Most-Often-Needed

1963

VOLUME TV-21

Television

Servicing Information

Compiled by

M. N. BEITMAN

SUPREME PUBLICATIONS

PRICE $3

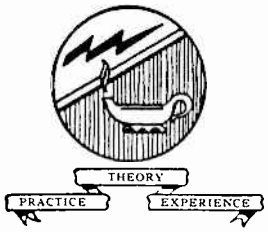
Most - Often - Needed

1963

Volume TV-21

Television

Servicing Information



Compiled by

M. N. BEITMAN

SUPREME PUBLICATIONS

AMAZING OFFER

RADIO & TV SERVICE DATA

Your best, complete source for all needed RADIO and TV diagrams and servicing data. Most amazing values. Only $2.50 and $3 per giant volume. Cover all important makes, models of all periods.

NO-RISK ORDER COUPON

TELEVISION SERVICE MANUALS

Supreme TV manuals are best for faster, easier TV repairs. Lowest priced. Factory data on practically all sets. Complete circuits, all needed alignment facts, wiring board views, waveforms, voltages, production changes, and double-page schematics. Only $3 per large annual manual. Check volumes wanted, send entire advertisement as your order form.

- ☐ New **Additional 1962 Television** Manual..... **$3.**
- ☐ **Early 1962 Television Servicing** Manual, only **$3.**
- ☐ **1961 TV** Manual, **$3.** ☐ **1960 TV** Manual, **$3.**
- ☐ **Additional 1959 TV, $3.** ☐ **Early 1959 TV, $3.**
- ☐ **1958 TV** Manual, **$3.** ☐ **Additional 1957 TV, $3.**
- ☐ **Early 1957 Television, $3.** ☐ **1956 TV** Manual, **$3.**
- ☐ **Additional 1955 TV, $3.** ☐ **Early 1955 TV, $3.**
- ☐ **1954 TV, $3.** ☐ **1953 TV, $3.** ☐ **1952 TV, $3.**
- ☐ **1951 TV, $3.** ☐ **Master Index** to all Manuals, **25¢**

RADIO DIAGRAM MANUALS

Here are low-priced radio manuals that simplify repairing. Cover everything from most recent 1962 radios to pre-war old-timers; home radios, stereo, combinations, transistor portables, FM, auto sets. Large schematics, all needed alignment facts, printed boards, voltages, dial stringing, hints. Volumes are big, 8½ x 11", about 190 pages, each.

$2.50

- ☐ **1962,** ☐ **1961,** ☐ **1960,** ☐ **1959,** ☐ **1958,** ☐ **1957,**
- ☐ **1956,** ☐ **1955,** ☐ **1954,** ☐ **1953,** ☐ **1952,** ☐ **1951,**
- ☐ **1950,** ☐ **1949,** ☐ **1948,** ☐ **1947,** ☐ **1946,** ☐ **1942,**
- ☐ **1941,** ☐ **1940,** ☐ **1926-38** **PRICE EACH, $2.50**

SUPREME PUBLICATIONS

1760 Balsam Road Highland Park, ILL.

Rush today **TV** and **Radio** manuals checked in no-risk order form of this ad. Send postpaid, I am enclosing full price. You guarantee my complete satisfaction or my money back.

Name: _____

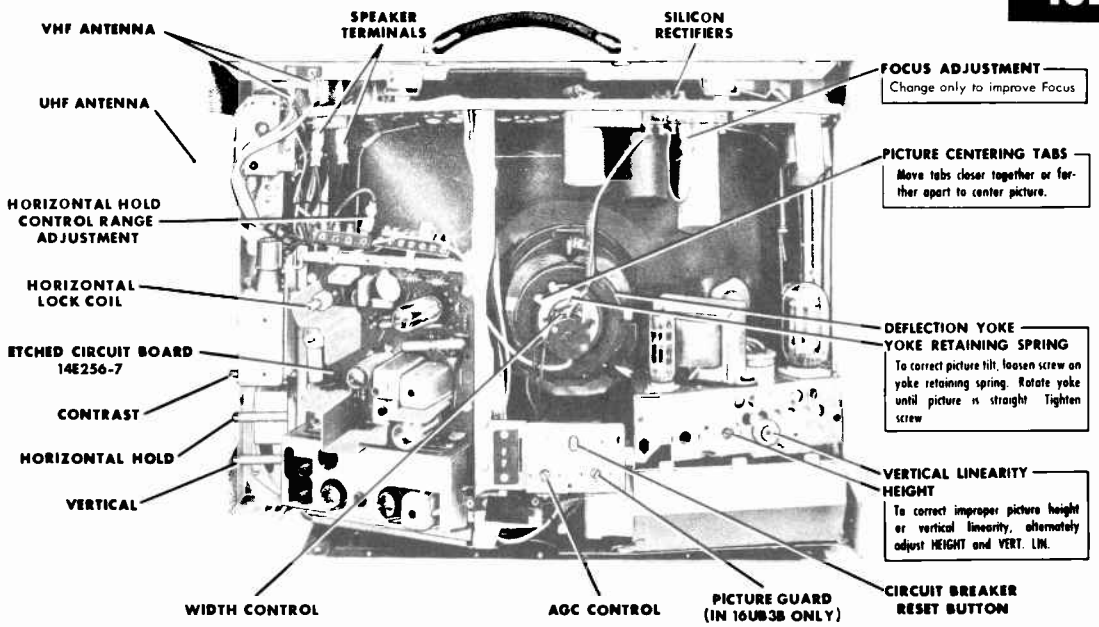
Address: _____

City: _____ State: _____

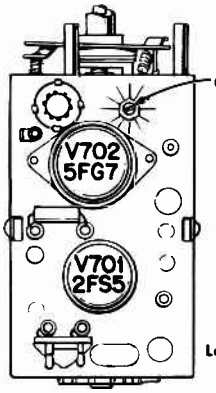
SUPREME PUBLICATIONS

ADMIRAL®

16A3B, 16A3U, 16UA3B, 16B3B, 16B3U, 16UB3B



MODEL CHART	
Chassis	Model
P93A11	16A3B
P93A11U	16A3U
P93UA11	16UA3B
P93B11	16B3B
P93B11U	16B3U
P93UB11	16UB3B
P93A13	16A3B
P93A13U	16A3U
P93UA13	16UA3B
P93B13	16B3B
P93B13U	16B3U
P93UB13	16UB3B
P93A16	16A3B
P93A16U	16A3U
P93UA16	16UA3B
P93B16	16B3B
P93B16U	16B3U
P93UB16	16UB3B
P93A28	16A3B
P93A28U	16A3U
P93UA28	16UA3B
P93B28	16B3B
P93UB28	16UB3B
P93A31	16A3B
P93A31U	16A3U
P93UA31	16UA3B
P93A48	16A3B
P93UA48	16UA3B
P93A48U	16A3U
P93B31	16B3B
P93UB31	16UB3B
P93B31U	16B3U
P93B31UM	16B3U
P93B48	16B3B
P93UB48	16UB3B
P93B48UM	16B3U
P93K11	16A3B
P93UK11	16UA3B
P93K11U	16A3U
P908M	16H3B
UP908M	16UH3B

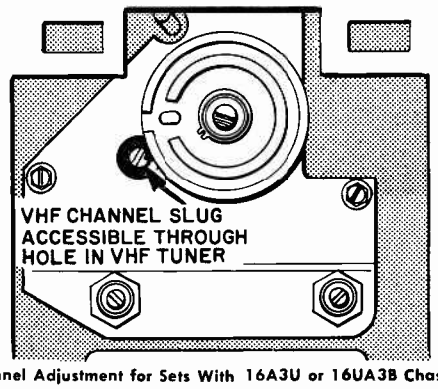


OVERALL VHF OSCILLATOR TRIMMER. ADJUST ON HIGHEST CHANNEL RECEIVED.

MODEL CHART	
Model	Chassis
PS93D11U	16D3U
PS93D13U	16D3U
PS93D28U	16D3U
PS93D38U	16D3U

This group of sets similar except for tuner and remote.

Channel Adjustment Location for Sets with 16A3B or 16B3B Chassis.



Channel Adjustment for Sets With 16A3U or 16UA3B Chassis.

HORIZONTAL FREQUENCY ADJUSTMENT

Make adjustment if picture "slips sideways" or "tears" when switching channels. If Horizontal Oscillator tube V403 (6FQ7 or 6CG7) is replaced, Horizontal Frequency adjustment may also be required.

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

2. Adjust Horizontal Hold control to sync (lock-in) horizontal sweep. If picture cannot be locked-in at approximate mid-rotation of Horizontal Hold control, perform following steps for complete horizontal frequency adjustment.

3. On etched circuit board, connect a jumper wire from junction of resistors R452 (680K) and R453 (1 meg) to chassis ground. Do this for shorting oscillator control voltage from Horizontal Phase Detector CR401. Connect a jumper wire across capacitor C452 (.0039 mf) for shorting Horizontal Lock coil L401.

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

4. Remove jumper from capacitor C452 (.0039 mf). Adjust Horizontal Lock coil L401, until horizontal blanking bar appears on screen. Remove remaining jumper wire. Picture should lock-in sync. If picture does not lock-in, trouble shooting of sync, phase detector or horizontal oscillator circuit is necessary for finding cause of trouble.

PICTURE GUARD ADJUSTMENT

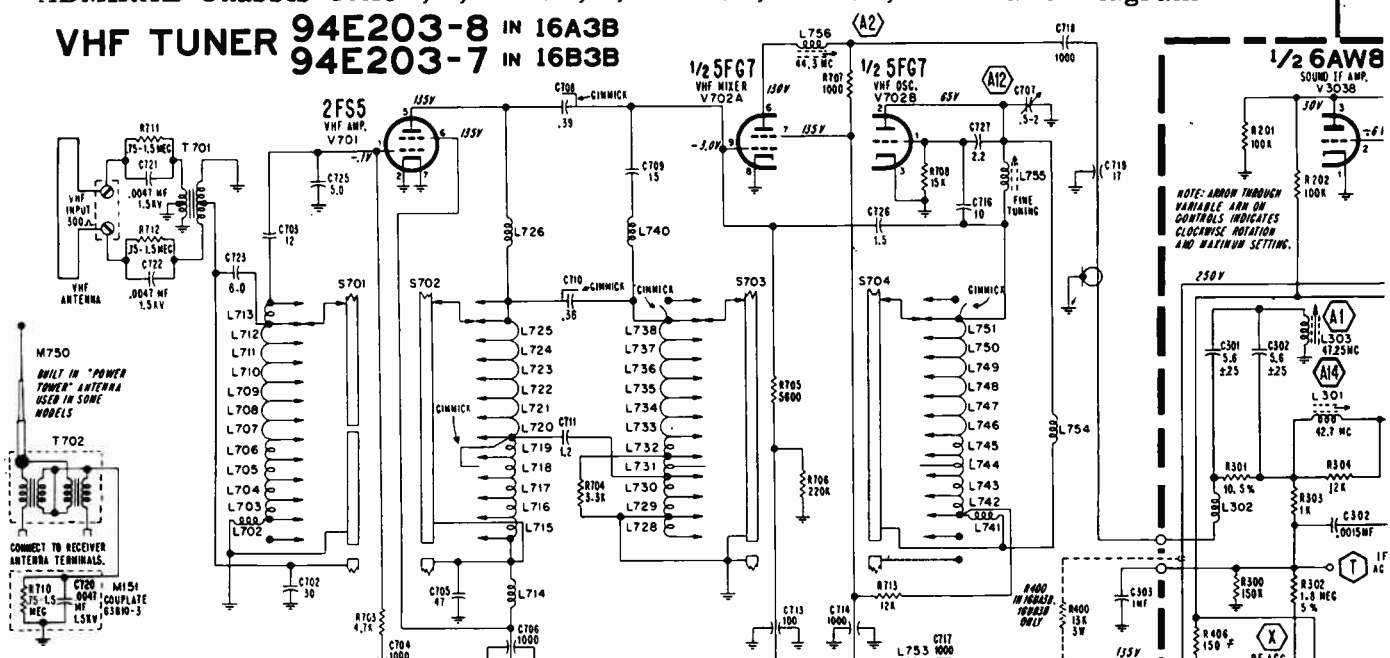
(Adjustment only in 16UB3B chassis.)

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.

ADMIRAL Chassis 16A3B, U, 16B3B, U, 16UA3B, 16UB3B, Schematic Diagram

VHF TUNER 94E203-8 IN 16A3B
94E203-7 IN 16B3B



Several other tuners were also used.

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

Isolation transformer used. 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
- CHASSIS GROUND.
- CABINET GROUND.
- # PART NOT MOUNTED OR ETCHED CIRCUIT BOARD.
- # VOLTAGE WILL VARY WITH SETTING OF CONTROLS.

RUN CHANGES

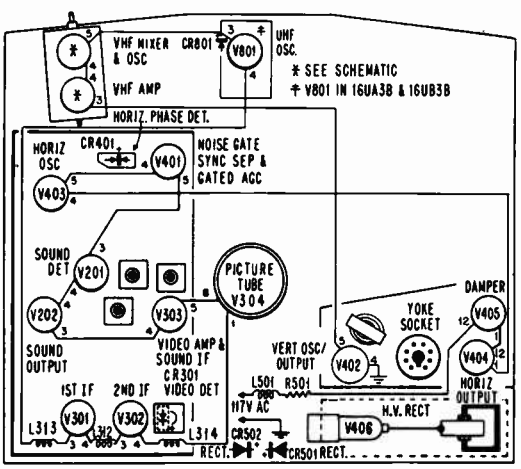
(10) Start of production.

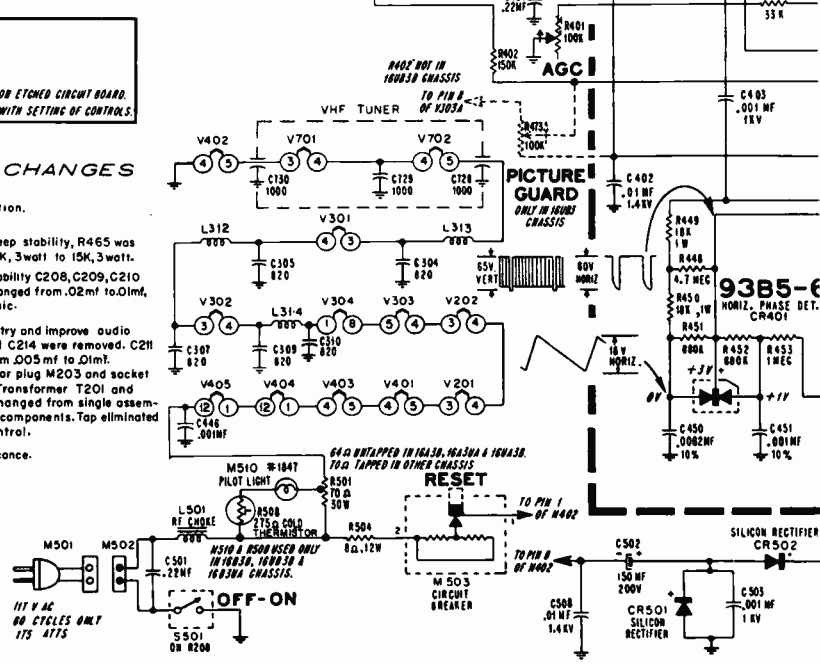
(11) For improved sweep stability, R465 was changed from 18K, 3watt to 15K, 3watt.

(12) For improved reliability C208, C209, C210 & C409 were changed from .02mf to.01mf, 500 volts, ceramic.

(13) To simplify circuitry and improve audio output. R214 and C214 were removed. C211 was changed from .005mf to .01mf. Speaker connector plug M203 and socket M204 removed. Transformer T201 and speaker M201 changed from single assembly to separate components. Tap eliminated from volume control.

(14) No service significance.



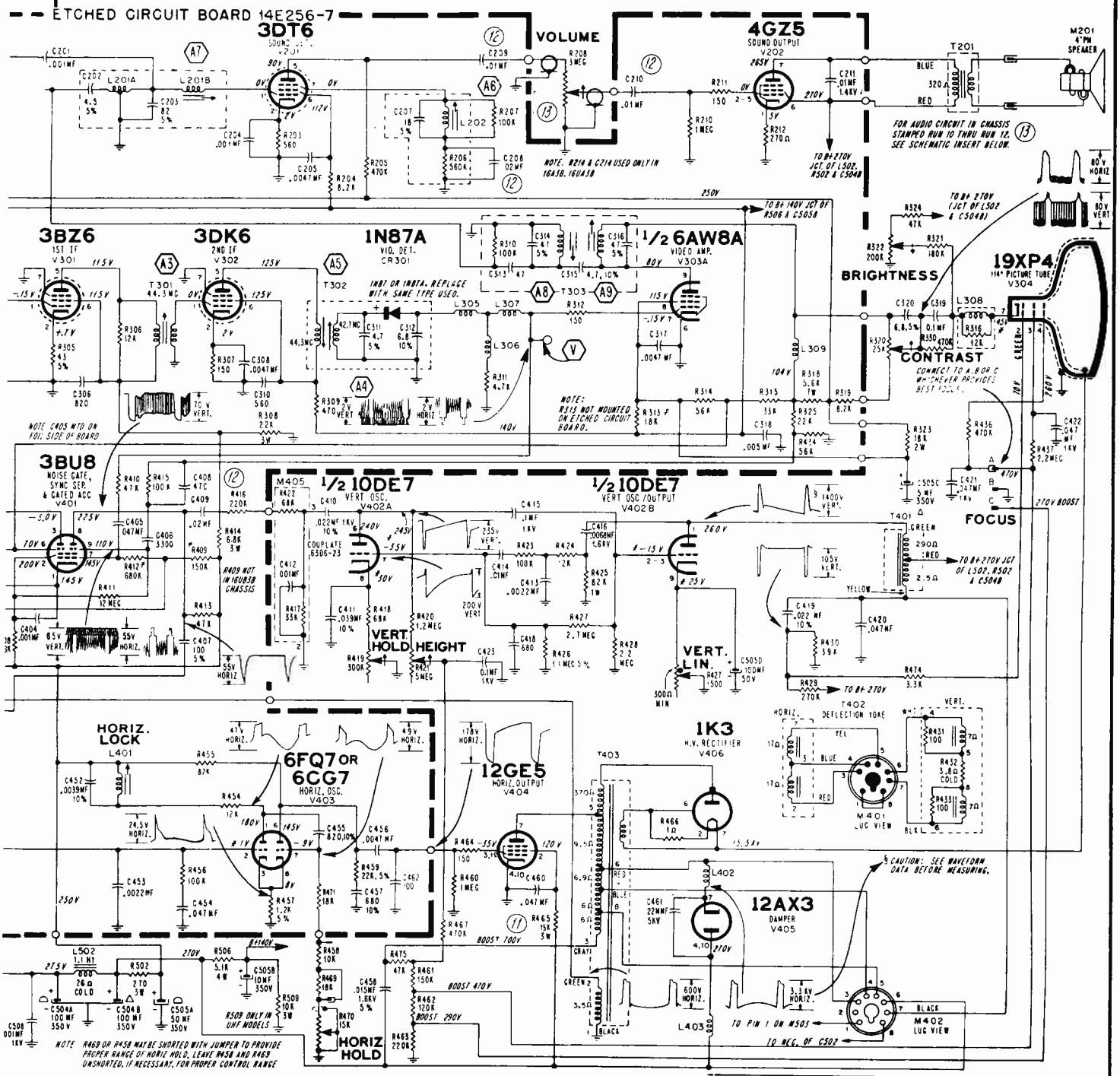


WIDTH ADJUSTMENT

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.

ADMIRAL Chassis 16A3B, U, 16B3B, U, 16UA3B, 16UB3B, Diagram, Continued



Sound Output Circuit in Chassis Stamped Run 10 Through Run 12.

Channel Adjustment for Sets With 16B3U or 16UB3B Chassis.

ADMIRAL Chassis 16A3B, U, 16B3B, U, 16UA3B, 16UB3B, Alignment, Continued

IF AMPLIFIER ALIGNMENT

Connect isolation transformer between AC line and receiver. Connect negative of 3 volt bias supply through 10K resistor to test points "T" (IF AGC) and "X" (RF AGC). 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 jumper wire across antenna terminals. For 16UB3B 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 47.25 and adjust A1 for minimum.

2. Connect wire jumper across IF input coil L301.

†3. Set generator at 44.3 MC and adjust A2 for maximum.

4. Remove wire jumper from across IF input coil L301.

†5. With generator at 44.3 MC, adjust A3 and A4 for maximum.

‡6. Set generator at 42.7 MC and adjust A5 and A14 for maximum.

‡7. Set generator at 44.3 MC and readjust A4 for maximum.

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

*If necessary, increase generator output and reduce bias to zero 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.

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

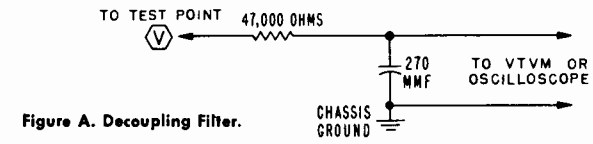
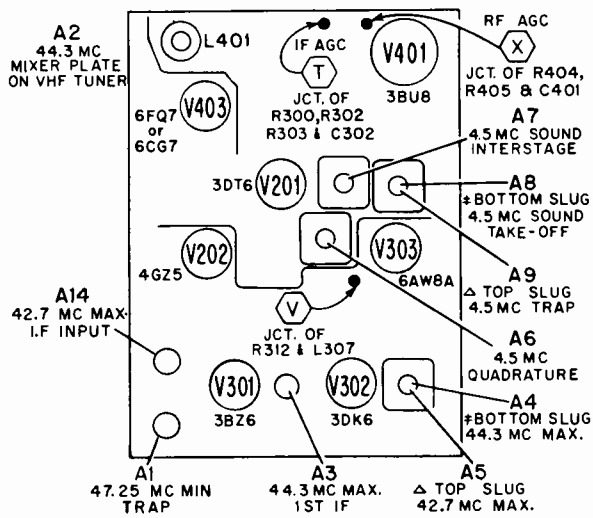


Figure A. Decoupling Filter.



‡ *SLUG NEAREST TO ETCHED CIRCUIT BOARD*
△ *SLUG FARTHEST FROM ETCHED CIRCUIT BOARD*

Figure B. View of Etched Circuit Board Showing Test Point Locations.

IF RESPONSE CURVE CHECK AND IF TRAP ALIGNMENT

1. Connect isolation transformer between AC line and receiver. Allow about 15 minutes for receiver and test equipment to warm up.

2. Set VHF tuner on channel 12. For 16UB3B 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 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 A2. If curve is not symmetrical, adjust A3.

For sets with 16UA3B VHF-UHF chassis, set VHF tuner to UHF position. Feed IF sweep generator to VHF antenna terminals through 300 ohm matching pad. Adjust A13 for minimum overall response, see figures D and F. NOTE: More than two peaks may appear on response curve.

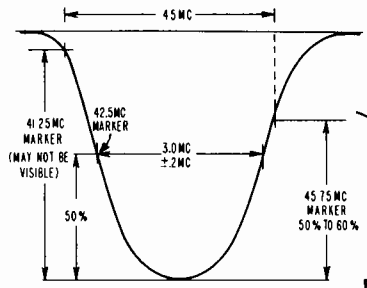


Figure C. Ideal IF Response Curve.

Figure D. Over-all Response for 41 MC IF Trap Adjustment.

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.

ALIGNMENT OF 4.5 MC TRAP

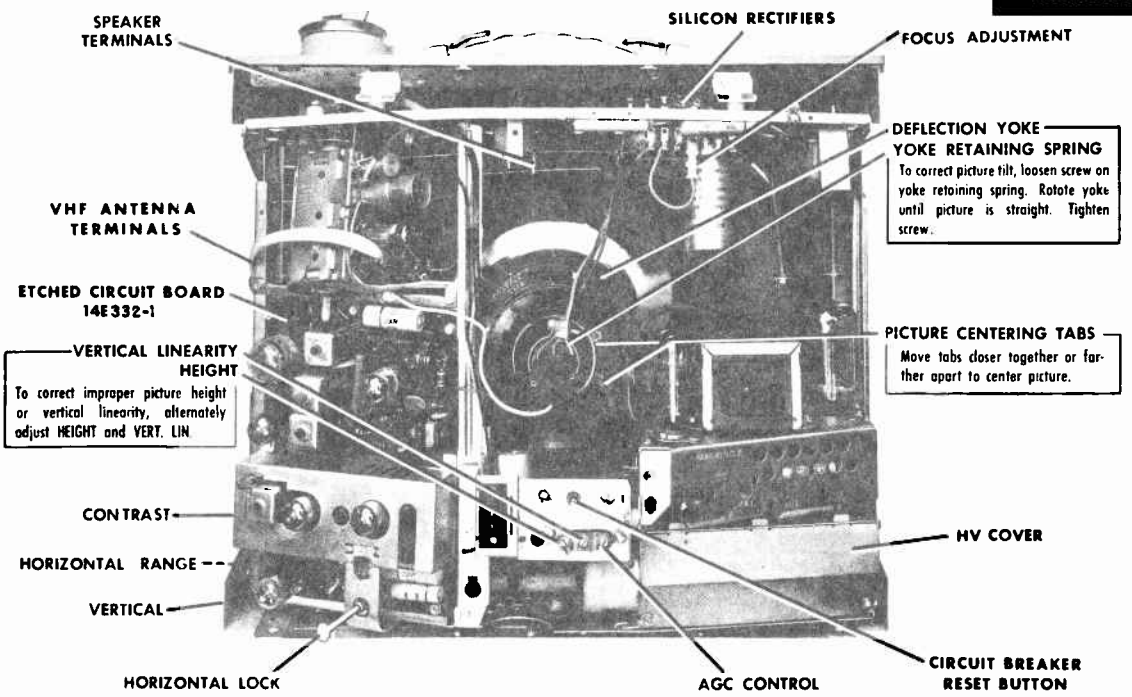
Alignment of 4.5 MC (beat interference) trap A9 requires use of a hexagonal non-metallic alignment tool (part number 98A30-12).

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). Use caution so as not to disturb bottom slug (slug nearest etched circuit board) as sound IF alignment will be affected.

ADMIRAL®

16K3B, 16UK3B, 16L3B, 16UL3B, 16M3B, 16UM3B



MODEL CHART	
Model	Chassis
P9509	16L3B
UP9509	16UL3B
P9511	16K3B
UP9511	16UK3B
P9513	16K3B
UP9513	16UK3B
P9521	16M3B
UP9521	16UM3B
P9523	16M3B
UP9523	16UM3B
P9538	16K3B
UP9538	16UK3B
P9548	16M3B
UP9548	16UM3B

Material on pages 7 through 10.

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.

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.

HORIZONTAL RANGE ADJUSTMENT

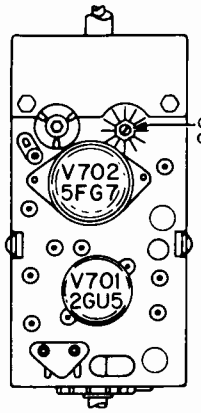
The Horizontal Range control is set at the factory and seldom requires readjustment. Adjustment need only be made if 6FQ7 tube (V403) has been replaced and the picture cannot be locked-in with the Horizontal Lock adjustment or if the Horizontal Lock adjustment has insufficient range.

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.

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) to chassis ground. See figure B for test point locations.
4. Connect a .22 mf, 400 volt capacitor from test point "S" (junction of horizontal lock coil L401 and resistor R446, 15,000 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". 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 16K3B, 16UK3B, 16L3B, 16UL3B, 16M3B, 16UM3B, Continued

Service Information



VHF Channel Adjustment Location.

ALIGNMENT OF 4.5 MC TRAP

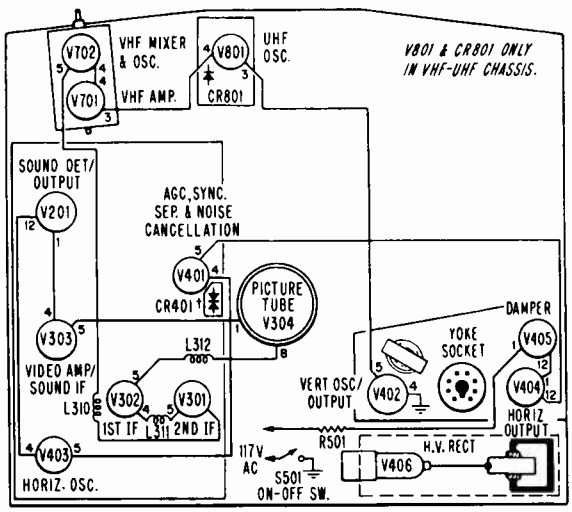
Alignment of 4.5 MC (beat interference) trap "A10" requires use of a hexagonal non-metallic alignment tool (part number 98A30-12).

To align 4.5 MC trap "A10", tune in television station with beat interference pattern in picture. While closely observing picture, adjust slug "A10" for minimum interference pattern.

Note that adjustment "A10" 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.

IMPROVING FOCUS

From rear view of chassis on front page, note that there are three focus (pin) connections at top rear of chassis, points shown as "A", "B" and "C" on schematic. To make adjustment, connect plug-in focus lead to either of the three focus pins, whichever provides best focus at central area of picture tube. Important: Focus adjustment should be made with controls set for picture with normal contrast and brightness.



Tube Locations and Heater String.

TUBE AND SEMI-CONDUCTOR COMPLEMENT

V701—2GU5
V702—5FG7
V201—10AL11
V301—3EH7
V302—3EJ7
V303—6JV8
V304—19CHP4
V401—4BL8
V402—9GV8
V403—6FQ7
V404—21HJ5
V405—12BE3
V406—1G3
V801—2DZ4 or 2AF4A
CR301—1N87A
CR401—93B5-6
CR501—93B12-1
CR801—1N82A

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.

B+ Circuit Breaker: B+ supply of this receiver is equipped with a thermal type circuit breaker having a manual reset button. Allow a few minutes for circuit breaker to cool off before pressing the reset button.

VOLTAGES AND WAVEFORMS

Isolation transformer used. Line Voltage: 117. Channel Selector on unused channel. Contrast control fully clockwise; all other controls counterclockwise. Do not disturb Horizontal Hold control.

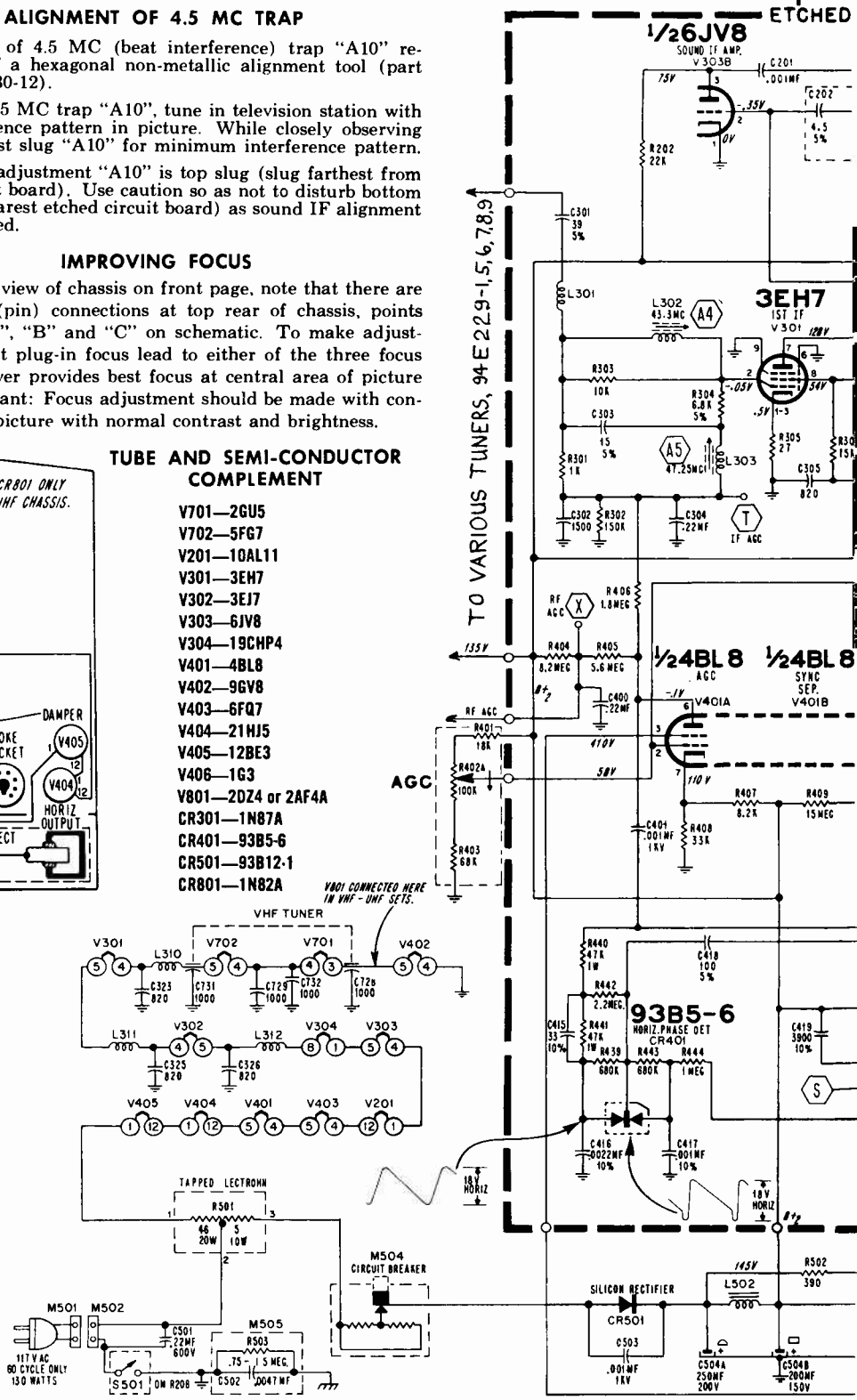
Antenna disconnected and terminals shorted. DC voltages measured with VTVM between tube socket and chassis, unless otherwise indicated.

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.

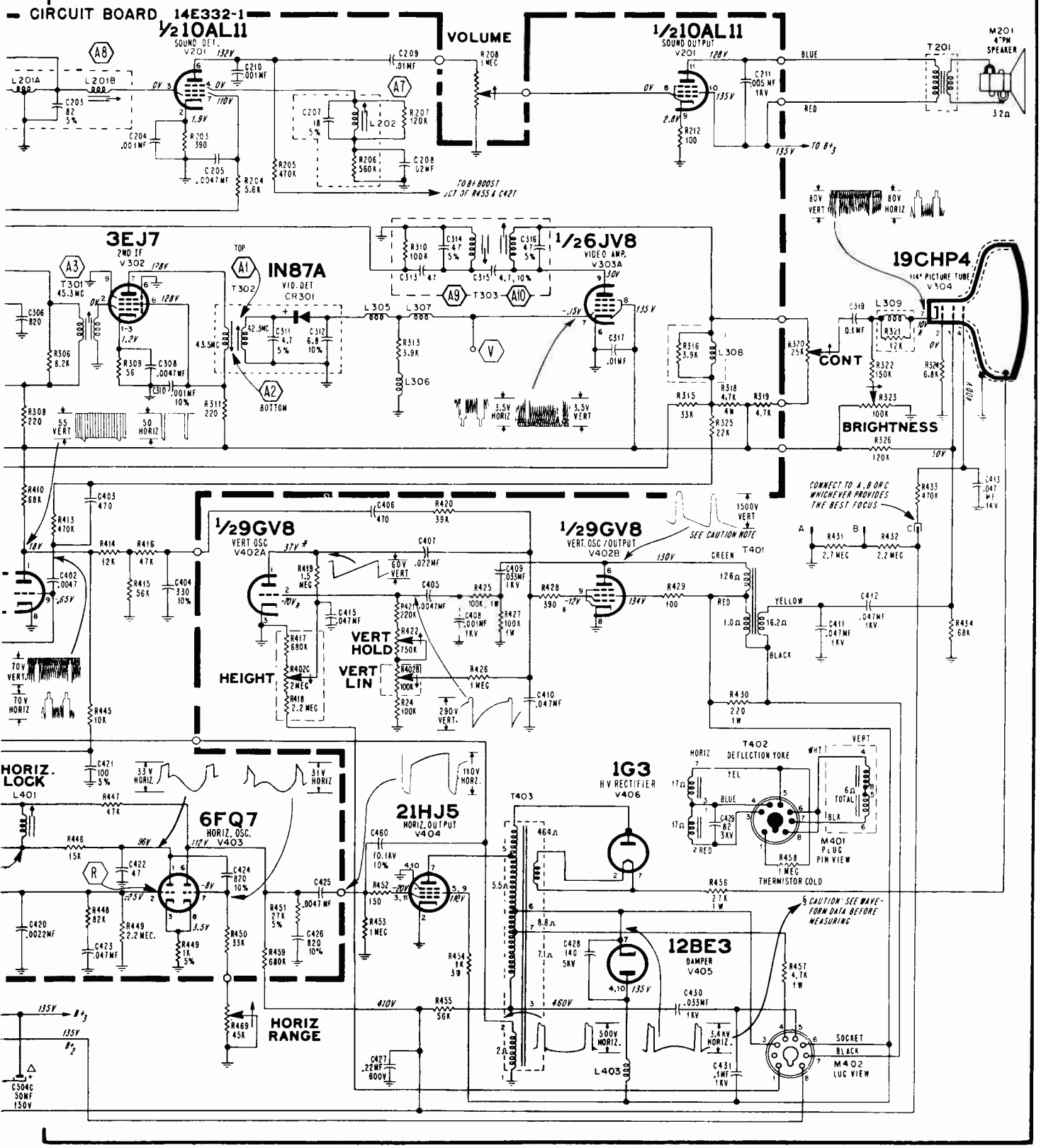
VOLTAGE WARNING

Pulsed high voltage is present at cap of V406, and pin 7 of V404 and V405. Use suitable test equipment at these points.



ADMIRAL Chassis 16K3B, 16UK3B, 16L3B, 16UL3B, 16M3B, 16UM3B, Continued

Main Schematic Diagram



ADMIRAL Chassis 16K3B, 16UK3B, 16L3B, 16UL3B, 16M3B, 16UM3B, Alignment

IF AMPLIFIER ALIGNMENT

Connect isolation transformer between AC line and receiver. Connect negative of 6 volt bias supply to test point "T" (IF AGC), positive to chassis. See figure B.

Using needle nose alligator clip or looped end of hookup wire, connect signal generator high side to test point "G", 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.

†1. Set generator at 42.3 MC and adjust A1 for maximum.

†2. Set generator at 43.5 MC and adjust A2 for maximum.

†3. Set generator at 45.3 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 A5 for minimum.

†6. Connect wire jumper across IF input coil L303.

†7. Set generator at 44.8 MC and adjust A6 for maximum.

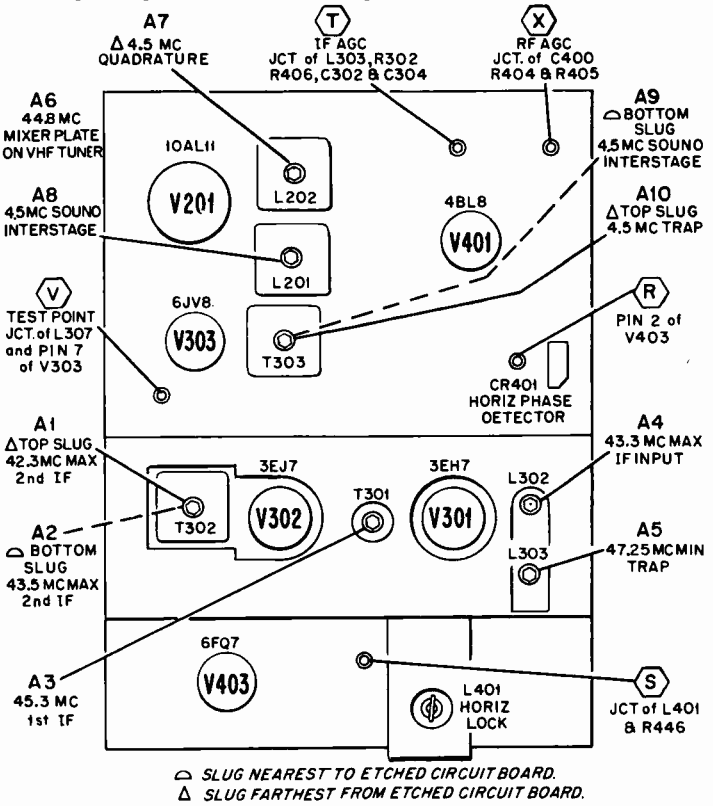
8. Remove wire jumper from across IF input coil L303.

9. Carefully repeat steps 1 and 4.

10. To insure correct IF alignment, make "IF Response Curve Check".

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

†Use — 6 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 2 volts.



BOTTOM SLUG NEAREST TO ETCHED CIRCUIT BOARD.
Δ SLUG FARTHEST FROM ETCHED CIRCUIT BOARD.

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

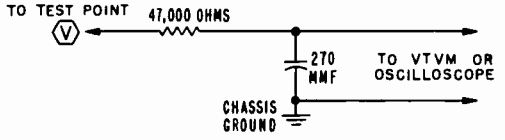


Figure A. Decoupling Filter.

IF RESPONSE CURVE CHECK

1. Connect isolation transformer between AC line and receiver. Allow about 15 minutes for receiver and test equipment to warm up.

2. Set VHF tuner on channel 12. Connect negative of 6 volt bias supply to test point "T" (IF AGC), positive to chassis. See figure B.

3. Using needle nose alligator clip or looped end of hookup wire, connect sweep generator high side to test point "G", low side directly to tuner. Set sweep frequency to 43 MC, sweep width approximately 7 MC. 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 A6 to position 45.75 MC Video Marker. Adjust A2 to correct shape of curve.

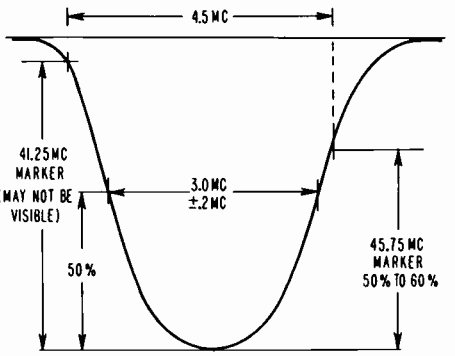


Figure C. Ideal IF Response Curve.

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 "A7" several turns to left until a buzz is heard in sound. Then slowly turn slug "A7" 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 "A8" for loudest and clearest sound with minimum hiss. If hiss disappears during alignment, reduce signal to maintain hiss level. Readjust slug "A8". NOTE: Slug "A8" should be at end of coil nearest etched circuit board.

5. Carefully adjust slug "A9" for loudest and clearest sound with minimum hiss. If hiss disappears during alignment, reduce signal to maintain hiss level. Readjust slug "A7". Caution: Slug "A9" 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 "A7" unless sound is distorted. If "A7" is readjusted, all steps in alignment procedure should be repeated exactly as instructed.

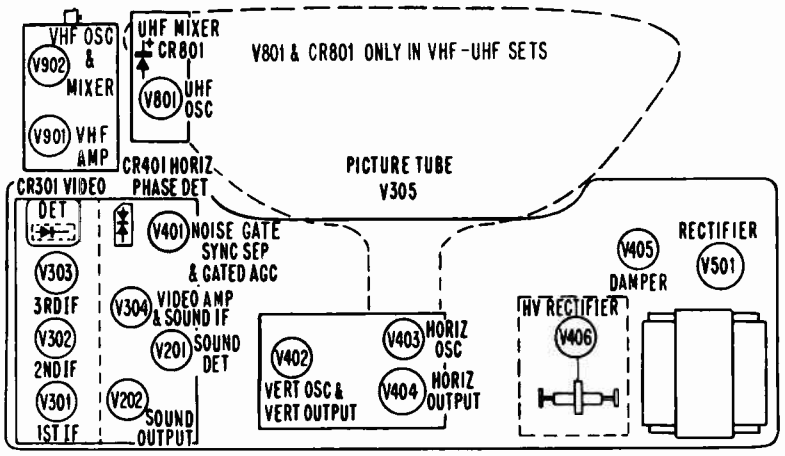
ADMIRAL®

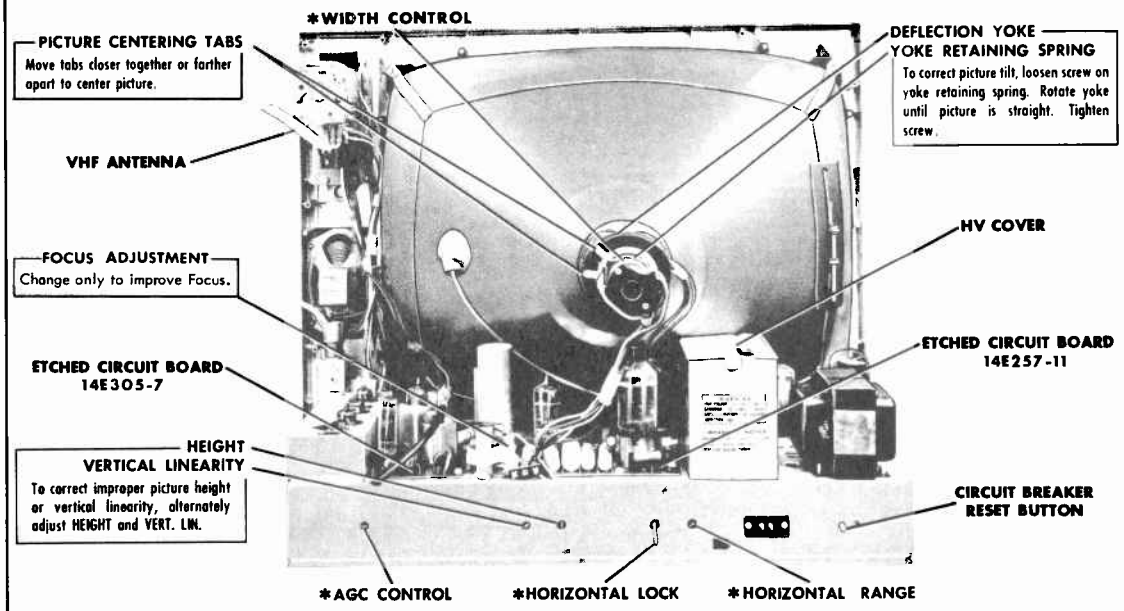
21K3U, 21UK3, 21L3U, 21UL3, 21M3U, 21UM3

For list of models see below. Service material on pages 11 through 14. For alignment information see such material on pages 16 and 18, which is also applicable to these sets.

Model	Chassis
C33K11	21K3U
C33UK11	21UK3
C33K12	21K3U
C33UK12	21UK3
C33K13	21K3U
C33UK13	21UK3
C33K21	21K3U
C33UK21	21UK3
C33K22	21K3U
C33UK22	21UK3
C33K23	21K3U
C33UK23	21UK3
C33K31	21K3U
C33UK31	21UK3
C33K32	21K3U
C33UK32	21UK3
C33K33	21K3U
C33UK33	21UK3
C33K41	21K3U
C33UK41	21UK3
C33K42	21K3U
C33UK42	21UK3
C33K43	21K3U
C33UK43	21UK3
C33K51	21K3U
C33UK51	21UK3
C33K52	21K3U
C33UK52	21UK3
C33K53	21K3U
C33UK53	21UK3
T33K10	21K3U
T33UK10	21UK3
T33K10E	21K3U
T33K11	21K3U
T33UK11	21UK3
T33K12	21K3U
T33UK12	21UK3
T33K13	21K3U
T33UK13	21UK3
L33K11	21K3U
L33UK11	21UK3
L33K12	21K3U
L33UK12	21UK3
L33K13	21K3U
L33UK13	21UK3
L33K25	21K3U
L33UK25	21UK3
L33K39	21K3U
L33UK39	21UK3
L33L11	21L3U
L33UL11	21UL3
L33L12	21L3U
L33UL12	21UL3
L33L29	21L3U
L33UL29	21UL3

Model	Chassis
L33L31	21L3U
L33UL31	21UL3
L33L32	21L3U
L33UL32	21UL3
L33L33	21L3U
L33UL33	21UL3
L33L41	21L3U
L33UL41	21UL3
L33L42	21L3U
L33UL42	21UL3
L33M11	21M3U
L33UM11	21UM3
L33M12	21M3U
L33UM12	21UM3
L33M13	21M3U
L33UM13	21UM3
L33M29	21M3U
L33UM29	21UM3
L33M39	21M3U
L33UM39	21UM3





***DETAILED ADJUSTMENT INFORMATION GIVEN ON OTHER PAGES.**

Rear View of Chassis Showing Adjustment Locations. VHF Tuner and On-Off-Volume Control on Separate Control Panel in Models with 21L3U, 21UL3, 21M3U and 21UM3 Chassis.

SCHEMATIC NOTES

Numbers or letters inside hexagons indicate alignment points.

Fixed resistor values shown in ohms ± 10% tolerance, ½ watt; capacitor values shown in micro-microfarads ± 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 Horizontal Hold control.
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.

RUN CHANGES

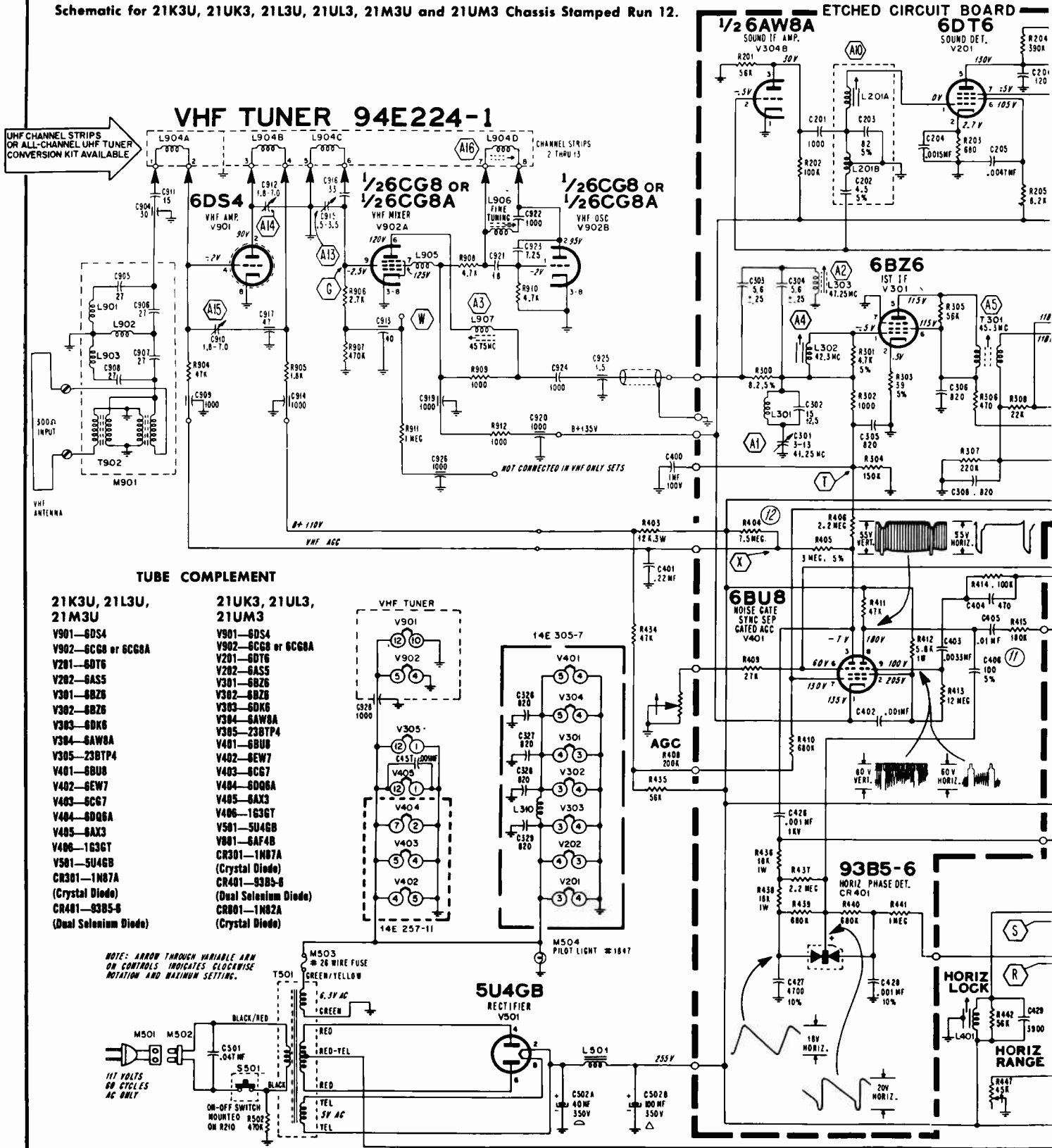
(10) Start of production.

(11) For improved reliability, C208, C213 & C405, were changed from .02mf, to .01mf, 500 volts, ceramic. C319 was changed to .047mf, mylar.

(12) For minimum snow in some intermediate areas, R404 was changed from 9.1 meg. to 7.5 meg., 5%.

ADMIRAL (Continued)

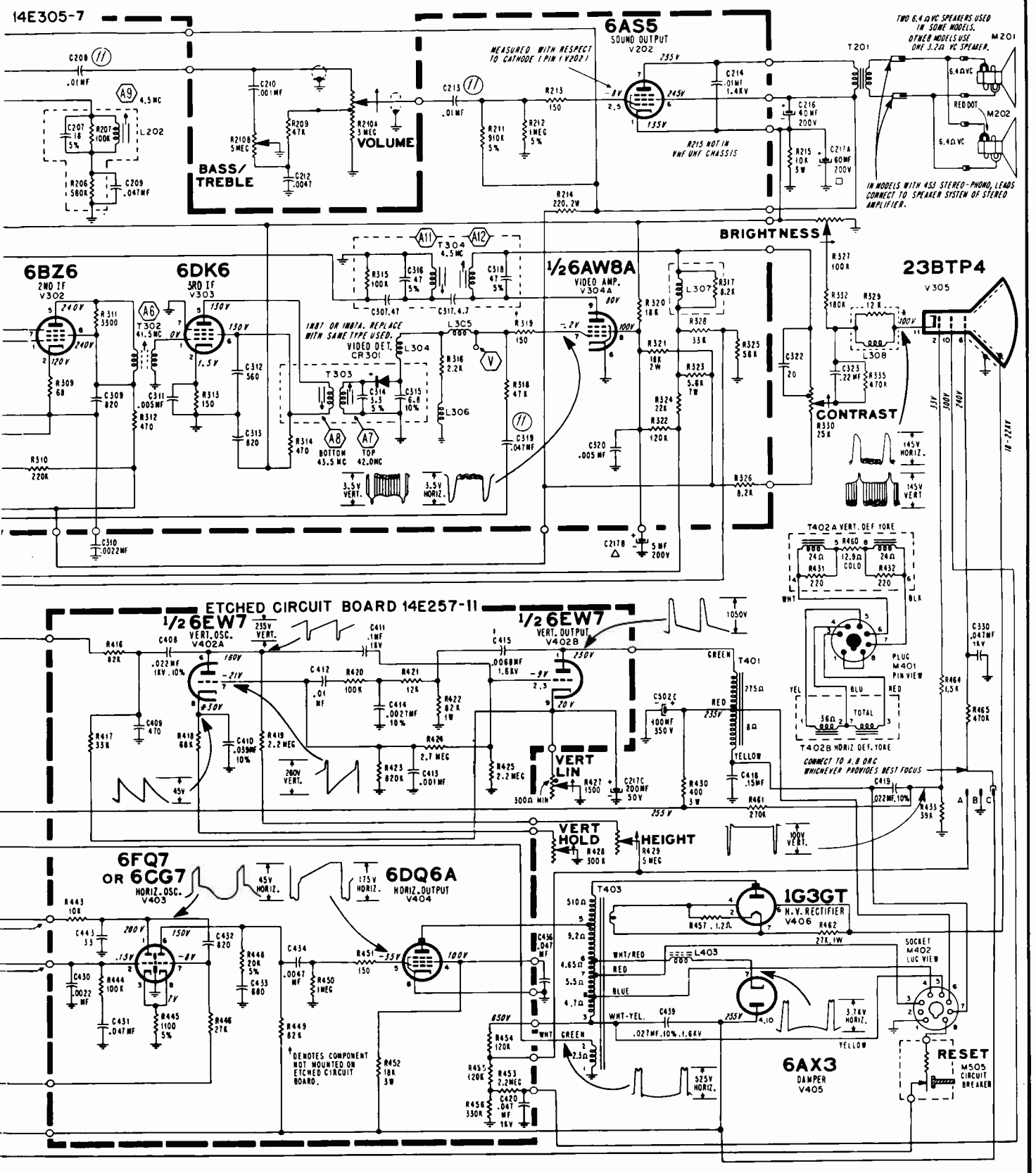
Schematic for 21K3U, 21UK3, 21L3U, 21UL3, 21M3U and 21UM3 Chassis Stamped Run 12.



TUBE COMPLEMENT

21K3U, 21L3U, 21M3U	21UK3, 21UL3, 21UM3
V901—6DS4	V901—6DS4
V902—6CG8 or 6CG8A	V902—6CG8 or 6CG8A
V201—6DT6	V201—6DT6
V202—6AS5	V202—6AS5
V301—6BZ6	V301—6BZ6
V302—6BZ6	V302—6BZ6
V303—6DK6	V303—6DK6
V304—6AW8A	V304—6AW8A
V305—23BTP4	V305—23BTP4
V401—6BU8	V401—6BU8
V402—6EW7	V402—6EW7
V403—6CG7	V403—6CG7
V404—6DQ6A	V404—6DQ6A
V405—6AX3	V405—6AX3
V406—1G3GT	V406—1G3GT
V501—5U4GB	V501—5U4GB
CR301—1N87A (Crystal Diode)	V801—6AF4B
CR401—93B5-6 (Dual Selenium Diode)	CR301—1N87A (Crystal Diode)
	CR401—93B5-6 (Dual Selenium Diode)
	CR801—1N82A (Crystal Diode)

ADMIRAL Chassis 21K3U, 21UK3, 21L3U, 21UL3, 21M3U, 21UM3, Diagram, Continued



ADMIRAL Chassis 21K3U, 21UK3, 21L3U, 21UL3, 21M3U, 21UM3, Continued

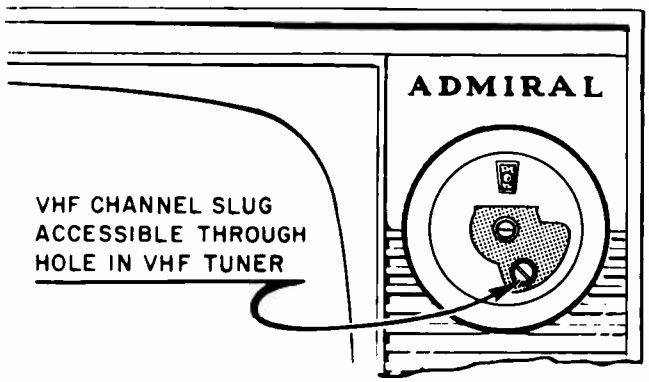
VHF CHANNEL ADJUSTMENT

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.



Channel Adjustment Location.
Channel Knob Removed.

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.

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. 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.

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. Horizontal Range adjustment need only be made if tube V403 (6FQ7 or 6CG7 tube) 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 (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, 6FQ7 or 6CG7 tube) 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, 6FQ7 or 6CG7 tube).

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.

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.

ADMIRAL

MODEL IDENTIFICATION CHART			
Model Number	TV Chassis	AM-FM Radio	Stereo
STF33S11	21S3U	7P2	FM and Phono
STF33S12	21S3U	7P2	FM and Phono
STF33S13	21S3U	7P2	FM and Phono
STF33X11	21X3U	7P2	FM and Phono
STF33X12	21X3U	7P2	FM and Phono
STF33X13	21X3U	7P2	FM and Phono
STR33S11	21S3U	6F4	*Phono
STR33S12	21S3U	6F4	*Phono
STR33S13	21S3U	6F4	*Phono

The group of sets listed at left and using Chassis 21S3U and 21X3U, is covered by material on pages 15 through 18. Models listed at right using Chassis 21T3U have practically identical TV section, but employ 9M1 AM-FM stereo radio.

MODEL CHART	
Model Number	TV Chassis
STF33T11	21T3U
STF33T12	21T3U
STF33T29	21T3U
STF33T31	21T3U
STF33T41	21T3U
STF33T49	21T3U

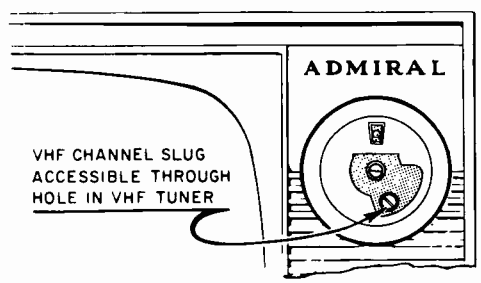
AGC CONTROL ADJUSTMENT

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.**

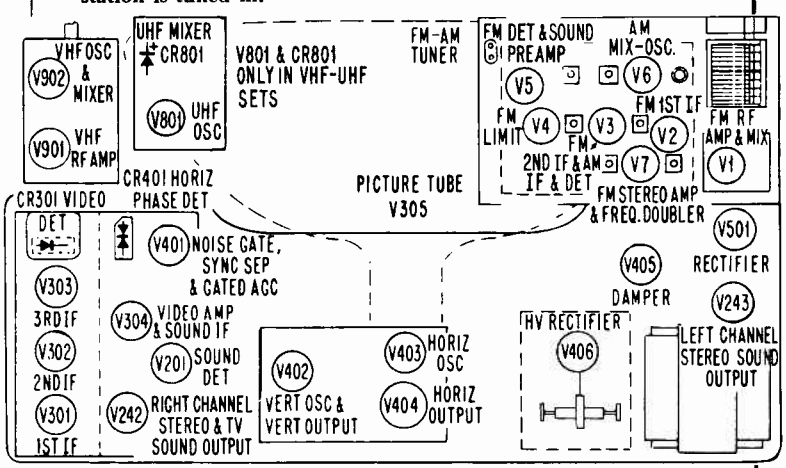
Improper AGC control adjustment can result in picture bending, tearing (overloading) or buzz in the sound. However, these same conditions can also be caused by other troubles in the set. Adjust as instructed below:

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.



Channel Adjustment. Channel and Fine Tuning Knobs Removed.



TUBE LOCATIONS

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.

ADMIRAL

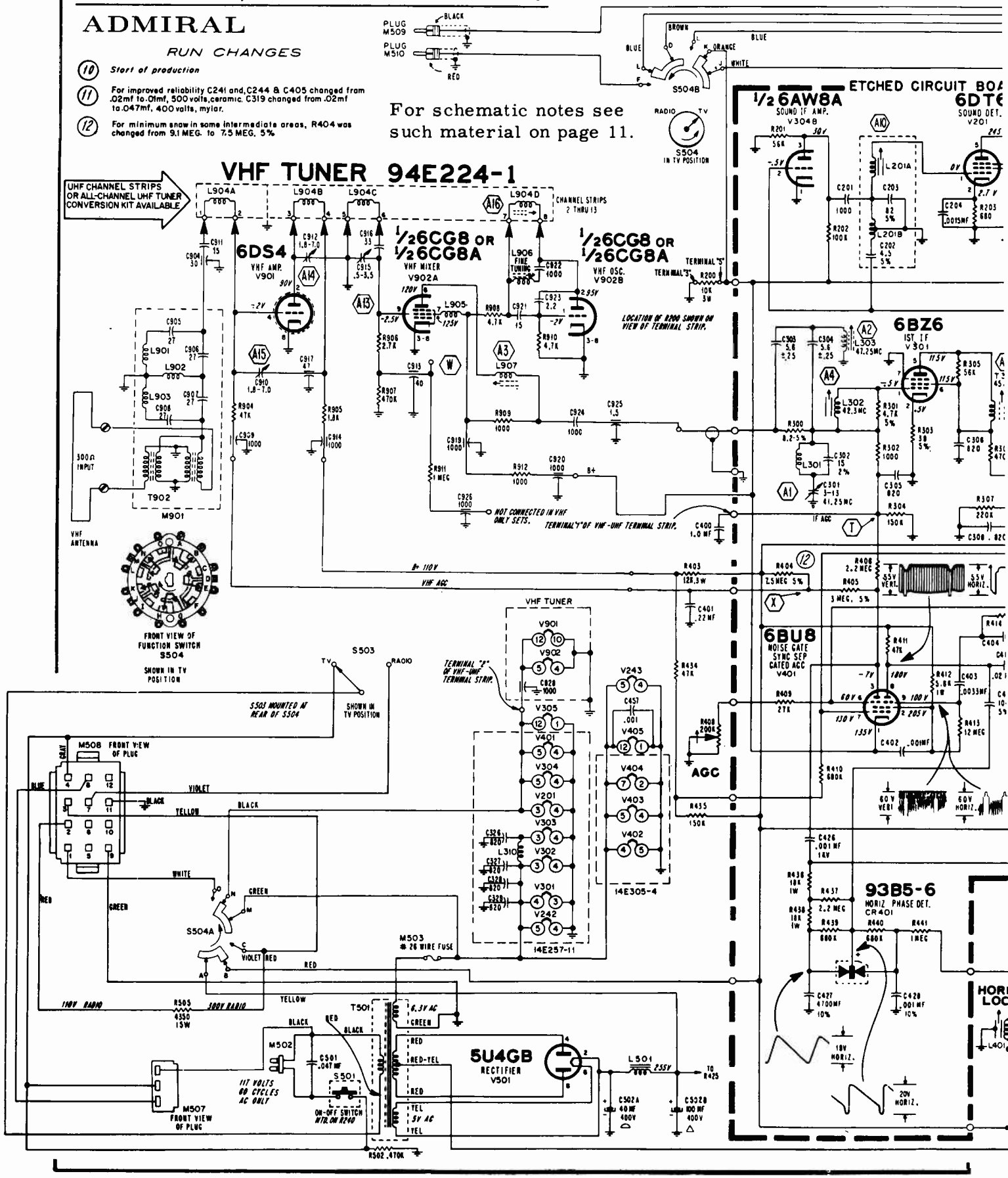
RUN CHANGES

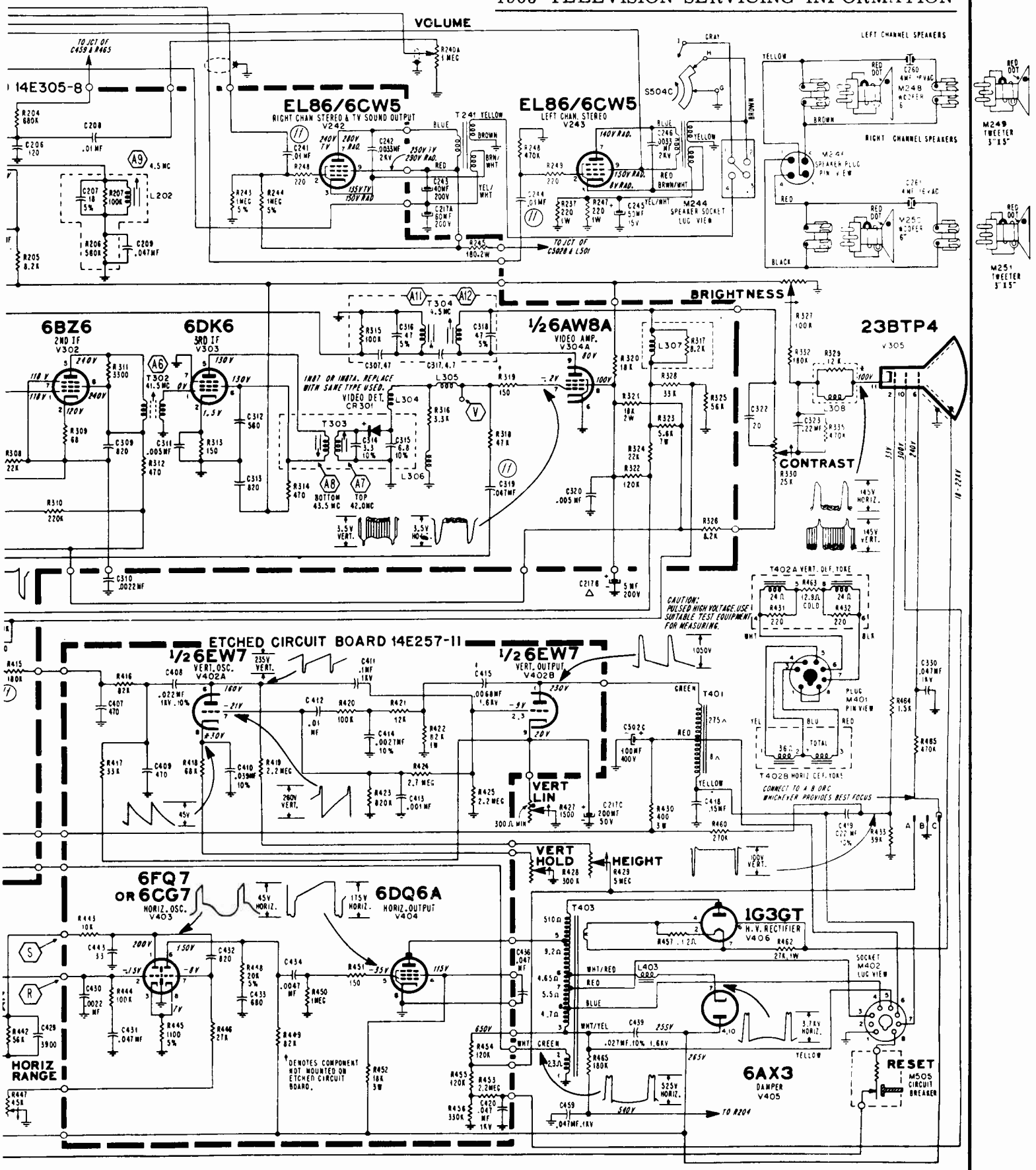
(10) *Start of production*

(11) For improved reliability C241 and C244 & C405 changed from .02mf to .01mf, 500 volts, ceramic. C319 changed from .02mf to .047mf, 400 volts, mylar.

(12) For minimum snow in some intermediate areas, R404 was changed from 9.1 MEG. to 7.5 MEG. 5%

For schematic notes see such material on page 11.




VOLUME
14E305-8
EL86/6CW5
RIGHT CHAN STEREO & TV SOUND OUTPUT
V242
EL86/6CW5
LEFT CHAN. STEREO
V243
S504C
LEFT CHANNEL SPEAKERS
RIGHT CHANNEL SPEAKERS
M244 SPEAKER SOCKET LUG VIEW
M248 WOOFER 6"
M250 WOOFER 6"
M249 TWEETER 3"X5"
M251 TWEETER 3"X5"
BRIGHTNESS
6BZ6
2ND IF
V302
6DK6
3RD IF
V303
1/26AW8A
VIDEO AMP.
V304A
23BTP4
V305
CONTRAST
VIDEO DET.
CR301
ETCHED CIRCUIT BOARD 14E257-11
1/26EW7
VERT. OSC.
V402A
1/26EW7
VERT. OUTPUT
V402B
VERT LIN
VERT HOLD
HEIGHT
6FQ7
OR 6CG7
HORIZ. OSC.
V403
6DQ6A
HORIZ. OUTPUT
V404
1G3GT
H.V. RECTIFIER
V406
6AX3
DAMPER
V405
HORIZ RANGE
RESET
M505 CIRCUIT BREAKER
T402A VERT. DEF. YOKE
T402B HORIZ DEF. YOKE
PLUG M401 PIN VIEW
SOCKET M402 LUG VIEW
CAUTION: PULSED HIGH VOLTAGE. USE SUITABLE TEST EQUIPMENT FOR MEASURING.
CONNECT TO A B OR C WHICHEVER PROVIDES BEST FOCUS
DENOTES COMPONENT NOT MOUNTED ON ETCHED CIRCUIT BOARD.
TO JCT OF C459 & R465
TO JCT OF C502B & L501
TO R204

ADMIRAL Chassis 21S3U, 21X3U, Alignment Information, Continued

IF AMPLIFIER ALIGNMENT

Connect negative of 6 volt bias supply to test point "T" (IF AGC), positive to chassis. See figure B.

Using needle nose alligator clip or looped end of hookup wire, connect signal generator high side to test point "G", 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.

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 45.75 MC and adjust A3 for maximum.

†4. Set generator at 42.3 MC and adjust A4 for maximum.

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

†6. Set generator at 41.5 MC and adjust A6 for maximum.

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

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

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.

† Use —6 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 2 volts.

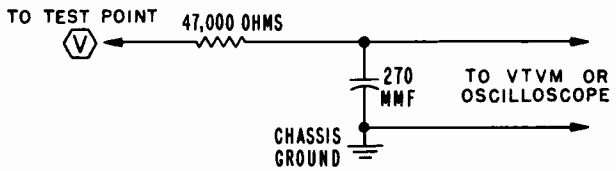


Figure A. Decoupling Filter.

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. Connect negative of 6 volt bias supply to test point "T" (IF AGC), positive to chassis. See figure B.

3. Using needle nose alligator clip or looped end of hookup wire, connect sweep generator high side to test point "G", 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.

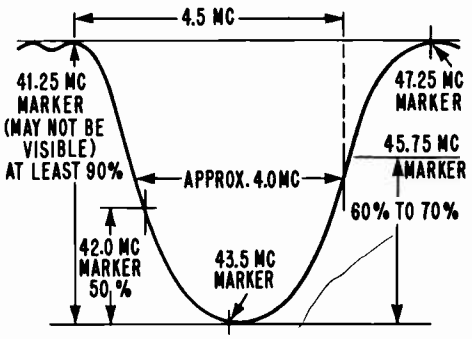
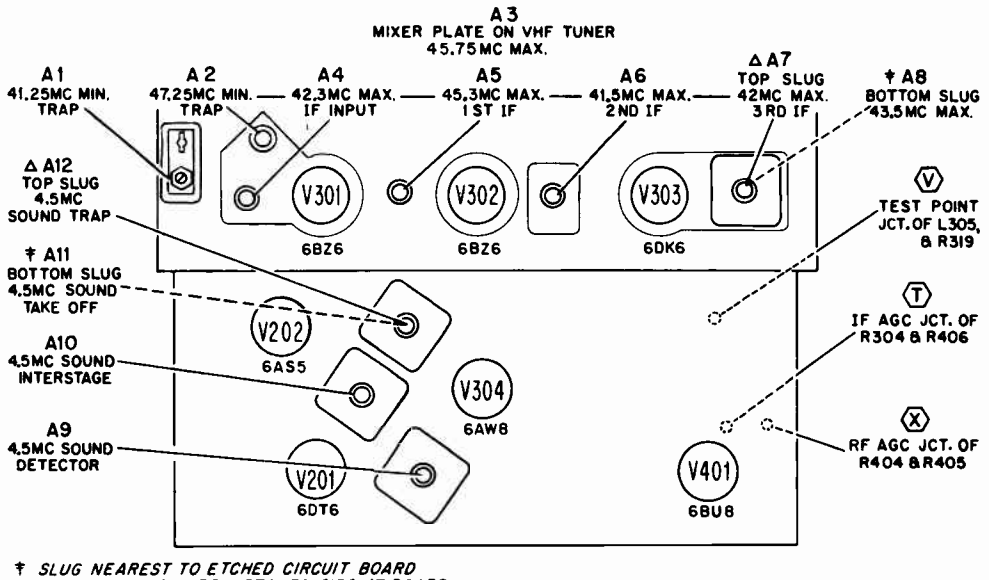


Figure C. Ideal IF Response Curve.



† *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

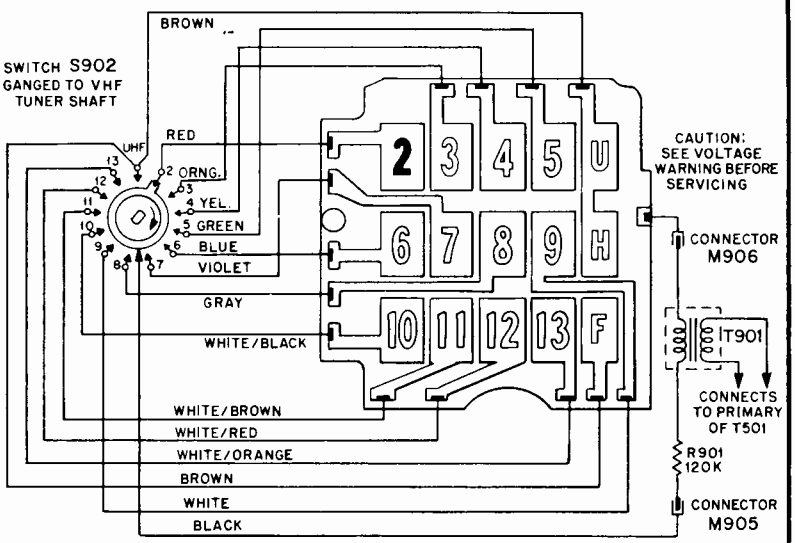
MODEL IDENTIFICATION CHART

Model	Chassis	Model	Chassis	Model	Chassis
C3101	21B4	CU3121	21UA4	T3001	21A4
CU3101	21UB4	C3122	21A4	TU3001	21UA4
C3102	21B4	CU3122	21UA4	T3004	21A4
CU3102	21UB4	C3125	21A4	TU3004	21UA4
C3103	21B4	CU3125	21UA4	T3011	21B4
CU3103	21UB4	L3211	21F4	TU3011	21UB4
C3111	21B4	LU3211	21UF4	T3012	21B4
CU3111	21UB4	L3212	21F4	TU3012	21UB4
C3112	21B4	LU3212	21UF4	T3021	21C4
CU3112	21UB4	L3213	21F4	TU3021	21UC4
C3113	21B4	LU3213	21UF4	T3022	21C4
CU3113	21UB4	T3000	21A4	TU3022	21UC4
C3121	21A4	TU3000	21UA4		

Service material on pages 19 through 22 is exact for the group of sets listed above. The group of sets listed in the chart below are stereo combinations with their TV section practically identical to material on these pages.

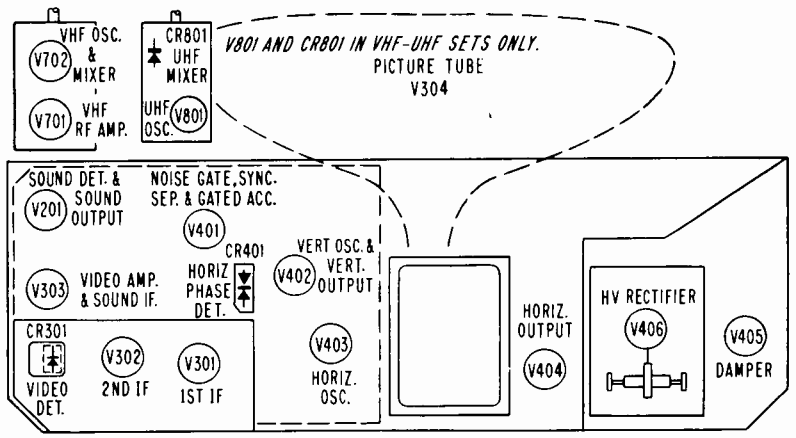
MODEL IDENTIFICATION CHART

Model Number	TV Chassis	AM-FM Radio or Stereo Amp.	Stereo
S3702	21G4	3G2	Phono
SU3702	21UG4	3G2	Phono
SR3501	21G4	8P1	Phono
SRU3501	21UG4	8P1	Phono
SR3502	21G4	8P1	Phono
SRU3502	21UG4	8P1	Phono
SR3503	21G4	8P1	Phono
SRU3503	21UG4	8P1	Phono
SM3811	21G4	9P1	FM and Phono
SMU3811	21UG4	9P1	FM and Phono
SM3812	21G4	9P1	FM and Phono
SMU3812	21UG4	9P1	FM and Phono
SM3831	21G4	9P1	FM and Phono
SMU3831	21UG4	9P1	FM and Phono



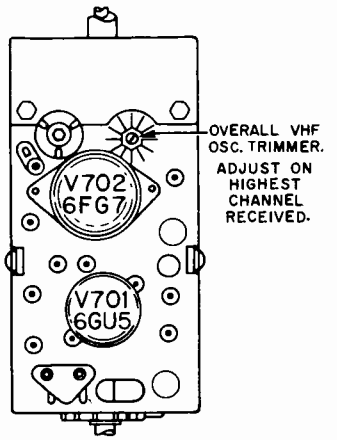
Circuitry of Dialescent Panel and Switch Assembly in Models with 21C4 or 21UC4 Chassis.

TUBE LOCATIONS



TUBE COMPLEMENT

V201—6AL11	V402—6EW7	V702—6FG7
V301—6EH7	V403—6FQ7	V801—6DZ4 or 6AF4A
V302—6EJ7	V404—6GE5	CR301—1N87A
V303—6JV8	V405—6AX3	CR401—93B5-6
V304—23CP4A	V406—1G3	CR501—93B12-1
V401—6BU8	V701—6GU5	CR502—93B12-1



VHF Channel Adjustment Location.

SCHEMATIC NOTES

Numbers or letters inside hexagons indicate alignment points.

Fixed resistor values shown in ohms ±10% tolerance, ½ watt; capacitor values shown in micro-microfarads ±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 Horizontal Hold control.
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.

B+ Circuit Breaker: B+ supply of this receiver is equipped with a thermal type circuit breaker having a manual reset button. Allow a few minutes for circuit breaker to cool off before pressing the reset button.

Heater Fuse: A one inch length of number 26 gauge bare annealed copper wire is used. Fuse wire is located at underside of chassis.

VOLTAGE WARNING

High AC voltages are present at terminals of wafer switch S902 and at terminals of dialescent panel.

