, -Q, 16F25, -Q, -T, 16F26, -Q, -T, 16F28, -Q, Continued

FRINGE LOCK ADJUSTMENT

The fringe lock adjustment is made to obtain best possible synchronization under weak and noisy signal conditions. To adjust, first check the AGC adjustment and proceed as follows:

1. Turn the fringe lock control fully clockwise and then back it off approximately 1/4 turn. Adjust the vertical and horizontal hold controls and check operation of the receiver to see that it syncs normally when the turret is switched from channel to channel.

2. If the picture jitters or shows evidence of delay, tearing, split phase, etc., back down the fringe lock control further, a few degrees at a time, each time readjusting the hold controls and switching from channel to channel until normal sync action is obtained. It will be found that under normal signal conditions, the correct adjustment will be near the counterclockwise position of the control.

3. In fringe and noisy areas, the best adjustment will be found at or near the maximum clockwise position of the control; however, do not automatically turn the fringe lock fully clockwise in fringe areas. Follow the procedure outlined. In areas where both local and fringe signals are received, a compromise setting should be made for best overall performance.

WIDTH ADJUSTMENT

To obtain proper width, slide and turn the metal sleeve along the neck of the picture tube. A setting will be found which results in proper width and linearity.

CORRECTOR MAGNET ADJUSTMENT

21 AND 23 INCH MODELS

Two corrector magnets are used to obtain straight, sharply focused sweep lines across the face of the picture tube. The magnets are mounted on the deflection coil mounting brackets and can be moved in and out or up and down by bending the flexible arms which support them. Adjustment has been made at the factory and should not require readjustment unless accidentally bent out of position. If this occurs, proceed as follows:

1. With the vertical and horizontal size controls reduce the size of the picture to a point where the four corners and sides of the picture are visible. (In some receivers it may not be possible to reduce the picture size sufficiently to see all sides and it may be necessary to shift the picture with the centering control to view one side at a time.)

2. Bend the corrector magnet arms until the corners become right angles and the top of the raster is parallel with the bottom and the left side is parallel with the right side. After adjustment, the picture should be restored to normal size.

NOTE: Misadjustment of the corrector magnets may cause pincushioning, barreling, keystoning, poor linearity, etc.

ALIGNMENT

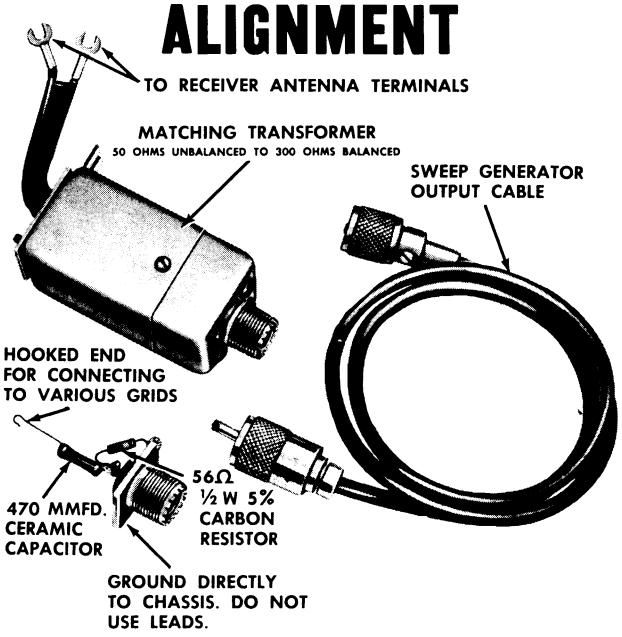


Fig. 4 IF-RF Alignment Fixtures

A suitable VHF and UHF sweep generator in conjunction with an accurate marker must be used for alignment work. It is extremely important to terminate the output cable properly and to check if the attenuator is reactive. If the attenuator is reactive or if the output cable is improperly terminated, correct alignment cannot be made since the degree of attenuation may change the shape as well as the amplitude of the response curve. The attenuator should only vary the amplitude and not the shape of the response curve.

SOUND ALIGNMENT

Proper alignment of the 4.5 Mc intercarrier sound channel can only be made if the signal to the receiver antenna terminals is reduced to a level below the limiting point of the 6BN6 Gated Beam Detector. This level can be easily identified by the "hiss" which then accompanies the sound. Various methods may be used to reduce the signal level; however, a step attenuator is recommended for most satisfactory results.

1. Connect the step attenuator between the antenna and the receiver antenna terminals.

2. Tune in a tone modulated TV signal. Adjust the step attenuator until the signal is reduced to a level where a "hiss" is heard in the sound.

3. Adjust the sound take-off coil (top and bottom cores), intercarrier transformer, quadrature coil and buzz control for the best quality sound and minimum buzz. It must be remembered that any of these adjustments may cause the "hiss" to disappear and further reduction of the signal will be necessary to prevent the "hiss" from disappearing during alignment.

VIDEO I F ALIGNMENT

Refer to the schematic and the tube and trimmer layout for reference test points.

1. Slowly turn the channel selector until the tuner rotor is made to rest between two channels. This will prevent an erroneous response.

2. Connect an oscilloscope through a 10,000 ohm isolation resistor to terminal "C" (detector). Connect the ground lead to chassis.

3. Feed the sweep generator through the special terminating network shown in Fig. 4 to point "G" (Pin 1 of the 3rd IF). Adjust generator to obtain a response similar to Fig. 5 with a detector output of 3 volts peak to peak. Do not exceed this level during any of the adjustments.

