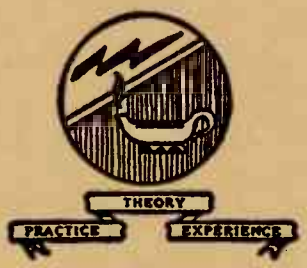
ADDITIONAL

1962

VOLUME TV-20

Television

Servicing Information



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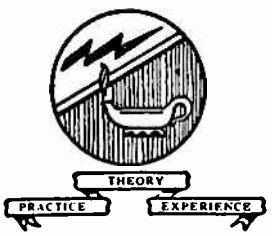

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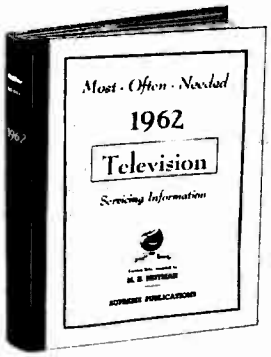

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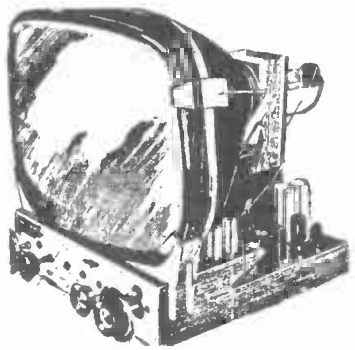

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ADMIRAL®

19E8B, 19UE8B 19G8B, 19UG8B 19J8B, 19UJ8B

MODEL CHART	
Model	Chassis
C341	19J8B
CU341	19UJ8B
C342	19J8B
CU342	19UJ8B
C343	19J8B
CU343	19UJ8B
C351	19J8B
CU351	19UJ8B
C352	19J8B
CU352	19UJ8B
C353	19J8B
CU353	19UJ8B
C360	19J8B
CU360	19UJ8B
C361	19J8B
CU361	19UJ8B
C362	19J8B
CU362	19UJ8B
C369	19J8B
CU369	19UJ8B
T320	19G8B
TU320	19UG8B
T321	19G8B
TU321	19UG8B
T322	19G8B
TU322	19UG8B
T323	19G8B
TU323	19UG8B
L301	19E8B
LU301	19UE8B
L302	19E8B
LU302	19UE8B
L303	19E8B
LU303	19UE8B
L309	19E8B
LU309	19UE8B
L321	19E8B
LU321	19UE8B
L322	19E8B
LU322	19UE8B
L323	19E8B
LU323	19UE8B
L3111	19E8B
LU3111	19UE8B
L3112	19E8B
LU3112	19UE8B
L3122	19E8B
LU3122	19UE8B
L3129	19E8B
LU3129	19UE8B

Model	Chassis
C341G1	19J8B
C341G11	19J8B
CU341G1	19UJ8B
CU341G11	19UJ8B
C342G2	19J8B
C342G12	19J8B
CU342G2	19UJ8B
CU342G12	19UJ8B
C343G3	19J8B
C343G13	19J8B
CU343G3	19UJ8B
CU343G13	19UJ8B

19F8B, 19UF8B 8H2, 8H2A AM-FM RADIO

Model Identification	
Model	Chassis
STF391	19F8B
STF391A	19F8B
STFU391	19UF8B
STFU391A	19UF8B
STF392	19F8B
STF392A	19F8B
STFU392	19UF8B
STFU392A	19UF8B
STF393	19F8B
STF393A	19F8B
STFU393	19UF8B
STFU393A	19UF8B
STF3109	19F8B
STF3109A	19F8B
STFU3109	19UF8B
STFU3109A	19UF8B
STF3111	19F8B
STF3111A	19F8B
STFU3111	19UF8B
STFU3111A	19UF8B

* Models with suffix letter "A" use 8H2A AM-FM Stereo Radio.

CHANNEL ADJUSTMENT FOR VHF ONLY SETS

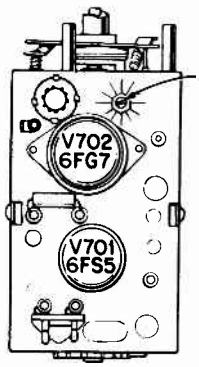
These sets are provided with an over-all channel adjustment screw, see illustration. Adjust as follows:

1. Remove cabinet back. Connect antenna and interlock line cord. Turn set on and allow 15 minutes for warm up.

2. Set Channel Selector at highest channel to be adjusted. Set Fine Tuning control at center of tuning range, by rotating it one third turn clockwise from full counter-clockwise rotation. Set other tuning controls for normal picture and sound.

3. Using a non-metallic alignment tool with metal tip blade, carefully adjust overall oscillator trimmer for best picture. Note: Sound may not be loudest at this point.

4. Check adjustment on lower channels to be sure that good picture and sound can be tuned within range of the Fine Tuning control. If good picture and sound are not tunable on a lower channel, touch-up adjustment of the over-all channel screw may be made on the lower channel, as a compromise adjustment to favor all channels.



Channel Adjustments Location for VHF Only Sets.

CHANNEL ADJUSTMENT FOR VHF-UHF SETS

These sets are provided with a channel adjustment screw for each channel, see illustration. Adjust as follows:

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

2. Set Channel Selector at channel to be adjusted. Set Fine Tuning control at center of tuning range, by rotating it one third turn clockwise from full counter-clockwise rotation. Set other tuning controls for normal picture and sound.

3. Remove Channel Selector and Fine Tuning knobs.

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

WIDTH ADJUSTMENT

Width adjustment is made at the factory and generally will not require field adjustment. Adjust as follows:

1. Turn receiver on. Allow a few minutes for warm up.

2. Tune in channel with normal picture. Set brightness and contrast controls to maximum (fully clockwise).

3. Loosen screw on yoke retaining spring. While holding rear of yoke (for preventing tilt), slide width sleeve in or out of yoke coil for obtaining full picture width, plus a slight amount of overscan. Width sleeve should be at top of tube neck.

4. After adjusting width, be sure yoke is seated against bell of picture tube. Check picture tilt. Tighten yoke screw.

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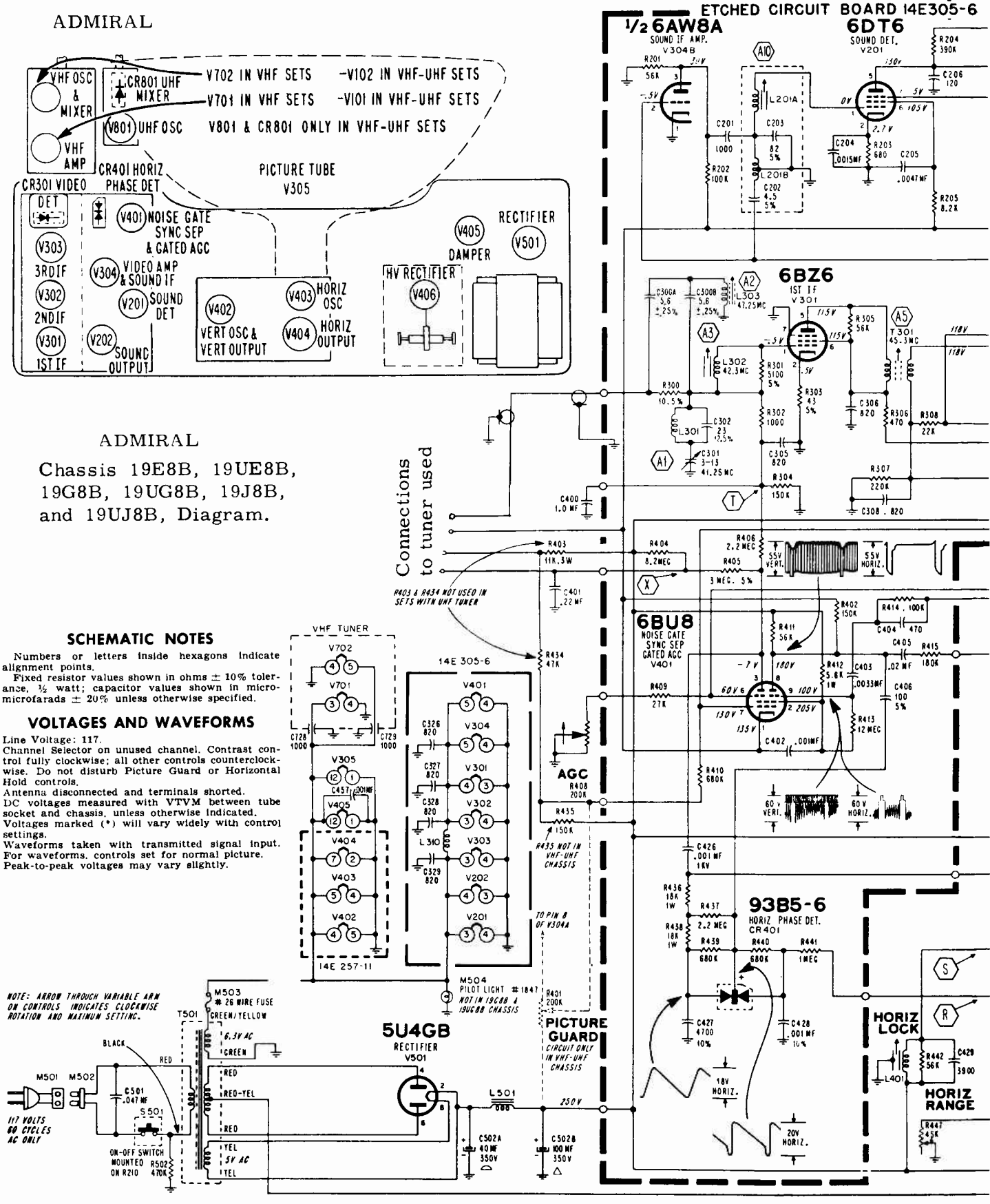
Chassis 19E8B, 19UE8B, 19G8B, 19UG8B, 19J8B, and 19UJ8B, Diagram.



SCHEMATIC NOTES

Numbers or 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.

VOLTAGES AND WAVEFORMS

Line Voltage: 117.

Channel Selector on unused channel. Contrast control fully clockwise; all other controls counterclockwise. Do not disturb Picture Guard or Horizontal Hold controls.

Antenna disconnected and terminals shorted.

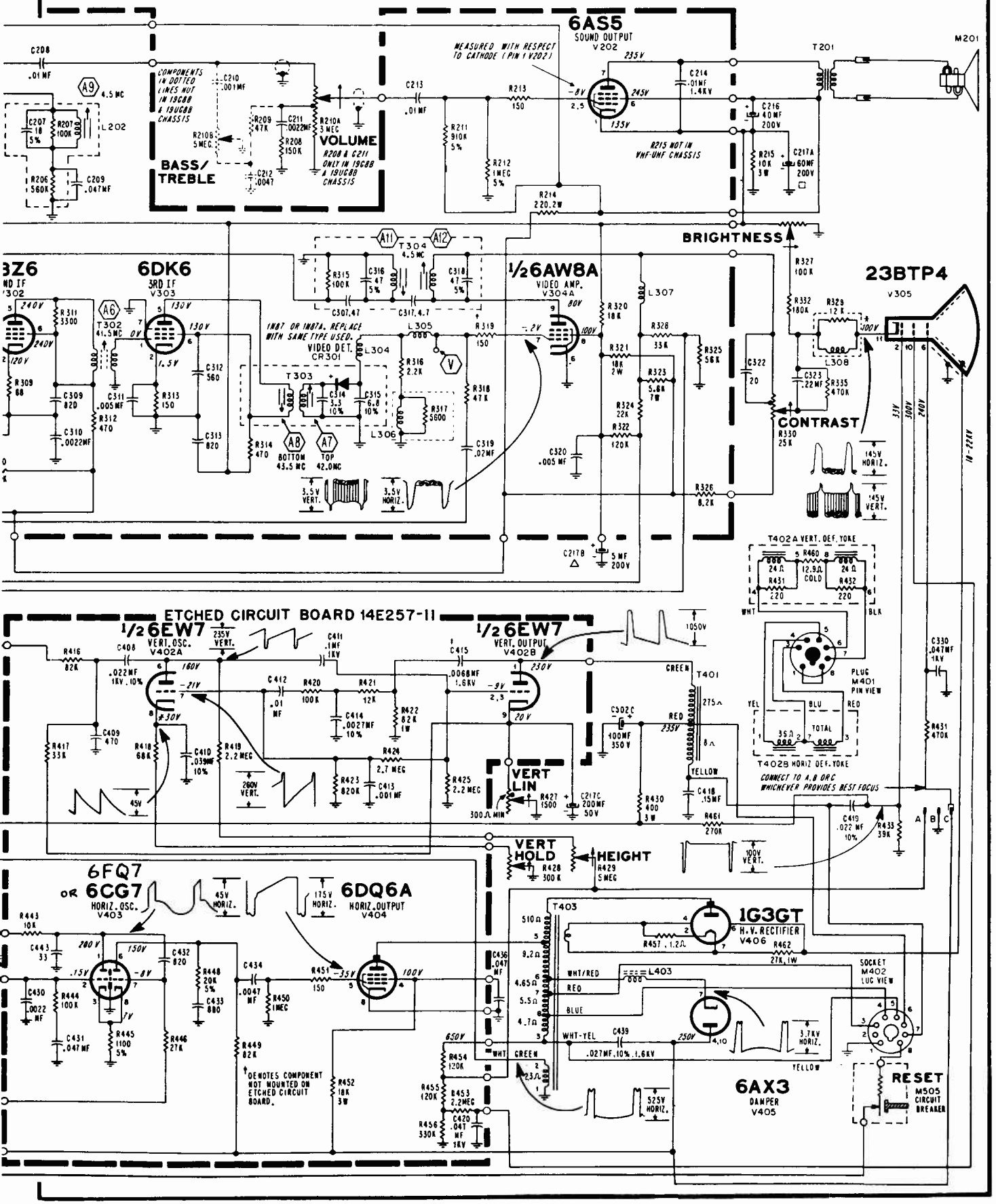
DC voltages measured with VTVM between tube socket and chassis, unless otherwise indicated.

Voltages marked (*) will vary widely with control settings.

Waveforms taken with transmitted signal input. For waveforms, controls set for normal picture.

Peak-to-peak voltages may vary slightly.

VOLUME TV-20, ADDITIONAL 1962 TELEVISION SERVICING INFORMATION



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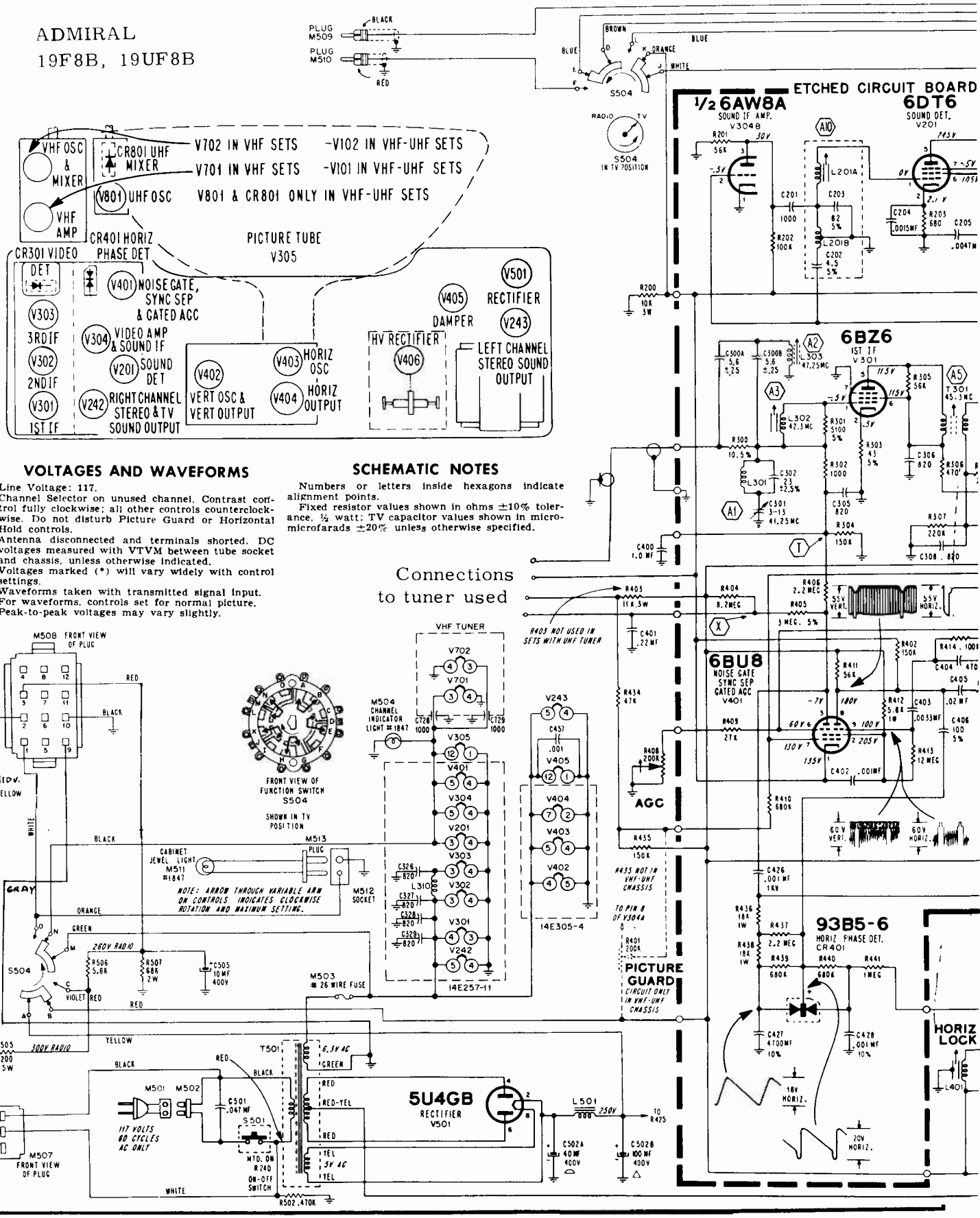
19F8B, 19UF8B

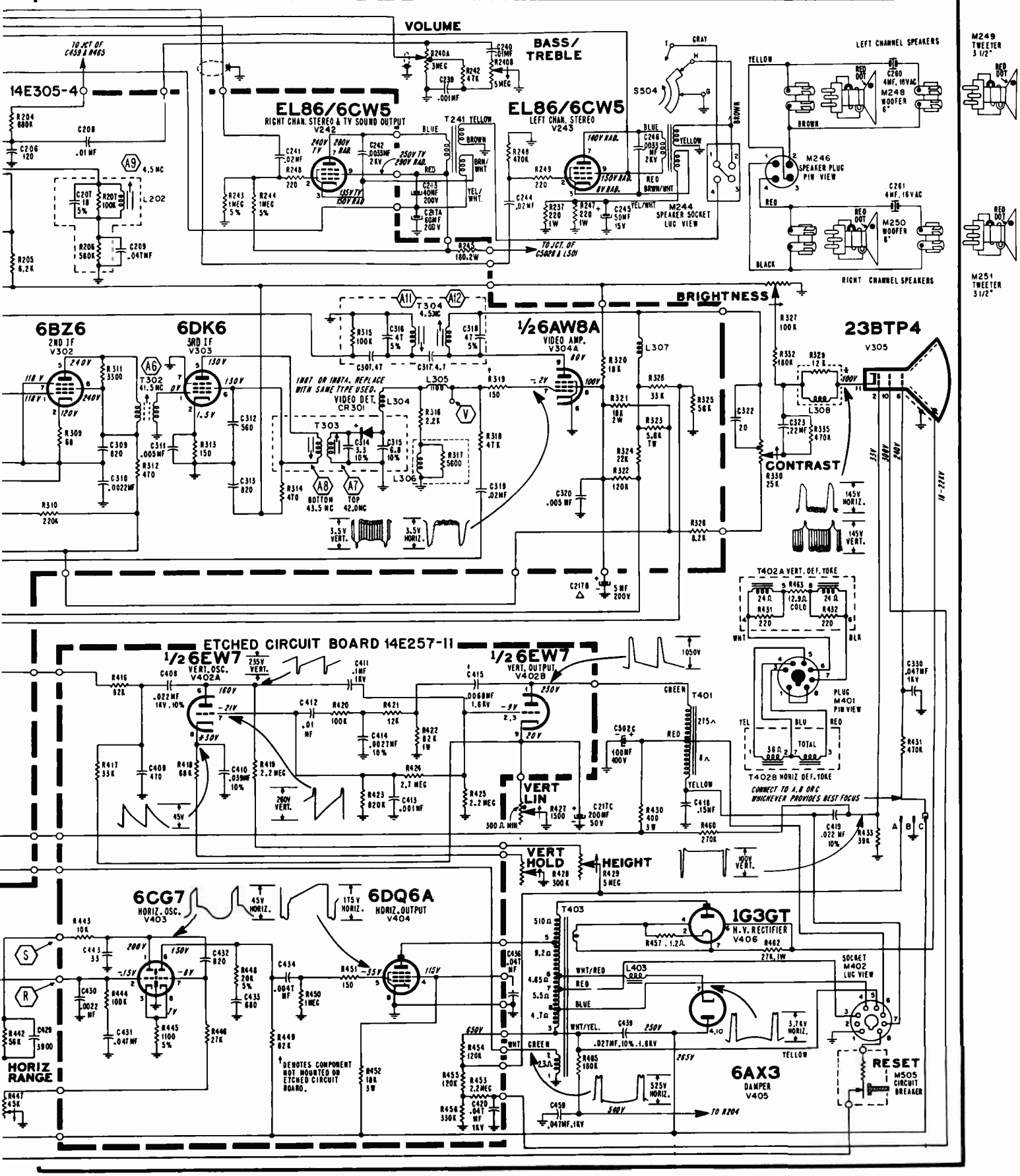


VOLTAGES AND WAVEFORMS

Line Voltage: 117.
Channel Selector on unused channel. Contrast control fully clockwise; all other controls counterclockwise. Do not disturb Picture Guard or Horizontal Hold controls.
Antenna disconnected and terminals shorted. DC voltages measured with VTVM between tube socket and chassis, unless otherwise indicated.
Voltages marked (*) will vary widely with control settings.
Waveforms taken with transmitted signal input. For waveforms, controls set for normal picture. Peak-to-peak voltages may vary slightly.

SCHEMATIC NOTES

Numbers or letters inside hexagons indicate alignment points.
Fixed resistor values shown in ohms ±10% tolerance, ½ watt; TV capacitor values shown in micromicrofarads ±20% unless otherwise specified.


VOLUME
BASS/ TREBLE
14E305-4
EL86/6CW5
RIGHT CHAN. STEREO & TV SOUND OUTPUT
V242
EL86/6CW5
LEFT CHAN. STEREO
V243
S504
LEFT CHANNEL SPEAKERS
M249 TWEETER 3 1/2"
M248 WOOFER 6"
M246 SPEAKER PLUG PIN VIEW
M244 SPEAKER SOCKET LUG VIEW
M250 WOOFER 6"
M251 TWEETER 3 1/2"
RIGHT CHANNEL SPEAKERS
BRIGHTNESS
6BZ6
2ND IF
V302
6DK6
3RD IF
V303
1/26AW8A
VIDEO AMP.
V304A
23BTP4
V305
VIDEO DET.
CR301
CONTRAST
R330 25K
T402A VERT. DEF. YOKE
T402B HORIZ DEF. YOKE
PLUG M401 PIN VIEW
CONNECT TO A, B OR C WHICHEVER PROVIDES BEST FOCUS
ETCHED CIRCUIT BOARD 14E257-11
1/26EW7
VERT. OSC.
V402A
1/26EW7
VERT. OUTPUT
V402B
VERT LIN
VERT HOLD
R428 300K
HEIGHT
R429 5 MEG
6CG7
HORIZ. OSC.
V403
6DQ6A
HORIZ. OUTPUT
V404
1G3GT
H.V. RECTIFIER
V406
6AX3
DAMPER
V405
HORIZ RANGE
RESET
M505 CIRCUIT BREAKER
SOCKET M402 LUG VIEW
DENOTES COMPONENT NOT MOUNTED ON ETCHED CIRCUIT BOARD.
TO R204
TO JCT. OF C502B & L501
10 JCT OF C459 & R465

ADMIRAL Chassis 19E8B, 19F8B, etc., Alignment Information, Continued

IF AMPLIFIER ALIGNMENT

Connect negative of 3 volt bias supply to test point "T" (IF AGC) and "X" (RF AGC), positive to chassis.

Connect signal generator high side to test point "W", low side directly to tuner.

Connect VTVM high side to test point "V" through a decoupling filter, see figure A. Connect low side to chassis.

Set Channel Selector to channel 12. Connect jumper wire across antenna terminals. For VHF-UHF chassis, set Picture Guard control fully to left.

Allow about 15 minutes for receiver and test equipment to warm up. Use a non-metallic alignment tool, part no. 98A30-12.

Important: Before proceeding check signal generator against frequency standard for calibration.

*1. Set generator at 41.25 MC and adjust A1 for minimum.

*2. Set generator at 47.25 MC and adjust A2 for minimum.

†3. Set generator at 42.3 MC and adjust A3 for maximum.

†4. Set generator at 45.3 MC and adjust A4 and A5 for maximum.

†5. Set generator at 41.5 MC and adjust A6 for mixiumum.

†6. Set generator at 42.0 MC and adjust A7 for maximum.

†7. Set generator at 43.5 MC and adjust A8 for maximum.

8. To insure correct IF alignment, make "IF Response Curve Check" given below.

* If necessary, increase generator output and/or reduce bias to —1½ volts to obtain a definite indication on VTVM.

† Use —3 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 2 volts.

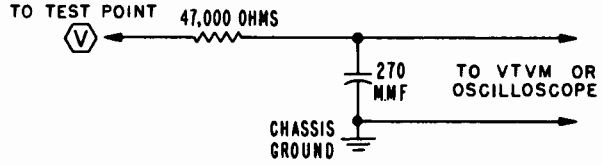


Figure A. Decoupling Filter.

IF RESPONSE CURVE CHECK AND IF TRAP ALIGNMENT

1. Allow about 15 minutes for receiver and test equipment warm up.

2. Set VHF tuner on channel 12. For VHF-UHF chassis, set Picture Guard control fully to left. Connect negative of 3 volt bias supply to test points "T" (IF AGC) and "X" (RF AGC), positive to chassis ground. See figure B.

3. Connect sweep generator high side to test point "W", low side directly to tuner. Set sweep frequency to 43 MC, sweep width approximately 7MC. If external marker generator is used, loosely couple high side to sweep generator lead, low side directly to tuner. Marker frequencies indicated on IF Response Curve.

4. Connect oscilloscope high side to test point "V" through a decoupling filter (figure A), low side to chassis.

5. Check curve obtained against ideal response curve, figure C. Keep marker and sweep outputs at very minimum to prevent over-loading. A reduction in sweep output should reduce curve amplitude without altering the shape of the response curve.

If curve is not within tolerance or markers not in proper location on curve, adjust A5 to position 45.75 MC Video Marker. Adjust A8 to position 43.5 MC marker and correct shape of curve.

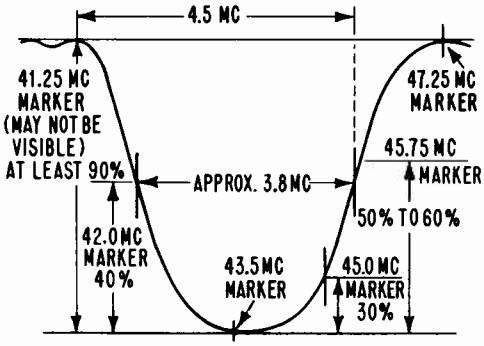
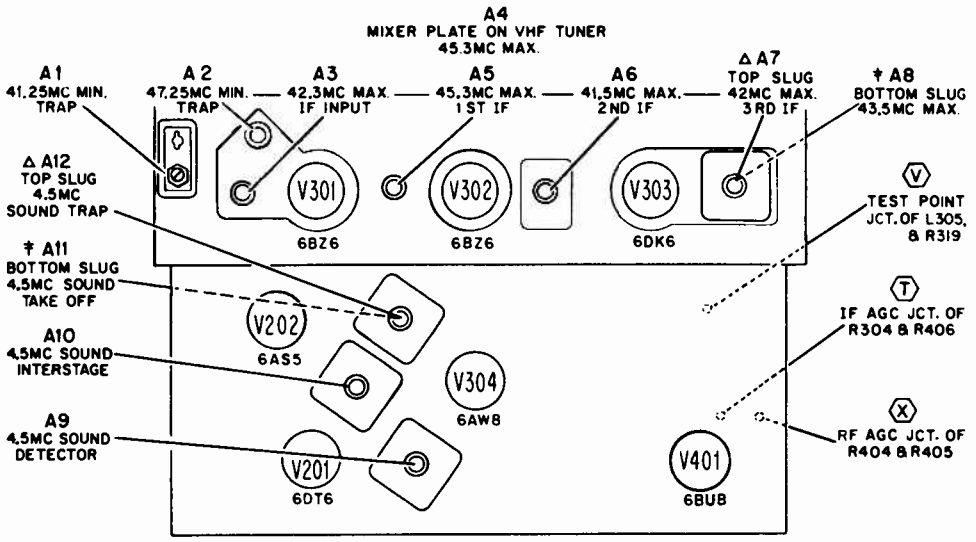


Figure C. Ideal IF Response Curve.



† *SLUG NEAREST TO ETCHED CIRCUIT BOARD*
Δ *SLUG FARTHEST FROM ETCHED CIRCUIT BOARD*

Figure B. View of Etched Circuit Board Showing Test Point Locations and IF Alignment Data.

ADMIRAL Chassis 19E8B, 19F8B, etc., Servicing Information, Continued

4.5 MC SOUND IF ALIGNMENT

1. Tune in normal picture on strongest TV station. Allow about 15 minutes for set to warm up. See figure B for adjustment locations.

*2. Using non-metallic alignment tool (part no. 98A30-12), slowly turn slug A9 several turns to left until a buzz is heard in sound. Then slowly turn slug A9 to the right for loudest and clearest sound. NOTE: There may be two points (approx. ½ turn apart) at which sound is loudest. The slug should be set at center of second point of loudest sound noted as slug is turned in (toward etched circuit board).

3. Reduce signal to antenna terminals until there is considerable hiss in sound. For best results, use a step attenuator, connected between antenna and antenna terminals. Signal can also be reduced by disconnecting antenna and placing it close to antenna terminals or leads.

4. Carefully adjust slug A10 for loudest and clearest sound with minimum hiss. If hiss disappears during alignment, reduce signal to maintain hiss level. Readjust slug A10. Note: Slug A10 should be at end of coil nearest etched circuit board.

5. Carefully adjust slug A11 for loudest and clearest sound with minimum hiss. If hiss disappears during alignment, reduce signal to maintain hiss level. Readjust slug A11. Caution: Slug A11 is bottom slug (adjustment nearest etched circuit board). Use care so as not to disturb top slug (adjustment farthest from etched circuit board).

6. If above alignment is correctly made, no further adjustment is 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.

ALIGNMENT OF 4.5 MC TRAP

Alignment of 4.5 MC (beat interference) trap "A12" requires use of a hexagonal non-metallic alignment tool (part number 98A30-12).

To align 4.5 MC trap "A12", tune in television station with beat interference pattern in picture. While closely observing picture, adjust slug "A12" for minimum interference pattern.

Note that adjustment "A12" is top slug (slug farthest from etched circuit board). Use caution so as not to disturb bottom slug (slug nearest etched circuit board) as sound IF alignment will be affected.

AGC CONTROL ADJUSTMENT

Improper AGC control adjustment can result in picture bending, tearing (overloading) or buzz in the sound. However, these same conditions can also be caused by other troubles in the set. Adjust as instructed below:

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

2. Turn Channel Selector to strongest station in the area.

3. Turn Contrast and Brightness controls to maximum (fully to right).

4. Very slowly turn AGC control to the left, just to the point where picture is weak (loses contrast).

5. Adjust Horizontal Lock (at rear of set) and Vertical Hold control (at side of set) for steady picture, without bending of vertical lines at top of picture.

6. Very slowly turn AGC control to the right, until picture just begins to bend, tear, shift, or buzz is heard in sound. Then very slowly turn the AGC control to the left, to the point at which picture bending, tearing, shifting and buzz is removed.

7. Make final adjustment by turning AGC control approximately 10 degrees further to the left.

8. Recheck 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.

PICTURE GUARD ADJUSTMENT

(Adjustment only in VHF-UHF sets.)

The Picture Guard control cannot be set properly if the Horizontal Lock, Vertical Hold or AGC controls are out of adjustment. Before attempting to adjust the AGC control, see information under "AGC Control Adjustment".

The Picture Guard control is used to improve sync stability in areas (especially fringe areas) where interference caused by ignition systems, switches, motors, etc, results in an unstable picture. NOTE: This control has been adjusted at the factory. It should only be turned from its original position if picture is unstable (jitters or loses sync) due to noise.

To adjust, turn Picture Guard control (at rear of set) to the right until picture becomes stable. A compromise setting of the control may be required in areas having both strong and weak signals. If the control is set too far right, picture may overload on strong signals.

IMPORTANT: Keep Picture Guard control as far to the left as possible while still maintaining good sync stability on all channels. If control is turned too far to the right in a strong signal area, picture instability may result.

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 AGC control has been adjusted according to instructions in this manual.

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.

IMPORTANT: If adjustment cannot be made using the Horizontal Lock control, it will be necessary to make Horizontal Range adjustment as instructed below.

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. Adjust as follows:

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.

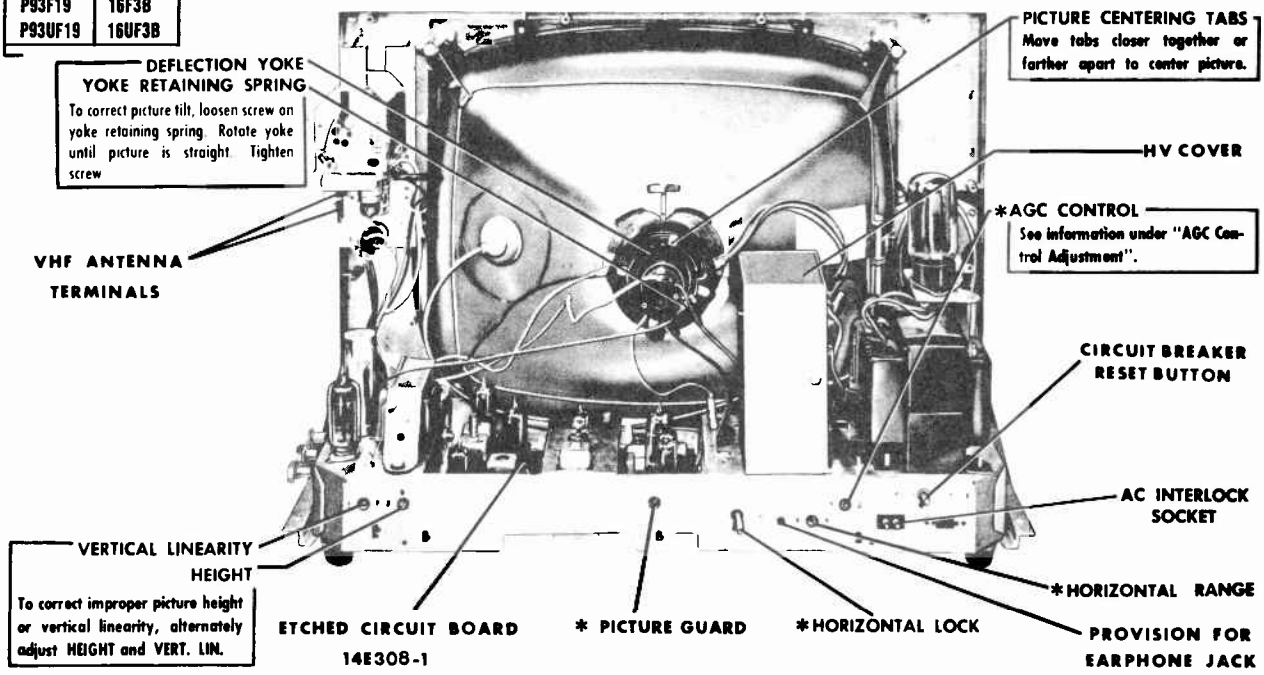
7. Remove wire short from test point "R" (pin 2 of V403, 6CG7).

8. Set Channel Selector to weakest station. Switch Channel Selector on and off channel, picture should remain in horizontal sync.

ADMIRAL

Model	Chassis
T93F10	16F3B
T93UF10	16UF3B
P93F10	16F3B
P93UF10	16UF3B
P93F11	16F3B
P93UF11	16UF3B
P93F16	16F3B
P93UF16	16UF3B
P93F19	16F3B
P93UF19	16UF3B

The material on pages 10 through 14 is exact for Chassis 16F3B, 16UF3B, used in models listed in the chart at left. Chassis 16G3U used in Models PS93G11U and PS93G19U is very similar except for tuner and other minor circuit changes needed to permit remote control operation.



* DETAILED ADJUSTMENT INFORMATION GIVEN ON OTHER PAGES.

Rear View of Chassis Showing Adjustment Locations (UHF Tuner in VHF-UHF Chassis).

CHANNEL ADJUSTMENT FOR VHF ONLY SETS

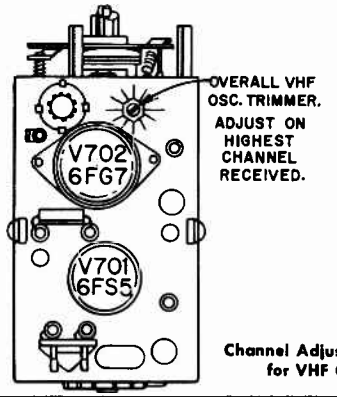
These sets are provided with an over-all channel adjustment screw, see illustration. Adjust as follows:

1. Remove cabinet back. Connect antenna and interlock line cord. Turn set on and allow 15 minutes for warm up.

2. Set Channel Selector at highest channel to be adjusted. Set Fine Tuning control at center of tuning range, by rotating it one third turn clockwise from full counterclockwise rotation. Set other tuning controls for normal picture and sound.

3. Using a non-metallic alignment tool with metal tip blade, carefully adjust channel screw for best picture. Note: Sound may not be loudest at this point.

4. Check adjustment on lower channels to be sure that good picture and sound can be tuned within range of the Fine Tuning control.



Channel Adjustment Location for VHF Only Sets.

CHANNEL ADJUSTMENT FOR VHF-UHF SETS

These sets are provided with a channel adjustment slug for each channel, see illustration. Adjust as follows:

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

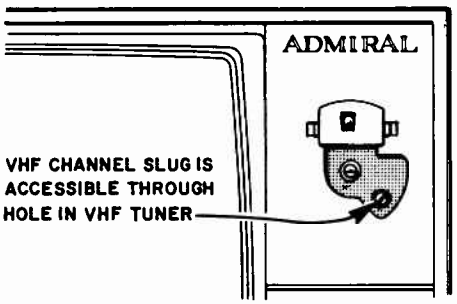
2. Set Channel Selector at channel to be adjusted. Set other tuning controls for normal picture and sound.

3. Remove Channel Selector and Fine Tuning knobs.

4. Turn Fine Tuning shaft to left or right until channel slug is visible through hole in fiber strip at front of VHF tuner.

5. Using a non-metallic alignment tool with 3/32" blade (part number 98B30-22), carefully adjust channel slug for best picture. Note: Sound may not be loudest at this point. Repeat procedure for each channel to be adjusted.

ADMIRAL Chassis 16F3B, 16UF3B, 16G3U, Service Information, Continued



Front View of Escutcheon in VHF-UHF Sets. Channel and Fine Tuning Knobs 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.

Note: This control is set at the factory and will not normally require field readjustment.

Improper AGC control adjustment can result in picture bending, tearing (overloading) or buzz in the sound. However, these same conditions can also be caused by other troubles in the set.

If adjustment is required, it should be made exactly as instructed.

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

2. Turn Channel Selector to strongest station in the area.

3. Turn Contrast and Brightness controls fully to the right.

4. Very slowly turn AGC control to the left, just to the point where picture is weak (loses contrast).

5. Adjust Horizontal Lock (at rear of set) and Vertical Hold control (at side of set) for steady picture, without bending of vertical lines at top of picture.

6. Very slowly turn AGC control to the right, until picture just begins to bend, tear, shift, or buzz is heard in sound. Then very slowly turn the AGC control to the left, to the point at which picture bending, tearing, shifting and buzz is removed.

7. Make final adjustment by turning AGC control approximately 10 degrees to the left.

8. Recheck 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.

PICTURE GUARD ADJUSTMENT

The Picture Guard control cannot be set properly if the Horizontal Lock, Vertical Hold or AGC controls are out of adjustment. Before attempting to adjust the AGC control, see information under "AGC Control Adjustment".

The Picture Guard control is used to improve sync stability in areas (especially fringe areas) where interference caused by ignition systems, switches, motors, etc. results in an unstable picture. NOTE: This control has been adjusted at the factory. It should only be turned from its original position if picture is unstable (jitters or loses sync) due to noise.

To adjust, turn Picture Guard control (at rear of set) to the right until picture becomes stable. A compromise setting of the control may be required in areas having both strong and weak signals. If the control is set too far to the right, picture may overload on strong signals.

IMPORTANT: Keep the Picture Guard control as far to the left as possible while still maintaining good sync stability on all channels. If control is turned too far to the right in a strong signal area, picture instability will result.

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 AGC control has been adjusted according to instructions in this manual.

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.

IMPORTANT: If adjustment cannot be made using the Horizontal Lock control, it will be necessary to make Horizontal Range adjustment as instructed below.

HORIZONTAL RANGE ADJUSTMENT

The Horizontal Range control is set at the factory and seldom requires readjustment. Adjustment need only be made if 6FQ7 or 6CG7 tube (V403) has been replaced and the picture cannot be locked-in with the Horizontal Lock adjustment or if the Horizontal Lock adjustment has insufficient range (adjustment only possible at extreme end rotation).

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. Adjust as follows:

1. Remove cabinet back. Connect interlock 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 in this manual.

3. Using a piece of hook-up wire, short test point "R" (pin 2 of V403, 6FQ7 or 6CG7) to chassis ground.

4. Connect a .22 mf, 400 volt capacitor from test point "S" (junction of horizontal lock coil L401 and resistor R454, 12,000 ohms) to chassis ground. Caution: To avoid B+ shock, turn receiver off when making this connection.

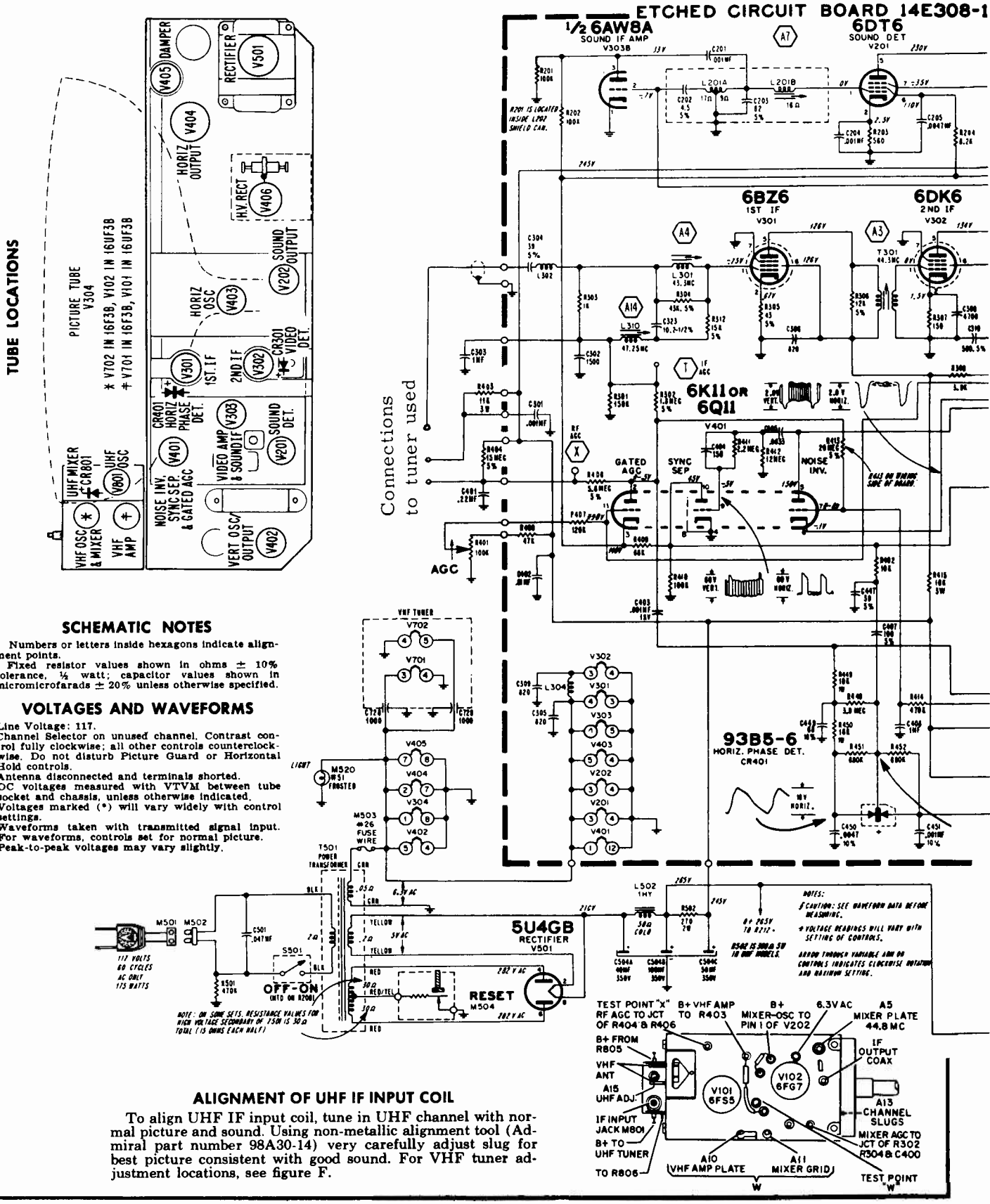
5. With picture in vertical sync, set Horizontal Range control at point where picture is in horizontal sync and almost remains stationary with tendency to shift to left or right.

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, 6FQ7 or 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.

ADMIRAL Chassis 16F3B, 16UF3B, Service Information, Continued



SCHEMATIC NOTES

Numbers or 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.

VOLTAGES AND WAVEFORMS

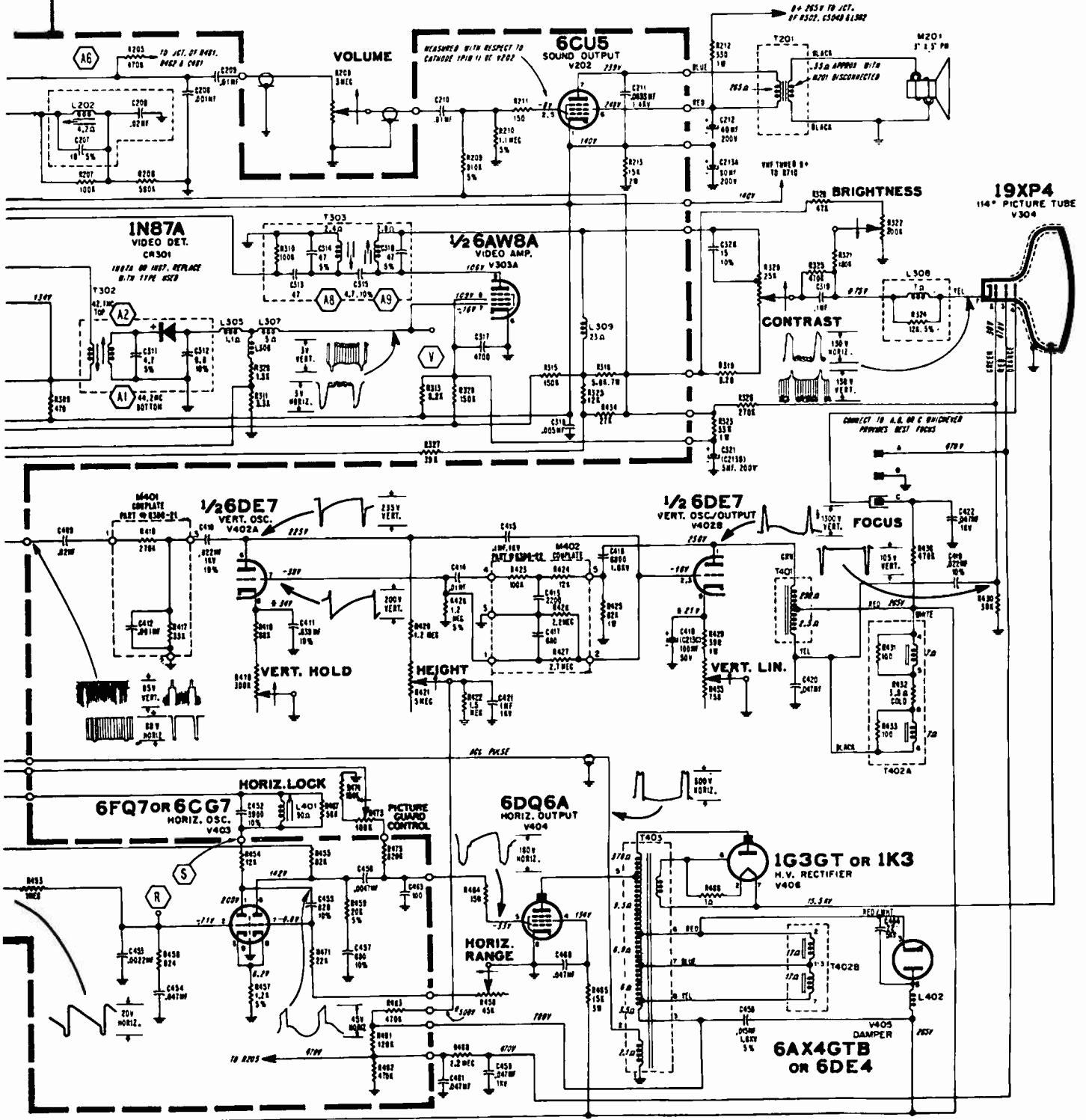
Line Voltage: 117.
Channel Selector on unused channel. Contrast control fully clockwise; all other controls counterclockwise. Do not disturb Picture Guard or Horizontal Hold controls.
Antenna disconnected and terminals shorted.
DC voltages measured with VTVM between tube socket and chassis, unless otherwise indicated.
Voltages marked (*) will vary widely with control settings.
Waveforms taken with transmitted signal input. For waveforms, controls set for normal picture.
Peak-to-peak voltages may vary slightly.

ALIGNMENT OF UHF IF INPUT COIL

To align UHF IF input coil, tune in UHF channel with normal picture and sound. Using non-metallic alignment tool (Admiral part number 98A30-14) very carefully adjust slug for best picture consistent with good sound. For VHF tuner adjustment locations, see figure F.

Figure F. Top View of VHF Tuner 94E200-25.

ADMIRAL Chassis 16F3B, 16UF3B, Schematic Diagram, Continued



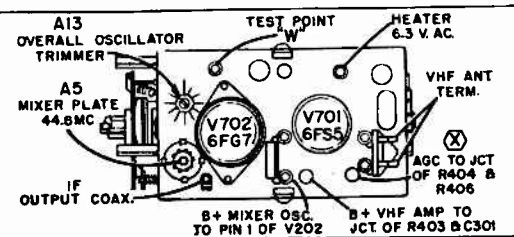


Figure G. Top View of VHF Tuner 94E203-6.

ALIGNMENT OF 4.5 MC TRAP

Alignment of 4.5 MC (beat interference) trap A9 requires use of a hexagonal non-metallic alignment tool (part number 98A30-12).

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

Note that adjustment A9 is top slug (slug farthest from etched circuit board).

ADMIRAL Chassis 16F3B, 16UF3B, 16G3U, Alignment Information, Continued

IF AMPLIFIER ALIGNMENT

Connect negative of 3 volt bias supply to test points "T" (IF AGC) and "X" (RF AGC), positive to chassis. Connect negative of 9 volt bias supply to center terminal of picture guard control, positive to chassis. See figure B.

Connect signal generator high side to test point "W", low side directly to tuner.

Connect VTVM high side to test point "V" through a decoupling filter, see figure A. Connect low side to chassis.

Set Channel Selector to channel 12. Connect a jumper wire across the antenna terminals. Set Contrast control fully to the right. Set Picture Guard control fully to the left.

Allow about 15 minutes for receiver and test equipment to warm up. Use a non-metallic alignment tool, part no. 98B30-12.

Important: Before proceeding check signal generator against frequency standard for calibration.

*1. Set generator at 42.7 MC and adjust A2 for maximum.

*2. Set generator at 44.2 MC and adjust A1 for maximum.

†3. Set generator at 44.3 MC and adjust A3 for maximum.

†4. Set generator at 43.3 MC and adjust A4 for maximum.

†5. Set generator at 47.25 MC and adjust A14 for minimum.

6. Place short jumper wire across L301.

†7. Set generator at 44.8 MC and adjust A5 for maximum.

8. Remove short from across L301. Then repeat "Step 4."

9. To insure correct IF alignment, make "IF Response Curve Check" given at right.

* If necessary, increase generator output and/or reduce bias to —1½ volts to obtain a definite indication on VTVM.

† If necessary, keep reducing generator output so that VTVM reading will be 1.5 to 2.5 volts above no signal voltage reading.

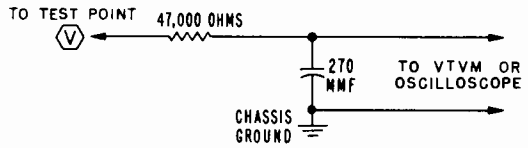


Figure A. Decoupling Filter.

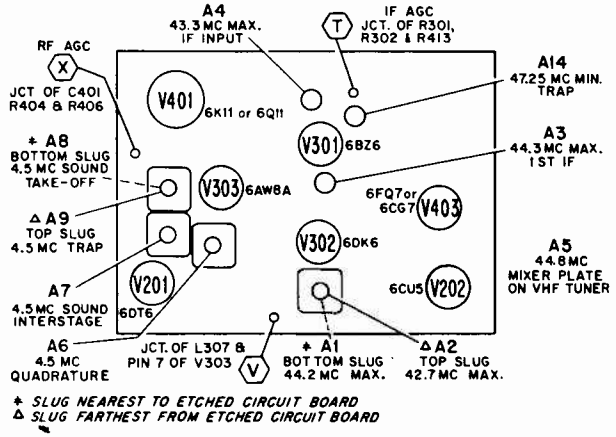


Figure B. View of Etched Circuit Board Showing Test Point Locations and IF Alignment Data.

IF RESPONSE CURVE CHECK AND IF TRAP ALIGNMENT

1. Allow about 15 minutes for receiver and test equipment warm up.

2. Set VHF tuner on channel 12. Contrast control full to left. Connect negative of 3 volt bias supply to test points "T" (IF AGC) and "X" (RF AGC), positive to chassis ground. Connect negative of 9 volt bias supply to center terminal of picture guard control, positive to chassis. See figure B.

3. Connect sweep generator high side to test point "W", low side directly to tuner. Set sweep frequency to 43 MC, sweep width approximately 7MC. If external marker generator is used, loosely couple high side to sweep generator lead, low side directly to tuner. Marker frequencies indicated on IF Response Curve.

4. Connect oscilloscope high side to test point "V" through a decoupling filter (figure A), low side to chassis.

5. Check curve obtained against ideal response curve, figure C. 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 video IF carrier marker (45.75 MC) does not fall at the 50 to 60% point on curve, position it with adjustment of A5. If curve is not symmetrical, adjust A1.

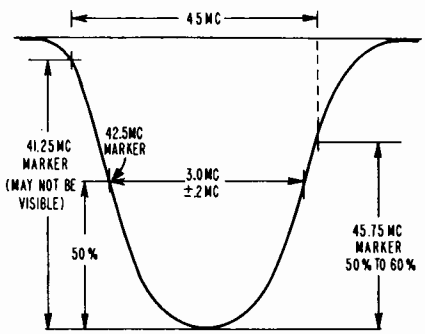


Figure C. Ideal IF Response Curve.

4.5 MC SOUND IF ALIGNMENT

1. Tune in normal picture on strongest TV station. Allow about 15 minutes for set to warm up. See figure B for adjustment locations.

*2. Using non-metallic alignment tool (part no. 98A30-12), slowly turn slug "A6" several turns to left until a buzz is heard in sound. Then slowly turn slug "A6" to the right for loudest and clearest sound. NOTE: There may be two points (approx. ½ turn apart) at which sound is loudest. The slug should be set at center of second point of loudest sound noted as slug is turned in (toward etched circuit board).

3. Reduce signal to antenna terminals until there is considerable hiss in sound. For best results, use a step attenuator, connected between antenna and antenna terminals. Signal can also be reduced by disconnecting antenna and placing it close to antenna terminals or leads.

4. Carefully adjust slug "A7" for loudest and clearest sound with minimum hiss. If hiss disappears during alignment, reduce signal to maintain hiss level. Readjust slug "A7". NOTE: Slug "A7" should be at end of coil nearest etched circuit board.

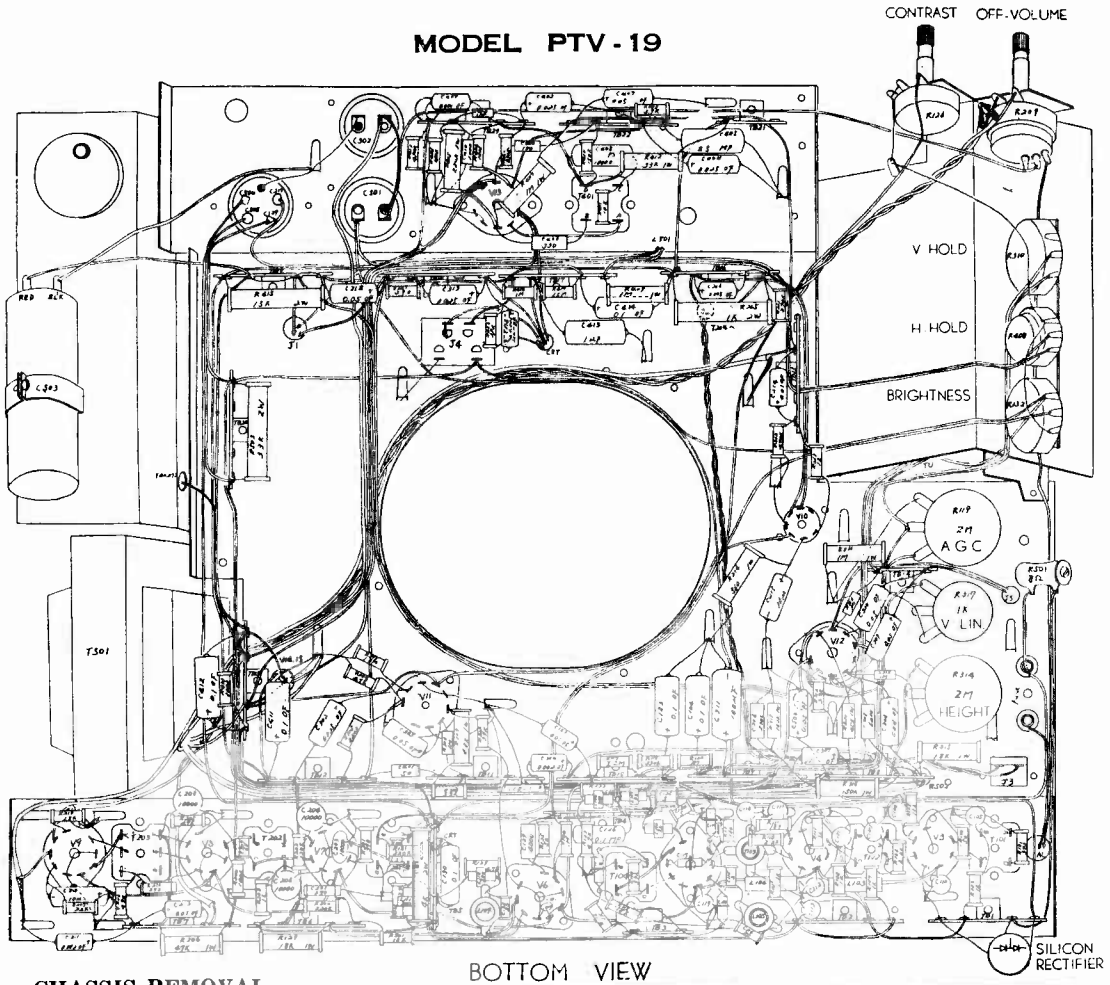
5. Carefully adjust slug "A8" for loudest and clearest sound with minimum hiss. If hiss disappears during alignment, reduce signal to maintain hiss level. Readjust slug "A8". Caution: Slug "A8" is located nearest bottom of shield can. Use care so as not to disturb slug nearest top of shield can.

6. If above alignment is correctly made, no further adjustment is 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 step in alignment procedure should be repeated exactly as instructed.

DELMONICO PORTABLE TELEVISION

MODEL PTV-19



BOTTOM VIEW

CHASSIS REMOVAL

CAUTION: When chassis is taken out, the cabinet is apt to fall forward.

1. Remove 2 single knobs and 1 dual knob on top and 3 knobs on side.
2. Remove 8 screws fastening rear cover and take it off after disconnecting antenna lead.
3. Disconnect lead connecting chassis and cabinet at interlock plug, and also speaker leads and negative lead of picture tube at yoke socket J1.
4. Disconnect yoke leads and picture tube socket.
5. Remove 5 screws fastening chassis from top and bottom of cabinet.
6. After pulling out chassis a little, disconnect anode cap of picture tube, then remove the chassis.
7. Make the chassis stand by supporting it with a pencil or so as shown in Fig. 3 to reconnect to the picture tube. For HV lead and speaker lead supplementary lead is needed.

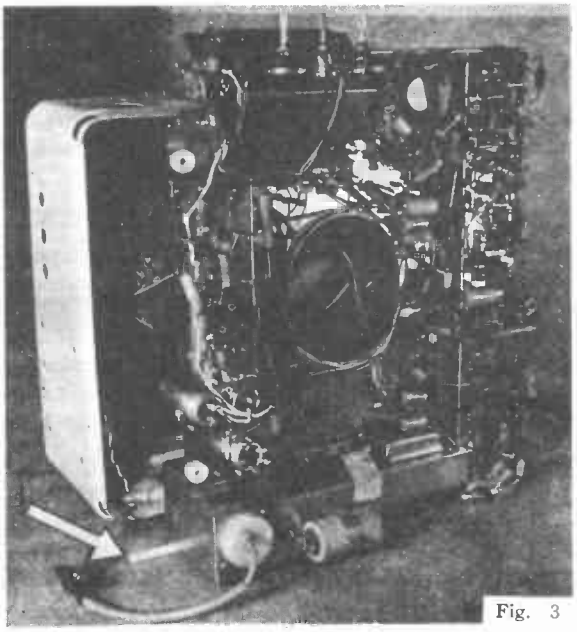
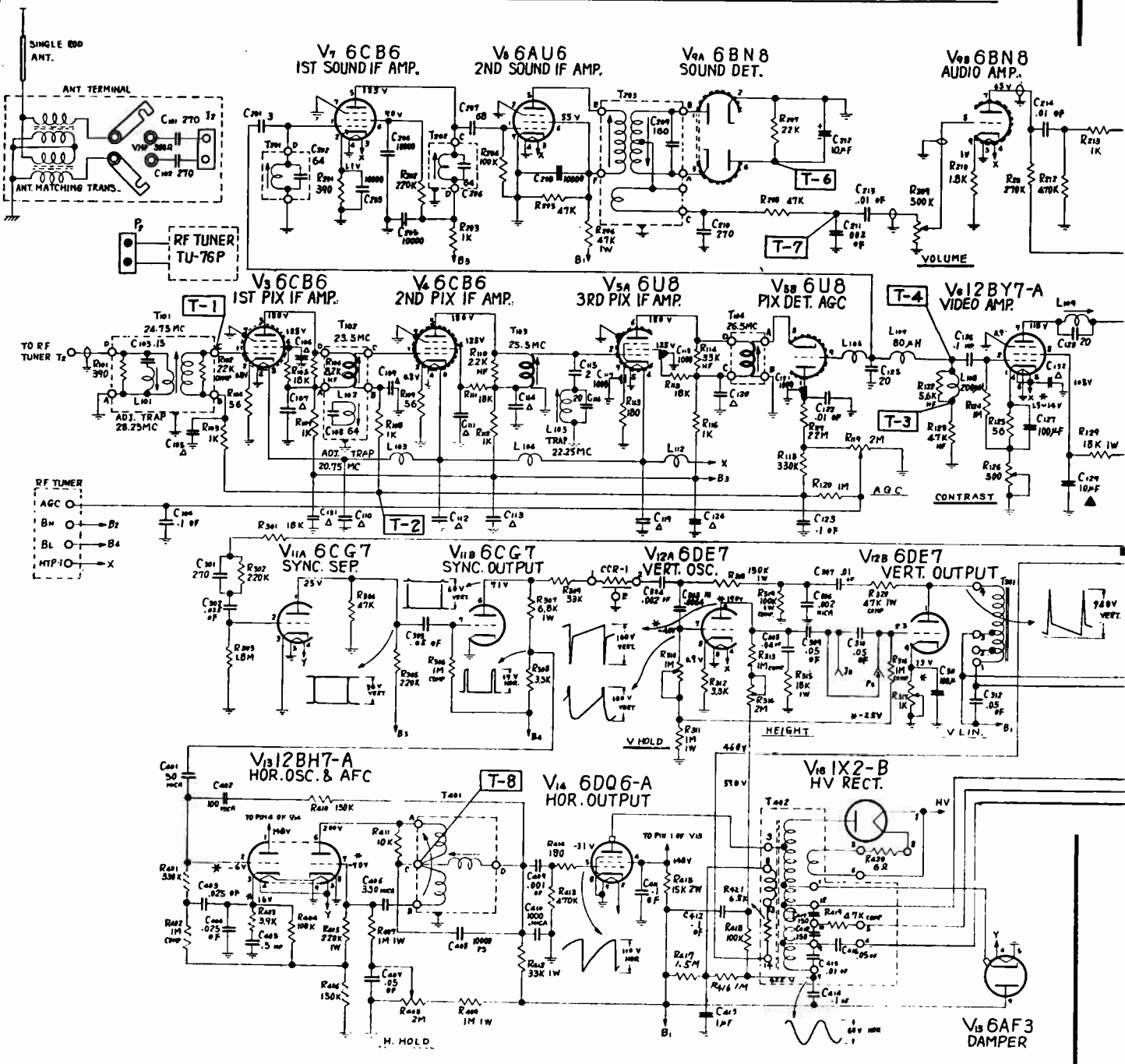


Fig. 3



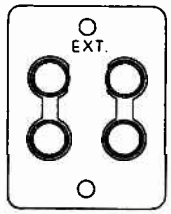
PTV-19 SCHEMATIC DIAGRAM

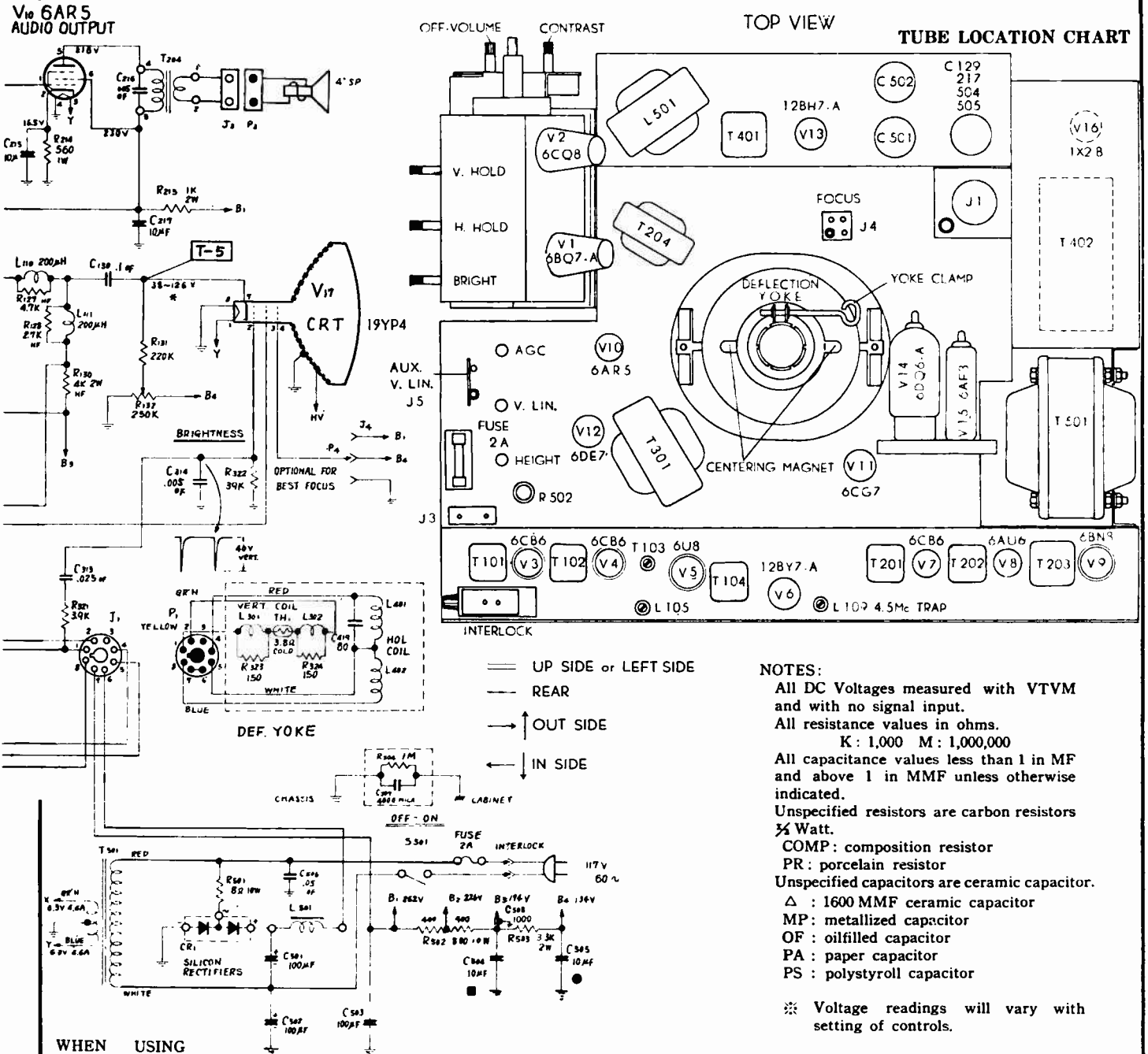
PICTURE TUBE REMOVAL

Remove the picture tube from the front.

1. Remove 5 screws fastening front cover.
2. Pull out the bottom part of front cover a little and raise it, then the front cover will come off.
3. Remove rear cover.
4. Disconnect socket and negative lead of picture tube.
5. Loosen yoke clamp and remove yoke.
6. Remove 4 hex nuts and washers holding picture tube mounting brackets.
7. Pull out the picture tube a little and remove the anbde cap, then the picture tube can be taken off.

WHEN USING THE SINGLE ROD ANTENNA





TUBE LOCATION CHART

NOTES:

All DC Voltages measured with VTVM and with no signal input.

All resistance values in ohms.

K : 1,000 M : 1,000,000

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

Unspecified resistors are carbon resistors ½ Watt.

COMP : composition resistor

PR : porcelain resistor

Unspecified capacitors are ceramic capacitor.

△ : 1600 MMF ceramic capacitor

MP : metallized capacitor

OF : oilfilled capacitor

PA : paper capacitor

PS : polystyroll capacitor

※ Voltage readings will vary with setting of controls.

CHECK WARNING

If in "no raster failure" the filaments are on, check quickly pin 5 of V14 Hor.Sweep Output tube 6DQ6-A. If -31V or any negative voltage cannot be noticed, out the power off and check the preceding circuit of V14 or B line. Otherwise, serious damage may be effected.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Turn the H. HOLD control to the extreme clockwise position. The picture should be out of sync, with bars slanting downwards to the right. Adjust Hor. Freq. adjustment core (outside of Hor. Osc. Transformer T401) so that about 5 diagonal black bars are obtained. With higher frequencies, the circuit may cause " double triggering ".

(H. HOLD control races over the extreme clockwise or counter-clockwise position.)

Emerson Television

MODEL NUMBER	TV RECEIVER CHASSIS	AM-FM-STEREO CHASSIS	RECORD CHANGER	CRT	TUNERS
1554	120572-C	120574-B	819159	19XP4	471230
1555	120573-D				471231 (VHF) 471220 (UHF)

SPEAKER PHASING AND REPLACEMENT

It is important that proper phasing of the speakers be maintained to insure against a reduction of the upper or lower frequency limits of the system. Speaker phasing may best be checked by following the procedure outlined below:

1. Set the push-pull ON-OFF switch (mounted on the stereo amplifier control panel) to its OFF position. This places both the right and left channel speaker systems in parallel and connects them to the TV oudio circuits.

2. Locate the terminal strip (mounted on floor of cabinet) to which the audio output transformer secondary leads from the TV chassis are connected.

3. Ploce a three-volt battery across the terminal strip located in step 2 and note whether or not all speaker canes move in the same direction at the same time. If they do, speakers are properly phased; if not, reverse connections at the speaker whose cone moves in opposition to the remoining speakers in the system and recheck.

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 voltage (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.

A small stiff-bristled brush should be used to wipe away melted solder before it has a chance to accumulate or drip on adjacent parts or printed wiring.

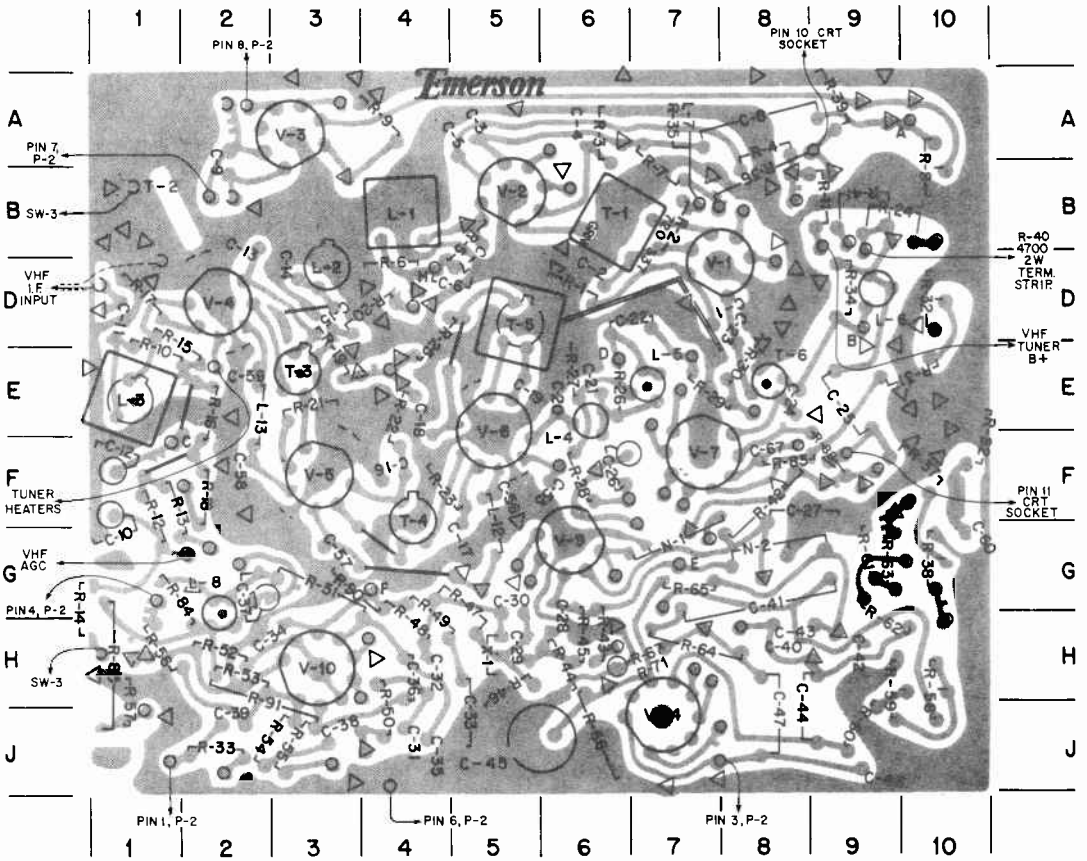


FIG. 1 – ETCHED PRINTED CIRCUIT BOARD CHASSIS (TOP VIEW)

EMERSON Chassis 120572C and 120573D, Servicing Information, Continued

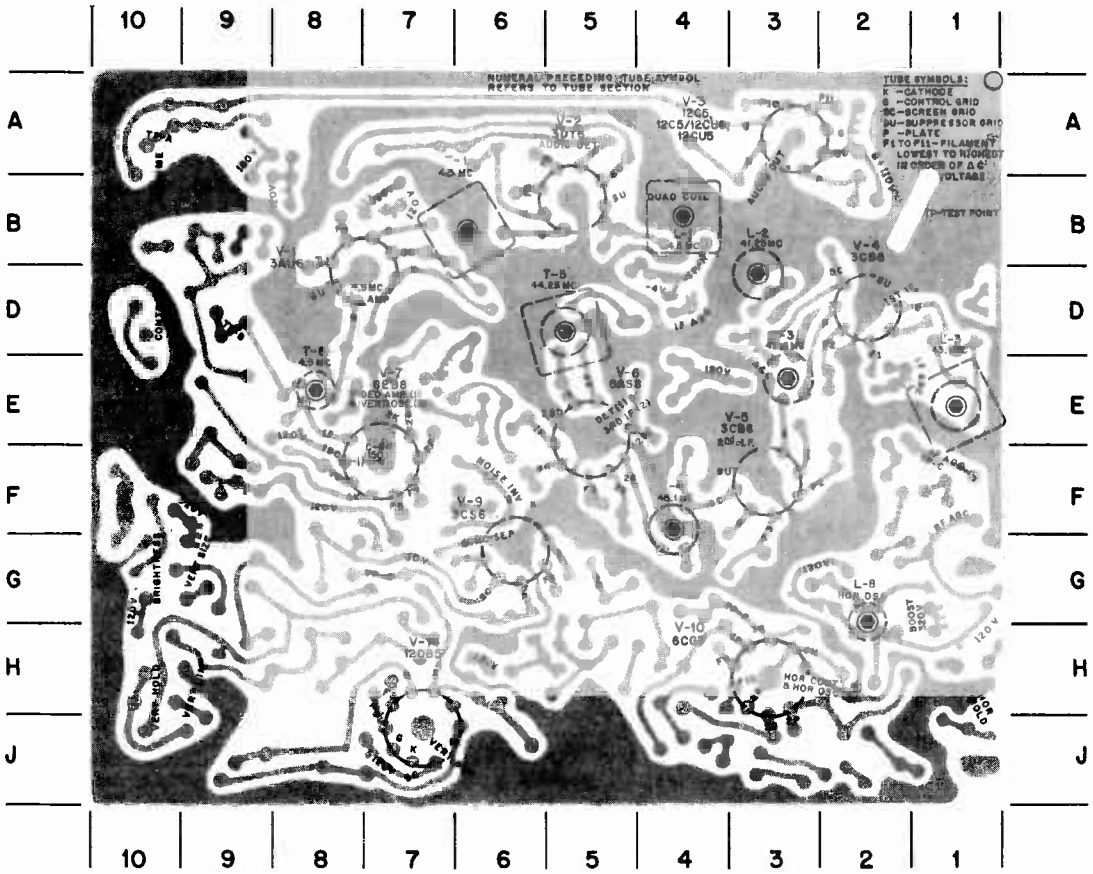


FIG. 3 – ETCHED PRINTED CIRCUIT BOARD CHASSIS (BOTTOM VIEW)

SYMBOL–COORDINATE CHART – REF.—Fig. 1 and 3

Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.
R-1	D-6	R-16	E-2	R-31	E-10	R-47	G-5	R-62	H-9	C-2	D-6	C-18	E-4	C-34	H-2	C-57	G-3	T-1	B-6	V-1	D-7
R-2	B-7	R-17	D-1	R-32	D-10	R-48	H-4	R-63	G-9	C-3	A-5	C-19	E-5	C-35	J-4	C-58	F-2	T-2	B-1	V-2	B-5
R-3	A-6	R-18	F-2	R-33	J-2	R-49	H-4	R-64	H-7	C-4	A-6	C-20	E-6	C-36	H-4	C-59	E-2	T-3	E-3	V-3	A-3
R-4	A-8	R-19	D-3	R-34	D-9	R-50	H-4	R-65	G-7	C-5	A-5	C-21	E-6	C-37	G-2	C-60	G-10	T-4	F-4	V-4	D-2
R-5	B-5	R-20	D-4	R-35	A-7	R-51	G-3	R-66	J-6	C-6	D-4	C-22	D-6	C-38	J-3	* C64	F-7	T-5	D-5	V-5	F-3
R-6	D-4	R-21	E-3	R-36	B-8	R-52	H-2	R-67	H-7	C-7	D-5	C-23	D-8	C-39	J-2	C-67	F-8	T-6	E-8	V-6	E-5
R-7	B-7	R-22	E-4	R-37	F-10	R-53	H-2	R-71	H-7	C-8	A-8	C-24	E-8	C-40	H-8	L-1	B-4	N-1	G-7	V-7	F-7
R-8	B-10	R-23	F-4	R-38	G-10	R-54	J-2	R-82	E-10	C-9	A-2	C-25	E-9	C-41	G-8	L-2	D-3	N-2	G-8	V-9	G-6
R-9	A-4	R-24	E-9	R-39	A-9	R-55	J-3	R-83	F-8	C-10	G-1	C-26	F-6	C-42	H-9	L-3	E-1	X-1	H-5	V-10	H-3
R-10	D-1	R-25	D-4	R-41	B-9	R-56	H-1	R-84	G-1	C-11	D-1	C-27	F-8	C-43	H-8	L-4	E-6	TP A	A-10	V-14	J-7
R-11	B-9	R-26	E-6	R-42	F-8	R-57	H-1	R-85	H-1	C-12	F-1	C-28	G-6	C-44	H-8	L-5	E-7	TP B	D-9	*Bot. View Only	
R-12	F-1	R-27	E-6	R-43	H-6	R-58	H-10	R-88	F-9	C-13	B-2	C-29	H-5	C-45	J-5	L-6	D-9	TP C	F-2		
R-13	F-1	R-28	F-6	R-44	H-6	R-59	H-9	R-90	G-3	C-14	B-3	C-30	G-5	C-46	J-9	L-7	A-7	TP D	E-6		
R-14	G-1	R-29	E-7	R-45	H-6	R-60	J-9	R-91	H-2	C-15	D-3	C-31	J-4	C-47	H-8	L-8	G-2	TP E	G-7		
R-15	D-1	R-30	E-8	R-46	H-5	R-61	G-9	C-1	D-8	C-16	F-4	C-32	H-4	C-55	F-6	L-12	F-5	TP F	G-4		
										C-17	G-5	C-33	H-5	C-56	F-5	L-13	E-2	TP H	D-4		

RESISTANCE READINGS, TV CHASSIS

SYMBOL	TUBE TYPE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V-1	3AU6	1	0	7	6.5	25K*	25K*	220	–	–
V-2	3DT6	4	560	6	6.5	220K*	27K*	560	–	–
V-3	12C5/12CU5	180	15Ω TO 850K	14	16	15Ω TO 850K	25K*	25K*	–	–
V-4	3CB6	1M	56	3.5	4.2	25K*	25K*	0	–	–
V-5	3CB6	1M	47	4.2	5	25K*	25K*	0	–	–
V-6	5AS8	25K*	0	180	5	6	4.7K	0	0	25K*
V-7	8EB8	0	380K TO 1.8M	5M TO 5.5M	9	7	10Ω TO 600Ω	340K	25K*	27K*
V-9	3CS6	900K	0	9	10	26K*	40K*	1.5M	–	–
V-10	6CG7	*120K	400K TO 500K	1K	14	12	39K*	1.3M	1K	0
V-11	12DQ6	N.C.	18	N.C.	18K*	360K	N.C.	22	0Ω TO 30Ω	PLATE CAP ∞
V-12	1G3/1K3	I N F I N I T E								PLATE CAP ∞
V-13	12D4	N.C.	N.C.	∞	N.C.	23K	N.C.	18	16	–
V-14	8EM5	*23K	100	2.3M TO 2.6M	12	10	2.3M TO 2.6M	100	N.C.	24K
				PIN 6	PIN 10	PIN 11	PIN 12			
V-8	19XP4	0	4.7K	0Ω OR 23K	23K	82K TO 220K	1.5			

RESISTANCE READINGS CHART

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

EMERSON Chassis 120572C and 120573D

Schematic Diagram & Parts Location

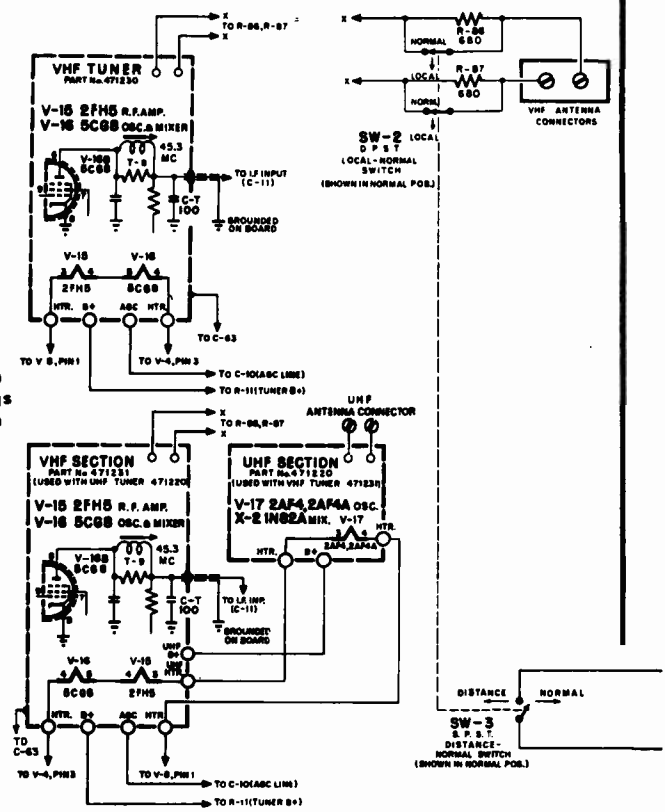
CONDITIONS FOR VOLTAGE AND RESISTANCE MEASUREMENTS, CHASSIS 120572-C, 120573-D

(Separate conditions apply to readings taken on AM, FM, or STEREO chassis.)

VOLTAGES AND WAVESHAPES were taken under actual operating conditions (normal picture and sound). AGC voltage developed at test paint Ⓒ (junction of R-15, R-16) was minus four 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 tuner 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.



I.F. OUTPUT CIRCUITS AND HEATER CONNECTIONS OF TUNERS

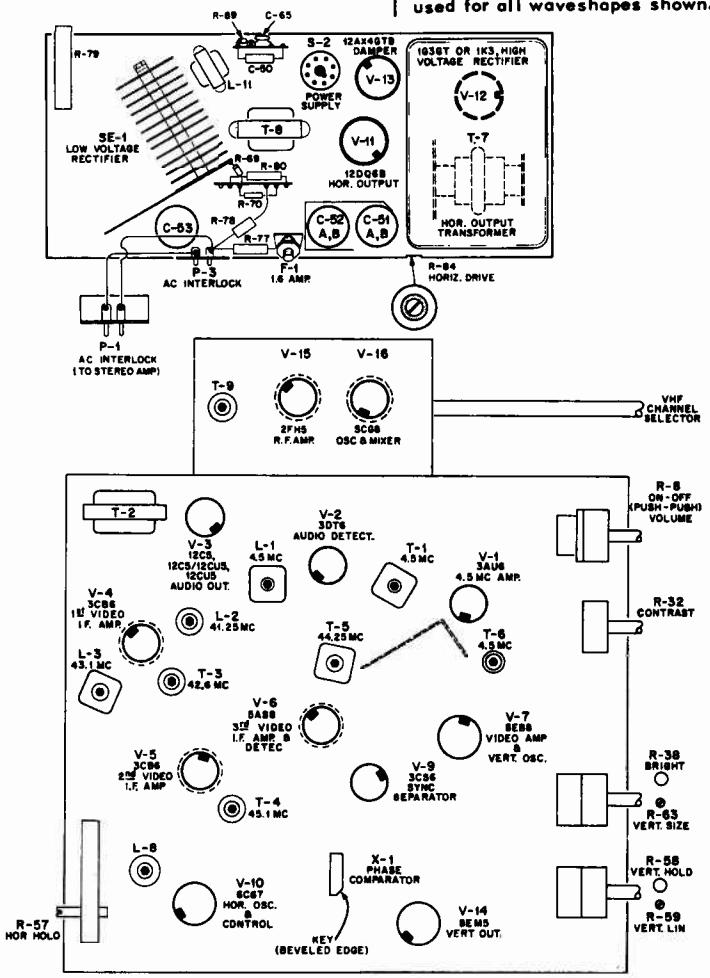
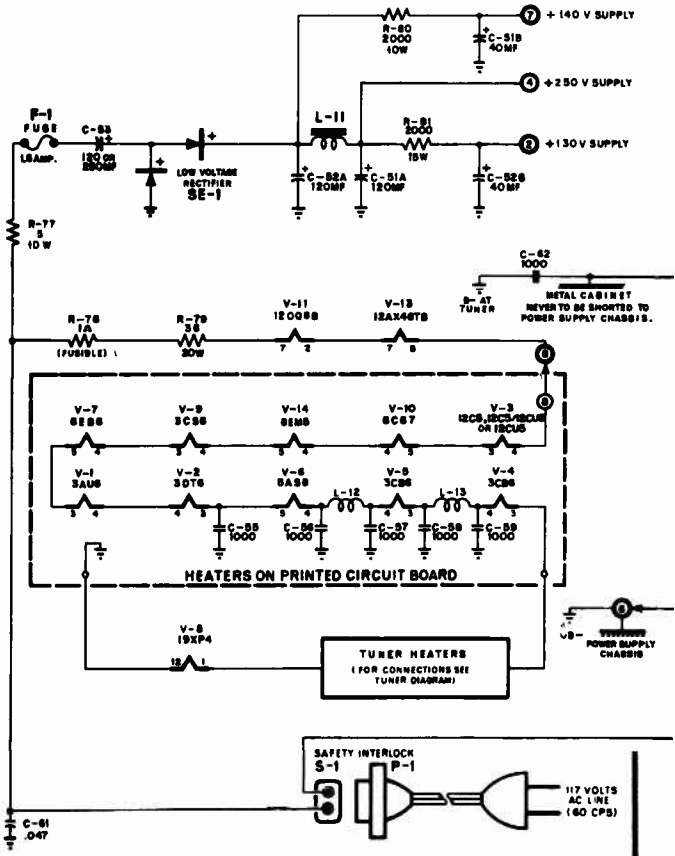
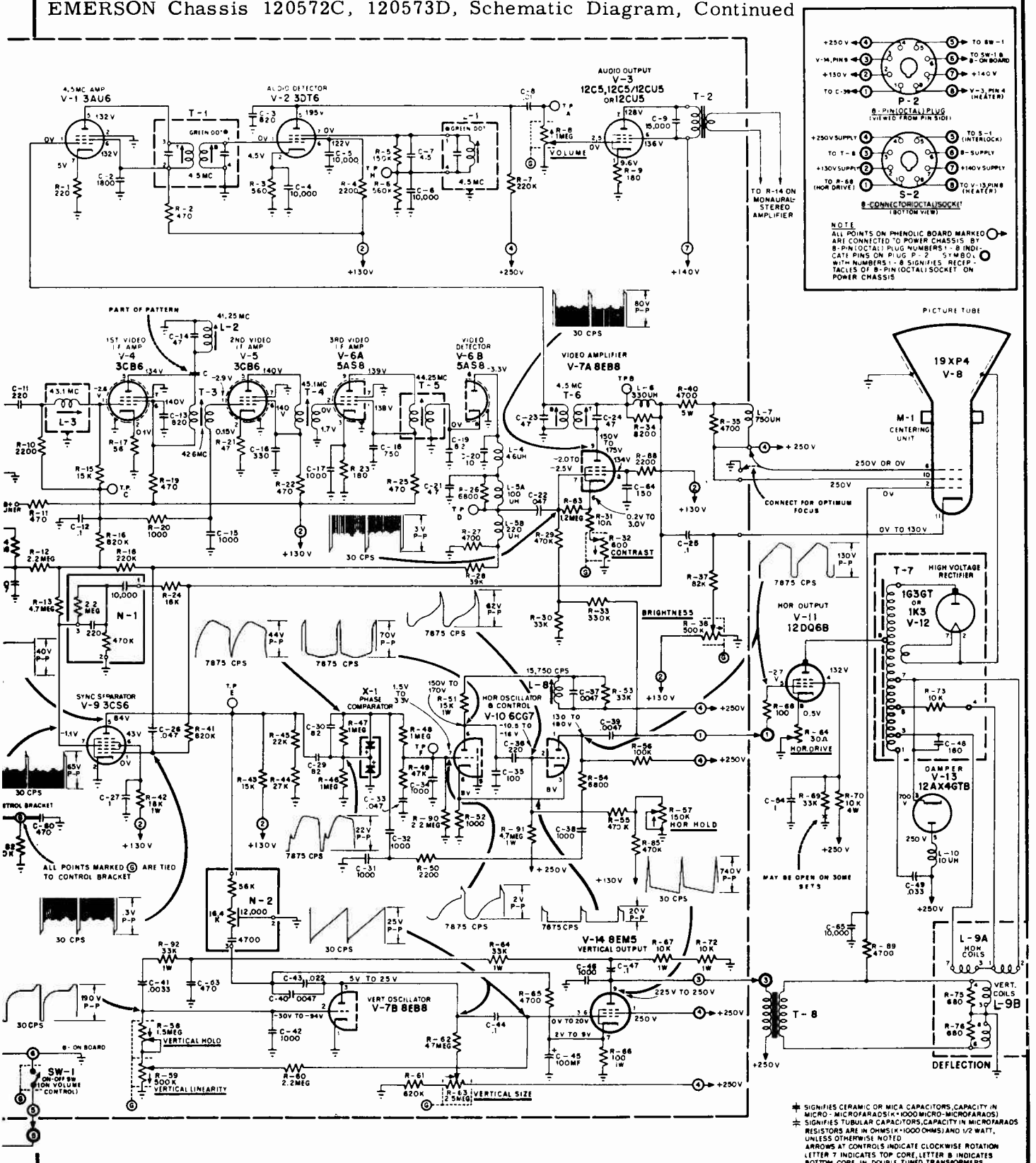


FIG. 4 – TUBE LOCATION AND ALIGNMENT POINTS DIAGRAM, POWER SUPPLY AND ETCHED PRINTED CIRCUIT BOARD CHASSIS



EMERSON Chassis 120572C, 120573D, Schematic Diagram, Continued



* SIGNIFIES CERAMIC OR MICA CAPACITORS, CAPACITY IN MICRO-MICROFARADS(K=1000 MICRO-MICROFARADS)
= SIGNIFIES TUBULAR CAPACITORS, CAPACITY IN MICROFARADS
RESISTORS ARE IN OHMS(K=1000 OHMS) AND 1/2 WATT, UNLESS OTHERWISE NOTED
ARROWS AT CONTROLS INDICATE CLOCKWISE ROTATION
LETTER T INDICATES TOP CORE, LETTER B INDICATES BOTTOM CORE IN DOUBLE TUNED TRANSFORMERS

CHASSIS Nos. 120572C, 120573D

FIG. 2 – TV SCHEMATIC, CHASSIS 120572-C, 120573-D

EMERSON Chassis 120572C, 120573D, Alignment Information, Continued

A. Connect TV chassis to AC supply using a 1:1 ratio isolation transformer.

B. Set tuner to highest unused channel and allow chassis and equipment being used to warm up for 10 minutes or more.

C. Connect —3 volts bias through a 10K resistor to AGC test point C (junction of R-15, R-16 and C-12 (See fig. 1).

D. Maintain signal generator output no higher than necessary to produce readings not in excess of two volts and use insulated alignment tools for adjusting.

E. 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 inches) 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 marker generator to metal foil on signal injection shim, low side to chassis through 1,000 mmf capacitor.
2. Connect VTVM (—5 volt range) to video detector test point D (junction of L-5A and L-5B (See fig. 1).
3. Peak the following for MAXIMUM indication on meter at the frequencies specified:
   a) T-5 at 44.25 MC
   b) T-4 at 45.1 MC
   c) T-3 at 42.6 MC
4. Adjust L-2 (41.25 MC trap) for MINIMUM indication on meter at 41.25 MC.
5. Adjust L-3 (input coil) in towards base of coil for MINIMUM indication on meter at 43.1 MC.
6. Adjust T-9 (tuner plate coil) for MAXIMUM indication on meter at 45.3 MC.
7. Re-tune L-3 (input coil) for MAXIMUM indication on meter at 43.1 MC.

To observe the response curve, remove VTVM and connect an oscilloscope through a 10K isolation resistor to video detector test point D (junction of L-5A and L-5B). Connect sweep generator to metal foil on signal injection shim (along with marker) and set frequency of generator to sweep highest unused channel. Adjust output of sweep generator to produce about two volts peak-to-peak on scope and reduce output of marker generator below level where distortion of the response curve occurs. 45.75 MC marker should fall between 65% and 70% down from center of response, 42.75 MC marker should fall between 50% and 60% down from center of response.

SOUND IF ALIGNMENT

1. Using a strong T.V. transmitted signal, adjust T-6, sound takeoff transformer, bottom, and T-1, sound interstage transformer, top and bottom, for the loudest sound.
2. Adjust L-1, 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 V.T.V.M. 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 (Ref. Fig. 4)

The horizontal oscillator can be aligned without removing the chassis from the cabinet. To accomplish this, tune in a known "good" channel, set both the LOCAL and FRINGE switches in the NORMAL position (down) and proceed as follows:

1. Disable sync by shorting test point E to B— (printed circuit chassis). Do not short to power supply chassis (See fig. 1).
2. Set Horizontal Hold control to center of range and adjust L-8, horizontal phase coil, for momentary lock-in (Picture will sway from side to side due to absence of sync).
3. Remove short from test point E Picture should now remain in sync when switching channels without the need for re-adjustment of the Horizontal Hold control.

ADJUSTMENT OF 'LOCAL' AND 'FRINGE' SWITCHES

Local and Fringe switches have been added to these sets to permit easy adjustment of reception from local and distant stations.

For strong local signals which may cause buzz, streaking, vertical jitter or loss of grays (washout), push "LOCAL" switch up.

To obtain a steady picture in noisy fringe areas, push "FRINGE" switch up.

For normal operation in most areas, push both "FRINGE" and "LOCAL" switches down.

HORIZONTAL DRIVE ADJUSTMENT

Horizontal drive may be adjusted by varying the horizontal drive control (R-84) located on the rear apron of the power supply chassis. To adjust, set the control to its maximum counter-clockwise position (maximum drive) while viewing raster on screen with channel selector set to a blank channel. If a drive line (bright vertical line in raster) is evident at this setting, rotate drive control slowly clockwise until the drive line just disappears.

HORIZONTAL SIZE ADJUSTMENT (REF. FIG. 4)

The chassis described in this service note have been designed for proper horizontal sweep under the normal changes usually encountered in line voltages. Variations from proper width may be compensated for by removal or installation of R-69 from the horizontal circuit. It is not necessary to remove the chassis from the cabinet to accomplish this, since R-69 is mounted on a terminal strip located on top of the power supply chassis, approximately one inch from the interlock plug.

CAUTION:
Always remove line cord plug from outlet before performing the above adjustment. Do not attempt to remove (or re-connect) R-69 with power applied to the chassis.

VERTICAL SIZE AND LINEARITY ADJUSTMENTS

Vertical size and linearity may be adjusted from the front of the cabinet after removal of the Brightness and Vertical Hold control knobs. Insert a fiber alignment tool or a long thin screwdriver into the hollow Brightness control shaft to adjust vertical size, and into the Vertical Hold control shaft to adjust vertical linearity.

OSCILLATOR ALIGNMENT

Channel 2 through 13 oscillator screws, mounted on a rotating drum, are accessible through a hole provided in the front of the tuner for this purpose after removal of the channel selector and fine tuning knobs. They may be adjusted individually or in any order desired, since each constitutes part of a seperately tuned circuit and therefore has no affect on any other channel.

NOTE: The smaller-than-average oscillator screws used in these tuners require the use of an alignment tool with a tip no wider than 3/32" for adjusting. It is recommended that a standard 1/8" diameter tool (Walsco 2531, 2531X or General Cement 8728) be ground down to the required 3/32" width.

CAUTION: Do not attempt to modify any alignment tool larger than 1/8" in diameter, as this will damage the coil form and render it useless.

EMERSON Chassis 120574B Servicing Information, Continued

FM SERVICE INFORMATION

Chassis 120574-B utilizes a hand wired sub-assembly (part no. 471296) containing the RF, Converter, IF and Demodulator stages necessary for reception of signals originating in the FM Band.

REMOVAL OF FM SUB-ASSEMBLY 471296

1. Unsolder center lead and shield of audio cable from terminal post at rear of sub-chassis.
2. Unsolder brown AC lead from terminal post near 12DT8 tube (junction of R-49 and R-696).
3. Unsolder white AC lead from top of sub-chassis (ground) near 12DT8 tube.
4. Remove two hex-head mounting screws used to secure edge of chassis to fiber mounting bracket.
5. Remove 2½" machine screw and fiber spacer used to support opposite end of chassis and remove FM sub-assembly by lifting upward.
6. Re-assemble in reverse order.

SERVICE INFORMATION, FM TUNING UNIT 963352

Components within the tuning unit may easily be made accessible after removal of the pressed wood mounting board used to support the chassis assembly, or after removal of the entire FM sub-assembly as outlined above. Removing four self-tapping screws (used to secure the bottom cover to the tuning unit) will allow the cover to be tilted backwards (toward rear of tuning unit) and out of the way. It is not necessary to remove the terminal strip at the rear of the cover plate or any of the components soldered to the terminal strip.

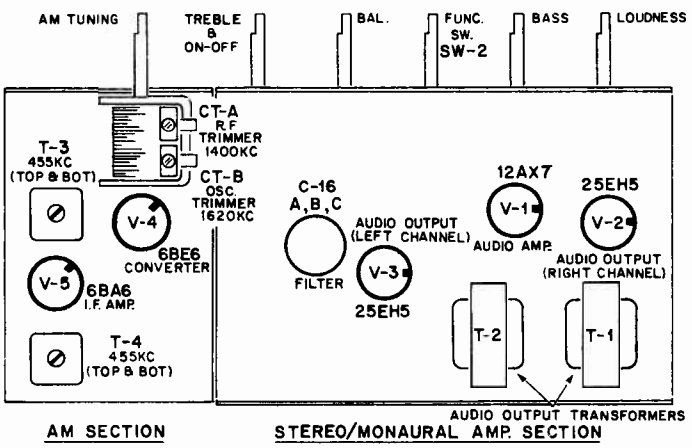


FIG. 9 – TUBE LOCATION AND ALIGNMENT POINTS LOCATION, AM AND AUDIO SECTIONS – CH. 120574-B

REMOVAL OF FM TUNING UNIT 963352 FOR MAJOR SERVICE OR REPLACEMENT (RE: FIG. 11)

1. Unsolder FM antenna lead from terminal strip at rear of tuning unit.
2. Unsolder B plus lead from C-44 (1,000 mmf feed-thru) ot side of tuning unit.
3. Unsolder filament lead from C-48 (1,000 mmf feed-thru) at side of tuning unit.
4. Unsolder tube socket terminal lug for pin 1 of V-7 (12BA6, 1st IF amp.) from C-46 (22 mmf feed-thru) at side of tuning unit.
5. Remove 3 hex-head self-tapping screws used to mount tuning unit and remove tuning unit from sub-chassis assembly.
6. Re-assemble in reverse order.

NOTE:

When returning FM tuning unit for service or replacement, it should be shipped complete with 12DT8 tube, dial pulley, bottom cover plate and input circuit components mounted to rear terminal strip. Only the antenna lead-in wire and the tuning knobs should be removed before shipping.

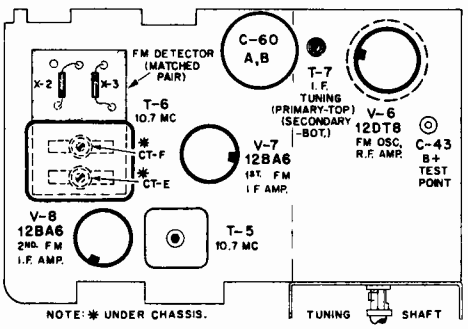


FIG. 10 – TUBE LOCATION AND ALIGNMENT POINTS, FM SECTION, CHASSIS 120574-B

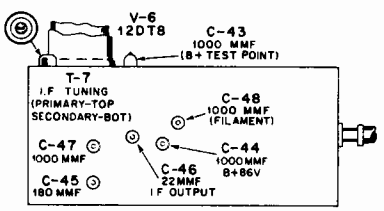


FIG. 11 – FM TUNING UNIT 963352

DIAL STRINGING PROCEDURE, FM TUNING UNIT 963352

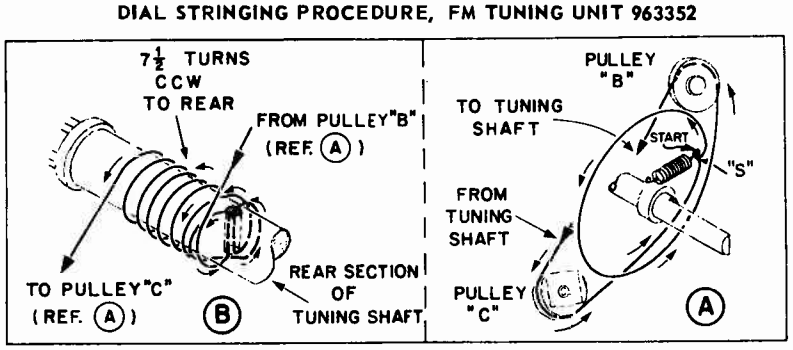
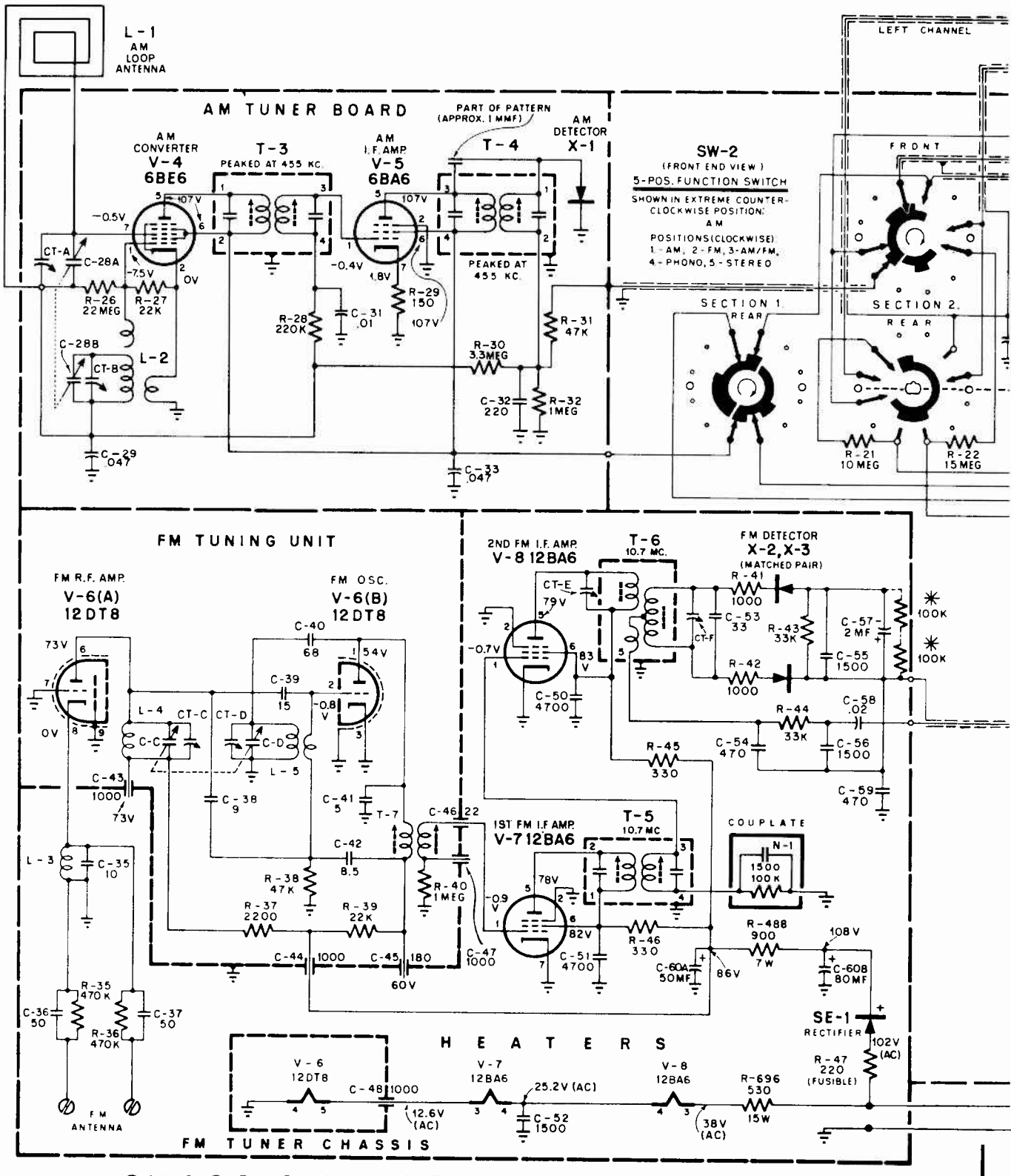


FIG. 12A,B-DIAL STRINGING PROCEDURE, FM TUNING UNIT 963352

1. Turn tuning shaft to its maximum clockwise position and set both tuning shaft and dial drum as shown in fig. 12-A.
2. Attach one end of a 24-inch length of standard thin diol cord to the tension spring at point "S."
3. Holding diol drum in position shown in fig. 12-A, route dial cord one full turn CCW around dial drum and over pulley "B" as shown.
4. Referring to fig. 12-B, route string around left side of tuning shaft and UP through hole in tuning shaft os shown.
5. Wind string one full turn CCW around tuning shaft and DOWN through hole in tuning shaft as shown.
6. Wind string seven turns CCW around tuning shaft (toward rear) ond down to pulley "C" (see fig. 12-A).
7. Route string around pulley "C" as shown and along bottom edge of dial drum to tension spring.
8. Fasten string to tension spring and opply a small amount of service cement at point "S" to insure against loosening during operation.

EMERSON Chassis 120574B Schematic Diagram, Continued



CHASSIS No. 120574-B

EMERSON Chassis 120574B Schematic Diagram, Continued

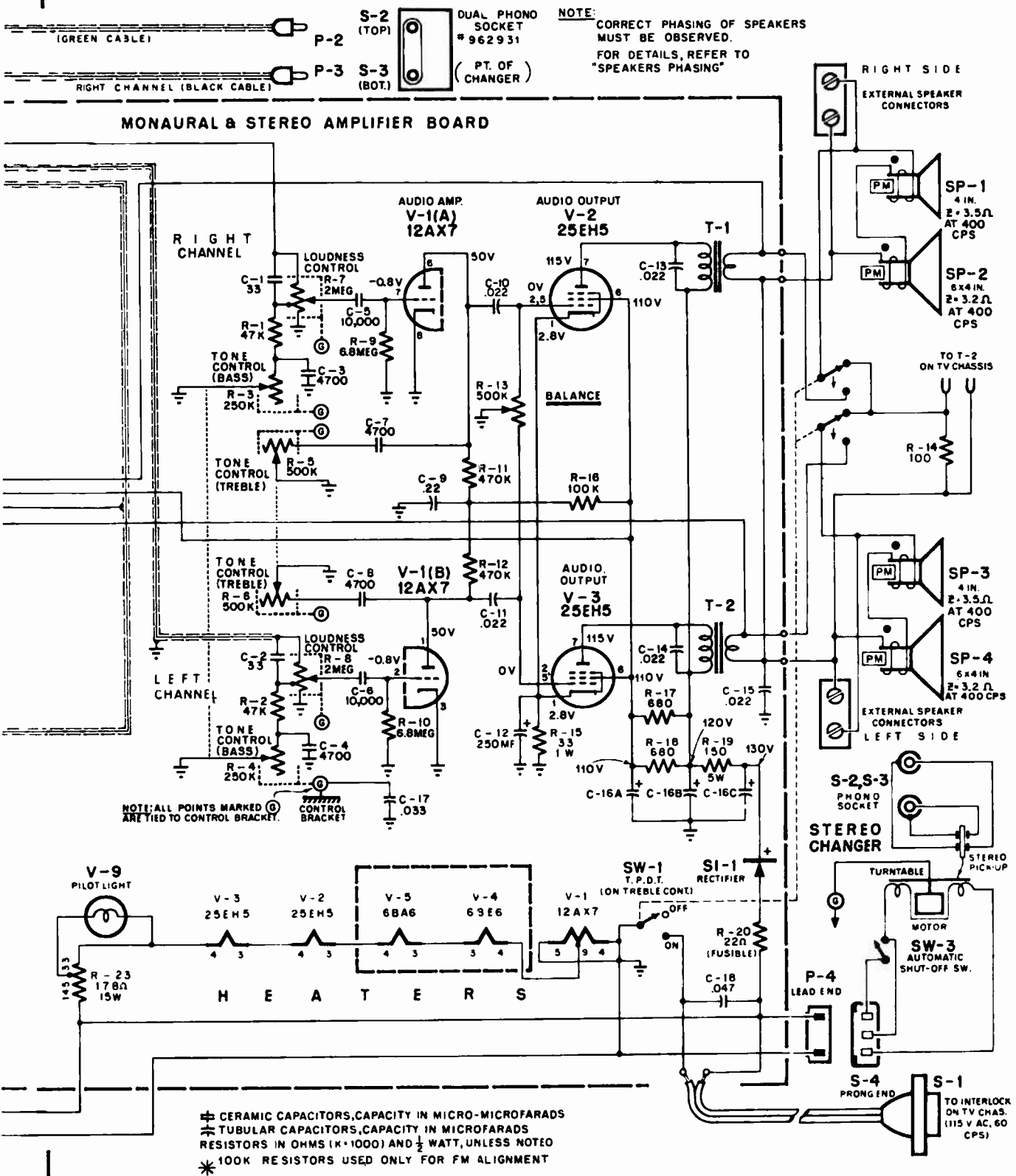


FIG. 13 – SCHEMATIC, CHASSIS 120574-B
(CONDITIONS AND RESISTANCE READINGS CHART, PG. 26.