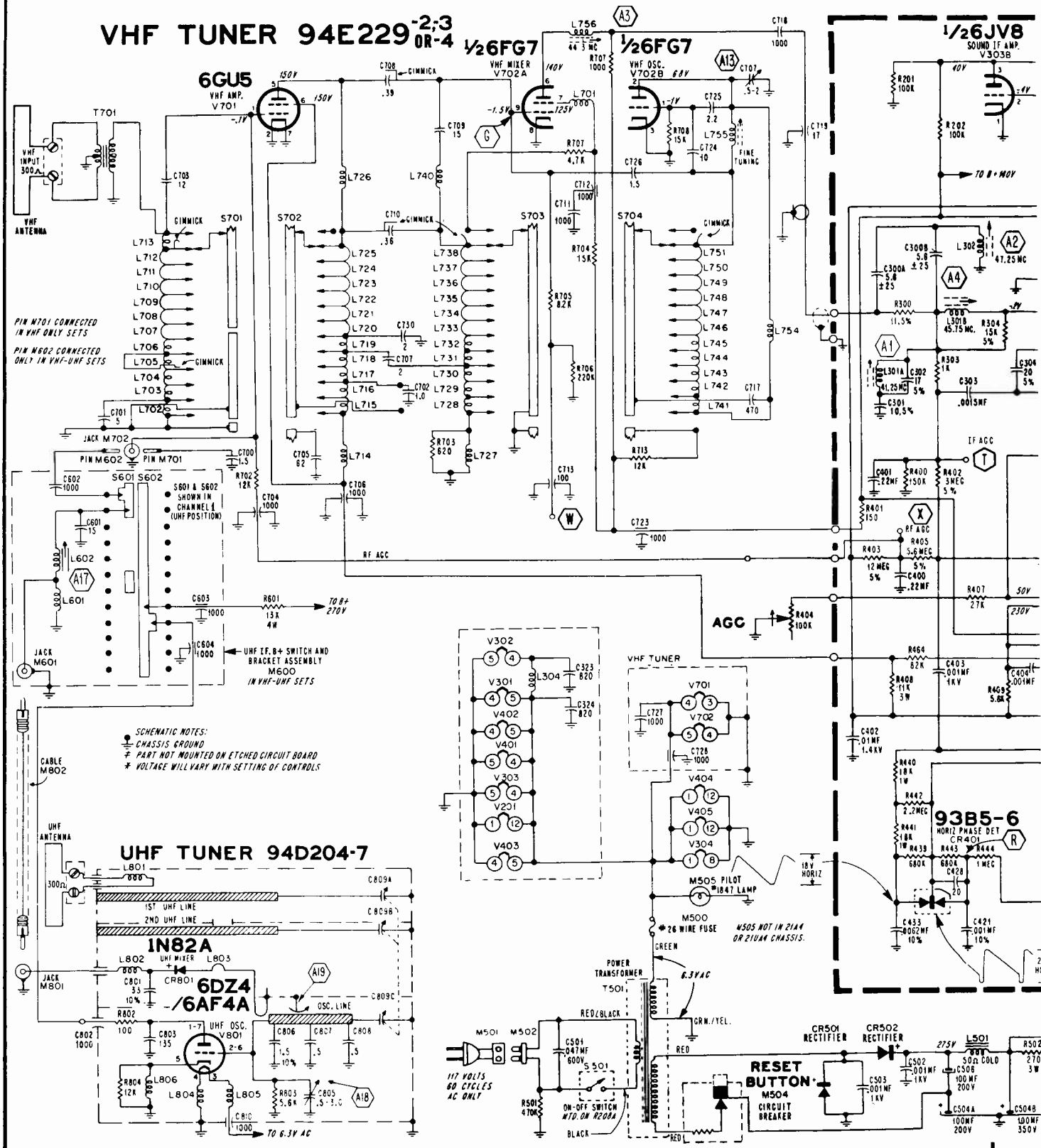
Exercise normal high voltage precautions when servicing wafer switch or rear of dialescent panel.

Pulsed high voltage is present at cap of V406, and pin 7 of V404 and V405. Use suitable test equipment at these points.

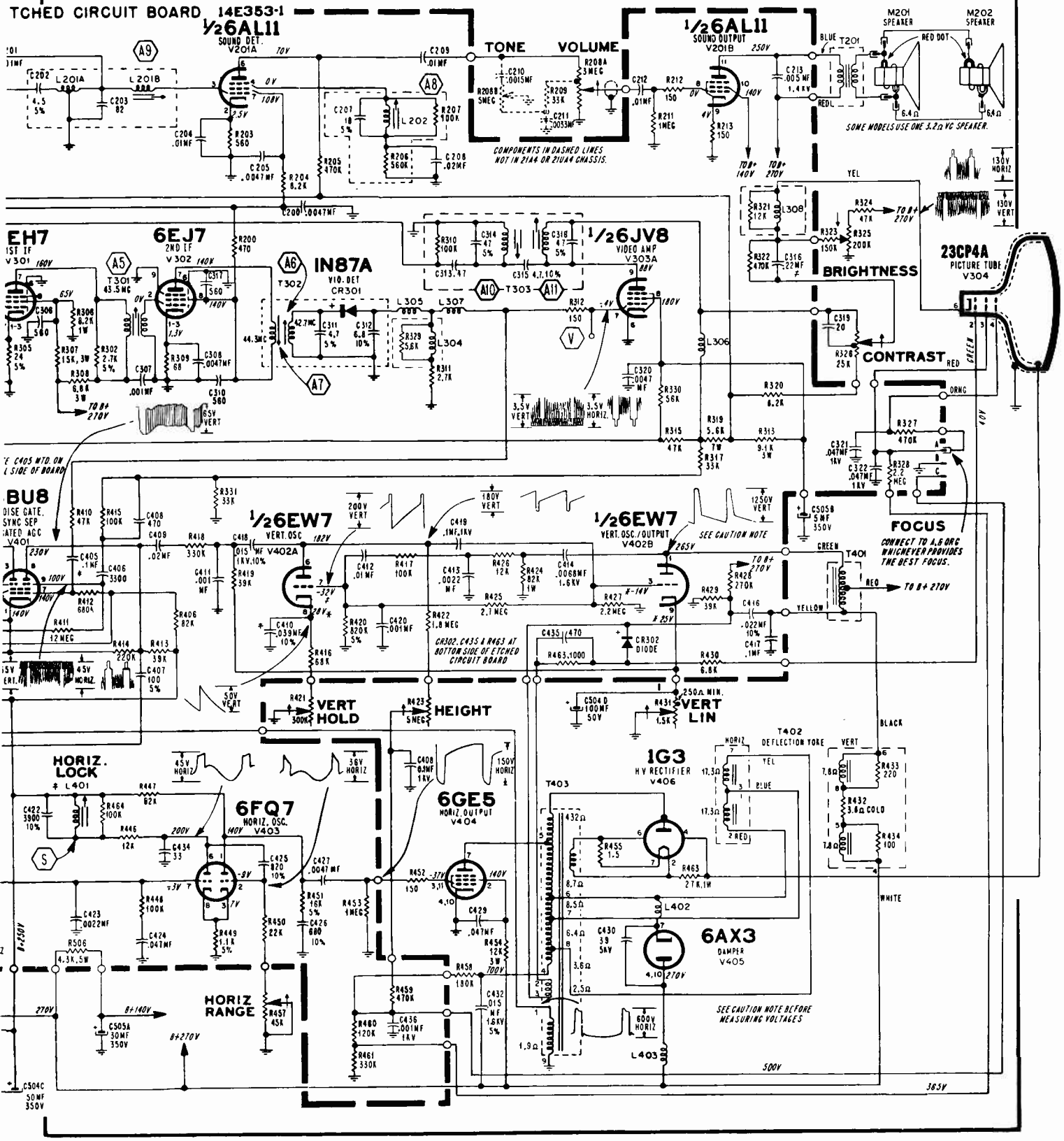
ADMIRAL

Schematic for 21A4, 21UA4, 21B4, 21UB4, 21C4, 21UC4, 21F4 and 21UF4 Chassis Stamped Run 11.

UHF IF, B+ Switch Assembly M600 and UHF Tuner Only in 21UA4, 21UB4, 21UC4 and 21UF4 Chassis.



ADMIRAL Chassis 21A4, 21UA4, 21B4, 21UB4, 21C4, 21UC4, 21F4, 21UF4, Schematic



ADMIRAL Chassis 21A4, 21UA4, etc., Alignment Information, Continued

IF AMPLIFIER ALIGNMENT

Connect negative of 6 volt bias supply to test point "T" (IF AGC), positive to chassis. See figure B.

Using needle nose alligator clip or looped end of hookup wire, connect signal generator high side to test point "G", low side directly to tuner.

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

Set Channel Selector to channel 12. Connect jumper wire across antenna terminals.

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. Connect wire jumper across resistor R304 (15K) at terminals of IF input coil L301B.

‡4. Set generator at 44.3 MC and adjust A3 for maximum. Remove wire jumper from across resistor R304.

‡5. Set generator at 45.75 MC and adjust A4 for maximum.

‡6. Retouch trap adjustments A1 and A2 (steps 1 and 2).

‡7. Set generator at 43.5 MC and adjust A5 for maximum.

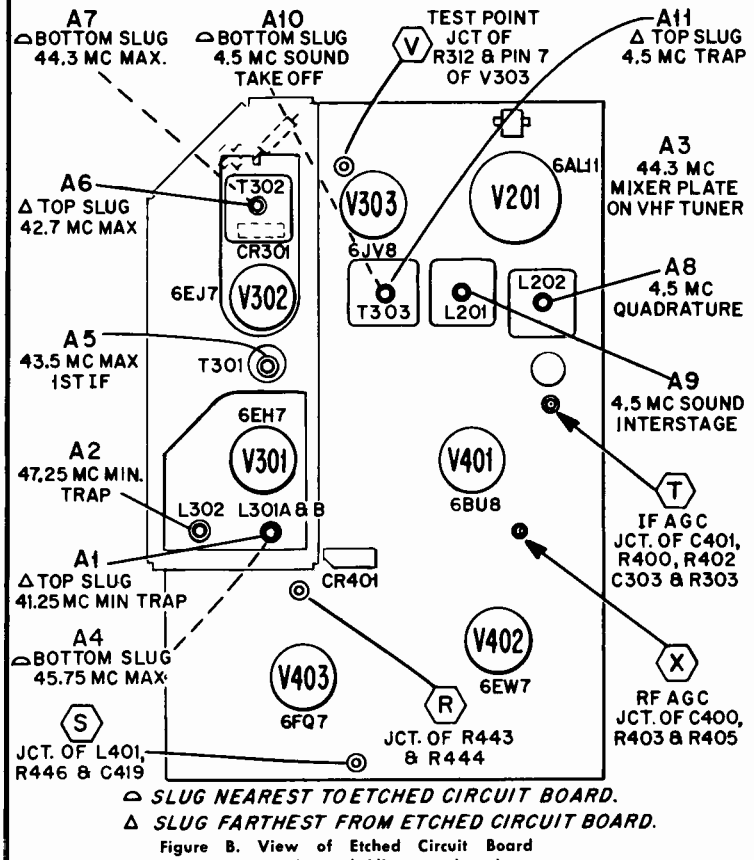
‡8. Set generator at 42.7 MC and adjust A6 for maximum.

‡9. Set generator at 44.3 MC and adjust A7 for maximum.

10. To insure correct IF alignment, make "IF Response Curve Check".

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

‡ Use —6 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 2 volts.



SLUG NEAREST TO ETCHED CIRCUIT BOARD.

SLUG FARTHEST FROM ETCHED CIRCUIT BOARD.

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

IF RESPONSE CURVE CHECK

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

2. Set VHF tuner on channel 12. Connect negative of 6 volt bias supply to test point "T" (IF AGC), positive to chassis. See figure B.

3. Using needle nose alligator clip or looped end of hookup wire, connect sweep generator high side to test point "G", low side directly to tuner. see figures E and F. 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 A6 and A7 to correct shape of 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 "A8" several turns to left until a buzz is heard in sound. Then slowly turn slug "A8" 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 "A9" for loudest and clearest sound with minimum hiss. If hiss disappears during alignment, reduce signal to maintain hiss level. Readjust slug "A9". NOTE: Slug "A9" should be at end of coil nearest etched circuit board.

5. 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 "A8". Caution: Slug "A10" is located nearest bottom of shield can. Use care so as not to disturb slug nearest top of shield can.

ALIGNMENT OF 4.5 MC TRAP

To align 4.5 MC trap "A11", tune in television station with beat interference pattern in picture. While closely observing picture, adjust slug "A11" for minimum interference pattern.

Note that adjustment "A11" 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.

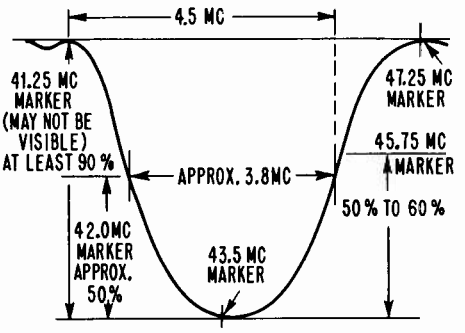


Figure C. Ideal IF Response Curve.

Emerson Television

TELEVISION RECEIVERS

MODEL NUMBER	CABINET STYLE	CHASSIS NUMBER	C.R.T.	VHF TUNER
T1800A	PORTABLE	120650-C	19XP4	471351
U1800A		120651-D		471352
T1801	CONSOLE	120587-A	2 3 C P 4	471332
T1802		120587-A		471332
U1802		120588-B		471333
T1803	LOWBOY	120587-A		471332
U1803		120588-B		471333
R1803		120589-C		471337
T1804	TABLE MODEL	120587-A		471332
U1804		120588-B		471333
T1805	PORTABLE	120656-C	1 9 X P 4	471351
U1805		120651-D		471352
T1806		120591-A		471338
U1806		120592-B		471341
R1806		120593-A		471338

MODEL NUMBER	CABINET STYLE	CHASSIS NUMBER	C.R.T.	VHF TUNER
T1807	CONSOLE	120587-A	2 3 C P 4	471332
U1807		120588-B		471333
T1808		120587-A		471332
U1808		120588-B		471333
T1810A		120587-A		471332
U1810A		120588-B		471333
T1811A	LOWBOY	120587-A		471332
U1811A		120588-B		471333
T1815	PORTABLE	120656-C	19XP4	471351
T1817		120656-C	17DTP4 or	471351
T1817A		120656-C	17DKP4	471351
R1818		120593-A	19XP4	471338
T1820		120656-C	17DTP4	471351
T1820A		120656-C	or	471351
U1820		120651-D	17DKP4	471352

NOTES

1. Models T-1800A and T-1806 are equipped with an automatic timer unit. Emerson part number 471324.
2. All UHF/VHF receivers described in this Service Note (models having the prefix letter "U" or "D") utilize a separate UHF tuner (Emerson part number 471227) in addition to the VHF tuner indicated in the charts above.
3. All Wireless Remote Controlled models described in this Service Note (models having the prefix letter "R" or "E") are equipped with remote control receiver chassis 471345 and remote control transmitter 471346 (23-inch sets) or remote control transmitter 963539 (19-inch sets).
4. All combination models described in this Service Note are equipped with additional chassis for reception of radio broadcasts, as well as a stereophonic amplifier for use in conjunction with the four-speed stereo record changer employed.

COMBINATION RECEIVERS

MODEL NUMBER	CABINET STYLE	TV CHASSIS NUMBER	C.R.T.	VHF TUNER
C-2000	CONSOLE	120587-A	2 3 C P 4	471332
C-2001	LOWBOY			
C-2001A				
C-2002				
C-2002A				
D-2002		120588-B		471333
D-2002A				
E-2002		120589-C		471337
E-2002A				

DUMONT

TYPE	MODEL NAME	MODEL NO.	CHASSIS	C.R.T.	VHF TUNER	UHF TUNER
VHF	BON VOYAGE	800-B148	120591-A	19XP4	471338	NONE
UHF/VHF		800-B149	120592-B		471341	471227
VHF		800-B150	120593-A		471338	NONE
		800-B151	120650-C		471351	
UHF/VHF	AMERICANA	800-B158	120657-A	17DTP4 (or) 17DKP4	471338	471227
		800-B159	120592-B		471341	
VHF	SPORTSMAN	800-B160	120657-A	19XP4	471338	NONE
UHF/VHF		800-B161	120592-B		471341	471227

(Service material on pages 23 through 28)

EMERSON and DUMONT Service Material, Continued

TV CHASSIS ALIGNMENT INFORMATION

GENERAL ALIGNMENT NOTES:

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

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

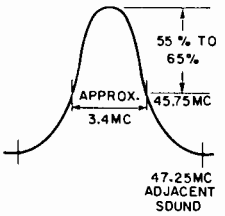
C. Maintain signal generator output no higher than necessary to produce a reading not to exceed two volts on VTVM and use insulated alignment tools for adjusting.

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

VIDEO IF ALIGNMENT

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

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



OVERALL I.F. RESPONSE CURVE

SOUND IF ALIGNMENT

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

4.5 MC VIDEO TRAP ALIGNMENT

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

HORIZONTAL OSCILLATOR ALIGNMENT

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

PROCEDURE:

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

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

ADJUSTMENT OF LOCAL-DISTANCE CONTROL (R-38)

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

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

HORIZONTAL SIZE ADJUSTMENT (R-80)

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

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

HORIZONTAL DRIVE ADJUSTMENT (R-79)

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

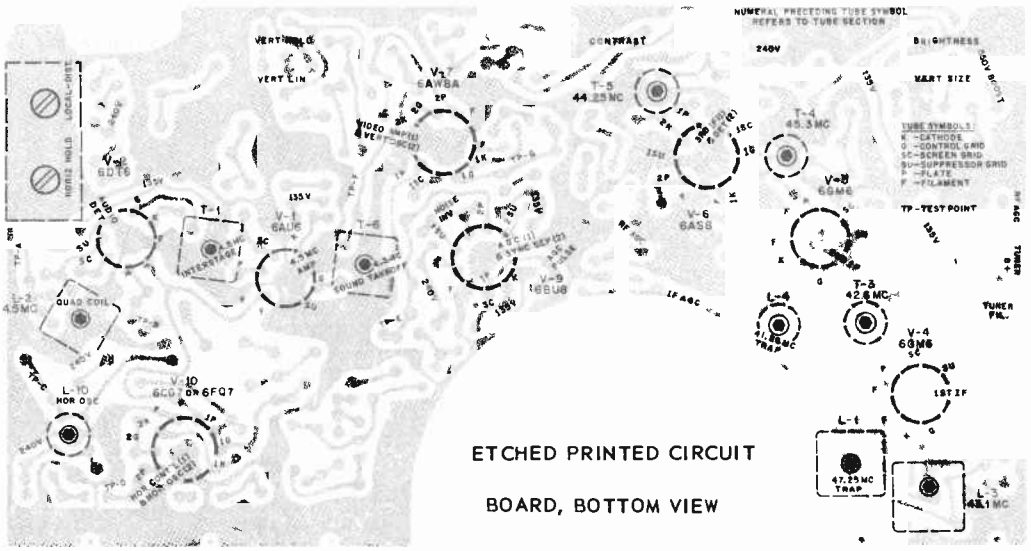
VERTICAL SIZE (R-63) AND LINEARITY (R-59) ADJUSTMENTS

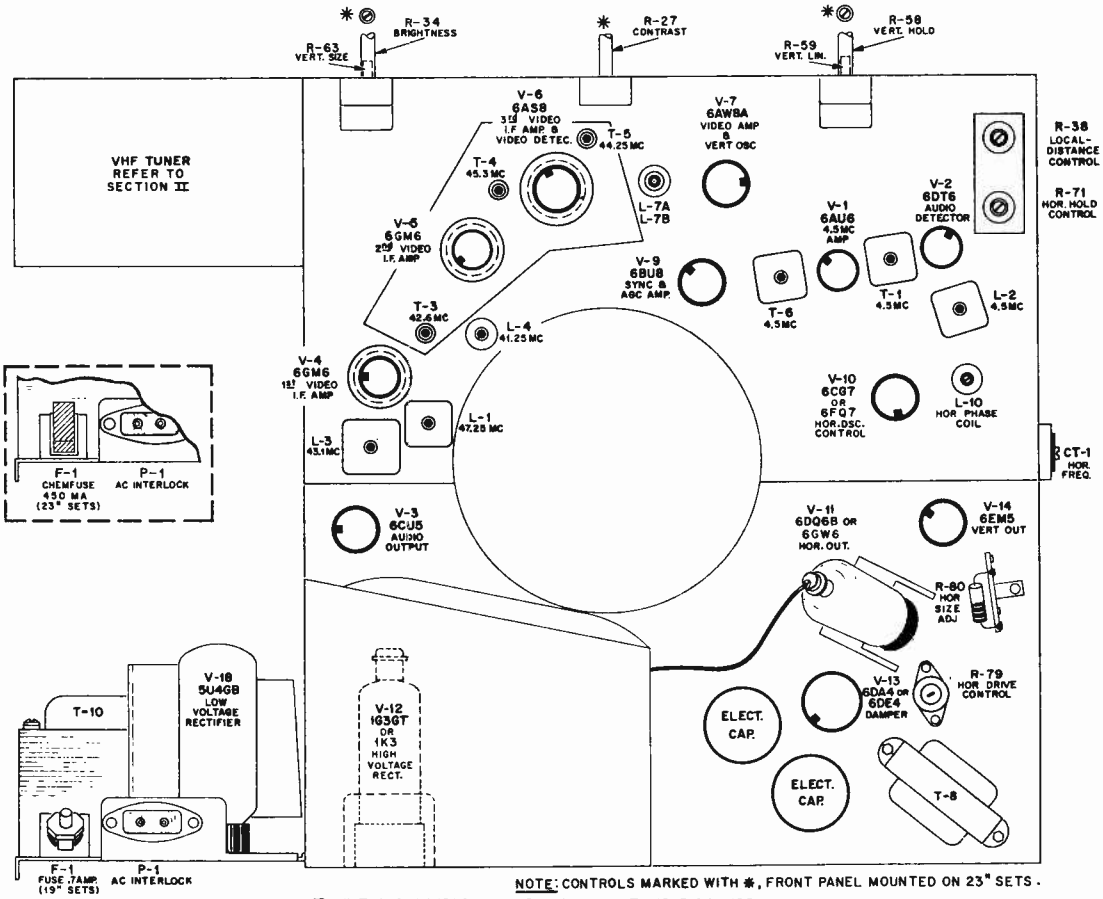
Vertical size and linearity may be adjusted by inserting a fiber alignment tool into the hollow shafts of the brightness and vertical hold controls, respectively. Insert alignment tool into the hollow brightness control shaft to adjust vertical size, and into the hollow vertical hold control shaft to adjust vertical linearity.

FOCUS ADJUSTMENT

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

EMERSON and DUMONT Service Material, Continued





NOTE: CONTROLS MARKED WITH *, FRONT PANEL MOUNTED ON 23" SETS.

TUBE LOCATION AND ALIGNMENT POINTS

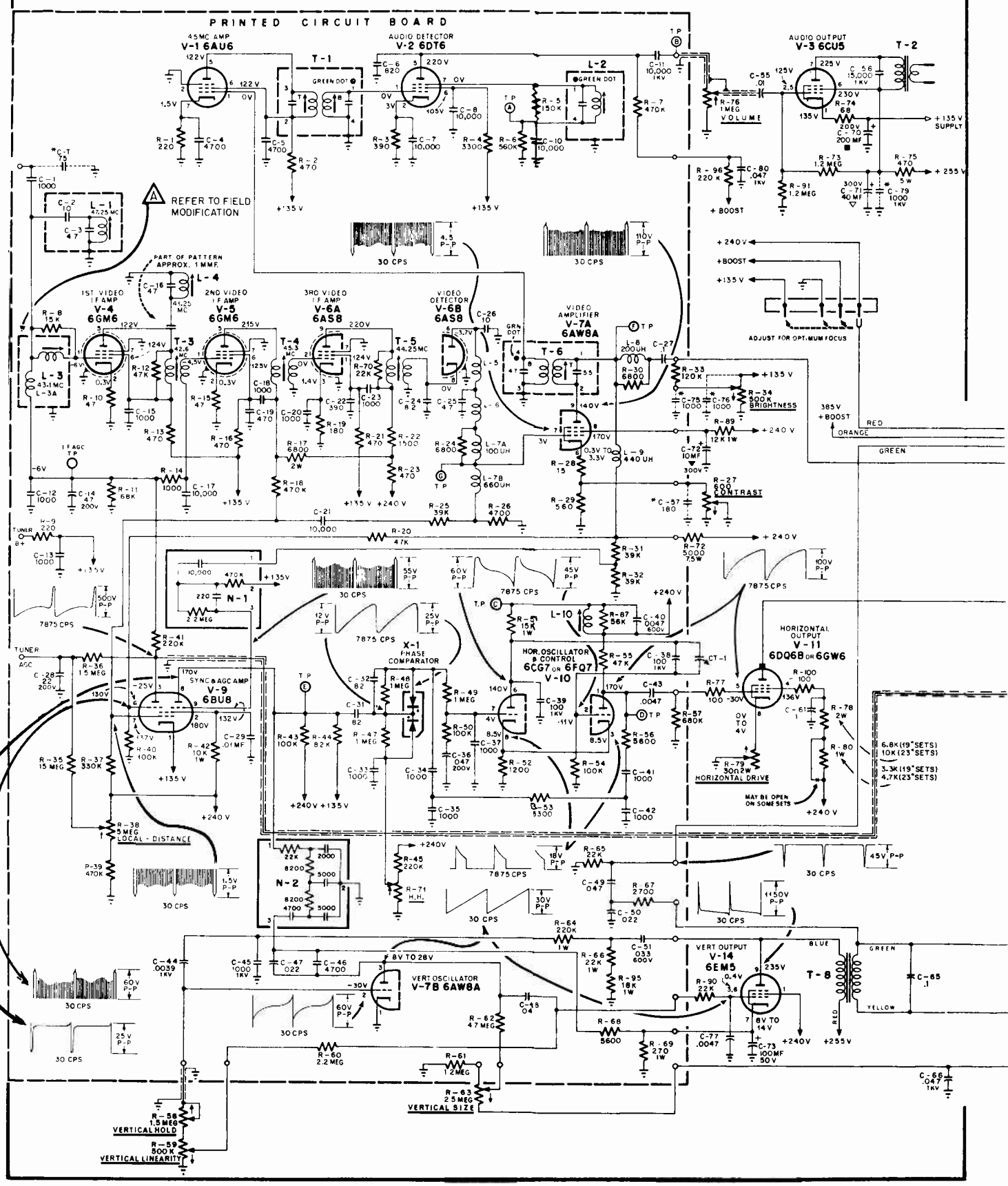
CONDITIONS FOR CHASSIS READINGS

VOLTAGES AND WAVESHAPES were taken under actual operating conditions (normal picture and sound). AGC voltage developed at junction of C-12, C-14 and R-11 was minus six volts. Voltage and waveshape readings obtained may vary ±15% in value due to component tolerances and strength of input signal to chassis under test.

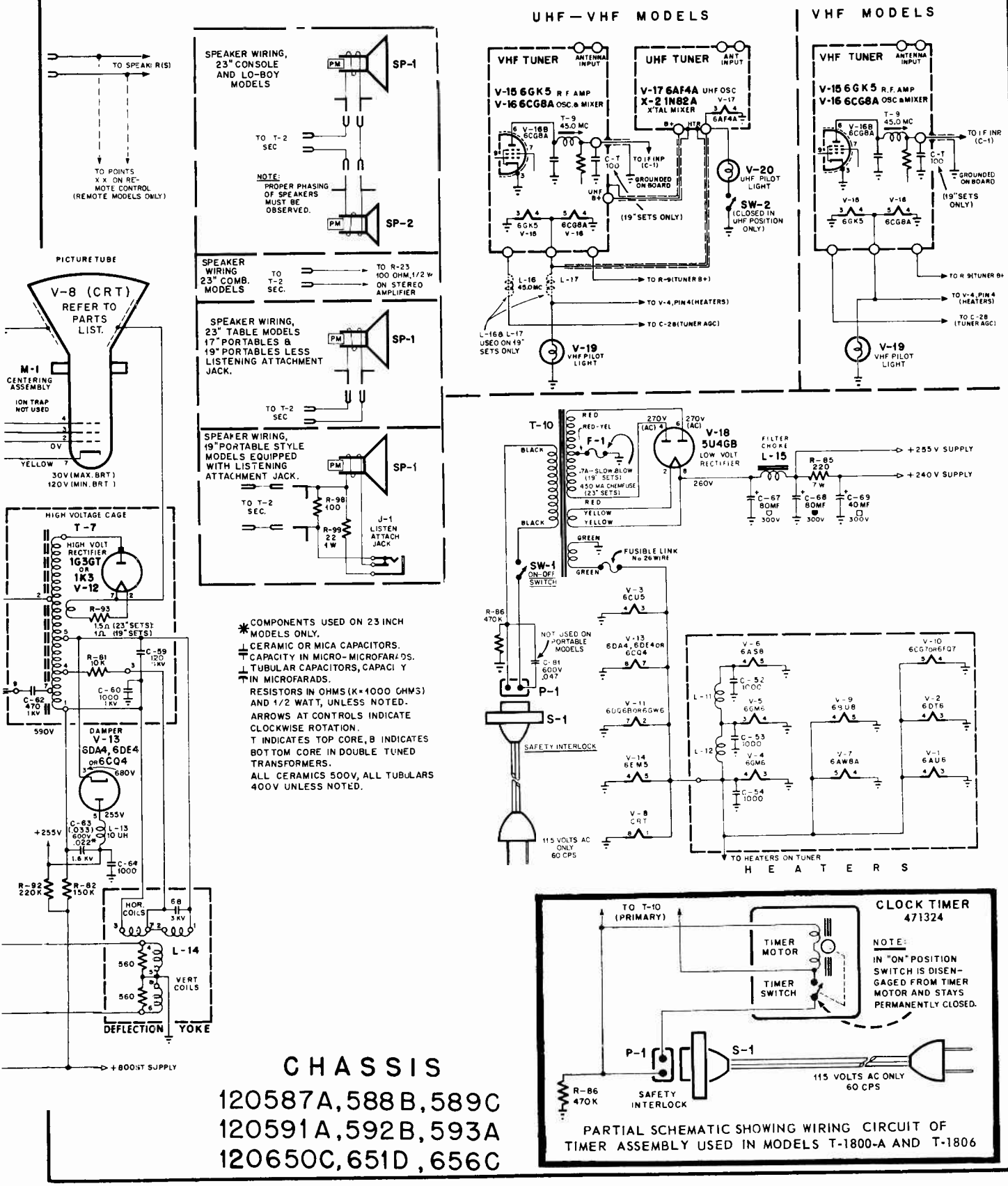
RESISTANCE READINGS were taken with no power applied. Where readings are affected by control settings, both maximum and minimum values are given. All resistance readings may vary ±10% due to normal component tolerances.

ALL MEASUREMENTS were taken between points indicated and chassis (unless otherwise indicated), 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.

EMERSON and DUMONT Service Material, Continued



EMERSON and DUMONT Alignment Information, Continued



✱ COMPONENTS USED ON 23 INCH MODELS ONLY.
‡ CERAMIC OR MICA CAPACITORS. CAPACITY IN MICRO-MICROFARADS.
‡ TUBULAR CAPACITORS, CAPACITY IN MICROFARADS.
RESISTORS IN OHMS (K = 1000 OHMS) AND 1/2 WATT, UNLESS NOTED.
ARROWS AT CONTROLS INDICATE CLOCKWISE ROTATION.
T INDICATES TOP CORE, B INDICATES BOTTOM CORE IN DOUBLE TUNED TRANSFORMERS.
ALL CERAMICS 500V, ALL TUBULARS 400V UNLESS NOTED.

PARTIAL SCHEMATIC SHOWING WIRING CIRCUIT OF TIMER ASSEMBLY USED IN MODELS T-1800-A AND T-1806

CHASSIS

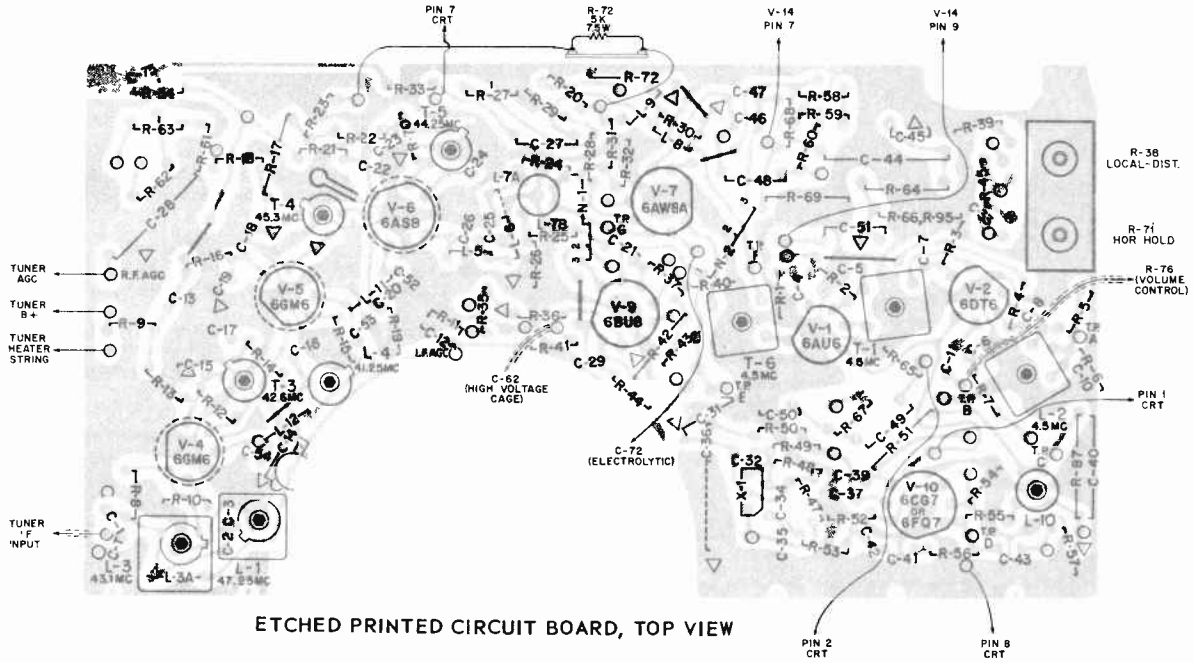
120587A, 588B, 589C
120591A, 592B, 593A
120650C, 651D, 656C

EMERSON and DUMONT Service Material, Continued

FIELD MODIFICATION NOTE

All chassis described in this Service Note (except those listed below) are equipped with an I-F input coil (L-3) which has been designed to allow for addition of an adjacent channel sound trap without removing the chassis from the cabinet. This input coil, which is housed in a two-piece shield can with removable top, has been wound around a coil form which extends beyond the windings sufficiently to allow the adjacent channel saund trap to be cemented in place around it, after which a tuning slug is inserted into the open end of the coil form and tuned for minimum adjacent channel sound interference, and the removable metal shield can top is replaced, Parts necessary for this modification may be ordered from Emerson distributors in areas where the need for this modification may exist.

Chassis 120587-A, 120588-B, 120591-A and 120650-C released prior to those marked Ⓐ (or higher) do not utilize the two-piece shield can or extended coil form to allow for this modification. Should it become necessary to perform this modification in one of these earlier released chassis, it will first be necessary to remove the I-F input coil and the metal shield can which surrounds it, replacing them with coil #720419 and two-piece shield can part numbers 414178 and 414180. If this is done, it will also be necessary to adjust L-3 after installation, as outlined in the alignment procedure.



ETCHED PRINTED CIRCUIT BOARD, TOP VIEW

SYM.	TUBE TYPE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V-1	6AU6	1.2	0	0	.1	*540	*540	220	—	—
V-2	6DT6	3.4	390	0	.1	‡920K	*3.3K	560K	—	—
V-3	6CU5	140K	1.2M	.1	0	N.C.	‡470	‡630	—	—
V-4	6GM6	68K	47	0	.1	*540	*540	0	—	—
V-5	6GM6	69K	47	.1	0	‡7.5K	*540	0	—	—
V-6	6AS8	*540	0	180	.1	0	4.7K	0	0	2.2K
V-7	6AW8A	0	500K TO 2M	5.9M TO 8.4M	0	.1	20 TO 300	4.7K	‡12.2K	‡4.6K
V-8	19XP4 OR 23CP4	.1	22K	3.5M	0 TO 3.5M	—	—	100K TO 240K	0	—
V-9	6BU8	* 68	‡10.2K	300K	0	.1	46K	200K	75K	3.2M
V-10	6CG7 OR 6FQ7	‡50K	100K	1.2K	0	.1	‡15K	3M	1.2K	0
V-11	6DQ6B OR 6GW6	T.P.	0	T.P.	‡7K TO 15K	680K	T.P.	.1	0 TO 30	—
V-12	1G3-GT OR 1K3	← INFINITE →								
V-13	6DA4 OR 6DE4 OR 6CQ4	N.C.	N.C.	‡380K	N.C	‡5	N.C.	.1	0	—
V-14	6EM5	‡220	T.P.	N.C.	.1	0	2.3M TO 2.8M	270	N.C.	‡310
V-15	6GK5	0	1.8M	0	.1	*1.5K	0	0	—	—
V-16	6CG8A	4.7K	* 5.3K	0	0	.1	* 1.4K	* 280	0	210K
V-18	5U4	N.C.	40K	N.C.	20	N.C.	20	N.C.	40K	—

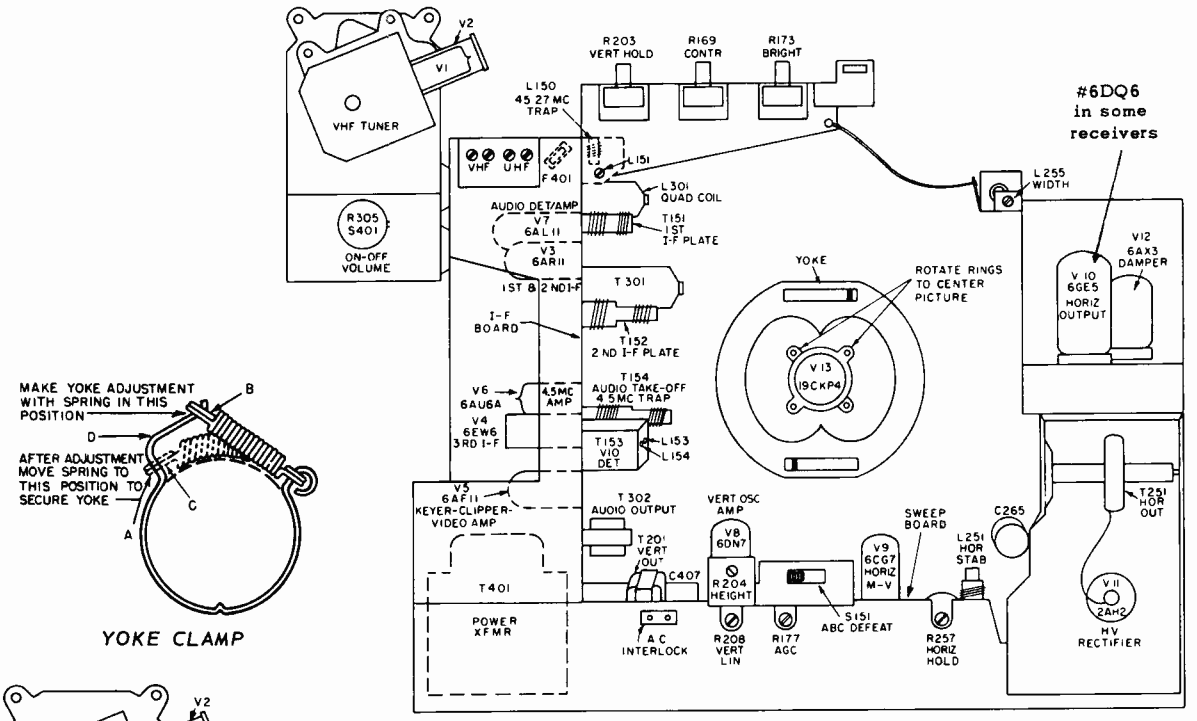
NOTES: ALL RESISTANCE READINGS ARE IN OHMS, UNLESS OTHERWISE SPECIFIED.
"K" DENOTES KILOHMS; "M" DENOTES MEGOHMS.
N.C. – DENOTES NO CONNECTION AT TERMINAL INDICATED.
T.P. – DENOTES TERMINAL INDICATED USED AS TIE POST.
* – MEASUREMENTS TAKEN WITH COMMON LEAD OF METER CONNECTED TO PIN 1 OF V-3 (6CU5).
‡ – MEASUREMENTS TAKEN WITH COMMON LEAD OF METER CONNECTED TO JUNCTION OF L-15 AND R-85 (B-PLUS 255 V).

GENERAL ELECTRIC

MODELS

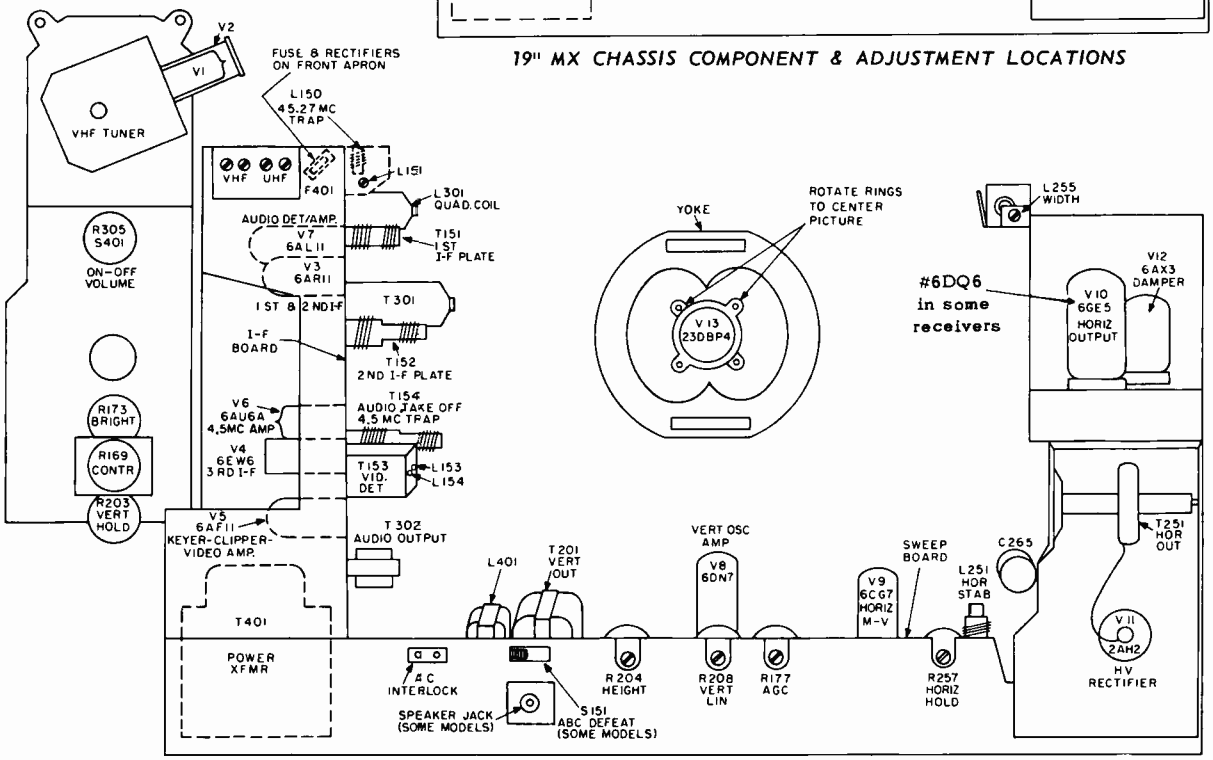
CAM602XVY
CBM602XVY
CFM602XVY
CAM606XVY
CFM606XVY
M608XGL
M608XGN
M608XVY
R608XGL
R608XVY
M609XGL
M609XGN
M609XVY
M614XCL
M614XWD
M615XCL
M615XWD
M616XCL
M616XVY
M616XWD
M617XCL
M617XVY
M617XWD
M684XCL
M684XVY
M684XWD
M685XCL
M685XVY
M685XWD
M720XEB
M720XMD
M720XOA
M720XWD
M721XEB
M721XMD
M721XOA
M721XWD
M730XMD
M730XWD
M731XMD
M731XWD
M732XMD
M732XOA
M732XWD
M733XMD
M733XOA
M733XWD
M734XMD
M734XMP
M734XWD
R734XMD
R734XMP
R734XWD

Chassis MX (Chassis MXT is similar in most respects)



19" MX CHASSIS COMPONENT & ADJUSTMENT LOCATIONS

YOKE CLAMP

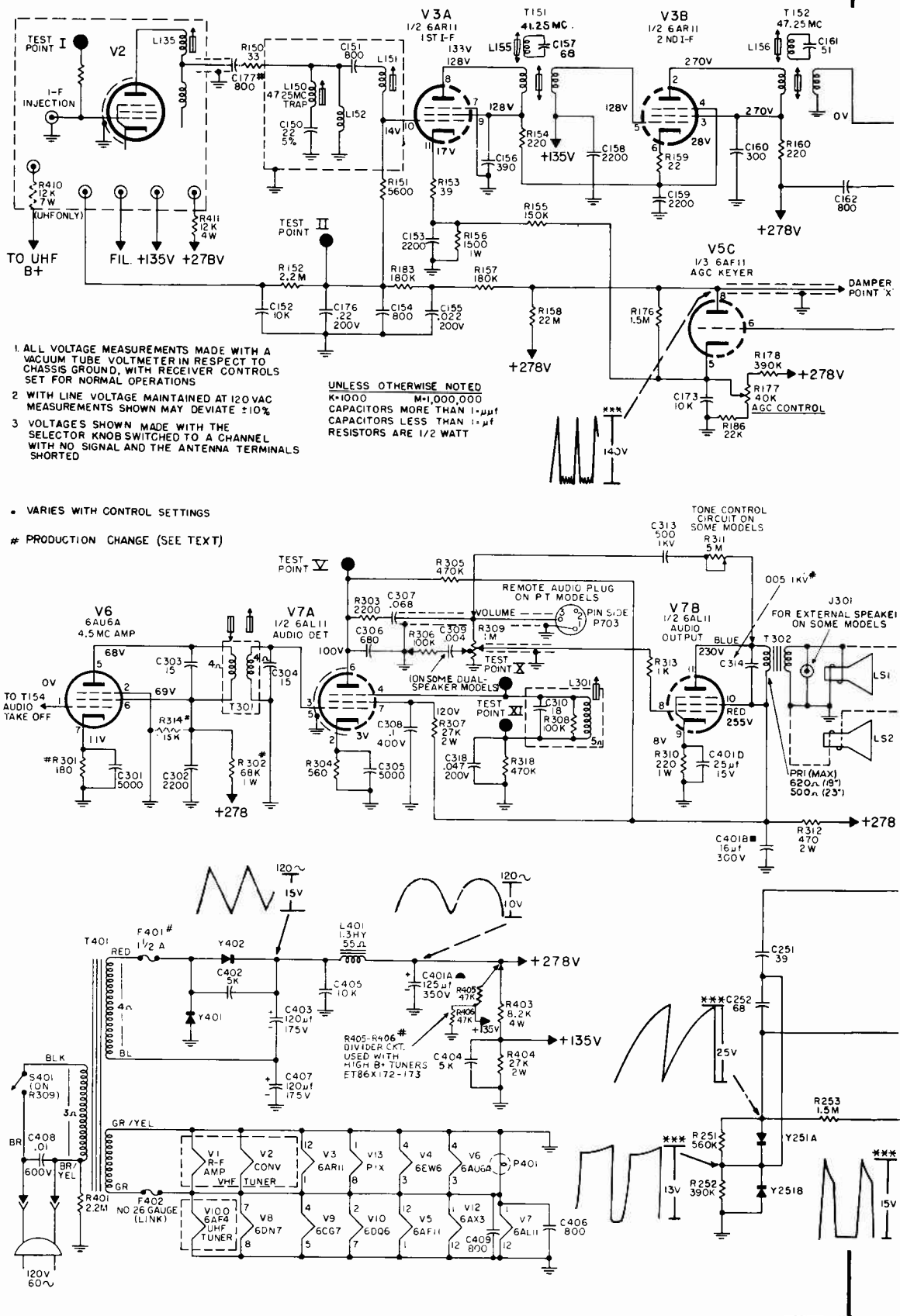


23" MX CHASSIS COMPONENT & ADJUSTMENT LOCATIONS

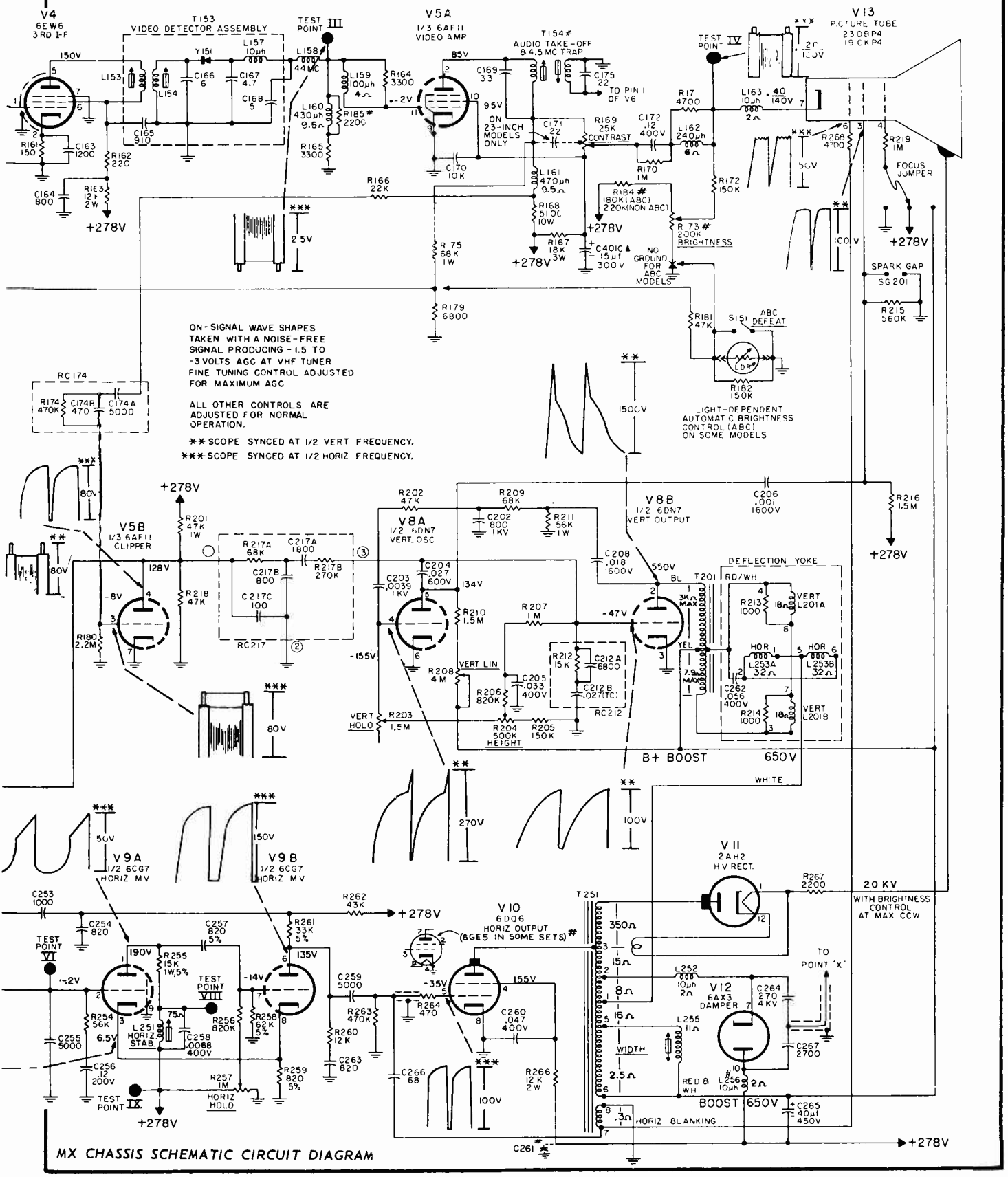
Additional models listed on page 30. Other service material pages 30 through 36.

M735XMD
M735XMP
M735XWD
M738XCL
M738XMD
M738XWD
M739XCL
M739XMD
M739XWD
M742XMD
M742XMP
M742XWD
M743XMD
M743XMP
M743XWD
M758XMD
M758XMP
M758XWD
M759XMD
M759XMP
M759XWD
M760XMD
M760XOA
M760XWD
M761XMD
M761XOA
M761XWD
M762XMD
M762XMP
M762XWD
R762XMD
R762XMP
R762XWD
M763XMD
M763XMP
M763XWD
M766XMD
M766XMP
M766XWD
M767XMD
M767XMP
M767XWD
M770XMD
M770XMP
M770XWD
M771XMD
M771XMP
M771XWD
M786XMP
M786XWD
M787XMP
M787XWD
M788XCL
M788XMD
M788XWD
M789XCL
M789XMD
M789XWD

GENERAL ELECTRIC Chassis MX Schematic Diagram



GENERAL ELECTRIC Chassis MX Schematic Diagram, Continued



MX CHASSIS SCHEMATIC CIRCUIT DIAGRAM

GENERAL ELECTRIC Chassis MX, Service Adjustments, Continued

WIDTH

This control, projecting from the rear of the cabinet near the top, should be rotated to correct improper picture width. Clockwise rotation decreases width; counterclockwise rotation increases it.

HEIGHT AND VERTICAL LINEARITY

These controls should be adjusted simultaneously to give proper vertical size consistent with good vertical linearity. Adjustment should then be made to extend the picture limits approximately 1/8 inch beyond the top and bottom edges of the mask.

HORIZONTAL HOLD

1. Remove the cabinet back and supply 120VAC at the interlock.
2. Tune in a weak signal and adjust the receiver for normal operation.
3. Using a jumper wire, short Test Point VI to chassis.
4. Connect a 1000-ohm resistor between Test Points VIII and IX.
5. Adjust the horizontal hold control until the picture just "floats" back and forth across the screen.
6. Remove the resistor and adjust the core of the stabilizer coil (L251) inward until the picture again floats across the screen. Then remove the jumper at Test Point VI. Repeat the procedure if the picture does not "lock."

PICTURE CENTERING

The picture centering device consists of two rings located on the yoke assembly. Each ring has tabs with punched holes through which insulated alignment tools may be inserted to provide easy rotation. The tabs should be moved toward or away from each other until the picture is properly centered on the tube face.

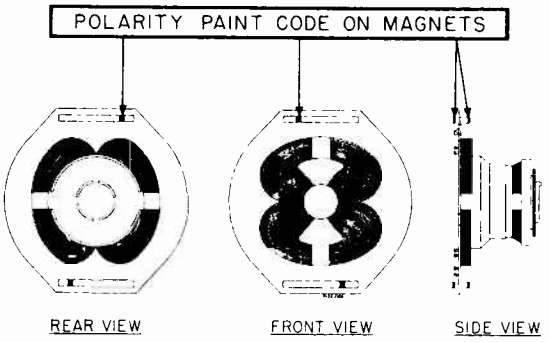
AGC CONTROL

Field Adjustment: Tune in the strongest available signal and adjust R177 to the point where overloading is indicated by "tearing" of the picture. Then back off the AGC control to just beyond the point where the overload condition disappears.

PINCUSHION MAGNETS

Two pincushion correction magnets in easily removable plastic holders are assembled to the top and bottom of the flange on a replacement deflection yoke. The magnets correct pincushioning (bowing of the scanning lines at the top and bottom of the raster). The pincushion effect may be seen by reducing the vertical size with R204 so that the top and bottom of the raster may be seen. Several degrees of correction are afforded by positioning the magnets as follows:

1. Where maximum correction is needed, mount the magnets on the front of the yoke flange nearest the picture tube.
2. Where moderate correction is needed, install the magnets on the rear of the yoke flange.
3. Where no correction is needed, remove the magnets and holders.
4. The magnets may be used in various combinations where necessary; for example, one at the top on the rear of the yoke flange and another on the bottom front of the flange. Polarity of the magnets is indicated by the red paint bar at one end of each magnet. Observe the polarity as shown in the accompanying illustration.



PINCUSHION MAGNET POLARITY

PRODUCTION CHANGES

1. Some 19-inch receivers produced after code 217X used 400K-ohm brightness potentiometers instead of the 200K-ohm units. When the higher value pot is used, the series resistor R184 is eliminated from the circuit.

2. After code 217MX, in most MX receivers, R314 was eliminated, R302 changed from 27K, 3W, to 68K, 1W, and R301 changed from 270 to 180 ohms. At the same time, the 5000-μμf value for C314 was made standard for 23-inch as well as for 19-inch receivers.

3. After code 220MX, R185 was standardized and the 2200-ohm value used for 19-inch as well as 23-inch receivers.

4. Prior to chassis date code 223MX, the 6GE5 Compactron was used in the horizontal output stage of the MX Chassis; thereafter, most MX receivers used the 6DQ6 in this application.

5. The capacitor C261 was eliminated from most MX receivers after code 224MX and the choke L256 added.

6. Beginning with code 226MX, the 2-ampere fuse ET10X41 was used in some MX receivers in place of the original 1 1/2-ampere fuse (F401). ET10X41 is recommended for replacement purposes in all MX receivers.

7. The blocking capacitor C177 appeared in some MX receivers beginning with chassis code 128MX. The receiver IF board was changed to Version II in these receivers to accommodate this capacitor, VHF tuners used with these receivers do not incorporate a blocking capacitor in the IF output.

8. After chassis code 228MX, part ET36X634 was used for T154 in place of ET36X603 in some MX receivers. The two transformers are interchangeable, but require different sound-takeoff cores.

9. The Version II light-dependent resistor appeared in MX receivers with automatic brightness control after code 229MX. It is interchangeable electrically with the Version I unit but requires the use of a special holder because of smaller physical dimensions.

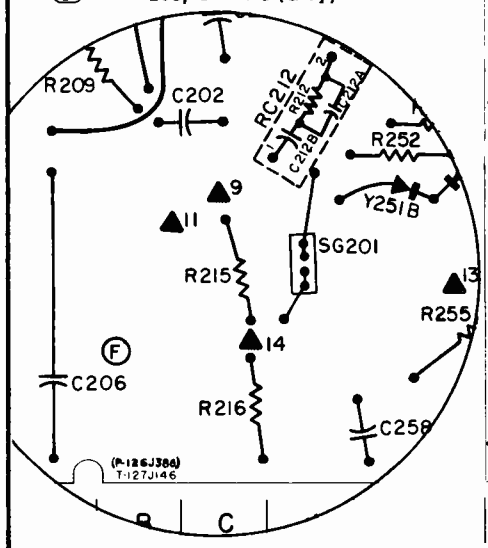
10. The resistors R403 and R404 are replaced by the matched 47K-ohm resistors R405 and R406 in any MX receiver using "high-B+" tuners. These tuners include ET86X172, ET86X173, ET86X176 and ET86X180. They operate from 278V B+ and require no 135V connection. The R405–R406 divider circuit should be substituted for the original circuitry whenever one of these tuners is substituted for another type MX tuner; likewise, the R403–R404 circuitry should be with any tuner requiring the 135V connection.

GENERAL ELECTRIC Chassis MX

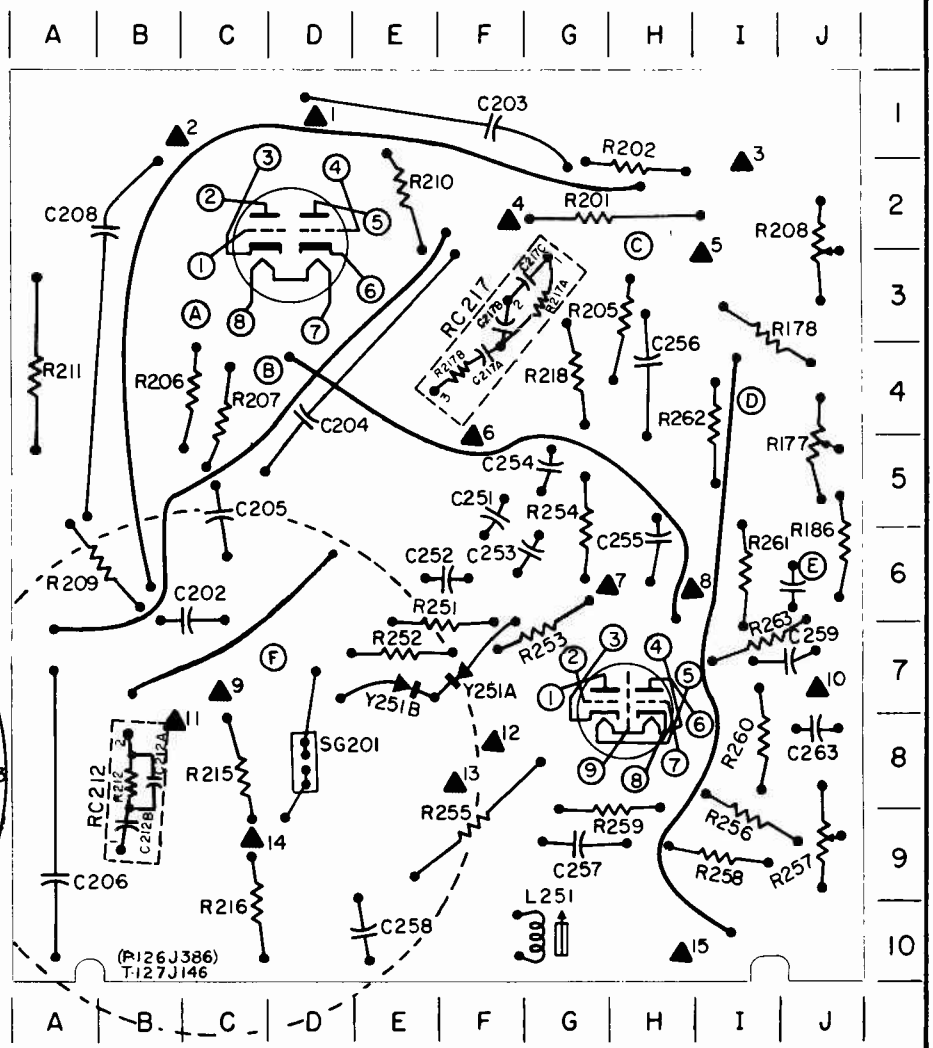
ETCHED CIRCUIT SWEEP BOARDS

▲1—To R203 (Gray)
▲2—To T201 (Blue)
▲3—To T201 (Yellow) & C265 (Red/White)
▲4—To D on IF Board (Green)
▲5—To 278 V & 11 on IF Board (Red)
▲6—(Ground)
▲7—Test Point VI
▲8—To CRT, Pin 8 (Brown)
▲9—(Ground)
▲10—To R264 on Damper Assembly
▲11—To T201 (Red) & Yoke, Term. 3
▲12—(Ground)
▲13—Test Point VIII
▲14—To CRT, Pin 3
▲15—Test Point IX

(A)—To R204 Control Arm (Gray)
(B)—To 6.3V on IF Board (Brown)
(C)—To R204 (Green)
(D)—To 16, IF Board (Yellow)
(E)—To T251, Term. 7 (Green)
(F)—To T251, Term. 8 (Gray)



19-INCH MX CHASSIS SWEEP BOARD



23-INCH MX CHASSIS SWEEP BOARD VIEWED FROM THE CONDUCTOR SIDE

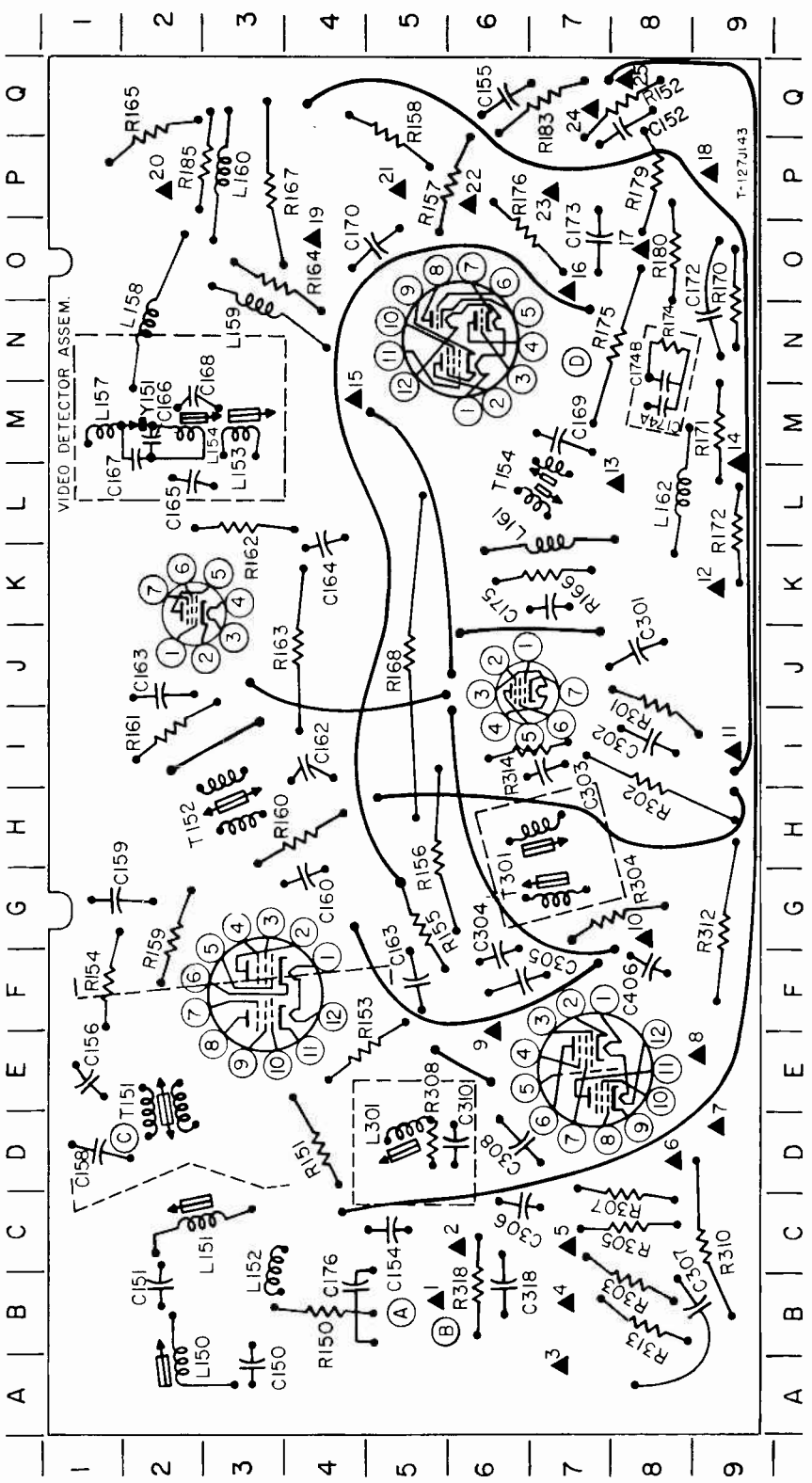
LOCATIONS BY COORDINATES

(Applicable to both 19-inch and 23-inch versions except where otherwise noted.)

RESISTORS	CAPACITORS	RC NETWORKS	WIRE CONNECTIONS
R178-I4	C202-C7	RC212-D7 (19")	(A)—C3
R186-J6	C203-F1	B9 (23")	(B)—D4
R201-H2	C204-D5	RC217-F4	(C)—H3
R202-H2	C205-C6		(D)—I5
R205-H4	C206-A10	SPARK GAP	(E)—J6
R206-C4	C208-B2	SG201-D9	(F)—B10 (19")
R207-C5	C251-F6		D7 (23")
R209-B6	C252-F7	COILS	▲1-D1
R210-E2	C253-G6	L251-G11	▲2-B1
R211-A4	C254-G5		▲3-I2
R215-C10	C255-H6	TUBES	▲4-F2
R218-G4	C256-H4		▲5-I3
R251-F7	C257-G10	V8—D3	▲6-F5
R252-E7	C258-E11	V9—H8	▲7-H7
R253-G7	C259-J8		▲8-I7
R254-G6	C263-J8		▲9-C8
R255-F9	C266-J7		▲10-J8
R256-I8		DIODES	▲11-B8
R258-I10	POTENTIOMETERS		▲12-F9
R259-H9		Y251A-F8	▲13-F9
R260-I8	R177-J5	Y251B-E8	▲14-C10
R261-I6	R208-J3		▲15-H11
R262-I5	R257-J10		
R263-I7			

GENERAL ELECTRIC Chassis MX, Service Information, Continued

ETCHED CIRCUIT IF BOARD, MX/MXT



COMPONENT LOCATIONS, MX-MXT, I-F BOARD (VERSION I) AS VIEWED FROM CONDUCTOR SIDE OF BOARD

(See partial IF board illustration on reverse side of this sheet for Version II variation)

NOTE: The Version I IF boards appear in MX and MXT Chassis receivers which do not contain the blocking capacitor, C177. These receivers are equipped with VHF tuners having built-in blocking capacitors in their output stages. The Version II IF boards are slightly modified (see illustration on next page) to accommodate this capacitor at the input end, and are used in conjunction with VHF tuners lacking the blocking capacitors.

For component locations and identification of wire terminals and connection points, see the following page.

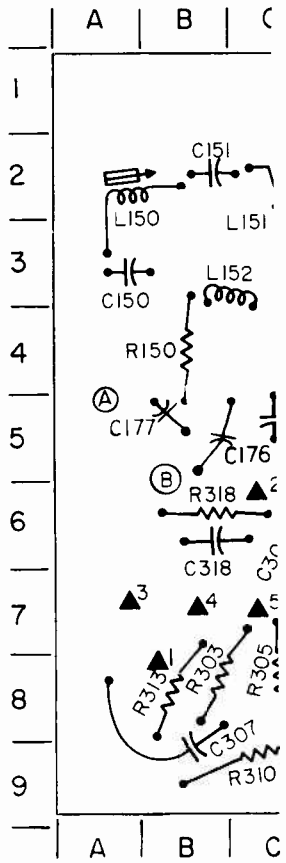
CIRCLED (A) LETTERS REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

(A) Tuner IF Link Cable
(B) Link Ground Sheath
(C) To 135V (Orange)
(D) To C251 on Sweep Board (Green)

GENERAL ELECTRIC Chassis MX, Service Information, Continued

ETCHED CIRCUIT IF BOARD, MX/MXT

VERSION II IF BOARD (PARTIAL VIEW)



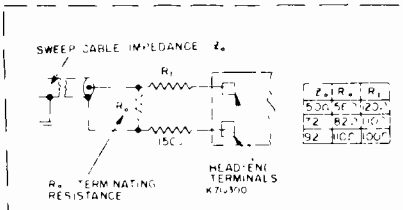
LOCATIONS BY COORDINATES

(See full board view on previous page. Locations in parentheses apply to Version II only.)

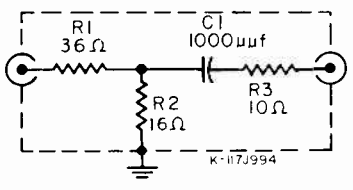
RESISTORS	CAPACITORS	WIRE CONNECTIONS
R150-B4 R151-D4 R152-Q8 R153-E5 R154-F1 R155-G5 R156-H5 R157-P6 R158-Q5 R159-G2 R160-H4 R161-I2 R162-L3 R163-J4 R164-O3 R165-O2 R166-K7 R167-P3 R168-J5 R170-O9 R171-M9 R172-L9 R175-N8 R176-O6 R179-P8 R180-O8 R183-Q7 R185-D3 R301-J8 R302-H8 R303-B8 R304-G7 R305-C8 R307-C8 R308-D5 R310-C9 R312-G9 R313-B8 R314-I7 R318-B6	C150-A3 C151-B2 C152-Q8 C153-F5 C154-C5 C155-Q6 C156-E1 C158-D1 C159-G1 C160-G4 C162-I4 C163-J2 C164-L4 C165-L2 C166-M2 C167-M2 C168-M2 C169-M7 C170-O5 C172-N9 C173-O7 C175-K7 C176-B4 (C5) C177-B5 C301-J8 C302-I8 C303-I7 C304-F6 C305-F6 C306-C6 C307-B9 C308-D6 C310-D6 C318-B6 C408-F8	A-B5 (A5) B-B6 C-D2 D-N7 1-B5 (B8) 2-C6 3-A7 4-B7 5-C7 6-D8 7-D9 8-E9 9-F6 10-G8 11-I9 12-K9 13-L8 14-M9 15-M4 16-O7 17-O8 18-P9 19-O4 20-P2 21-P5 22-P6 23-P7 24-Q7 25-Q8
	TUBES V3—F3 V4—K2 V5—N6 V6—J7 V7—E7	COILS & TRANSFORMERS L150-A2 L151-C2 L152-C3 L153-M3 L154-M2 L157-M1 L158-N2 L159-O3 L160-P3 L161-L7 L162-L8 L301-D5 T151-E2 T152-H3 T154-L7 T301-H7
	RC NETWORK RC174-N8	
	DIODE Y151-M2	

TRIANGLE (▲1) NUMBERS REPRESENT WIRE WRAP TERMINALS FOR CONNECTION OF WIRES FROM POINTS INDICATED

- ▲1—Ground Plane
- ▲2—Test Point XI
- ▲3—To R309 (Yellow)
- ▲4—To R309 Control Arm (Green)
- ▲5—Test Point V
- ▲6—To C401D (Gray)
- ▲7—To C401B, C314 & T302 (Red/Black)
- ▲8—To T302, C314 (Blue)
- ▲9—Test Point X
- ▲10—To 6.3V, Filament (Brown)
- ▲11—To 278V and R411 (Red)
- ▲12—To R173 Control Arm (Blue)
- ▲13—To R169
- ▲14—Test Point IV; to L163 (Yellow)
- ▲15—To Fuse Wire & Sweep Filaments (Brown)
- ▲16—To AGC Pot, Control Arm (Yellow)
- ▲17—Connection Point, LDR Circuit
- ▲18—To R169 Control Arm (Green)
- ▲19—To R169 & C401C (Orange/Black)
- ▲20—Test Point III
- ▲21—To Damper Pulse Lead Ground Sheath
- ▲22—To Damper Pulse Lead
- ▲23—To Filament Fuse Wire and T401 (Green)
- ▲24—To Tuner AGC (White)
- ▲25—Test Point II



SWEEP EQUIPMENT TERMINATION



IF INJECTION NETWORK

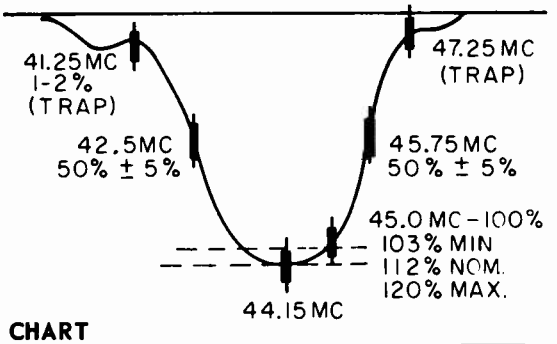
GENERAL ELECTRIC Chassis MX

VIDEO IF SYSTEM

1. Set the channel selector to Channel 9, the fine tuning and volume to minimum positions (fully counterclockwise) and the contrast control to the clockwise extreme.
2. Short the VHF antenna terminals together and leave them shorted throughout video alignment.
3. Connect an oscilloscope to Test Point III through a 22,000-ohm resistor (which should not be more than 1-1/2 inches away from Test Point III) and short Test Point II to chassis.
4. Inject signals from a properly-terminated AM signal generator or sweep generator, through the network shown, to the I-F injection point (accessible through hole in the top apron of the tuner).
5. Align the receiver to produce the response curve illustrated.

AM PRE-PEAKING FREQUENCIES

L155	Min. at 41.25MC
L150, L156	Min. at 47.25MC
L135	Max. at 45.75MC
L151	Max. at 42.50MC
L153, L154	Max. at 44.15MC
T151	Max. at 43.00MC
T152	Max. at 45.20MC



VIDEO I-F ALIGNMENT CHART

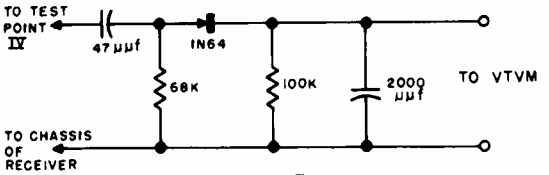
STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1.	47.25 MC AM	Adjust first L156, then L150 for minimum scope deflection. Correct L156 core position is one nearest circuit board which gives minimum indication.	Use maximum scope sensitivity and smallest possible signal for the 47.25 MC AM adjustments.
2.	41.25 MC AM	Adjust L155 for minimum. Correct core position is farthest from circuit board which gives minimum indication.	
3.	44.15 MC AM	Adjust first L154, then L153 for maximum scope deflection.	Do not retouch these adjustments.
4.	38—48 MC sweep generator, with scope calibrated 3 volts peak to peak for 2 inch deflection; markers at 41.25, 42.5, 44.15, 45 & 45.75 MC	L135 (converter plate) for maximum deflection of the 45.75 MC marker.	
5.	SAME	L151 (1st I-F grid) for maximum deflection of the 42.5 MC marker and proper nose shaping.	Symmetry of the nose is important. No portion of the nose should be out of symmetry by more than 3%.
6.	SAME	T152 (2nd I-F Plate) to place 45.75 MC marker properly on the curve.	Repeat 5, 6, and 7 if necessary.
7.	SAME	T151 (1st I-F Plate) to place 42.5 MC marker properly on the curve.	
8.	SAME	L151 if necessary to shape the nose.	

4.5 MC TRAP ALIGNMENT

1. Connect −10V bias between Test Point II and chassis, with the positive bias lead to chassis.
2. Temporarily short Test Point X to Test Point XI. Set contrast at maximum, volume at minimum.
3. Connect the detector network illustrated between Test Point IV and chassis and feed its output to an AC VTVM.
4. Apply a 4.5 MC signal through a 47uuf capacitor to Test Point III and adjust the top core of T154 for minimum VTVM reading. Two core positions may give minimum readings; the correct one is the closer to the top of the coil form.

AUDIO TAKEOFF & INTERSTAGE TRANSFORMER ALIGNMENT

1. Prepare receiver for alignment as in Steps 1 and 2 of the 4.5 MC trap alignment procedure.
2. Connect an oscilloscope probe to Test Point V and apply a 4.5 MC AM signal as described in the trap alignment instructions.
3. Adjust the top core of T154 and both cores of T301 to obtain maximum undistorted sine wave on the scope. Where maximum indications are obtained at more than one core position, select the position nearest that end of the coil form in which the core in question is located.
   NOTE: The trap adjustment may require retouching after audio takeoff alignment.



DETECTOR NETWORK

AUDIO ALIGNMENT

Use this procedure for on-the-air alignment of the audio system:

1. Tune in a strong signal and set the volume to a low audible level.
2. Carefully adjust the L301 (quadrature coil) core for maximum undistorted, buzz-free output.
3. Adjust the AGC control to obtain distortion on audio peaks and then carefully tune both cores of T301 (interstage transformer) for maximum clarity of sound. Advance the AGC bias again and repeat the T301 adjustments to obtain optimum settings.
4. Proceed to T154 and adjust the bottom core only, using the same procedure as in Step 3.

GENERAL ELECTRIC

DISASSEMBLY

TO REMOVE THE CABINET REAR

Disconnect all antenna leads from the screw terminals on the antenna terminal board. Disassemble three screws and remove the rear of the two piece molded cabinet.

TO REMOVE THE CHASSIS

Remove cabinet rear. Disassemble three knobs from the front and two from the underside of the cabinet. Remove four screws holding the chassis in the cabinet front (two on each side). The chassis may now be pulled back from the cabinet front for service without disconnecting any wires. Complete disassembly can be accomplished, if desired, by unsoldering the speaker leads from the terminal strip on the chassis and removing the picture tube socket, yoke assembly and anode lead from the picture tube.

TO REMOVE THE PICTURE TUBE

Safety glasses and gloves should be worn while handling the picture tube. Completely remove the chassis from the cabinet front. Lay the cabinet front and picture tube face down on a thick pad of clean soft cloth or a thick piece of foam rubber or equivalent so that the plastic coated faceplate of the picture tube will not be damaged. The pad should be placed on a clean work surface so that there is no chance of pointed objects piercing the pad. Loosen two sling screws at the top and bottom of the picture tube until sling falls away from the tube. The picture tube may now be removed from the cabinet front.

INSTALLATION

ELECTRICAL ADJUSTMENTS

HEIGHT AND VERTICAL LINEARITY: Adjust R218 and R208 simultaneously for proper vertical size and linearity. Picture should extend 1/8-inch beyond top and bottom edges of mask. Width control L252 should be in extreme counterclockwise position.

WIDTH CONTROL: Adjust this control, L252, for largest picture necessary to fill mask.

HORIZONTAL HOLD:

1. Remove the cabinet back.
2. Tune the receiver to a weak signal and adjust the controls for normal operation.
3. Short Test Point VI to the chassis with a jumper wire.
4. Connect a 1000 ohm resistor from Test Point VIII to Test Point IX (in parallel with L251.)
5. Adjust HORIZONTAL HOLD potentiometer, R258, until picture just "floats" back and forth across the screen. Leave R258 set in this position.
6. Remove the 1000 ohm resistor from Test Point VIII and Test Point IX. Adjust L251 (stabilizer coil) so that the picture again just "floats" across the screen, turning the core toward the printed board. Leave L251 set in this position.
7. Remove the chassis jumper from Test Point VI. Repeat adjustments if the picture does not "lock".

PICTURE TUBE ADJUSTMENTS

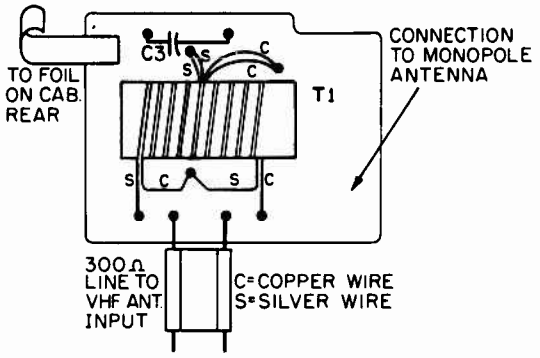
PICTURE TILT: To correct picture tilt, loosen the YOKE CLAMP by sliding the eye of the spring over the bend in the clamp. Adjust the yoke to correct the tilt. Secure the yoke by sliding the eye of the spring back over the bend in in the clamp. See Index and LX chassis for a detailed description of the yoke clamp.

PICTURE CENTERING: Rotate the two centering rings located at the rear of the yoke assembly until picture is properly centered.