4. Set the marker generator to 45.75 Mc and alternately adjust the top and bottom cores of the 4th IF for maximum gain and symmetry with the 45.75 Mc marker positioned as shown in Fig. 5. The 39.75 Mc

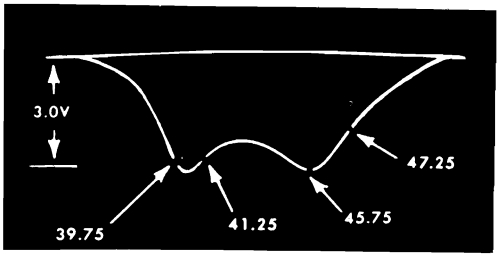


Fig. 5 4th IF Response

marker can fall within ± 0.5 Mc of the specified frequency. If the correct response cannot be obtained, check the position of the cores to see that they are not butted but are entering their respective windings from the opposite ends of the coils.

5. Connect the sweep generator to terminal "A" (mixer grid, see Fig. 1, 2 or 3 depending on tuner). Connect terminal "F" to chassis and connect a jumper between terminal "E" and the junction of the 56 (68 in the 16F25 chassis) and 1500 ohm resistors in the cathode of the 1st IF. Adjust sweep to obtain a response similar to Fig. 8. Switch oscilloscope to 10X gain to "blow up" the traps.

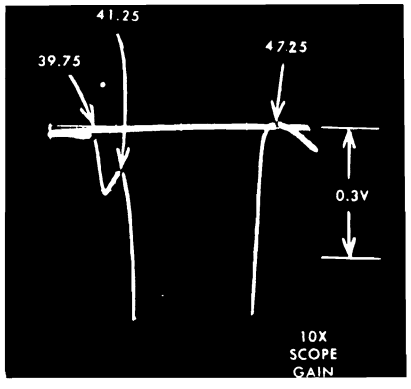


Fig. 6 Expanded View of Traps

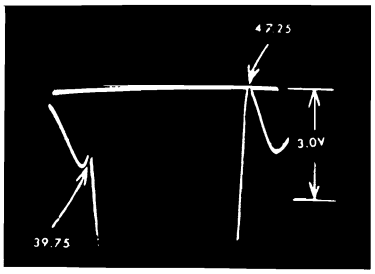


Fig. 7 Further Expansion of Fig. 6 for Detail View of the 39.75 and 47.25 Mc Traps.

6. Refer to Fig. 6 and 7 and adjust the 39.75 Mc 41.25 and the two 47.25 Mc traps for minimum marker amplitude. (The 16F25 chassis has one 47.25 Mc trap). It can be seen that high oscilloscope gain must be used to "run" the response off the screen in order to view a "blow up" of the traps.

7. Disconnect the jumper between "E" and the 56 and 1500 ohm cathode resistors. Connect this jumper between "E" and chassis. Adjust sweep generator for 3 volts peak to peak output. Alternately adjust the 2nd, 3rd, 1st IF and the converter plate coil until an overall response similar to Fig. 8 (Fig. 9 for the 16F25 chassis is obtained. It will be found that the 2nd IF affects the low side (42.75 Mc) and the 3rd IF the high side of the response

If the receiver is equipped with a Target tuner, feed a 45.5 Mc signal to the antenna terminals and adjust L1 (when used) for minimum response. After alignment, remove all jumpers and check operation.