EMERSON Chassis 120574B, Servicing Information, Continued

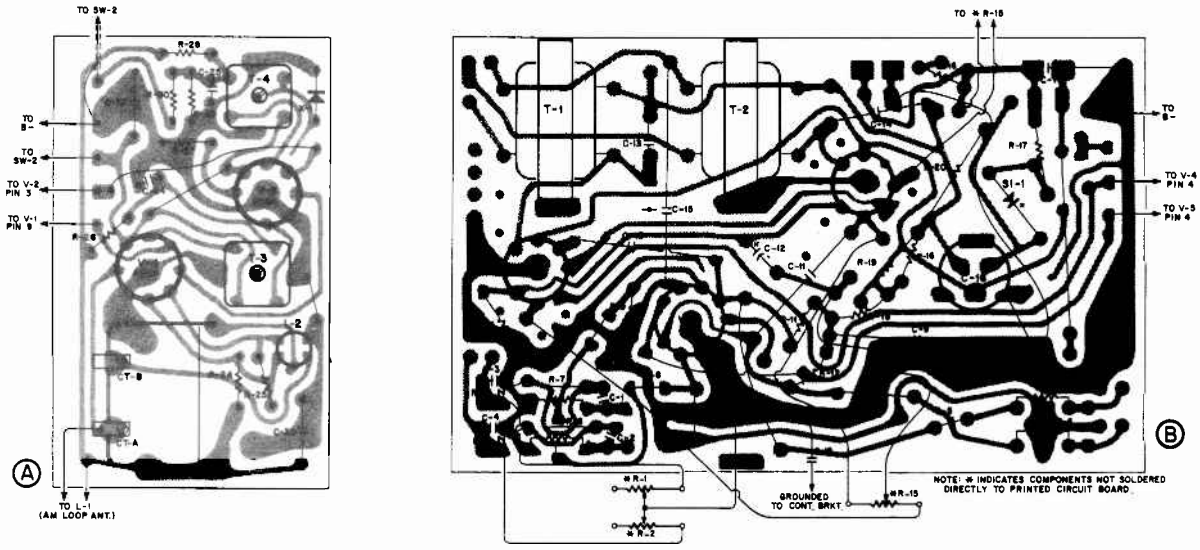


FIG. 14 A, B – ETCHED PRINTED CIRCUIT SECTION (TOP VIEW) CH. 120574-B-(A) AM SECT. -(B) AUDIO SECT.

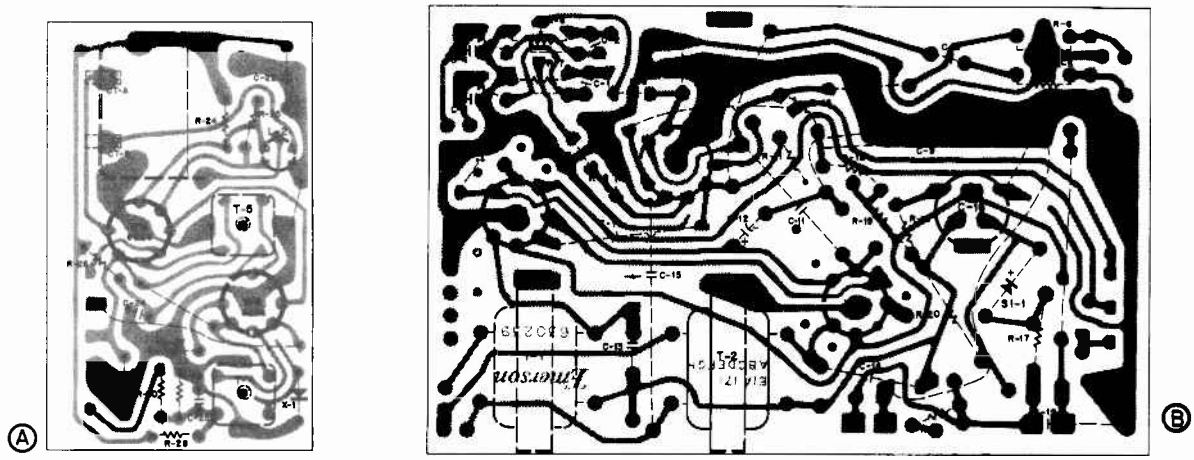


FIG. 15 A, B – ETCHED PRINTED CIRCUIT SECTION (BOT. VIEW) CH. 120574-B; (A) AM SECTION (B) AUDIO SECTION

CONDITIONS FOR VOLTAGE AND RESISTANCE MEASUREMENTS, CHASSIS 120574-B

1. Voltages are positive d.c., resistances are in ohms, unless otherwise indicated.
2. Measurements taken with Voltohmyst or equivalent.
3. All measurements taken from tube pin to B minus (metal can of electralytic filter) unless otherwise indicated.
4. Voltage measurements taken with:
   (a) Line voltage maintained at 115 volts a.c.
   (b) Loudness control set for minimum volume.
   (c) No signal input AM or FM.
   (d) SW-2 in both AM and FM positions.
5. Resistance measurements taken with:
   (a) Power line cord disconnected from outlet.
   (b) Loudness control set for minimum volume.
   (c) SW-2 selector switch in AM and FM positions.

NOTES:
A. Filament resistance values are cold readings.
B. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
C. N.C. denotes no connection, K is Kilohms, and Meg. is Megohms.
D. Resistance readings above 30 megohms are considered infinite.

RESISTANCE READINGS, CH. 120574-B (SCHEMATIC, PGS. 24-25

SYMBOL	TUBE TYPE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V-1	12AX7	*600K	6.8M	0	0	0	*600K	6.8M	0	4Ω
V-2	25EH5	33Ω	250K	8.5Ω	18Ω	250K	*500	*320	–	–
V-3	25EH5	33Ω	250K	18Ω	27Ω	250K	*500	*320	–	–
V-4	6BE6	22K	1Ω	6Ω	4Ω	*500	*500	2.6M	–	–
V-5	6BA6	2.8M	0	6Ω	8.5Ω	*500	*500	150	–	–
V-6	12DT8	‡23K	47K	0	0	12Ω	‡3.1K	0	0	0
V-7	12BA6	1M	0	12Ω	22Ω	‡1.2K	‡1.2K	0	–	–
V-8	12BA6	100K	0	28Ω	22Ω	‡1.2K	‡1.2K	0	–	–

* Indicates readings taken with negative lead of meter connected to junction of R-19, C-16C and SI-1.
‡ Indicates readings taken with negative lead of meter connected to junction of R-488, C-60B and SE-1.

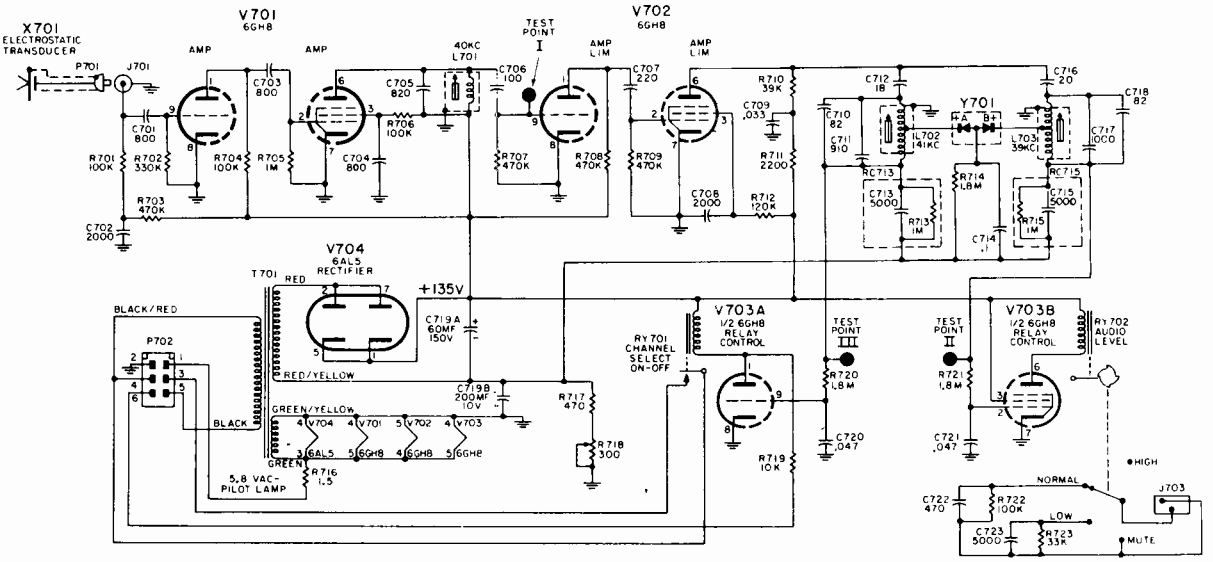
GENERAL ELECTRIC

MW CHASSIS

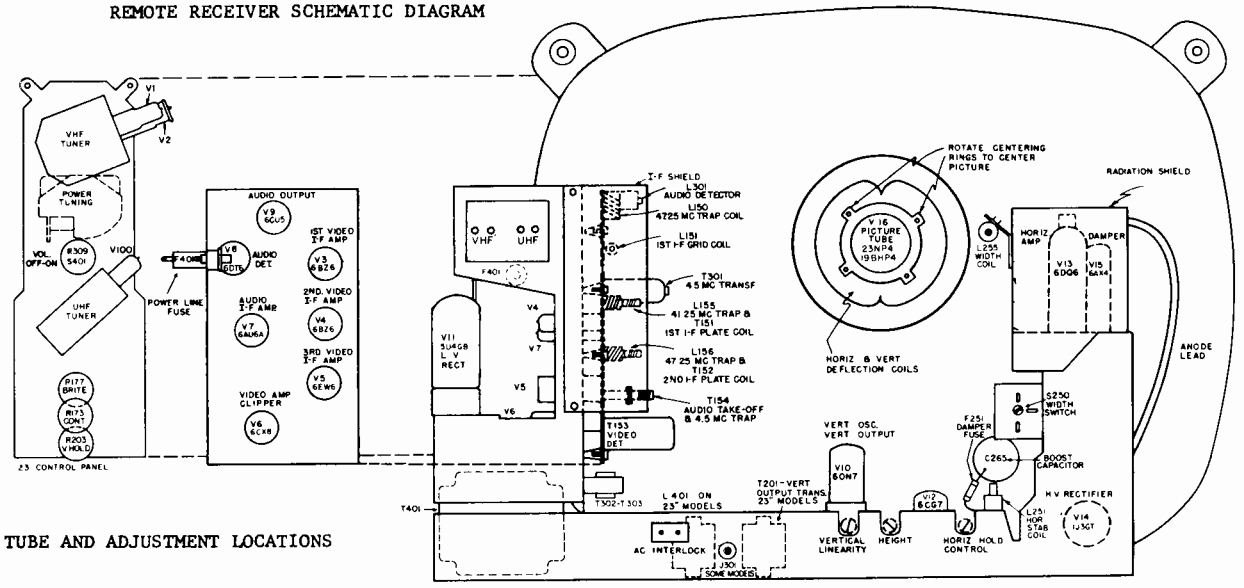
COVERS MODELS

M602W
M604W
M605W
M606W
M607W
M608W
R608W
M609W
M610W
M611W
R610W
M614W
M615W
M620W
M720W
M721W
CAM724WEB
CAM726WEB
M730W
M731W
M732W
R732W
M733W
M734W
M735W
M736WMD
M736WWD
M737WMD
M737WWD
M738WMD
M738WMP
M738WOA
M738WWD
SAM738WMP
SAM738WWD
M739WMD
M739WMP
M739WOA
M739WWD
M740WMD
M740WMP
M740WWD
M741WMD
M741WMP
M741WWD
SAM742WMD
SAM742WMP
SAM742WOA
SAM743WMD
SAM743WMP
SAM743WOA
M760WCD
M760WMD
M760WWD
M761WCD
M761WMD
M761WWD
M770WMD
M770WMP
M770WWD
M771WMD
M771WMP
M771WWD
SAM774WMD
SAM774WWD
M780WCL
M780WMD
M780WWD
M781WCL
M781WMD
M781WWD

Service material on pages 27 through 38.



REMOTE RECEIVER SCHEMATIC DIAGRAM



TUBE AND ADJUSTMENT LOCATIONS

GENERAL ELECTRIC Chassis MW, Alignment Information, Continued

VIDEO I-F ALIGNMENT

INTRODUCTION:

The video I-F system must be in alignment in order to align most other sections of the receiver. The coils may be tuned to the AM pre-peaking frequencies listed below, but over-all sweep alignment is necessary to correctly align the I-F system.

AM PRE-PEAKING FREQUENCIES

L150	Min. at 47.25 MC
L155	Min. at 41.25 MC
L156	Min. at 47.25 MC
L135	Max. at 45.75 MC
L151	Max. at 42.50 MC
L153	Max. at 44.30 MC
L154	Max. at 44.30 MC
T151	Max. at 43.00 MC
T152	Max. at 45.20 MC

GENERAL NOTES

1. Allow the receiver and alignment equipment at least 20 minutes of warm-up time before proceeding.
2. 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. Turn the fine tuning control fully counter clockwise. Turn the volume control fully counter clockwise and the contrast control fully clockwise.
3. Short the receiver antenna terminals together with a short jumper wire.
4. Connect an oscilloscope to Test Point III through a 22,000 ohm isolating resistor. The resistor must be connected not more than 2.5 inches away from Test Point III.
5. Connect -3.5 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 a sweep generator through the network in Fig. 1 to the I-F injection jack* on the VHF tuner.
7. Align the receiver to produce the response curve in Fig. 2 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 of the plug grips the injection jack firmly. Press the plug firmly into place without excess pressure. See Fig. 1 for the plug construction.

Proceed as follows:

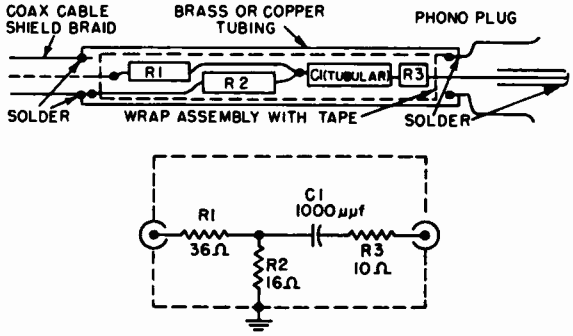


FIG. 1, IF INJECTION NETWORK

VIDEO I-F ALIGNMENT CHART

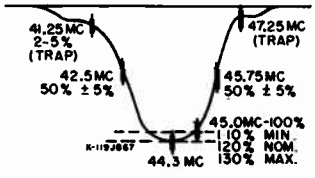
STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1.	47.25 MC AM	Adjust L150 and L156 for minimum scope deflection.	Use maximum scope gain and the smallest possible signal for the 41.25 MC and 47.25 MC adjustments.
2.	41.25 MC AM	Adjust L155 for minimum scope deflection.	Two positions of minimum deflection may be attained with each core. Select the position nearest the printed board.
3.	44.3 MC AM	First L154, then L153 in that order for maximum scope deflection.	Use maximum scope gain and minimum signal. DO NOT RETOUCH EITHER OF THESE CORES.
4.	38-48 MC sweep generator, with scope calibrated 3 volts peak to peak for 2 inch deflection	L135 (converter plate) for maximum deflection at 45.75 MC.	DO NOT RETOUCH THIS ADJUSTMENT.
5.	SAME	L151 (1st I-F grid) for maximum deflection of the 42.5 MC marker and proper shaping of the curve nose.	
6.	SAME	T152 (2nd I-F plate) to place the 45.75 MC marker in the proper position on the curve. Position the core at the peak farthest away from the printed board.	
7.	SAME	T151 (1st I-F plate) to place the 42.5 MC marker in the proper position on the curve. Position the core at the peak farthest away from the printed board.	Repeat 6 and 7 if necessary.
8.	SAME	L151 only if necessary to set the shape of the nose. Adjusting the core should "rock" the nose around a pivot of 44.3 MC ± 400 KC.	Symmetry of the nose is important. No portion of the nose should be out of symmetry by more than 3%.

FIG. 2 IF CURVE

GENERAL ELECTRIC Chassis MW, Service Information, Continued

4.5 MC TRAP ALIGNMENT

1. Connect a -7.5 bias to Test Point II, with the positive bias lead grounded to chassis.
2. Short Test Points X and XI together temporarily.
3. Connect DC VTVM (250V range) to Test Point III.
4. Turn contrast control to maximum, volume to minimum.
5. Connect the detector network shown in Figure 3 to Test Point IV and feed its output to an AC VTVM.
6. Apply a 4.5 MC AM signal through a 1000 μμf. capacitor at Test Point III.
7. Adjust the top core of T154 for minimum reading at Test Point IV. Two core positions will give a minimum indication. The correct one is nearest the top end of the coil form.
8. Adjust the bottom core of T154 for maximum reading at Test Point XII. Two core positions will give a maximum indication. The correct one is nearest the printed board.
9. Repeat 7 and 8.

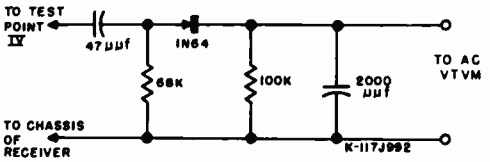
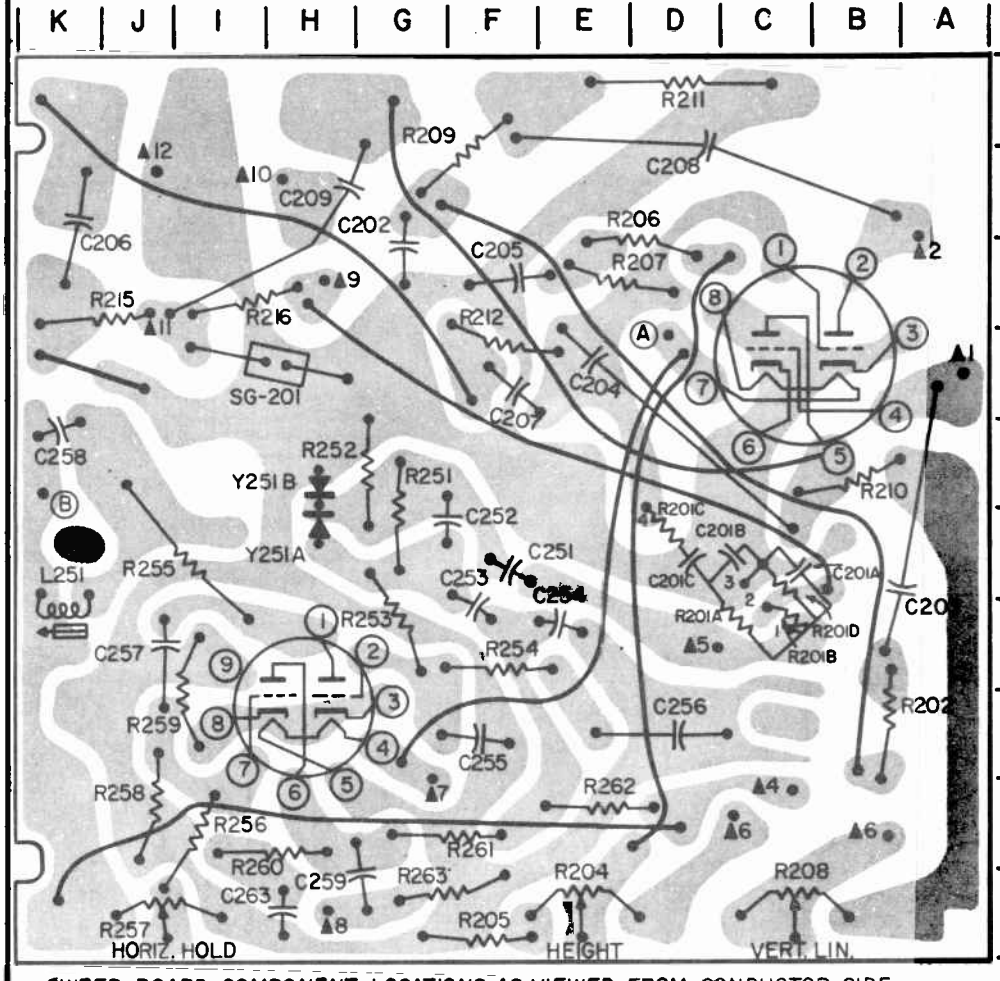


FIG. 3 DETECTOR NETWORK

AUDIO ALIGNMENT

1. Tune in a weak television signal and set the volume control to minimum.
2. Connect a DC VTVM to Test Point XII with the negative lead to chassis.
3. Adjust the bottom core of T154 and both cores of T301 for maximum. Ovserve previously outlined peaking procedures in tuning.
4. Switch to a strong television signal and turn the core of L301 to the end of the coil form away from the printed board. Then carefully tune inward for the SECOND meter dip. This is the point of maximum undistorted output.



SWEEP BOARD COMPONENT LOCATIONS AS VIEWED FROM CONDUCTOR SIDE

23 INCH SWEEP COMPONENT BOARD

SWEEP BOARD COMPONENT LOCATION

RESISTORS

R202	B8
R204	E10
R205	F10
R206	D2
R207	D3
R208	C10
R209	F1
R210	B5
R211	D1
R212	F4
R215	J3
R216	H3
R251	G5
R252	G5
R253	G7
R254	F7
R255	I6
R256	I9
R257	J10
R258	J9
R259	I8
R260	H9
R261	F9
R262	E9
R263	F10

CAPACITORS

C202	G3
C203	A6
C204	E4
C205	F3
C206	K2
C207	F4
C208	D2
C209	H2
C251	F6
C252	F6
C253	F7
C254	E7
C255	F8
C256	D8
C257	J7
C258	K5
C259	H10
C263	H10

MISCELLANEOUS

SG201	H4
RC201	C6
L251	K6
Y251	H5

NUMBERED (▲7) TRIANGLES

REPRESENT WIREWRAP TERMINALS ON COMPONENT BOARD FOR CONNECTION OF WIRES FROM POINTS INDICATED

- ▲1 VERTICAL HOLD CONTROL
- ▲2 BLUE LEAD OF T201
- ▲3 YELLOW LEAD OF T201 & C265+
- ▲4 C401B & L401 RED LEAD
- ▲5 Ⓓ ON I-F BOARD
- ▲6 VERTICAL HOLD CONTROL CENTER TERM
- ▲7 V16 PIN 8 & V13 PIN 7
- ▲8 R264 ON SWEEP CHASSIS
- ▲9 A10 ON I-F BOARD
- ▲10 YOKE TERM 3 & T201 RED LEAD
- ▲11 V16 PIN 3
- ▲12 T251 TERM 8

FOCUS POINTS

- B+ BOOST — ▲3
- HIGH B+ — ▲4
- LOW B+ — ▲9
- GROUND — TERM ON REAR APRON

ROMAN (VIII) NUMERALS

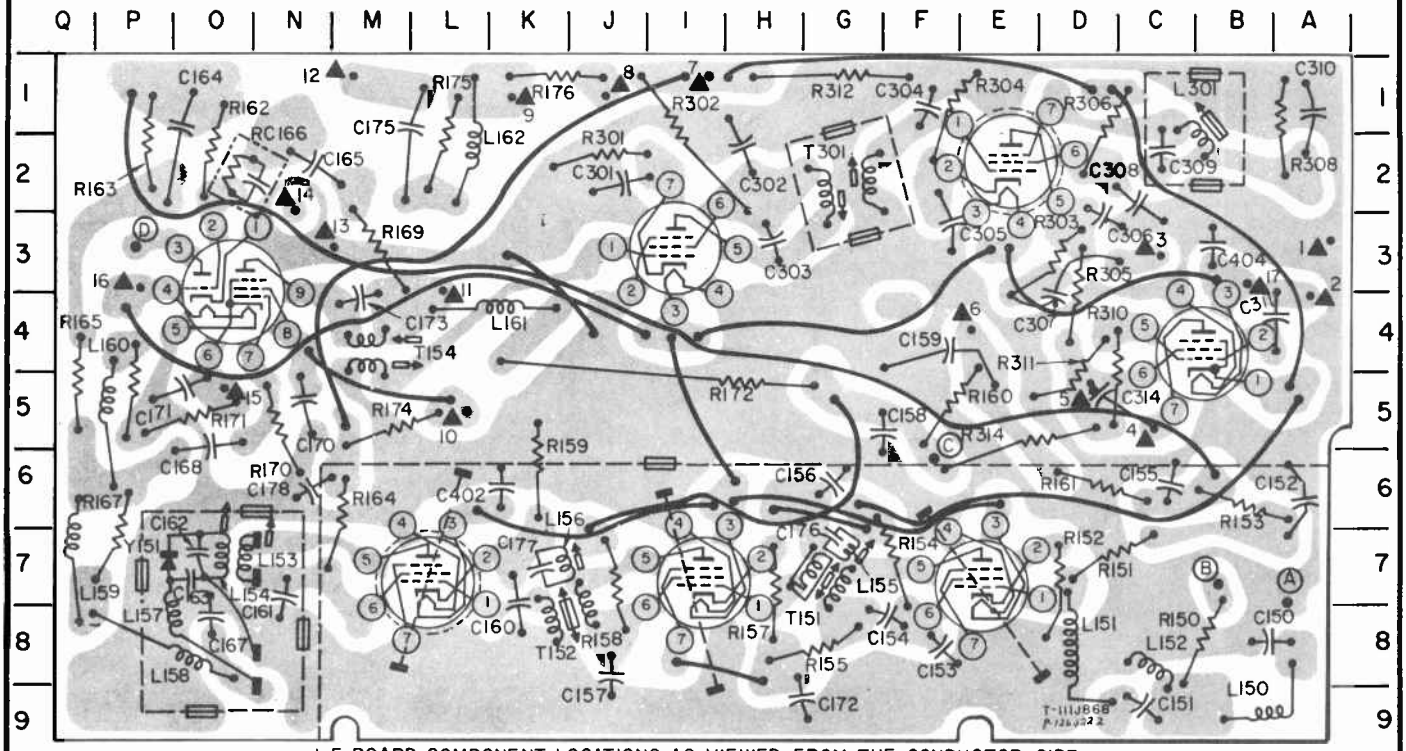
REPRESENT TEST POINTS

CIRCLED (A) LETTERS

REPRESENT WIRES ON BOARD CONNECTED TO POINTS INDICATED

- Ⓐ TO ▲16 ON I-F BOARD
- Ⓑ FUSE F251 TO C265 NEGATIVE TERM

GENERAL ELECTRIC Chassis MW, Component Boards, Continued



I-F BOARD COMPONENT LOCATIONS AS VIEWED FROM THE CONDUCTOR SIDE

I-F COMPONENT BOARDS

I-F BOARD COMPONENT LOCATION

NUMBERED (▲7) TRIANGLES
REPRESENT WIREWRAP TERMINALS ON COMPONENT BOARD FOR CONNECTION OF WIRES FROM POINTS INDICATED

- ▲1. SHIELD OF AUDIO CABLE FROM VOLUME CONTROL SHIELD OF REMOTE AUDIO CABLE (WHEN USED)
- ▲2. GREEN LEAD OF AUDIO CABLE FROM VOLUME CONTROL
- ▲3. YELLOW LEAD OF AUDIO CABLE FROM VOLUME CONTROL – GREEN LEAD OF REMOTE AUDIO CABLE (WHEN USED)
- ▲4. BLUE LEAD FROM T302-T303
- ▲5 C313+
- ▲6 AGC TERMINAL ON TUNER
- ▲7 C401C ▲8 C313 NEGATIVE TAB
- ▲8 BRIGHTNESS CONTROL CENTER TERMINAL
- ▲9 V16, PIN 7
- ▲10 TO ▲4 ON 19" SWEEP BOARD & C401D TO ▲9 ON 23" SWEEP BOARD & C401D
- ▲11. TO CONTRAST CONTROL
- ▲12 TO CONTRAST CONTROL CENTER
- ▲13. TO C169 NEGATIVE
- ▲14 GREEN LEAD FROM T401 F402 FROM ▲16
- ▲15 TO C169 POSITIVE
- ▲16. F402 FROM ▲14 TO Ⓐ ON SWEEP BOARD
- ▲17 TO 6.3V FIL. TERM. ON TUNER

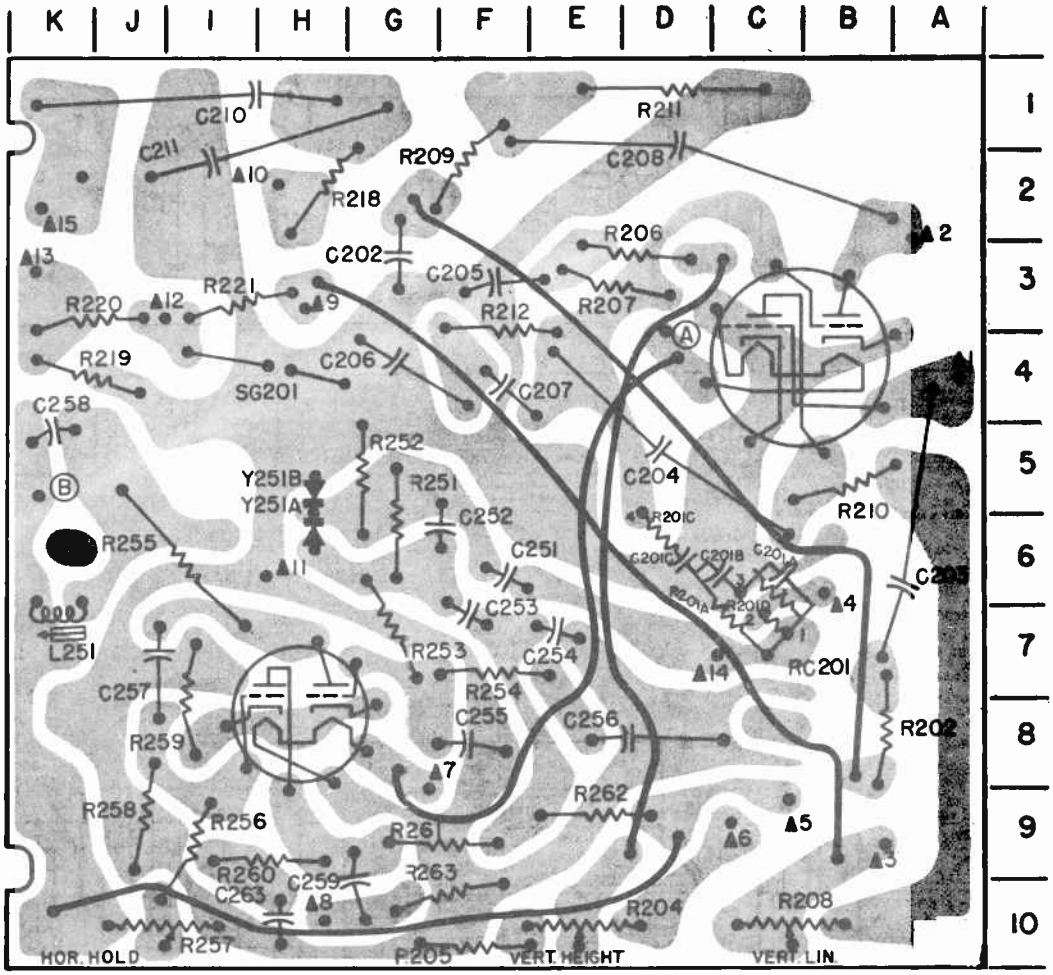
CIRCLED Ⓐ LETTERS
REPRESENT BOARD MOUNTED WIRES CONNECTED TO POINTS INDICATED

- Ⓐ SHIELD OF LEAD FROM TUNER
- Ⓑ CENTER CONDUCTOR OF TUNER SHIELDED LEAD
- Ⓒ C401B ■
- Ⓓ TO ▲5 ON 23" SWEEP BOARD TO ▲14 ON 19" SWEEP BOARD

ROMAN (Ⅴ) NUMERALS
REPRESENT TEST POINTS

RESISTORS	CAPACITORS	CAPACITORS (CONT'D)	MISCELLANEOUS (CONT'D)
R150 - B8	C150 - A8	C310 - A1	
R151 - C7	C151 - C9	C311 - A4	V6 - O3
R152 - D7	C152 - A6	C312 - B5	V7 - I3
R153 - B6	C153 - F8	C314 - D5	V8 - E2
R154 - F7	C154 - F8	C402 - K6	V9 - B4
R155 - G8	C155 - C6	C404 - B3	
R157 - H8	C156 - G6		
R158 - J7	C157 - J8	COILS & TRANSFORMERS	TRIANGLE NUMBERS
R159 - K5	C158 - F5		
R160 - F5	C159 - F4	L150 - A9	1 - A3
R161 - C6	C160 - K8	L151 - D8	2 - A3
R162 - O1	C161 - N7	L152 - C8	3 - C3
R163 - P1	C162 - O7	L153 - N7	4 - C5
R164 - M6	C163 - O7	L154 - O7	5 - D6
R165 - Q5	C164 - O1	L155 - G7	6 - E4
R167 - P7	C165 - N2	L156 - K7	7 - I1
R168 - P4	C167 - O8	L157 - O8	8 - J1
R169 - M3	C168 - O5	L158 - O8	9 - K1
R170 - N5	C170 - N5	L159 - Q6	10 - L5
R171 - O5	C171 - O5	L160 - P5	11 - L4
R172 - H5	C172 - G9	L161 - K4	12 - M1
R174 - M5	C173 - M4	L162 - L2	13 - M3
R175 - L1	C175 - L1	L301 - B1	14 - N2
R176 - K1	C176 - G7	T151 - G7	15 - O5
R301 - J2	C177 - K7	T152 - J8	16 - P3
R302 - I1	C178 - N6	T154 - M4	
R303 - D3	C301 - J2	T301 - G2	
R304 - F1	C302 - H2		
R305 - D3	C303 - H3	MISCELLANEOUS	
R306 - D1	C304 - F1		
R308 - A2	C305 - E3	RC166 - O2	
R310 - C5	C306 - C3	Y151 - P7	
R311 - D4	C307 - D4	V3 - E7	
R312 - G1	C308 - C2	V4 - H7	
R314 - D5	C309 - C2	V5 - L7	

GENERAL ELECTRIC Chassis MW, Component Boards, Continued



SWEEP BOARD COMPONENT LOCATIONS AS VIEWED FROM CONDUCTOR SIDE

COMPONENT LOCATION

RESISTORS	CAPACITORS
R202 - B8	C202 - G3
R204 - E10	C203 - A6
R205 - F10	C204 - D5
R206 - D3	C205 - F3
R207 - E3	C206 - G4
R208 - C10	C207 - F4
R209 - F2	C208 - D2
R210 - B5	C210 - I1
R211 - D1	C211 - I2
R212 - F3	C251 - F6
R218 - H2	C252 - G6
R219 - K4	C253 - F6
R220 - K3	C254 - E7
R221 - I3	C255 - F8
R251 - G5	C256 - E8
R252 - G5	C257 - J7
R253 - G7	C258 - K4
R254 - F7	C259 - H9
R255 - I6	C263 - H10
R256 - I9	
R257 - J10	MISCELLANEOUS
R258 - J9	
R259 - I8	RC201 - C6
R260 - H9	SG201 - H4
R261 - G9	L251 - K7
R262 - E9	Y251 - H5
R263 - G9	

19 INCH SWEEP COMPONENT BOARDS

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)

▲4. TO ▲10 ON IF BOARD & PIN 5, V16
▲5. TO C401B & RED LEAD OF L402
▲6. TO VERT. HOLD CONTROL ARM
▲7. TO V16, PIN 1 & DRIVER-DAMPER FIL.

▲8. TO R264 - DRIVER-DAMPER ASSEM.
▲9. TO TERM. 4 OF YOKE; TO C265 + & YELLOW LEAD OF T201
▲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 & PIN 6, V16
▲14. TO I-F BOARD (PIN 3, 6CX8)
▲15. TO TERMINAL 8 ON T251

ROMAN VIII NUMERALS

REPRESENT TEST POINTS

CIRCLED (A) LETTERS

REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

(A) TO FIL FUSE & (PIN 4, 6CX8) I-F BOARD

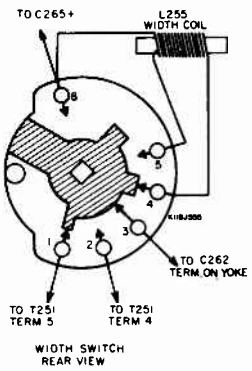
(B) TO F251

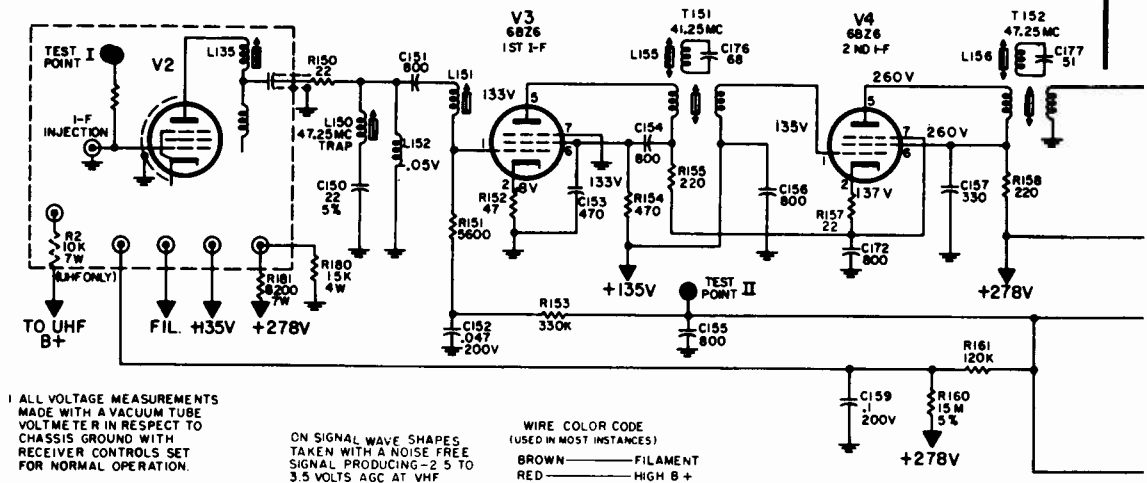
WIRE COLOR CODE

(USED IN MOST INSTANCES)

BROWN — FILAMENT
RED — HIGH B+
ORANGE — LOW B+
RED/WHITE — B+ BOOST
WHITE — AGC

GENERAL ELECTRIC Chassis MW Schematic Diagram





1. ALL VOLTAGE MEASUREMENTS MADE WITH A VACUUM TUBE VOLTMETER IN RESPECT TO CHASSIS GROUND WITH RECEIVER CONTROLS SET FOR NORMAL OPERATION.
2. WITH LINE VOLTAGE MAINTAINED AT 120 VAC MEASUREMENTS SHOWN MAY DEVIATE ± 10%.
3. VOLTAGES SHOWN MADE WITH THE SELECTOR KNOB SWITCHED TO A CHANNEL WITH NO SIGNAL AND THE ANTENNA TERMINALS SHORTED & GROUNDED
4. RESISTANCE MEASUREMENTS MADE WITH COMPONENTS DISCONNECTED.
- VARIES WITH CONTROL SETTINGS.

ON SIGNAL WAVE SHAPES 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

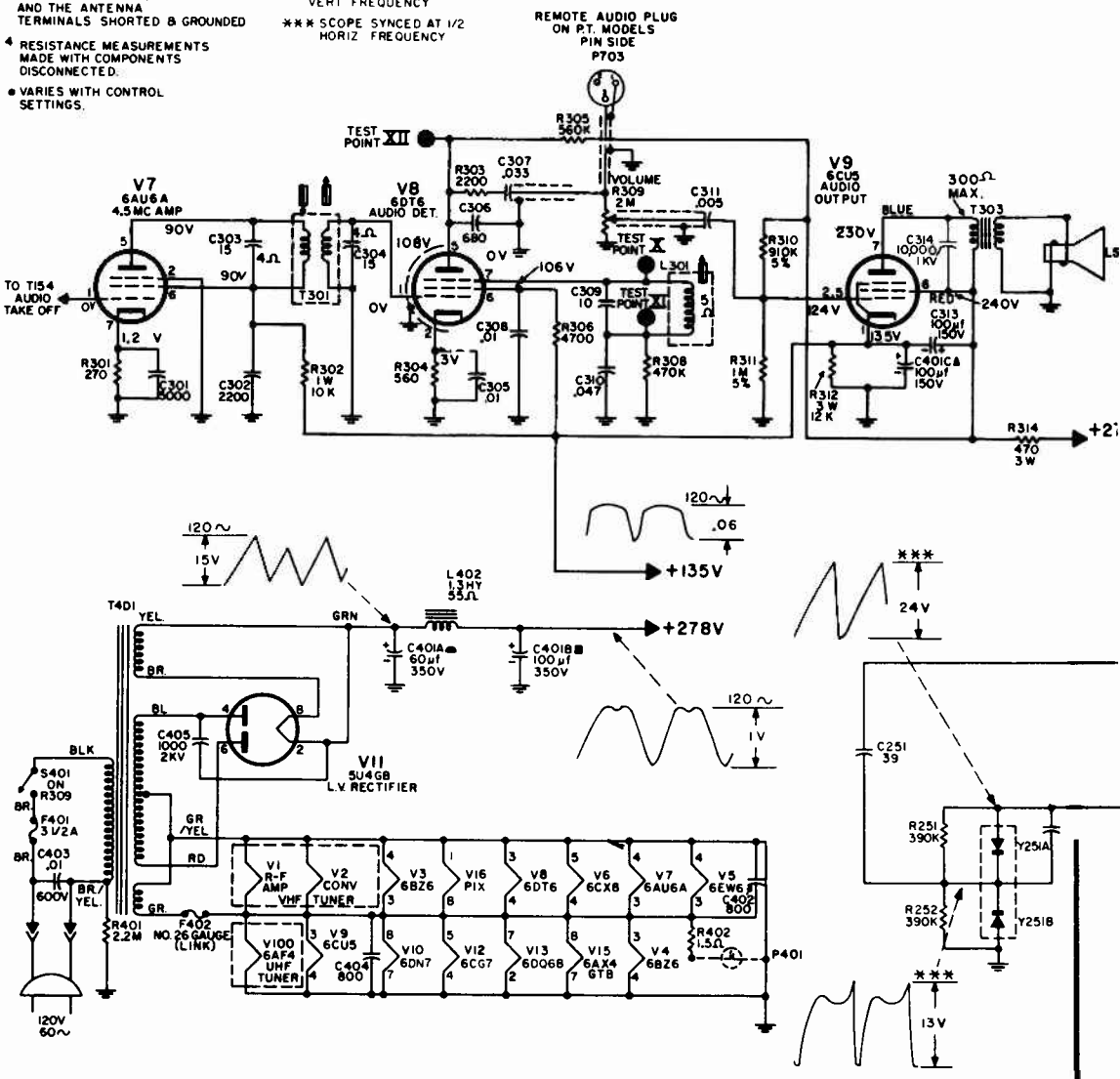
** SCOPE SYNCED AT 1/2 VERT FREQUENCY

*** SCOPE SYNCED AT 1/2 HORIZ FREQUENCY

WIRE COLOR CODE (USED IN MOST INSTANCES)

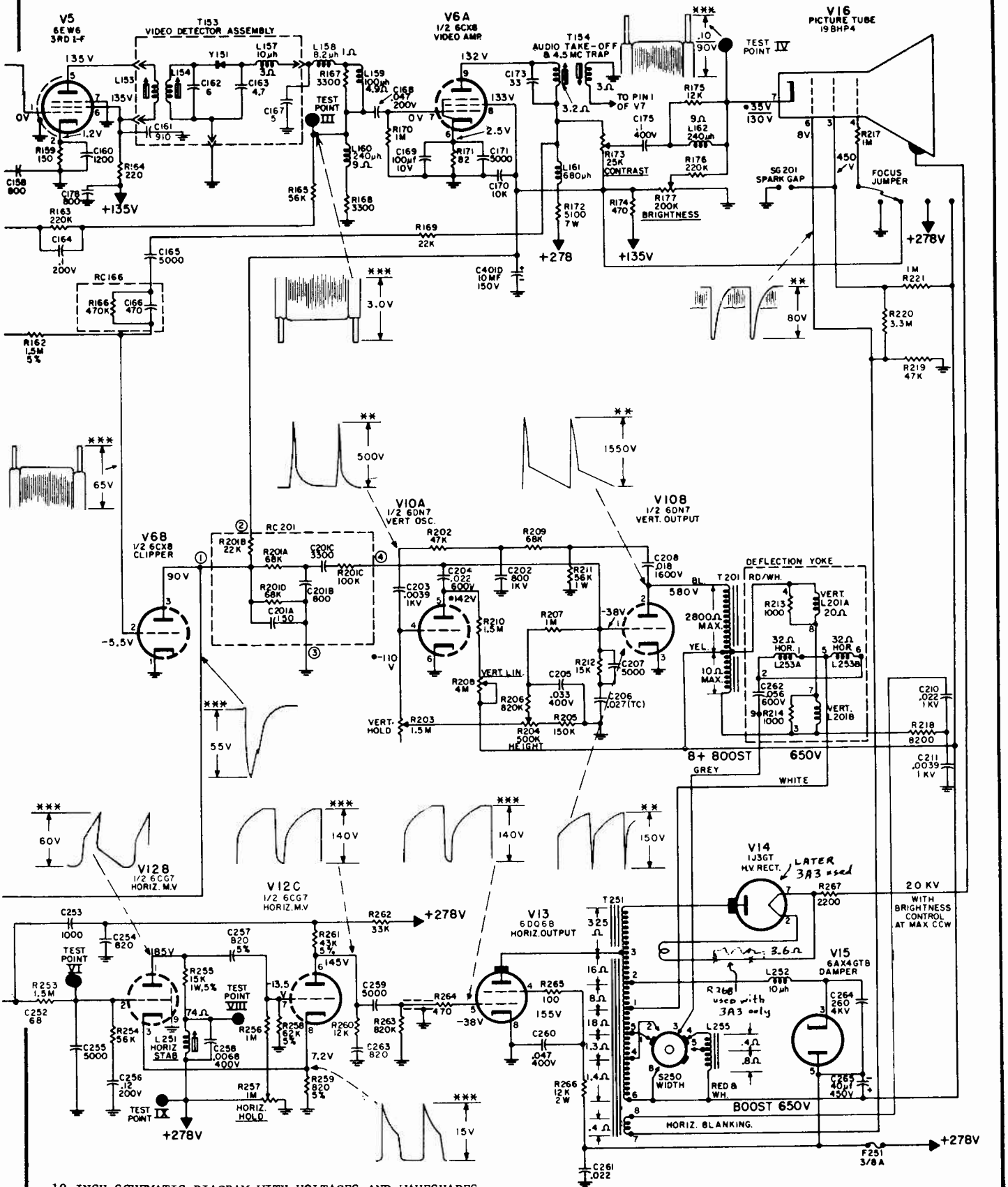
BROWN	FILAMENT
RED	HIGH B+
ORANGE	LOW B+
RED & WHITE	B+ BOOST
WHITE	AGC

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



While many of the features listed in the MW Preliminary are common for both the 19 and 23 inch MW models, some 23 inch models have additional features such as a separate tone control; bass boost; multiple speakers; a speaker jack mounted on the back of the receiver; and on the 23 inch models blanking injection to the picture tube is different from that used on 19 inch receivers. Models M780-M781 are the new TV-Phono/Stereo-Radio home entertainment center that utilizes a slightly modified 23 inch MW chassis.

GENERAL ELECTRIC Chassis MW, Schematic Diagram, Continued



19 INCH SCHEMATIC DIAGRAM WITH VOLTAGES AND WAVESHAPES

GENERAL ELECTRIC Chassis MW, Production Changes, Continued

MAIN CHASSIS PRODUCTION CHANGES

CHANGE NO.	SYMBOL or COMPONENT	ORIGINAL COMPONENT	CHANGE	REMARKS	CHASSIS CODE 19"	CHASSIS CODE 23"
1.	R176	180,000Ω	150,000Ω	Changed on 23" to increase beam current of CRT		117MW
2.	Y251 A/B	Dual Selenium Unit (ET16X7)	Individual Silicon Diodes (ET16X11)	Change was made for more reliability	125MW	123MW
	C252	68μμf (ET18X325)	56μμf (ET18X239)			
3.	V14	IJ3	3A3	See Note 1, below	125MW	125MW
	R268		added 3.6Ω, 1/2W (ET14X139)			
4.	C266		added 100μμf (ET18X311)	Capacitor added to reduce picture top curl (See Note 2, below)	127MW	125MW
5.	R402	1.5Ω	Deleted		126MW	127MW
6.	R263	820,000Ω	560,000Ω	Change made to avoid overdissipation of V13 grid	128MW	128MW
7.	R181	8200Ω, 7W	Deleted	With this change R180 is now connected from B+ 135V to the tuner R-F B+ input	129MW	129MW
	R312	12,000Ω, 3W				
	R180	15,000Ω, 4W	2200Ω, 2W			
	R160	15 MegΩ	16 MegΩ			
8.	C170	10,000μμf (ET22X50)	Deleted		133MW	133MW
	C171	5,000μμf (ET22X67)				
9.	C305	10,000μμf	5,000μμf		134MW	134MW
	C308	10,000μμf (ET22X22)	5,000μμf (ET22X167)			
10.	R2	10,000Ω, 7W (ET14X126)	15,000Ω, 4W (ET14X145)	Change made to decrease UHF radiation. (See note 3 below, and change 12)	125MW	125MW
11.	R316 (Models M780 & M781)	10,000Ω	15,000Ω	Change made to increase audio output		137MW
12.	R2	15,000Ω, 4W (ET14X145)	12,000Ω, 7W (ET14X104)	(See note 3 below)	139MW	139MW

NOTES

1. With the change of V14, three turns of filament winding are used on the high voltage transformer. The additional resistor (R268) is in series with the winding & tube filament.
2. Capacitor C266 is added from pin 7 of the horizontal output transformer to the junction of R263-R264 and is mounted on the sweep circuit board.
3. If replacement of R2 becomes necessary, replace with the 15,000Ω unit (ET14X145) except where the UHF tuner is stamped EN78, then the 12,000Ω (ET14X104) unit is used.

MAIN CHASSIS PRODUCTION CHANGES INVOLVING COMPACTRONS

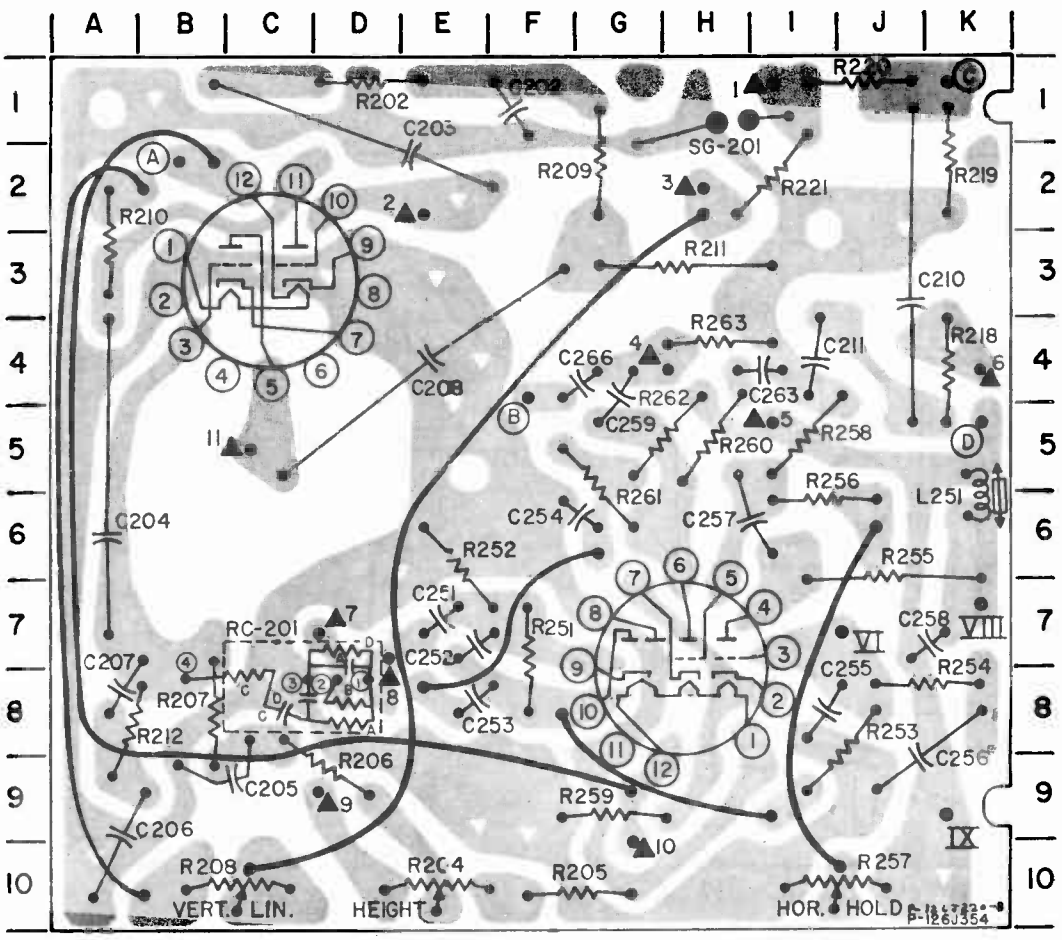
Beginning with chassis code 144M for 23" chassis and code 147MW for 19", a series of changes are made to the MW chassis. These changes consist of slightly altering the horizontal and vertical circuits to utilize COMPACTRONS, and changing the power transformer to facilitate a different fusing method.

There are five COMPACTRONS involved in the change from previous tube types (see figures). These changes are made in two steps as follows:

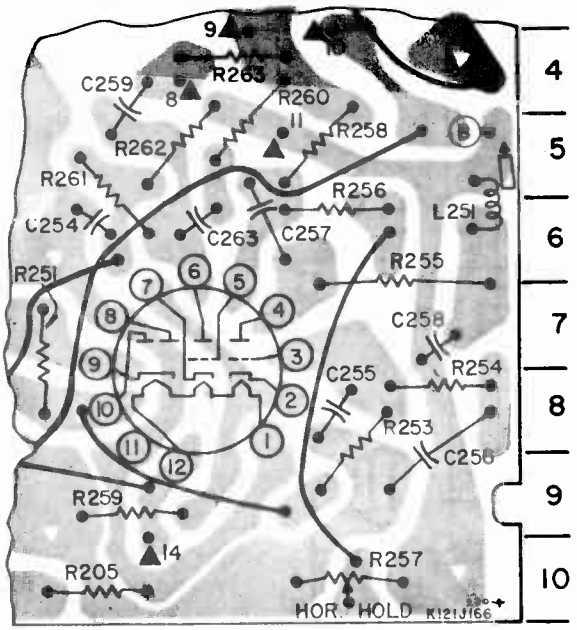
1. The etched circuit board along with some components, are changed to utilize a 6FJ7 COMPACTRON for the vertical oscillator-output; and a 6B10 COMPACTRON for the horizontal multivibrator-phase detector.
2. The horizontal output tube (V13), high voltage rectifier (V14), and damper tube (V15), are changed to the following COMPACTRONS: V13-6GE5, V14-2AH2, & V15-6AX3.

Since all of the above changes are not made simultaneously, the rear apron of the chassis (near the AC interlock) is coded with a color line. Where the color line on the chassis is blue, yellow, or green, the background of the tube location label is also colored to match the color used on the chassis, as follows:

GENERAL ELECTRIC Chassis MW, Production Changes, Continued



Component view of 19" sweep board w/COMPACTRONS



Partial sweep board for 23" Receivers w/stamping EN118A

NUMBERED (▲7) TRIANGLES

REPRESENT WIREWRAP TERMINALS ON COMPONENT BOARD FOR CONNECTION OF WIRES FROM POINTS INDICATED.

FOR 23" RECEIVERS
2. TO PIN 3 OF V16
3. TO VERT. HOLD CONTROL R203
4. TO R217 & ▲10 ON I-F BOARD
5. TO RED LEAD OF T201 & YOKE PIN 3
6. TO BLUE LEAD OF T201
7. TO PIN 7 OF T251
8. TO R264
9. TO PIN 8 OF T251.
10. TO YELLOW LEAD OF T201 & C265+
11. TO RED LEAD OF L401 & C401B
12. TO (D) ON I-F BOARD
13. TO ARM OF VERT. HOLD CONTROL R203
14. TO PIN 8 OF V16 & FILAMENTS OF V13 & V15

FOR 19" RECEIVERS
1. TO PIN 3 OF V16
2. TO VERT. HOLD CONTROL R203
3. TO C265+, YELLOW LEAD OF T201, & YOKE
4. TO R264
5. TO RED LEAD OF L401 & C401B
6. TO RED LEAD OF T201 & YOKE
7. TO R217 & ▲10 ON I-F BOARD
8. TO (D) ON I-F BOARD
9. TO VERT. HOLD CONTROL ARM
10. TO PIN 1 OF V16 & V13, FILAMENT OF V15
11. TO BLUE LEAD OF T201

CIRCLED (A) LETTERS

WIRES ON BOARD CONNECTED TO POINTS INDICATED.

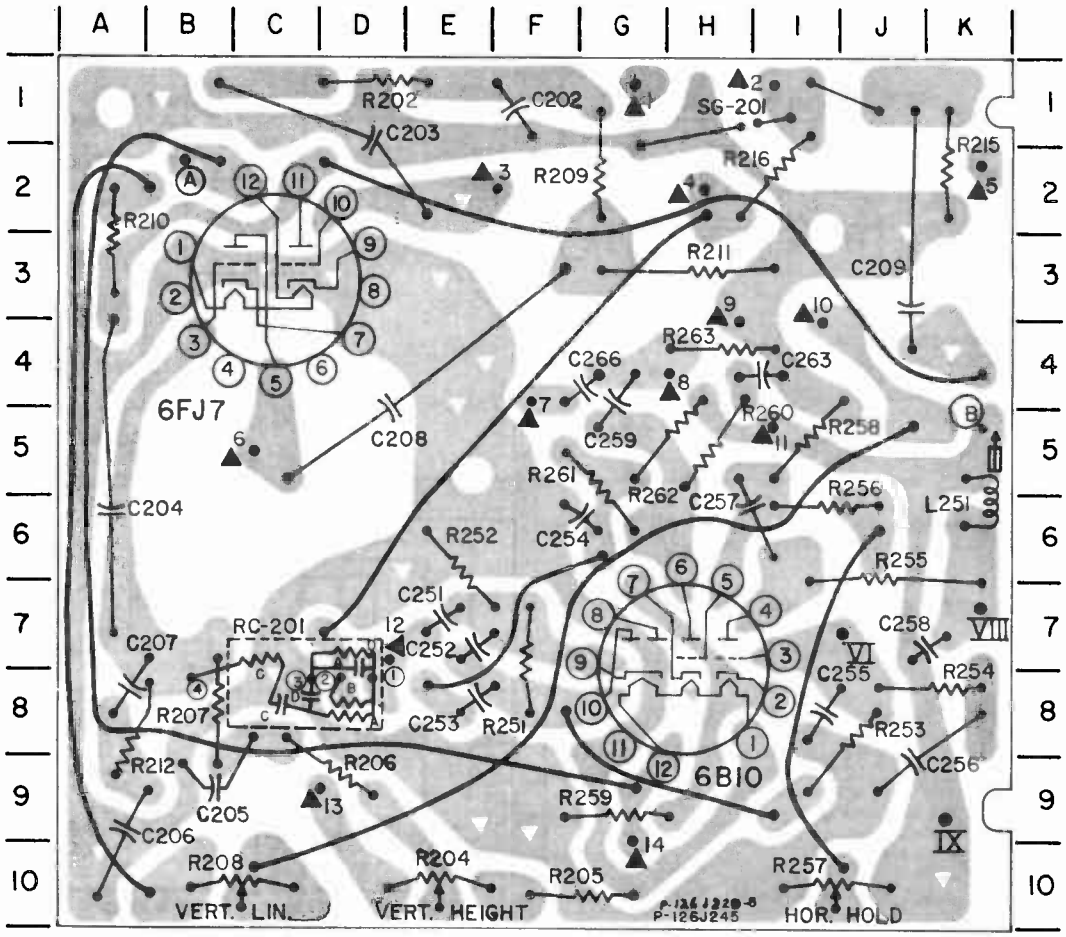
FOR 23" RECEIVERS
(A) TO ▲16 (FIL. FUSE) ON I-F BOARD
(B) TO C265 NEG. TERM.

FOR 19" RECEIVERS
(A) TO ▲16 ON I-F BOARD
(B) TO PIN 7 OF T251
(C) TO PIN 8 OF T251
(D) TO C265 NEG. TERM.

COMPONENT LOCATION

RESISTORS	CAPACITORS
R202-D1	C202-F1
R205-F10	C203-D1
R206-C9	C204-A6
R207-B8	C205-B9
R209-G2	C206-A9
R210-A2	C207-A7
R211-H3	C208-D4
R212-A8	C209-J3 (23")
R215-K1 (23")	C210-J3 (19")
R216-I2 (23")	C251-E7
R218-K4 (19")	C252-E7
R219-K2 (19")	C253-E8
R220-J1 (19")	C254-F6
R221-I2 (19")	C255-J8
R251-F7	C256-K9
R252-E6	C257-H5
R253-J8	C258-K7
R254-K8	C259-G5
R255-J6	C263-I4
R256-I6	C266-G4
R258-I5	**MISC**
R259-G9	V10-C3
R260-H5	V12-H7
R261-G6	R204-E10
R262-H5	R208-B10
R263-H4	R257-J10
	L251-K5

GENERAL ELECTRIC Chassis MW, Production Changes, Continued

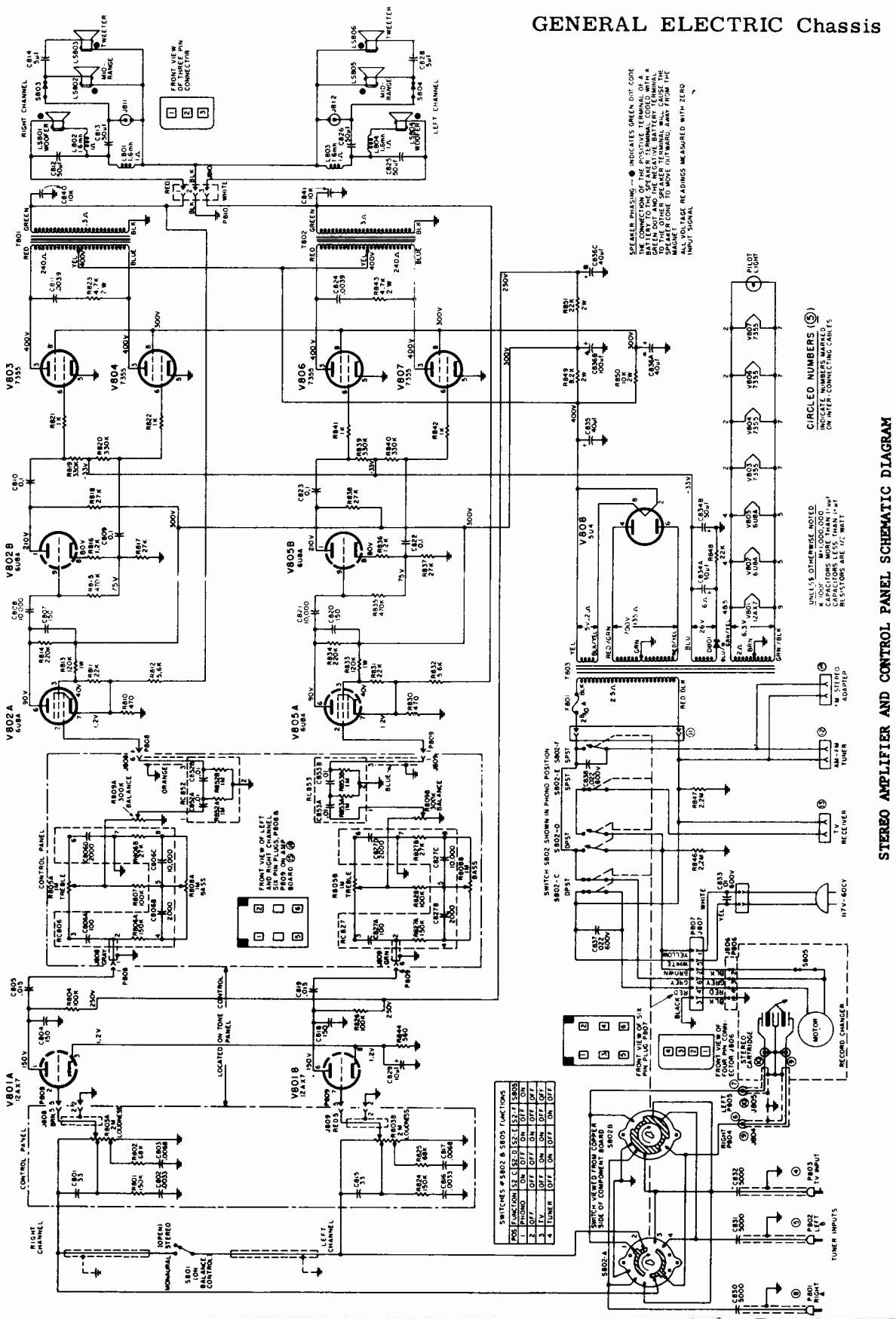


Component view of 23" sweep board w/COMPACTRONS

COMPACTRON AND FUSING CHANGES

CHANGE NO.	SYMBOL or COMPONENT	ORIGINAL COMPONENT	CHANGE	REMARKS	CHASSIS CODE
16. Sweep Circuit Board	V10	6DN7 Tube	6FJ7 COMPACTRON	See Figures. Sweep circuit board layouts	Beginning with code 144MW for 23" and code 147MW for 19". (Chassis are additionally color coded, see identification chart above.) Blue Green Yellow & Black Color Code
	V12	6CG7 Tube	6B10 COMPACTRON		
	R251	390,000Ω	680,000Ω		
	R252	390,000Ω	470,000Ω		
	R256	1 Meg.	1.2 Meg.		
	R259	820, 5%	910, 5%		
	R262	33,000Ω	27,000Ω		
	R263	560,000Ω	470,000Ω	See Note 1	
	C251	39μμf (ET18X285)	30μμf (ET18X434)		
	C252	56μμf (ET18X239)	68μμf (ET18X325)		
	C257	820μμf (ET19X64)	910μμf (ET19X80)		
	C258	.00068μf (ET25X29)	.00068μf, temp. comp. (ET25X46)	Changed on 19" only	
	C263	820μμf, cer. (ET22X37)	.00082μf, molded (ET26X67)		
	C266	100μμf	Not used, (23" w/ EN118A Stamp only)	See Note 1	

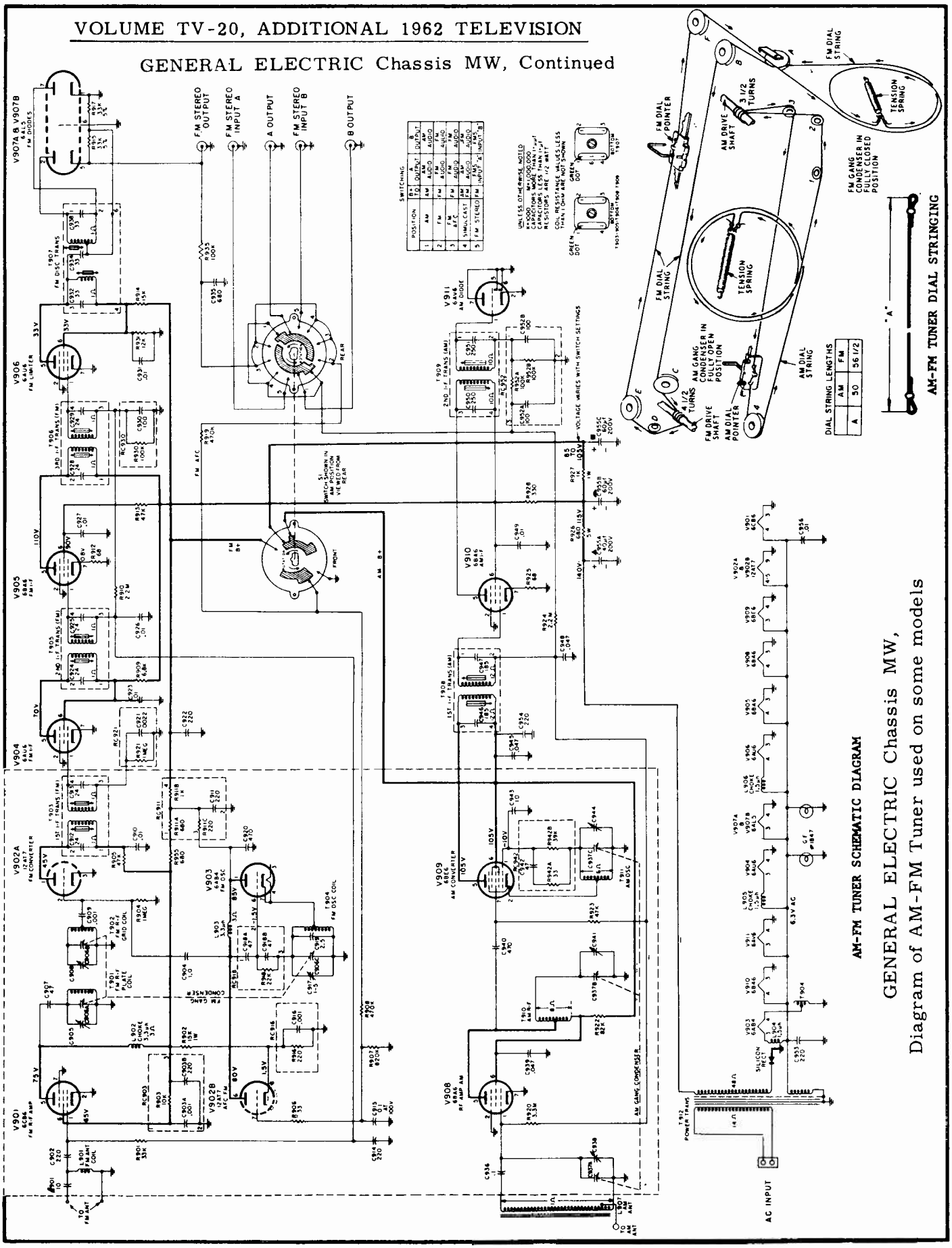
GENERAL ELECTRIC Chassis MW



GENERAL ELECTRIC CHASSIS MW, Diagram of Stereo Amplifier and Control Panel

STEREO AMPLIFIER AND CONTROL PANEL SCHEMATIC DIAGRAM

GENERAL ELECTRIC Chassis MW, Continued



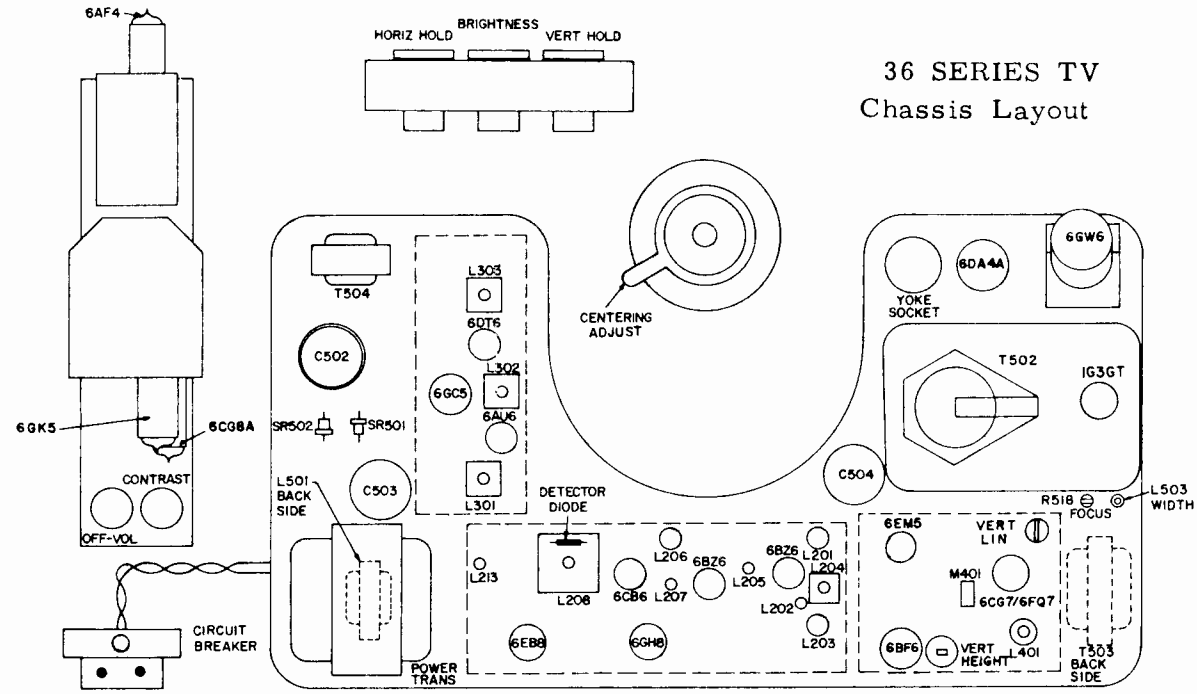
GENERAL ELECTRIC Chassis MW,
Diagram of AM-FM Tuner used on some models

Magnavox

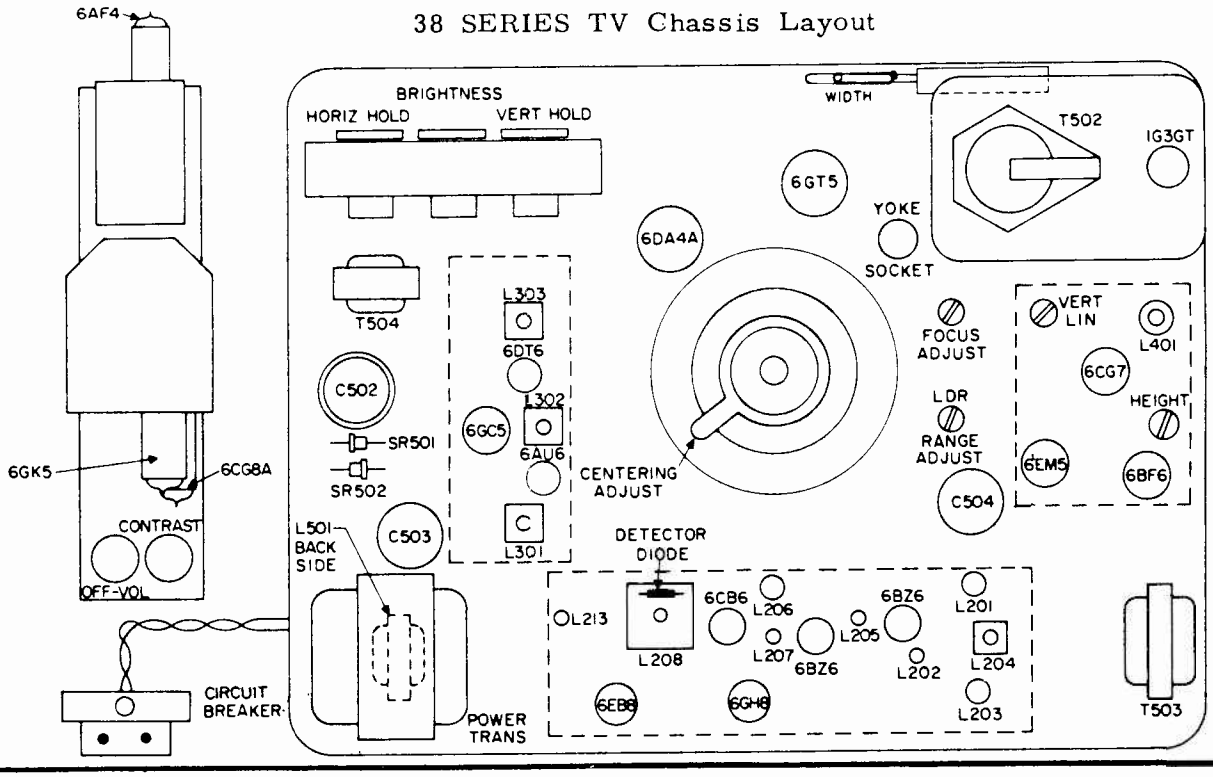
36 SERIES TV, 38 SERIES TELEVISION CHASSIS

(Material on pages 39 through 46)

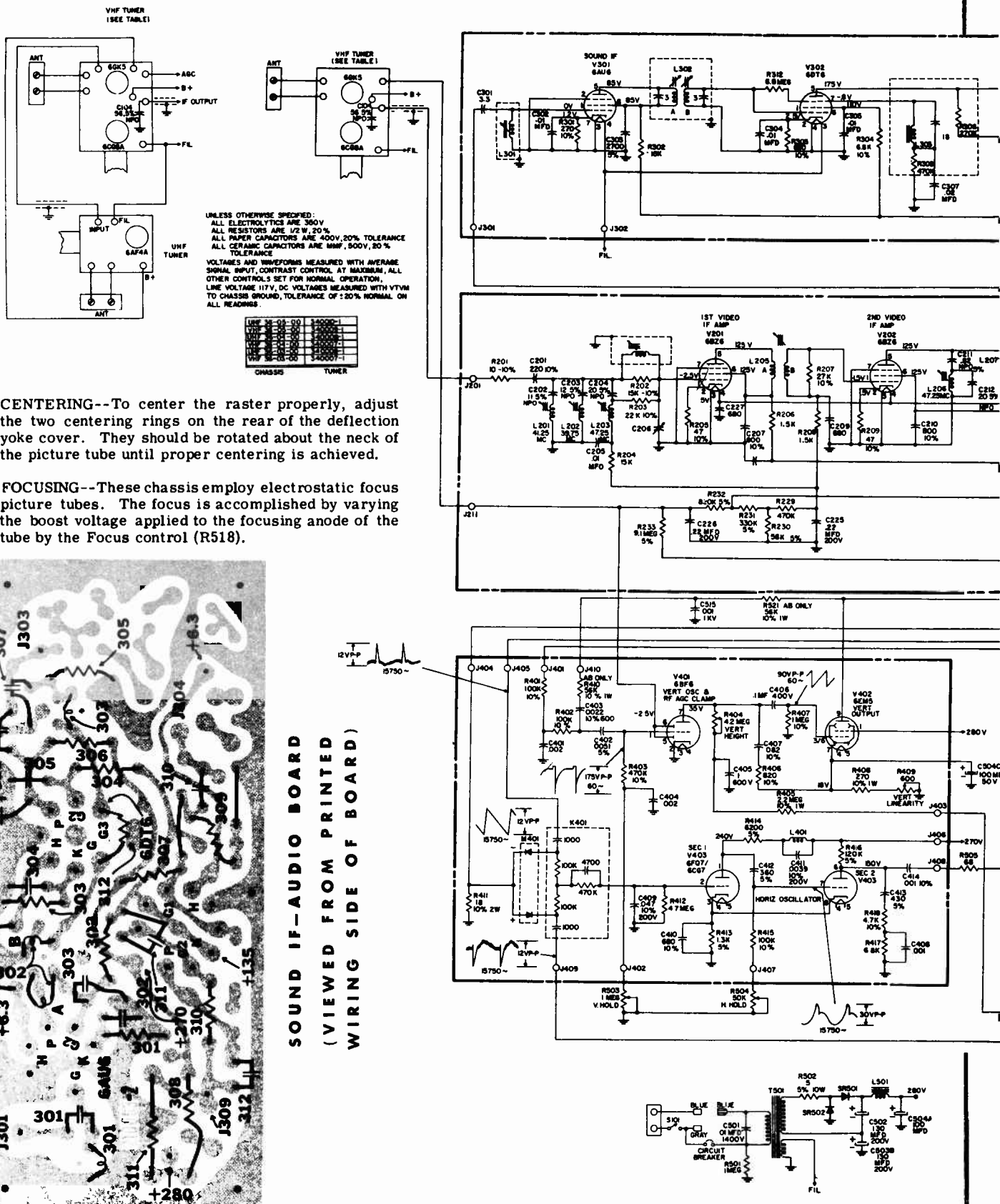
36 SERIES TV
Chassis Layout



38 SERIES TV Chassis Layout



MAGNAVOX Chassis 36-01, 36-03, 36-04, 36-05, Schematic Diagram



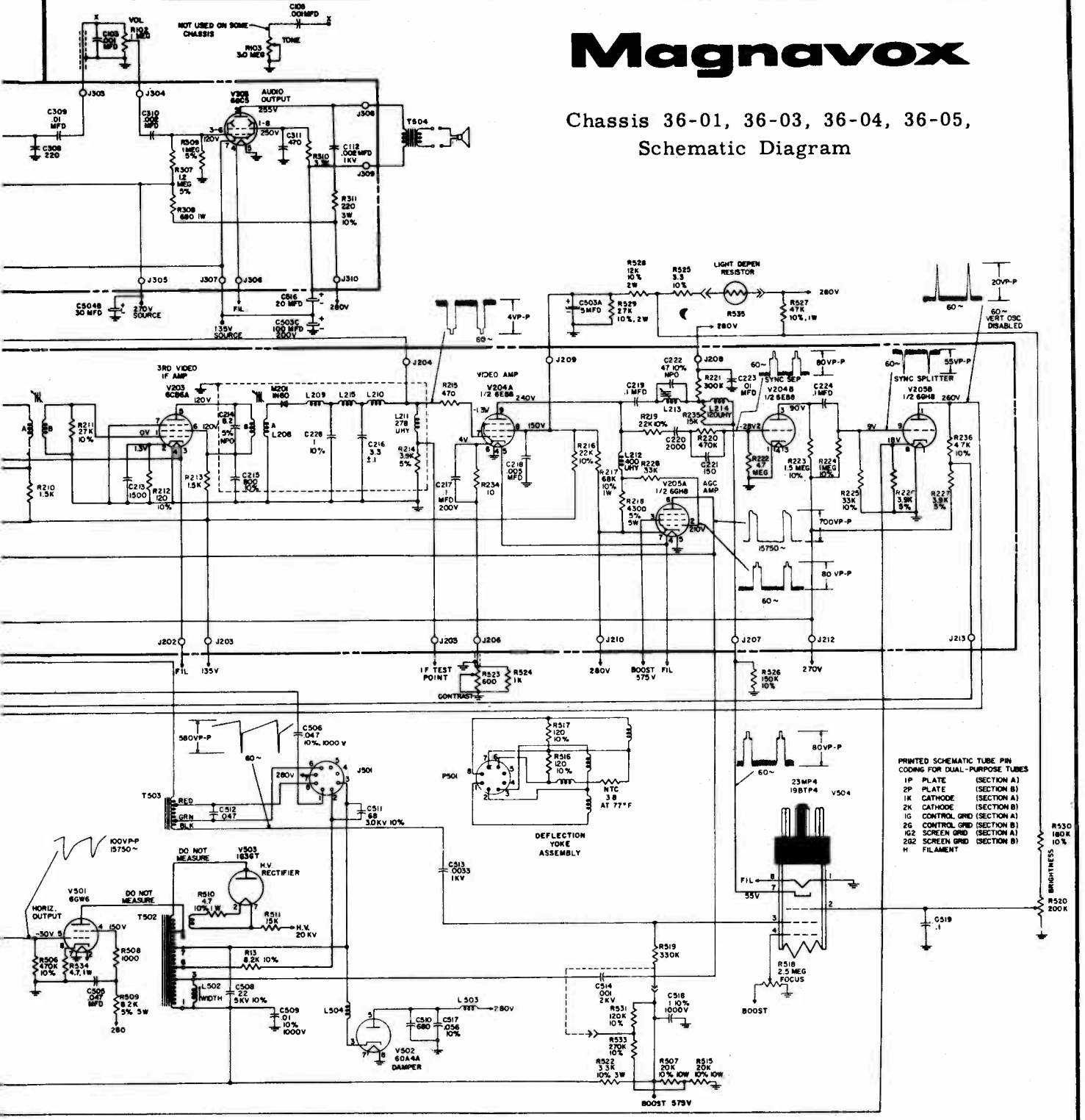
CENTERING--To center the raster properly, adjust the two centering rings on the rear of the deflection yoke cover. They should be rotated about the neck of the picture tube until proper centering is achieved.

FOCUSING--These chassis employ electrostatic focus picture tubes. The focus is accomplished by varying the boost voltage applied to the focusing anode of the tube by the Focus control (R518).

SOUND IF-AUDIO BOARD (VIEWED FROM PRINTED WIRING SIDE OF BOARD)

Magnavox

Chassis 36-01, 36-03, 36-04, 36-05,
Schematic Diagram

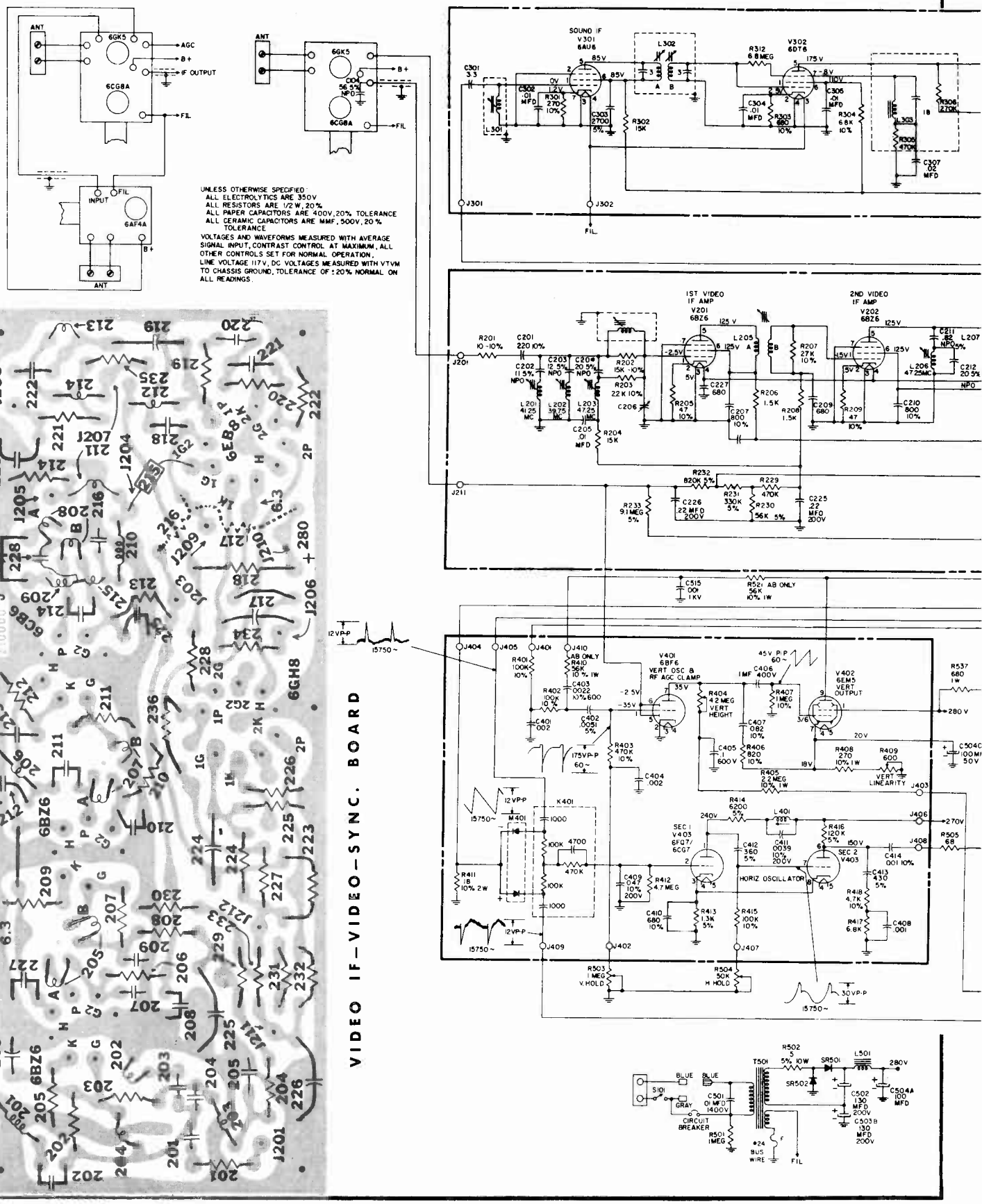


ADJUSTMENT

LDR RANGE ADJUST--The following procedures assumes that the adjustment would be made under normal (a bright light) conditions where it would not be possible to darken the room.

As a preliminary step, set this control to the maximum clockwise position. Adjust the Contrast and Brightness Controls for what would be a normal picture in semi-darkness. A semi-darkness condition, insofar as the amount of light striking the LDR, can be assimilated by placing your hand flat over the window of the LDR. Check the contrast to brightness ratio under bright light conditions by removing your hand. If the picture appears too light rotate the LDR Range Adjust slightly counter-clockwise. Repeat the above procedure until the contrast to brightness ratio remains constant throughout the variation of room lighting.

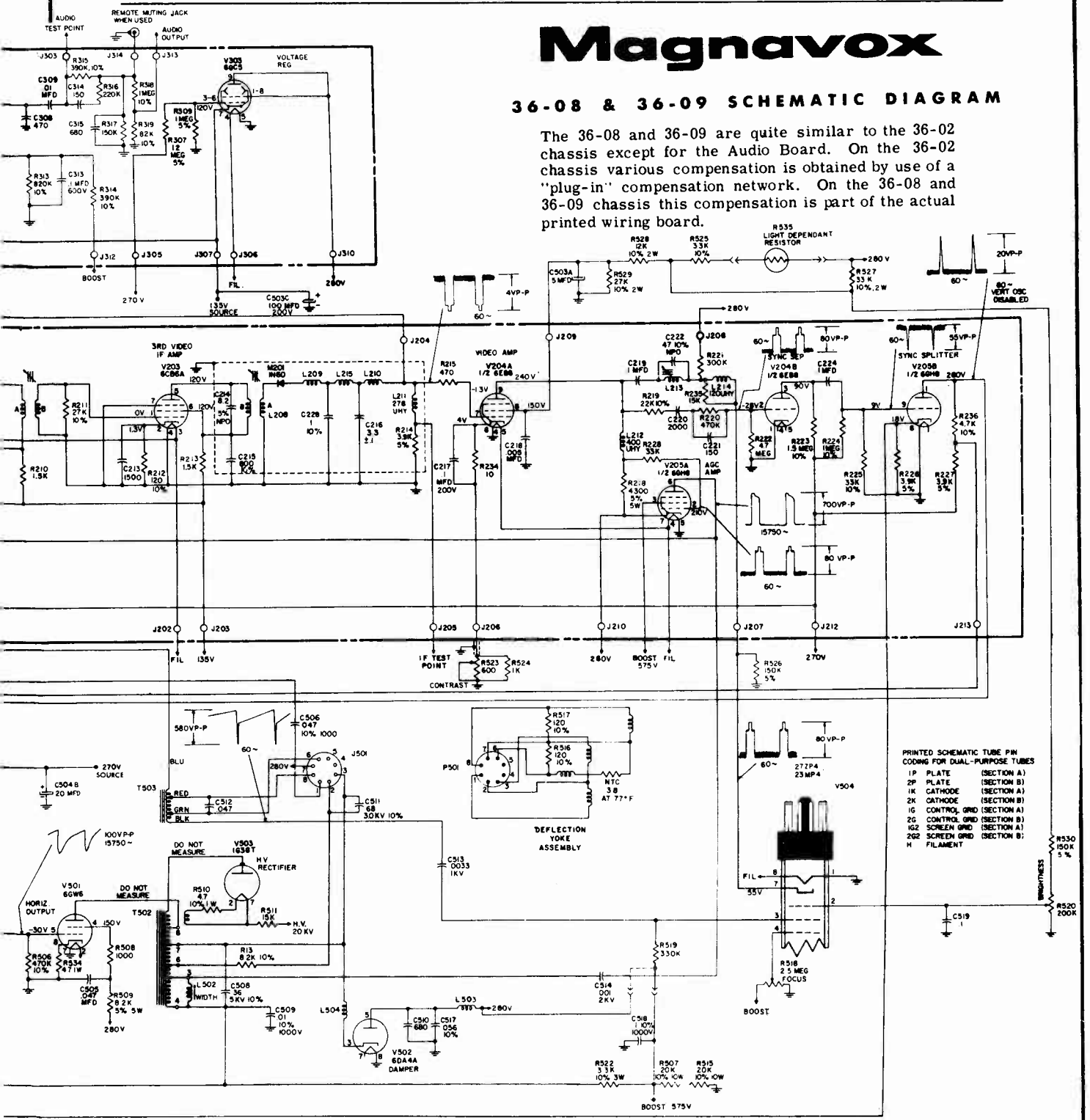
MAGNAVOX Chassis 36-02, 36-08, 36-09, Schematic Diagram



Magnavox

36-08 & 36-09 SCHEMATIC DIAGRAM

The 36-08 and 36-09 are quite similar to the 36-02 chassis except for the Audio Board. On the 36-02 chassis various compensation is obtained by use of a "plug-in" compensation network. On the 36-08 and 36-09 chassis this compensation is part of the actual printed wiring board.

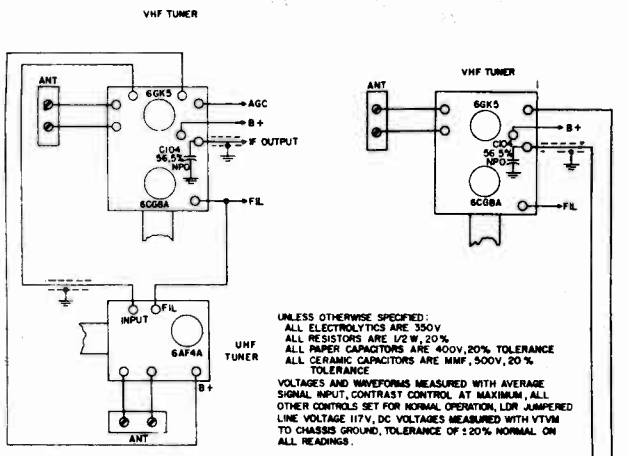


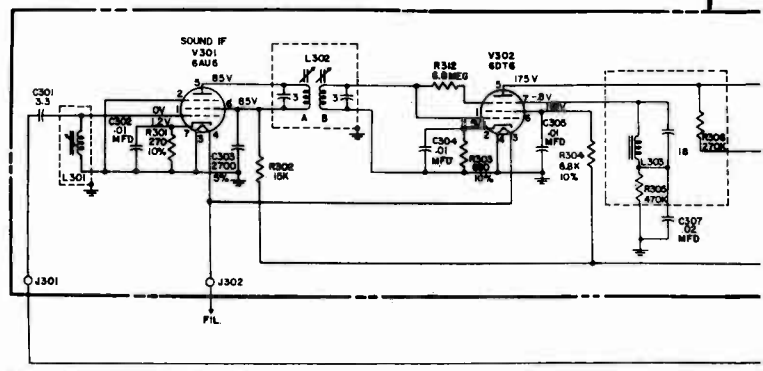
PICTURE WIDTH--Adjust the Width control (use a hex tip alignment tool) until the raster is just slightly wider than necessary to fill the mask opening.

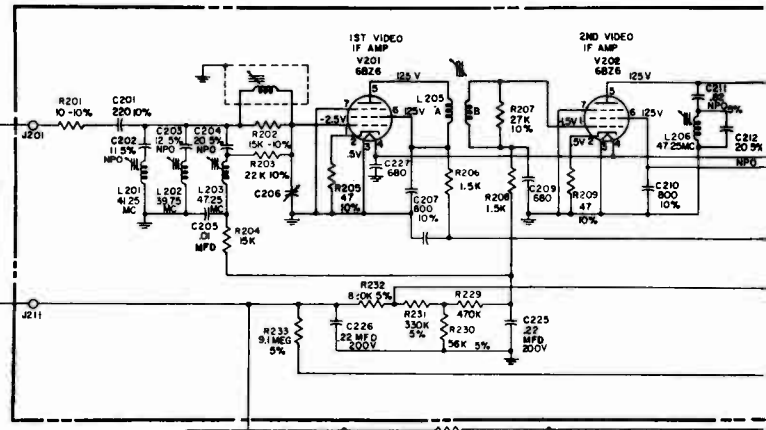
VERTICAL LINEARITY AND HEIGHT--Adjust the height and vertical linearity so that the picture slightly overfills the mask with the linearity uniform from top to bottom on all available channels. Adjustment of either of these controls may necessitate adjustment of the vertical hold.

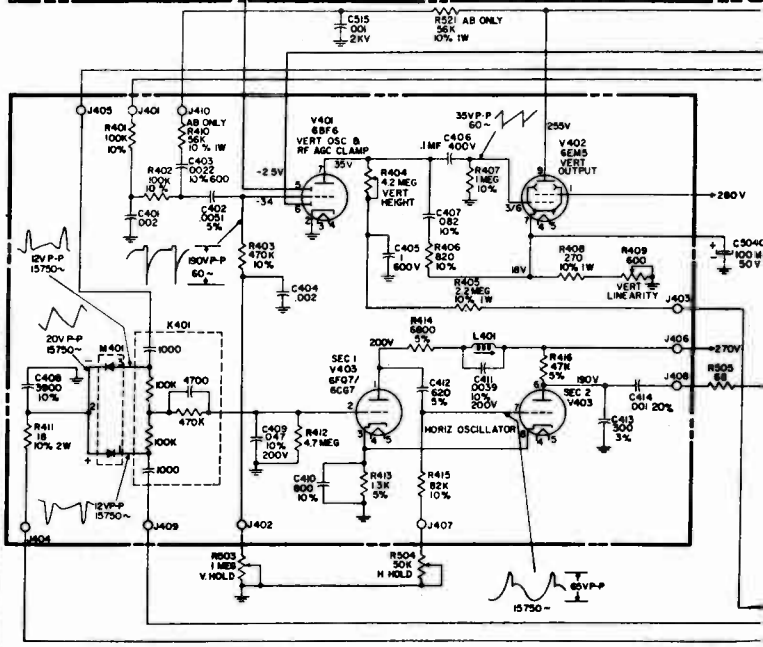
HORIZONTAL OSCILLATOR--Turn the Horizontal Hold control to its mid-range position. Adjust the horizontal frequency coil "slug" until picture falls into synchronization. Keep adjusting this "slug" until the picture just falls out of sync. Now reverse the direction of the adjustment until the picture just holds sync. Rotate the Hold control to both extremes of rotation. The picture should either stay in sync at both positions or should fall out of sync by an equal number of bars at each end of the control.

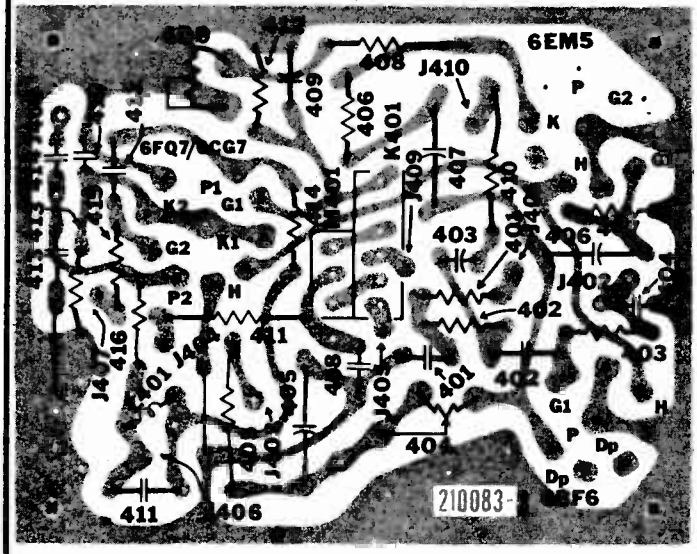
MAGNAVOX 38 SERIES TV Schematic Diagram



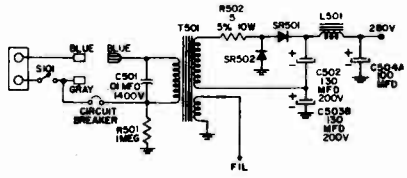








SWEEP BOARD



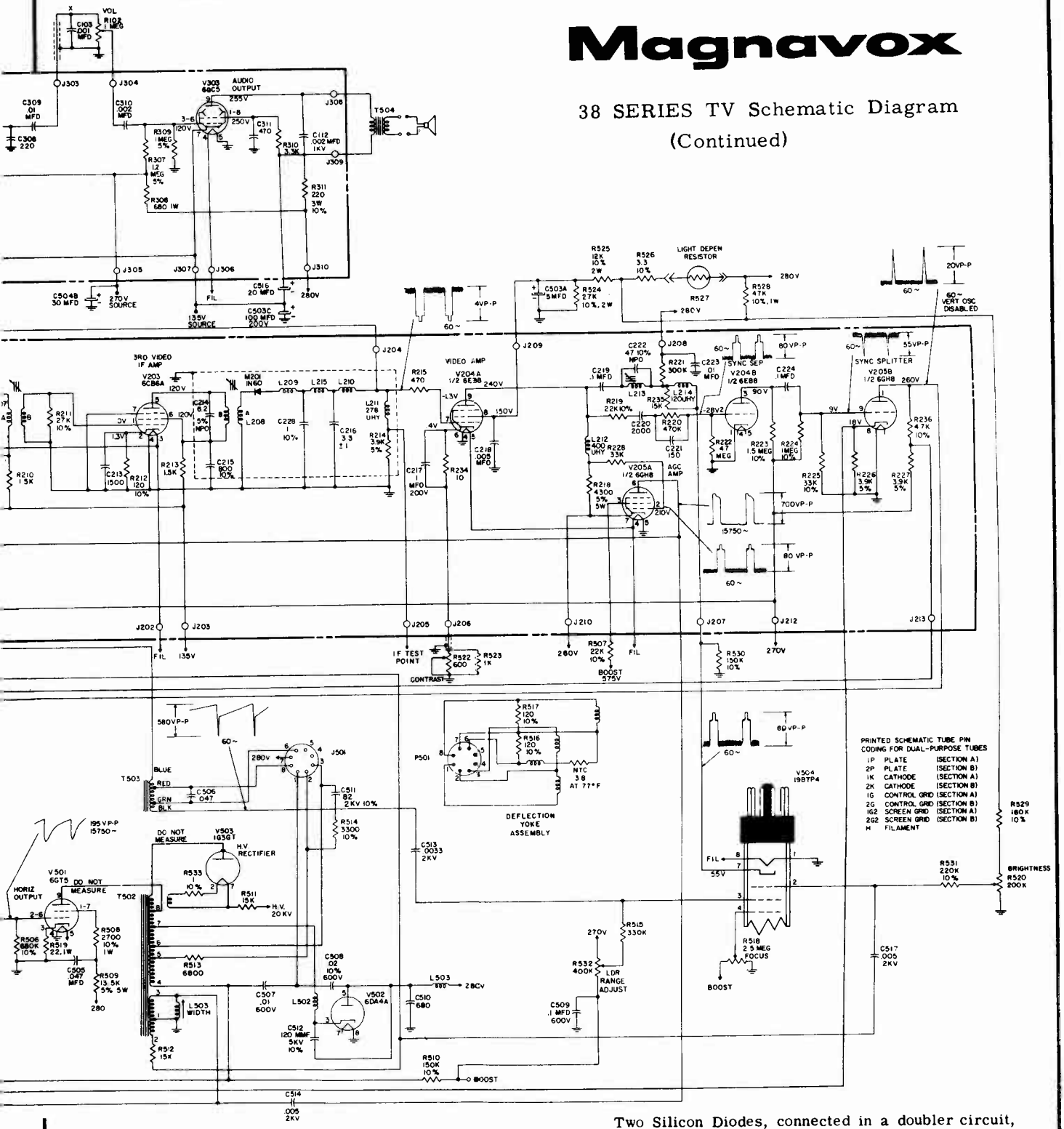
The 38 Series is a deluxe transformer powered television chassis featuring printed-wiring construction. VHF versions employ 17 tubes (VHF/UHF versions 18) plus a germanium diode detector, a dual-selenium diode used as the Horizontal AFC Detector and two Silicon Diode Rectifiers. These chassis are used with a 19BTP4 picture tube.

The entire chassis is designed for easy servicing. All tubes plus the Silicon Diode Rectifiers and detector diodes are accessible from the rear of the set. For access to the wiring side the chassis must be removed from the cabinet. There are three printed-wiring boards used, one housing the Sound I-F and Audio Circuits, the second contains Video I-F, Video, Sync and AGC Circuits and the third housing the Vertical and Horizontal Sweep Circuits. Large components such as the sweep output transformers, horizontal output tube, power transformer and electrolytic capacitors are mounted on the main chassis pan.

As an aid in circuit tracing both the top and bottom sides of the printed boards are provided with component identification symbol numbers corresponding to the symbol numbers used on the schematic diagram. In addition the printed wiring side of the boards are provided with schematic symbols

Magnavox

38 SERIES TV Schematic Diagram (Continued)



VHF OSCILLATOR--The VHF tuner is equipped with individual oscillator adjustment "slugs" for each channel. The oscillator "slug" is adjusted when the Fine Tuning control is rotated. Set the Channel Selector to the channel to be adjusted and rotate the Fine Tuning control for the correct picture. Repeat this for all channels received in your area.

Two Silicon Diodes, connected in a doubler circuit, are used as low voltage rectifiers. Adequate filtering is provided by an inductance-capacitance type filter circuit. A basic B + supply of approximately 280V is obtained from this circuit. An additional tap at 270V obtained through the use of a resistor-capacitor decoupling network is used to power the sync circuits and the horizontal oscillator. A +135V source is obtained at the cathode of the Audio Output Stage

MAGNAVOX 36 & 38 SERIES TV Alignment Instructions, Continued

VIDEO ALIGNMENT

Note 1. Before proceeding with alignment allow a 10 minute warm-up for the chassis and test equipment.

Note 2. Connect the negative lead of a 3.0 volt bias supply to the junction of R204 and R229 (IF Bias) and the negative lead of a 2.5 volt bias supply to J211 (RF Bias). Connect the positive side of the bias supply to ground. Remove the AGC Amplifier tube, 6GH8.

Note 3. Use only enough sweep generator output to provide a usable pattern on the scope. Set the sweep generator for 10 MC sweep.

Note 4. All Alignment slugs are accessible from Tube side of chassis. Standard Hexagonal Alignment tools are needed with 3/32" and 1/16" tip.

SWEEP GEN. COUPLING	SWEEP GEN. FREQUENCY	MARKER GEN. COUPLING	MARKER GEN. FREQUENCY	CONNECT SCOPE	ADJUSTMENTS
1st I-F grid (Pin 1 of V201). Detune mixer plate coil by adjusting slug fully out.	43 mc. Adjust gain so trap suckout is visible.	Converter grid (use test point indicated on tuner)	47.25 mc Adjust gain so pip is just visible.	I-F Test Point J205. Place 10K res. in series with probe.	Adjust trap L206 to center marker pip in suckout. See Fig. 1. Maximum attenuation is at two positions Use one with slug farthest out.
"	43 mc Note 3	"	42.25 mc 45.0 mc 45.75 mc	"	Check for response curve similar to Fig. 1. Tune L208 for max. gain between 42.25 mc and 45.75 mc. Tune L207 to place 45.75 mc marker at 65% response. Tune L205 to place 42.25 mc marker at 65% response. Repeat adjustments to optimize curve. Recheck 47.25 mc trap.
Converter grid (accessible thru hole in top of tuner)	43 mc Note 3	Loosely couple to converter tube.	42.25 mc 45.0 mc 45.75 mc	"	Set VHF Tuner to channel 11*. Tune converter plate coil (L6 on VHF tuner) for max. gain between 42.25 mc and 45.75 mc markers. *Or to any channel where sweep harmonics do not cause distortion of curve.
"	43 mc Adjust gain for max. with trap suckout still visible on scope	"	41.25 mc 47.25 mc 39.75 mc	"	SHORTOUT AGC BIAS. Set VHF Tuner between channels. Adjust trap L201 until 41.25 mc marker falls in center of trap suckout. Adjust L202 until 39.75 mc marker falls in center of trap. Adjust L203 until 47.25 mc marker falls in center of trap suckout. Adjust L204 for maximum attenuation of 47.25 mc. Recheck trap settings.
"	43 mc Note 3	"	45.75 mc	"	Set VHF Tuner to Channel 11. Set Bias as in Note 2. Adjust converter plate coil (L6 on Guided Grid & L2 on Compact) and I-F trimmer C206 for max. gain & proper tilt maintaining the 45.75 marker as shown in Fig. 2.
UHF Input on VHF Tuner. Use 1K isolation resistor.	43 mc Note 3 (This adjustment for VHF/UHF Chassis only)	"	45.75 mc 45.0 mc 42.25 mc	"	Set VHF tuner to UHF position. Adjust R-F amp. grid coil (L11 located on UHF position strip on Guided Grid and T2 on rear of Compact) for min. tilt. Response should conform to Figure 2.

VHF OSCILLATOR ALIGNMENT

VHF antenna terms.	Channels 2 thru 13 R-F	Loosely couple to VHF ant. terminals.	Picture and sound carrier for individual channel.	"	Check all channels for bandwidth, slope and position of carrier. Adjust Fine Tuning Control to set Osc

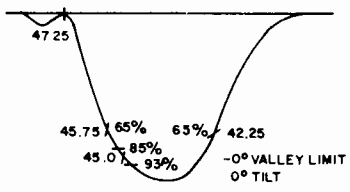


FIGURE 1

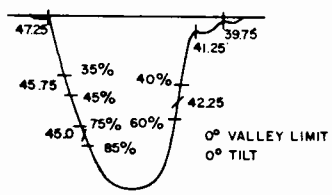


FIGURE 2

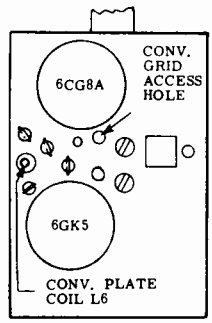


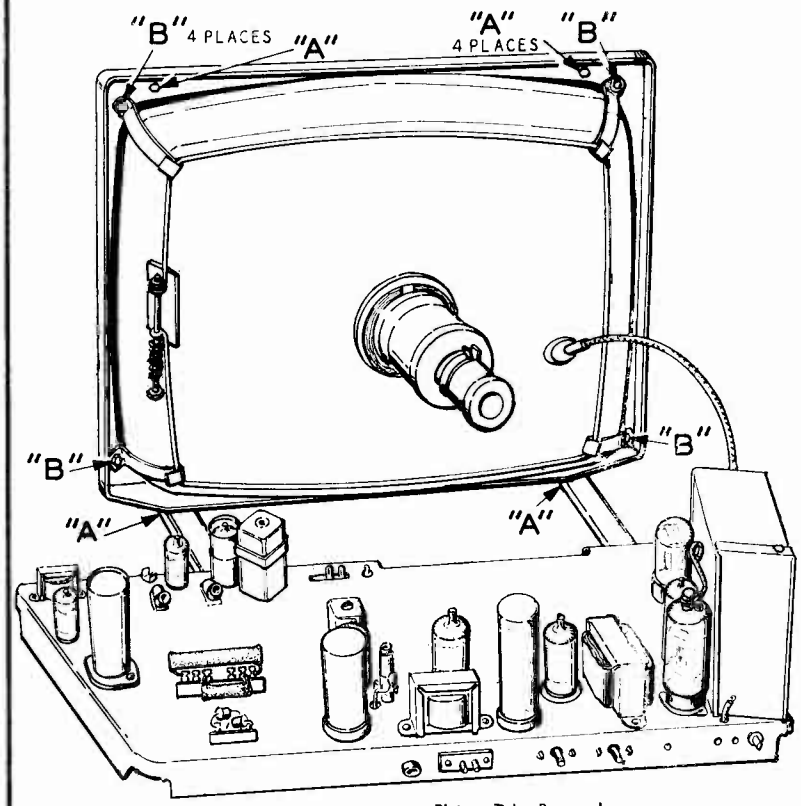
FIGURE 3

SOUND ALIGNMENT

1. Turn quadrature coil L303 to minimum inductance (core out).
2. Tune receiver to a strong local station (preferably a tone signal or music). Adjust quadrature coil L303 just past the point of maximum sound with minimum distortion.
3. Reduce signal input by removing antenna or placing an adjustable pad across the antenna terminals so that with Volume control set at near maximum, sound is at a low level. Tune the Fine Tuning control through undistorted sound. Set Fine Tuning control to the verge of distortion.
4. Adjust bottom core (grid tuning) of detector drive transformer L302 top core of L302 plate tuning) and sound take-off coil L301 for minimum distortion.
5. Readjust Fine Tuning control as necessary during adjustment of L301 and L302 to maintain conditions as indicated in step 3 above.

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

WG-5224A (VHF)	WG-5324A (VHF-UHF)	WG-5234A (VHF)	WG-5334A (VHF-UHF)	WG-5235A (VHF)	WG-5335A (VHF-UHF)	WG-5237A (VHF)	WG-5337A (VHF-UHF)



Picture Tube Removal

SERVICE ADJUSTMENTS

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 this should be done at 105V line (if possible) to obtain nominal setting. Adjust each ring in the centering device until proper centering is determined. If centering is not adjusted properly, focus may be poor.

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.)

INSTRUCTIONS CHASSIS REMOVAL

1. Remove all the knobs from front of cabinet.
2. Remove cabinet back and disconnect the yoke plug, pix tube socket and anode lead.
3. Disconnect the speaker leads.
4. Disconnect the antenna leads from the tuner.
5. Remove screws holding the tuner assembly and secondary control 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. Remove the four screws and carefully remove the chassis assembly.

PICTURE TUBE REMOVAL AND REPLACEMENT

1. Remove the chassis etc. as outlined in "Instructions Chassis Removal" above.
2. Place the cabinet face down on a cushioned and clean surface so as not to scratch or mar the cabinet.
3. Remove the four (4) screws (marked "A" in illustration) holding entire picture tube frame assembly to the cabinet.
4. Remove the entire picture tube frame assembly from the cabinet and position it on four blocks of wood (2"x4"x4") so that each corner of the frame sets on an individual block of wood.
5. Remove the yoke assembly and centering device.
6. Loosen the nut part way on picture tube ring.
7. Remove the four (4) screws (marked "B" in illustration) holding tube clamps in place and lift off the entire mounting ring.
   CAUTION—There are tinnerman nuts at the rear of the frame. When re-assembling the tube clamps be sure that the tinnerman nuts are replaced.
8. Carefully lift the pix tube out making sure not to disturb the gasket around the pix glass. IMPORTANT—Unless absolutely necessary, do not remove the gasket from the pix glass. Use a 26A758 pix glass and gasket assembly for replacement purposes.
9. Install the new pix tube and with a blunt instrument gently position the gasket completely around the picture tube until it fits snugly into place.
10. Reverse steps 7 thru 1 to re-assemble all items to the frame and to the cabinet.