(Material on pages 37 through 44)

QX MODELS

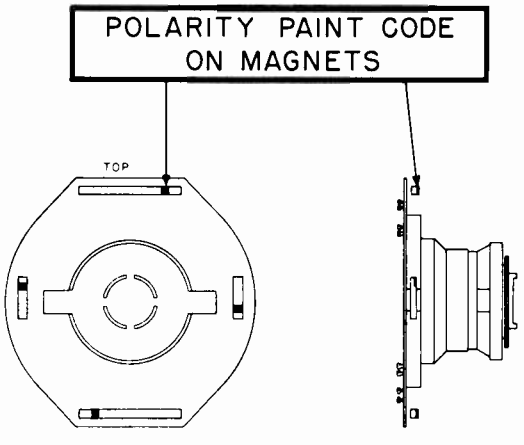
M500XBG	M502XBN
M500XRD	M502XEB
M500XTS	M502XVY
M501XBG	M503XBN
M501XRD	M503XEB
M501XTS	M503XVY



MONOPOLE BALUN CIRCUIT BOARD VIEWED FROM CONDUCTOR SIDE

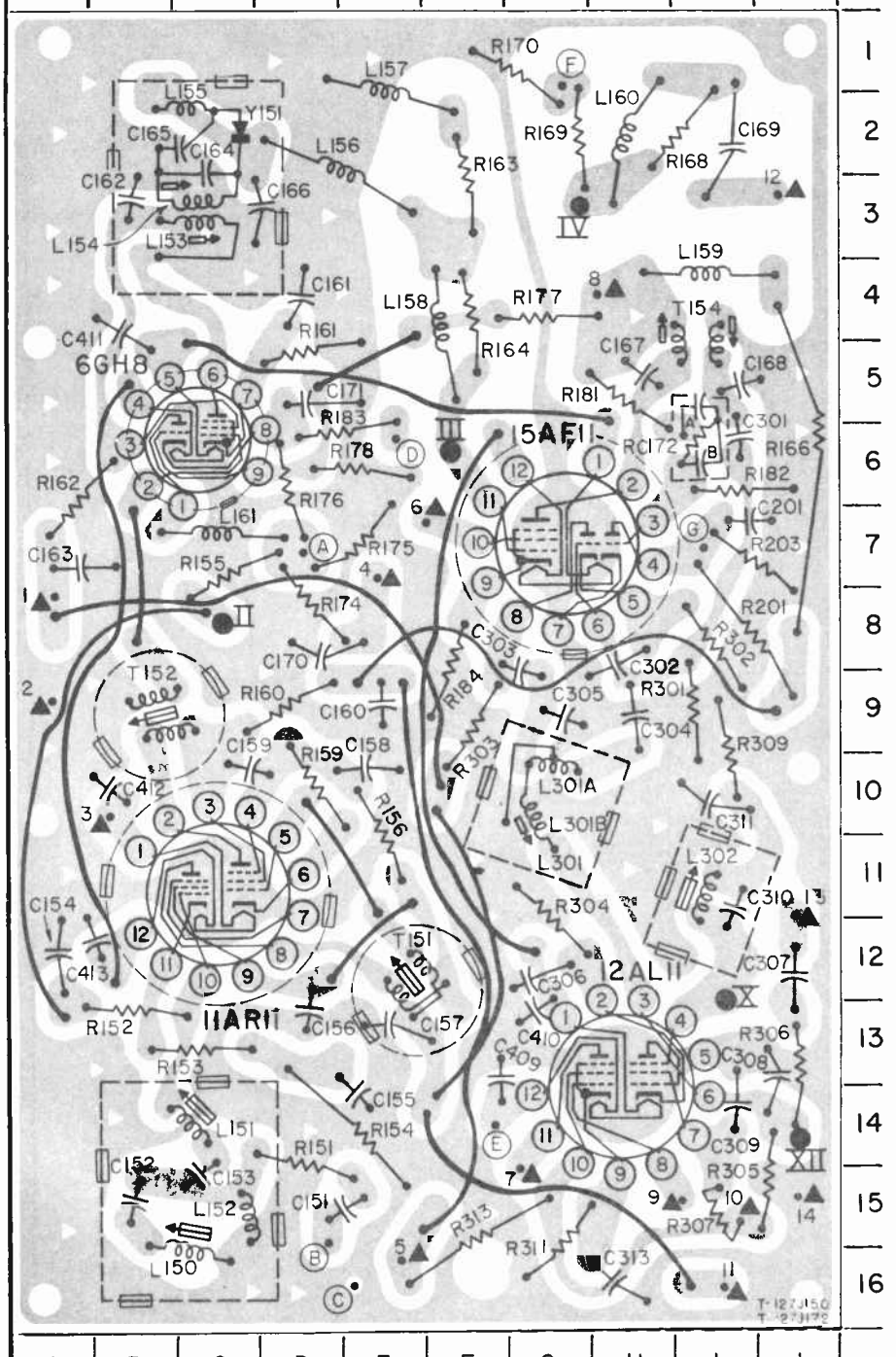
PINCUSHION MAGNETS

Four pincushion correction magnets, in easily removable plastic holders, are assembled on the rear of the deflection yoke flange. The magnets correct bowing of the top, bottom and sides of the raster. The colored dot on each magnet indicates its polarity and the magnets must be mounted in the polarity shown in the illustration.



PINCUSHION MAGNET POLARITY

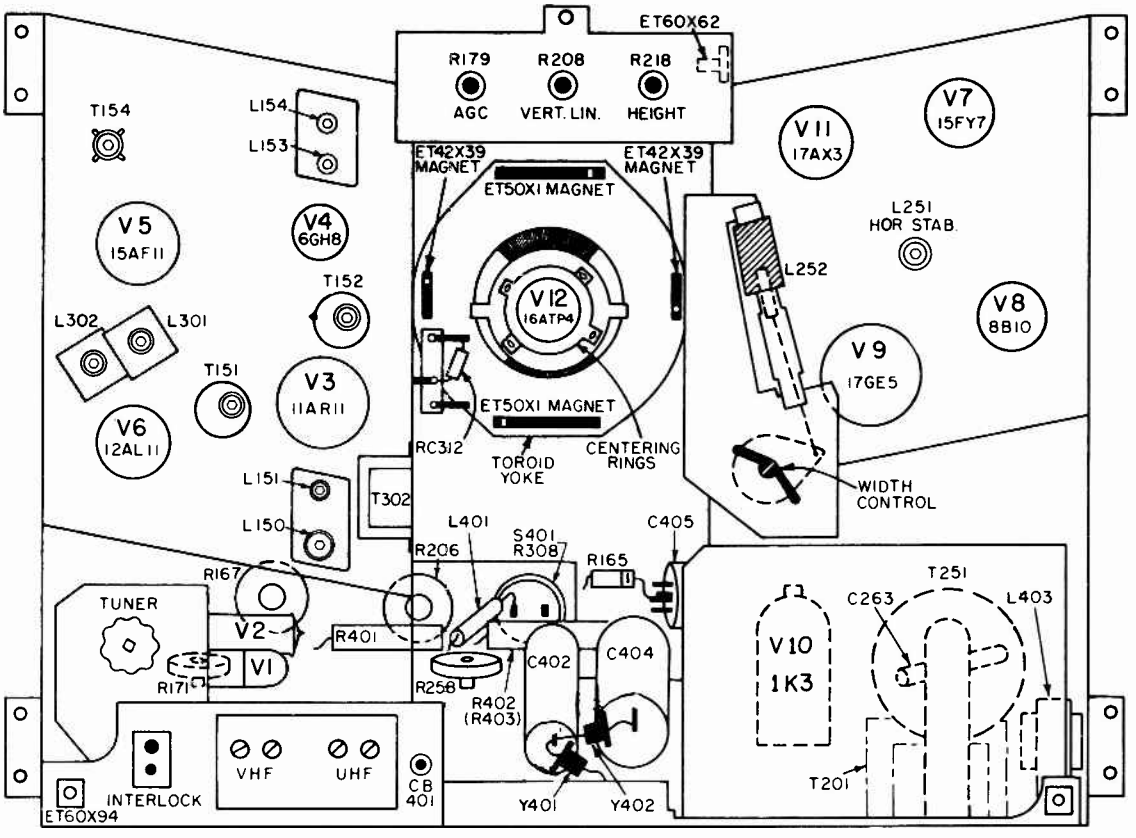
GENERAL ELECTRIC Chassis QX, Service Information, Continued



COMPONENT LOCATIONS BY COORDINATES

CAPACITORS	RESISTORS
C151-D15 C152-B15 C153-C14 C154-A12 C155-E14 C156-D13 C157-E13 C158-E10 C159-C10 C160-E9 C161-D4 C162-B3 C163-A7 C164-C2 C165-B2 C166-D3 C167-H5 C168-I5 C169-I2 C170-D8 C171-D5 C201-J7 C301-I6 C302-H8 C303-F8 C304-H9 C305-G9 C306-G12 C307-J12 C308-I13 C309-I14 C310-I11 C311-I10 C313-H16 C409-G13 C410-G13 C411-B4 C412-B10 C413-B12	R151-D14 R152-B13 R153-C13 R154-E14 R155-C7 R156-E10 R159-D10 R160-C9 R161-D5 R162-A6 R163-F2 R164-F4 R166-J6 R168-I2 R169-G2 R170-G1 R174-D8 R175-E7 R176-D6 R177-G4 R178-E6 R181-H5 R182-I6 R183-E5 R184-F9 R201-I8 R203-J7 R301-H9 R302-I8 R303-F9 R304-G11 R305-I15 R306-J13 R307-I15 R309-I9 R311-G15 R313-F15
COILS & TR'NSF'M'RS	**WIRE CONNECTIONS**
L150-B16 L151-C14 L152-C15 L153-C3 L154-B3 L155-C2 L156-E2 L157-E1 L158-F4 L159-I4 L160-H2 L161-C7 L301A-G10 L301B-G10 L302-I11 T151-E12 T152-B9 T154-I4	Ⓐ-D7 Ⓑ-D15 Ⓒ-D16 Ⓓ-E6 Ⓔ-F14 Ⓕ-G1 Ⓖ-I7 ▲1-A8 ▲2-A9 ▲3-B10 ▲4-E7 ▲5-E15 ▲6-E6 ▲7-G15 ▲8-H4 ▲9-H15 ▲10-I15 ▲11-I16 ▲12-J3 ▲13-J11 ▲14-J15
TEST POINTS	**TUBES**
II-C8 III-F6 IV-G3 X-I12 XII-J14	V3-C13 V4-B5 V5-G6 V6-H12
DIODE	**R/C NETWORK**
Y151-D2	RC172-H6

GENERAL ELECTRIC Chassis QX, Service Information, Continued



TUBE AND ADJUSTMENT LOCATIONS

FOCUS: The proper focus potential for the tube was chosen at the time the set was manufactured. If it becomes necessary to install a new picture tube or change the focus potential, any one of four potentials may be chosen for best focus. Connection points for two focus potentials are located on the sweep (small) printed board. The orange lead from R179 on the picture tube socket may be connected for best focus as follows:

1. To the grounded wirewrap terminal at the right edge of the I-F board adjacent to T152.
2. To the +135 volt wirewrap terminal at the right edge of the I-F board directly above (1).
3. To the +265 volt wirewrap terminal at Test Point XI.
4. To the B+ boost center terminal on Vertical Linearity pot. R208.

INTERCONNECTING WIRES

CIRCLED (A) LETTERS

REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

- (A) GREEN OF SHIELDED CABLE FROM ▲11 ON SWEEP BOARD
- (B) WHITE OF SHIELDED CABLE TO TUNER I-F OUTPUT
- (C) SHIELD OF (B)
- (D) YELLOW TO AGC CONTROL, R179
- (E) BROWN TO ▲5 ON SWEEP BOARD
- (F) GREEN TO BRITENESS, R171
- (G) BLUE TO ▲1 ON SWEEP BOARD

ROMAN IV NUMERALS

REPRESENT TEST POINTS

TRIANGLE (▲7) NUMBERS

DENOTE WIREWRAP TERMINALS ON BOARD FOR CONNECTION OF WIRES FROM OTHER COMPONENTS

- ▲1. ORANGE TO PICTURE TUBE SOCKET, PIN 2; +135V FOCUS POTENTIAL
- ▲2. SHIELD OF GREEN SHIELDED CABLE FROM ▲9 ON SWEEP BOARD; ALSO GROUND FOCUS POTENTIAL
- ▲3. BROWN TO PICTURE TUBE SOCKET, PIN 8
- ▲4. WHITE TO TUNER AGC TERMINAL
- ▲5. RED TO +265V ON ET86X137 TUNER; RED TO HORIZ. HOLD, R258
- ▲6. ORANGE/GREEN TO C405C▲
- ▲7. BLUE TO T302
- ▲8. YELLOW TO CONTRAST, R167
- ▲9. GREEN OF SHIELDED CABLE FROM VOLUME, R308
- ▲10. RED TO T302; RED/BLUE TO C405B■; R307
- ▲11. TO R402 (R403)
- ▲12. BLUE TO CONTRAST, R167
- ▲13. YELLOW OF SHIELDED CABLE FROM VOLUME, R308
- ▲14. SHIELD OF GREEN & YELLOW SHIELDED CABLE

GENERAL ELECTRIC Chassis QX, Alignment Information, Continued

RECEIVER ALIGNMENT

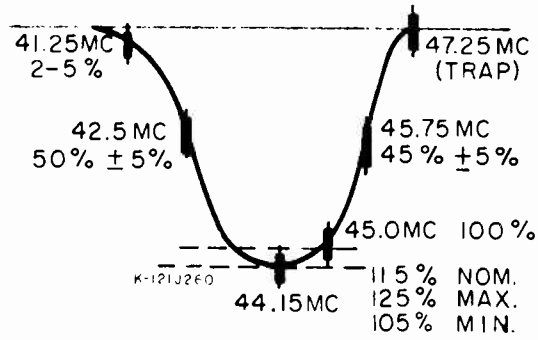
VIDEO I-F SYSTEM

AM PRE-PEAKING & TRAP FREQUENCIES

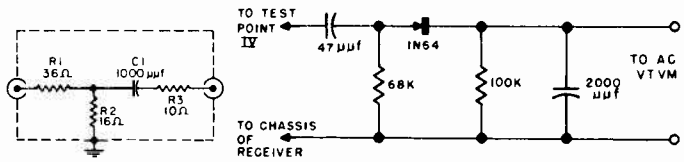
L150 . . . . .Min. 47.25 MC	T151 . . . . . Max. 42.5 MC
L135 . . . . .Max. 45.75 MC	T152 . . . . .Max. 45.75 MC
L151 . . . . Max. 42.50 MC	L153, L154 .Max. 44.15 MC

GENERAL: Allow receiver and test equipment at least 20 minutes warm-up. Power the receiver from an isolation transformer.

1. Turn volume control to minimum and contrast control fully clockwise. Set channel selector to Channel 9. Use a channel not equipped with a strip if set has a VHF-UHF Tuner. Short antenna terminals together.
2. Connect oscilloscope to Test Point III thru 22,000Ω resistor not more than 2.5 inches away from Test Point III. Connect −3.5V bias between Test Point II and chassis.
3. Inject signals from a properly terminated AM signal generator or sweep generator, through the I-F INJECTION NETWORK shown, to the I-F injection point. This point is accessible through a hole in the tuner top deck at the base of the Oscillator V2.
4. Align the receiver to produce the response curve illustrated.
5. Position all cores at ends of coils away from circuit board except as noted below.



I-F RESPONSE CURVE



I-F INJECTION NETWORK *DETECTOR NETWORK*

VIDEO I-F ALIGNMENT CHART

STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1	47.25 MC AM	Adjust L150 for minimum scope deflection	Use maximum scope sensitivity and smallest possible signal for the 47.25 MC AM adjustments.
2	44.15 MC AM	Adjust first L154, then L153 for maximum scope deflection	Position L154 core at end of coil nearer circuit board. Do not retouch these adjustments.
3	38–48 MC sweep generator, with scope calibrated 3 volts peak to peak for 2 inch deflection; markers at 41.25, 42.5, 44.15, 45.0 MC & 45.75 MC	L135 (converter plate) for maximum deflection of the 45.75 MC marker	
4		L151 (1st I-F grid) for maximum deflection of the 42.5 MC marker and proper nose shaping	Symmetry of the nose is important. No portion of the nose should be out of symmetry by more than 3%
5		T152 (2nd I-F Plate) to place 45.75 MC marker properly on the curve.	
6		T151 (1st I-F Plate) to place 42.5 MC marker properly on the curve.	Repeat 5, 6, and 7 if necessary.
7		L151 if necessary to shape the nose	

4.5 MC TRAP ALIGNMENT

1. Connect a −15V bias to Test Point II, with the positive bias lead grounded to chassis.
2. .05μf capacitor between Test Point X and chassis.
3. Turn contrast control to maximum, volume to minimum.
4. Connect the DETECTOR NETWORK shown to Test Point IV and feed its output to an AC VTVM.
5. Apply a 4.5 MC AM signal through a 5μμf capacitor at Test Point III.
6. Adjust the top core of T154 for minimum reading on Test Point IV. Two core positions will give an apparent minimum indication, the correct one is nearer the top end of the coil form.

NOTE: Retouching of the trap adjustment may be necessary after alignment of the audio takeoff.

AUDIO ALIGNMENT WITH ON-THE-AIR SIGNALS

1. Tune in a strong local signal and set receiver volume to a low audible level.
2. Adjust L302 for maximum undistorted, buzz-free audio output. Start with the core at the outermost position away from the printed board and tune for the second "peak" encountered on the way into the coil form.
3. Connect a variable bias supply (3 to 15V) to the AGC test point with the positive lead to the chassis. Adjust bias until audio signal distorts on peaks slightly, then adjust core of L301 to curb distortion. Repeat this procedure several times at increased bias levels until maximum clarity of audio is obtained.
4. Adjust the bottom core of T154, repeating the bias advances in step 3, to achieve the optimum setting for noise-free performance at low signal levels.

AGC CONTROL

Field Adjustment: Tune the strongest available signal into smear and adjust R179 to the point where overloading is indicated by "tearing" of the picture. Then back off the AGC control to just beyond the point where the overload condition disappears.

Instrument Adjustment:

1. Tune in a broadcast signal, preferably a monoscope signal that is monitored to assure that the percentage of sync does not exceed 25 percent.
2. Connect an oscilloscope to Test Point IV. Synchronize the scope at a vertical rate and observe at least two vertical sync pulses.
3. Adjust the fine tuning for maximum scope gain and the AGC control to the point where the sync pulses begin to compress. Then back off the AGC control slightly from this point.

GE Chassis QX

COMPONENT LOCATIONS

CAPACITORS

C202-A11
C203-A8
C204-F2
C205-F5
C206-B6
C207-G4
C209-B3
C251-C12
C252-B11
C253-B11
C254-G11
C255-C7
C256-A9
C257-G8
C258-E9
C259-E12
C260-E12
C261-I7
C262-I5
C264-J3
C265-J3
C266-K8
C407-I5
C408-G3

RESISTORS

R180-I6
R202-A12
R204-A7
R205-E2
R207-E5
R209-A6
R210-H5
R211-G6
R22-G5
R213-A4
R214-B5
R215-C4
R216-C6
R217-E1
R251-C11
R252-B10
R253-C11
R254-B9
R255-E8
R256-G10
R257-F9
R259-D10
R260-F11
R261-D12
R262-D11
R263-F11
R264-F12
R265-H7
R268-K4
R269-J7

WIRE CONNECTIONS

Ⓐ-D6
Ⓑ-E7
Ⓒ-E5
Ⓓ-F10
Ⓔ-G1
Ⓕ-G9
Ⓖ-I8
Ⓗ-I2
Ⓘ-J11
Ⓙ-J5
Ⓚ-K6
▲1-B12
▲2-B8
▲3-C2
▲4-C8
▲5-D5
▲6-E2
▲7-F2
▲8-G6
▲9-J6
▲10-J8
▲11-K4

TUBES

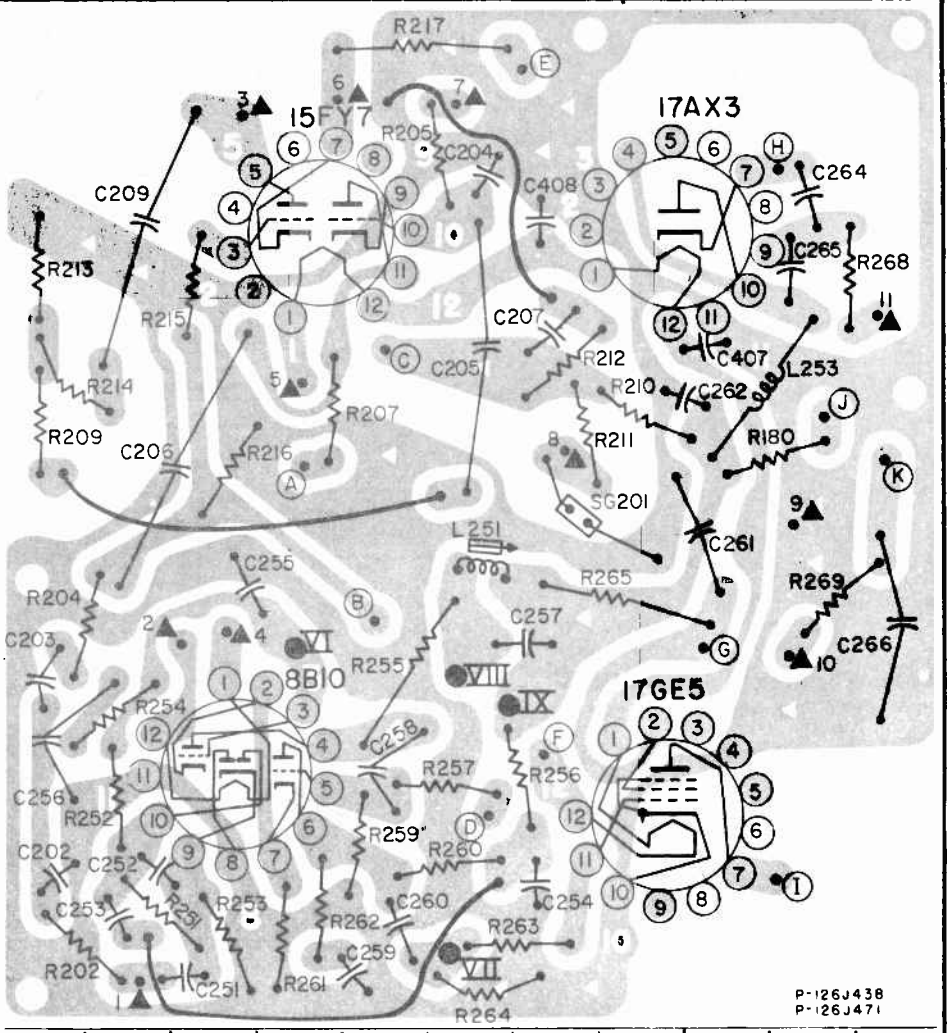
V7-D2
V8-D8
V9-H8
V11-I2

SPARK GAP

SG201-H6

COILS

L251-F7
L253-J5



A | B | C | D | E | F | G | H | I | J | K

SWEEP BOARD COMPONENT LOCATIONS AS VIEWED FROM CONDUCTOR SIDE

INTERCONNECTING WIRES

TRIANGLE (▲2) NUMBERS

DENOTE WIREWRAP TERMINALS ON BOARD FOR CONNECTION OF WIRES FROM OTHER COMPONENTS

▲ 1. Ⓖ ON I-F BOARD
▲ 2. FILAMENT TERMINAL ON TUNER
▲ 3. BLUE TO T201
▲ 4. BROWN TO PICTURE TUBE SOCKET, PIN 1
▲ 5. Ⓔ ON I-F BOARD
▲ 6. YELLOW TO C405D−
▲ 7. GREEN TO VERT. HOLD, R206
▲ 8. RED/GREEN TO PICTURE TUBE SOCKET, PIN 3
▲ 9. ▲2 ON I-F BOARD; BLACK TO HEIGHT, R218
▲ 10. RED/WHITE TO HORIZ. SIZE, L252; RED/WHITE TO T251, TERMINAL 1
▲ 11. Ⓐ ON I-F BOARD

CIRCLED (A) LETTERS

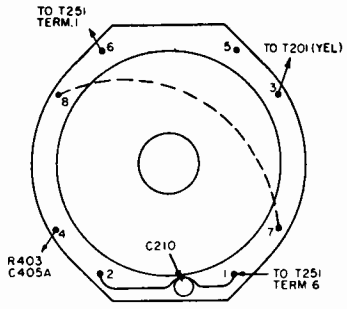
REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

Ⓐ BLUE TO VERT. LIN., R208
Ⓑ GREEN TO C208 ON TERMINAL STRIP
Ⓒ YELLOW TO C208 ON TERMINAL STRIP
Ⓓ GRAY TO HORIZ. HOLD, R258
Ⓔ YELLOW TO HEIGHT, R218
Ⓕ BROWN TO L401, R401
Ⓖ ORANGE/BLACK TO BRITENESS CONTROL, R171
Ⓗ WHITE TO L254 ON T251, TERMINAL 2
Ⓘ BLACK TO T251, TERMINAL 5
Ⓙ RED/BLUE TO AGC CONTROL, R179
Ⓚ RED/BLACK TO VERT. LIN., R208

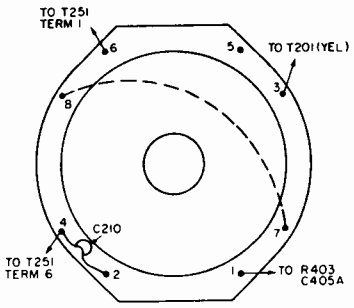
ROMAN VI NUMERALS

REPRESENT TEST POINTS

GENERAL ELECTRIC Chassis QX Schematic Diagram



BELOW CODE 226 QX



FROM CODE 226 QX

DEFLECTION YOKE

ON-SIGNAL VOLTAGES, NUMBERS WITHOUT LETTER "V".
& WAVE SHAPES SHOWN TAKEN WITH A NOISE-FREE SIGNAL PRODUCING -2.5 TO -3.5 VOLTS AGC AT VHF TUNER FINE TUNING CONTROL ADJUSTED FOR MAXIMUM AGC

ALL OTHER CONTROLS ARE ADJUSTED FOR NORMAL OPERATION

** SCOPE SYNCED AT 1/2 VERT FREQUENCY

*** SCOPE SYNCED AT 1/2 HORIZ FREQUENCY

1 ALL VOLTAGE MEASUREMENTS MADE WITH A VACUUM TUBE VOLTMETER IN RESPECT TO CHASSIS GROUND, WITH RECEIVER CONTROLS SET FOR NORMAL OPERATION

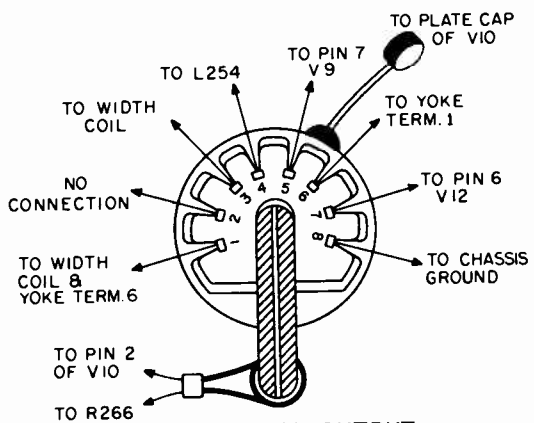
2 WITH LINE VOLTAGE MAINTAINED AT 120 VAC MEASUREMENTS SHOWN MAY DEVIATE ± 10%

3 VOLTAGES SHOWN WITH "V" MADE WITH THE SELECTOR KNOB SWITCHED TO A CHANNEL WITH NO SIGNAL AND THE ANTENNA TERMINALS SHORTED

VARIES WITH CONTROL SETTINGS

* BRIGHTNESS CONTROL MAX CCW

#INDICATES PRODUCTION CHANGE

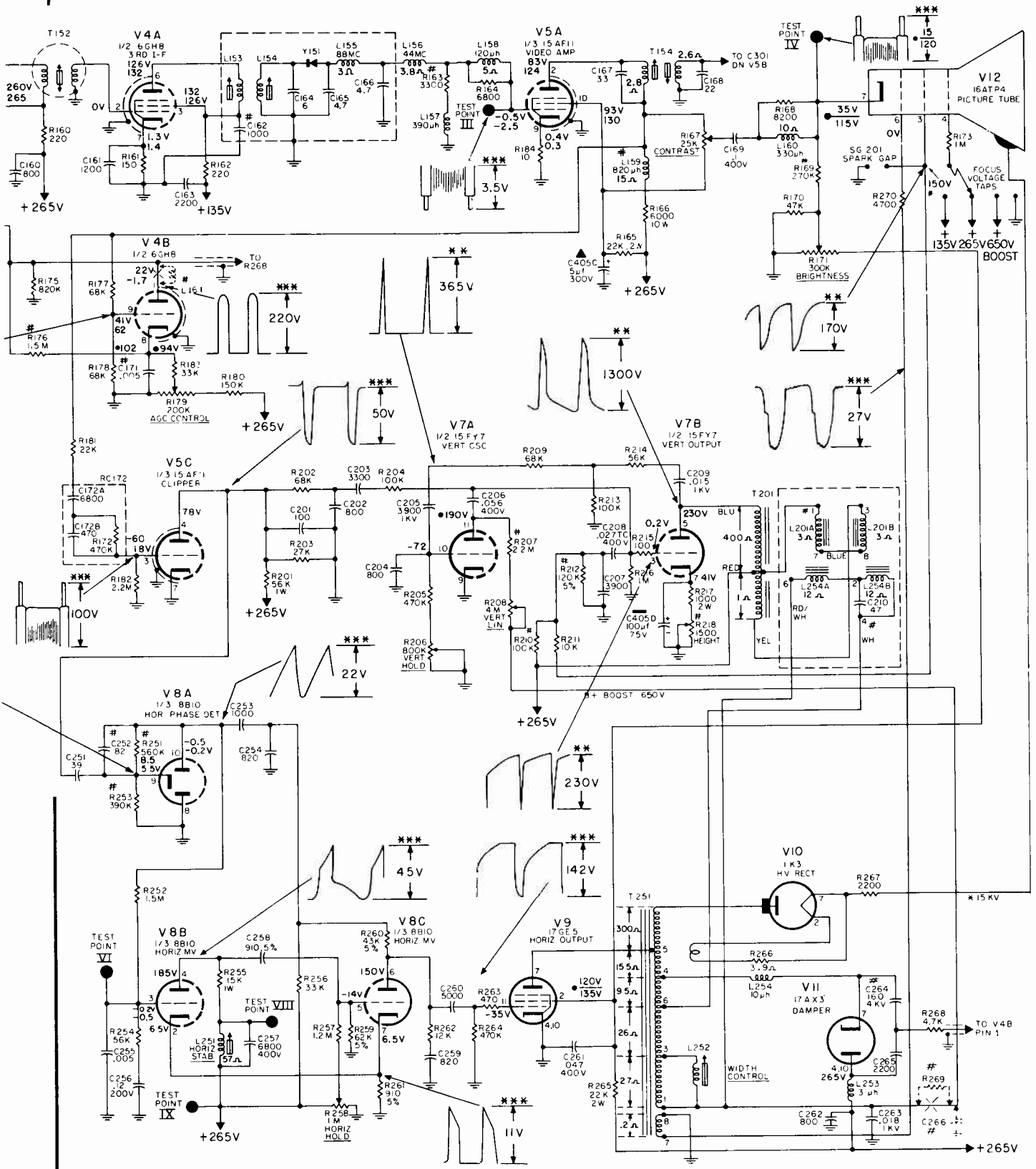


HORIZONTAL OUTPUT TRANSFORMER T251

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 mf
CAPACITORS LESS THAN 1 mf
RESISTORS ARE 1/2 WATT

GENERAL ELECTRIC Chassis QX Schematic Diagram, Continued



QX CHASSIS SCHEMATIC DIAGRAM

GENERAL ELECTRIC Chassis QX Production Changes, Continued

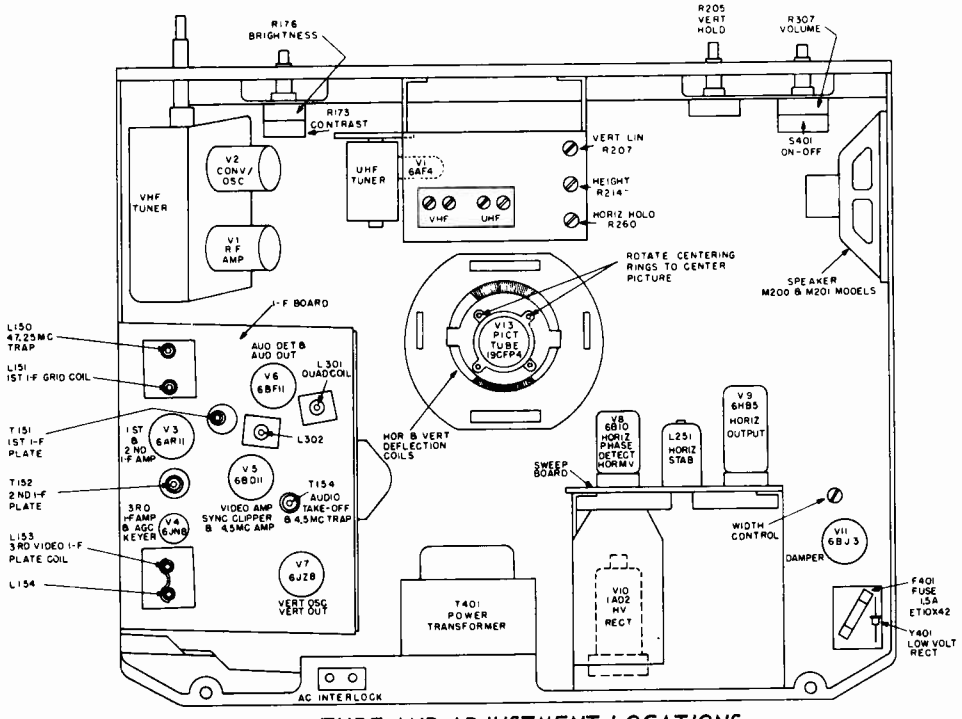
PRODUCTION CHANGE CHART

CHANGE	SYMBOL OR COMPONENT	ORIGINAL COMPONENT	CHANGE	REMARKS	STARTING W/ CHASSIS CODE
1.	R163	3900 ohm	3300 ohm		223 QX
2.	C162	820 μμf. ET22X82	1000μμf. ET22X117		224 QX
3.	C170	.22μf. ET25X41	.01μf. ET22X22	See Note 1	225 QX
	R176	2.2 meg.	1.5 meg.		
4.	L201 & L253 Deflection Yoke	ET76X35	ET76X36	Receivers coded 225 QX & below Yoke is wired as shown on Page C71	226 QX
5.	L161	Choke ET36X420	No longer used		227 QX
6.	C403 Connection	1000μμf., 1KV.		See Note 2.	229 QX
7.	R269	680K ohm	470K ohm	See Note 3.	233 QX
8.	C264	170μμf. ET18X480	160μμf ET18X482		234 QX
9.	C308	2700μμf. ET22X142	1200μμf. ET22X95	See Note 4.	234 QX
	C314	Added 2200μμf. ET22X154			
10.	R401	6.8 ohms ET14X163	9 ohms, 10W ET14X167	See Note 5.	234 QX
	R402	3000 ohm, 10W ET14X164	3800 ohm, 10W ET14X168		
	R403	3500 ohm, 10W ET14X165	4400 ohm, 10W ET14X169		
	R404	33K ohm, 1W	No longer used		
	C406	Added .047μf. cap. ET25X23			
11.	R251	470K ohm	560K ohm		236 QX
	R253	470K ohm	390K ohm		
	C252	56μμf. ET18X329	82μμf. ET18X486		
12.	L159	680μh. ET36X261	820μh. ET36X284		237 QX
13.	R269	470K ohm	No longer used		239 QX
	C266	.1μf.			
14.	Picture tube aquadag grounding			See Note 6.	242 QX
15.	R207	1.2 meg.	2.2 meg.		244 QX
16.	C313 & C404	ET31X139 ET31X207	Changed to a Dual unit C404A & B ET31X222	See Note 7.	246 QX
17.	R218	Method of mounting the height control to the rear bracket		See Note 8.	246 QX
18.	C171	.022μf. ET26X36	5000μμf. ET22X67		248 QX
19.	R169	180K ohms	330K ohms	Starting W/code 250 QX, R169 is 270K ohms.	249 QX
	R210	220K ohms	100K ohms		
	R212	68K ohms	120K ohms		

NOTES

1. With the change of R176 & C170, resistor R174 is connected from C170 to junction of R152, R155, & C154.
2. C403 is now connected from the top circuit breaker terminal (junction of R401 & Circuit breaker) to a ground lug near the antenna terminal board.
3. Some receivers coded 229 QX were built with a 470K ohm resistor for R269.
4. C314 is connected across T302 primary and is mounted on the IF board. The change of C308 and addition of C314 is made simultaneously.
5. Components R401 thru C406 are changed simultaneously. If replacement of one of these components becomes necessary, associated components should be checked to agree with production code. Capacitor C406 is mounted on the IF board and is connected from +135V to ground.
6. The picture tube ground path for the final version is thru a strap to the chassis retaining clip mounted on the upper left side of the cabinet and thus to the chassis. If the chassis is removed and replaced, make certain the chassis retaining screws are tight.
7. C313 is removed from the IF board and is included in the same can with C404, thus symbol C404 becomes C404A and C313 becomes C404B.
8. The original vertical height control is mounted on insulation board and the board is mounted on the rear control bracket. With the changed version, the shell of the control is insulated from the internal structure and the control is tab mounted directly to the control bracket. The original version (ET49X395) is supplied for replacement.

GENERAL ELECTRIC



TUBE AND ADJUSTMENT LOCATIONS

LY CHASSIS MODELS

M200YBN
M201YBN
PAM202YVY
PAM203YVY
M204YGN
M204YTS
M204YVY
M205YGN
M205YTS
M205YVY
SAM212YVY
SAM213YVY
SAM214YGL
SAM215YGL

(Material on pages 45 through 50)

DISASSEMBLY

TO REMOVE CABINET REAR:

Remove six 1/4-inch hex head screws and all antenna connections and pull off back.

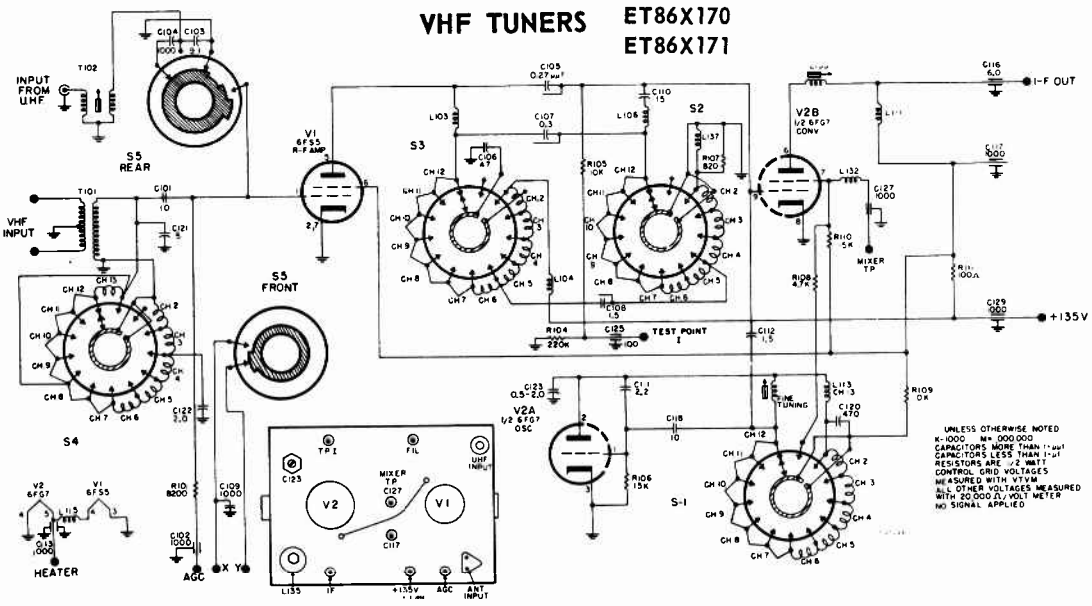
TO DETACH FRONT ASSEMBLY:

Remove rear. Remove four 5/8-inch screws at corners of chassis frame. Swing front section away from the chassis at speaker side for access to chassis interior.

TO REMOVE PICTURE TUBE:

Detach front as above. Remove socket, yoke, and anode connections from picture tube. Withdraw front assembly and place face down on soft cloth. Loosen two tube-sling screws until sling falls away from tube. Remove tube. Safety glasses and gloves should be worn while handling picture tube.

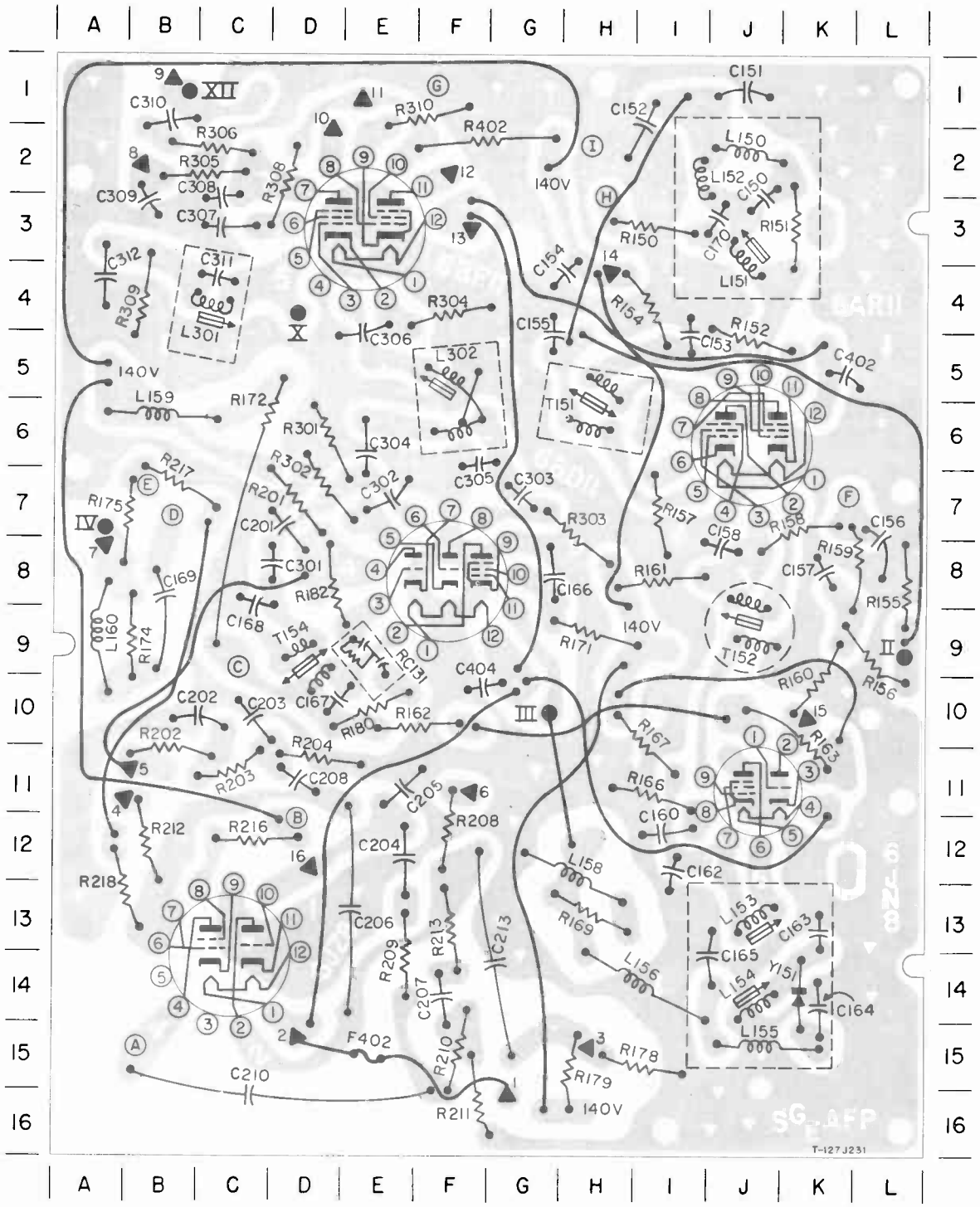
VHF TUNERS ET86X170 ET86X171



GENERAL ELECTRIC Chassis LY, Circuit Boards Information, Continued

ETCHED CIRCUIT BOARD

IF BOARD



I-F BOARD LOCATIONS AS VIEWED FROM CONDUCTOR SIDE

ROMAN X NUMERALS
REPRESENT TEST POINTS

GENERAL ELECTRIC Chassis LY, Circuit Boards Information, Continued

IF BOARD COMPONENT LOCATIONS

CIRCLED Ⓐ LETTERS

REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

- Ⓐ BLUE LEAD OF T201, & C211
- Ⓑ TO C211, C401B, & T201
- Ⓒ TO R173 (CONTRAST) HIGH END
- Ⓓ TO R173 (CONTRAST) ARM
- Ⓔ TO R176 (BRIGHTNESS) ARM
- Ⓕ TO TUNER AGC TERMINAL
- Ⓖ TO R176 (BRIGHTNESS) GROUND END
- Ⓗ SHIELDED CABLE FROM TUNER IF OUTPUT
- Ⓘ SHIELD OF Ⓗ

TRIANGLE (▲) NUMBERS

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

- ▲1. GREEN LEAD TO T401 (FIL.)
- ▲2. TO PIN 8 OF PICTURE TUBE (FIL.)
- ▲3. TO PIN 3 OF PICTURE TUBE
- ▲4 TO R214 (HEIGHT) TO ARM
- ▲5. TO ▲8 OF SWEEP BOARD (C251)
- ▲6. TO R207 (VERT LIN.) ARM
- ▲7. TO PIN 2 OF PICTURE TUBE SOCKET
- ▲8 TO R207 (VERT LIN – BOOST VOLT)
- ▲9. TO R307 (VOLUME) HIGH END
- ▲10 TO R307 (VOLUME) TO ARM
- ▲11 TO C401C
- ▲12 BLUE LEAD OF T303
- ▲13. TO TUNER FILIMENT
- ▲14. TO TUNER +140V & BRIGHTNESS CONTROL
- ▲15 TO C266 CONNECTED TO T251 PIN 2
- ▲16. TO R205 (VERT HOLD.) END

CAPACITORS

C150–J2, C151–J1, C152–I1, C153–I5, C154–H4, C155–G4, C156–L7, C157–K8, C158–J8, C160–I12, C162–I12, C163–K13, C164–K14, C165–J14, C166–G8, C167–D10, C168–C9, C169–B8, C170–J3, C201–D7, C202–B10, C203–C10, C204–E12, C205–E11, C206–E13, C207–F14, C208–D11, C210–C16

CAPACITORS (CONT'D)

C213–G13, C301–D8, C302–E7, C303–G7, C304–E6, C305–F7, C306–E5, C307–C3, C308–C3, C309–B3, C310–B1, C311–C4, C312–A4, C402–K5, C404–F10

RESISTORS

R150–I3, R151–K3, R152–J4, R154–I4, R155–L8, R156–L9, R157–I7, R158–K7, R159–K8, R160–K9

RESISTORS (CONT'D)

R161–I8, R162–E10, R163–K10, R166–I11, R167–I10, R169–H13, R171–H9, R172–C6, R174–B9, R175–A7, R178–I15, R179–H15, R180–E10, R182–D8, R201–D7, R202–B11, R203–C11, R204–D11, R208–F12, R209–E14, R210–F15, R211–F16, R212–B12, R213–F13, R216–C12, R217–B7, R218–A12

RESISTORS (CONT'D)

R301–D6, R302–D7, R303–H7, R304–F4, R305–C2, R306–C2, R308–D2, R309–B4, R310–F1, R402–F2

COILS & TRANSFORMERS

L150–J2, L151–J4, L152–I2, L153–J13, L154–J14, L155–J15, L156–I14, L158–H12, L159–B6, L160–A9, L301–C4, L302–F5, T151–H6, T152–J9, T154–D9

MISC.

RC131–E9, F401–E15, Y151–K14

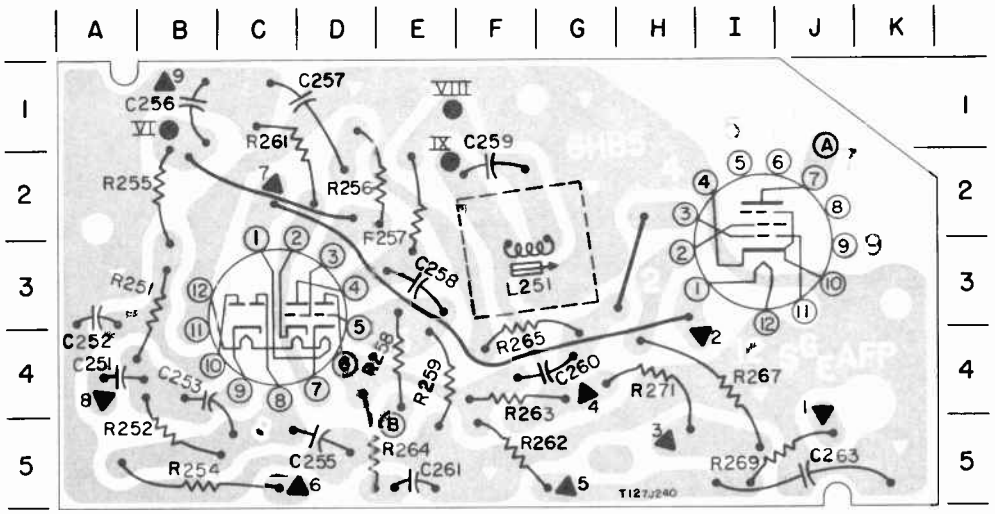
TUBES

V3–J6, V4–J11, V5–F8, V6–E3, V7–C14

TEST POINTS

II–L9, III–G10, IV–A7, X–D4, XII–B1

HORIZONTAL SWEEP BOARD CONDUCTOR SIDE



SWEEP BOARD COMPONENT LOCATIONS

CIRCLE Ⓐ LETTERS

REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

- Ⓐ TO T251 TERMINAL 5
- Ⓑ TO R260 (HORIZ HOLD)

TRIANGLE (▲3) NUMBERS

DENOTE WIREWRAP TERMINALS ON BOARD FOR CONNECTION OF WIRES FROM OTHER COMPONENTS

- ▲1 TO T251 TERMINAL 3 & PIN 5 OF DEFLECTION YOKE
- ▲2 TO VII PIN 12
- ▲3 TO C262 & C401B
- ▲4. TO R260 & C401D
- ▲5 TO R207 (VER LIN.)
- ▲6. TO T251 TERMINAL 1
- ▲7 TO PIN 8 OF PICTURE TUBE
- ▲8. TO ▲5 OF IF BOARD
- ▲9 TO PIN 1 OF PICTURE TUBE & R260 (HORIZ HOLD)

CAPACITORS

C251–A4, C252–A3, C253–B4, C255–D5, C256–B1, C257–D1, C258–E3, C259–F2, C260–G4, C261–E5, C263–J5

COIL

L251–F3

RESISTORS

R251–B3, R252–B5, R254–B5, R255–B2, R256–D2, R257–E2, R258–E4, R259–E4, R261–C1, R262–F5, R263–F4, R264–E5, R265–F4, R267–I4, R269–I5, R271–H4

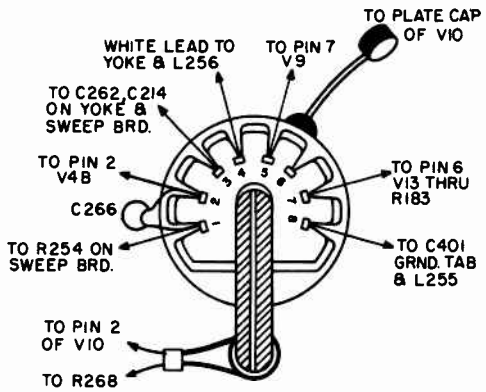
TUBES

V8–C3, V9–I2

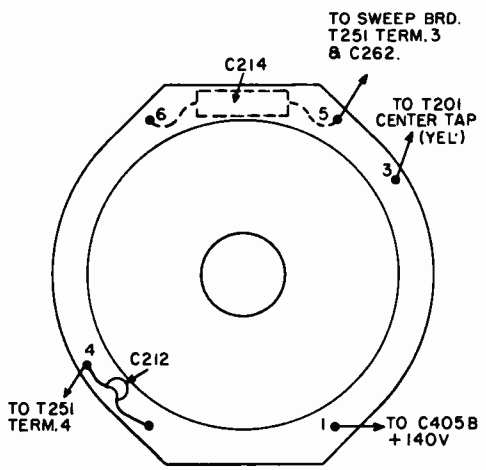
TEST POINTS

VI–B1, VIII–E1, IX–E2

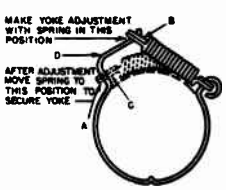
GENERAL ELECTRIC Chassis LY Service Information, Continued



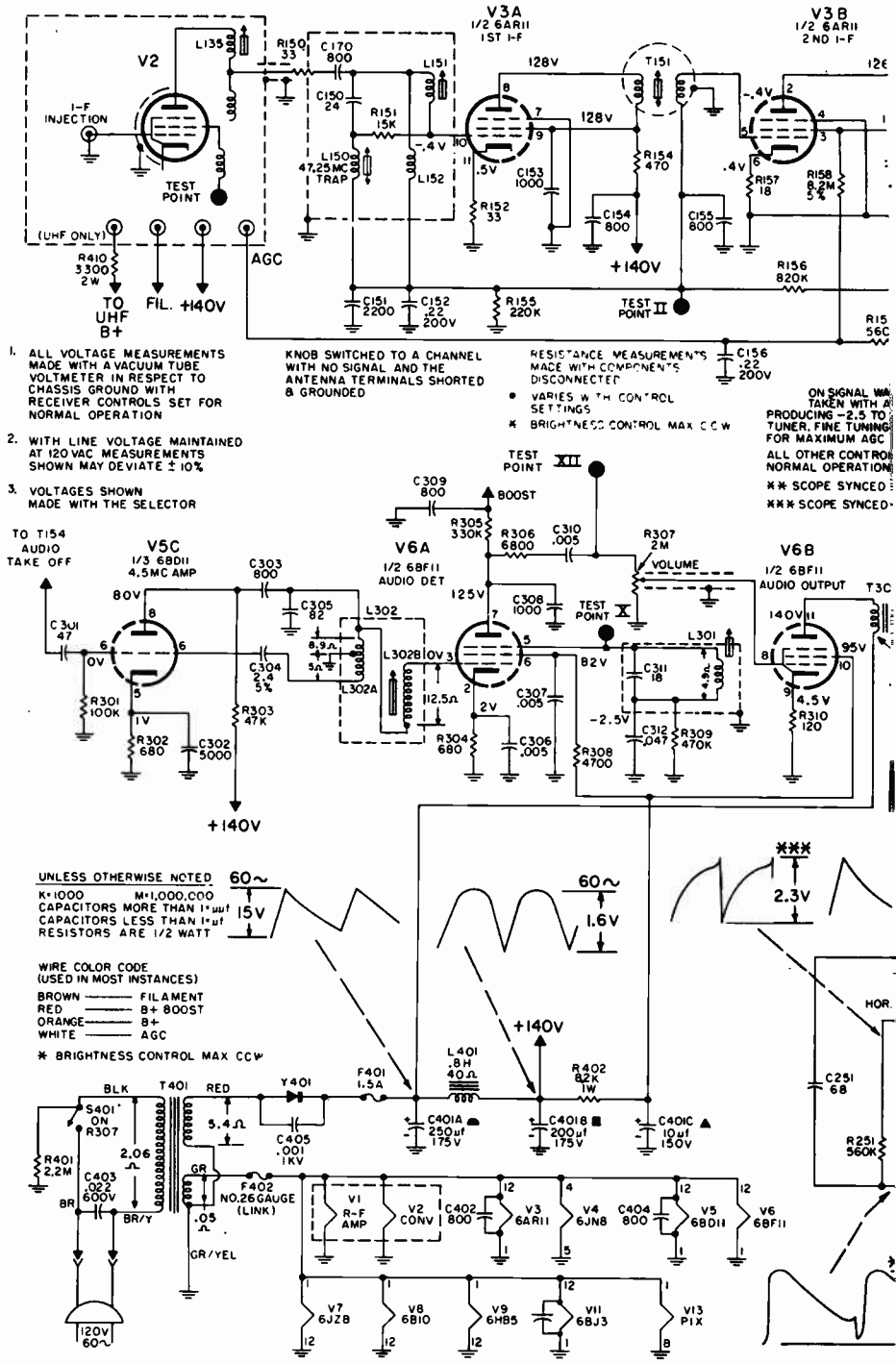
HORIZONTAL OUTPUT TRANSFORMER WIRING



YOKE WIRING



YOKE CLAMP



PICTURE TUBE ADJUSTMENTS

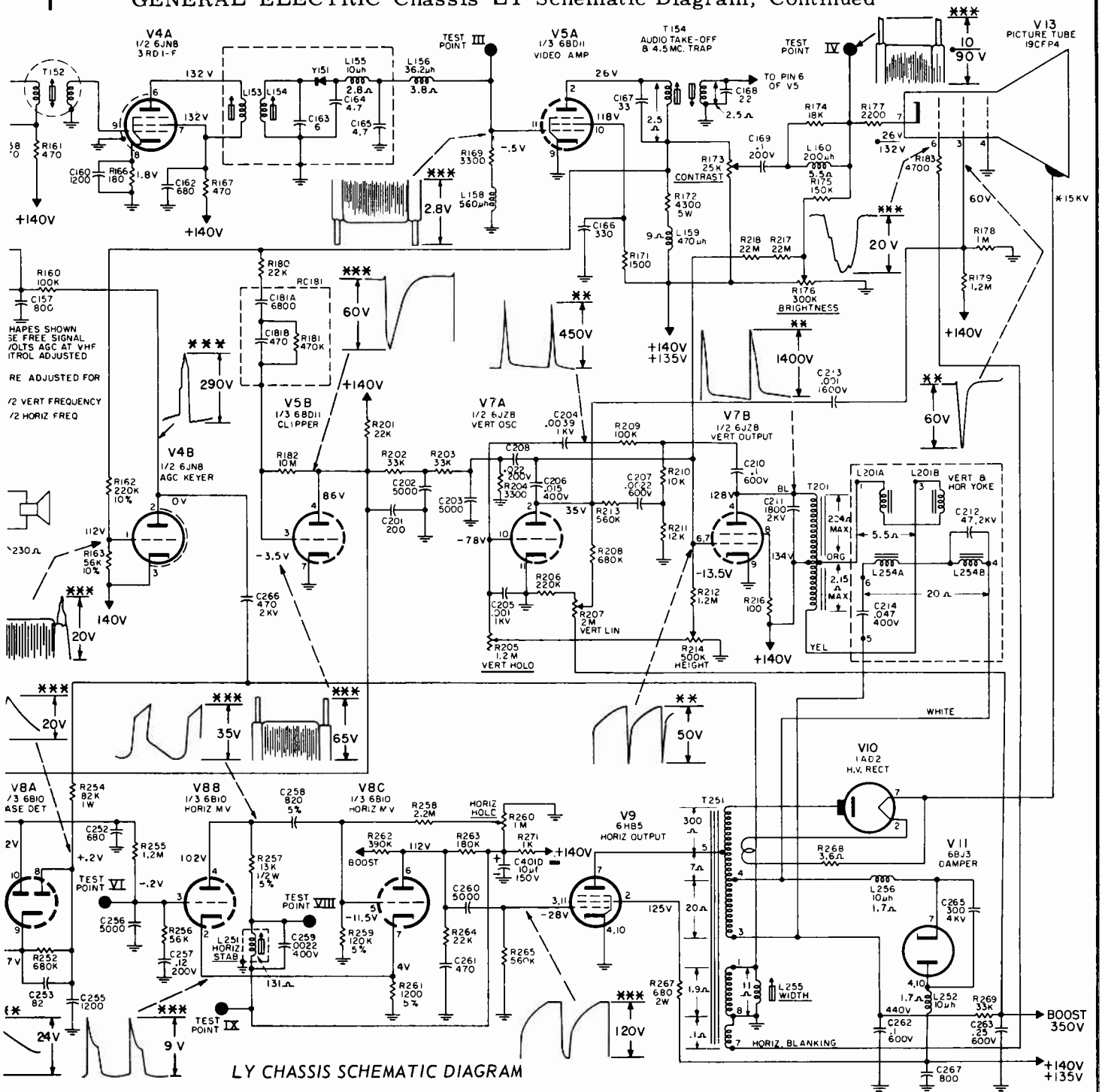
PICTURE TILT: To correct picture tilt, loosen the YOKE CLAMP by squeezing points C and D with long nose pliers until the eye of the spring slides over the bend in the clamp. Adjust yoke to correct tilt. Secure yoke by using pliers between points A and B until spring slips over bend in clamp.

PICTURE CENTERING: Rotate the two centering rings located at the rear of the yoke assembly until picture is properly centered.

FOCUS: The proper focus potential for the picture tube is Zero volts or chassis ground.

NOTE—Zero focus replacement 19CFP4 picture tubes are identified by a label near the anode button and on the tube carton.

GENERAL ELECTRIC Chassis LY Schematic Diagram, Continued



ELECTRICAL ADJUSTMENTS

HEIGHT AND VERTICAL LINEARITY: Adjust R207 and R214 simultaneously for proper vertical size and linearity. Picture should extend 1/8-inch beyond top and bottom edges of mask. Width control L255 should be in extreme counter-clockwise position.

WIDTH CONTROL: Adjust this control, L255, for largest picture necessary to fill mask.

HORIZONTAL HOLD:

1. Remove the cabinet back.
2. Tune the receiver to a weak signal and adjust the controls for normal operation.
3. Short Test Point VI to the chassis with a jumper wire.
4. Connect a 1000 ohm resistor from Test Point VIII to Test Point IX (in parallel with L251.)
5. Adjust HORIZONTAL HOLD potentiometer, R260, until picture just "floats" back and forth across the screen. Leave R260 set in this position.
6. Remove the 1000 ohm resistor from Test Point VIII and Test Point IX. Adjust L251 (stabilizer coil) so that the picture again just "floats" across the screen, turning the core toward the printed board. Leave L251 set in this position.
7. Remove the chassis jumper from Test Point VI. Repeat adjustments if the picture does not "lock".

GENERAL ELECTRIC Chassis LY Alignment Information, Continued

VIDEO I-F SYSTEM

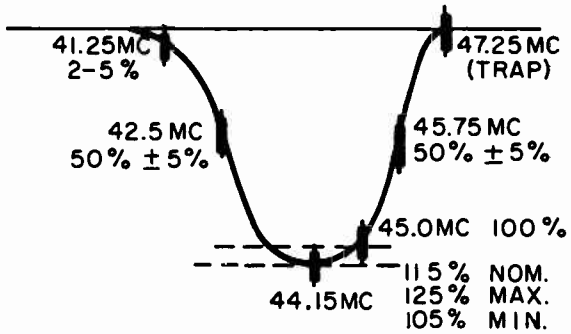
AM PRE-PEAKING & TRAP FREQUENCIES

L150 . . . . .Min. 47.25 MC	T151 . . . . . Max. 42.8 MC
L135 . . . . .Max. 45.75 MC	T152 . . . . .Max. 45.2 MC
L151 . . . . Max. 42.50 MC	L153, L154 . Max. 44.15 MC

GENERAL: Allow receiver and test equipment at least 20 minutes warm-up.

1. Turn volume control to minimum and contrast control fully clockwise. Set channel selector to Channel 9 and fine tuning fully counterclockwise.
2. Short antenna terminals together.
3. Connect oscilloscope to Test Point III thru 22,000Ω resistor not more than 2.5 inches away from Test Point III. Connect −3.5V bias between Test Point II and chassis.
4. Inject signals from a properly terminated AM signal generator or sweep generator, through the I-F INJECTION NETWORK shown, to the I-F injection point. This point is accessible through a hole in the tuner top deck at the base of the Oscillator V2.
5. Align the receiver to produce the response curve illustrated.

All cores are positioned away from printed board.



I-F RESPONSE CURVE

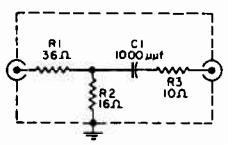
VIDEO I-F ALIGNMENT CHART

STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1	47.25 MC AM	Adjust L150 for minimum scope deflection	Use maximum scope sensitivity and smallest possible signal
2	44.15 MC AM	Adjust first L154, then L153 for maximum scope deflection	Do not retouch these adjustments.
3	38—48 MC sweep generator, with scope calibrated 3 volts peak to peak for 2 inch deflection	L135 (converter plate) for maximum deflection of the 45.75 MC marker	Do not retouch this adjustment.
4		L151 (1st I-F grid) for maximum deflection of the 42.5 MC marker and proper nose shaping	Symmetry of the nose is important. No portion of the nose should be out of symmetry by more than 3%
5		T152 (2nd I-F Plate) to place 45.75 MC marker properly on the curve.	
6		T151 (1st I-F Plate) to place 42.5 MC marker properly on the curve.	Repeat 5, 6, and 7 if necessary.
7		L151 if necessary to shape the nose	

4.5 MC TRAP ALIGNMENT

1. Connect a −7.5V bias to Test Point II, with the positive bias lead grounded to chassis.
2. Turn contrast control to maximum, volume to minimum.
3. Connect the DETECTOR NETWORK shown to Test Point IV and feed its output to an AC VTVM.
4. Apply a 4.5 MC AM signal through a 5μμf capacitor at Test Point III.
5. Adjust the top core of T154 for minimum reading on Test Point IV. Two core positions will give an apparent minimum indication, the correct one is reached while turning the core toward the top end of the coil form.

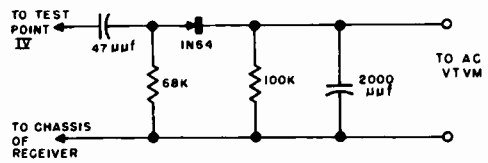
NOTE: Retouching of the trap adjustment may be necessary after alignment of the audio takeoff.



I-F INJECTION NETWORK

AUDIO ALIGNMENT WITH ON-THE-AIR SIGNALS

1. Tune in a strong local signal and set receiver volume to a low audible level.
2. Adjust L301 for maximum undistorted, buzz-free audio output. Start with the core at the outermost position away from the printed board and tune for the second "peak" encountered on the way into the coil form.
3. Connect a variable bias supply (3 to 15V) to the AGC test point with the positive lead to the chassis. Adjust bias until audio signal distorts on peaks slightly, then adjust core of L302 to curb distortion. Repeat this procedure several times at increased bias levels until maximum clarity of audio is obtained.
4. Adjust the bottom core of T154, repeating the bias advances in step 3, to achieve the optimum setting for noise-free performance at low signal levels.

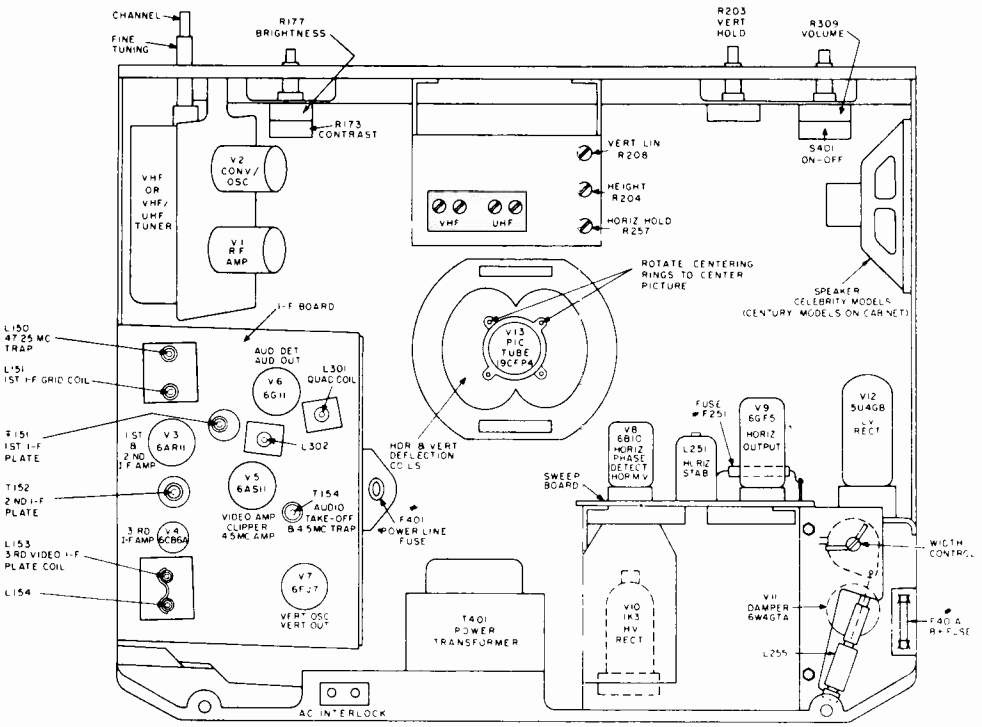


DETECTOR NETWORK

GENERAL ELECTRIC

LX CHASSIS MODELS

M200XGN
SAM200XBN
M201XGN
M202XBN
M202XGN
M202XGR
SAM202XVY
M203XBN
M203XGN
M203XGR
SAM203XVY
M204XBN
M204XGR
M204XVY
SAM204XVY
SBM204XBG
M205XBN
M205XGR
M205XVY
SAM205XVY
SBM205XBG
M206XBN
M206XEB
M206XVY
SAM206XGL
M207XBN
M207XEB
M207XVY



TUBE AND ADJUSTMENT LOCATIONS
#Indicates production change.

DISASSEMBLY

TO REMOVE CABINET REAR:

Remove six 1/4-inch hex head screws and all antenna connections and pull off back.

TO DETACH FRONT ASSEMBLY:

Remove rear. Remove four 5/8-inch screws at corners of chassis frame. Swing front section away from the chassis at speaker side for access to chassis interior.

TO REMOVE PICTURE TUBE:

Detach front as above. Remove socket, yoke, and anode connections from picture tube. Withdraw front assembly and place face down on soft cloth. Loosen two tube-sling screws until sling falls away from tube. Remove tube. Safety glasses and gloves should be worn while handling picture tube.

ELECTRICAL ADJUSTMENTS

HEIGHT AND VERTICAL LINEARITY: Adjust R204 and R208 simultaneously for proper vertical size and linearity. Picture should extend 1/8-inch beyond top and bottom edges of mask. Width control L255 should be in extreme counter-clockwise position.

WIDTH CONTROL: Adjust this control, L255, for largest picture necessary to fill mask.

HORIZONTAL HOLD:

1. Remove the cabinet back.
2. Tune the receiver to a weak signal and adjust the controls for normal operation.
3. Short Test Point VI to the chassis with a jumper wire.
4. Connect a 1000 ohm resistor from Test Point VIII to Test Point IX (in parallel with L251.)
5. Adjust HORIZONTAL HOLD potentiometer, R257, until picture just "floats" back and forth across the screen. Leave R257 set in this position.
6. Remove the 1000 ohm resistor from Test Point VIII and Test Point IX. Adjust L251 (stabilizer coil) so that the picture again just "floats" across the screen, turning the core toward the printed board. Leave L251 set in this position.
7. Remove the chassis jumper from Test Point VI. Repeat adjustments if the picture does not "lock".

PICTURE TUBE ADJUSTMENTS

PICTURE TILT: To correct picture tilt, loosen the YOKE CLAMP by squeezing points C and D with long nose pliers until the eye of the spring slides over the bend in the clamp. Adjust yoke to correct tilt. Secure yoke by using pliers between points A and B until spring slips over bend in clamp.

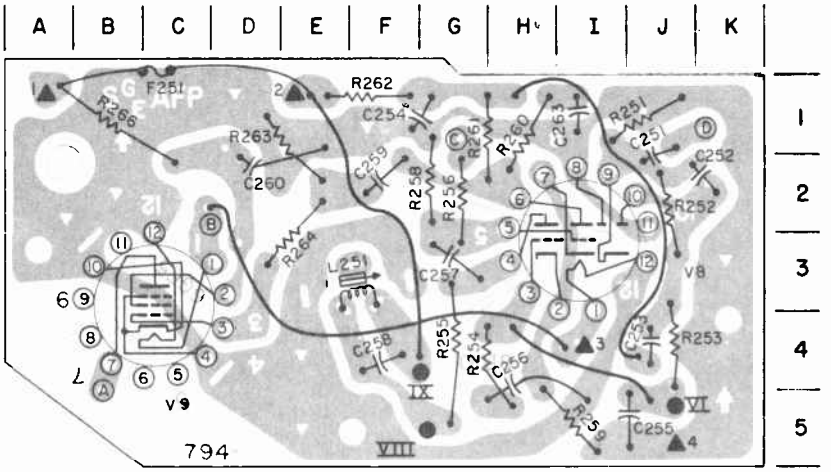
PICTURE CENTERING: Rotate the two centering rings located at the rear of the yoke assembly until picture is properly centered.

FOCUS: The proper focus potential for the tube was chosen at the time the set was manufactured. If it becomes necessary to install a new picture tube or change the focus potential, any one of three potentials may be chosen for best focus. Connection points for two focus potentials are located on the sweep (small) printed board. The orange lead from R179 on the picture tube socket may be connected for best focus as follows:

1. To the grounded wirewrap terminal at the rear edge of the sweep board behind V8.
2. To the B+ wirewrap terminal nearest C260 on the front edge of the sweep board.
3. To the B+ boost wirewrap terminal on Vertical Linearity pot. R208.

GENERAL ELECTRIC Chassis LX, Circuit Boards Information, Continued

ETCHED CIRCUIT BOARD
HORIZONTAL SWEEP BOARD
LX CHASSIS



SWEEP BOARD SOLDER SIDE

NUMBERED (▲2) TRIANGLES

REPRESENT WIREWRAP TERMINALS ON BOARD FOR CONNECTION OF WIRES FROM OTHER COMPONENTS.