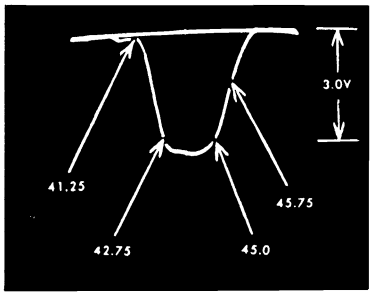


Fig. 8 Overall IF Response

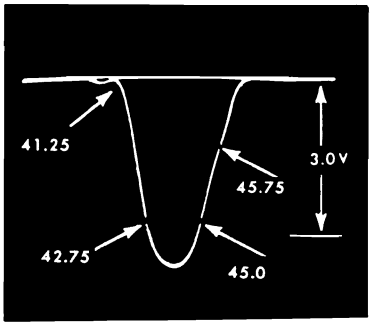
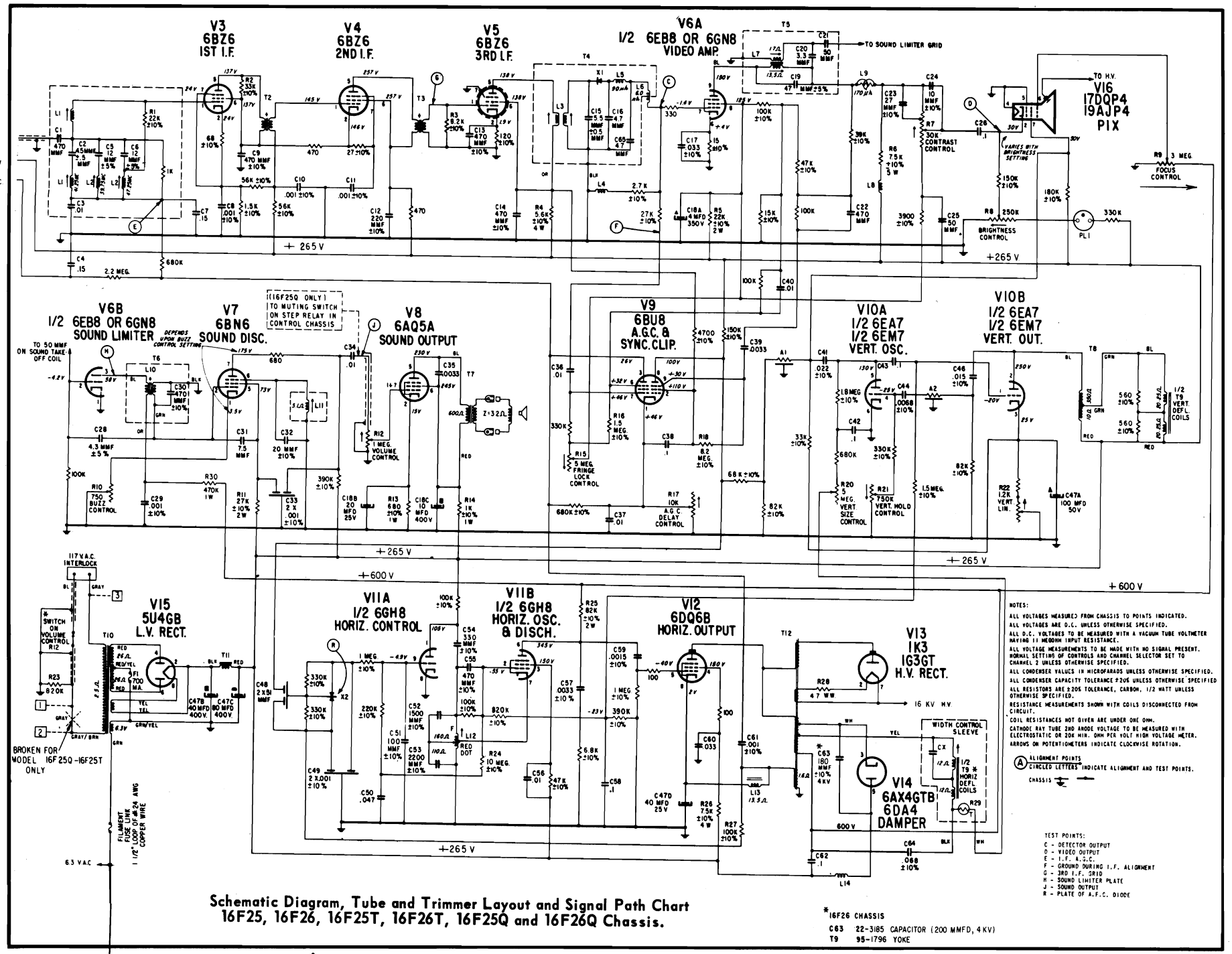
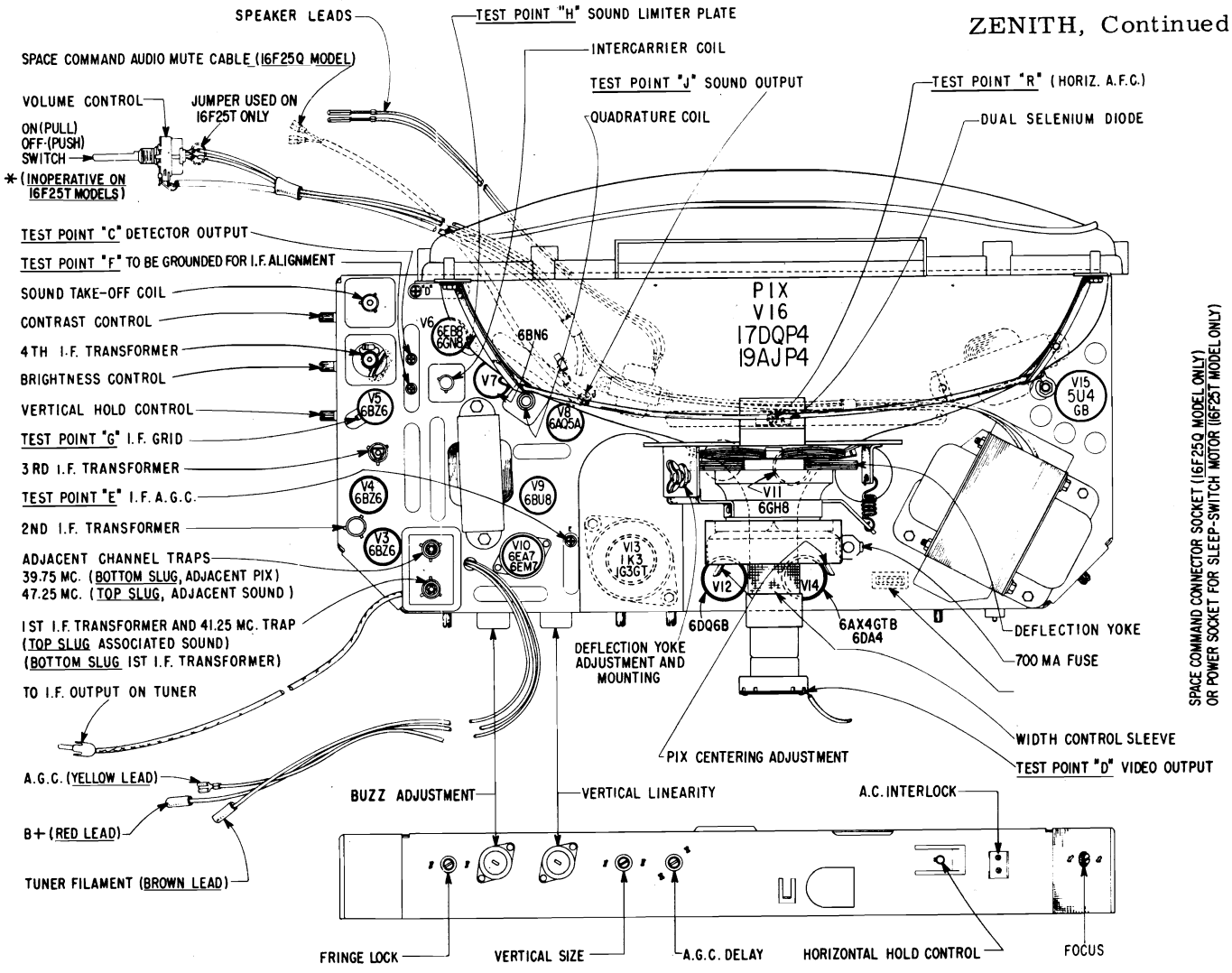


Fig. 9. Overall IF Response 16F25 Chassis Only

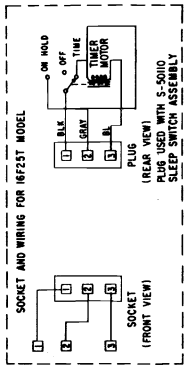


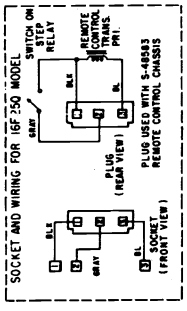
Schematic Diagram, Tube and Trimmer Layout and Signal Path Chart
16F25, 16F26, 16F25T, 16F26T, 16F25Q and 16F26Q Chassis.