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. In general, the weaker the signal, the more clockwise the control should be turned.

MONTGOMERY WARD

MODELS

WG-5224A — WG-5234A
WG-5235A — WG-5237A
WG-5324A — WG-5334A
WG-5335A — WG-5337A

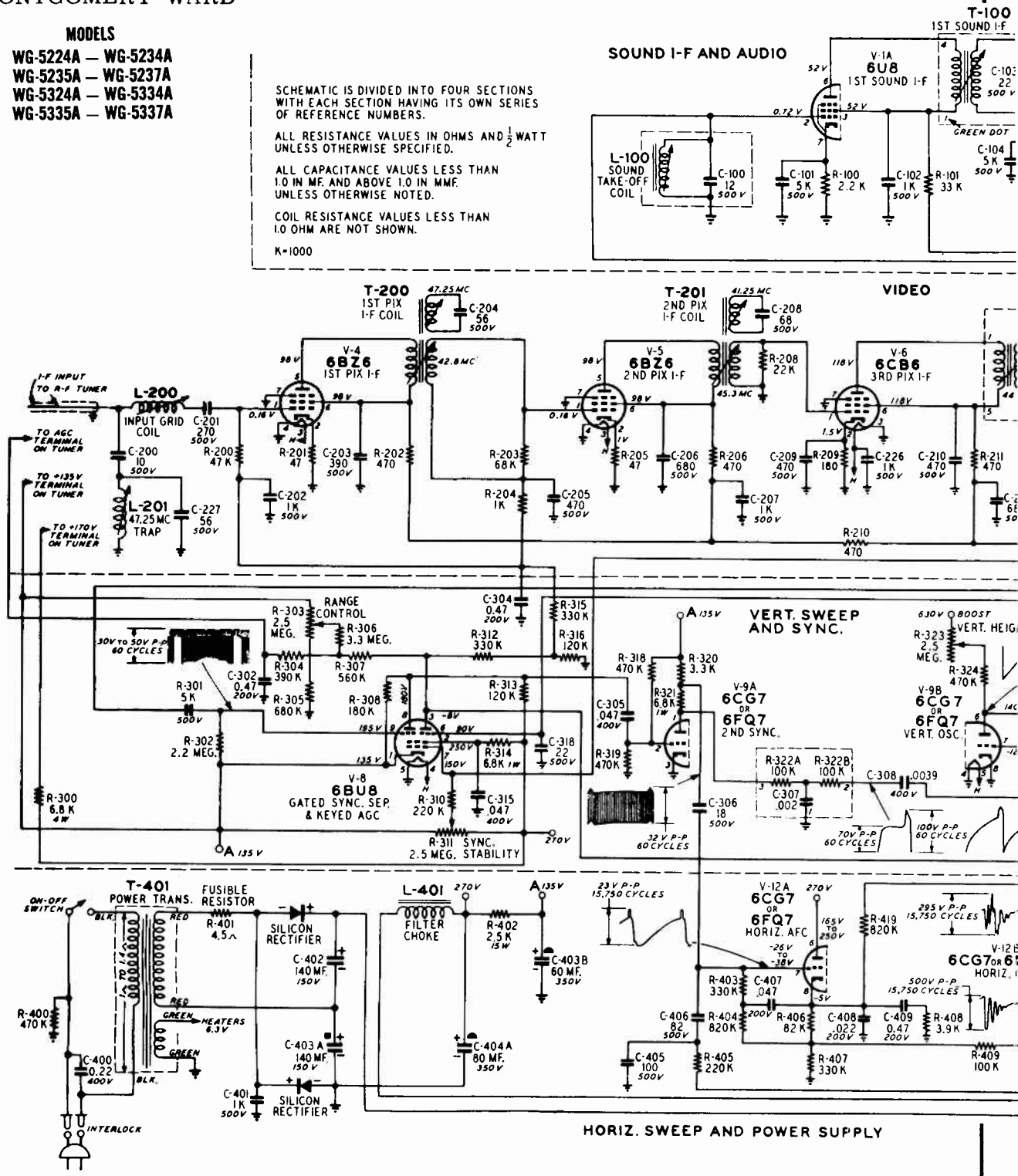
SCHEMATIC IS DIVIDED INTO FOUR SECTIONS WITH EACH SECTION HAVING ITS OWN SERIES OF REFERENCE NUMBERS.

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.

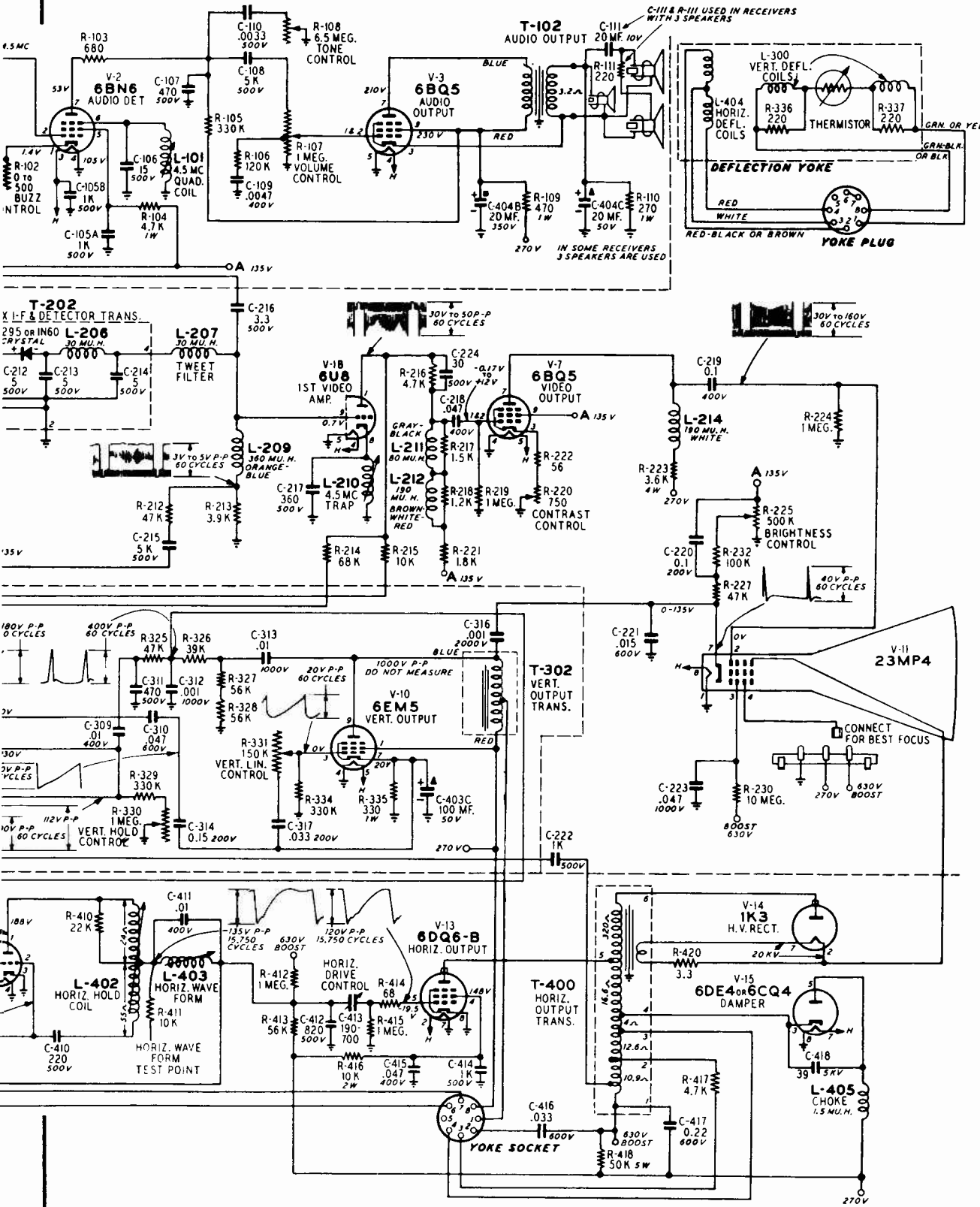
COIL RESISTANCE VALUES LESS THAN 1.0 OHM ARE NOT SHOWN.

K=1000



OSCILLOSCOPE WAVEFORM PATTERNS

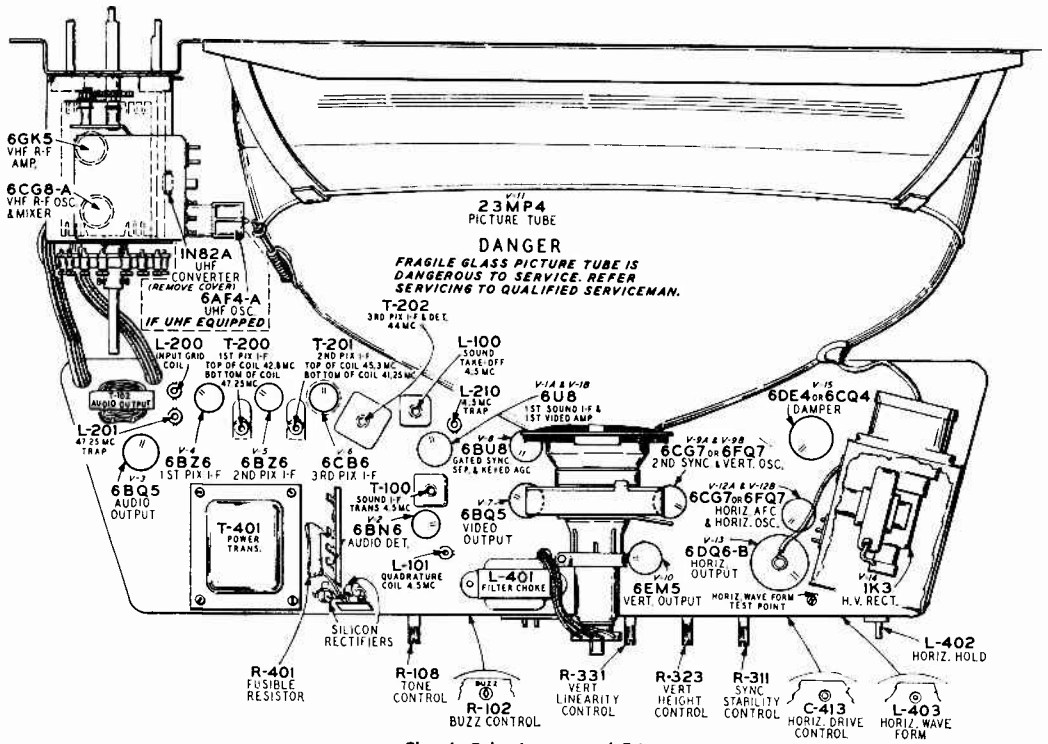
The waveforms shown on the schematic diagram are as observed on a Tektronix type 524D wide band television oscilloscope with the receiver tuned to a reasonably strong signal and a normal picture. The voltages shown on each waveform are the approximate peak to peak amplitudes. The frequency accompanying 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.

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

MONTGOMERY WARD Chassis WG-5224A, WG-5324A, etc., Continued



Chassis Tube Layout and Trimmers

ALIGNMENT PROCEDURE

TEST EQUIPMENT—To service this receiver properly, it is recommended that the following test equipment be available.

R-F SWEEP GENERATOR meeting the following requirements:

(a) Frequency ranges:
38-90 mc, 10 mc sweep width
170-225 mc, 10 mc sweep width
470-890 mc, 10 mc sweep width

(b) Output adjustable with at least .1 volt maximum.

(c) Output constant on all ranges.

(d) Flat output in all attenuator positions.

(e) A source of the following markers:
41.25 Mc 2nd Pix I-F Coil (Bottom of Coil)
42.4 Mc
42.8 Mc 1st Pix I-F Coil (Top of Coil)
44.0 Mc 3rd Pix I-F Coil (Bottom of Coil)
44.5 Mc
45.3 Mc 2nd Pix I-F Coil (Top of Coil)
45.75 Mc
47.25 Mc 1st Pix I-F Coil (Bottom of Coil)

CATHODE-RAY OSCILLOSCOPE with good low frequency response in vertical amplification and an input calibrating source.

BIAS BATTERY —1.5V & —4.5V

VTVM

DIODE DETECTOR

40 M.C. I.F. Alignment—Connect sweeper with very short leads through a 1K $\mu\mu$f disc ceramic capacitor to mixer grid test point on tuner. With short leads connect crystal diode detector (fig. 4) to grid of 2nd I.F. tube (pin #1 of V-5 and ground). Connect —3.0V to A.G.C. line (junction of C-304 & R-204). Connect oscilloscope to detector ouput. Adjust sweep output to give adequate deflection. Adjust 47.25 mc trap (L-201) so that slug is completely out of trap (adjust slug towards chassis side of coil).

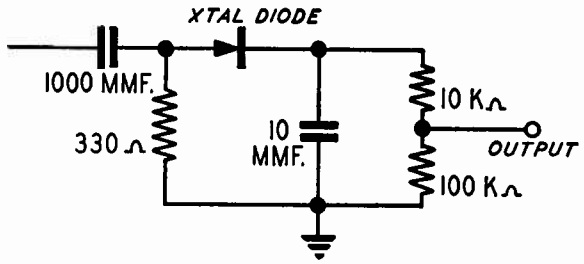


Fig. 4—Crystal Diode Detector

FREQUENCY	ADJUST
1. 47.25	1st Pix I.F. Coil (T-200 bottom of coil) to center its notch over 47.25 mc marker.
2. 47.25	47.25 mc trap L-201 to center its notch over 47.25 mc marker.

Adjust converter plate coil (L-7) and 1st I.F. input grid coil (L-200) to give response shown in figure #5.

MONTGOMERY WARD Chassis WG-5224A, WG-5324A, etc., Continued

ALIGNMENT PROCEDURE—(continued)

B. When the input circuit is aligned, 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.
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.

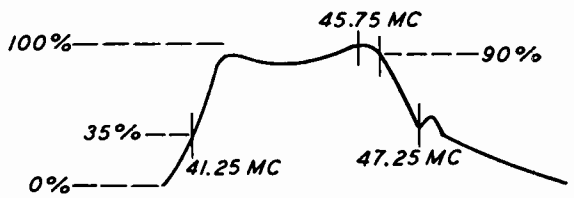


Fig. 5—Input Circuit Response

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.

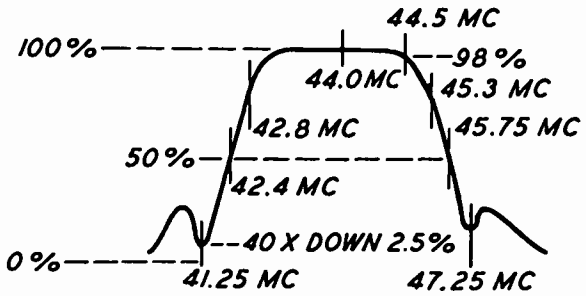


Fig. 6—Overall Response Curve

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.

CHECK OF HORIZONTAL OSCILLATOR ALIGNMENT—Turn the horizontal hold control clockwise. The picture should be out of sync with a minimum of 5 or 6 bars slanting downward to the left. Turn the control slowly counter-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 counter-clockwise rotation of the control. Continue turning counter-clockwise at least one full turn of the control until the picture pulls to the right. Turn the control clockwise until the picture is centered and steady. Momentarily remove the signal by switching off channel and then back. The picture should remain in sync.

HORIZONTAL DRIVE ADJUSTMENT—While receiving a signal from a station with picture locked in sync, turn the horizontal drive control counter clockwise. At a certain degree of rotation the right center of the picture will compress. Then turn the horizontal drive control clockwise just to the point where maximum picture width is obtained.

CONTROLS FRONT OF CHASSIS

VHF Channel Selector & UHF Switch	
Off-On Volume	R-107
Contrast	R-220
Brightness	R-225
Vertical Hold	R-330
Range	R-303

CONTROLS REAR OF CHASSIS

Horizontal Drive	C-413
Vertical Linearity	R-331
Height	R-323
Horizontal Wave Form	L-403
Buzz	R-102
Horizontal Hold	L-402
Sync Stability	R-311
Tone Control	R-108

MONTGOMERY WARD Chassis WG-5224A, WG-5324A, etc., Continued

SERVICE SUGGESTIONS

NO RASTER ON PICTURE TUBE—If raster cannot be obtained check below for the possible causes.

1. No +B voltage. Check silicon rectifier. If O.K. check fusible resistor. Replace if defective. If fusible resistor continually burns out check:
   (A) Horizontal output tube V-13.
   (B) Check damper tube V-15.
   (C) Check horizontal oscillator tube V-12 for proper operation.
   (D) With an ohm meter, check for a short between terminal 1 of the horizontal output transformer and the chassis.
   (E) Check DC resistance of horizontal output transformer.
2. No high voltage. Check V-12, V-13, V-14 and V-15 tubes and circuits. If the horizontal deflection circuits are operating as evidenced by the correct voltage (630V) measured on terminal 1 of the horizontal output transformer, the trouble can be isolated to the high voltage rectifier circuit. Either the high voltage winding to V-13 plate or V-14 plate is open, tube V-14 is defective, its filament circuit is open or pix tube elements shorted internally.
3. Defective picture tube, heater open or cathode return circuit open.

HORIZONTAL DEFLECTION ONLY—If only horizontal deflection is obtained as evidenced by a straight line across the face of the picture tube, it can be caused by the following:

1. V-9 or V-10 inoperative. Check socket voltages.
2. Vertical oscillator transformer defective.
3. Vertical output transformer open or shorted.
4. Yoke vertical coils open or shorted.
5. Vertical hold, height or linearity controls may be defective.

POOR VERTICAL LINEARITY—If adjustment of the height and linearity controls will not correct this condition any of the following may be the cause:

1. Check variable resistors R-323 and R-331.
2. Vertical output transformer defective.
3. Capacitor C-403C defective.
4. V-9 or V-10 defective, check voltages.
5. Excess leakage or incorrect value of capacitors C-310, C-311, C-312 or open or incorrect value of resistors R-321, R-322, R-324 and R-327.
6. Low plate voltages. Check power supply.
7. Vertical deflection coils defective.

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

1. Check or replace V-13 & V-15.
2. Check capacitors C-411, C-412, C-416 & resistors R-412 & R-413 for defects.
3. Horizontal deflection coils defective.
4. Check horizontal drive setting.

TRAPEZOIDAL OR NONSYMMETRICAL RASTER

1. Defective yoke.

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

1. Defective yoke.
2. V-15 defective.
3. R-417 defective.

SMALL RASTER—This condition can be caused by:

1. Low +B or line voltage. Check silicon rectifier.
2. Insufficient output from V-13. Replace tube.
3. Insufficient output from V-9 and V-10. Replace tubes.
4. Incorrect setting of horizontal drive control.
5. V-15 defective.

RASTER; NO IMAGE, BUT ACCOMPANYING SOUND—This condition can be caused by:

1. No signal on picture tube grid. Check V-1 and V-7 tubes and associated circuits.
2. Bad contact to picture tube grid (lead to socket broken).
3. AGC tube (V-8) may be defective. Check tube and its associated circuit.
4. Range control misadjusted.
5. Fine tuning control misadjusted.

SIGNAL APPEARS ON PICTURE TUBE GRID BUT IMPOSSIBLE TO SYNCHRONIZE THE PICTURE VERTICALLY AND HORIZONTALLY—A condition of this nature can be caused by:

1. Defective V-8 or V-9.
2. If tubes are O.K. Check voltages and associated circuits.
3. AGC system inoperative. Check V-8.
4. Sync Stability or Range Controls misadjusted.

SIGNAL ON PICTURE TUBE GRID AND HORIZONTAL SYNC ONLY—If this condition is encountered, check:

1. Vertical integrating network.
2. Vertical hold control.
3. Voltage of V-9.

SIGNAL ON PICTURE TUBE GRID AND VERTICAL SYNC ONLY

1. V-12 defective. Replace.
2. Improper setting of horizontal hold control.
3. Check setting of horizontal wave form adjustments.
4. Check V-12 socket voltages.
5. Capacitor C-306 defective.

PICTURE JITTER

1. If regular sections at left of picture are displaced, replace V-12.
2. Vertical instability may be due to loose connections or noise received with the signal.
3. Horizontal instability may be due to unstable transmitted sync.
4. Check receiver AGC system for proper operation.
5. Check V-9 and V-8 tubes.
6. Incorrect setting of fine tuning control.
7. Improper adjustment of range or sync stability controls.

"SNOW" IN PICTURE

1. Insufficient signal on receiver antenna terminals due to distant station, poor antenna installation, broken lead-in, etc.
2. Range control misadjusted.
3. Weak or defective R-F amplifier tube in tuner.

BUZZ IN SOUND

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

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

MODELS

WG-4235A (VHF) WG-4335A (VHF-UHF)

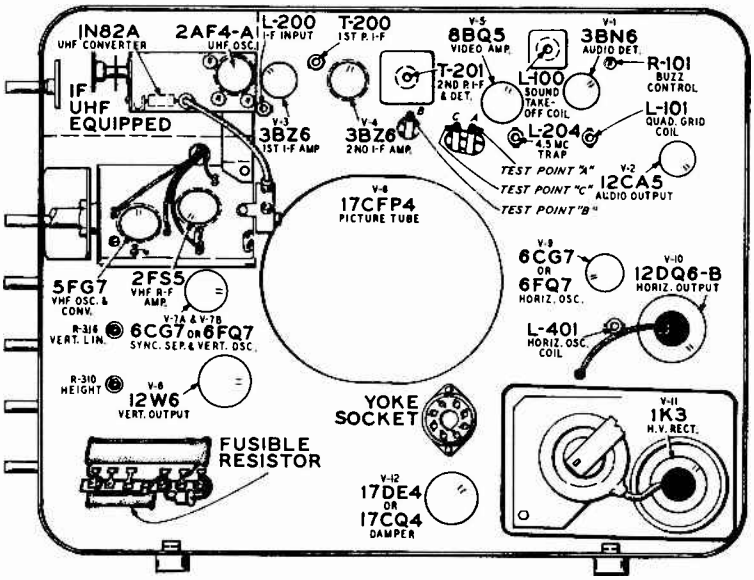


Fig. 1—Chassis Tube Layout and Trimmers

CONTROLS REAR OF CHASSIS

Horizontal Centering	Centering Device
Vertical Centering	Centering Device
Vertical Linearity	R-316
Height	R-310
Buzz	R-101
Horizontal Oscillator	L-401

SERVICE ADJUSTMENTS

CENTERING ADJUSTMENT—If horizontal or vertical centering is required this should be done at 105V line (if possible) to obtain nominal setting. Adjust each ring in the centering device until proper centering is determined. If centering is not adjusted properly, focus may be poor.

PROCEDURE FOR ADJUSTING HORIZONTAL OSCILLATOR COIL IN SETS USING A MULTIVIBRATOR OSCILLATOR—Short sync separator plate to ground or B+. Place a short across the terminals of the horizontal oscillator coil. Adjust the horizontal hold control until the horizontal blanking bar drifts slowly across the screen. Remove the short across the horizontal oscillator coil and adjust iron slug in the coil until horizontal blanking bar drifts slowly across the screen. Remove short from the sync separator plate. The picture will lock in—controls need not be touched.

NOTE: Once the coil has been adjusted, it should never be touched again.

CHASSIS REMOVAL

1. Remove all control knobs from receiver by pulling each one straight out.
2. Disconnect antenna leads from cabinet back and remove the screws holding cabinet back in place. Lay cabinet back over top of cabinet.
3. Place receiver with back side up on any soft surface that will not mar safety glass and remove two (2) screws holding safety interlock bracket to bottom rear of cabinet.
4. Disconnect pix tube socket, yoke plug, speaker leads and ground lead going to pix tube mounting strap.
5. Remove speaker from side of cabinet.
6. Remove two (2) screws from bottom of cabinet, two (2) screws holding chassis on inside top of cabinet and unsolder the grounding lead between case and chassis.
7. Pull chassis part way out, reach in and disconnect anode lead and then carefully lift chassis out of cabinet.
8. To re-install chassis, reverse the above procedure.

PICTURE TUBE REMOVAL AND REPLACEMENT

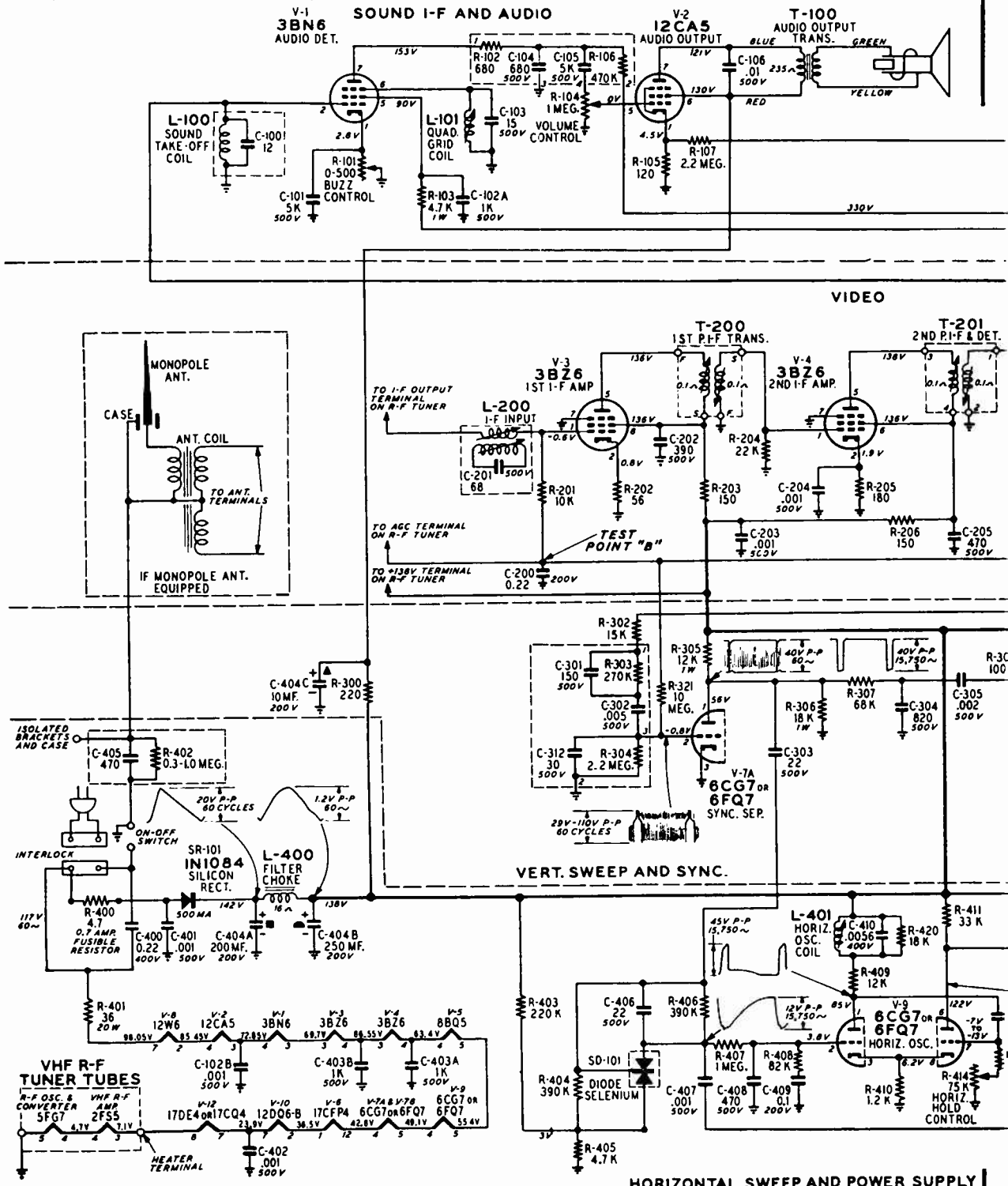
1. Disconnect antenna leads from cabinet back and remove the screws holding cabinet back in place. Lay cabinet back over top of cabinet.
2. Disconnect pix tube socket, yoke plug and ground lead from pix tube mounting strap to chassis.
3. Remove handle & dipole antenna assembly (if equipped).
4. Remove two (2) screws at each side of cabinet, one (1) screw under front of handle and one (1) screw at bottom of cabinet.
5. Carefully pull mask escutcheon away from case (pix tube and safety glass will come out with it) a short distance to allow reaching in and disconnecting the anode lead.
6. Remove pix tube and mask escutcheon and place on soft surface safety glass down and remove pix tube strap assembly.
7. Lift pix tube off safety glass and escutcheon.
8. Install new tube and reverse the above procedure for assembling all the items back into the cabinet.

(Material continued on pages 54 through 56)

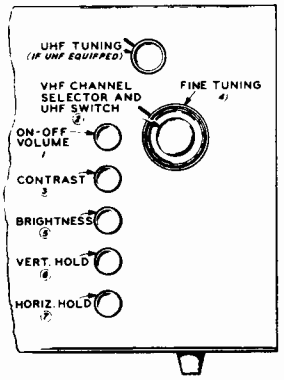
MONTGOMERY WARD Chassis WG-4235A, WG-4335A, Schematic Diagram

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.

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.



MONTGOMERY WARD Chassis WG-4235A, WG-4335A, Continued

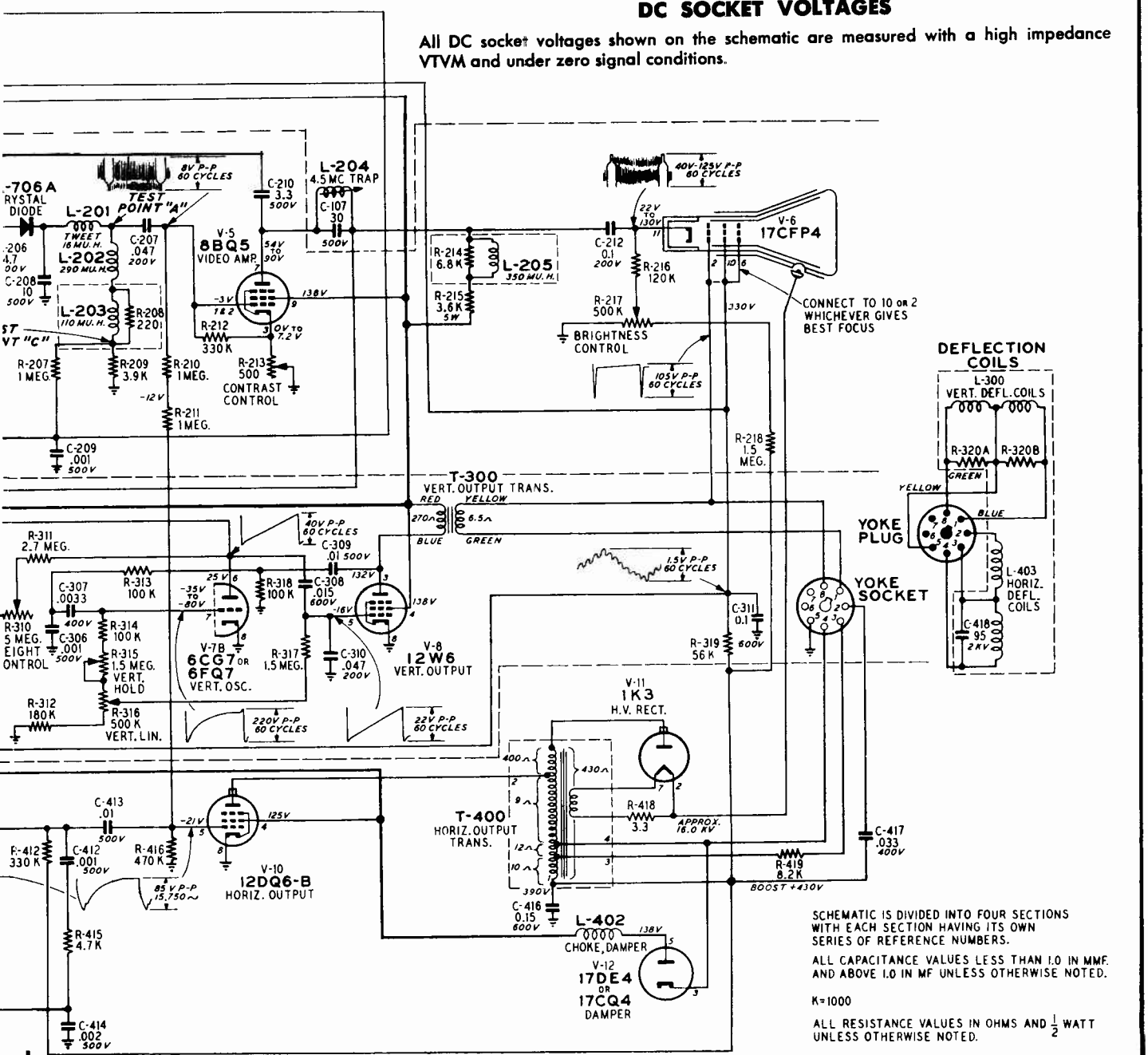


OSCILLOSCOPE WAVEFORM PATTERNS

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.



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.

MONTGOMERY WARD Chassis WG-4235A, WG-4335A, Alignment Data

ALIGNMENT PROCEDURE

R-F SWEEP GENERATOR meeting the following requirements:

(a) Frequency ranges:
- 38-90 mc, 10 mc sweep width
- 170-225 mc, 10 mc sweep width
- 470-890 mc, 10 mc sweep width

(b) Output adjustable with at least .1 volt maximum.
(c) Output constant on all ranges.
(d) Flat output in all attenuator positions.
(e) A source of the following Markers:
- 45.75 mc
- 44.5 mc
- 43.5 mc
- 42.4 mc
- 41.25 mc

PROCEDURE

1. Connect sweep output to 2nd I-F grid (pin #1-V4), oscilloscope to Test Point "C". Set output of sweeper so that some output is indicated in 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 2.

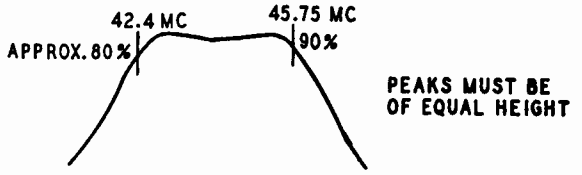


Fig. 2—2nd Pix I-F Response

2. With approximately —5.5V bias on AGC line (Test Point "B") 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 3.)

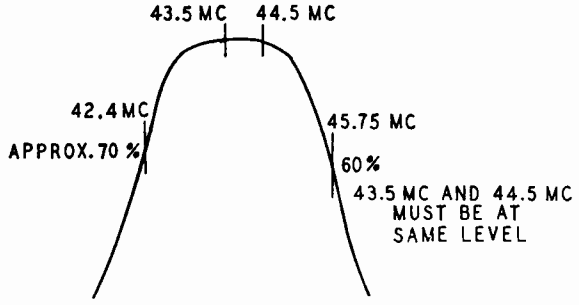


Fig. 3—Pix I-F Response From 1st Pix I-F Grid

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 5). 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-15 primary) and input grid coil (top of L-200) for maximum gain and symmetry with 45.75 mc marker at 50%. (Figure 4.)

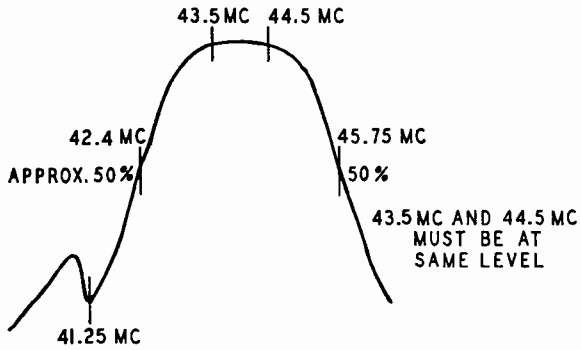


Fig. 4—Overall Pix I-F Response Curve

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 "A") 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-101) for maximum undistorted sound and minimum buzz.
3. If "hiss" disappears during step 2, further reduce signal strength.

MOTOROLA

Service material for various chassis with numbers 441A, 448, 450, 570, 576, and 579, each with various prefix letters such as: TS, STS, WTS, and others as listed below, and some with suffix Y. Diagrams for different chassis included as needed; alignment information applicable to all chassis.

MODEL BREAKDOWN CHART

MODEL	CHASSIS VERSION	VHF TUNER(S)	UHF TUNER
19K16W	TS-441	LTT-307	-
19K16WA	WTS-448	LTT-307 or 322	-
Y19K16W	TS-441Y	LTT-307Y	ZTT-601
Y19K16WA	WTS-448Y	LTT-307Y or 322Y	ZTT-601
19K17M	TS-441	LTT-307	-
19K17MA	WTS-448	LTT-307 or 322	-
Y19K17M	TS-441Y	LTT-307Y	ZTT-601
Y19K17MA	WTS-448Y	LTT-307Y or 322Y	ZTT-601
19K17W	TS-441	LTT-307	-
19K17WA	WTS-448	LTT-307 or 322	-
Y19K17W	TS-441Y	LTT-307Y	ZTT-601
Y19K17WA	WTS-448Y	LTT-307Y or 322Y	ZTT-601
19K18CW	TS-441	LTT-307	-
19K18CWA	WTS-448	LTT-307 or 322	-
Y19K18CW	TS-441Y	LTT-307Y	ZTT-601
Y19K18CWA	WTS-448Y	LTT-307Y or 322Y	ZTT-601
19K19M	TS-441	LTT-307	-
19K19MA	WTS-448	LTT-307 or 322	-
Y19K19M	TS-441Y	LTT-307Y	ZTT-601
Y19K19MA	WTS-448Y	LTT-307Y or 322Y	ZTT-601
19K19W	TS-441	LTT-307	-
19K19WA	WTS-448	LTT-307 or 322	-
Y19K19W	TS-441Y	LTT-307Y	ZTT-601
Y19K19WA	WTS-448Y	LTT-307Y or 322Y	ZTT-601
19K20CW	TS-441	LTT-307	-
19K20CWA	WTS-448	LTT-307 or 322	-
Y19K20CW	TS-441Y	LTT-307Y	ZTT-601
Y19K20CWA	WTS-448Y	LTT-307Y or 322Y	ZTT-601
A19T8-10K[2]	ATS-448	RTT-308 or 323[1]	-
A19T8-11K[2]	ATS-448	RTT-308 or 323[1]	-
A19T8-12K[2]	ATS-448	RTT-308 or 323[1]	-
A19T8-13K[2]	ATS-448	RTT-308 or 323[1]	-
A19T8-14K[2]	ATS-448	RTT-308 or 323[1]	-
19T11CHK	QTS-448	TT-300 or 319	-
Y19T11CHK	QTS-448Y	TT-305Y or 320Y	STT-601
19T11CHL	VTS-448	TT-311	-
19T11CHP	QTS-450	TT-300	-
Y19T11CHP	QTS-450Y	TT-305Y	STT-601
19T12-1K	STS-448	TT-300 or 319	-
Y19T12-1K	STS-448Y	TT-305Y or 320Y	STT-601
19T12-2K	STS-448	TT-300 or 319	-
Y19T12-2K	STS-448Y	TT-305Y or 320Y	STT-601
19T13-1K	TS-448	TT-305 or 320	-
Y19T13-1K	TS-448Y	TT-305Y or 320Y	STT-601
19T13-2K	TS-448	TT-305 or 320	-
Y19T13-2K	TS-448Y	TT-305Y or 320Y	STT-601
19T14WK	TS-448	TT-305 or 320	-
Y19T14WK	TS-448Y	TT-305Y or 320Y	STT-601
19T14CWK	TS-448	TT-305 or 320	-
Y19T14CWK	TS-448Y	TT-305Y or 320Y	STT-601
19T14WL	RTS-448	TT-306 or 321[1]	-
19T14CWL	RTS-448	TT-306 or 321[1]	-
23C8M	TS-570	TT-305	-
23C8MA	TS-570	TT-305	-
23C8MF	TTS-579	TT-305 or 320	-
Y23C8M	TS-570Y	TT-305Y	RTT-601
Y23C8MA	TS-570Y	TT-305Y	RTT-601
Y23C8MF	TTS-579Y	TT-305Y or 320Y	RTT-601
23C8W	TS-570	TT-305	-
23C8WF	TTS-579	TT-305 or 320	-
Y23C8W	TS-570Y	TT-305Y	RTT-601
Y23C8WF	TTS-579Y	TT-305Y or 320Y	RTT-601
23C8BW	TS-570	TT-305	-
23C8BWF	TTS-579	TT-305 or 320	-
Y23C8BW	TS-570Y	TT-305Y	RTT-601
Y23C8BWF	TTS-579Y	TT-305Y or 320Y	RTT-601
23C10M	PTS-570	PTT-307	-
23C10MA	PTS-570	PTT-307	-
23C10MD	PTS-570	PTT-307	-
23C10MF	PTS-579	PTT-307 or 322	-
Y23C10M	PTS-570Y	PTT-307Y	KTT-601
Y23C10MA	PTS-570Y	PTT-307Y	KTT-601
Y23C10MD	PTS-570Y	PTT-307Y	KTT-601
Y23C10MF	PTS-579Y	PTT-307Y or 322Y	KTT-601
23C10W	PTS-570	PTT-307	-
23C10WA	PTS-570	PTT-307	-
23C10WD	PTS-570	PTT-307	-
23C10WF	PTS-579	PTT-307 or 322	-
Y23C10W	PTS-570Y	PTT-307Y	KTT-601
Y23C10WA	PTS-570Y	PTT-307Y	KTT-601
Y23C10WD	PTS-570Y	PTT-307Y	KTT-601
Y23C10WF	PTS-579Y	PTT-307Y or 322Y	KTT-601
23C10BW	PTS-570	PTT-307	-
23C10BWA	PTS-570	PTT-307	-
23C10BWD	PTS-570	PTT-307	-
23C10BWF	PTS-579	PTT-307 or 322	-
Y23C10BW	PTS-570Y	PTT-307Y	KTT-601
Y23C10BWA	PTS-570Y	PTT-307Y	KTT-601
Y23C10BWD	PTS-570Y	PTT-307Y	KTT-601
Y23C10BWF	PTS-579Y	PTT-307Y or 322Y	KTT-601
23C10CW	PTS-570	PTT-307	-
23C10CWA	PTS-570	PTT-307	-
23C10CWD	PTS-570	PTT-307	-
23C10CWF	PTS-579	PTT-307 or 322	-
Y23C10CW	PTS-570Y	PTT-307Y	KTT-601
Y23C10CWA	PTS-570Y	PTT-307Y	KTT-601
Y23C10CWD	PTS-570Y	PTT-307Y	KTT-601
Y23C10CWF	PTS-579Y	PTT-307Y or 322Y	KTT-601
A23C11M[2]	ATS-570	PTT-308[1]	-
A23C11MF[2]	ATS-579	PTT-308 or 323[1]	-
A23C11W[2]	ATS-570	PTT-308[1]	-
A23C11WF[2]	ATS-579	PTT-308 or 323[1]	-
A23C11BW[2]	ATS-570	PTT-308[1]	-
A23C11BWF[2]	ATS-579	PTT-308 or 323[1]	-
A23C11CW[2]	ATS-570	PTT-308[1]	-
A23C11CWF[2]	ATS-579	PTT-308 or 323[1]	-
23K50M	TS-570	TT-305	-
23K50MA	TS-570	TT-305	-
23K50MF	TTS-579	TT-305 or 320	-
Y23K50M	TS-570Y	TT-305Y	RTT-601
Y23K50MA	TS-570Y	TT-305Y	RTT-601
Y23K50MF	TTS-579Y	TT-305Y or 320Y	RTT-601
23K51CWA	TS-570	TT-305	-
Y23K51CWA	TS-570Y	TT-305Y	RTT-601
23K52M	TS-570	TT-305	-
23K52MA	TS-570	TT-305	-
23K52MF	TTS-579	TT-305 or 320	-
Y23K52M	TS-570Y	TT-305Y	RTT-601
Y23K52MA	TS-570Y	TT-305Y	RTT-601
Y23K52MF	TTS-579Y	TT-305Y or 320Y	RTT-601
23K52W	TS-570	TT-305	-
23K52WA	TS-570	TT-305	-
23K52WF	TTS-579	TT-305 or 320	-
Y23K52W	TS-570Y	TT-305Y	RTT-601
Y23K52WA	TS-570Y	TT-305Y	RTT-601
Y23K52WF	TTS-579Y	TT-305Y or 320Y	RTT-601
23K53MA	TS-570	TT-305	-
Y23K53MA	TS-570Y	TT-305Y	RTT-601
23K54CWA	TS-570	TT-305	-
Y23K54CWA	TS-570Y	TT-305Y	RTT-601
23K55B	KTS-570	TT-300	-
23K55BA	TS-579	TT-300 or 319	-
Y23K55B	KTS-570Y	TT-305Y	RTT-601
Y23K55BA	TS-579Y	TT-305Y or 320Y	RTT-601
23K55M	KTS-570	TT-300	-
23K55MA	TS-579	TT-300 or 319	-
Y23K55M	KTS-570Y	TT-305Y	RTT-601
Y23K55MA	TS-579Y	TT-305Y or 320Y	RTT-601
23K55W	KTS-570	TT-300	-
23K55WA	TS-579	TT-300 or 319	-
Y23K55W	KTS-570Y	TT-305Y	RTT-601
Y23K55WA	TS-579Y	TT-305Y or 320Y	RTT-601
23K55CW	KTS-570	TT-300	-
23K55CWA	TS-579	TT-300 or 319	-
Y23K55CW	KTS-570Y	TT-305Y	RTT-601
Y23K55CWA	TS-579Y	TT-305Y or 320Y	RTT-601
23K56B	KTS-570	TT-300	-
23K56BA	TS-579	TT-300 or 319	-

Model Breakdown continued on page 58, over; other service material on pages 59 thru 74.

MOTOROLA Model Breakdown Chart for various chassis, Continued

MODEL	CHASSIS VERSION	VHF TUNER(S)	UHF TUNER
Y23K56B	KTS-570Y	TT-305Y	RTT-601
Y23K56BA	TS-579Y	TT-305Y or 320Y	RTT-601
23K56M	KTS-570	TT-300	-
23K56MA	TS-579	TT-300 or 319	-
Y23K56M	KTS-570Y	TT-305Y	RTT-601
Y23K56MA	TS-579Y	TT-305Y or 320Y	RTT-601
23K56W	KTS-570	TT-300	-
23K56WA	TS-579	TT-300 or 319	-
Y23K56W	KTS-570Y	TT-305Y	RTT-601
Y23K56WA	TS-579Y	TT-305Y or 320Y	RTT-601
23K56BW	KTS-570	TT-300	-
23K56BWA	TS-579	TT-300 or 319	-
Y23K56BW	KTS-570Y	TT-305Y	RTT-601
Y23K56BWA	TS-579Y	TT-305Y or 320Y	RTT-601
23K56CW	KTS-570	TT-300	-
23K56CWA	TS-579	TT-300 or 319	-
Y23K56CW	KTS-570Y	TT-305Y	RTT-601
Y23K56CWA	TS-579Y	TT-305Y or 320Y	RTT-601
23K57B	KTS-570	TT-300	-
23K57BA	TS-579	TT-300 or 319	-
Y23K57B	KTS-570Y	TT-305Y	RTT-601
Y23K57BA	TS-579Y	TT-305Y or 320Y	RTT-601
23K57M	KTS-570	TT-300	-
23K57MA	TS-579	TT-300 or 319	-
Y23K57M	KTS-570Y	TT-305Y	RTT-601
Y23K57MA	TS-579Y	TT-305Y or 320Y	RTT-601
23K57W	KTS-570	TT-300	-
23K57WA	TS-579	TT-300 or 319	-
Y23K57W	KTS-570Y	TT-305Y	RTT-601
Y23K57WA	TS-579Y	TT-305Y or 320Y	RTT-601
23K60M	PTS-570	PTT-307	-
23K60MF	PTS-579	PTT-307 or 322	-
Y23K60M	PTS-570Y	PTT-307Y	KTT-601
Y23K60MF	PTS-579Y	PTT-307Y or 322Y	KTT-601
23K60W	PTS-570	PTT-307	-
23K60WF	PTS-579	PTT-307 or 322	-
Y23K60W	PTS-570Y	PTT-307Y	KTT-601
Y23K60WF	PTS-579Y	PTT-307Y or 322Y	KTT-601
23K61CW	PTS-570	PTT-307	-
23K61CWF	PTS-579	PTT-307 or 322	-
Y23K61CW	PTS-570Y	PTT-307Y	KTT-601
Y23K61CWF	PTS-579Y	PTT-307Y or 322Y	KTT-601
23K62B	PTS-570	PTT-307	-
23K62BF	PTS-579	PTT-307 or 322	-
Y23K62B	PTS-570Y	PTT-307Y	KTT-601
Y23K62BF	PTS-579Y	PTT-307Y or 322Y	KTT-601
23K62M	PTS-570	PTT-307	-
23K62MF	PTS-579	PTT-307 or 322	-
Y23K62M	PTS-570Y	PTT-307Y	KTT-601
Y23K62MF	PTS-579Y	PTT-307Y or 322Y	KTT-601
23K62W	PTS-570	PTT-307	-
23K62WF	PTS-579	PTT-307 or 322	-
Y23K62W	PTS-570Y	PTT-307Y	KTT-601
Y23K62WF	PTS-579Y	PTT-307Y or 322Y	KTT-601
23K62BW	PTS-570	PTT-307	-
23K62BWF	PTS-579	PTT-307 or 322	-
Y23K62BW	PTS-570Y	PTT-307Y	KTT-601
Y23K62BWF	PTS-579Y	PTT-307Y or 322Y	KTT-601
23K63M	VTS-570	PTT-308[1]	-
23K63MF	KTS-579	PTT-308 or 323[1]	-
Y23K63M	LTS-570Y	PTT-307Y	KTT-601
Y23K63MF	LTS-579Y	PTT-307Y or 322Y	KTT-601
23K63W	VTS-570	PTT-308[1]	-
23K63WF	KTS-579	PTT-308 or 323[1]	-
Y23K63W	LTS-570Y	PTT-307Y	KTT-601
Y23K63WF	LTS-579Y	PTT-307Y or 322Y	KTT-601
23K63BW	VTS-570	PTT-308[1]	-
23K63BWF	KTS-579	PTT-308 or 323[1]	-
Y23K63BW	LTS-570Y	PTT-307Y	KTT-601
Y23K63BWF	LTS-579Y	PTT-307Y or 322Y	KTT-601
23K64M	VTS-570	PTT-308[1]	-
23K64MF	KTS-579	PTT-308 or 323[1]	-
Y23K64M	LTS-570Y	PTT-307Y	KTT-601
Y23K64MF	LTS-579Y	PTT-307Y or 322Y	KTT-601
23K65CW	VTS-570	PTT-308[1]	-
23K65CWF	KTS-579	PTT-308 or 323[1]	-
Y23K65CW	LTS-570Y	PTT-307Y	KTT-601
Y23K65CWF	LTS-579Y	PTT-307Y or 322Y	KTT-601
A23K67M[2]	ATS-570	PTT-308[1]	-
A23K67MF[2]	ATS-579	PTT-308 or 323[1]	-
A23K67W[2]	ATS-570	PTT-308[1]	-
A23K67WF[2]	ATS-579	PTT-308 or 323[1]	-
A23K68M[2]	ATS-570	PTT-308[1]	-
A23K68MF[2]	ATS-579	PTT-308 or 323[1]	-
A23K68W[2]	ATS-570	PTT-308[1]	-
A23K68WF[2]	ATS-579	PTT-308 or 323[1]	-
A23K68BW[2]	ATS-570	PTT-308[1]	-
A23K68BWF[2]	ATS-579	PTT-308 or 323[1]	-
23K70W	PTS-576	PTT-308 or 323[1]	-
Y23K70W	QTS-576Y	PTT-307Y or 322Y	KTT-601
23K71MB	VTS-570	PTT-308[1]	-
23K71MBF	VTS-579	PTT-308 or 323[1]	-
Y23K71MB	LTS-570Y	PTT-307Y	KTT-601
Y23K71MBF	LTS-579Y	PTT-307Y or 322Y	KTT-601
23K72W	PTS-576	PTT-308 or 323[1]	-
Y23K72W	QTS-576Y	PTT-307Y or 322Y	KTT-601
A23K72W[2]	ATS-576	PTT-308 or 323[1]	-
23K73MB	PTS-576	PTT-308 or 323[1]	-
Y23K73MB	QTS-576Y	PTT-307Y or 322Y	KTT-601
A23K73MB[2]	ATS-576	PTT-308 or 323[1]	-
23K74W	PTS-576	PTT-308 or 323[1]	-
Y23K74W	QTS-576Y	PTT-307Y or 322Y	KTT-601
A23K74W[2]	ATS-576	PTT-308 or 323[1]	-
23SF5MA[3]	QTS-570	QTT-308[1]	-
23SF5MAF[3]	QTS-579	QTT-308 or 323[1]	-
Y23SF5MA[3]	RTS-570Y	QTT-307Y	QTT-601
23SF5MAF[3]	RTS-579Y	QTT-307Y or 322Y	QTT-601
23SF5WA[3]	QTS-570	QTT-308[1]	-
23SF5WAF[3]	QTS-579	QTT-308 or 323[1]	-
Y23SF5WA[3]	RTS-570Y	QTT-307Y	QTT-601
Y23SF5WAF[3]	RTS-579Y	QTT-307Y or 322Y	QTT-601
23SF6MA[4]	QTS-570	QTT-308[1]	-
23SF6MAF[4]	QTS-579	QTT-308 or 323[1]	-
Y23SF6MA[4]	RTS-570Y	QTT-307Y	QTT-601
Y23SF6MAF[4]	RTS-579Y	QTT-307Y or 322Y	QTT-601
23SF6WA[4]	QTS-570	QTT-308[1]	-
23SF6WAF[4]	QTS-579	QTT-308 or 323[1]	-
Y23SF6WA[4]	RTS-570Y	QTT-307Y	QTT-601
Y23SF6WAF[4]	RTS-579Y	QTT-307Y or 322Y	QTT-601
23SF6BWA[4]	QTS-570	QTT-308[1]	-
23SF6BWAF[4]	QTS-579	QTT-308 or 323[1]	-
Y23SF6BWA[4]	RTS-570Y	QTT-307Y	QTT-601
Y23SF6BWAF[4]	RTS-579Y	QTT-307Y or 322Y	QTT-601
23SF7CWA[4]	QTS-570	QTT-308[1]	-
23SF7CWAF[4]	QTS-579	QTT-308 or 323[1]	-
Y23SF7CWA[4]	RTS-570Y	QTT-307Y	QTT-601
Y23SF7CWAF[4]	RTS-579Y	QTT-307Y or 322Y	QTT-601
23SF8WA[4]	QTS-570	QTT-308[1]	-
23SF8WAF[4]	QTS-579	QTT-308 or 323[1]	-
Y23SF8WA[4]	RTS-570Y	QTT-307Y	QTT-601
Y23SF8WAF[4]	RTS-579Y	QTT-307Y or 322Y	QTT-601
A23T8M[2]	VATS-570	BTT-310[1]	-
A23T8MF[2]	VATS-579	BTT-310 or STT-323[1]	-
A23T8W[2]	VATS-570	BTT-310[1]	-
A23T8WF[2]	VATS-579	BTT-310 or STT-323[1]	-
A23T8CW[2]	VATS-570	BTT-310[1]	-
A23T8CWF[2]	VATS-579	BTT-310 or STT-323[1]	-
23T12BRF	TS-579	TT-300 or 319	-
Y23T12BRF	TS-579Y	TT-305Y or 320Y	RTT-601
23T13B	MTS-570	TT-305	-
23T13BF	MTS-579	TT-305 or 320	-
Y23T13B	MTS-570Y	TT-305Y	RTT-601
Y23T13BF	MTS-579Y	TT-305Y or 320Y	RTT-601
23T13M	MTS-570	TT-305	-
23T13MF	MTS-579	TT-305 or 320	-
Y23T13M	MTS-570Y	TT-305Y	RTT-601
Y23T13MF	MTS-579Y	TT-305Y or 320Y	RTT-601
23T13W	MTS-570	TT-305	-
23T13WF	MTS-579	TT-305 or 320	-
Y23T13W	MTS-570Y	TT-305Y	RTT-601
Y23T13WF	MTS-579Y	TT-305Y or 320Y	RTT-601
23T13BW	MTS-570	TT-305	-
23T13BWF	MTS-579	TT-305 or 320	-
Y23T13BW	MTS-570Y	TT-305Y	RTT-601
Y23T13BWF	MTS-579Y	TT-305Y or 320Y	RTT-601
23T13CW	MTS-570	TT-305	-
23T13CWF	MTS-579	TT-305 or 320	-
Y23T13CW	MTS-570Y	TT-305Y	RTT-601
Y23T13CWF	MTS-579Y	TT-305Y or 320Y	RTT-601

(1) UHF adaptor kit, TK-126, will convert these turret type tuners for UHF reception.

(2) Automatic tuning models using the TRR-1 remote control receiver and TRT-1 remote control transmitter.

(3) Stereo-TV models using the HS-979, 14 watt, stereo amplifier and VM58RC record changer. Models with an FM suffix contain the HS-1013 AM/FM tuner. AM/FM tuner kit, HK-45-2, may be installed in models that do not come equipped with a AM/FM tuner.

(4) Stereo-TV models using the HS-977 stereo preamplifier, HS-909, 14 watt, stereo power amplifier, vibrasonic transducer and VM58RC (23SF6 and 23SF7) or VM59RC (23SF8) record changer. Models with an FM suffix contain the HS-1013 AM/FM tuner. AM/FM tuner kit, HK-45-2, may be installed in models that do not come equipped with an AM/FM tuner.

MOTOROLA Chassis TS-441, TS-570, etc., Service Information, Continued

Switch Type Tuners With Pre-Set Fine Tuning

Prior to adjusting the tuner fine tuning adjustment screws, set optimizer control to its mid-mechanical position.

Individual channel screw adjustments are accessable from the front or rear of the receivers, depending on the model, without removing the chassis or back cover.

The pre-set screws have a rotation of approximately one and one half turns. Set all pre-set screws to mid-position. Set tuner to highest numbered available channel. On 23" models, remove the channel selector knob and the insert bearing from the control mask by turning in the direction of the arrow. With an insulated screwdriver, adjust the individual channel oscillator screw for best picture and sound. Only a slight adjustment should be necessary to bring in each channel. Adjust all other available channels in descending order. Channel 2 coil has no screw adjustment. Replace insert bearing and channel selector knob. Re-adjust all available channel pre-set screws for best picture and sound.

Switch Type Tuners With Continuously Variable Fine Tuning

Remove channel selector and fine tuning knobs (some models have a pilot lamp window mask which must also be removed). Center the fine tuning control, set tuner to the highest numbered available channel and with an insulated screwdriver, adjust the individual channel oscillator screw for best picture and sound. Adjust all other available channels in descending order. Only a slight adjustment should be necessary to bring in each channel.

Turret Type Tuners With Pre-Set Fine Tuning

The pre-set screws have a rotation of approximately one and one half turns. Set pre-set screws of available channel(s) to mid-position. On 23" models, remove the channel selector knob and the insert bearing from the control mask by turning in the direction of the arrow. On A23T8 series models, remove the back cover. Adjust oscillator core for best picture and sound. Use an insulated screwdriver with a shaft diameter of .09" or less to avoid ruining threads in strip coil forms. Re-adjust all available channel pre-set screws after replacing removed items.

NOTE: On automatic tuning models, refer to Indexing Automatic Tuners For Available Channels for further adjustments.

Turret Type Tuners With Continuously Variable Fine Tuning

Remove the channel selector knob, fine tuning knob and pilot lamp window mask. Center the fine tuning control mechanically and adjust oscillator core for best picture and sound. Use an insulated screwdriver with a shaft diameter of .09" or less to avoid ruining threads in strip coil forms.

INDEXING AUTOMATIC TUNERS FOR AVAILABLE CHANNELS

Proper adjustment of the pre-set fine tuning screw and the oscillator core in the channel strip for best picture and sound is all that is necessary to index an available channel. Refer to Fine Tuning Adjustments (turret type tuners with pre-set fine tuning).

To by-pass an unused channel, turn to the channel, push-in the channel selector knob, engage the pre-set screw and turn the knob counterclockwise as far as it will go. Release the channel selector knob and spin it until it engages with the selector shaft.

NOTE: A safety switch, activated by the fine tuning pre-set arm, opens the motor circuit when fine tuning or when the channel selector knob is free-wheeling. Therefore, automatic channel changing will be inoperative unless the channel selector knob is engaged with the selector shaft.

REMOTE CONTROL ON-OFF SWITCH

The Remote Control On-Off switch located on the back cover, allows automatic or manual operation of the receiver. If the automatic portion of the receiver becomes inoperative at any remote tuning function, whether it be receiver "off", sound "muted" or any other setting, the receiver may be restored to normal manual operation by setting the switch to the "off" position.

NOISE GATE CONTROL

The Noise Gate control is located at the rear of the receiver and is used to adjust the receiver for best noise protection under different signal strength conditions.

To adjust, tune in a channel for best picture and sound. Turn the noise gate control counterclockwise (when viewed from rear of receiver) until the picture becomes unstable (rolls down or slips, etc.). Then turn control clockwise until the picture returns to normal. Check all channels; if any are unstable, continue turning control clockwise until the picture is normal on all channels.

DEFLECTION YOKE ADJUSTMENT

If the deflection yoke is not correctly positioned, the picture will be tilted. If the deflection yoke is not tight against the flare of the picture tube, the picture may have raster distortions or neck shadow.

To adjust the yoke, loosen the yoke retainer clamp, position the yoke as far forward as possible, and rotate until picture is straight. When satisfactory, tighten yoke retainer clamp.

PICTURE CENTERING

Position the 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.

VERTICAL SIZE AND LINEARITY ADJUSTMENTS

Adjust the Vertical Size and Vertical Linearity controls for best overall linearity with desired picture size. The Vert Lin primarily affects the upper picture portion while the Vert Size primarily affects the lower portion.

HORIZONTAL SIZE CONTROL

The Horizontal Size control is located at the rear of the receiver and varies the screen voltage of the horizontal output tube.

HORIZONTAL OSCILLATOR ADJUSTMENT

No special adjustment is required for the horizontal oscillator coil as the coil is also used as the horizontal hold control. Merely adjust for most stable horizontal sync.

FOCUSING ADJUSTMENT

To provide for differences in picture tube gun structures, a focus adjustment is provided by three lugs located on the chassis. They provide a ground potential point, a B+ voltage point and a bootstrap voltage point. Connect the blue lead from the picture tube socket to the lug which provides the best overall focus, center to edge of screen.

PINCUSHION MAGNETS

Pincushion magnets, in both the vertical and horizontal planes, are provided as part of the yoke. These magnets are glued into pockets provided in the yoke flare and require no adjustment.

MOTOROLA Chassis TS-441, TS-570, etc., Alignment Information, Continued

CHASSIS ALIGNMENT

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 local oscillator. On turret type tuners, set tuner between channels. On switch type tuners, short out pins 8 and 9 of mix-osc tube with a fine piece of bare wire, or short pin 9 to tube shield with a fine piece of wire.

4. Apply the negative lead of a 6.0 volt bias supply to IF AGC buss and positive lead to chassis ground.

5. Connect a 1500 ohm 60W voltage normalizing resistor from B+ to chassis.

6. Set the contrast control at minimum (extreme counterclockwise position), and set optimizer control for maximum resistance (extreme counterclockwise position).

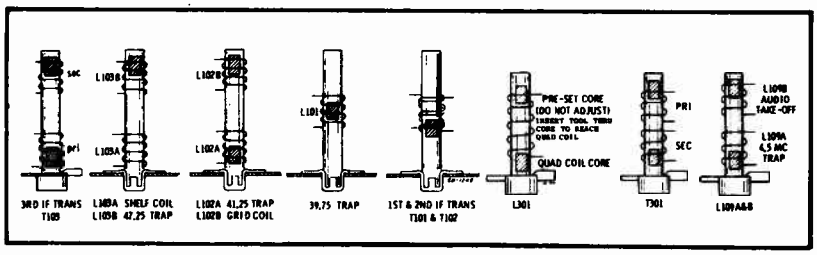
7. Insert a 8200 ohm 1/2W resistor from the top of the diode (grid of video output) load to ground.

8. Short across tuner input terminals.

9. Maintain 2 to 5 volts peak-to-peak at the grid of Video Amp, except when specific values are given in the procedure chart.

10. Refer to Video IF and Sound Alignment Detail for component and test point locations.

11. All coil core tuning positions, in relation to chassis, are given in the Video IF and Sound Alignment Detail and in the Core Position Detail.



COIL CORE POSITIONS

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GEN. & MARKER	INDICATOR	ADJUST	ADJ. FOR AND/OR REMARKS
1.	To grid of 3rd IF thru .001mf cap. Set sweep to approx. 44 Mc, markers as required.	Scope to grid of Video Amp thru 47K ohm resistor.	Both cores of 3rd IF trans (T103)	Equal peaks & marker placement as shown in curve #1.
2.	To mixer T.P. (M) thru .001 cap. Set sweep to 44 Mc, markers as required.	Same as step #1.	47.25 Mc trap (L103B & L104) & 41.25 Mc trap (L102A)	Minimum response at proper trap freq. See curve #2. 39.75 Mc trap (L101) core is turned fully into coil at a trap freq. of 36 Mc or lower. This trap is set at 39.75 Mc only when upper adjacent video interference is present.* NOTE: Temporary removal of bias and an increase of generator output may be required to see traps clearly.
3.	To grid (pin 1) of 1st IF Amp thru .001 mf cap. Wrap a wire around grid pin of tube and connect generator to wire. Set sweep to 44 Mc, markers as required.	Same as step #1.	1st IF trans (T101)	Proper 42.25 Mc marker placement. See curve #3.
			2nd IF trans (T102)	Proper 45.75 Mc marker placement. See curve #3. NOTE: Mixer plate trans (T1) may cause suck-out in IF response. De-tune trans if desired.
4.	Same as step #2.	Same as step #1.	Mixer plate trans, (T1 on tuner) & 1st IF grid coil (L102B)	To obtain curve #4. The mixer trans affects the center peak and the grid coil affects the two outside peaks. Tune coils simultaneously for proper tuning and bandwidth consistant with maximum gain. If necessary, the 1st and 2nd IF trans can be touched-up to obtain proper response as shown in curve #4. If interference from a upper adjacent TV channel is present, L101 should be adjusted for 39.75 Mc. If there is no interference from a upper adjacent channel L101 is adjusted out of the band pass, or at 36 Mc.

*The 39.75 Mc trap (L101) is factory adjusted to 36 Mc and is not tuned to 39.75 Mc unless adjacent video interference is present. Adjust trap by tuning core away from chassis, until adjacent video interference is visually no longer present on CRT.

MOTOROLA Chassis TS-441, TS-570, etc., Alignment Information, Continued

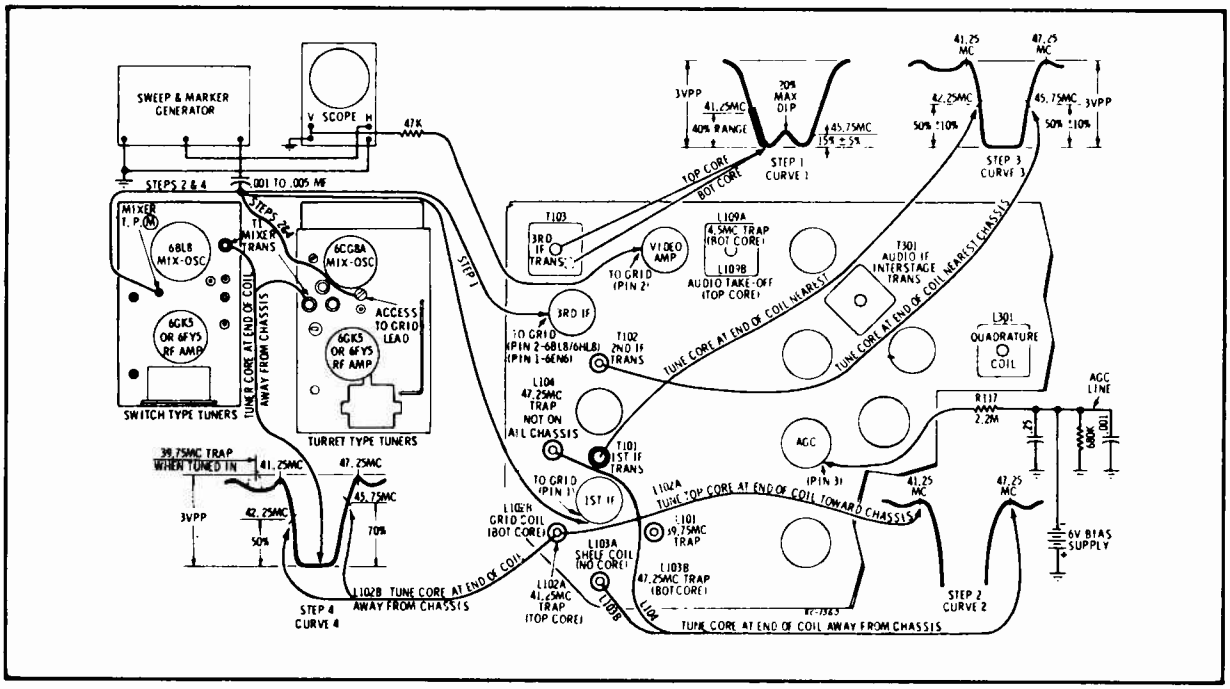


FIGURE 10. VIDEO IF & SOUND ALIGNMENT DETAIL

SOUND ALIGNMENT (Station Signal Method)

The sound system used in this 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.

4.5 MC TRAP ADJUSTMENT (L109A)

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 (L109A) 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.

SOUND ALIGNMENT PROCEDURE

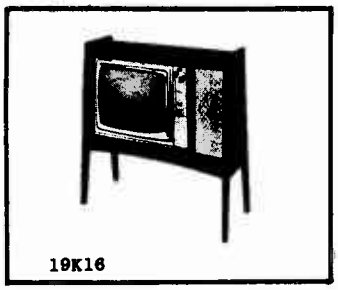
STEP	STATION	INDICATOR	ADJUST	ADJ. FOR AND/OR REMARKS
1.	Strong signal	VTVM to point (A) on quad. coil L301 (See schematic diagram.)	L301 (quad. coil)	Max deflection (coarse adj.) of two possible max tuning points, use that giving the largest voltage reading.*
2.	"	Listening test	"	Max sound with minimum distortion (fine adj.)
3.	Weak signal	"	T301 (inter-stage coil)	Max sound with minimum distortion (maintain hiss level).**
4.	"	"	L109B (take off coil)	Max sound with minimum distortion.

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

*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.

**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.

MOTOROLA TELEVISION CHASSIS TS-441A-00



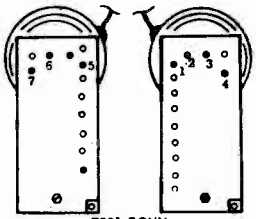
NOTES:

VOLTAGE MEASUREMENTS

1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM, ±20%.
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.

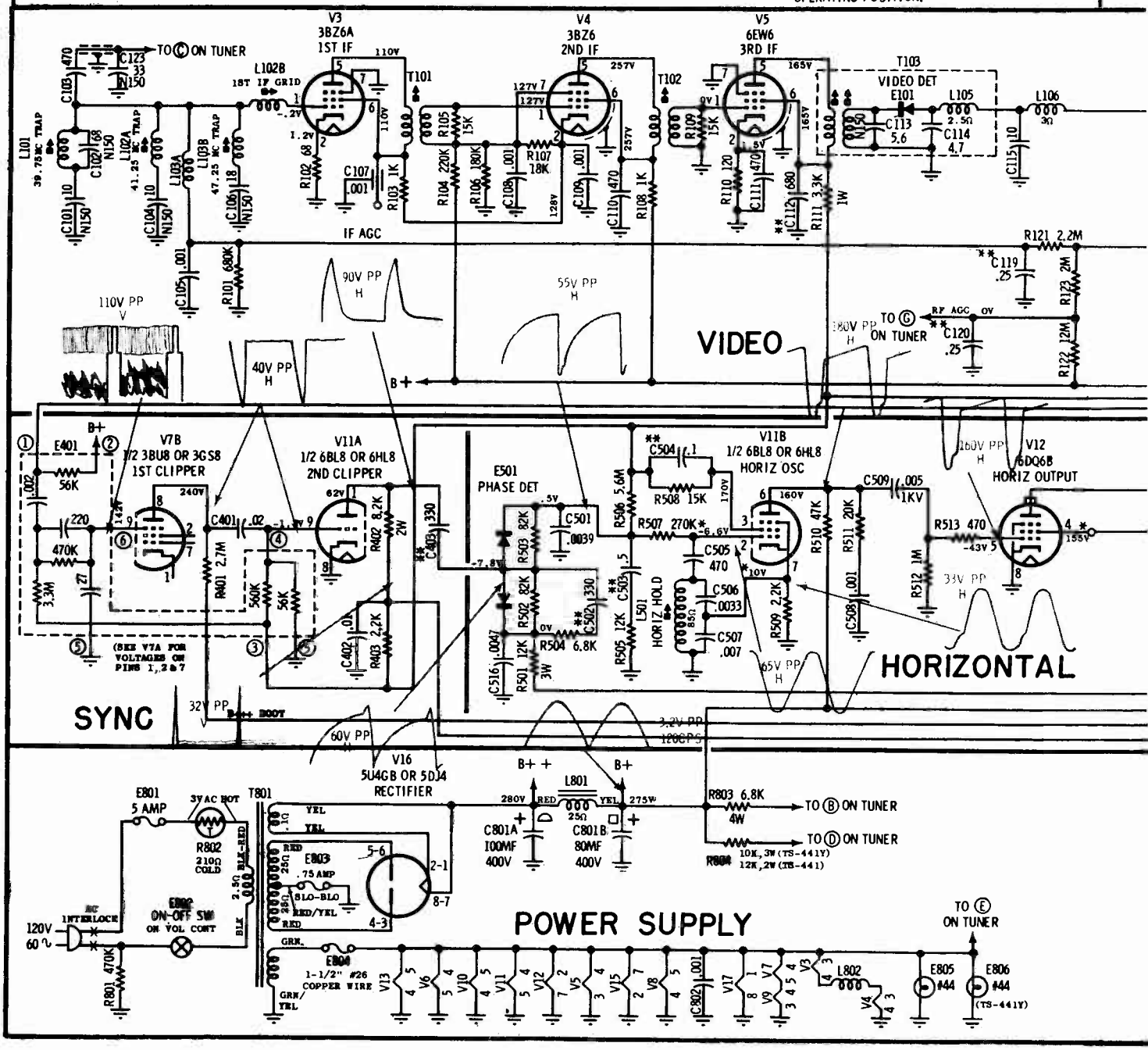
CAPACITORS: UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

** INDICATES SPECIAL COMPONENTS.

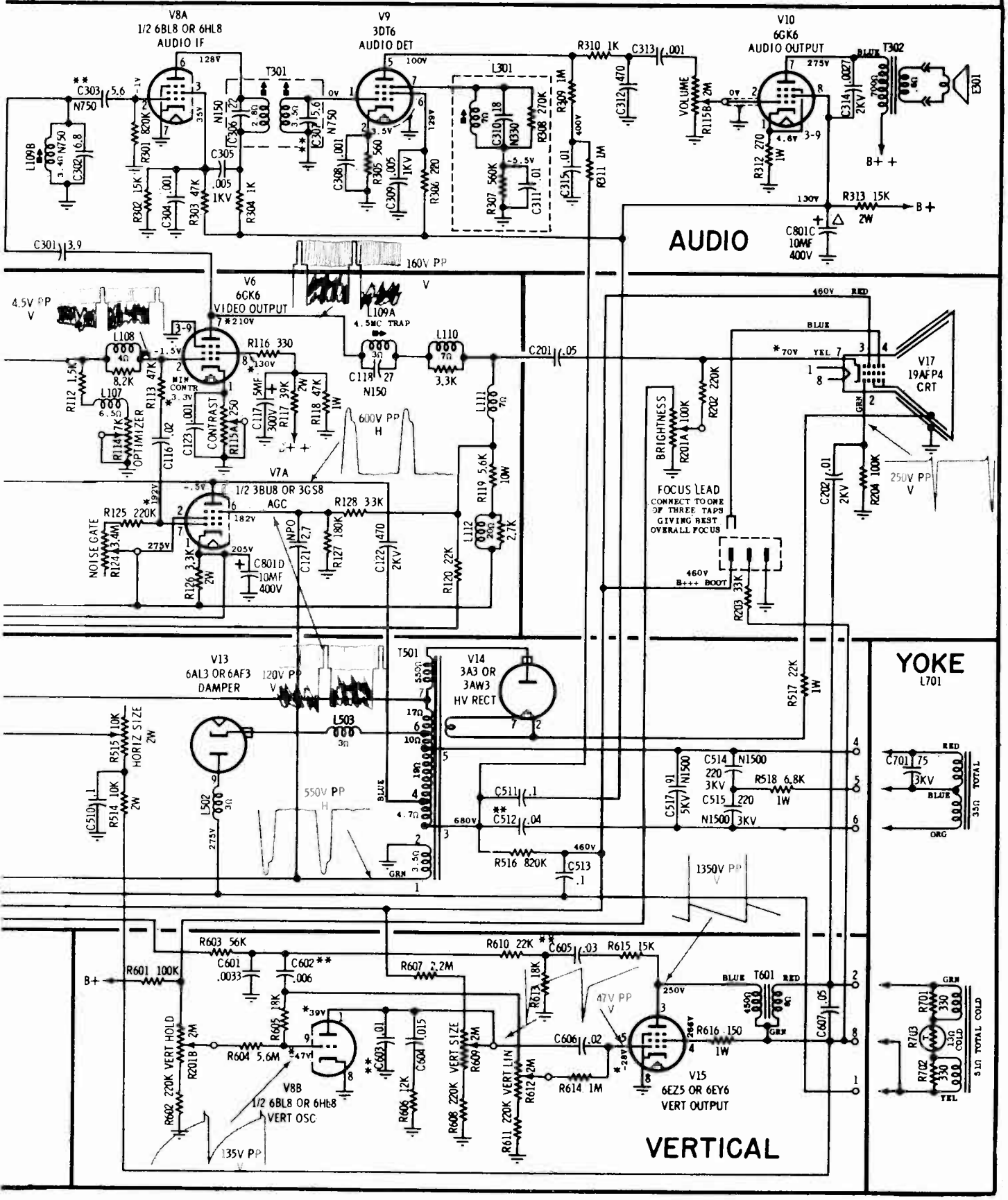


WAVEFORM MEASUREMENTS

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.



MOTOROLA Chassis TS-441A Schematic Diagram, Continued

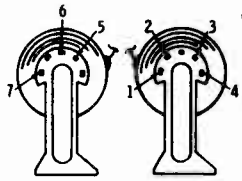


CHASSIS TS, ATS, QTS, RTS, VTS, & WTS-448 A-00 THRU A-05 (ALSO QTS & VTS-450A-00)

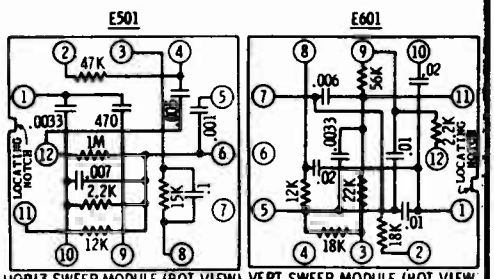
19" MOTOROLA GOLDEN M CHASSIS TS-448 & 450

Chassis TS-448 and the TS-450 are 16-tube receivers which are electrically identical. However, the TS-450 has the picture tube mounted directly to the chassis, whereas the TS-448 has the picture tube, tuner and speed control bracket all mounted directly to the bezel. In this unit the bottom chassis cover is removeable for convenience to the service Technician.

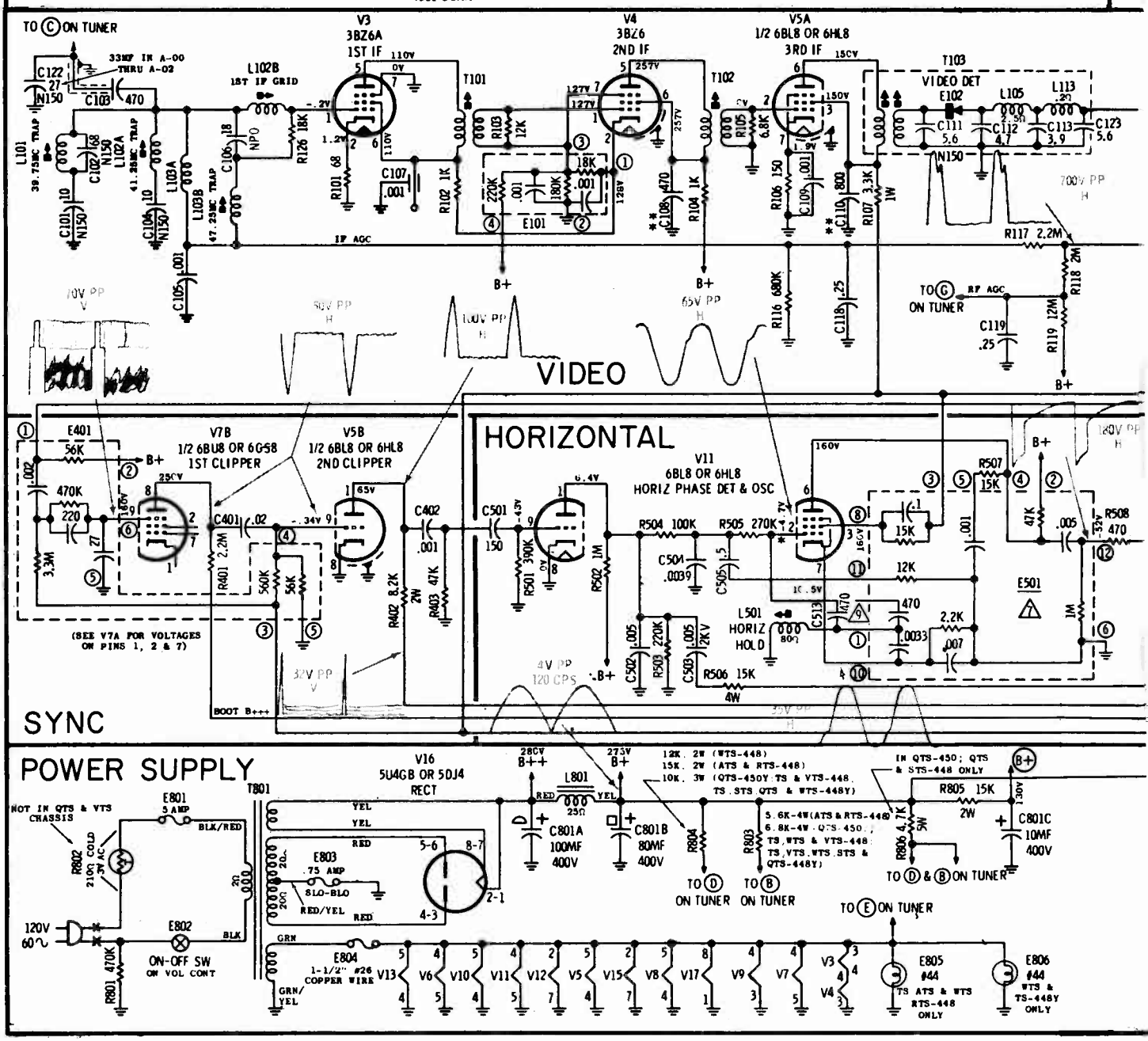
NOTES:
VOLTAGE MEASUREMENTS
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM±20%
2. LINE VOLTAGE MAINTAINED AT 120V AC.
3. VOLTAGES INDICATED BY AN ASTERISK WILL VARY WITH ASSOCIATED CONTROL SETTINGS.
4. TAKEN WITH CONTRAST CONTROL AT MINIMUM AND ALL OTHER CONTROLS IN NORMAL OPERATING POSITION WITH NO SIGNAL INPUT.
5. TUNER ON CHANNEL 13 OR CHANNEL OF LEAST NOISE WITH ANTENNA TERMINALS SHORTED.



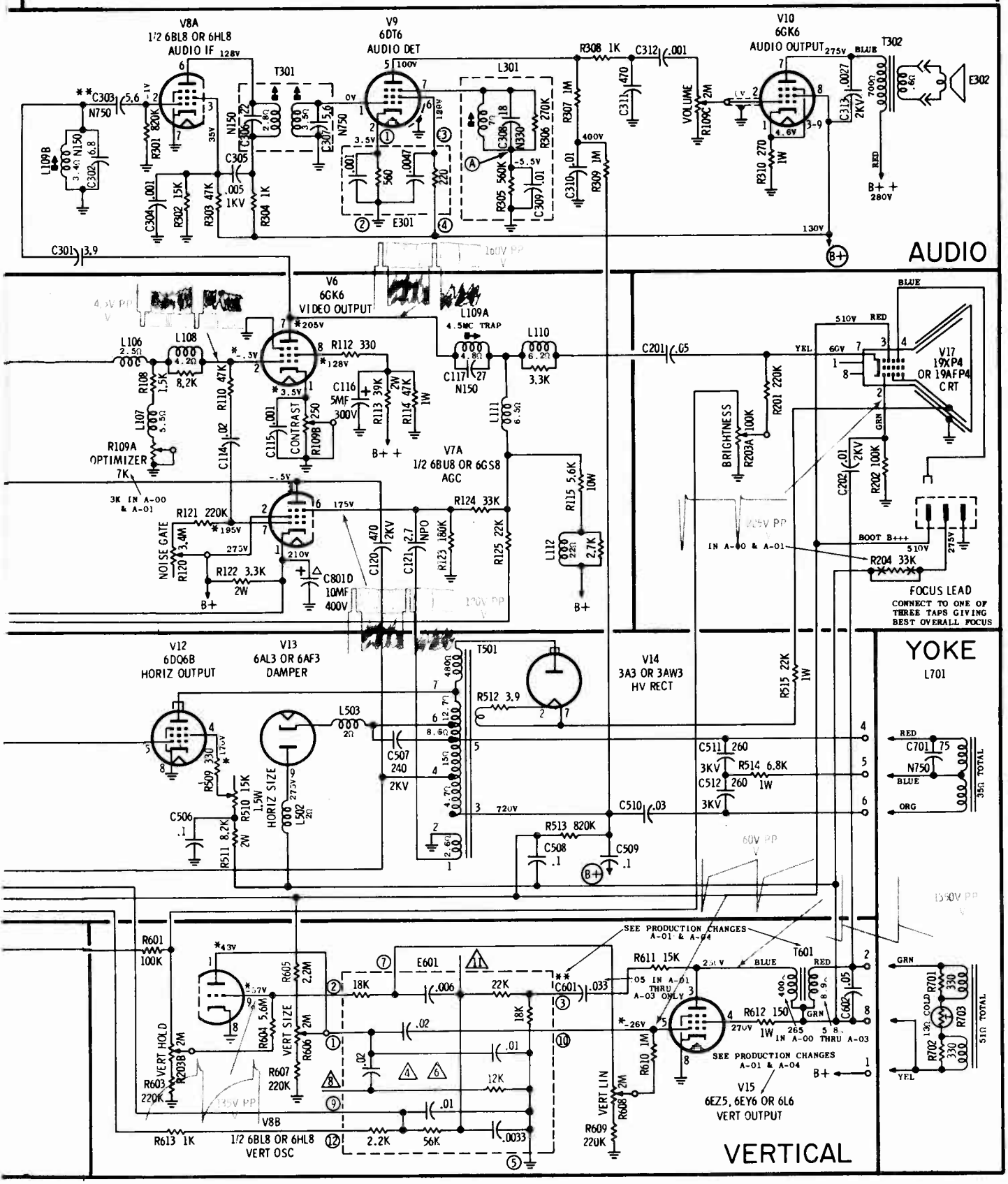
WAVEFORM MEASUREMENTS
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A WIDE-BAND OSCILLOSCOPE.
2. OSCILLOSCOPE SYNCED NEAR SWEEP RATE INDICATED.
3. TAKEN WITH STRONG SIGNAL; CONTRAST CONTROL AT MAXIMUM; ALL OTHER CONTROLS IN NORMAL OPERATING POSITION.



CAPACITORS: UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.
** INDICATES SPECIAL COMPONENTS.



MOTOROLA Chassis TS-448, QTS-450, etc., Schematic Diagram, Continued



MOTOROLA

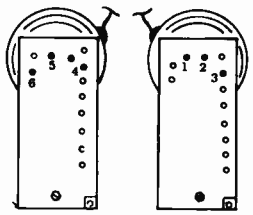
CHASSIS TS, ATS, KTS, LTS, MTS, PTS, QTS, RTS, VTS & VATS-570 A-00 THRU B-05

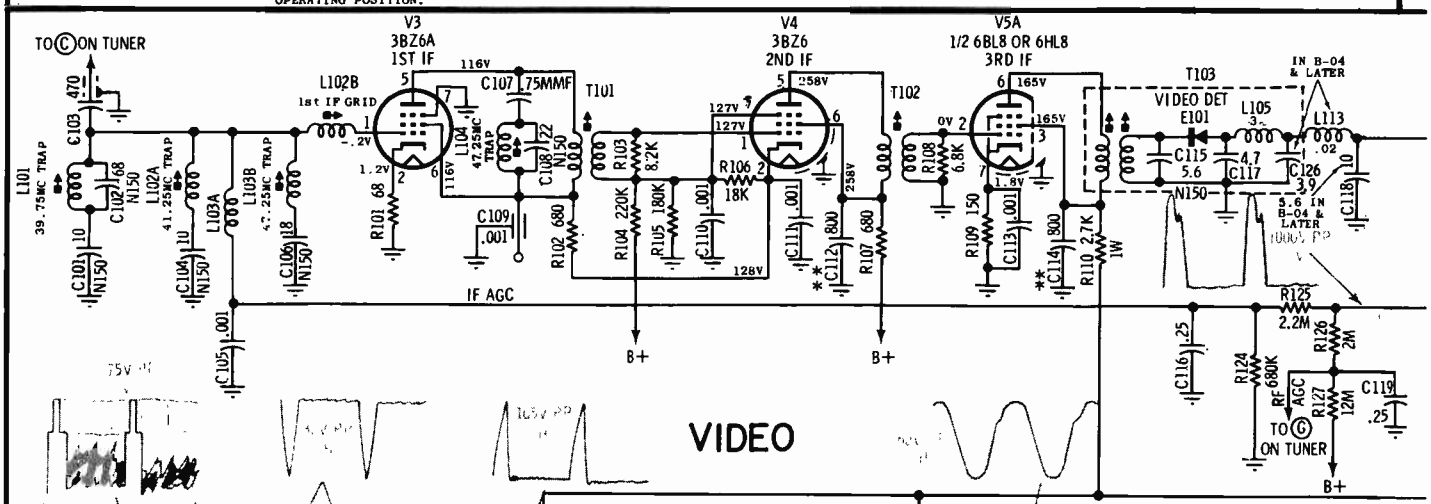
NOTES:
VOLTAGE MEASUREMENTS
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM. ± 20%
2. LINE VOLTAGE MAINTAINED AT 120V AC.
3. VOLTAGES INDICATED BY AN ASTERISK WILL VARY WITH ASSOCIATED CONTROL SETTINGS.
4. TAKEN WITH CONTRAST CONTROL AT MINIMUM AND ALL OTHER CONTROLS IN NORMAL OPERATING POSITION WITH NO SIGNAL INPUT.
5. TUNER ON CHANNEL 13 OR CHANNEL OF LEAST NOISE WITH ANTENNA TERMINALS SHORTED.

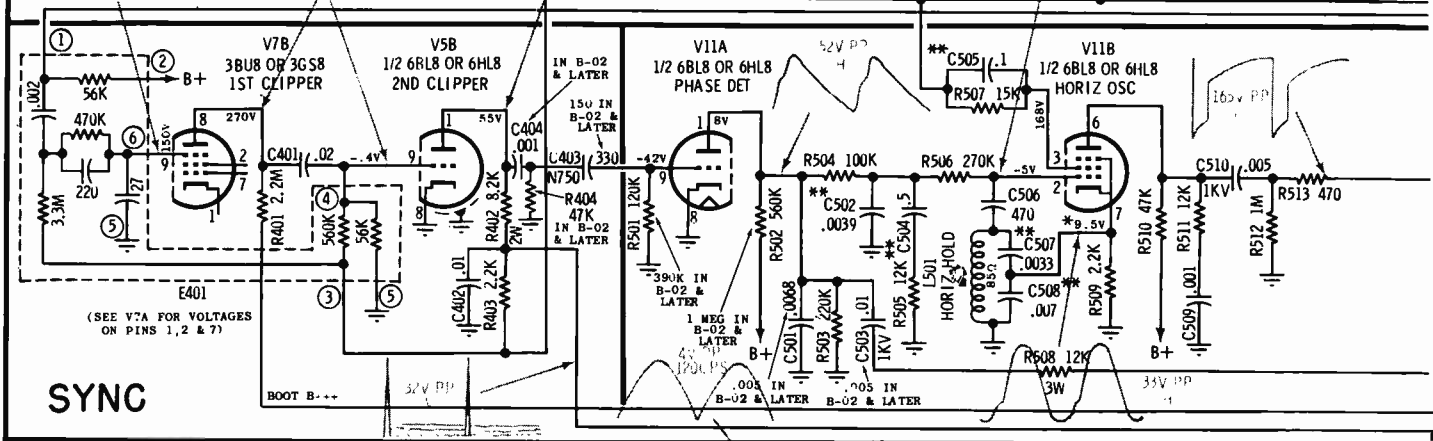
**INDICATES SPECIAL COMPONENTS.

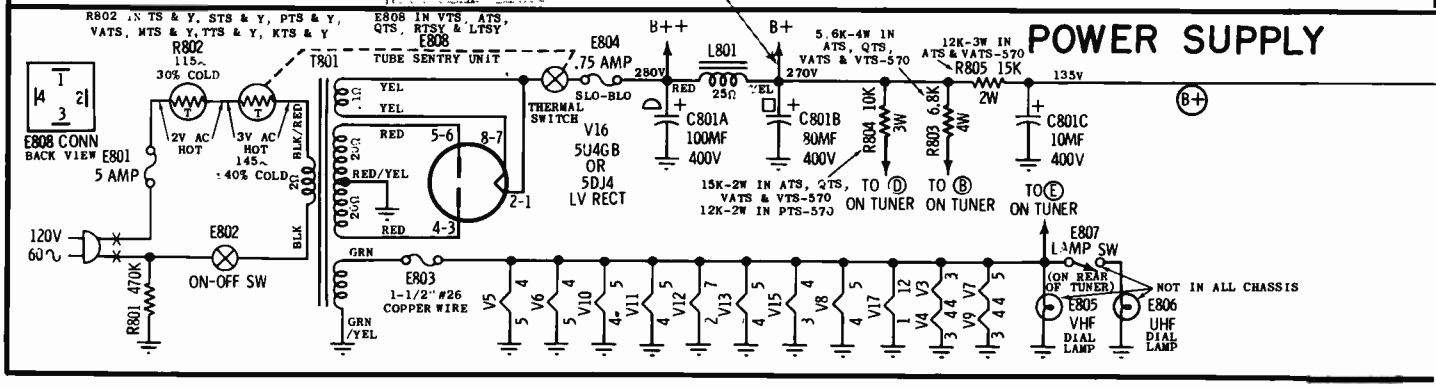
CAPACITORS: UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

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.

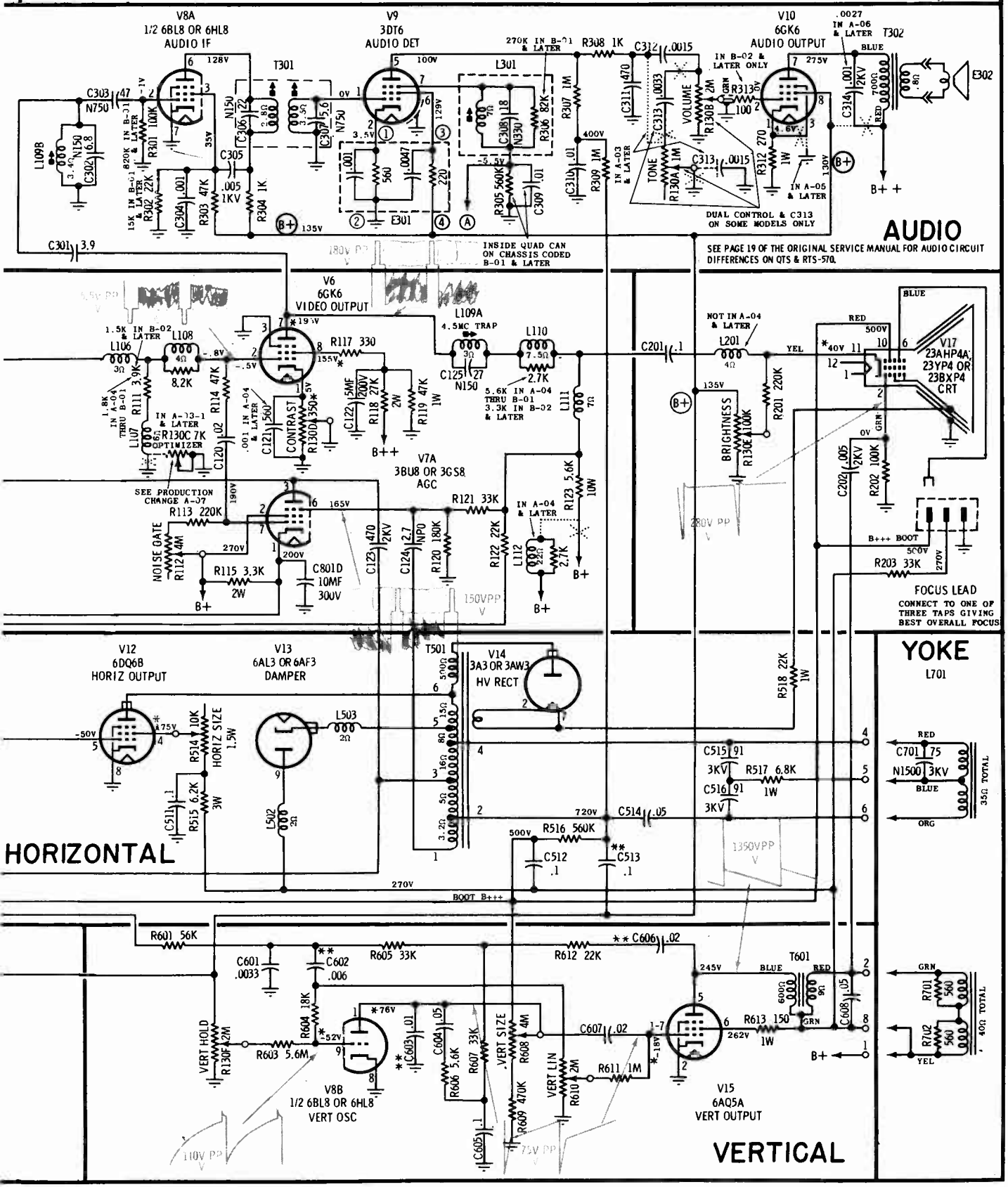








MOTOROLA Chassis TS-570, etc., Schematic Diagram, Continued



VOLUME TV-20, ADDITIONAL 1962 TELEVISION SERVICING INFORMATION

MOTOROLA Production Changes for various chassis as listed

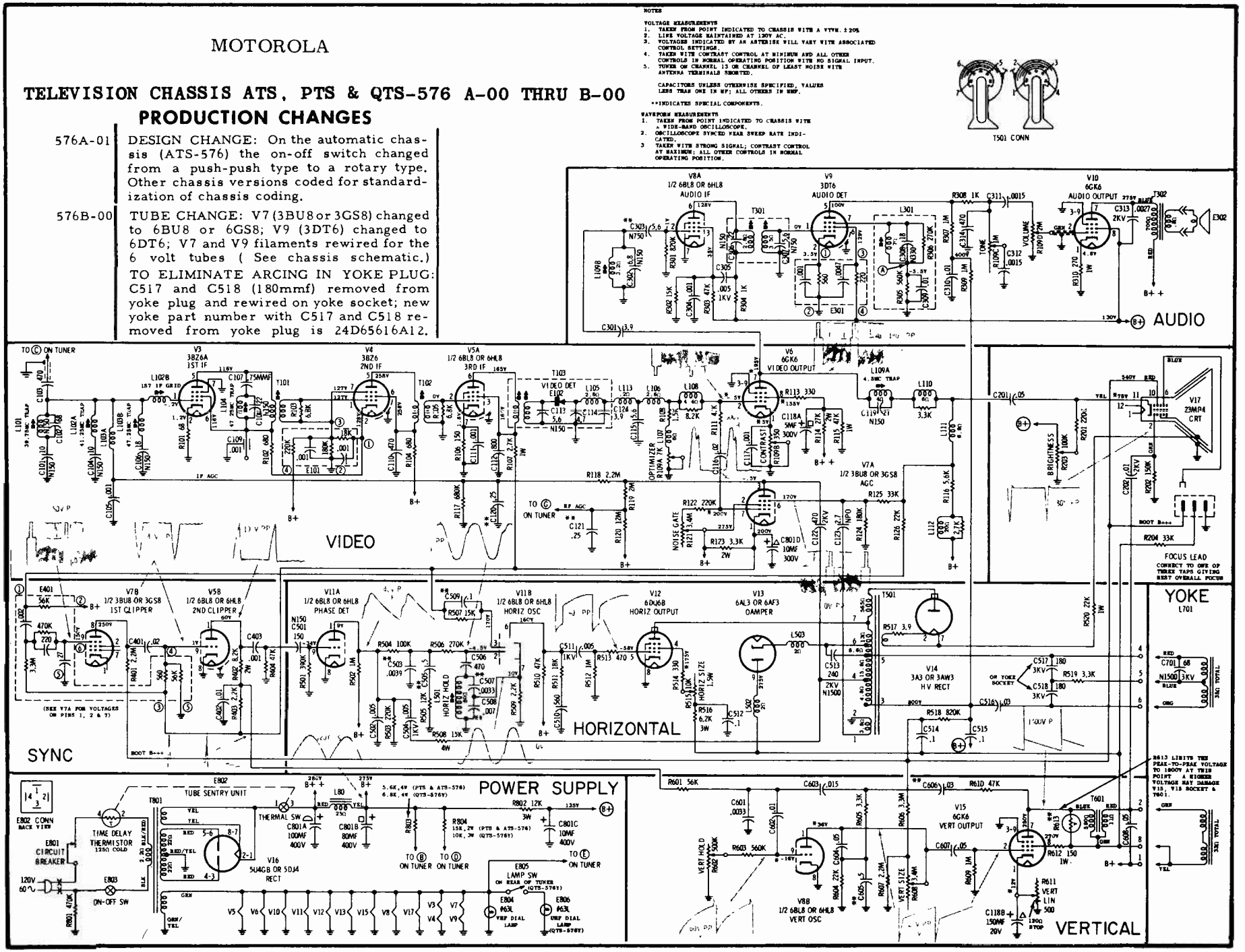
Chassis Coding	Changes
448A-01	TO IMPROVE VERTICAL LIN EARITY: C601 (.033mf) changed to .05mf. The .05mf capacitor should be used in place of the .033mf capacitor when vertical output transformers 25D65840A05 or 25D65840A06 are used on the chassis. Also, use tube type 6EY6 only as the vertical output tube when the above mentioned output transformers are used. See 448A-04 change.
448A-02	TO PROVIDE MORE EFFECTIVE CONTROL OF THE OPTIMIZER CIRCUIT: The 3000 ohm optimizer control changed to 7000 ohms. If replacement is necessary, replace with the 7000 ohm control. DESIGN CHANGE: R204 (33K) removed.
448A-03	TO REDUCE REGENERATION ON CHANNEL 3 WHEN USING THE MONOPOLE ANTENNA: C122 (33mmf) changed to 27mmf.
448A-04	TO IMPROVE VERTICAL LINEARITY: C601 (.05mf) changed to .033mf; T601, Part # 25D65840A05 or 25D65840A06, changed to Part # 25D65840A01 or 25D65840A07. This change in the vertical output transformer allows the use of the 6EZ5 or 6EY6 vertical output tube without affecting proper linearity. NOTE: Some chassis use the 6L6GT tube in place of the 6EZ5 or 6EY6. If replacement of the 6L6GT is required, use a 6EZ5 or 6EY6 as the replacement.
448A-05	HORIZONTIAL OUTPUT TRANSFORMER CHANGE: T-501 Horizontial output transformer part number changed from 24D66258A02 to 24D66258A06. The damper lead from the coil was relocated from former terminal 6 to the blank center lug located between terminals 5 and 6.
570A-03	TO INCREASE AUDIO OUTPUT: C312 (.0015 mf) re-located from chassis to control bracket; C313 (.0033 mf) changed to .0015 mf; C313 and tone control (R310B) re-wired. See Schematic Diagram for wiring changes.
570A-04	OPTIMIZER CONTROL ADDITION: C121 (560 mmf) changed to .001 mf; L107 (390 µh) changed to 200 µh; L110 (240 µh) changed to 270 µh; L111 (500 µh) changed to 240 µh; L201 (100 µh) removed; L112 (900 µh) added in series with R123; R130C (3K - optimizer control) added in series with L107 to ground; R111 (3.9K) changed to 1.8K. NOTE: See Production Change 570A-07.
570A-04-1	Same as A-05 change.
570A-05	TO REDUCE AUDIO REGENERATION: Jumper lead between pins 1 and 3 of Audio Output tube (V10) removed and suppressor grid (pin 3) connected to chassis ground.
570A-06	TO REDUCE HIGH FREQUENCY NOISE WHEN CHANGING CHANNELS: C314 (.001) changed to .0027 mf.
570A-07	TO PROVIDE A MORE EFFECTIVE CONTROL OF THE OPTIMIZER CIRCUIT: The 3000 ohm optimizer control changed to 7000 ohms. If replacement is necessary, replace with a 7000 ohm control.
570B-02	TO ELIMINATE POSSIBILITY OF HORIZONTAL PULL: C503 (.01) changed to .005 mf; C501 (.0068) changed to .005 mf; C403 (330 mmf) changed to 150 mmf N750; C404 (.001 mf) added in series with C403; R404 (47K) added, from plate (pin 1) of 2nd clipper to ground; R502 (560K) changed to 1 meg; R501 (120K) changed to 390K. OPTIMIZER CIRCUIT CHANGE: L110 (270 µh) compensating coil changed to 200 µh (with 3.3K swamping resistor); R111 (1.8K) changed to 1.5K. TO REDUCE AUDIO OUTPUT REGENERATION: R313 (100) added in series with control grid of audio output tube.
570B-04	TO REDUCE CHANNEL 8 TWEET: T103 (3rd IF transformer) changed to Part No. 1V66244A26 which includes C115, C116, C126, E101, L105 and L113; C118 (10mmf) changed to 5.6mmf. NOTE: New components in T103 are C126 (3.9mmf, Part No. 21R115953) and L113 (filter, 180mc resonant, Part No. 24C65828A16).
570B-05	Chassis coded for production control only. No electrical changes.
579A-01	TO ELIMINATE HORIZONTAL OSCILLATOR INTERRUPTION: Locate R507 (12K), wired between lugs 2 and 5 of the terminal strip nearest E501's (horizontal module) socket. Lug # 1 of the strip is furthest from E501's socket. Interchange the connections between lugs 1 and 2 of the strip. R507 (12K-3W) changes to 15K-4W. The yellow cathode lead of the CRT socket is now dressed along the top of the high voltage cage. A nylon wire retainer clip (Part # 42K753665) is used to properly dress the lead.
579A-03	TO IMPROVE VERTICAL RETRACE BLANKING AT TOP OF PICTURE: R204 (33K) changed to 68K.
579B-00	TUBE CHANGE: V7 (3BU8 or 3GS8) changed to 6BU8 or 6GS8; V9 (3DT6) changed to 6DT6; V7 and V9 filaments re-wired for the 6 volt tubes (See chassis schematic).
579B-01	HORIZONTIAL MODULE CHANGE: E501 Part No. 51D66326A01 changed to Part No. 51D66326A04. The 470mmf capacitor between pins 9 and 1 have been removed from the new module. A 470mmf capacitor, Part No. 21D66395A03 is wired from pin 9 of the module to pin 2 of V-11. When replacing 51D66326A01 with 51D66326A04, it will be necessary to add the 470mmf capacitor between pin 9 of the module and pin 2 of V-11.
579B-02	INCREASED BRIGHTNESS RANGE ON ATS-579 ONLY: Terminal 2 of the high voltage transformer T-501 was relocated from ground to 135V B+.
579B-03	TO REDUCE THE POSSIBILITY OF CORONA ARC BETWEEN C508 AND CORE OF HIGH VOLTAGE TRANSFORMER T501: Plastic sleeving placed over C508 to reduce possibility or arcing.

MOTOROLA

TELEVISION CHASSIS ATS, PTS & QTS-576 A-00 THRU B-00

PRODUCTION CHANGES

576A-01	DESIGN CHANGE: On the automatic chassis (ATS-576) the on-off switch changed from a push-push type to a rotary type. Other chassis versions coded for standardization of chassis coding.
576B-00	TUBE CHANGE: V7 (3BU8 or 3GS8) changed to 6BU8 or 6GS8; V9 (3DT6) changed to 6DT6; V7 and V9 filaments rewired for the 6 volt tubes (See chassis schematic.) TO ELIMINATE ARCING IN YOKE PLUG: C517 and C518 (180mmf) removed from yoke plug and rewired on yoke socket; new yoke part number with C517 and C518 removed from yoke plug is 24D65616A12.



MOTOROLA Chassis TS-579 Schematic Diagram, Continued

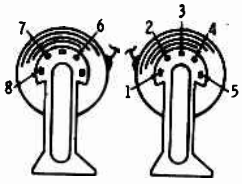
NOTES:

VOLTAGE MEASUREMENTS
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM. ±20%
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.

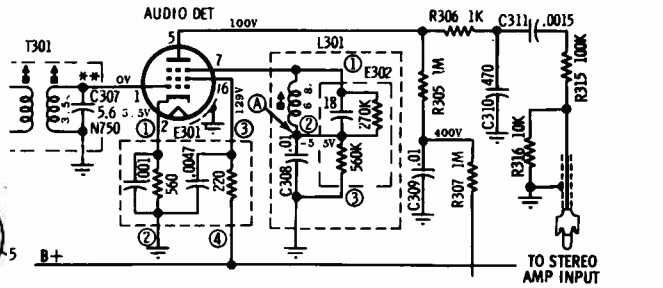
CAPACITORS UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

**INDICATES SPECIAL COMPONENTS.

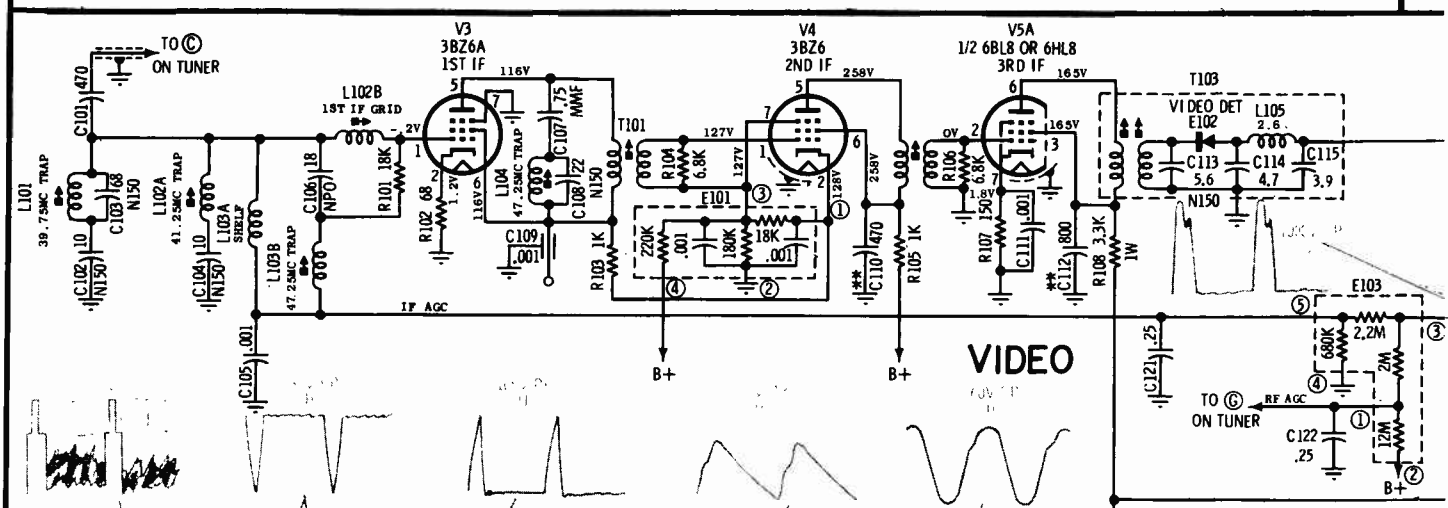
WAVEFORM MEASUREMENTS
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A WIDE-BAND OSCILLOSCOPE.
2. OSCILLOSCOPE SYNCED NEAR SWEEP RATE INDICATED.
3. TAKEN WITH STRONG SIGNAL, CONTRAST CONTROL AT MAXIMUM; ALL OTHER CONTROLS IN NORMAL OPERATING POSITION.