CIRCLED Ⓐ LETTERS

REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

- ▲1 TO +265V
- Ⓐ BLK, TO T251, PIN 5
- Ⓑ BRN., FILAMENT
- ▲2 TO +268V
- Ⓒ YELLOW, TO R257 HORIZ-HOLD
- ▲3 BRN., FILAMENT
- Ⓓ GREEN, TO R215
- ▲4 TO GROUND - PIN 8 CRT SOCKET
- ● TEST POINT VI
- ● TEST POINT VIII
- ● TEST POINT IX

LOCATION BY COORDINATES

RESISTORS	CAPACITORS	WIRE CONNECTIONS
R251-J1 R252-J2 R253-J4 R254-G3 R255-G4 R256-G2 R258-G2 R259-I5 R260-H1 R261-G1 R262-F1 R263-D1 R264-E3 R266-B1	C251-J2 C252-K2 C253-J4 C254-F1 C255-J5 C256-H5 C257-G3 C258-F4 C259-F2 C260-D2 C263-I1	▲1-A1 ▲2-E1 ▲3-I4 ▲4-J5 Ⓐ-B4 Ⓑ-C2 Ⓒ-G1 Ⓓ-K1
	TUBES	**COILS**
	V8-I3 V9-C4	L251-F3
		FUSES
		F251-C1

SWEEP BOARD COMPONENT LOCATIONS

TRIANGLE ▲7 NUMBERS

DENOTE WIREWRAP TERMINALS ON BOARD FOR CONNECTION OF WIRES FROM OTHER COMPONENTS

- ▲1 TO C314
- ▲2 TO PIN 7 OF CRT & TUNER 268V
- ▲3 GROUND TO R309
- ▲4 TO R203, VERT. HOLD
- ▲5 TO T401
- ▲6 F402 LINK, TO ▲5
- ▲7 TO C314
- ▲8 TO PIN 3 OF SOCKET 8 ▲9
- ▲9 TO ▲8
- ▲10 FILAMENT
- ▲11 GREEN - TO R309, CENTER
- ▲12 ORANGE/GREEN - TO C401D
- ▲13 GRAY - TO R204, HEIGHT POT
- ▲14 TO T401
- ▲15 ORANGE - TO +135V ON TUNER

CIRCLED Ⓐ LETTERS

REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

- Ⓐ ORANGE - TO R177, BRIGHT.
- Ⓑ BLUE - TO R173, CONTRAST
- Ⓒ YELLOW - TO R173, CENTER
- Ⓓ BLUE - TO T201
- Ⓔ BLUE - TO T303
- Ⓕ I-F LINK, TO R-F TUNER
- Ⓖ ORANGE - TO R173, CONTRAST
- Ⓗ WHITE - TO R-F TUNER, AGC

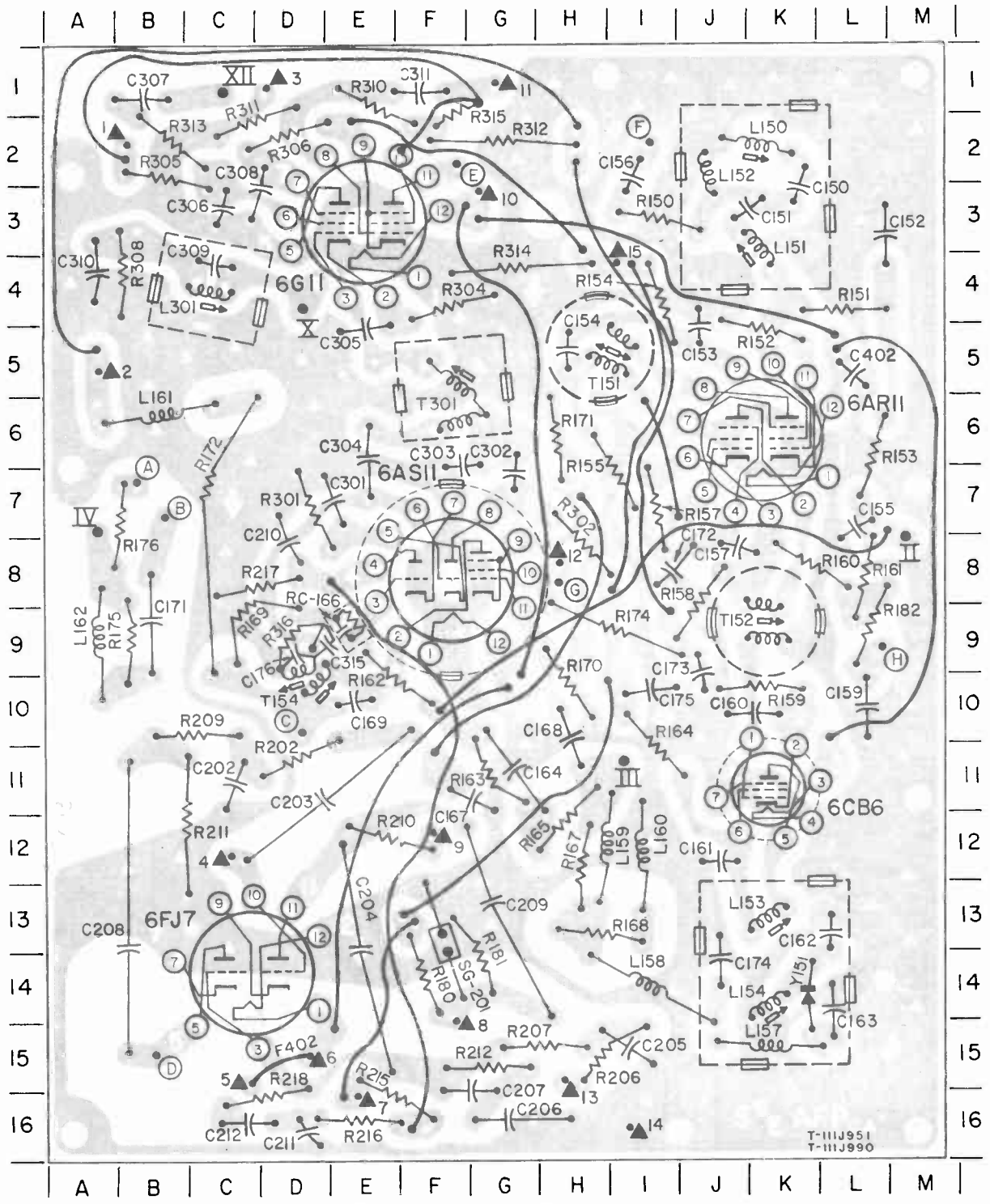
CAPACITORS	CAPACITORS (CONT'D)	RESISTORS	RESISTORS (CONT'D)	DIODES
C150-K3 C151-J3 C152-L3 C153-J5 C154-H5 C155-L7 C156-I2 C157-J8 C159-L10 C160-K10 C161-J12 C162-L13 C163-L14 C164-G11 C167-G11 C168-H10 C169-E10 C171-B9 C172-I8 C173-J9 C174-J14 C175-I10 C176-D9 C202-C11 C203-D11 C204-E13 C205-I15 C206-G16 C207-G16 C208-B13 C209-G13 C210-D8 C211-D16 C212-C16 C301-E7 C302-G7 C303-F6 C304-E6	C305-E5 C306-C3 C307-B1 C308-D3 C309-C4 C310-A4 C311-F1 C315-D9 C402-L5	R150-I3 R151-L4 R152-K5 R153-L6 R154-I4 R155-I7 R157-I7 R158-J8 R159-K10 R160-K8 R161-L8 R162-E10 R163-G11 R164-I11 R165-H12 R167-H12 R168-H13 R169-C9 R170-H10 R171-H6 R172-C7 R174-I9 R175-B9 R176-B7 R180-F14 R181-G14 R182-L9 R202-D11 R206-H15 R207-H15 R209-C10 R210-E12 R211-C12 R212-G15 R215-E16 R216-E16 R217-D8 R218-D16	R301-D7 R302-H8 R304-F4 R305-B2 R306-D2 R308-B4 R310-E1 R311-C2 R312-G2 R313-B2 R314-G4 R315-F1 R316-D9	Y151-K14
	COILS & TRANS-FORMERS		**TUBES**	**SPARK GAP**
				201-F13
			V3-K6 V4-K11 V5-F8 V6-E3 V7-C14	**WIRE CONNECTIONS**
	L150-K2 L151-K3 L152-J2 L153-K13 L154-K14 L157-K15 L158-I14 L159-I12 L160-I12 L161-B6 L162-A9 L301-C4 T151-I5 T152-K9 T154-D10 T301-F5		**R. C. NETWORK**	Ⓐ-B6 Ⓑ-B7 Ⓒ-D10 Ⓓ-B15 Ⓔ-F2 Ⓕ-I2 Ⓖ-H8 Ⓗ-M9 ▲1-B2 ▲2-A5 ▲3-D1 ▲4-C12 ▲5-C15 ▲6-D15 ▲7-E16 ▲8-F14 ▲9-F12 ▲10-G3 ▲11-G1 ▲12-H8 ▲13-H15 ▲14-I16 ▲15-I4
			RC166-E9	
			FUSES	
			F402-D16	

IF BOARD COMPONENT LOCATIONS

GENERAL ELECTRIC Chassis LX, Circuit Boards Information, Continued

ETCHED CIRCUIT BOARD (CONT'D)

IF BOARD

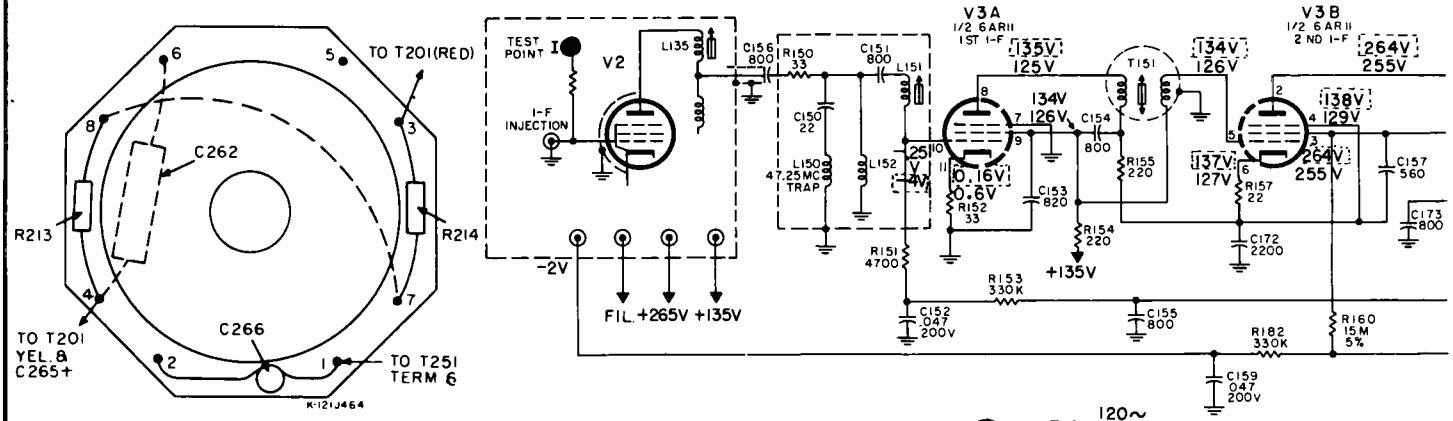


I-F BOARD LOCATIONS AS VIEWED FROM CONDUCTOR SIDE

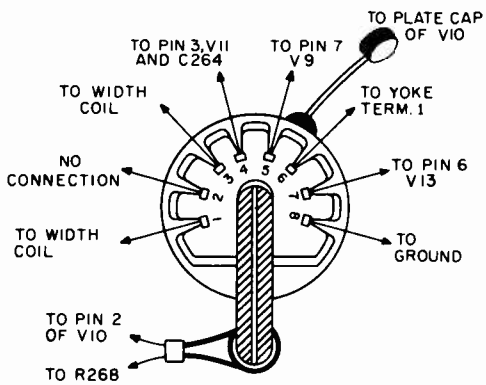
LX CHASSIS

ROMAN X NUMERALS
REPRESENT TEST POINTS

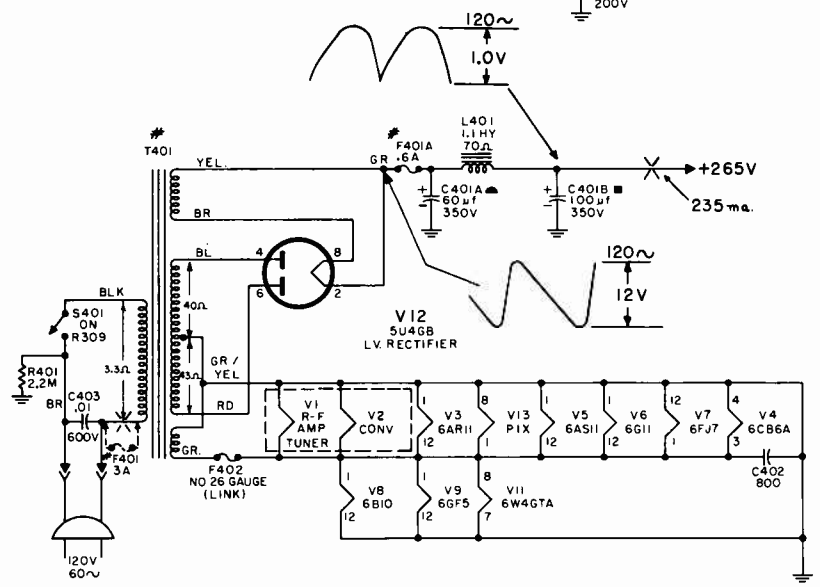
GENERAL ELECTRIC Chassis LX Schematic Diagram

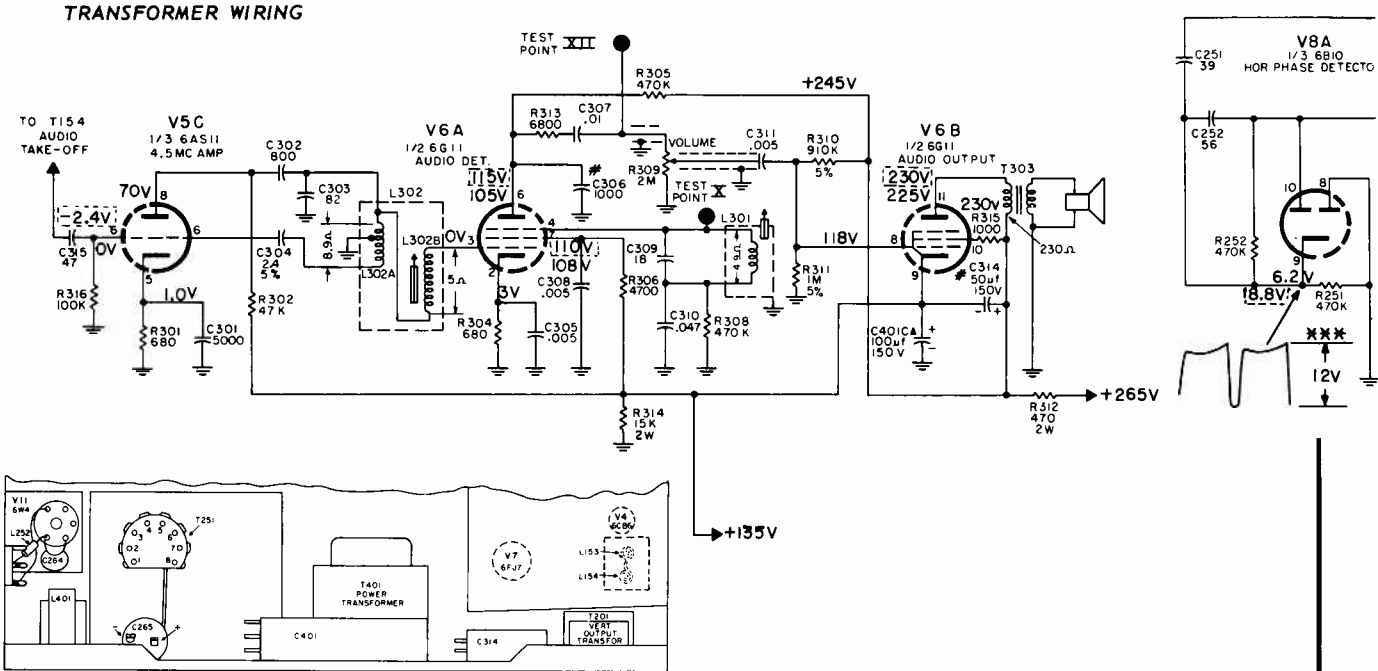


YOKE WIRING



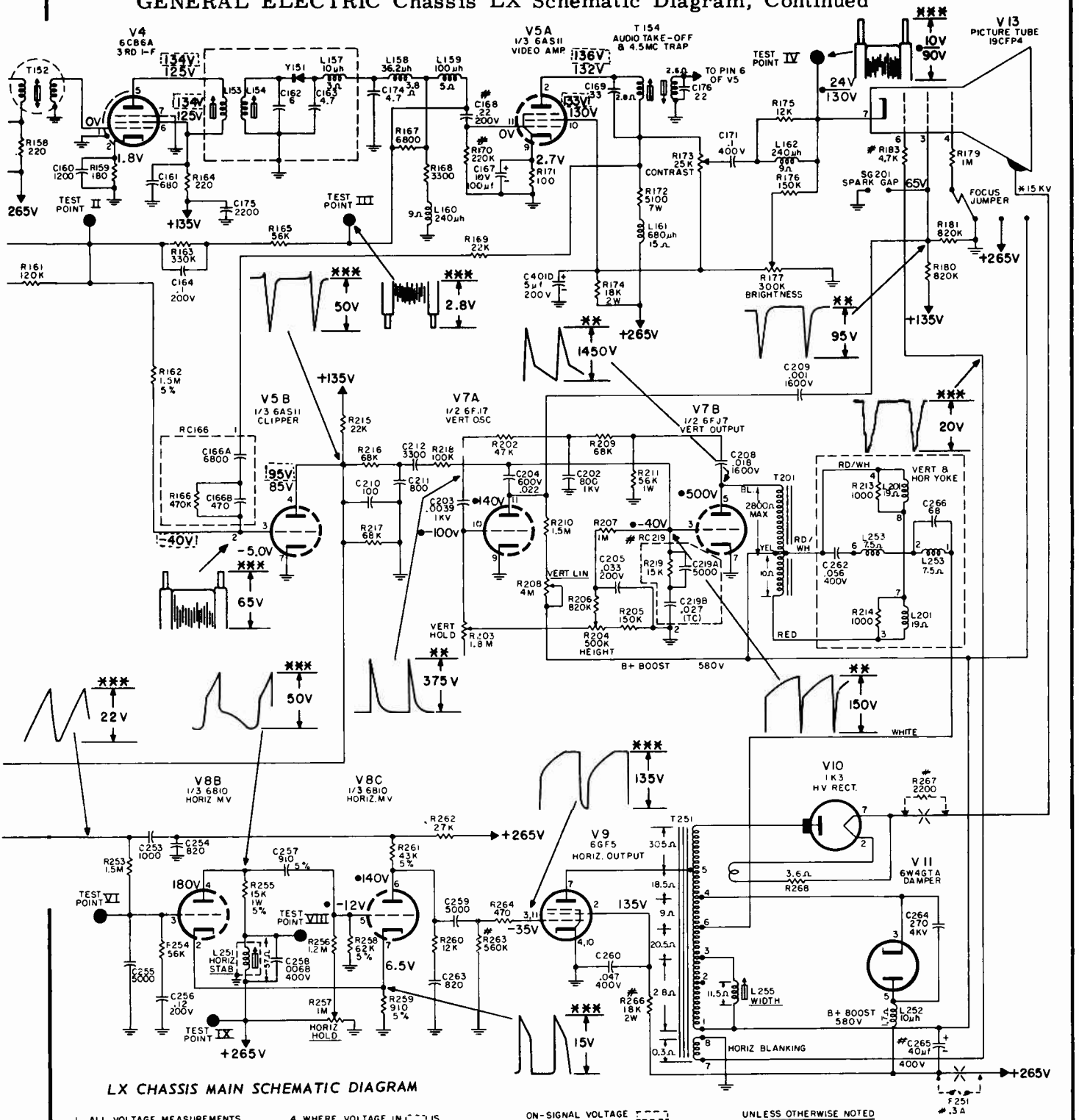
HORIZONTAL OUTPUT TRANSFORMER WIRING





CHASSIS COMPONENT FRONT VIEW

GENERAL ELECTRIC Chassis LX Schematic Diagram, Continued



LX CHASSIS MAIN 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 120VAC 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
4. WHERE VOLTAGE IN [ ] IS NOT SHOWN, VOLTAGE IN BLACK IS MADE EITHER ON SIGNAL OR OFF SIGNAL

• VARIES WITH CONTROL SETTINGS

* BRIGHTNESS CONTROL MAX CCW

# INDICATES PRODUCTION CHANGE

ON-SIGNAL VOLTAGE [ ] & WAVE SHAPES TAKEN WITH A NOISE-FREE SIGNAL PRODUCING -1.5 TO -2 VOLTS AGC AT VHF TUNER FINE TUNING CONTROL ADJUSTED FOR MAXIMUM AGC

ALL OTHER CONTROLS ARE ADJUSTED FOR NORMAL OPERATION

** SCOPE SYNCED AT 1/2 VERT FREQUENCY

*** SCOPE SYNCED AT 1/2 HORIZ FREQUENCY

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

WIRE COLOR CODE
(USED IN MOST INSTANCES)

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

GENERAL ELECTRIC Chassis LX, Production Changes, Continued

PRODUCTION CHANGE IDENTIFICATION

The main-chassis production code numbers are used to show the approximate point in production where each change took place. The code numbers change periodically without regard to production changes, progressively larger numbers being used from the beginning to the end of production. Therefore, a change listed with the number 229LX will appear in chassis stamped 229LX, 230LX and upwards, but not in those stamped 228LX and below.

The symbol # is used as a key on the schematic diagrams to distinguish components that were changed during production. Each of the listed changes are generally in order in which they occurred in production

In addition to production changes, components may be substituted in place of those shown in the parts list and schematic diagrams. These substitutions are not covered as production changes, and whenever possible, the subject component should be replaced with the same value that appeared in the receiver.

PRODUCTION CHANGES

CHANGE	SYMBOL OR COMPONENT	ORIGINAL COMPONENT	CHANGE	REMARKS	CHASSIS CODE
1.	C168	.047µf. ET25X23	.22µf. ET25X41	See note 1.	149LX
	R170	1 Megohm	220K		
2.	R263	680,000ohm	560,000 ohm		151LX
3.	R266	20,000 ohm Glass ET14X137	18,000 ohm, 2W Carbon		152LX
4.	C306	820µµf. ET22X94	1000µµf. ET22X117		210LX
5.	R212	15,000 ohm	Not used	R212, C206 & C207 are replaced by RC219—Values are not changed.	210LX
	C206	.027µf. ET22X84			
	C207	5,000µµf. ET22X67			
	RC219		Added ET33X46		
6.	R267	2200 ohm	Not used		213LX
7.	F401	3 amp. ET10X24	Not used		214LX
	F251	0.3 amp. ET10X28			
	F401A	0.6 amp. ET10X39	Added		
8.	R183		Added 4,700 ohm, 1/2 W	R183 added in series w/V13 Pin 6 & T251 Pin 7	218LX
9.	C314	Can Type ET31X184	Pig Tail Type ET31X215		228LX
10.	C265	40µf. ET31X170	20µf.	Use 40µf. , ET31X170 for replacement.	241LX (Some sets)

NOTES:

1. If it becomes necessary to change C168 or R170, both components should be checked to agree with production code.
2. There are two versions of power transformers used for production. One has the high voltage secondary center tap and one side of the filament winding internally connected. A single wire is brought out of the transformer to externally ground the two windings. The second version has an additional wire to ground each winding separately. The latter is supplied for replacement.

GENERAL ELECTRIC Chassis LX, Alignment Information, Continued

VIDEO I-F SYSTEM

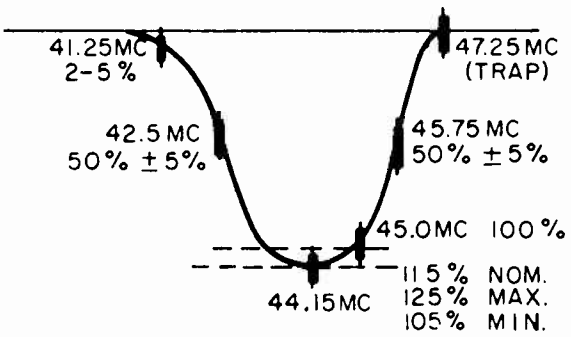
AM PRE-PEAKING & TRAP FREQUENCIES

L150	Min. 47.25 MC	T151	Max. 42.8 MC
L135	Max. 45.75 MC	T152	Max. 45.2 MC
L151	Max. 42.50 MC	L153, L154 .	Max. 44.15 MC

GENERAL: Allow receiver and test equipment at least 20 minutes warm-up.

1. Turn volume control to minimum and contrast control fully clockwise. Set channel selector to Channel 9 and fine tuning fully counterclockwise.
2. Short antenna terminals together.
3. Connect oscilloscope to Test Point III thru 22,000Ω resistor not more than 2.5 inches away from Test Point III. Connect −3.5V bias between Test Point II and chassis.
4. Inject signals from a properly terminated AM signal generator or sweep generator, through the I-F INJECTION NETWORK shown, to the I-F injection point. This point is accessible through a hole in the tuner top deck at the base of the Oscillator V2.
5. Align the receiver to produce the response curve illustrated.

RECEIVER ALIGNMENT



I-F RESPONSE CURVE

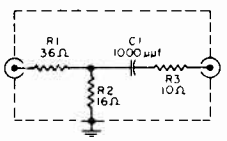
VIDEO I-F ALIGNMENT CHART

STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1	47.25 MC AM	Adjust L150 for minimum scope deflection	Use maximum scope sensitivity and smallest possible signal
2	44.15 MC AM	Adjust first L154, then L153 for maximum scope deflection	Do not retouch these adjustments.
3	38–48 MC sweep generator, with scope calibrated 3 volts peak to peak for 2 inch deflection	L135 (converter plate) for maximum deflection of the 45.75 MC marker	Do not retouch this adjustment.
4		L151 (1st I-F grid) for maximum deflection of the 42.5 MC marker and proper nose shaping	Symmetry of the nose is important. No portion of the nose should be out of symmetry by more than 3%
5		T152 (2nd I-F Plate) to place 45.75 MC marker properly on the curve.	
6		T151 (1st I-F Plate) to place 42.5 MC marker properly on the curve.	Repeat 5, 6, and 7 if necessary.
7		L151 if necessary to shape the nose	

4.5 MC TRAP ALIGNMENT

1. Connect a −7.5V bias to Test Point II, with the positive bias lead grounded to chassis.
2. Turn contrast control to maximum, volume to minimum.
3. Connect the DETECTOR NETWORK shown to Test Point IV and feed its output to an AC VTVM.
4. Apply a 4.5 MC AM signal through a 5μμf capacitor at Test Point III.
5. Adjust the top core of T154 for minimum reading on Test Point IV. Two core positions will give an apparent minimum indication, the correct one is reached while turning the core toward the top end of the coil form.

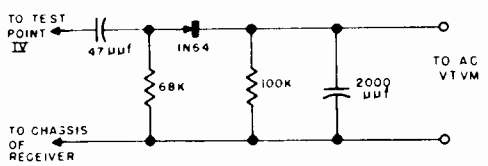
NOTE: Retouching of the trap adjustment may be necessary after alignment of the audio takeoff.



I-F INJECTION NETWORK

AUDIO ALIGNMENT WITH ON-THE-AIR SIGNALS

1. Tune in a strong local signal and set receiver volume to a low audible level.
2. Adjust L301 for maximum undistorted, buzz-free audio output. Start with the core at the outermost position away from the printed board and tune for the second "peak" encountered on the way into the coil form.
3. Connect a variable bias supply (3 to 15V) to the AGC test point with the positive lead to the chassis. Adjust bias until audio signal distorts on peaks slightly, then adjust core of L302 to curb distortion. Repeat this procedure several times at increased bias levels until maximum clarity of audio is obtained.
4. Adjust the bottom core of T154, repeating the bias advances in step 3, to achieve the optimum setting for noise-free performance at low signal levels.

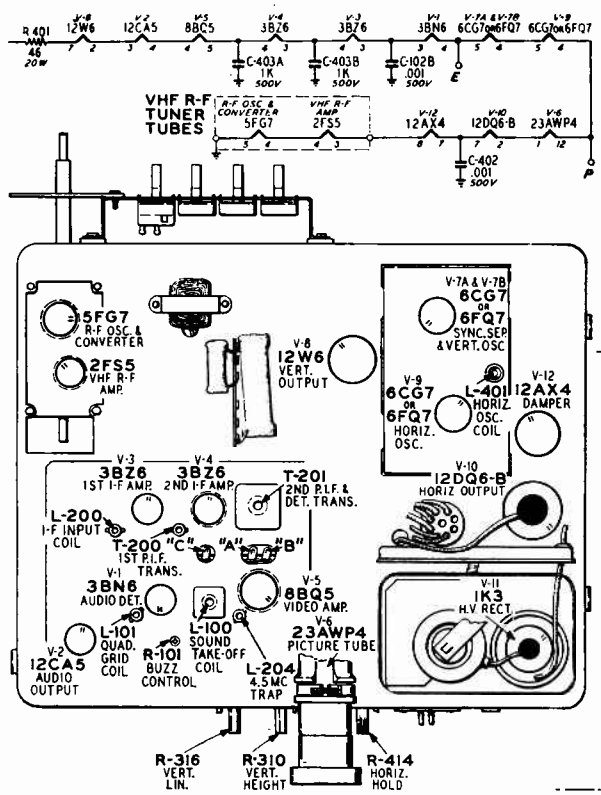


DETECTOR NETWORK

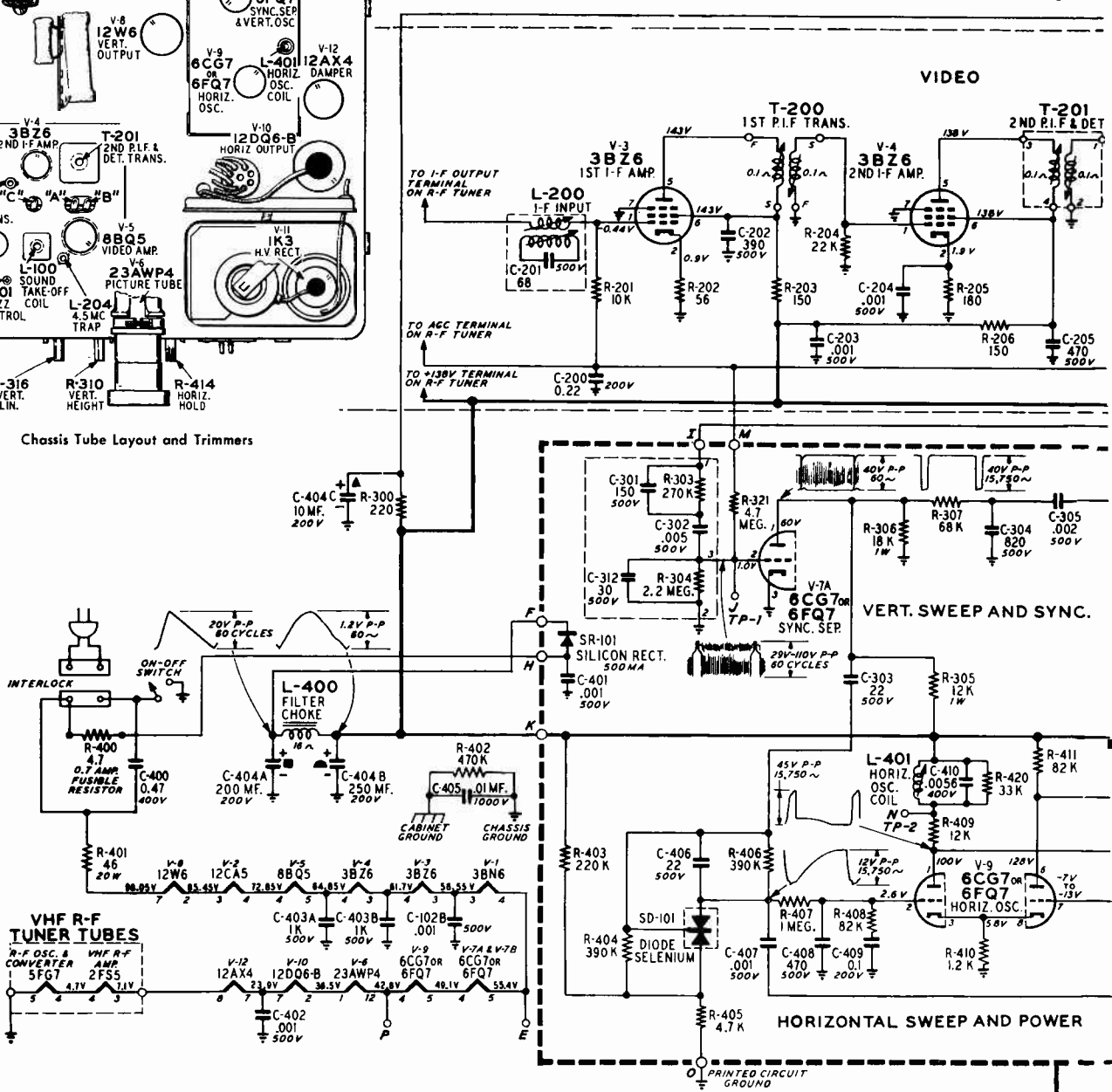
MONTGOMERY WARD

Models WG-3113A, WG-3123A, WG-3143A, WG-3153A, WG-3213A, WG-3273A, WG-3413A, WG-3423A, WG-3443A, WG-3453A, WG-4113A, WG-4123A, WG-4143A, WG-4153A, WG-4213A, WG-4273A, WG-4413A, WG-4423A, WG-4443A, and WG-4453A

(Material on pages 58 through 60)



Chassis Tube Layout and Trimmers

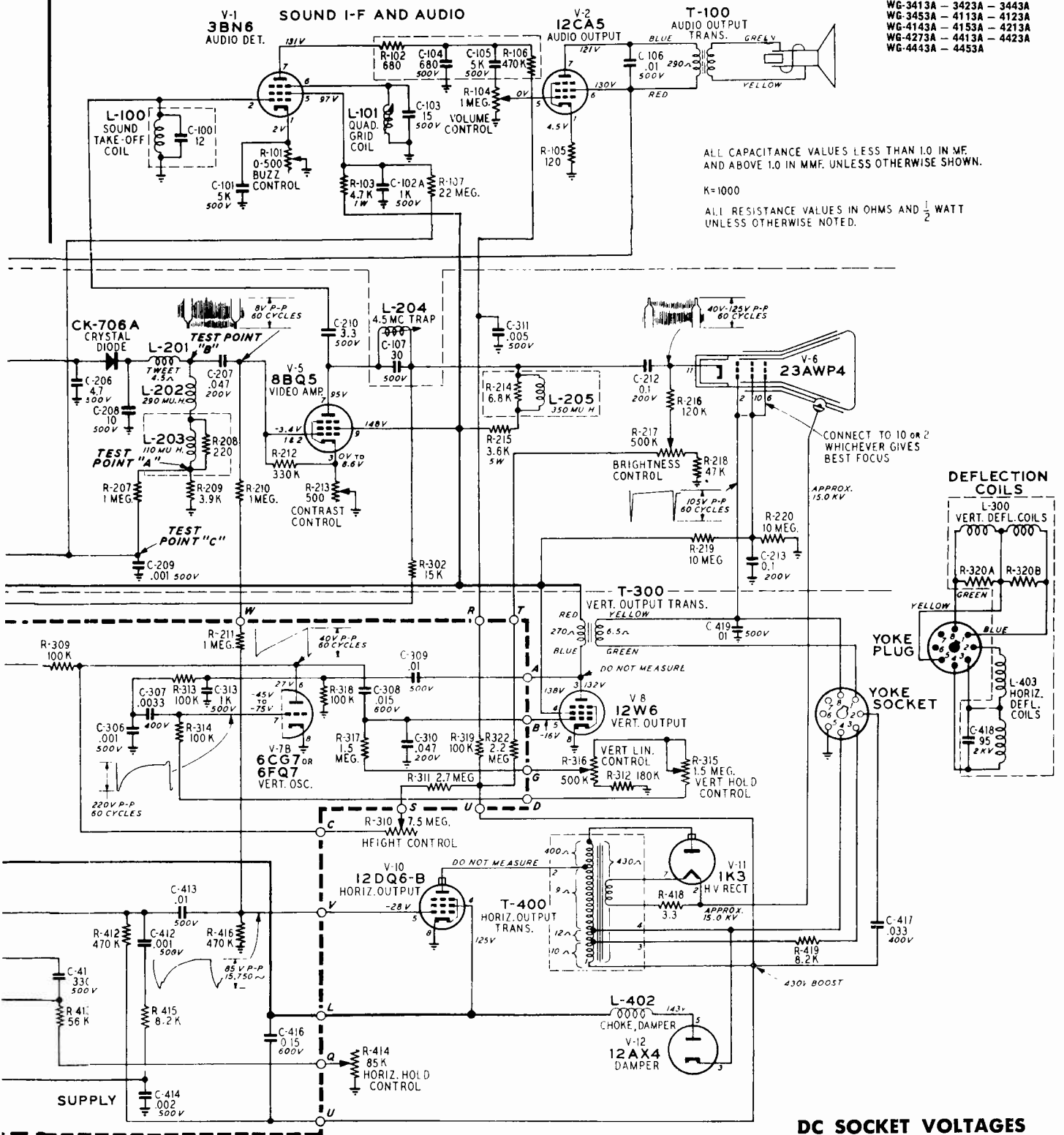


NOTE—In UHF receivers the filament voltages in the tuner and above the tuner in the heater string will be slightly greater because of the filament voltages of the tuner tubes.

MONTGOMERY WARD

Airline

MODELS
WG-3113A – 3123A – 3143A
WG-3153A – 3213A – 3273A
WG-3413A – 3423A – 3443A
WG-3453A – 4113A – 4123A
WG-4143A – 4153A – 4213A
WG-4273A – 4413A – 4423A
WG-4443A – 4453A



DC SOCKET VOLTAGES

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

MONTGOMERY WARD Models WG-3113A, WG-3123A, etc., Continued

INSTRUCTIONS CHASSIS REMOVAL

1. Remove all the knobs from front of cabinet.
2. Remove cabinet back and disconnect the yoke plug, pix tube socket, anode lead, beam aligner (if used) and lead from high voltage can to pix tube mounting ring screw.
3. Disconnect the speaker leads.
4. Disconnect the antenna leads from the tuner.
5. Four screws are used in mounting the chassis to the cabinet. One screw is located at the front (near the tuner), one screw at the rear, holding brace bracket to the cabinet and the other two screws are accessible through the holes in the perforated bottom panel. Remove the four screws and carefully remove the chassis from the cabinet.

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 normal setting. Adjust each ring in the centering device until proper centering is determined. If centering is not adjusted properly, focus may be poor.

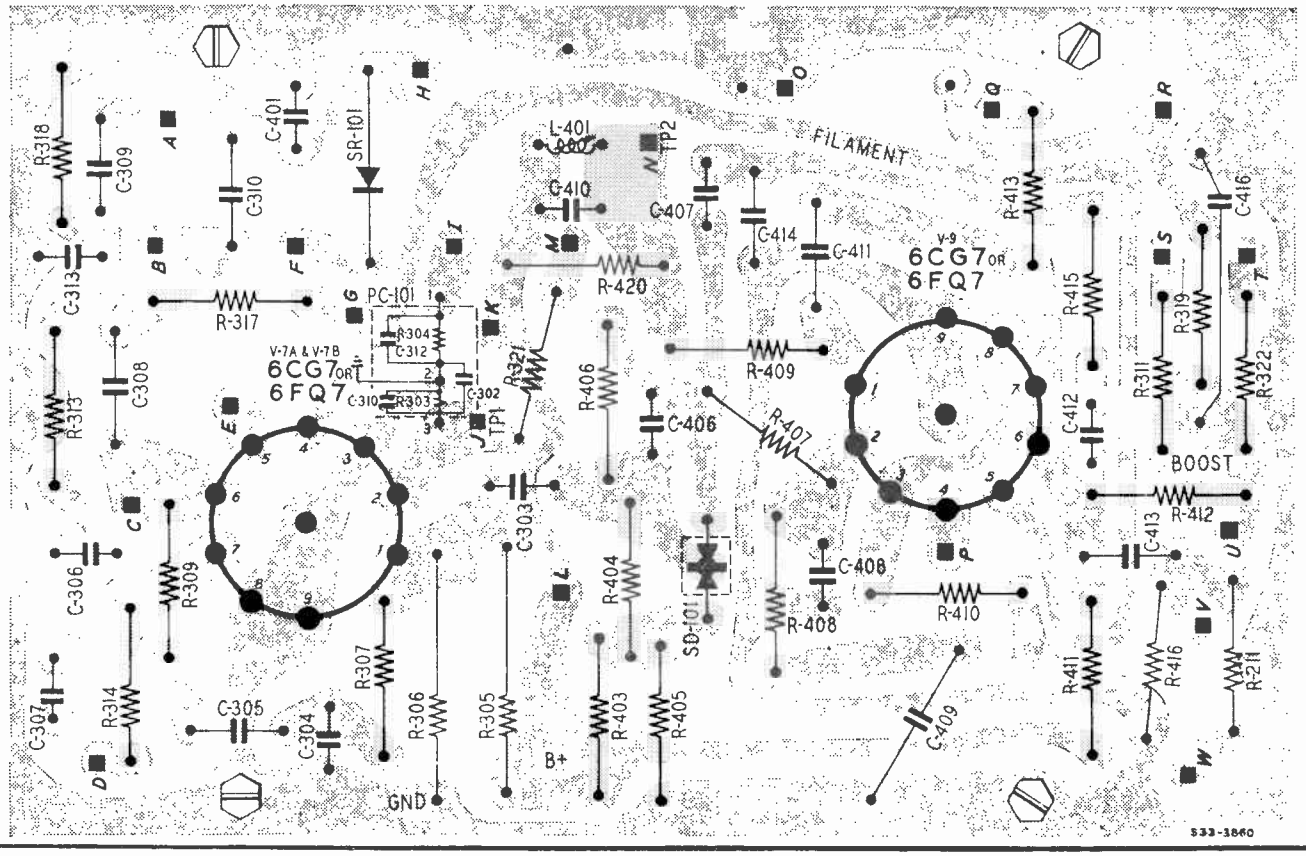
PICTURE ADJUSTMENT — For further adjustments, obtain a test pattern on the receiver. When a test pattern is obtained, it may be necessary to slightly re-adjust the fine tuning control for clearest picture.

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.

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.

PRINTED CIRCUIT BOARD ASSEMBLY (S-38A2363)



MOTOROLA

CHASSIS TS-584

MODELS 19T20, 21, 22, A19T24, 25, 19RT29; 23K76, 82, 83, 84, 87, 88, 90, 91, 95, 96, A23K100, 101, 102, 103, 23K105, 106, 107, 23SF15, 16, 17, 18, 23T15, 16; 27K10, 11, 13, 14

MODEL BREAKDOWN CHART

MODEL	CHASSIS	VHF TUNER	UHF TUNER	ADDITIONAL CHASSIS
19T20GA,EA	CDTS-584	WTT-319*	--	
Y19T20GA,EA	CDTS-584Y	WTT-320Y*	ZTT-601	
19T20GLA,ELA	KDTS-584	STT-311 or STT-327*	--	
19T21JA,BEA	PCDTS-584	CPTT-329**	--	
Y19T21JA,BEA	CDTS-584Y	WTT-320Y*	ZTT-601	
19T22AWA,GRA,WGA	DTS-584	CPTT-330**	--	
Y19T22AWA,GRA,WGA	DTS-584Y	TT-320Y*	ZTT-601	
A19T24AWA,EA,GA	ADTS-584	RTT-323****	--	Rem. Rec. - TRR-1
A19T25AWA,GRA,WGA	ADTS-584	RTT-323****	--	Rem. Rec. - TRR-1
19RT29AW,CH,G	RCDTS-584	WTT-319*	--	Radio - THS-4101
23K76CWA,MA,WA	DETS-584	DCPTT-330**	--	
Y23K76CWA,MA,WA	DETS-584Y	WTT-320Y*	LTT-601	
23K82B,M,W	PCETS-584	CPTT-329**	--	
Y23K82B,M,W	CETS-584Y	WTT-320Y*	LTT-601	
23K83MP	PCETS-584	CPTT-329**	--	
Y23K83MP	CETS-584Y	WTT-320Y*	LTT-601	
23K84B,M,W	PCETS-584	CDTT-329**	--	
Y23K84B,M,W	CETS-584Y	WTT-320Y*	LTT-601	
23K87M,W	LDETS-584	CPTT-330**	--	
Y23K87M,W	LDETS-584Y	TT-320Y*	LTT-601	
23K88W	LDETS-584	CPTT-330**	--	
Y23K88W	LDETS-584Y	TT-320Y*	LTT-601	
23K90M,W,MA,WA	ETS-584	SPTT-333****	--	
Y23K90M,W,MA,WA	ETS-584Y	SPTT-322Y***	KTT-601	
23K91CW	ETS-584	SPTT-333****	--	
Y23K91CW	ETS-584Y	SPTT-322Y***	KTT-601	
23K95M	ETS-584	SPTT-333****	--	
Y23K95M	ETS-584Y	SPTT-322Y***	KTT-601	
23K96CW	ETS-584	SPTT-333****	--	
Y23K96CW	ETS-584Y	SPTT-322Y***	KTT-601	
A23K100B,M,W	ADETS-584	ACPTT-331**	--	Rem. Rec. - TRR-1 or TRR-2
A23K100BD,MD,WD	DADETS-584	ASPTT-334****	--	Rem. Rec. - TRR-1 or TRR-2
A23K101B,M,W	ADETS-584	ACPTT-331**	--	Rem. Rec. - TRR-1 or TRR-2
A23K101BD,MD,WD	DADETS-584	ASPTT-334****	--	Rem. Rec. - TRR-1 or TRR-2
A23K102M,W	ADETS-584	ACPTT-331**	--	Rem. Rec. - TRR-1 or TRR-2
A23K102MD,WD	DADETS-584	ASPTT-334****	--	Rem. Rec. - TRR-1 or TRR-2
A23K103W	ADETS-584	ACDTT-331**	--	Rem. Rec. - TRR-1 or TRR-2
A23K103WD	DADETS-584	ASPTT-334****	--	Rem. Rec. - TRR-1 or TRR-2
23K105W	FTS-584	SPTT-333****	--	
Y23K105W	FTS-584Y	SPTT-322Y***	KTT-601	
23K106MB	FTS-584	SPTT-333****	--	
Y23K106MD	FTS-584Y	SPTT-322Y***	KTT-601	
23K107W,WH	FTS-584	SPTT-333****	--	
Y23K107W,WH	FTS-584Y	SPTT-322Y***	KTT-601	
23SF15M-FM,W-FM	QETS-584	SPTT-333****	--	FM-AM Tun & AF Pwr Amp - THS-1076 Multiplex Unit - HK-71# Record Changer - VM71RC
Y23SF15M-FM,W-FM	QETS-584Y	SPTT-322Y***	QTT-601	FM-AM Tun & AF Pwr Amp - THS-1076 Multiplex Unit - HK-71# Record Changer - VM71RC
23SF16CW-FM	QETS-584	SPTT-333****	--	FM-AM Tun & AF Pwr Amp - THS-1076 Multiplex Unit - HK-71# Record Changer - VM71RC
Y23SF16CW,FM	QETS-584Y	SPTT-322Y***	QTT-601	FM-AM Tun & AF Pwr Amp - THS-1076 Multiplex Unit - HK-71# Record Changer - VM71RC
23SF17W-FM	DQETS-584	SPTT-333****	--	FM-AM Tuner - HS-1043 AF Pre-Amp & Vibrasonic - THS-1079 AF Pwr-Amp - THS-1078 Multiplex Unit - HK-71## Record Changer - VM73RC
Y23SF17W-FM	DQETS-584Y	SPTT-322Y***	QTT-601	AM-FM Tuner - HS-1043 AF Pre-Amp & Vibrasonic - THS-1079 AF Pwr-Amp - THS-1078 Multiplex Unit - HK-71## Record Changer - VM73RC

MOTOROLA Chassis TS-584 (group) Service Adjustments, Continued

MASTER MODEL BREAKDOWN CHART (Cont.)

MODEL	CHASSIS	VHF TUNER	UHF TUNER	ADDITIONAL CHASSIS
23SF18W-FM	DQETS-584	SPTT-333****	--	AM-FM Tuner - HS-1043 AF Pre-Amp & Vibrasonic - THS-1079 AF Pwr-Amp - THS-1078 Multiplex Unit - HK-71## Record Changer - VM75RC
Y23SF18W-FM	DQETS-584Y	SPTT-322Y***	QTT-601	AM-FM Tuner - HS-1043 AF Pre-Amp & Vibrasonic - THS-1079 AF Pwr-Amp - THS-1078 Multiplex Unit - HK-71## Record Changer - VM75RC
23T15BRA	CETS-584	WTT-319*	--	
Y23T15BRA	CETS-584Y	WTT-320Y*	LTT-601	
23T15BRLA	KETS-584	STT-327*	--	
23T16BA,CWA,MA,WA	DETS-584	DCPTT-330**	--	
Y23T16BA,CWA,MA,WA	DETS-584Y	WTT-320Y*	LTT-601	
27K10MA,WA	GTS-584	PTT-322***	--	
Y27K10MA,WA	GTS-584Y	PTT-322Y***	KTT-601	
27K11MA.WA	GTS-584	PTT-322***	--	
Y27K11MA,WA	GTS-584Y	PTT-322Y***	KTT-601	
27K13CW,M,W	HTS-584	HSPTT-333****	--	
A27K13CW,M,W	AHTS-584	HASPTT-334****	--	Rem. Rec. - TRR-2
Y27K13CW,M,W	HTS-584Y	PTT-322Y***	KTT-601	
27K14M,W	HTS-584	HSPTT-333****	--	
A27K14M,W	AHTS-584	HASPTT-334****	--	Rem. Rec. - TRR-2
Y27K14M,W	HTS-584Y	PTT-322Y***	KTT-601	

*Switch type tuner with continuously variable fine tuning, refer to "Installation And Service Adjustment" section for fine tuning adjustment procedure.

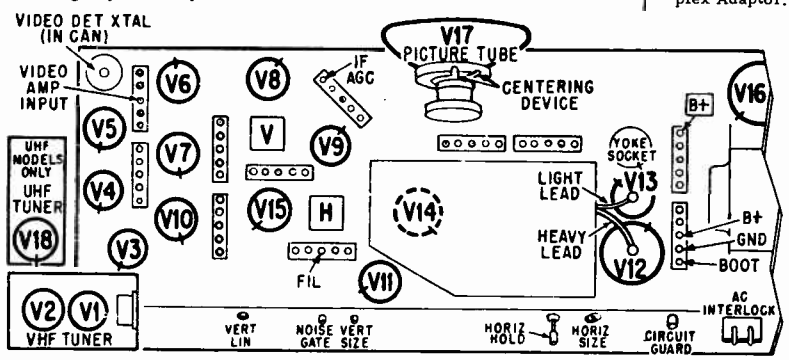
**Switch type tuner with concentric pre-set fine tuning, refer to "Installation And Service Adjustment" section for fine tuning adjustment procedure.

***Switch type tuner with one knob, push-in, pre-set fine tuning. Refer to "Installation And Service Adjustment" section for fine tuning adjustment procedure.

****Turret type tuner with one knob, push-in, pre-set fine tuning. Refer to "Installation And Service Adjustment" section for fine tuning adjustment procedure.

#Stereo-TV with model suffix letter "A" uses the following chassis: HK-54-1 Multiplex Adaptor and HK-62 Audio Inverter. Models with suffix letter "Z" will use the HK-54-2 Multiplex Adaptor.

##Stereo-TV model with suffix letter "A" uses the HK-54-1 Multiplex Adaptor. Models with suffix letter "Z" will use the HK-54-2 Multiplex Adaptor.



TS-584 SERIES TUBE LOCATION

INSTALLATION & SERVICE ADJUSTMENTS

Prior to making any fine tuning adjustments, set the optimizer control to its mid-mechanical position (see "Optimizer Control" in this section).

Switch Type Tuners With Continuously Variable Fine Tuning

Center the fine tuning control mechanically. 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.

Switch Type Tuners With Concentric Pre-Set Fine Tuning

Rotate the fine tuning knob in either direction for best picture and sound on all available channels. Turning the fine tuning shaft to the right or left engages the pre-set gears. The gears, in-turn, change the position of the core in the oscillator coil. Individual coils are used for each channel.

Switch Type Tuners With One Knob, Push-In, Pre-Set Fine Tuning

Push in the channel selector knob disengaging the channel selector shaft and engage the fine tuning mechanism. Hold it there and rotate the control in either direction for best picture and sound. Then release the knob until it turns freely, rotating it until it locks back into its channel position.

If the proper tuning point is not within the range of the pre-set screw, it will be necessary to remove the knob and adjust the individual screws with an insulated screwdriver. Start with the highest numbered channel and adjust in descending order. Channel 2 coil has no adjustment. The number adjacent to each hole corresponds to the channel. On some 23" and 27" models, it will be necessary to remove the channel selector knob insert bearing by turning it in the direction of the arrow. Center the pre-set screw within its range, then adjust the corresponding individual oscillator screw for best picture and sound.

Turret Type Tuners With One Knob, Push-In, Pre-Set Fine Tuning

Push in the channel selector knob disengaging the channel selector shaft and engage the fine tuning mechanism. Hold it there and rotate the control in either direction for best picture and sound. Then release the knob until it turns freely, rotating it until it locks back into its channel position.

MOTOROLA Chassis TS-584 (group) Service Adjustments, Continued

If the proper tuning point is not within the range of the pre-set screws, it will be necessary to adjust the oscillator core within the strip. First, center the pre-set screw within its range; then adjust the screw that appears in the hole above and to the left of the shaft for best picture and sound.

On A19T24 and A19T25 series models, remove the back cover. Adjust the 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 for best picture and sound.

INDEXING AUTOMATIC TUNERS FOR AVAILABLE CHANNELS

To index (stop) an available channel, adjust the pre-set tuning for best picture and sound. Refer to "Fine Tuning Adjustments" (tuners with pre-set fine tuning) in this section.

To by-pass (skip) an unused channel, set switch on back cover to "manual" position. Turn the fine tuning adjustment for the channel counter-clockwise four (4) turns.

NOTE: On models A19T24 and A19T25, 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 MANUAL SWITCH

The remote manual 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 "manual" position.

DEFLECTION YOKE ADJUSTMENT

The picture will be tilted if the deflection yoke is not correctly positioned. The picture may have raster distortions or neck shadows if the deflection yoke is not tight against the flare of the picture tube.

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

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.

HORIZONTAL SIZE CONTROL

The horizontal size control varies the screen voltage of the horizontal output tube and should be adjusted after the raster has been properly centered.

FOCUSING ADJUSTMENT

To provide for differences in the picture tube gun structure, a focus adjustment is provided by three (3) 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 over-all focus, center to edge of screen.

DYNAMIC FOCUS ADJUSTMENT (23" AND 27", 110° CHASSIS)

Connect the lead from the focus adjust coil to the lug which provides the best over-all focus. Then adjust the core in the focus adjust coil for best right and left hand edge focus. Tune core away from the mounting bracket.

NOISE GATE CONTROL

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

To adjust, tune in a channel for best picture and sound. Turn the noise gate control counter-clockwise (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.

CIRCUIT GUARD

The circuit guard is a thermal cut-out type of overload relay. It is in series with the power into the receiver for protection against shorts in the chassis.

The circuit guard will remain in the "closed circuit" state when the current requirements are normal. 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 AC power. After the bi-metallic elements have cooled, the circuit guard may be re-set 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 reapplied when the re-set button is held depressed.

OPTIMIZER CONTROL
(On All Models Except 19RT29)

The optimizer control is connected in series with the video detector load which results in a variable load affecting the video response of the receiver.

The optimizer control is not a service adjustment. It should be used in conjunction with the fine tuning, contrast and brightness controls to reduce the "snow effect" in fringe areas or sharpen and crispen the picture in areas where the signal strength is high.

For optimum effect, set the optimizer control to its mid-mechanical position, then adjust the fine tuning control to the point where sound bars just disappear from the picture. Then adjust the optimizer control for desired picture quality.

39.75 Mc TRAP ADJUSTMENT
(Adjacent Video)

The adjacent video trap coil (L-101) is set to approximately 36 Mc at the factory and must be adjusted if interference from an upper adjacent channel is present. See "Alignment Detail" for location.

SERVICE NOTES

CHASSIS REMOVAL HINTS

19" & 23" Table Models

The chassis can be completely exposed by removing the back and bottom covers. Voltages and waveforms can be taken and all chassis components are accessable.

23" & 27" Consoles

Remove the chassis, tuner and control mounting bracket as a unit from the rear of the cabinet. The medallion covering the brightness and vertical hold knobs (27" models only) can be easily removed from the control mask by prying it forward with a thin bladed screw-

MOTOROLA Chassis TS-584 (group) Service Information, Continued

driver in order to remove and replace the two (2) knobs. Always replace grounding braids and/or clips and dress all leads properly (see receiver rear view photos) when re-installing chassis.

PICTURE TUBE REPLACEMENT

Use extreme care in handling the picture tube as rough handling may cause it to implode due to atmospheric pressure. Do not nick or scratch glass or subject it to any undue pressure in removal or installation. Use goggles and heavy gloves for protection.

Always place protective tape on the replacement tube in the same position as on the original tube. Rolls of tape may be purchased from Motorola Distributors (Part Number 11M131475 - black or Part Number 11M10033A12 - white). In most cases, it should only be necessary to loosen, not remove, the picture tube mounting strap in order to remove the tube.

PICTURE TUBE REPLACEMENT

Models 19T20, 19T21, 19T22, A19T24, A19T25 and 19RT29

1. Remove socket, yoke and high voltage connection to picture tube.

2. Remove chassis from cabinet.

3. Place cabinet face down on soft cloth.

4. Remove CRT retainer and dust sealing tape to remove tube from bezel.

5. Re-install in reverse order.

Models 23K76A, 23K82, 23K83, 23K84, 23K87, 23K88, A23K100, A23K101, A23K102, A23K103, 23T15 and 23T16

1. Remove chassis with picture tube and its mounting bracket from the rear as a unit.

2. Remove socket, yoke and high voltage connection to picture tube.

3. Remove spring clips from top and bottom of window frame.

4. Remove four (4) screws securing frame to CRT mounting brackets.

5. Remove gasket, window and frame in one piece from CRT.

6. Remove CRT mounting strap noting its position on bell of tube.

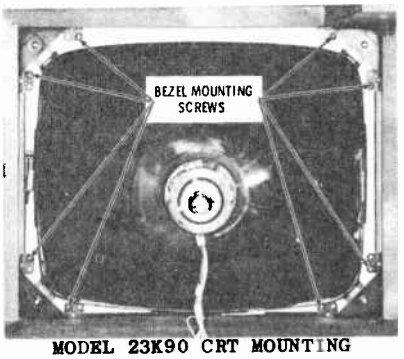
7. Remove CRT from bracket noting position of anode connection.

MODEL 23T16 CRT MOUNTING

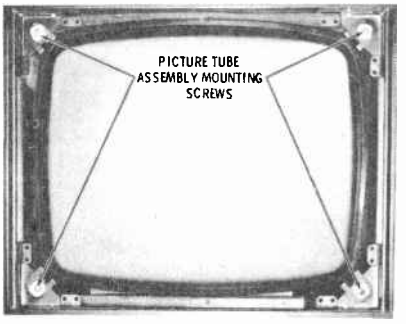
8. Remove protective tape from old CRT and place it in the same position on the new tube. Clean face and re-install new CRT, tightening the strap mounting screws. New tube must be positioned properly to allow an air tight seal with the window in place.

9. To insure proper sealing between window and CRT, it is recommended that a new gasket, Motorola Part No. 32C65859A01, be used when the tube is changed.

10. Install the four (4) frame mounting screws and two (2) clip retainers. Before tightening screws, use the pressure of both hands to press the frame tight against the face of the tube, one side at a time. Hold the frame in position with one hand and tighten the self-tapping screws with the other hand.



MODEL 23K90 CRT MOUNTING REAR VIEW



MODEL 23K90 CRT MOUNTING FRONT VIEW

Models 23K90, 23K91, 23K95, 23K105, 23K106, 23K107, 23SF15 thru 23SF18 and 27K10 thru 27K14

1. Remove socket, yoke and high voltage connection to picture tube.

2. If necessary, remove chassis to gain access to lower bezel mounting screws.

3. Remove bezel mounting screws and bezel.

4. First, remove two (2) upper CRT mounting bolts; then, while supporting CRT, remove the lower bolts. Remove CRT and mounting strap out the front of the cabinet.

5. Remove strap and protective tape and place in position on new tube.

6. Re-assemble in reverse order.

Apply power with service line cord and check receiver operation. Make all adjustments in accordance with the instructions given in the "Service and Installation Adjustment" section.

TO REMOVE I F COILS FROM SHIELDS

The coils located in shields are locked in position inside the shield. In order to gain access to the coil and components located within the shield, grip one side of the coil form with long-nose pliers and carefully pull it out of the shield. If leads are to short to permit access to the coil, unsolder leads from chassis components, not from coil form. Heating the coil terminals may result in component dam age or loss of wax protection against moisture.

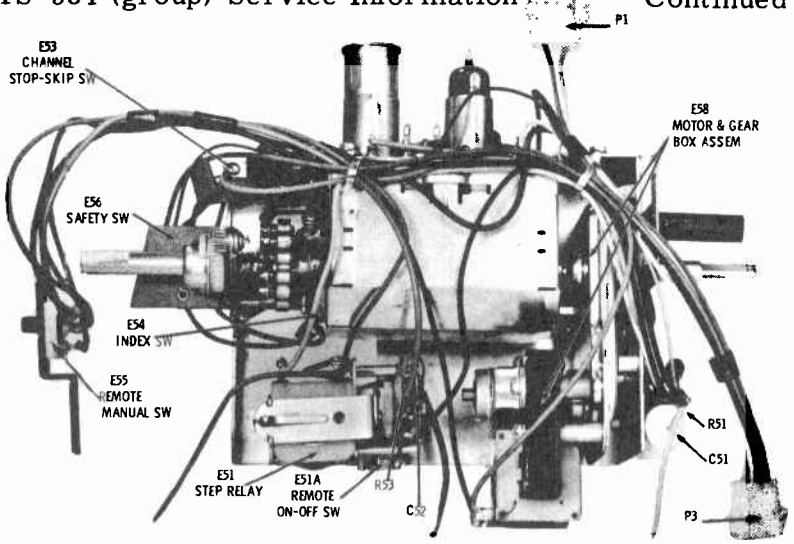
When re-inserting coil assembly in shield, be sure coil form locks into position inside the shield.

Coils which are dipped in wax must be replaced as an assembly to maintain proper moisture protection in high humidity areas.

MOTOROLA Chassis TS-584 (group) Service Information Continued

RESCAP AND MODULAR COMPONENT REPAIR

If it is necessary to repair a receiver containing a defective rescap or modular component and the replacement unit is not immediately available, it is possible to repair the existing unit in the following manner. Merely remove the defective component from the circuitry by cutting the appropriate lead(s) and then substitute conventional capacitors or resistors back into the circuitry. When this method is used, it is always desirable to replace the circuitry in such a manner that the defective component is removed entirely from the system. In other words, do not bridge the defective component with the replacement unit. This is to avoid any detrimental effect that the defective component might inject into the system. An example of this would be an open coupling or by-pass capacitor which you would normally think could be bridged by an external capacitor with no ill effects. However, you should keep in mind that it is possible for the capacitor to intermittently cure itself causing the total capacity to intermittently double. On the other hand, it is just as possible for the defective capacitor to short-out in the near future. Therefore, when replacing components with external parts, remove the component completely from the circuit. In some cases two or more components are connected internally to a single wire and when the wire is removed from the circuit, more than one component is disconnected. In these cases, it will be necessary to replace the remainder of the components with external parts.



AUTOMATIC TUNER

AUTOMATIC TUNING

This section contains an explanation of the automatic operation, switch function and service information. The schematic diagrams of the remote receivers are at the back.

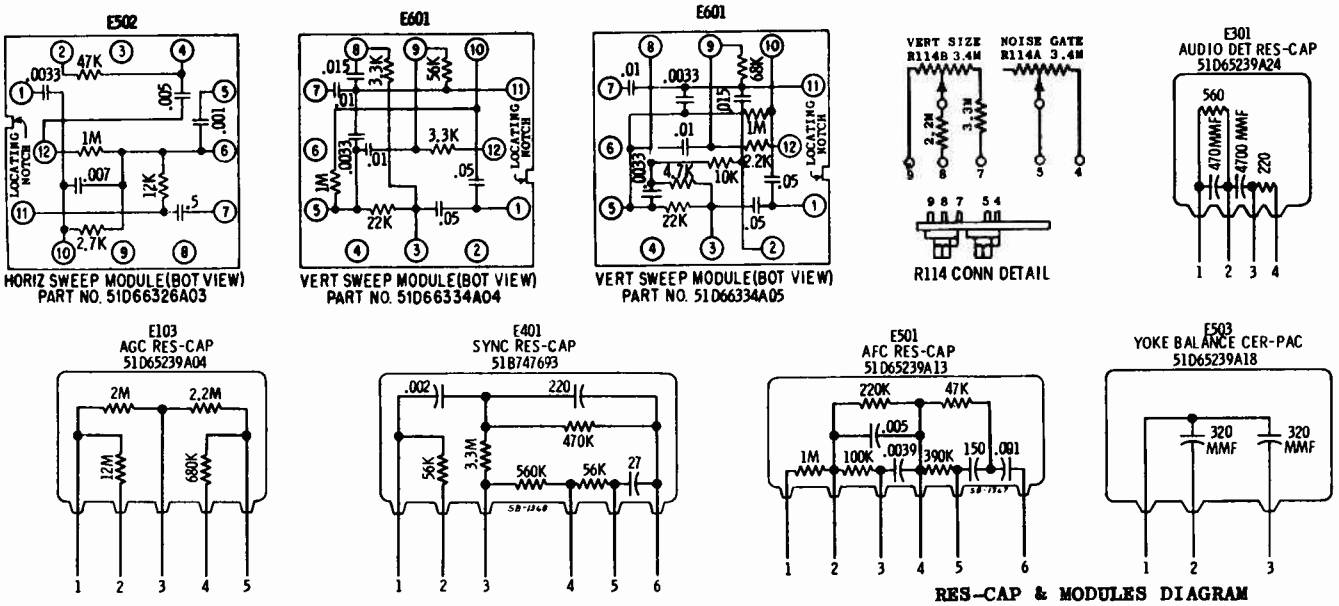
TYPE AND FUNCTION OF RELAYS

The Channel Change Control relay (E-906) and Audio Stepping Control relay (E-907), 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 (E-51) located on the TV receiver controls the audio levels, audio mute and remote on-off functions.

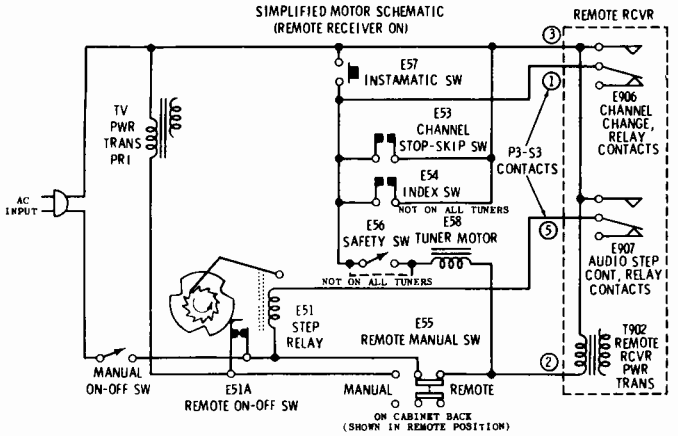
The armature on the stepping relay actuates a rotary switch (E-51B) having twelve (12) positions. Each time the relay is actuated, the armature drives the switch to a new position. The rotary switch has four (4) stator contacts and the wiper arm has three (3) contacts spaced 120° apart. Consequently, 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 (E-51A) is opened every fourth successive step



RES-CAP & MODULES DIAGRAM

MOTOROLA Chassis TS-584 (group) Automatic Tuning Data, Continued



SIMPLIFIED MOTOR WIRING DIAGRAM

of the stepping relay and removes power from the TV receiver. The leaf switch (E-51A) is paralleled in the "remote" position with a manual slide switch located at the rear of the TV receiver. This switch (E-55, Manual-Remote), when closed, by-passes the remote on-off switch (E-51A) and the TV receiver will remain on. The contact gap for the leaf switch (E-51A) should be .030" minimum when open.

CHANNEL STOP-SKIP SWITCH (E-53)

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.

If the switch must be adjusted or is being replaced, proceed as follows: Rotate the fine tuning shaft until the pre-set screw is at the end of its travel in the position to accuate the switch. The switch should then be adjusted to open when the fine tuning shaft is turned 90° clockwise. An ohmmeter can be connected across the switch contacts to determine when it opens.

INDEX SWITCH (E-54) On Models A19T24 & A19T25 Only

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 Adjustments:

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

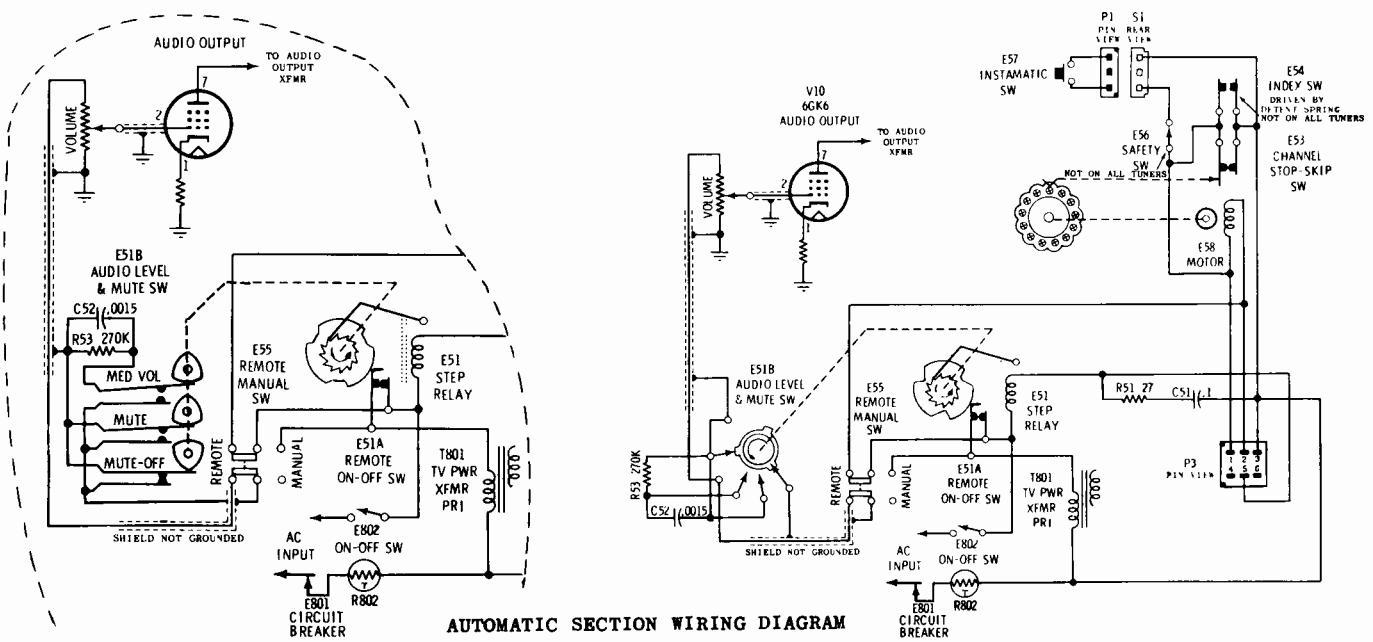
2. With tuner in indexed position, set contact gap between .030" and .045".

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

If Steps 1 thru 3 are correctly performed when making contact adjustment, timing of the Index switch (E-54) will be correct.

REMOTE MANUAL SWITCH (E-55)

One-half of this double pole-double throw switch is wired in parallel with the remote on-off switch (E-51A, located on stepping relay). When it is closed, (MANUAL position), it by-passes switch E-51A and defeats the remote TV on-off function. At the same time, it opens the remote receiver's power input circuit.



AUTOMATIC SECTION WIRING DIAGRAM

MOTOROLA Chassis TS-584 (group) Service Information, Continued

The other half of the switch connects the audio level and mute switch (E-51B) in parallel with the volume control. In the MANUAL position, switch E-51B is disconnected from the audio circuit allowing the volume level to be controlled thru its full range by the front panel volume control only.

INSTA-MATIC SWITCH (E-57)

This momentary pushbutton type switch, when closed, supplies power to tuner motor and serves to start the channel changing process only.

SAFETY SWITCH (E-56) On Models A19T24 & A19T25 Only

The Safety switch is a normally open type. It is activated (closed) when the channel selector knob is in the normal position. When the channel selector knob is pushed in for fine tuning adjustments, the safety switch contacts open, removing power from the tuner motor and eliminating the possibility of jamming the tuner mechanism.

THE FOLLOWING SEQUENCE OF EVENTS OCCUR WHEN CHANNEL CHANGING IS IN PROCESS

Use of the simplified motor wiring schematic with the following text will help to illustrate how the channel change functions.

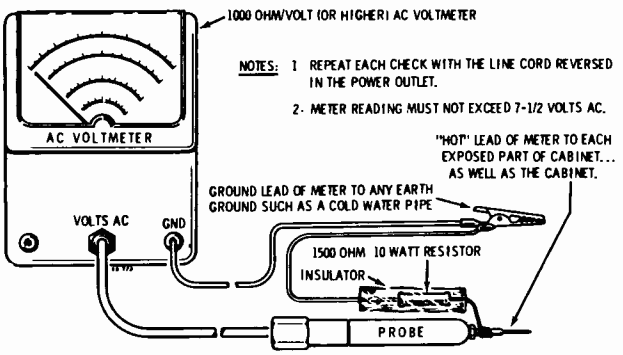
When either the Insta-Matic switch (E-57) or the Channel Change relay (E-906) are momentarily closed, power is applied to tuner motor. When the tuner moves about 5°, Index switch (E-54) closes and power to the motor is applied thru this switch. When the tuner has rotated approximately 10°, Channel Stop-Skip switch (E-53) closes.

Index switch (E-54) opens at each channel. Therefore, if the indexing wheel is not indexed to stop the tuner at the next channel, Channel Stop-Skip switch (E-53) will remain closed and the motor will continue to drive tuner until switch E-53 is opened by the indexing wheel.

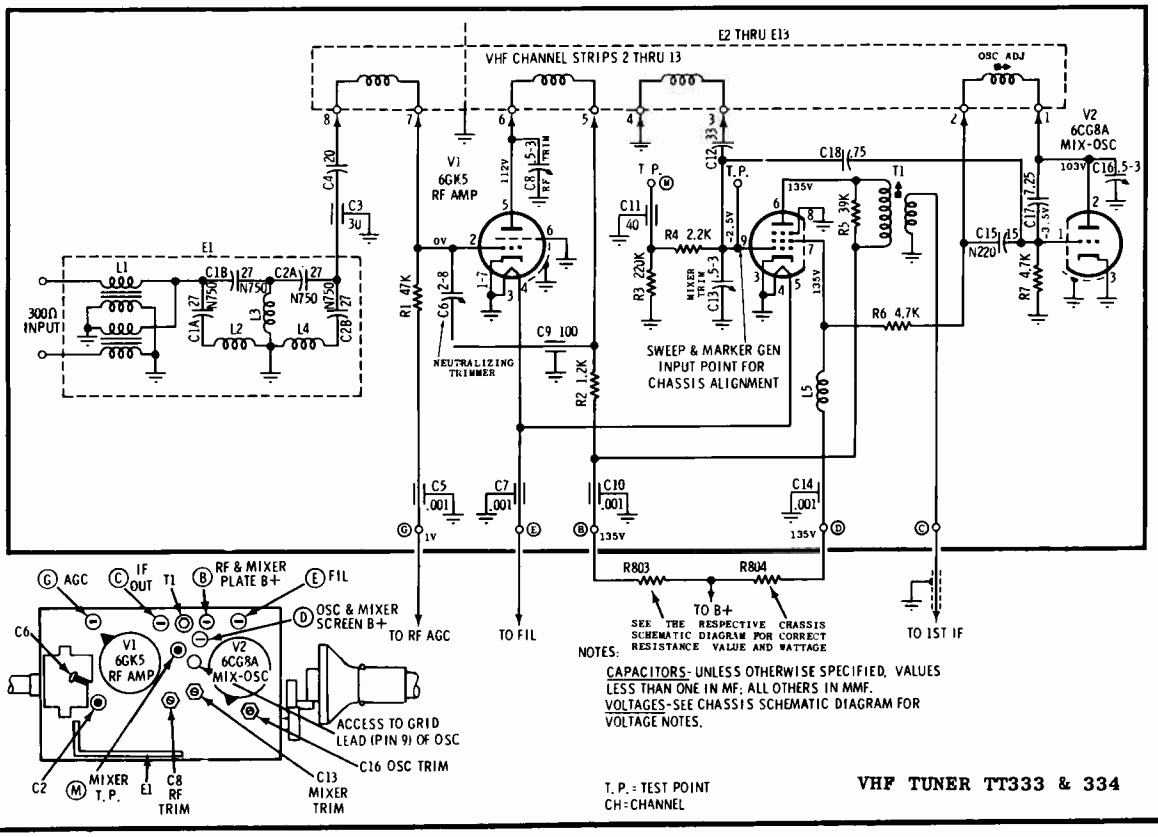
When Channel Stop-Skip switch (E-53) is opened by the indexing wheel, power to motor is continued thru switch E-54 until the tuner reaches a point of 3° to 5° from being indexed. Then Index switch (E-54) opens and the tuner is indexed by the ball detent.

NOTE: Any one of the four switches (Channel Stop-Skip, Insta-Matic, Index or Channel Change Relay) remaining in the closed position will cause the tuner motor to continually operate.

On concentric pre-set tuners, the function of the Index switch has been included in the Channel Stop-Skip switch action.



VOLT METER HOOK-UP FOR SAFETY CHECKS



VHF TUNER TT333 & 334

MOTOROLA Chassis TS-584 (group) Alignment Information, Continued

PRE-ALIGNMENT INSTRUCTIONS

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

VIDEO IF & MIXER ALIGNMENT

Pre-Alignment Steps

1. Maintain line voltage at 120 with variac.

2. Remove the deflection yoke plug to eliminate RF interference radiation.

3. Disable local oscillator. On turret type tuners, set tuner between channels. On switch type tuners, short out oscillator grid of mixer-oscillator grid tube with a fine piece of bare wire or short grid 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 counter-clockwise position), and set optimizer control for maximum resistance (extreme counter-clockwise 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 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 optimum response in the tuning position nearest its respective end of the coil form.

4.5 MC TRAP ADJUSTMENT (L-110A)

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

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

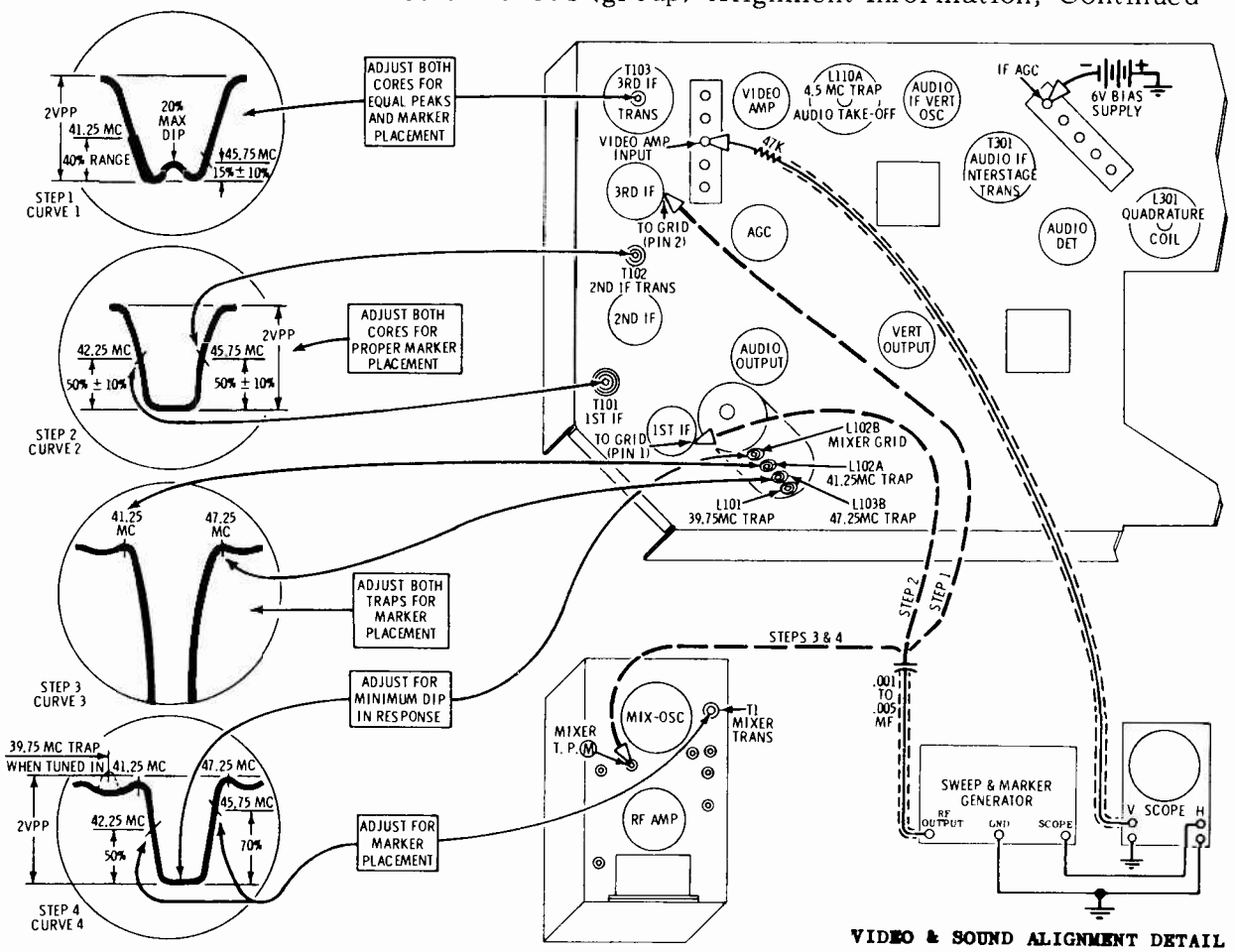
3. Adjust sound trap (L-110A) to find the two points of adjustment at which the sound beat is just noticeable on the picture tube screen. Rotate the core toward the center of the two points. Use minimum amount of inductance (core out of coil) that will result in no apparent beat interference.

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GEN. & MARKER	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
1.	To grid of 3rd 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 (T-103)	Equal peaks and marker placement as shown in curve #1.
2.	To grid (pin 1) of 1st IF Amp thru .001mf cap. Wrap a wire around grid pin of tube and connect generator to wire. Set sweep to 44Mc, markers as required.	Same as step #1.	1st IF trans (T-101) 2nd IF trans (T-102)	Proper 42.25 Mc marker placement. See curve #2. Proper 45.75 Mc marker placement. See curve #3. NOTE: Mixer plate transformer (T-1) may cause suck-out in IF response. Detune transformer if desired.
3.	To mixer T.P. M thru .001mf cap. Set sweep to 44Mc, markers as required.	Same as step #1.	47.25 Mc trap (L-103B & 41.25Mc Trap (L-102B)	Minimum response at proper trap frequency. See curve #3. 39.75 Mc trap (L-101) core is turned fully into coil at a trap frequency 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.
4.	Same as step #2.	Same as step #1.	Mixer plate trans, (T-1 on tuner) & 1st IF grid coil (L-102B)	To obtain curve #4. The mixer transformer 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 transformers can be touched-up to obtain proper response as shown in curve #4. If interference from an upper adjacent TV channel is present, L-101 should be adjusted for 39.75 Mc. If there is no interference from an upper adjacent channel, L-101 is adjusted out of the band pass or at 36 Mc.

*The 39.75 Mc trap (L-101) 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 out of coil until adjacent video interference is visually no longer present on CRT.

MOTOROLA Chassis TS-584 (group) Alignment Information, Continued



VIDEO & SOUND ALIGNMENT DETAIL

SOUND ALIGNMENT (Station Signal Method)

This 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.

STEP	STATION	INDICATOR	ADJUST	ADJUSTMENT FOR AND/OR REMARKS
1.	Strong signal	VTVM to point A on quad. coil L-301 (See schematic diagram)	L-301 (quad. coil)	Maximum deflection (coarse adjustment) of two possible maximum tuning points, use that giving largest voltage reading.*
2.	"	Listening test	"	Maximum sound with minimum distortion (fine adjustment).
3.	Weak signal	"	T-301 (inter-stage coil)	Maximum sound with minimum distortion (maintain hiss level).**
4.	"	"	L-110B (take off coil)	Maximum 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-584A-00** (Continued)

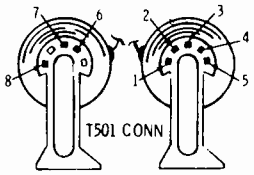
NOTES:

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.

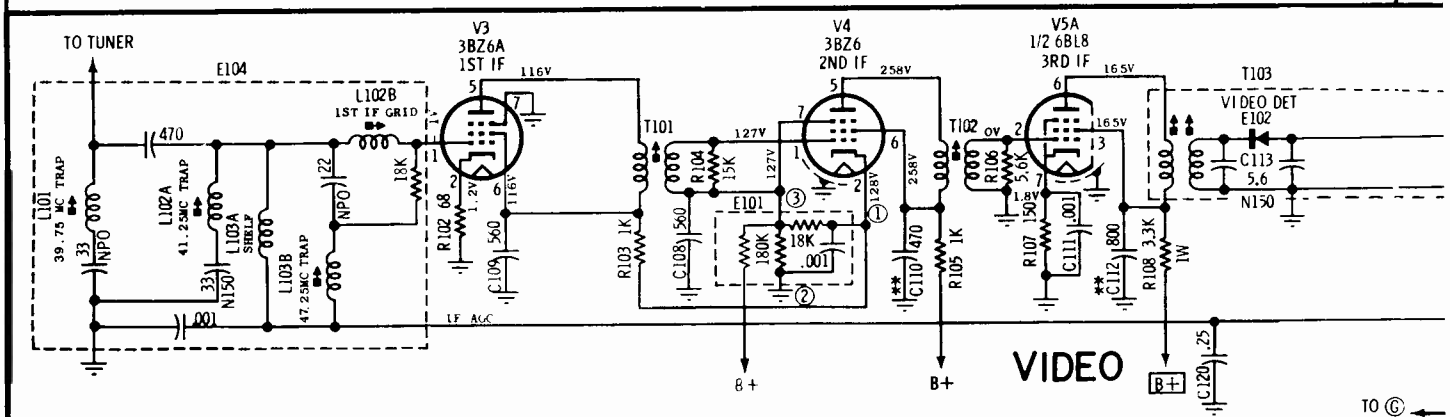
WAVEFORM MEASUREMENTS

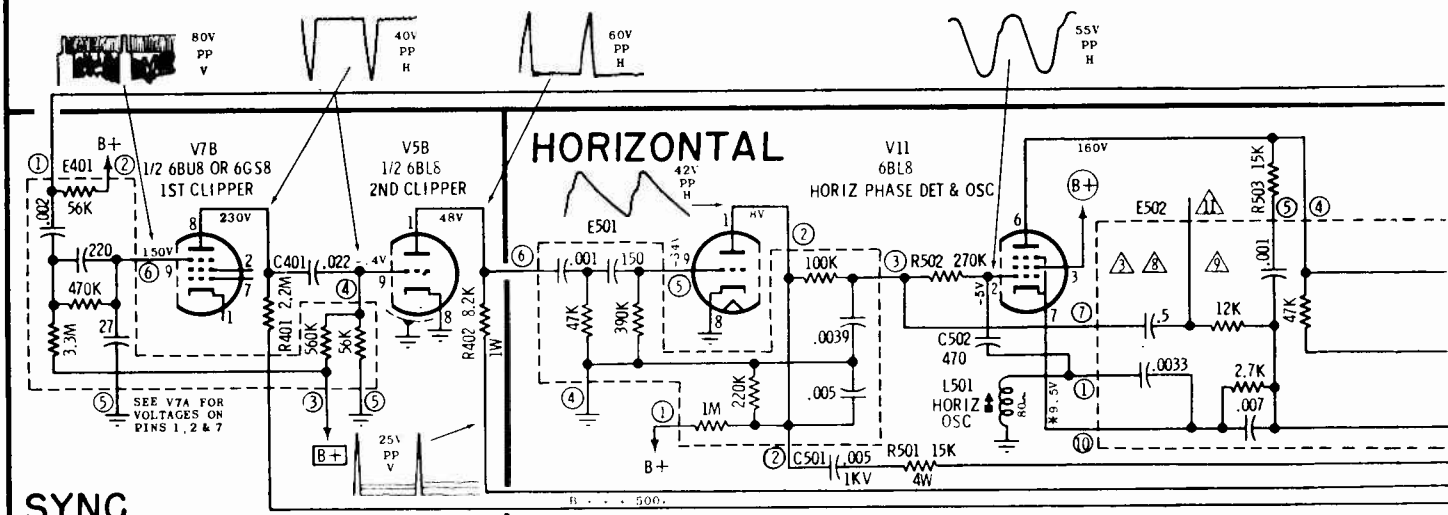
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A WIDE-BAND OSCILLOSCOPE.
2. OSCILLOSCOPE SYNCED NEAR SWEEP RATE INDICATED.
3. TAKEN WITH STRONG SIGNAL, CONTRAST CONTROL AT MAXIMUM; ALL OTHER CONTROLS IN NORMAL OPERATING POSITION.