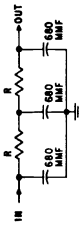
ZENITH, Continued



* TIMER SWITCH AND MOTOR USED ON 16F25T CHASSIS ONLY

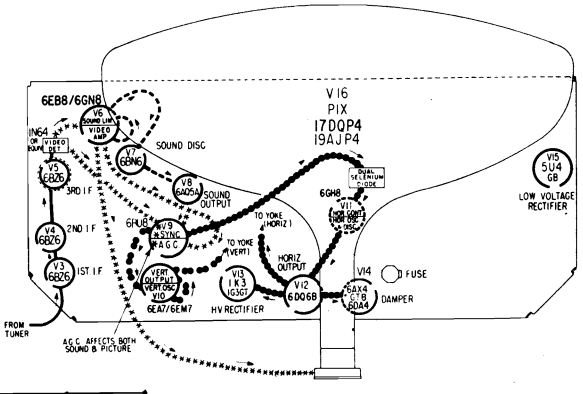


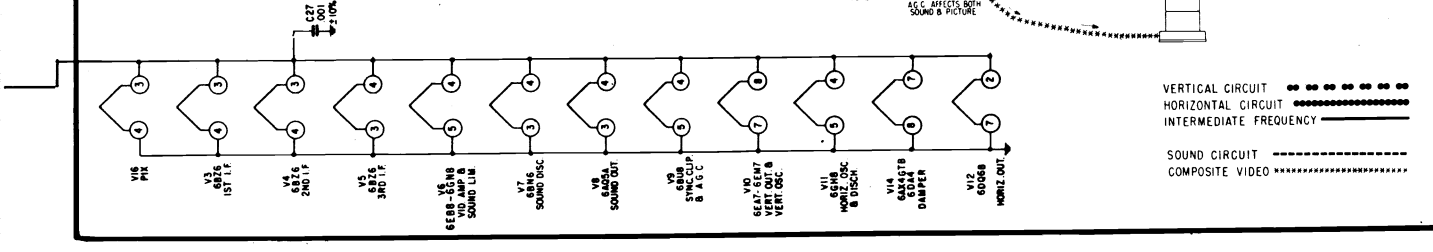


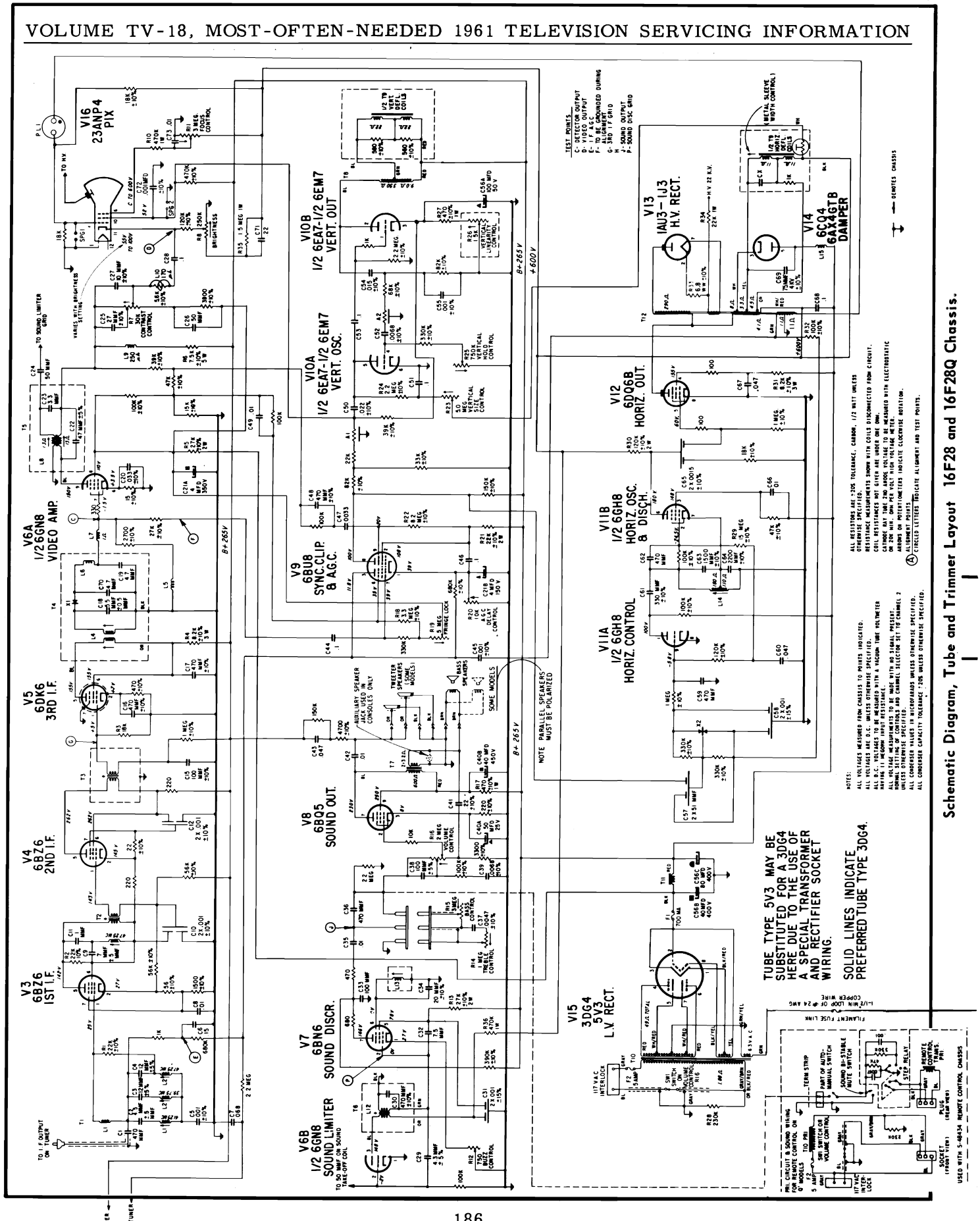


EQUIVALENT CIRCUIT A-1 and A-2 INTEGRATORS

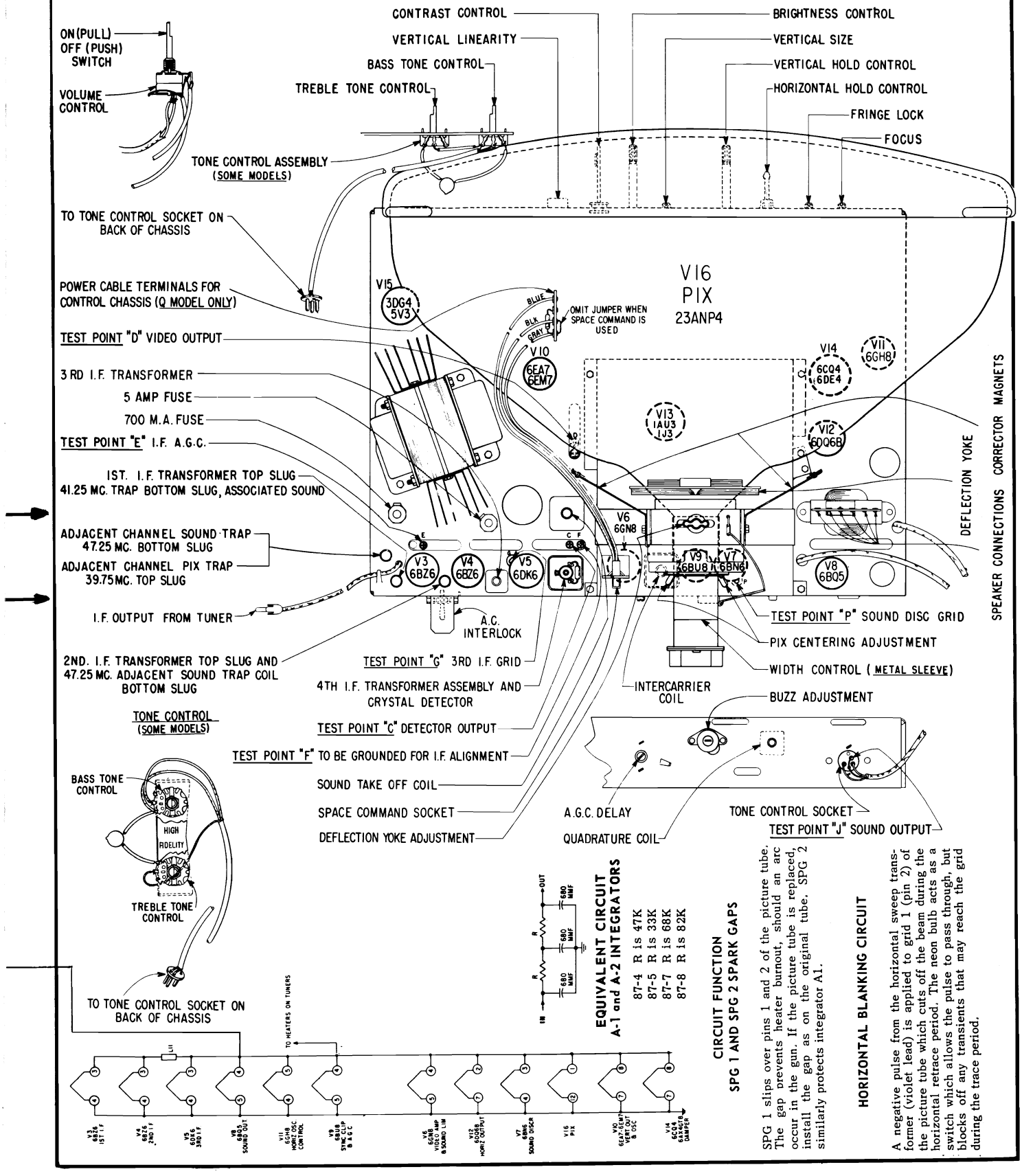
87-7 R is 68K
87-8 R is 82K






V16 23ANP4 PIX
V10B 1/2 6EA7-1/2 6EM7 VERT. OUT
V10A 1/2 6EA7-1/2 6EM7 VERT. OSC.
V13 1AU3-1U3 H.V. RECT.
V14 6CQ4 6AX4GTB DAMPER
V12 6DQ6B HORIZ. OUT.
V11B 1/2 6GH8 HORIZ. OSC. & DISCH.
V11A 1/2 6GH8 HORIZ. CONTROL
V6A 1/2 6GN8 VIDEO AMP.
V5 6DK6 3RD I.F.
V4 6BZ6 2ND I.F.
V3 6BZ6 1ST I.F.
V9 6BU8 SYNC. CLIP. & A.G.C.
V8 6BQ5 SOUND OUT.
V7 6BN6 SOUND DISCR.
V6B 1/2 6GN8 SOUND LIMITER
V15 3DG4 5V3 L.V. RECT.
TEST POINTS
NOTES:
TUBE TYPE 5V3 MAY BE SUBSTITUTED FOR A 3DG4 HERE DUE TO THE USE OF A SPECIAL TRANSFORMER AND RECTIFIER SOCKET WIRING.
SOLID LINES INDICATE PREFERRED TUBE TYPE 3DG4.
Schematic Diagram, Tube and Trimmer Layout 16F28 and 16F28Q Chassis.