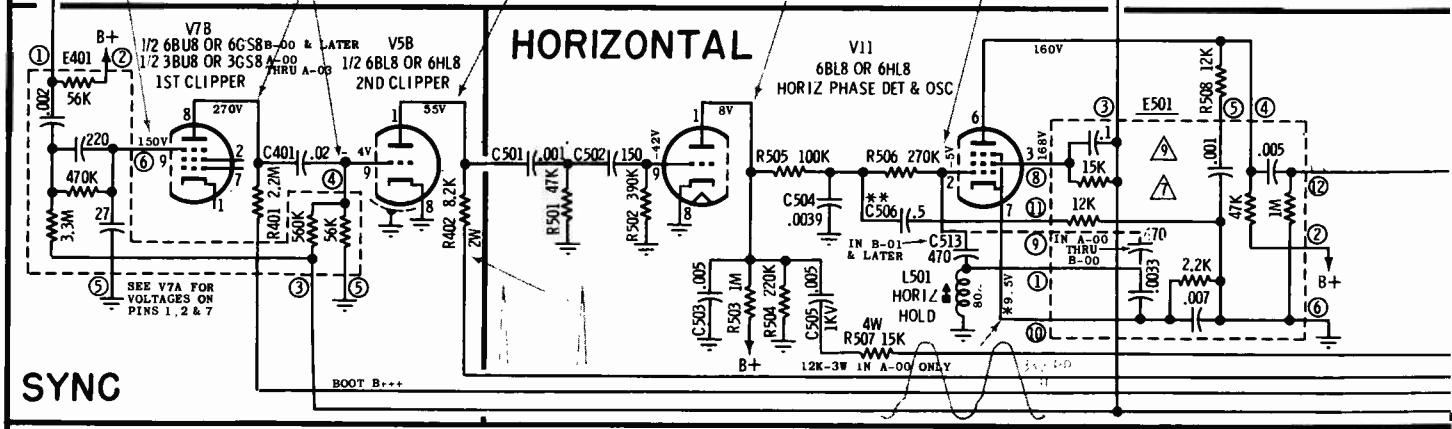


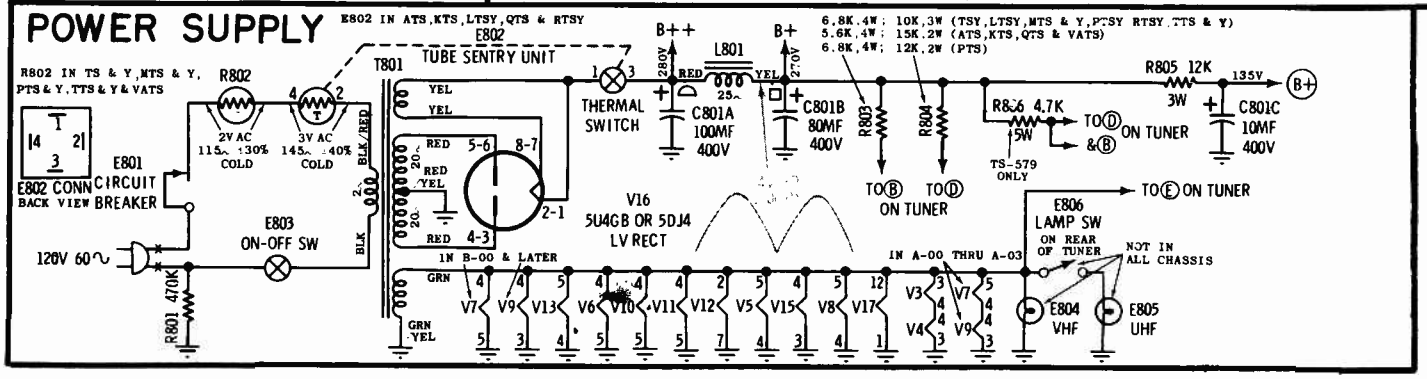
T501 CONN



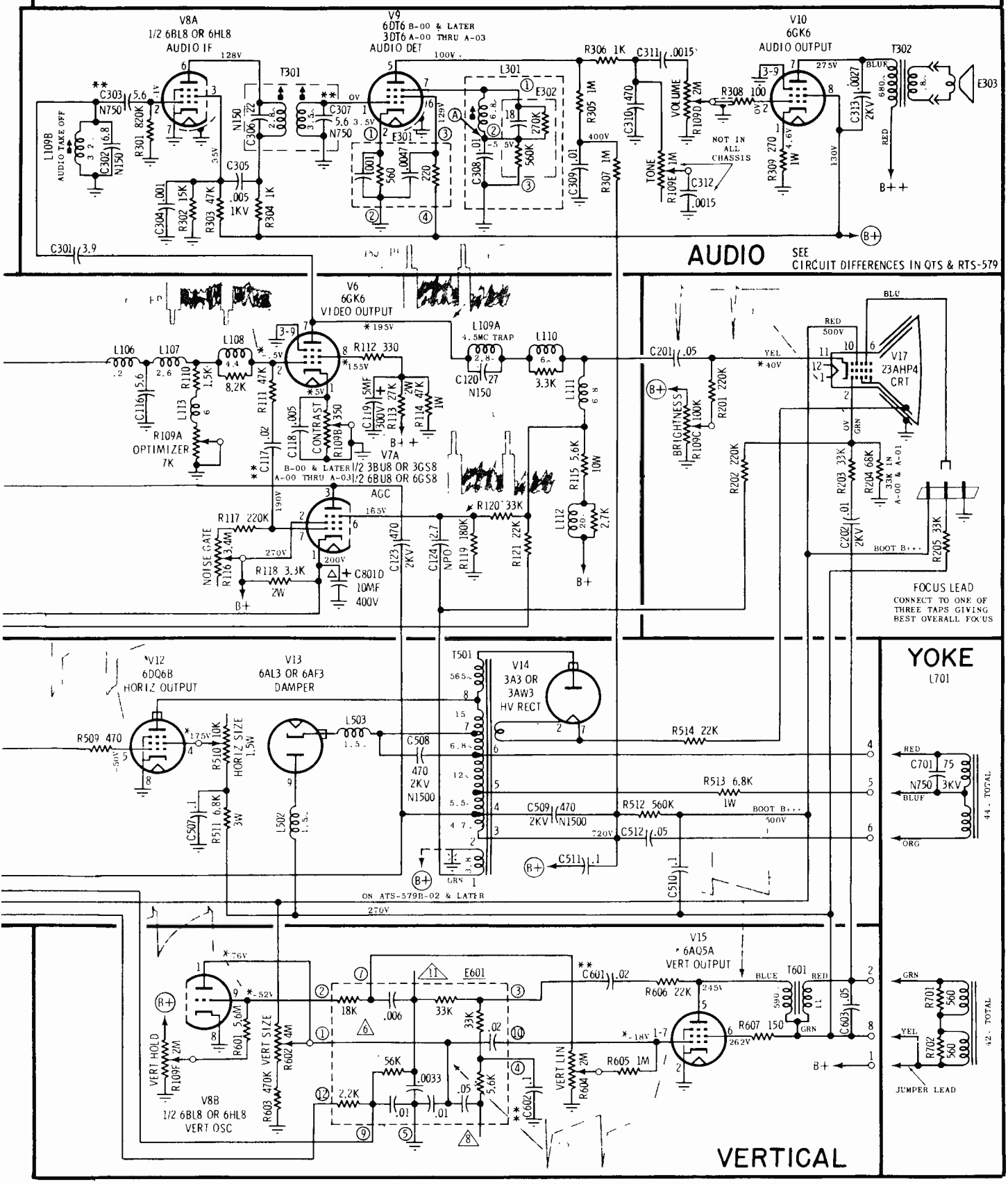
TV CHASSIS AUDIO CIRCUIT FOR STEREO-TV MODELS (CHASSIS QTS & RTS-579)



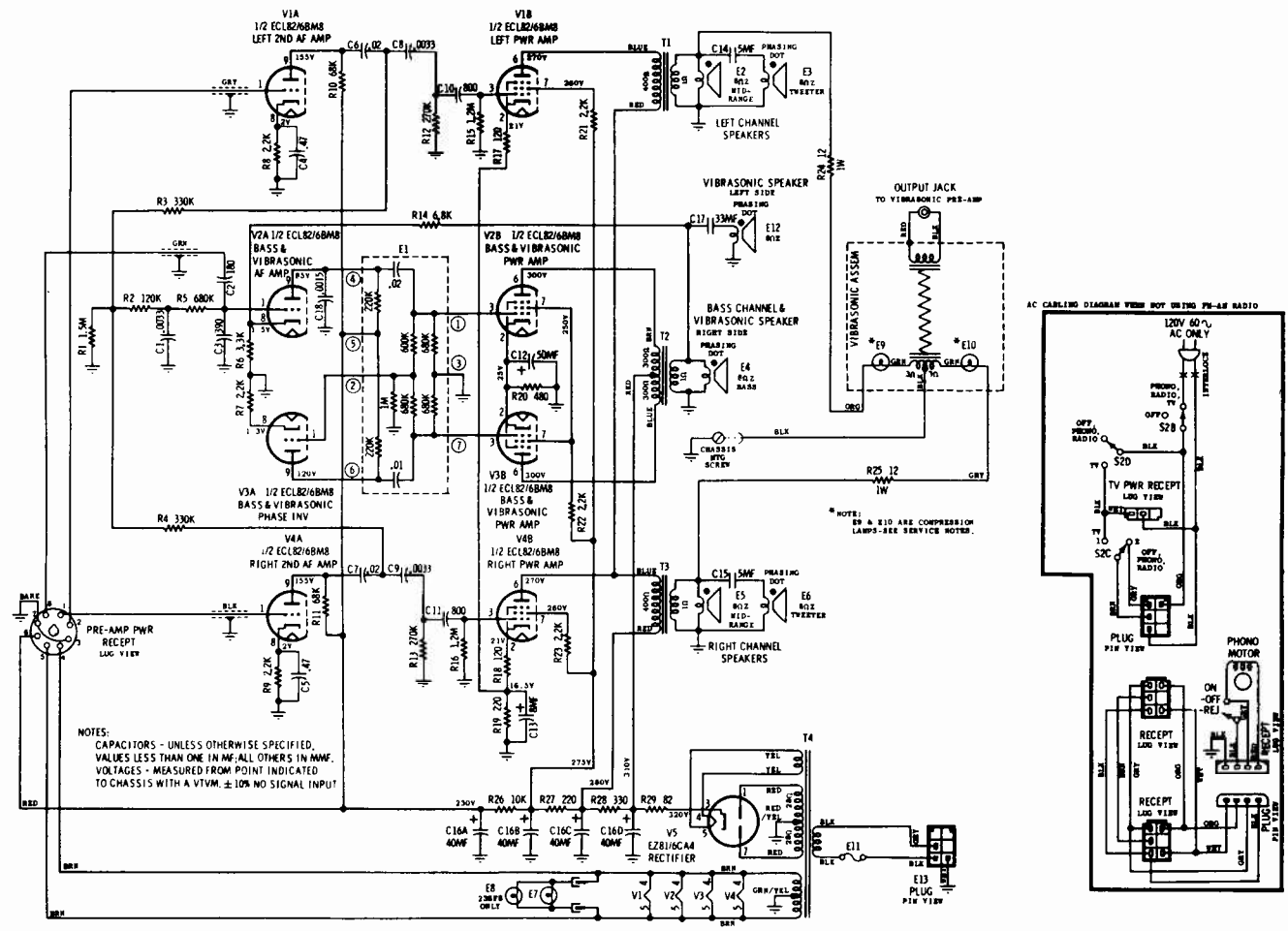




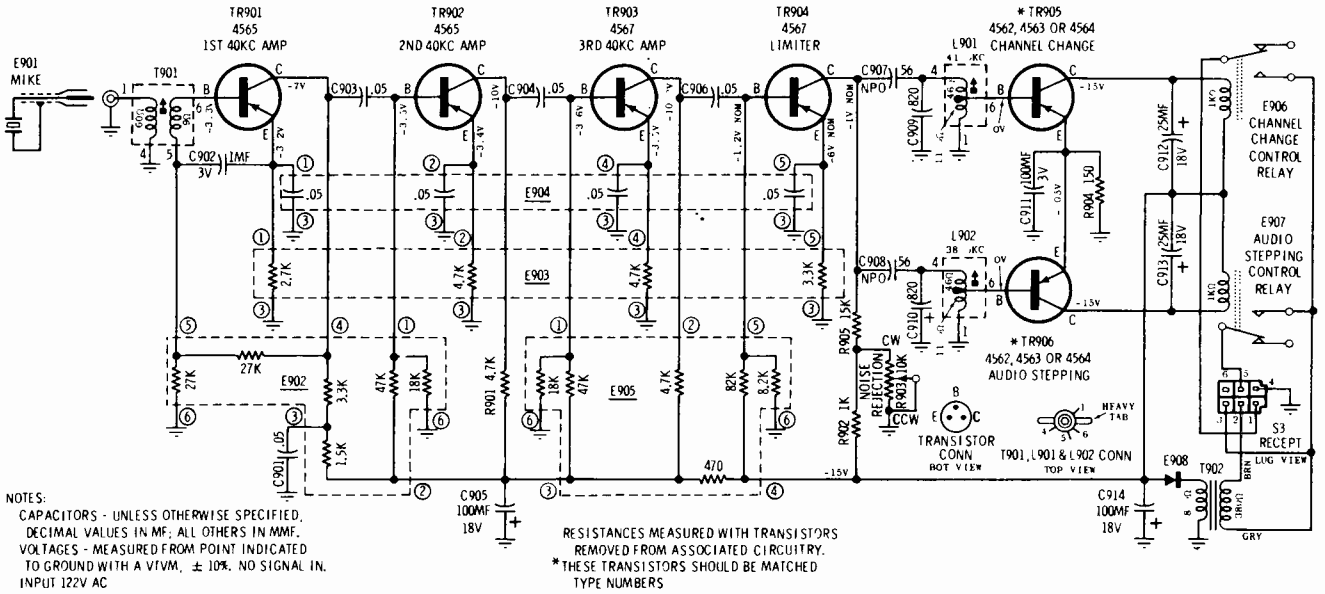
CHASSIS TS, ATS, KTS, LTS, MTS, PTS, QTS, RTS & VATS-579 A-00 THRU B-03



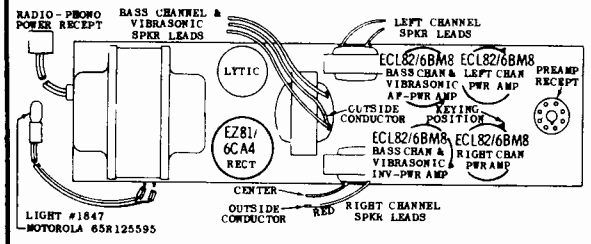
MOTOROLA Amplifier Chassis HS-909 and Remote Chassis TRR-1B



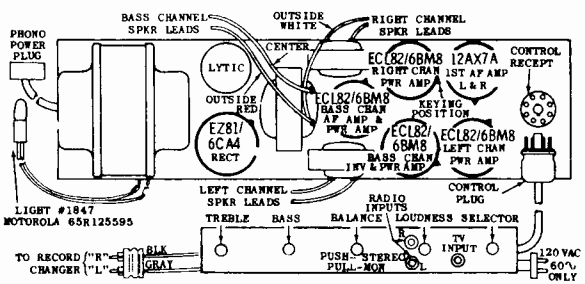
AUDIO AMPLIFIER CHASSIS HS-909



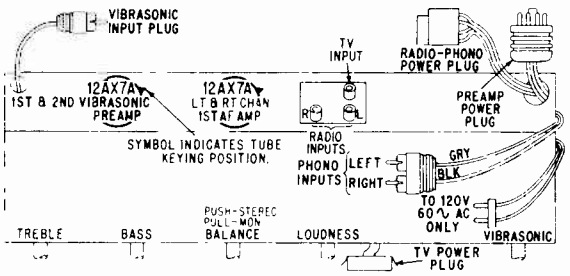
REMOTE CHASSIS TRR-1B-00



TUBE LOCATIONS HS-909 AUDIO AMPLIFIER CHASSIS

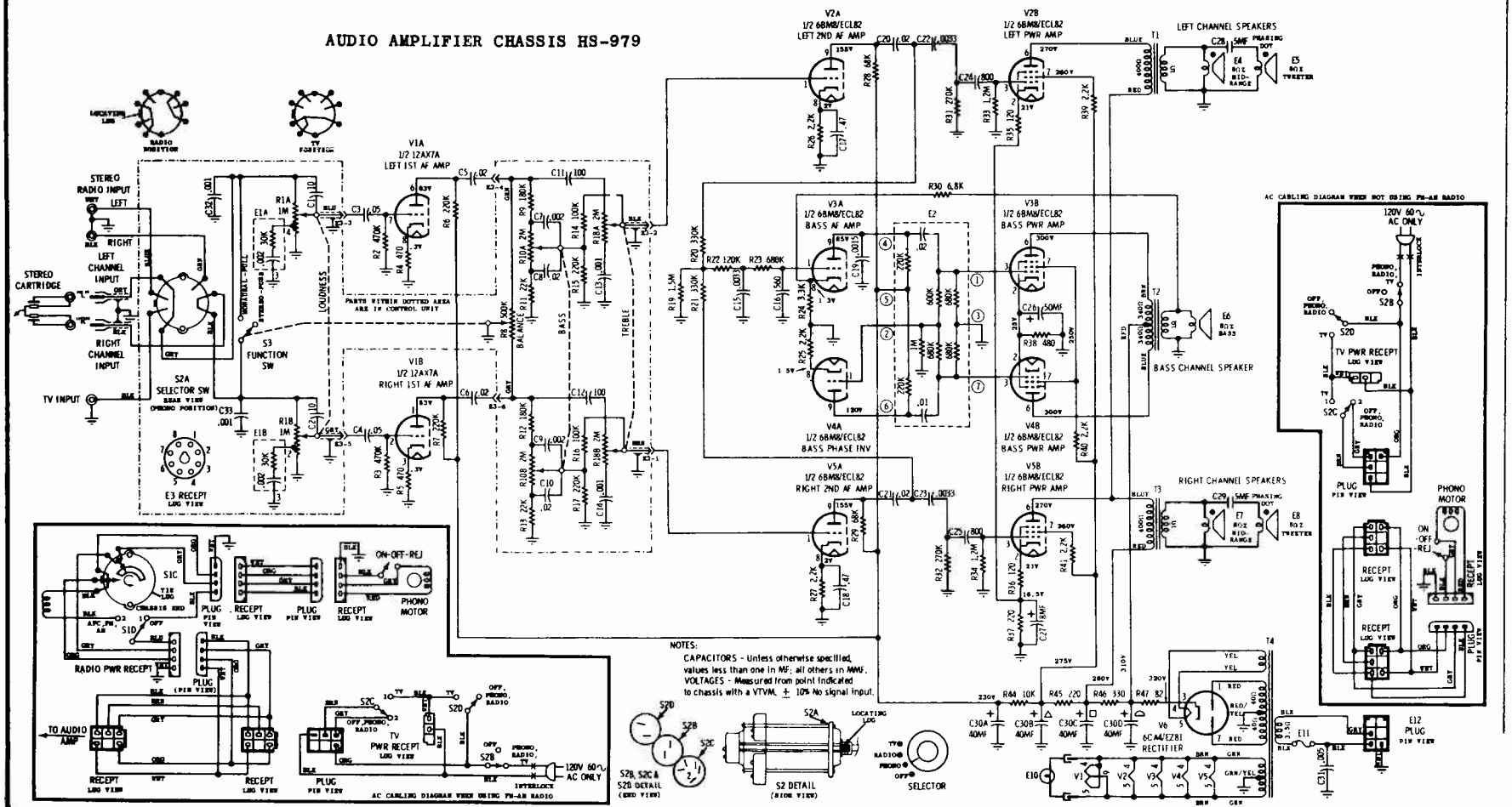


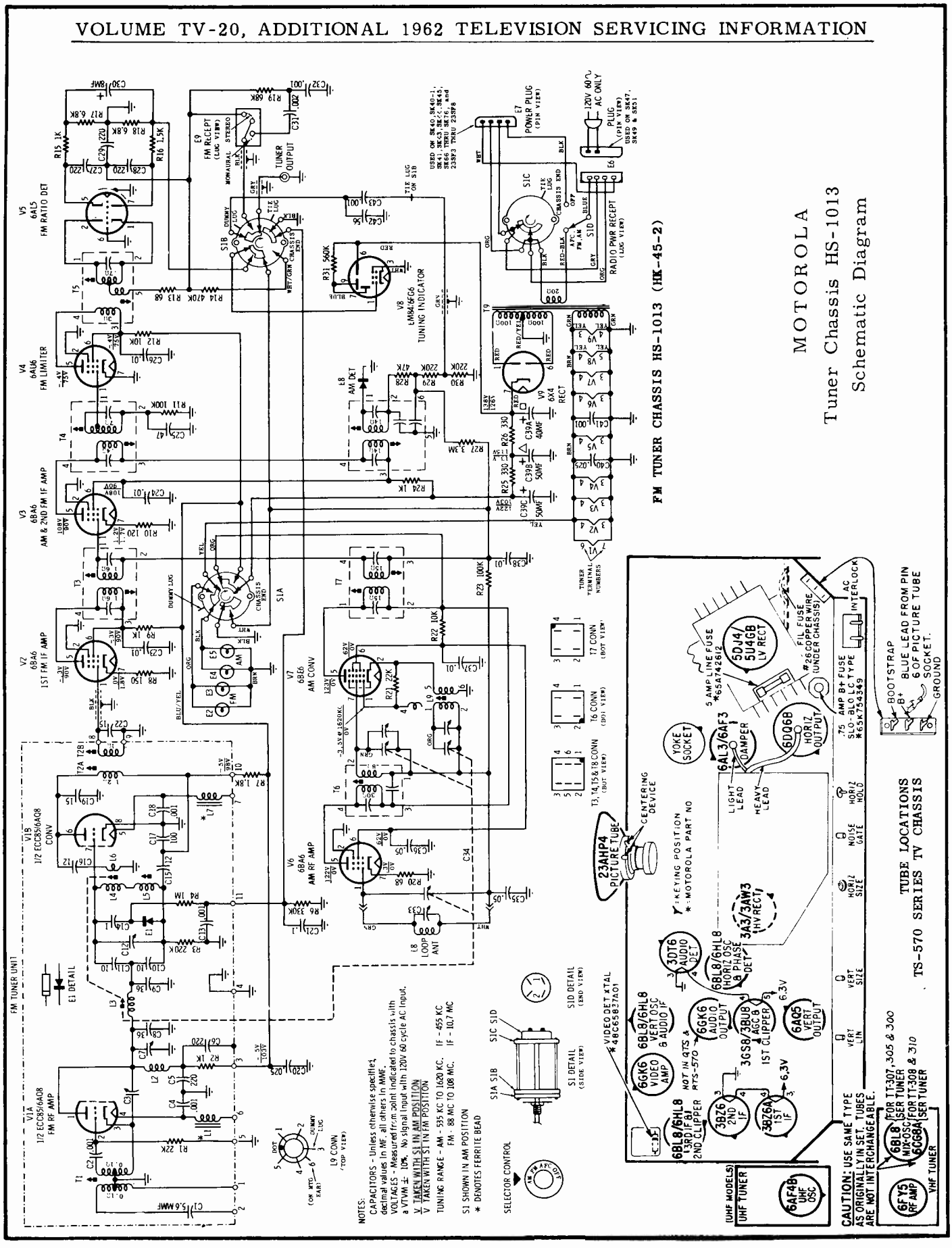
HS-979 TUBE LOCATIONS
AUDIO AMPLIFIER CHASSIS



TUBE LOCATIONS HS-977 PRE-AMP CHASSIS

AUDIO AMPLIFIER CHASSIS HS-979




MOTOROLA
Tuner Chassis HS-1013
Schematic Diagram
FM TUNER CHASSIS HS-1013 (HK-45-2)
FM TUNER UNIT
NOTES:
CAPACITORS - Unless otherwise specified, decimal values in MF, all others in MMF.
VOLTAGES - Measured from point indicated to chassis with a VTVM ± 10%. No signal input with 120V 60 cycle AC input.
V TAKEN WITH S1 IN AM POSITION
V TAKEN WITH S1 IN FM POSITION
TUNING RANGE - AM - 535 KC TO 1620 KC. IF - 455 KC
FM - 88 MC TO 108 MC. IF - 10.7 MC
S1 SHOWN IN AM POSITION
* DENOTES FERRITE BEAD
TUBE LOCATIONS
TS-570 SERIES TV CHASSIS
CAUTION: USE SAME TYPE AS ORIGINALLY IN SET. TUBES ARE NOT INTERCHANGEABLE.
UHF MODELS)
UHF TUNER
6AF4B UHF OSC
6F Y5 RF AMP
6T8 MIX-OSC
FOR TT-307, 305 & 300 SER TUNER
6C6BA FOR TT-308 & 310 SER TUNER
VHF TUNER
V1A 1/2 ECC85/6AQ8 FM RF AMP
V1B 1/2 ECC85/6AQ8 CONV
V2 6BA6 1ST FM IF AMP
V3 6BA6 AM & 2ND FM IF AMP
V4 6AU6 FM LIMITER
V5 6AL5 FM RATIO DET
V6 6BA6 AM RF AMP
V7 6BE6 AM CONV
V8 LM84GFG6 TUNING INDICATOR
V9 6X4 RECT
23AHP4 PICTURE TUBE
6D J4/5U4GB LV RECT
6AL3/6AF3 DAMPER
6D Q6B HORIZ OUTPUT
3A3/3AW3 HV RECT
6BL8/6HL8 HORIZ OSC & PHASE DET
3D T6 AUDIO DET
6BL8/6HL8 VERT OSC & AUDIO IF
6GK6 VIDEO AMP
6BL8/6HL8 1ST/FW 2ND CLIPPER
6GK6 AUDIO OUTPUT
3GS8/3BU8 AGC & 1ST CLIPPER
6A Q5 VERT OUTPUT
3BZ6 2ND IF
3BZ6A 1ST IF
6.3V
VIDEO DET XTAL #48C6583A01
NOT IN QTS & RTS-570
* KEYING POSITION
* MOTOROLA PART NO
CENTERING DEVICE
YOKE SOCKET
LIGHT LEAD
HEAVY LEAD
5 AMP LINE FUSE #65A742612
FIL FUSE #26 COPPER WIRE (UNDER CHASSIS)
.75 AMP B+ FUSE SLO-BLO LC TYPE #65K754349
AC INTERLOCK
BOOTSTRAP
B+ BLUE LEAD FROM PIN 6 OF PICTURE TUBE SOCKET.
GROUND
VERT LIN
VERT SIZE
HORIZ SIZE
NOISE GATE
HORIZ HOLD
T3, T4, T5 & T8 CONN (BOT VIEW)
T6 CONN (BOT VIEW)
T7 CONN (BOT VIEW)
TUNER TERMINAL NUMBERS
S1A S1B
S1C S1D
S1 DETAIL (SIDE VIEW)
S1D DETAIL (END VIEW)
SELECTOR CONTROL
E1 DETAIL
L9 CONN (TOP VIEW)
E7 POWER PLUG (PIN VIEW)
E6 PLUG (PIN VIEW)
USED ON SK40, SK40-1, SK41, SK43, SK43-1, SK45, SK66 THRU SK76, and 239F3 THRU 239F8
USED ON SK47, SK49 & SS51
RADIO PWR RECEPT (LUG VIEW)
E9 FM RECEPT (LUG VIEW)
MONAURAL STEREO
TUNER OUTPUT
120V 60 AC ONLY

MOTOROLA

CHASSIS TS-581 SERIES
MODELS 19T20,21,22,A19T24,25; 23T15,16;27K10,11 SERIES

MODEL BREAKDOWN CHART

MODEL	CHASSIS VERSION	VHF TUNER	UHF TUNER
19T20E	CDTS-581	WTT-300 or 319	-
Y19T20E	CDTS-581Y	WTT-305Y or 320Y	ZTT-601
19T20EL	KDTS-581	STT-311 or 327	-
19T20G	CDTS-581	WTT-300 or 319	-
Y19T20G	CDTS-581Y	WTT-305Y or 320Y	ZTT-601
19T20GL	KDTS-581	STT-311 or 327	-
19T21BE	CDTS-581	WTT-300 or 319	-
Y19T21BE	CDTS-581Y	WTT-305Y or 320Y	ZTT-601
19T21BEL	CDTS-581	STT-311 or 327	-
19T21J	CDTS-581	WTT-300 or 319	-
Y19T21J	CDTS-581Y	WTT-305Y or 320Y	ZTT-601
19T21JL	CDTS-581	STT-311 or 327	-
19T22AW	DTS-581	TT-305 or 320	-
Y19T22AW	DTS-581Y	TT-305Y or 320Y	ZTT-601
19T22GR	DTS-581	TT-305 or 320	-
Y19T22GR	DTS-581Y	TT-305Y or 320Y	ZTT-601
19T22WG	DTS-581	TT-305 or 320	-
Y19T22WG	DTS-581Y	TT-305Y or 320Y	ZTT-601
A19T24AW(2)	ADTS-581	RTT-308 or 323(1)	-
A19T24CH(2)	ADTS-581	RTT-308 or 323(1)	-
A19T24E(2)	ADTS-581	RTT-308 or 323(1)	-
A19T24G(2)	ADTS-581	RTT-308 or 323(1)	-
A19T25AW(2)	ADTS-581	RTT-308 or 323(1)	-
A19T25GR(2)	ADTS-581	RTT-308 or 323(1)	-
A19T25WG(2)	ADTS-581	RTT-308 or 323(1)	-
23T15BR	CETS-581	WTT-300 or 319	-
Y23T15BR	CETS-581Y	WTT-305Y or 320Y	LTT-601
23T15BRL	KETS-581	STT-311 or 327	-
23T16B	DETS-581	WTT-305 or 320	-
Y23T16B	DETS-581Y	WTT-305Y or 320Y	LTT-601
23T16CW	DETS-581	WTT-305 or 320	-
Y23T16CW	DETS-581Y	WTT-305Y or 320Y	LTT-601
23T16M	DETS-581	WTT-305 or 320	-
Y23T16M	DETS-581Y	WTT-305Y or 320Y	LTT-601
23T16W	DETS-581	WTT-305 or 320	-
Y23T16W	DETS-581Y	WTT-305Y or 320Y	LTT-601
27K10M	GTS-581	PTT-307 or 322	-
Y27K10M	GTS-581Y	PTT-307Y or 322Y	KTT-601
27K10W	GTS-581	PTT-307 or 322	-
Y27K10W	GTS-581Y	PTT-307Y or 322Y	KTT-601
27K11M	GTS-581	PTT-307 or 322	-
Y27K11M	GTS-581Y	PTT-307Y or 322Y	KTT-601
27K11W	CTS-581	PTT-307 or 322	-
Y27K11W	GTS-581Y	PTT-307Y or 322Y	KTT-601

(1). UHF adaptor kit, TK-126, will convert these turret type tuners for UHF reception.

(2). Automatic tuning models using the TRR-1 remote control receiver and TRT-1 (A19T25 series) or TRT-2 (A19T24 series) remote control transmitter.

See pages 76-77 for diagram, see page 78 for other service material on automatic models. For alignment see material on pages 60-61 under Chassis TS-441A, etc.

PICTURE CENTERING

Position the magnetic centering device arms 180° apart (minimum field strength) and so they lie in a vertical plane. Rotate each arm to center the picture. Best adjustment is usually with minimum field strength.

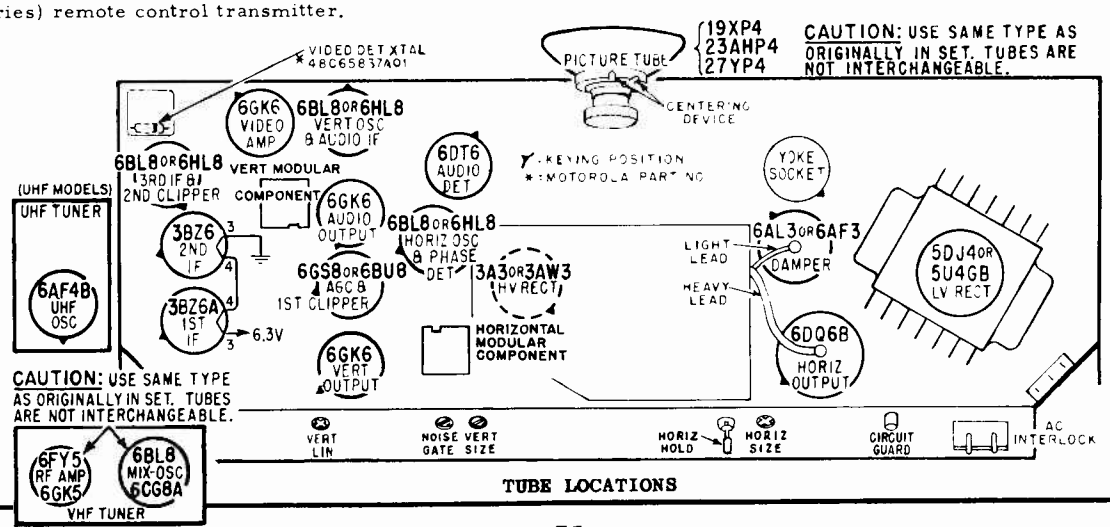
NOISE GATE CONTROL

The noise gate control is used to adjust the receiver for best noise protection under different signal strength conditions.

To adjust, tune in a channel for best picture and sound. Turn the noise gate control counterclockwise (when viewed from rear of receiver) until the picture becomes unstable (rolls down or slips, etc.). Then turn control clockwise until the picture returns to normal. Check all channels; if any are unstable, continue turning control clockwise until the picture is normal on all channels.

39.75 Mc TRAP ADJUSTMENT (Adjacent Video)

The adjacent video trap coil (L101) is set to approximately 36 Mc at the factory and must be adjusted if interference from a upper adjacent channel is present. The trap coil may be adjusted thru a hole provided in the cabinet bottom panel or chassis shelf.



TUBE LOCATIONS

MOTOROLA **TELEVISION CHASSIS TS-581A**

NOTES:

VOLTAGE MEASUREMENTS

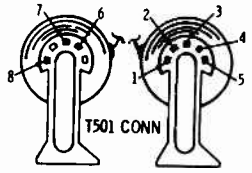
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM. ±20%
2. LINE VOLTAGE MAINTAINED AT 120V AC.
3. VOLTAGES INDICATED BY AN ASTERISK WILL VARY WITH ASSOCIATED CONTROL SETTINGS.
4. TAKEN WITH CONTRAST CONTROL AT MINIMUM AND ALL OTHER CONTROLS IN NORMAL OPERATING POSITION WITH NO SIGNAL INPUT.
5. TUNER ON CHANNEL 13 OR CHANNEL OF LEAST NOISE WITH ANTENNA TERMINALS SHORTED.

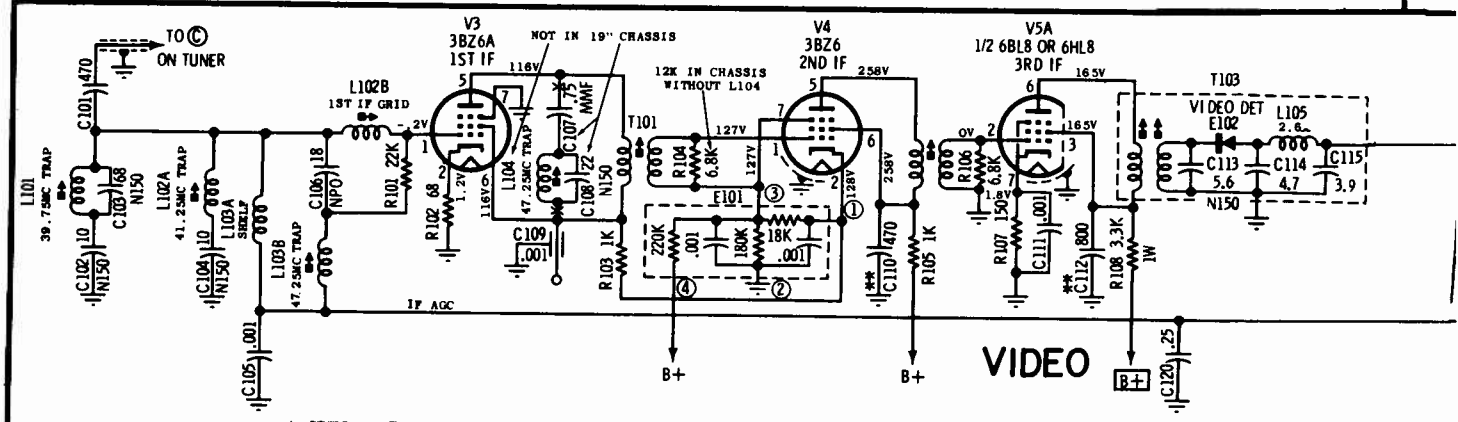
WAVEFORM MEASUREMENTS

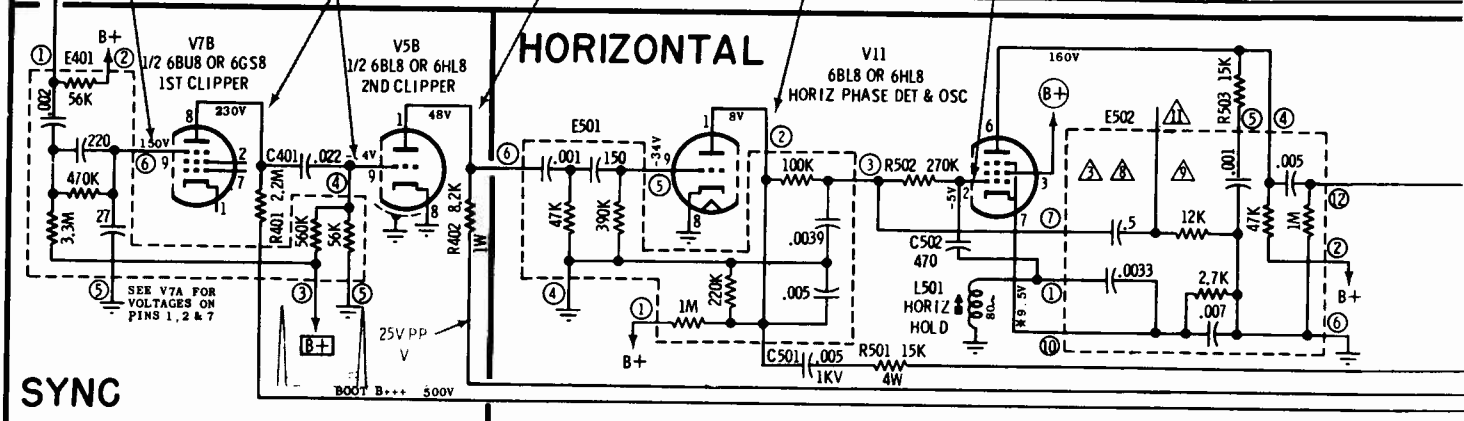
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A WIDE-BAND OSCILLOSCOPE.
2. OSCILLOSCOPE SYNCED NEAR SWEEP RATE INDICATED.
3. TAKEN WITH STRONG SIGNAL, CONTRAST CONTROL AT MAXIMUM; ALL OTHER CONTROLS IN NORMAL OPERATING POSITION.

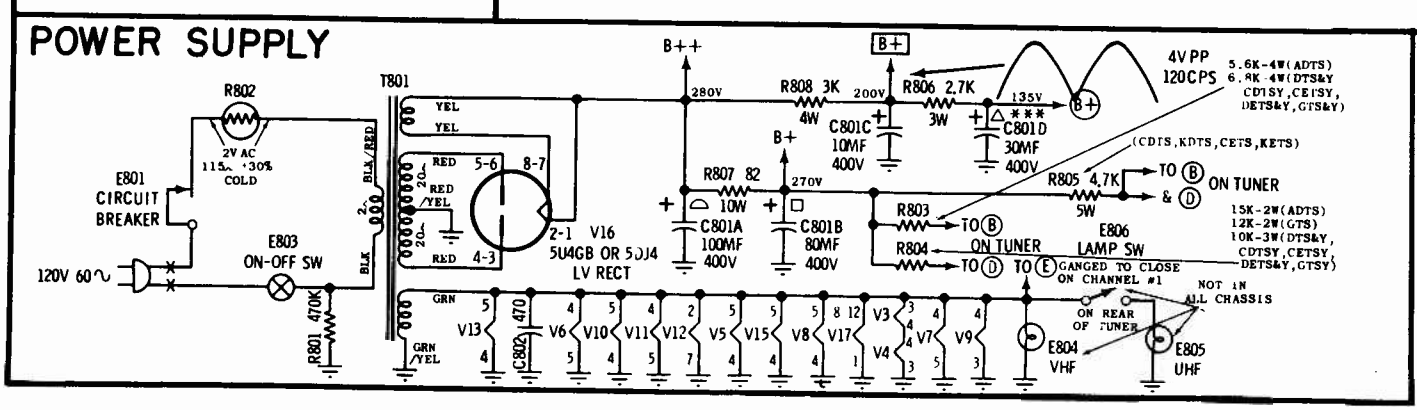
CAPACITORS: UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

*** SOME EARLY PRODUCTION CHASSIS USED AN EXTERNAL 20MF CAPACITOR WHEN C801D WAS 10MF. REMOVE THE 20MF CAPACITOR WHEN REPLACING C801 WITH REPLACEMENT

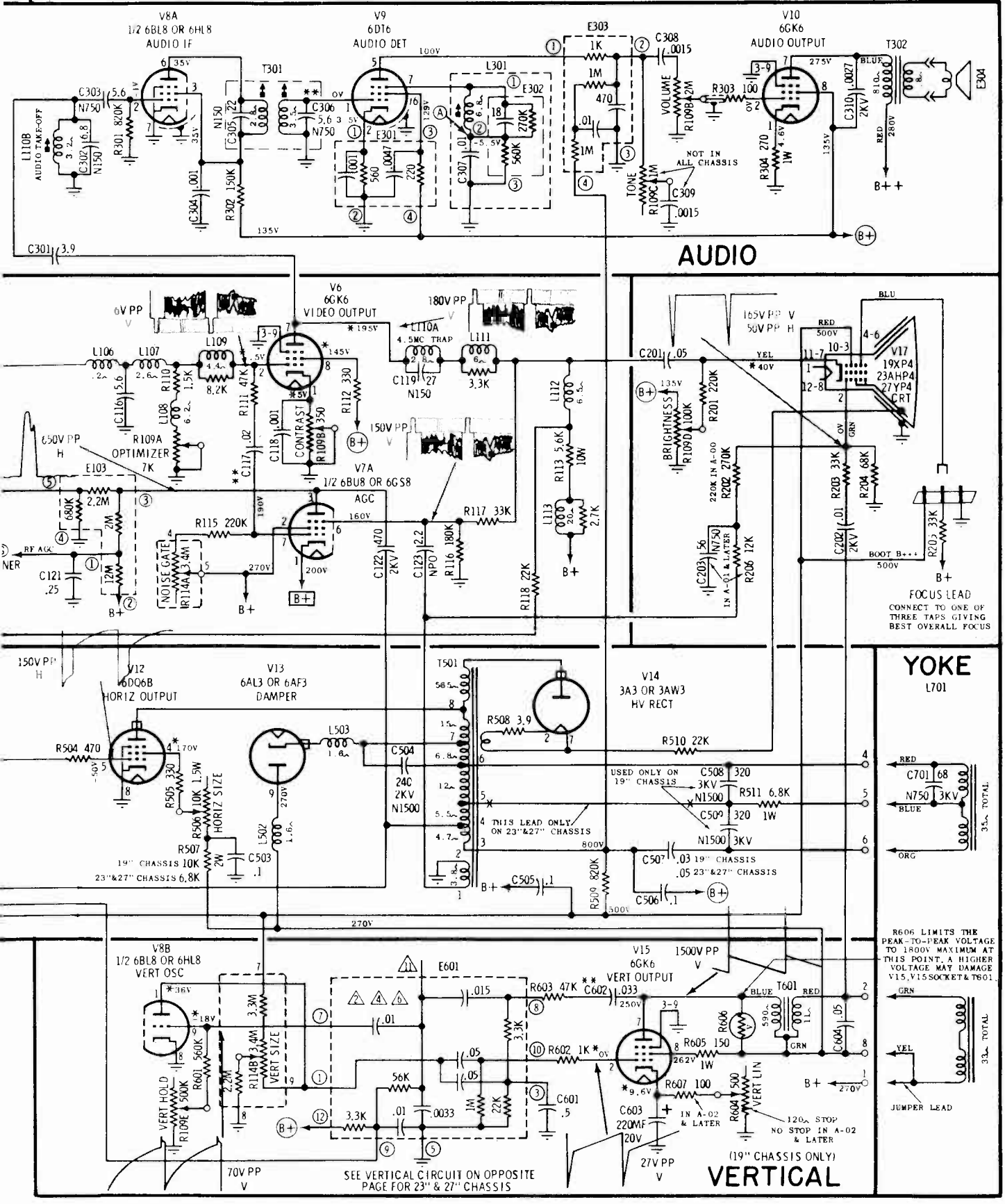








MOTOROLA Chassis TS-581A Schematic Diagram, Continued



MOTOROLA Automatic Models Service Information, Continued

TYPE AND FUNCTION OF RELAYS

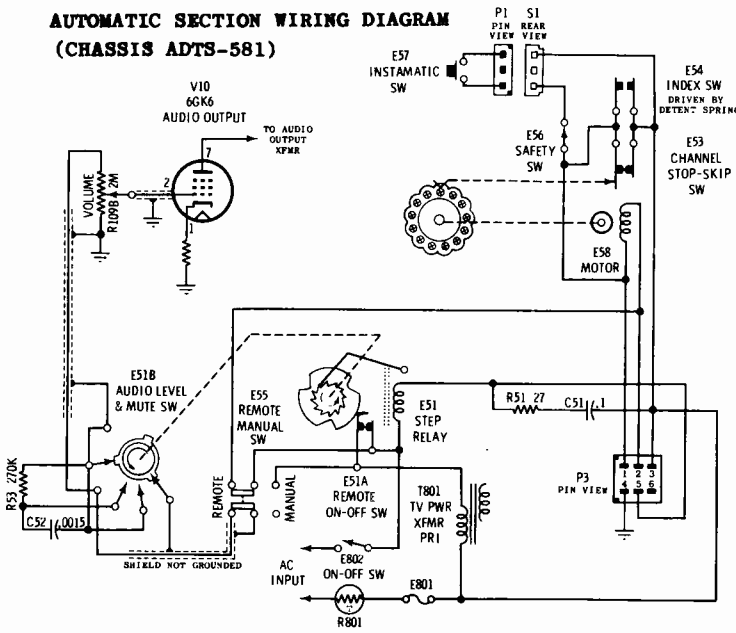
The Channel Change Control relay (E906) and Audio Stepping Control relay (E907), located on the remote chassis, are of the momentary contact type. The relays close during power application and return to their normal resting position when the power is removed.

The AC Stepping relay (E51), located on the TV receiver, controls the audio levels, audio mute and remote on-off functions.

The armature on the stepping relay actuates a rotary switch (E51B) having 12 positions. Each time the relay is actuated, the armature drives the switch to a new position. The rotary switch has four (4) stator contacts and the wiper arm has three (3) contacts spaced 120° apart. Consequently, the functions performed by the rotary switch repeat each time the switch is driven four (4) times. The rotary switch, when actuated, controls the audio and successively repeats steps from high volume, low volume and mute and mute once more. (The last mute is coupled with the remote "off" position.)

In addition to controlling the audio levels, the AC Stepping relay turns the TV receiver on and off remotely. A leaf switch (E51A) is opened every fourth successive step of the stepping relay and removes power from the TV receiver. The leaf switch (E51A) is paralleled in the "remote" position with a manual slide switch located at the rear of the TV receiver.

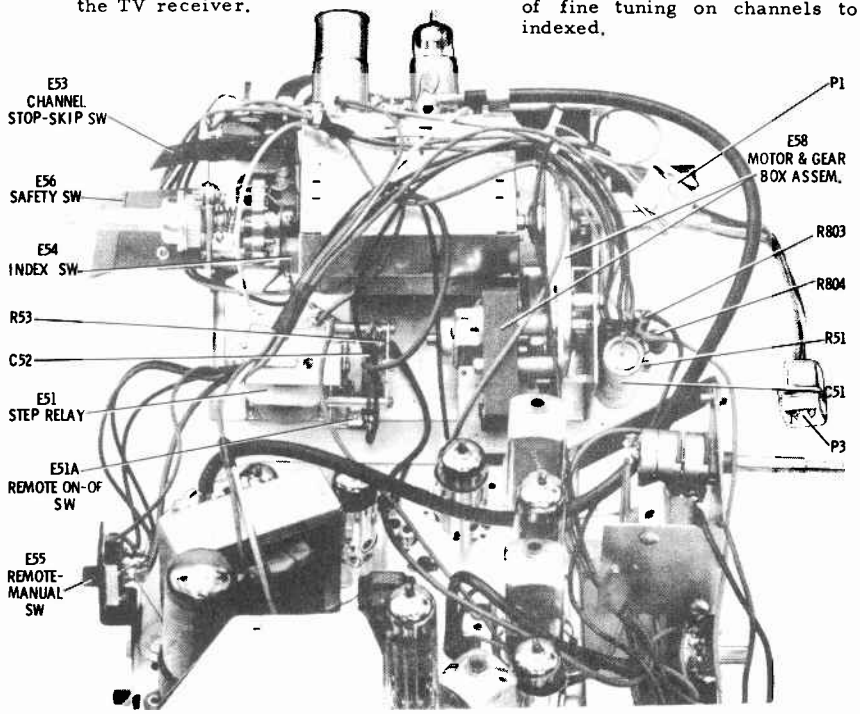
AUTOMATIC SECTION WIRING DIAGRAM (CHASSIS ADTS-581)



CHANNEL STOP-SKIP SWITCH (E53)

The primary function of the Channel Stop-Skip switch is to stop the tuner at the indexed channels and to continue to apply power to the motor when the tuner, in motion, reaches a channel which has not been indexed.

SWITCH POSITIONING: This switch is activated by the fine tuning screws and must be properly positioned to allow an adequate range of fine tuning on channels to be indexed.



AUTOMATIC TUNER (CHASSIS ADTS-581)

INDEX SWITCH (E54)

The Index switch, actuated by the tuner detent spring, supplies power to the tuner motor. Its timing is important in that it supplies power to the tuner motor until the tuner reaches a point of 3° to 5° from its indexing point. The tuner is then pulled into the precise indexing point by the large detent ball located on the tuner.

Misadjustment of the Index switch may cause the tuner indexing to be sluggish or tuner stopping between channels.

Contact Adjustment:

1. Rotate tuner thru all channels; note the gap between contacts of the switch and leave in position affording minimum gap.

2. With tuner in indexed position, set contact gap between .030" and .045".

3. When switch closes due to tuner movement, the contact actuated by the detent spring must have a minimum of .010" overtravel after it makes contact with the stationary contact. Adjust the stationary contact if necessary so that dimensions in step 2 and 3 are met.

REMOTE MANUAL SWITCH (E55)

One half of this double pole double throw switch is wired in parallel with the remote on-off switch (E51A, located on stepping relay). When it is closed, (MANUAL position), it by-passes switch E51A and defeats the remote TV on-off function. At the same time, it opens the remote receiver's power input circuit.

MOTOROLA

CHASSIS TS-449
MODELS 19P15,16 SERIES

The service material and alignment given in this section is exact for sets listed in the table below.

MODEL BREAKDOWN CHART

MODEL	CHASSIS VERSION	VHF TUNER	UHF TUNER
19P15BE	TS-449	TT-314	-
Y19P15BE	TS-449Y	TT-315Y	STT-600
19P15BEF	VTS-449	TT-312	-
19P16BE	TS-449	TT-314	-
Y19P16BE	TS-449Y	TT-315Y	STT-600
19P16BEF	VTS-449	TT-312	-
19P16CT	TS-449	TT-314	-
Y19P16CT	TS-449Y	TT-315Y	STT-600
19P16CTF	VTS-449	TT-312	-
19P16GR	TS-449	TT-314	-
Y19P16GR	TS-449Y	TT-315Y	STT-600
19P16GRF	VTS-449	TT-312	-

CHASSIS TS-578
MODEL 23T17 SERIES

The group of sets listed below employ chassis TS-578(Y) which is electrically similar to corresponding TS-449 chassis of this section. Main differences are in the deflection and high voltage circuits and in the use of 23DAP4 tube. A separate schematic of this chassis is included.

MODEL BREAKDOWN CHART

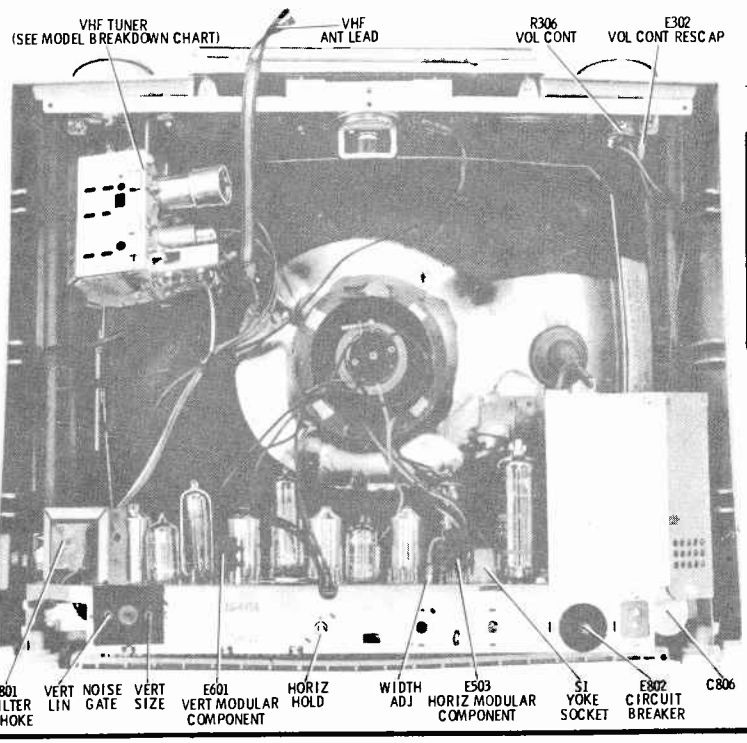
MODEL	CHASSIS	VHF TUNER	UHF TUNER
23T17CHD	TS-578	VTT-314	--
Y23T17CHD	TS-578Y	VTT-315Y	STT-600
23T17MG	TS-578	VTT-314	--
Y23T17MG	TS-578Y	VTT-315Y	STT-600
23T17WG	TS-578	VTT-314	--
Y23T17WG	TS-578Y	VTT-315Y	STT-600

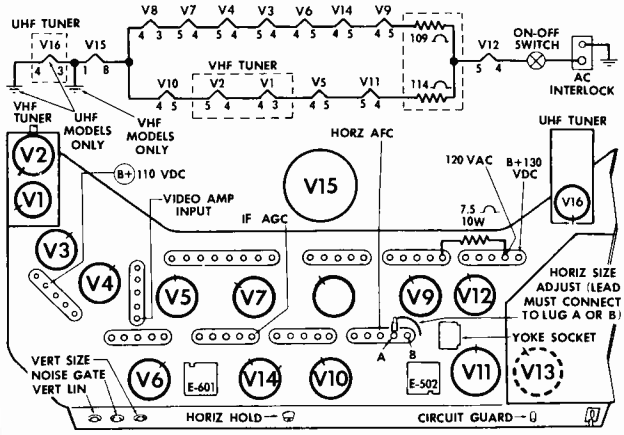
CHASSIS REMOVAL HINTS

Most of the chassis can be exposed for servicing by removing the four (4) chassis mounting screws and re-installing two (2) of the mounting screws thru the rear cabinet holes into the front mounts. It will be necessary to extend the high voltage lead to the picture tube. The cabinet may then be turned on its side and placed on a soft cloth for servicing.

To completely remove chassis and tuner-control bracket, it will be necessary to remove the cabinet handle. Two (2) steel pins are used to fasten the handle top section and may be pushed out with a small screwdriver.

Apply pressure thru the holes from the side of the handle nearest the front of the cabinet. Remove the screws that fasten the tuner and control bracket to the cabinet. Remove the chassis mounting screws from the bottom.





REF. No.	TUBE TYPE	FUNCTION	REF. No.	TUBE TYPE	FUNCTION
V1	4GK5	RF AMP	V12	16AQ3/XY88	DAMPER
V2	7HG8	MIXER OSC	V13	3A3 OR 3AW3	HV RECT
V3	6EH7/EF183	1ST IF	V14	15CW5/PL84	VERT OUTPUT
V4	6EJ7/EF184	2ND IF	V15	19CHP4	CRT 19" MODELS
V5	15HB6	VIDEO AMP			CRT 23" MODELS
V6	9A8/PCF80	AGC		-	
V7	9A8/PCF80	VERT OSC & SOUND IF	V16	2AF4B	UHF OSC (UHF ONLY)
V8	6DT6	AUDIO DET	E502	-	HORIZ MODULE
V9	15CW5/PL84	AUDIO OUTPUT	E601	-	VERT MODULE
V10	9A8/PCF80	SYNC & HORZ OSC			
V11	27GB5/PL500	HORZ OUTPUT			

MOTOROLA TELEVISION CHASSIS TS-449A-00

NOTES:

VOLTAGE MEASUREMENTS

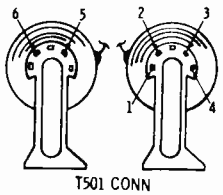
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM. ± 20%
2. LINE VOLTAGE MAINTAINED AT 120V AC.
3. VOLTAGES INDICATED BY AN ASTERISK WILL VARY WITH ASSOCIATED CONTROL SETTINGS.
4. TAKEN WITH CONTRAST CONTROL AT MINIMUM AND ALL OTHER CONTROLS IN NORMAL OPERATING POSITION WITH NO SIGNAL INPUT.
5. TUNER ON CHANNEL 13 OR CHANNEL OF LEAST NOISE WITH ANTENNA TERMINALS SHORTED.

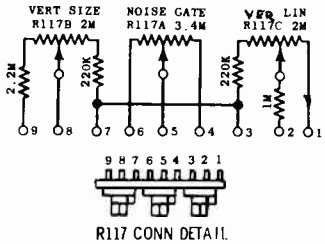
WAVEFORM MEASUREMENTS

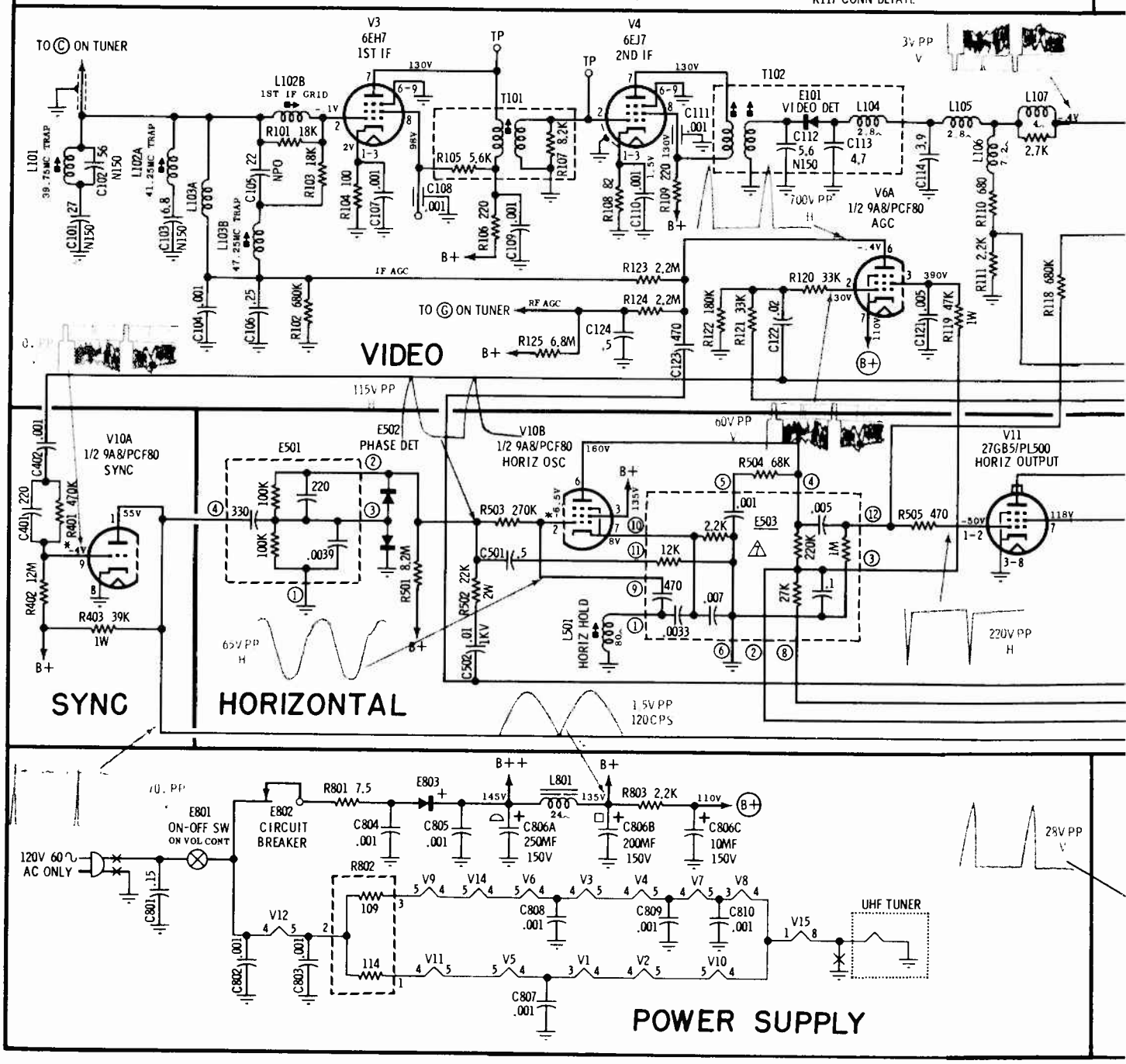
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A WIDE-BAND OSCILLOSCOPE.
2. OSCILLOSCOPE SYNCED NEAR SWEEP RATE INDICATED.
3. TAKEN WITH STRONG SIGNAL, CONTRAST CONTROL AT MAXIMUM; ALL OTHER CONTROLS IN NORMAL OPERATING POSITION.

CAPACITORS UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

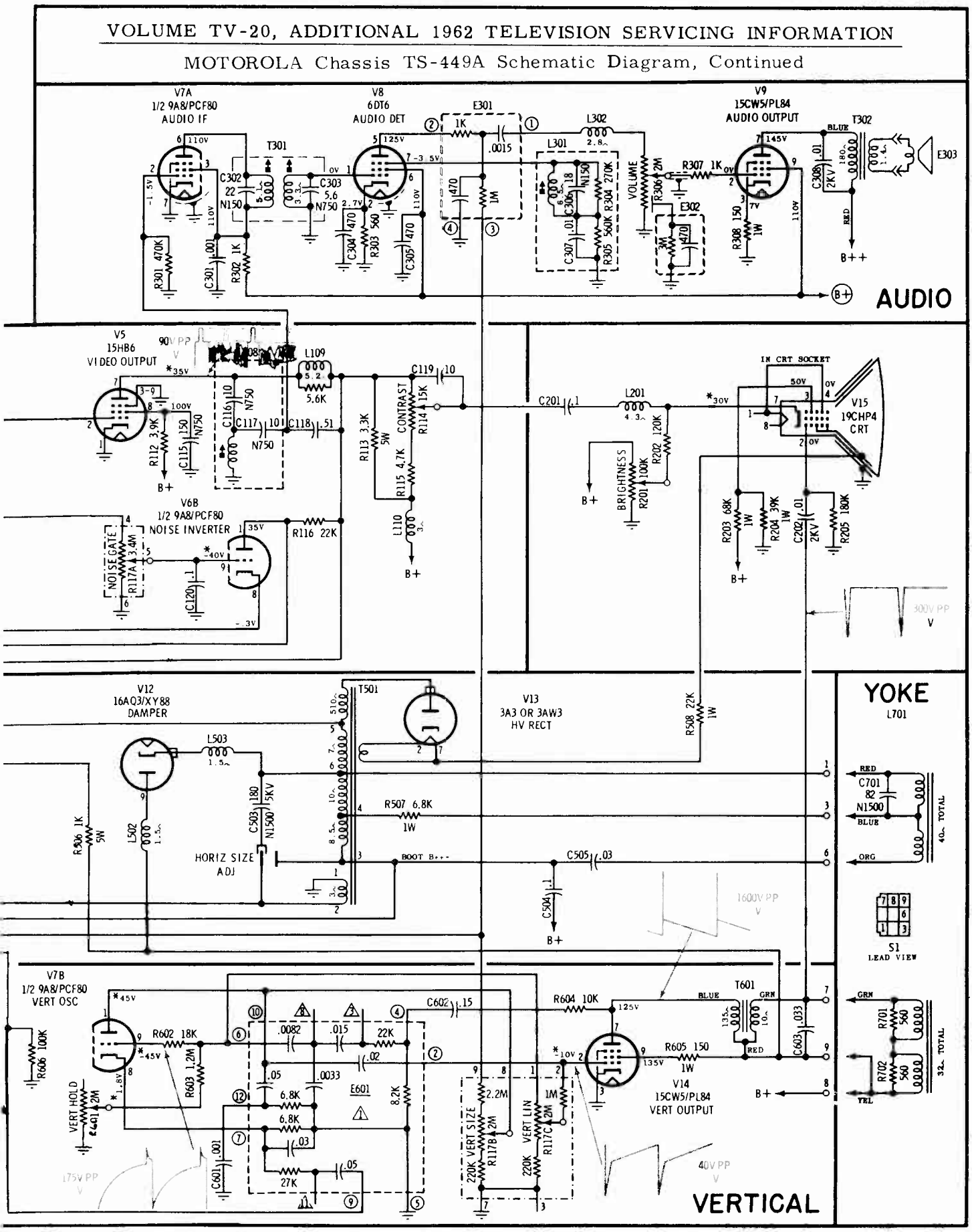
** INDICATES SPECIAL COMPONENTS.







MOTOROLA Chassis TS-449A Schematic Diagram, Continued



MOTOROLA Chassis TS-449, TS-578, etc., Service Information, Continued

NOISE GATE CONTROL

The Noise Gate control is located at the rear of the receiver and is used to adjust the receiver for best noise protection under different signal strength conditions.

To adjust, tune in a channel for best picture and sound. Turn the noise gate control clockwise (when viewed from rear of receiver) until the picture becomes unstable (rolls down or slips, etc.). Then turn control counterclockwise until the picture returns to normal. Check all channels; if any are unstable, continue turning control counterclockwise until the picture is normal on all channels.

PINCUSHION MAGNETS

Pincushion magnets, in both the vertical and horizontal planes, are provided as part of the yoke. These magnets are glued into pockets provided in the yoke flare and require no adjustment.

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 under 2.2 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 reset by depressing the plastic re-set button.

The Circuit Guard is designed to remain "closed" on the higher-than-normal instantaneous surge currents encountered during the initial charge of the filter capacitors. The Circuit Guard is unique in the fact that, when a short exists in the associated circuitry, power is not re-applied when the re-set button is held depressed.

CHASSIS ALIGNMENT

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 local oscillator. Short out pin 9 of mix-osc tube with a wire or a thin bladed screw driver thru hole provided adjacent to pin 9.
4. Apply the negative lead of 9.0 volt bias supply to IF AGC line (jct of R and C), and positive lead to chassis ground.
5. Connect a 1500 ohm 15W voltage normalizing resistor from B+ to chassis.
6. Set the contrast control at minimum (extreme counterclockwise position).
7. Rotate noise inverter control fully counter-clockwise.
8. Short across tuner input terminals.
9. Maintain 2 to 5 volts peak-to-peak at the grid of Video Amp, except when specific values are given in the procedure chart.
10. Refer to Video IF and Sound Alignment Detail for component and test point locations.

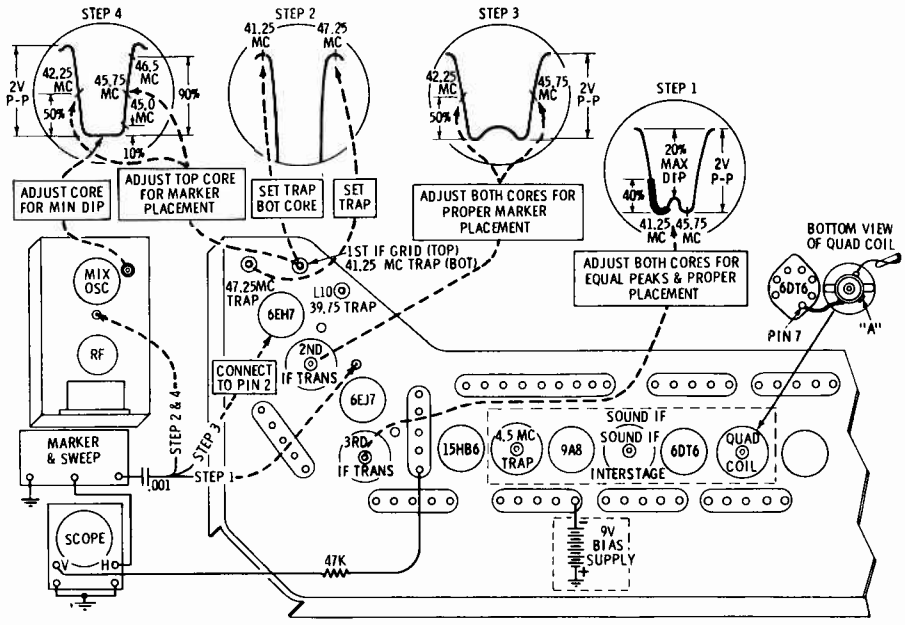
NOTE: To reduce the possibility of interaction between the two tuning cores in a double tuned transformer or coil, each core should be adjusted for optimom response in the tuning position nearest its respective end of the coil form.

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.

4.5 MC TRAP ADJUSTMENT (L108A)

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 (L108A) 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.



VIDEO IF & SOUND ALIGNMENT DETAIL

MOTOROLA Chassis TS-449, TS-578, etc., Alignment Information, Continued

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GEN. & MARKER	INDICATOR	ADJUST	ADJ. FOR AND/OR REMARKS
1.	To grid of 2nd IF thru .001mf cap. Set sweep to approx. 44Mc, markers as required.	Scope to grid of Video Amp thru 47K ohm resistor.	Both cores of 3rd IF trans (T102)	Equal peaks & marker placement as shown in curve #1.
2.	To mixer T.P. M thru .001 cap. Set sweep to 44 Mc, markers as required.	Same as step #1.	47.25 Mc trap (L103B) & 41.25 Mc trap (L102A)	Minimum response at proper trap freq. See curve #2. 39.75 Mc trap (L101) core is turned fully into coil at a trap freq. of 36 Mc or lower. This trap is set at 39.75 Mc only when upper adjacent video interference is present.* NOTE: Temporary removal of bias and an increase of generator output may be required to see traps clearly.
3.	To grid (pin 2) of 1st IF Amp thru .001 mf cap. Wrap a wire around grid pin of tube and connect generator to wire. Set sweep to 44 Mc, markers as required.	Same as step #1.	2nd IF trans (T101)	Proper 42.25 Mc and 45.75 Mc marker placement. See curve #3. NOTE: Mixer plate trans (T1) may cause suck-out in IF response. De-tune trans if desired. To provide the desired bandwidth it may be necessary to re-position the wire gimmick coupling connected to the first IF plate terminal, in relation to the 2nd IF grid terminal. Placing the loose end nearer the grid lead increases the bandwidth, moving it away decreases bandwidth.
4.	Same as step #2.	Same as step #1.	Mixer plate trans. (T1 on tuner) & 1st IF grid coil (L102B)	To obtain curve #4. The mixer trans affects the center peak and the grid coil affects the two outside peaks. Tune coils simultaneously for proper tuning and bandwidth consistant with maximum gain. If necessary, the 2nd IF trans can be touched-up to obtain proper response as shown in curve #4. If interference from an upper adjacent TV channel is present, L101 should be adjusted for 39.75 Mc. If there is no interference from an upper adjacent channel L101 is adjusted out of the band pass, or at 36 Mc.

*The 39.75 Mc trap (L101) is factory adjusted at 36 Mc and is not tuned to 39.75 Mc unless adjacent video interference is present. Adjust trap by tuning core away from chassis, until adjacent video interference is no longer present on CRT.

SOUND ALIGNMENT (Station Signal Method)

The sound system used in this 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.

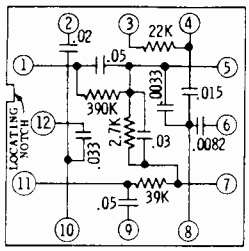
SOUND ALIGNMENT PROCEDURE

STEP	STATION	INDICATOR	ADJUST	ADJ. FOR AND/OR REMARKS
1.	Strong signal	VTVM to point A on quad. coil L301 (See schematic diagram.)	L301 (quad. coil)	Max deflection (coarse adj.) of two possible max tuning points, use that giving the largest voltage reading.*
2.	"	Listening test	"	Max sound with minimum distortion (fine adj.)
3.	Weak signal	"	T301 (interstage coil)	Max sound with minimum distortion (maintain hiss level).**

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

*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 of the coil form. If the pre-set core should be misadjusted by previous service work, merely re-set near top end of coil and tune for maximum as in Step 1.
**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.

MOTOROLA Chassis TS-578 Schematic Diagram, Continued



VERT SWEEP MODULE (BOT VIEW)
PART NO. 51D66334A08

NOTES:

VOLTAGE MEASUREMENTS

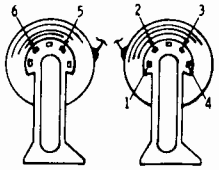
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM. ±20%
2. LINE VOLTAGE MAINTAINED AT 120V AC.
3. VOLTAGES INDICATED BY AN ASTERISK WILL VARY WITH ASSOCIATED CONTROL SETTINGS.
4. TAKEN WITH CONTRAST CONTROL AT MINIMUM AND ALL OTHER CONTROLS IN NORMAL OPERATING POSITION WITH NO SIGNAL INPUT.
5. TUNER ON CHANNEL 13 OR CHANNEL OF LEAST NOISE WITH ANTENNA TERMINALS SHORTED.

WAVEFORM MEASUREMENTS

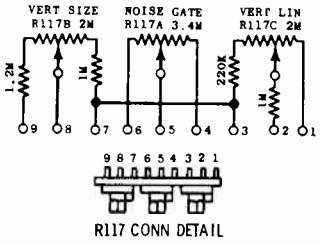
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A WIDE-BAND OSCILLOSCOPE.
2. OSCILLOSCOPE SYNCED NEAR SWEEP RATE INDICATED.
3. TAKEN WITH STRONG SIGNAL, CONTRAST CONTROL AT MAXIMUM; ALL OTHER CONTROLS IN NORMAL OPERATING POSITION.

CAPACITORS UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

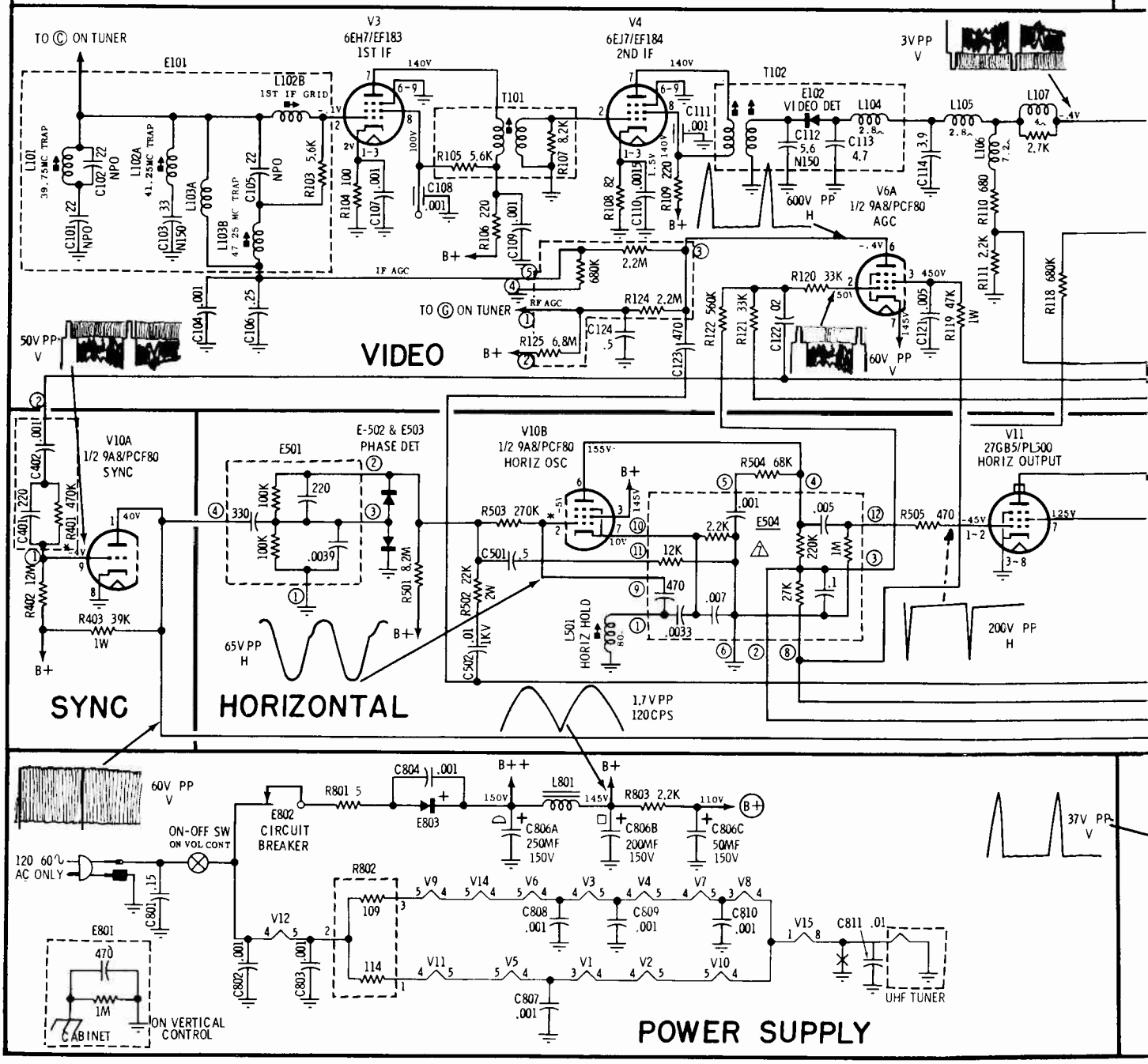
** INDICATES SPECIAL COMPONENTS,



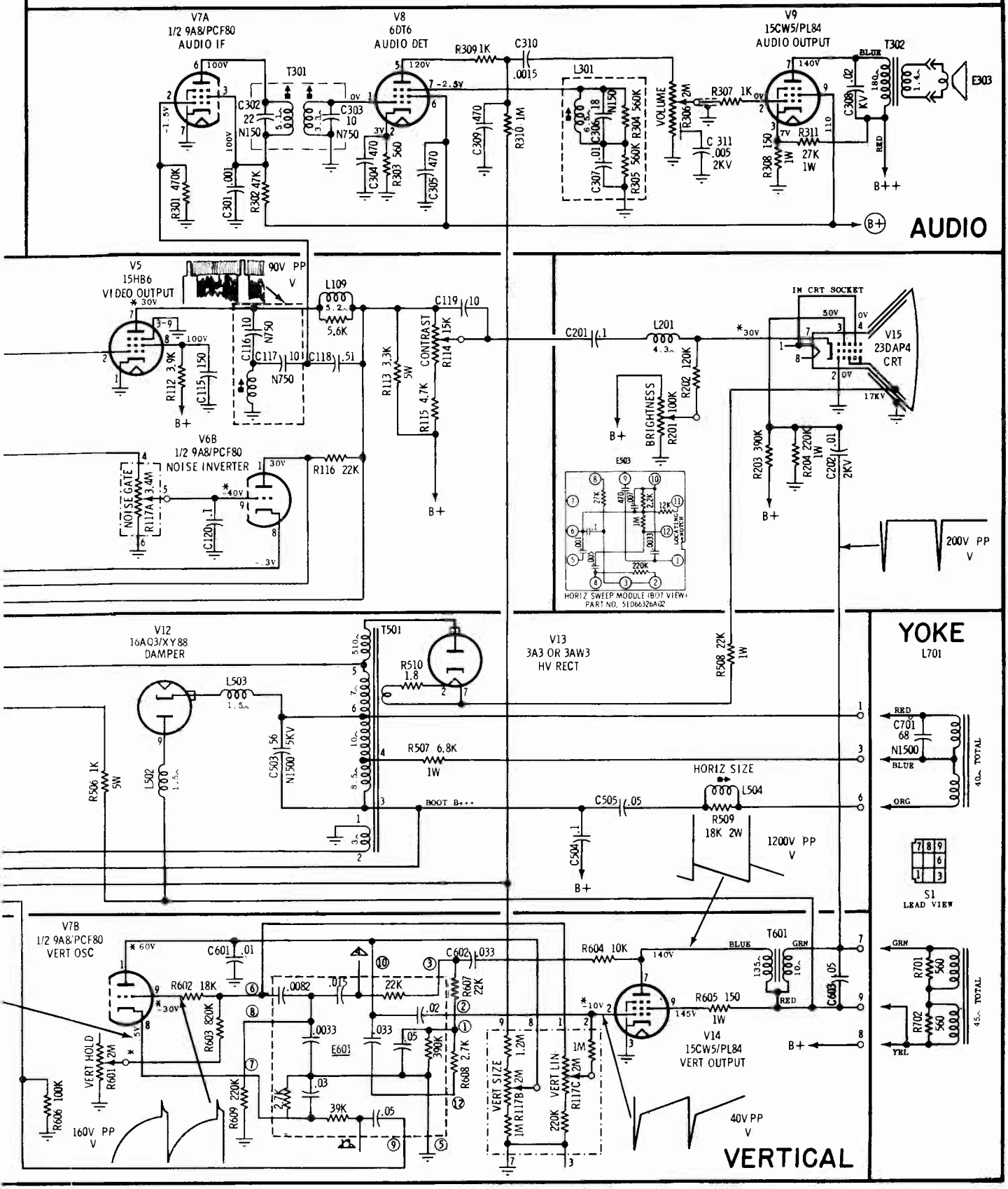
T501 CONN



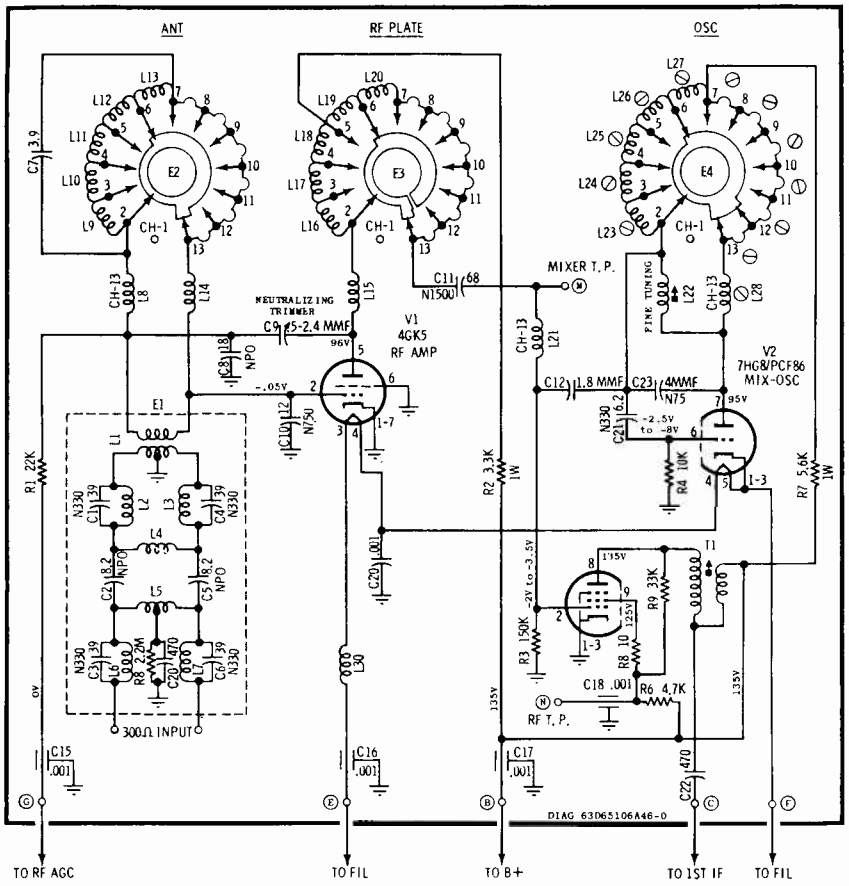
R117 CONN DETAIL

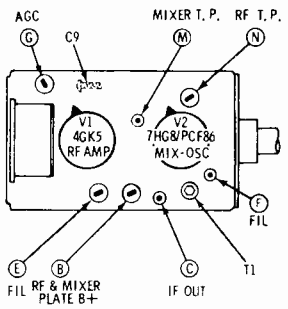


MOTOROLA Chassis TS-578 Schematic Diagram, Continued



MOTOROLA Chassis TS-578, Service Information, Continued

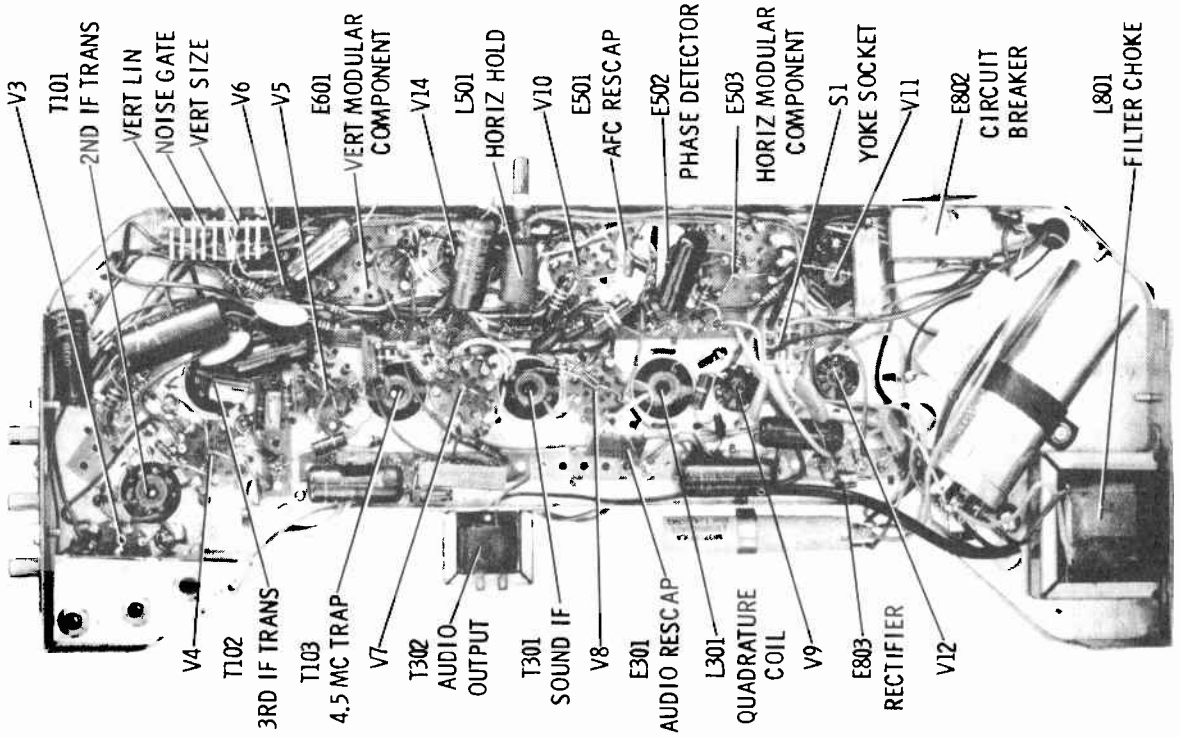




NOTES:
CAPACITORS - UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

VOLTAGES - SEE CHASSIS SCHEMATIC DIAGRAM FOR VOLTAGE NOTES.
T. P.=TEST POINT
CH = CHANNEL
CHANNEL SELECTOR SHOWN IN CHANNEL 13 POSITION

VHF TUNER TT-314 SCHEMATIC DIAGRAM



CHASSIS COMPONENTS

Muntz TV INC.

MODEL NUMBER	CHASSIS NUMBER
19PD 19PSA	T37X09 T37X11
19PS 19PSX	T37AC09 T37AC11
23RCM 23RCW 23RCB	T37Z10
23LBM 23LBW 23LBB 23CDM 23CDW 23LBAM 23LBAW 23LBAMAP 23LM 23LW 23L-MAP 23CDB 23EAX	T37V09 T37V11
23CM 23CW 23CB 23CAM 23CAW 23CAB 23CSM 23LTS 23TM 23TW 23TB 23CP4M 23CP4W 23CP4B 23CP5M 23CP5W 23CP5B	T37W09 T37W11
23CP1M 23CP1W 23CP1B	T37AA09 T37AA11
23CP2M 23CP2W 23CP2B 23CP3M 23CP3W 23CP3B	T37AB09 T37AB11
23CP8M 23CP8W 23CP8B 23CP10M 23CP10W 23CP10B	T37Y09 T37Y11
ALL 82 POSITION (UHF) TUNERS	RUN NUMBERS FOLLOWED BY "U" INDICATE UHF EQUIPPED MODELS

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

SPECIFICATIONS

Power Supply	108-125 Volts AC
Power Consumption	125-150 Watts
Sound Output	One Watt Max.
Voice Coil Impedance	3.2 OHM
Deflection	Electromagnetic
Focus	Electrostatic
Video Carrier	45.75 Megacycles
Sound Carrier	41.25 Megacycles
Sound IF	4.5 Megacycles
Antenna Input	300 OHMS Balanced

(Material on pages 87 thru 91)

CHASSIS REMOVAL

1. Remove channel selector knob, fine tuning knob, and 4 small service control knobs.
2. Remove screws holding cabinet back.
3. Disconnect H-V lead to CRT.
4. Disconnect Socket to CRT.
5. Disconnect black grounding wire to metal CRT tube mount.
6. Disconnect speaker wires.
7. Remove yoke from CRT by releasing yoke mtg. spring.

8A Front tuning models. Remove 4 (6/32) nuts holding tuner control plate.

8B Top tuning models. Remove 3 (6/32) nuts, and one hex head screw holding tuner control plate.

8C Side tuning models. Remove Phillip head flat screw located under F/T knob, and two hex head screws located in rear of cabinet holding tuner control plate.

9. Remove 4 chassis mounting bolts from the bottom and slip chassis out of cabinet.

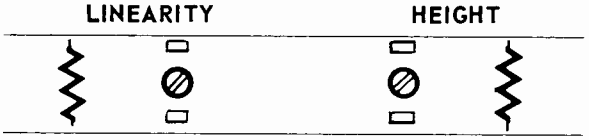
INDIVIDUAL CHANNEL ADJUSTMENT USING A TV SIGNAL

The channel tuning slugs are accurately set at the factory and should not require any adjustment. Should a tube change necessitate a touching up of these oscillator slugs, proceed in the following manner.

The tuning slug is located on the front (Shaft End) of the tuner about 1 inch away from the shafts themselves. The adjusting tool must be an insulated 1/8" rod, ground to a screwdriver. The tool can be placed through the holes in the white plastic channel selector indicator plate, tuner mounting plate, and then to the slugs. (On tv chassis that do not use a pilot light, the plastic indicator plate is not used).

VERTICAL LINEARITY AND HEIGHT CONTROLS

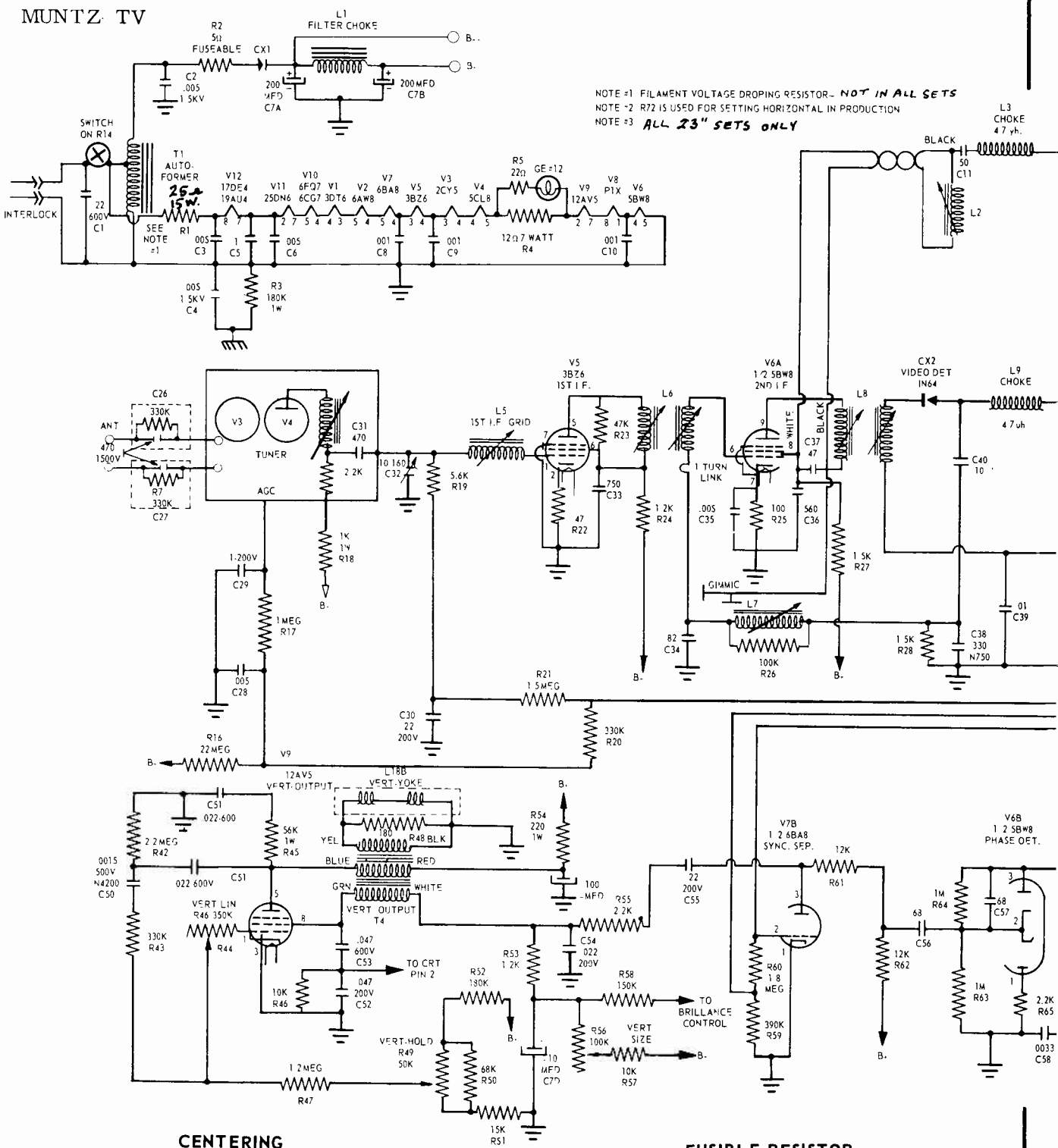
These controls are available when the back of the set is removed.



BOTTOM OF TV CHASSIS

With the Height control, located nearer the center of the chassis, bring picture down so that it 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.

MUNTZ TV



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 exists, 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.

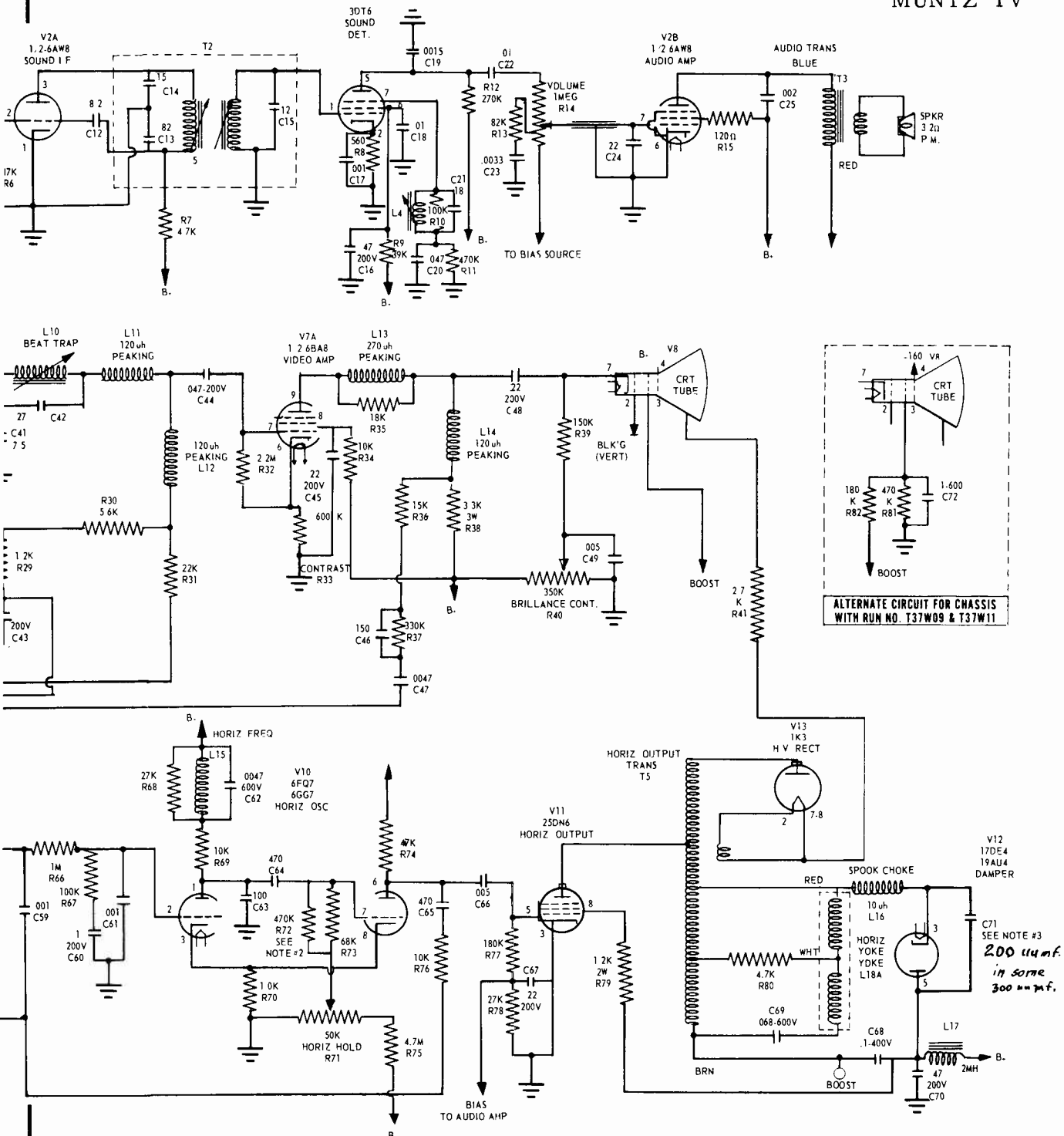
FUSIBLE RESISTOR

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.

SILICON RECTIFIER

Silicon rectifier is of the pigtail type and solders to terminals on the same strip as the Fusible Resistor.

MUNTZ TV



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.

CLEANING PICTURE TUBE SAFETY GLASS

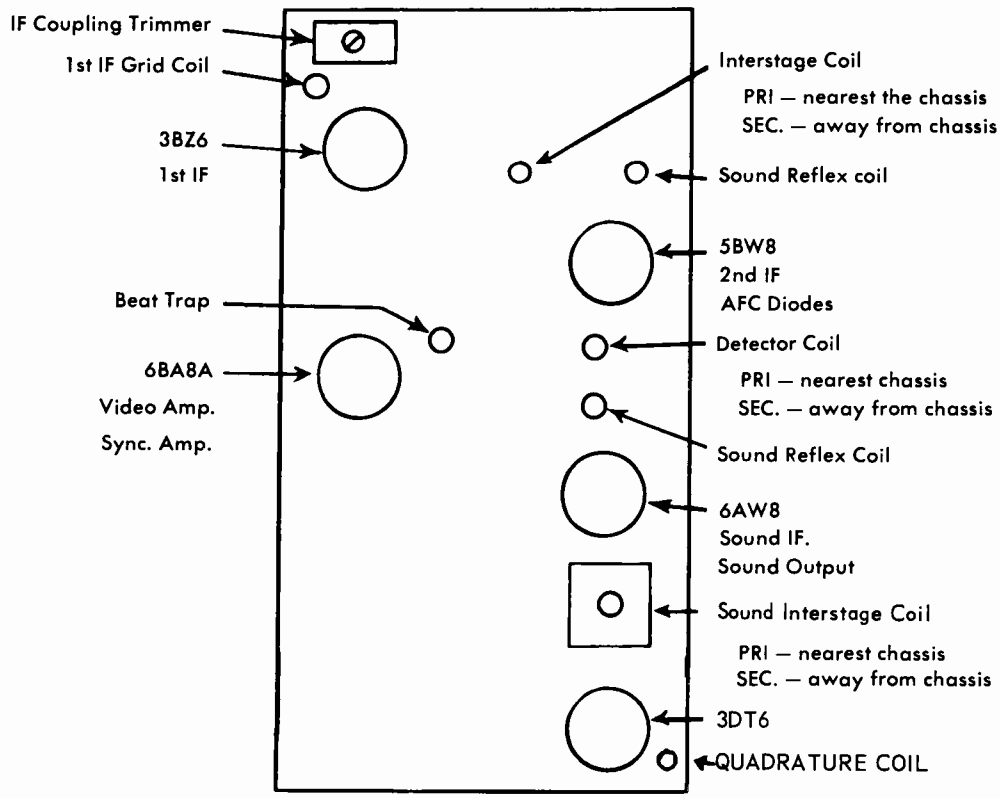
1. Remove either plastic trim strip on top of safety glass or metal molding strip on bottom by first unscrewing Phillips screws.
2. Remove and clean glass and screen with soft cloths and cleaner.

MUNTZ TV Chassis T37+++ Alignment Information, Continued

ALIGNMENT OF HORIZONTAL OSCILLATOR

Tune in a good signal and allow the receiver to warm up for a few minutes. Then follow the procedures listed.

1. Tune in the receiver properly and adjust the picture below an over-contrast condition.
2. Short out ringing coil with a jumper directly across the coil.
3. Short out AFC Diodes (Pin 2 of 5BW8) to ground.
4. After receiver is warmed up, adjust Horizontal Hold Control for a single picture.
5. Remove short from Ringing Coil and adjust Ringing Coil with the core entering the coil from the chassis side until a single picture is attained. Then turn in approximately ¼ of a turn clockwise for final adjustment of this coil.
6. Remove short from diodes and the picture will snap into sync.
7. Read the voltage at Pin 2 of the 6CG7 to chassis ground. It should be 0 to .2 Wolt. when the circuit is operating properly.



The above diagram represents a top view of the vertical portion of the slimline chassis.

PRE-ALIGNMENT INSTRUCTIONS

Because one side of the chassis is connected to the line, use an isolation transformer to protect yourself and the test equipment. The high voltage lead should be kept away from the chassis if set is being aligned without Pix. tube. Allow a 20 minute warm-up time for set and test equipment.

Connect the negative lead of 5.0 volt bias supply to junction of 5.6K, 1.5 Meg. and .22 capacitor. Connect positive lead of bias supply to ground.

Terminate the sweep generator output lead in its characteristic impedance, usually 50 OHMS.

When observing the television receiver band pass characteristic on the scope, it is important to avoid distortion of the response curve which would occur when using an abnormally large signal input from the sweep and marker generators. Always set the generator attenuator below the point where its output voltage starts to alter the shape of the response curve shown on the scope. This applies to both sweep and marker generators.

To operate set without picture tube, insert a 10 OHM, 2 Watt resistor between pins 1 & 8 of picture tube socket in 110· sets.

MUNTZ TV Chassis T37+;++ Alignment Information, Continued

VIDEO IF ALIGNMENT

Step No.	Sweep Generator Coupling	Sweep Gen. Freq.	Marker Gen. Freq.	Channel	Scope Connections	Adj.	Remarks
1.	To Pin 6 of 5BW8 thru .001 MFD	44 MC (10 MC Sweep)	41.25 42.75 44.75 45.75 47.25	Channel 11, 12, or 13, whichever has least interference.	Thru a 15K resistor in series with a High Freq. Scope Lead to junction 4.7 uh choke, 7.5 uuFD Cap. 270 uh Peaking coil.		See pre-alignment instructions.
2.	Same	Same	Same	Same	Same	DET. coil PRI & SEC	Per Fig. 1 Peaking at approximately 44.25 MC.
3.	To Pin 1 of	Same	Same	Same	Same	Interstage coil PRI & SEC.	Per Fig 2.
4.	Thru floating tube shield over converter tube*	Same	Same	Same	Same	1st IF Grid Coil.	Per Fig 2, Peaking at approximately 44.5 MC.
						IF output on tuner. IF coupling trimmer.	For Max. gain consistent with specifications of Fig 3. Use the Coupling trimmer to control bandwidth. See Note.

Note: The one turn coupling adjustments on the interstage coil is set at the factory and cemented in place. This should be adjusted only if it has been accidentally moved.

* An alternate method is to cut a strip of thin metal ¼ inch wide and 2 inches long, insulating it with one layer of plastic tape and inserting it between the mixer tube and shield. Connect the sweep generator to portion extending above tube shield.

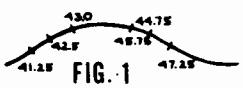


FIG. 1

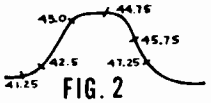


FIG. 2

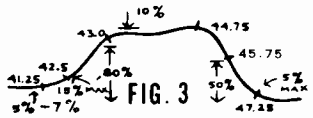


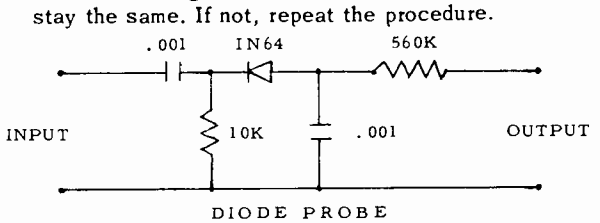
FIG. 3

COMPLETE SOUND ALIGNMENT

1. Connect the signal generator (4. 5MC crystal controlled 400 c/s AM modulated) to the tweet choke of the video detector.
2. Connect VTVM through the diode probe to pin 7 of the 3DT6.
3. Connect audio wattmeter to the output of audio transformer.
4. Preset the Quadrature coil core to the top of the coil and interstage coil cores to the extreme outer positions.
5. Prealign roughly all sound IF coils with audio wattmeter.
6. Adjust sound IF coils (cores closer to chassis) and sound IF interstage transformer (cores at outer peaks) for maximum deflection on the VTVM with minimum of signal input (below limiting).
7. Disconnect diode probe and with the signal strength just above the limiting, adjust the quadratune coil for minimum deflection on the audio wattmeter at the first peak.
8. Check for Sound Quality and Audio Power output by injecting FM signal.

FIELD SOUND ALIGNMENT

1. Tune up the receiver to any local station. Disconnect the antenna and couple it loosely for acceptable picture and sound level below limiter action level.
2. Connect VTVM diode probe to pin 7 of the 3DT6.
3. Adjust sound IF coils (peak closer to chassis) and sound IF interstage transformer (cores from extreme outer positions) for maximum deflection on VTVM being careful that all these adjustments are made below limiting action of limiter.
4. Disconnect diode probe and VTVM and connect the antenna to the terminals. Tune up to the strongest stations for the best picture and with the volume control set for normal reception adjust Quadrature Coil for the loudest sound peak with minimum distortion.
5. Check the quality of sound alignment by tuning to weak and strong stations. The level of sound should stay the same. If not, repeat the procedure.



OLYMPIC RADIO & TELEVISION

MODELS 3C605, 3T600 LY and LYU Chassis

(Servicing material on pages 92 through 95)

FUSE

One fuse wire (F1) is used for the low voltage power supply and one fuse wire (F3) for filament protection. Fuse F2 is for general set protection.

BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Sound Clarifier (L12) for minimum buzz and maximum sound.

CENTERING

Centering is accomplished by two magnetic rings, located behind the yoke, on the neck of the picture tube.

FOCUS

Connect the terminal connector on the blue lead (pin 6 - focusing grid of the picture tube) to one (whichever gives the best focus) of the three terminal lugs (265V, 135V or ground - indicated as A, B and C on the schematic) mounted on the high voltage cage.

TUBE COMPLEMENT

V1	6EJ7/EF184	Video IF
V2	6AW8A	Video Amp., Sound IF
V3	6DT6	Discriminator
V4	6AQ5A	Audio Output
V5	6AV6	Sync. Separator
V6	6CM7	Vert. Osc. & Output
V7	6CG7	Hor. Osc.
V8	6CU6 or 6DU6	
	6DU6	Hor. Output
V9	1B3/GT	HV Rectifier
V10	6AX4/GT	Damper
V11	5U4G	Rectifier
V12	23AWP4 or	
	23BJP4	Picture Tube
V101	6FS5	RF Amp.
V102	6FG7	Mixer - Osc.
V201	6AF4A	UHF Osc.

RESISTANCE MEASUREMENTS

ITEM	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V1	6EJ7/ EF184	190	3	190	0	AC	0	28K	28K	0
V2	6AW8A	0	100K	40K	0	AC	660	500K	55K	30K
V3	6DT6	3	1K	AC	0	300K	26K	600K		
V4	6AQ5A	100K	220	AC	0	27K	27K	100K		
V5	6AV6	1M	0	AC	0	100K	NC	100K		
V6	6CM7	400K	NC	100K	0	AC	1.5M	1.5M	1.5M	100
V7	6CG7	35K	600K	750	AC	0	100K	65K	750	
V8	6CU6 or 6DQ6B		0		32K	500K		AC	0	
V9	1B3GT	Pins 1 through have infinite resistance.								
V10	6AX4/GT	NC	NC	500K		15K		0	AC	
V11	5U4G		24K		34		34		24K	
V12	23AWP4 or 23BJP4	0	23K	Pin 10 45K	Pin 11 250K	Pin 12 AC				

NOTES: Controls set for normal (mid-range) operation.
AC notations indicate tube filaments.
All measurements made to ground.
K = Kilohms; M = Megohms.

OLYMPIC LY, LYU, Alignment Instructions, Continued

TEST EQUIPMENT REQUIRED

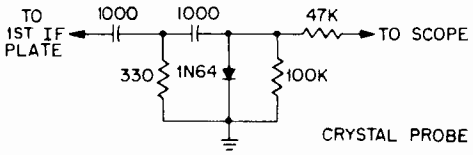
Sweep Generator having a 10 mc sweep width. (Sweep from 4 mc to 50 mc). RCA Model WR59C or equivalent.

Oscilloscope with crystal probe. Sylvania Model 400 or equivalent.

Marker Generator. RCA Model WR39A or equivalent.

VTVM with crystal probe.

Variable bias supply: 0 to -4 volts dc.



VIDEO IF ALIGNMENT

Connect the synchronized sweep output from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. Use only enough sweep generator output to provide a usable pattern on scope, without overloading. Connect variable bias (negative lead) to AGC line TP1 and positive lead to chassis. Adjust bias to obtain response curve which shows no indication of overloading.

SWEEP GENERATOR CONNECTIONS	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	SCOPE CONNECTIONS	ADJUST	REMARKS
1. HIGH SIDE TO I.F. INJECTION POINT ON TUNER. LOW SIDE TO TUNER CHASSIS.	44 MC (10 MC SWP)	43.25 MC 45.75 MC	ANY NON-INTERFERING CHANNEL.	VERT. AMP. THRU CRYSTAL PROBE TO PIN 7 OF 6EJ7/EF184 (V1). LOW SIDE TO CHASSIS NEAR CRYSTAL PROBE.	L101, L2	ADJUST FOR MAXIMUM GAIN AND SYMMETRY OF RESPONSE SIMILAR TO FIG. 1.
2. "	"	43.25 MC 44.5 MC 45.75 MC	"	VERT. AMP. DIRECTLY TO TP2.	L3, L4	TURN BOTH CORES OUT. TURN L3 IN FOR MAX. AMPLITUDE AT44.5MC. ADJUST L4 FOR RESPONSE SIMILAR TO FIG. 2. IF NECESSARY, RETOUCH L3 AND L4 TO OBTAIN DESIRED RESPONSE.

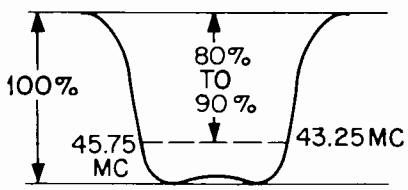


FIGURE 1

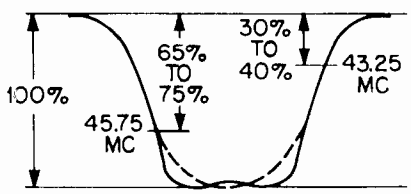


FIGURE 2

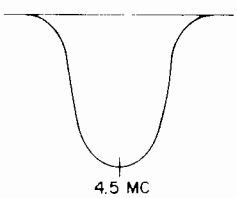


FIGURE 3

SOUND IF ALIGNMENT

1. Short out the Discriminator Coil by placing a jumper across R28, 150K.
2. Set the contrast control to the extreme counterclockwise (minimum) position and remove V1, type 6EJ7/EF184.
3. Inject a 4.5 mc signal from the marker generator into TP2. High side to TP2 and low side to ground. Use maximum signal from the marker generator.
4. Connect the crystal probe of the VTVM to pin 1 of Z1, TP3.
5. With the VTVM on a low voltage scale, adjust the slug of coil L7 (top of chassis) for minimum value. If there is no indication on the VTVM, turn the Contrast Control up. Remove the crystal probe and marker generator leads.
6. Connect the oscilloscope directly to TP4. Connect a 4.5 mc signal from the sweep generator and marker generator to TP2. Set the Contrast Control at minimum and adjust L8 (bottom of chassis) and L11 for maximum output at 4.5 mc. Repeat adjustment to obtain the curve of figure 3.
7. Replace V1, remove all test equipment leads and remove jumper across R28.
8. Tune in a strong TV signal. Adjust L12 for maximum volume and minimum buzz.

OLYMPIC Chassis LY, LYU,

Schematic Diagram

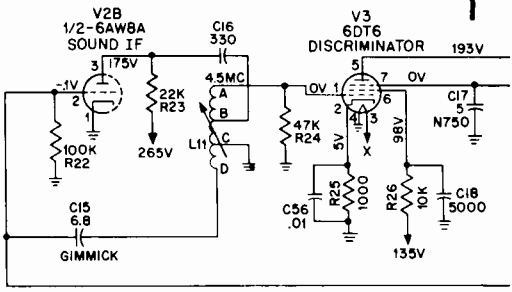
NOTES:

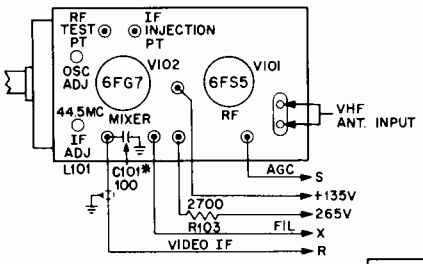
ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.

ALL CAPACITOR VALUES LESS THAN 1.0 ARE IN MICROFARADS AND GREATER THAN 1.0 ARE IN MICRO-MICROFARADS UNLESS OTHERWISE NOTED.

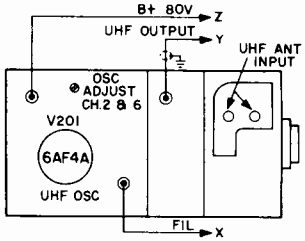
ALL VOLTAGES ±15%, MEASURED WITH A VTVM, BETWEEN INDICATED POINTS AND GROUND WITH AN INPUT VOLTAGE OF 117V, 60~ AND NORMAL SIGNAL INPUT WITH CONTRAST CONTROL SET TO PRODUCE 90V, P-P AT KINESCOPE.