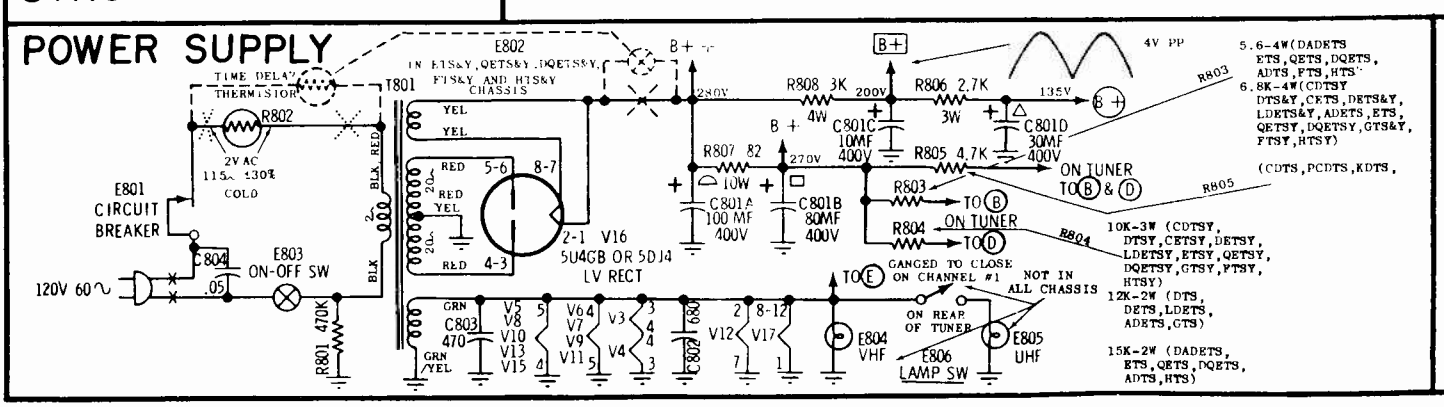


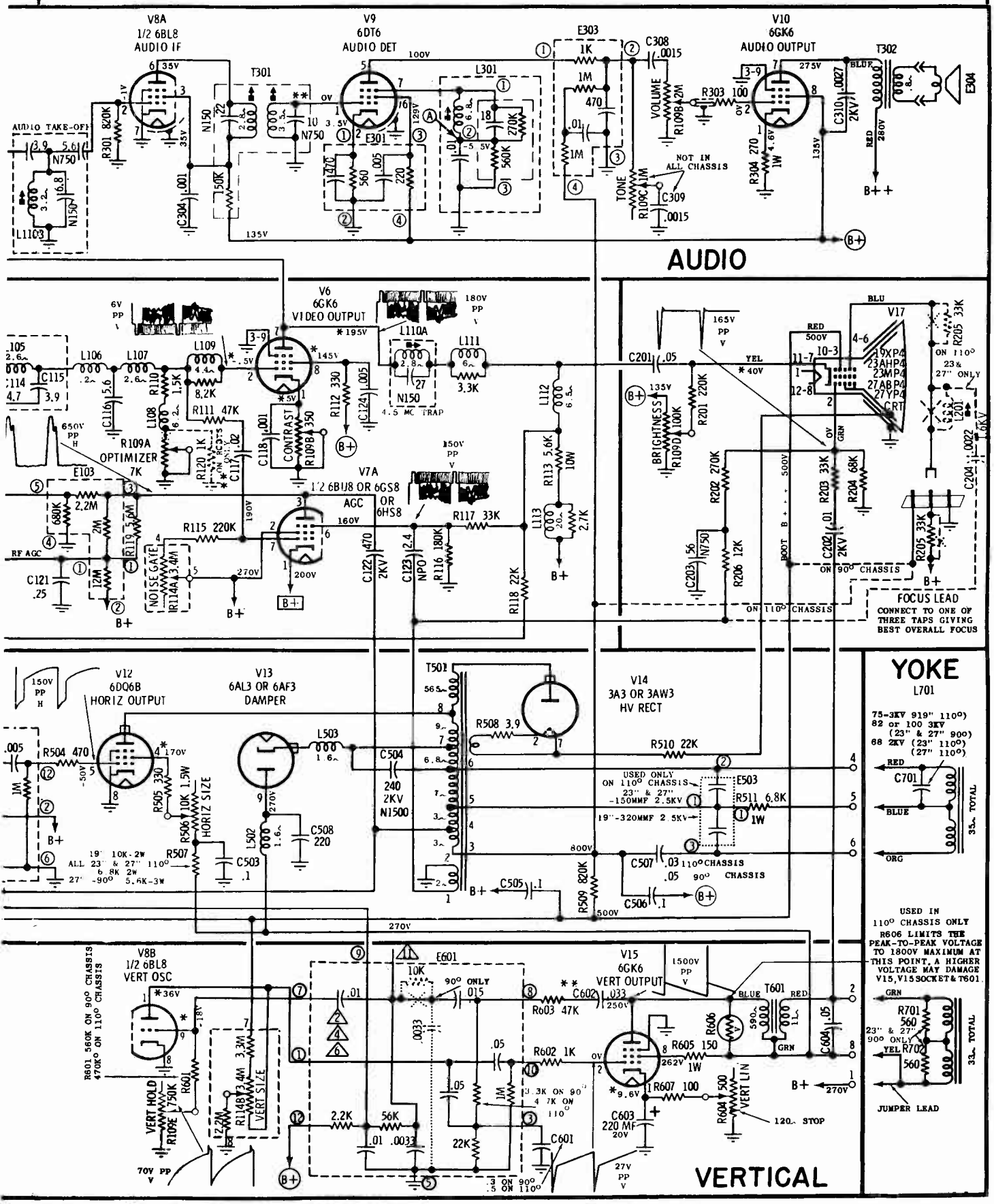
CAPACITORS: UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

** INDICATES SPECIAL COMPONENTS.

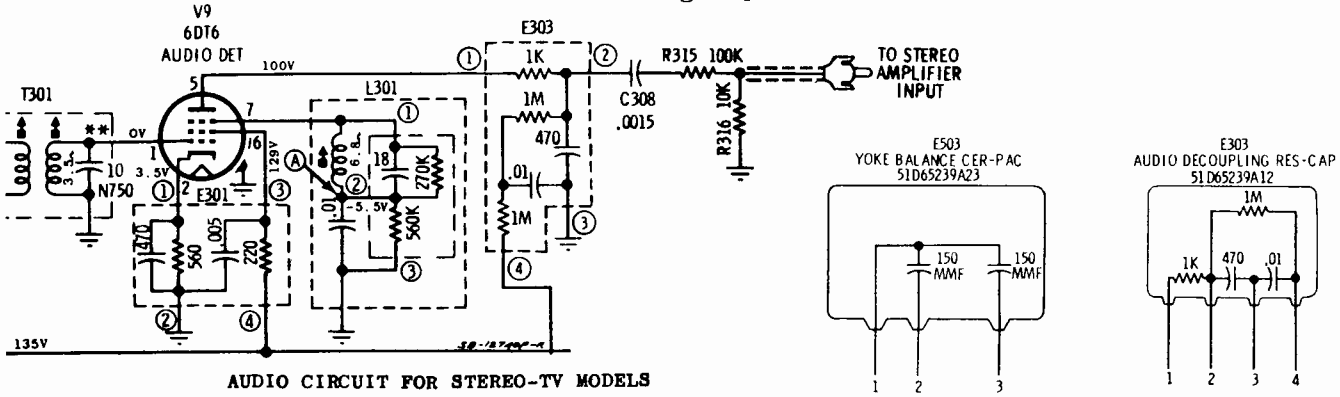




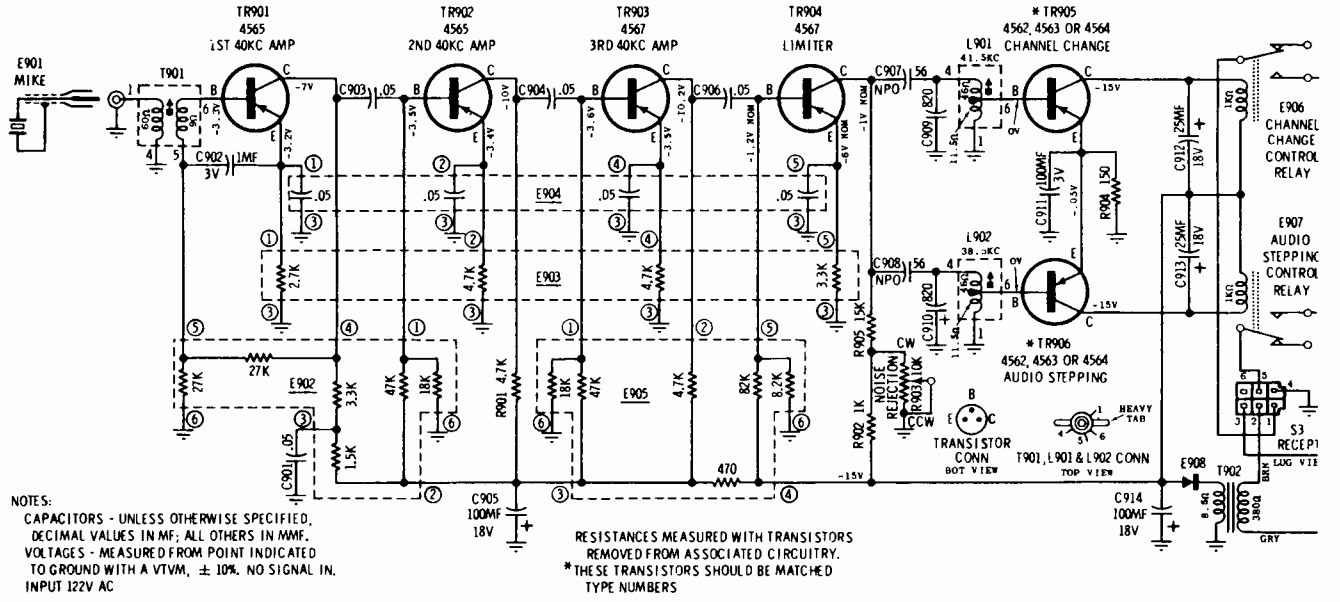



V8A
1/2 6BL8
AUDIO IF
V9
6DT6
AUDIO DET
V10
6GK6
AUDIO OUTPUT
T301
T302
L301
E303
C308 .0015
VOLUME
R109B 2M
R303 100
C310 .0027 2KV
E304
TONE
R109C 1M
C309 .0015
NOT IN ALL CHASSIS
R304 270 1W
AUDIO TAKE-OFF
L1103
AUDIO
V6
6GK6
VIDEO OUTPUT
L110A
L111
3.3K
N150
4.5 MC TRAP
C201 .05
V17
19XP4
23AHP4
23MP4
27ABP4
27YP4
CRT
R205 33K
ON 110° 23" & 27" ONLY
L201
C204 .0022 4.6KV
BRIGHTNESS
R109D 100K
R201 220K
R202 270K
R203 33K
R204 68K
R205 33K
C202 .01 2KV
C203 56 N750
R206 12K
BOOST B+ ... 500V
ON 90° CHASSIS
ON 110° CHASSIS
FOCUS LEAD
CONNECT TO ONE OF THREE TAPS GIVING BEST OVERALL FOCUS
R109A OPTIMIZER 7K
R111 47K
R112 330
C118 .001
CONTRAST
R109B 350
C124 .005
V7A
1/2 6BU8 OR 6GS8 OR 6HS8
AGC
R113 5.6K 10W
L112
L113 2.7K
R115 220K
R117 33K
R116 180K
C122 470 2KV
C123 2.4 NPO
R118 22K
C121 .25
RF AGC
NOISE GATE
R114A 3.4M
R114B 1M
R119 5.6M
E103
V12
6DQ6B
HORIZ OUTPUT
V13
6AL3 OR 6AF3
DAMPER
V14
3A3 OR 3AW3
HV RECT
T501
L503
C504 240 2KV N1500
R504 470
R505 330 1.5W
R506 10K 1.5W HORIZ SIZE
R507 19" 10K-2W ALL 23" & 27" 110° 6.8K 2W 27" -90° 5.6K-3W
C503 .1
L502
C508 220
R508 3.9
R510 22K
USED ONLY ON 110° CHASSIS 23" & 27" -150MMF 2.5KV 19"-320MMF 2.5KV
E503
R511 6.8K 1W
C507 .03 110° CHASSIS .05 90° CHASSIS
C505 .1
C506 .1
R509 820K
YOKE
L701
75-3KV 919" 110°)
82 or 100 3KV (23" & 27" 90°)
68 2KV (23" 110°) (27" 110°)
C701
RED
BLUE
ORG
35" TOTAL
V8B
1/2 6BL8
VERT OSC
R601 560K ON 90° CHASSIS 470K° ON 110° CHASSIS
VERT HOLD
R108E 1.750K
R601
R148 3.4M
VERT SIZE
E601
10K
90° ONLY
.015
.0033
.01
.05
V15
6GK6
VERT OUTPUT
R603 47K
C602 .033 250V
R602 1K
R606
R605 150 1W
T601
C604 .05
R607 100
VERT LIN
R604 500
120 STOP
C603 220 MF 20V
C601
.3 ON 90° .5 ON 110°
3.3K ON 90° 4.7K ON 110°
R701 560
R702 560
23" & 27" 90° ONLY
YEL
GRN
33" TOTAL
JUMPER LEAD
USED IN 110° CHASSIS ONLY
R606 LIMITS THE PEAK-TO-PEAK VOLTAGE TO 1800V MAXIMUM AT THIS POINT. A HIGHER VOLTAGE MAY DAMAGE V15, V15 SOCKET & T601.
B+
B++
270V
135V
100V
180V PP V
165V PP V
150V PP V
650V PP H
70V PP V
27V PP V
1500V PP V
VERTICAL

MOTOROLA Chassis TS-584 (group) Service Information, Continued



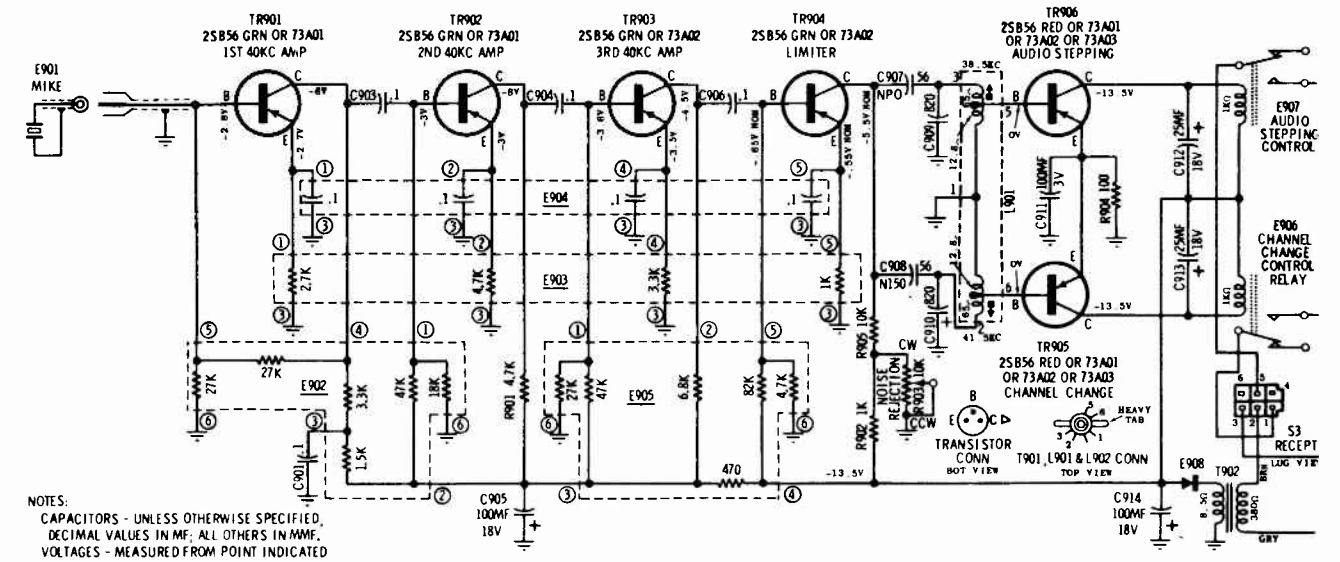
AUDIO CIRCUIT FOR STEREO-TV MODELS



NOTES:
CAPACITORS - UNLESS OTHERWISE SPECIFIED, DECIMAL VALUES IN MF; ALL OTHERS IN MMF.
VOLTAGES - MEASURED FROM POINT INDICATED TO GROUND WITH A VTVM, ± 10%. NO SIGNAL IN. INPUT 122V AC

RESISTANCES MEASURED WITH TRANSISTORS REMOVED FROM ASSOCIATED CIRCUITRY.
*THESE TRANSISTORS SHOULD BE MATCHED TYPE NUMBERS

REMOTE CHASSIS TRR1



NOTES:
CAPACITORS - UNLESS OTHERWISE SPECIFIED, DECIMAL VALUES IN MF; ALL OTHERS IN MMF.
VOLTAGES - MEASURED FROM POINT INDICATED TO GROUND WITH A VTVM, ± 10%. NO SIGNAL IN. INPUT 122V AC

REMOTE CHASSIS TRR2

MOTOROLA

CHASSIS TS-585
MODELS 19T38,39,40; 23T27,28

MODEL BREAKDOWN CHART

MODEL	CHASSIS	VHF TUNER	UHF TUNER
19T38BE,CH,P	SDTS-585	CMTT-340*	--
Y19T38BE,CH,P	SDTS-585Y	CMTT-340*	VTT-601
19T39AW,CH	PDTS-585	CPTT-338**	--
Y19T39AW,CH	PDTS-585Y	CPTT-338**	VTT 601
19T40MPG,WG	DTS-585	CPTT-339**	--
Y19T40MPG,WG	DTS-585Y	CPTT 339**	VTT-601
23T27BE,BR	PFTS-585	CPTT-338**	--
Y23T27BE,BR	PFTS-585Y	CPTT-338**	MTT-601
23T28MG,MPG,WG	PFTS-585	CPTT-338**	--
Y23T28MG,MPG,WG	PFTS-585Y	CPTT-338**	MTT-601

*Switch type tuner with continuously variable fine tuning, refer to "Installation and Service Adjustment" section for fine tuning adjustment procedure.

**Switch type tuner with concentric preset fine tuning, refer to "Installation and Service Adjustment" section for fine tuning adjustment procedure.

INSTALLATION & SERVICE ADJUSTMENTS

FINE TUNING ADJUSTMENTS

Prior to making any fine tuning adjustments, set the optimizer control to its mid-mechanical position (see "Optimizer Control" in this section).

Switch Type Tuners With Continuously Variable Fine Tuning

Center the fine tuning control mechanically. 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.

Switch Type Tuners With Concentric Pre-Set Fine Tuning

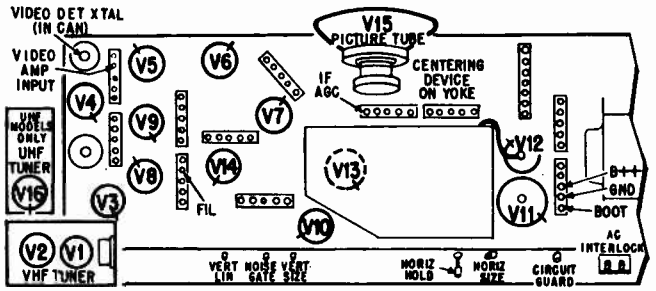
Rotate the fine tuning knob in either direction for best picture and sound on all available channels. Turning the fine tuning shaft to the right or left engages the pre-set gears. The gears, in turn, change the position of the core in the oscillator coil. Individual coils are used for each channel. Therefore, channel pre-set adjustments can be made in any sequence.

HORIZONTAL HOLD ADJUSTMENT

Adjust the horizontal hold on the rear of the cabinet for most stable horizontal sync while switching from channel to channel.

DEFLECTION YOKE ADJUSTMENT

The picture will be tilted if the deflection yoke is not correctly positioned. The picture may have raster distortions or neck shadows if the deflection yoke is not tight against the flare of the picture tube.



TS-585 SERIES TUBE LOCATION

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

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.

HORIZONTAL SIZE CONTROL

The horizontal size control varies the screen voltage of the horizontal output tube and should be adjusted after the raster has been properly centered.

NOISE GATE CONTROL

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

To adjust, tune in a channel for best picture and sound. Turn the noise gate control counter-clockwise (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.

OPTIMIZER CONTROL

The optimizer control is connected in series with the video detector load which results in a variable load affecting the video response of the receiver.

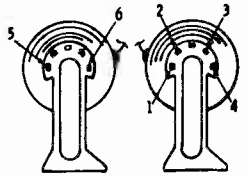
The optimizer control is not a service adjustment. It should be used in conjunction with the fine tuning, contrast and brightness controls to reduce the "snow effect" in fringe areas or sharpen and crispen the picture in areas where the signal strength is high.

For optimum effect, set the optimizer control to its mid-mechanical position, then adjust the fine tuning control to the point where sound bars just disappear from the picture. Then adjust the optimizer control for desired picture quality.

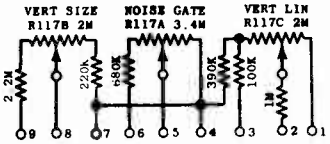
MOTOROLA **CHASSIS TS-585A-00**

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

** INDICATES SPECIAL COMPONENTS.



T501 CONN



R117 CONN DETAIL

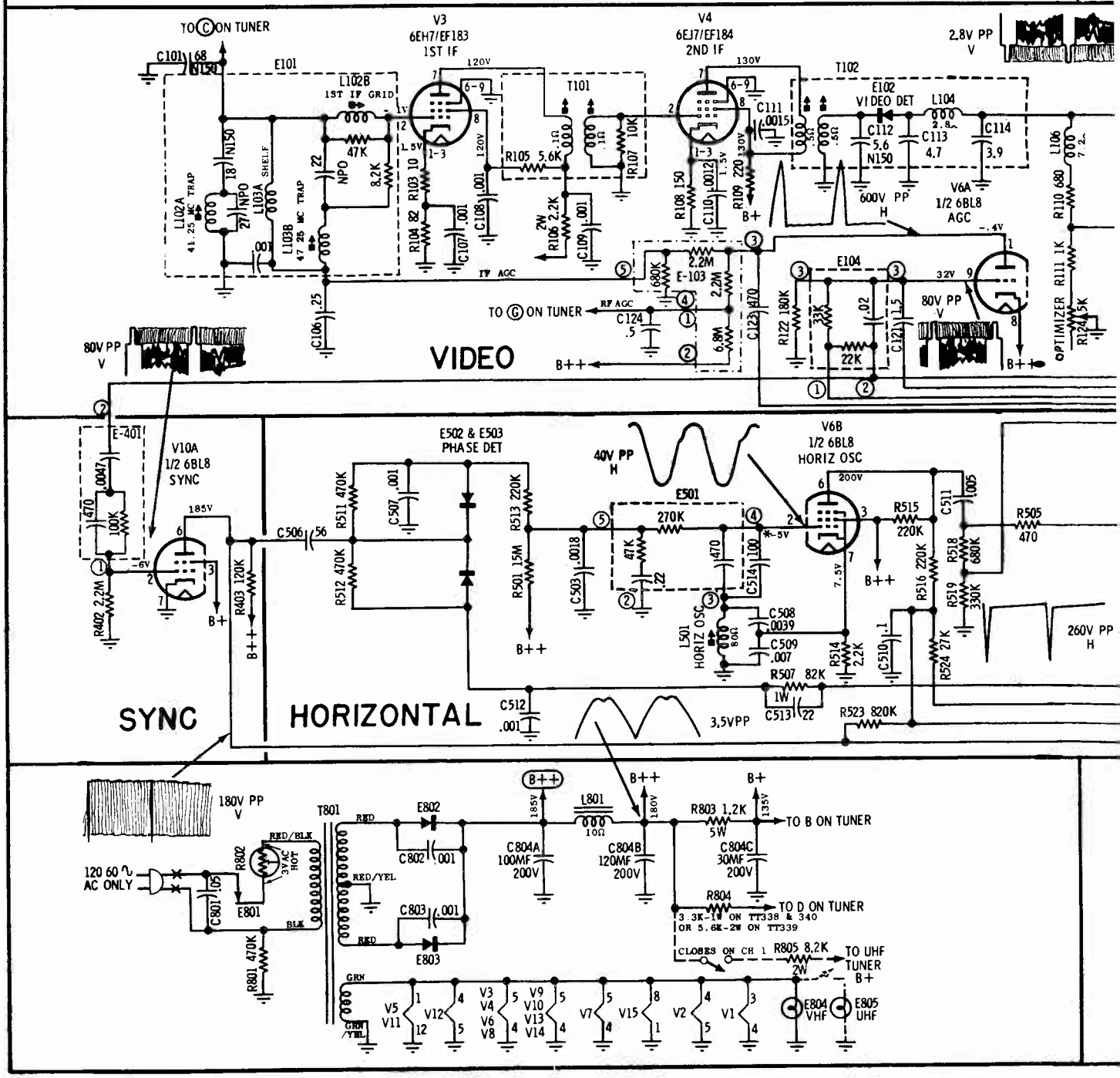
NOTES:

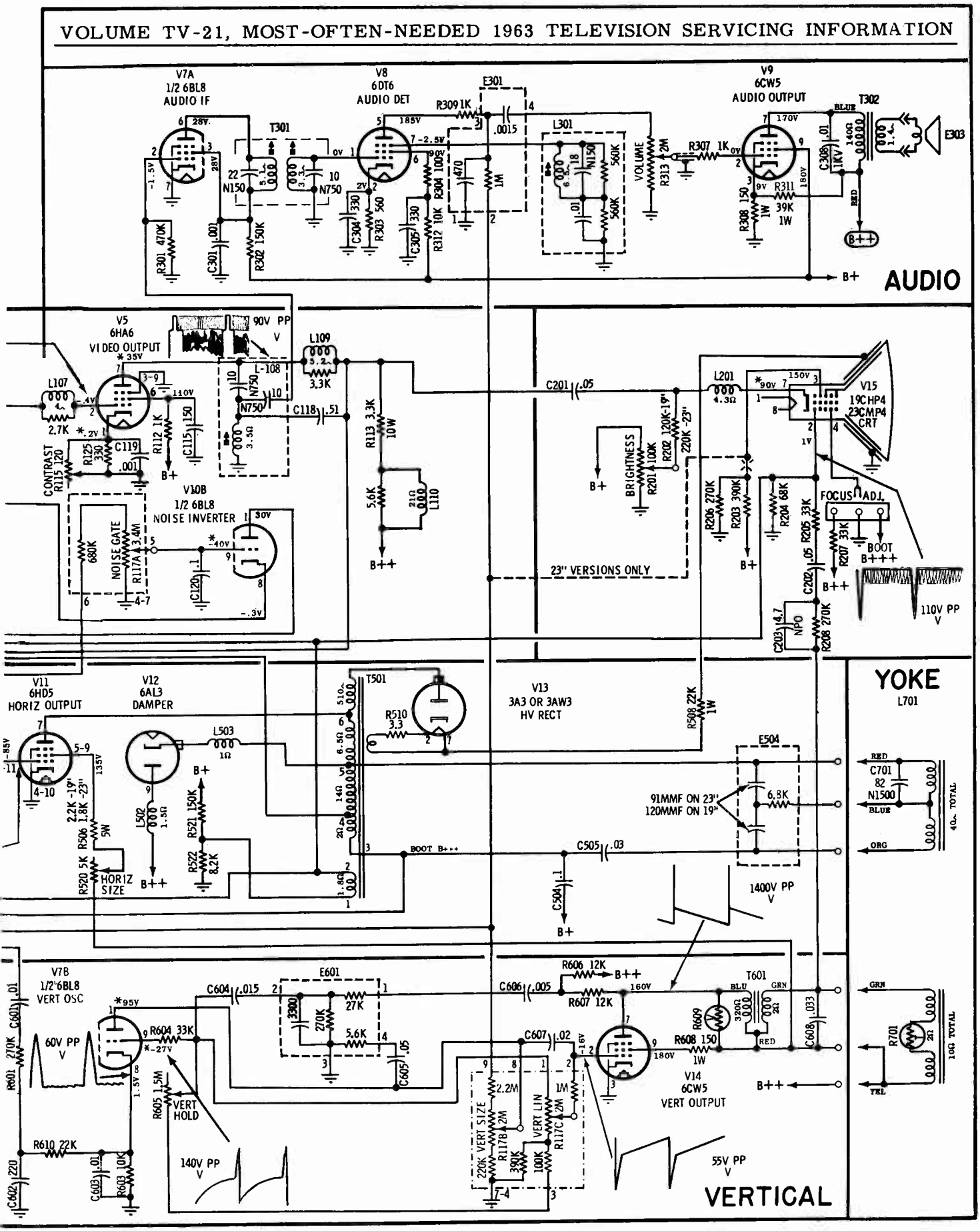
VOLTAGE MEASUREMENTS

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.




V7A
1/2 6BL8
AUDIO IF
V8
6DT6
AUDIO DET
V9
6CW5
AUDIO OUTPUT
T301
T302
E301
L301
E303
AUDIO
V5
6HA6
VIDEO OUTPUT
90V PP
V
L107
L109
L108
C118
C201
L201
V15
19CHP4
23CMP4
CRT
CONTRAST
BRIGHTNESS
FOCUS ADJ.
V10B
1/2 6BL8
NOISE INVERTER
NOISE GATE
23" VERSIONS ONLY
BOOT B+++
110V PP
V
YOKE
L701
V11
6HD5
HORIZ OUTPUT
V12
6AL3
DAMPER
T501
V13
3A3 OR 3AW3
HV RECT
E504
91MMF ON 23"
120MMF ON 19"
1400V PP
V
HORIZ SIZE
V7B
1/2 6BL8
VERT OSC
E601
T601
60V PP
V
VERT HOLD
140V PP
V
V14
6CW5
VERT OUTPUT
55V PP
V
VERT SIZE
VERT LIN
VERTICAL
B+
B++
B+++

MOTOROLA Chassis TS-585 (group) 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 radiatin.

3. Disable local oscillator. Short out the oscillator grid of mixer-oscillator tube with a wire or a thin bladed screwdriver thru hole provided adjacent to the grid pin.

4. Apply the negative lead of 9.0 volt bias supply to IF AGC line (junction of R and C), and positive lead to chassis ground.

5. Connect a 750 ohm, 15 watt voltage normalizing resistor from B+ to chassis.

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

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

7. Rotate noise inverter control fully 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 inter-action between the two tuning cores in a double tuned transformer or coil, each core should be adjusted for optimum response in the tuning position nearest its respective end of the coil form.

4.5 MC TRAP ADJUSTMENT (L-108)

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

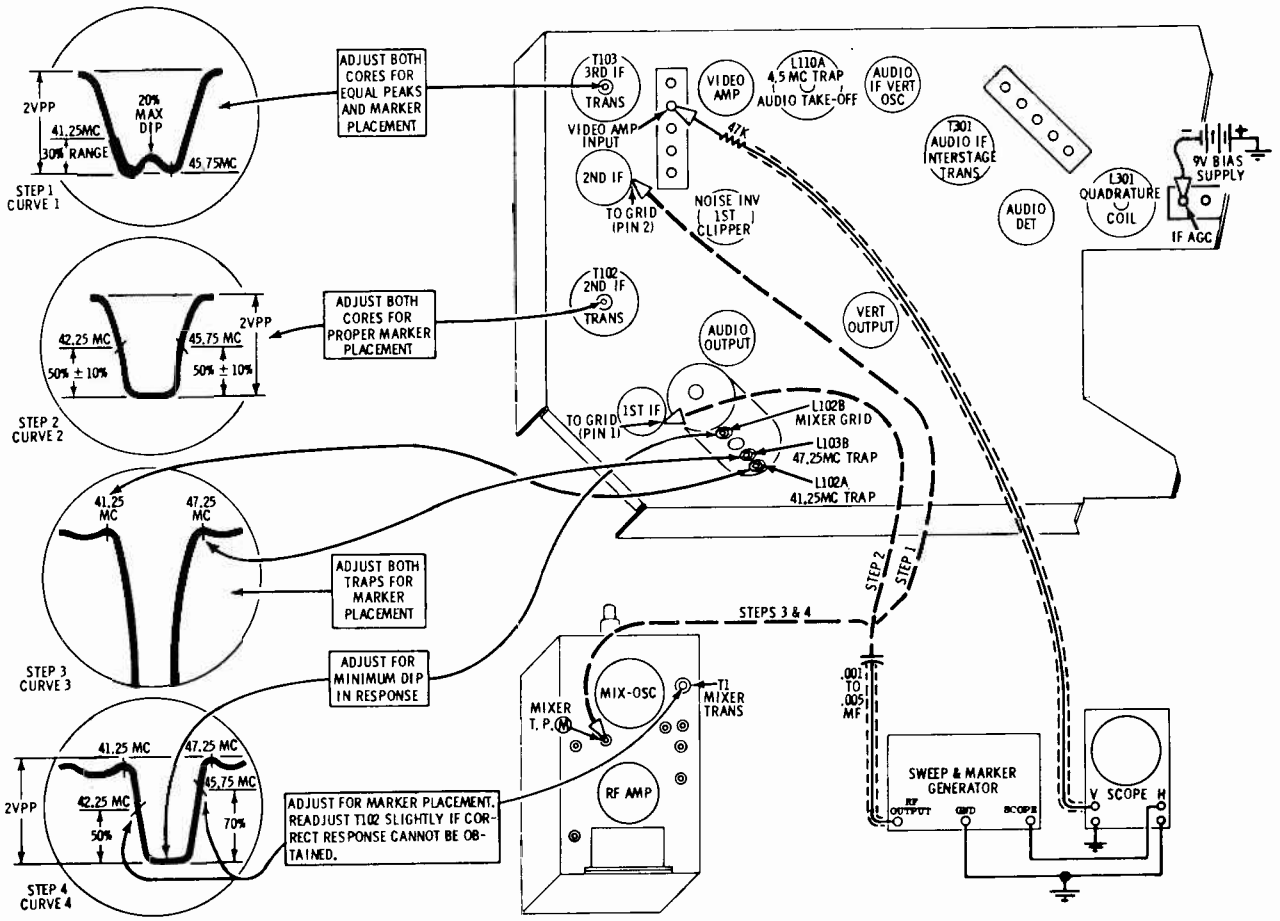
2. Adjust local oscillator (with fine tuning control) to bring 4.5 Mc interference strongly into the picture.

3. Adjust sound trap (L-108) 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 w ill result in no apparent beat interference.

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GEN. & MARKER	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
1.	To grid (pin 2) of 2nd IF Amp thru .001 mf cap. Wrap a wire around grid pin of tube and connect generator to wire. Set sweep to 44Mc, markers as required.	Scope to grid of Video Amp thru 47K ohm resistor.	Both cores of 3rd IF transformer (T-102)	Equal peaks and marker placement as shown in curve #1.
2.	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 44Mc, markers as required.	Same as step #1.	2nd IF transformer (T-101)	Proper 42.25Mc and 45.75Mc marker placement. See curve #2. NOTE: Mixer plate transformer (T-1) may cause suck-out in IF response. De-tune transformer if desired.
3.	To mixer T.P. M thru .001 cap. Set sweep to 44Mc, markers as required.	Same as step #1.	47.25Mc trap (L-103B) & 41.25Mc trap (L-102A)	Minimum response at proper trap frequency. See curve #3. NOTE: Temporary removal of bias and an increase of generator output may be required to see traps clearly.
4.	Same as step #3.	Same as step #1.	Mixer plate transformer (T-1 on tuner) & 1st IF grid coil (L-102B)	To obtain curve #4. The mixer transformer 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 transformer can be touched-up to obtain proper response as shown in curve #4.

MOTOROLA Chassis TS-585 (group) Alignment Information, Continued



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 guadrature 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.

SOUND ALIGNMENT PROCEDURE

STEP	STATION	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
1.	Strong signal.	VTVM to point A on quad coil L-301 (See schematic diagram.)	L-301 (quad coil)	Maximum deflection (coarse adjustment) of two possible maximum tuning points, use that giving the largest voltage reading.*
2.	Strong signal	Listening test	L-301 (quad coil)	Maximum sound with minimum distortion (fine adjustment).
3.	Weak signal	Listening test	T-301 (inter-stage coil)	Maximum 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 maladjusted 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.

Olympic

MA & MAU Chassis

3T700, 3C701, 3C702, 3C703, 3K718, 3K719, 3K720, 3K721, 3K722, 3K725

MB & MBU Chassis

3T800, 3C805, 3C806, 3C812, 3C813, 3C814, 7C809, 7C810, 3K826, 3K827, 3K830, 3K832, 3K834, 3K835, 3K836

ME & MEU Chassis

3T900, 3C901, 3C902

FUSES & CIRCUIT BREAKERS

In the MA/MAU chassis, fuse F1 is used for general set protection, fuse F2 for the 5V filament supply protection and fuse F3 for the 6.3V filament protection.

In the MB/MBU and ME/MEU chassis, circuit breaker CB1 is used for general set protection for temporary overloads or short circuits instead of fuses F1, F2 and F3. If the receiver does not operate, with plug in receptacle and power switch "on", press the Circuit Breaker push button on the rear of the chassis to reset (close) the circuit.

BUZZ ADJUSTMENT

To eliminate the intercarrier buzz, adjust the Sound Clarifier (L14 in MA/MAU, MB/MBU and L15 in ME/MEU) for minimum buzz and maximum sound.

CENTERING

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

FOCUS

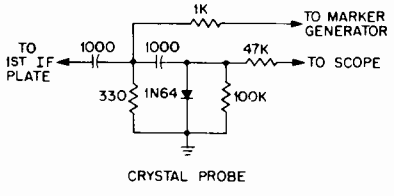
Connect the spring jumper from pin 6 (focusing grid of the picture tube) to pin 1 or from pin 6 to pin 10, whichever gives the best focus.

(Service material continued on pages 78 through 85)

ALIGNMENT INSTRUCTIONS

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 xrystal probe.
Variable bias supply: 0 to -5 volts dc.



PRELIMINARY ACTION

The high voltage lead should be securely taped away from the chassis. Allow the receiver and test equipment to warm up for about 20 minutes before proceeding with the alignment.

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 ground. Adjust bias to obtain response curve which shows no indication of overloading.

OLYMPIC Chassis MA, MAU, MB, MBU, ME, MEU, Alignment, Continued

STEP	SWEEP GENERATOR CONNECTIONS	SWEEP GENERATOR FREQUENCY	MARKER GEN. FREQUENCY (MC) MA MB	MARKER GEN. FREQUENCY (MC) ME	CONNECT TEST EQUIPMENT	ADJUST MA MB	ADJUST ME	REMARKS
1			47.5 High side to IF injection point on tuner, low side to tuner chassis.	47.5	VTVM thru probe to TP2. Low side to chassis near test point.	L1 (MB L23)	L1 L21	Set channel selector to channel 12. Adjust for maximum dip on VTVM.
2	Highside to IF injection point on tuner. Low side to tuner chassis.	44MC (10MC sweep)	42.75 45.75	42.5 45.75	Vertical amplifier of scope thru crystal probe to pin 5 of first IF (V1). Low side to chassis near crystal probe.	L101 L2	L101 L2	Connect jumper across antenna terminals. Adjust for symmetrical response curve similar to figure 1.
					Vertical amplifier of scope directly to TP2.	T1 L4 L5	T1 T2 T3	Turn all cores out. Turn in cores in order specified to obtain symmetrical response curve similar to figure 2. Retouch first two coils if required to obtain desired response.

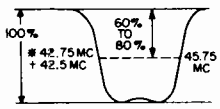


FIGURE 1

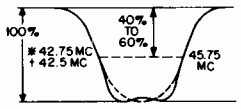


FIGURE 2

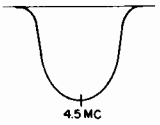


FIGURE 3

* MA, MAU, MB, MBU CHASSIS
† ME, MEU CHASSIS

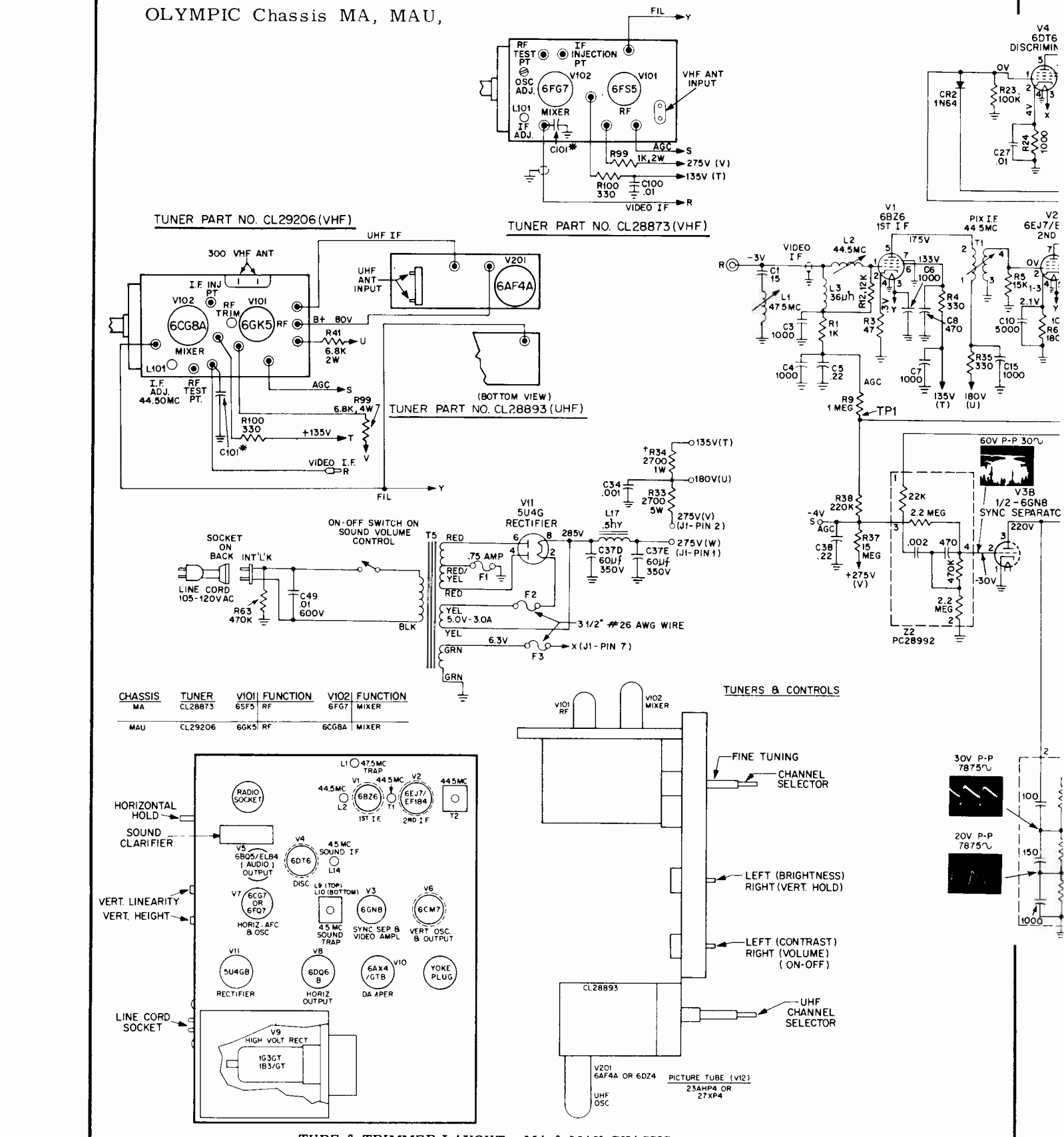
HORIZONTAL SWEEP CIRCUIT ADJUSTMENT

1. Turn the set on and allow it to warm up for 2 minutes.
2. Tune in a TV station, preferably one with a test pattern.
3. Connect a clip lead from the sync. separator tube (6GN8 pin 2 on MA and 6BU8 pin 9 on MB and ME) to chassis ground. Connect another clip lead across the Horizontal Frequency coil.
4. Turn the Horizontal Drive trimmer (MB and ME chassis only) counterclockwise until a vertical white line (drive line) appears near the center of the picture tube, then turn it clockwise until the line just disappears. If drive line cannot be obtained, keep at minimum capacity (counterclockwise).
5. Check the number of bars. There should be less than 12. If there are between 12 and 20 bars, clip out the 1.5 meg resistor, (R67-MA and MB, R68-ME). If there are more than 20 bars, clip out the 2.2 meg. resistor (R68-MA and MB, R85-ME).
6. Remove the clip lead from the Horizontal Frequency coil and adjust it until the picture is again in frequency.
7. Remove the clip lead from the sync. separator (step 3).

SOUND IF ALIGNMENT

1. Short out the Discriminator Coil by placing a short jumper across R27 (MA and MB) or R33 (ME) 150K.
2. Set all the controls to the extreme counterclockwise (minimum) position.
3. Remove V2, 2nd I.F.
4. Inject a 4.5 mc signal from the marker generator into TP2. High side to TP2 and low side to chassis ground. Use maximum signal from the marker generator.
5. Connect the crystal probe of the VTVM to pin 1 of Z1, TP3.
6. With the VTVM on the -3 volt scale, adjust the slug of coil L9 (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.
7. 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 L10 (bottom of chassis) and L13 (MB and ME only) maximum output at 4.5 mc. Repeat adjustment to obtain the curve of figure 3.
8. Replace removed tube (step 3) remove all test equipment leads and remove jumper across 150K resistor.
9. Tune in a strong TV signal. Adjust L14 (MA and MB) or L15 (ME) for maximum volume and minimum buzz. Notice that several peaks are evident, tune to the second peak starting with the slug all the way out.

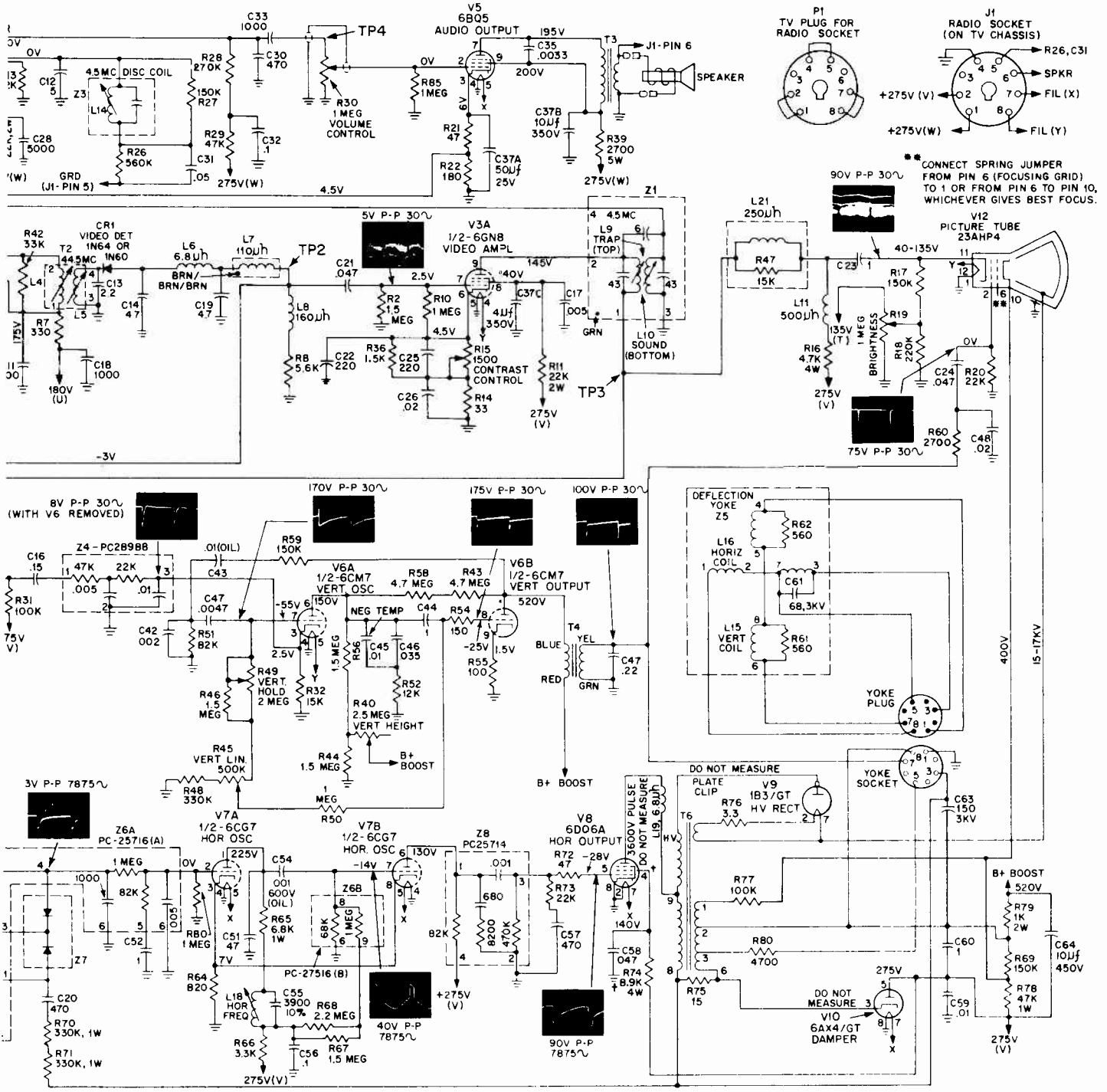
OLYMPIC Chassis MA, MAU,



CHASSIS	TUNER	V101	FUNCTION	V102	FUNCTION
MA	CL28873	6SF5	RF	6FG7	MIXER
MAU	CL29206	6GK5	RF	6CG8A	MIXER

TUBE & TRIMMER LAYOUT - MA & MAU CHASSIS

OLYMPIC Chassis MA, MAU, Schematic Diagram, Continued



CHASSIS MA &MAU, SCHEMATIC DIAGRAM

NOTES:

ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.

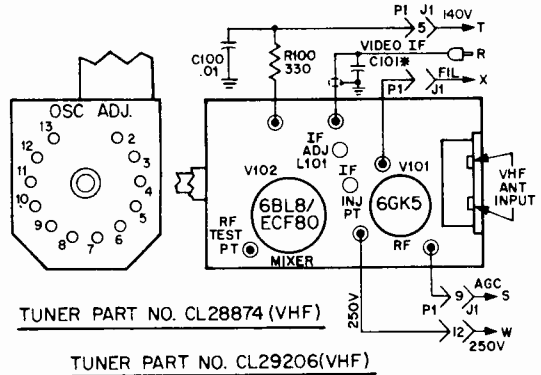
ALL CAPACITOR VALUES LESS THAN 1.0 ARE IN MICROFARADS AND GREATER THAN 1.0 ARE IN MICRO-MICROFARADS UNLESS OTHERWISE NOTED

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 A 5µµf OR A 10µµf CAPACITOR OR BOTH IN PARALLEL.

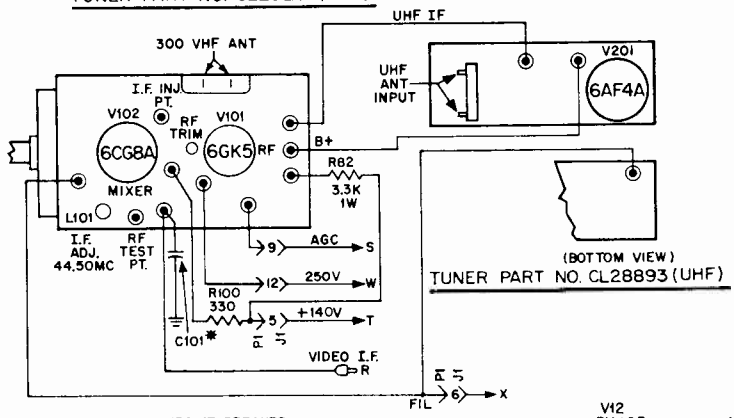
OLYMPIC

Chassis MB, MBU

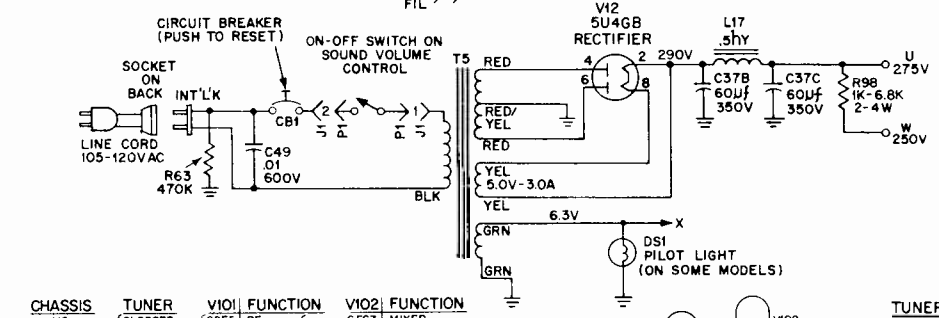


TUNER PART NO. CL28874 (VHF)

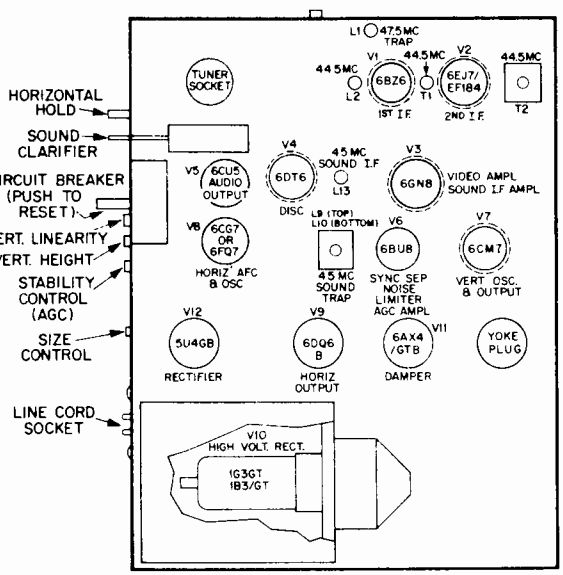
TUNER PART NO. CL29206(VHF)

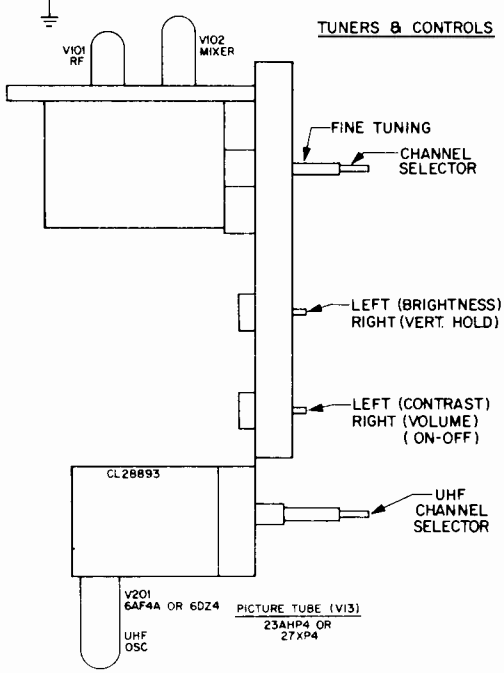


TUNER PART NO. CL28893 (UHF)

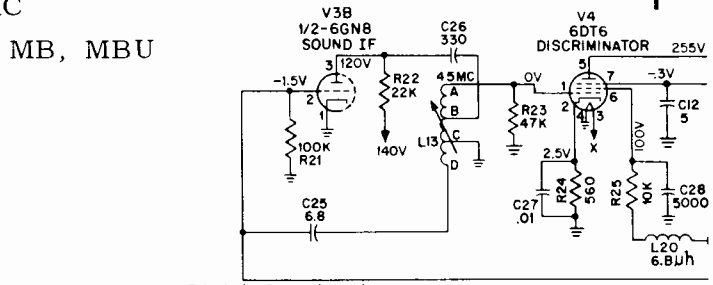


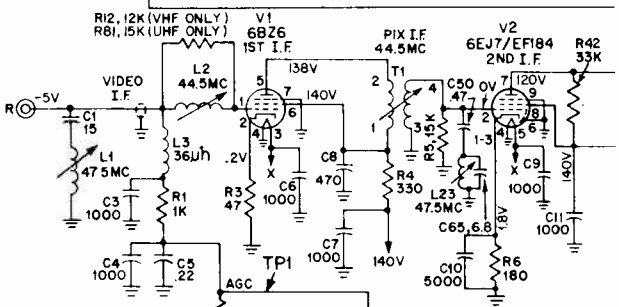
CHASSIS	TUNER	V101	FUNCTION	V102	FUNCTION
MB	CL28873 OR CL28874-1	6SF5 OR 6GK5	RF RF	6FG7 OR 6BL8/ECF80	MIXER MIXER
MBU	CL29206	6GK5	RF	6CG8A	MIXER

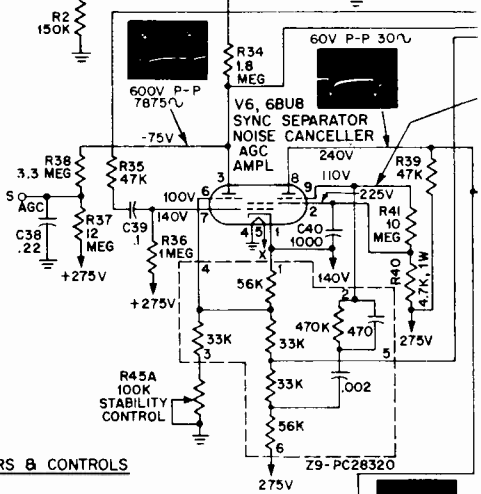


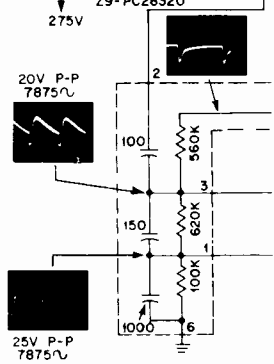


TUNERS & CONTROLS



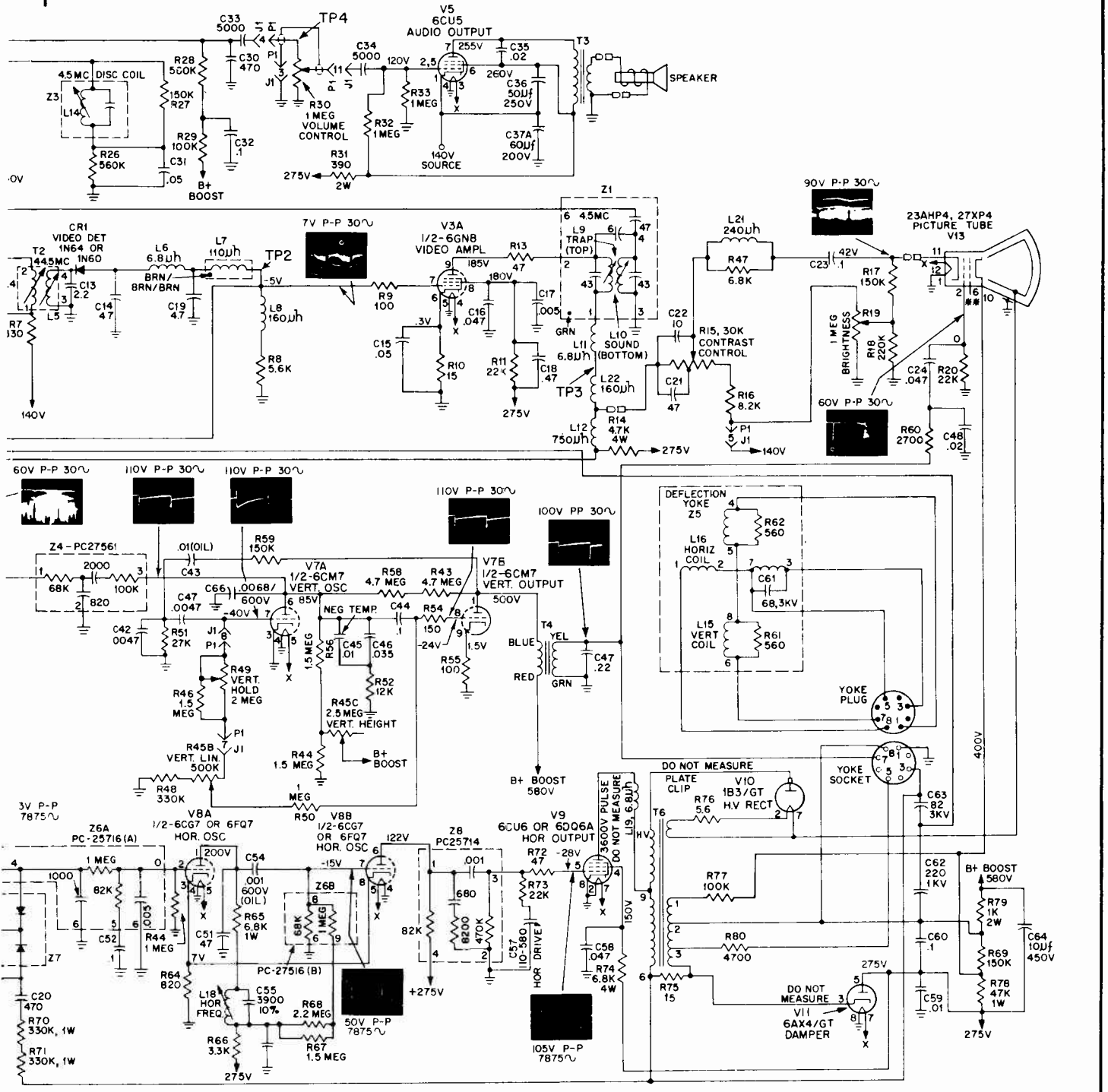






TUBE & TRIMMER LAYOUT - MB & MBU CHASSIS

OLYMPIC Chassis MB, MBU, Schematic Diagram, Continued



CHASSIS MB & MBU, SCHEMATIC DIAGRAM

NOTES:

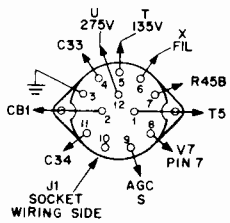
ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.

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

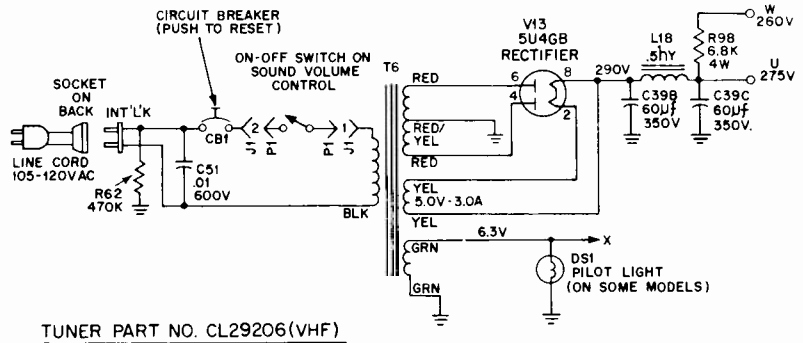
ALL VOLTAGES ±15%, MEASURED WITH A VTVM, BETWEEN INDICATED POINTS AND GROUND WITH AN INPUT VOLTAGE OF 117V, 60∿ AND NORMAL SIGNAL INPUT WITH CONTRAST CONTROL SET TO PRODUCE 90V, P-P AT KINESCOPE.

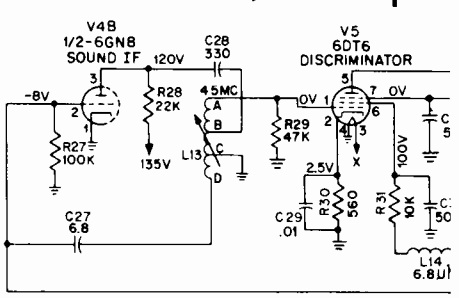
*SOME SETS HAVE A 5µµf OR A 10µµf OR BOTH IN PARALLEL.

**CONNECT SPRING JUMPER FROM PIN 6 (FOCUSING GRID) TO 1 OR FROM PIN 6 TO PIN 10, WHICHEVER GIVES BEST FOCUS.

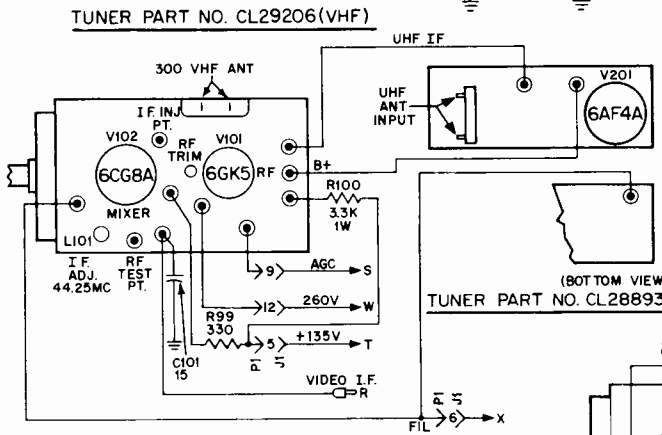


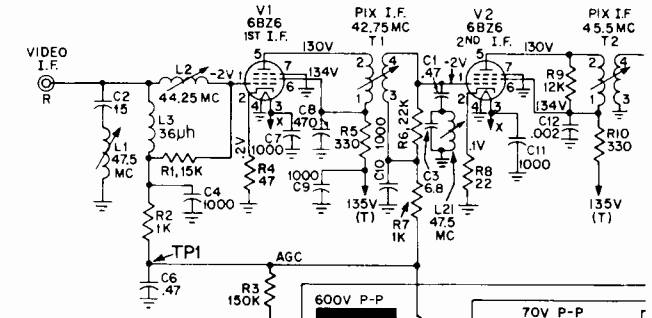
OLYMPIC Chassis ME, MEU





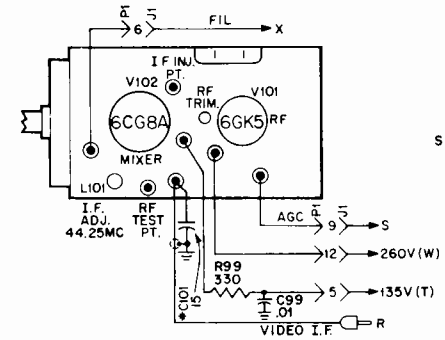
TUNER PART NO. CL29206(VHF)

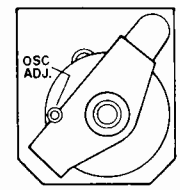




(BOTTOM VIEW)

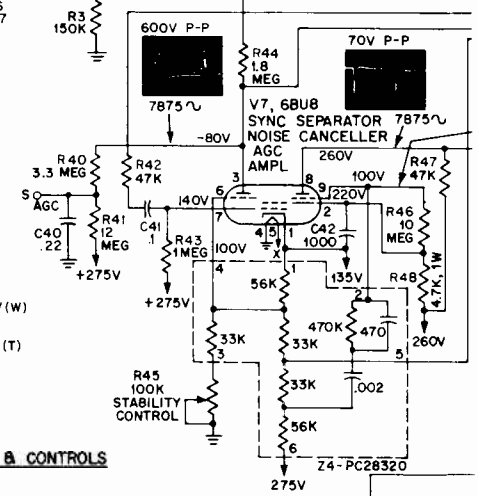
TUNER PART NO. CL28893(UHF)



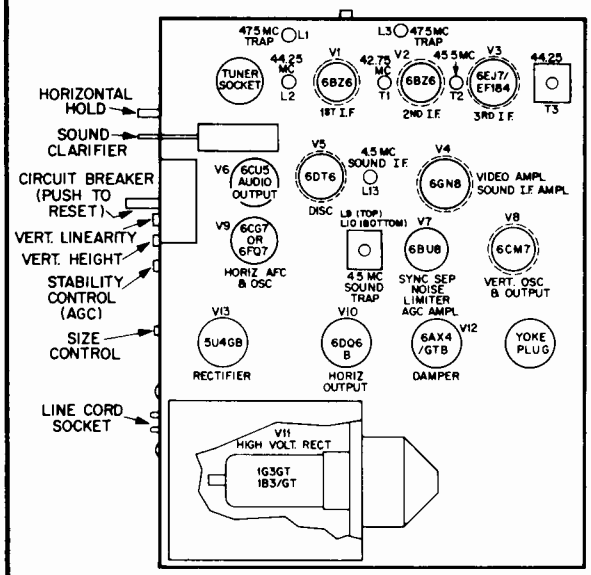


FRONT VIEW OF TUNERS

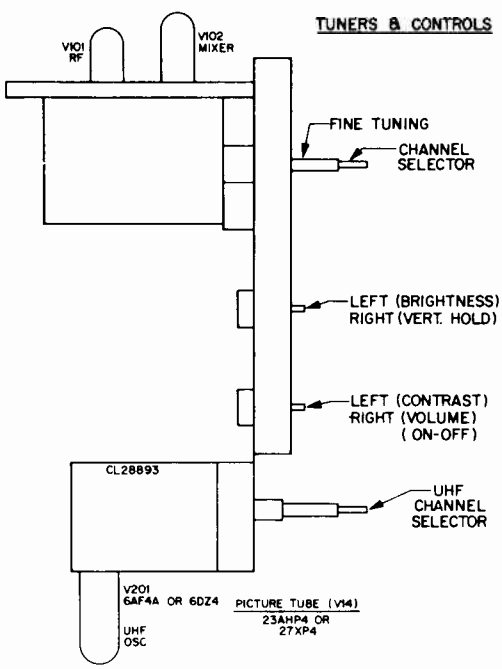
TUNER PART NO. CL28875(VHF)

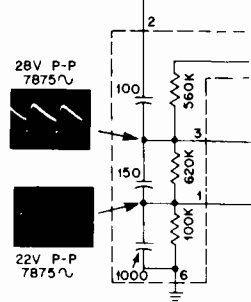


CHASSIS	TUNER	V101	FUNCTION	V102	FUNCTION
ME	CL28875	6GK5	RF	6CG8A	MIXER
MEU	CL29206	6GK5	RF	6CG8A	MIXER



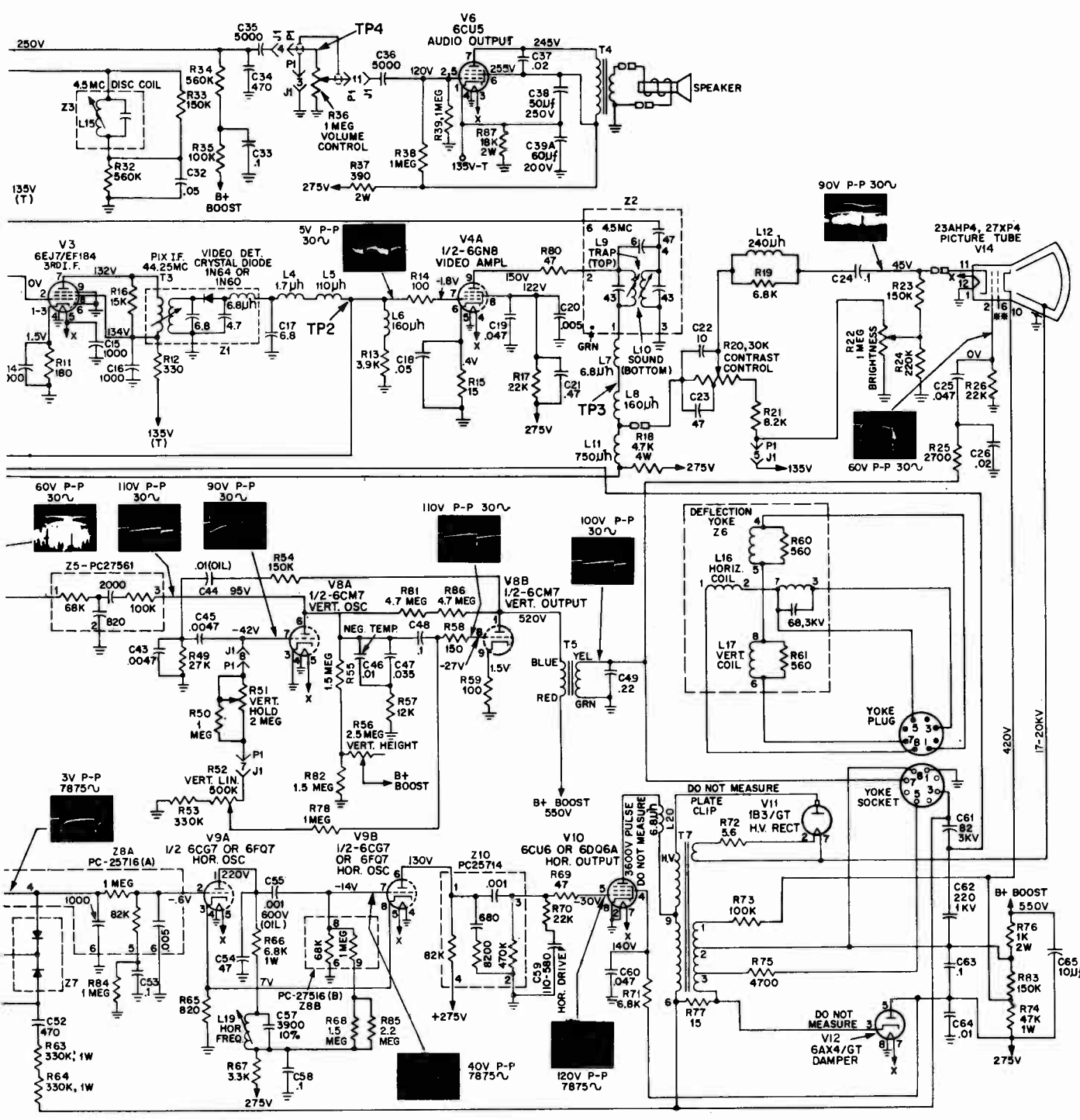
TUNERS & CONTROLS





TUBE & TRIMMER LAYOUT - ME & MEU CHASSIS

OLYMPIC Chassis ME, MEU, Schematic Diagram, Continued



CHASSIS ME & MEU, SCHEMATIC DIAGRAM

NOTES:

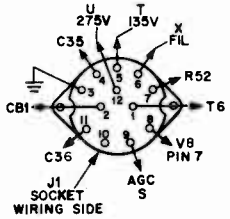
ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.

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 A 5µµf CAPACITOR IN PARALLEL WITH C101.

** CONNECT SPRING JUMPER FROM PIN 6 (FOCUSING GRID) TO 1 OR FROM PIN 6 TO PIN 10, WHICHEVER GIVES BEST FOCUS.



Packard Bell

TELEVISION MODELS 23DC14, -15, & -16, 23DT2, & 23DD9

The chassis 98D16 and 98D16C used in the above listed models differ in that the former contains a picture tube with 114 degree deflection and the latter contains a picture tube with 92 degree deflection. On pages 86-87 is exact diagram for 98D16C, while the other chassis has differences in deflection circuits. Other service material is continued on page 88.

CIRCUIT BREAKER

A circuit breaker, instead of a fuse, protects against voltage surges or component failure. If set becomes inoperative, push red button at rear to reset circuit breaker. **Turn power off first.**

D-C RESTORER SWITCH

The brightness control knob operates the D-C restorer switch, which is on when the knob is pulled **out.** The D-C restorer circuitry helps to maintain the black level of the picture at a constant value, and should be used unless the picture quality is impaired thereby. Under some conditions of transmission, the picture may be more satisfactory with the D-C restorer switch off.

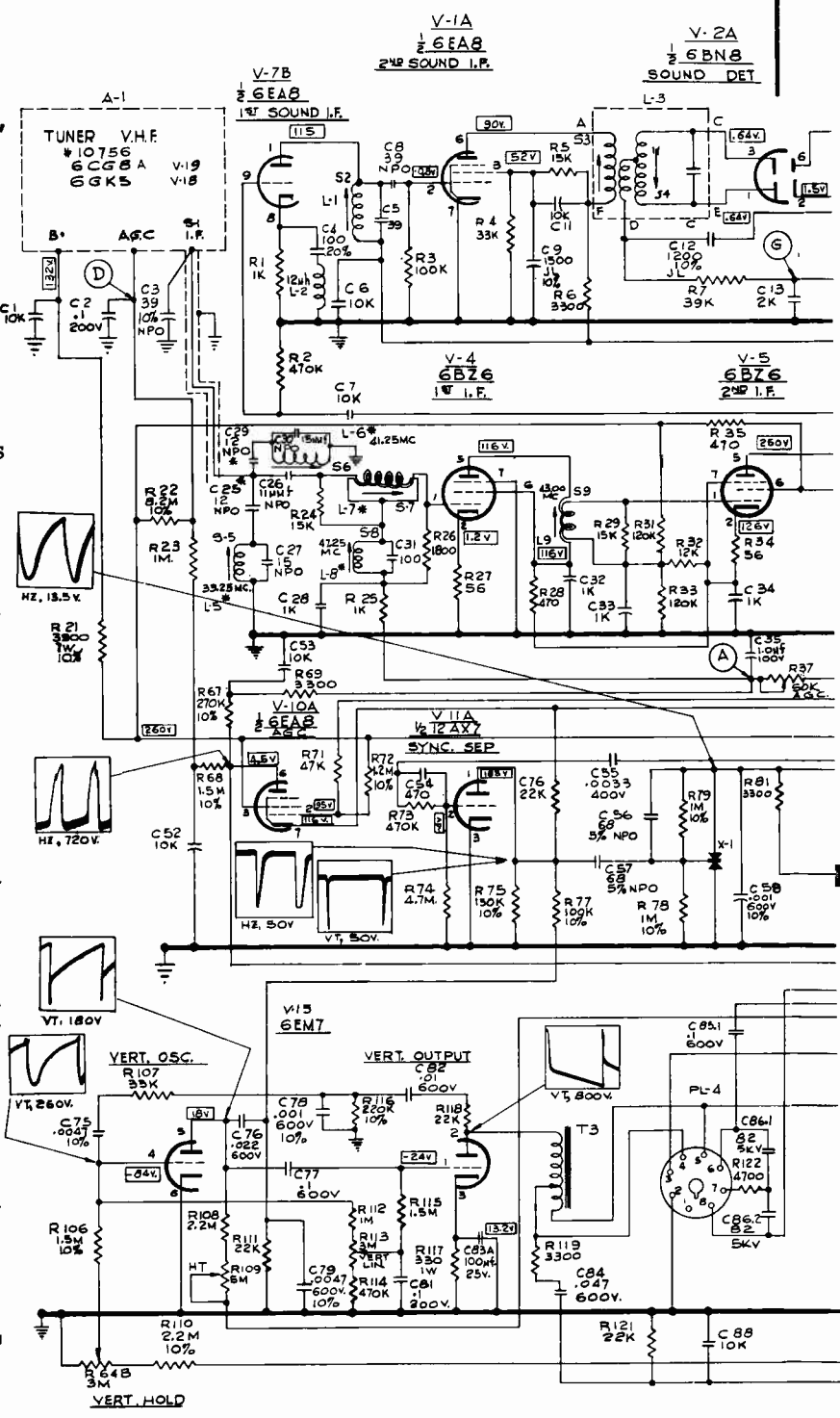
CONTROLS

A complete list of the controls will be found in the parts list under the heading "CONTROLS". Operation of controls not mentioned here is considered self-explanatory.

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

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

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

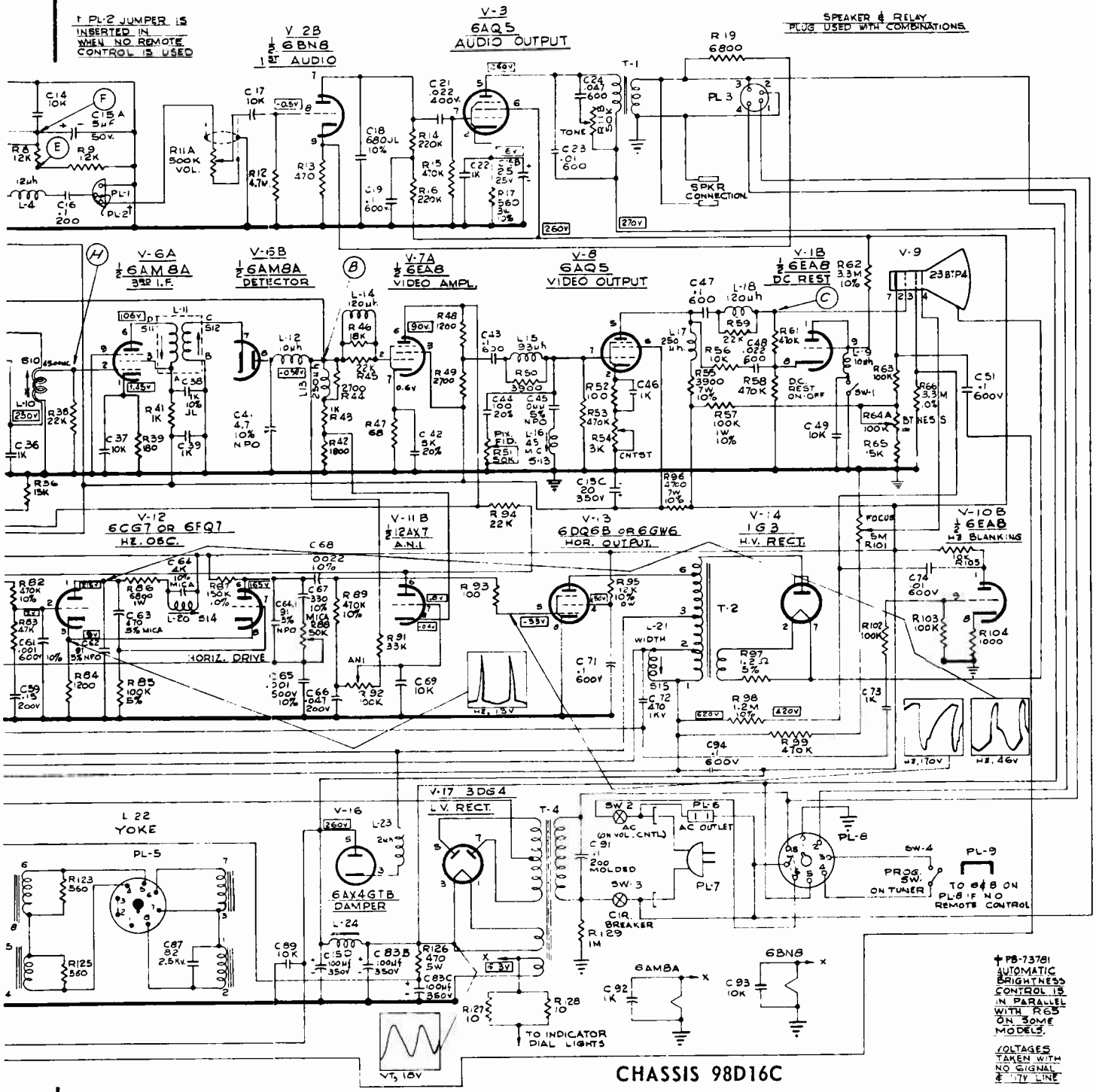


HORIZONTAL DRIVE is turned counterclockwise until drive bar appears and then clockwise until drive bar just disappears.