ZENITH Chassis 16F28, 16F28Q, Service Material, Continued



EQUIVALENT CIRCUIT A-1 and A-2 INTEGRATORS

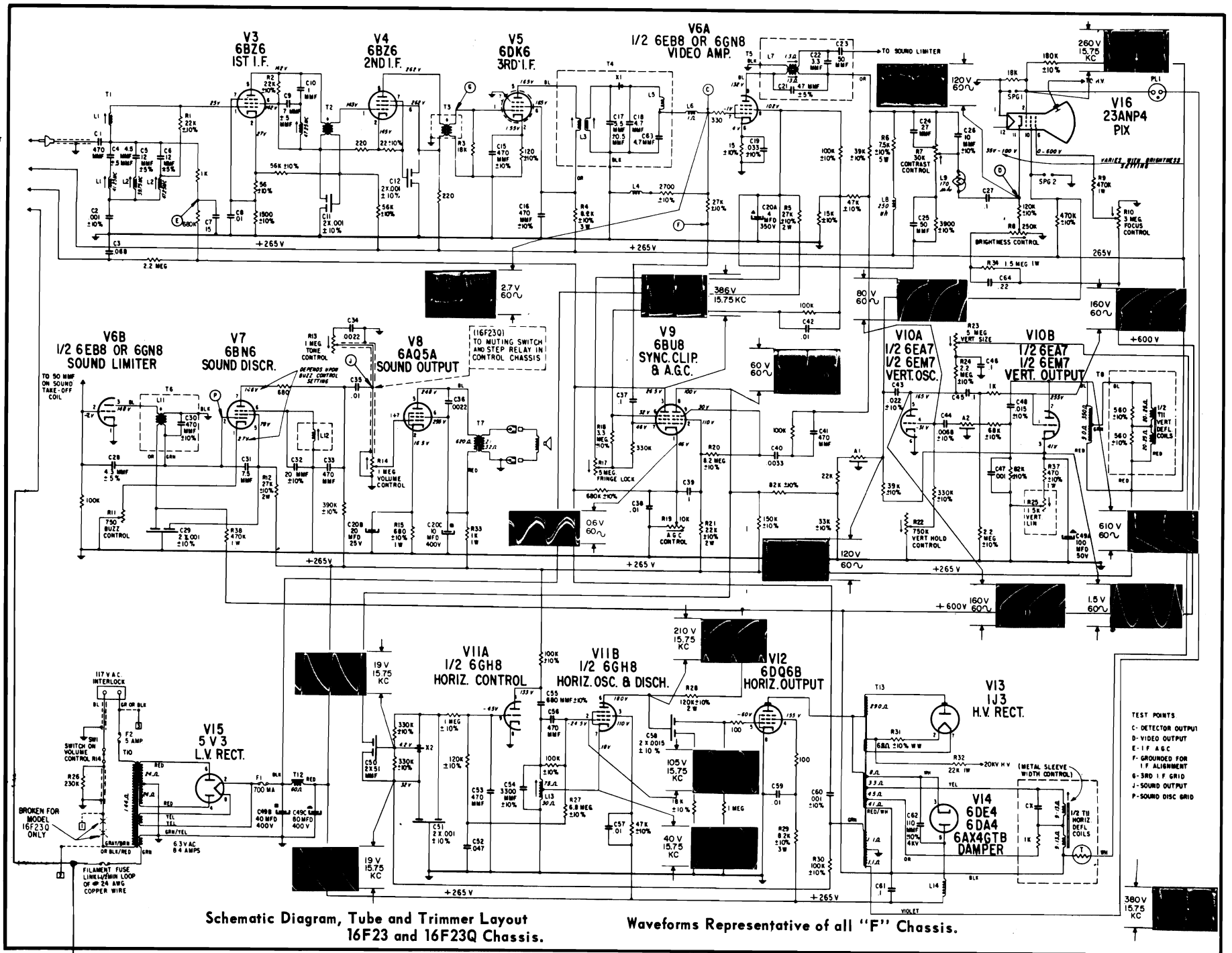
87-4 R is 47K
87-5 R is 33K
87-7 R is 68K
87-8 R is 82K

CIRCUIT FUNCTION SPG 1 AND SPG 2 SPARK GAPS

SPG 1 slips over pins 1 and 2 of the picture tube. The gap prevents heater burnout, should an arc occur in the gun. If the picture tube is replaced, install the gap as on the original tube. SPG 2 similarly protects integrator A1.