*SOME SETS HAVE ONE OR TWO 15μμf CAPACITORS IN PARALLEL WITH C101.

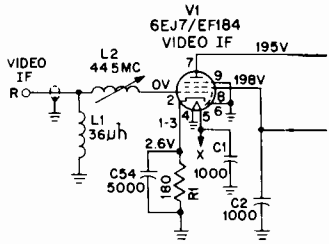


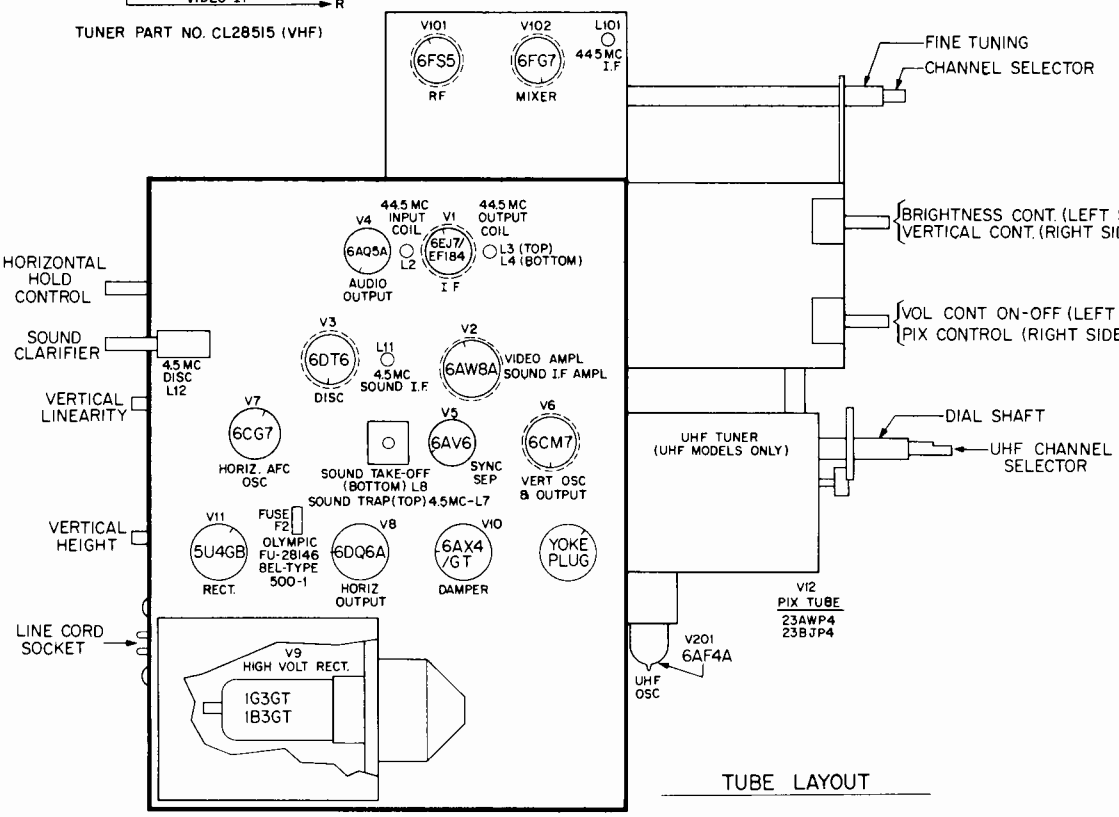


TUNER PART NO. CL28515 (VHF)

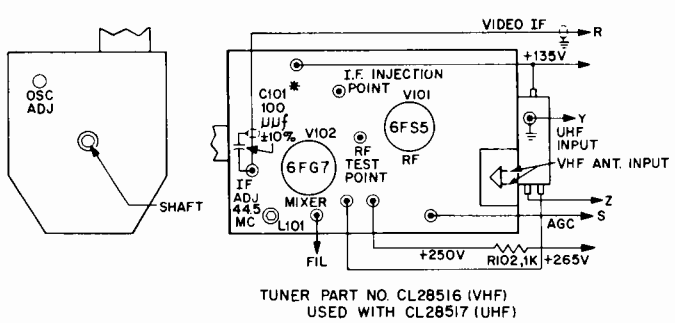


TUNER PART NO. CL28517 (UHF)

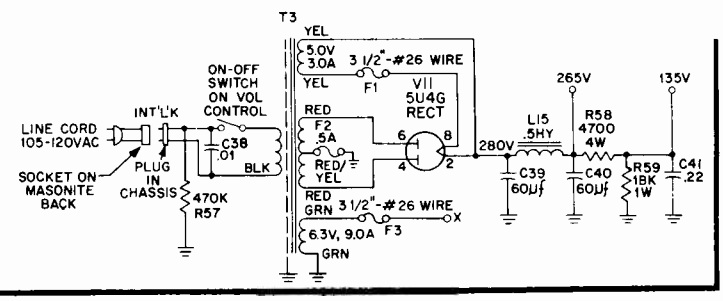


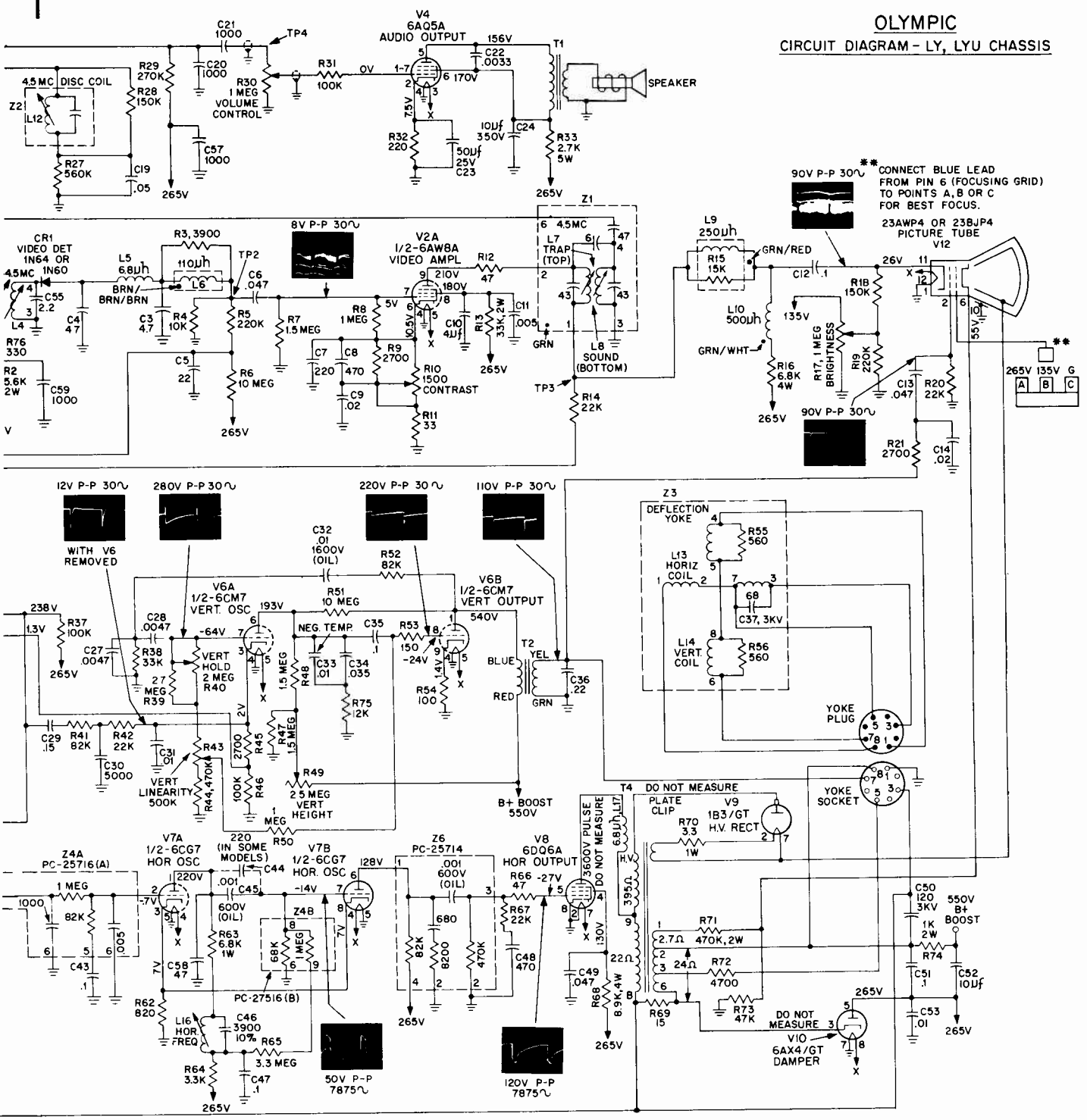


TUBE LAYOUT



TUNER PART NO. CL28516 (VHF)
USED WITH CL28517 (UHF)

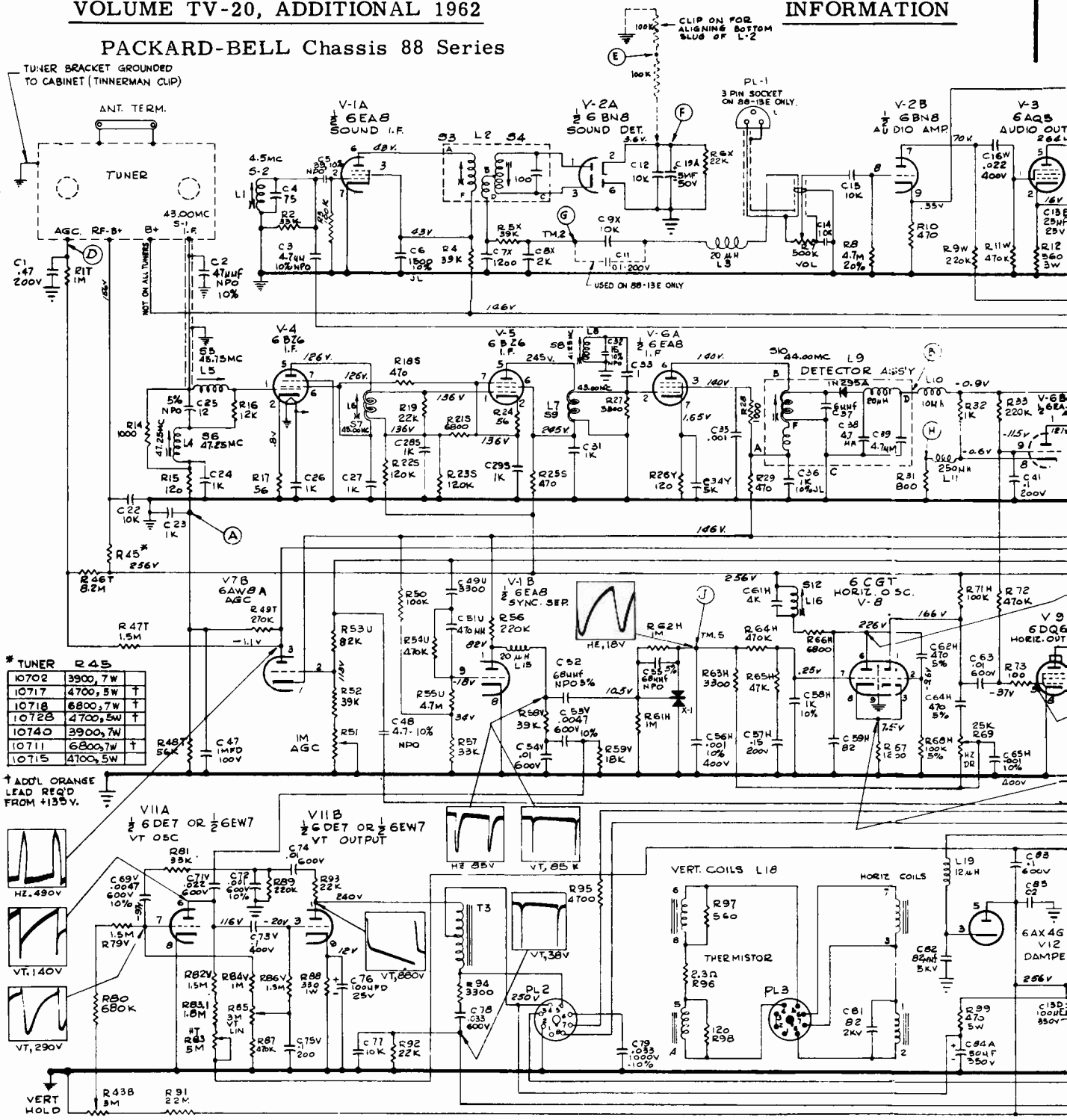




HORIZONTAL SWEEP CIRCUIT ALIGNMENT

1. Turn the set on and allow it to warm up about 2 minutes.
2. Tune in a TV station, preferably one with a test pattern.
3. Adjust the Horizontal Frequency (L16) until the picture synchronizes horizontally.
4. Turn the Channel Selector off the tuned inchannel and then back on. Readjust L16 if necessary.

PACKARD-BELL Chassis 88 Series



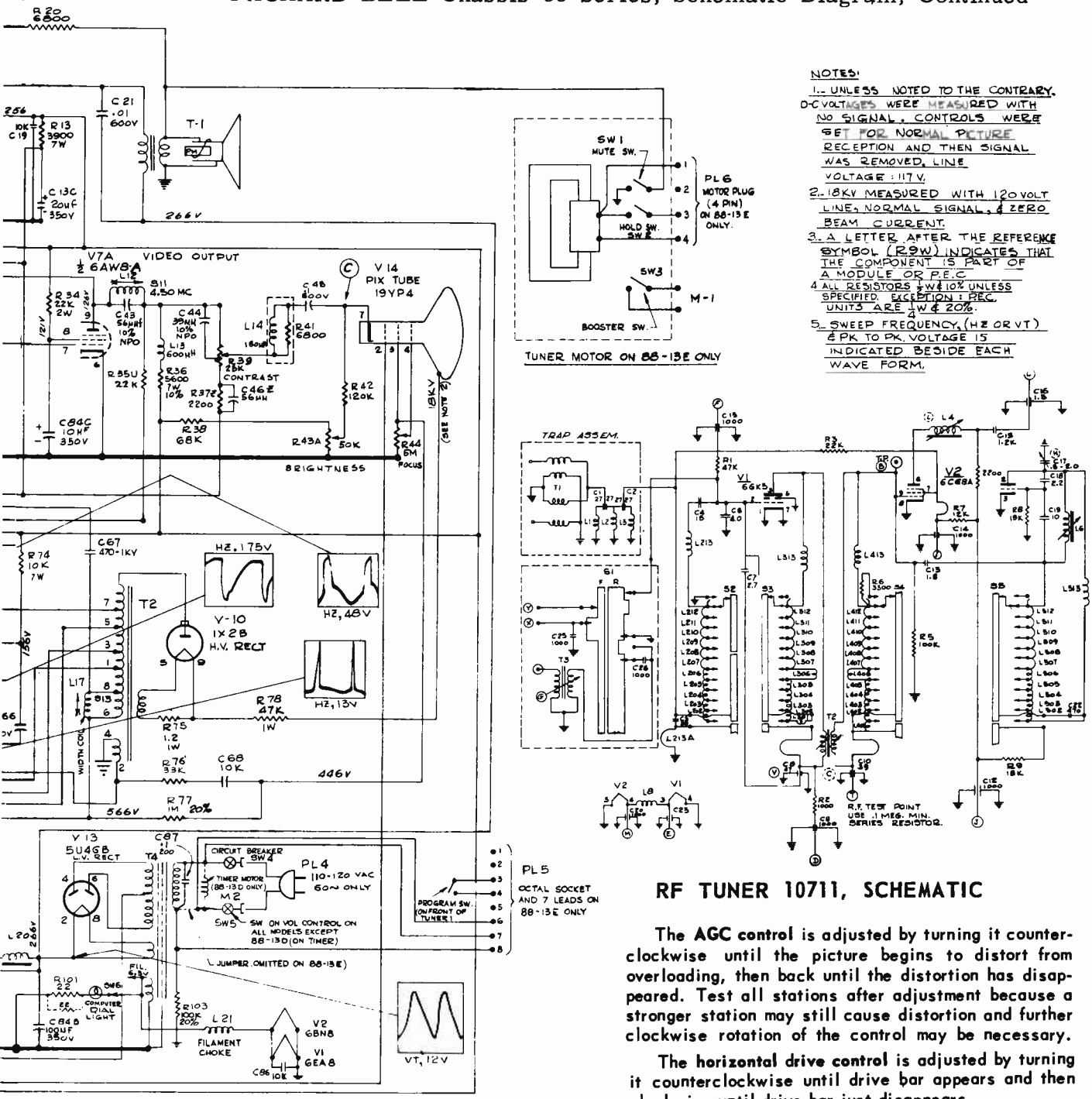
Packard Bell

Chassis 88 Series

(Material on pages 96 thru 98)

MODEL	CHASSIS
19T6	88-13C
19T7	88-13D
19T8	88-13E
19C2	88-13F
19C3	88-13E
19T9	88-13F

PACKARD-BELL Chassis 88 Series, Schematic Diagram, Continued



RF TUNER 10711, SCHEMATIC

The **AGC control** is adjusted by turning it counterclockwise until the picture begins to distort from overloading, then back until the distortion has disappeared. Test all stations after adjustment because a stronger station may still cause distortion and further clockwise rotation of the control may be necessary.

The **horizontal drive control** is adjusted by turning it counterclockwise until drive bar appears and then clockwise until drive bar just disappears.

LAST MINUTE CHANGES, ADDITIONS, OR MODIFICATIONS:

1. PEC 24538B was replaced in later sets by PEC 24551. The latter includes R-50 and R-57, which were separate units when 24538B was used.
2. Two additional RF tuners were added as alternates. Tuners 10711 and 10715 were added for possible use on 19T6 models not meant for kit conversion to UHF. Tuner 10715 was also added for possible use on the timer model 19T7.
3. R-101 was changed to 22 ohms (was 10), and R-102 was deleted in order to reduce the brightness of computer dial lights (chassis 88-13D & -E). However, in some sets where brighter lights are needed, two 22 ohms resistors are placed in parallel.

PACKARD-BELL Chassis 88 Series, Alignment Information, Continued

Equipment Required

Signal generator, sweep generator, VTVM with RF probe, oscilloscope, matching network (sweep generator to antenna input), capacitor, .001 mfd, resistor, 22,000 ohms, and two batteries, 6 v and 3 v.

Picture I-F Alignment

1. Connect point "J" to ground. "J" is terminal 5 of the horizontal oscillator module 10709C.
2. Connect the six volt battery between point "A" and ground, with the negative lead going to point "A".
3. Connect the three volt battery between point "D" and ground with the negative lead to point "D".
4. Connect the VTVM between point "B" and ground.
5. Connect the signal generator to mixer grid in RF tuner through the .001 mfd capacitor. Connection may be made through the terminal next to the 6CG8A mixer tube.
6. Set generator output at maximum.

For the following steps, reduce the 6-volt bias at point "A" if necessary to obtain a definite reading on the VTVM.

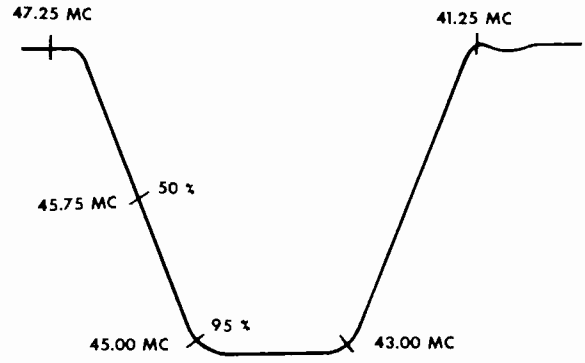
STEP	SIG GEN FRQNCY	ADJUST	FOR
7.	41.25 mc	S-8	Minimum
8.	47.25 mc	S-6	Minimum

For the following steps adjust signal generator output to obtain a reading of between two and three volts at point "B" with the six volt battery connected at point "A".

9.	44.00 mc	S-10	MAXIMUM
10.	43.00 mc	S-9	MAXIMUM
11.	45.00 mc	S-7	MAXIMUM
12.	45.75 mc	S-5	MAXIMUM
13.	43.00 mc	S-1 (on tuner)	MAXIMUM

REPEAT STEPS 7 THRU 13

14. Disconnect VTVM.
15. Connect scope between point "B" and ground thru the 22,000 ohm resistor.
16. Connect sweep generator to antenna terminals through the impedance matching network.
17. Disconnect signal generator from mixer grid and connect hot lead to ground lead of I-F input cable. If this connection produces insufficient marker signal on the response curve, try connecting to other ground points in the vicinity of the 1st I-F stage.
18. Rotate selector to channel 3 and set sweep generator to center frequency of channel (63 mc). With a sweep width of 8 mc, adjust generator output to develop not more than 5 volts peak to peak on the scope.
19. Adjust signal generator output to provide the markers shown on the illustrated response curve. Check positions of the markers one at a time. Some slight touching-up of the I-F adjustments may be needed to make the curve correspond to the illustration.



RESPONSE CURVE

In touching up the adjustments, use S-1 (tuner) to position 42.50 at 50% to 60% of response. Use S-5 to set 45.75 mc at 50%. Use S-10 to flatten or tilt response.

Use S-7 to position 45.00 mc on corner of response.

NOTE: Trap tuning may be rechecked by disconnecting the six volt battery from point "A". The response will be expanded sufficiently to show the trap settings.

20. Remove the ground connection from point "J". Remove all test equipment.

Alignment of 4.50 MC Trap:

1. Connect signal generator between point "B" and ground.
2. Turn contrast control to maximum.
3. Connect RF probe of VTVM to point "C".
4. Set signal generator to 4.50 mc, with the output at one volt or more.
5. Adjust trap, S-11, for minimum VTVM reading.

NOTE: If signal generator is not capable of a one volt output, the trap may be adjusted visually. Observe the picture and detune the signal to accentuate the 4.50 mc beat. Then adjust S-11 for minimum beat in the picture.

Sound I-F and Ratio Detector Alignment:

1. Connect signal generator between point "B" and ground thru the .001 mfd capacitor.
2. Connect VTVM between point "F" and ground.
3. With a generator frequency of 4.50 mc, adjust S-2 and S-3 for MAXIMUM READING ON THE VTVM. If definite peak cannot be obtained, disconnect signal generator from point "B" (step 1), and connect to point "H".
4. Connect VTVM between points "E" and "G", with ground lead to point "E". (Point "G" is terminal 2 of packaged circuit 24540.)
5. Adjust ratio detector secondary, S-4, for zero between positive and negative peaks.
6. Repeat steps 2 thru 5.

PHILCO

CHASSIS 12J28

MODEL-CHASSIS CROSS REFERENCE

Model	Chassis for VHF Models	Chassis for UHF Models	12 Position VHF Tuner	13 Position VHF-UHF Tuner	All Channel UHF Tuner	CRT Type
K3240GD	12J28A		76-12405-3 (TT-106A)			19ABP4
UK3240GD		12J28AU		76-12432-2 (TT-105U)	76-12320-2 (TT-135)	19ABP4
K3240SL	12J28A		76-12405-3 (TT-106A)			19ABP4
UK3240SL		12J28AU		76-12432-2 (TT-105U)	76-12320-2 (TT-135)	19ABP4
K3244BK	12J28A		76-12405-3 (TT-106A)			19ABP4
UK3244BK		12J28AU		76-12432-2 (TT-105U)	76-12320-2 (TT-135)	19ABP4
K3244SA	12J28A		76-12405-3 (TT-106A)			19ABP4
UK3244SA		12J28AU		76-12432-2 (TT-105U)	76-12320-2 (TT-135)	19ABP4

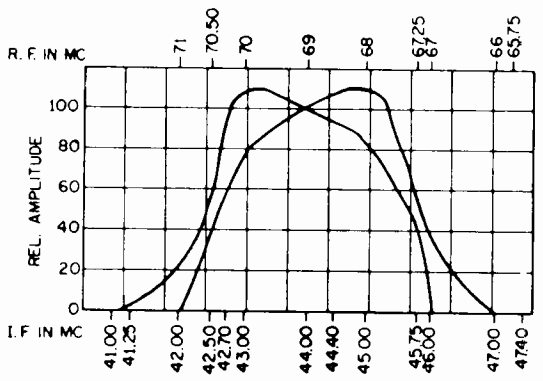
CHASSIS AND CRT REMOVAL—12J28 AND 12J28A

1. Remove back—11 screws, two at top, three on either side, three at bottom.
2. Disconnect yoke socket, CRT socket, anode lead and two speaker leads.
3. Remove knobs.
4. Remove two screws from top bracket (indicated by arrows).
5. Remove five 5/16" drive screws from cabinet bottom.
6. To remove chassis slide speaker side out first.
7. To remove CRT from bezel, loosen 5/16" bolt from CRT mounting strap then disengage from four corner clips.

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 terminals 1 and 3.
2. Set the horizontal hold control VR5 shaft, to the center of its range.
3. Adjust control VR5 (12J28) 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-6 and adjust the ringing coil core for stable picture sync. Bring picture into sync from high frequency side.



OVERALL R.F., I.F. RESPONSE

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: −8 volts to L13 on VIFS panel.
SCOPE: connect to L15 on VIFS panel, video detector output.
OUTPUT LEVEL: not to exceed 1.0 volt peak to peak during pole and sweep alignment. Not less than .2 volt peak to peak as null, during trap alignment, is approached.

1. Adjust tuner pole, T1T for maximum at 42.9mc. This is a temporary setting for trap alignment.
2. Adjust trap VC4 (12J28) for minimum at 41.25 mc.*
3. Adjust traps VC3 (12J28) for minimum at 47.25mc.*
4. Repeat steps 2 and 3. Bias may be reduced as trap minimum is approached.
5. Adjust tuner pole, T1T (tuner) for maximum at 42.9mc.
6. Adjust VC1 for maximum at 45.5mc.
7. Adjust T5 for maximum at 44.3mc.
8. Adjust T4 (top) for maximum at 45.0mc.
9. Adjust T4 (bottom) for maximum at 42.7mc.
10. Repeat step 8 only.

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

PHILCO Chassis 12J28, Alignment Information, Continued

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. Refer to Fig. (1-1)
   a. VC1, to set carrier level.
   b. T1T on tuner, to adjust 42.5mc (sound side) slope.
   c. T5, adjust for *flat* response curve.
   d. Detune T5, to set knee on sound side 20% lower than knee on carrier side.

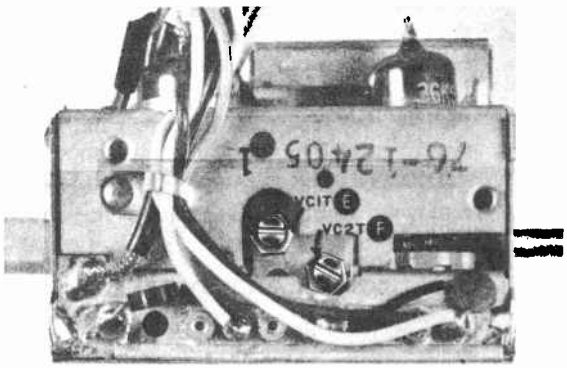


FIGURE 1–1 ALIGNMENT POINTS, T106 TUNER, RIGHT SIDE

4.5 MC TRAP ALIGNMENT

1. Inject 4.5mc AM signal into L15 or use station signal.
2. Connect 4.5mc detector Fig. 1-2 to L1 (12J28) (pin 7 of CRT).
   NOTE: When using generator calibrate by zero beating with sound I-F developed from station signal.
3. 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 (T2 bottom) for minimum indication.

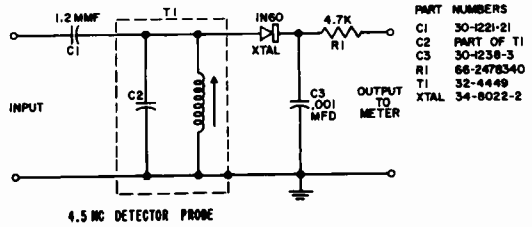


FIGURE 1–2 4.5MC DETECTOR PROBE CIRCUIT

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, T1, for maximum sound.
2. Remove short from sound test point L11 and add parallel combination 15K resistor and 150 mmf capacitor to ground.
3. First rotate fine tuner into maximum smear (maximum counter-clockwise) to reduce signal. Adjust T2, (top) sound takeoff coil and sound interstage transformer, T3, both coils for maximum negative dc at L11.
4. Retouch quadrature coil for maximum sound.
   NOTE: Misadjustment of the sound takeoff, T2 (top) and the sound interstage, T3, will cause either weak sound or an excessively high noise level, or both.

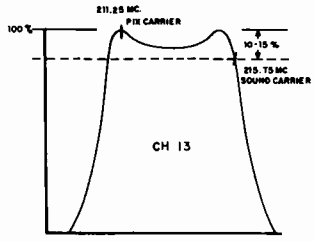


FIGURE 1–3

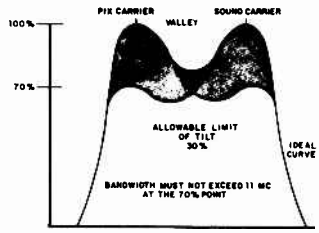


FIGURE 1–4

TUNER RESPONSE CURVE SHOWING BANDPASS LIMITS

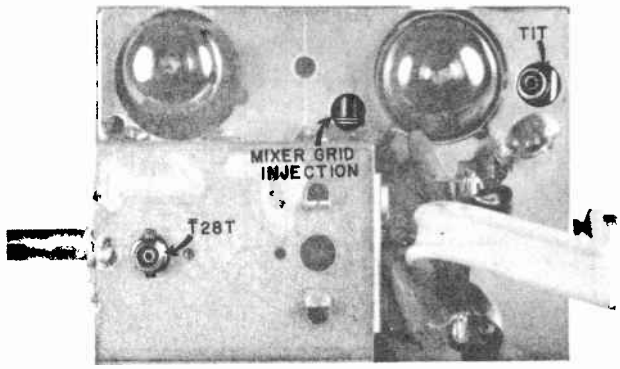


FIGURE 1–3b ALIGNMENT POINTS OF T106 TUNER, TOP VIEW

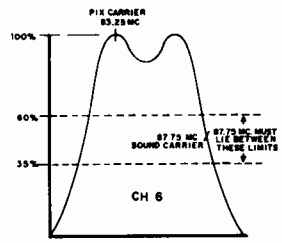


FIGURE 1–5

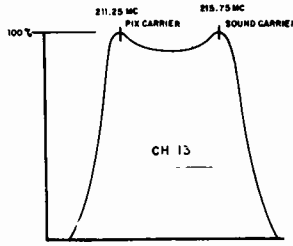
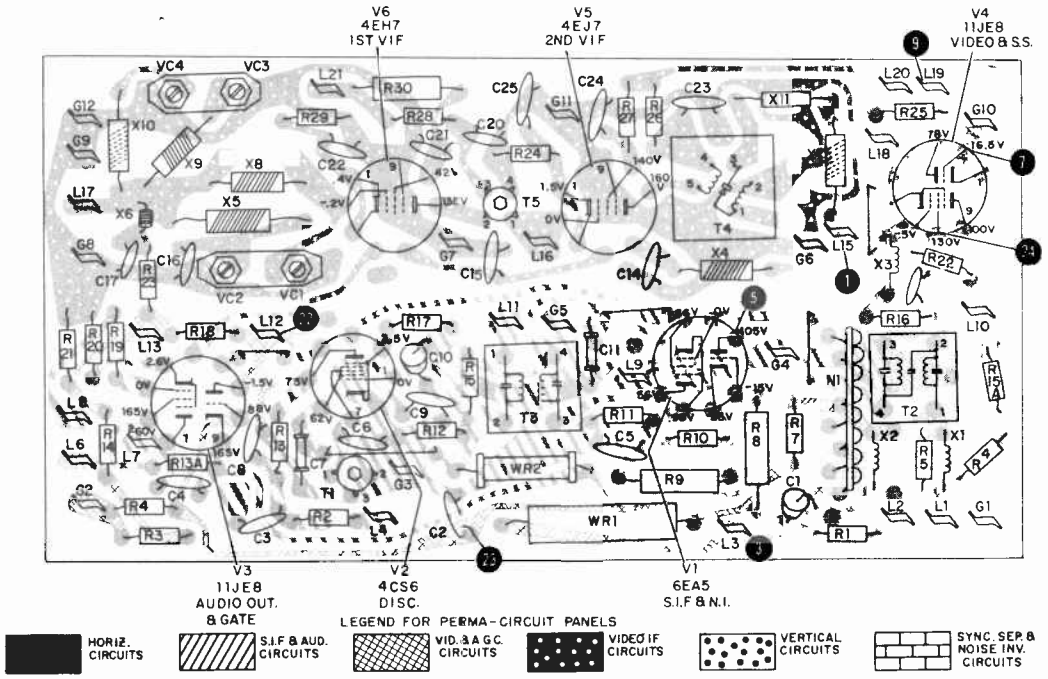


FIGURE 1–6

TUNER RESPONSE CURVE, SHOWING TRACKING COMPENSATION CHANNEL 7

PHILCO Chassis 12J28, Perma-Circuit Panels, Continued



VIFS PERMA-CIRCUIT PANEL

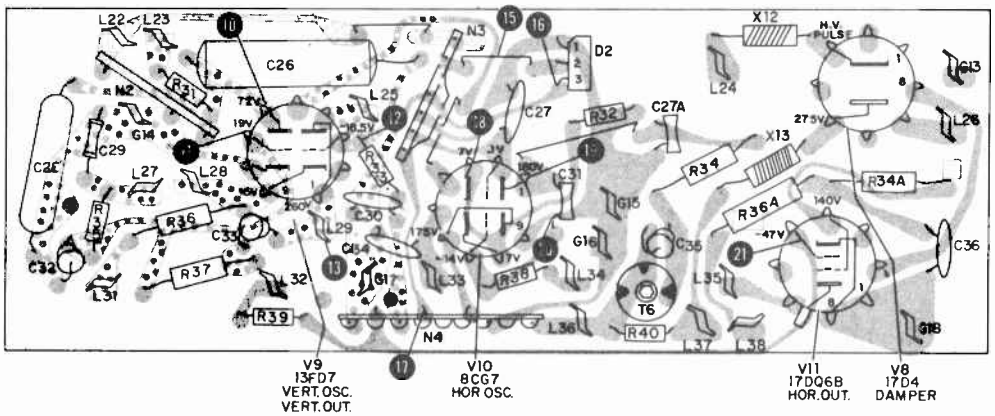
PANEL LUG CONNECTIONS

Terminal Lug Identification VIFS Panel

Lug	Identification
L1	Video Output to CRT Cathode Pin 7
L2	Lead to center lug of brightness control, VR3
L3	275V B+ lead
L4	260V B+ lead
L5	Shielded lead to top of volume control VR1
L6	Tuner AGC lead
L7	Blue lead of A.O.T. to audio output plate
L8	Shielded lead from arm of volume control VR1
L9	Filament lead to L25 of sweep panel
L10	Lead to contrast control VR1, lug 3
L11	Test point for sound detector
L12	Gate pulse from H.O.T.
L13	I-F, AGC
L14	Lead to Lug 2 of VR1 the contrast control
L15	Video output from video 2nd detector
L16	Test point: grid of second I-F
L17	I-F input link from tuner
L18	Filament input from L26 of deflection panel
L19	165V B+ lead
L20	Sync output to L22 of sweep panel
L21	150V B+ lead

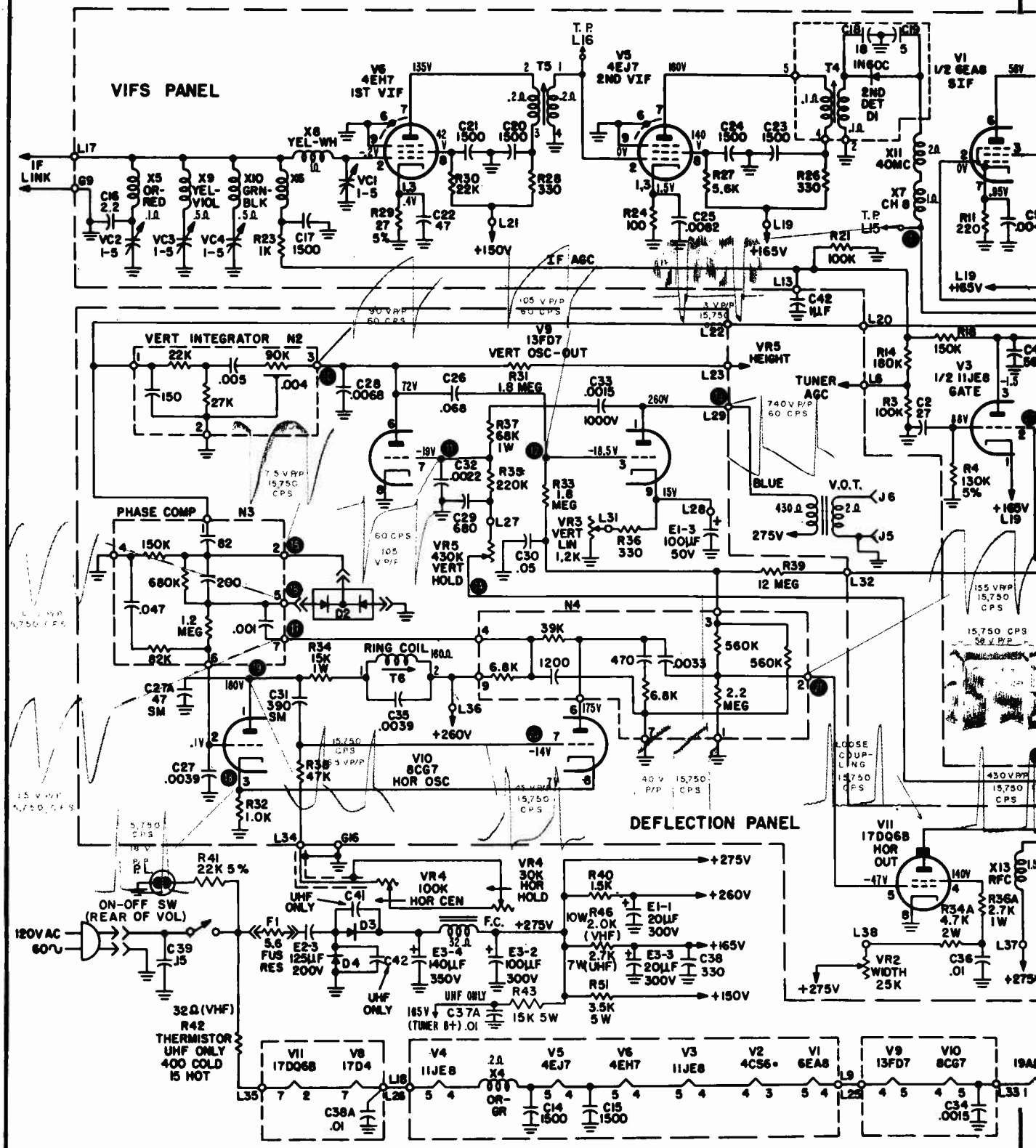
Terminal Lug Identification Deflection Panel

L22	Sync input from VIFS panel L20
L23	Lead to top of height control VR5
L24	Lead from damper cathode to H.O.T. Terminal #4
L25	Filament lead to V9 13FD7 Pin 4 from L9 of VIFS panel
L26	Filament lead from V8 17D4 Pin 7 to VIFS panel L18
L27	Lead to top of vertical hold control VR5
L28	Vertical output cathode, lead to E1 by-pass electrolytic
L29	Vertical output plate, blue lead to V.O.T.
L31	Lead to center tap of vertical linearity control VR3
L32	Vertical output bias, lead to VIFS panel L2
L33	Filament lead from Pin 4 of V10-8CG7 to CRT Pin 1
L34	Shielded lead to horizontal hold centering control, VR4
L35	Filament lead from surge resistor to V11 17DQ6B
L36	De-coupled B+, 260V
L37	275V B+
L38	Lead from top of width control VR2



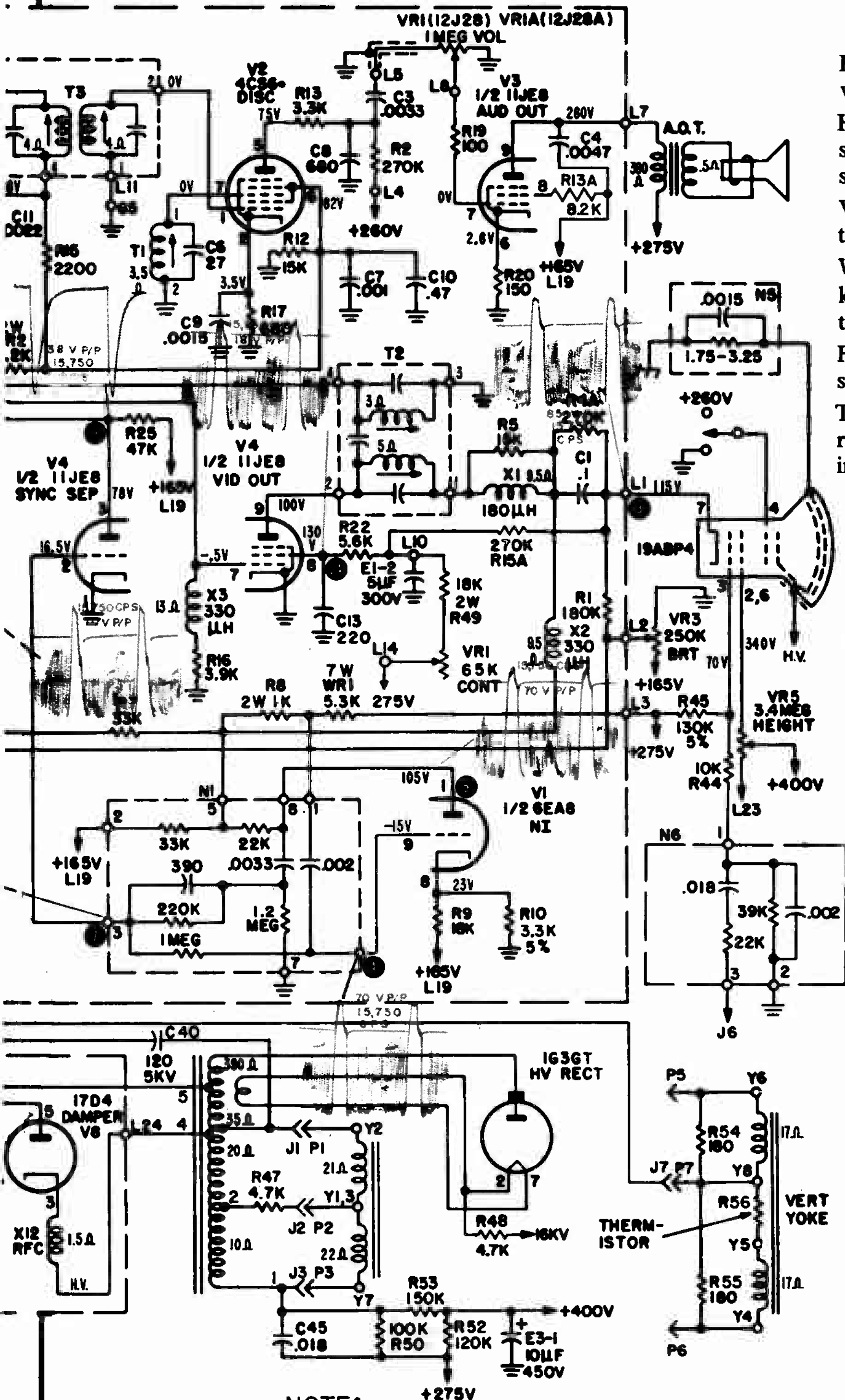
DEFLECTION PERMA-CIRCUIT PANEL

PHILCO Chassis 12J28, Schematic Diagram, Continued



SCHEMATIC DIAGRAMS AND OSCILLOSCOPE WAVEFORMS 12J28

PHILCO Chassis 12J28, Service Information, Continued



NOTE:

ALL VOLTAGES AND RESISTANCE MEASUREMENTS ARE UNDER A NO SIGNAL CONDITION WITH THE YOKE PLUGGED IN, USING AN 11 MEG. INPUT V.T.V.M. CONTROL SETTINGS AS FOLLOWS:

- BRIGHT. & CONTRAST — MAX. CLOCKWISE
- HOR. & VERT. HOLD, HEIGHT & WIDTH — CENTER POSITION
- VERT. LIN. & HOR. FREQ. — 3/4 CLOCKWISE
- VOL. AT MINIMUM

N1, N2, N3, N4, N5 & N6, ARE COMPONENT PACKS

RECEIVER SET UP CONTROL LOCATIONS

Height—Adjust with a thin screw driver through the vertical hold shaft.

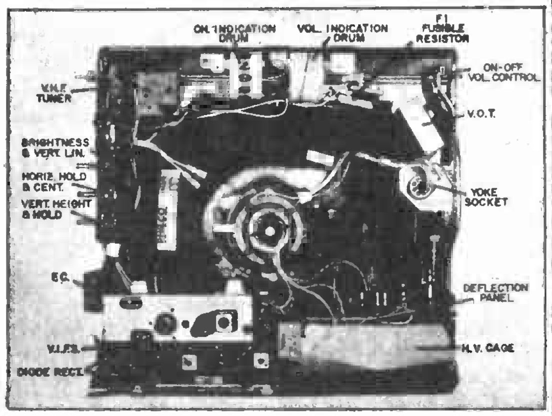
Horizontal Hold Centering—Adjust with a thin screw driver through the hollow horizontal hold shaft.

Vertical Linearity—Adjust with a thin screw driver through hollow shaft of brightness control.

Width Adjustment—Remove volume and contrast knobs, the width control VR5 can be adjusted through the opening.

Fusible B+ Resistor—Remove cabinet back. Resistor is a plug-in unit at top right corner.

Tubes—All tubes (except CRT) are accessible after removing back. 1G3GT, high voltage rectifier, is in cage.



TELEVISION CHASSIS 12J28

CHANGES

Run 1. As shown.

Run 2. Deflection panel identified by a red dot. R35 changed from 220K to 270K ohms.

Run 2B. R31 moved in position and changed to 2.7 megohms.

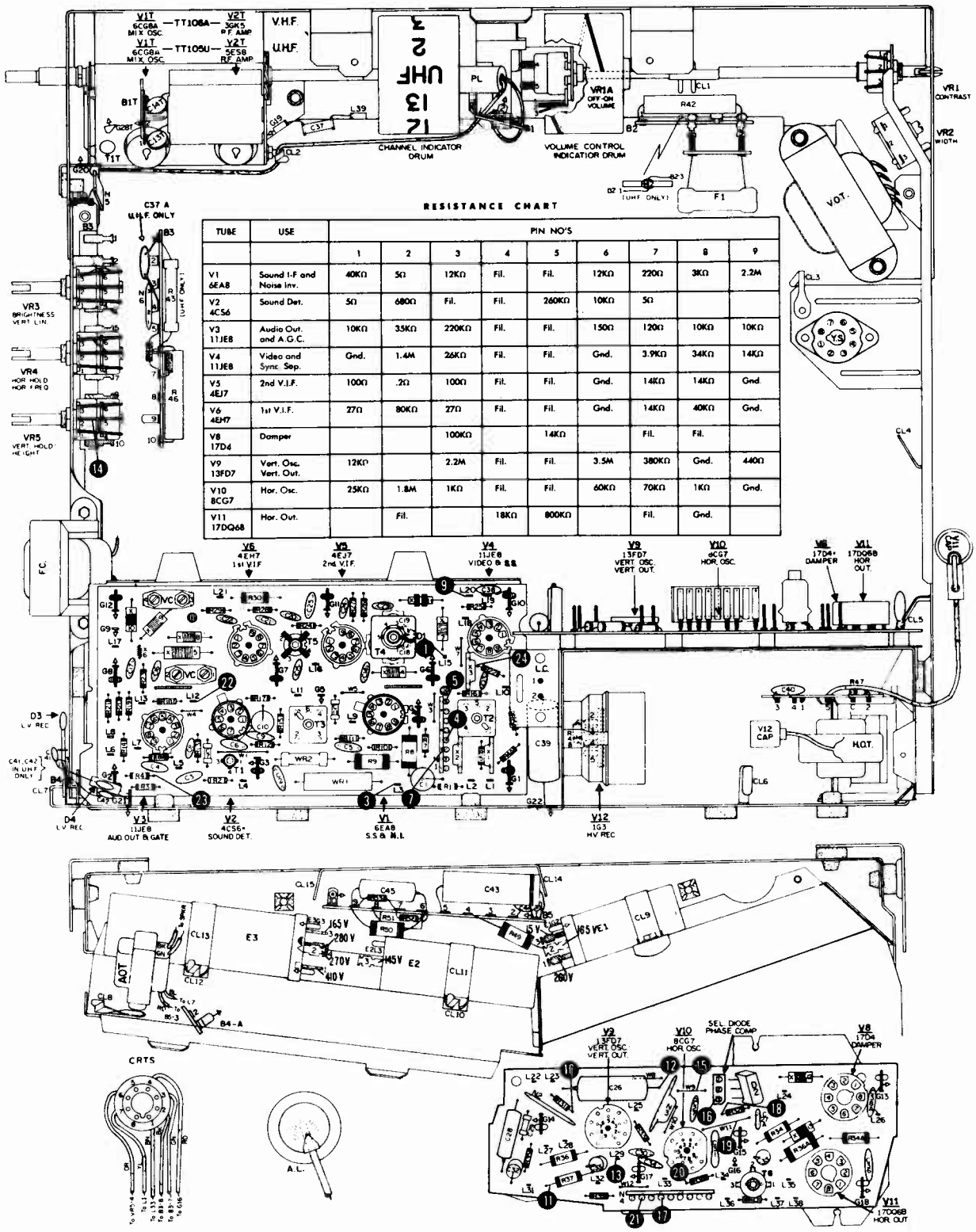
Run 3. Deflection panel shows an orange dot. R31 now 2.2 Meg. and back to original position.

Run 4. Deflection panel identified with a yellow dot. Different RC Network N4.

Run 5. Different VR5 control.

Run 6. VIFS panel changed from first production to Run 2, red dot, R25 to 33K ohms. Deflection panel of Run 6, blue dot, R32 from 1000 ohms to 820 ohms.

PHILCO Chassis 12J28, Service Information, Continued



TUBE	USE	PIN NO'S								
		1	2	3	4	5	6	7	8	9
V1 6EA8	Sound I-F and Noise Inv.	40KΩ	5Ω	12KΩ	Fil.	Fil.	12KΩ	220Ω	3KΩ	2.2M
V2 4CS6	Sound Det.	5Ω	680Ω	Fil.	Fil.	260KΩ	10KΩ	5Ω		
V3 11JE8	Audio Out. and A.G.C.	10KΩ	35KΩ	220KΩ	Fil.	Fil.	150Ω	120Ω	10KΩ	10KΩ
V4 11JE8	Video and Sync. Sep.	Gnd.	1.4M	26KΩ	Fil.	Fil.	Gnd.	3.9KΩ	34KΩ	14KΩ
V5 4EJ7	2nd V.I.F.	100Ω	.2Ω	100Ω	Fil.	Fil.	Gnd.	14KΩ	14KΩ	Gnd.
V6 4EH7	1st V.I.F.	27Ω	80KΩ	27Ω	Fil.	Fil.	Gnd.	14KΩ	40KΩ	Gnd.
V8 17D4	Damper			100KΩ		14KΩ		Fil.	Fil.	
V9 13FD7	Vert. Osc. Vert. Out.	12KΩ		2.2M	Fil.	Fil.	3.5M	380KΩ	Gnd.	440Ω
V10 8CG7	Hor. Osc.	25KΩ	1.8M	1KΩ	Fil.	Fil.	60KΩ	70KΩ	1KΩ	Gnd.
V11 17DQ68	Hor. Out.		Fil.		18KΩ	800KΩ		Fil.	Gnd.	

COMPONENT PLACEMENT, 12J28 CHASSIS

PHILCO

"K" - LINE TELEVISION MODELS

MODEL CHASSIS CROSS REFERENCE

MODEL	CHASSIS FOR VHF MODEL	CHASSIS FOR VHF/UHF MODEL	VHF TUNER	UHF ADAPTABLE VHF TUNER	ALL CHANNEL UHF TUNER	CRT TYPE	REMOTE CONTROL
K3726 RBE	12N52	12N52		76-12480-1 (TT78A)	UHF Strip Insert	19BLP4	RC-21
K3728 RWH	12N52	12N52		76-12480-1 (TT78A)	UHF Strip Insert	19BLP4	RC-65
K4330 EB, MR	12N50A	12N50AU	76-12380-1 (TT140)	76-12381-1 (TT144)	76-12343-3 (TT134)	23BVP4	
K4331 MR	12N50A	12N50AU	76-12380-1 (TT140)	76-12381-1 (TT144)	76-12343-3 (TT134)	23BVP4	
K4332 MR, WA, BL	12N50A	12N50AU	76-12380-2 (TT140A)	76-12381-2 (TT144A)	76-12343-3 (TT134)	23BVP4	
K4333 MR	12N50A	12N50AU	76-12380-2 (TT140A)	76-12381-2 (TT144A)	76-12343-2 (TT132)	23BVP4	
K4335 EB	12N50A	12N50AU	76-12380-1 (TT140)	76-12381-5 (TT144F)	76-12343-3 (TT134)	23BVP4	
K4336 MR, WA, BL	12N50A	12N50AU	76-12380-2 (TT140A)	76-12381-2 (TT144A)	76-12343-3 (TT134)	23BVP4	
K4831 MR	12N50A	12N50AU	76-12380-2 (TT140A)	76-12381-1 (TT144)	76-12343-3 (TT134)	23BVP4	
K4832 MR	12N50A	12N50AU	76-12380-2 (TT140A)	76-12381-2 (TT144A)	76-12343-3 (TT134)	23BVP4	
K4840 MR, BL, WA	12N50	12N50U	76-12380-1 (TT140)	76-12381-3 (TT144X)	76-12343-2 (TT132)	23BVP4	
K4841 MR, WA, BL	12N50	12N50U	76-12380-1 (TT140)	76-12381-3 (TT144X)	76-12343-2 (TT132)	23BVP4	
K4842 MR, WA, BL, CH	12N51A	12N51AU	76-12380-1 (TT140)	76-12381-1 (TT144)	76-12343-2 (TT132)	23BNP4	
K4844 MB, WA	12N51A	12N51AU	76-12380-1 (TT140)	76-12381-1 (TT144)	76-12343-2 (TT132)	23BNP4	
K4844 XBL, XMR, XWA	12N51A	12N51AU	76-12380-1 (TT140)	76-12381-1 (TT144)	76-12343-2 (TT132)	23BNP4	
K4846 SMB, SBL	12N51A	12N51AU	76-12380-1 (TT140)	76-12381-1 (TT144)	76-12343-2 (TT132)	23BNP4	
K4847 CH, DW	12N51X	12N51XU	76-12380-1 (TT140)	76-12381-3 (TT144X)	76-12343-1 (TT133)	23BNP4	
K4848 CH, MR	12N51A	12N51AU	76-12380-1 (TT140)	76-12381-1 (TT144)	76-12343-2 (TT132)	23BNP4	
K4849 SCH, SMR, SWA	12N51X	12N51XU	76-12380-1 (TT140)	76-12381-3 (TT144X)	76-12343-1 (TT133)	23BNP4	
K4850 WB, BL, WA	12N53	12N53U	76-12480-2 (TT78B)	76-12480-3 (TT79B)	76-12343-1 (TT133)	23BNP4	RC-65 Adapt (VHF)
K4852 WA	12N54	12N54	76-12480-4 (TT78C)	76-12480-5 (TT79C)	76-12031-2 (T28M)	23BNP4	RC-65 Adapt (VHF)
K4854 WA, MA, MB, MR	12N53	12N53U	76-12480-2 (TT78B)	76-12480-3 (TT79B)	76-12343-1 (TT133)	23BNP4	RC-65 Adapt (VHF)
K4857 WA	12N50A	12N50AU	76-12380-2 (TT140A)	76-12381-2 (TT144A)	76-12343-3 (TT134)	23BVP4	
K4864 EB, MA, WB, WA	12N54	12N54U	76-12480-4 (TT78C)	76-12480-5 (TT79C)	76-12031-2 (T28M)	23BNP4	RC-65 Adapt (VHF)
K4908 MR, WA, HMR, HWA	12N50A	12N50AU	76-12380-1 (TT140)	76-12480-3 (TT79B)	76-12343-3 (TT134)	23BVP4	
K4910 MR, WA, HMR, HWA, HMC	12N53	12N53U	76-12480-3 (TT78B)	76-12480-3 (TT79B)	76-12343-1 (TT133)	23BNP4	

For Chassis 12N51A, -AU, -X, -XU, see similar material for 12N51, -U, in Volume TV-19, the Early 1962 Television Service Manual, pages 121 through 124. Service material on "K" Line sets continued through pages 106-114. Additional models released at a later date listed in the cross reference chart on page 106, over.

PHILCO "K" Line, 12N50 Series, Service Information, Continued

Addition to "K"-Line Model-Chassis Cross Reference

MODEL	CHASSIS FOR VHF MODEL	CHASSIS FOR VHF/UHF MODEL	VHF TUNER	UHF ADAPTABLE VHF TUNER	ALL CHANNEL UHF TUNER	CRT TYPE
K3732 BE, BW PW	12N51	12N51U	TT140 76-12380-1	TT144 76-12381-1	TT132 76-12343-2	19BLP4
K3733 GD, SL	12N51	12N51U	TT140 76-12380-1	TT144 76-12381-1	TT132 76-12343-2	19BLP4
K3734 DL, WG, WA	12N51	12N51U	TT140 76-12380-1	TT144 76-12381-1	TT132 76-12343-2	19BLP4
K4335 MR, WA	12N50A	12N50AU	TT140 76-12380-1	TT144F 76-12381-5	TT134 76-12343-3	23BVP4
K4336 XMR	12N50A	12N50AU	TT140A 76-12380-2	TT144A 76-12381-2	TT134 76-12343-3	23BVP4
K4829 MR	12N50A	12N50AU	TT140B 76-12380-3	TT144G 76-12381-7	TT132 76-12343-2	23BVP4
K4831 WA	12N50A	12N50AU	TT140A 76-12380-2	TT144A 76-12381-2	TT134 76-12343-3	23BVP4
K4832 WA, VMR, VWA	12N50A	12N50AU	TT140A 76-12380-2	TT144A 76-12381-2	TT134 76-12343-3	23BVP4
K4833 MC, MR,	12N50A	12N50AU	TT140A 76-12380-2	TT144A 76-12381-2	TT134 76-12343-3	23BVP4
K4834 SBL, SMR, SWA	12N50A	12N50AU	TT140A 76-12380-2	TT144A 76-12381-2	TT134 76-12343-3	23BVP4
K4835 MR, WA	12N50A	12N50AU	TT140A 76-12380-2	TT144A 76-12381-2	TT134 76-12343-3	23BVP4
K4837 SBL, SMR, SWA	12N50A	12N50AU	TT140A 76-12380-2	TT144A 76-12381-2	TT134 76-12343-3	23BVP4
K4843 CH, FP, MB, WA	12N51X	12N51XU	TT140 76-12380-1	TT144X 76-12381-3	TT132 76-12343-2	23BNP4
K4845 MB, ML, WA	12N51X	12N51XU	TT140 76-12380-1	TT144X 76-12381-3	TT132 76-12343-2	23BNP4
K4846 JSBL, JSMB, JSWA	12N51X	12N51XU	TT140 76-12380-1	TT144X 76-12381-3	TT132 76-12343-2	23BNP4
K4847 WH	12N51X	12N51XU	TT140 76-12380-1	TT144X 76-12381-3	TT133 76-12343-1	23BNP4
K4848 JCH, JMB	12N51X	12N51XU	TT140 76-12380-1	TT144X 76-12381-3	TT132 76-12343-2	23BNP4
K4849 JSCH, JSMB, JSWA	12N51X	12N51XU	TT140 76-12380-1	TT144X 76-12381-3	TT133 76-12343-1	23BNP4
K4850 JBL, JMB, JWA	12N53	12N53U	TT78B 76-12480-2	TT79B 76-12480-3	TT133 76-12343-1	23BNP4
K4853 MR	12N50	12N50U	TT140 76-12380-1	TT144F 76-12381-5	TT134 76-12343-3	23BVP4
K4854 ML	12N53	12N53U	TT78B 76-12480-2	TT79B 76-12480-3	TT133 76-12343-1	23BNP4
K4857 MB	12N50A	12N50AU	TT140A 76-12380-2	TT144A 76-12381-2	TT134 76-12343-3	23BVP4
K4864 FP	12N54	12N54U	TT78C 76-12480-4	TT79C 76-12480-5	T28M 76-12031-2	23BNP4

CABINET COLORS: (Last two letters following model number)
BE = BEIGE, BL = BLONDE, BW = BLUE & WHITE, CH = CHERRY, DL = DARK BROWN LEATHER, FP = FRENCH PROVINCIAL, GD = GOLD, MB = MAHOGANY BROWN, MC = MAHOGANY CHERRY, ML = MAHOGANY LIGHT, MR = MAHOGANY RED, PW = PINK & WHITE, SL = SILVER, WA = WALNUT, WG = WHITE GOLD, WH = WHITE
NOTE: J = JANUARY LINE, S = SWIVEL, X and V = SALES DESIGNATION

NOISE CONTROL SETUP (VR2)

The "Noise Control," VR2, 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 the 18,000 ohm resistor.

CHECKING THE HORIZONTAL PHASE COMPARER SELENIUM DIODE (D1 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 connected in reverse polarity to the diode) should be a minimum of 2 megohms. The center of the phase comparer unit is the common negative.

PHILCO "K" Line, 12N50 Series, Service Information, Continued

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 C33, place jumper between lugs L37 and L40 (C37, L44 and L45 in 12N53-54).
2. Set the horizontal hold control, VR6, to the center of its range (VR7 in 12N53-54).
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 C33 and adjust the ringing coil T6 core for stable picture sync.

SOUND TAKE-OFF AND INTERSTAGE ALIGNMENT

To align the circuits in T7 and T5 it is necessary to use the sound test point L27 for output indication. This test point is grounded and no RC network is on the panel.

1. Remove the ground and add an RC network to ground. The network consists of a 15K ohm resistor and a 150 μμf capacitor in parallel.
2. Connect V.T.V.M. to RC network. A TV station signal may be used for alignment if the 4.5 mc. signal level can be reduced below the limiting level. This can be done by tuning the tuner local-oscillator all the way into smear and turning down the contrast. Reducing the antenna input until the picture is slightly snowy should also reduce the 4.5 mc. signal level.
3. Adjust the upper core of T7 and both cores of T5 for maximum meter reading. With 4.5 mc. level, set for −3V meter reading, turn lower core of T5 clockwise to drop meter reading to −2V. Turn upper core of T5 counterclockwise to drop meter reading to −1V. This should be approximately ¼ turn.

QUADRATURE CIRCUIT ALIGNMENT

The quadrature circuit should be aligned on a strcng signal with sound test point L27 grounded. If some settings of fine tuning and contrast give buzz in the sound, these two controls should be set for minimum buzz during alignment.

Start with core at top of coil form. Turn core in to peak audio output.

NOTE: Further turning in of core will give another audio peak, but output will be down. This peak is incorrect.

CRITICAL LEAD DRESS

A. *To Prevent Corona:*

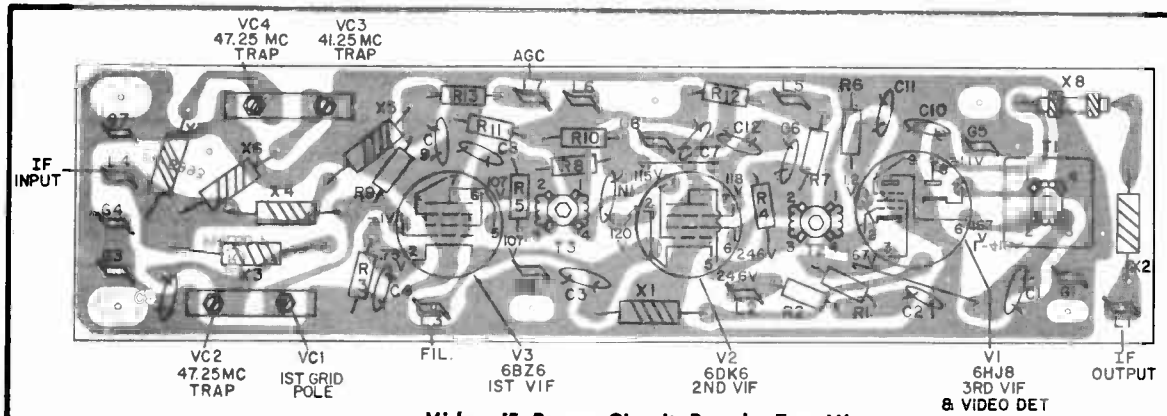
1. V-14 socket must be free of solder points and sharp wire ends.
2. Lead from V-14 cap must be at least ¾" from any metal of H.V. Cage.
3. Filament leads from H.O.T. to V-14 must have slack (if any) dress down toward base away from glass bulb of 1G3 tube.
4. All leads from H.O.T. coil to Y.S. must be free of each other and dress away from any metal parts.
5. Lead from V-13 cap must be dressed at least ½" away from H.O.T. winding.
6. Leads from Y.S. 3 and 6 and brown damper lead must be dressed under lugs CL17, CL18 and CL20 away from winding of H.O.T.
7. Leads from lugs 3, 4, and 5 on H.O.T. panel must dress under CL19 and away from winding of H.O.T.
8. All leads must be dressed clear of L52 and V12-3.
9. Leads from V-13 and V-14 caps must be at least ½" apart.

B. *To Prevent Pinched Leads:*

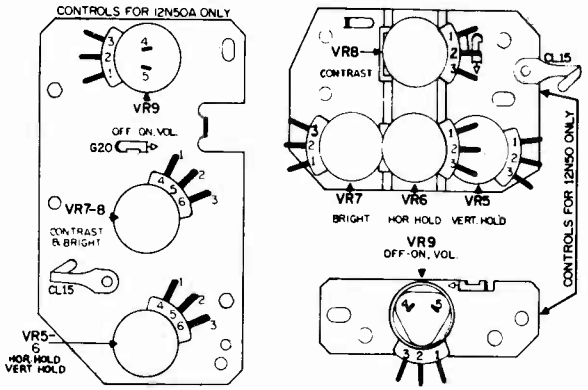
1. Leads from L1, L2, L3, L5, and L7 must dress thru nearest cutouts provided in I-F shield.
2. All leads from H.O.T. must be dressed thru cutouts provided in H.V. Cage.
3. All leads in region between I-F panel and H.V. Cage must dress between F.C. and I-F panel under dress lugs CL3 and CL4.
4. All leads from secondary controls, on-off volume and contrast control must dress thru CL12 except leads from on-off switch which should be twisted together and taped to volume control cable just before it goes thru CL12. All other leads must dress under CL7, CL6, CL5, CL2, and CL1 to respective wiring points.
5. Leads from L5 and L7 must dress thru slots C and D to clear foot of I-F shield.
6. Anode lead must dress thru cutout in cage with all slack pulled outside cage.

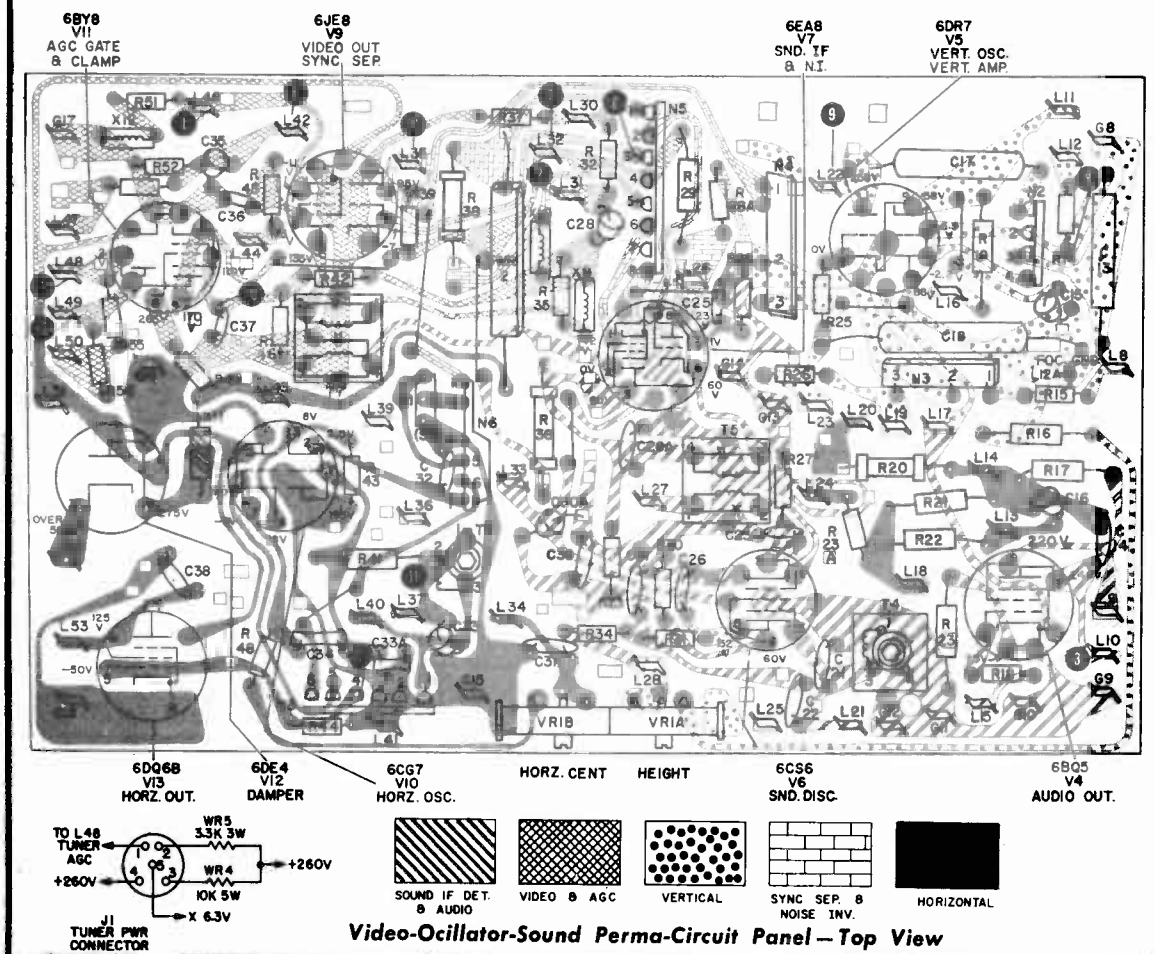
C. *To Prevent Lead Burning and 4.5 Beat:*

1. All leads must be dressed away from hot resistor WR2, WR3, WR4, WR5, R1, and R59. R62, WR3, WR4, and WR5 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 WR2, R17, R20, R21, R22, R29, WR1A, R38, and R47.
3. Leads to L34, and L36 must dress between VOS panel and B1, T7, and L43 to wiring points.
4. All CRTS leads should dress thru slots "B" and "A" under CL1 to wiring points.
5. Leads to L14 must dress between L8 and C13.
6. Lead from E2-1 to L43 should dress down on VOS panel away from R47.
7. Brown lead from Y.S. #3 must dress along front edge of chassis under CL7, CL6, CL5, and CL2 to L13.
8. Lead to L26 must not touch R29.
9. Fuse F2 must be dressed above all wires and B1.
10. WR2 must have crimped leads and body must not touch VOS panel.



Video IF Perma-Circuit Panel — Top View





Video-Ocillator-Sound Perma-Circuit Panel — Top View

PANEL LUG CONNECTIONS

VIF PANEL

L1 Lead to L46 VOS panel
L2 Lead B4-7
L3 Lead to L51
L4 I-F output
L5 Lead to Electrolytic Capacitor E2-2
L6 N/C
L7 Lead to L42 VOS panel

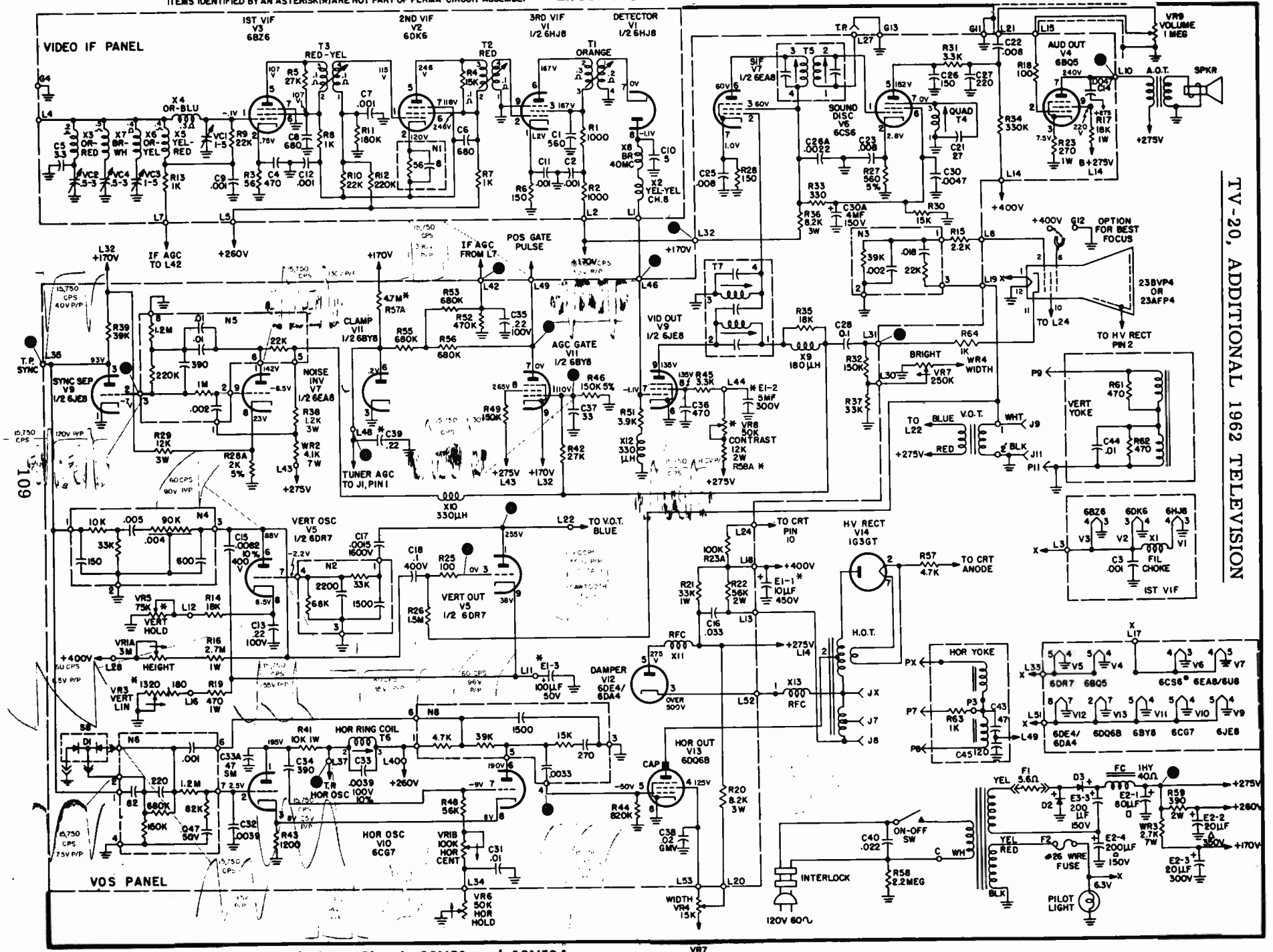
VOS PANEL

L8 Lead to grid of CRT, Pin 6
L9 N/C
L10 Lead to A.O.T.
L11 Lead to Electrolytic Capacitor E1-3
L12 Lead to VR5, vertical hold
L12A Focus ground
L13 Lead to J8, horizontal yoke
L14 Lead to A.O.T.
L15 Lead to VR9, volume control
L16 Lead to VR3, vertical lin. control
L17 Lead to B1-9 and CRT fil., pin 12
L18 Lead to Electrolytic Capacitor E1-1
L19 Lead to V.O.T., Lead to J9 of vertical hold
L20 Lead to width control, VR4
L21 Lead to VR9, volume control
L22 Blue lead to V.O.T.
L23 N/C
L24 Leads to grid of CRT, Pin 6 & 10
L25 N/C
L26 N/C
L27 Lead to G13
L28 Lead to Electrolytic Capacitor E1-1
L30 Lead to VR7, brightness control
L31 Lead to CRT cathode
L32 Lead to E2-3 VIF panel
L33 Lead to B1-9
L34 Lead to VR6, horizontal hold control
L35 N/C, test point
L36 N/C
L37 N/C, test point, horizontal osc. coil
L39 N/C
L40 Lead to Electrolytic Capacitor E2-2
L41 N/C
L42 Lead to L7, VIF panel
L43 Lead to B4-4
L44 N/C
L46 Lead to L1 VIF panel
L47 Lead to B1-5
L48 Lead to B4, tuner AGC
L49 Lead to horizontal yoke
L51 Lead to B1-9
L52 Lead to Pin 1 of H.O.T.
L53 Lead to width control

12N50 & 12N50A CHASSIS

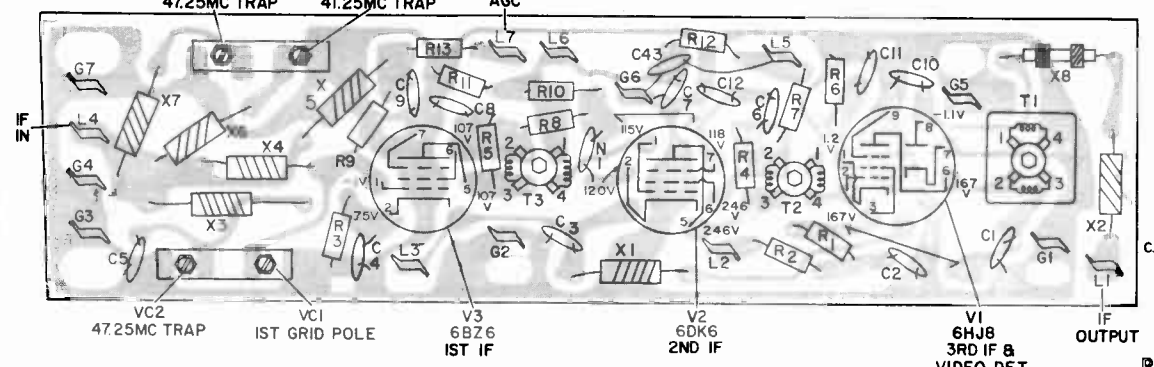
12N50 & 12N50A CHASSIS SCHEMATIC DIAGRAM

NOTE:
ITEMS IDENTIFIED BY AN ASTERISK(*) ARE NOT PART OF PERMA-CIRCUIT ASSEMBLY

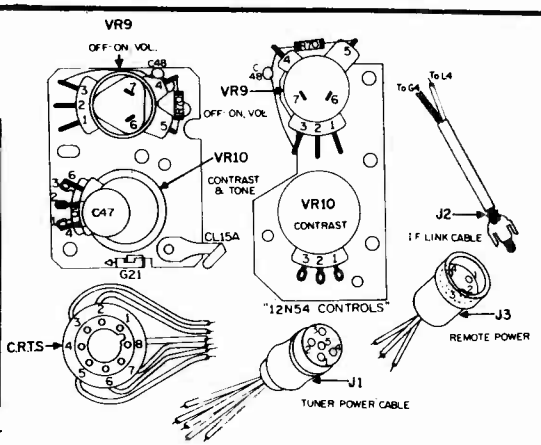


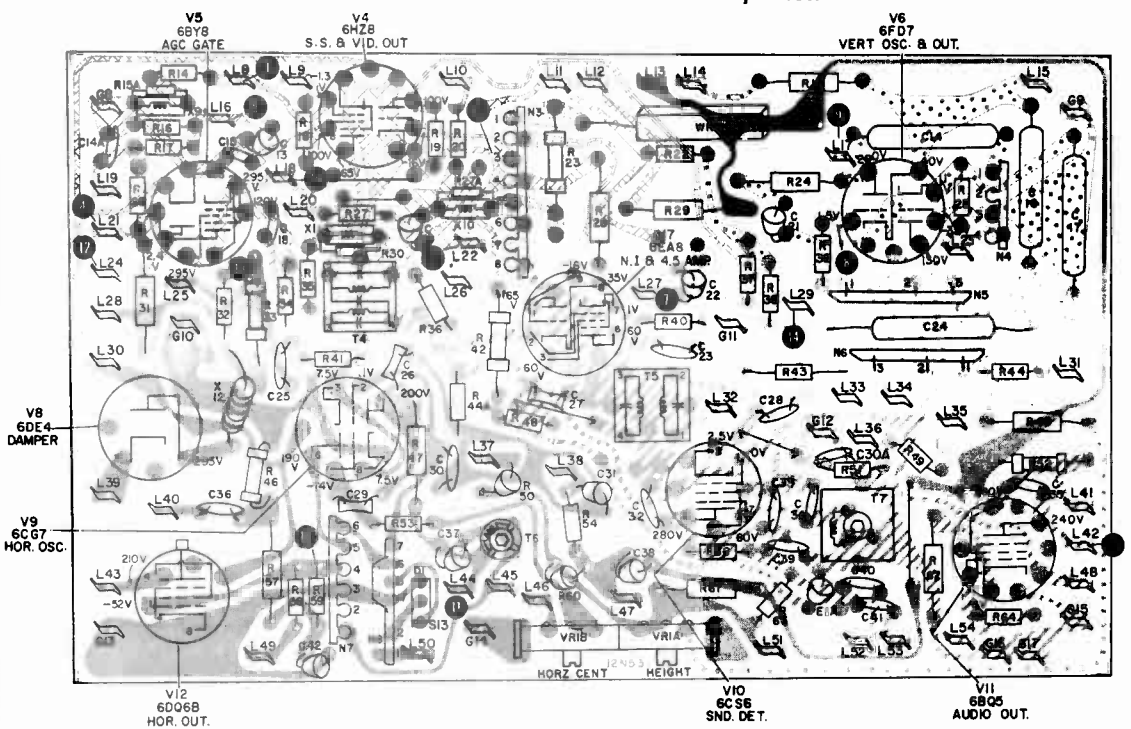
Schematic Diagram — Television Chassis 12N50 and 12N50A

PHILCO 12N53 & 12N54 CHASSIS



Video IF Perma-Circuit Panel — Top View





Video-Oscillator-Sound Perma-Circuit Panel — Top View

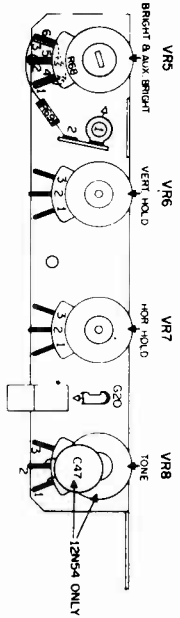
PANEL LUG CONNECTIONS

VIF PANEL

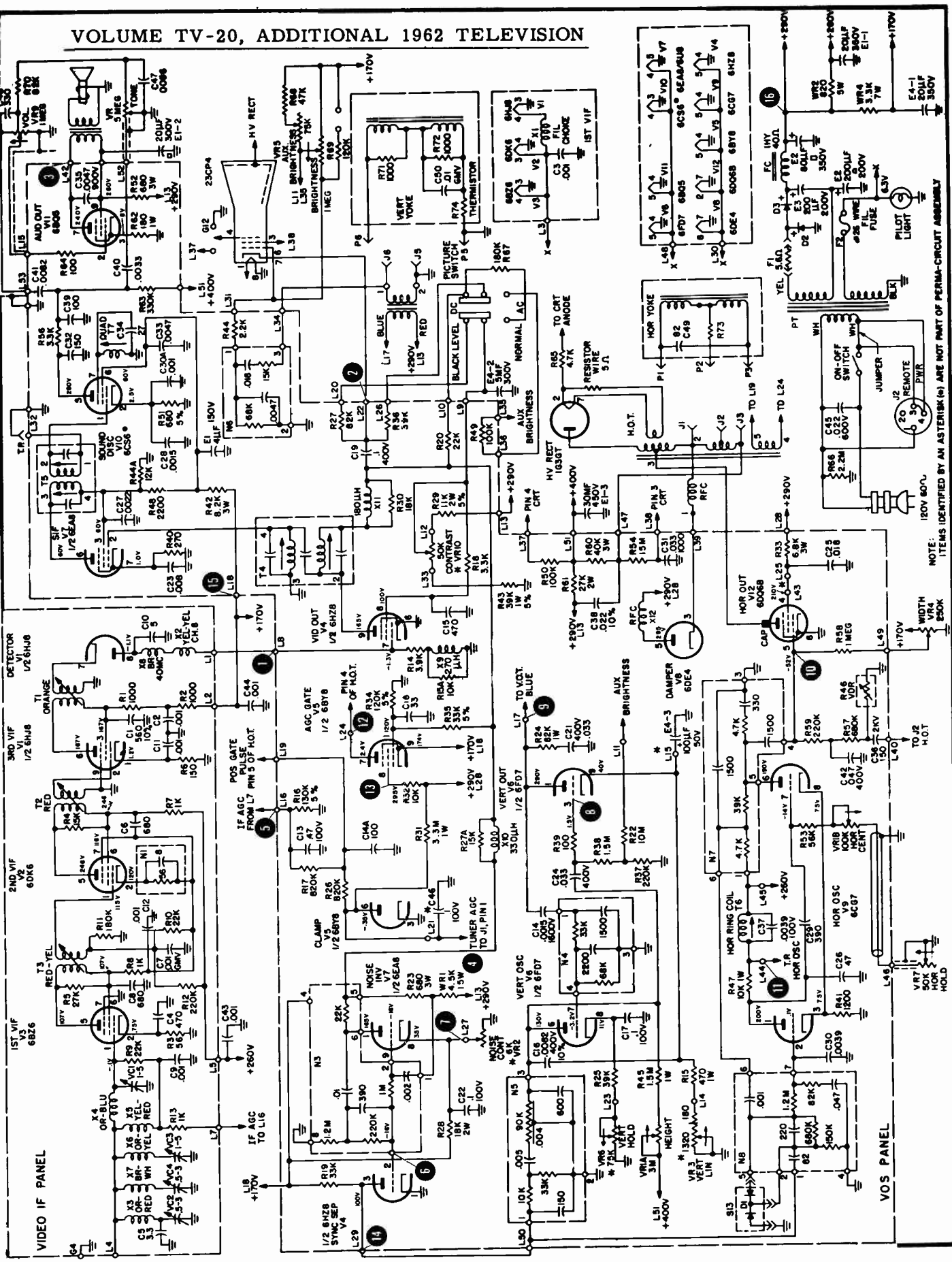
L1 Lead to L8
L2 Lead to B4-1
L3 Lead to L30
L4 Lead to I-F Input
L5 Lead to B4-7
L6 N/C
L7 Lead to L16

VOS PANEL

L9 Lead to Pin 2 of SW1 and center tap of VR10
L10 Lead to Pin 6 of SW1
L11 Lead to aux. brightness
L12 Lead to contrast, top of VR10
L13 Red lead of V.O.T.
L14 Lead to Vertical Lin. Control
L15 Lead to E4-3
L16 Lead to L7
L17 Blue lead to V.O.T.
L18 Lead to B4-1 & L2
L19 Lead to Pin 5 of H.O.T.
L20 Lead to Pin 3 of SW1
L21 Lead to B1-6
L22 Lead to Pin 7 of CRT
L23 Lead to Vertical Hold Control
L24 Lead to Pin 4 of H.O.T.
L25 Lead to L43
L26 Lead to Pin 5 of SW1
L27 Lead to Center Tap of VR2
L28 Lead to B4-4
L29 Lead to L50
L30 Lead to B1-9
L31 Lead to Pin 6 of CRT & VR5
L32 Lead to G12 (Test Point)
L33 Lead to Contrast Top VR10
L34 Lead to Secondary of V.O.T.
L35 Lead to L11
L36 Lead to Pin 4 of SW1
L37 Lead to Pin 4 of CRT
L38 Lead to Pin 3 of CRT
L39 Lead to Pin 1 of H.O.T.
L40 Lead to H.O.T.
L41 Lead to audio output transformer
L42 Lead to audio output transformer
L43 Lead to L25
L44 N/C — Horizontal Test Point
L45 Lead to B4-7
L46 Lead to Horizontal Hold Control
L47 Lead to J3 of H.O.T.
L48 Lead to Pin 1 of CRT
L49 Lead to Center Tap of Width Control VR4
L50 Lead to L29
L51 Lead to E1-3
L52 Lead to Tone Control Top VR10
L53 Lead to Volume Control Top VR9
L54 Lead to Volume Control Center VR9
L56 Lead to L32



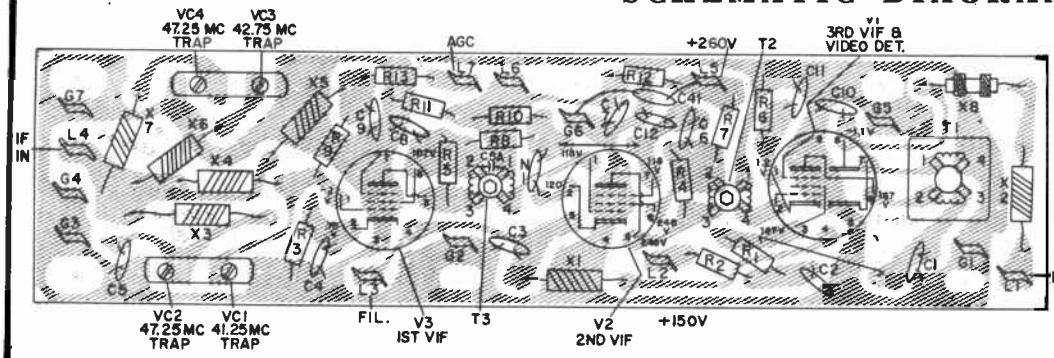
12N53 & 12N54 CHASSIS SCHEMATIC DIAGRAM



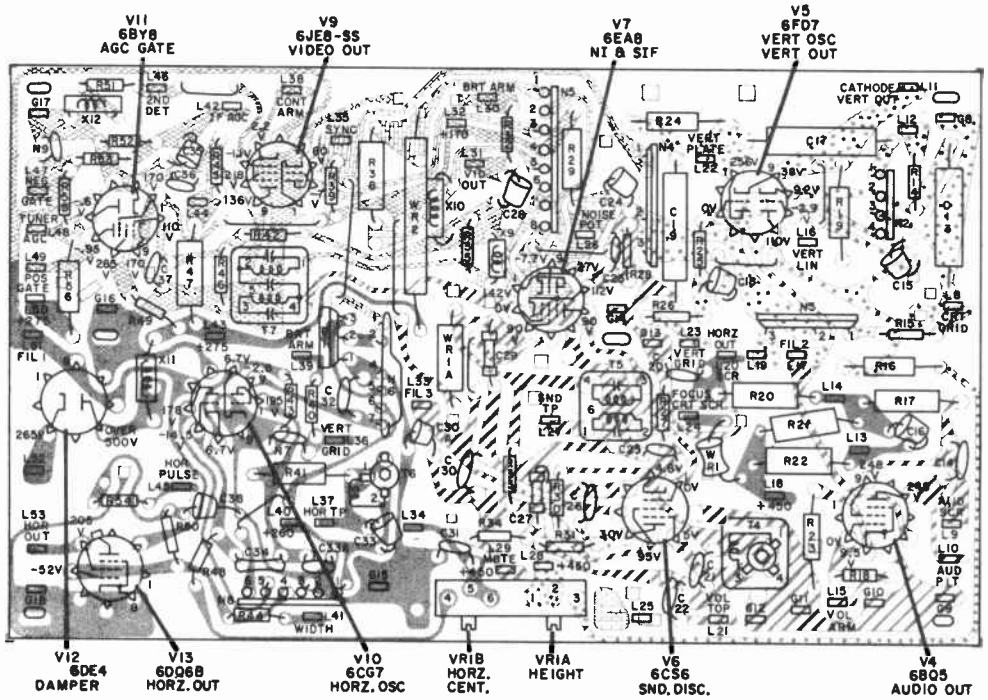
Schematic Diagram — Television Chassis 12N53 and 12N54

PHILCO

12N52 CHASSIS SCHEMATIC DIAGRAM



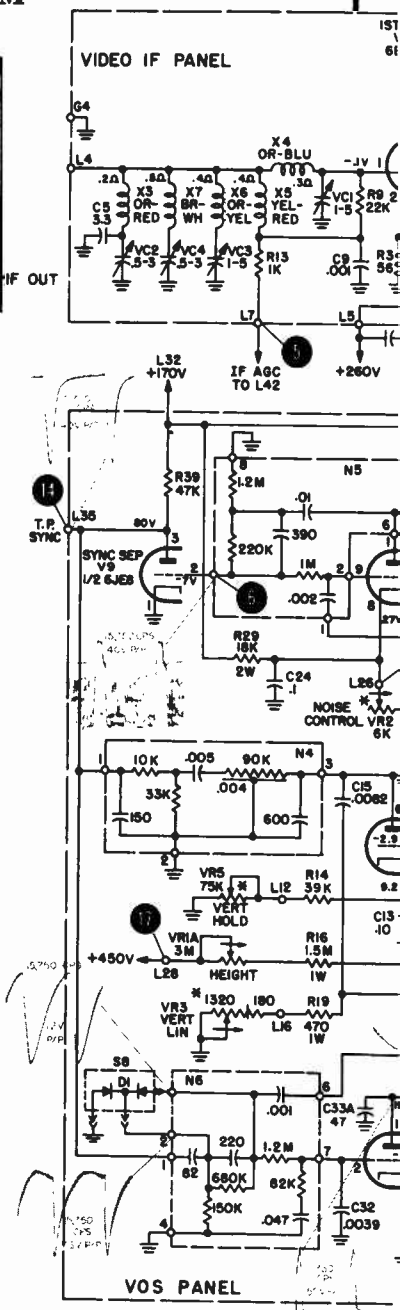
Video IF Perma-Circuit Panel — Top View



LEGEND FOR PERMA-CIRCUIT PANELS

- HORIZONTAL CIRCUITS
- VERTICAL CIRCUITS
- VIDEO AND AGC CIRCUITS
- SOUND IF DETECTOR AND AUDIO CIRCUITS
- SYNC SEPARATOR AND NOISE INVERTER CIRCUITS

Video-Oscillator-Sound Perma-Circuit Panel — Top View



PANEL LUG CONNECTIONS

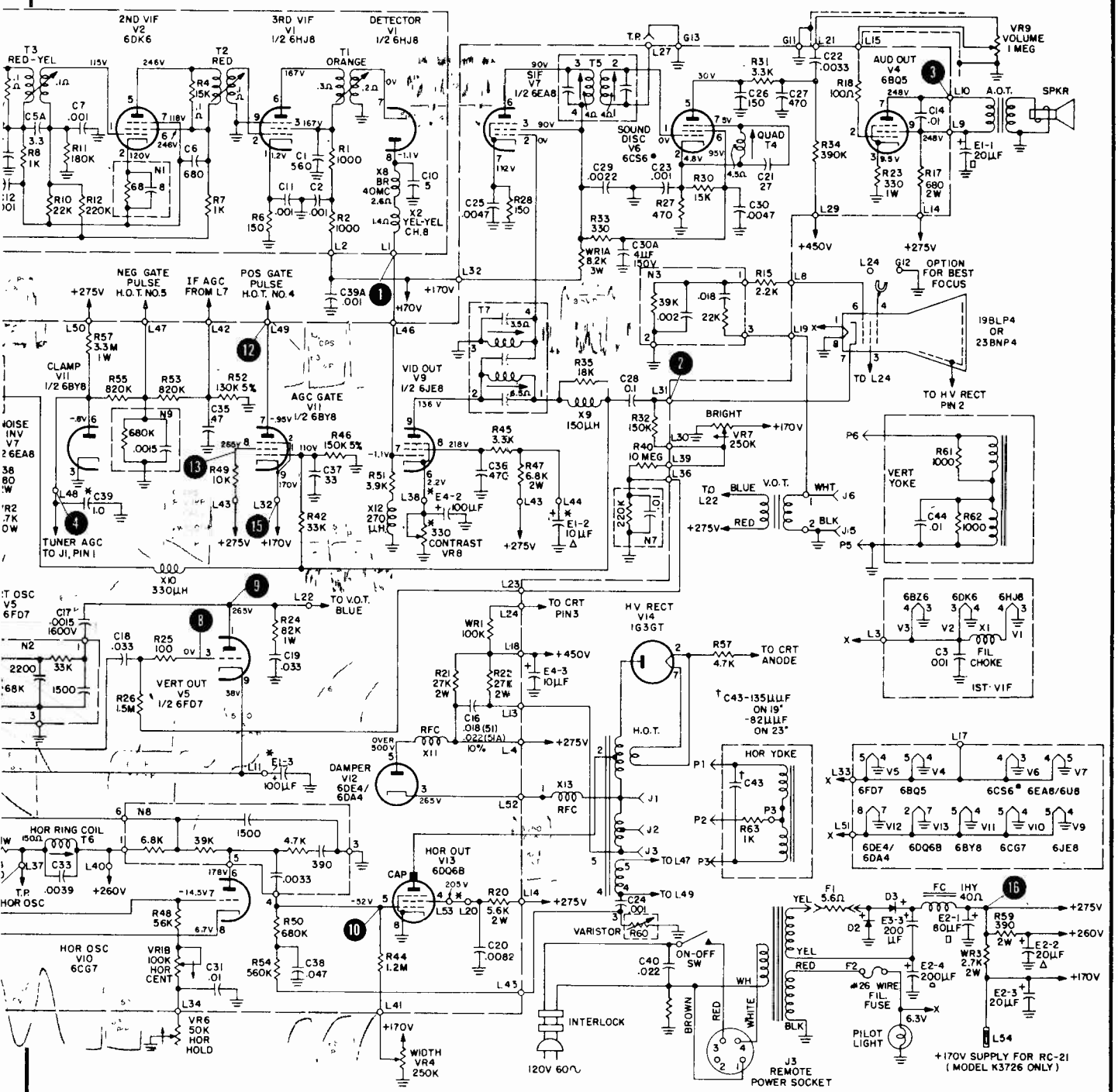
VIF PANEL

- L1 Lead to L46 VOS Panel
- L2 Lead to L32 VOS Panel
- L3 Lead to L51
- L4 I-F Output
- L5 Lead to Electrolytic Capacitor E2-2
- L6 B+ 140 volts
- L7 Lead to L42 VOS Panel

VOS PANEL

- L8 Lead to grid of CRT, pin 6
- L9 Lead to A.O.T.
- L10 Lead to A.O.T.
- L11 Lead to Electrolytic Capacitor E1-3
- L12 Lead to VR5, vertical hold
- L13 Lead to P8, horizontal yoke
- L14 Lead to L48
- L15 Lead to VR9, volume control
- L16 Lead to VR3, vertical lin. control
- L17 Lead to B1-9
- L18 Lead to Electrolytic Capacitor E4-3
- L19 Lead to V.O.T., Lead to P9 of vertical yoke
- L20 Lead to L53
- L21 Lead to VR9, volume control
- L22 Blue lead to V.O.T.
- L23 Lead to L36
- L24 Lead to grid of CRT, pin 3
- L25 N/C
- L26 Lead to VR2, noise control
- L27 Lead to G13
- L28 Lead to E4-3
- L29 Lead to L28, E4-3
- L30 Lead to VR7, brightness control
- L31 Lead to CRT cathode, pin 7
- L32 Lead to L2 I-F panel
- L33 Lead to B1-9
- L34 Lead to VR6, horizontal hold control
- L35 N/C, test point
- L36 Lead to L23
- L37 N/C, test point
- L38 Lead to E4-2, lead to VR8 contrast control
- L39 Lead to E1-2
- L40 Lead to B4-7
- L41 Lead to VR4, width control
- L42 Lead to L7 I-F panel
- L43 Lead to L14
- L44 Lead to E1-2
- L45 Lead to pin 3 of H.O.T.
- L46 Lead to L1 I-F panel
- L47 Lead to pin 5 of H.O.T.
- L48 Lead to B4-4
- L49 Lead to P4 of H.O.T.
- L50 Lead to B+ 275 volts
- L51 Lead to B1-9
- L52 Lead to pin 1 H.O.T.
- L53 Lead to L20

PHILCO Chassis 12N52 Schematic Diagram, Continued



Schematic Diagram — Television Chassis 12N52

NOTE:
ITEMS IDENTIFIED BY AN ASTERISK(*) ARE NOT PART OF PERMA-CIRCUIT ASSEMBLY

RESISTANCE CHART

TUBE	USE	PIN NUMBERS 1	2	3	4	5	6	7	8	9
V1 6HJ8	Det. 3rd I-F	150Ω	.1Ω	10K	Fil.	Fil.	10K	.1Ω	3.9Ω	Gnd.
V2 6DK6	2nd I-F	95K	115K	Fil	Fil.	15K	15K	120K		
V3 6BZ6	1st I-F	68K	56Ω	Fil.	Fil.	110K	110K	Gnd.		
V4 6HZ8	SS and Vid. Out.	Gnd.	1.2M	20K	Fil.	Fil.	Gnd.	3.9K	28K	15K
V5 6BY8	AGC Gate, Clamp	30Ω	8K	Gnd.	Fil.	Fil.	1M	350K	18K	8K
V6 6FD7	Vert. Osc. Vert. Out.	10K			1.6M	Fil.	Fil.	3M	68K	73K	1.25K
V7 6EA8	NI and SIF	35K	5Ω		10K	Fil.	Fil.	10K	150Ω	3.8K	2.1M
V8 6DE4	Damper				75K		12K		Fil.	Fil.	
V9 6CG7	Horz. Osc.	12K	1.6M		1.2K	Fil.	Fil.	12K	12K	1.2K	Gnd.
V10 6CS6	Snd. Det.	3Ω	560Ω		Fil.	Fil.	380K	10K	3Ω		
V11 6BQ5	Audio Out.				180Ω	Fil.	Fil		12K		12K
V12 6DQ6B	Horz. Out.		Fil.			18K	850K		Fil.	Gnd.	

PHILCO "K" Line, 12N50 Series, Production Run Changes, Continued

PRODUCTION RUN CHANGE INFORMATION 12N50 CHASSIS, 12N50A CHASSIS

Run 1 First production

Run 2 The VOS panel was changed from Run 1 to Run 2 (red dot) Run 2 VOS panel

Transformer T5 was changed from part no. 32-4745-2 to part no. 32-4745-4

Reason: To improve sound sensitivity

Run 3 The VOS panel was changed from Run 2 to Run 3 (orange dot) Run 3 VOS panel

Capacitor C38 was changed from .02mf to .01mf part no. 30-1262-53

Reason: To reduce drive lines

Run 4 The VOS panel was changed from Run 3 to Run 4 (yellow dot)

Resistor R57A was changed from 4.7 meg to 5.6 meg, part no. 66-5568340

Reason: To improve interference rejection

Resistor R19 was changed from 470 ohms to 560 ohms part no. 66-1564350

Reason: To center vertical linearity control

PRODUCTION RUN CHANGE INFORMATION 12N51 CHASSIS

Run 1 First production

Run 2 The VOS panel was changed from a Run 1 to Run 2 (red dot)

Run 2 VOS panel

Resistor R44 was changed from 1.2 meg to 1.8 meg, part no. 66-5188340

Reason: To improve width

Run 3 The VOS panel was changed from Run 2 to Run 3 (orange dot)

Run 3 VOS panel

Resistor R20 was mounted in a vertical position

Reason: To minimize heat

Run 4 A capacitor C39A was added from lug L2 to terminal board B2-1. This is a .001 mf capacitor, part no. 30-1238-37

Reason: To improve interference rejection

Run 5 A four inch piece of vynal tape was added to the cap of the 1G3 high voltage rectifier tube

Reason: To prevent carona

Run 6 The VOS panel was changed from Run 3 to Run 4 (yellow dot)

Run 4 VOS panel

Resistor R52 was changed from 130K ohms to 100K ohms, part no. 66-4108250

Reason: To improve interference rejection

PRODUCTION RUN CHANGE INFORMATION 12N51A CHASSIS

Run 1 First production

Run 2 Same as Run 3 of 12N51 chassis

Run 3 Same as Run 5 of 12N51 chassis

Run 4 Same as Run 6 of 12N51 chassis

PRODUCTION RUN CHANGE INFORMATION 12N51X CHASSIS

Run 1 First production

Run 2 Same as Run 5 of 12N51 chassis

Run 3 Same as Run 6 of 12N51 chassis

PRODUCTION RUN CHANGE INFORMATION 12N52 CHASSIS

Run 1 First production, same as first production of the 12N51 chassis with the exception that the tuner employed is type TT-78A, part no. 76-12480-1, and facilities for installation of the RC-21 or RC-65 remote control units.

Run 2 Same as Run 5 of 12N51 chassis

Run 3 Same as Run 6 of 12N51 chassis

PRODUCTION RUN CHANGE INFORMATION 12N53 CHASSIS, 12N54 CHASSIS

Run 1 First production

Run 2 Resistor R69A, 180K ohms, part no. 66-4188340 has been added from lug 1 of control VR7 to lug 3 of the same control.

Reason: To improve horizontal hold range

Run 3 A four inch piece of vynal tape was added around the cap of the 1G3 high voltage rectifier tube

Reason: To prevent carona

Run 4 The VOS panel was changed from Run 1 to Run 2 (red dot)

Run 2 VOS panel

A resistor, 39K ohms, part no. 66-3398340, was added to the VOS panel (inserted in two new panel holes) across lugs L44 and L45

Reason: To improve sync performance

The VOS panel was changed from Run 2 to Run 3 (orange dot)

The Run 3 panel incorporates the following changes:

Resistor R63 was changed from 330K ohms to 270K ohms, part no. 66-4278350

Reason: To improve detector centering

Resistor R31 was changed from 3.3 meg to 3.9 meg, part no. 66-5398350

Reason: To improve AGC operation

RCA VICTOR Chassis KCS136 Series

MODEL AND CHASSIS REFERENCE—TV MODELS

MODEL	CABINET TYPE	CHASSIS	TUNER MOUNTING ASSEMBLY	TUNER	REMOTE CHASSIS	KINESCOPE
232-B-152MV, 5MV, 6MV & 7MV	Table	KCS136A	TMA27A	KRK103C		23BJP4
232-B-152MU, 5MU, 6MU & 7MU	Table	KCS136B	TMA27B	KRK104C/KRK66AB		23BJP4
232-B-182MV, 5MV & 6MV	Table	KCS136D	TMA27A	KRK103C		23BKP4*
232-B-182MU & 5MU	Table	KCS136E	TMA27B	KRK104C/KRK66AB		23BKP4*
232-B-215MV & 6MV	Table	KCS136H	TMA28A	KRK103D		23BLP4*
232-B-215RS & 6RS	Table	KCS136K	TMA30A	KRK102M	KRS26A/KRT3A	23BLP4*
232-C-245MV, 6MV & 7MV	Console	KCS136H	TMA28A	KRK103D		23BKP4*
232-C-245MU, 6MU & 7MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB		23BKP4*
232-C-245RS, 6RS & 7RS	Console	KCS136K	TMA30A	KRK102M	KRS26A/KRT3A	23BKP4*
232-C-275MV, 6MV & 7MV	Console	KCS136A	TMA27A	KRK103C		23BJP4
232-C-275MU, 6MU & 7MU	Console	KCS136B	TMA27B	KRK104C/KRK66AB		23BJP4
232-C-304MV	Console	KCS136H	TMA28A	KRK103D		23BKP4*
232-C-304MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB		23BKP4*
232-C-304RS	Console	KCS136K	TMA30A	KRK102M	KRS26A/KRT3A	23BKP4*
232-C-335MV, 6MV & 7MV	Console	KCS136H	TMA28A	KRK103D		23BKP4*
232-C-335MU, 6MU & 7MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB		23BKP4*
232-C-335RS & 6RS	Console	KCS136K	TMA30A	KRK102M	KRS26A/KRT3A	23BKP4*
232-C-365MV, 6MV, 7MV & 9MV	Console	KCS136H	TMA28A	KRK103D		23BKP4*
232-C-365MU, 6MU & 7MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB		23BKP4*
232-C-365RS & 6RS	Console	KCS136K	TMA30A	KRK102M	KRS26A/KRT3A	23BKP4*
232-C-376MV	Console	KCS136H	TMA28A	KRK103D		23BKP4*
232-C-376MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB		23BKP4*
232-C-376RS	Console	KCS136K	TMA30A	KRK102M	KRS26A/KRT3A	23BKP4*
232-C-405MV & 6MV	Console	KCS136H	TMA28A	KRK103D		23BKP4*
232-C-405MU & 6MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB		23BKP4*
232-C-465MV & 6MV	Console	KCS136P	TMA28A	KRK103D		23BLP4*
232-C-495MV & 6MV	Console	KCS136P	TMA28A	KRK103D		23BLP4*
232-C-505MV, 6MV & 9MV	Console	KCS136P	TMA28A	KRK103D		23BLP4*
232-C-524MV	Console	KCS136P	TMA28A	KRK103D		23BLP4*
232-C-524RS	Console	KCS136T	TMA30A	KRK102M	KRS26A/KRT3A	23BLP4*
232-C-540MV & 9MV	Console	KCS136P	TMA28A	KRK103D		23BLP4*
232-C-555MV & 6MV	Console	KCS136H	TMA28A	KRK103D		23BKP4*
232-C-565MV, 6MV & 7MV	Console	KCS136H	TMA28A	KRK103D		23BKP4*
232-C-602MV & 6MV	Console	KCS136U	TMA29A	KRK103E		23BLP4*
232-C-602RS & 6RS	Console	KCS136T	TMA30A	KRK102M	KRS26A/KRT3A	23BLP4*

*Capped Kinescope

(Table continued on the next page, over, followed by service material on the next 10 pages.)

RCA Victor Chassis KCS-136, Model and Chassis Reference, Continued

MODEL AND CHASSIS REFERENCE—TV MODELS—Cont.

MODEL	CABINET TYPE	CHASSIS	TUNER MOUNTING ASSEMBLY	TUNER	REMOTE CHASSIS	KINESCOPE
232-C-620MV & 8MV	Console	KCS136U	TMA29A	KRK103E		23BLP4*
232-C-620RS & 8RS	Console	KCS136T	TMA30A	KRK102M	KRS26A/KRT3A	23BLP4*
232-C-636MV	Console	KCS136U	TMA29A	KRK103E		23BLP4*
232-C-648MV	Console	KCS136U	TMA29A	KRK103E		23BLP4*
232-C-648RS	Console	KCS136T	TMA30A	KRK102M	KRS26A/KRT3A	23BLP4*

The final numeral in the model number designates the cabinet finish, as follows: 0—DARK CHERRY, 2—BLACK, 4—MAPLE, 5—MAHOGANY, 6—WALNUT, 7—OAK, 8—ANTIQUE CHERRY, 9—FABER CHERRY. The suffix "U" in the model number identifies instruments with provision for UHF channel reception.

MODEL AND CHASSIS REFERENCE—COMBINATION MODELS

MODEL	CABINET TYPE	TV CHASSIS	TV TUNER MOUNTING ASSEMBLY	TV TUNER	AM/FM TUNER AND AUDIO AMPLIFIER	RECORD CHANGER	KINESCOPE
232-D-675MV & 6MV	Combination Console	KCS136AB	TMA29C	KRK103E	RC1207A	RP215-A1	23BLP4*
232-D-684MV	Combination Console	KCS136AB	TMA29C	KRK103E	RC1207A	RP215-A1	23BLP4*
232-D-696MV	Combination Console	KCS136AB	TMA29C	KRK103E	RC1207A	RP215-A1	23BLP4*

The final numeral in the model number designates the cabinet finish, as follows: 4—MAPLE, 5—MAHOGANY, 6—WALNUT.

*Capped Kinescope

The additional models listed in the table below were added after the initial models were released. The material on the pages following apply to all these models.

MODEL AND CHASSIS REFERENCE

MODEL	CABINET TYPE	CHASSIS	TUNER MOUNTING ASSEMBLY	TUNER	KINESCOPE
232-B-192MV, 5MV, 6MV & 7MV	Table	KCS136D	TMA27A	KRK103C	23BKP4
232-B-192MU, 5MU, 6MU & 7MU	Table	KCS136E	TMA27B	KRK104C/KRK66AB	23BKP4
232-C-235MV, 6MV & 7MV	Console	KCS136H	TMA28A	KRK103D	23BLP4
232-C-235MU, 6MU & 7MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB	23BLP4
232-C-264MV	Console	KCS136H	TMA28A	KRK103D	23BKP4
232-C-264MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB	23BKP4
232-C-286MV	Console	KCS136H	TMA28A	KRK103D	23BKP4
232-C-286MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB	23BKP4
232-C-295MV & 6MV	Console	KCS136H	TMA28A	KRK103D	23BKP4
232-C-295MU & 6MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB	23BKP4
232-C-355MV, 6MV & 7MV	Console	KCS136D	TMA27A	KRK103C	23BKP4
232-3-355MU, 6MU & 7MU	Console	KCS136E	TMA27B	KRK104C/KRK66AB	23BKP4
232-C-385MV & 6MV	Console	KCS136H	TMA28A	KRK103D	23BLP4
232-C-385MU & 6MU	Console	KCS136J	TMA28B	KRK104D/KRK66AB	23BLP4
232-C-515MV, 6MV & 9MV	Console	KCS136H	TMA28A	KRK103D	23BLP4
232-C-575MV & 6MV	Console	KCS136U	TMA29A	KRK103E	23BLP4
232-C-584MV	Console	KCS136U	TMA29A	KRK103E	23BLP4
232-C-596MV	Console	KCS136U	TMA29A	KRK103E	23BLP4

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

RCA Victor Chassis KCS-136 Series, Service Information, Continued

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 reciever. Console models are provided with a built-in VHF antenna which should be disconnected when an external antenna is used.

CENTERING ADJUSTMENT

Centering is accomplished by adjustment of two disc magnets located on the back of the deflection 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 can be obtained.

DEFLECTION YOKE ADJUSTMENT

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

FOCUS

Electrostatic focus kinescopes, type 23BJP4, 23BKP4, and 23BLP4, are employed in these receivers. A focus control, R114, is provided to permit proper focusing of the kinescope. The control is located on the rear apron of the chassis and should be adjusted to give best overall focus with brightness set at normal operating level.