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

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

PACKARD BELL Chassis 98D16C Schematic Diagram, Continued

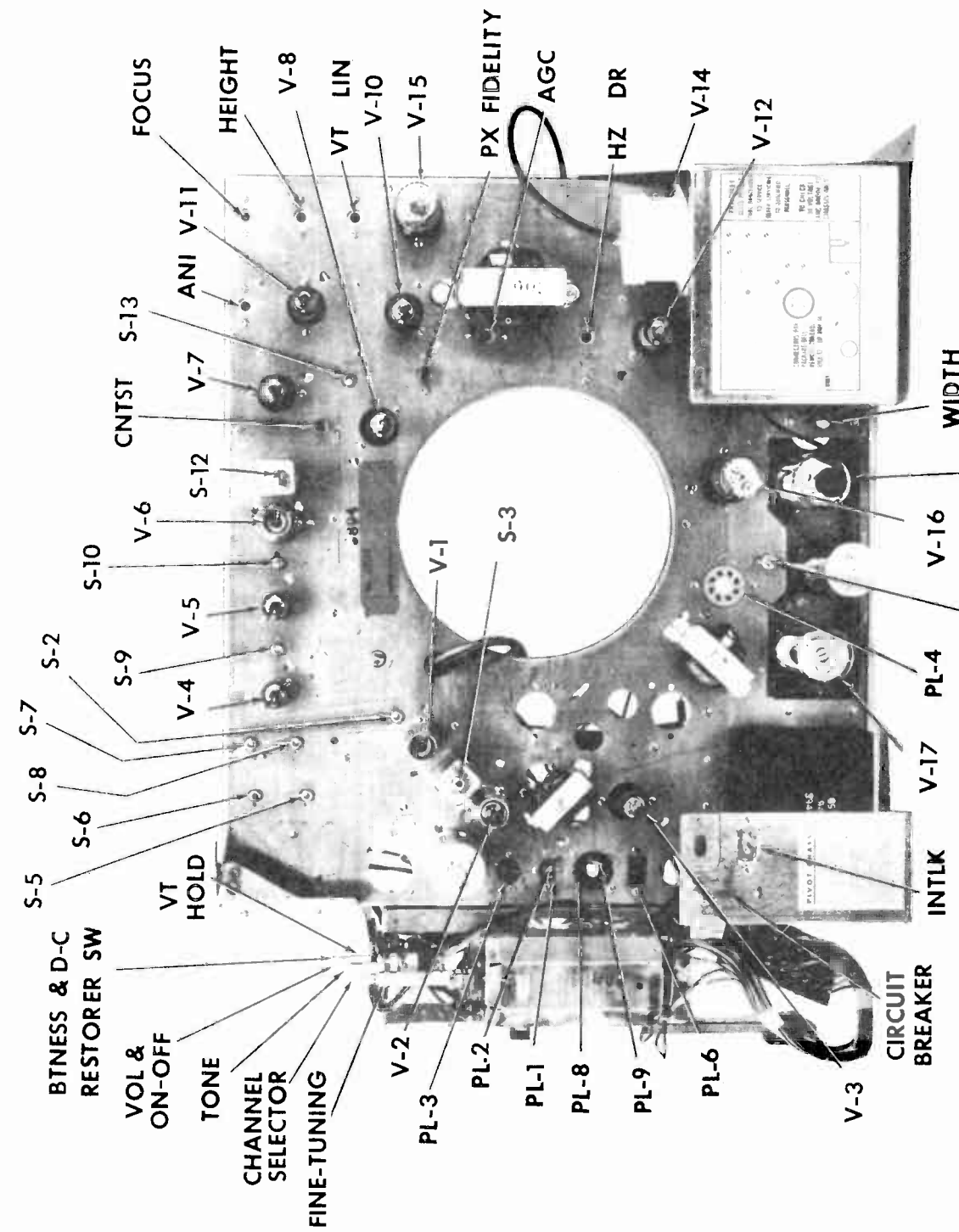


RF TUNER

The VHF tuner used in chassis 98D16 & 98D16C is part number 10756. It contains a 6GK5 amplifier and a 6CG8A oscillator-mixer.

Oscillator core adjustment is accomplished by means of the fine tuning knob. A gear train makes it possible to adjust each channel tuning individually, so that only one adjustment is needed per channel. This feature is Packard Bell's "Set-N-Forget" fine tuning.

PACKARD BELL Chassis 98D16,C, Service Information, Continued



CHASSIS 98D16, TOP VIEW (CALLOUTS FOR CHASSIS 98D16C ARE THE SAME)

PHILCO

The cross reference chart below and on the next page will tell you what chassis material is needed for any particular model. All chassis types with reference to pages for such material are listed directly below. Some general service information applicable to all chassis is on page 90.

Chassis 13G20, C, U, diagrams, alignment, service data, see pages 91-96;
Chassis 13J27, U, diagrams, alignment, service material, see pages 97-102;
Chassis 13J28, U, practically identical to Chassis 13J27, see above;
Chassis 13J41, 13J42, 13J43, C, U, 13J45, U, service material on pages 103-108;
Chassis 13N50A, AU, U, alignment, diagrams, service data, pages 109-113;
Chassis 13N51, U, 13N52, 13N53, U, similar to above, diagram on page 114.

1963 "L" LINE TELEVISION MODEL-CHASSIS CROSS REFERENCE

MODEL	CHASSIS FOR VHF MODELS	CHASSIS FOR UHF MODELS
PORTABLE MODELS		
L2600BU	13G20	13G20U
L2600CBU	13G20C	
L2602BR	13G20	13G20U
L2602CBR	13G20C	
L2604BK	13G20	13G20U
L2604CBK	13G20C	
L3219BU	13J27	13J27U
L3221BE, WB	13J27	13J27U
L3225BE, GD	13J27	13J27U
L3232GD, SL	13J27	13J27U
L3243BE	13J28	13J28U
L3244BK, SA, WH	13J28	13J28U
COMPACT MODELS		
L3740BE, CG	13J45	13J45U
L3804BE	13J41	13J43U
L3804CBE	13J43C	
L3808BK, WH	13J43	13J43U
L3808CWH, CBK	13J43C	
L3810WA	13J43	13J43U
L3810CWA	13J43C	
L3814RWH	13J42	

MODEL	CHASSIS FOR VHF MODELS	CHASSIS FOR UHF MODELS
TABLE AND CONSOLE MODELS		
L4340BK, WA, MR	13N50	13N50U
L4340XMR, XWA	13N50	13N50U
L4341CBK, CMR	13N50	13N50U
L4343CMR, CWA	13N50	13N50U
L4863CMR, CWA, CBL	13N50	
L4865CMR	13N50	
L4866XMR, XWA	13N50	13N50U
L4866CJMR, CJWA	13N50	
L4867CWA, CBL, CMR	13N50	
L4868XMR, XWA	13N50	13N50U
L4869M, BL, WA	13N50	13N50U
L4870MR, MA, WA	13N50	13N50U
L4870CJWA, CJMR	13N50	13N50U
L4871MR, WA	13N50	13N50U
L4872MR, CH	13N50	13N50U
L4873CMR, CWA	13N50	
L4874SMR, SBL, SWA	13N50	13N50U
L4875CMR, CMA	13N50	
L4876SBL, SMR, SWA	13N50	13N50U
L4877CSMR, CSWA, CSBL	13N50	
L4879VMR, PMA, VWA	13N50	13N50U
L4879CMR, CMA, CWA	13N50	

PHILCO 1963 "L" Line Television, General Information, Continued

TABLE AND CONSOLE MODELS (Continued)

MODEL	CHASSIS FOR VHF MODELS	CHASSIS FOR UHF MODELS
L4880ML, WA, MA, MB, CH, WH	13N51	13N51U
L4880RWA, RMB, RML	13N52	
L4880CMB, CML, CCH, CWA, CMA, CWH	13N51	
L4882MB, ML, WA	13N51	13N51U
L4882CML, CMB, CWA	13N51	
L4882RMB, RWA, RML	13N52	
L4886CH, MB	13N51	13N51U
L4886CMB, CCH	13N51	
L4888MB, WA, CH	13N51	13N51U
L4888CMB, CWA, CCH	13N51	
L4890MA, MB, WA, ML	13N53	13N53U
L4890CMB, CWA, CMA, CML	13N53	
L4896WA, MB, CH, EB	13N53	13N53U
L4896CEB, CCH, CWA, CMB	13N53	

CONSOLE COMBINATION MODELS

L4923MB, WA	13N50	13N50U
L4923CMB, CWA	13N50	
L4924WA, MB, MA	13N53	13N53U
L4924CMB, CMA, CWA	13N53	
L4926M, WA, CH	13N53	13N53U
L4926CCH, CWA	13N53	

G-2 CONTROL SET-UP

Chassis Types - 13J41, 13J42, 13J43 and 13J45

1. Allow 5 minute receiver warm-up time.
2. Set channel selector to any unused channel.
3. Set brightness and contrast controls to maximum.
4. Apply -1.5V bias to lug M41.
   Note: Bias supply must be of low impedance, such as a 1.5 volt battery.
5. Open CRT cathode lead at lug M34, insert d-c microamp meter.
6. Adjust CRT cathode current to approximately 220 by adjusting G-2 control (VR2). Acceptable limit of cathode current is between 180 and 280.

Chassis Types - 13N50, 13N51, 13N52 and 13N53

1. Repeat Steps 1, 2 and 3 above.
2. Apply -1.5V bias to lug M7 on VOS panel.
   Note: Bias supply must be of low impedance, such as a 1.5 volt battery.
3. Open CRT cathode lead at lug M19 on VOS panel, insert d-c microamp current meter.
4. Adjust CRT cathode current to approximately 250ua, by adjusting G-2 control (VR2). Acceptable limit of cathode current is between 200ua and 300ua.

CHECKING THE HORIZONTAL PHASE COMPARER SELENIUM DIODE (D1 ON V.O.S. PANEL)

When servicing television receivers where the dual selenium diode 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.

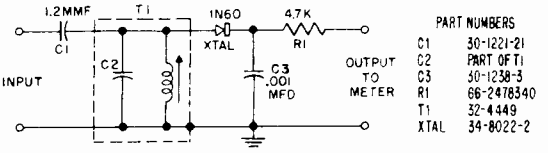
HORIZONTAL OSCILLATOR ADJUSTMENT

Allow Set to warm up. Tune in a picture.

1. Short out horizontal ringing coil by placing jumper across coil or between components connected to the coil terminals.
2. Set horizontal hold control to center of its range.
3. Adjust horizontal hold centering control, (secondary control) to set oscillator to correct horizontal line frequency (to stop picture, it will not be stable).
4. Remove shorting jumper and adjust ringing coil for stable picture sync.

4.5 MC DETECTOR JIG

It is important that the jig be properly aligned to give proper results. Connect detector jig to an accurate source of 4.5 MC signal and pad transformer T1 for maximum d-c voltage output. Signal generator can be calibrated by zero beating with sound I-F developed from station signal.



4.5 MC Detector Jig Schematic

TUNER OSCILLATOR ALIGNMENT

This procedure uses the traps of the video I-F channel, thus, proper oscillator adjustment is dependent upon an accurately aligned I-F strip.

1. Connect A-M generator to antenna input terminals (no matching network required). Use 30% modulated signal.

2. Connect oscilloscope to the video detector output lug.

LINE LEAKAGE COLD CHECK

1. Remove a-c plug from wall outlet and place a jumper between the two plug prongs. Turn receiver a-c switch "on".

2. Connect one lead from an ohmmeter to the jumpered a-c plug and touch the other ohmmeter lead to the exposed metal parts of the cabinet and trim (including antenna). Limits within which the readings should fall are:

   Receivers with power transformers - 1.2 meg to 3.2 meg
   Receivers without power transformers - 1.5 meg to 3.5 meg

PHILCO

CHASSIS ALIGNMENT
13G20

VIDEO I-F AM AND SWEEP ALIGNMENT PROCEDURE

Preliminary Information

The following video I-F alignment procedure is based upon a tuner, with proper bandpass alignment, connected to the TV chassis.

1. Apply −10VDC to AGC test point, lug M16 on perma-circuit panel.
2. Calibrate oscilloscope for 2.0V p/p for 100% deflection.
3. Connect scope through 10K isolating resistor to 2nd detector T.P., lug M21. Connect .001 mfd from lug M21 to ground to sharpen sweep markers.
4. Connect AM and marker signal generators through test jig to mixer (C1T on tuner). Connect sweep generator, through a 72 ohm to 300 ohm matching network, to antenna terminals.
5. (a) Preset L-12, L-14, and L-18 so that top of cores are 1/8-inch out of coils.
   (b) Preset L-13, L-15, and L-17 so that top of cores are even with top of coils.

AM ALIGNMENT CHART

STEP	AM MOD. 400 AT 50%	ADJUST	REMARKS
1	43.5 MC	L17 - for max.	Adjust input level to prevent overloading.
2	43.0 MC	L18 - for max.	Same as Step #1.
3	43.5 MC	L10 - for max. L14 - for max. L1T (tuner I-F coil) - for max.	Same as Step #1.
4	41.25 MC 47.25 MC 47.25 MC	L-13 - for min. L-12 - for min. L-15 - for min.	Bias may be lowered to produce sufficient scope amplitude. Repeat adjustments of L12 and L15 until no further improvement is obtained.

NOTE: To properly position fine tuning for sweep alignment, set tuner to channel 4 and inject 65.75MC, modulated 30% at the antenna terminals. Adjust fine tuning control for minimum scope indication. Do not touch fine tuning control for channel selector for balance of alignment.

Fig. I-6A

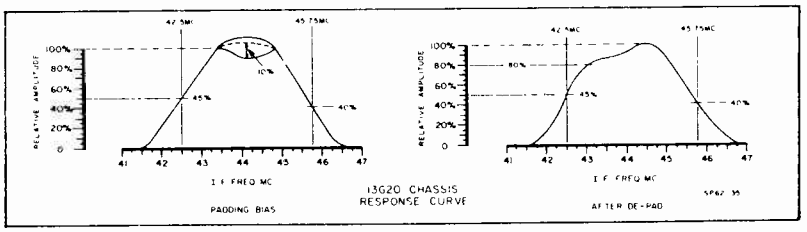


Fig. I-6B

SWEEP ALIGNMENT CHART

STEP	SWEEP GEN. APPROX. 8 MC SWEEP WIDTH	MARKER GEN. UNMOD. R-F	ADJUST	REMARKS
5	69 MC	42.5 MC	L1T (tuner I-F coil)	Adjust L1T to place 42.5 MC marker between indicated limits on sound side of curve (Figure 1-6A). Adjust sweep generator level to limit scope to 2V p/p deflection. Keep response level with L10.
6	69 MC	45.75 MC	L14	Adjust L14 to place 45.75 MC marker between indicated limits on video side of curve (Figure 1-6A). Adjust sweep generator level to limit scope to 2V p/p deflection. Keep response level with L10.
7	69 MC	42.5 MC and 45.75 MC	L10	L10 tilts or levels curve. Adjust curve to fall within limits (Figure 1-6B).

PHILCO Chassis 13G20 Alignment Information, Continued

4.5MC TRAP, SOUND TAKE-OFF AND INTERSTAGE ALIGNMENT

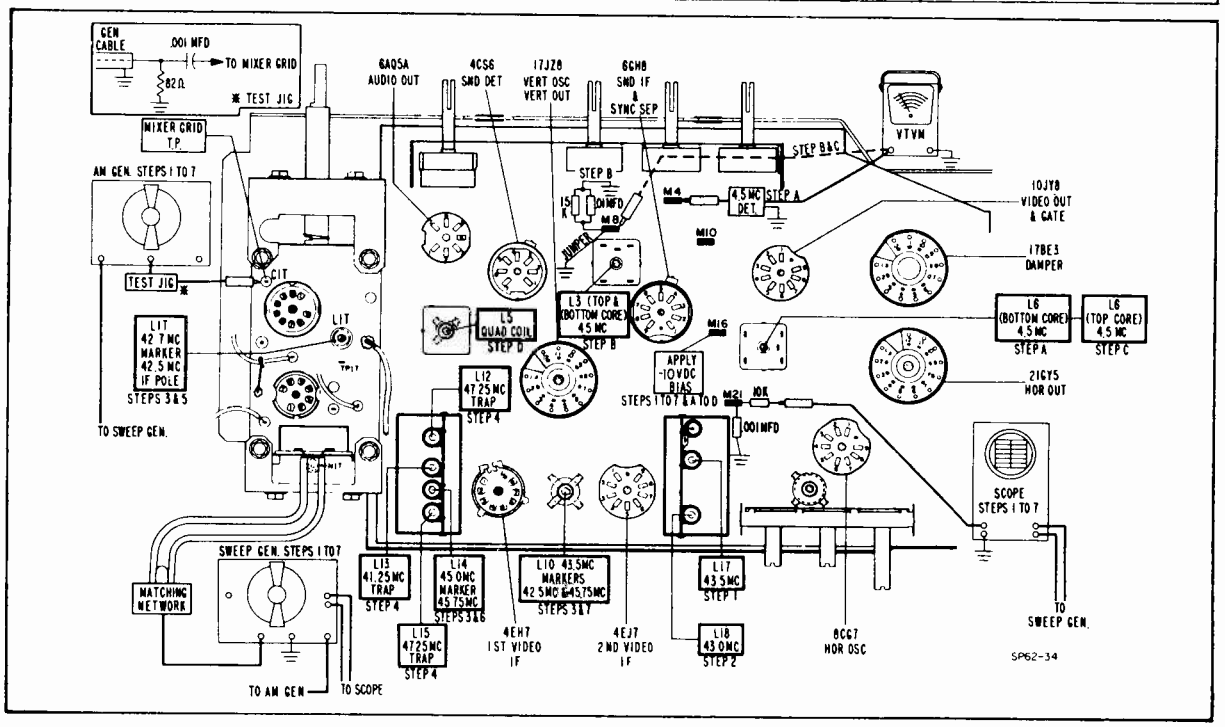
Preliminary:

1. Set contrast control to maximum
2. Set volume control to minimum
3. Apply −12V bias to lug M16

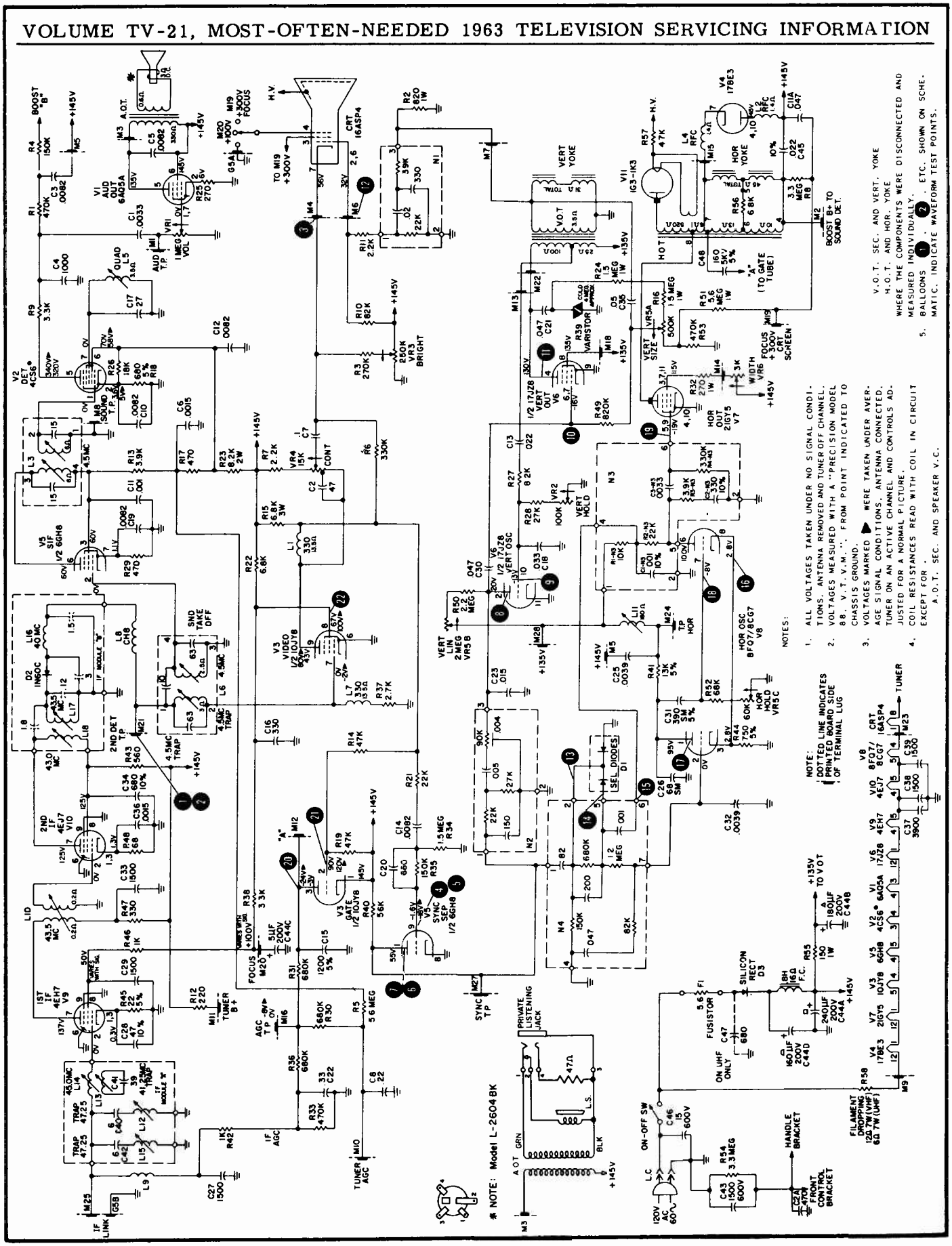
Equipment:

1. V.T.V.M.
2. AM Generator
3. RC Network (15K resistor and .01 mfd in parallel)
4. 4.5 MC Detector Probe (See page 90 for circuit diagram)

STEP	SIGNAL INPUT THROUGH 1500Ω RESISTOR TO LUG M2I	OUTPUT	ADJUST	REMARKS
A	4.5MC AM or station signal	Connect 4.5MC detector probe to lug M4. Connect VTVM to 4.5MC probe. Set meter to 2.5V range.	L6 (bottom core) for minimum output indication on VTVM.	Increase signal input to give 1/4 scale deflection at null point (this step for 4.5MC trap adj. only).
B	4.5MC AM or station signal	Remove ground connection from Lug M8. Connect RC Network from M8 to ground. Place VTVM across network. Input should be adjusted to keep output between −1V and −2V.	L3 (top & bottom cores) for maximum indication on VTVM.	RC Network consists of a 15K resistor and a .01 mfd capacitor in parallel.
C	4.5MC AM or station signal	Same as Step B	L6 (top core) for maximum indication on VTVM.	
D	Use station signal	Remove RC Network and replace ground to Lug M8.	Quad coil L5 for maximum sound output.	The correct peak will be the second one when turning core into coil.



13G20 Equipment Setup & Alignment Points

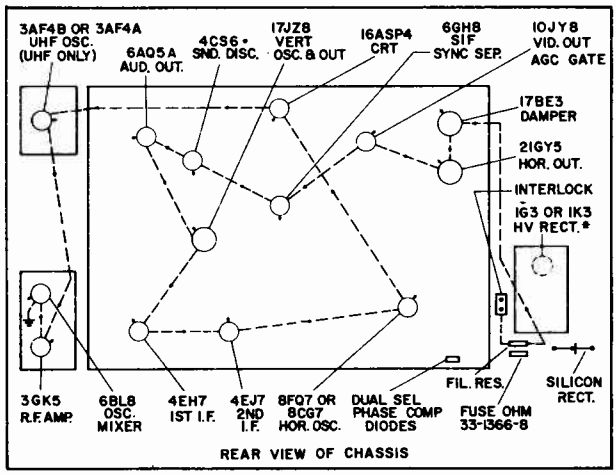


PHILCO Chassis 13G20, U, Schematic Diagram

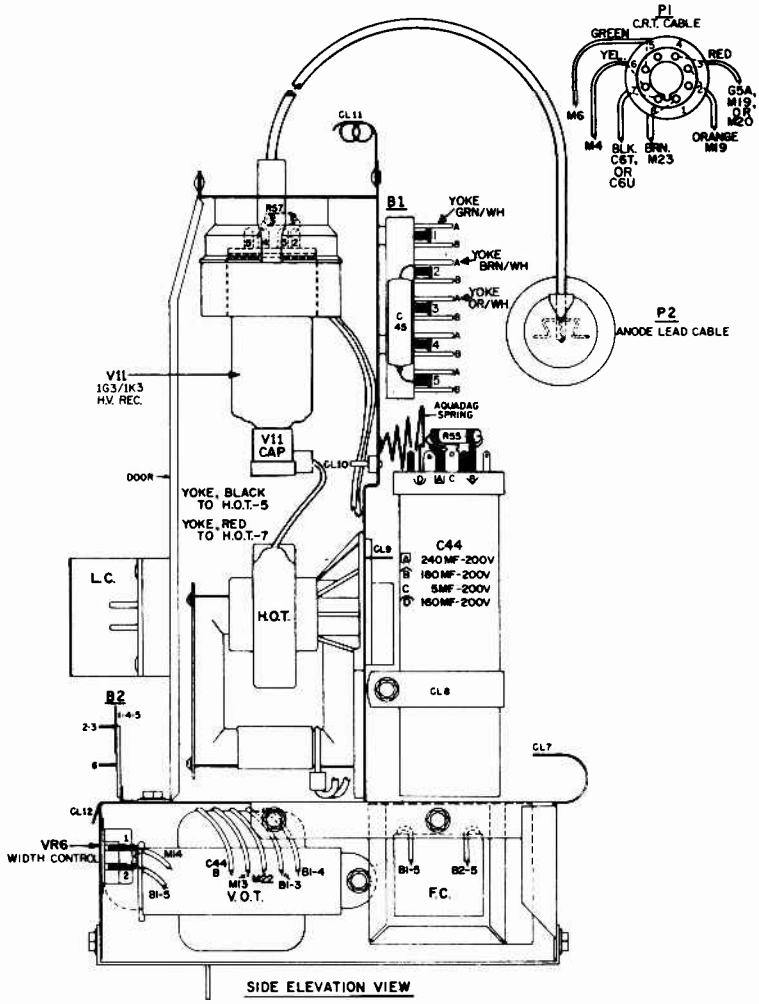
PHILCO Chassis 13G20, U, Service Information, Continued

CHASSIS AND CRT REMOVAL - 13G20

1. Remove knobs from front.
2. Remove 5 back mounting screws and remove back.
3. Remove 2 hex head screws from chassis mounting ears under chassis at bottom rear.
4. Remove hex head screw from ear at top of high voltage cage.
5. Chassis may now be slid out the rear for service accessibility.
6. To completely remove chassis - disconnect anode lead; unsolder bracket grounding lead from ground terminal next to tuner; remove CRT socket and remove yoke or unsolder yoke leads.
7. To remove CRT - remove chassis as above. Place set face down on soft padding; remove 8 hex head screws mounting plastic CRT frame to cabinet; lift CRT out.



Series Filament Connections - 13G20



PANEL LUG CONNECTIONS

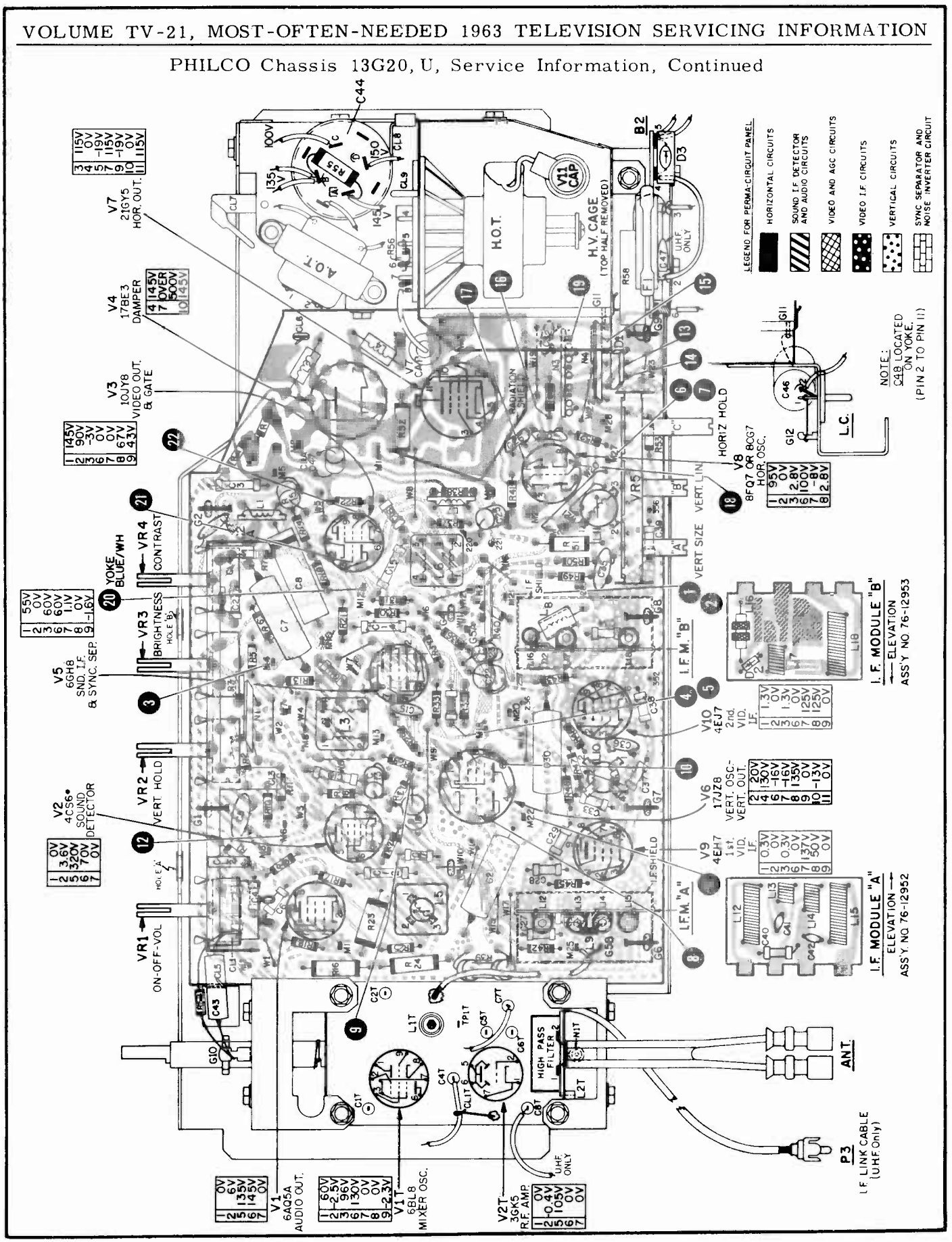
Lug	Connection
M1	Audio Test Point
M2	White Lead to B1-2
M3	Blue Lead to A.O.T.
M4	Video Output, Yellow/White lead to Pin 7 of C.R.T.
M5	Red/White Lead to B1-5, 145V B-plus
M6	Green/White Lead to Pin 6 of CRT
M7	Orange/White Lead to B1-3, vertical retrace suppression
M8	Sound Det. Test Point, Ground Link
M9	Brown/White Lead to B2-1, start of filament chain
M10	White Lead, Tuner AGC
M11	Yellow Lead, Tuner B-plus
M12	Blue/White Lead to Yoke, AGC Gate Pulse
M13	Red/White Lead of V.O.T., Vertical Feedback
M14	Blue/White Lead to VR6-1, Width Control
M15	Red Lead to H.O.T. Pin 7
M16	AGC Test Point
M18	Orange/White Leads to M28 and to C44B, 135V B-plus
M19	Orange/White Lead to Pin 4 of CRT, 300V, optional focus connection
M20	Green/White Lead to C44C, 100V B-plus, optional focus connection
M21	Video 2nd detector test point
M22	Blue/White Lead of V.O.T., vertical output plate
M23	Brown/White Lead to Pin 1 of CRT, filament
M24	Horizontal Oscillator Test Point
M25	I-F Input, center conductor of shielded tuner I-F link
M27	Sync Test Point
M28	Orange/White Lead to M18, 135V B-plus

INSULATED PERMA-CIRCUIT JUMPER WIRES

The following jumpers connect between the holes given. These holes are indicated on the base layout of the Perma-Circuit panel as small numbered dots. The leads pass through these holes and are soldered on the foil side.

Hole No's.	
76 to 285	White
220 to 237	Red/White
221 to 236	Green/White
352 to 356	Brown/White

PHILCO Chassis 13G20, U, Service Information, Continued

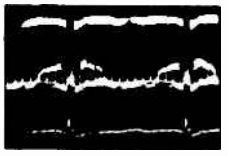


PHILCO Chassis 13G20, U, Service Information, Continued

OSCILLOSCOPE WAVEFORM PATTERNS

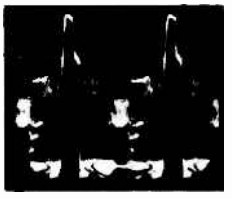
These waveforms were taken with the receiver adjusted for an approximate peak-to-peak output of 3.5 volts at the video detector. Voltage readings taken with raster just filling screen and all controls set for normal picture viewing. The voltages given are approximate peak-to-peak values. The frequencies shown are those of the waveforms—not the sweep rate of the oscilloscope. All readings were taken with a Model ES-550B Precision oscilloscope.

1 3 5 volts p/p, 15,750 c.p.s.



2 3.5 volts p/p, 60 c p s

3 100 volts, p/p, 15,750 c.p.s



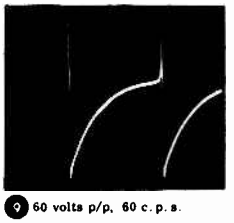
4 80 volts p/p, 15,750 c p s

5 80 volts p/p, 60 c.p s.

6 50 volts p/p, 60 c p.s.

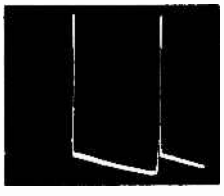
7 50 volts p/p, 15,750 c p.s.

8 40 volts p/p, 60 c.p s.



9 60 volts p/p, 60 c.p.s.

10 40 volts p/p, 60 c p.s.

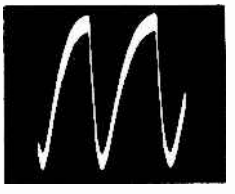


11 1150 volts p/p, 60 c.p s.

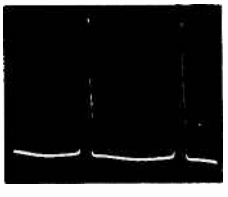
12 60 volts p/p, 60 c p s

13 8 volts p/p, 15,750 c p.s.

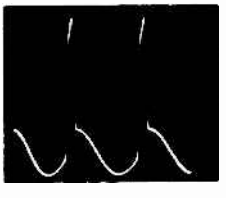
14 12 volts p/p, 15,750 c p s.



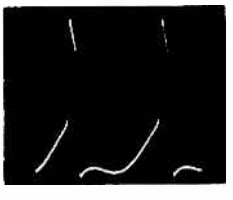
15 15 volts p/p, 15,750 c.p.s.



16 8 volts p/p, 15,750 c p.s.

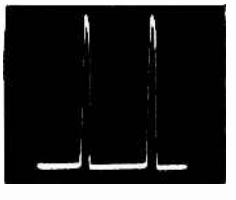


17 30 volts p/p, 15,750 c p s.



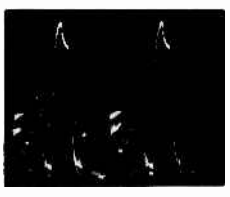
18 25 volts p/p, 15,750 c.p s.

19 90 volts p/p, 15,750 c.p.s.



20 350 volts p/p, 15,750 c.p.s.

21 60 volts p/p, 15,750 c.p.s.



22 16 volts p/p, 15,750 c p.s.

RESISTANCE CHART

		PIN NUMBERS											
TUBE	USE	1	2	3	4	5	6	7	8	9	10	11	12
V1 6AQ5A	Audio Output	60K *	270 Ω	17 Ω	19 Ω	16K	16K	60K*					
V2 4CS6	Sound Det.	6 Ω	680 Ω	22 Ω	19 Ω	9 meg	13K	3.5Ω					
V3 10JY8	Vid. Output AGC Gate	15K	36K	1.7 meg	24 Ω	27 Ω	0 Ω	2K	22K	13K			
V4 17BE3	Damper	33 Ω	33Ω	33 Ω	16K	Inf.	Inf.	8.5 meg	Inf.	Inf.	16K	Inf.	40 Ω
V5 6GH8	Sound I-F Sync Sep.	28K	2.5 Ω	16K	24 Ω	22 Ω	16K	470 Ω	0 Ω	1.6 meg			
V6 17JZ8	Vert. Osc. Output	11 Ω	2.8 meg	Inf.	16K	Inf.	1.5 meg	1.5 meg	16K	0 Ω	130K	0 Ω	17 Ω
V7 21GY5	Hor. Output	27Ω	Inf.	19K	0Ω	330K	19K	19K	19K	330K	0Ω	19K	33Ω
V8 8FQ7 8CG7	Hor. Osc.	24K	1.7 meg	750 Ω	5Ω	8 Ω	45K	95K	750Ω	0Ω			
V9 4EM7	1st VIF	22 Ω	430K	22Ω	11 Ω	10Ω	0Ω	16K	22K	0Ω			
V10 4EJ7	2nd VIF	68Ω	0.1 Ω	68 Ω	10 Ω	8Ω	0 Ω	16.5K	16.5K	0Ω			
CRT 16A5P4		5Ω	18K	6M	0Ω 25K ** 6 meg	Inf.	18K	165K	3Ω				

* Varies with volume control setting

**Depends on focus connection

PHILCO

CHASSIS ALIGNMENT 13J27 AND 13J28

VIDEO I-F AM AND SWEEP ALIGNMENT PROCEDURE

Preliminary Information

The following video I-F alignment procedure is based upon a tuner, with proper bandpass alignment, connected to TV chassis.

1. Set contrast control for maximum and channel selector of tuner to channel 4 position.
2. AM generator signal is injected through test jig to feed-thru capacitor at mixer screen grid circuit of tuner.
3. Apply −8 volts to terminal lug L13 (AGC Bus) on VIFS panel.
4. Connect oscilloscope, calibrated for 1 volt peak to peak through a 10K isolating resistor to video detector output, terminal lug L15 on VIFS panel.
5. Connect sweep generator to antenna terminals through matching network (generator to 300 ohms).
6. Adjust signal generator input during AM and sweep alignment so that signal at 2nd detector output does not exceed 1.0 volt peak to peak, and not less than .2 volt peak to peak as null is approached during trap alignment.
7. An isolation transformer is recommended for chassis to minimize shock hazard and equipment damage.

AM ALIGNMENT CHART

STEP	AM GEN. MOD. 400 CYS AT 30%	ADJUST	REMARKS
1	42.9 MC	T1T (tuner)	Adjust for maximum. This is temporary setting of mixer output coil for trap alignment.
2	41.25 MC	VC2	Adjust for minimum. If necessary, increase generator output and reduce bias so that scope deflection shows not less than 0.2V at null for accurate null adjustment.
3	47.25 MC	VC3 and VC4	Same as Step 2.
4			Repeat Steps 2 and 3 reducing bias as trap minimum is approached. Reset bias to −8 volts at completion.
5	42 9 MC	T1T (tuner)	Adjust for maximum. Output of generator should be adjusted to maintain 1.0V peak to peak deflection.
6	45.5 MC 44.3 MC 45.0 MC 42.7 MC	VC1 T5 T4 (top) T4 (bottom)	Same as Step 5.

SWEEP ALIGNMENT CHART

NOTE: Fine tuning control must be positioned properly for sweep alignment. Set channel selector to channel 4 and inject 65.75MC signal modulated 30%, at the antenna terminals and adjust fine tuning control for minimum scope indication. Do not touch fine tuning control or channel selector for balance of alignment.

STEP	SWEEP GEN. 6MC SWEEP WIDTH	MARKER GEN. UNMOD. R-F	ADJUST	REMARKS
7	69 MC	45.75 MC	VC1	Adjust VC1 to place 45.75 MC marker between 35% and 45% on video side of curve (Figure 1-7). Adjust sweep generator output to limit video detector output on scope to 1.0 volt peak to peak.
8	69 MC	42.5 MC	T1T (tuner)	Adjust tuner mixer output coil T1T to place 42.5 MC marker between 43% and 57% on the sound side of curve (Figure 1-7).
9	69 MC	42.5 MC and 45.75 MC	T5	T5 tilts or levels curve. Adjust T5 so that curve falls within limits (Figure 1-7). Best adjustment is obtained with knee (top) of curve on sound side 10% lower than knee of curve on video side.

PHILCO Chassis 13J27 and 13J28 Alignment Information, Continued

4.5MC TRAP, SOUND TAKE-OFF AND INTERSTAGE ALIGNMENT

Preliminary:
1. Set contrast control to maximum.
2. Set volume control to minimum.
3. Apply −8V bias to lug L13 on VIFS panel.

Equipment:
1. VTVM
2. AM Generator
3. RC Network (15K resistor and .01 mfd in parallel.
4. 4.5MC detector probe (See Page 90, for circuit diagram).

STEP	SIGNAL INPUT TO LUG L15	OUTPUT	ADJUST	REMARKS
A	4.5MC AM or station signal	Connect 4.5MC detector probe to Lug L3 (13J27), L1 (13J28). Connect VTVM to 4.5MC probe. Set meter to 2.5V range.	T2 (bottom core) trap for minimum output indication on VTVM.	Increase signal input to give 1/4 scale deflection at null point. (This step for 4.5MC trap adj. only).
B	4.5MC AM or station signal	Remove jumper from Lug L11. Connect RC Network from L11 to ground. Place VTVM across RC Network. Input should be adj. to keep output between −2V and −3V.	T3 (top and bottom cores) for maximum indication on VTVM.	RC Network consists of a 15K resistor and .01 mfd capacitor in parallel.
C	4.5MC AM or station signal	Same as Step B.	T2 (top core) for maximum indication on VTVM.	
D	Use station signal	Remove RC Network and replace ground connection between L11 and G5.	Quad coil T1 for maximum sound output.	Start with core in "out" position and adjust to 2nd maximum peak on way in.

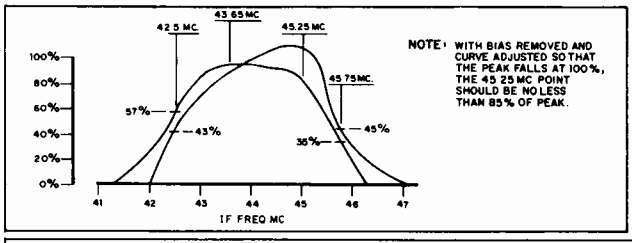
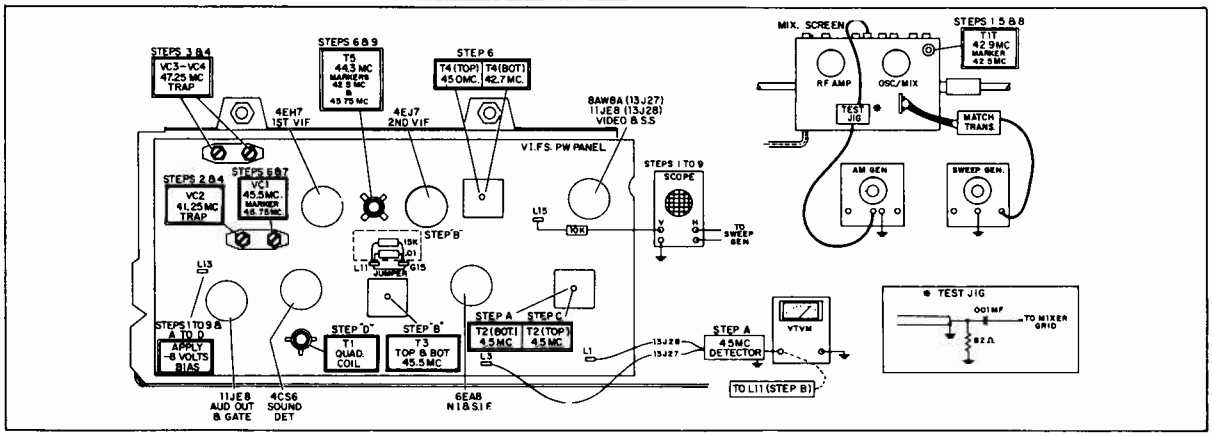
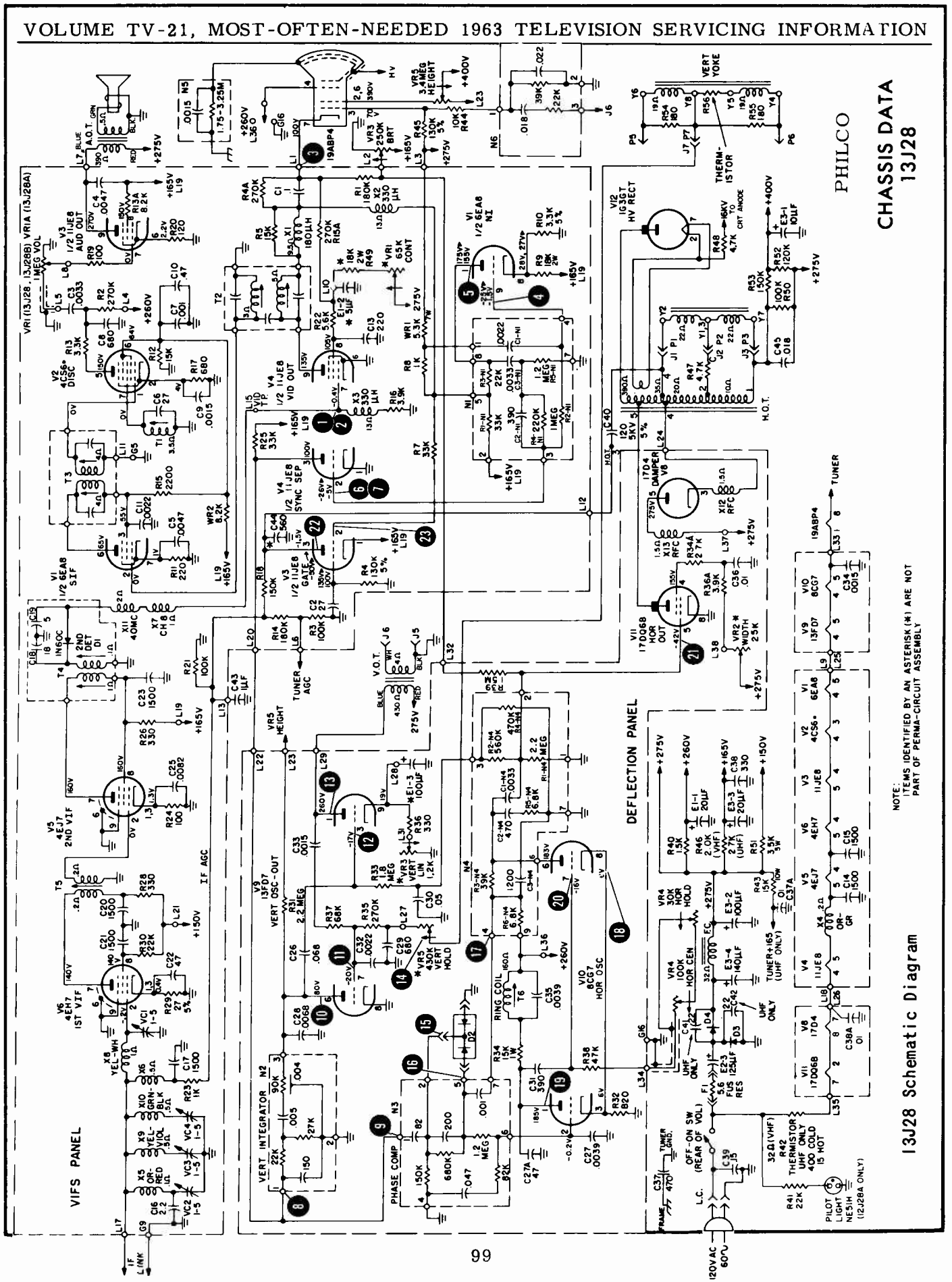


Figure 1-7. Overall I-F Response Curve 13J27 and 13J28 Chassis

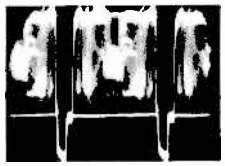


Equipment Set-Up and Alignment Points - 13J27 and 13J28 Chassis


PHILCO
CHASSIS DATA
13J28
13J28 Schematic Diagram
VIFS PANEL
DEFLECTION PANEL
IF AGC
TUNER AGC
VERT INTEGRATOR N2
PHASE COMP N3
RING COIL T6
VERT OSC-OUT
HOR OSC
2ND DET
2ND VIF
1ST VIF
SIF
SYNC SEP
VID OUT
VID TP
GATE
AUD OUT
AUD VOL
HV RECT
DAMPER
HOR OUT
VERT YOKE
THERM-ISTOR
TUNER
H.O.T.
OFF-ON SW (REAR OF VOL)
120VAC 60~
PILOT LIGHT NE51H (12J28A ONLY)
UHF ONLY
TUNER+I65 (UHF ONLY)
NOTE:
ITEMS IDENTIFIED BY AN ASTERISK (*) ARE NOT PART OF PERMA-CIRCUIT ASSEMBLY

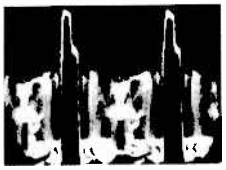
OSCILLOSCOPE WAVEFORM PATTERNS

These waveforms were taken with the receiver adjusted for an approximate peak-to-peak output of 2.0 volts at the video detector. Voltage readings taken with raster just filling screen and all controls set for normal picture viewing. The voltages given are approximate peak-to-peak values. The frequencies shown are those of the waveforms—not the sweep rate of the oscilloscope. All readings were taken with a Model ES-550B Precision oscilloscope.

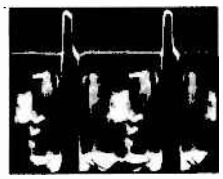


1 3 volts p/p, 15,750 c.p.s., max. contrast

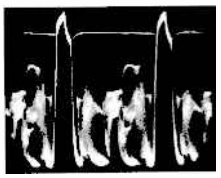
2 3 volts p/p, 60 c.p.s., max. contrast



3 85 volts p/p, 15,750 c.p.s., 2nd det. set at 2V p/p

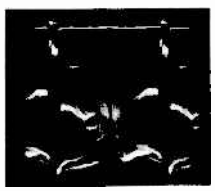


4 65 volts p/p, 15,750 c.p.s.

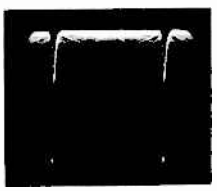


5 70 volts p/p, 15,750 c.p.s.

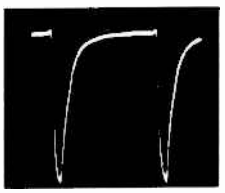
6 60 volts p/p, 15,750 c.p.s.



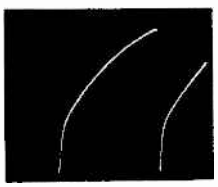
7 60 volts p/p, 60 c.p.s.



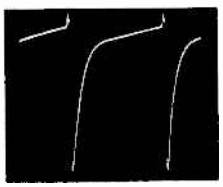
8 38 volts p/p, 60 c.p.s.



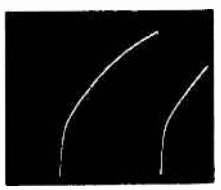
9 38 volts p/p, 15,750 c.p.s.



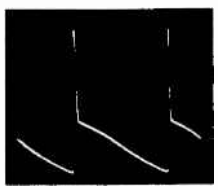
11 90 volts p/p, 60 c.p.s.



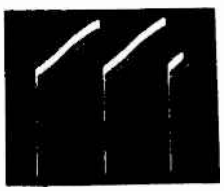
10 105 volts p/p, 60 c.p.s.



12 105 volts p/p, 60 c.p.s.

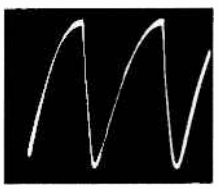


13 740 volts p/p, 60 c.p.s.

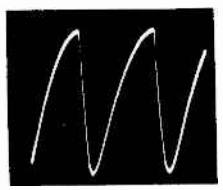


14 40 volts p/p, 60 c.p.s.

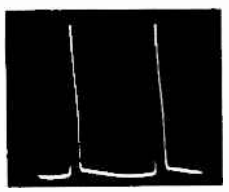
15 7.5 volts p/p, 15,750 c.p.s.



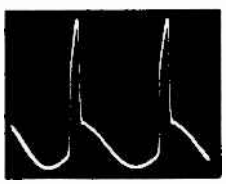
16 10 volts p/p, 15,750 c.p.s.



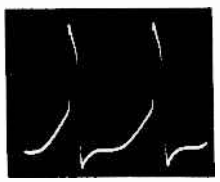
17 15 volts p/p, 15,750 c.p.s.



18 18 volts p/p, 15,750 c.p.s.

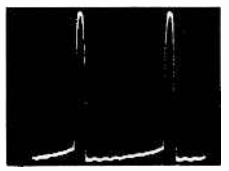


19 65 volts p/p, 15,750 c.p.s.

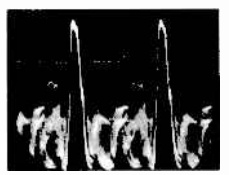


20 45 volts p/p, 15,750 c.p.s.

21 155 volts p/p, 15,750 c.p.s.



22 430 volts p/p, 15,750 c.p.s.



23 70 volts p/p, 15,750 c.p.s.

PHILCO

CHASSIS DATA
13J27

CHASSIS AND CRT REMOVAL—

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

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

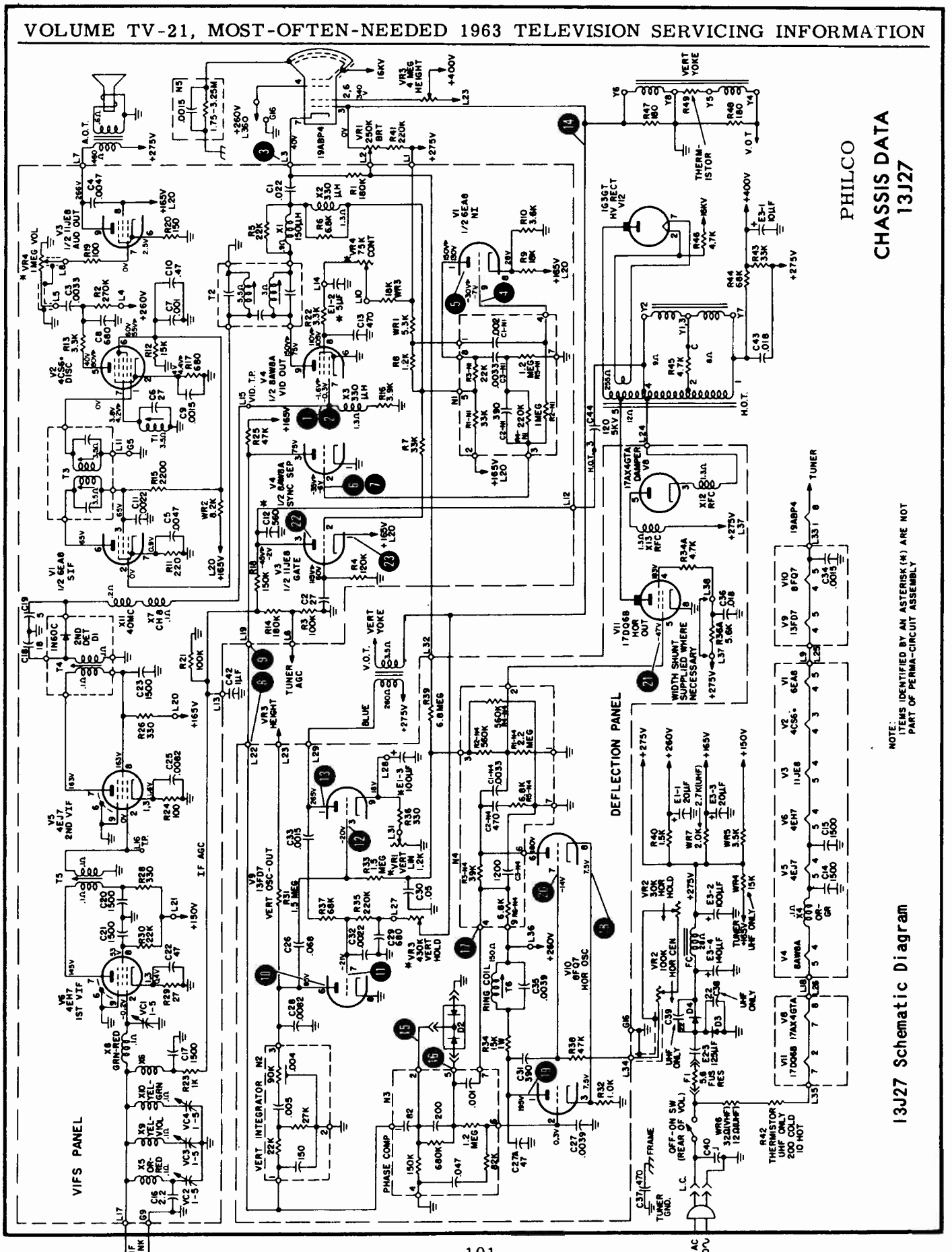
3. Remove knobs.
4. Remove the five 5/16" drive screws from cabinet bottom.
5. Remove one 1/4" drive screw from right rear side and one 1/4" drive screw from left rear side.
6. Remove two 1/4" drive screws from rear top bracket. Tilt bracket and remove.
7. Remove 5-1/4" drive screws from top front.
8. Separate wrap-around cabinet from chassis.

CAUTION: Speaker leads are still connected.

9. To remove CRT from bezel, loosen 5/16" bolt from CRT mounting strap then disengage from four corner clips.

NOTES:

1. ALL VOLTAGES TAKEN UNDER NO SIGNAL CONDITIONS. ANTENNA REMOVED AND TUNER OFF CHANNEL.
2. VOLTAGES MEASURED WITH A "PRECISION MODEL 88 V.T.V.M.", FROM POINT INDICATED TO CHASSIS GROUND.
3. VOLTAGES MARKED ▶ WERE TAKEN UNDER AVERAGE SIGNAL CONDITIONS, ANTENNA CONNECTED AND TUNER ON AN ACTIVE CHANNEL.
4. COIL RESISTANCES READ WITH COIL IN CIRCUIT EXCEPT FOR AUDIO OUTPUT TRANSFORMER SEC., SPEAKER WAS DISCONNECTED.
5. BALLOONS ❶ , ❷ , ❸ , ❹ , ETC., SHOWN ON SCHEMATIC, INDICATE WAVEFORM TEST POINTS.
6. CONTROL SETTINGS:
   VOLUME - MINIMUM
   CONTRAST - MID-RANGE
   BRIGHTNESS - MID-RANGE
   ALL OTHER CONTROLS SET FOR NORMAL OPERATION


PHILCO
CHASSIS DATA
13J27
13J27 Schematic Diagram
VIFS PANEL
DEFLECTION PANEL
NOTE:
ITEMS IDENTIFIED BY AN ASTERISK (*) ARE NOT
PART OF PERMA-CIRCUIT ASSEMBLY

PHILCO

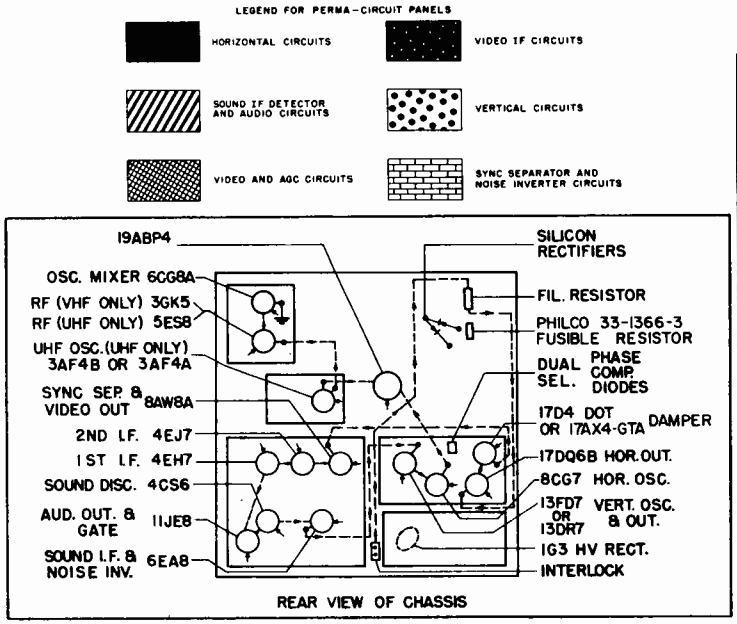
PANEL LUG CONNECTIONS

VIFS Panel

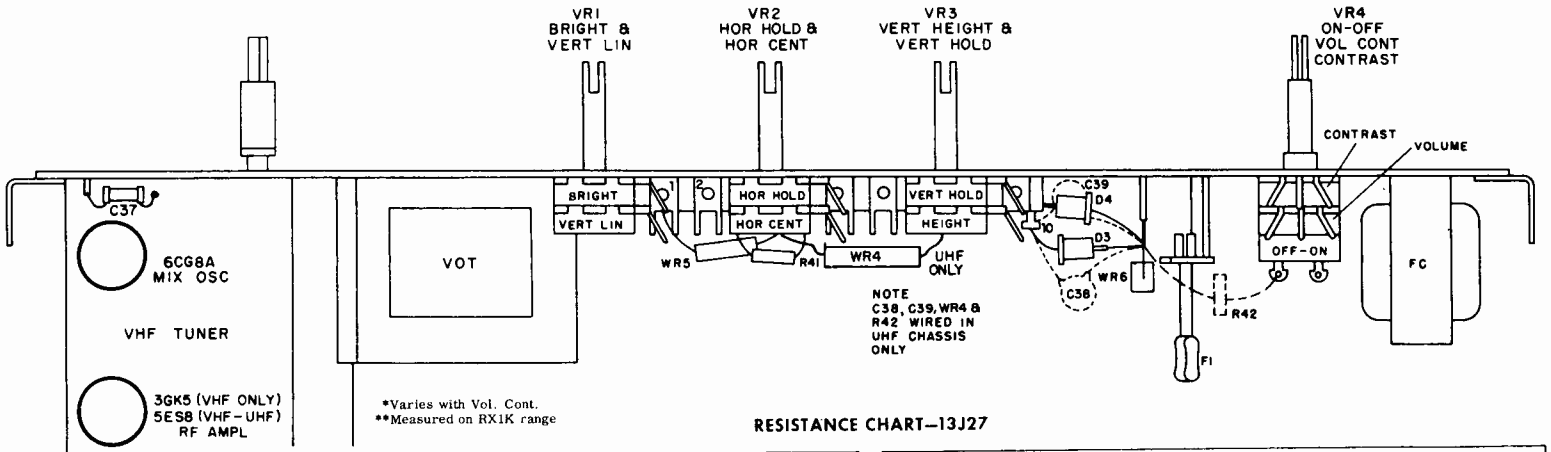
Lug	Connection
L1	Video Output to CRT Cathode, Pin 7
L2	Lead to Center Arm of Brightness Control, VR3
L3	275V B plus
L4	260V B plus
L5	Shielded Lead to top of Volume Control, VR1 (or VR1A)
L6	Tuner A.G.C. Lead
L7	Blue Lead of A.O.T. to Audio Output Plate
L8	Shielded Lead from Arm of Volume Control, VR1 (or VR1A)
L9	Filament Lead to L25 of Deflection Panel
L10	Lead to E1-2
L11	Sound Detector Test Point
L12	A.G.C. Gate Pulse from H.O.T.
L13	I-F A.G.C. - Lead to C43 at B5-5
L15	Video 2nd Det. Test Point
L16	Test Point - Grid of Second V.I.F.
L17	I-F Input Link from Tuner
L18	Filament From L26 of Deflection Panel
L19	165V B plus
L20	Sync Output to L22 of Deflection Panel
L21	150V B plus

Deflection Panel

L22	Sync Input from VIFS Lug L20
L23	Lead to top of Height Control, VR5
L24	Lead from Damper Cathode to H.O.T.
L25	Filament Lead from VIFS L9
L26	Filament Lead to VIFS L18
L27	Lead to top of Vertical Hold Control, VR5
L28	Vertical Output Cathode, lead to E1-3
L29	Vertical Output Plate, Blue Lead of V.O.T.
L31	Lead to Arm of Vertical Linearity Control, VR3
L32	Lead to Arm of Brightness Control, VR3
L33	Filament Lead to CRT, Pin 1
L34	Shielded Lead to Horizontal Hold Centering Control, VR4
L35	Filament Lead from R42, B2-1
L36	260V B plus
L37	275V B plus
L38	Lead from top of Width Control, VR2



Series Filament Connections - 13J27



*Varies with Vol. Cont.
**Measured on RX1K range

RESISTANCE CHART—13J27

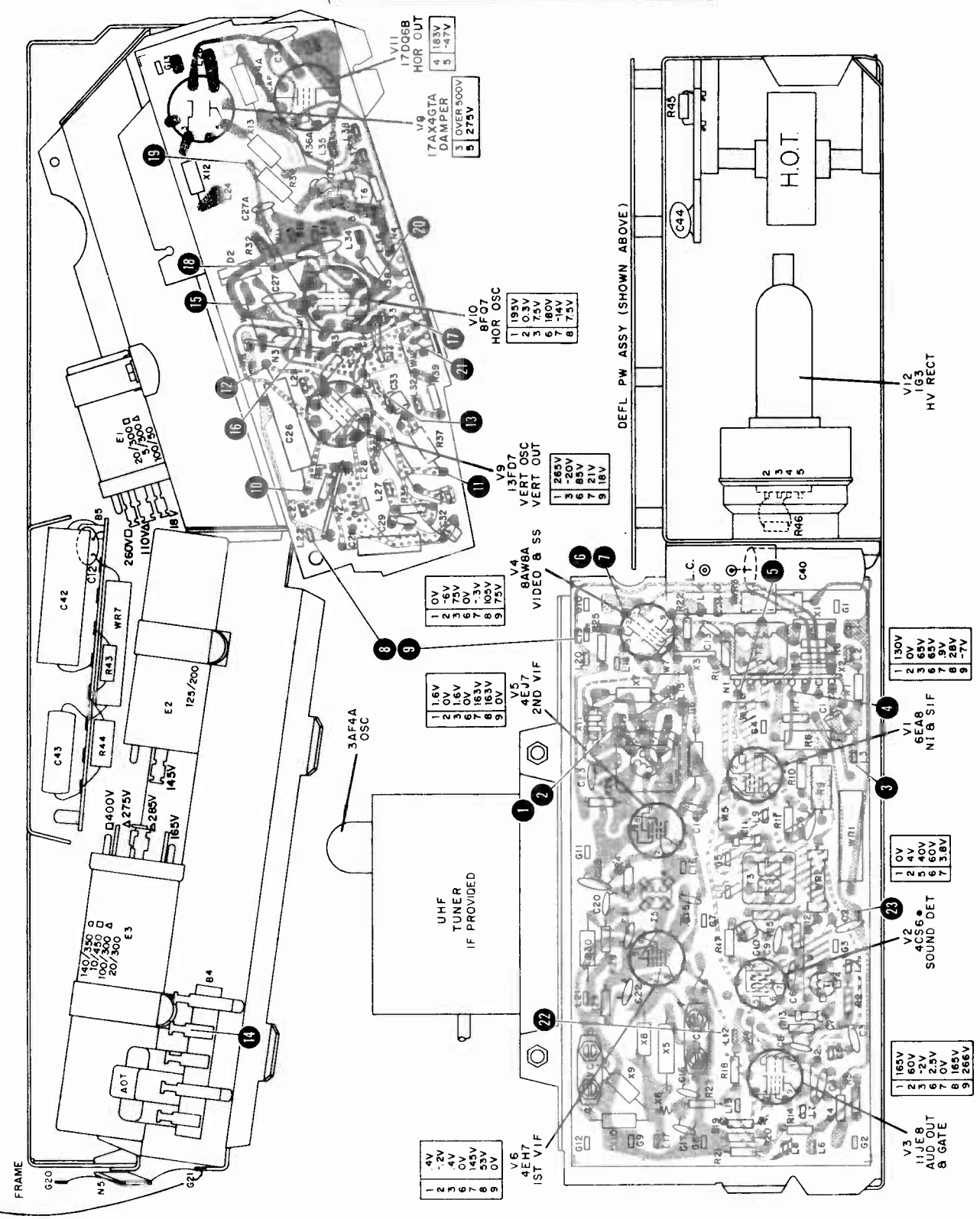
TUBE	USE	PIN NUMBERS 1	2	3	4	5	6	7	8	9
V1 6BA8	Sound I-F and Noise Inverter	37K	5.5Ω	9.5K	15Ω	13Ω	9.5K	150Ω	3.1K	2.4M
V2 4CS6*	Sound Detector	3.5Ω	470Ω	15Ω	16Ω	240K	9.5K	470Ω		
V3 11JE8	Audio Output and A.G.C. Gate	9K	35K	200K	16Ω	19Ω	150Ω	100Ω 1 Meg*	9K	11K
V4 8AW8A	Video Output and Sync. Sep.	0Ω	1.4M	26K	23Ω	25Ω	0Ω	1.1K**	55K	15K
V5 4EJ7	2nd Video IF	100Ω	0.1Ω	100Ω	21Ω	23Ω	0Ω	9.5K	9.5K	0Ω

TUBE	USE	PIN NUMBERS 1	2	3	4	5	6	7	8	9
V6 4EH7	1st Video IF	27Ω	70K	27Ω	19Ω	21Ω	0Ω	15K	35K	0Ω
V8 17AX4	Damper			100K		11K		30Ω	25Ω	
V9 13FD7	Vert. Osc. and Vert. Output	11K		2M	13Ω	8.5Ω	3.2M	400K	0Ω	500Ω
V10 8FQ7	Hor. Osc.	26K	1.8M	1K	8.5Ω	6Ω	60K	75K	1K	0Ω
V11 17DQ6B	Hor. Output		30Ω		21K	700K		35Ω	0Ω	

CHASSIS DATA 13J27

PHILCO

CHASSIS DATA
13J27



PHILCO

CHASSIS DATA
13J41, 13J42, 13J43, & 13J45

CHASSIS DATA
13J41, 13J42, 13J43, & 13J45

PANEL LUG CONNECTIONS

M1	Lead to I-F Input
M2	Lead to C39-A
M3	Lead to VR2
M4	Lead to C43-C
M5	N/C
M6	Lead to VR4-3
M7	Lead to VR4-2
M8	Lead to TP-M33
M9	Lead to M45
M10	Lead to B3-3, B plus 275V
M11	Lead to B1-4
M12	Lead to Horiz. Osc. Coil T. P.
M13	Lead to C39-C
M14	Lead to B3-2
M15	Lead to M20
M16	Lead to A. O. T. primary (blue & white)
M17	Lead to B2-1 and M25
M18	Lead to B3-7
M19	Lead to V. O. T. primary (blue)
M20	Lead to M15
M21	Lead to VR5-1
M22	Lead to B3-5
M23	Lead to VR3
M24	N/C (I-F AGC)
M25	Lead to M17
M26	Lead to B5-4
M27	N/C
M28	Lead to B5-6
M29	Lead to B2-1
M30	Lead to H. O. T. Pin 3
M31	Lead to G11 (T. P.)
M32	Lead to VR6-2 and H. O. T. Pin 5
M33	Lead to M8 (T. P.)
M34	Lead to Pin 7 of CRT
M35	Lead to V. O. T. (white)
M36	Lead to M44
M37	Lead to VR2A-1
M38	Lead to VR6-1 and B3-3
M39	Lead to B3-7
M40	Lead to B5-3
M41	N/C I-F output
M42	Lead to C43-B
M43	Lead to Pin 1 of CRT
M44	Lead to Pin 6 of CRT
M45	Lead to M9

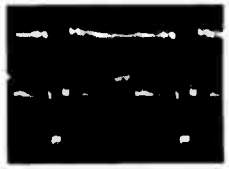
OSCILLOSCOPE WAVEFORM PATTERNS

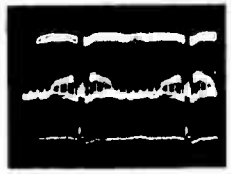
These waveforms were taken with the receiver adjusted for an approximate peak-to-peak output of 1.5 volts at the video detector. Voltage readings taken with the raster just filling screen and all controls set for normal picture viewing. The voltages given are approximate peak-to-peak values. The frequencies shown are those of the waveforms---not the sweep rate of the oscilloscope. All readings were taken with a Model ES-550B Precision Oscilloscope.

SCOPE WAVEFORM TEST POINTS ARE INDICATED BY ❶, ❷, ETC.

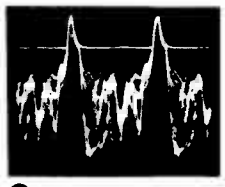
NOTE: THE SOLID BLACK DOTS INDICATE ADDITIONAL SCOPE WAVEFORM TEST POINTS. THE POINTS THUS INDICATED ARE: ❺ JUMPER WIRE W9, ❼ & ❽ PIN 5 OF N4, ❾ & ❿ LUG M33, ⓫ JUMPER WIRE W5, ⓭ END OF R11.

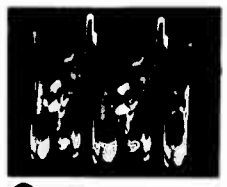

❶ 1.5 volts p/p, 60 cps

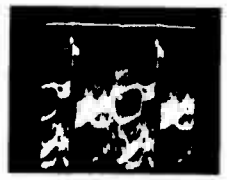

❷ 1.5 volts p/p, 15,750 cps

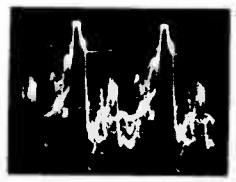

❸ 70 volts p/p, 60 cps


❹ 650 volts p/p, 15,750 cps

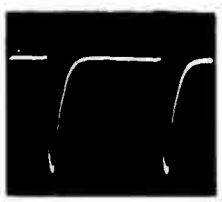

❺ 60 volts p/p, 15,750 cps


❻ 65 volts p/p, 15,750 cps


❼ 60 volts p/p, 60 cps

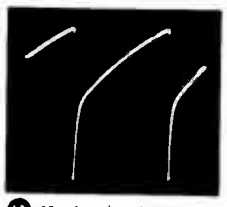

❽ 60 volts p/p, 15,750 cps


❾ 48 volts p/p, 60 cps


❿ 48 volts p/p, 15,750 cps


⓫ 98 volts p/p, 60 cps


⓬ *420 volts p/p, 60 cps

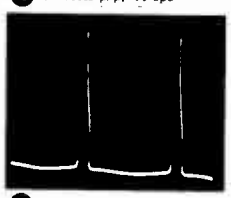

⓭ 95 volts p/p, 60 cps


⓮ 680 volts p/p total, 230 volts p/p sawtooth, 60 cps

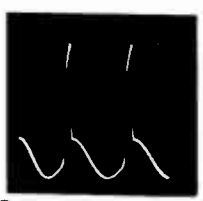

⓯ 55 volts p/p 60 cps

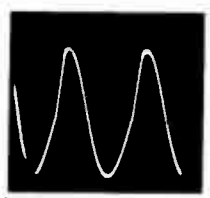

⓰ 9 volts p/p, 15,750 cps

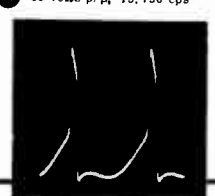

⓱ 14.5 volts p/p, 15,750 cps


⓲ 25 volts p/p, 15,750 cps

*NOTE: When checking p/p voltage on vertical osc. grid (Figure 12), connect 10K isolating resistor to series with scope probe to keep video in sync.


⓳ 55 volts p/p, 15,750 cps


⓴ 32 volts p/p, 15,750 cps


㉑ 52 volts p/p, 15,750 cps


㉒ 155 volts p/p, 15,750 cps

Removal of Filter Choke (F.C.)

1. Remove four 1/4" self-tapping screws holding power transformer.
2. Gently lay power transformer toward front of chassis. Filter choke now fully visible.
3. Remove one 1/4" self-tapping screw holding filter choke and slide choke toward front of chassis to remove.

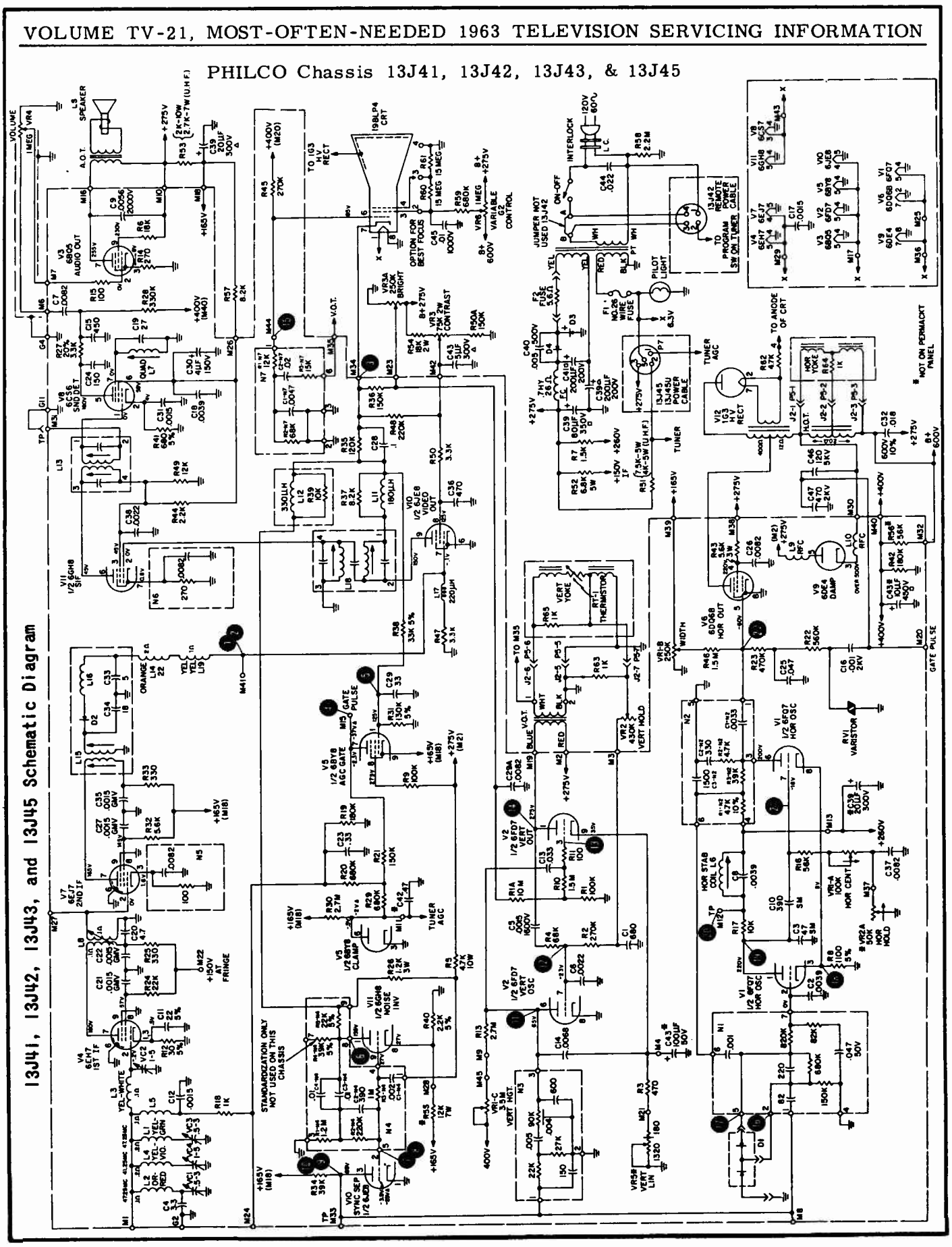
Removal of Filter C-43

1. Unsolder all leads from filter.
2. Straighten three holding tabs on front of filter and slide filter toward rear of chassis and out bottom opening.

Removal of Vertical Output Transformer (V.O.T.)

1. Remove two 1/4" self-tapping screws from high voltage cage lid and lift up.
2. Remove four 1/4" self-tapping screws to remove entire high voltage cage.
3. Lift high voltage cage, and pull gently toward rear of set.
4. 1/4" self-tapping screw holding V.O.T. is now exposed and can be freely removed. Remove screw, slide V.O.T. toward rear of chassis to remove.

PHILCO Chassis 13J41, 13J42, 13J43, & 13J45



PHILCO Chassis 13J41, 13J42, 13J43, & 13J45, Alignment Information

VIDEO I-F, AM, AND SWEEP ALIGNMENT PROCEDURE

Preliminary Information

1. The following video I-F alignment is based upon a tuner, with proper bandpass alignment, connected to the TV chassis.
2. Apply −2VDC to tuner AGC lug M11, and −10VDC to I-F AGC lug M24.
   NOTE: I-F bias not required in steps 1 and 2 of AM alignment.
3. Remove 6BY8 (V5) AGC gate tube, and set contrast control to maximum.
   NOTE: Do not remove applied tuner bias, while AGC gate tube is removed.
4. Connect oscilloscope through 10K isolating resistor to I-F output lug M41. Connect .001 mf capacitor from lug M41 to ground to sharpen sweep.
5. Calibrate oscilloscope for 2.0V p/p for 100% deflection.
6. Connect AM and marker signal generators through test jig to prevent overloading.
   Steps 1 and 2 apply signal to lug M27.
   Steps 3 thru 6 apply signal to tuner mixer grid test point.
   Steps 7 thru 9 couple into VC4 screw.
   Connect sweep generator through a 72 ohm to 300 ohm matching network, to antenna terminals.

AM ALIGNMENT CHART

STEP	AM MOD. 400 AT 50%	ADJUST	REMARKS
1	44.9MC	L15 (top) for max. Preset top core up several turns and bottom core down several turns.	Signal applied to lug M27, bias voltage not required. Limit scope level to 0.5V to prevent overloading.
2	43.25MC	L15 (bottom) for max. L15 (top) for max.	Same as Step #1. Repeat L15 bottom and top adjustments until no further improvement is obtained.
3	44.4MC 42.0MC 42.9MC	L8 for max. 12 position tuner 13 position tuner I-F Pole on tuner	Signal applied to tuner mixer grid test point. Reduce bias level and increase signal level so that accurate null may be obtained.
4	45.25MC	VC2 for max.	Same as Step #3.
5	47.25MC	VC1 and VC3 for min.	Same as Step #3. Scope deflection should not be less than 0.2V at null.
6	41.25MC	VC4 for min.	Same as Step #5.

NOTE: To properly position fine tuning for sweep alignment, set channel selector to channel 4 and inject 65.75MC, modulated 30%, at the antenna terminals. Adjust fine tuning control for minimum scope indication. DO NOT touch fine tuning control or channel selector for balance of alignment.

SWEEP ALIGNMENT CHART

STEP	SWEEP GEN. APPROX. 8MC SWEEP WIDTH	MARKER GEN. UNMOD. R-F	ADJUST	REMARKS
7	69MC	42.5MC	L15 (top)	Adjust L15 to place 42.5MC marker between indicated limits on sound side of curve (Figure 1-8A). Adjust sweep generator level to limit scope to 2.0V p/p for 100% deflection.
8			L8	L8 tilts or levels curve. Adjust curve to fall within limits (Figure 1-8A).
9	69MC	45.75MC	VC2	Adjust VC2 to place 45.75MC marker between limits on video side of curve (Figure 1-8A). Adjust sweep generator level to limit scope to 2.0V p/p for 100% deflection.