HORIZONTAL BLANKING CIRCUIT

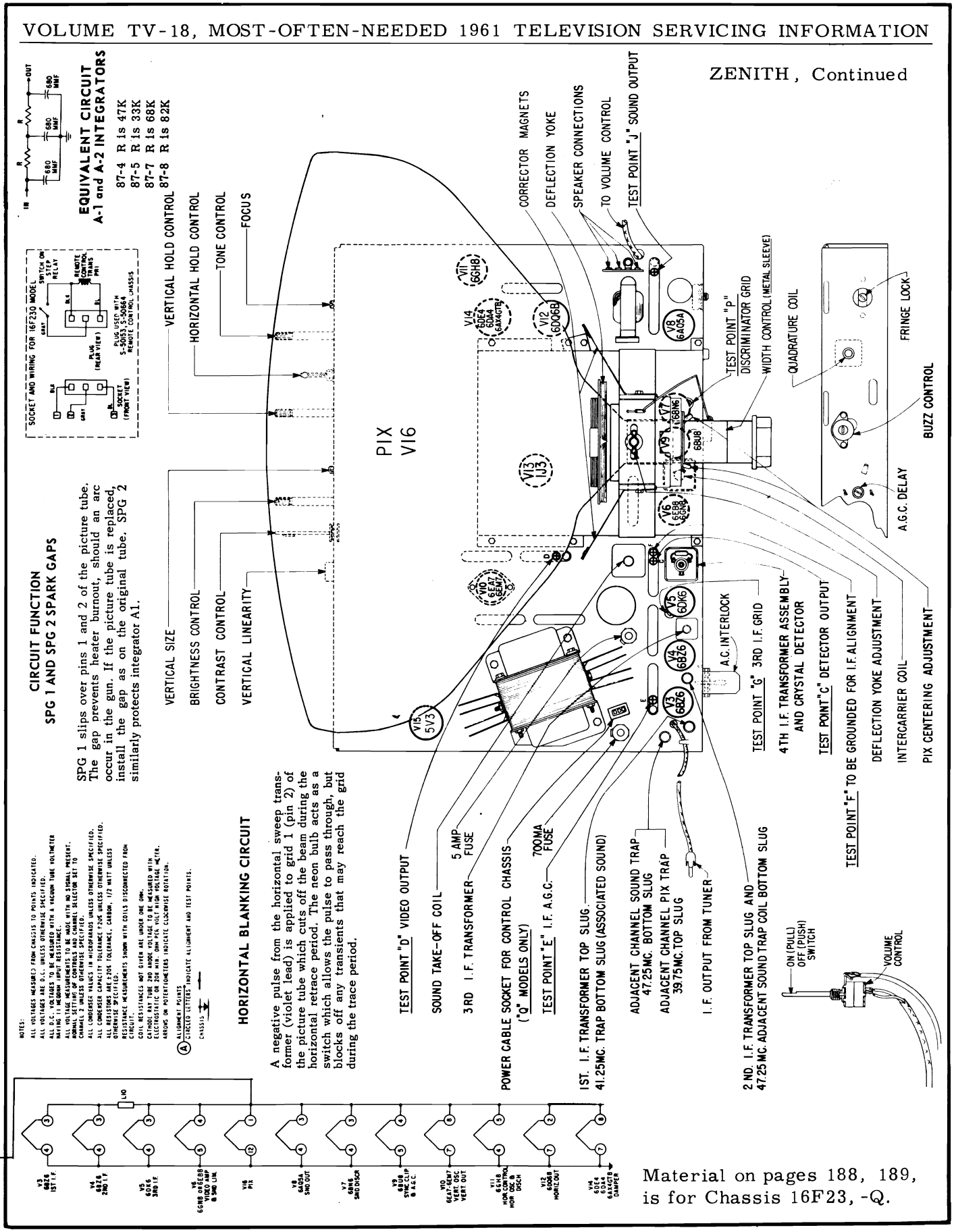
A negative pulse from the horizontal sweep transformer (violet lead) is applied to grid 1 (pin 2) of the picture tube which cuts off the beam during the horizontal retrace period. The neon bulb acts as a switch which allows the pulse to pass through, but blocks off any transients that may reach the grid during the trace period.



Schematic Diagram, Tube and Trimmer Layout 16F23 and 16F23Q Chassis.

Waveforms Representative of all "F" Chassis.