HORIZONTAL OSCILLATOR ADJUSTMENT

To determine whether the sine-wave coil (L501A on PW500 deflection board) requires adjustment, make the following check:

Turn the Horizontal Hold control (R129 on front control bracket) clockwise until the picture falls out of sync, then slowly counterclockwise. The number of diagonal black bars sloping downward to the left will be gradually reduced, and when only 1 to 3 bars are obtained, slight additional counterclockwise rotation of the control should pull the picture into sync. The picture should remain in sync for approximately one-half turn of additional counterclockwise rotation. Continue counterclockwise rotation until the picture again falls out of sync, then rotate the control slowly clockwise. The number of diagonal black bars sloping downward to the right will be gradually reduced, and when only 1 to 3 bars are obtained, slight additional clockwise rotation should pull the picture into sync.

If the above check is satisfactory, no adjustment of L501A should be necessary. If the check is unsatisfactory, or doubtful, then perform the following check:

Connect a short jumper across the terminals of the sine-wave coil. Also, short the grid of the sync tube, pin 1 of V502, to ground with a jumper or small screwdriver

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 L501A. The frequency should not change by more than one-half bar if the sine-wave coil is properly adjusted. If the frequency changed more than one-half bar, L501A should be adjusted. With the short removed, adjust L501A to again obtain a picture with the sides vertical. When properly adjusted, alternate shorting and unshorting of L501A should not cause a change in frequency; only a slight sideways shift of the picture should occur.

WIDTH ADJUSTMENT

The width adjustment, L101, is located on the rear apron of the chassis between the Focus control and the AC interlock.

The width of the picture should be adjusted to fill the mask with a line voltage of 108v. With normal line 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.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENTS

Adjust the Height control (R121 on rear apron of chassis) until the picture overscans approximately ⅝ inch at both top and bottom. Adjust Vertical Linearity (R124 on rear apron of chassis) until the blanking bar shows unchanging thickness (vertical size) when the picture is rolled slowly with the Vertical Hold control. Adjustment of either control (Height or Linearity) will require slight readjustment of the other. Adjust centering to align the picture with the mask.

AGC CONTROL ADJUSTMENT

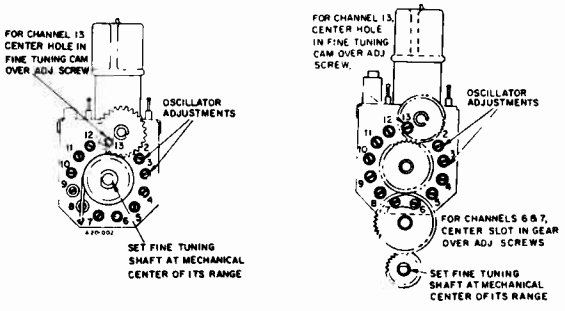
To check the adjustment of the AGC control (R119 on rear apron of chassis), tune in a strong signal and sync the picture. Momentarily remove the signal by switching off channel and then back. If the picture reappears immediately, the receiver is not overloading due to improper setting of the AGC control. If the picture takes more than a second to reappear, or bends excessively, R119 should be readjusted.

AGC may be adjusted by turning R119 fully counterclockwise, then clockwise until there is a very slight bend at the top of the picture; then turn R119 counterclockwise just sufficiently to remove the bend.

SYNC STABILIZER CONTROL ADJUSTMENT

Before adjustment of the Sync Stabilizer control (R120 on rear apron of chassis) is attempted, the AGC control should be properly adjusted.

Turn the Sync Stabilizer control fully clockwise. Turn the Horizontal Hold control clockwise until the picture falls out of sync, then turn slowly counterclockwise until picture syncs. Continue turning the control counterclockwise until the picture again falls out of sync, then clockwise slowly until picture again syncs. If the picture tends to "hang up" (blanking bar appears just before picture syncs) on either side of Hold control range, turn R120 counterclockwise slightly until "hang up" is eliminated.



(A) Concentric Fine Tuning *(B) Off-Set Fine Tuning*

Figure 2—Oscillator Adjustments

VHF RF OSCILLATOR ADJUSTMENTS

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

RCA Victor Chassis KCS-136 Series, Service Adjustments, Continued

Model Series 232-B-15-M, 232-B-18-M, 232-B-21-M, 232-C-24-M, 232-C-27-M, 232-C-30-M, 232-C-33-M, 232-C-36-M, 232-C-37-M, 232-C-40-M, 232-C-46-M, 232-C-49-M, 232-C-50-M, 232-C-52-M, 232-C-54-M, 232-C-55-M, and 232-C-56-M.

On these models, adjustments for channels 2 through 13 are available through holes in the front of the tuner. See Fig. 2. Remove the channel-selector knob to make adjustments. (On concentric versions, the fine-tuning knob will also have to be removed.) Set fine tuning to mechanical center of its range.

Model Series 232-C-60-M, 232-C-62-M, 232-C-63-M, 232-C-64-M, 232-D-67-M, 232-D-68-M, and 232-D-69-M.

These models employ a "One-Set" fine-tuning mechanism having thirteen gear assemblies mounted around a turret on the front of the tuner. Oscillator adjustments are provided for channels 6 and 13 only and these are accessible through holes in the front of the tuner. Remove the channel-selector knob to make adjustments. To set the fine tuning to the mechanical center of its range, pull out on the fine-tune knob and turn it clockwise a minimum of 6 turns; then turn knob counterclockwise 3 turns. See Fig. 3.

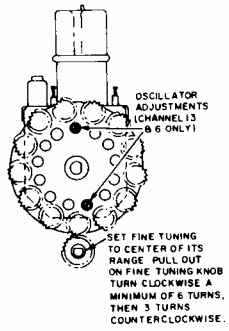


Figure 3—One-Set Fine Tuning—Manual

Model Series 232-B-21-R, 232-C-24-R, 232-C-30-R, 232-C-33-R, 232-C-36-R, 232-C-37-R, 232-C-52-R, 232-C-60-R, 232-C-62-R, and 232-C-64-R.

These models incorporate remote control, with a "One-Set" fine-tuning and channel-selector programming mechanism. There are thirteen gear assemblies mounted around a turret on the front of the tuner. A rotating-drum tuner is employed wherein the aperture for oscillator adjustment is in the same location for all channels, 2 through 13, as shown in Fig. 4. Remove the volume-control knob and its decorative escutcheon to make adjustments. To set the fine tuning to the mechanical center of its range, pull out on the fine-tune knob and turn it counterclockwise a minimum of 3 turns; then turn knob clockwise 1½ turns. Repeat this procedure for each channel to be used.

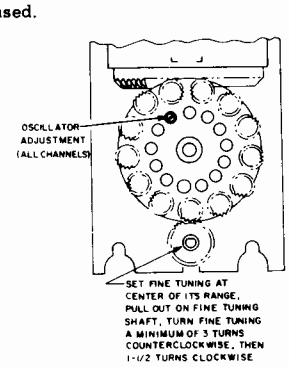


Figure 4—One-Set Fine Tuning—Remote

REMOTE CONTROL PROGRAMMING

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 "One-Set" Fine Tuning/Channel Selector button provides for channel selection, fine tuning, and programming on these models. Each time the CHANNEL button on the remote transmitter or the Fine Tune/Channel Selector knob on the receiver is depressed, the tuner will change channels. The position between channels 2 and 13 is an OFF or "Standby" position, permitting the chassis of the television receiver to be turned On or Off while the remote amplifier itself remains On.

The receiver is preset at the factory to stop at all channels and at the OFF position. To set the receiver to bypass unused channels, turn the receiver On and advance the channel selector to the first unused channel. Pull out on the Fine Tune/Channel Selector knob and rotate it three turns to the right (clockwise). Repeat this procedure for each unused channel and for the OFF position if it is not to be used. To adjust the fine tuning for best reception on active channels, advance the channel selector to the first active channel. Pull out on the Fine Tune/Channel Selector knob and rotate it either direction until harsh interference occurs and picture begins to disappear. Then turn slowly back until interference disappears and picture is clear.

To change a passing position to a stopping position, the receiver must first be turned Off. Locate the Auxiliary Channel Selector knob on the back of the receiver. Rotate this knob until the first channel number to be reset appears in the indicator window. To set the channel for stopping, pull out on the Fine Tune/Channel Selector knob and rotate it two turns to the left (counterclockwise). Turn the receiver On again and adjust fine tuning for best reception as described previously.

To change a stopping position to a passing position, the receiver may be left On. Simply pull out on the Fine Tune/Channel Selector knob and rotate it three turns to the right. If the OFF position is to be reset, follow the same procedure used to set active or unused channels, whichever applies.

KINESCOPE AND SAFETY GLASS CLEANING

On all models except the 232-B-15-M Series and the 232-C-27-M Series, the safety glass is sealed to the face of the kinescope and is a part of the kinescope itself. The front face of the safety glass is all that requires cleaning for these models.

The 232-B-15-M and 232-C-27-M Model Series employ a cabinet-mounted safety glass separate from the kinescope. The safety glass may be removed for cleaning and to permit cleaning of the kinescope faceplate. Refer to Fig. 5 for correct safety-glass removal on these models.

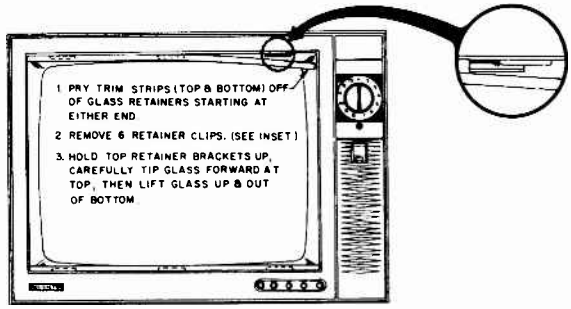


Figure 5—Safety Glass Removal

RCA Victor Chassis KCS-136 Series, Alignment Information, Continued

PICTURE I-F TRANSFORMER AND TRAP ADJUSTMENTS

TEST EQUIPMENT CONNECTIONS:

BIAS ..... Connect —6 volts from terminal "C" of PW200 to ground.
OSCILLOSCOPE ..... Connect to 2nd Detector at test point TP203. Set scope for 5v. p-p.
SIGNAL GENERATOR ..... Connect to mixer grid test point through 1500 mmf. capacitor.
SWEEP GENERATOR ..... Connect to the grid of 3rd picture I-F, pin 1, V205, test point TP202. Use shortest leads possible. (See Figure 29.)
VACUUM TUBE VOLTMETER ..... Connect to 2nd Detector output at test point TP203. Use DC probe.
MISCELLANEOUS ..... Refer to Figure 29 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.	————	41.25 mc.	T204 (top)	Adjust for minimum output indication on meter.

SWEEP ALIGNMENT OF PICTURE I-F

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Connect —6 volts from terminal "C" on PW200 to ground.
OSCILLOSCOPE ..... Connect a .001 mf. capacitor in series with a 180 ohm resistor from TP201 to ground, with the capacitor connected to TP201. Connect oscilloscope to the junction of the resistor and capacitor, using diode probe. (See Figure 29.)
SWEEP GENERATOR ..... Connect in series with 1000 mmf. capacitor into mixer grid test point. 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 TP203. Use DC probe.
MISCELLANEOUS ..... Refer to Figure 29 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	Sweep output set for 0.5v. 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 (bottom)	
	Repeat step 4 above, if necessary, for minimum output at 47.25 mc. Remove 180 ohm resistor, .001 capacitor and scope from TP201. Connect scope to test point TP203, using direct probe. Set bias to — 10 volts at terminal "C" on 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 5v. 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 "VoltOhmyst." Remove the pad and connect generator directly 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.
	Connect sweep generator to antenna terminals using pad shown in Figure 8.				
11	Check overall	Channels 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 Chassis KCS-136 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 IF AGC bus at terminal "C" on PW200.
OSCILLOSCOPE ..... Connect across speaker voice coil.
SIGNAL GENERATOR ..... Connect to test point TP203 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 29 for adjustment locations.

	STEP	SIGNAL GENERATOR	ADJUST	REMARKS
12	Adjust detector grid transformer	4.5 mc.	T202	Adjust for maximum negative DC on meter. Set generator for 1.0 to 1.5 volts when peaked. T201A top core and T202 core should penetrate the coil from top of can when finally peaked.
13	Adjust sound take-off transformer	4.5 mc.	T201A (top)	
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 transformer	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 "U" on PW200. Use diode probe. Set contrast control to maximum clockwise position.				
16	Adjust 4.5 mc. trap	4.5 mc., 400 cycle, AM mod.	T201B (bottom)	Adjust for minimum 400 cycle indication on oscilloscope. The core should penetrate the coil from the bottom of the can when finally adjusted.
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 transformer	4.5 mc., 400 cycle F-M mod., 7½ kc. dev.	T203	Adjust for max. 400 cycle 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 grid trans. and sound take-off transformer for breakout	4.5 mc., 400 cycle F-M mod; 7½ kc. dev.	T201A & T202	Decrease input to minimum usable signal. Retouch T201A and T202 for symmetrical breakout response in Figure 11. The top core of T201A and core of T202 should penetrate the coil from top of can when finally peaked.
Move the oscilloscope to terminal "U" on PW200. Use diode probe. Set 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.		

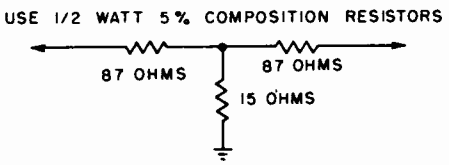


Figure 6—Sound Attenuation Pad

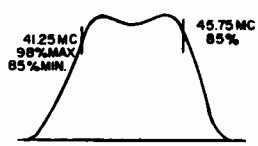


Figure 9—T208 3rd Pix I-F Response

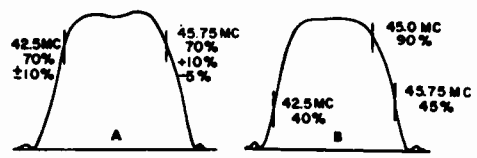


Figure 10—Mixer Plate and Overall I-F Response

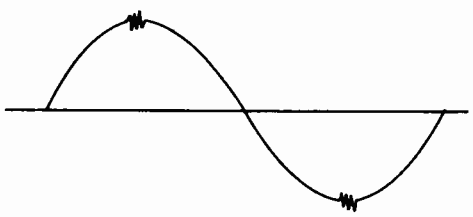


Figure 11—Sound Detector Response

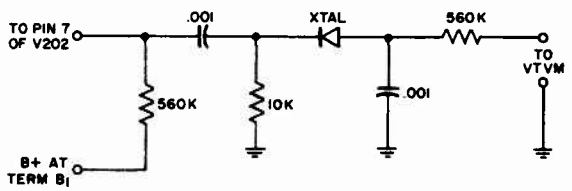
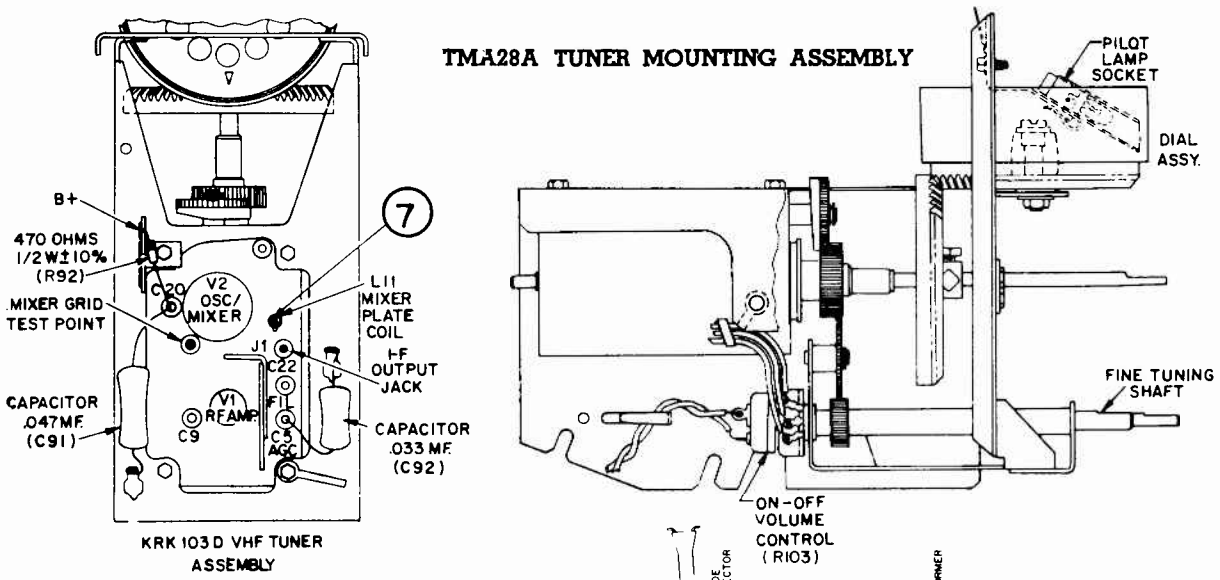


Figure 12—Sound Diode Detector

RCA Victor Chassis KCS-136 Series, Service Information, Continued



TMA28A Tuner Mounting Assemblies

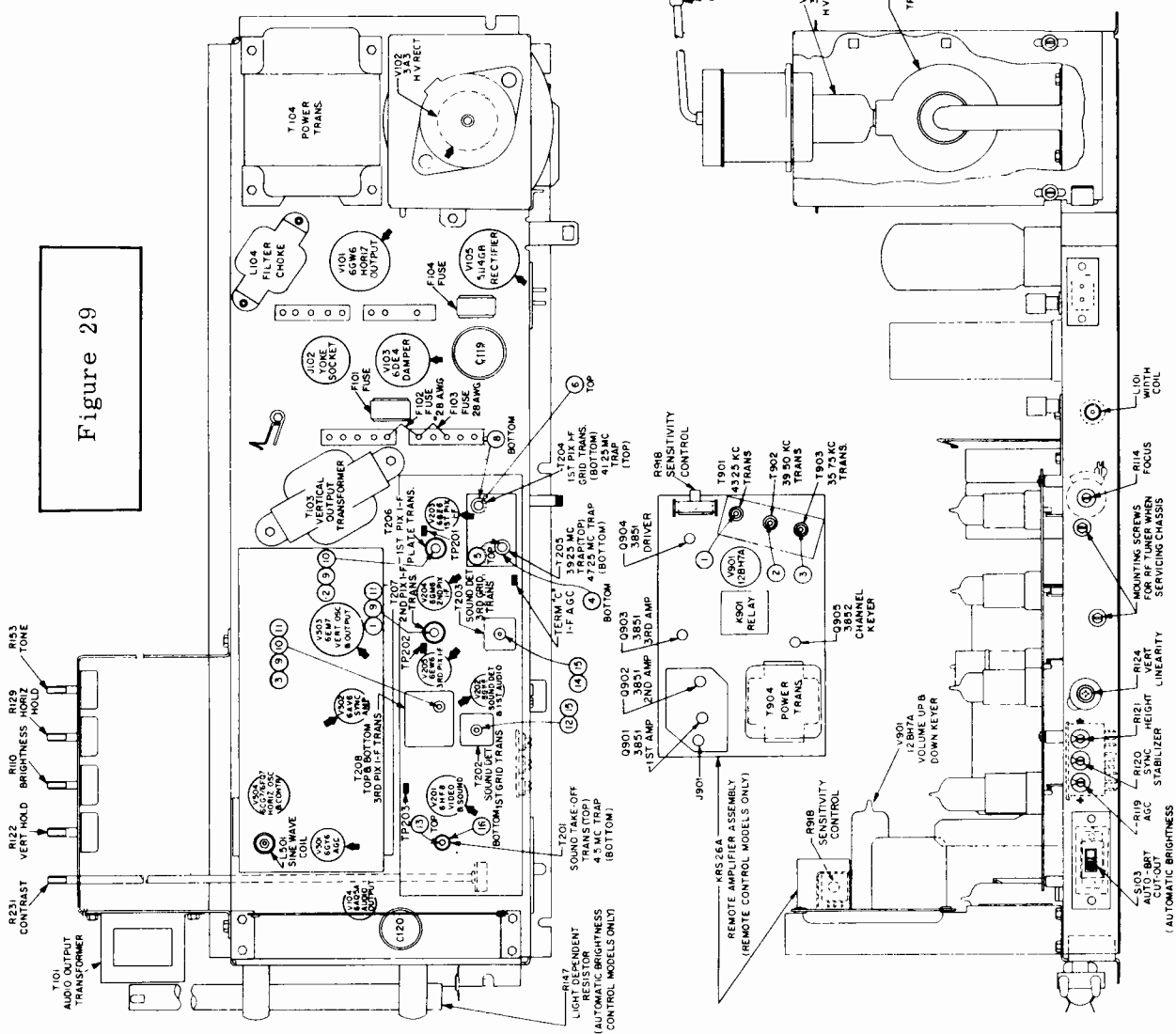
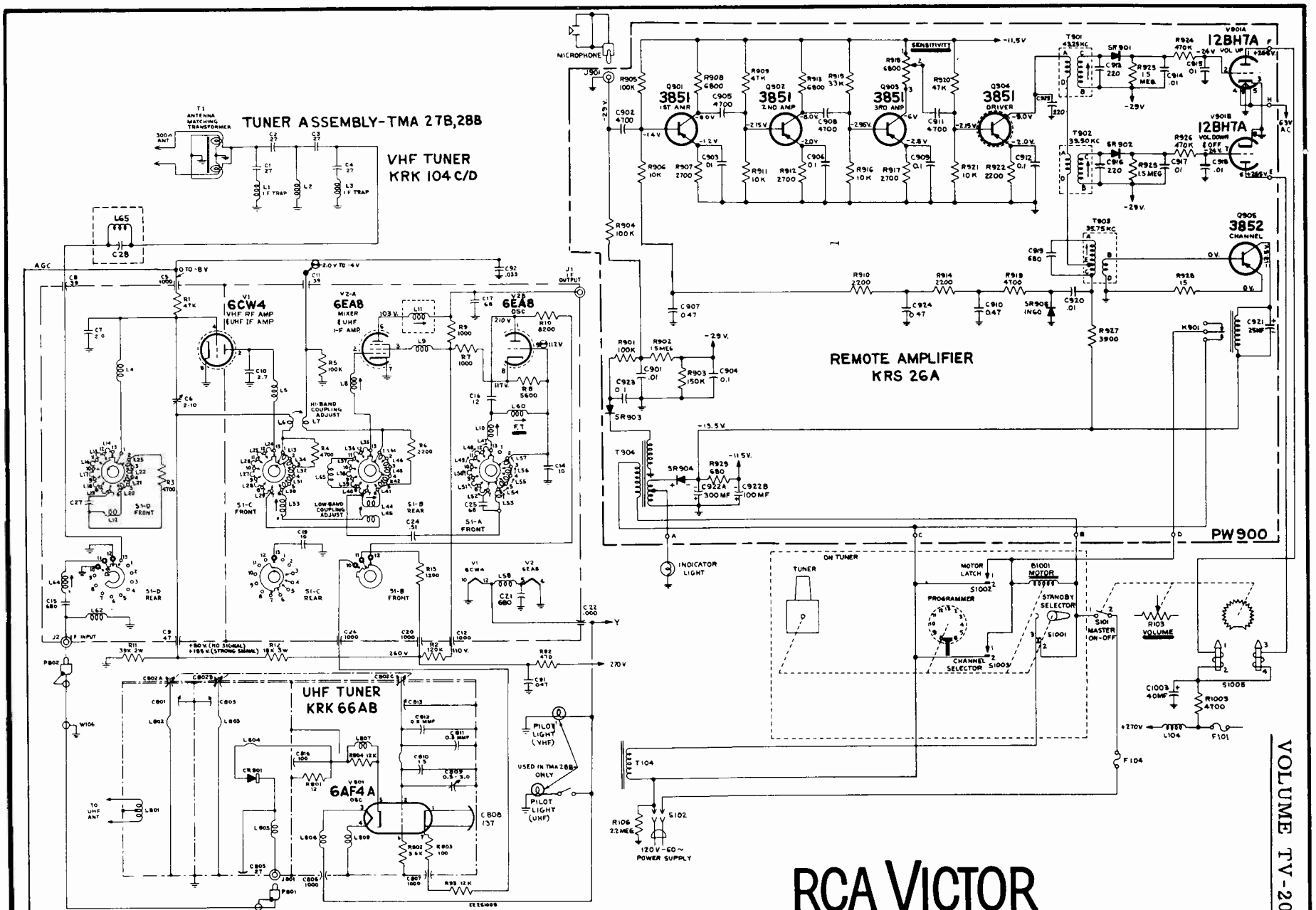


Fig. 29. *KCS136 Chassis View*



CHANNEL SELECTOR SWITCH NOTES:

1. FRONT AND REAR SECTIONS OF SWITCH S1-A,-B,-C AND -D, ARE VIEWED FROM FRONT WITH THE CONTROL SHAFT IN CHANNEL 13 POSITION.
2. BLACK DOT IN SWITCH ROTOR SEGMENT INDICATES THRU CONNECTION
3. O - INDICATES THRU CONNECTION FROM FRONT TO REAR OF SWITCH TERMINALS.
4. O - INDICATES CONTACTS INSULATED - NOT CONNECTED FROM FRONT TO REAR OF SWITCH.

⊖ USE 100K ISOLATION RESISTOR IN SERIES WITH PROBE

RCA VICTOR

CIRCUIT SCHEMATIC DIAGRAM FOR KCS136A, B, D, E, H, J, K, P, T & U
(Shown With KRS26A Remote Control Unit Used With Chassis KCS136K & T)

VOLUME TV-20

RESISTANCE VALUES IN OHMS K=1000

CAPACITANCE VALUES LESS THAN 1 IN MF, 1 AND ABOVE IN MMF UNLESS OTHERWISE INDICATED.

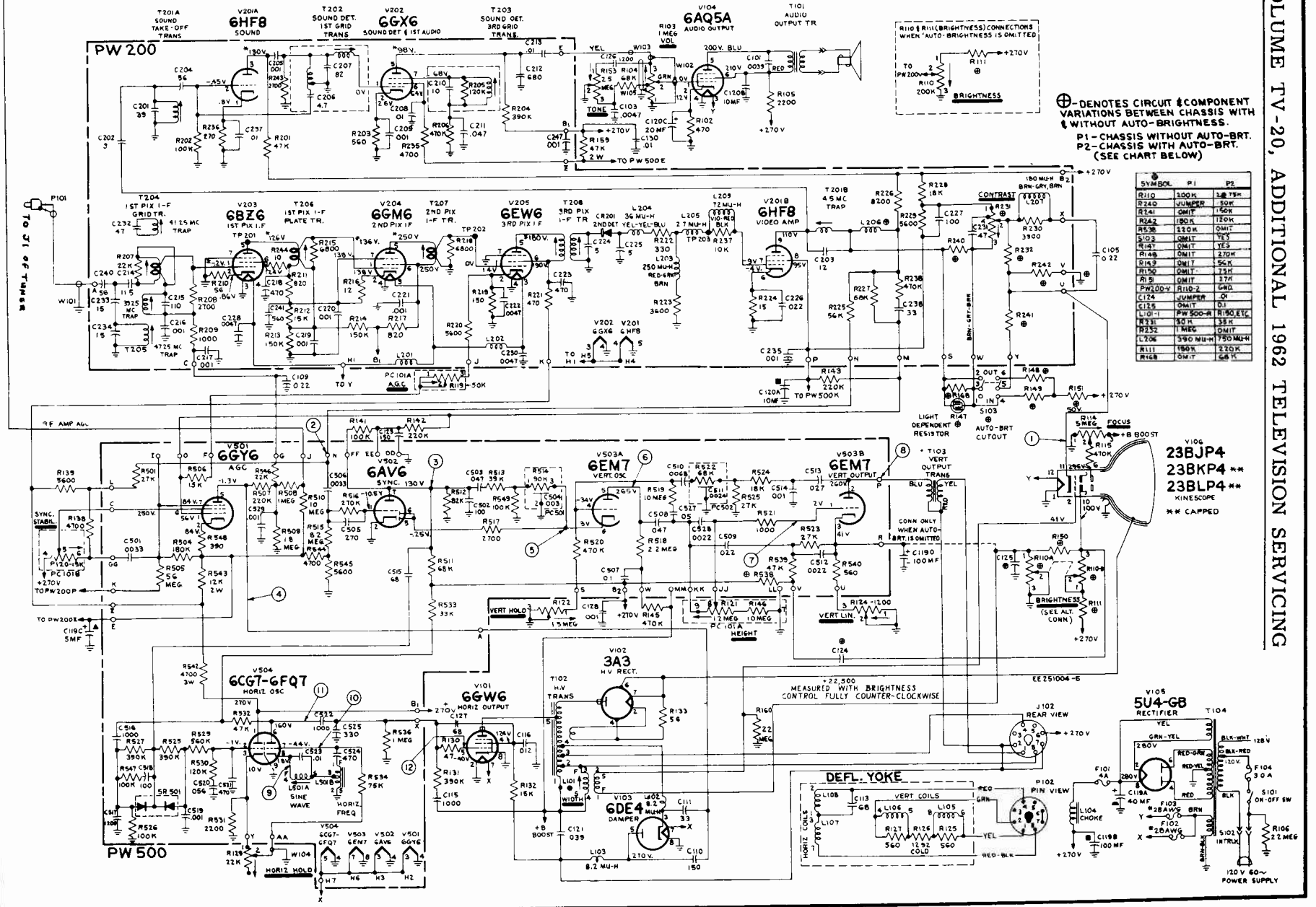
DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION

VOLTAGES MEASURED WITH VOLTOHMYST AND WITH NO SIGNAL INPUT, AND SHOULD HOLD WITHIN ±20% WITH 120 VOLT A C SUPPLY.

*VOLTAGES MEASURED WITH 1 MEG 1/2 WATT RESISTOR IN SERIES WITH METER PROBE.

Balloons (1), (2), etc. shown on schematic indicate points of observation of waveforms which are shown in conjunction with the schematic on the next page.

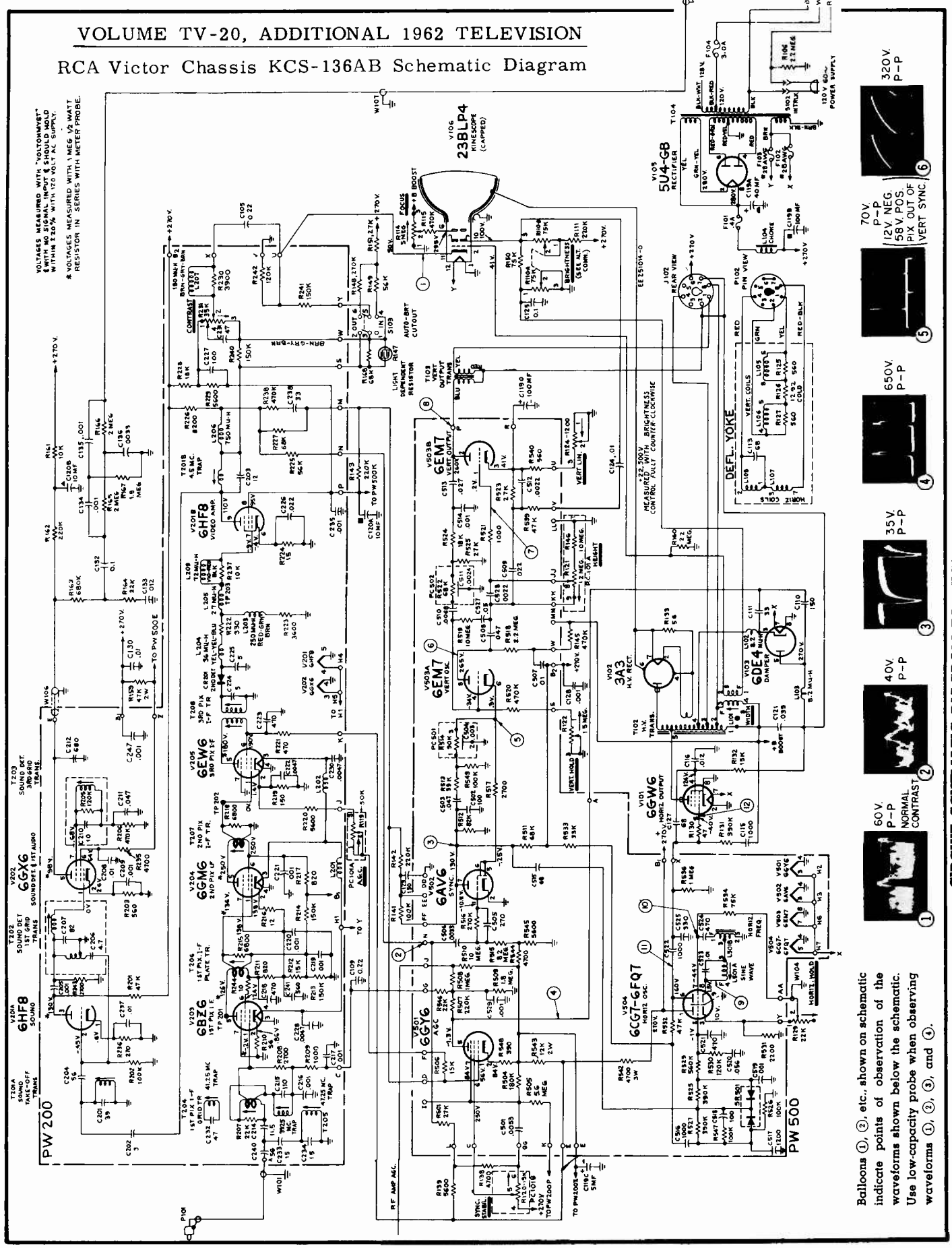
Circuit Schematic Diagram for KCS136A, B, D, E, H, J, K, P, T & U Chassis (Shown with KRS26A Remote Control Unit used with KCS136K & T Chassis)



SYMBOL	P1	P2
R110	200K	1.75M
R240	JUMPER	50K
R141	OMIT	150K
R242	180K	120K
R238	220K	OMIT
S103	OMIT	YES
R147	OMIT	YES
R148	OMIT	270K
R149	OMIT	56K
R150	OMIT	75K
R151	OMIT	27K
PW200-V	R110-2	680
C124	JUMPER	.01
C125	OMIT	0.1
L101-1	PW 500-A	R150 ETC.
R231	50 K	33 K
R232	1 MEG	OMIT
L206	390 MU-H	750 MU-H
R111	150K	220K
R148	OMIT	68 K

VOLUME TV-20, ADDITIONAL 1962 TELEVISION

RCA Victor Chassis KCS-136AB Schematic Diagram



CIRCUIT SCHEMATIC DIAGRAM FOR KCS136AB CHASSIS
(Shown with RC1207A AM/FM Tuner & Audio Amplifier Chassis)

Balloons ①, ②, etc., shown on schematic indicate points of observation of the waveforms shown below the schematic. Use low-capacity probe when observing waveforms ①, ②, ③, and ④.

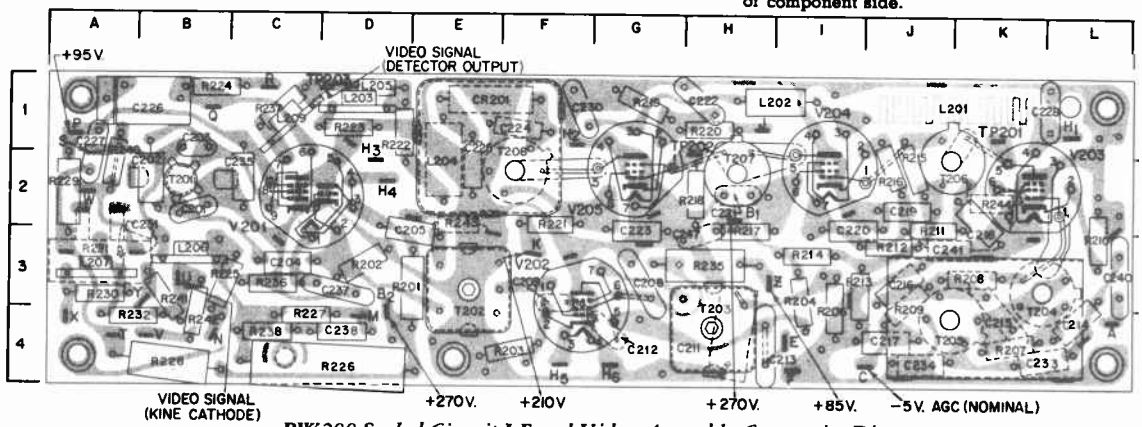
RCA Victor RC-1207A AM/FM Tuner & Audio Amplifier Chassis

RCA Victor Chassis KCS-136 Series Printed Board Diagrams (Continued)

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.

In some instances, components may be located on the wiring side of the assemblies although shown on the top or component side.

PW200 PRINTED CIRCUIT BOARD DIAGRAM



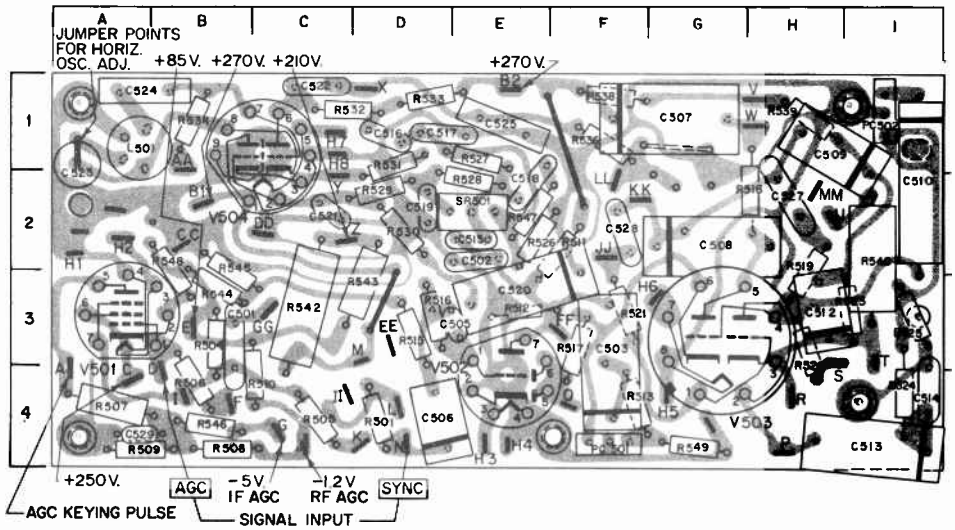
PW200 Sealed Circuit I-F and Video Assembly Composite Diagram

PW200 COMPONENT LOCATION GUIDE

C201....B2	C216....J3	C228....L1	CR201....E1	R202....D3	R215....J2	R227....C4	R242....B4
C202....B2	C217....J4	C230....F1		R203....F4	R216....J2	R228....B4	R243....E2
C203....B1	C218....K2	C231....B3	L201....J1	†R204....I3	R217....H3	R229....A2	R244....K2
C204....C3	C219....J2	C233....L4	L202....I1	R206....I3	R218....H2	R230....A3	
C205....D2	C220....I2	C234....J4	L203....D1	R207....K4	R219....G1	R231....A3	T201....B2
C208....G3	C221....H2	C235....C2	L204....E2	R208....K3	R220....H1	‡R232....A4	T202....E3
C209....F3	C222....H1	C237....D3	L205....D1	R209....J3	R221....F2	R235....H3	T203....H4
C211....H4	C223....G2	C238....D4	L206....B3	R210....L3	R222....D1	R236....C3	T204....K3
C212....G4	C224....F1	C240....L3	L207....A3	R211....J2	R223....D1	R237....C1	T205....K4
*C213....H4	C225....E2	C241....J3	L209....C1	R212....J3	R224....B1	R238....C4	T206....K2
C214....L4	C226....B1	C247....H3		R213....I3	R225....B3	⊙R240....A2	T207....H2
C215....K4	C227....A1		R201....E3	R214....I3	R226....D4	*R241....B3	T208....F2

*In TV-only models; jumpered in combination models. †In TV-only models; omitted in combination models. ‡In chassis without auto-brite; omitted in chassis with auto-brite.
⊙In chassis with auto-brite; jumpered in chassis without auto-brite. *In chassis with auto-brite; omitted in chassis without auto-brite.

PW500 SECURITY SEALED CIRCUIT ASSEMBLY



PW500 COMPONENT LOCATION GUIDE

C501....B3	C513....I4	C523....A1	PC502....I1	R511....F2	R523....I3	R533....D1	R546....B4
C502....E2	C514....I4	C524....A1		R512....E3	R524....I4	R534....B1	R547....E2
C503....F3	C515....E2	C525....E1	R501....D4	R513....F4	R525....I3	R536....F1	R548....B2
C505....D3	C516....D1	C527....H2	R504....B3	R515....D3	R526....E2	‡R538....F1	R 549....G4
C506....D4	C517....D1	C528....F2	R505....C4	R516....D3	R527....E1	R539....H1	
C507....G1	C518....E2	C529....A4	R506....B4	R517....F3	R528....E2	R540....I2	SR501....E2
C508....G2	C519....D2		R507....A4	R518....H2	R529....D2	R542....C3	
C509....H1	C520....E3	L501....A1	R508....B4	R519....H2	R530....D2	R543....D3	
C510....I2	C521....C2		R509....A4	R520....H3	R531....D1	R544....B3	
C512....H3	C522....C1	PC501....F4	R510....C4	R521....F3	R532....C1	R545....B2	

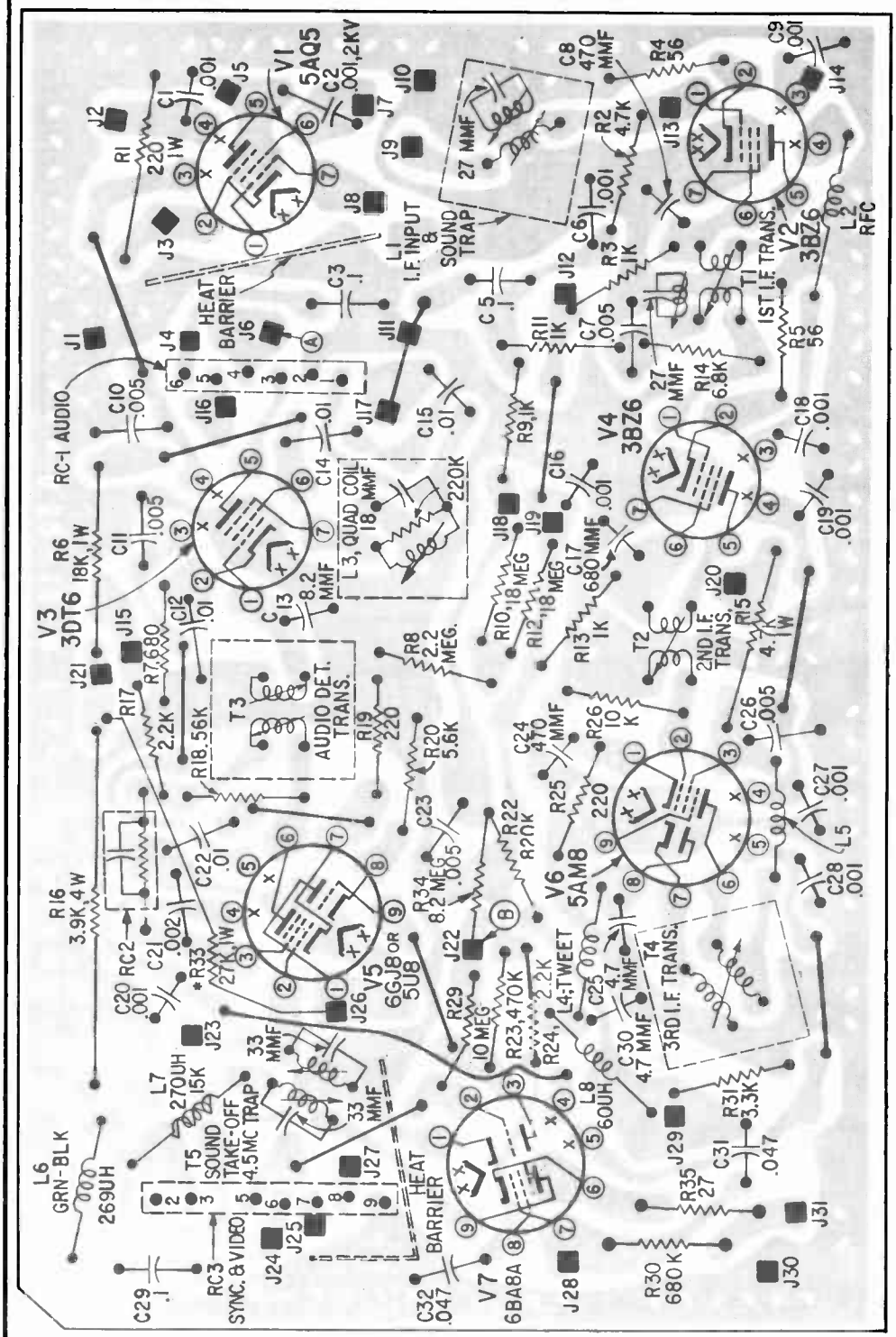
‡In chassis without auto-brite; omitted in chassis with auto-brite.

SEARS, ROEBUCK and CO.

CHASSIS NOS. 456.51710 528.51710
456.51711 528.51711
456.51712 528.51712
456.51713 528.51713

USED IN MODELS			
1130	1152	1158A	2130
1131	1153	1159A	2131
1132	1154	1190	2132
1133	1155	1191	2133
1150	1158	1192	2134
1151	1159	1193	2135

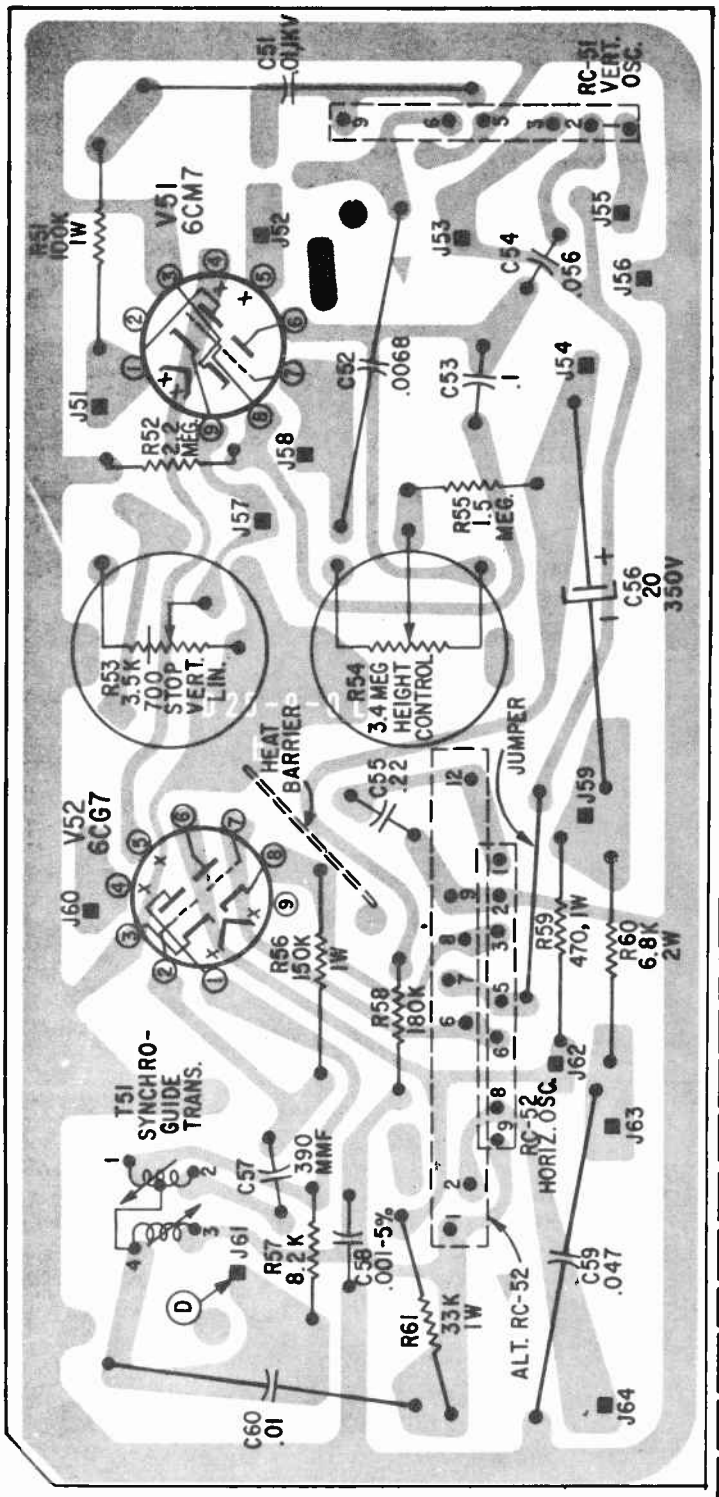
(Material continued on pages 127 - 129)



WIRING DIAGRAM I.F. SYNC.-SOUND BOARD 84-7274-7

NOTES:
1. WIRING DIAGRAM SHOWN FROM CIRCUIT SIDE
2. SOLID LINES INDICATE WIRE JUMPERS
3. *R33 IS LOCATED ON CIRCUIT SIDE OF THE BOARD

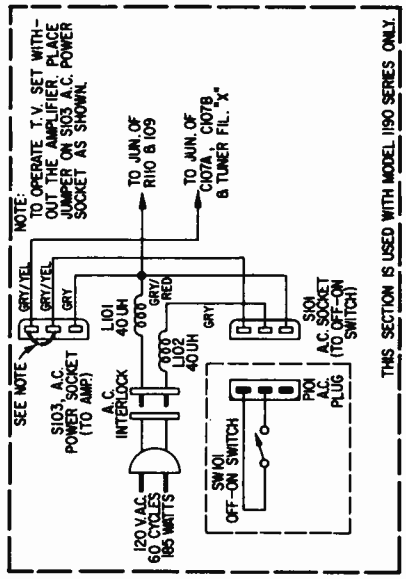
SEARS, ROEBUCK and CO. Chassis 456.51710, 528.51710, etc., Continued

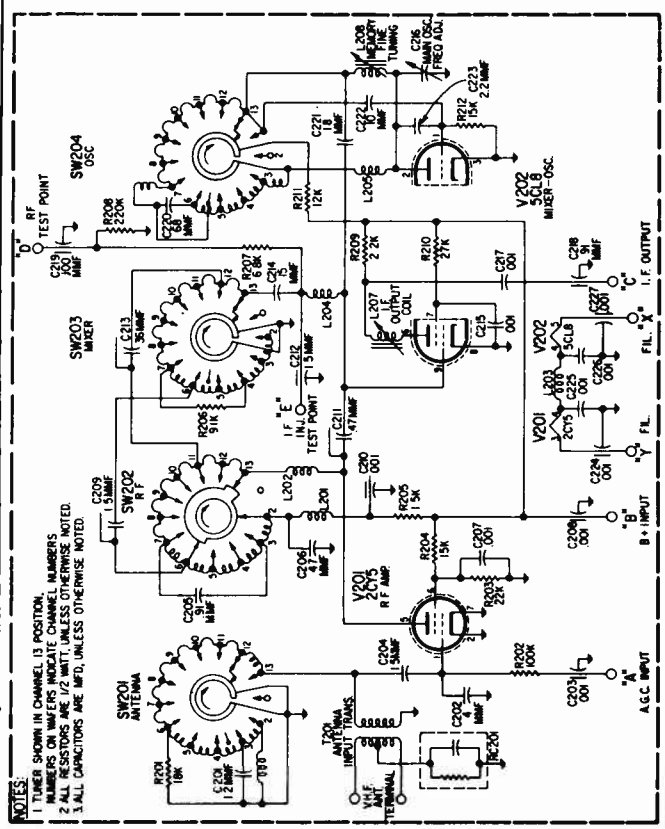


NOTE:
WIRING DIAGRAM SHOWN FROM CIRCUIT SIDE

VERTICAL-HORIZONTAL OSCILLATOR BOARD, 84-7905-1

CAUTION: Discharging or metering of second anode of picture tube must be to main chassis only.



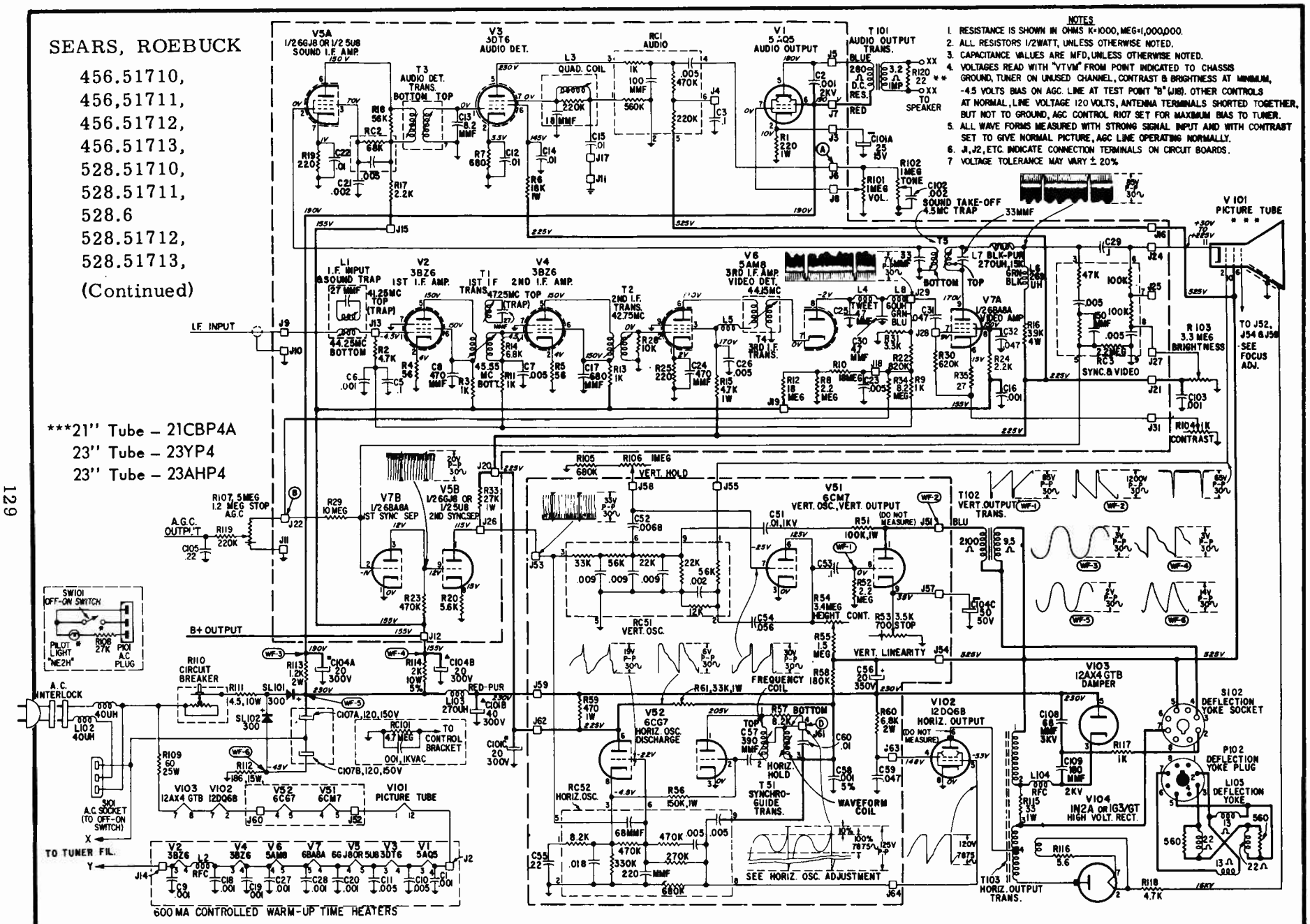


VHF Tuner Schematic

SEARS, ROEBUCK

456.51710,
456,51711,
456.51712,
456.51713,
528.51710,
528.51711,
528.6
528.51712,
528.51713,
(Continued)

***21" Tube – 21CBP4A
23" Tube – 23YP4
23" Tube – 23AHP4



* NOT USED ON SOME MODELS.
** USED ON MODELS 1190 SERIES

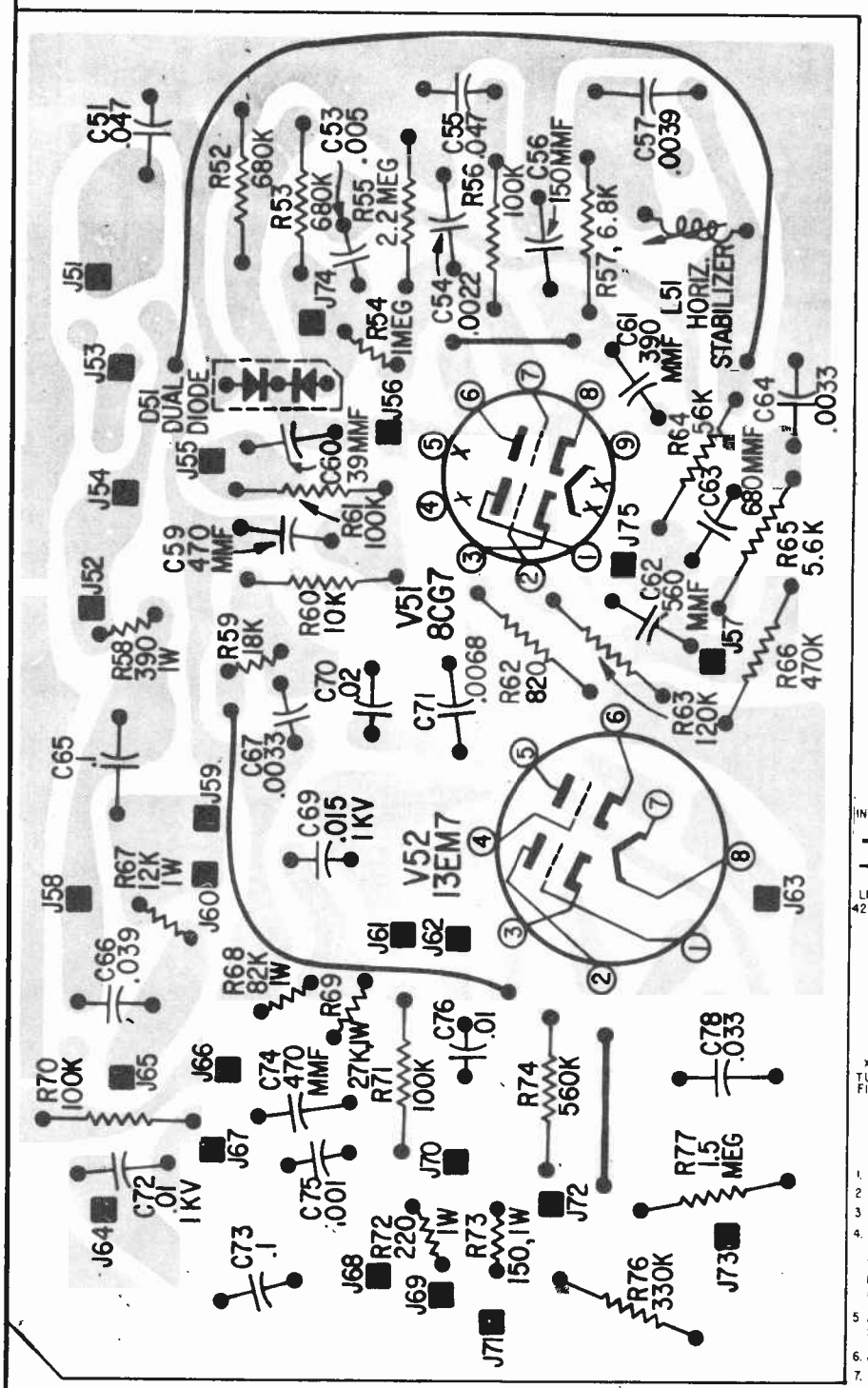
SEARS, ROEBUCK and CO. Chassis 456.51710, 528.51710, etc., Continued

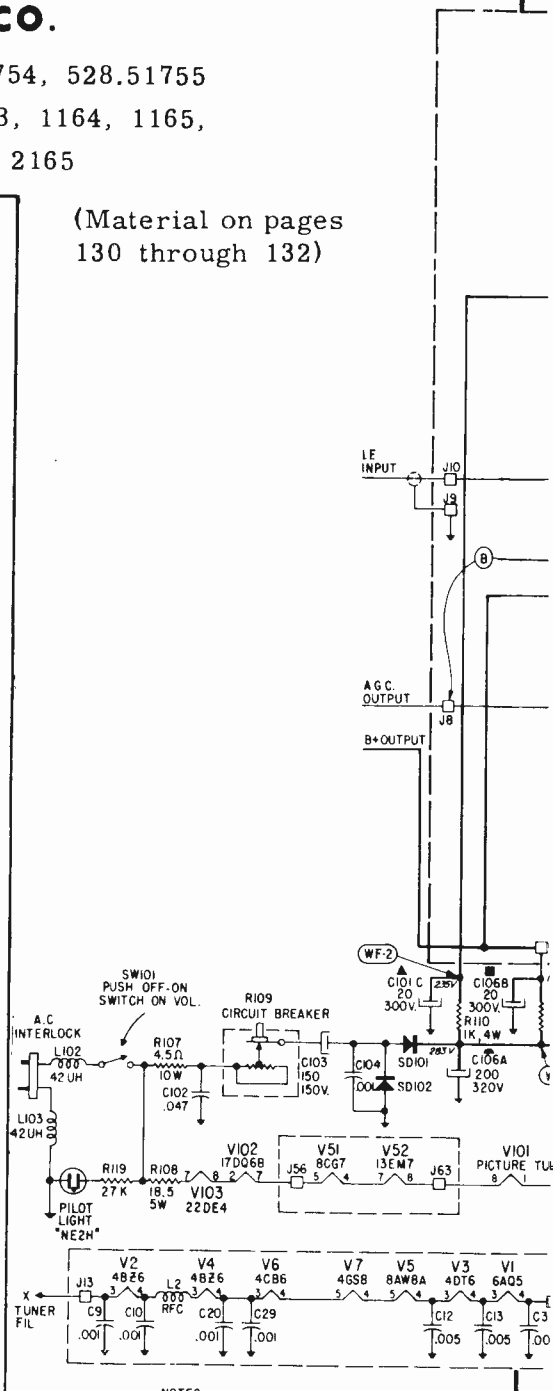
SEARS, ROEBUCK and CO.

Chassis 456.51754, 456.51755, 528.51754, 528.51755

Models 1114M, 1160, 1161, 1162, 1163, 1164, 1165,
2160, 2161, 2162, 2163, 2164, 2165

(Material on pages 130 through 132)





NOTES

1. RESISTANCE IS SHOWN IN OHMS K=1000, MEG=1,000,000
2. ALL RESISTORS 1/2 WATT, UNLESS OTHERWISE NOTED
3. CAPACITANCE VALUES ARE MFD, UNLESS OTHERWISE NOTED.
4. VOLTAGES READ WITH "VTVM" FROM POINT INDICATED TO CHASSIS GROUND, TUNER ON UNUSED CHANNEL, CONTRAST & BRIGHTNESS AT MINIMUM, -4.5 VOLTS BIAS ON AGC LINE ON TEST POINT "B" (J16 & J8) OTHER CONTROLS AT NORMAL, LINE VOLTAGE 117 VOLTS, ANTENNA TERMINALS SHORTED TOGETHER, BUT NOT TO GROUND.
5. ALL WAVE FORMS MEASURED WITH STRONG SIGNAL INPUT AND WITH CONTRAST SET TO GIVE NORMAL PICTURE, AGC LINE OPERATING NORMALLY.
6. J1, J2 ETC. INDICATE CONNECTION TERMINALS ON PRINTED BOARDS.
7. VOLTAGE TOLERANCE MAY VARY ±20%.

WIRING DIAGRAM SHOWN FROM CIRCUIT SIDE.
SOLID LINES INDICATE WIRE JUMPERS.

Wiring Diagram, Vertical-Horizontal Oscillator Board 84-11682-4

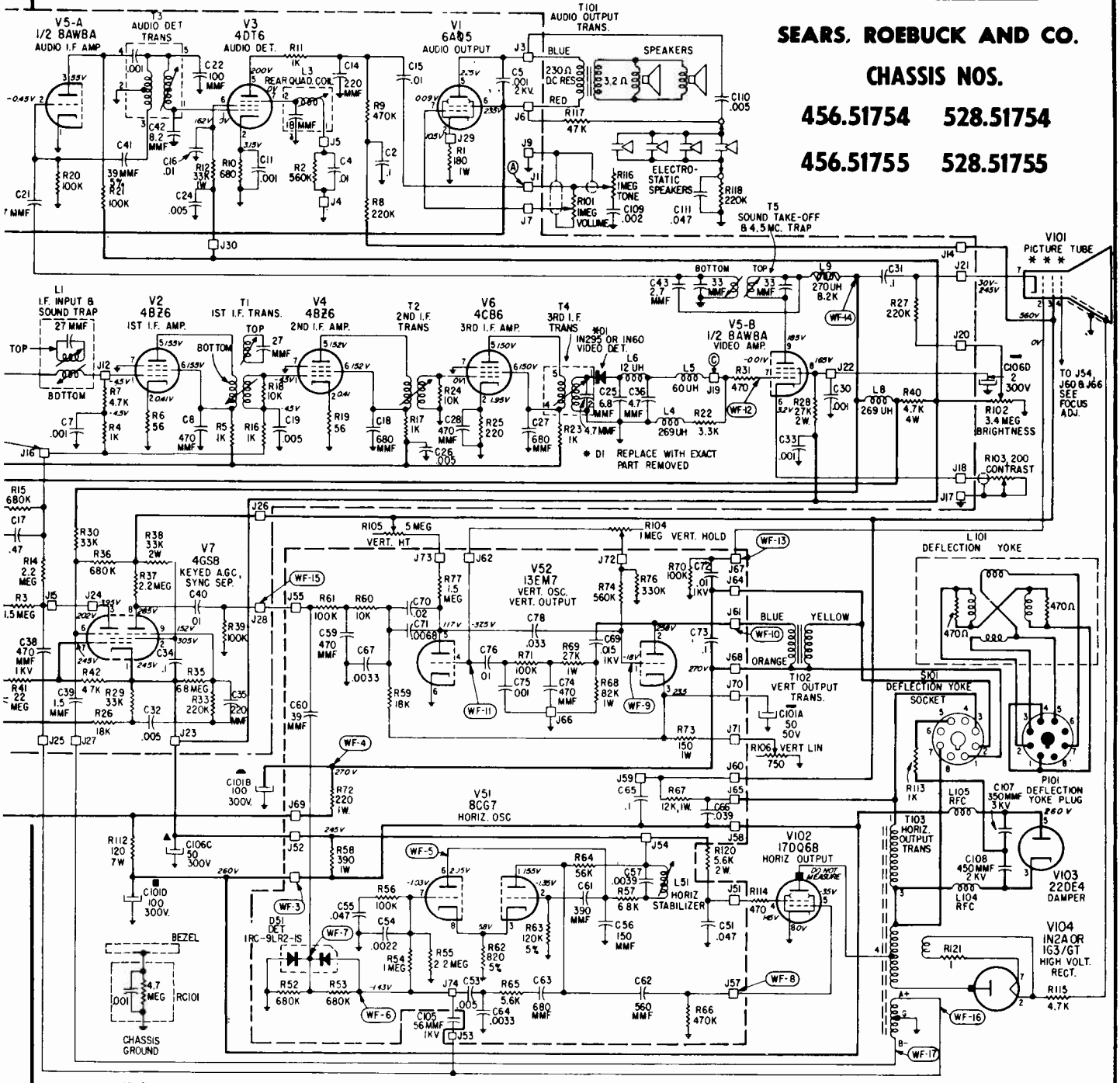
*Electrostatic speakers are used in Model 1160 and 2160 Series only

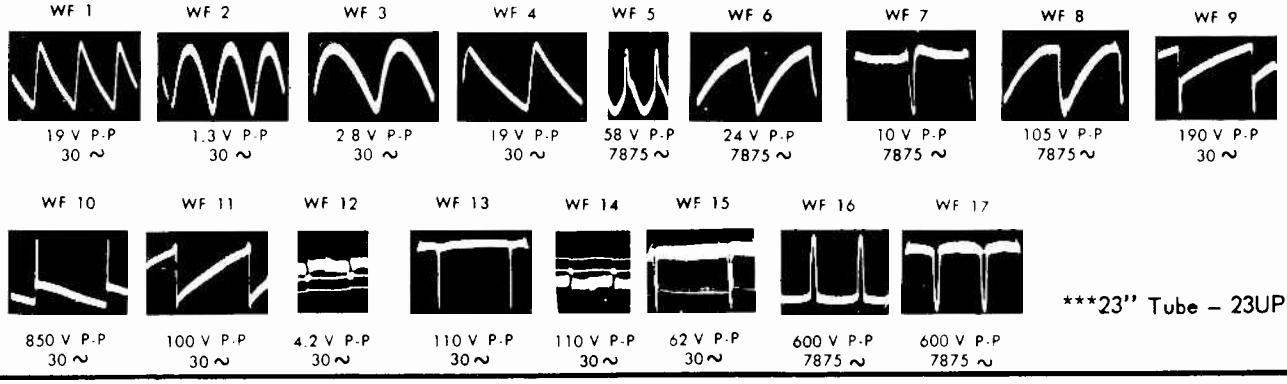
SEARS, ROEBUCK AND CO.

CHASSIS NOS.

456.51754 528.51754

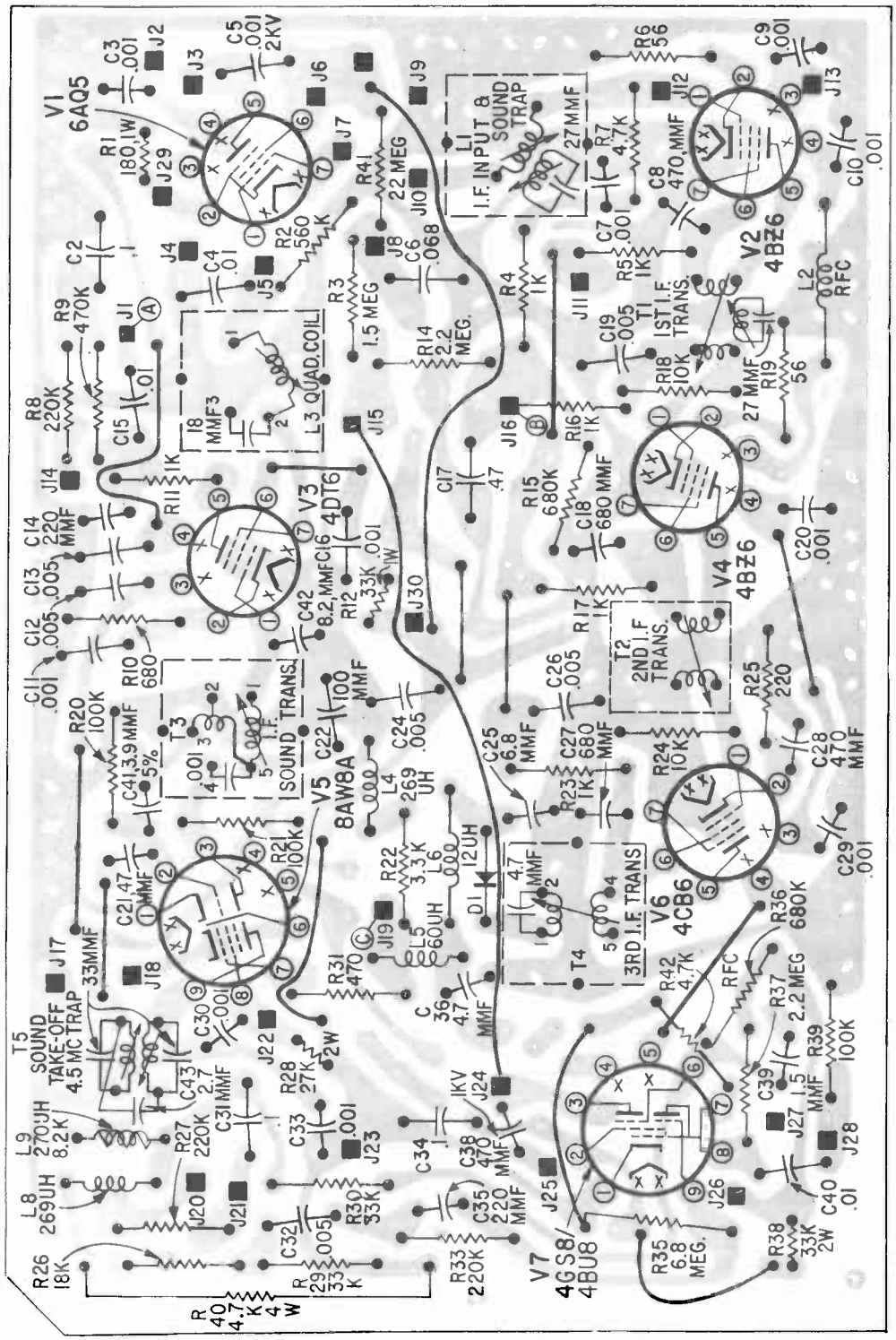
456.51755 528.51755





***23" Tube – 23UP4

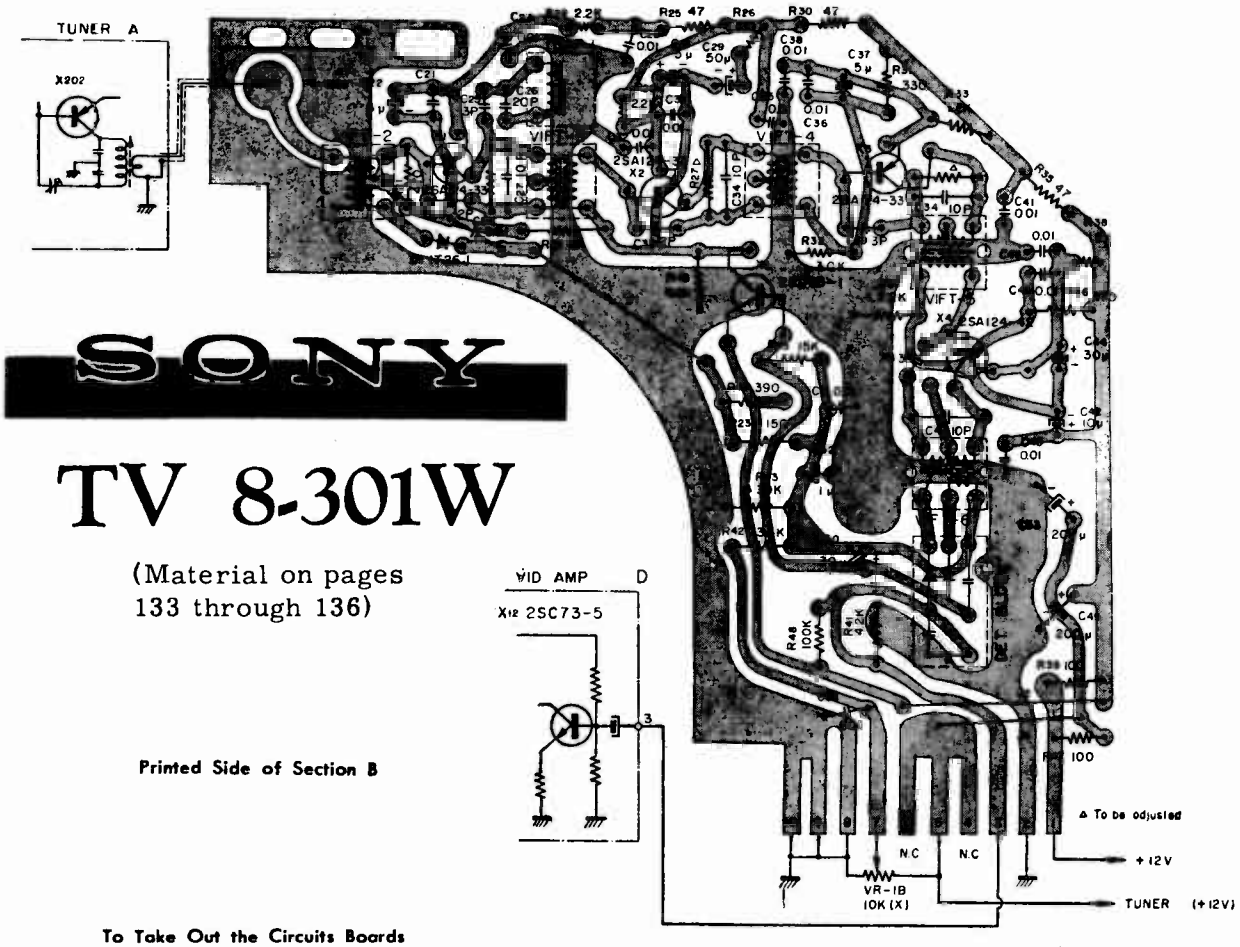
SEARS, ROEBUCK Chassis 456.51754, 456.51755, 528.51754, 528.51755
(Continued)



NOTES:
1. WIRING DIAGRAM SHOWN FROM CIRCUIT SIDE
2. SOLID LINES INDICATES WIRE JUMPERS

Wiring Diagram, I.F. Sync. Sound Board 84-11715-6

SONY CORPORATION Model TV 8-301 W



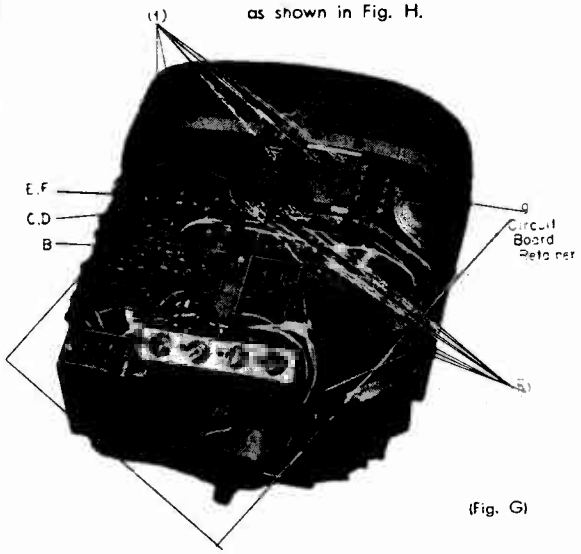
SONY

TV 8-301W

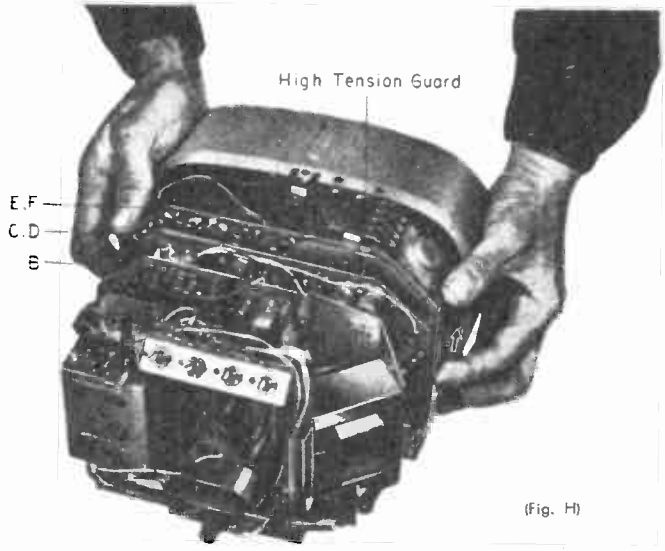
(Material on pages 133 through 136)

To Take Out the Circuits Boards

1) Remove five screws (f) and pull out the circuit board retainers (g). Pull out seven pins, two on the circuit board B, one on the circuit board C, D and four on the circuit board E, F. The circuit boards B and C, D will be dismounted by pulling up straight.
2) To take out the circuit board E, F, push upward of the lower end of the high tension guard as shown in Fig. H.



(Fig. G)



(Fig. H)

Remove the anode connector for the picture tube behind the high tension guard.

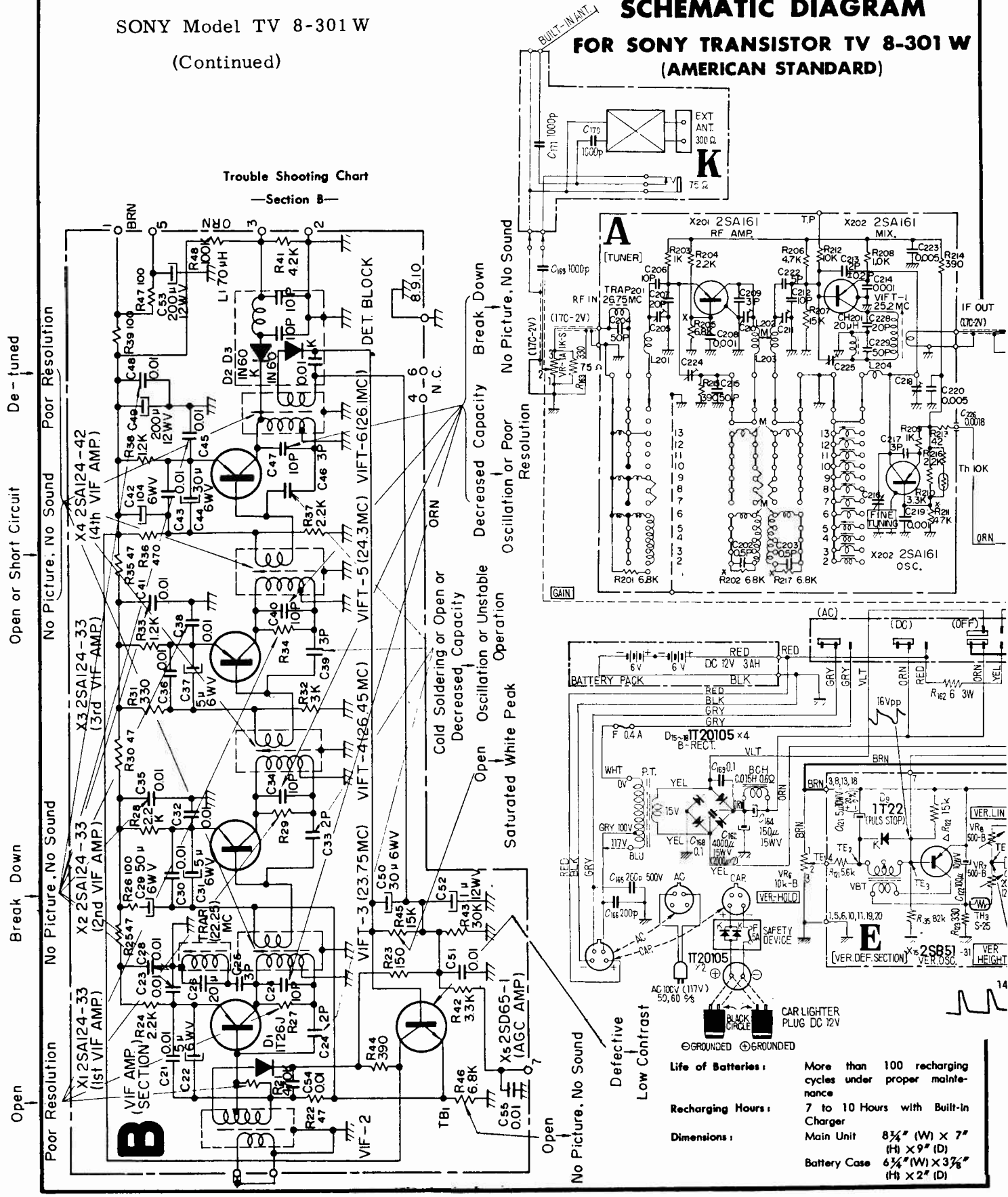
SONY Model TV 8-301 W

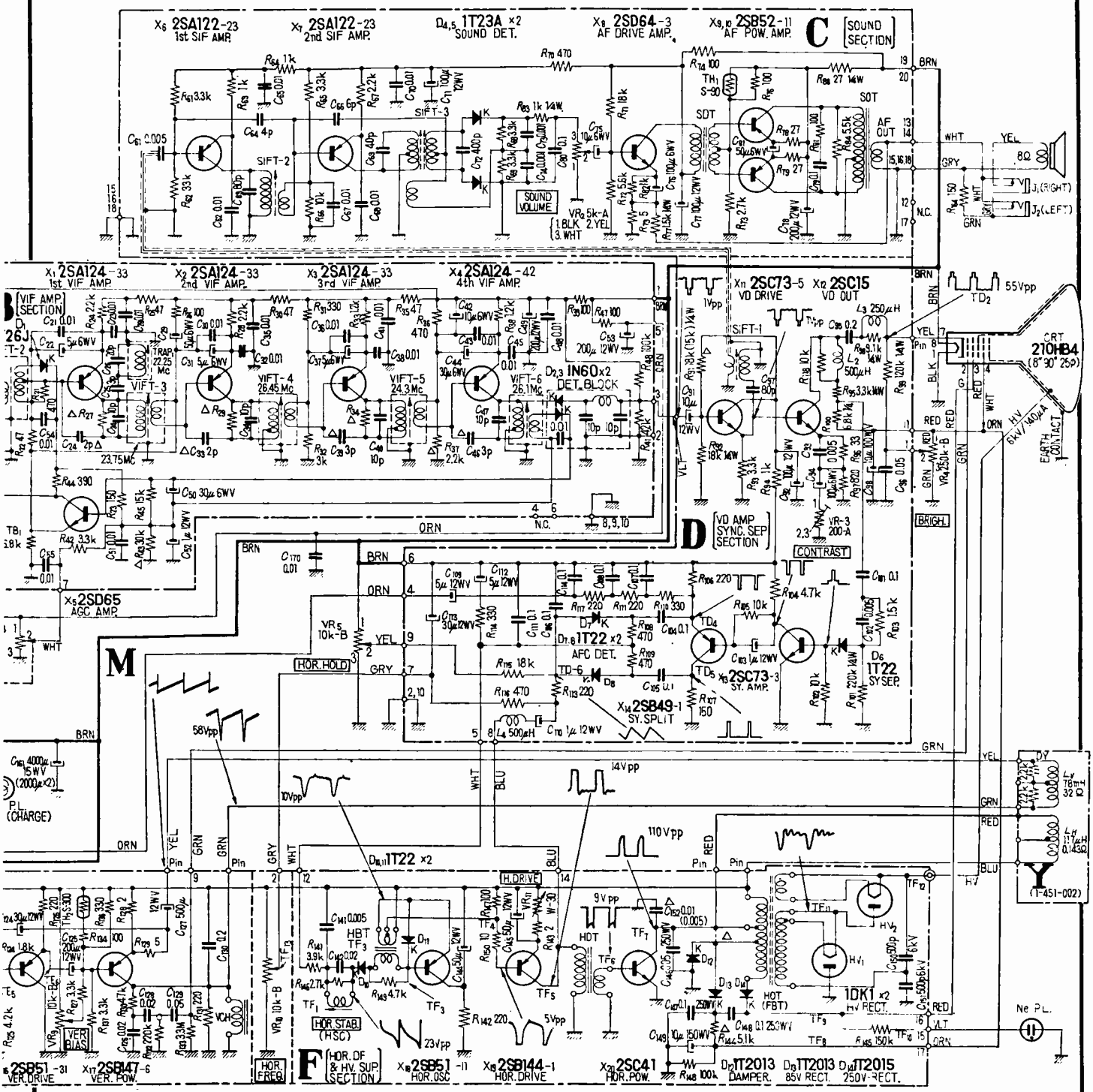
(Continued)

SCHEMATIC DIAGRAM

FOR SONY TRANSISTOR TV 8-301 W

(AMERICAN STANDARD)

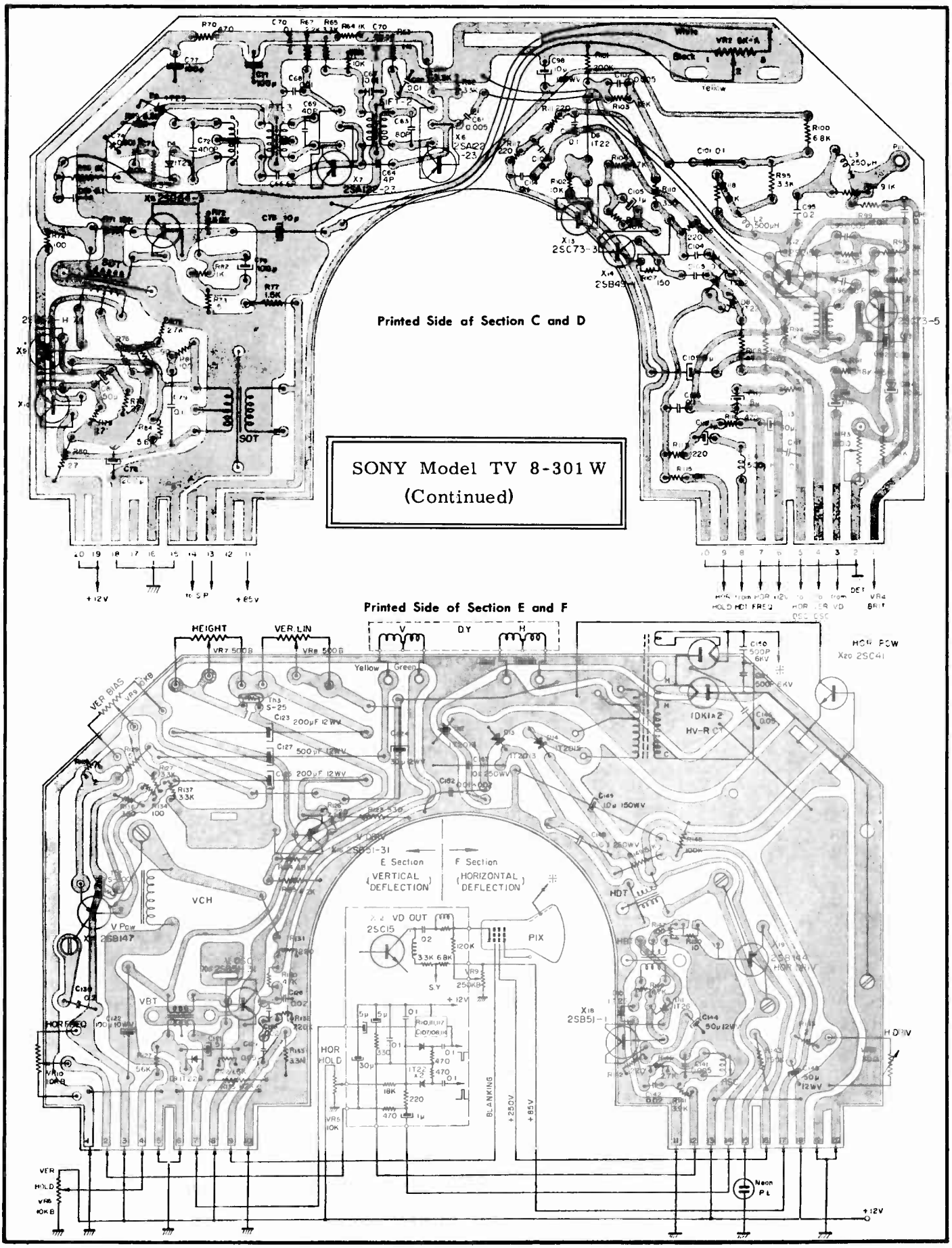




Specifications for Transistor Television SONY 8-301W

Picture Tube:	210HB4 8 inches, 90-degree Deflection Aluminized Screen, Automatic Control Focus, 8¼" in Length
Semi-conductors:	23 Transistors and 18 Diodes
Sensitivity:	Approx. 30μV at Antenna Input for All Channels
With Built-in Antenna:	Receives up to miles in flat terrain
With External Antenna:	Receives up to 93 miles in flat terrain

Intermediate Frequencies:	Video	26.75 Mc
	Sound	22.25 Mc
Video Band Width:	3.1 Mc/3db	
Resolution:	Vertical	400 Lines
	Horizontal	250 Lines
Audio Output:	300 Milliwatts with 10% Distortion	
External Antenna Output:	300-ohm balanced	
Speaker:	4"×2½" PM Dynamic	


Printed Side of Section C and D
Printed Side of Section E and F
SONY Model TV 8-301 W
(Continued)
HEIGHT
VER. LIN
DY
E Section
(VERTICAL DEFLECTION)
F Section
(HORIZONTAL DEFLECTION)
VCH
V Pow
VBT
HOR FREQ
HOR HOLD
VER HOLD
PIX
BLANKING
+250V
+85V
+12V
H DRIV
Neon PL
HDT
HOR POW

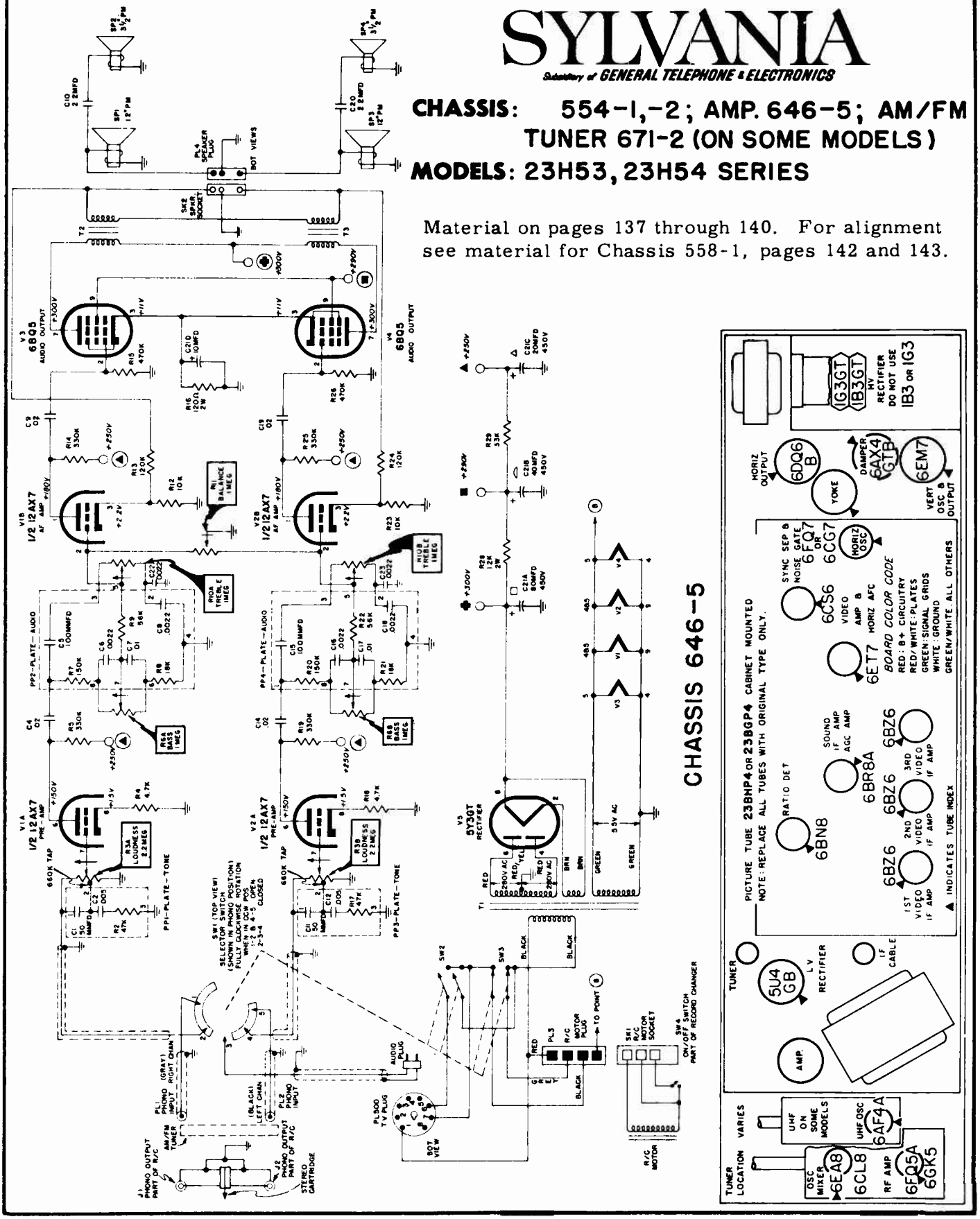
SYLVANIA

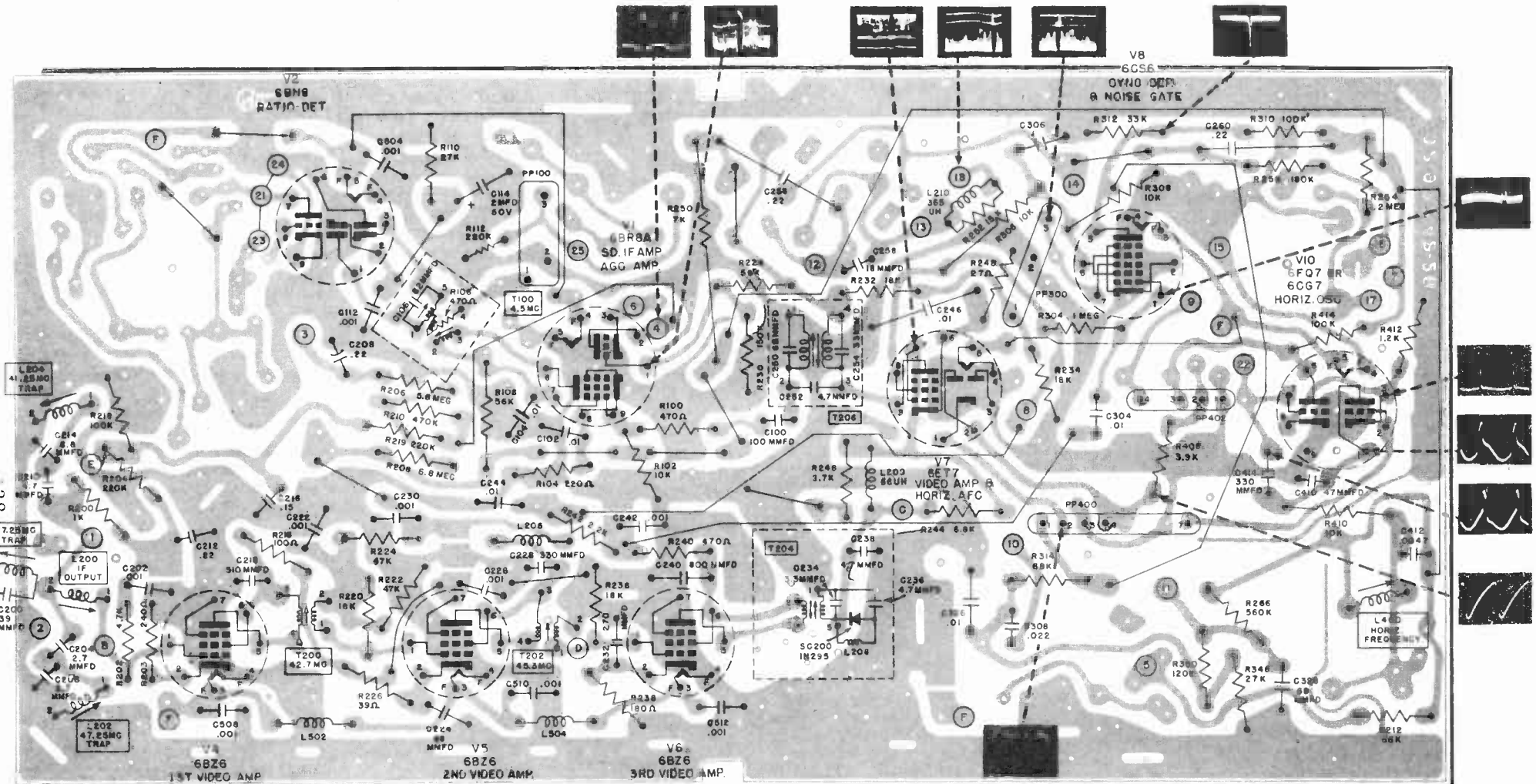
Subsidiary of GENERAL TELEPHONE & ELECTRONICS

CHASSIS: 554-1,-2; AMP. 646-5; AM/FM TUNER 671-2 (ON SOME MODELS)

MODELS: 23H53, 23H54 SERIES

Material on pages 137 through 140. For alignment see material for Chassis 558-1, pages 142 and 143.





PRINTED BOARD ASSEMBLY — 554-1,-2 CHASSIS

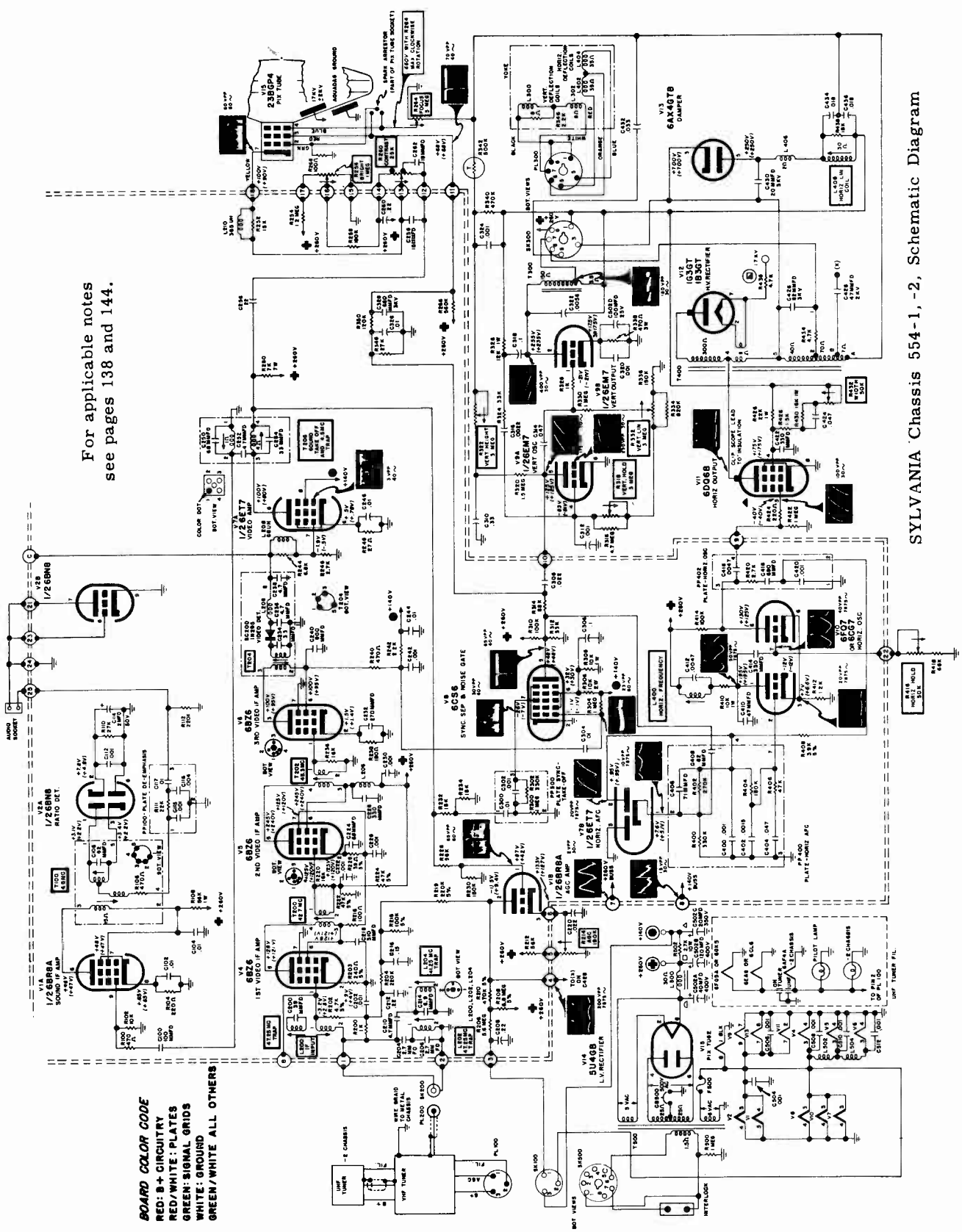
GENERAL SCHEMATIC NOTES

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 points, corresponding with those shown on parts layout of printed board.
4. All capacitors are in microfarads unless otherwise specified.
5. Coils, transformers, plugs and sockets are shown as viewed from the bottom.
6. Arrows on controls indicate direction of clockwise rotation.
7. Schematic coordinates are for reference in locating components.

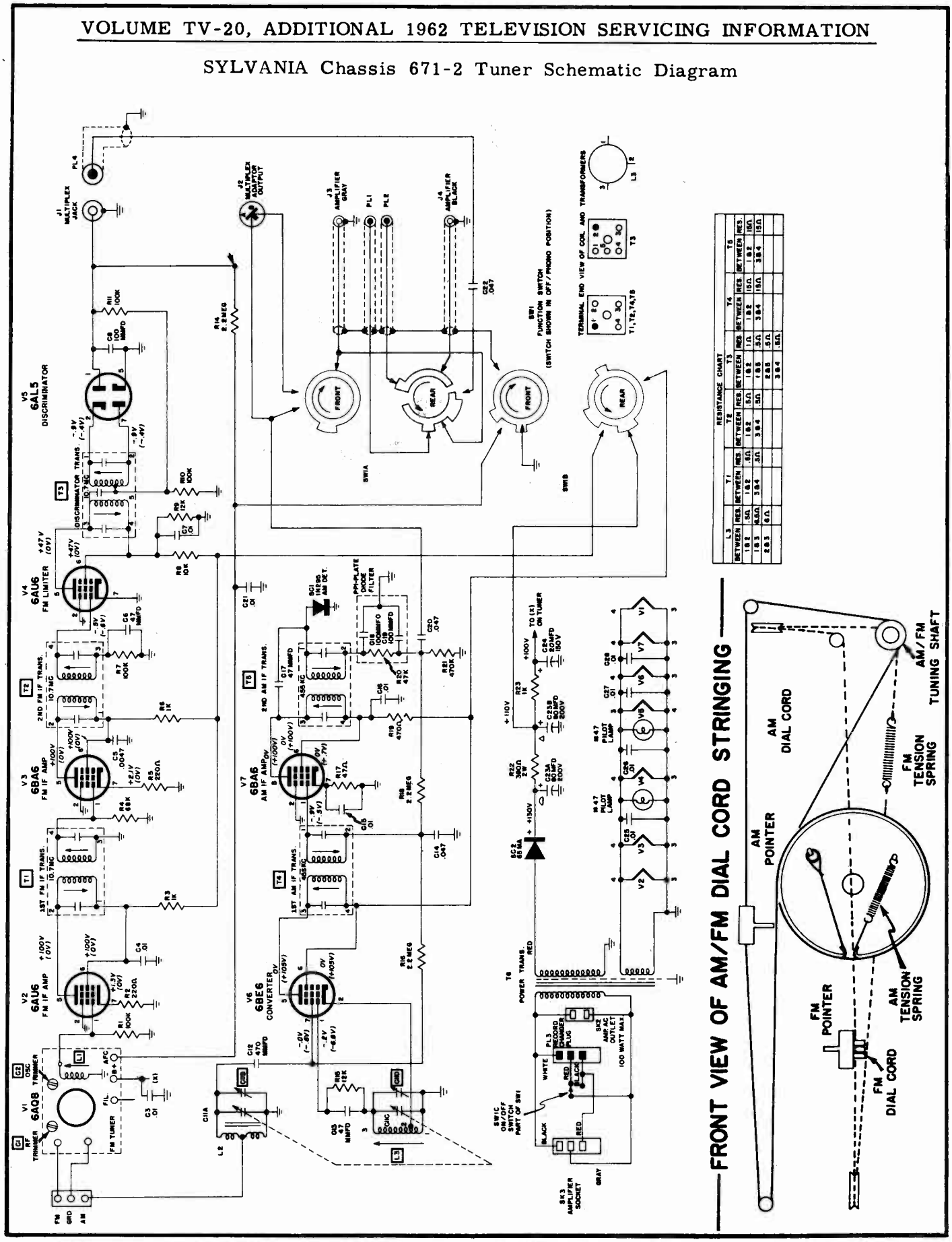
WAVEFORM MEASUREMENT CONDITIONS

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 a wide band oscilloscope. (Other type oscilloscopes may alter waveform shapes or amplitudes).
4. The terms "60~" or "7875~" refer to scope frequency used.

SYLVANIA Chassis 554-1, -2, Printed Board


For applicable notes
see pages 138 and 144.
SYLVANIA Chassis 554-1, -2, Schematic Diagram
BOARD COLOR CODE
RED: B+ CIRCUITRY
RED/WHITE: PLATES
GREEN: SIGNAL GRIDS
WHITE: GROUND
GREEN/WHITE ALL OTHERS

SYLVANIA Chassis 671-2 Tuner Schematic Diagram



SYLVANIA
Subsidiary of GENERAL TELEPHONE & ELECTRONICS

CHASSIS: 558-1,-2
MODELS: 19L17 SERIES

CHASSIS REMOVAL

1. Disconnect AC power cord and antenna connections. Remove interlock cover.
2. Disconnect the following plug and socket connections:
   A. Yoke - at chassis
   B. Tuner cluster - at chassis
   C. Picture tube cable - at picture tube
   D. Volume control cable - at chassis
   E. High voltage lead - at picture tube
   F. IF input - at chassis
   G. Speaker leads - at speaker
3. Remove screw securing braided cable grounding tuner assembly to main chassis.
4. Remove chassis mounting screws.
5. Slide chassis to the rear until clear of cabinet. NOTE: Lower front control knobs will automatically disconnect while chassis is being removed.
6. Remove tuner cluster knobs by pulling straight outward.
7. Remove screw securing antenna board to cabinet.
8. Remove tuner mounting screw securing tuner cluster to cabinet.
9. Lift tuner cluster upward slightly and then back. Remove tuner cluster.
10. To replace chassis, reverse the above procedure, engaging lower front controls by pressing ends of shaft assemblies over control shafts. Re-connect all plug and socket connections.

CENTERING ADJUSTMENT

1. Position deflection yoke as far forward as possible on the neck (against the flare) of the picture tube.
2. Rotate centering adjustment rings (located on yoke cover) individually or together, until picture is centered. Turn brightness control to a low level and check that no corner cutting exists in the picture.

FOCUS

With contrast and brightness at normal settings, adjust R264 for maximum sharpness and clarity of fine detail in center and edges of picture.

AGC ADJUSTMENT

1. Set channel selector to strongest channel in area and adjust fine tuning control to correct tuning point.
2. Set contrast and brightness controls to maximum.
3. Rotate AGC control R214 clockwise until picture "bends" or "jumps" sideways.
4. Reverse rotation of the AGC control (counterclockwise) until picture is horizontally and vertically stable.
5. Reduce contrast and brightness to normal setting, rotate fine tuning control to correct tuning point. Normal picture should be observed. If this condition cannot be met, rotate the AGC control a small amount further in the counterclockwise direction.

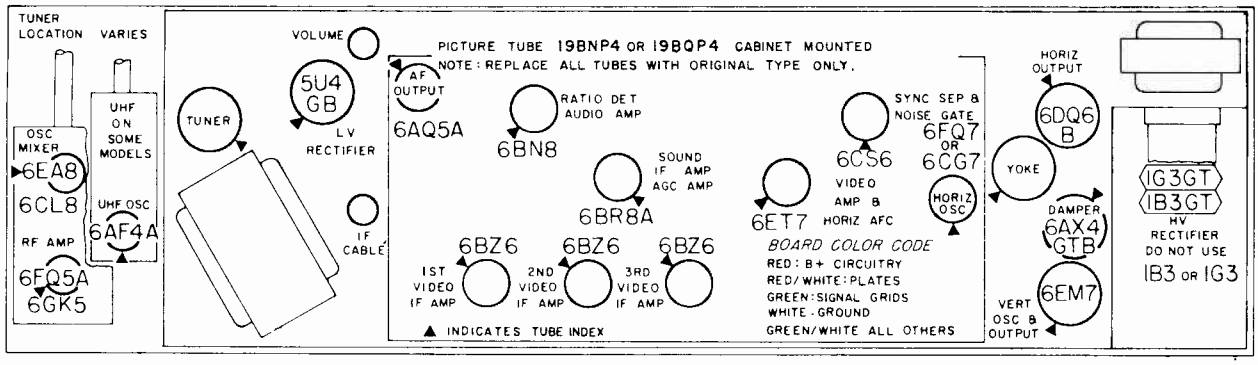
HORIZONTAL AFC ADJUSTMENT

Before performing the following procedure, check AGC adjustment as described:

1. Rotate horiz. hold control R416 to center of rotation.
2. Set channel selector to strongest channel in area and adjust fine tuning control to correct tuning point.
3. Adjust vertical height, vertical linearity, and width control for normal picture.
4. Rotate horizontal frequency control L400 in either direction until picture falls out of horizontal sync. (If picture is not out of sync at the end of the control range, momentarily switch tuner to "free" channel and then return to original.)
5. Reverse rotation of frequency control slowly until picture falls into sync.
6. Rotate channel selector to a position on which no signal is received; then return to the original station. The picture should immediately fall into sync. If not, slightly readjust horizontal frequency control L400 and repeat this step.

(Continued on pages 142 through 146)

SYLVANIA Chassis 558-1, -2, Service Information, Continued



TUBE LAYOUT DIAGRAM

4.5 MC TRAP, SOUND IF AND RATIO DETECTOR ALIGNMENT

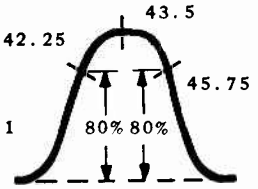
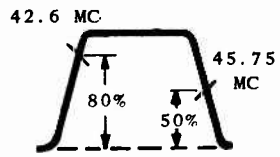
STEP	ALIGNMENT SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1	Set contrast control to maximum and brightness control to minimum. Connect -30 volts DC source (-) terminal to test point (E) and (+) terminal to chassis. Connect a 4.5 MC series tuned circuit between yellow cathode lead of picture tube and ground.	VTVM - Ground or "common" lead to junction of two matched 100K resistors connected in series across R110 (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) T206 (Bottom core) T206 (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: T206 (Bottom core) Using lowest signal generator output level, repeat Step 1 except T206 (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

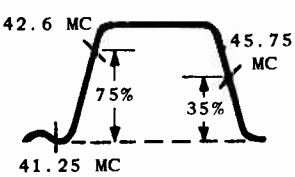
Connect a good antenna to the receiver and properly tune in a strong station. Adjust T206 (Bottom core) for minimum 4.5 MC interference in the picture. This interference takes the form of a "grainy" appearance or a fine line pattern through the picture.