NOTE: Padders L15, L8 and VC2 may be adjusted in whatever order necessary. Adjust L8 for 10% tilt as shown in Figure 1-8B.

NOTES

1. ALL VOLTAGES TAKEN UNDER NO SIGNAL CONDITIONS, ANTENNA REMOVED AND TUNER OFF CHANNEL.
2. VOLTAGES MEASURED WITH "PRECISION MODEL 88 V.T.V.M.", FROM POINT INDICATED TO CHASSIS GROUND.
3. VOLTAGES MARKED ▲ WERE TAKEN UNDER AVERAGE SIGNAL CONDITIONS, ANTENNA CONNECTED AND TUNER ON USED CHANNEL.
4. COIL RESISTANCES READ WITH COIL IN CIRCUIT.
5. BALLOONS ❺, ❻, ❼, ETC., SHOWN ON SCHEMATIC, INDICATE WAVEFORM TEST POINTS.

CONTROL SETTINGS:

VOLUME - MINIMUM
ALL OTHER CONTROLS SET FOR NORMAL OPERATION.

PHILCO Chassis 13J41, 13J42, 13J43, & 13J45, Alignment Data, Continued

4.5 MC TRAP, SOUND TAKE-OFF AND INTERSTAGE ALIGNMENT

Preliminary:
1. Set contrast control to maximum.
2. Set volume control to minimum.
3. Apply −10V bias to lug M24.

Equipment:
1. VTVM
2. AM generator
3. RC Network (15K resistor and .01 mfd in parallel)
4. 4.5MC detector probe (See Page 90 for circuit diagram.)

STEP	SIGNAL INPUT TO LUG M41	OUTPUT	ADJUST	REMARKS
A	4.5MC AM or station signal	Connect 4.5MC detector probe to Lug M34. Connect VTVM to 4.5MC probe. Set meter to 2.5V range.	L18 (bottom core) trap for minimum output indication on VTVM.	Increase signal input to give 1/4 scale deflection at null point. (This step for 4.5MC trap adj. only).
B	4.5MC AM or station signal	Remove ground connection from Lug M31. Connect RC Network from M31 to ground. Place VTVM across RC Network. Input should be adj. to keep output between −2V and −3V.	L13 (top and bottom cores) for maximum indication on VTVM.	RC Network consists of a 15K resistor and .01 mfd capacitor in parallel.
C	4.5MC AM or station signal	Same as Step B	L18 (top core) for maximum indication on VTVM.	
D	Use station signal	Remove RC Network and replace ground connection between M31 and G11.	Quad coil L7 for maximum sound output.	

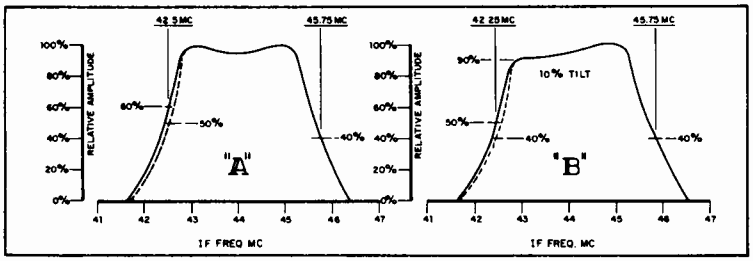
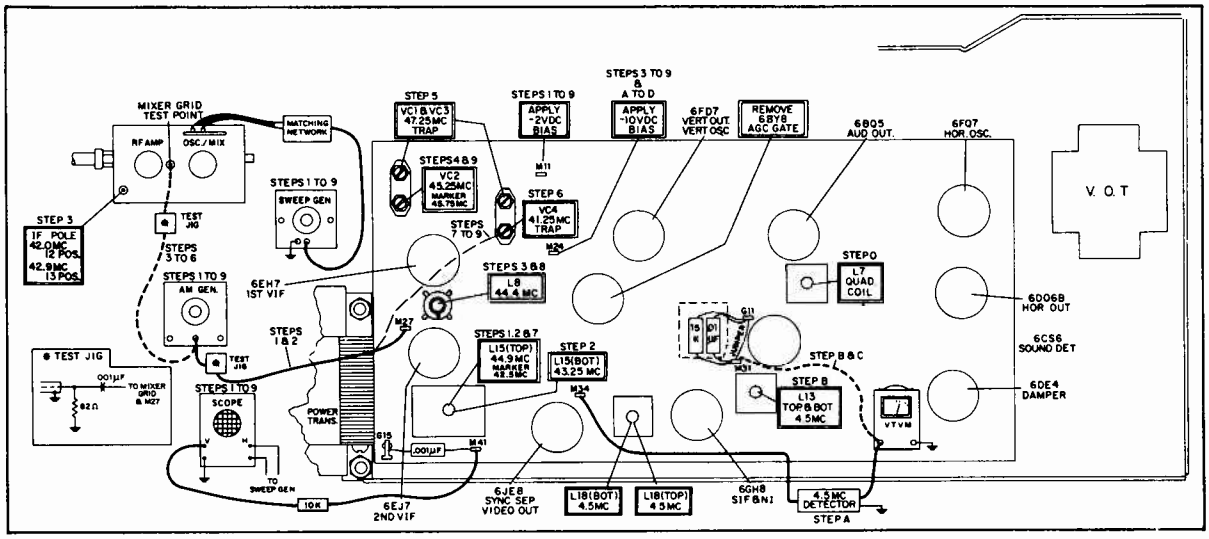


FIGURE 1-8A

Overall I-F Response Curves

13J41, 13J42, 13J43

and 13J45 Chassis



Equipment Set-Up and Alignment Points - 13J41, 13J42, 13J43 & 13J45 Chassis

PHILCO

CHASSIS ALIGNMENT
13N50, 13N51, 13N52, AND 13N53

VIDEO I-F AM AND SWEEP ALIGNMENT PROCEDURE

Preliminary Information

1. The following video I-F alignment procedure is based upon a tuner, with proper bandpass alignment, connected to the TV chassis.
2. Remove 6BY8 (AGC gate tube).
3. Apply −2VDC to tuner AGC, lug M23 on VOS panel and −10VDC to I-F AGC, lug M15 on VOS panel.
4. Calibrate oscilloscope for 2.0V p/p for 100% deflection.
5. Connect scope through 10K isolating resistor to I-F output, lug M7 on VOS panel. Connect .001 mfd from lug M7 to ground to sharpen sweep.
6. Connect AM and marker signal generators through test jig to mixer grid to prevent loading. Connect the sweep generator, through a 72 ohm to 300 ohm matching network, to antenna terminals.

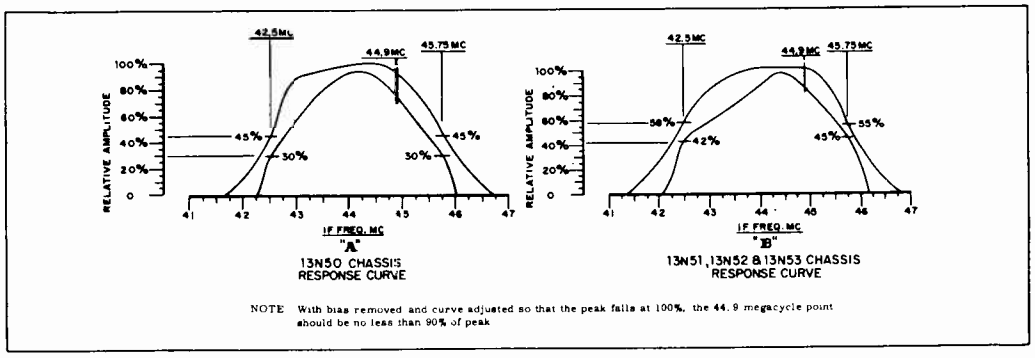
AM ALIGNMENT CHART

STEP	AM GEN. MOD. 400 AT 30%	ADJUST	REMARKS
1	41.25 MC	VC2-min.	Reduce bias level and increase signal level so that accurate null may be obtained. Scope deflection should not be less than 0.2V at null.
2	47.25 MC	VC1-min. VC3-min.	Same as Step #1. Repeat VC1 and VC3 adjustments until no further improvement is obtained.
3	44.4 MC 45.5 MC	L8-max. L1T-max. (on tuner)	Reset bias to −10V and maintain through balance of alignment. Adjust generator level to limit scope to 2V p/p deflection.
4	45.0 MC 42.5 MC 42.7 MC	L6-max. VC4-max. L7-max.	Same as Step #3.

NOTE: To properly position fine tuning for sweep alignment, set channel selector to channel 4 and inject 65.75 MC, modulated 30%, at the antenna terminals. Adjust fine tuning control for minimum scope indication. Do Not touch fine tuning control or channel selector for balance of alignment.

SWEEP ALIGNMENT CHART

STEP	SWEEP GEN. APPROX. 8MC SWEEP WIDTH	MARKER GEN. UNMOD. R-F	ADJUST	REMARKS
5	69 MC	42.5 MC	L7	Adjust L7 to place 42.5 MC marker between indicated limits on sound side of curve (Figure 1-9). Adjust sweep generator level to limit scope to 2V p/p deflection.
6	69 MC	45.75 MC	L6	Adjust L6 to place 45.75 MC marker between indicated limits on video side of curve (Figure 1-9). Adjust sweep generator level to limit scope to 2V p/p deflection.
7	69 MC	42.5 MC and 45.75 MC	L8	L8 tilts or levels curve. Adjust curve to fall within limits (Figure 1-9).



NOTE With bias removed and curve adjusted so that the peak falls at 100%, the 44.9 megacycle point should be no less than 90% of peak

Overall I-F Response Curves - 13N50, 13N51, 13N52 and 13N53 Chassis

PHILCO Chassis 13N50, 13N51, 13N52, 13N53, Alignment Data, Continued

4.5MC TRAP, SOUND TAKE-OFF AND INTERSTAGE ALIGNMENT

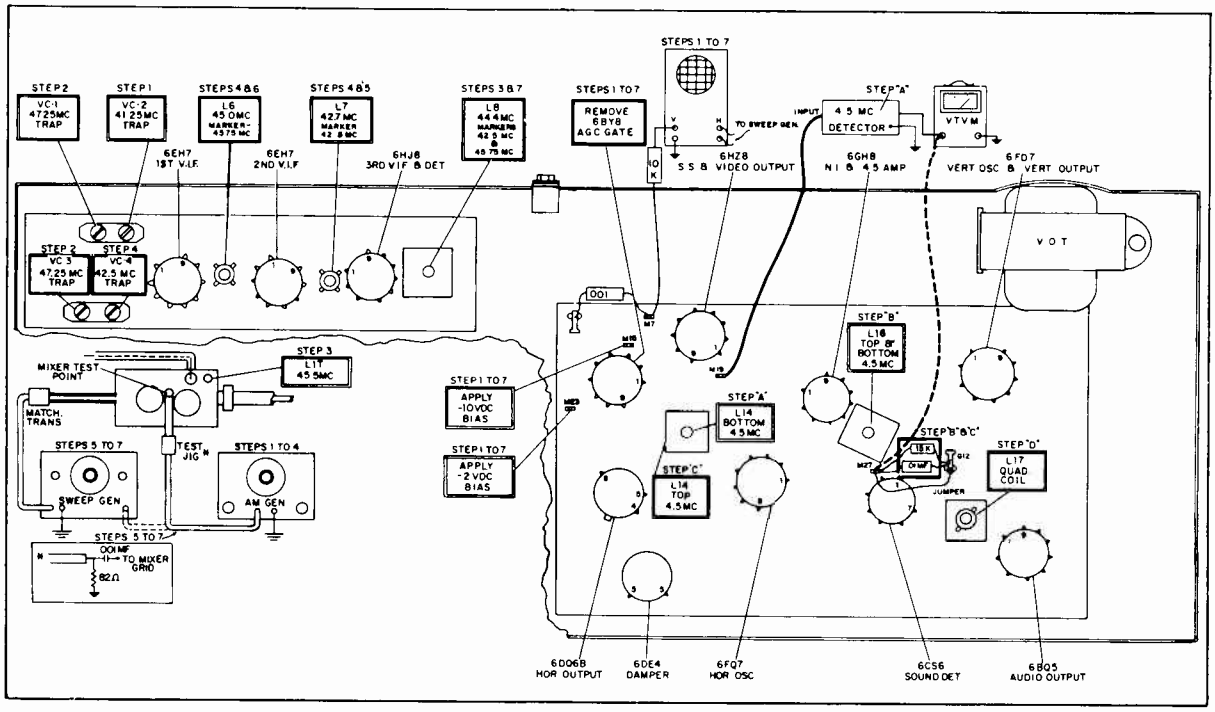
Preliminary:

1. Set contrast control to maximum.
2. Set volume control to minimum.
3. Apply −10V bias to lug M15 on VOS panel.

Equipment:

1. VTVM
2. AM Generator
3. RC Network (15K resistor and .01mfd in parallel)
4. 4.5MC detector probe, see page 90 for circuit diagram.)

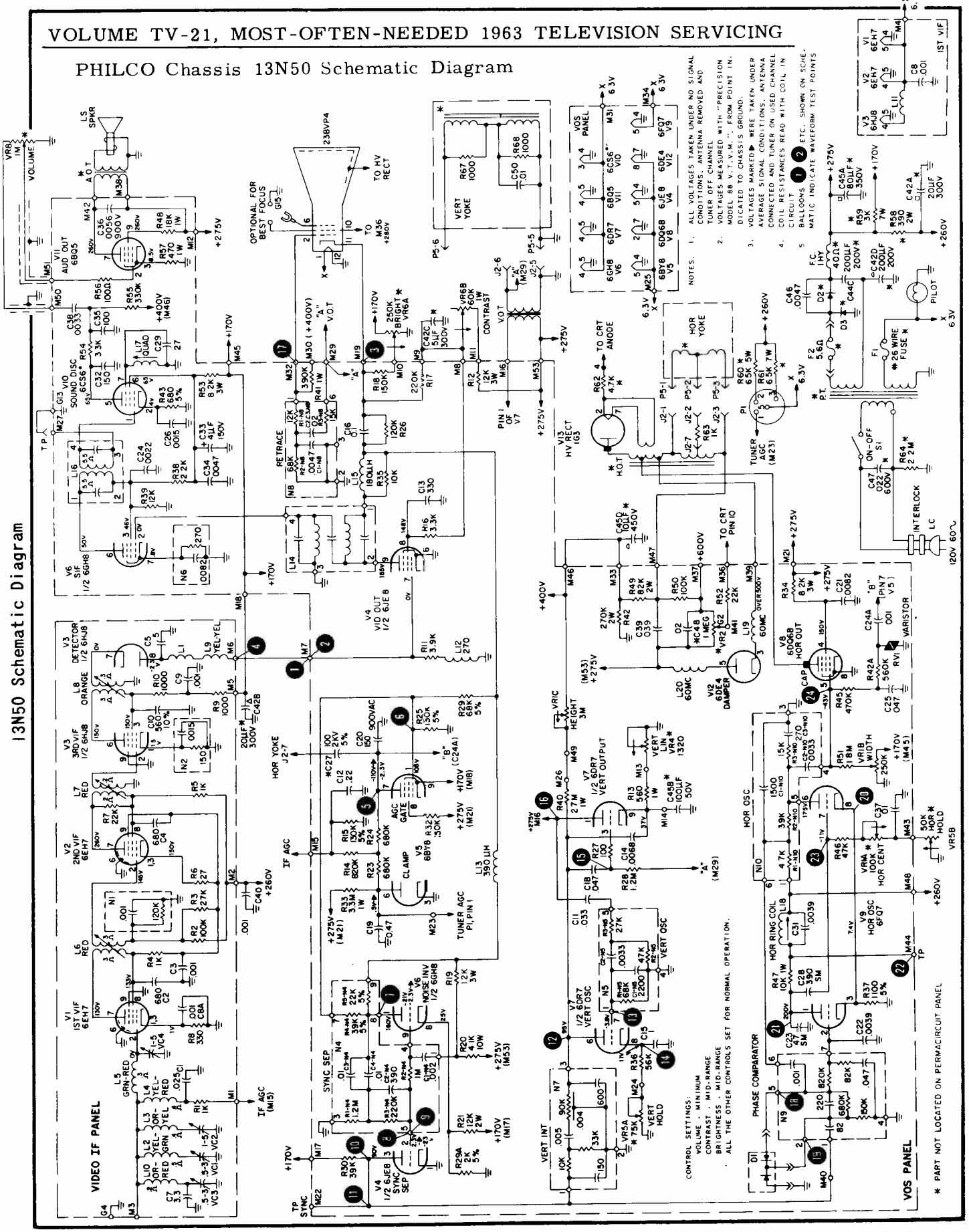
STEP	SIGNAL INPUT TO LUG M7	OUTPUT	ADJUST	REMARKS
A	4.5MC AM or station signal	Connect 4.5MC detector probe to Lug M19. Connect VTVM to 4.5MC probe. Set meter to 2.5V range.	L14 (bottom core) trap for minimum output indication on VTVM.	Increase signal input to give 1/4 scale deflection at null point. (This step for 4.5MC trap adj. only.)
B	4.5MC AM or station signal	Remove ground connection from Lug M27. Connect RC Network from M27 to ground. Place VTVM across RC Network. Input should be adj. to keep output between −2V and −3V.	L16 (top and bottom cores) for maximum indication on VTVM.	RC Network consists of a 15K resistor and .01 mfd capacitor in parallel.
C	4.5MC AM or station signal	Same as Step B	L14 (top core) for maximum indication on VTVM.	
D	Use station signal	Remove RC Network and replace ground connection between M27 and G12.	Quad coil L17 for maximum sound output.	



Equipment Set-Up and Alignment Points - 13N50, 13N51, 13N52 & 13N53 Chassis

PHILCO Chassis 13N50 Schematic Diagram

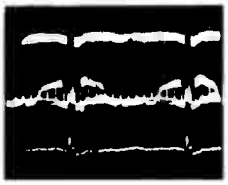
13N50 Schematic Diagram



PHILCO Chassis 13N50 Service Information, Continued

OSCILLOSCOPE WAVEFORM PATTERNS

These waveforms were taken with the receiver adjusted for an approximate peak-to-peak output of 4.0 volts at the video detector. Voltage readings taken with raster just filling screen and all controls set for normal picture viewing. The voltages given are approximate peak-to-peak values. The frequencies shown are those of the waveforms—not the sweep rate of the oscilloscope. All readings were taken with a Model ES-550B Precision oscilloscope.



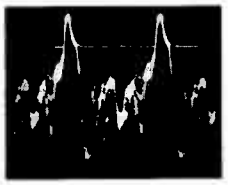
1 4 volts P/P, 60 CPS - maximum contrast

2 4 volts P/P, 15,750 CPS - maximum contrast

3 60 volts P/P, 60 CPS

4 4 volts P/P, 15,750 CPS

5 700 volts P/P, 15,750 CPS



6 42 volts P/P, 15,750 CPS

7 45 volts P/P, 15,750 CPS

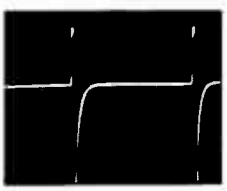
8 42 volts P/P, 60 CPS

9 42 volts P/P, 15,750 CPS

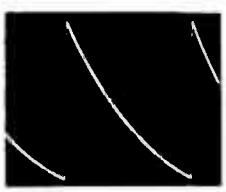
10 45 volts P/P, 60 CPS

11 45 volts P/P, 15,750 CPS

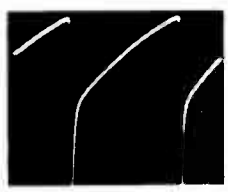
12 100V P/P, 60 CPS



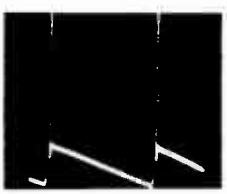
13 85 volts P/P, 60 CPS



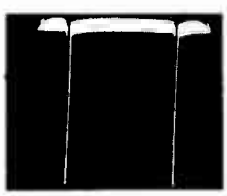
14 19 volts P/P, 60 CPS



15 110 volts P/P, 60 CPS

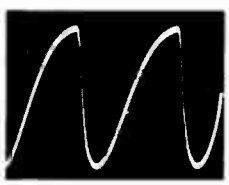


16 620 volts P/P total, 250 volts P/P sawtooth, 60 CPS

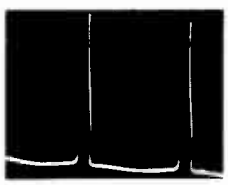


17 37 volts P/P, 60 CPS

18 8.5 volts P/P, 15,750 CPS

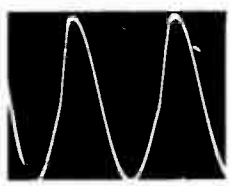


19 12 volts P/P, 15,750 CPS



20 13 volts P/P, 15,750 CPS

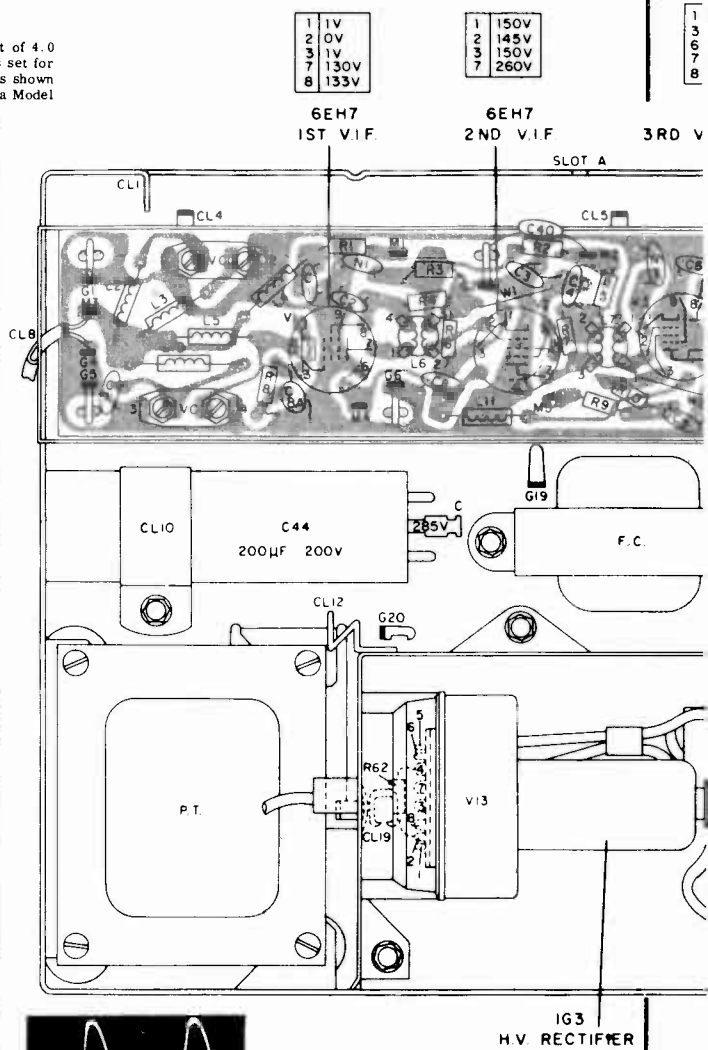
21 52 volts P/P, 15,750 CPS



22 23 volts P/P, 15,750 CPS

23 50 volts P/P, 15,750 CPS

24 160 volts P/P, 15,750 CPS

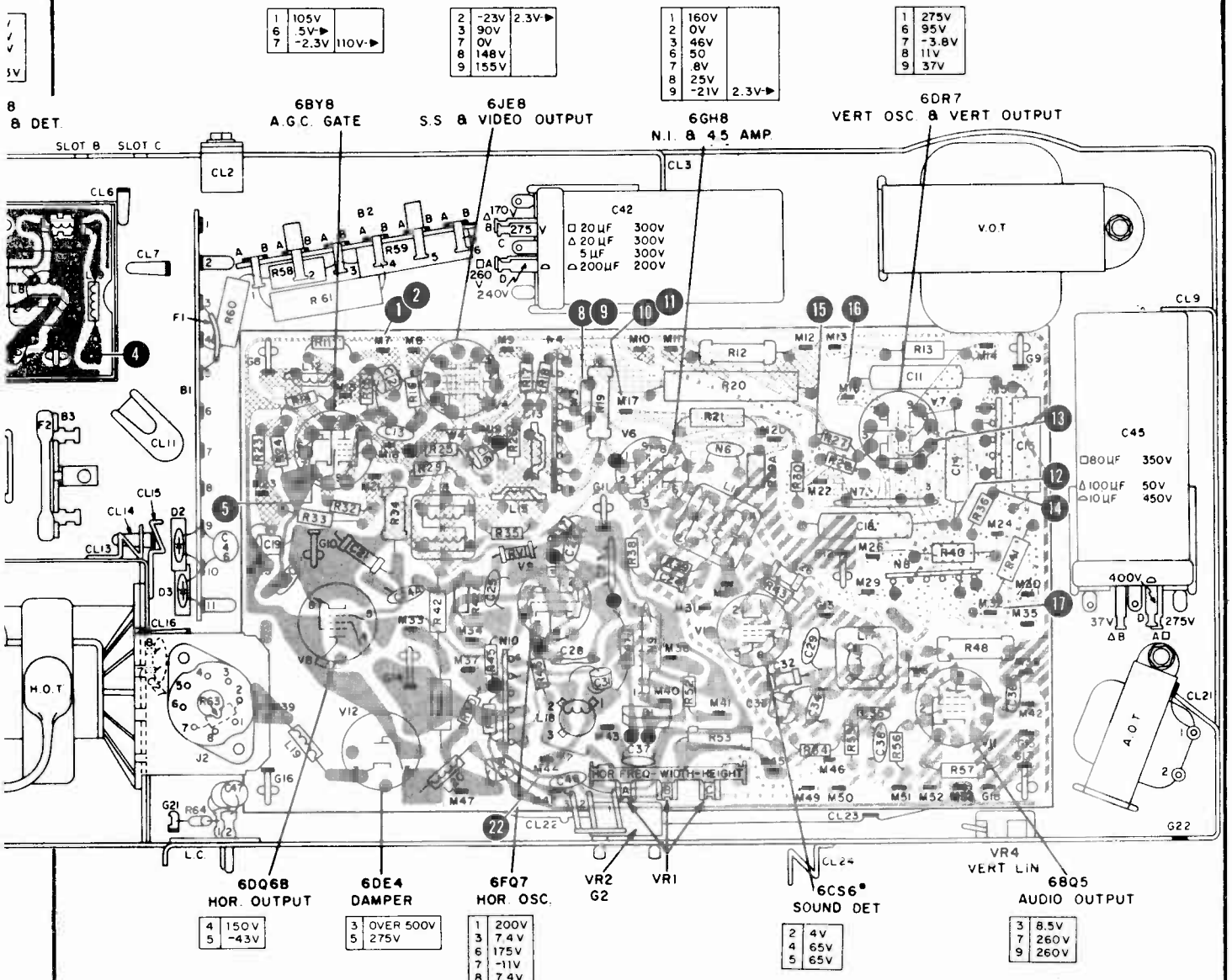


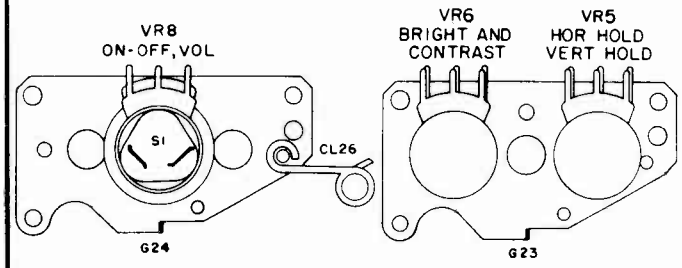
13N50 Base View

LEGEND FOR CODED VOS PERMACIRCUIT PANEL

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

PHILCO Chassis 13N50 Service Information, Continued





SCOPE WAVEFORM TEST POINTS ARE INDICATED BY ❶, ❷, ETC.

NOTE: THE SOLID BLACK DOTS INDICATE ADDITIONAL SCOPE WAVEFORM TEST POINTS. THE POINTS THUS INDICATED ARE: ❸ -LUG M19, ❻ -END OF R-25, ❼ -PIN 1-6GH8, ⓲ -PIN 5-N9, ⓳ -PIN 2-N9, ⓴ -END OF R37, ㉑ -END OF R47, ㉓ -END OF R46, ㉔ -END OF R45.

PANEL LUG CONNECTIONS 13N50

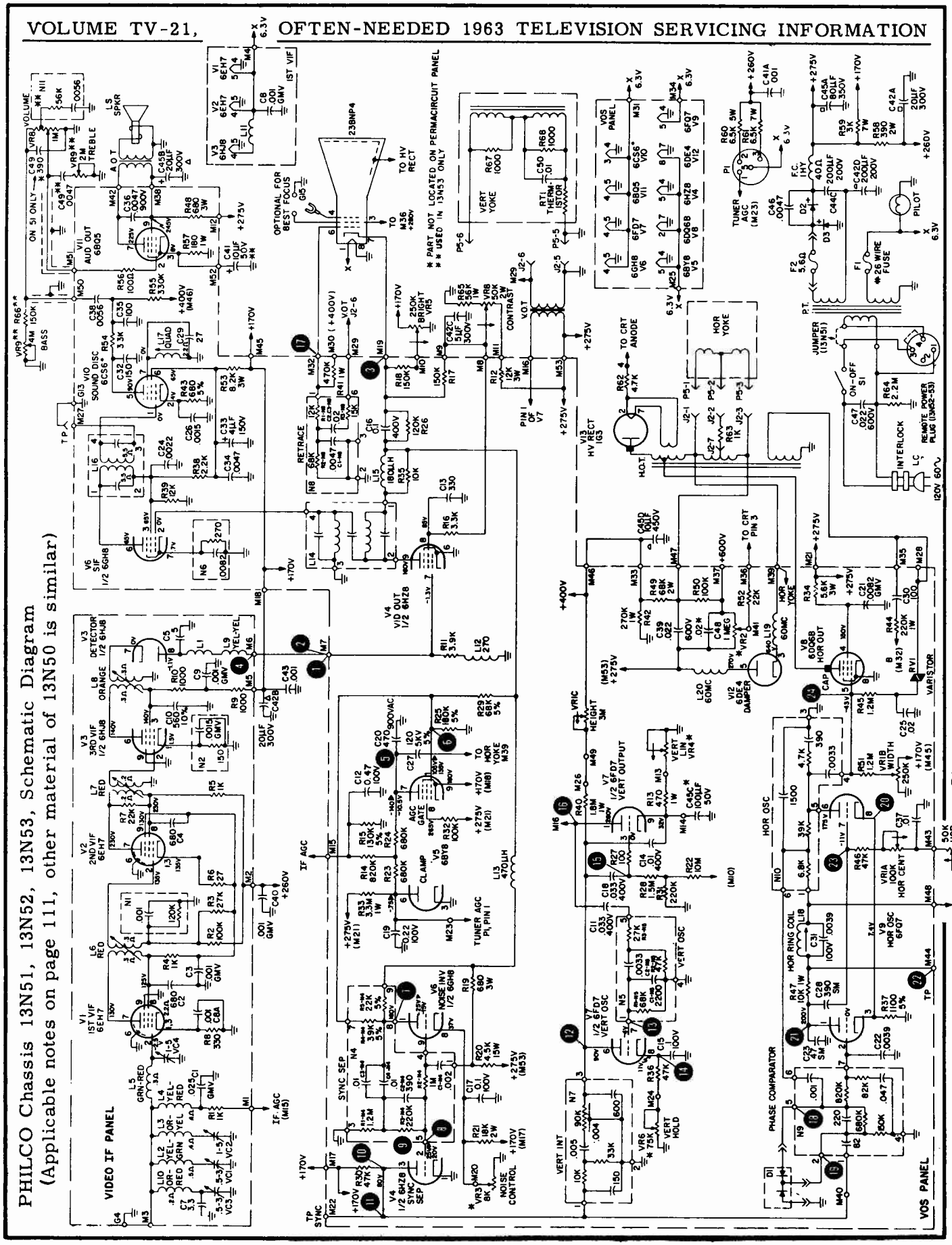
VIF Panel

M1	Lead to M15
M2	Lead to B2-1B
M3	IF Output
M4	Lead to B1-3
M5	Lead to B2-6A
M6	Lead to M7

VOS Panel

M7	Lead to M6
M8	Lead to VR6, contrast cont.
M9	Lead to filter C42-C
M10	Lead to VR6, bright. cont.
M11	Lead to VR6, contrast cont.
M12	Lead to B2-3B
M13	Lead to VR4, vert. lin. cont.
M14	Lead to filter C45-C
M15	Lead to M1
M16	Lead to V.O.T.
M17	Lead to M18
M18	Lead to B2-6A
M19	Lead to CRT, Pin 11
M21	Lead to B2-3A
M22	Lead to M40
M23	Lead to tuner pwr. plug, Pin 1
M24	Lead to VR5A, vert. hold cont.
M25	Lead to B1-3 and M34
M26	Lead to M49
M27	Lead to L16-3
M29	Lead to vert. yoke plug, J2-6
M30	Lead to filter C45D and M46
M31	Lead to B1-3
M32	Lead to CRT, Pin 2
M33	Lead to M46
M34	Lead to M25
M36	Lead to CRT, Pin 10
M37	Lead to VR2, G2 cont.
M39	Lead to H.O.T., Pin 5
M40	Lead to M22
M41	Lead to VR2, G2 cont.
M42	Lead to filter C45-B
M43	Lead to VR5B, horz. hold cont.
M44	Horz. ring coil, TP
M45	Lead to filter C42-A
M46	Lead to M30
M47	Lead to H.O.T., Pin 2
M48	Lead to B2-1B
M49	Lead to M46
M51	Lead to VR8, vol. cont. C.T.
M53	Lead to filter C45-A and VR2-1

PHILCO Chassis 13N51, 13N52, 13N53, Schematic Diagram
(Applicable notes on page 111, other material of 13N50 is similar)



RCA VICTOR

MODEL SERIES	CHASSIS
233-B-60-M	KCS136YA, B
233-B-60-R	KCS136YF
233-B-61-M	KCS136YD, E
233-C-65-M	KCS136YA, B
233-C-66-M	KCS136YA, B
233-C-67-M	KCS136YA, B
233-C-68-M	KCS136YA, B
233-C-71-M	KCS136YA, B
233-C-72-M	KCS136YA, B
233-C-75-R	KCS136YF
233-C-76-R	KCS136YF
233-C-79-M	KCS136YD, E
233-C-80-M	KCS136YD, E
233-C-82-M	KCS136YH
233-C-85-M	KCS136YH
233-C-86-M	KCS136YH
233-C-87-M	KCS136YH
233-D-95-M	KCS136YL
233-DX-95-M	KCS136YL
233-D-96-M	KCS136YN
233-D-97-M	KCS136YN
233-D-98-M	KCS136YN

Additional, recently released models.

MODEL SERIES	CHASSIS
233-B-59-M	KCS136YA, YB
233-C-64-M	KCS136YA, YB
233-C-73-M	KCS136YA, YB
233-C-74-M	KCS136YA, YB
233-C-77-M	KCS136YD, YE
233-C-81-M	KCS136YD, YE
233-C-83-M	KCS136YD, YE
233-C-84-M	KCS136YT, YU

MODELS
193-A-482, 4, 7, MV, MU
193-A-532, 9 MV, MU
193-K-040 MV, MU

MODEL	CABINET TYPE	CHASSIS
233-B-602-MV, 5MV, 6MV, 7MV	Table	KCS136YA
233-B-602-MU, 5MU, 6MU, 7MU	Table	KCS136YB
233-B-605-RS, 6RS	Table	KSC136YF
233-B-615-MV, 6MV, 7MV	Table	KCS136YD
233-B-615-MU, 6MU, 7MU	Table	KCS136YE
233-C-655-MV, 6MV, 7MV	Consolette	KSC136YA
233-C-655-MU, 6MU, 7MU	Consolette	KCS136YB
233-C-664-MV	Consolette	KSC136YA
233-C-664-MU	Consolette	KCS136YB
233-C-675-MV, 6MV	Lowboy	KCS136YA
233-C-675-MU, 6MU	Lowboy	KCS136YB
233-C-686-MV	Consolette	KCS136YA
233-C-686-MU	Consolette	KCS136YB
233-C-715-MV, 6MV	Console	KCS136YA
233-C-715-MU, 6MU	Console	KCS136YB
233-C-725-MV, 6MV, 7MV	Console	KCS136YA
233-C-725-MU, 6MU, 7MU	Console	KCS136YB
233-C-755-RS, 6RS, 7RS	Console	KCS136YF
233-C-765-RS, 6RS, 7RS	Console	KCS136YF
233-C-795-MV, 6MV	Console	KCS136YD
233-C-795-MU, 6MU	Console	KCS136YE
233-C-805-MV, 6MV	Console	KCS136YD
233-C-805-MU, 6MU	Console	KCS136YE
233-C-825-MV, 6MV, 8MV*	Console	KCS136YH
233-C-854-MV*	Console	KCS136YH
233-C-866-MV*	Lowboy	KCS136YH
233-C-870-MV, 8MV*	Lowboy	KCS136YH
233-D-955-MV, 6MV	Combination	KCS136YL
233-DX-955-MV, 6MV	Combination	KCS136YL
233-D-965-MV, 6MV*	Combination	KCS136YN
233-D-974-MV*	Combination	KCS136YN
233-D-986-MV*	Combination	KCS136YN

COMBINATION CONSOLES

Models 233-D-95-M, 233-D-96-M, 233-D-97-M and 233-D-98-M feature TV, AM/FM tuner and stereophonic, 4-speed record changer. Models 233-D-96-M, 233-D-97-M and 233-D-98-M also feature FM stereo. The television receiver in the combination consoles is completely independent of the radio and "Victrola" and only the speaker system is common to all. The SS6 "total sound" speaker systems are compatible with these models, and jacks are provided for their installation. Model 233-DX-95-M is identical to 233-D-95-M except it includes an FM stereo adaptor.

CABINET FINISHES

The cabinet finish is identified by the last digit in the model number as follows: 2—ebony, 4—maple, 5—mahogany, 6—walnut, 7—oak, 8—cherry and 0—antique parchment white.

REMOTE CONTROL

Models 233-B-60-RS, 233-C-75-RS and 233-C-76-RS are equipped with KRS26A remote control receiver and KRT3A remote control transmitter.

AUTOMATIC BRIGHTNESS CONTROL

Models listed above, marked with asterisk (*) are equipped with automatic brightness control.

(Material Continued on pages 116 through 120)

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

SERVICE ADJUSTMENTS

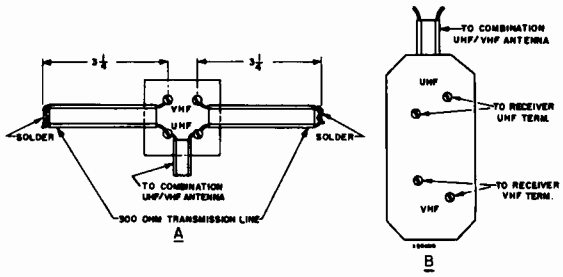


Figure 1—Combination UHF/VHF Antenna Matching

VHF FINE TUNING

To center the fine tuning range of concentric Models 233-B-60-M, 233-C-65-M, 233-C-66-M, 233-C-67-M, 233-C-68-M, 233-C-71-M, 233-C-72-M, remove the channel selector and fine tuning knobs. Always adjust the highest numbered channel first. See Fig. 2.

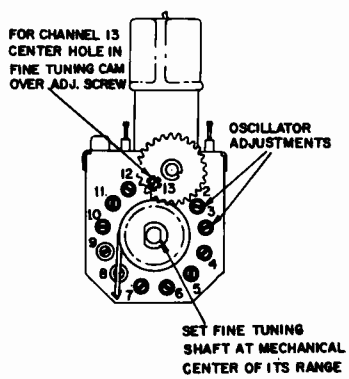


Figure 2—Concentric Fine Tuning—Manual

VHF FINE TUNING (MANUAL)

Preset tuning Models 233-B-61-M, 233-C-79-M, 233-C-80-M, 233-C-82-M, 233-C-85-M, 233-C-86-M, 233-C-87-M, 233-D-95-M, 233-DX-95-M, 233-D-96-M, 233-D-97-M and 233-D-98-M: First center the fine tuning range on each channel as shown in Fig. 3. The Channel 6 oscillator slug will affect the fine tuning on Channels 6 through 2, and the Channel 13 oscillator slug will affect the fine tuning on all 12 channels. Therefore, the Channel 13 slug should be adjusted first.

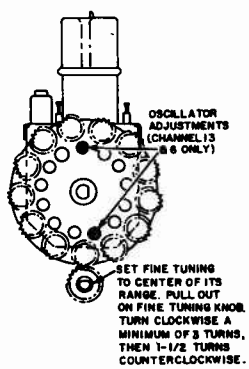


Figure 3—One-Set Fine Tuning—Manual

VHF FINE TUNING (REMOTE)

Preset tuning Models 233-B-60-R, 233-C-75-R and 233-C-76-R have a turret tuner. First, center the fine tuning range on each channel and then adjust the oscillator slug for each station received. (See Fig. 4.) The channels may be adjusted in any order.

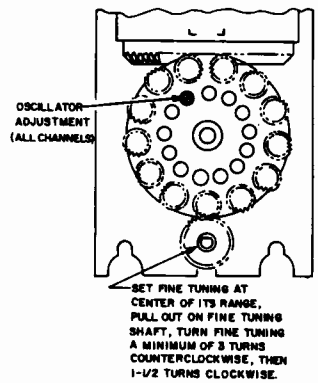


Figure 4—One-Set Fine Tuning—Remote

AGC AND SYNC STABILIZER

Turn the sync stabilizer control completely counterclockwise and adjust a.g.c. while tuned to a strong, local station. Turn the a.g.c. clockwise until picture begins to distort, and then counterclockwise slightly below the point where the distortion is eliminated. Advance the sync stabilizer fully clockwise and rotate the horizontal hold counterclockwise until horizontal sync is lost. Then slowly sync the picture again. If the picture tends to distort or "hang-up" before locking in, retard the sync stabilizer control until this condition is corrected.

HORIZONTAL OSCILLATOR SINE COIL

With sync shorted (Pin 1 of V502 shorted to ground) connect jumper across terminals of L501A and adjust the horizontal hold control so that the sides of the picture are vertical. Remove jumper from L501A only, and adjust L501A slug, if necessary, to again bring the sides of the picture vertical. Remove jumper from Pin 1 of V502 to ground.

CENTERING

If the picture does not fill the screen, it may be necessary to center the picture with the 2 disc magnets mounted behind the yoke cover. Both horizontal and vertical centering are accomplished at once by rotating the discs together or separately. Perform this adjustment along with vertical height, vertical linearity, and width, as they are all interdependent.

TESTING PICTURE PROPORTIONS

Rotate the vertical hold control to roll the picture slowly downward and study the blanking bar. If it is not level, or if the bar varies in thickness as it moves down the screen, read the next 2 paragraphs.

DEFLECTION YOKE

If the picture is tilted, loosen the yoke clamp screw and rotate the yoke to level the picture. Retighten the yoke clamp.

HEIGHT AND VERTICAL LINEARITY

If the blanking bar changed size while moving down, alternately adjust the height and vertical linearity controls for best vertical proportions. Final vertical size should allow the raster to overlap the mask about 5/8 inch at top and bottom with normal (120 volts) line voltage.

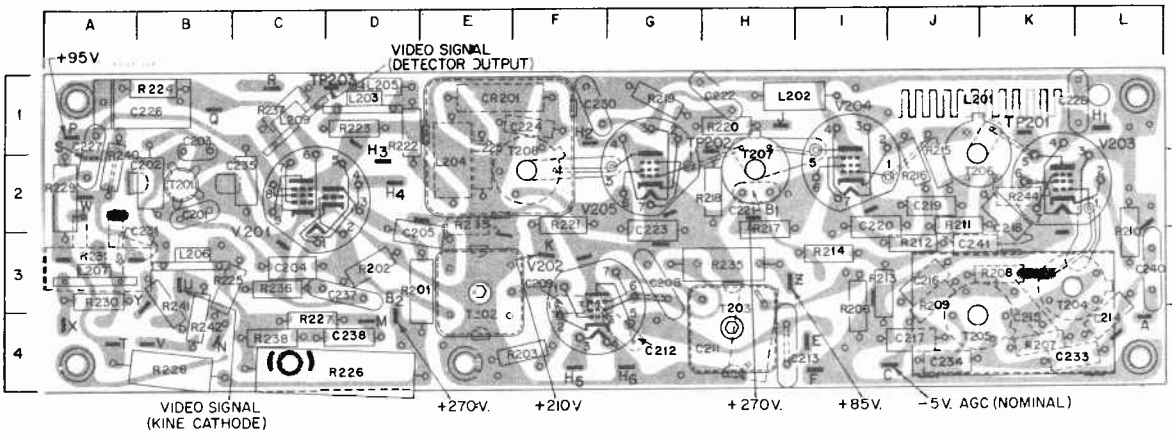
WIDTH

The width adjustment is made with L101. With normal line voltage, the raster should overscan the mask about 5/8 inch on each side. The raster should fill the mask at 108 volts.

(For some alignment information see such material under KCS-140, pages 121-122)

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

PW200 SECURITY SEALED CIRCUIT ASSEMBLY



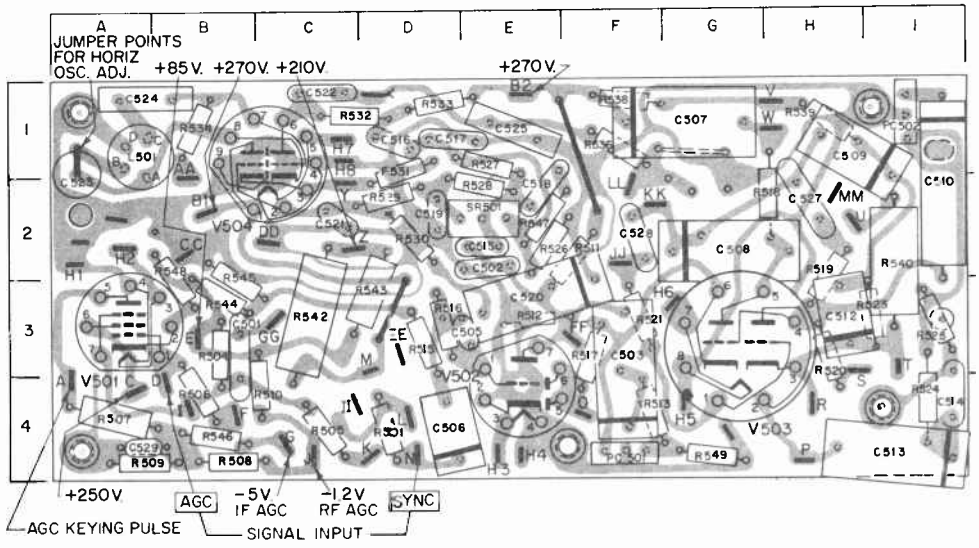
PW200 Sealed Circuit I-F and Video Assembly Composite Diagram

PW200 COMPONENT LOCATION GUIDE

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

†In chassis **with** auto-brightness; omitted in chassis **without** auto-brigtatness.

PW500 SECURITY SEALED CIRCUIT ASSEMBLY



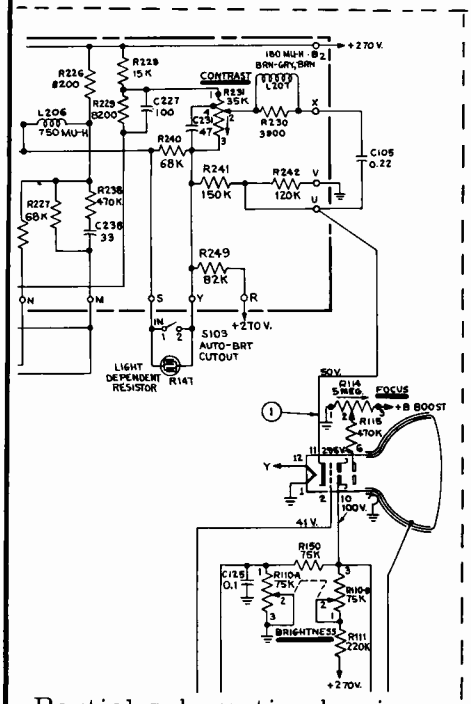
PW500 Sealed Circuit Deflection Assembly Composite Diagram

PW500 COMPONENT LOCATION GUIDE

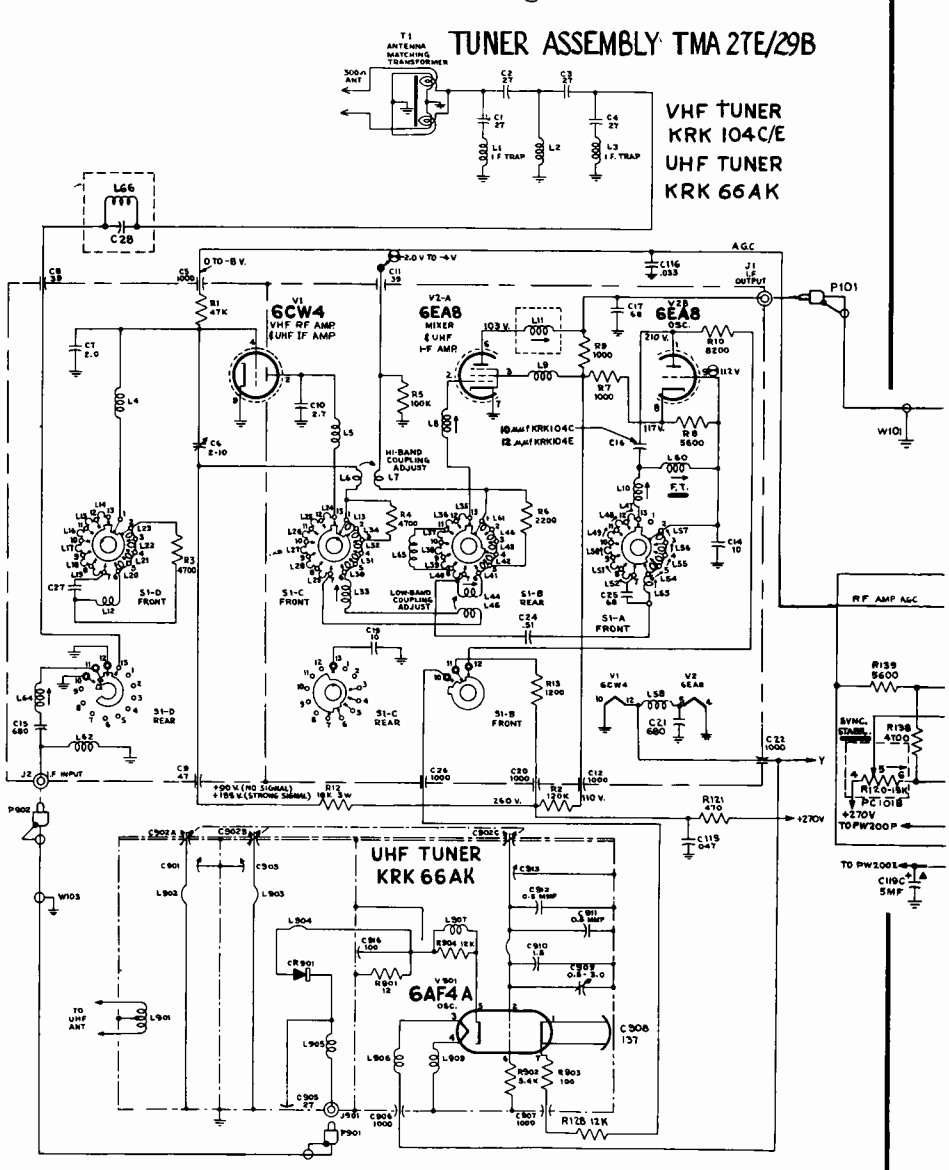
C501 .....B3	C513 .....I4	C523 .....A1	PC502 ....I1	R511 .....F2	R523 .....I3	R533 .....D1	R546 .....B4
C502 .....E2	C514 .....I4	C524 .....A1		R512 .....E3	R524 .....I4	R534 .....B1	R547 .....E2
C503 .....F3	C515 .....E2	C525 .....E1	R501 .....D4	R513 .....F4	R525 .....I3	R536 .....F1	R548 .....B2
C505 .....D3	C516 .....D1	C527 .....H2	R504 .....B3	R515 .....D3	R526 .....E2	†R538 .....F1	R549 .....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-brightness; omitted in chassis **with** auto-brightness.

RCA Victor KCS-136Y Series Diagram, Continued



Partial schematic showing main difference of Chassis KCS136YH, YN, with automatic brightness control.

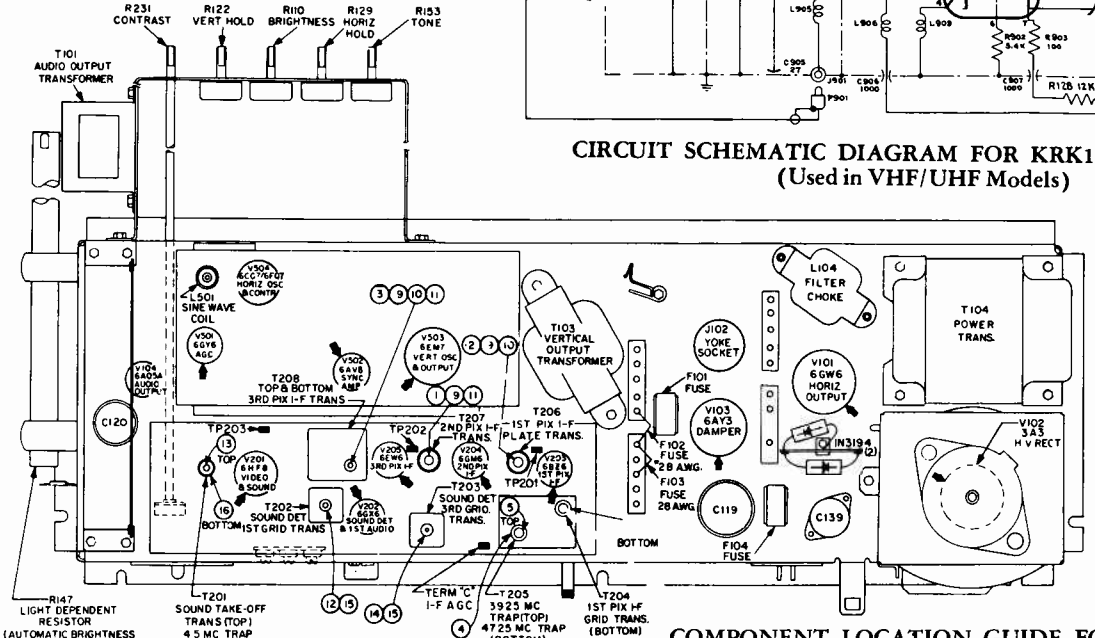


CHANNEL SELECTOR SWITCH NOTES:

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. ○ – INDICATES THRU CONNECTION FROM FRONT TO REAR OF SWITCH TERMINALS.
4. ◎ – INDICATES CONTACTS INSULATED - NOT CONNECTED FROM FRONT TO REAR OF SWITCH.

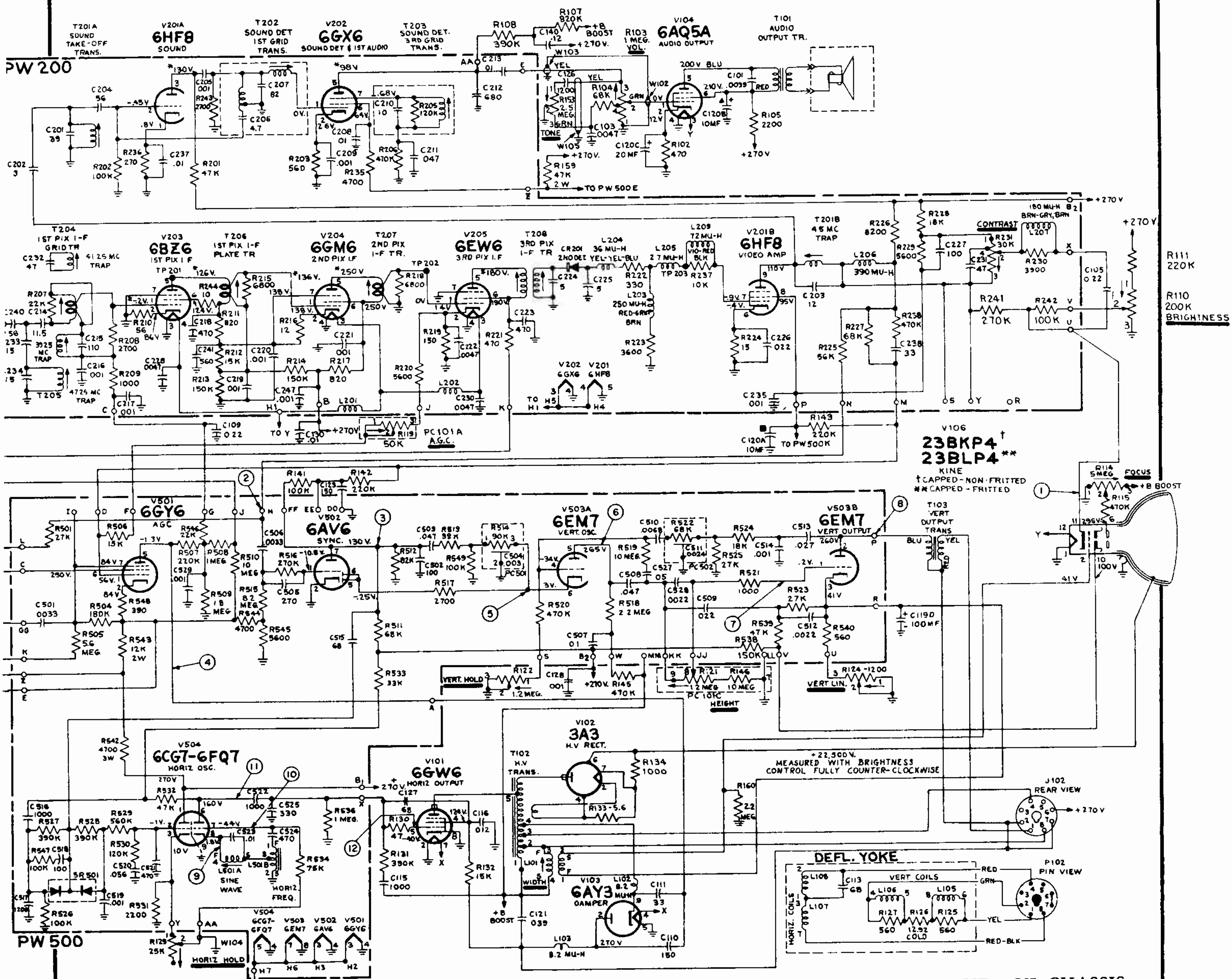
⊖ USE 100K ISOLATION RESISTOR IN SERIES WITH PROBE

CIRCUIT SCHEMATIC DIAGRAM FOR KRK104C,E/KRK66AK
(Used in VHF/UHF Models)

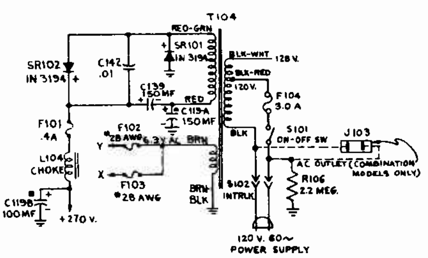


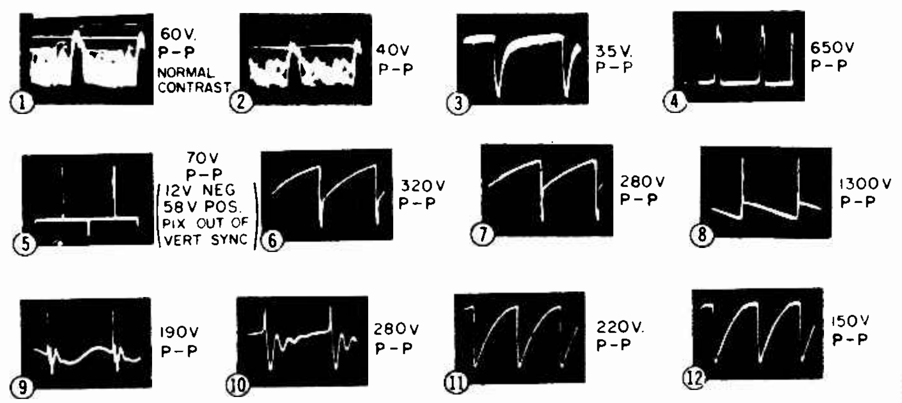
COMPONENT LOCATION GUIDE FOR KCS136Y CHASSIS
(For All Model Series)

RCA Victor Chassis KCS-136Y Series, Schematic Diagram, Continued



CIRCUIT SCHEMATIC DIAGRAM FOR KCS136YA, YB, YD, YE, YF & YL CHASSIS
(Without Automatic Brightness Control)



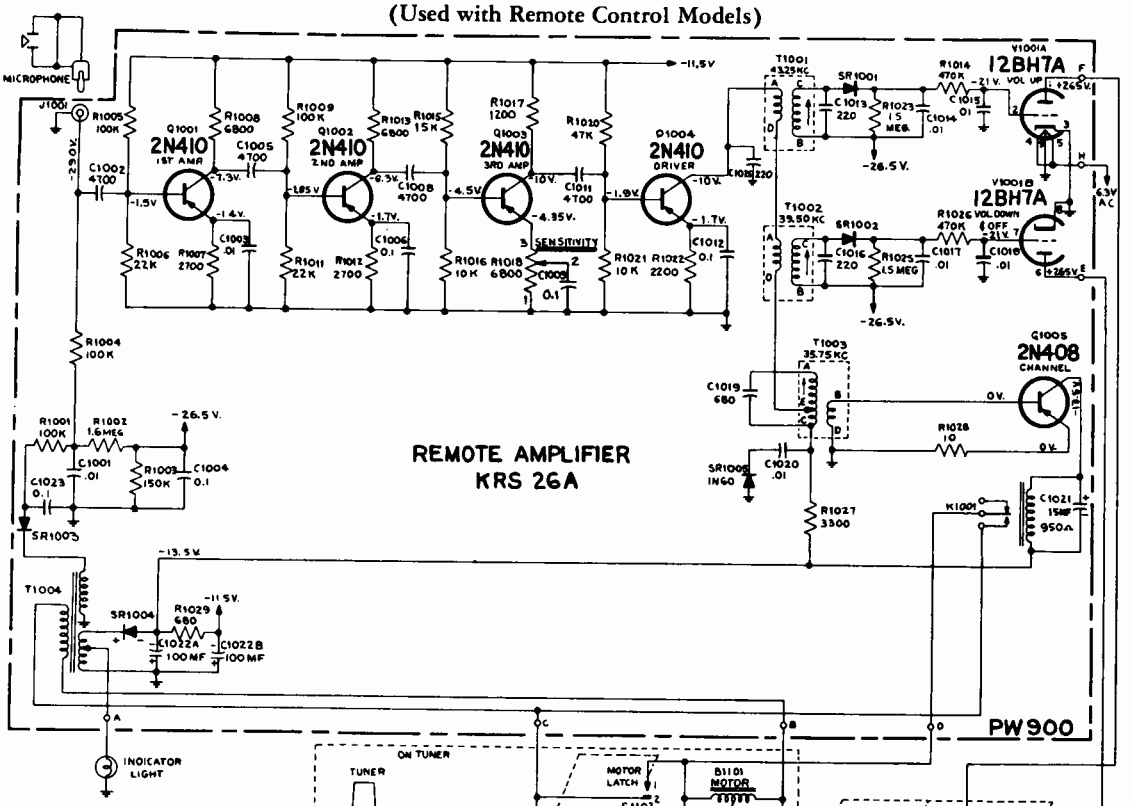


Balloons ①, ②, etc., shown on schematic indicate points of observation of the waveforms shown below the schematic. Use low-capacity probe when observing waveforms ①, ②, ③, and ④.

RCA Victor

CIRCUIT SCHEMATIC DIAGRAM FOR KRS26A

(Used with Remote Control Models)

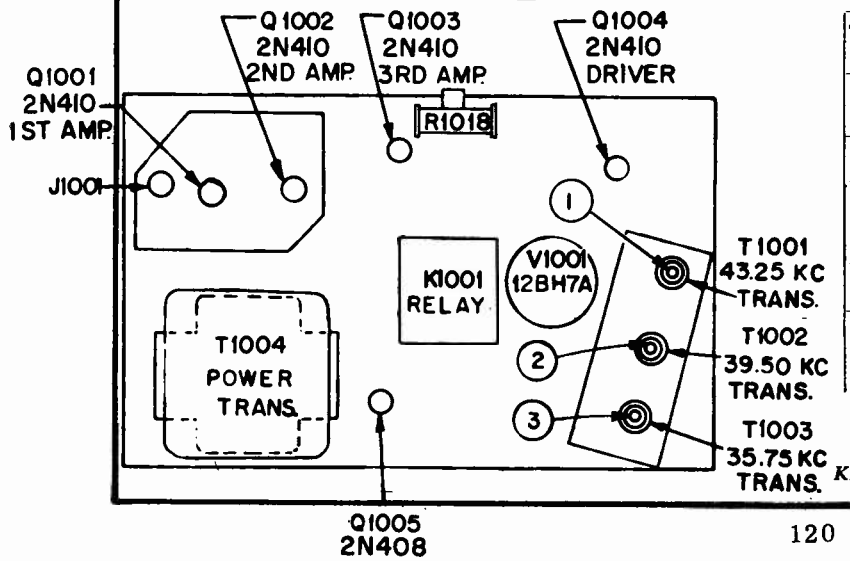


NOTE: Indicated voltage readings at the transistor terminals are typical. The voltage difference between base and emitter (E_{bc}) should hold within ±20%. Resistance readings should be taken with the transistors removed from the circuit.

The transmitter standard should be operated at a distance of approximately four feet from the amplifier to prevent excessive pick-up when the amplifier is finally peaked.

Connect meter to junction of SR1001 and R1023.

TRANSMITTER FREQUENCY	TRANSMITTER FUNCTION	ADJUST
43.25 kc.	Depress "OFF" button	T1001 for maximum dip on meter.
Move meter to junction of SR1002 and R1025.		
39.50 kc.	Depress left side "Volume" button	T1002 for maximum dip on meter.
Move meter to junction of C1021 and Q1005 collector (black dot).		
35.75 kc.	Depress left side "tint" button	T1003 for maximum dip on meter.



KRK26A—Remote Control Amplifier Chassis View

RCA VICTOR Chassis KCS140A & KCS140B

MODEL	CHASSIS
193-A-542-MV	KCS140A
193-A-542-MU	KCS140B
193-A-546-VM	KCS140A
193-A-546-MU	KCS140B
193-A-549-MV	KCS140A
193-A-549-MU	KCS140B

A.G.C. CONTROL ADJUSTMENT

Perform the following routine test: Adjust the receiver and antenna to obtain the best picture from a strong, local station. Quickly switch off channel and back, and if the picture distorts and bends, or does not reappear immediately, rotate the a.g.c. control R113, counterclockwise and then clockwise until picture bend occurs. Then slowly retard control until the bend is gone. The noise stabilizer control should be turned counterclockwise to the end of rotation before adjusting a.g.c.

HORIZONTAL OSCILLATOR ADJUSTMENT

Turn the horizontal hold control R120 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 above conditions are not obtained, adjustment of the sine wave coil may be required (L501A on PW500 deflection board). Remove cabinet back as shown in Fig. 2. Attach short jumpers across L501A and from pin 1 of V504 to ground. Adjust horizontal hold control to obtain a picture with sides vertical (picture may drift slowly). Momentarily remove and re-attach L501A jumper while adjusting and unshorting of the coil causes no more than a slight sideways shift of the picture. Remove all jumpers.

NOISE STABILIZER CONTROL

If the picture hangs up, or bends before locking in, retard the noise control until this symptom is eliminated. Note: Adjust a.g.c. before noise stabilizer.

DEFLECTION YOKE

If the picture is tilted, loosen the yoke clamp screw and rotate the yoke to level the picture. Retighten the yoke clamp.

HEIGHT AND VERTICAL LINEARITY

If the blanking bar changed size while moving down, alternately adjust the height and vertical linearity controls until the condition is corrected. Final vertical size should allow the raster to overlap the mask about 5/8 inch at top and bottom.

WIDTH

The width adjustment is made with L101. The picture may be adjusted to fill the mask with a line voltage of 108 volts, and with normal line voltage, the raster should overscan the mask about 5/8 inch on each side. "Normal" line voltage is 120 volts.

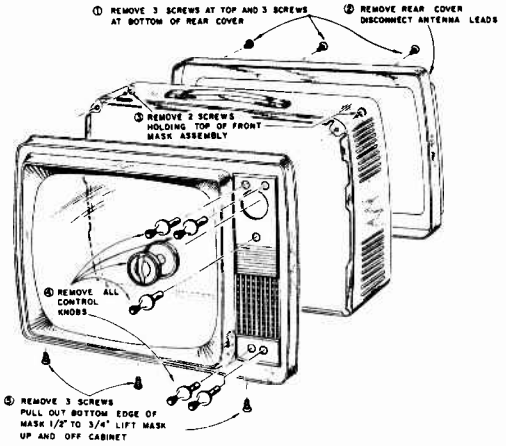


Figure 2—Chassis Removal and Safety Glass Cleaning

PICTURE I.F. TRANSFORMER AND TRAP ADJUSTMENTS

BIAS ..... Adjust for —6 volts on i.f. a.g.c. bus at terminal "N" of PW200.

OSCILLOSCOPE ..... Connect to 2nd Detector output at test point TP204. Set "scope" for 5 volts peak to peak.

SIGNAL GENERATOR ..... Connect to mixer grid in series with 1500 mmf. capacitor.

SWEEP GENERATOR ..... Connect to the grid of the 3rd picture i.f. amplifier, pin 1 of V206, through hole in board. Use shortest leads possible. (See Fig. 16.)

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

MISCELLANEOUS ..... Refer to Fig. 16 for adjustment locations.

	STEP	SWEEP GENERTOR	SIGNAL GENERATOR	ADJUST	REMARKS
1	Peak 2nd pix. i.f. transformer	———	45.5 mc.	T207	Peak T207 and T206 on frequency for maximum 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 and bottom cores)	Adjust for maximum with response shown in Fig. 6. Use 5 volt peak to peak on "scope."
4	Adjust 47.25 mc. trap	———	47.25 mc.	T205 (bottom)	Adjust for minimum output indication on meter.
5	Adjust 39.25 mc. trap	———	39.25 mc.	T205 (top)	Adjust for minimum output indication on meter.
6	Adjust 41.25 mc. trap	———	41.25 mc.	T204 (top)	Adjust for minimum output indication on meter.

RCA Victor Chassis KCS-140A, B, Alignment Information, Continued

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

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Apply —10 volts to the i.f. a.g.c. bus at terminal "N" on PW200.
OSCILLOSCOPE ..... Connect across speaker voice coil.
SIGNAL GENERATOR..... Connect to test point TP204 on PW200.
VACUUM TUBE VOLTMETER... Connect to output of diode detector shown in Fig. 9. Set meter for negative voltage readings.
MISCELLANEOUS..... Connect test diode detector, see Fig. 9, to pin 7 of V202. Refer to Fig. 16 for adjustment locations.

	STEP	SIGNAL GENERATOR	ADJUST	REMARKS
	Set contrast control maximum clockwise.			
12	Adjust Driver Transformer Primary and Secondary	4.5 mc.	T202 (top and bottom)	Adjust T202 top and bottom for maximum on meter. Set generator for 1.0 to 1.5 volts when peaked. Peak cores at open end of coils.
13	Adjust Sound Take-Off Trans.	4.5 mc.	T201	Adjust T201 for maximum negative d.c. on meter. Set generator for 1.0 to 1.5 volts on meter.
14	Disconnect the diode test detector. Turn off signal and tune in strongest signal in area adjusting volume control for normal volume. Tuner core of T203 flush with top of coil form.			
15	Adjust Sound Detector Trans.	Observing oscilloscope and listening to audio output adjust T203 clockwise to a peak. Continue clockwise to second louder peak and adjust for maximum on this peak.		
	Move the oscilloscope to the kinescope cathode. Use the diode probe. Set the contrast control to maximum clockwise position.			
16	Adjust 4.5 mc. trap	4.5 mc., A-M modulation, 400 cycles	T209	Adjust for minimum 400 cycle indication on oscilloscope.
	Alternate Method Using Generators With F-M Modulation Provided.			
12	Same as step 12 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7.5 kc. deviation.			
13	Same as step 13 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7.5 kc. deviation.			
14	Adjust Sound Detector Trans.	4.5 mc., 400 cycle F-M modulation, 7.5 kc. deviation	T203	Adjust T203 for maximum 400 cycle output on "scope" using maximum amplitude peak. Set volume control for .70 volt peak to peak on "scope" when peaked. See response in Fig. 8.
15	Retouch Driver and Sound Take-Off Trans. for breakout	4.5 mc., 400 cycle F-M modulation, 7.5 kc. deviation	T201 and T202	Decrease input to minimum usable signal. Retouch T201 and T202 for symmetrical breakout. Response in Fig. 8.
	Move the oscilloscope to the kinescope cathode. Use the diode probe. Set the contrast control to maximum clockwise position.			
16	Adjust 4.5 mc. trap	Same as step 16 above. Adjust for minimum 400 cycle indication on oscilloscope.		