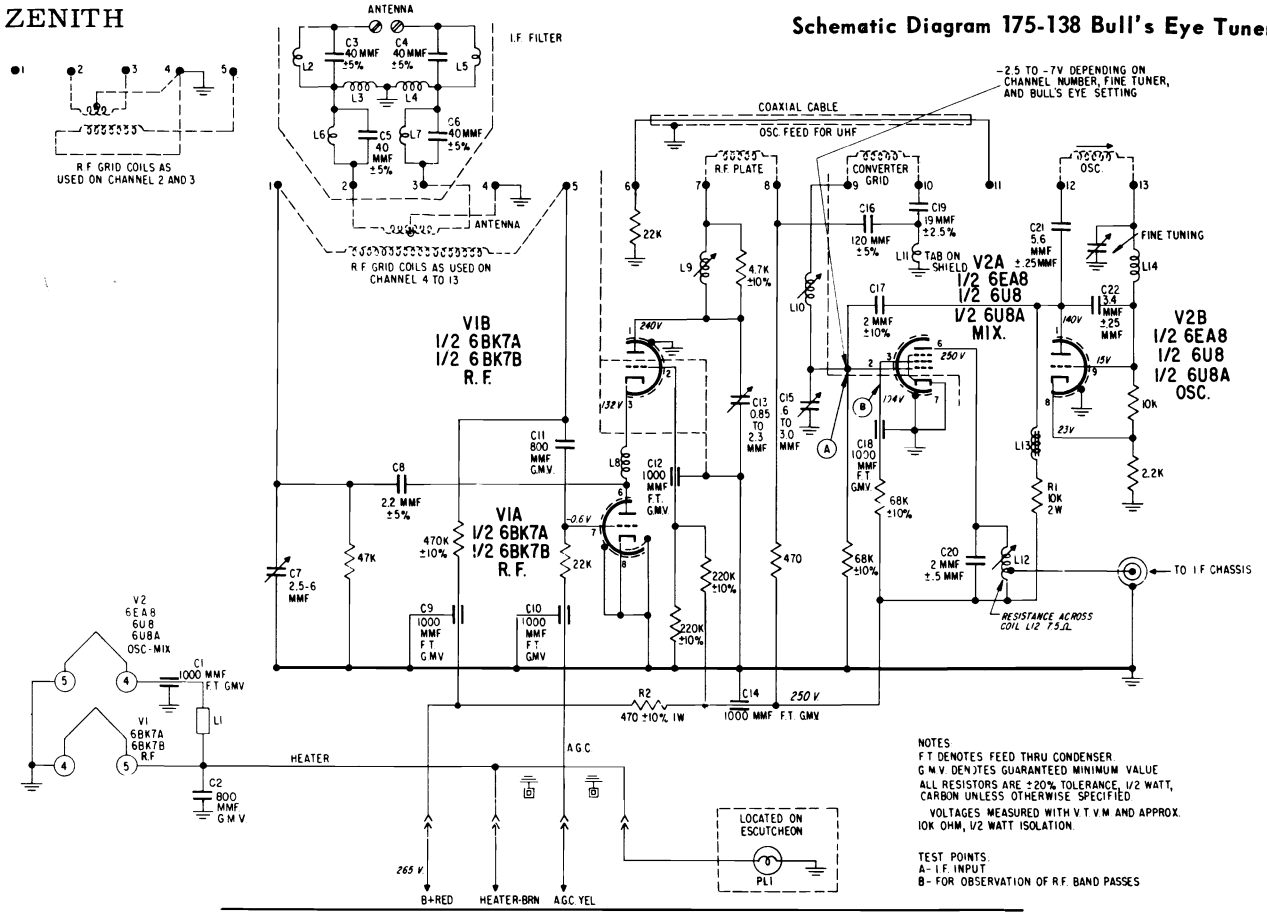
ZENITH, Continued



Material on pages 188, 189, is for Chassis 16F23, -Q.

ZENITH

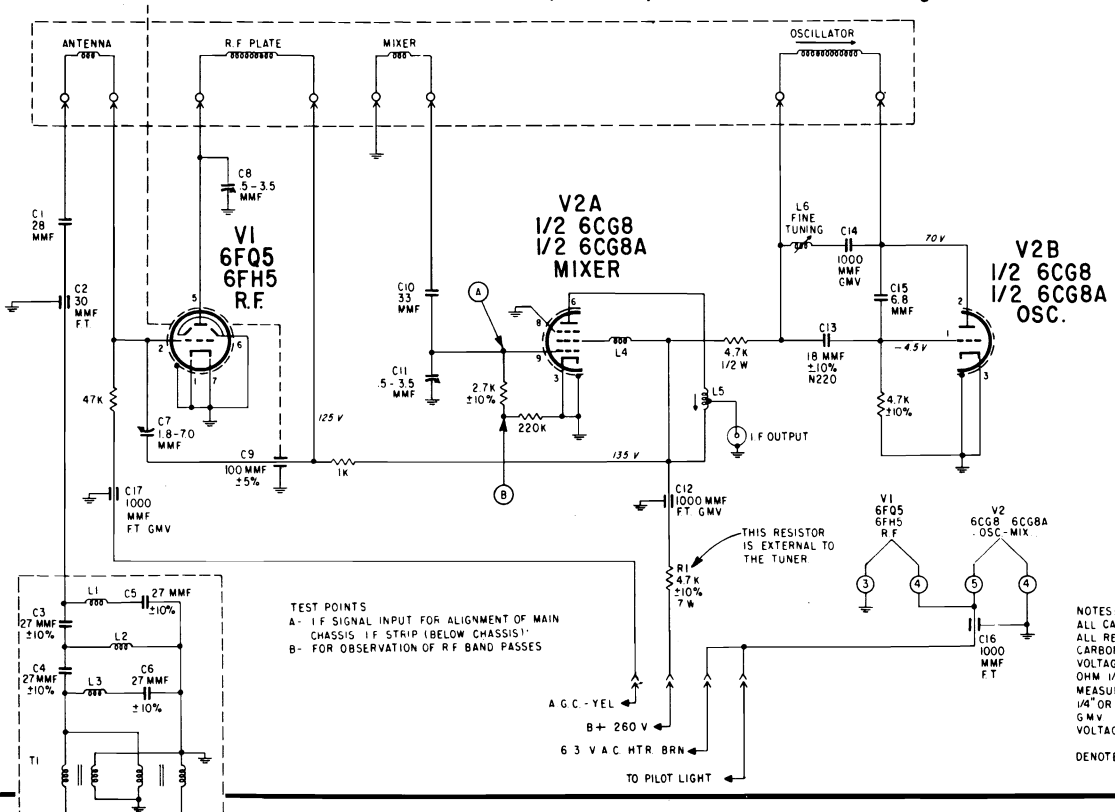
Schematic Diagram 175-138 Bull's Eye Tuner.



NOTES:
F.T. DENOTES FEED THRU CONDENSER.
G.M.V. DENOTES GUARANTEED MINIMUM VALUE.
ALL RESISTORS ARE ±20% TOLERANCE, 1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED.
VOLTAGES MEASURED WITH V.T.V.M. AND APPROX. 10K OHM, 1/2 WATT ISOLATION.

TEST POINTS:
A- I.F. INPUT
B- FOR OBSERVATION OF R.F. BAND PASSES

Schematic Diagram 175-156, 175-158, 175-160 and 175-164 Target Tuner.



TEST POINTS
A- I.F. SIGNAL INPUT FOR ALIGNMENT OF MAIN CHASSIS I.F. STRIP (BELOW CHASSIS)
B- FOR OBSERVATION OF R.F. BAND PASSES

NOTES:
ALL CAPACITORS ARE IN MICRO MICROFARADS
ALL RESISTORS ARE 1/4 WATT, ±20% TOLERANCE, CARBON UNLESS OTHERWISE SPECIFIED
VOLTAGES MEASURED WITH A VTVM AND A 10K OHM 1/2 WATT ISOLATION RESISTOR (LEAD ON MEASURING END OF RESISTOR MUST BE SHORT 1/4" OR LESS)
G.M.V. DENOTES GUARANTEED MINIMUM VALUE
VOLTAGES MEASURED WITH NO SIGNAL ON CH #4

DENOTES CHASSIS

AFC ADJUSTMENT

The horizontal hold control is equipped with a stop which limits knob rotation to approximately 270 degrees. To adjust the AFC, remove the knob and turn the shaft to a position where it is virtually impossible to disrupt horizontal synchronization when switching from channel to channel. After adjustment, install the knob with its pointer centered between the stops.

INDEX

Under each manufacturer's name, at left there are listed that make chassis and models in numerical order. The corresponding page number at right of each listing refers to the first page of the section dealing with such material.

(Index continued on page 192)

INDEX Continued

Another

Supreme Publications

Service Manual