SYLVANIA Chassis 558-1, -2, Alignment Information, Continued

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. Connect -3.5 V DC source (-) terminal to point (E) (+) terminal to chassis. Connect -25V DC source (-) terminal to point (3) (+) terminal to chassis.	SWEEP GENERATOR - through a .0047 MFD capacitor to point (D). Set generator to 43.5 MC with 10 MC sweep. Adjust sweep output for maximum without distorting curve. MARKER GENERATOR - Loosely coupled to sweep generator lead. OSCILLOSCOPE - Through a 33K resistor to point (C).	T204 Top and Bottom cores for maximum separation between cores. THEN Adjust bottom core for maximum scope deflection at 43.5 MC. Top core to adjust for tilt. Touch up both cores for correct response. See Figure 1.  FIGURE 1
2	Same as Step 1 Detune tuner converter plate (IF output) coil by turning core fully counterclockwise.  FIGURE 2	SWEEP GENERATOR - through a .0047 MFD capacitor to point (B). Set generator to 43.5 MC with 10 MC sweep. Adjust for 3 volt peak to peak. MARKER GENERATOR - Same Step 1. OSCILLOSCOPE - Same as Step 1. Calibrate oscilloscope for 3 volt peak to peak. Do not exceed for remainder of alignment.	a. Adjust T202 to position 45.75 MC marker. b. Adjust T200 to position 42.6 MC marker. c. Adjust T204 (top core) to remove tilt. Repeat steps A, B, C to obtain response curve shown in Figure 2. DO NOT ADJUST T204 BOTTOM CORE.
3	Same as Step 2	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. MARKER GENERATOR - Loosely coupled to jig shield. OSCILLOSCOPE - Same as Step 2.	a. Set marker generator at 47.25 MC. Detune L202 then adjust trap L200 (top core) for maximum dip. Adjust L202 for maximum dip at 47.25 MC. b. Set signal generator at 41.25 MC and adjust L204 for maximum dip. Note: to observe results it may be necessary to disconnect the -3.5 V DC source to point (E).

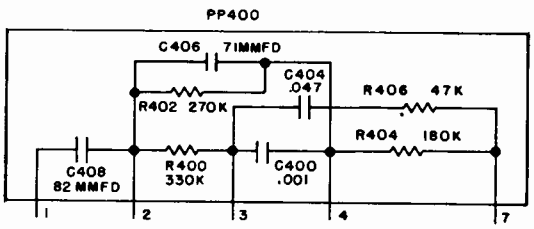
ALTERNATE STEP 3 - Remove -3.5V DC source from point (E). Connect a VTVM on — DC scale to point (C).
1. Insert 47.25 MC CW signal from signal generator into jig shield. Adjust L200 (top core) and L202 for minimum DC reading on meter. 2. Insert 41.25 MC CW signal to jig shield and adjust L204 for minimum DC reading on meter.

4	Same as Step 2  FIGURE 3	SWEEP GENERATOR - Same as Step 3. MARKER GENERATOR - Same as Step 3. OSCILLOSCOPE - Same as Step 3.	a. Adjust converter coil in tuner and L200 (bottom core) to position 42.6 and 45.75 markers as shown in Figure 3. Note: If 42.6 marker will not position properly, adjust T200 and T204 (top core) slightly. DO THIS ONLY IF NECESSARY.

SYLVANIA Chassis 558-1, -2, Schematic Diagram, Continued

VOLTAGE MEASUREMENT CONDITIONS UNLESS OTHERWISE SPECIFIED.

1. Voltages measured to chassis using VTVM.
2. AC power source 120 volt 60 cycle line.
3. Voltage readings in brackets taken with no 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 a strong local station developing approximately -3.5 volts on IF AGC Buss, test point (E), (Junction of R218 and R219).
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.

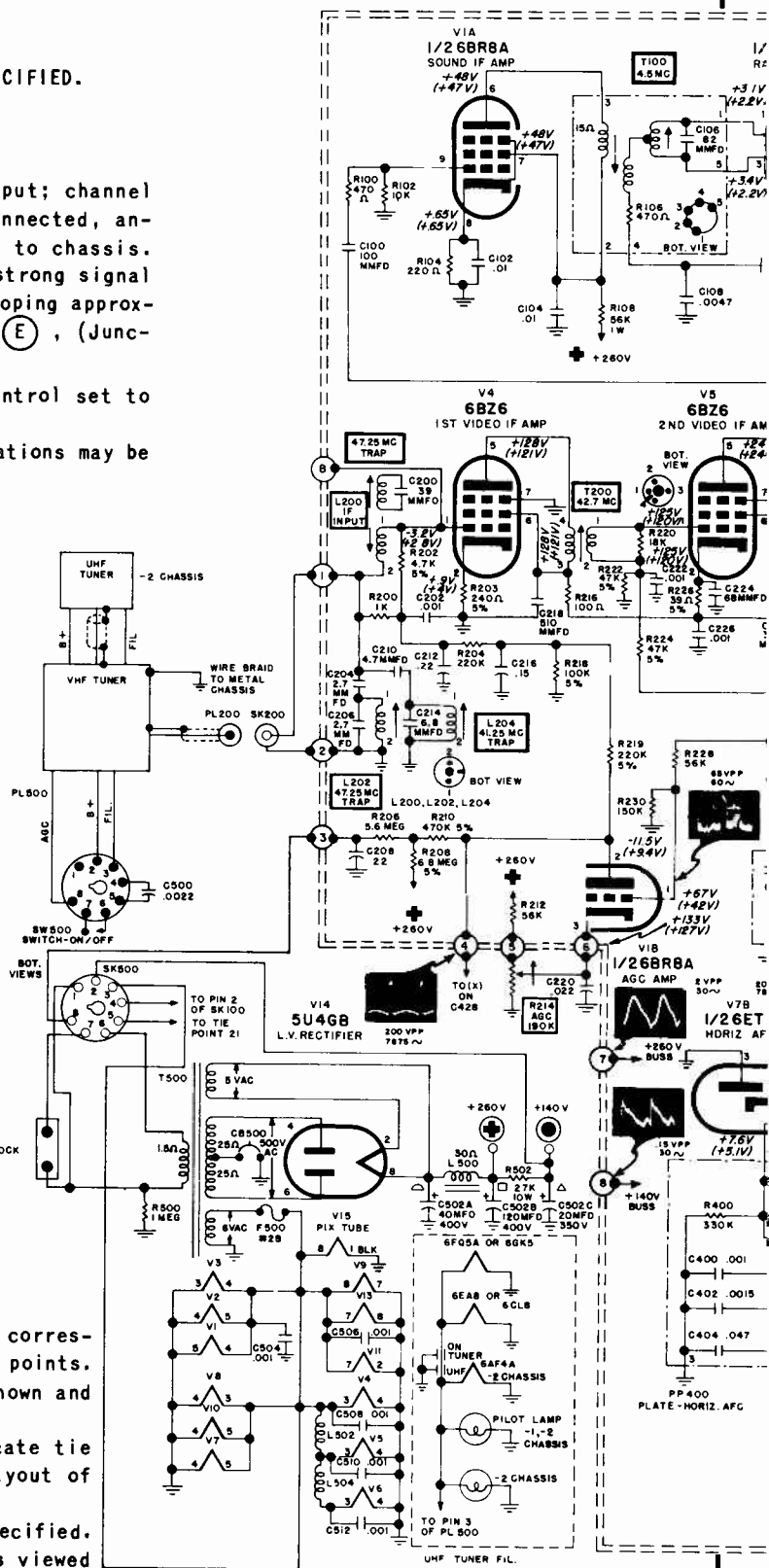


PARTS CODING

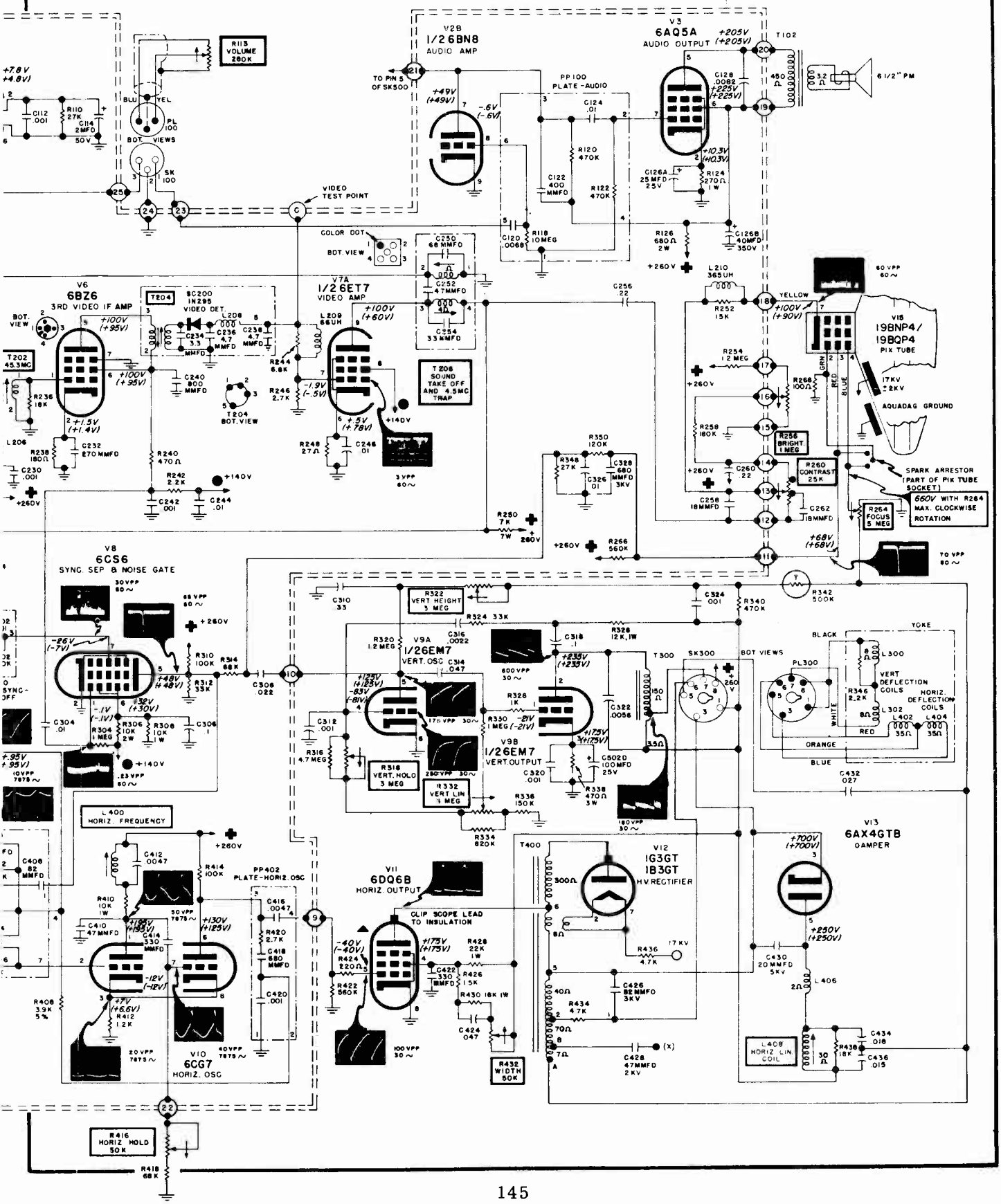
Sound Section	100-199
Video Section	200-299
Vert. and Sync Section	300-399
Horiz. and H.V. Section	400-499
L.V. Supply, Fil.	500-599

GENERAL SCHEMATIC NOTES

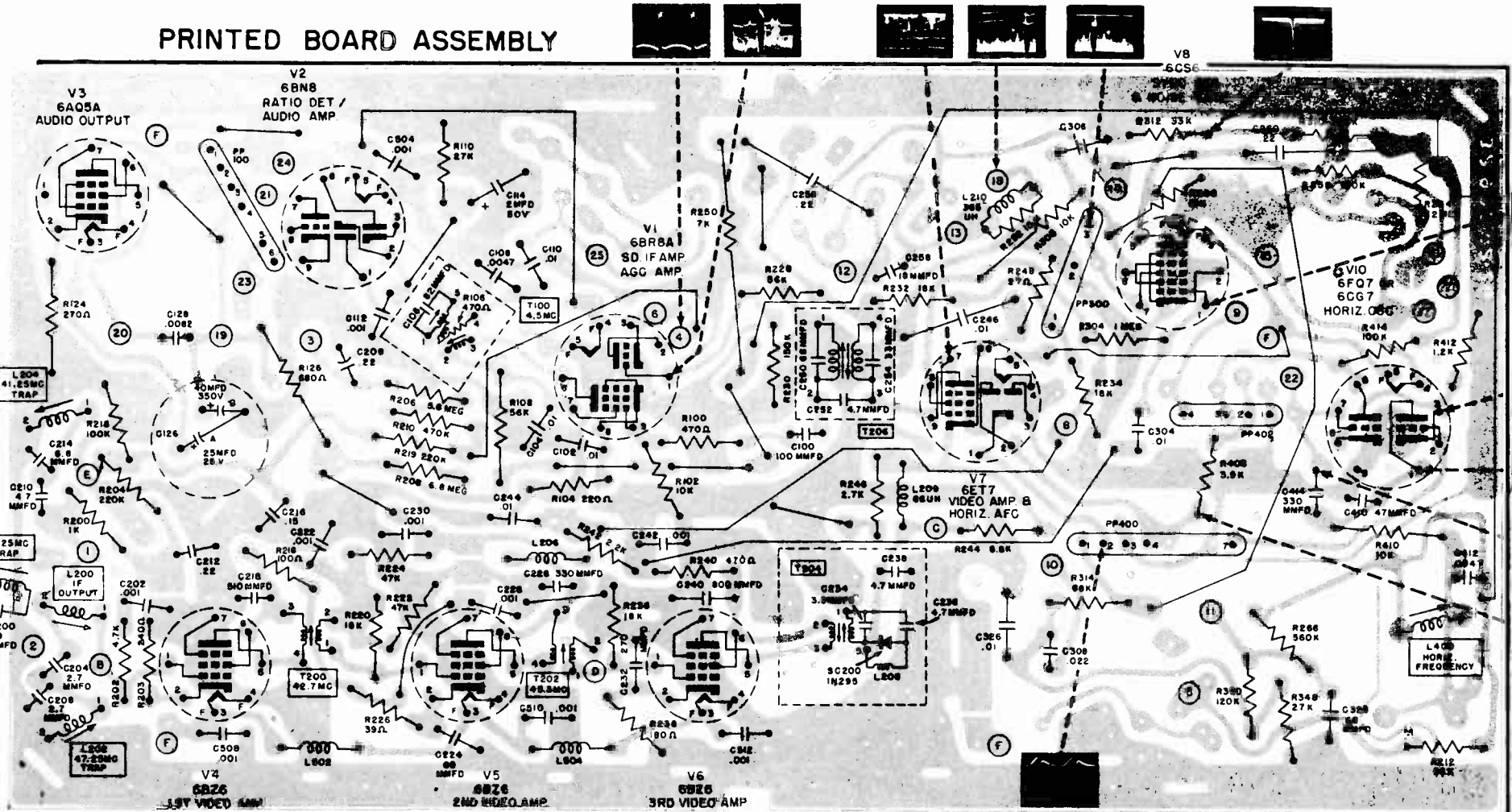
Voltage sources are indicated by encircled symbols; corresponding symbols without circles indicate voltage tie points.
Average resistances of coils and transformers are shown and are measured with component connected in circuit.
Encircled numbers on edge of printed circuit indicate tie points, corresponding with those shown on parts layout of printed board.
All capacitors are in microfarads unless otherwise specified.
Coils, transformers, plugs and sockets are shown as viewed from the bottom.
Arrows on controls indicate direction of clockwise rotation.



SYLVANIA Chassis 558-1, -2, Schematic Diagram, Continued

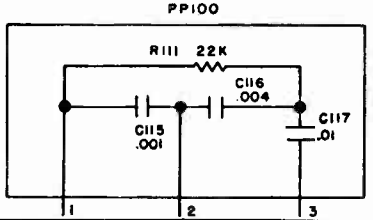


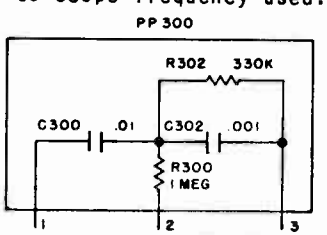
PRINTED BOARD ASSEMBLY



WAVEFORM MEASUREMENT CONDITIONS

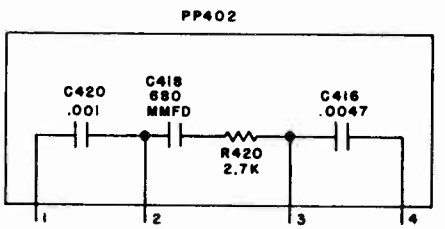
1. Channel selector set to strong channel.
2. Contrast control set for signal of 60 volt peak to peak at yellow lead of picture tube.
3. Waveforms measured with respect to chassis using a wide band oscilloscope. (Other type oscilloscopes may alter waveform shapes or amplitudes).
4. The terms "60~" or "7875~" refer to scope frequency used.





BOARD COLOR CODE

RED: B+ CIRCUITRY
RED/WHITE: PLATES
GREEN: SIGNAL GRIDS
WHITE: GROUND
GREEN/WHITE ALL OTHERS



SYLVANIA Chassis 558-1, -2, Printed Board

MODEL AND CHASSIS CHART

MODEL	CHASSIS	TUNERS USED	TUNER TUBES
H-P3410 H-P3411 H-P3412	V2409-6	470V071H02	RF AMP 6ER5 Osc-Mix 6CG8A
H-P3410U H-P3411U H-P3412U	V2409-5	470V071H02 472V037H02	RF AMP 6ER5 Osc-Mix 6CG8A Osc 6AF4A Xtal 1N82A
H-P3460 H-P3461	V2409-7 V2418-1 (Rem Rec) 559V087H01 (Rem Transmitter)	470V071H02	RF AMP 6ER5 Osc-Mix 6CG8A
H-P3463	V2409-8 V2418-1 (Rem Rec) V2430-1 (Mobil Sound) 559V087H01 (Rem Transmitter)	470V071H02	RF AMP 6ER5 Osc-Mix 6CG8A
H-P9090 H-P9091	V2409-4	470V077H01	RF AMP 6ER5 Osc-Mix 6CG8A

Westinghouse

CHASSIS ASSEMBLIES

V-2409-4 VHF Manual
V-2409-5 VHF/UHF Manual
V-2409-6 VHF Manual
V-2409-7 Remote Control
V-2409-8 Remote Control With Mobil Sound

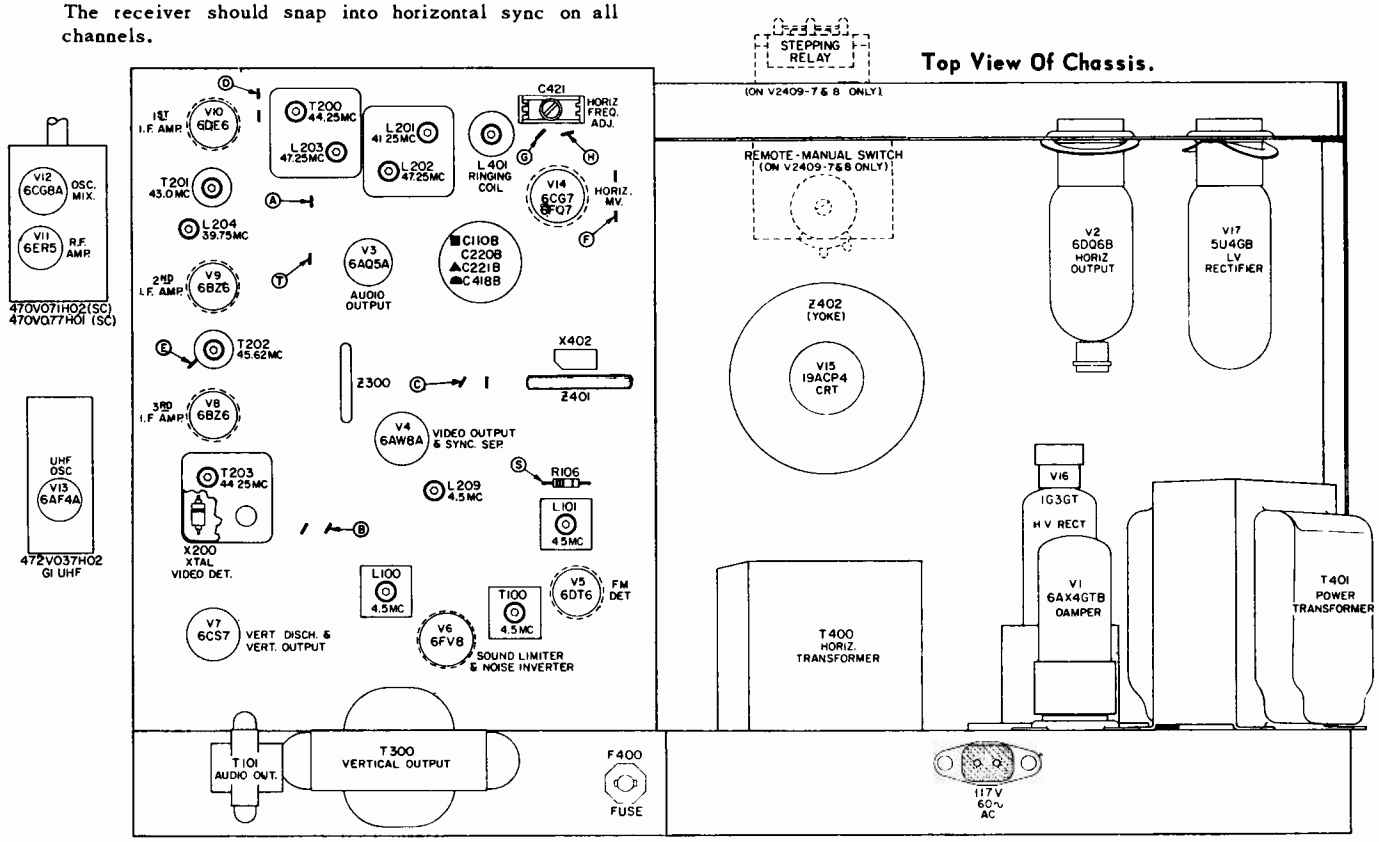
RINGING COIL AND HORIZONTAL FREQUENCY ADJUSTMENT

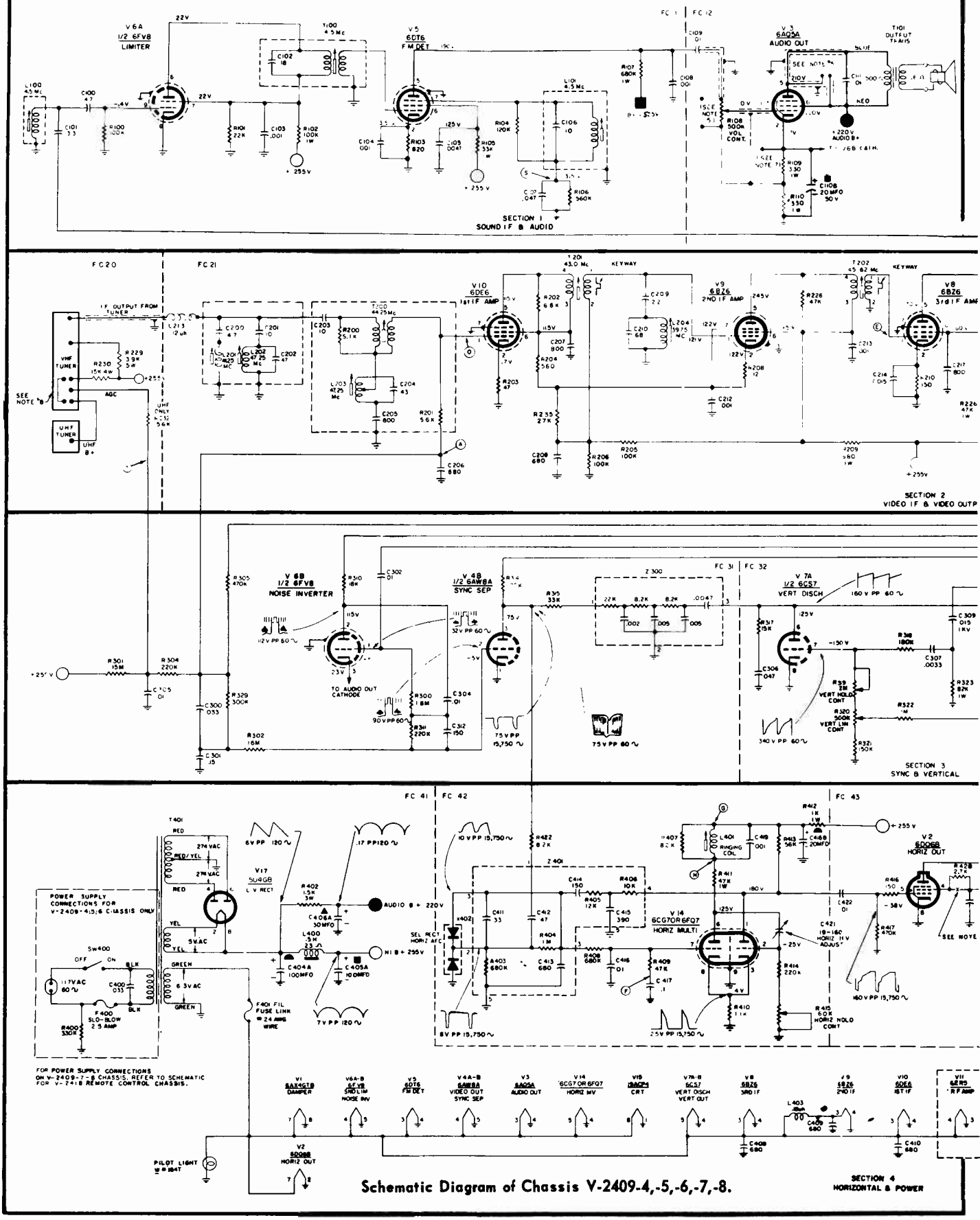
1. Short out the ringing coil (L401) with a jumper wire.
2. Set the horizontal hold control to the center of its mechanical range. Do not change this setting during the steps that follow.
3. Calibrate a VTVM to 0V Center scale on the 1.5V range and connect to test point (F) for measuring the DC voltage between (F) and ground.
4. With the receiver tuned to a station of normal signal strength, adjust trimmer C421 so that moving it one way causes the meter to swing to the left and moving it the other way causes it to swing to the right. Then carefully adjust trimmer C421 for center scale on this meter.
5. Remove the jumper from the ringing coil.
6. Adjust the ringing coil for center scale on the VTVM. Check by switching to another channel and back again. The receiver should snap into horizontal sync on all channels.

WIDTH ADJUSTMENT

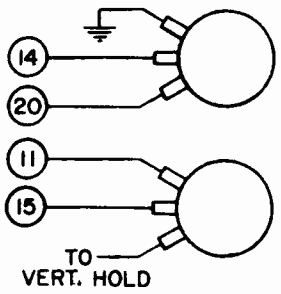
This adjustment is a plastic tab with a copper rectangle bonded on to one side. It protrudes out from between the yoke and the bottom of the neck of the picture tube. The shiny side of the copper rectangle goes down against the picture tube while the clamp opening goes to the top. The rectangle must be centered at the bottom of the CRT neck.

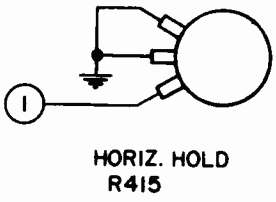
To adjust the width, loosen the yoke clamp. Pushing the tab into the yoke decreases width. Pulling the tab out of the yoke increases width. Best linearity, however, is possible with the width tab pushed all the way in. If insufficient width occurs, pull out the tab for just enough scan without causing poor linearity. A jumper across R428 gives maximum scan when left in the circuit. Removing this jumper would decrease the width.

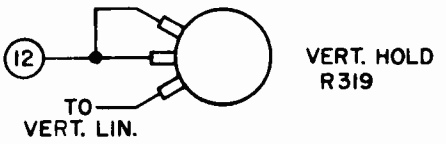


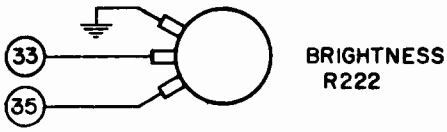

SECTION 1
SOUND I F & AUDIO
SECTION 2
VIDEO I F & VIDEO OUTP
SECTION 3
SYNC & VERTICAL
SECTION 4
HORIZONTAL & POWER
Schematic Diagram of Chassis V-2409-4,-5,-6,-7,-8.

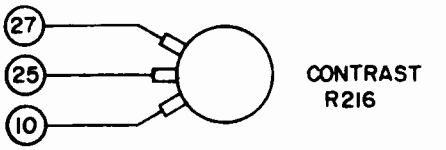
WESTINGHOUSE Chassis V-2409-4, -5, -6, -7, -8 (Continued)

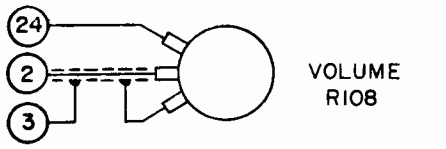


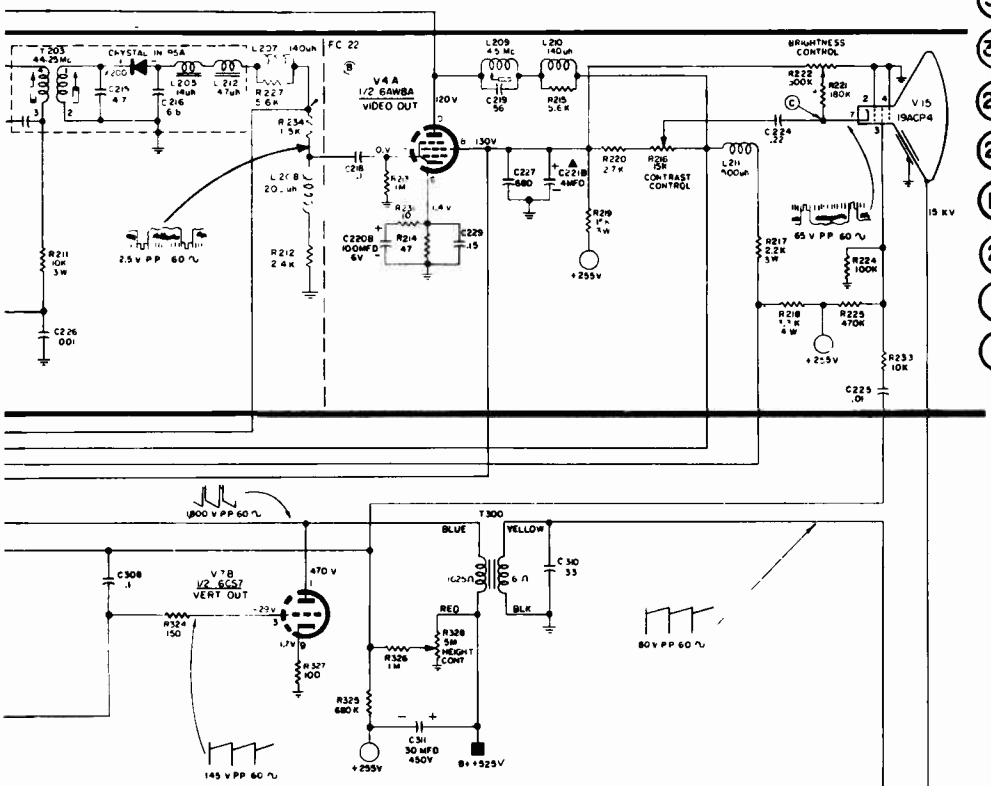


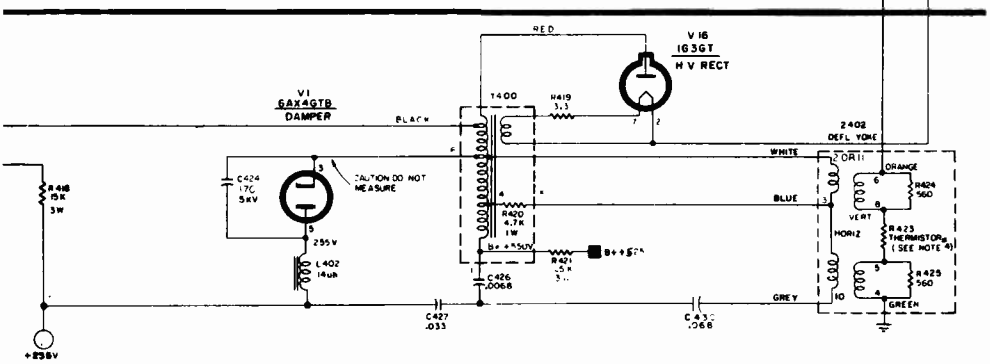


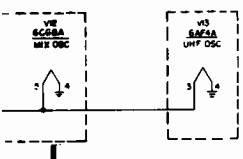












NOTES

1. ALL CAPACITANCE VALUES LESS THAN 1 ARE IN MFD AND VALUES GREATER THAN 1 ARE IN MMF. WHILE ALL RESISTANCE VALUES ARE IN OHMS, 1/2 WATT UNLESS OTHERWISE INDICATED.
2. D C VOLTAGES MEASURED FROM B−, WITH A VTVM, NO SIGNAL APPLIED, LINE VOLTAGE AT 117 VAC
3. WAVEFORMS WERE TAKEN WITH CONTROLS SET FOR A NORMAL PICTURE WITH CONTRAST CONTROL SET FOR 65V P-P AT T. P. "C".
4. RESISTANCE MEASURES 8 OHMS COLD AND 1 OHM HOT
5. CONNECTED TO REMOTE CONTROL STEPPING RELAY ON V-2409-7-8 CHASSIS. (SEE SCHEMATIC FOR V-2418 CHASSIS)
6. SERVICE AND FACTORY ADJUSTMENT - JUMPER IN GIVES MAXIMUM WIDTH.
7. SUPPLY VOLTAGE FOR SILENT SOUND OSCILLATOR ON V-2409-8 CHASSIS (SEE SCHEMATIC FOR V-2430 CHASSIS)
8. MAKES CONTACT ON CHANNEL "1".

KEY TO PC BOARD LAYOUT

1. Horiz hold control (see diagram)
2. Volume control (see diagram)
3. Volume control (see diagram)
4. Tuner IF output
5. Tuner filament
6. Pilot lamp filament
7. Tuner AGC
8. Shielded cable to (16)
9. C406A
10. Contrast control (see diagram)
11. Vertical lin control (see diagram)
12. Vertical hold control (see diagram)
13. T300 primary, blue wire
14. Height control (see diagram)
15. Vertical lin control (see diagram)
16. Shielded cable to (8)
17. T101 primary, blue wire
18. T300 secondary, black wire
19. Z402 green wire
20. Height control (see diagram)
21. T300 primary, red wire
22. Junction C311, R421
23. CRT pin 8
24. Volume control (see diagram)
25. Contrast control (see diagram)
26. C405A
27. Contrast control (see diagram)
28. Z402 orange wire
29. T300 secondary, yellow wire
30. CRT pin 3
31. CRT pin 1
32. CRT pin 2
33. Brightness control (see diagram)
34. CRT pin 7
35. Brightness control (see diagram)
36. CRT pin 4
37. Junction R416, R417

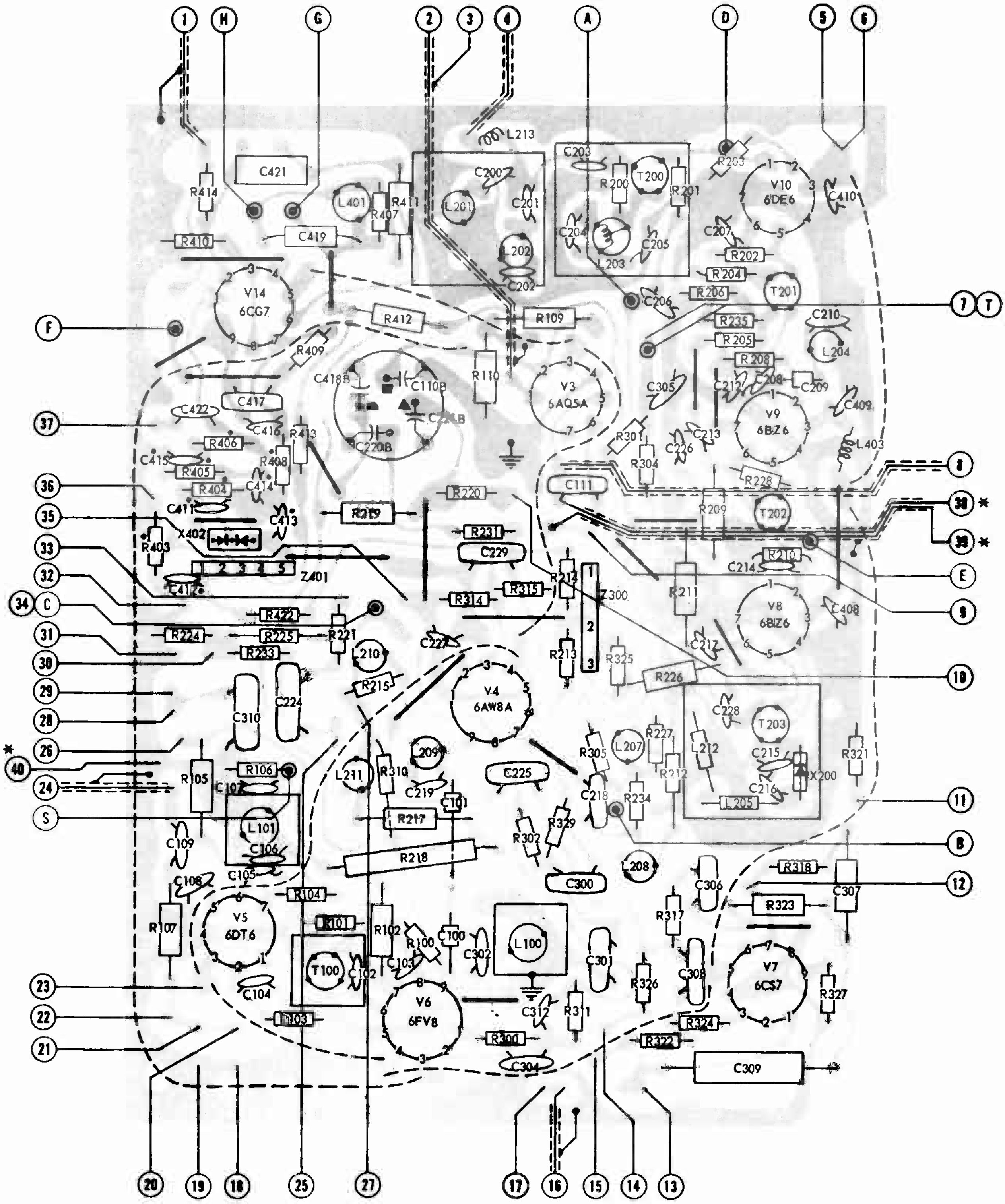
*38. SWB K400 stepping relay
*39. SWB K400 stepping relay
*40. To Mobil Sound chassis ground

TEST POINTS

A	AGC Test Points for IF	F	Horiz MV
B	Video detector	G	Ringing coil
C	CRT cathode	H	
D	1st IF	S	FM sound
E	3rd IF	T	Tuner AGC

* V2409-8 Chassis only

WESTINGHOUSE PC Board of Chassis V-2409-4, -5, -6, -7, -8, Continued



• OMIT IF Z401 IS USED   * V2409-8 ONLY

See page 149 for KEY to PC Board Layout.

Bottom View of PC Board Showing Location of Top Components in Solid Outlines. Tube Pin Numbering is for Bottom of Socket.

MODEL AND CHASSIS CHART

Model	Chassis	Tuners Used	Tuner Tubes
H-P3400A H-P3401A H-P3402A	V-2409-11	470V071H01 VHF	MIX-OSC: 6CG8A RF AMP: 6ER5
H-P3400UA H-P3401UA H-P3402UA	V-2409-12	470V063H03 VHF 472V037H02 UHF	MIX-OSC: 6CL8A RF AMP: 6EA5 OSC: 6AF4A CRYSTAL: 1N82A
H-P3450A H-P3451A H-P3452A	V-2409-13 V-2408 Remote Director	470V071H01 VHF	MIX-OSC: 6CG8A RF AMP: 6ER5

Westinghouse

CHASSIS ASSEMBLIES

MANUAL, VHF ONLY V-2409-11

MANUAL, VHF/UHF V-2409-12

REMOTE CONTROLLED V-2409-13

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:	6AX4GTB	Damper	NC	NC		NC	23*	NC	FIL	FIL	
V2:	6DQ6B	Horiz Out.	NC	FIL	15K*	15K*	470K	NC	FIL	0	Cap 16▲
V3:	6AQ5A	Audio Out.	0 to 500K	330	FIL	FIL	2K*	1.5K*	0 to 500K		
V4:	6AW8A	Video Out. & Sync Sep.	0	2.4M	75K*	FIL	FIL	47	1M	10K*	5K*
V5:	6DT6	FM Det	5	820	FIL	FIL	682K▲	33K*	560K		
V6:	6FV8	Sound Lim & Noise Inverter	4.4M	23K*	330	FIL	FIL	16K	16K	0	100K
V7:	6CS7	Vert Disch & Vert Out	3.1K▲		1.2M to 1.7M	FIL	FIL	550K*	650K to 2.6M	0	100
V8:	6BZ6	3RD IF	.1	150	FIL	FIL	10K*	47K*	0		
V9:	6BZ6	2ND IF	55K*	INF	FIL	FIL	700*	700*	12■		
V10:	6DE6	1ST IF	58K	47	FIL	FIL	572■	572■	0		
V11:	6EA5● 6ER5†	RF AMP	720K 0	0 740K	FIL FIL	FIL FIL	1.2K* 5.7K*	47K* 0	0 0		
V12:	6CL8A● 6CG8A†	MIX-OSC	INF 4.7K	700* 15.6K*	INF 0	FIL FIL	FIL FIL	INF 6.6K*	INF 28K*	0 0	102K 222K
V13:	6AF4A	UHF OSC	12.8K*	5.6K	FIL	FIL	.1	5.6K	12.8K*		
V14:	6CG7/6FQ7	Horiz MV	57K*	180K to 220K	1K	FIL	FIL	48K*	2.2M	1K	0
V15:	19ACP4	CRT	FIL	0	85K	0	NC	NC	130K	FIL	
V16:	1G3GT	Hv Rect	← INFINITE →								Cap 680
V17:	5U4GB	LV Rect	NC		NC	28	NC	28	NC		

NC No connection

Resistances measured from tube pin to chassis ground (Except *▲ ■)

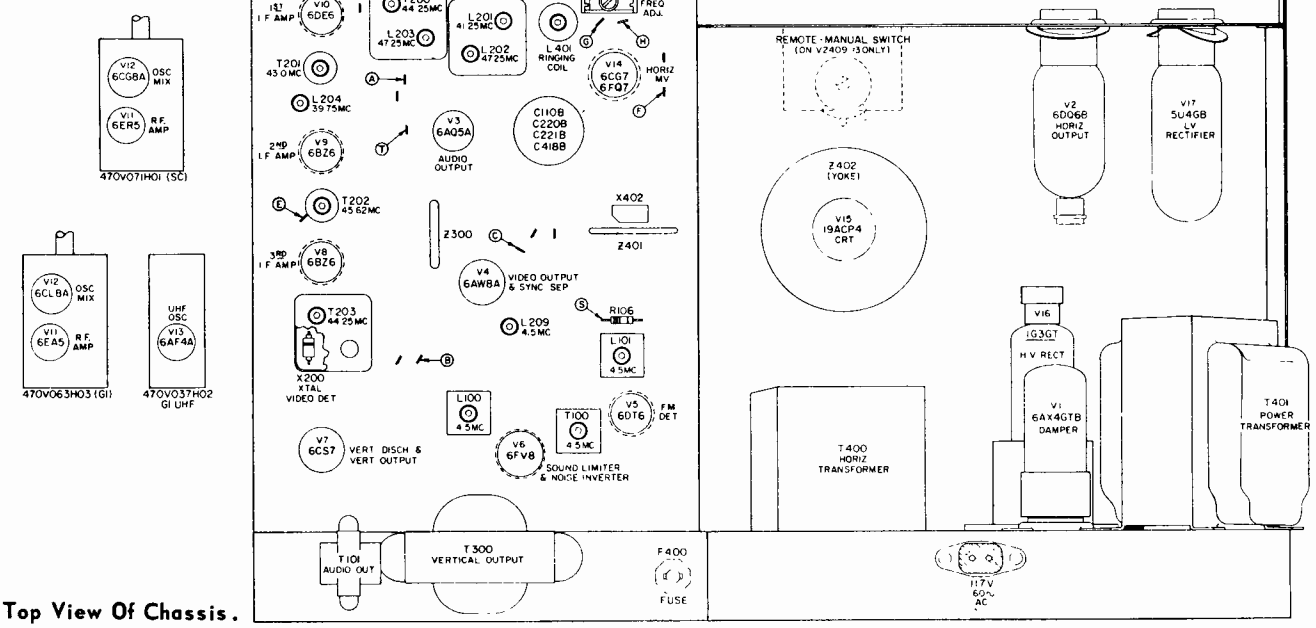
* Resistances measured from tube pin to pin 8, V17 (5U4GB)

▲ Resistances measured from tube pin to pin 3, V1 (6AX4GTB)

■ Resistances measured from tube pin to pin 2, V9 (6BZ6)

● Used with 470V063H03 tuner

† Used with 470V071H01 tuner



Top View Of Chassis.

WESTINGHOUSE V-2409-11, -12, -13

RINGING COIL AND HORIZONTAL FREQUENCY ADJUSTMENT

1. Short out the ringing coil (L401) with a jumper wire.
2. Set the horizontal hold control to the center of its mechanical range. Do not change this setting during the steps that follow.
3. Calibrate a VTVM to 0V center scale on the 1.5V range and connect to test point (F) for measuring the DC voltage between (F) and ground.
4. With the receiver tuned to a station of normal signal strength, adjust trimmer C421 so that moving it one way causes the meter to swing to the left and moving it the other way causes it to swing to the right. Then carefully adjust trimmer C421 for center scale on this meter.
5. Remove the jumper from the ringing coil.
6. Adjust the ringing coil for center scale on the VTVM. Check by switching to another channel and back again.

PILOT LAMP REPLACEMENT

1. To replace pilot lamps, remove the front knobs and escutcheon, held by one screw.
2. The remote pilot lamp clips onto the tuner mounting bracket. Remove only the shield to replace the lamp.
3. To replace the channel indicator lamp, remove the dial and the lamp shield. When replacing the shield, be sure the slot is toward the dial.
4. After replacing the dial, turn the set on and check to see that the channel numbers appear correctly. To adjust the pilot light, loosen the bracket screw from the rear of the set.

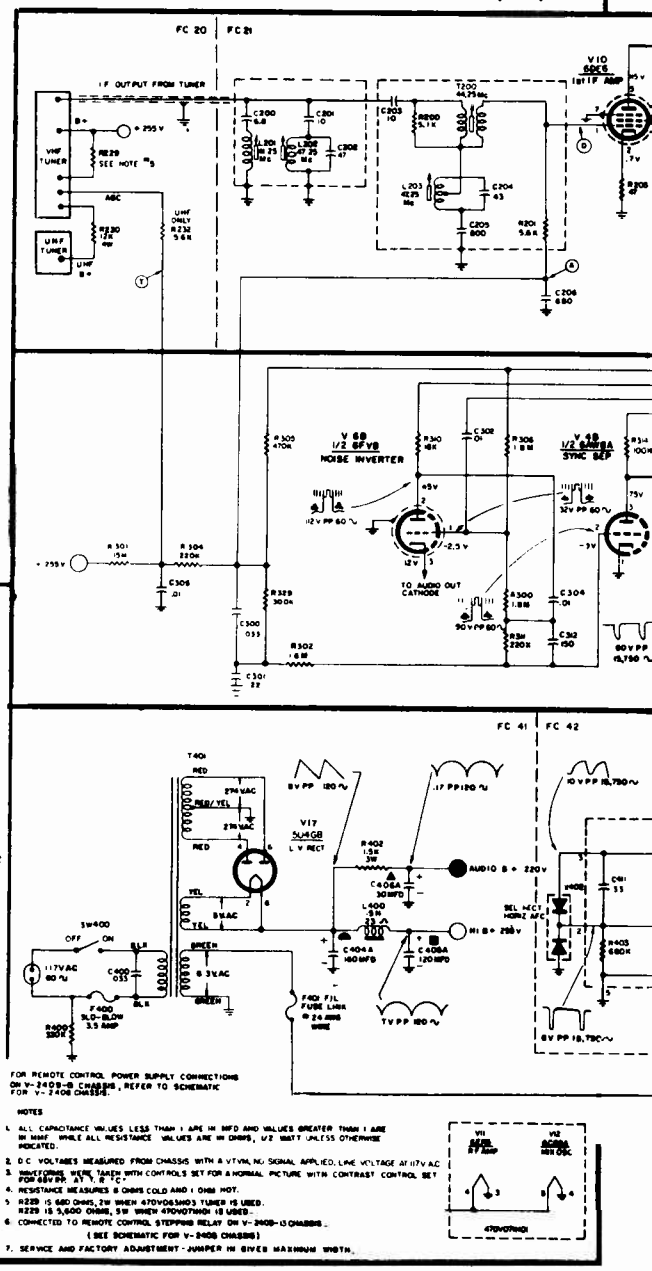
CHASSIS REMOVAL

1. Remove control knobs.
2. Remove back cover and antenna connectors.
3. On receivers having Remote Director remove remote receiver, amp-lok connector and transducer plug.
4. Unsolder the speaker leads at the speaker and remove the lower screw. The speaker can remain in the cabinet held by one screw.
5. Remove four screws holding control panel to front escutcheon and one screw holding top of CRT assembly to front escutcheon.
6. Remove the remaining seven screws from the bottom of the cabinet.
7. Carefully slide the chassis out from the cabinet, tuner assembly first.

WIDTH ADJUSTMENT

To adjust the width, loosen the yoke clamp. Pushing the tab into the yoke decreases width. Pulling the tab out of the yoke increases width. Best linearity, however, is possible with the width tab pushed all the way in. If insufficient width occurs, pull out the tab for just enough scan without causing poor linearity. A jumper across R428 gives maximum scan when left in the circuit. Removing this jumper would decrease the width.

Schematic Diagram of Chassis V-2409-11,-12,-13.



KEY TO PC BOARD LAYOUT (LATE PRODUCTION) V2409-11,-12,-13

1. Horizontal Hold control, high side
2. Volume control, arm
2A. Stepping relay (V-2409-13 chassis)
3. Tuner IF output
4. Tuner filament
4A. Pilot light, filament
5. Tuner AGC
6. Shielded cable to (13)
7. C406A
8. Vertical Lin control, low side
9. Vertical Hold control, arm and high side
10. T300 primary, blue wire
11. Height control, arm
12. Vertical Lin control, arm
13. Shielded cable to (6)
14. T101 primary, blue wire
15. V1, pin 7
16. Contrast control, high side (blue wire)
17. Contrast control, arm
18. T300 secondary, black wire
19. Z402, green wire
20. T300 primary, red wire
21. Height control, high side
22. Junction C311, R421
23. CRT pin 8
24. Volume control, high side
25. C405A
26. Z402, orange wire
27. T300 secondary, yellow wire
28. CRT, pin 3
29. CRT, pin 1
30. CRT, pin 7
31. CRT, pin 2
32. Brightness control, high side
33. Brightness control, arm
34. CRT, pin 4
35. Contrast control, low side
36. Junction R416 and R417

TEST POINTS

A. AGC for IF
B. Video Detector
C. CRT cathode
D. 1st IF grid
E. 3rd IF grid
F. Horizontal MV
G., H. Ringing Coil
S. FM sound
T. Tuner AGC

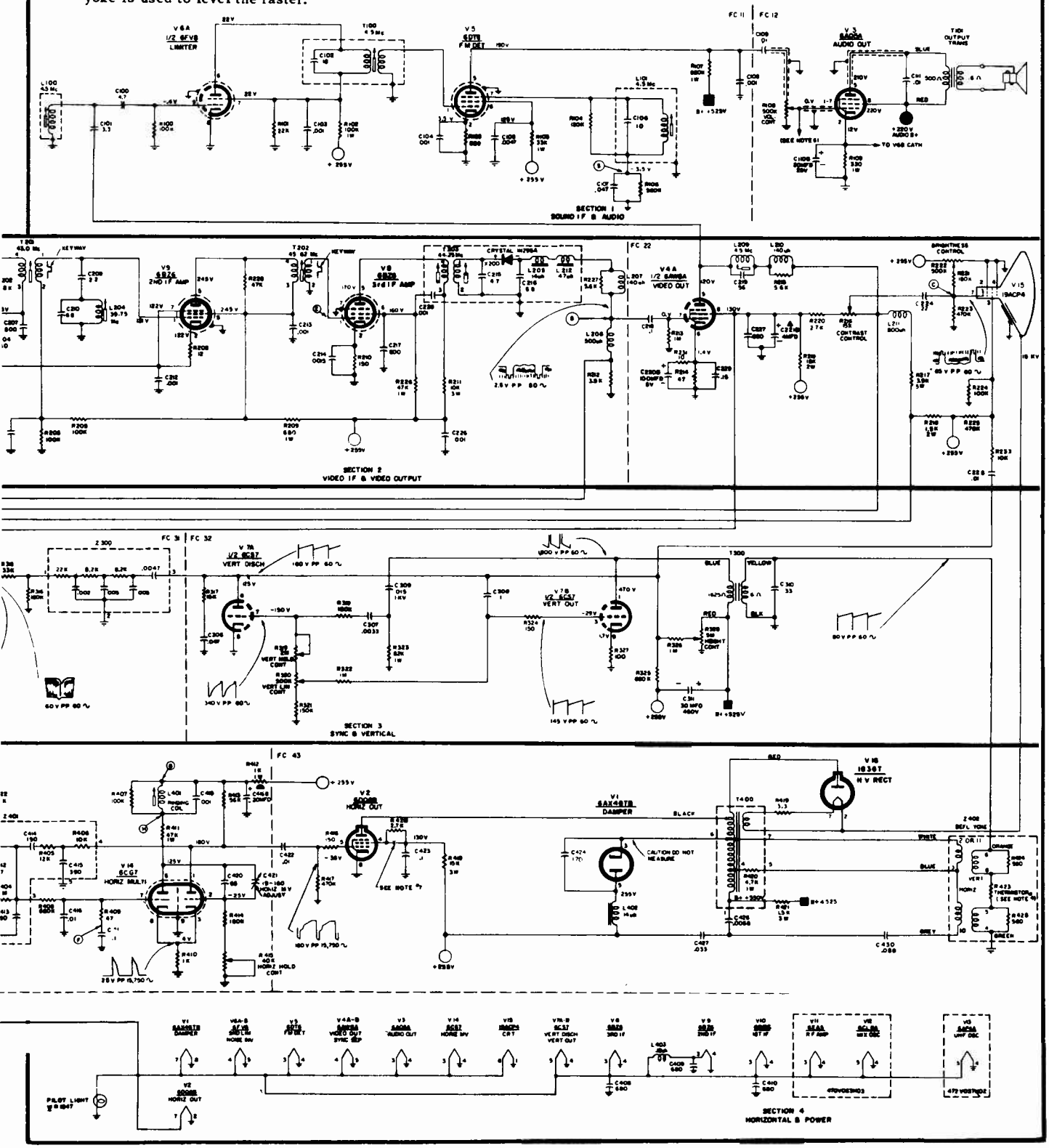
WESTINGHOUSE Chassis V-2409-11, -12, -13, Schematic Diagram, Continued

DEFLECTION YOKE

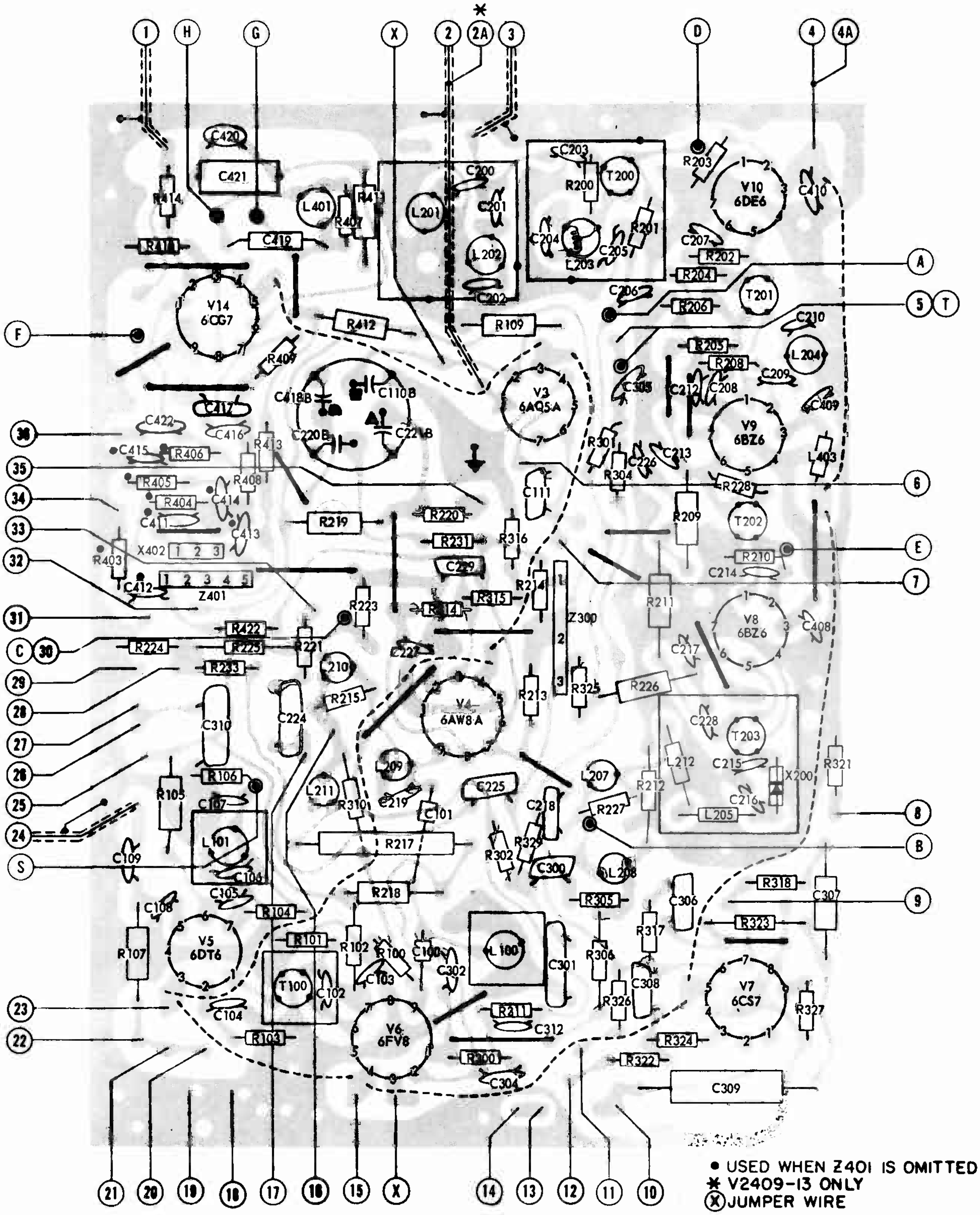
The deflection yoke should be as far forward as possible (touching the bell of the CRT). Rotation of the deflection yoke is used to level the raster.

CENTERING

The centering rings, located at the rear of the deflection yoke should be rotated to center the raster.



WESTINGHOUSE PC Board of Chassis V-2409-11, -12, -13, Continued



Bottom view of PC board (late production) showing location of top components in solid outline. Tube pin numbering is for bottom of socket.

See page 152 for KEY to above PC Board Layout.
For "early production" PC Board see page 156 of Volume TV-19, Early 1962 TV Manual.

MODEL & CHASSIS CHART

Models	Chassis	Tuner Used	Tuner Tubes
H-T3560B H-T3561B H-T3562B H-T3563B H-K3810B H-K3811B	V2414-3	470V095H01/02	RF AMP: 2GK5 OSC-MIX: 5EA8
H-T3560UB H-T3561UB H-T3562UB H-T3563UB H-K3810UB H-K3811UB	V2414-4	VHF 450V098H01	RF AMP: 2GK5 OSC-MIX: 5CG8
		UHF 472V034H04	UHF OSC: 2AF4A

Westinghouse

CHASSIS ASSEMBLIES

V-2414-3 VHF

V-2414-4 VHF/UHF

TV Chassis V-2414-5, used in combination Models H-C5200, H-C5201, H-C5203, is practically the same as above chassis.

RINGING COIL AND HORIZONTAL FREQUENCY ADJUSTMENT

1. Short out the ringing coil (L401) with a jumper wire.
2. Set the horizontal hold control to the center of its mechanical range. Do not change this setting during the steps that follow.
3. Calibrate a VTVM to 0V Center scale on the 1.5V range and connect to test point (F) for measuring the DC voltage between (F) and ground.
4. With the receiver tuned to a station of normal signal strength, adjust trimmer C419 so that moving it one way causes the meter to swing to the left and moving it the other way causes it to swing to the right. Then carefully adjust trimmer C419 for center scale on this meter.
5. Remove the jumper from the ringing coil.
6. Adjust the ringing coil for center scale on the VTVM. Check by switching to another channel and back again. The receiver should snap into horizontal sync on all channels.

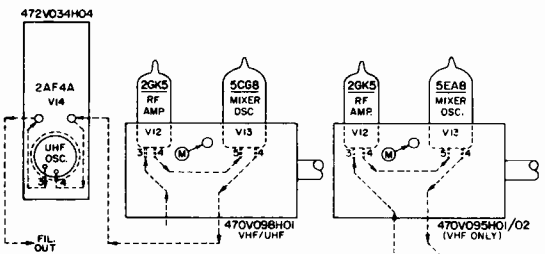
WIDTH ADJUSTMENT

This adjustment is a plastic tab with a copper rectangle bonded on one side. It protrudes from between the yoke and the bottom of the neck of the picture tube. The shiny side of the copper rectangle goes down against the picture tube and the clamp opening goes to the top of the tube. The rectangle must be centered at the bottom of the CRT neck.

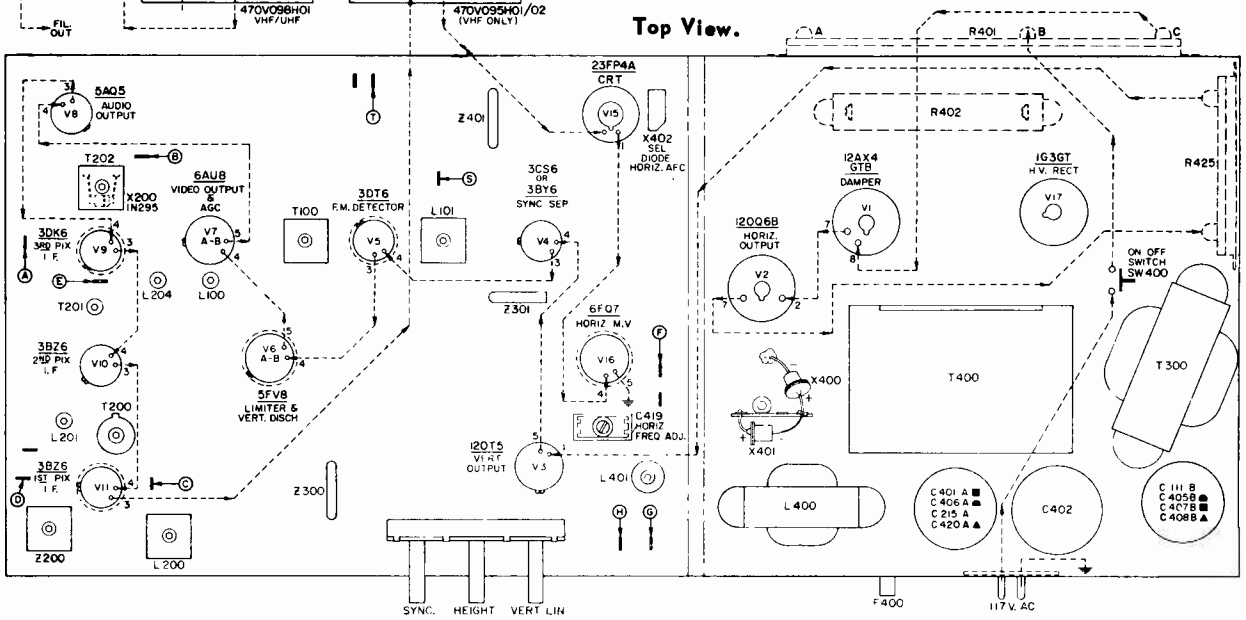
To adjust the width, loosen the yoke clamp. Pushing the tab into the yoke decreases the width. Pulling the tab out of the yoke increases the width. Best linearity, however, is provided with the width tab pushed all the way in. If insufficient width occurs, pull out the tab for enough scan without causing poor linearity.

SYNC

In areas where the receiver signal is weak or there is noise interference, maximum picture stability will be obtained by adjusting the SYNC control as follows. With the receiver tuned to a weak signal, adjust the HORIZONTAL and VERTICAL hold controls for best stability. Turn the SYNC control toward the position marked NOISY AREA – *just far enough* to obtain maximum sync stability. Check the adjustment by switching to other channels. Picture should remain stable on all channels.



Top View.



(Service material continued on the next five pages)

WESTINGHOUSE Chassis V-2414-3 and V-2414-4, Alignment Data, Continued

ALIGNMENT

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. 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.
9. Check the sound on a TV station. A slight adjustment of L100, L101, and T100 may be necessary.

4.5 MC TRAP ALIGNMENT

Disconnect the antenna. 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 L204 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 and –2.5 volts.
6. Standard Alignment Tool with a 3/32" hexagonal tip. (long enough to reach bottom slugs)
7. A 5/64" hexagonal tip alignment tool for the mixer plate coil on the tuner.

TERMINATION AND ADJUSTMENT OF EQUIPMENT

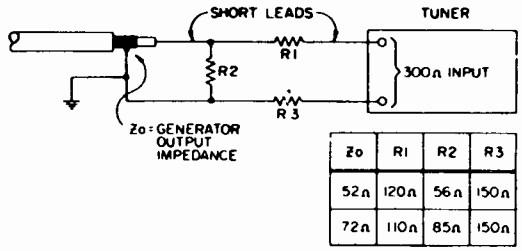
These instructions on termination and adjustment of equipment will apply throughout the IF Alignment procedure.

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 8. 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 7. 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 6 – Impedance matching network.

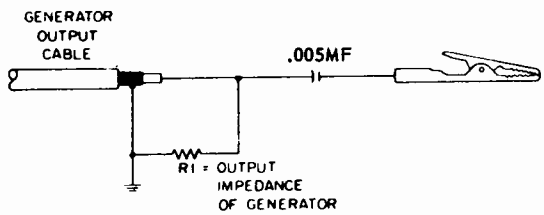


Figure 7 – Generator cable termination.

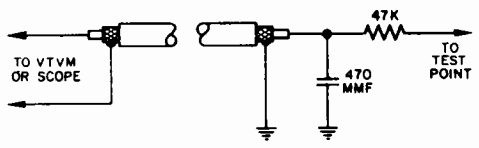


Figure 8 – Decoupling Network.

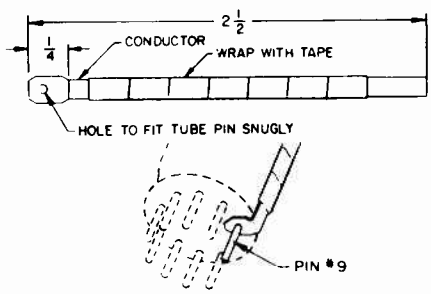


Figure 9 – Mixer Coupling device.

WESTINGHOUSE Chassis V-2414-3 and V-2414-4, Alignment Data, Continued

IF ALIGNMENT

For all of the following steps, connect an oscilloscope or a VTVM through the decoupling network of Figure 8, to TP (B). Fine tuning should be set to center of range. Set AGC level control fully CCW.

Before beginning alignment, detune the bottom slugs of Z200 and L200 to the bottom of the coil form and detune the top slugs of Z200 and T202 to the top of the coil form. Detune the mixer plate coil on the tuner.

Step	*Test Equipment and Connection*	*Adjustment*
1.	−2.5 volt bias to TP (T) and −4 volt bias to TP (A). Short the antenna terminals.	Channel selector to channel 10.
2.	IF sweep generator with CW marker at 44.50 MC to TP (E) thru generator termination, Figure 7.	T202 primary (bottom slug): Maximum amplitude at 44.50 MC. T202 secondary (top slug): Rocking symmetrical response at 44.50 MC (See Figure 10).
3.	Remove sweep generator from TP (E).	
4.	CW generator to TP (D) at: a. 45.25 MC b. 39.75 MC c. 42.50 MC	a. T201: Maximum amplitude on VTVM. Set generator so that maximum is approximately −1.5V to −2.0V DC at the detector level. b. L201: Minimum amplitude on VTVM c. T200: Maximum amplitude on VTVM.
5.	IF sweep generator to TP (D).	Check response on scope. Retouch T202 (top slug) for flat response (See Figure 11).
6.	Remove sweep generator from TP (D).	
7.	*CW generator to TP (M) on tuner at: a. 44.25 MC b. 41.25 MC c. 47.25 MC It may be necessary to increase the generator output or lower the IF bias to obtain an indication at TP (B).	a. Tuner mixer output coil for maximum on VTVM, then Z200 (bottom slug) for maximum on VTVM. b. L200: Minimum on VTVM. c. Z200 (top slug): Minimum on VTVM.
8.	IF sweep generator with markers at 44.25 MC and 45.75 MC to TP (M).	Mixer Output Coil: Adjust for maximum amplitude of response curve. Z200 (bottom slug): Adjust in conjunction with Mixer Output Coil, to obtain a symmetrical response curve which "rocks" about 44.25 MC. The 45.75 MC pix marker should be approximately 7DB down on the response curve as shown in Figure 12.
9.	Repeat step 7c.	Response should approximate Figure 12.
10.	Remove short from antenna terminals. Set oscilloscope for 2VPP. Connect sweep generator thru impedance matching network (See Figure 6) 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 (±400 KC) marker on scope (See Figure 13).
11.	Repeat step 10 for all channels.	
12.	Reset the AGC control (see ADJUSTMENTS).	

* If chassis has tuner 470V098H01, use the mixer coupling device of Figure 9.

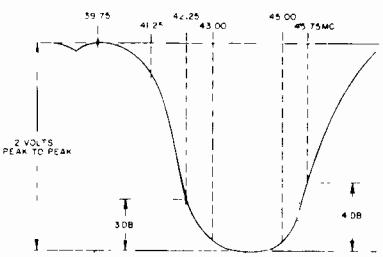


Figure 10 – IF Response: 3rd IF amp grid to 2nd detector.

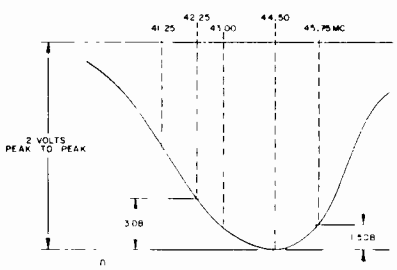


Figure 11 – IF Response: 1st IF amp grid to 2nd detector.

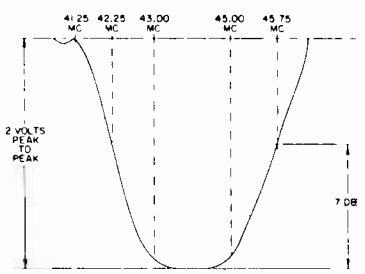


Figure 12 – IF Response: mixer grid to 2nd detector.

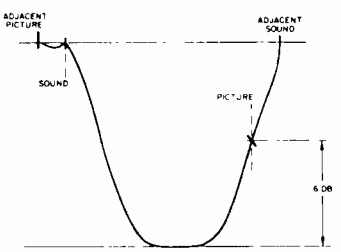
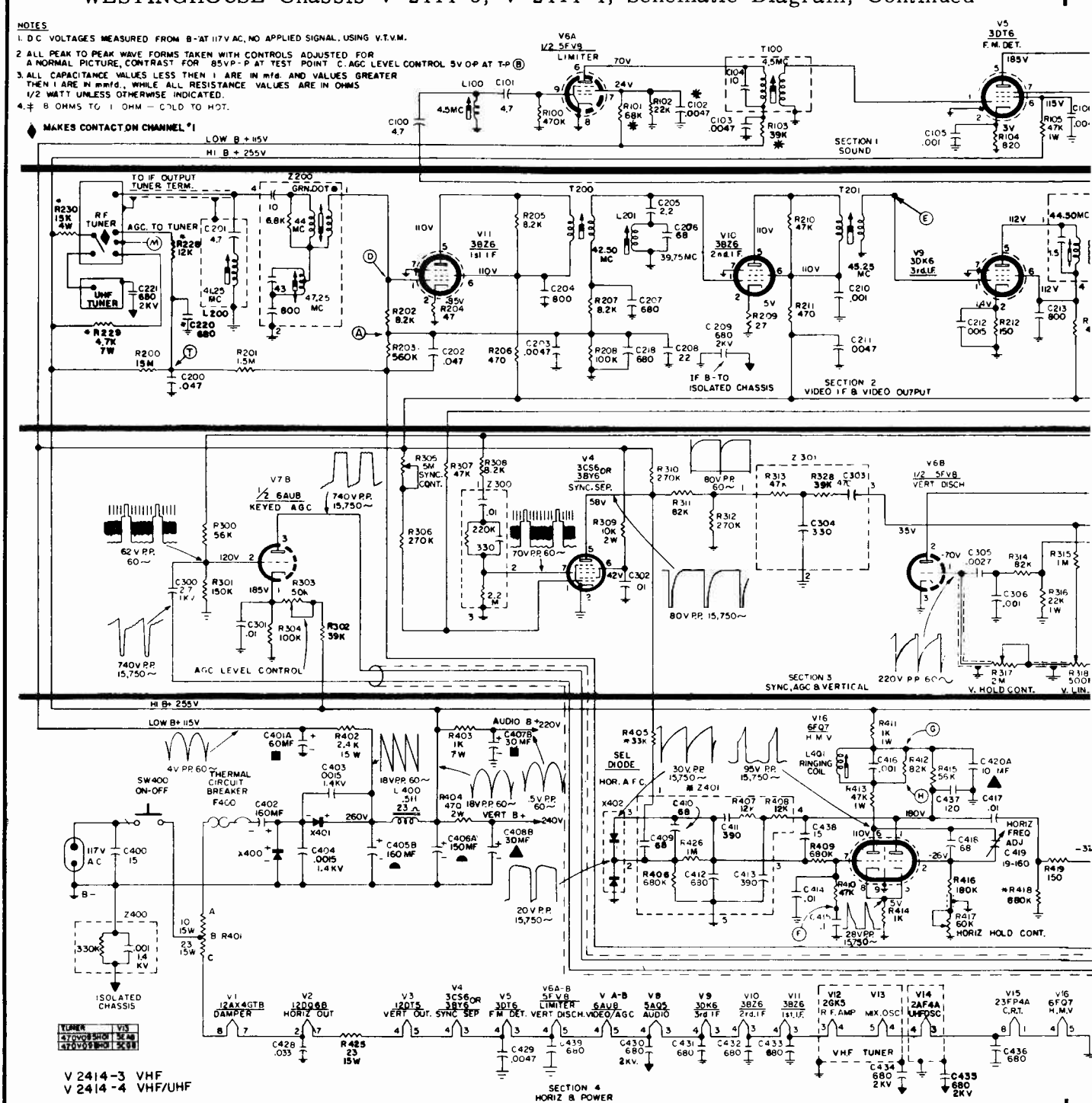


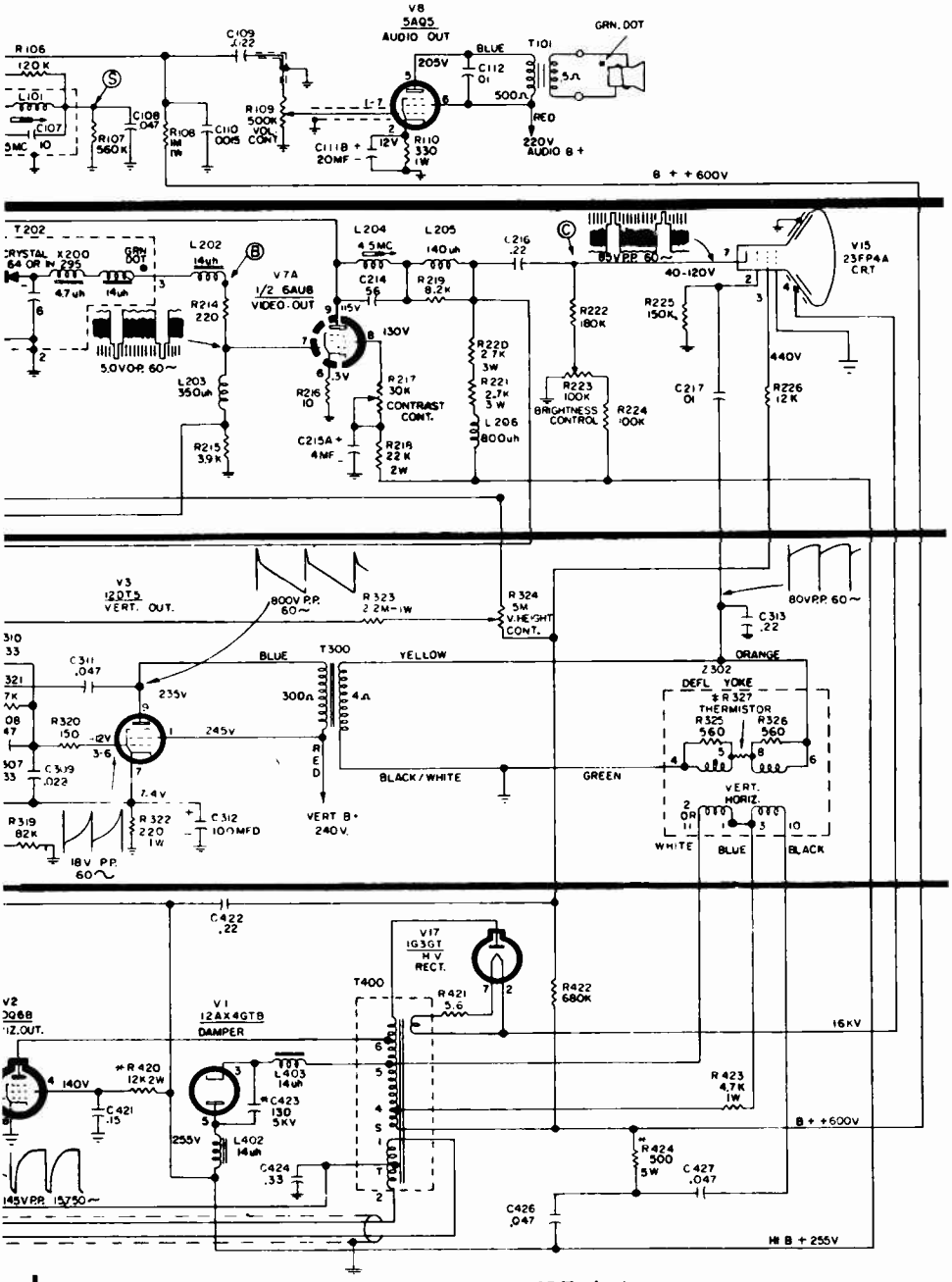
Figure 13 – RF–IF Response

WESTINGHOUSE Chassis V-2414-3, V-2414-4, Schematic Diagram, Continued

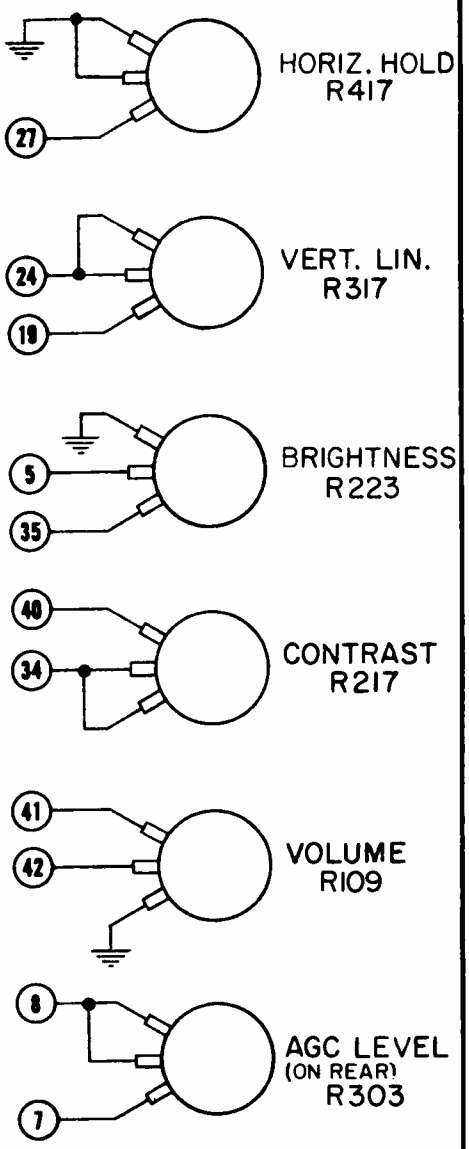


Front View of Control Panel.

WESTINGHOUSE Chassis V-2414-3, V-2414-4, Service Information, Continued



CONTROL WIRING DIAGRAM
All views seen from rear.



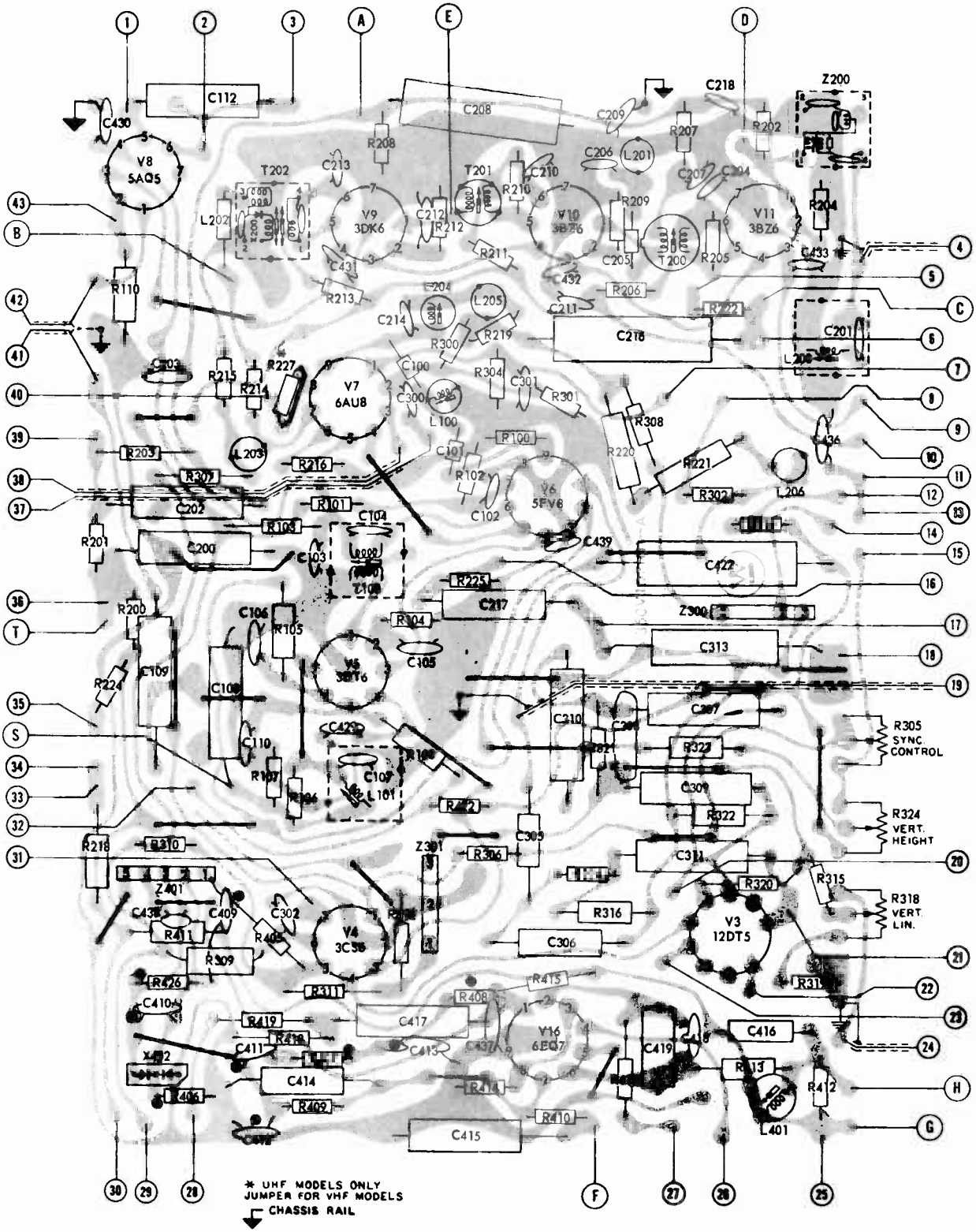
KEY TO PC BOARD LAYOUT

1 T100, blue wire
2 Junction R403, C407B
3 T100, red wire
4 Tuner IF output
5 Brightness control (see diagram at right)
6 CRT pin 7
7 AGC level control (see diagram at right)
8 AGC level control (see diagram at right)
9 Filament to tuner
10 Tuner B+
11 Filament to tuner
12 CRT pin 3
13 CRT pin 8
14 To (31)
15 Junction C401A, R402 (low B+)
16 CRT pin 2
17 Junction T300 yellow wire, Z302 orange
18 CRT pin 4
19 Vertical hold control (see diagram at right)
20 C312
21 T300, blue wire
22 Junction C408B, R404
23 To R425
24 Vertical hold control (see diagram at right)
25 C420A
26 CRT pin 1
27 Horizontal hold control (see diagram at right)
28 V2 pin 5
29 Junction C401A, R402
30 Junction C406A, L400, R403, R404
31 To (14)
32 Junction C425, R424, T400 lug S (B boost) & R422
33 C215A
34 Contrast control (see diagram at right)
35 Brightness control (see diagram at right)
36 Tuner AGC
37 White wire to T400 lug #1
38 Black wire to T400 lug #2
39 Junction C424, T400 lug T
40 Contrast control (see diagram)
41 Volume control (see diagram)
42 Volume control (see diagram)
43 C111B

TEST POINTS

(A) AGC for IF
(B) Video detector
(C) CRT cathode
(D) 1st IF input
(E) 3rd IF Grid
(F) Horiz. MV
(G) (H) Ringing Coil
(M) Tuner mixer grid
(S) Quad coil
(T) AGC for tuner

WESTINGHOUSE Chassis V-2414-3, -4, PC Board Layout, Continued



For KEY to PC Board Layout see page 159, preceding.

Bottom view of PC board showing location of top components in solid outlines. Tube pin numbering is for bottom of socket.

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MODEL AND CHASSIS CHART

MODELS	CHASSIS	TUNERS	TUNER TUBES
H-P3170 H-P3172 H-P3171 H-P3173	V2416-5	VHF: 470V085H01	RF AMP 3ER5 OSC-MIX 6CG8A
H-P3170U H-P3172U H-P3171U H-P3173U	V2416-2	VHF: 470V085H01 UHF: 472V035H01	RF AMP 3ER5 OSC-MIX 6CG8A OSC 3AF4A CRYSTAL 1N82A
H-P3320 H-P3322 H-P3321	V2416-3	470V070H03/04	RF AMP 3ER5 OSC-MIX 6CG8A
H-P3320U H-P3322U H-P3321U	V2416-4	VHF: 470V070H03/04 UHF: 472V035H01	RF AMP 3ER5 OSC-MIX 6CG8A OSC 3AF4A CRYSTAL 1N82A
H-P3174 H-P3172B H-P3170B H-P3173B H-P3171B	V2416-1	470V083H01	RF AMP 3ER5 OSC-MIX 6CG8A
H-P3323	V2416-6	470V070H03/04	RF AMP 3ER5 OSC-MIX 6CG8A
H-P3323U	V2416-7	VHF: 470V070H03/04 UHF: 472V035H01	RF AMP 3ER5 OSC-MIX 6CG8A OSC 3AF4A CRYSTAL 1N82A
H-P3327 H-P3329 H-P3328	V2416-9	470V070H03/04	RF AMP 3ER5 OSC-MIX 6CG8A

CHASSIS ASSEMBLIES

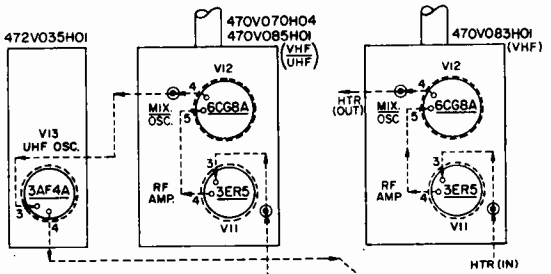
V2416-1, V2416-3, V2416-5 } VHF

V2416-2, V2416-4 } VHF/UHF

V2416-6, V2416-9 } VHF "Instant On"

V2416-7 VHF/UHF "Instant On"

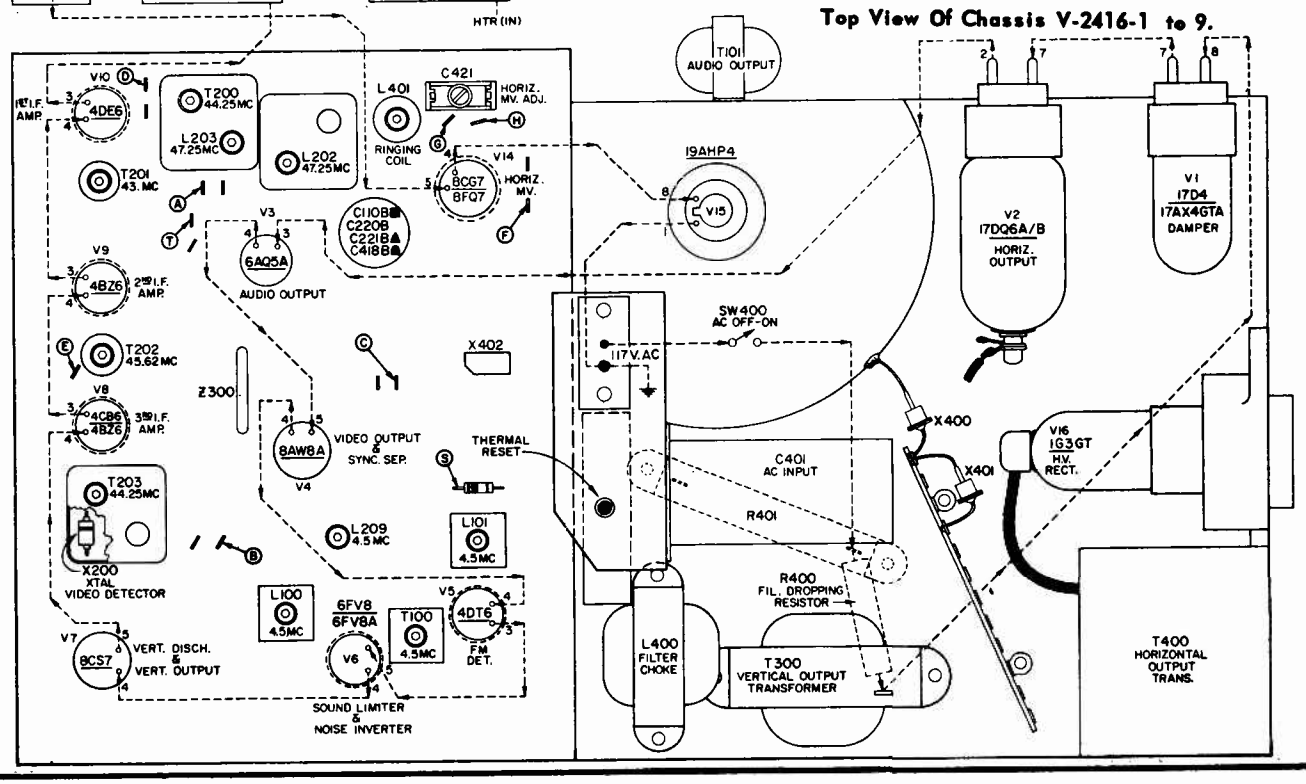
Additional Models H-P3176 and H-P3176U use later production of Chassis V-2416-1 and V-2416-2. Chassis V-2416-7 used in the following additional Models H-P3330U, H-P3331U, H-P3332U, H-P3333U. Chassis V-2416-8 is the same as V-2416-6 except for tuner, and is used in Models H-P3330, H-P3331, H-P3332, H-P3333. Chassis V-2416-11 is the same as V-2416-3 except for tuner, and is used in Models H-P3324, H-P3325, H-P3326.



SPECIFICATIONS

Operating Voltages: 105 to 120 V, 60 cycle AC
Power Consumption: 150 Watts
Audio Power Out. Max: 2.4 Watts

Top View Of Chassis V-2416-1 to 9.



WESTINGHOUSE Chassis V-2416-1 through -9, Service Information, Continued

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. Disconnect speaker leads at the output transformer. Remove speaker and grill (2 screws and 4 trimounts).
5. Remove three ¼" screws securing control panel and chassis to cabinet front.
6. Remove 7 screws holding chassis to cabinet base.
7. Carefully remove chassis, 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. Discharge high voltage button at CRT.
3. Remove high voltage lead, CRT socket and yoke.
4. Loosen the two screws from upper strap of CRT.
5. Remove picture tube from front of chassis.
6. Install in reverse order.

JUMPER

The jumper shunting C428 is sometimes cut to decrease width. This is a factory adjustment and normally no change should be made in the field.

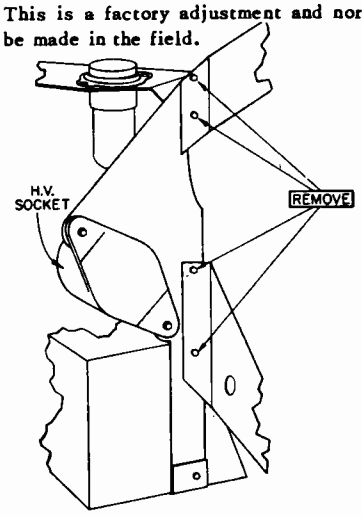


Figure 1 – Bracket Screw Removal for PC Board Accessibility

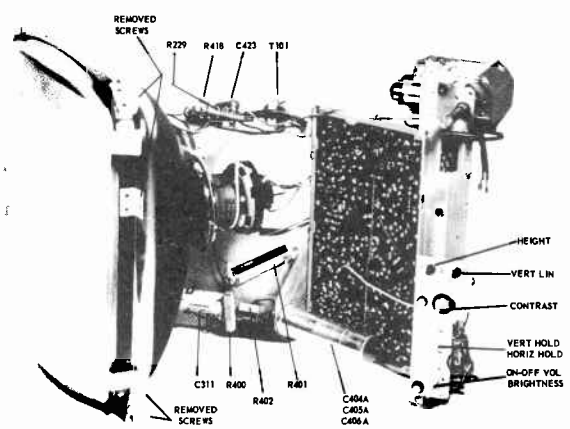


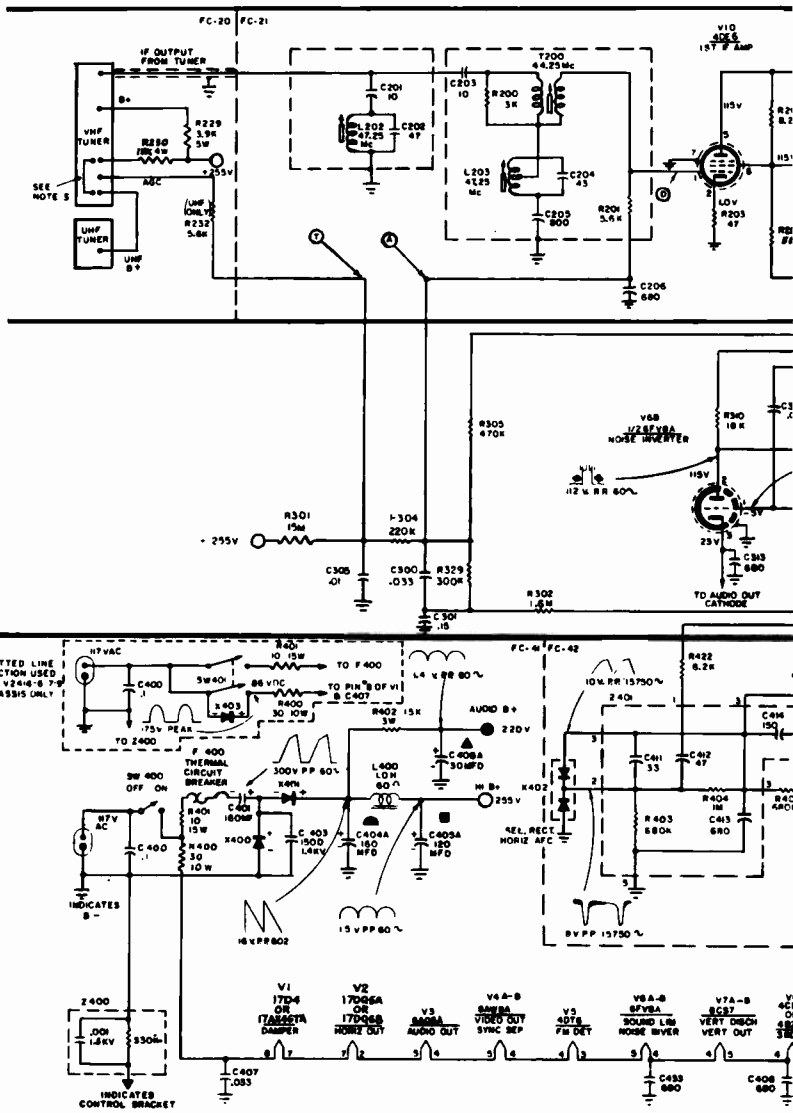
Figure 2 – PC Board Accessibility.

PC BOARD ACCESSIBILITY

To provide easy access to the PC board, the CRT assembly can be partially disassembled.

1. Remove the 4 screws shown in Figure 1.
2. Remove the 4 screws shown in Figure 2.
3. Move the CRT assembly out and to the left.

Caution: To operate the set while partially disassembled, connect a jumper from the aquadag coating to chassis ground. Be careful that the high voltage anode lead does not short or arc to the frame.

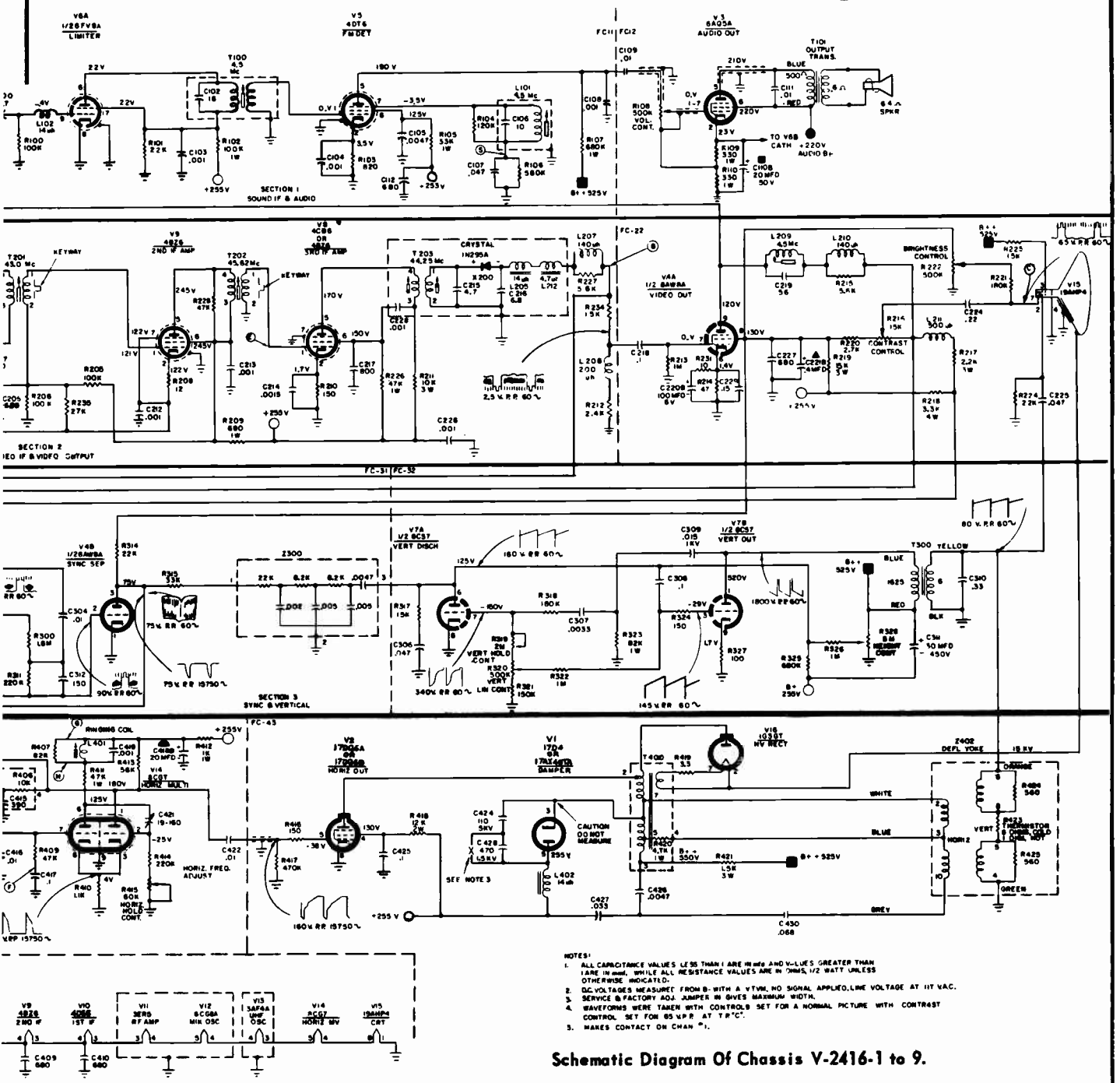


THERMAL RESET BUTTON

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.

NOTE: Do not hold button in. To do so when it repeatedly pops out will probably cause component failure. If button pops out repeatedly, immediately after receiver is turned on, a defect exists within receiver.

WESTINGHOUSE Chassis V-2416-1 through -9, Schematic Diagram, Continued



NOTES:
1. ALL CAPACITANCE VALUES LESS THAN 1 ARE IN mfd AND VALUES GREATER THAN 1 ARE IN mmf, WHILE ALL RESISTANCE VALUES ARE IN OHMS, 1/2 WATT UNLESS OTHERWISE INDICATED.
2. DC VOLTAGES MEASURED FROM B- WITH A VTVM, NO SIGNAL APPLIED, LINE VOLTAGE AT 117 VAC.
3. SERVICE & FACTORY ADJ. JUMPER IN GIVES MAXIMUM WIDTH.
4. WAVEFORMS WERE TAKEN WITH CONTROLS SET FOR A NORMAL PICTURE WITH CONTRAST CONTROL SET FOR 65 V P-P AT TP "C".
5. MAKES CONTACT ON CHAN "1".

Schematic Diagram Of Chassis V-2416-1 to 9.

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 FREQUENCY AND RINGING COIL

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.

WESTINGHOUSE Chassis V-2416-1 through -9, Alignment Data, Continued

ALIGNMENT

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 in 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 the VTVM will indicate a sharp response to and 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 .001 mf capacitor to TP (B). Connect a .001 mf 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, and –2.5 volts.
6. **Standard Alignment Tool** with a 3/32" hexagonal tip. (long enough to reach bottom slugs)

TERMINATION AND ADJUSTMENT OF EQUIPMENT

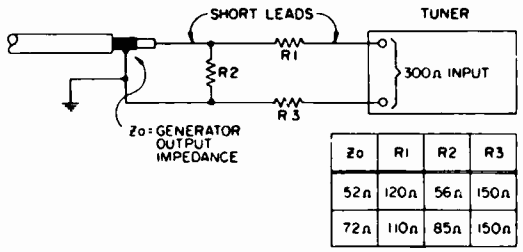
These instructions on termination and adjustment of equipment will apply throughout the IF Alignment procedure.

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 9. 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 8. 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 7 – Impedance matching network.

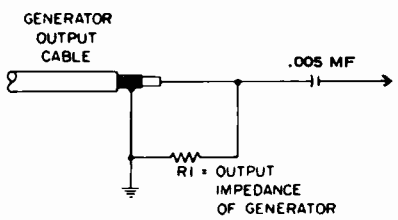


Figure 8 – Generator cable termination.

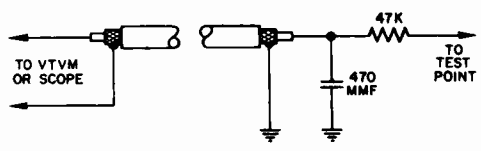


Figure 9 – Decoupling network.

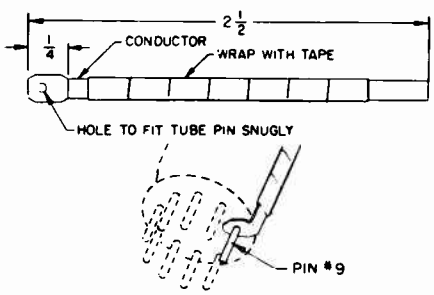


Figure 10 – Mixer coupling gimmick.

WESTINGHOUSE Chassis V-2416-1 through -9, Alignment Data, Continued

IF ALIGNMENT

STEP	TEST EQUIPMENT AND CONNECTION	ADJUSTMENT
1.	−4v Bias to TP (A), −2.5v to TP (T)	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 11)
3.	CW generator to TP (D) at: a. 45.62 MC b. 43.00 MC	 T202: Maximum 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 to obtain response curve with correctly placed markers as shown in Figure 12. Use T203 (top slug) to flatten peak of curve, T201 to adjust low frequency slope and T202 to adjust high frequency slope.
5.	CW generator to TP (M) use gimmick shown in Figure 10) at: a. 44.25 MC b. 44.25 MC c. 47.25 MC } It may be necessary to increase d. 47.25 MC } generator output and/or decrease bias.	 Tuner mixer output coil: Maximum on VTVM T200: Maximum 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.	T200: Rocking symmetrical response at 44.25 MC with wave shape as shown in Figure 13. Mixer output coil: Tune for maximum amplitude and markers as shown in Figure 13.
7.	CW generator to TP (M) at 47.25 MC.	L203: Minimum amplitude (see Step 5d).
8.	Sweep generator to TP (M) at 44.25 MC	Wave shape as shown in Figure 13.
9.	Oscilloscope, 2V–PP. Sweep generator thru impedance matching network (See Figure 7) to antenna terminals. Set pix marker at 193.25 MC Channel 10. 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 10. Oscillator slug setting: Picture carrier should fall at 45.75 MC (±300KC) marker on scope. (See Figure 14).
10.	Repeat step 8 for all channels	

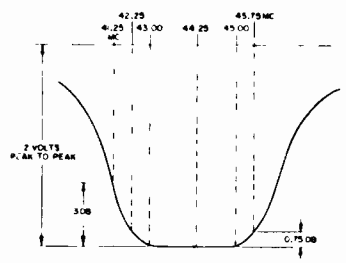


Figure 11 – Typical IF response, 3rd IF Amp grid to 2nd Det.

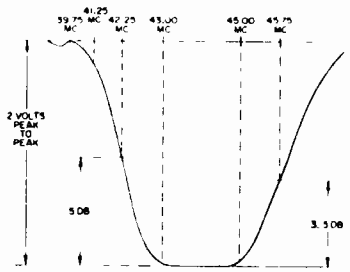


Figure 12 – Typical IF response, 1st IF Amp grid to 2nd Det.

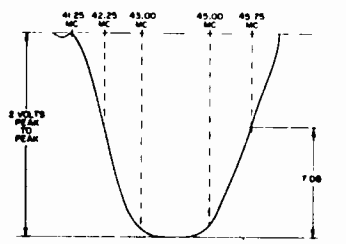


Figure 13 – Typical IF response, Mixer Amp grid to 2nd Det.

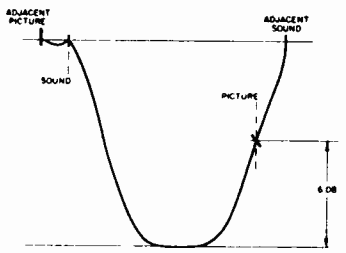


Figure 14 – Typical RF-IF response.

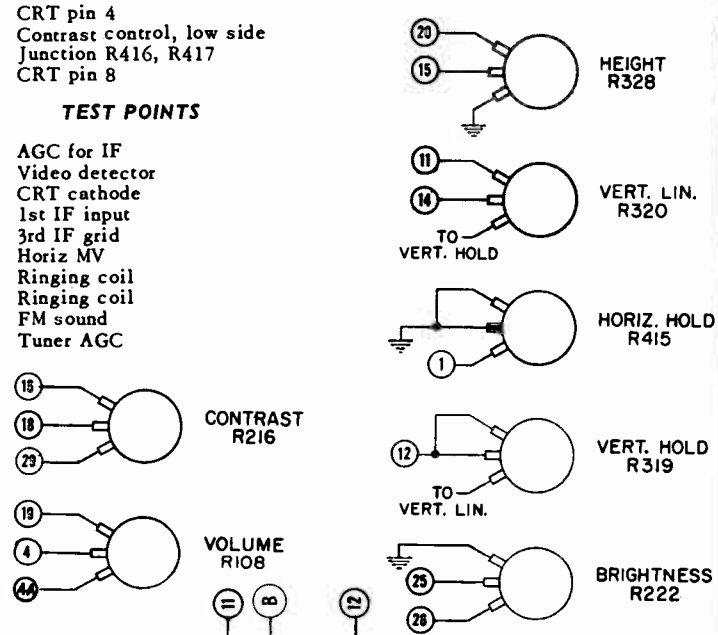
WESTINGHOUSE Chassis V-2416-1 through -9, PC Board Layout

PCB Legend V2416-1 to 9

1. Horiz hold control, high side
2. Tuner filament
3. Tuner to IF input
4. Volume control, arm
4A. Volume control, low side
5. Pin 2 of 17DQ6A/B
6. Tuner filament
7. Tuner AGC
8. T101, blue wire
9. Audio B+, T101, red wire
10. Junction C406A, R402
11. Vert lin control, low side
12. Vert hold control, arm & high side
13. T300, blue wire
14. Vert lin control, arm
15. Height control, arm
16. Contrast control, high side
17. Junction C405A, C427, L402 (B+ 255V)
18. Contrast control, arm
19. Volume control, high side
20. Height control, high side
21. Junction R421, C311 (B boost 525V)
22. CRT pin 3
23. Junction, T300 yellow wire, Z402 orange wire
24. CRT pin 2
25. Brightness control, arm
26. Brightness control, high side
27. CRT pin 7
28. CRT pin 4
29. Contrast control, low side
30. Junction R416, R417
31. CRT pin 8

TEST POINTS

A. AGC for IF
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
T. Tuner AGC



X-X JUMPER WIRE
● OMIT IF Z401 IS USED

Bottom view of PC board showing location of top components in solid outline. Tube pin numbering

Westinghouse

V-2417-1, -3, -5 VHF
V-2417-2, -4, -6 VHF/UHF

MODEL AND CHASSIS CHART

MODEL	CHASSIS	TUNERS USED	TUNER TUBES	TONE CONTROL
H-T3603 H-K3901 H-K3900 H-K3902	V-2417-1	470V080H01	RF AMP: 6GK5 OSC-MIX: 6CG8A	NO
H-T3603U H-K3901U H-K3900U H-K3902U	V-2417-2	470V080H01 472V037H02	RF AMP: 6GK5 OSC-MIX: 6CG8A UHF OSC: 6AF4A/B XTAL: 1N82A	NO
H-T3600 H-T3601 H-T3604 H-K4020 H-K4021 H-K4023 H-K4030 H-K4031 H-K4032 H-K4033 H-T3605 H-T3606 H-T3607 H-T3608	V-2417-3	470V071H03	RF AMP: 6GK5 OSC-MIX: 6CG8A	NO
H-T3600U H-T3601U H-T3604U H-T3605U H-T3606U H-T3607U H-T3608U H-T3730U H-T3732U H-K4020U H-K4021U H-K4023U	V-2417-4	470V071H03 472V037H02	RF AMP: 6GK5 OSC-MIX: 6CG8A UHF OSC: 6AF4A/B XTAL: 1N82A	NO
H-T3720 H-T3721 H-T3723 H-K4120 H-K4121 H-K4122 H-K4123 H-K4130 H-K4131 H-K4220 H-K4221 H-K4223 H-K4230	V-2417-5	470V071H03	RF AMP: 6GK5 OSC-MIX: 6CG8A	YES
H-T3720U H-T3721U H-T3723U H-K4120U H-K4121U H-K4122U H-K4123U H-K4220U H-K4221U H-K4223U H-K4231U	V-2417-6	470V071H03 472V037H02	RF AMP: 6GK5 OSC-MIX: 6CG8A UHF OSC: 6AF4A/B XTAL: 1N82A	YES

HORIZONTAL WIDTH AND LINEARITY COIL

The width and linearity coil, L404A,B is mounted on top of the horizontal output transformer cage. The width section of the coil, L404B, is a 3/32 inch hex alignment tool and/or a screwdriver slot adjustment that can be adjusted through the back cover of the set.

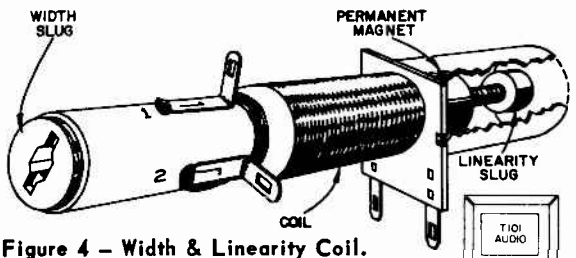


Figure 4 – Width & Linearity Coil.

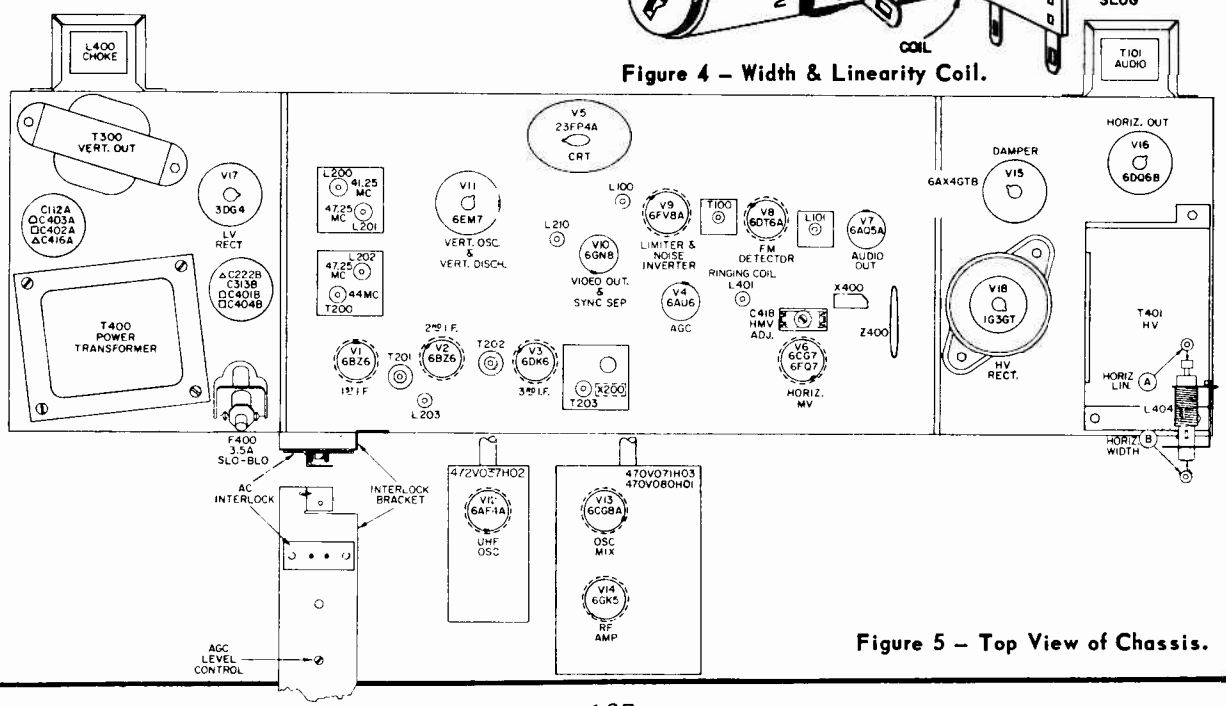


Figure 5 – Top View of Chassis.

WESTINGHOUSE Chassis V-2417-1 through -6, Alignment Data, Continued

IF ALIGNMENT

For all of the following steps, connect a −4 volt bias to TP (A), a −2.5V bias to TP (T) and an oscilloscope and a VTVM to TP (B). Channel selector should be set to channel 10. Fine tuning screws should be set to center of range on tuners with Memory Fine Tuning. Tuners with Continuous Fine Tuning should be set to the center of the range.

Before beginning alignment, pull out the AGC tube (V4) and detune L200, L201, L202, T200 and mixer output coil. L200 should be detuned clockwise to the bottom of the coil form while L201, L202 and T200 should be detuned to maximum counter-clockwise.

Step	*Test Equipment and Connection*	*Adjustment*
1.	Sweep generator at TP (E), 44.25 MC center. Loosely couple CW marker generator to sweep generator. Set CW generator to 44.25 MC.	T203 Primary (bottom slug): Maximum amplitude at 44.25 MC. T203 Secondary (top slug): Rocking symmetrical response at 44.25 MC (see Figure 13).
2.	CW generator to TP (D) at: a. 45.62 MC b. 39.75 MC c. 43.00 MC	T202: Maximum amplitude. L203: Minimum amplitude. Reduce bias if necessary to produce sharp indication. T201: Maximum amplitude.
3.	Sweep generator at TP (D), 44.25 MC center. Loosely couple CW marker generator to sweep generator. Vary CW marker generator to produce markers at frequencies indicated on Figure 14.	T203 secondary: Slight retouching may be necessary to flatten peak of response curve. T201, T202: Slight retouching may be necessary to obtain curve shown in Figure 14.
4.	VTVM to TP (B) and CW generator to TP (M) (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 e. 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)	Mixer output coil: Maximum on VTVM - See Figure 15 T200: Maximum on VTVM L200: Minimum on VTVM L201: Minimum on VTVM L202: Minimum on VTVM
5.	Oscilloscope to TP (B) and sweep generator at 44 MC center to TP (M) (use gimmick in Figure 12) adjust for approximately 2V-PP. Couple CW marker generator to sweep generator.	Mixer Plate coil: Maximum amplitude T200: Rocking symmetrical response at approximately the center of the passband so that the Pix carrier (45.75 MC) is placed 7DB down from the peak response. See Figure 15.
6.	CW generator at 47.25 MC to TP (M) Repeat Step 4e.	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 TP (B) Sweep generator thru impedance matching network to the antenna terminals. Set picture marker at 193.25 MC, Channel 10. 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 on Memory Fine Tuning tuners or on Continuous Fine Tuning tuners, set fine tuning to center of range. Channel selector to #10. Oscillator slug setting: picture should fall at 45.75 MC (±300 KC) marker on oscilloscope. See Figure 16.
8.	Repeat step 7 for all channels. Set generators to appropriate channel frequencies.	Channel selector to appropriate channel.

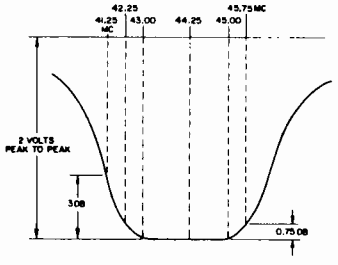


Figure 13 – IF response, 3rd IF Amp grid to 2nd Det.

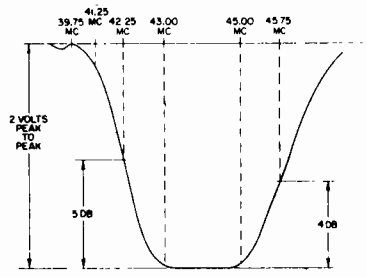


Figure 14 – IF response, 1st IF Amp grid to 2nd Det.

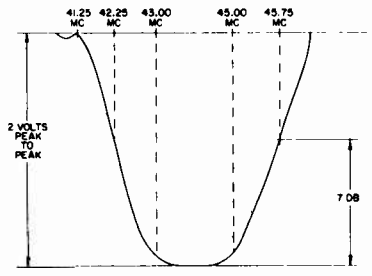


Figure 15 – Response, Mixer Grid to 2nd Det.

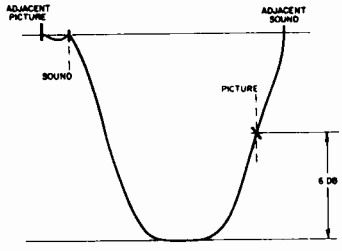


Figure 16 – Typical RF-IF Response.

WESTINGHOUSE Chassis V-2417-1 through -6, PC Board Layout

KEY TO PC BOARD LAYOUT

1 To F401
2 Shielded cable to (8)
3 CRT pin 8
4 Z301, orange wire
5 CRT pin 2
6 CRT pin 1
7 V16 pin 4
7A CRT pin 4
8 Shielded cable to (2)
9 AGC level control (see Figure 8)
10 Horizontal hold control (see Figure 8)
11 Junction T401 lug 5, R422, C425
11A V16 pin 5
12 CRT pin 3
12A To R426
13 To C416 A
14 T101 primary, blue wire
14A To C114
15 T101 primary, red wire
16 Junction R402, C404B
17 Height control (see Figure 8)
18 Junction T401, R426
19 To C112A
20 Volume control (see Figure 8)
21 Volume control (see Figure 8)
22 Volume control (see Figure 8)
23 Junction L402, C424, R419
24 Brightness control (see Figure 8)
25 To C222B
26 Contrast control (see Figure 8)
27 Vertical linearity control (see Figure 8)
28 T300 primary, blue wire
29 To C313B
30 Height control (see Figure 8)
31 Vertical hold control (see Figure 8)
32 Tuner B+, to R202
33 Junction R401, R402, L400
34 Tuner AGC
35 Tuner IF output

TEST POINTS

A AGC for IF
B Video detector
C CRT cathode
D 1st IF grid
E 3rd IF grid
F Horiz MV
G Ringing coil
H Ringing coil
S Sound
T Tuner AGC

See page 171 for Figure 8, showing related connections for certain parts.

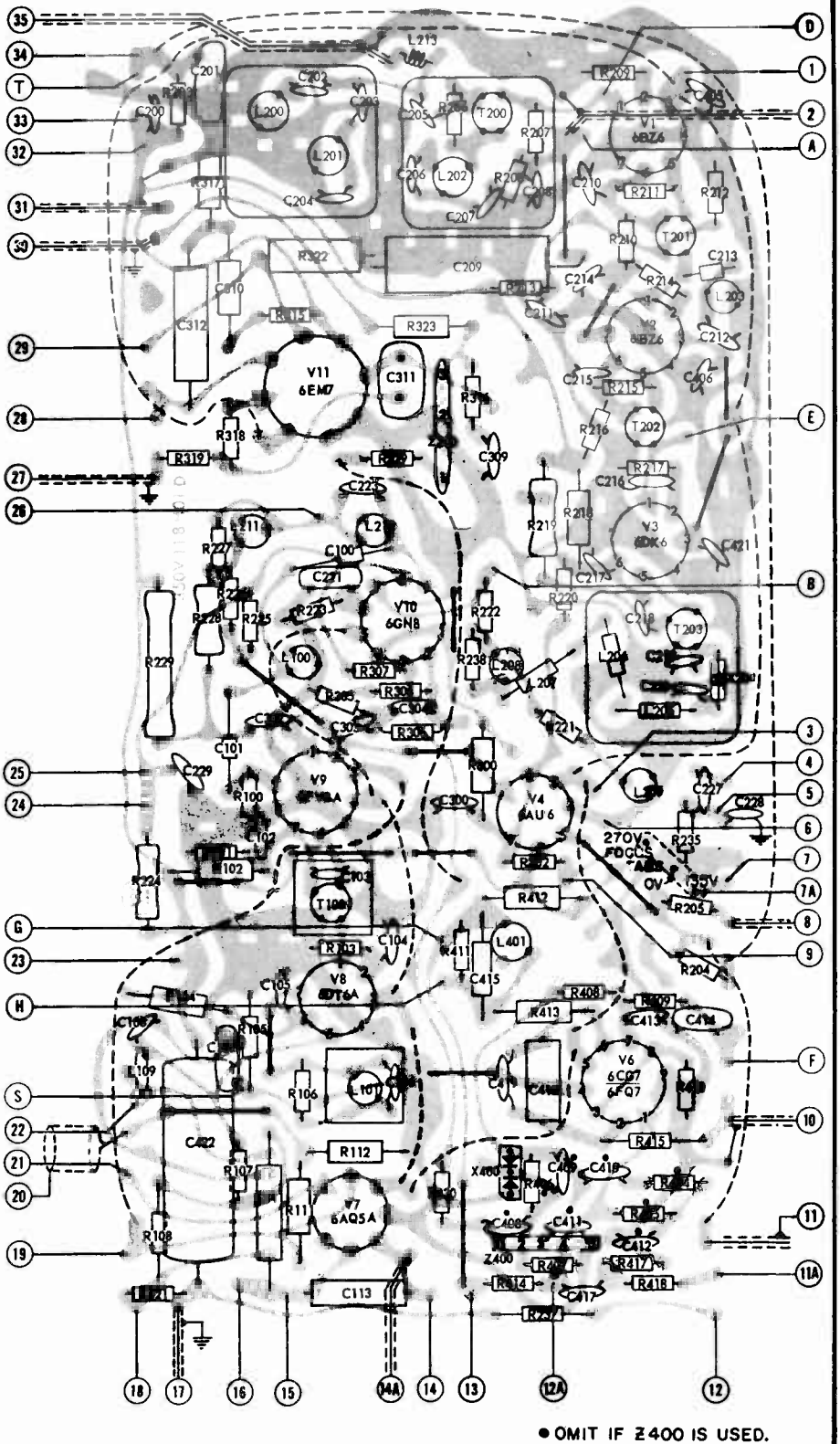
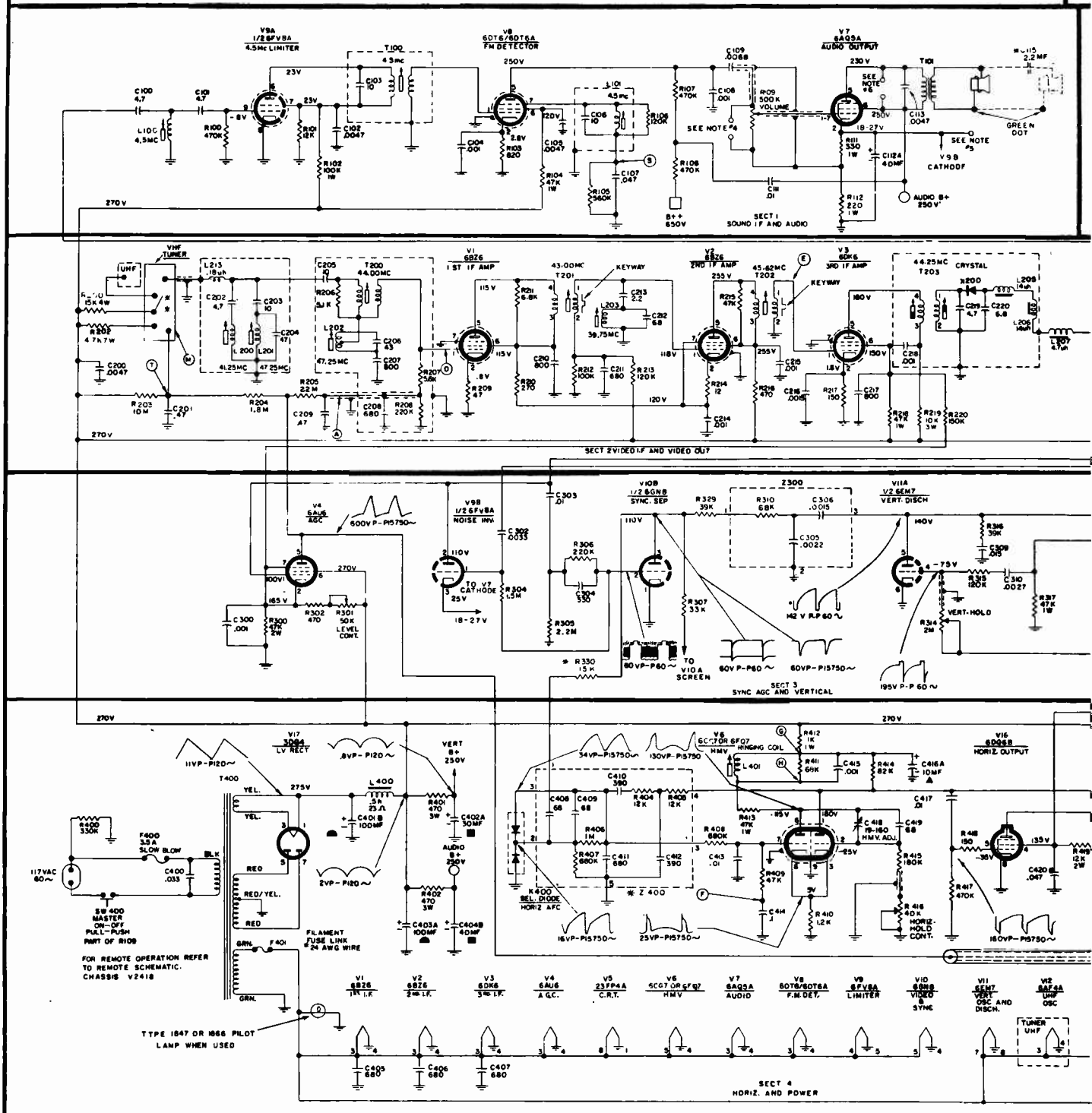


Figure 6 – Bottom view of PC board showing location of top components in solid outlines. Tube pin numbering is for bottom of socket.

WESTINGHOUSE Chassis V-2417-1 through -6, Schematic Diagram



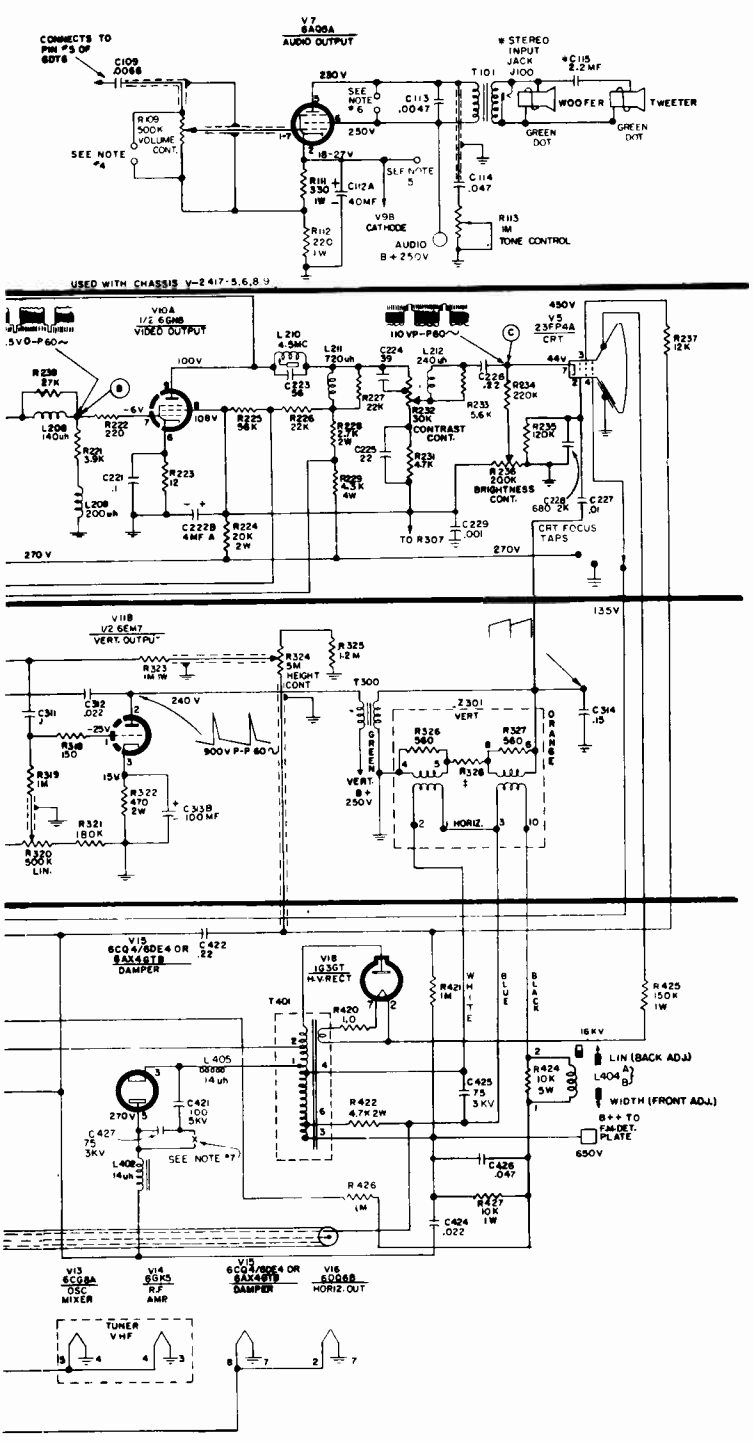
CHASSIS REMOVAL

1. Remove control knobs.
2. Remove back cover and antenna terminal bracket.
3. Remove the five screws which secure control panel to front escutcheon.
4. Remove the screws which secure chassis to cabinet.
5. Remove speaker leads from terminal lugs on chassis.
6. Carefully slide chassis out from cabinet.

CRT REMOVAL

1. Remove chassis from cabinet. USE SHATTERPROOF GOGGLES TO PROTECT YOUR EYES.
2. Discharge high voltage lead to chassis ground.
3. Remove CRT socket, yoke clamp and second anode lead.
4. Loosen bolt at top of CRT to release strap.
5. Use heavy gloves to remove CRT.

WESTINGHOUSE Chassis V-2417-1 thru -6



NOTES

1. D.C VOLTAGES MEASURED FROM CHASSIS GROUND; NO APPLIED SIGNAL USING A V.T.V.M., LINE VOLTAGE 117 A.C
2. ALL PEAK TO PEAK WAVEFORMS AND DC VOLTAGES TAKEN WITH ALL CONTROLS SET FOR NORMAL PICTURE, WITH LEVEL CONTROL SET FOR 5 O-P AT T.P (B)
3. ALL CAPACITANCE VALUES LESS THAN 1 ARE IN MFD. AND VALUES GREATER THAN 1 ARE M.M.F.D. ALL RESISTANCE VALUES ARE IN OHMS & 1/2 WATT UNLESS OTHERWISE INDICATED.
4. TO REMOTE CONTROL STEPPING RELAY, CHASSIS V 2417 7 & 9.
5. SUPPLY VOLTAGE, FOR SILENT SOUND OSCILLATOR CHASSIS V-2430
6. TO REMOTE CONTROL STEPPING RELAY CHASSIS V 2417-9.
7. SERVICE & FACTORY ADJ. JUMPER IN GIVES MAX. WIDTH.

* 8 OHMS COLD 1 OHM HOT

\# SWITCH MAKES CONTACT ONLY ON THE UHF POSITION

RINGING COIL AND HORIZONTAL FREQUENCY ADJUSTMENT

1. Short out the ringing coil (L401) with a jumper wire.
2. Set the horizontal hold control to the center of its mechanical range. Do not change this setting during the steps that follow.
3. Calibrate a VTVM to 0V Center scale on the 1.5V range and connect to test point (F) for measuring the DC voltage between (F) and ground.
4. With the receiver tuned to a station of normal signal strength, adjust trimmer C418 so that moving it one way causes the meter to swing to the left and moving it the other way causes it to swing to the right. Then carefully adjust trimmer C418 for center scale on this meter.
5. Remove the jumper from the ringing coil.
6. Adjust the tinging coil for center scale on the VTVM. Check by switching to another channel and back again. The receiver should snap into horizontal sync on all channels.

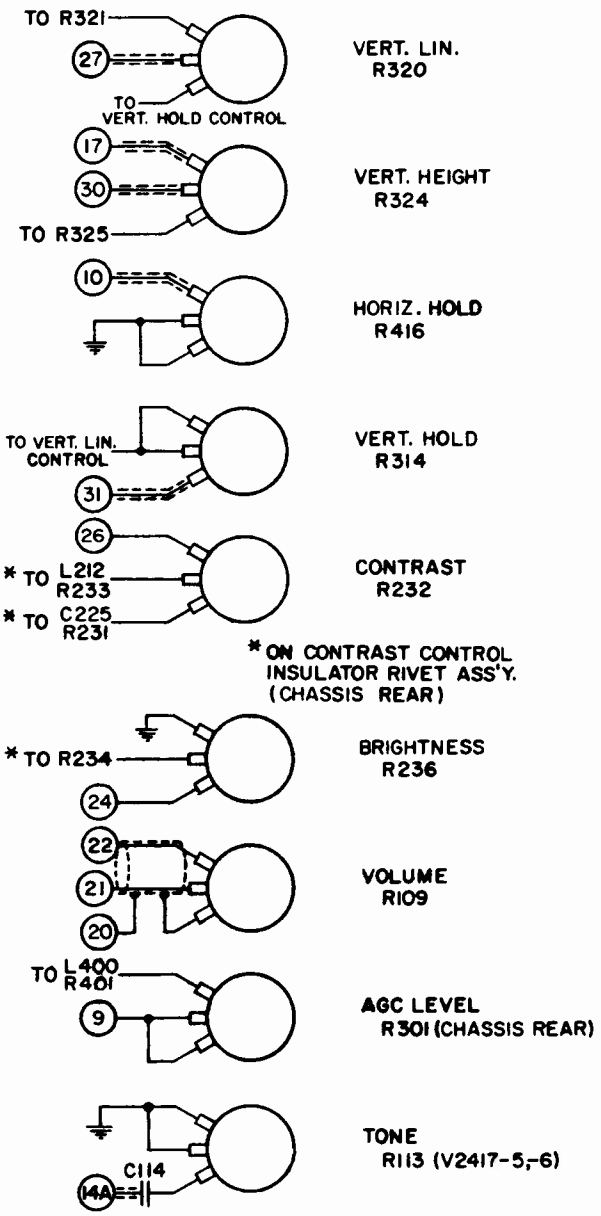
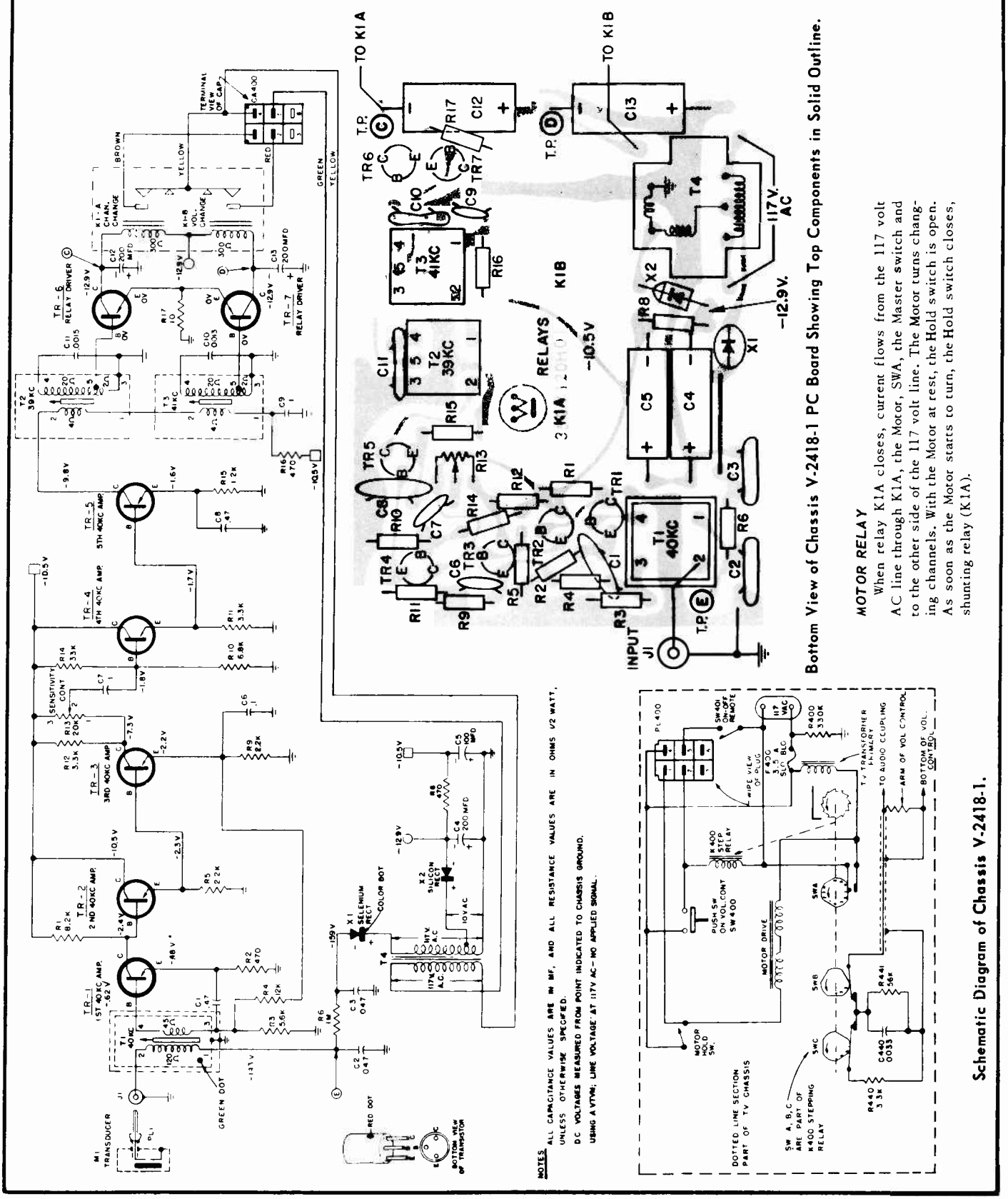


Figure 8 – Control Wiring Diagram
All views seen from rear.

WESTINGHOUSE Remote Receiver V-2418-1, Service Material



Schematic Diagram of Chassis V-2418-1.

ZENITH RADIO CORPORATION

ZENITH

1962 TELEVISION

MODEL AND CHASSIS INFORMATION

MODEL	SPACE COMMAND	TYPE	CHASSIS	TUNER	PICTURE TUBE
H1925C,L		Table	16J20	Bandswitch	19BDP4
H2050E,R,W		Console	16H23	Target Turret	23ANP4
H2060H,R,W		Console	16H23	Target Turret	23ANP4
H2070W		Console	16H23	Target Turret	23ANP4
H2101C,F		Table	16J20	Bandswitch	19BDP4
H2102R,W		Table	16J20	Bandswitch	19BDP4
H2103L		Table	16J20	Bandswitch	19BDP4
H2104C,G		Table	16J27	Bandswitch	19AJP4
H2105B,L		Table	16J27	Target Turret	19AJP4
H2110G,J		Table	16J27	Target Turret	19AJP4
H2122C,L		Table	16H27	Super Target Turret	19AJP4
H2125J,L		Table	16H27	Gold Video Guard Turret	19AJP4
H2126J		Table	16H27T	Gold Video Guard Turret	19AJP4
H2125J,L		Table	16J27	Gold Video Guard Turret	19AJP4
H2126J		Table	16J27T	Gold Video Guard Turret	19AJP4
H2211C	"300"	Table	16J20Q	Super Target Turret	19BDP4
H2212F,G	"300"	Table	16J20Q	Super Target Turret	19BDP4
H2213G	"300"	Table	16H20Q	Gold Video Guard Turret	19BDP4
H2214G	"300"	Table	16J27Q	Gold Video Guard Turret	19AJP4
H2228J	"300"	Table	16J27Q	Gold Video Guard Turret	19AJP4
H2231L	"300"	Table	16J27QT	Gold Video Guard Turret	19AJP4
H2304R,W	"300"	Table	16H21	Bandswitch	21CXP4
H2705R,Y		Table	16H23	Bandswitch	23ANP4
H2707R,Y		Table	16H23	Super Target Turret	23ANP4
H2715Y		Table	16H22	Target Turret	23ANP4
H2717E,R,W		Table	16H22	Gold Video Guard Turret	23ANP4
H2735E,L,R,W		Console	16H23	Target Turret	23ANP4
H2736E,H,M,R,W		Console	16H23	Target Turret	23ANP4
H2737E,R,W		Console	16H23	Target Turret	23ANP4
H2738E,R,W		Console	16H23	Target Turret	23ANP4
H2739E,R,W		Console	16H23	Super Target Turret	23ANP4
H2740H,R,W		Console	16H23	Super Target Turret	23ANP4
H2749H,M,R,W		Console	16H23	Super Target Turret	23ANP4
H2753E,W		Console	16H22	Gold Video Guard Turret	23ANP4
H2755H,M,R,W		Console	16H22	Gold Video Guard Turret	23ANP4
H2756E,R,W		Console	16H22	Gold Video Guard Turret	23ANP4
H2760E,R,W		Console	16H22	Gold Video Guard Turret	23ANP4
H2762W		Console	16H22	Gold Video Guard Turret	23ANP4
H2781E,R,W		Comb.	16H23/4G21	Super Target Turret	23ANP4
H2786E,M,R,W		Comb.	16H23/4G21/7F20	Super Target Turret	23ANP4
H2787W		Comb.	16H23/8H30/7F20	Super Target Turret	23ANP4
H2789M,R		Comb.	16H23/8H30/7F20	Super Target Turret	23ANP4
H3308R,Y	"300"	Table	16H23Q	Super Target Turret	23ANP4
H3310E,R,W	"300"	Table	16H22Q	Gold Video Guard Turret	23ANP4
H3311R,W,Y	"400"	Table	16H22Q	Gold Video Guard Turret	23ANP4
H3340E,R,W	"300"	Console	16H23Q	Super Target Turret	23ANP4
H3341E,M,R,W	"300"	Console	16H23Q	Super Target Turret	23ANP4
H3342E,R,W	"300"	Console	16H23Q	Super Target Turret	23ANP4
H3343E,R,W	"300"	Console	16H23Q	Super Target Turret	23ANP4

(Model and chassis cross reference continued on the next two pages)

MODEL AND CHASSIS INFORMATION, Continued

MODEL	SPACE COMMAND	TYPE	CHASSIS	TUNER	PICTURE TUBE
H3345E,R,W	"300"	Console	16H23Q	Super Target Turret	23ANP4
H3349H,M,R,W	"300"	Console	16H23Q	Super Target Turret	23ANP4
H3350E,R,W	"400"	Console	16H22Q	Gold Video Guard Turret	23ANP4
H3353W	"400"	Console	16H22Q	Gold Video Guard Turret	23ANP4
H3354H,M,R	"400"	Console	16H22Q	Gold Video Guard Turret	23ANP4
H3355H	"400"	Console	16H22Q	Gold Video Guard Turret	23ANP4
H3360W,Y	"400"	Console	16H28Q	Gold Video Guard Turret	23AFP4
H3368M,R	"400"	Console	16H28Q	Gold Video Guard Turret	23AFP4
H3375H	"400"	Console	16H28Q	Gold Video Guard Turret	23AFP4
H3385H	"400"	Console	16H28Q	Gold Video Guard Turret	23AFP4
H3388W	"400"	Comb.	16H22Q/8H30/7F20	Gold Video Guard Turret	23ANP4
J2100L		Table	16J20	Bandswitch	19BDP4
J2101C,F		Table	16J20	Bandswitch	19BDP4
J2101CT,FT		Table	16J20	Super Target Turret	19BDP4
J2103L		Table	16J20	Bandswitch	19BDP4
J2108C,J		Table	16J27	Super Target Turret	19CDP4
J2109B,L		Table	16J27	Super Target Turret	19CDP4
J2110G		Table	16J27	Gold Video Guard Turret	19CDP4
J2122C		Table	16J27	Super Target Turret	19CDP4
J2122C1		Table	16H27	Super Target Turret	19AJP4
J2124L		Table	16J27	Super Target Turret	19CDP4
J2125J,L		Table	16J27	Gold Video Guard Turret	19CDP4
J2126J		Table	16J27T	Gold Video Guard Turret	19CDP4
J2211C	"300"	Table	16J20Q	Super Target Turret	19BDP4
J2212F,G	"300"	Table	16J20Q	Super Target Turret	19BDP4
J2214F,L	"300"	Table	16J27QS	Gold Video Guard Turret	19CDP4
J2226L	"300"	Table	16J27Q	Super Target Turret	19CDP4
J2228J	"300"	Table	16J27Q	Gold Video Guard Turret	19CDP4
J2231L	"300"	Table	16J27QT	Gold Video Guard Turret	19CDP4
J2705R,Y		Table	16J23	Bandswitch	23BJP4
J2707R,Y		Table	16J23	Super Target Turret	23ANP4
J2717E,R,W		Table	16J22	Gold Video Guard Turret	23ANP4
J2735E,L,R,W		Console	16J23	Super Target Turret	23ANP4
J2736E,M,R,W		Console	16J23	Super Target Turret	23ANP4
J2737E,R,W		Console	16J23	Super Target Turret	23ANP4
J2738E,R,W		Console	16J23	Super Target Turret	23ANP4
J2738E1,R1,W1		Console	16H23	Super Target Turret	23ANP4
J2739E,R,W		Console	16J23	Super Target Turret	23ANP4
J2739E1		Console	16H23	Super Target Turret	23ANP4
J2740H,R,W		Console	16J23	Super Target Turret	23ANP4
J2740H1,R1,W1		Console	16H23	Super Target Turret	23ANP4
J2741E,R,W		Console	16J23	Super Target Turret	23ANP4
J2749H,M,R,W		Console	16J22	Gold Video Guard Turret	23ANP4
J2749H1,M1,R1,W1		Console	16H22	Gold Video Guard Turret	23ANP4
J2755H,M,R,W		Console	16J22	Gold Video Guard Turret	23ANP4
J2756L,R,W		Console	16J22	Gold Video Guard Turret	23ANP4
J3308R,Y	"300"	Table	16J23Q	Super Target Turret	23BJP4
J3308R1,Y1	"300"	Table	16H23Q	Super Target Turret	23BJP4
J3310E,R,W	"300"	Table	16J22QS	Gold Video Guard Turret	23ANP4
J3311R,W,Y	"400"	Table	16J22QS	Gold Video Guard Turret	23ANP4
J3340E,R,W	"300"	Console	16J23QS	Super Target Turret	23ANP4
J3340R1,W1	"300"	Console	16H23QS	Super Target Turret	23ANP4
J3341E,M,R,W	"300"	Console	16J23QS	Super Target Turret	23ANP4
J3341E1,R1,W1	"300"	Console	16H23QS	Super Target Turret	23ANP4
J3342E,R,W	"300"	Console	16J23QS	Super Target Turret	23ANP4
J3342R1	"300"	Console	16H23QS	Super Target Turret	23ANP4
J3343E,R,W	"300"	Console	16J23QS	Super Target Turret	23ANP4
J3343R1,W1	"300"	Console	16H23QS	Super Target Turret	23ANP4
J3345L,R,W	"300"	Console	16J23QS	Super Target Turret	23ANP4
J3350L,R,W	"400"	Console	16J22QS	Gold Video Guard Turret	23ANP4
J3355H,M,R,W	"400"	Console	16J22QS	Gold Video Guard Turret	23ANP4
J3360W,Y	"400"	Console	16J28QS	Gold Video Guard Turret	23AFP4
J3360W1	"400"	Console	16H28QS	Gold Video Guard Turret	23AFP4

(Model and chassis reference continued on the next page)

MODEL AND CHASSIS INFORMATION, Continued

MODEL	SPACE COMMAND	TYPE	CHASSIS	TUNER	PICTURE TUBE
J3368M,R	"400"	Console	16J28QS	Gold Video Guard Turret	23AFP4
J3375H	"400"	Console	16J28QS	Gold Video Guard Turret	23AFP4
J3375H1	"400"	Console	16H28QS	Gold Video Guard Turret	23AFP4
J3385H	"400"	Console	16J28QS	Gold Video Guard Turret	23AFP4
J3385H1	"400"	Console	16H28QS	Gold Video Guard Turret	23AFP4
T2050M,R,W		Console	16J23	Super Target Turret	23ANP4
T2050M1,R1,W1		Console	16H23	Super Target Turret	23ANP4
T2070E,R,W		Console	16J23	Super Target Turret	23ANP4
T2070E1,R1,W1		Console	16H23	Super Target Turret	23ANP4
T2072H,W		Console	16J23	Super Target Turret	23ANP4
T2072H1,W1		Console	16H23	Super Target Turret	23ANP4
T2073M		Console	16J23	Super Target Turret	23ANP4
T2073M1		Console	16H23	Super Target Turret	23ANP4
T2075L,W		Console	16J22	Gold Video Guard Turret	23ANP4
T2104C,G		Table	16J27	Bandswitch	19CDP4
T2105L		Table	16J27	Super Target Turret	19CDP4
T2706W		Table	16J23	Bandswitch	23ANP4
T2706W1		Table	16H23	Bandswitch	23ANP4
T3072H,W	"400"	Console	16J23Q	Super Target Turret	23ANP4
T3072H1,W1	"400"	Console	16H23Q	Super Target Turret	23ANP4
T3073M	"400"	Console	16J23Q	Super Target Turret	23ANP4
T3073M1	"400"	Console	16H23Q	Super Target Turret	23ANP4
T3075L,W	"400"	Console	16J22QS	Gold Video Guard Turret	23ANP4
MH2786E,M,R,W		Comb.	16H23/9H20/4G21	Super Target Turret	23ANP4
MH2787W		Comb.	16H23/9H20/8H30	Super Target Turret	23ANP4
MH2789M,R		Comb.	16H23/9H20/8H30	Super Target Turret	23ANP4
MH3388W	"400"	Comb.	16H22Q/9H20/8H30	Gold Video Guard Turret	23ANP4
MJ2786L,W		Comb.	16J23/9H20/4G21	Super Target Turret	23ANP4
MJ2787M,R		Comb.	16J23/9H20/8H30	Super Target Turret	23ANP4
MJ2789M,R		Comb.	16J22/9H20/8H30	Gold Video Guard Turret	23ANP4
MJ2789M1,R1		Comb.	16H22/9H20/8H30	Gold Video Guard Turret	23ANP4
MJ3388H	"400"	Comb.	16J22QS/9H20/8H30	Gold Video Guard Turret	23ANP4

Material presented is exact for "J" type chassis. The "H" type chassis are practically identical to corresponding "J" types, (for example, 16H23 and 16J23). Suffix "Q" following the chassis number identifies a receiver with a remote control.

SPECIFICATIONS

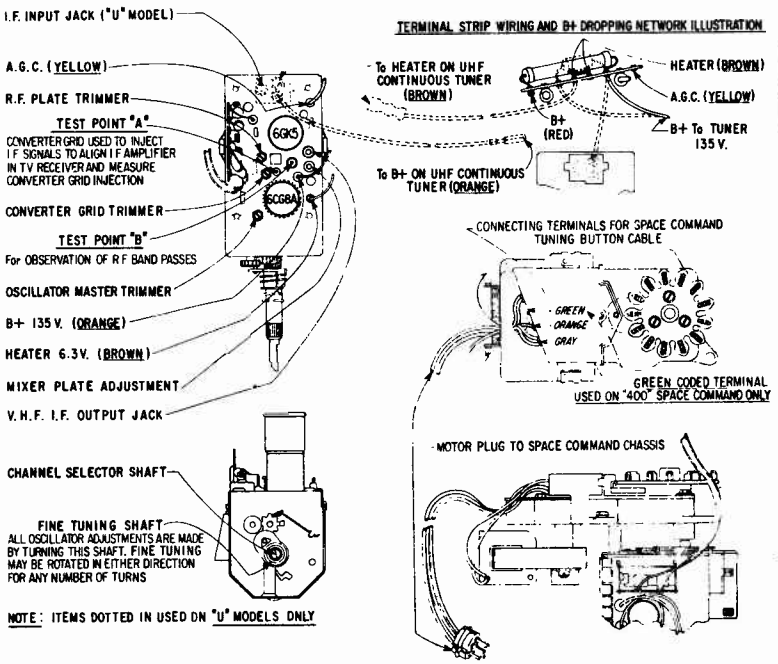
POWER SUPPLY
120 Volts, 60 Cycles AC

CHASSIS		WATTS
16J20 & U		185
16J20Q		270*
16J22 & U		220
16J22Q & QS	"300"	305
16J22Q & QS	"400"	270
16J23 & U		215
16J23Q & QS	"300"	300
16J23Q & QS	"400"	265
16J27 & U		200
16J27T		205
16J27Q, QT & QS		285*
16J28 & U		225
16J28QS		275*

*With Space Command motor drive in operation.

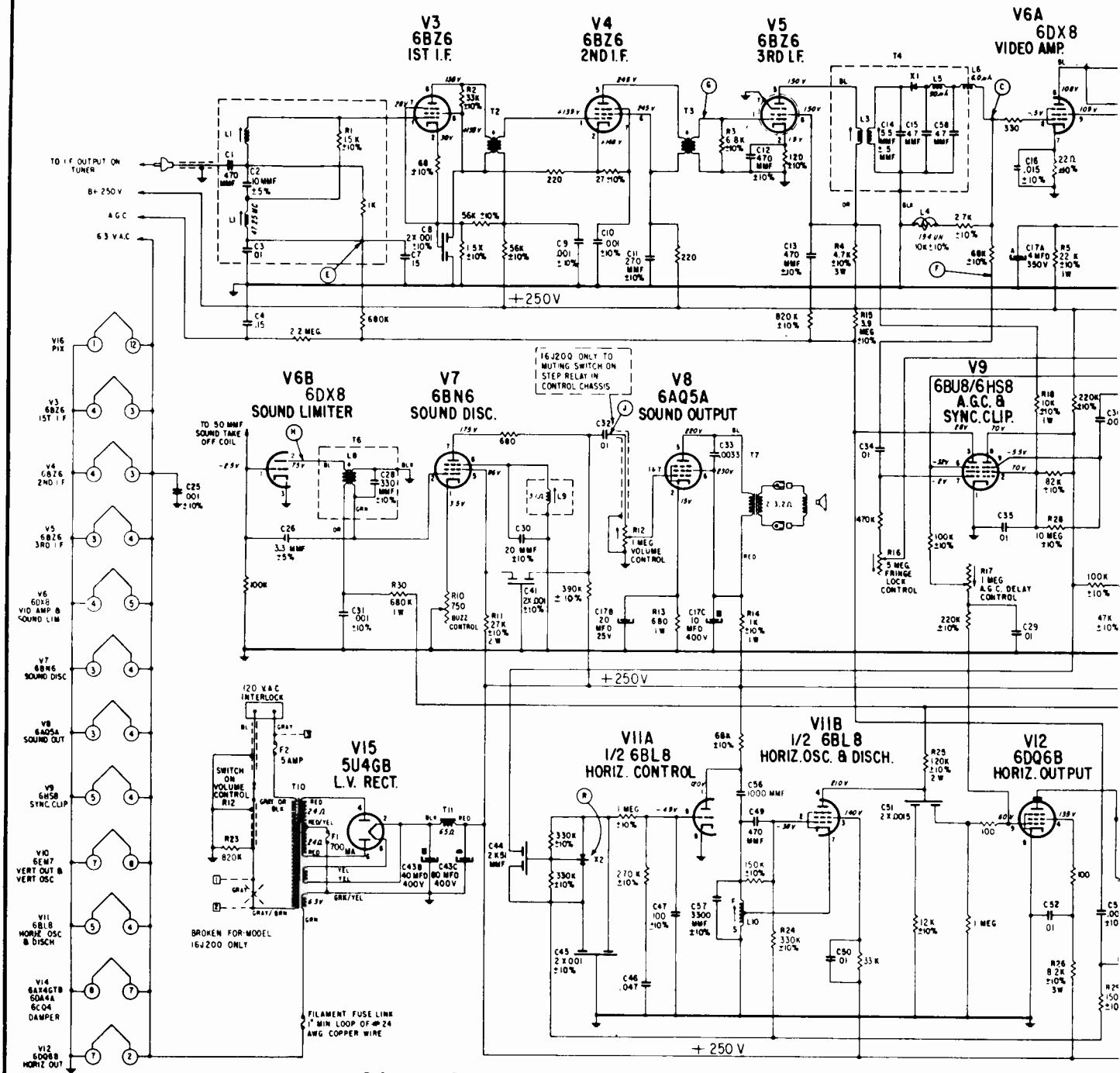
WIDTH ADJUSTMENT

To obtain proper width, slide the metal sleeve along the neck of the picture tube until a position is found which results in proper width and linearity. In the 16J27 and 16H27 chassis, the sleeve must be installed with the open side facing the picture tube high voltage connector button.



Tube and Trimmer Layout, Super Target Tuner.

ZENITH Schematic Diagram 16J20 and 16J20Q Chassis



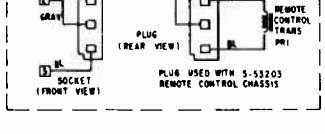
Schematic Diagram, 16J20 and 16J20Q Chassis.

NOTES:

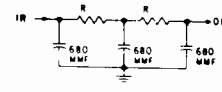
ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.
ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT. NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER CAPACITY TOLERANCE +20% UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS ARE ±10% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.
RESISTANCE MEASUREMENTS SHOWN WITH COILS DISCONNECTED FROM CIRCUIT.
COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.
CATHODE RAY TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC OR 20K MIN. OHM PER VOLT HIGH VOLTAGE METER.
ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.
(A) ALIGNMENT POINTS
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS
CHASSIS

CX = CAPACITOR VALUE SELECTED FOR MINIMUM YOKE RINGING. VARIES WITHIN A RANGE OF 47 mmf TO 72 mmf (2 K.V. ±10%) WHEN NECESSARY. REPLACE WITH EXACT VALUE FOUND IN YOKE.

SOCKET AND WIRING FOR 16J200 MODEL



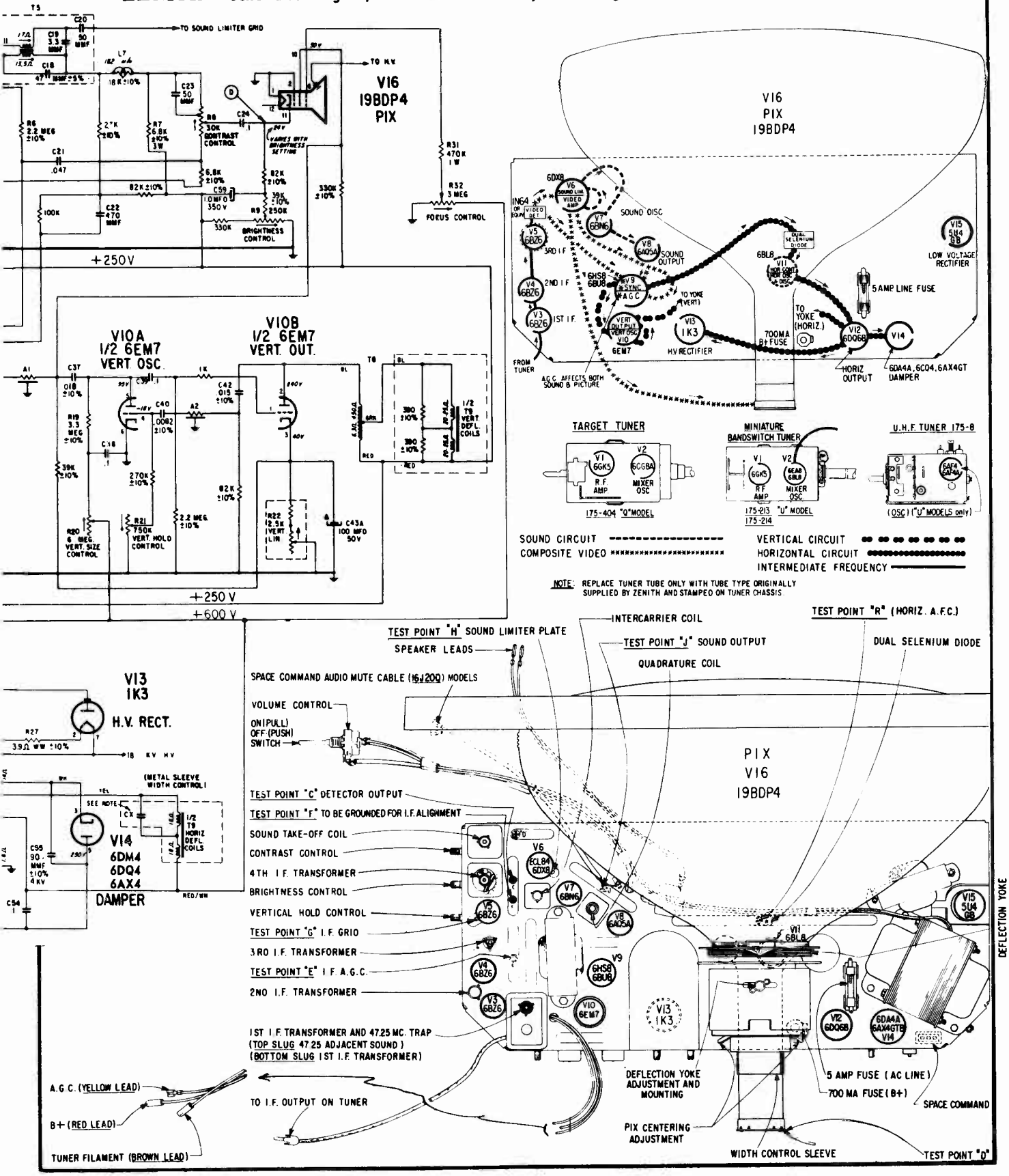
TEST POINTS
C- DETECTOR OUTPUT
D - VIDEO OUTPUT
E - I F AGC
F - GROUND DURING I F ALIGNMENT
G - 3RD I F GRID
H - SOUND LIMITER PLATE
J - SOUND OUTPUT
R - PLATE OF A F C DIODE



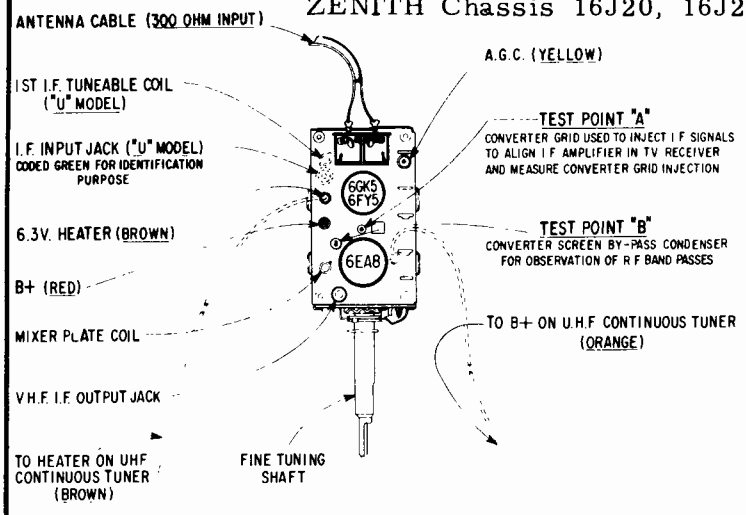
EQUIVALENT CIRCUIT
A-1 and A-2 INTEGRATORS

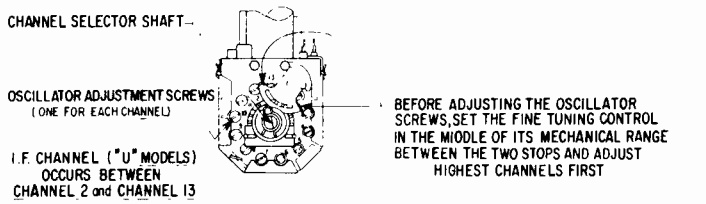
87-7 R is 68K
87-8 R is 82K

ZENITH Schematic Diagram, Tube and Trimmer Layout and Signal Path Chart 16J20 and 16J20Q Chassis.



ZENITH Chassis 16J20, 16J22, 16J23, 16J27, 16J28, etc., Continued





Tube and Trimmer Layout, Bandswitch Tuner.

AGC ADJUSTMENT

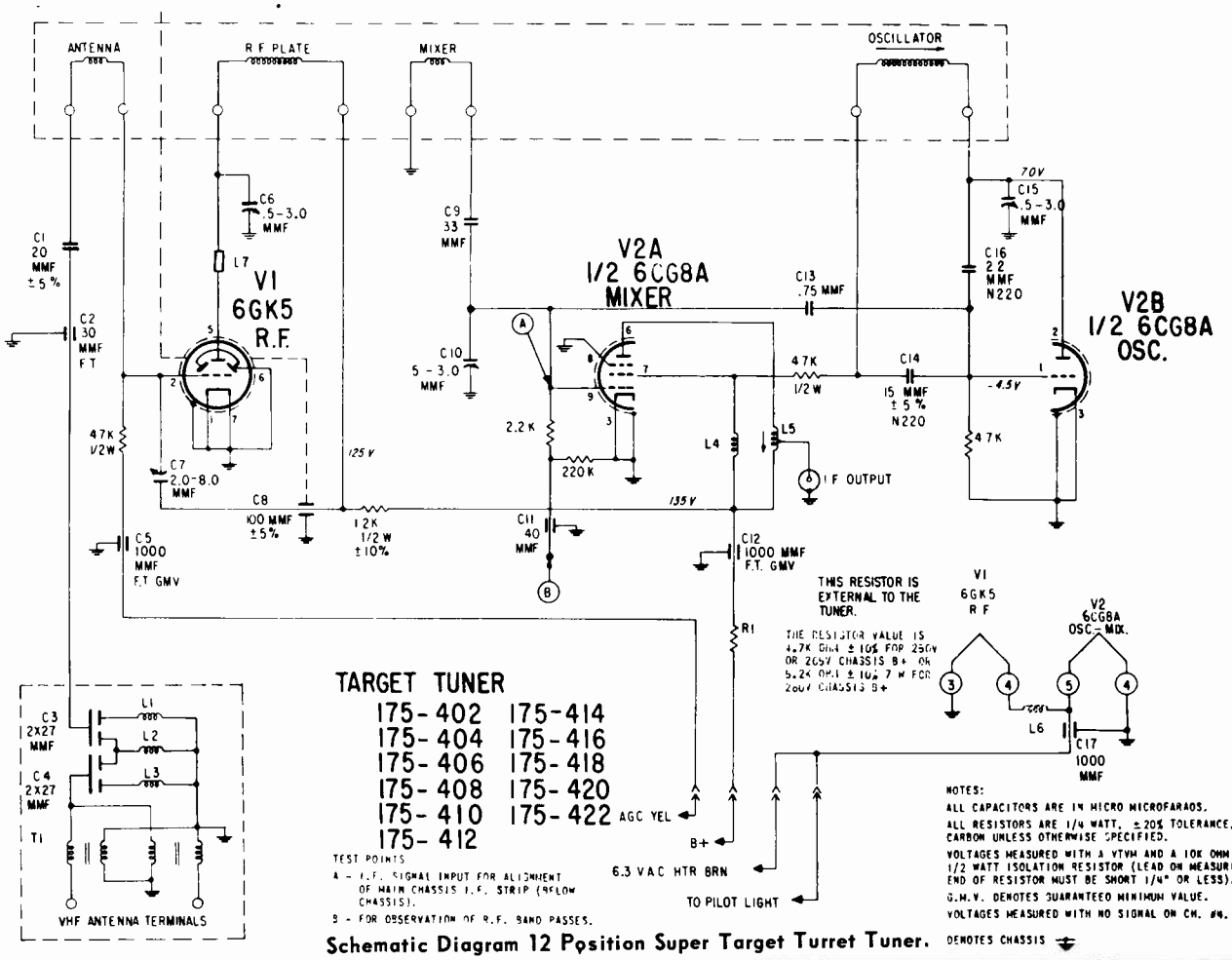
Tune in a strong TV signal and slowly turn the delay control until a point is reached where the picture distorts and buzz is heard in the sound. The control should then be backed down from this position and set at a point comfortably below the level of intercarrier buzz, picture distortion and improper 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.

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.



TARGET TUNER

175-402	175-414
175-404	175-416
175-406	175-418
175-408	175-420
175-410	175-422
175-412	

Schematic Diagram 12 Position Super Target Turret Tuner.

ZENITH Chassis 16J20, 16J22, 16J23, 16J27, 16J28, etc., Continued

FRINGE LOCK ADJUSTMENT

The fringe lock adjustment is made to obtain best possible synchronization under weak and noisy signal conditions. 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 counter-clockwise 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.

CENTERING ADJUSTMENT

The centering assembly is built into the yoke housing. This assembly is made of two magnetic rings which can be rotated by means of tabs. Centering is accomplished by gradually rotating the tabs with respect to each other, then rotating both tabs simultaneously until the picture is centered.

CORRECTOR MAGNET ADJUSTMENT

Two corrector magnets are used in all 23 and some 19 inch models 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 the support brackets are 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 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

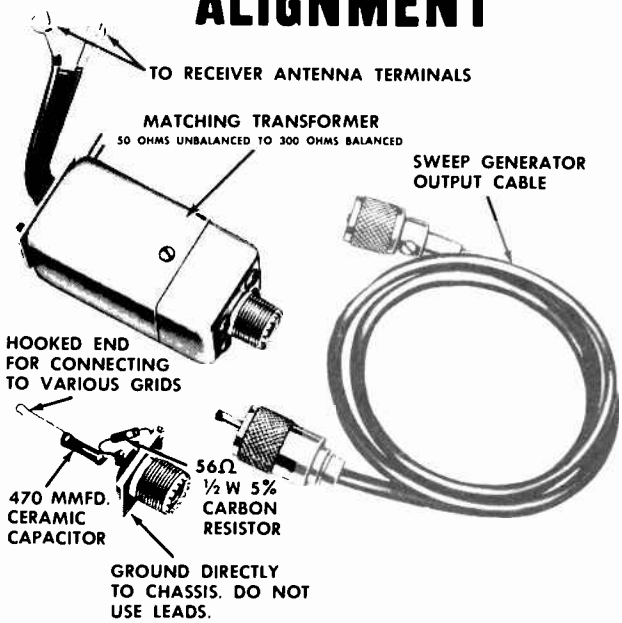


Fig. 4 IF-RF Alignment Fixtures

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.

ZENITH Chassis 16J22, 16J23, 16J27, 16J28 Alignment, Continued

VIDEO IF ALIGNMENT
(EXCEPT 16J20 CHASSIS)

Refer to the appropriate schematic diagram and 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. In the 16J28 chassis turn the Peak Picture Control to the extreme counter-clockwise position.

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 two peaks must be equal in height and the high frequency peak

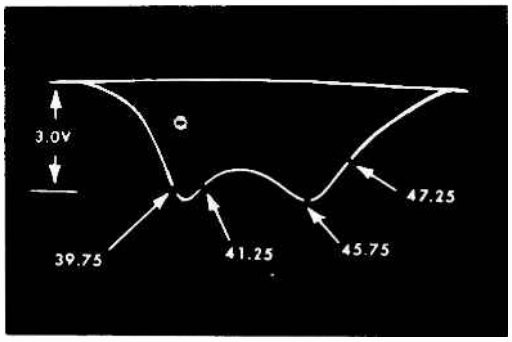


Fig. 5 4th IF Response

at 45.75 Mc. 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" (converter grid, Fig. 1, 2 or 3 depending on tuner). Connect terminal "F" to chassis and connect a jumper between terminal "E" and chassis. Adjust sweep to obtain a 3V.P.P. response somewhat similar to Fig. 8. Switch oscilloscope to 10X gain to "blow up" the traps, (Fig. 6).

6. Refer to Fig. 6 and adjust the 39.75 Mc and the 41.25 Mc traps for minimum marker amplitude. Disconnect the jumper between "E" and chassis. Connect this jumper between "E" and the junction of the 22 (68 in the 16J27 chassis) and 1500 ohm resistors in the cathode of the first I.F. This provides an additional "Blow Up" of the 47.25 Mc traps (Fig. 7). In the 16J28 chassis the receiver is shipped from the factory with the adjacent channel reject switch (at the rear of the chassis) in the "out" position. For alignment, the switch should be in the "in" position. Adjust the 47.25 Mc traps (the 16J27 chassis has one 47.25 Mc trap) for minimum marker amplitude.

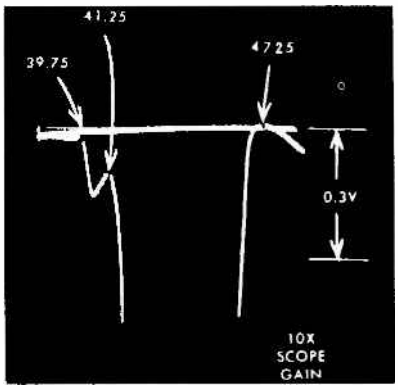


Fig. 6 Expanded View of Traps

7. Disconnect the jumper between "E" and the 22 and 1500 ohm cathode resistors. Connect this jumper between "E" and chassis. In the 16J28 chassis switch the adjacent channel reject switch to the "out" position. Adjust sweep generator for 3 volts peak to peak output. Alternately adjust the 2nd, 3rd, 1st I.F. and the converter plate coil until an overall response similar to Fig. 8 (Fig. 9 for the 16J27 chassis) is obtained. It will be found that the 2nd I.F. affects the low side (42.75 Mc) and the 3rd I.F. the high side of the response.

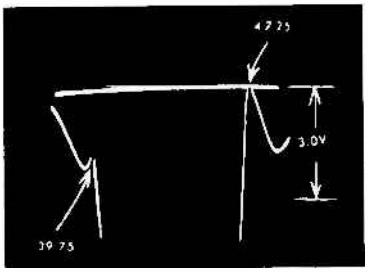


Fig. 7 Further Expansion of Fig. 6 for Detail View of the 39.75 and 47.25 Mc Traps.

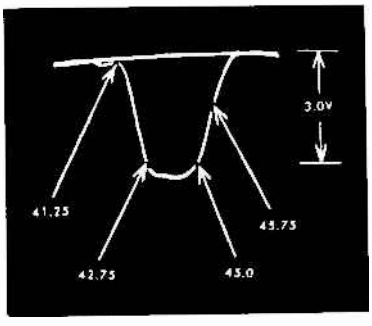


Fig. 8 Overall IF Response

ZENITH Chassis 16J20 Alignment Information, Continued

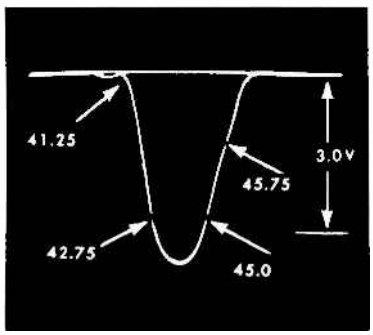


Fig. 9 Overall IF Response
16J27 Chassis

IF ALIGNMENT 16J20 CHASSIS

Refer to the 16J20 schematic diagram, 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 as shown in Fig. 4 to point "G" (Pin 1 of the 3rd IF). Adjust generator to obtain a response similar to Fig. 12. Do not exceed the 3 volt peak to peak detector output during any of the following 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 and the 42.75 Mc markers positioned as shown in Fig. 10. 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.

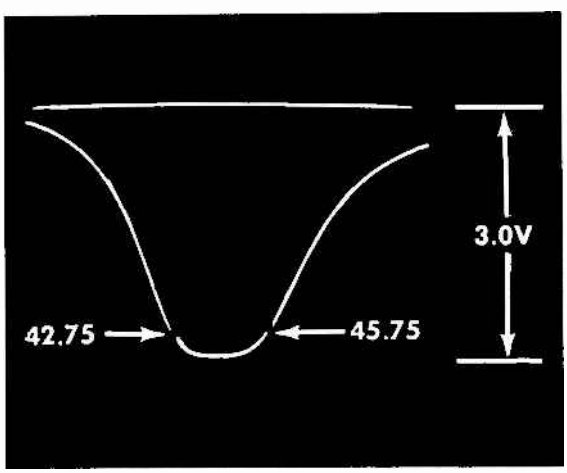


Fig. 10 4th IF Response
16J20 Chassis

5. Connect the sweep generator to terminal "A" (converter grid, Fig. 1 or 2 depending on tuner). Connect terminal "F" to chassis and connect a jumper between terminal "E" and the junction of the 68 and 1500 ohm resistors in the cathode of the first IF. This provides a "Blow Up" of the 47.25 Mc trap (Fig. 11). Adjust the 47.25 Mc trap for minimum marker amplitude.

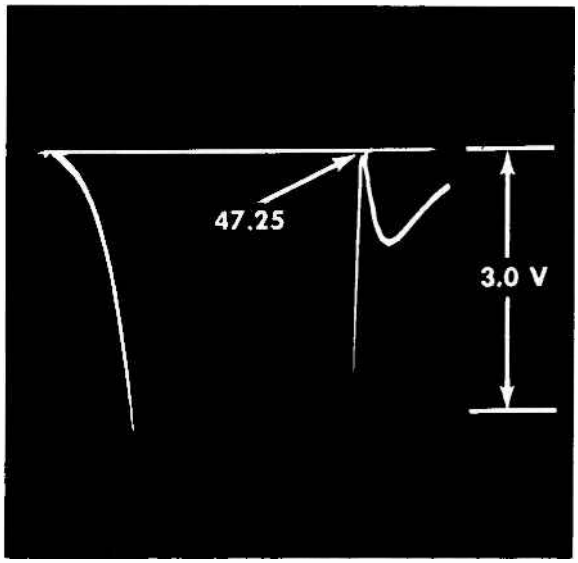


Fig. 11 Expanded View of the
47.25 Mc Trap, 16J20 Chassis

6. Disconnect the jumper between "E" and the 68 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. 12 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. Remove jumpers after alignment.

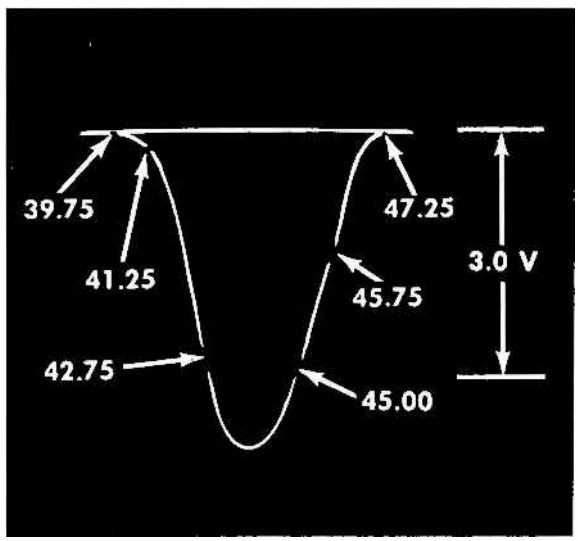
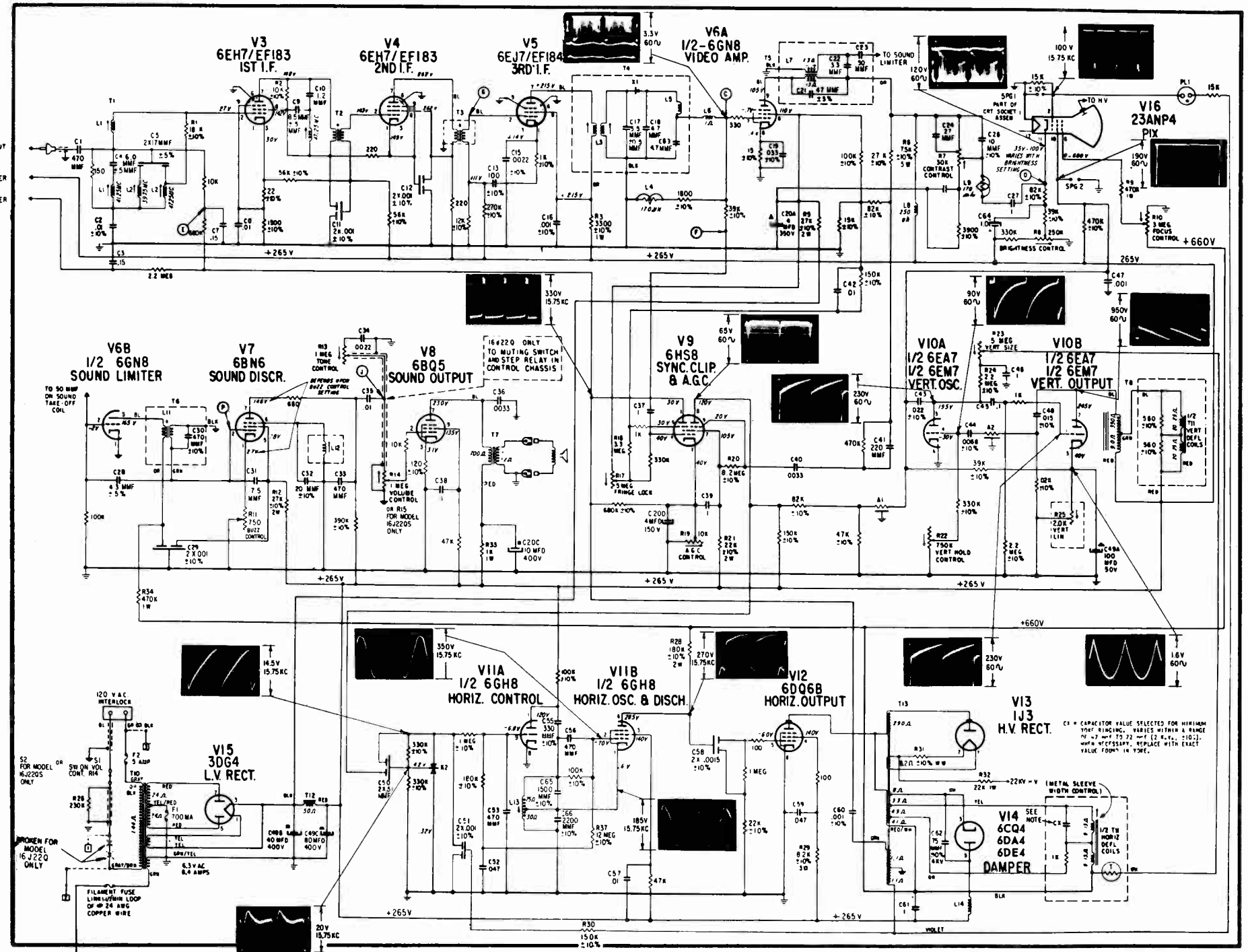


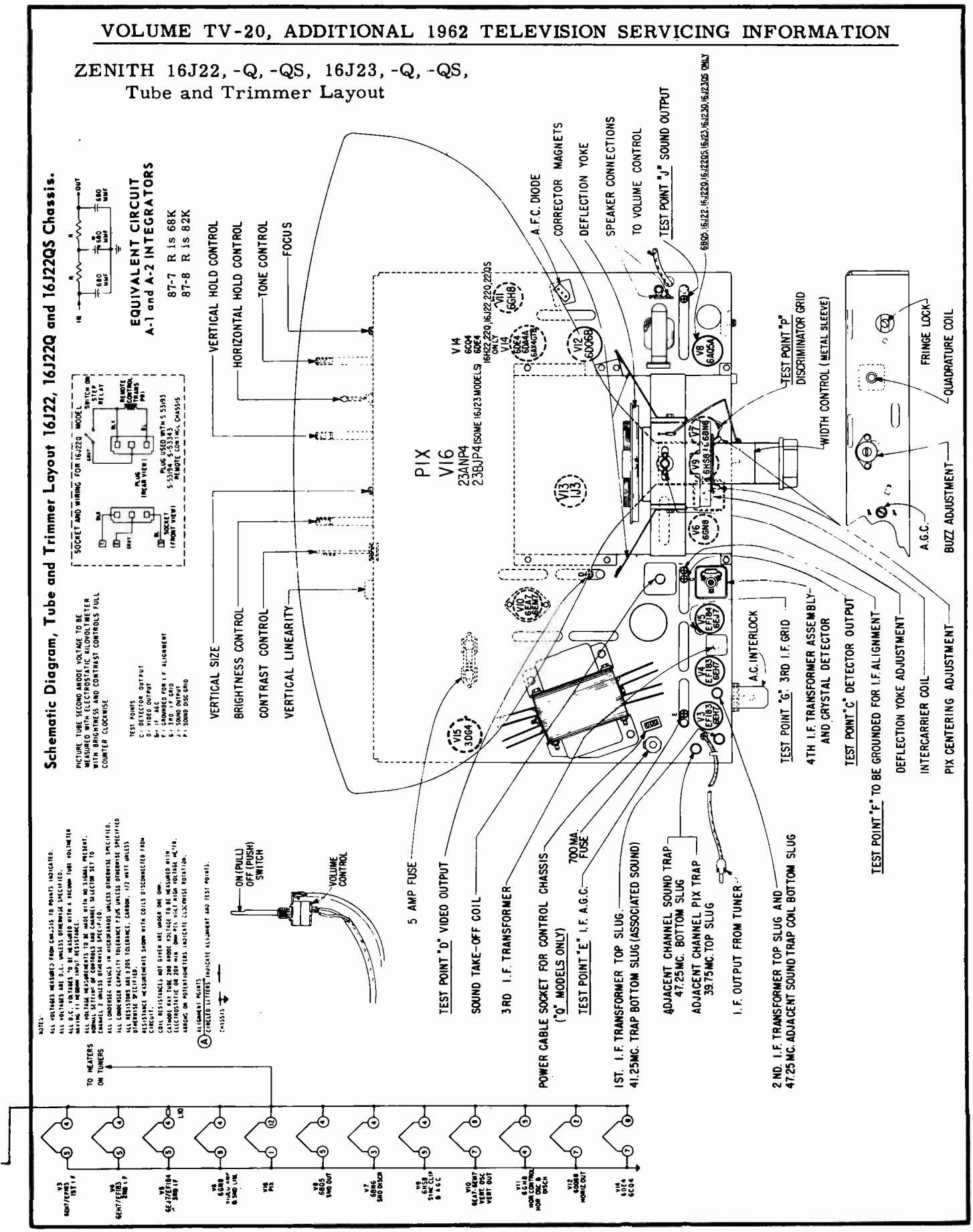
Fig. 12 Overall IF Response
16J20 Chassis

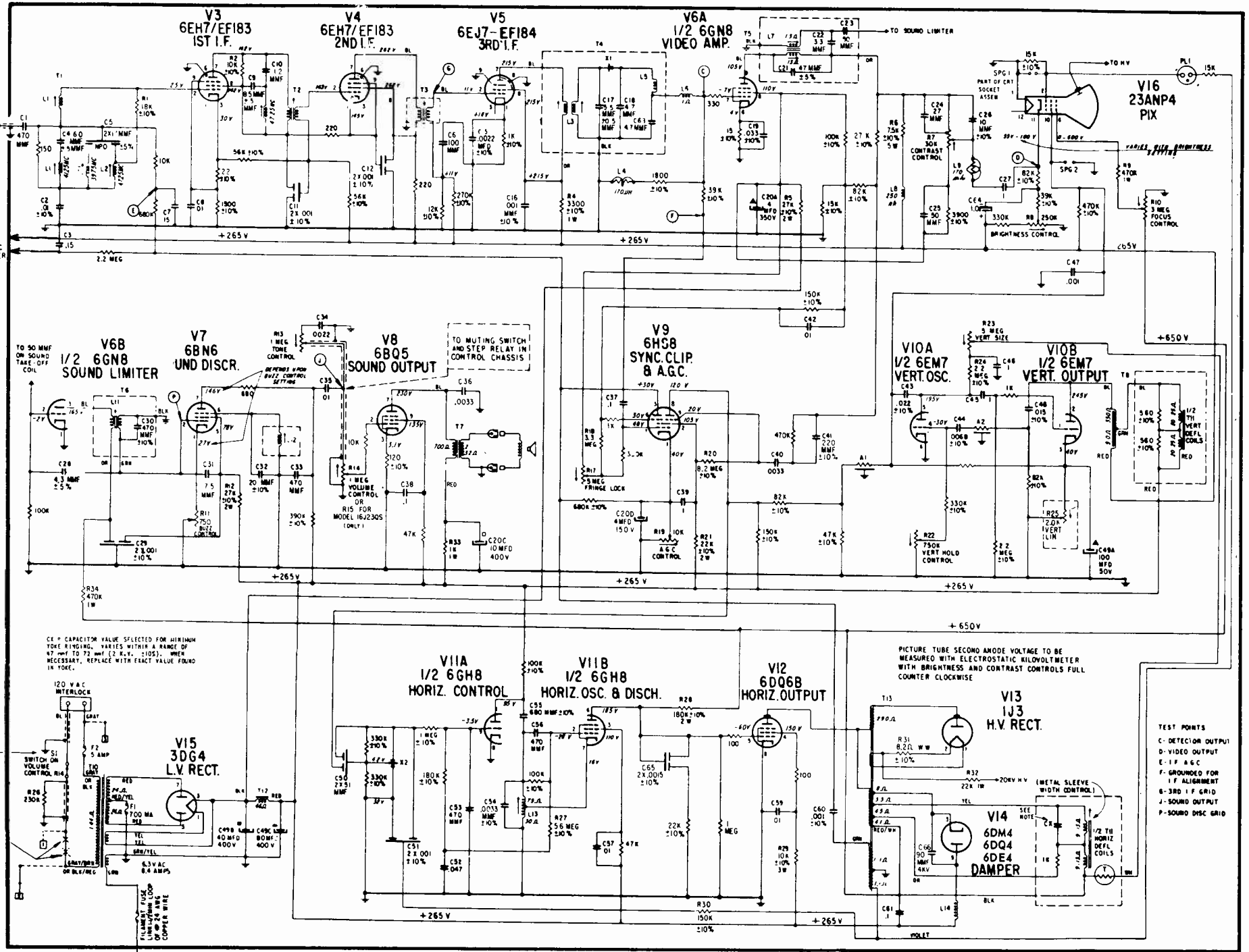


Schematic Diagram, Tube and Trimmer Layout 16J22, 16J22Q and 16J22QS Chassis.

ZENITH 16J22, -Q, -QS, 16J23, -Q, -QS,
Tube and Trimmer Layout

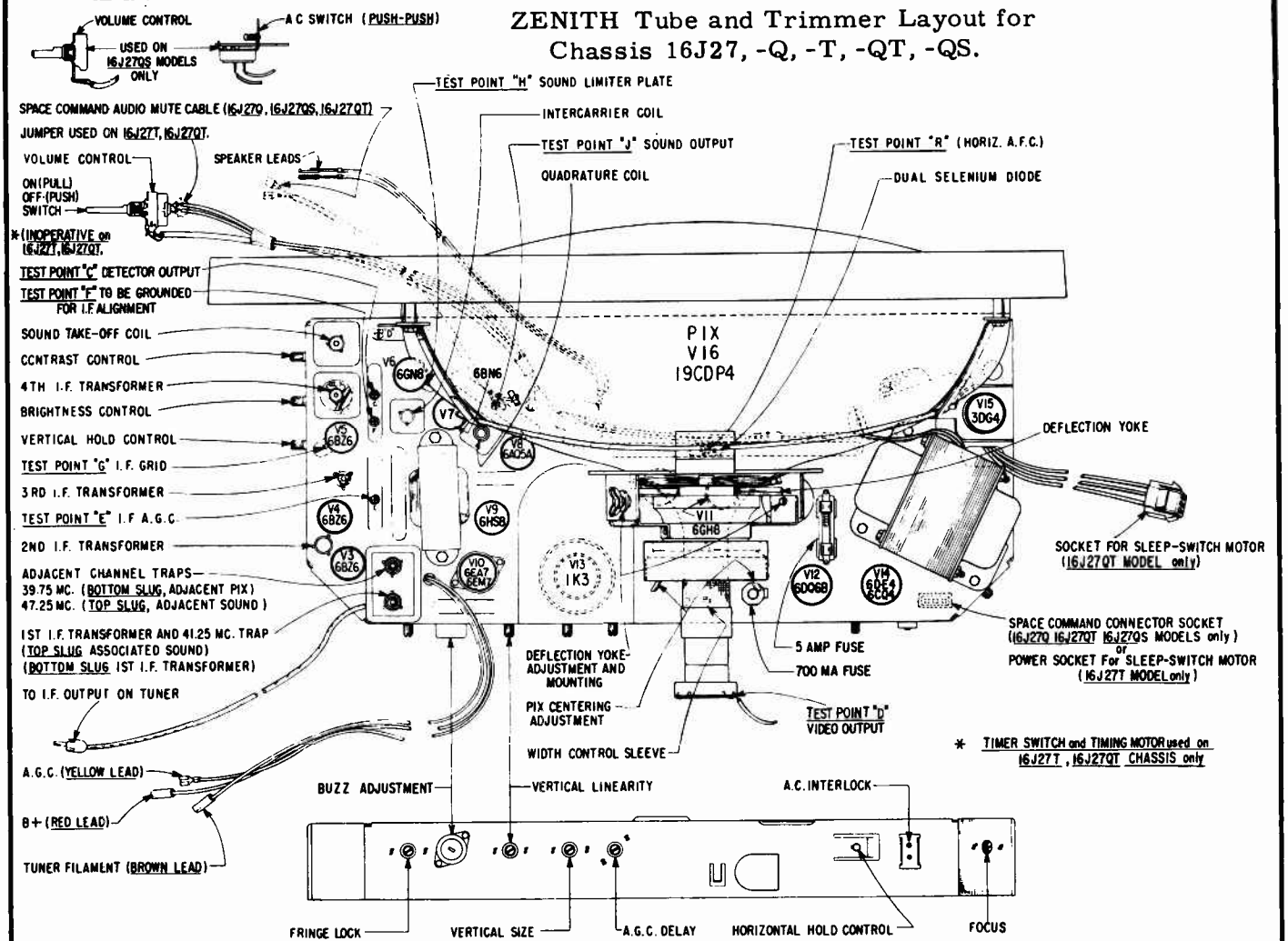
Schematic Diagram, Tube and Trimmer Layout 16J22, 16J22Q and 16J22QS Chassis.



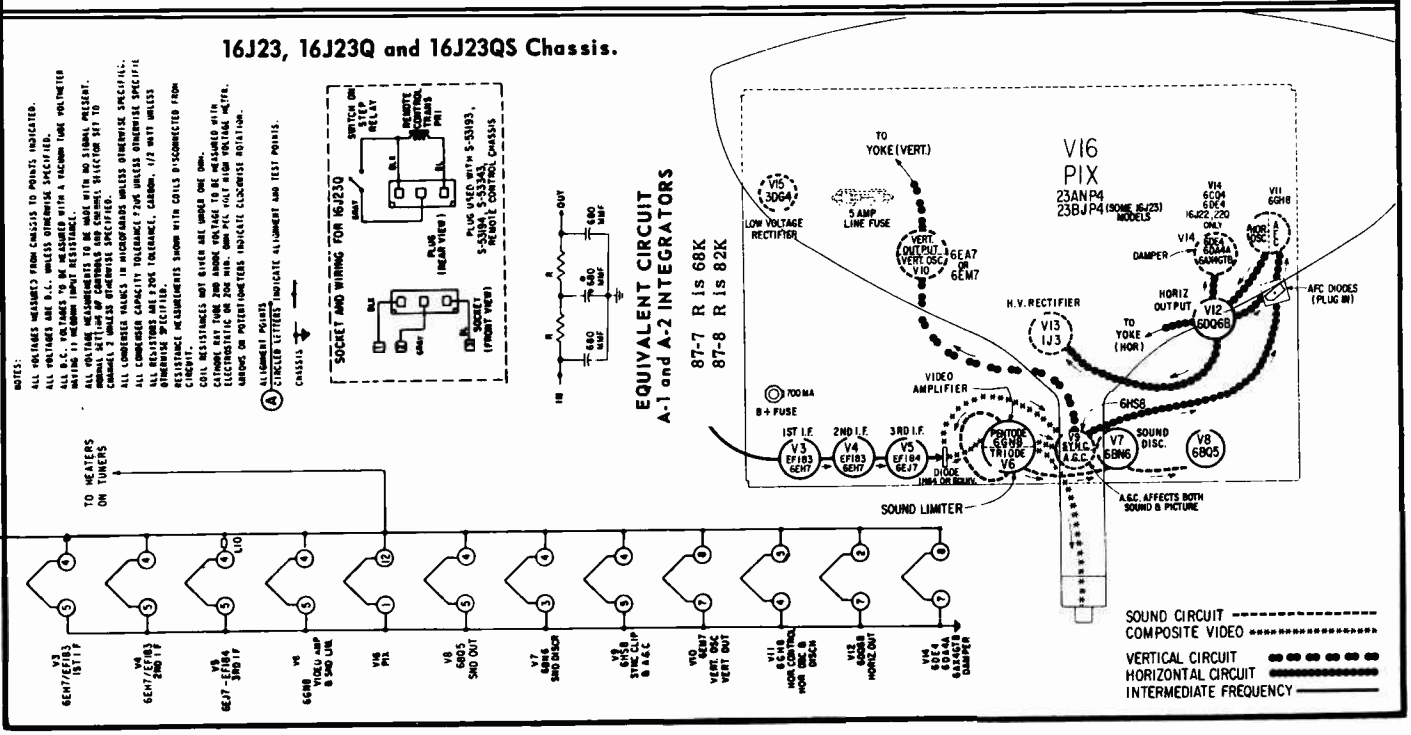


Schematic Diagram, Tube and Trimmer Layout 16J23, 16J23Q and 16J23QS Chassis.

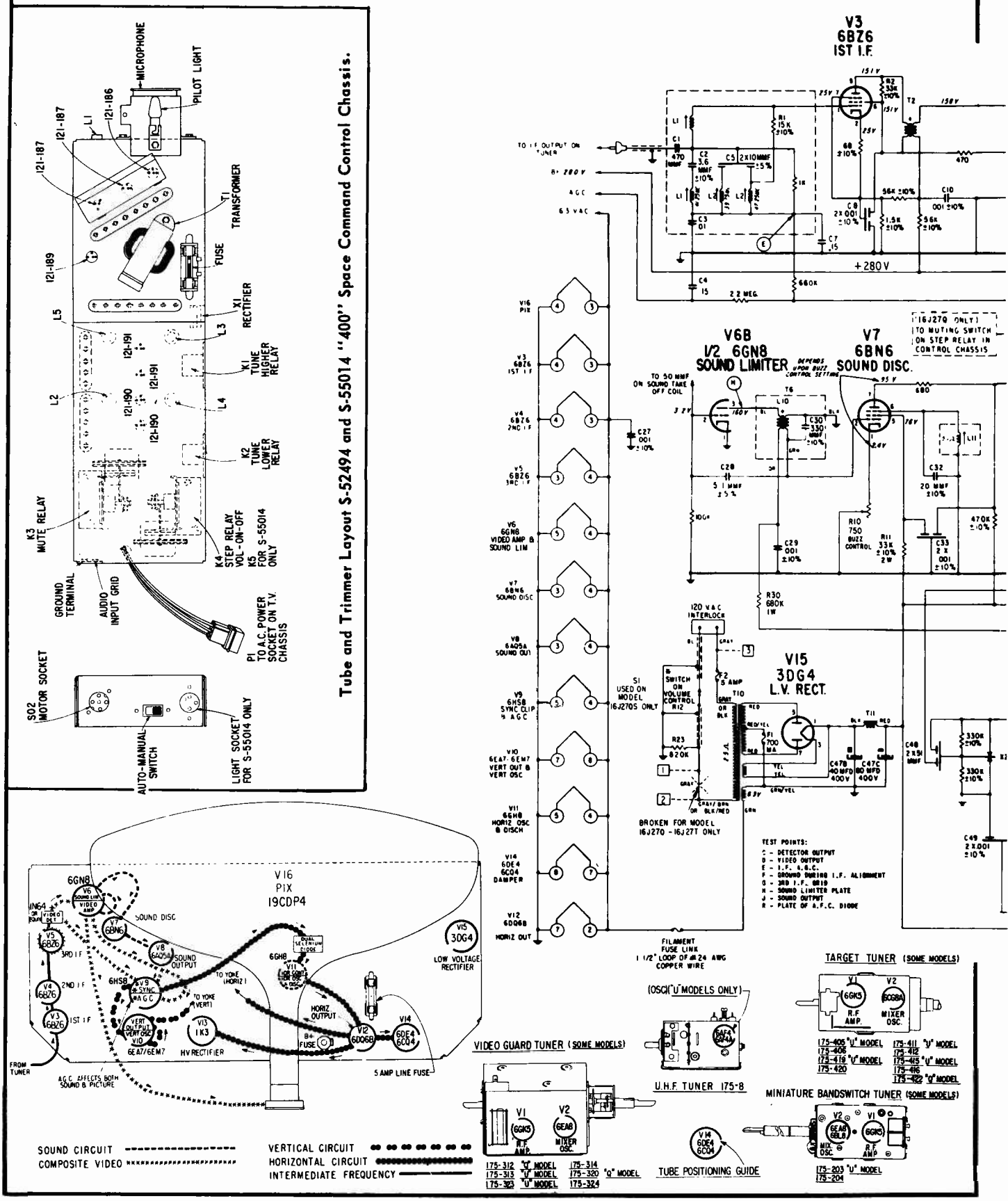
ZENITH Tube and Trimmer Layout for Chassis 16J27, -Q, -T, -QT, -QS.



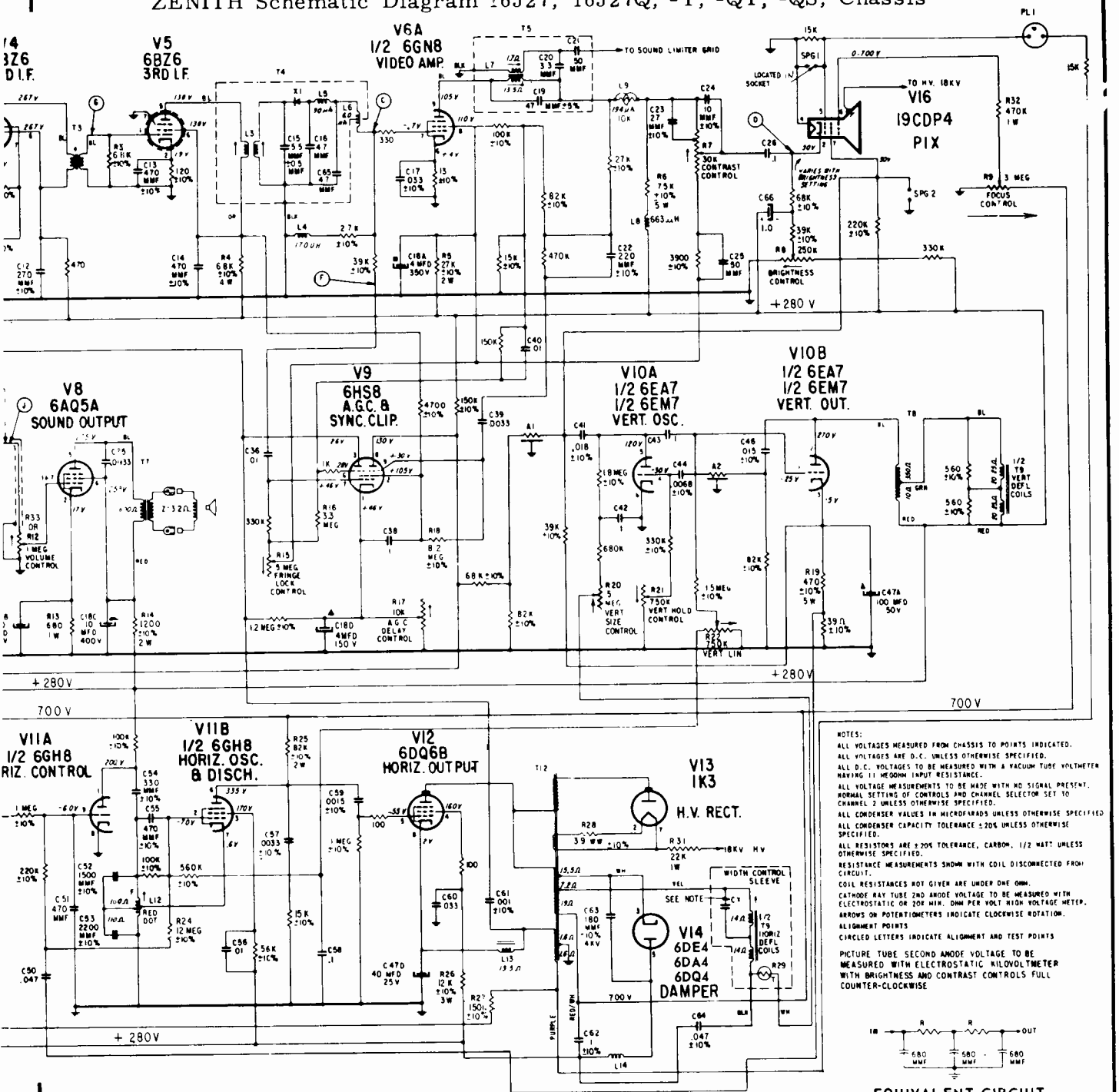
16J23, 16J23Q and 16J23QS Chassis.



ZENITH Schematic Diagram and Signal Path Chart 16J27, 16J27Q, 16J27T, 16J27QT and 16J27QS Chassis.



ZENITH Schematic Diagram 16J27, 16J27Q, -T, -QT, -QS, Chassis



NOTES:

ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.

ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT, NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.

ALL CONDENSER VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED

ALL CONDENSER CAPACITY TOLERANCE ±20% UNLESS OTHERWISE SPECIFIED.

ALL RESISTORS ARE ±20% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.

RESISTANCE MEASUREMENTS SHOWN WITH COIL DISCONNECTED FROM CIRCUIT.

COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.

CATHODE RAY TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC OR 20K MIN. OHM PER VOLT HIGH VOLTAGE METER.

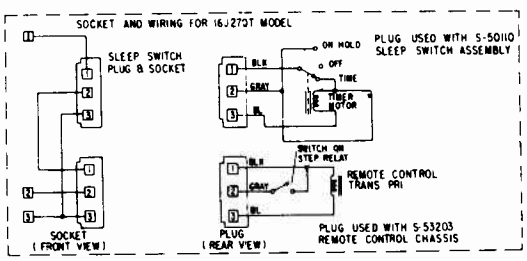
ARROWS OR POTENTIOMETERS INDICATE CLOCKWISE ROTATION.

ALIGNMENT POINTS

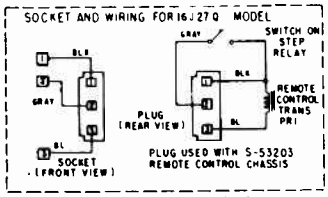
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS

PICTURE TUBE SECOND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER-CLOCKWISE

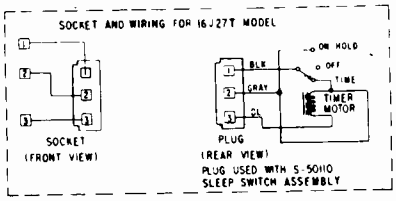
EQUIVALENT CIRCUIT
A-1 and A-2 INTEGRATORS
87-7 R is 68K
87-8 R is 82K



CX = CAPACITOR VALUE SELECTED FOR MINIMUM YOKE RINGING. VARIES WITHIN A RANGE OF 47 mmf TO 72 mmf (3 K.V., ±10%). WHEN NECESSARY, REPLACE WITH EXACT VALUE FOUND IN YOKE.



* SWITCH IS MECHANICALLY LOCKED IN "ON" POSITION IN 16J27T MODELS ONLY



* SWITCH IS MECHANICALLY LOCKED IN "ON" POSITION IN 16J27T MODELS ONLY

ADJACENT CHANNEL REJECT SWITCH 16J28 CHASSIS

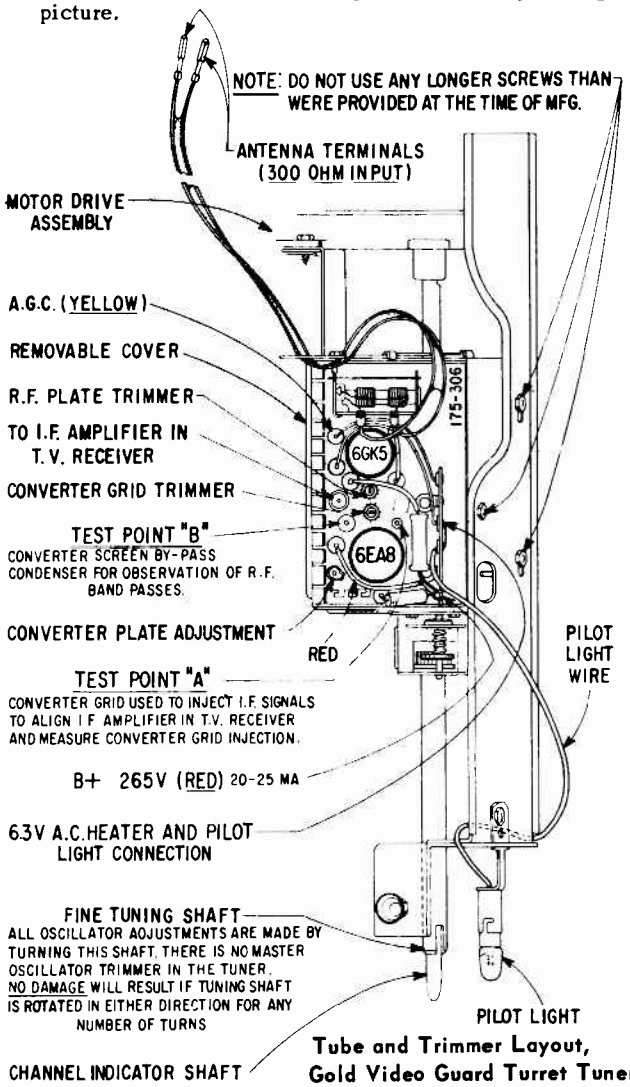
This switch is located at the rear of the chassis and is used to switch the 47.25 Mc adjacent channel sound trap in or out of the circuit as required.

When the trap is switched out of the circuit a slight improvement in IF band pass occurs for better picture detail. The receiver is shipped from the factory with the trap in the "out" position.

PEAK PICTURE CONTROL

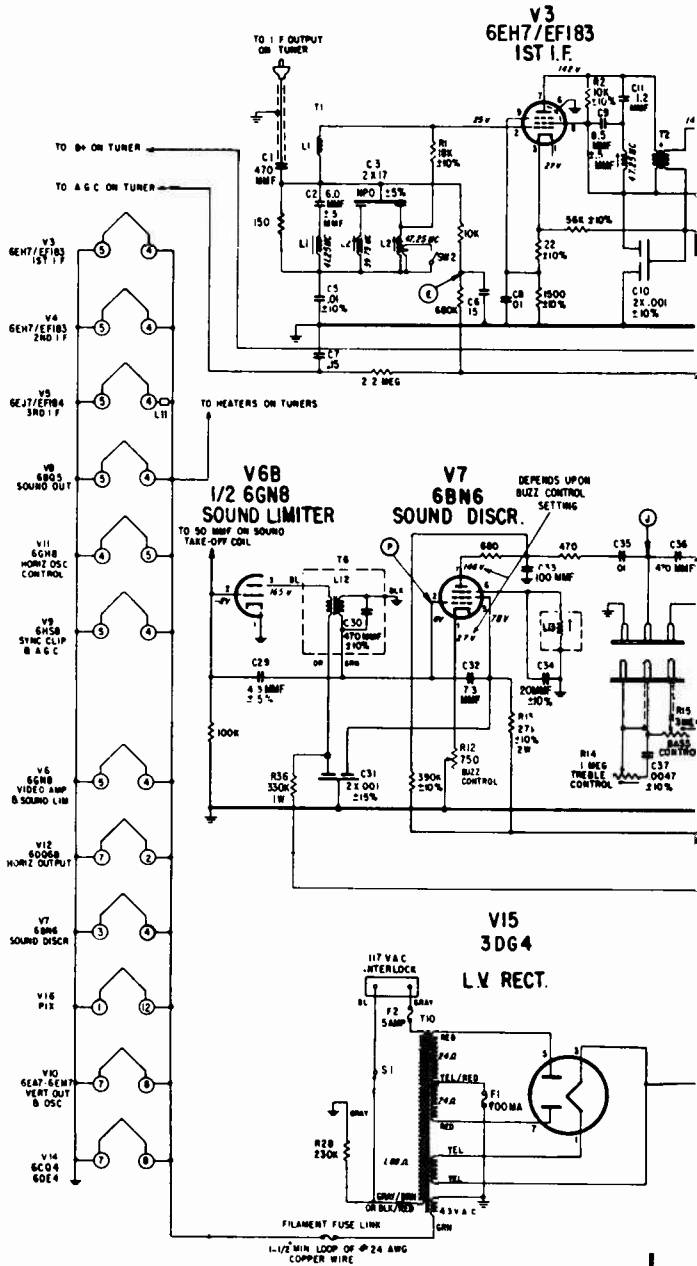
This control is at the rear of the chassis. It is part of the video detector load and has a decided effect on the video response of the receiver. The response can be changed from a slight smear at the extreme counter-clockwise position of the control to an exaggerated overshoot in the maximum clockwise position.

The control is adjusted at the factory for best picture detail under normal signal conditions, however, it can be changed in the field to suit a particular signal or program condition. As an example, an old movie can be "crispened" or the texture of "snow" in a fringe area can be changed for a more pleasing picture.



Tube and Trimmer Layout, Gold Video Guard Turret Tuner.

ZENITH Chassis 16J28QS

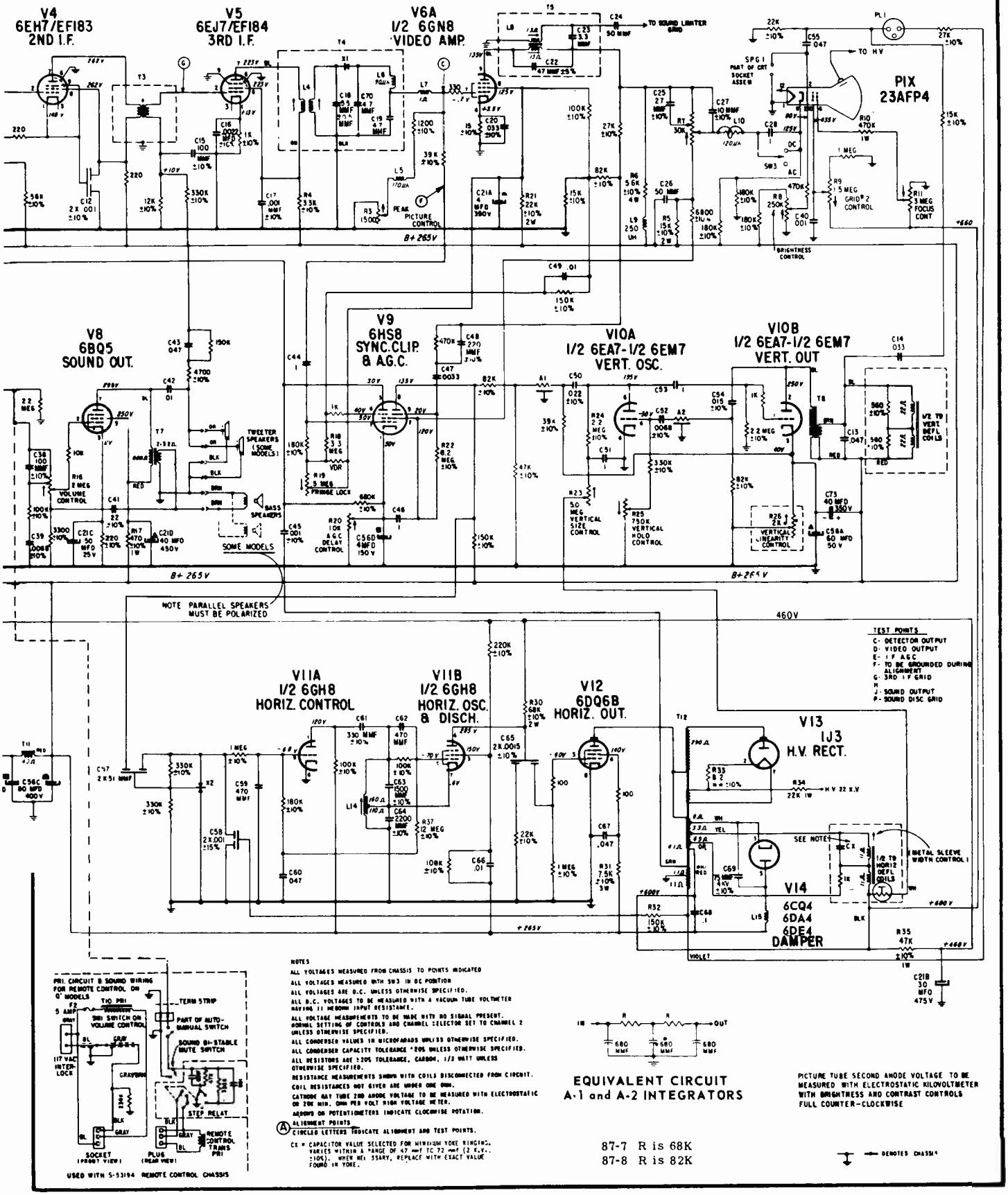


G2 ADJUSTMENT

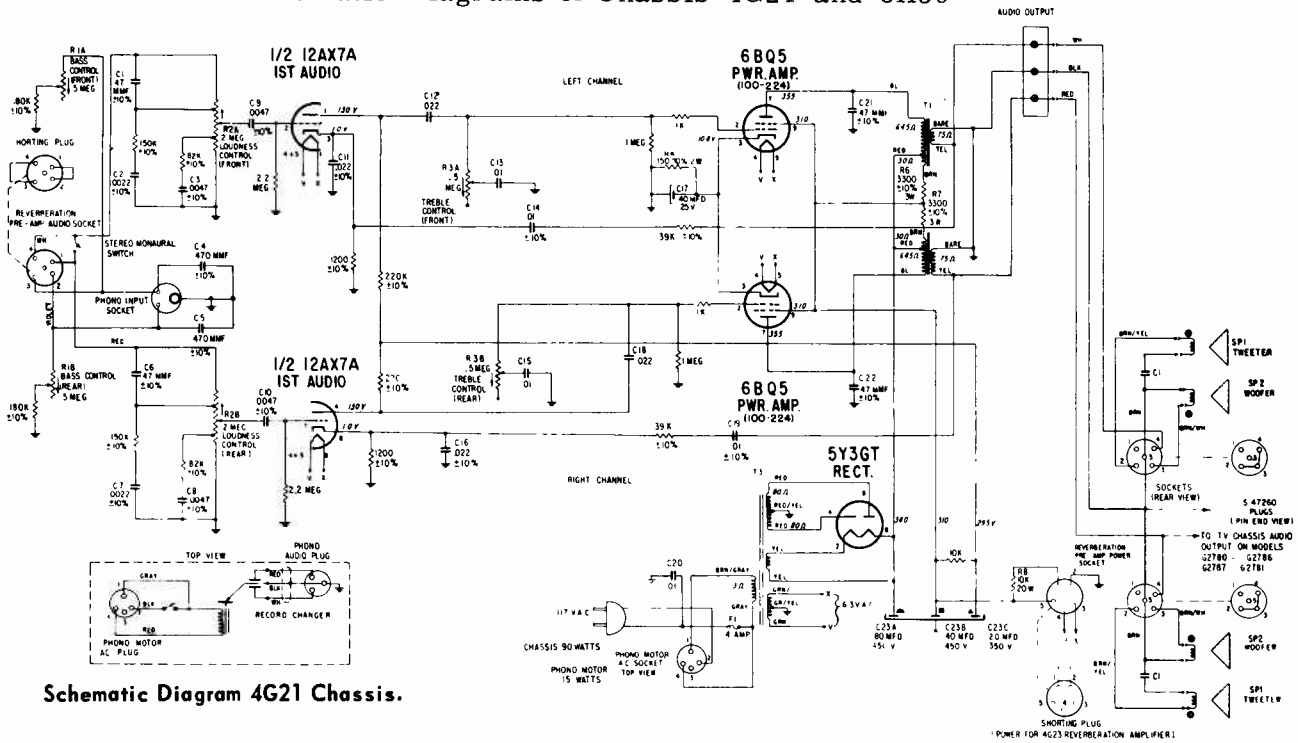
1. Connect the negative lead of a variable bias supply (0-6V) to the grid (pin 7) of the 6GN8 video amplifier and the positive lead to chassis. Switch the tuner to a blank channel. Pull the dynamic contrast switch out (DC position).
2. Connect a VTVM to the cathode of the picture tube (pin 11) and adjust the bias supply until this voltage reads 150V.
3. Connect the VTVM to grid 1 (pin 2) and adjust the brightness control for 95 volts indication on the meter.
4. Leave the meter connected to grid 1 and adjust G2 until the raster is just extinguished.

NOTE: An alternate and reasonably accurate method of adjustment is to tune in a TV signal and adjust the G2 control for 450 volts on grid 2 (pin 10)

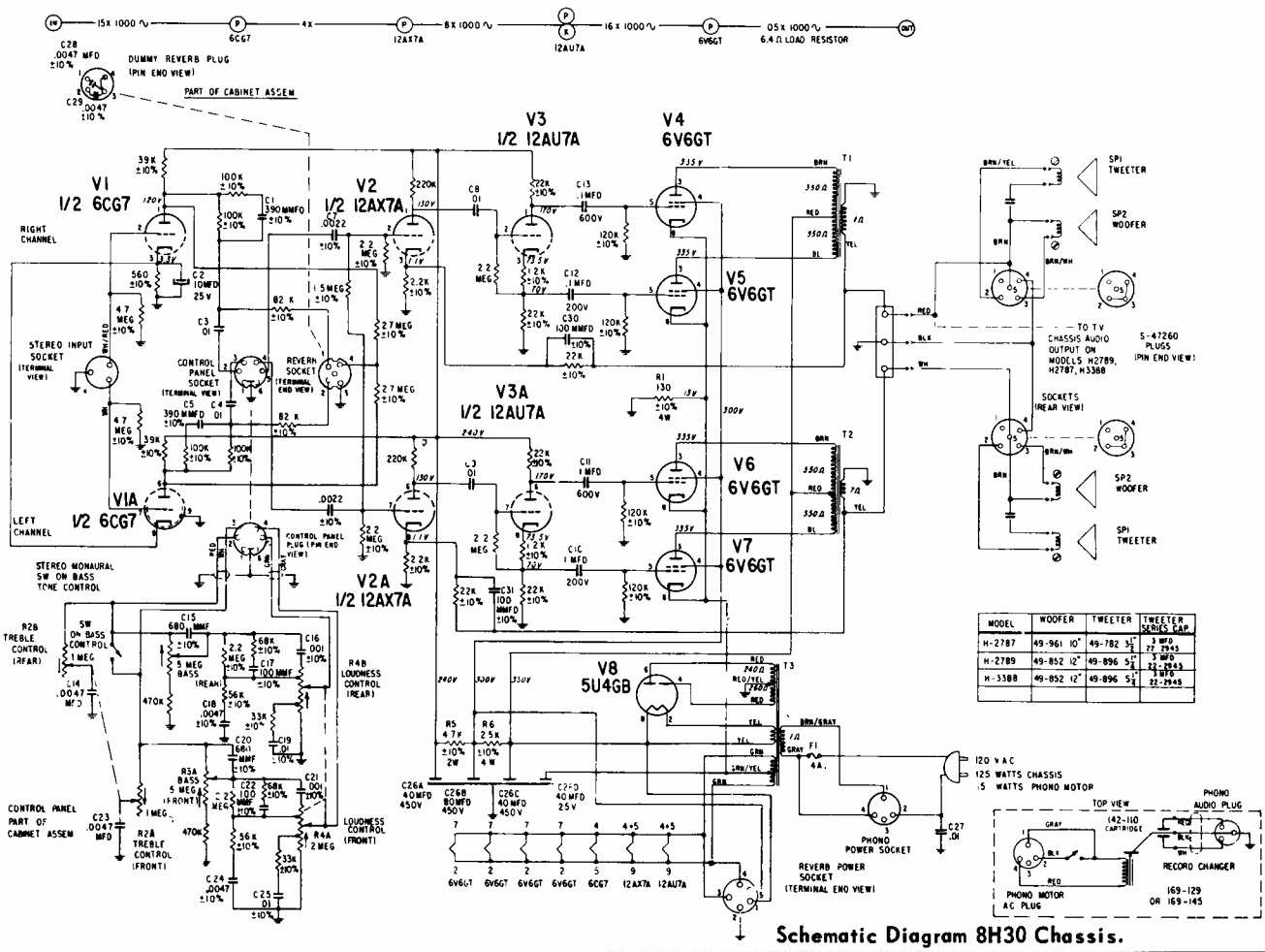
ZENITH Chassis 16J28QS Schematic Diagram



ZENITH Schematic Diagrams of Chassis 4G21 and 8H30



Schematic Diagram 4G21 Chassis.



MODEL	WOOFER	TWEETER	TWEETER SERIES CAP.
H-2787	49-961 10"	49-782 5"	3 MFD 22-2945
H-2789	49-852 12"	49-896 5"	3 MFD 22-2945
H-3388	49-852 12"	49-896 5"	3 MFD 22-2945

Schematic Diagram 8H30 Chassis.

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.

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Another

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Service Manual