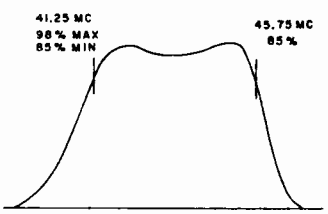


Figure 6—T208 3rd Pix-I.F. Response

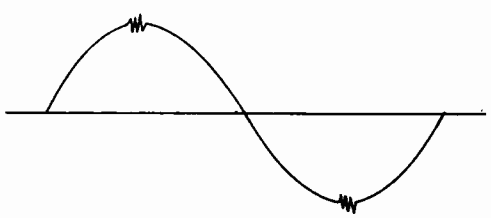


Figure 8—Sound Detector Response

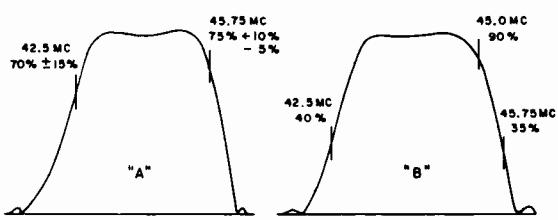


Figure 7—Mixer Plate and Overall I.F. Response

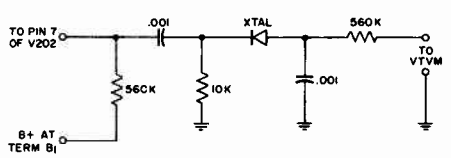


Figure 9—Sound Diode Detector

RCA Victor Chassis KCS-140A,B, Service Information, Continued

PW200 SECURITY SEALED
CIRCUIT ASSEMBLY

PW200 COMPONENT LOCATION GUIDE

C201	B5
C207	B3
C208	C2
C209	B2
C210	B1
C211	A1
C215	B2
C217	C1
C218	C1
C219	C1
C221	D2
C224	D4
C225	C3
C227	C5
C228	D5
C229	C6
C230	C5
C232	A5
C233	D1
C234	C6
C238	D3
C239	B6
C243	C1
C244	C1
C245	A5
C246	A5
C247	B5
C248	B1
CPR201	C5
CPR202	B5
CPR203	D5
CPR204	B4
CR201	C6
L201	C3
L202	C5
L204	D6
L205	D6
L206	A4
L208	C6
PC202	D3
R203	B4
R206	B4
R209	C2
R212	A2
R213	B2
R214	D1
R215	C1
R216	D1
R217	C2
R222	D3
R226	D5
R227	D6
R228	A3
R229	A2
R233	A4
R234	B6
R236	A6
R238	A4
R243	A2
R246	A1
R247	C6
R248	A5
R249	A5
R250	A5
R251	D3
T201	B6
T202	B4
T203	B3
T204	D1
T205	C1
T206	D3
T207	D4
T208	D6
T209	A5

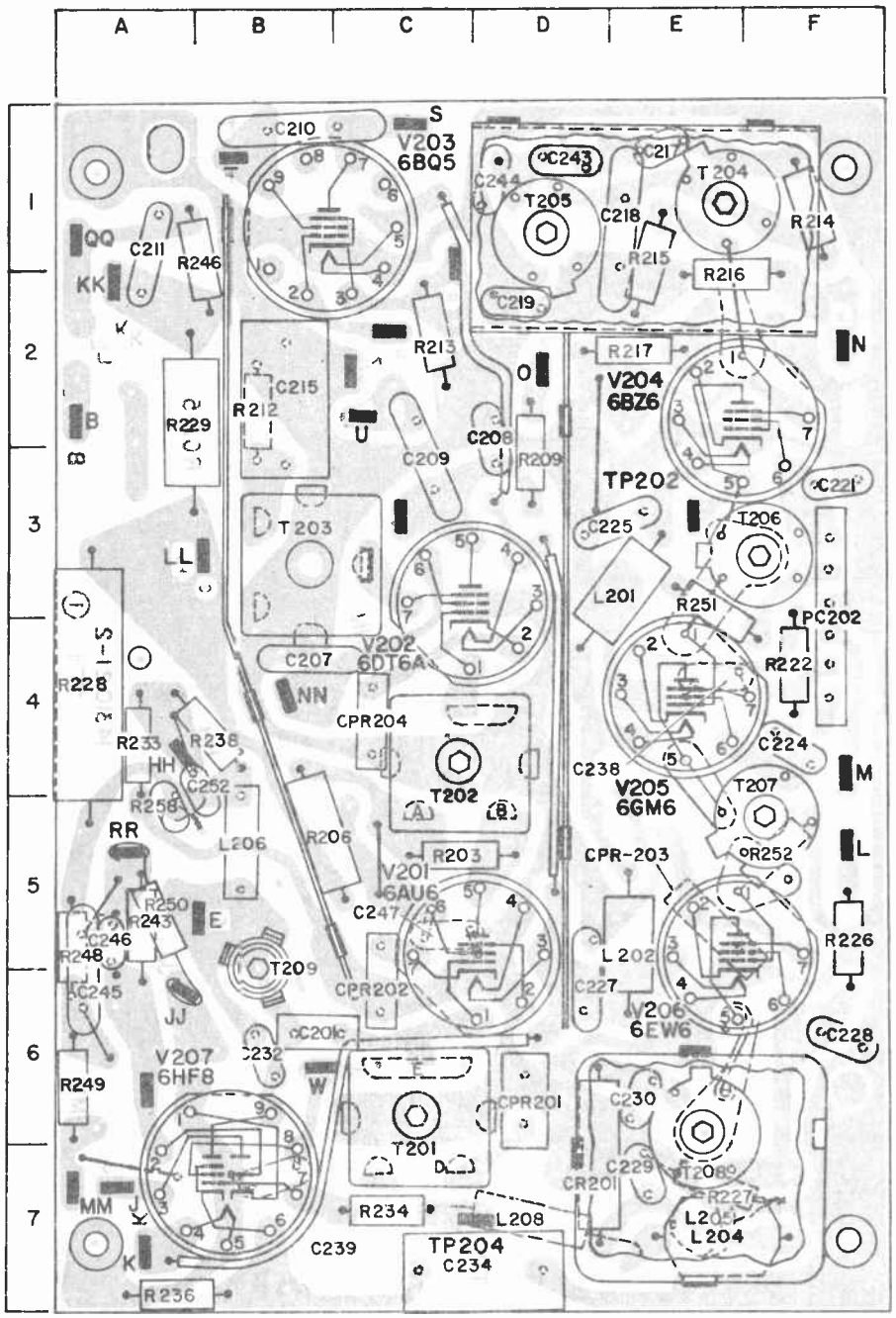


Figure 13—PW200 Sealed Circuit I.F. and Video Assembly Composite Diagram

RCA Victor Chassis KCS-140A,B, Service Information, Continued

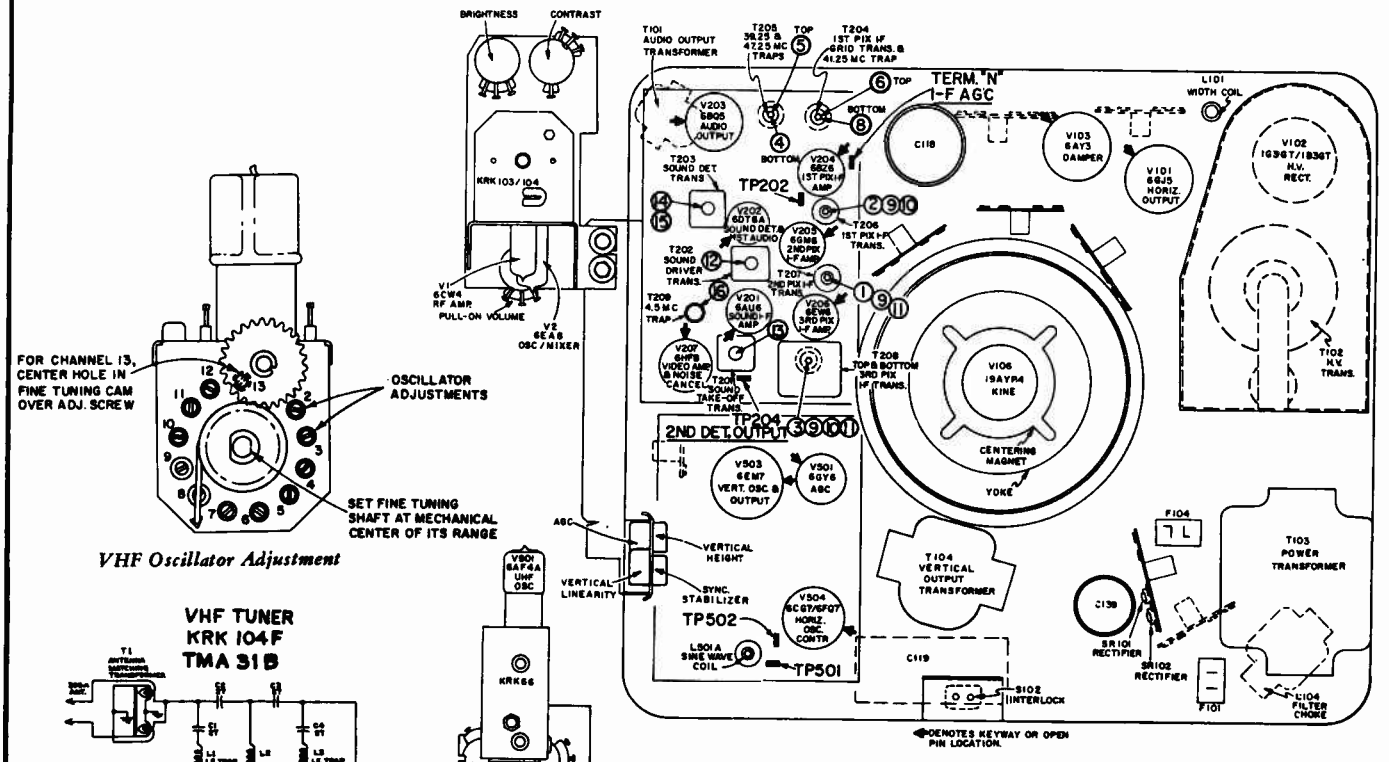
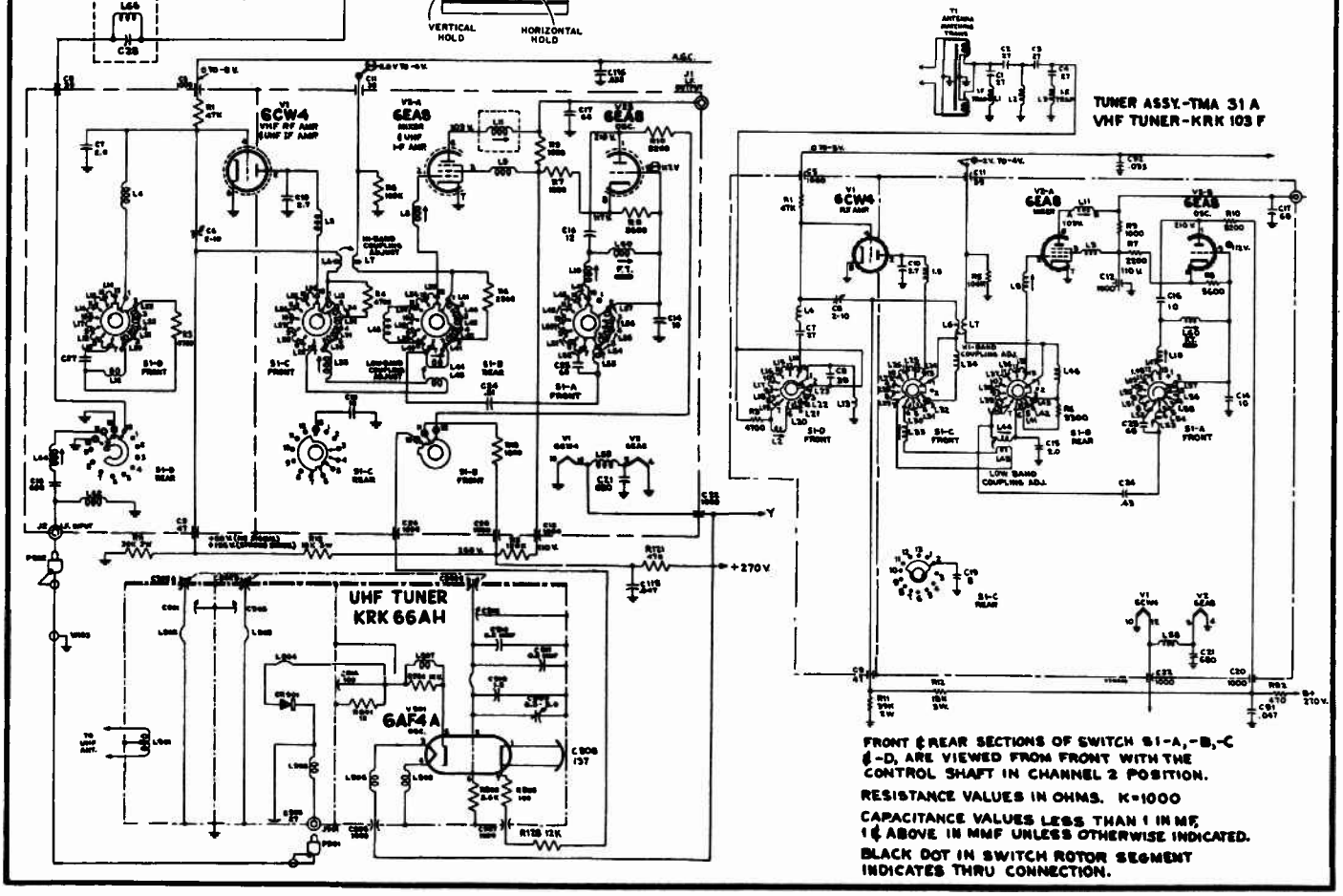
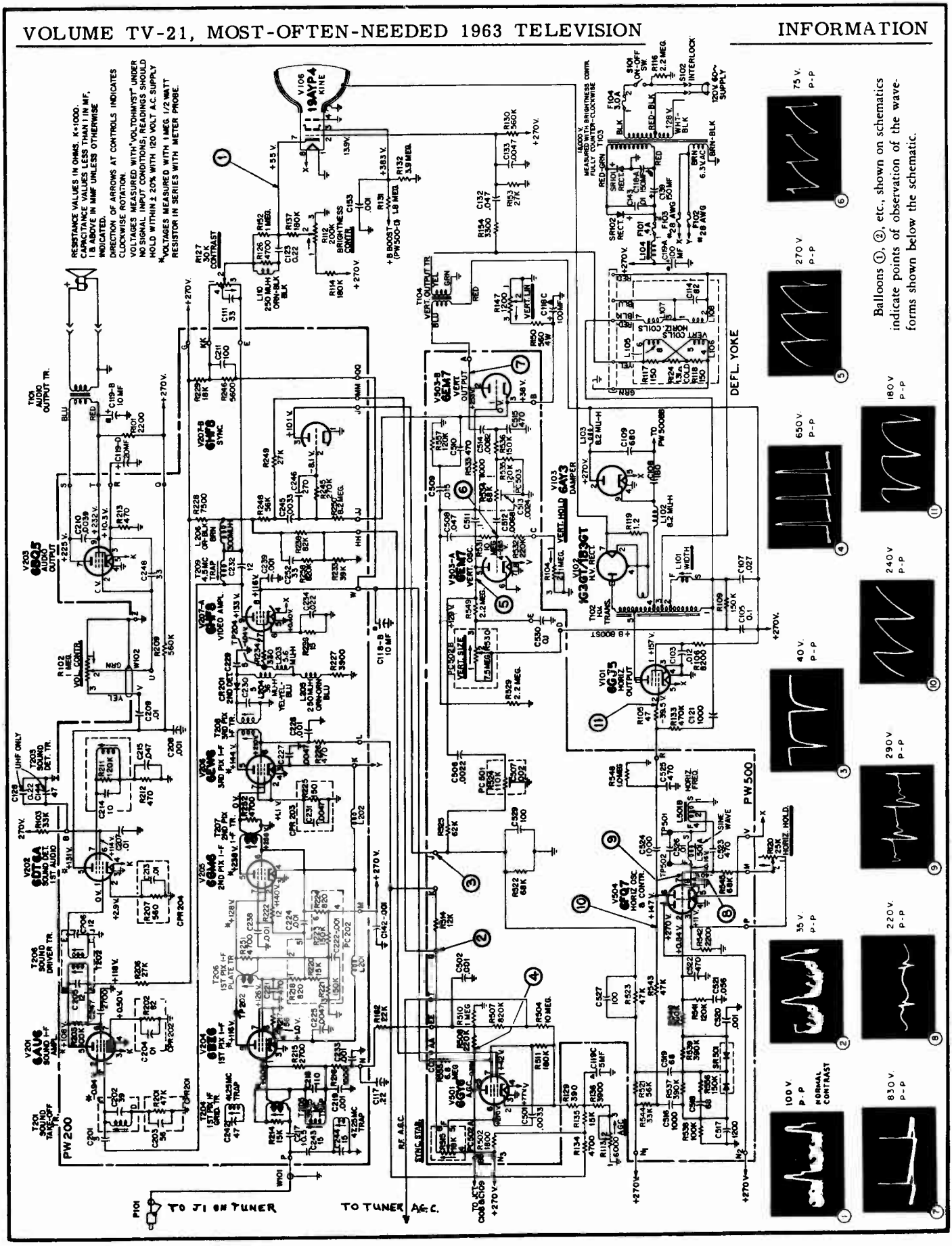


Figure 16—Chassis Rear View



CIRCUIT SCHEMATIC DIAGRAM FOR KCS140A & B CHASSIS



RCA Victor Chassis KCS-140A,B, Service Information, Continued

PW500 SECURITY SEALED CIRCUIT ASSEMBLY

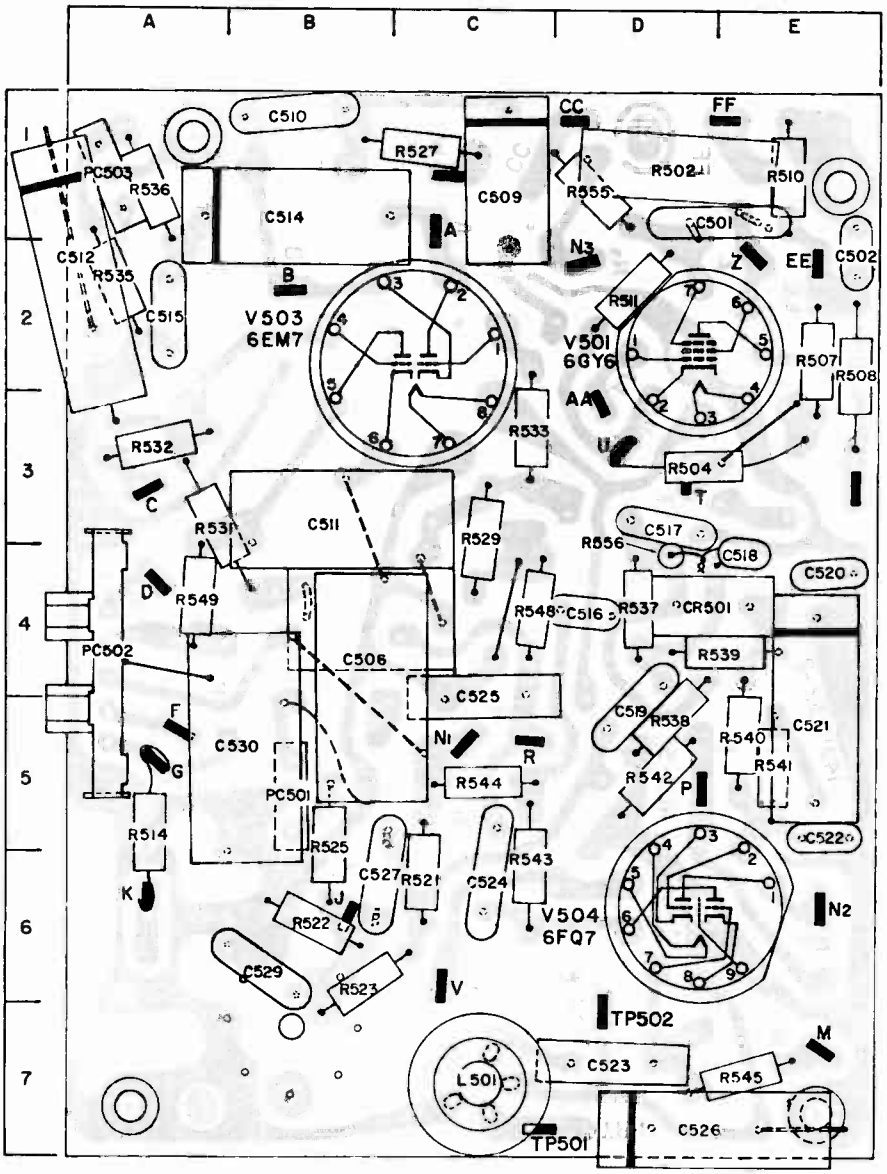


Figure 14—PW500 Sealed Circuit Deflection Assembly Composite Diagram

PW500 COMPONENT LOCATION GUIDE

C501	D1
C502	E2
C506	B4
C509	C1
C510	B1
C511	B3
C512	A1
C514	B1
C515	A2
C516	D4
C517	D3
C518	E4
C519	D5
C520	E4
C521	E4
C522	E5
C523	D7
C524	C6
C525	C4
C526	D7
C529	B6
C530	B5
CR501	D4
L501	C7
PC501	B5
PC502	A4
PC503	A1
R502	D1
R504	D3
R507	E2
R508	E2
R510	E1
R511	D2
R514	A5
R521	C6
R522	B6
R523	B6
R525	B5
R527	C1
R529	C3
R531	A3
R532	A3
R533	C3
R535	A2
R536	A1
R537	D4
R538	D5
R539	E4
R540	E5
R541	E5
R542	D5
R543	C6
R544	C5
R545	E7
R548	C4
R549	A4
R555	D1
R556	D3

The assemblies represented above and on page 123 are viewed from the component side of the circuits and are oriented as they will usually be viewed when servicing the chassis.

Figures 13 and 14 are diagrammatic views of the circuits showing the printed wiring in a "phantom" view superimposed on the component layout. These presentations provide for rapid circuit tracing while referring to only the component side of the assemblies.

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

RCA VICTOR Chassis KCS 141 Series

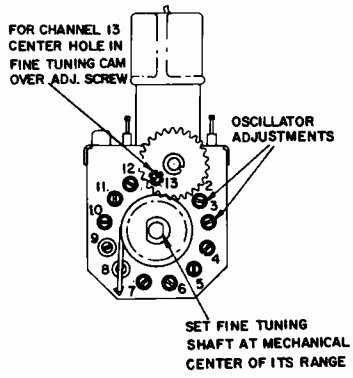


Figure 2—Concentric Fine Tuning—Manual

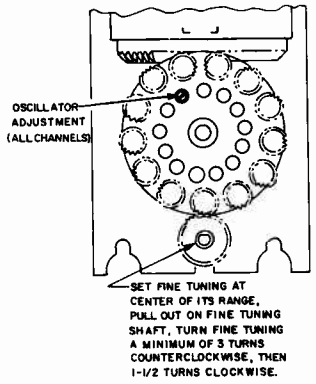


Figure 3—One-Set Fine Tuning—Remote

MODEL	CHASSIS
193-B-571-MV	KCS141A
193-B-571-MU	KCS141B
193-B-572-MV	KCS141A
193-B-572-MU	KCS141B
193-B-576-MV	KCS141A
193-B-576-MU	KCS141B
193-B-578-MV	KCS141A
193-B-578-MU	KCS141B
193-B-574-RS	KCS141C
193-B-576-RS	KCS141C

VHF R-F OSCILLATOR ADJUSTMENT

If excessive fine tuning is required when changing channels, the tuner oscillator requires adjustment as shown in Fig. 2. The channel selector and fine tuning knobs must be removed to reach adjustments.

VHF FINE TUNING (REMOTE)

Preset tuning Models 193-B-574-RS and 193-B-576-RS have a turret tuner. First, center the fine tuning range on each channel and then adjust the ocsillator slug for each station received. (See Fig. 3) Snap off crystal dial cover and remove dial for access to tuner oscillator slugs.

SERVICE ADJUSTMENTS

All chassis service adjustments are identified in Fig. 22. The following controls may be reached through holes in the back cover. Vertical height, vertical linearity, a.g.c. and noise stabilizer.

AGC AND SYNC STABILIZER

Turn the sync stabilizer control completely counterclockwise and adjust a.g.c. while tuned to a strong, local station. Turn the a.g.c. clockwise until picture begins to distort, and then counterclockwise slightly below the point where the distortion is eliminated. Advance the sync stabilizer fully clockwise and rotate the horizontal hold counterclockwise until horizontal sync is lost. Then slowly sync the picture again. If the picture tends to distort or "hang-up" before locking in, retard the sync stabilizer control until this condition is corrected.

HORIZONTAL OSCILLATOR

The horizontal sine wave coil is adjusted by temporarily attaching a short jumper across the coil (L501) and another jumper from Pin 2 of V501 to ground. Carefully adjust the horizontal hold for least sideways drift of the picture and remove the coil jumper. Again stop the sideways drift (if any) by adjusting the sine wave coil slug with nonmetallic tool. Remove all jumpers. See page 14.

CENTERING

If the picture does not fill the screen, it may be necessary to center the picture with the 2 disc magnets mounted behind the yoke cover. Both horizontal and vertical centering are accomplished at once by rotating the discs together or separately. Perform this adjustment along with vertical height, vertical linearity, and width, as they are all interdependent.

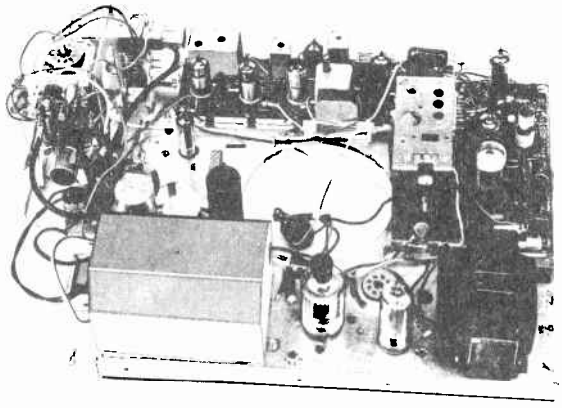


Fig. 1—The KCS 141 Chassis

TESTING PICTURE PROPORTIONS

Rotate the vertical hold control to roll the picture slowly downward and study the blanking bar. If it is not level, or if the bar varies in thickness as it moves down the screen, read the next 2 paragraphs.

DEFLECTION YOKE

If the picture is tilted, loosen the yoke clamp screw and rotate the yoke to level the picture. Retighten the yoke clamp.

HEIGHT AND VERTICAL LINEARITY

If the blanking bar changed size while moving down, alternately adjust the height and vertical linearity controls for best vertical proportions. Final vertical size should allow the raster to overlap the mask about $\frac{5}{8}$ inch at top and bottom with normal (120 volts) line voltage.

WIDTH

The width adjustment is made with L101. With normal line voltage, the raster should overscan the mask about $\frac{5}{8}$ inch on each side. The raster should fill the mask at 108 volts.

KINESCOPES

All the receivers listed in this data feature a safety glass bonded to the picture tube face and no disassembly is required for screen cleaning. The 19AFP4 kinescope employs magnetic deflection and electrostatic fixed focus. The 19AFP4 safety glass is clear and the 19AUP4 safety glass is fritted.

RCA Victor Chassis KCS-141 Series, Alignment Information

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 5 volts peak to peak.
SIGNAL GENERATOR ..... Connect to mixer grid test point through 1500 mmf. capacitor.
SWEEP GENERATOR..... Connect to the grid of 3rd picture IF, pin 1, V205, test point TP202. Use shortest leads possible. (See Figure 22.)
VACUUM TUBE VOLTMETER... Connect to 2nd Detector output at test point TP203. Use d.c. probe.
MISCELLANEOUS..... Refer to Figure 22 for adjustment locations.

	STEP	SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
1	Peak 2nd pix. IF 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. IF transformer	———	43.0 mc.	T206	
3	Adjust 3rd pix. IF transformer	40-50 mc. (IF)	41.25 mc. 45.75 mc.	T208 (top & bottom cores)	Adjust for maximum with response shown in Figure 7. Use 5 volts peak to peak on "scope."
4	Adjust 47.25 mc. trap	———	47.25 mc.	T205 (bottom)	Adjust for minimum output indication on meter.
5	Adjust 39.25 mc. trap	———	39.25 mc.	T205 (top)	Adjust for minimum output indication on meter.
6	Adjust 41.25 mc. trap	———	41.25 mc.	T204 (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 22.)
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 d.c. probe.
MISCELLANEOUS..... Refer to Figure 22 for adjustment locations.

	STEP	SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
	Set Channel Selector to Channel 4.				
7	Adjust mixer plate coil	40-50 mc. (IF)	42.5 mc. 45.75 mc.	L11	Sweep output set for 0.5 volts peak to peak on "scope." Adjust for maximum gain and response "A" in Figure 8. Maximum allowable tilt 20%.
8	Adjust IF input	40-50 mc. (IF)	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 IF transformers	40-50 mc. (IF)	42.5 mc. 45.0 mc. 45.75 mc.	T208 T207 T206	Adjust for response "B" in Figure 8. Use 5 volts peak to peak on "scope."
	Remove sweep from mixer grid. Couple signal generator to mixer, in series with pad shown in Figure 4. Set generator to 45.75 mc. and adjust output for exactly 1.5 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 6.				
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."

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

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Apply —10 volts to the I-F AGC bus at terminal "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 10. Set meter for negative voltage readings.
MISCELLANEOUS..... Connect test diode detector to pin 7 of V202. Refer to Figure 22 for adjustment locations.

	STEP	SIGNAL GENERATOR	ADJUST	REMARKS
12	Adjust detector grid transformer	4.5 mc.	T202	Adjust for maximum negative d.c. 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. 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 kinescope end of C105. 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 FM Modulation Provided.			
12	Same as Step 12 above. Modulate 4.5 mc. signal with FM 400 cycle signal with 7.5 kc. deviation.			
13	Same as Step 13 above. Modulate 4.5 mc. signal with FM 400 cycle signal with 7.5 kc. deviation.			
14	Adjust sound detector transformer	4.5 mc., 400 cycle FM modulation, 7.5 kc. deviation	T203	Adjust for maximum 400 cycle output on "scope" using maximum amplitude peak. Set volume control for .70 volts peak to peak on "scope" when peaked. See response in Figure 9.
15	Retouch grid trans. and sound take-off transformer for breakout	4.5 mc., 400 cycle FM modulation, 7.5 kc. deviation	T201A & T202	Decrease input to minimum usable signal. Retouch T201A and T202 for symmetrical breakout response in Figure 9. The top core of T201A and core of T202 should penetrate the coil from top of can when finally peaked.
Move the oscilloscope to kinescope cathode side of C105. Use diode probe. Set the contrast to maximum clockwise position.				
16	Adjust 4.5 mc. trap	Same as Step 16 above. Adjust for minimum 400 cycle indication on oscilloscope.		

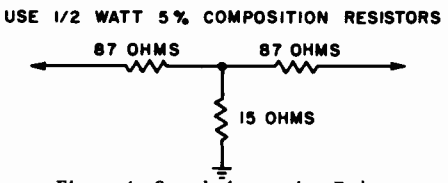


Figure 4—Sound Attenuation Pad

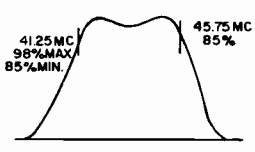
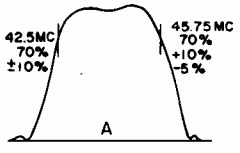


Figure 7—T208 3rd Pix I-F



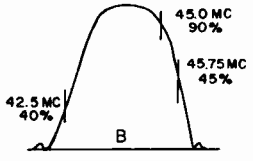


Figure 8—Mixer Plate and Overall I-F Response

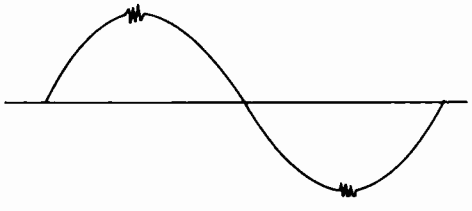


Figure 9—Sound Detector Response

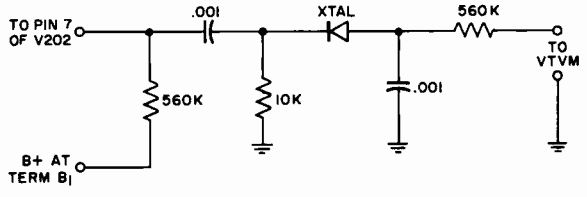


Figure 10—Sound Diode Detector

RCA Victor Chassis KCS-141 Series, Service Information, Continued

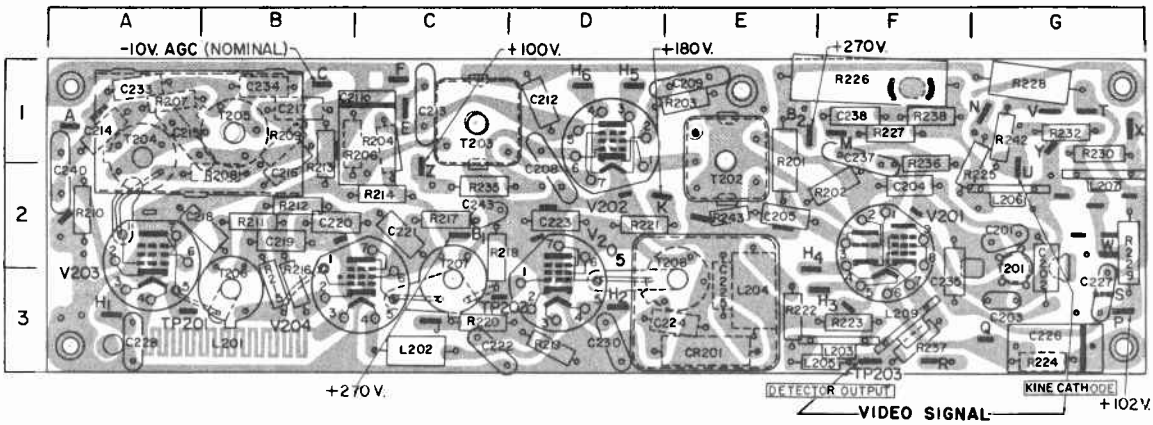
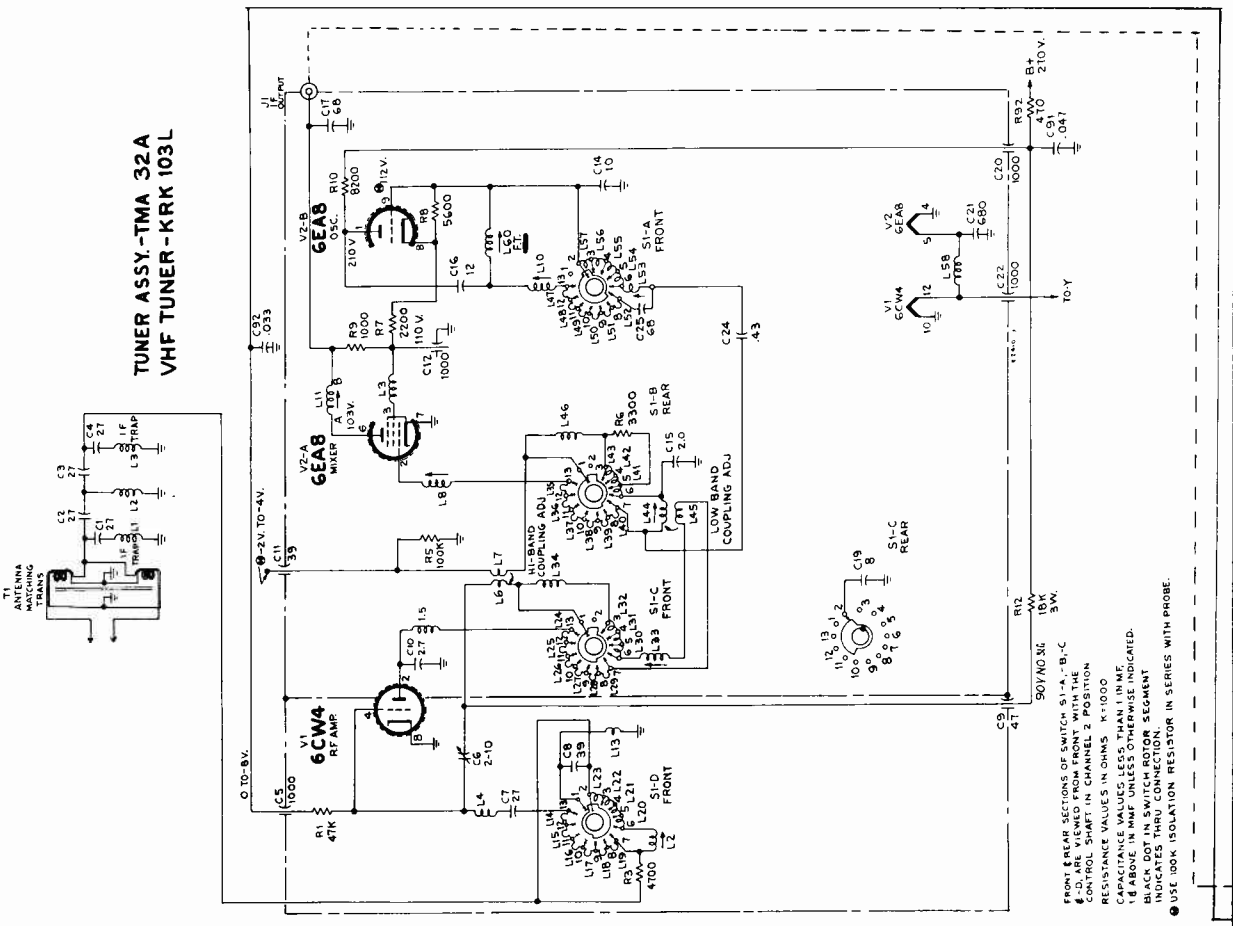


Figure 17—PW200 Sealed Circuit I-F and Video Assembly Composite Diagram

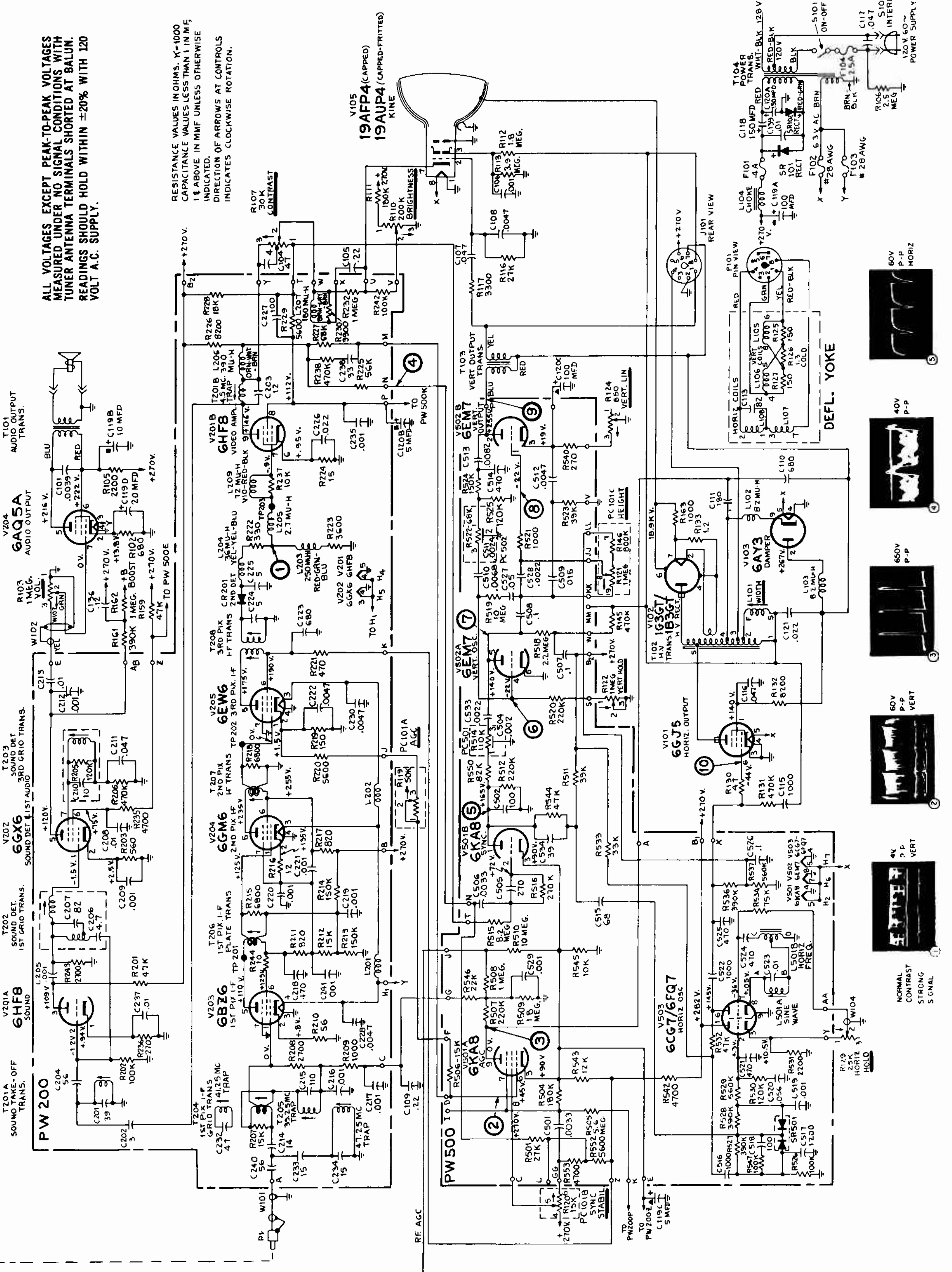
PW200 COMPONENT LOCATION GUIDE

C201 .....G2	C216 .....B1	C228 .....A3	CR201 ....E3	R202 .....F2	R215 .....B3	R227 .....F1	T201 .....G2		
C202 .....G2	C217 .....B1	C230 .....D3		R203 .....E1	R216 .....B3	R228 .....G1	T202 .....E1		
C203 .....G3	C218 .....B2	C233 .....A1	†L201 .....B3	R204 .....C1	R217 .....C2	R229 .....G2	T203 .....C1		
C204 .....F2	C219 .....B2	C234 .....B1	L202 .....C3	R206 .....B1	R218 .....C2	R230 .....G1	T204 .....A1		
C205 .....E2	C220 .....B2	C235 .....F3	L203 .....F3	R207 .....A1	R219 .....D3	R232 .....G1	T205 .....B1		
C208 .....D2	C221 .....C2	C237 .....F1	L204 .....E3	R208 .....B2	R220 .....C3	R235 .....C2	T206 .....B3		
C209 .....E1	C222 .....C3	C238 .....F1	L205 .....E3	R209 .....B1	R221 .....D2	R236 .....F1	T207 .....C3		
C211 .....C1	C223 .....D2	C240 .....A2	L206 .....G2	R210 .....A2	R222 .....E3	R237 .....F3	T208 .....E3		
C212 .....D1	C224 .....D3	*C241 .....B2	L207 .....G2	R211 .....B2	R223 .....F3	R238 .....F1			
C213 .....C1	C225 .....E3	*C242 .....D1	L209 .....F3	R212 .....B2	R224 .....G3	R242 .....G1	*Under Board		
C214 .....A1	C226 .....G3	C243 .....C2		R213 .....B1	R225 .....F2	R243 .....E2	†Printed		
C215 .....A1	C227 .....G3		R201 .....E1	R214 .....C2	R226 .....F1	*R244 .....B2			

CIRCUIT SCHEMATIC DIAGRAM FOR KRK103L
(Used in VHF Models)



RCA Victor Chassis KCS-141 Series Diagram



Circuit Schematic Diagram for KCS141 Chassis Series

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

RCA Victor Chassis KCS-141 Series, Service Information, Continued

C501 ....G4	C514 ....A2	C524 ....D4	PC501 ....E5	R510 ....F2	R524 ....A1	R534 ....E3	R550 ....F5
C502 ....E4	C515 ....D4	C525 ....D4	PC502 ....A5	R511 ....D5	R525 ....A2	R536 ....D3	R552 ....F4
C505 ....F3	C516 ....D4	C526 ....E2		R512 ....F5	R526 ....C4	R537 ....E2	R553 ....F5
C506 ....F3	C517 ....C4	C527 ....B4	R501 ....F4	R515 ....E2	R527 ....C3	R540 ....A3	
C507 ....C5	C518 ....C3	C528 ....C2	R504 ....F3	R516 ....F2	R528 ....C2	R542 ....E1	SR501 ....D3
C508 ....B3	C519 ....C1	C529 ....G1	R505 ....G5	R518 ....B4	R529 ....C2	R543 ....F1	
C509 ....A5	C520 ....C1	C533 ....D5	R506 ....F4	R519 ....B3	R530 ....C1	R544 ....E5	
C510 ....A4	C521 ....D1	C534 ....E5	R507 ....G1	R520 ....B2	R531 ....D2	R545 ....E2	
C512 ....A3	C522 ....D3		R508 ....F1	R521 ....C2	R532 ....D3	R546 ....G1	
C513 ....A1	C523 ....E3	L501 ....E4	R509 ....G1		R533 ....D5	R547 ....C4	

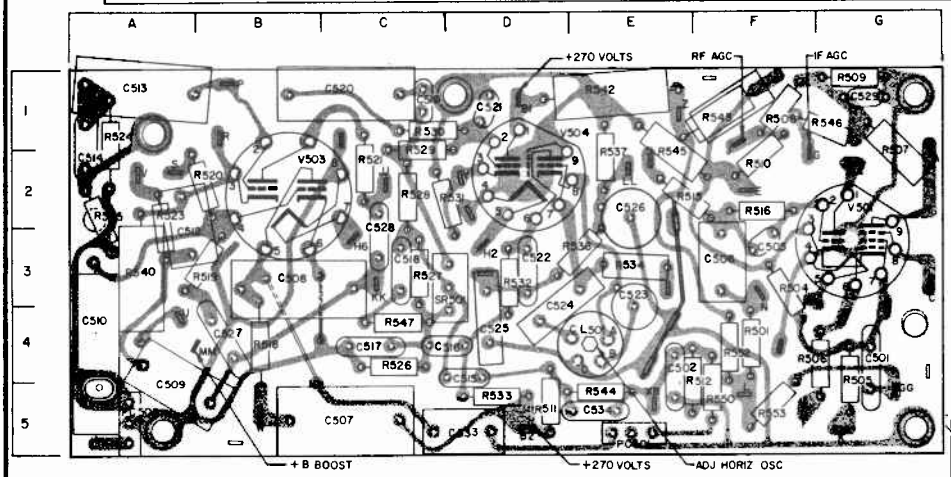


Figure 18—PW500 Sealed Circuit Deflection Assembly Composite Diagram

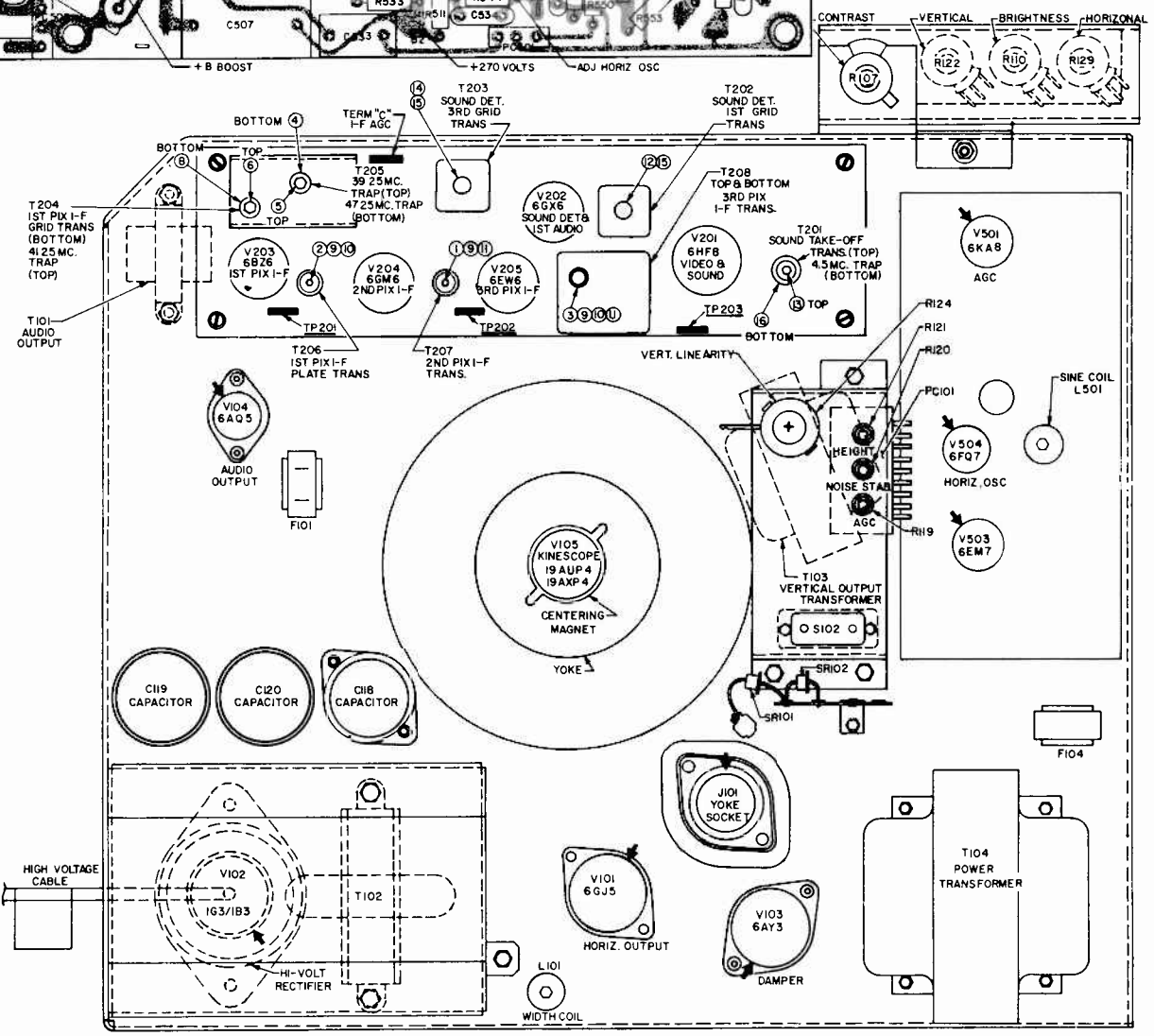


Figure 22—Chassis Rear View KCS141 Series

SYLVANIA
Subsidiary of GENERAL TELEPHONE & ELECTRONICS

CHASSIS: 563-1,-2,-4,-5,-7

Models of 19P08 and 19T09 Series

(Diagrams and service material on pages 133 through 136. For alignment information see pages 141 and 142, under Chassis 565, also applicable to these sets.)

AGC ADJUSTMENT

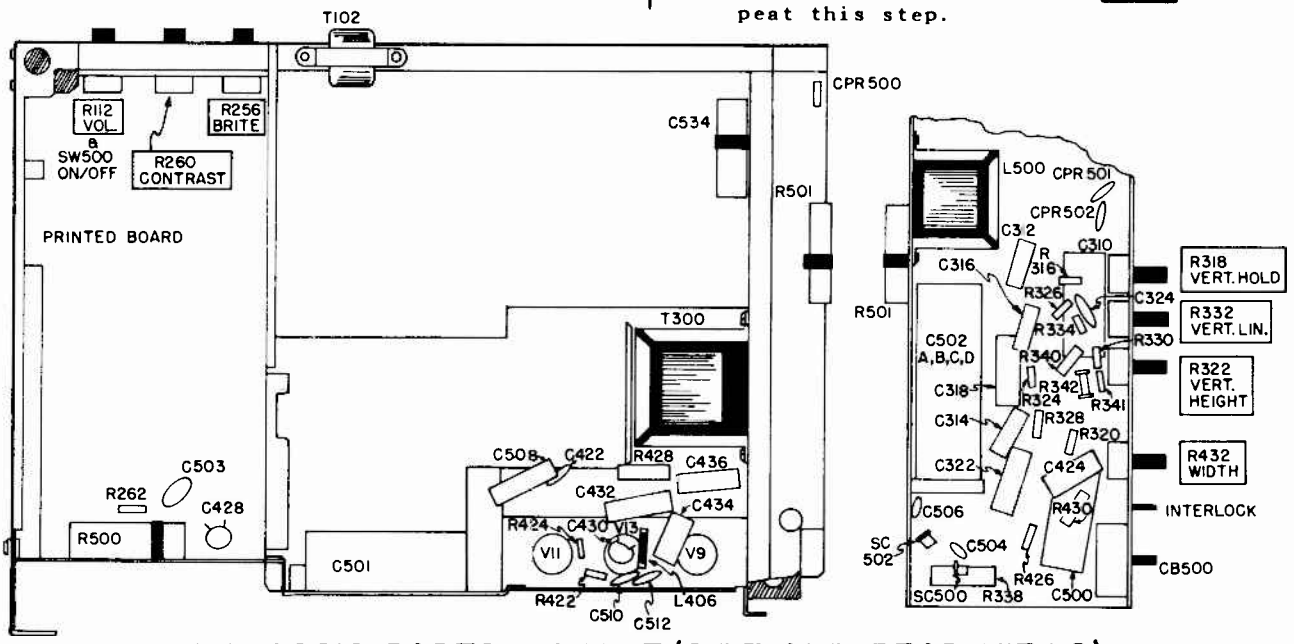
1. Set channel selector to strongest channel in area and adjust fine tuning control to correct tuning point.
2. Set contrast and brightness controls to maximum.
3. Rotate AGC control R228 (546 chassis), R214 (563 chassis) clockwise until picture "bends" or "jumps" sideways.
4. Reverse rotation of the 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.

NOTE: For optimum performance, this adjustment should be made under actual operating conditions (in the owner's home).

HORIZONTAL AFC ADJUSTMENT

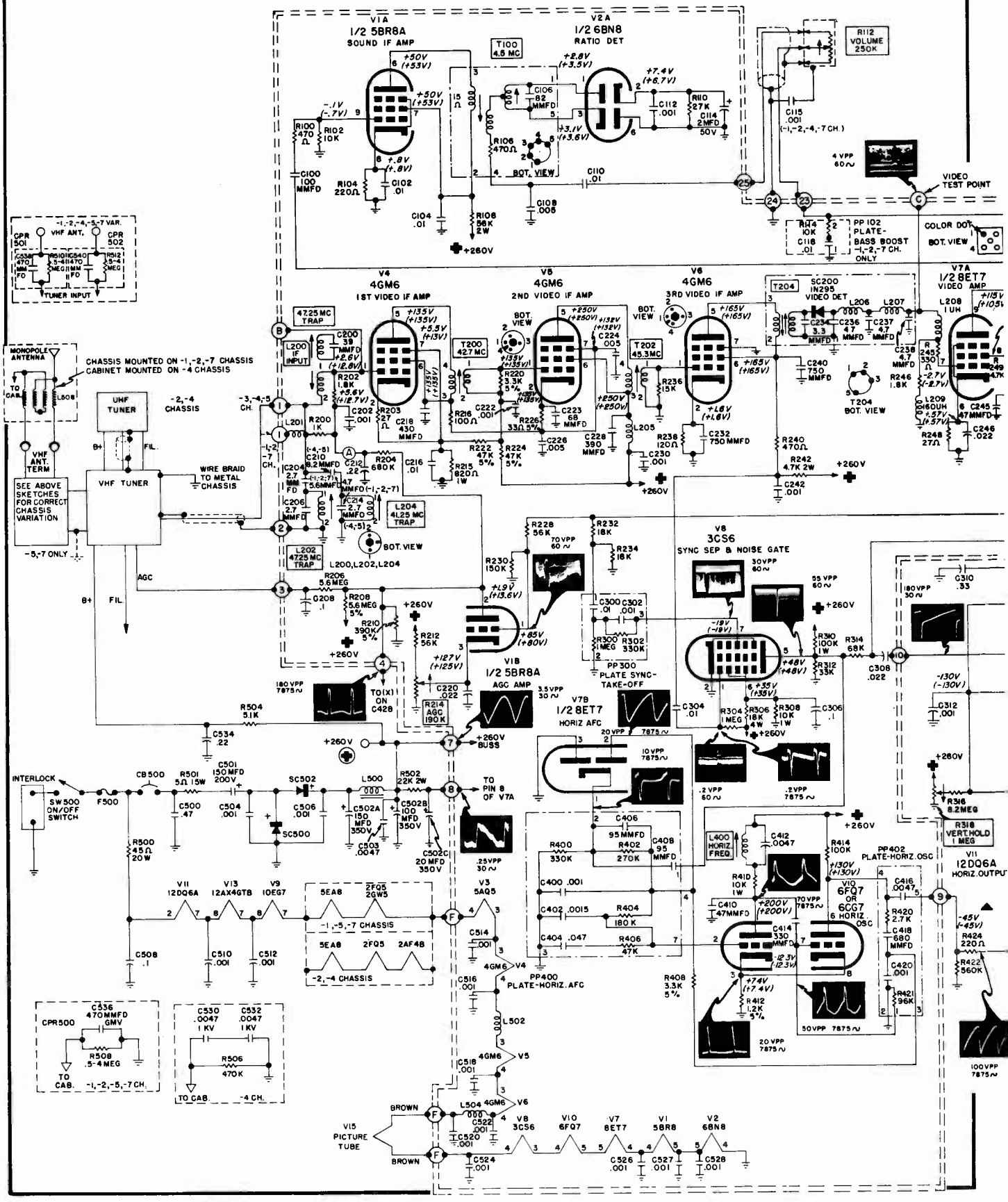
Before performing the following procedure, check AGC adjustment as described:

1. Set channel selector to strongest channel in area and adjust fine tuning control to correct tuning point.
2. Adjust vertical height, vertical linearity, and width control for normal picture.
3. 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.)
4. Reverse rotation of frequency control slowly until picture falls into sync.
5. 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.



563 CHASSIS PARTS LAYOUT (SIDE AND REAR VIEWS)
(PORTABLE MODELS)

SYLVANIA Chassis 563-1, -2, -4, -5, -7, Schematic Diagram



SYLVANIA Chassis 563-1, -2, -4, -5, -7, Schematic Diagram, Continued

SCHEMATIC DIAGRAM (563-1,-2,-4,-5,-7)

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.

VOLTAGE MEASUREMENT CONDITIONS UNLESS OTHERWISE SPECIFIED.

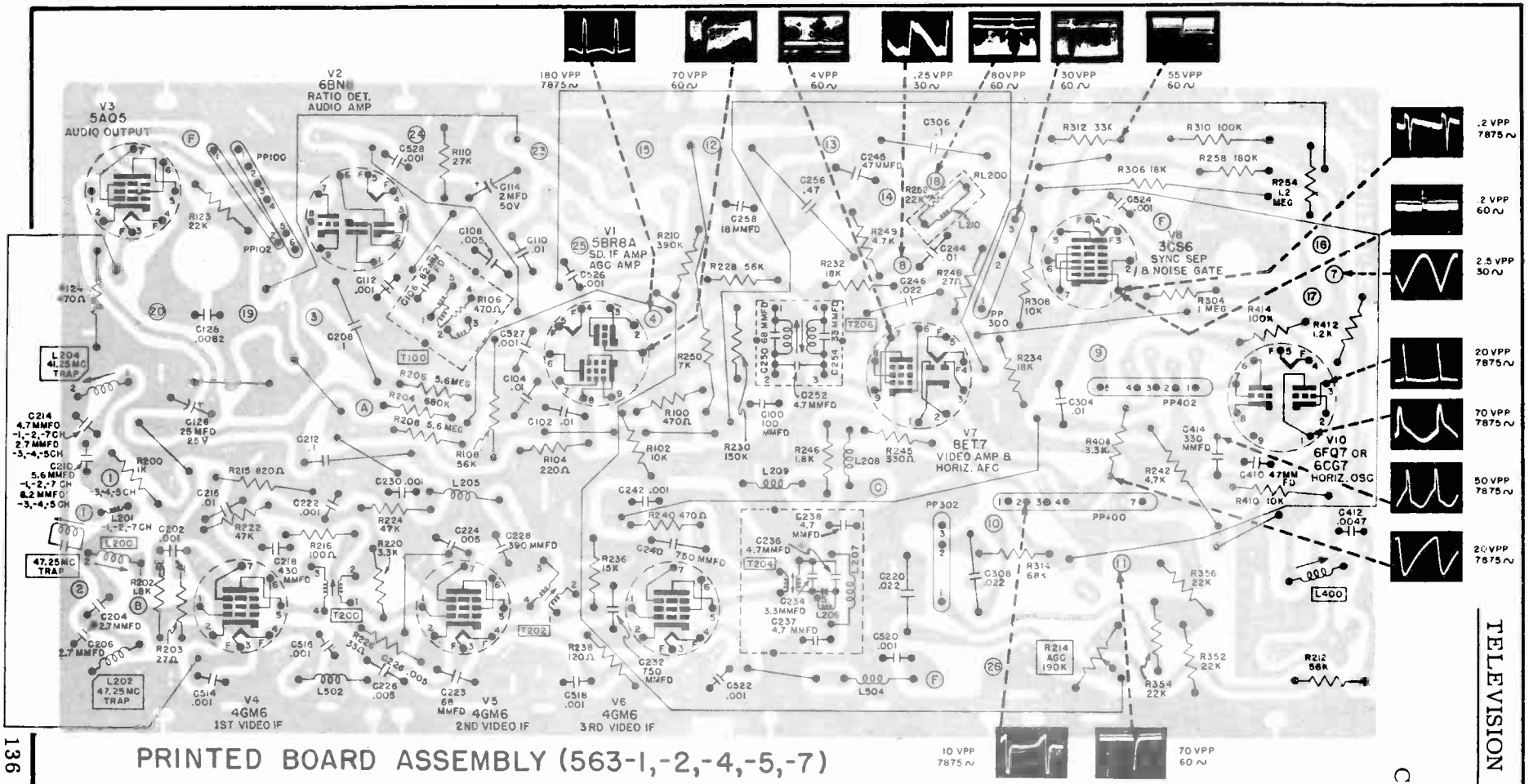
1. Voltages measured to chassis using VTVM.
2. AC power source 120 volt 60 cycle line.
3. Voltage readings in brackets taken with no input; channel selector set to a free channel, antenna disconnected, antenna terminals shorted together and grounded to chassis.
4. Voltage readings not in brackets taken with a strong signal input; tuner set to a strong local station developing approximately -3.5 volts on IF AGC Buss, test point (A), junction of R202 and R204.
5. Contrast control set to maximum. Brightness control set to minimum.
6. Voltage values shown are average readings. Variations may be observed due to normal production tolerances.

SPECIAL VOLTAGE MEASUREMENT CONDITIONS

(P) Picture tube anode voltage measured with VTVM high voltage probe at line voltage of 120 volts under conditions of normal signal, no brightness and correct scan size.

◀ High peak voltage of short duration may damage meter used for this measurement.

SYLVANIA
Chassis 563-1, -2, -4, -5, -7
(Continued)



PRINTED BOARD ASSEMBLY (563-1,-2,-4,-5,-7)

WAVEFORM MEASUREMENT CONDITIONS

1. Channel selector set to strong channel.
2. Contrast control set for signal of 80 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.

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., Misc.	500-599

SYLVANIA

CHASSIS 565-1,-2,-3,-4,-7

MODELS 23L62, 23L63, 23L66, 23L67, 23L70, 23L71, 23L72, 23L73, 23L74, 23T60, 23T61, 23V64, 23V65, 23V68, 23V69

(Service material is on pages 137 through 142)

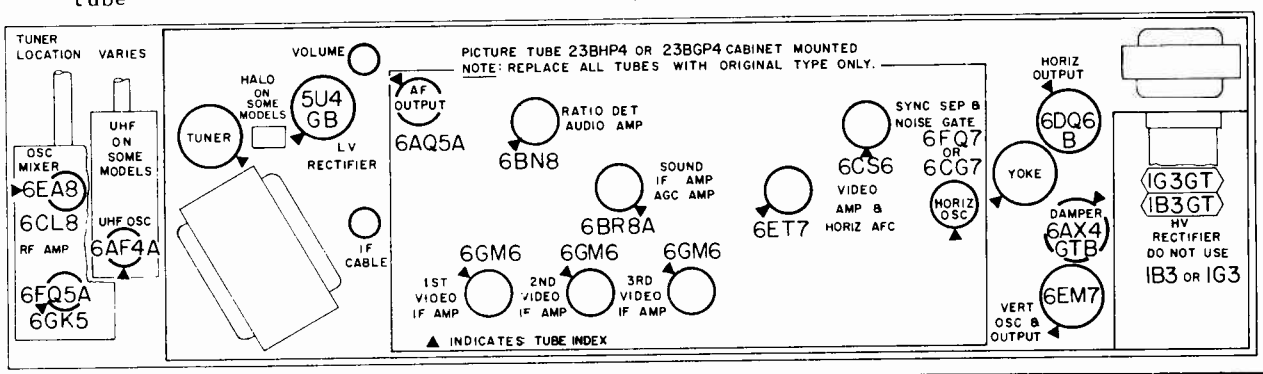
AGC ADJUSTMENT

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.

NOTE: For optimum performance, this adjustment should be made under actual operating conditions (in the owner's home).

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. Halo-Light (on some models) - at chassis
   D. Picture tube cable - at picture tube
   E. Volume control cable - at chassis
   F. High voltage lead - at picture tube
   G. IF input - at chassis
   H. Speaker leads - at speaker
   I. Remote receiver antenna (remote models only) - at remote chassis
3. Remove screw securing braided cable grounding tuner assembly or remote chassis, to main chassis.
4. Remove chassis mounting screws (3) securing rear apron of chassis to shelf.
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 screws 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.
   NOTE: On some remote models where the remote chassis is separate from the main TV chassis, remove the two (2) remote control receiver mounting screws securing remote chassis to cabinet. Lift chassis slightly upward to disengage chassis from mounting bracket, remove chassis.
10. To replace chassis, reverse the above procedure, engaging lower front controls by pressing ends of shaft assemblies over control shafts. Reconnect all plug and socket connections.



SYLVANIA Chassis 565-1, -2, -3, -4, -7, Schematic Diagram

VOLTAGE MEASUREMENT CONDITIONS UNLESS OTHERWISE SPECIFIED.

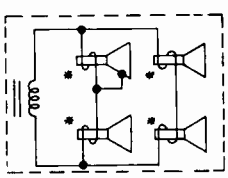
1. Voltages measured to chassis using VTVM.
2. AC power source 120 volt 60 cycle line.
3. Voltage readings in brackets taken with no input; channel selector set to a free channel, antenna disconnected, antenna terminals shorted together and grounded to chassis.
4. Voltage readings not in brackets taken with a strong signal input; tuner set to a strong local station developing approximately -3.5 volts on IF AGC Buss, test point (A), junction of R202 and R204.
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.

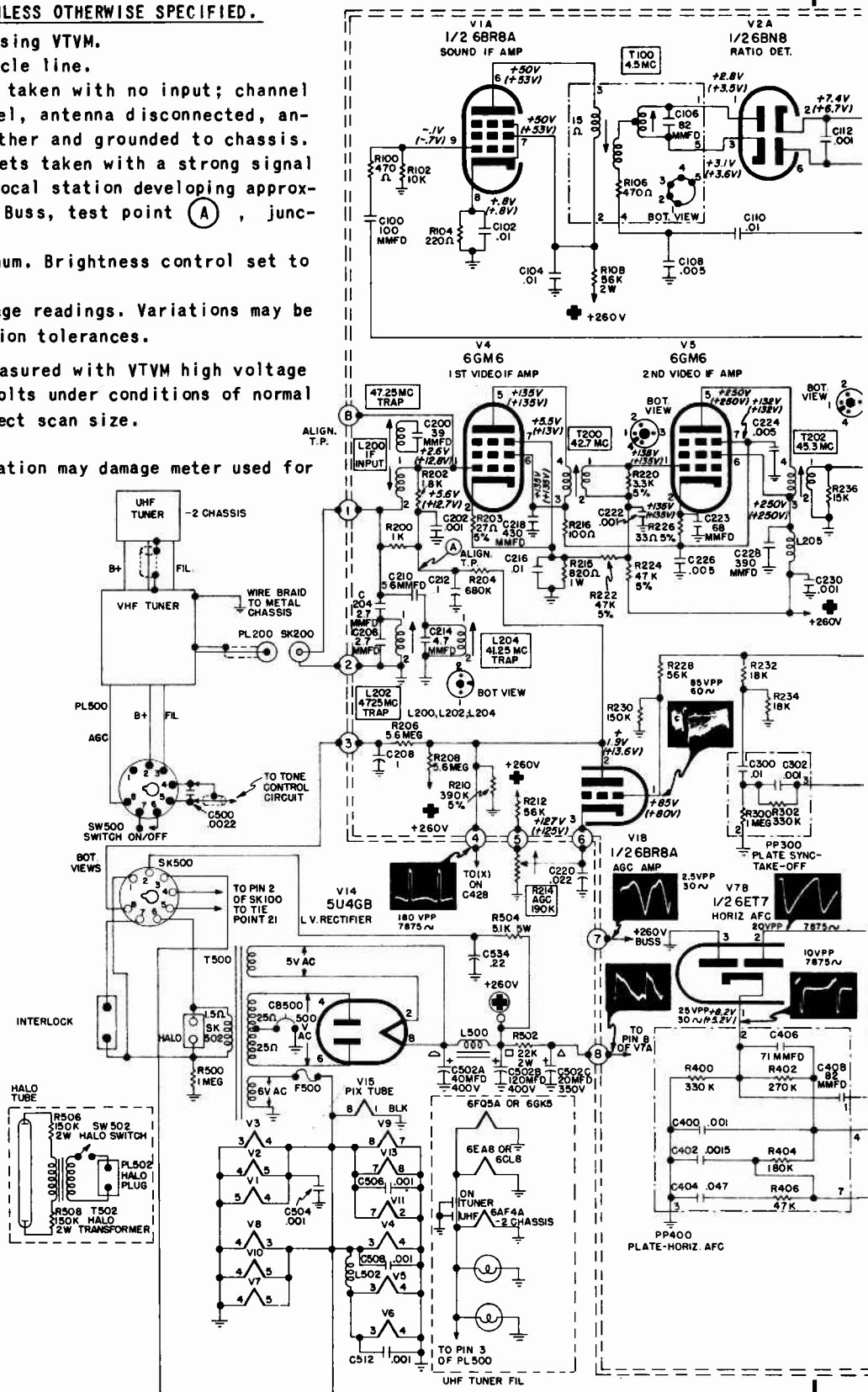
Picture tube anode voltage measured with VTVM high voltage probe at line voltage of 120 volts under conditions of normal signal, no brightness and correct scan size.

▲ High peak voltage of short duration may damage meter used for this measurement.

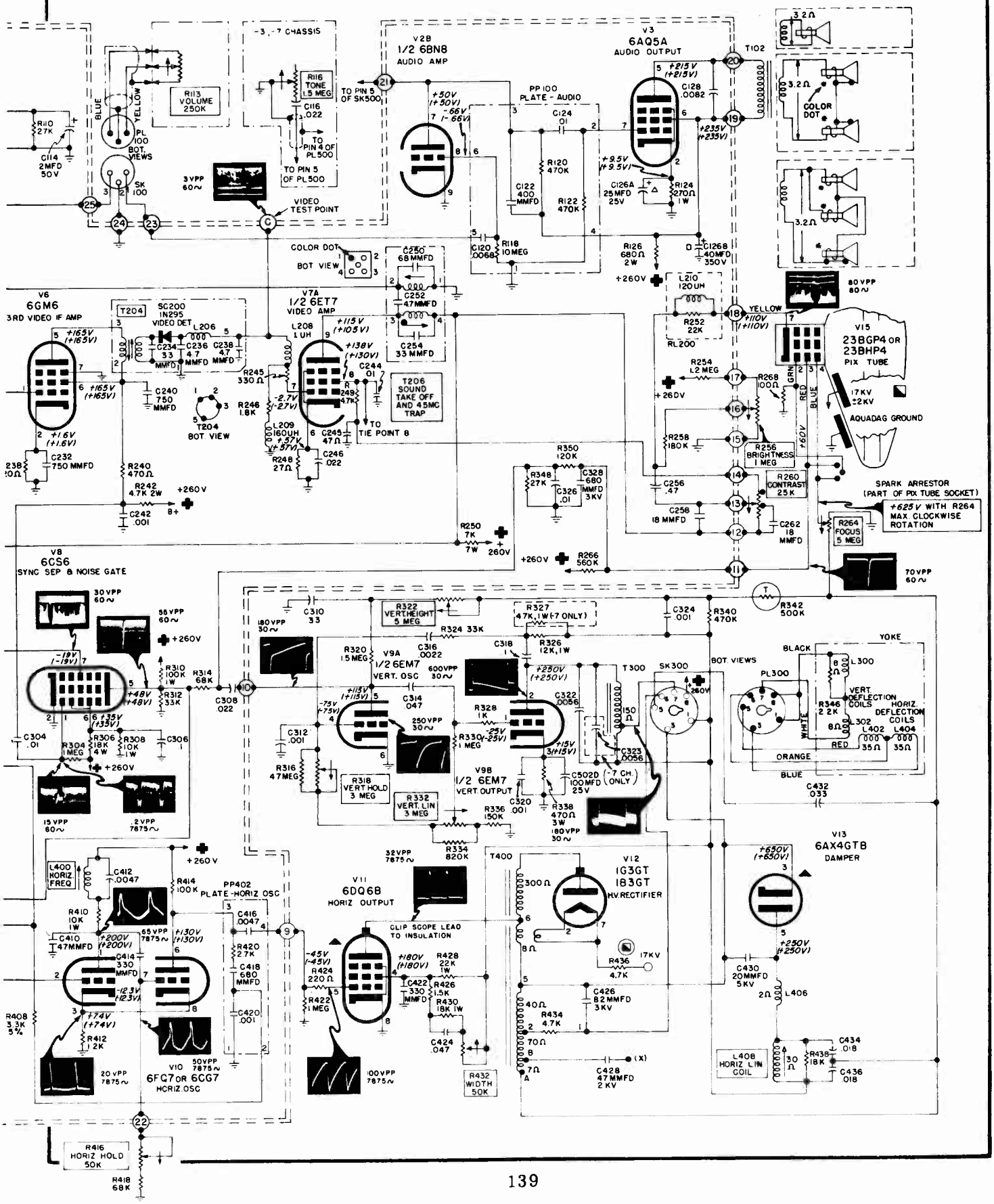
WAVEFORM MEASUREMENT CONDITIONS

1. Channel selector set to strong channel.
2. Contrast control set for signal of 80 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.

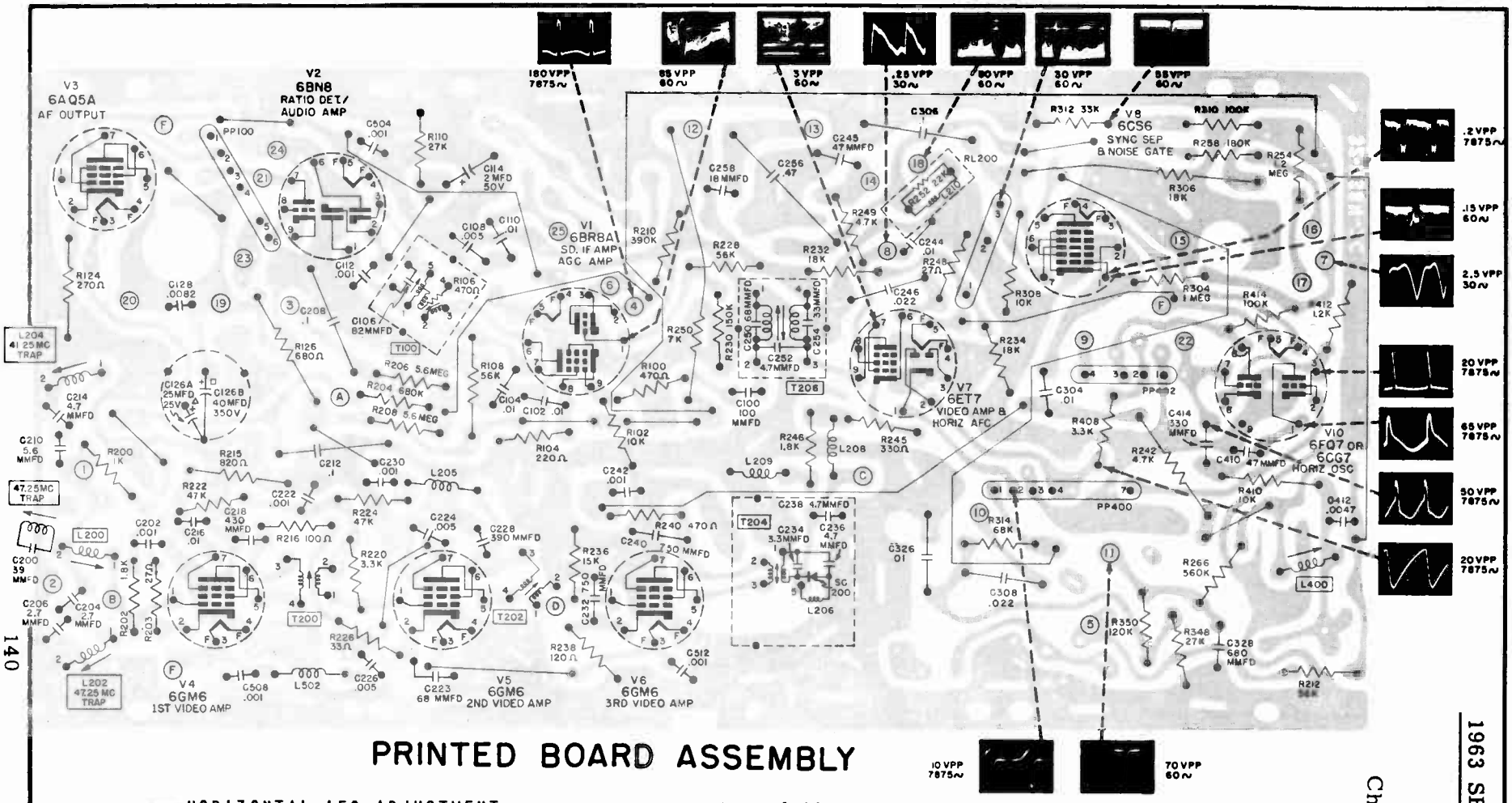




SYLVANIA Chassis 565-1, -2, -3, -4, -7, Schematic Diagram, Continued



SYLVANIA
Chassis 565-1, -2, -3, -4, -7
(Continued)



PRINTED BOARD ASSEMBLY

——HORIZONTAL AFC ADJUSTMENT——

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

1. Rotate horizontal 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.

SYLVANIA Chassis 565-1, -2, -3, -4, -7, Alignment Information, Continued

VIDEO IF, SOUND IF AND 4.5MC TRAP ALIGNMENT PROCEDURES

PRELIMINARY INSTRUCTIONS

1. Line voltage should be maintained at 120 volts.
2. Keep marker generator coupling at a minimum to avoid distortion of the response curve.
3. Do not use tubular capacitors for coupling sweep into receiver. Disc ceramics are best.
4. For best results, solder the sweep generator ground to chassis, do not use clips.
5. Sweep generator "hot" lead must make good electrical contact at all points given under TEST EQUIPMENT HOOK-UP.
6. Adjust sweep generator output for maximum peak-to-peak response curve on the scope.
7. Receiver and test equipment should warm up for approximately 15 minutes before alignment.

4.5MC 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 (A) and (+) terminal to chassis.	VTVM - Across ratio detector load resistor (R110). SIGNAL GENERATOR - Through a .01 capacitor to test point (C). Set signal generator to 4.5MC 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. Repeat until maximum neg. reading possible is obtained.
2	Same as Step 1. except Connect a 4.5MC series tuned circuit between yellow cathode lead of picture tube and ground. See Figure 1	VTVM - RF probe connected across coil of series tuned 4.5MC circuit. SIGNAL GENERATOR - Same as Step 1. Set generator for maximum output.	For MINIMUM reading: [T206] (Bottom core)
3	Same as Step 1.	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 - 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.

4.5 SERIES RESONANT CIRCUIT

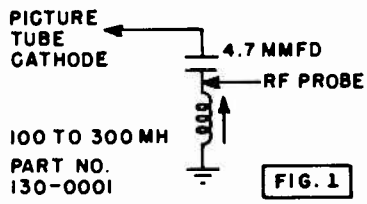


FIG. 1

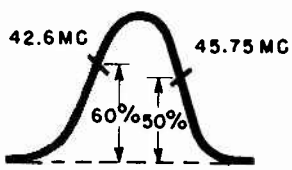
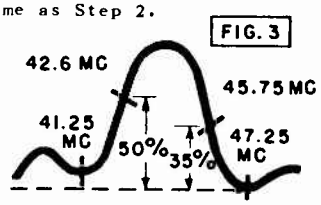
ALTERNATE 4.5MC TRAP ALIGNMENT

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

4	Remove all test equipment and connections. Check receiver on an air signal.

SYLVANIA Chassis 565-1, -2, -3, -4, -7, 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. Response curve should not change with fine tuning. Ground test point (A) . Remove cap from horizontal output tube 6DQ6B to prevent the horizontal pulses from affecting the response curve.	SWEEP GENERATOR - through a .0047 MFD capacitor to point (D) . Set generator to 44.5MC with 10MC 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 both cores until the 42.6 MC and 45.75MC markers are equal in amplitude. Both markers should be positioned at 95% of the response curve, or better, but of equal amplitude. See Figure 1.
2	Same as Step 1. Detune tuner converter plate (IF output) coil by turning core fully counterclockwise.  FIG. 1	SWEEP GENERATOR - Through a .0047 MFD capacitor to point (B) . Set generator to 44.5MC with 10MC sweep. MARKER GENERATOR - Same as Step 1. OSCILLOSCOPE - Same as Step 1.	A. Adjust [T202] to position 45.75MC marker at 50%. B. Adjust [T200] to position 42.6MC marker at 60%. Repeat Steps A,B to obtain response curve shown in Figure 2.
3	Same as Step 2.  FIG. 2	SWEEP GENERATOR - Through a .0047 MFD capacitor to IF test point on VHF tuner. MARKER GENERATOR - Loosely coupled to sweep generator 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 47.25MC. B. Set signal generator at 41.25 MC and adjust [L204] for maximum dip. See Figure 3.
	ALTERNATE STEP 3 - Connect a VTVM on — DC scale to point (C) . 1. Insert 47.25MC CW signal from signal generator to tuner test point. Adjust [L200] (Top core) and [L202] for minimum DC reading on meter. 2. Insert 41.25MC CW signal to tuner test point and adjust [L204] for minimum DC reading on meter.		
4	Same as Step 2. FIG. 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. Repeat Step 3.
5	Remove all test equipment and replace cap on 6DQ6B tube. Check receiver on an air signal.		

Westinghouse

CHASSIS ASSEMBLIES

V-2435-1 . . . . . VHF
V-2435-2 . . . . . VHF/UHF MANUAL

V-2435-3,-5,-8. . . . . VHF MANUAL "INSTANT ON"

V-2435-4,-6,-9. . . . . VHF/UHF MANUAL "INSTANT ON"

V-2435-7,-10. . . . . REMOTE CONTROL WITH "INSTANT ON"

V-2435-11 . . . . . REMOTE CONTROL WITH "INSTANT ON" AND "MOBIL SOUND"

114° CRT

19BWP4 V-2435-8 thru 11
23CQP4 V-2435-1 thru 7

Combination Models H-C5220, H-C5221, and H-C5223, use television chassis V-2435-12, -13, which are similar to chassis assemblies listed above and covered on pages 143 through 152.

RINGING COIL AND HORIZONTAL FREQUENCY ADJUSTMENT

1. Short out the ringing coil (L401) with a jumper wire between TP Ⓒ and TP Ⓑ.
2. Set the horizontal hold control, R416, to the center of its electrical range. Place the VTVM probe to TP Ⓓ. Turn the control to measure one-half the B+ voltage coming into the high end of the horizontal hold control. This is the electrical center of the 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 HMV control, R418, 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 control R418 for center scale on this meter.
5. Remove the jumper from the ringing coil and bring into horizontal sync by adjusting L401.
6. With the set in horizontal sync, 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.

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.

MODEL AND CHASSIS CHART

MODELS	CHASSIS	TUNERS USED
H-K3820 H-K3821 H-K3822	V-2435-1	470V105H02/03 470V107H01 (ALTERNATE) 470V123H01 (ALTERNATE)
H-K3820U H-K3821U H-K3822U	V-2435-2	470V119H01 (VHF) 472V038H02 (UHF)
H-T3570 H-T3571 H-T3572 H-T3573 H-K3860	V-2435-3	470V105H02/03 470V107H01 (ALTERNATE) 470V123H01 (ALTERNATE)
H-T3570U H-T3571U H-T3572U H-T3573U H-K3860U	V-2435-4	470V119H01 (VHF) 472V038H02 (UHF)
H-K4040 H-K4041 H-K4043	V-2435-5	470V105H02/03 470V107H01 (ALTERNATE) 470V123H01 (ALTERNATE)
H-K4040U H-K4041U H-K4043U	V2435-6	470V119H01 (VHF) 472V038H02 (UHF)
H-T3670	V-2435-7 (TV) V-2418-4 (REMOTE RECEIVER)	470V111H01
H-P3420 H-P3421	V-2435-8	470V105H02/03 470V107H01 (ALTERNATE) 470V123H01 (ALTERNATE)
H-P3420U H-P3421U	V-2435-9	470V119H01 (VHF) 472V038H02 (UHF)
H-P3470 H-P3471	V-2435-10 (TV) V-2418-4 (REMOTE RECEIVER) 559V087H02 (REMOTE XMTR)	470V111H01
H-P3473	V-2435-11 (TV) V-2418-4 (REMOTE RECEIVER) V-2430-3 (MOBIL SOUND) 559V087H02 (REMOTE XMTR)	470V111H01

HEIGHT AND VERTICAL LINEARITY

The height and vertical linearity controls are accessible by removing the horizontal and vertical hold knobs and exposing the hollow shafts through which the adjustments are made. The height control is adjusted through the hollow horizontal hold control shaft while the linearity control is at the rear of the vertical hold control.

Adjust the height and vertical linearity controls to get a picture of proper height and proportion.

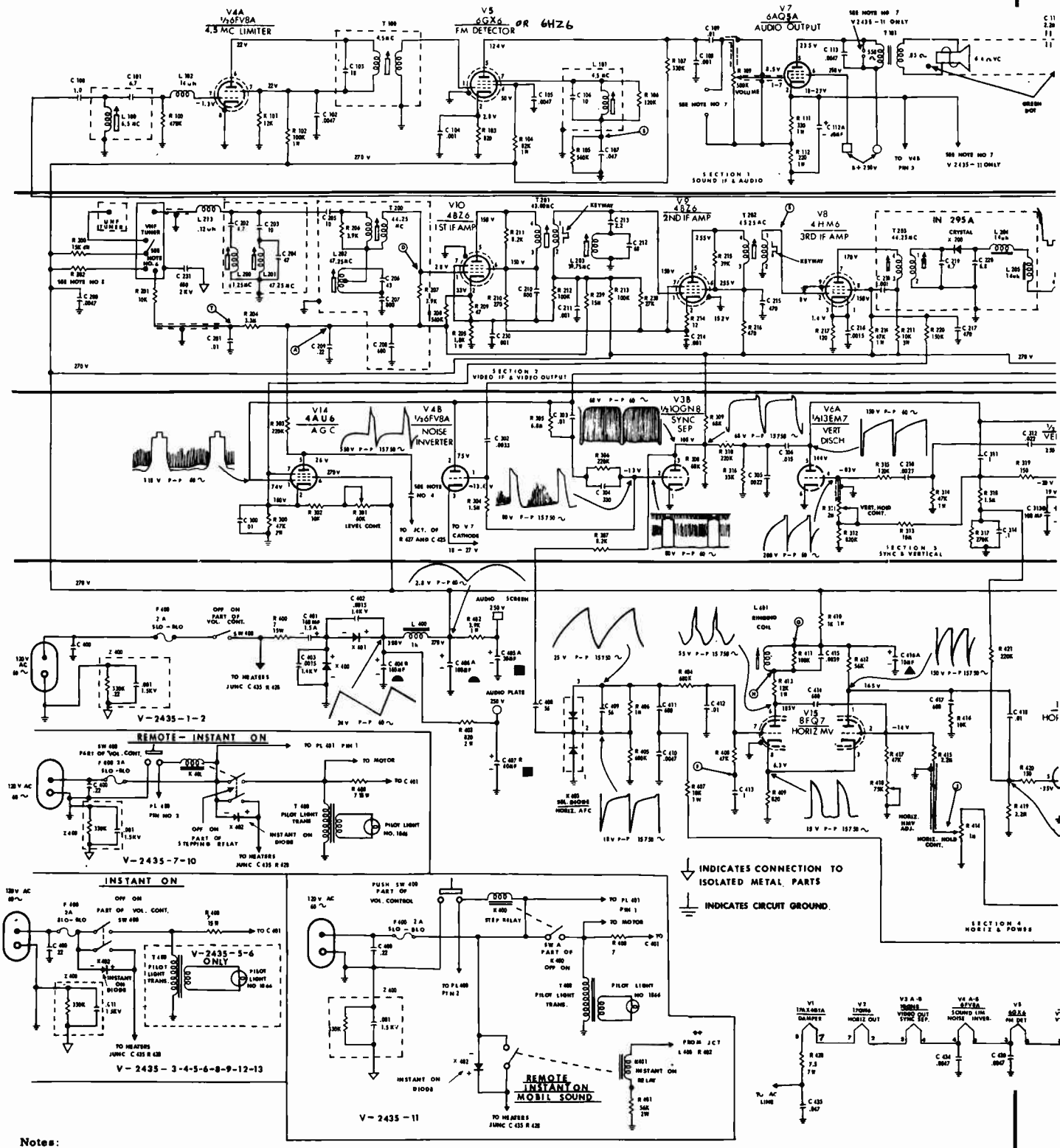
FUSE, F400

The AC line fuse is located at the lower right end of the PC board. The fuse is a 2A, slo-blo, flange/plug-in type and is 1-7/16" long.

WIDTH JUMPER

A push-on clip jumper, shunting C423, is sometimes disconnected to decrease width. This is a factory adjustment and normally no change should be made in the field.

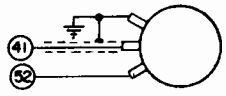
WESTINGHOUSE Chassis V-2435-1 through V-2435-11 Schematic Diagram



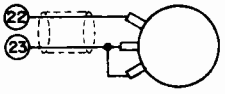
Notes:

1. All capacitor values less than 1 are in MF, and values greater than 1 are PF. All resistance values are in Ohms 1/2 watt unless otherwise indicated.
2. DC voltages are measured from point indicated to circuit ground with a VTVM. line voltage at 120V A. C. , no signal applied.
3. Waveforms were taken with controls set for a normal picture with level control set for Video sync tips 80V below B+ at TP (K).
4. Capacitor made from 750V071H09 cable.
5. Resistance measures 8 Ohms cold, 1 Ohms hot.

WESTINGHOUSE Chassis V-2435-1 through V-2435-11 Schematic Diagram

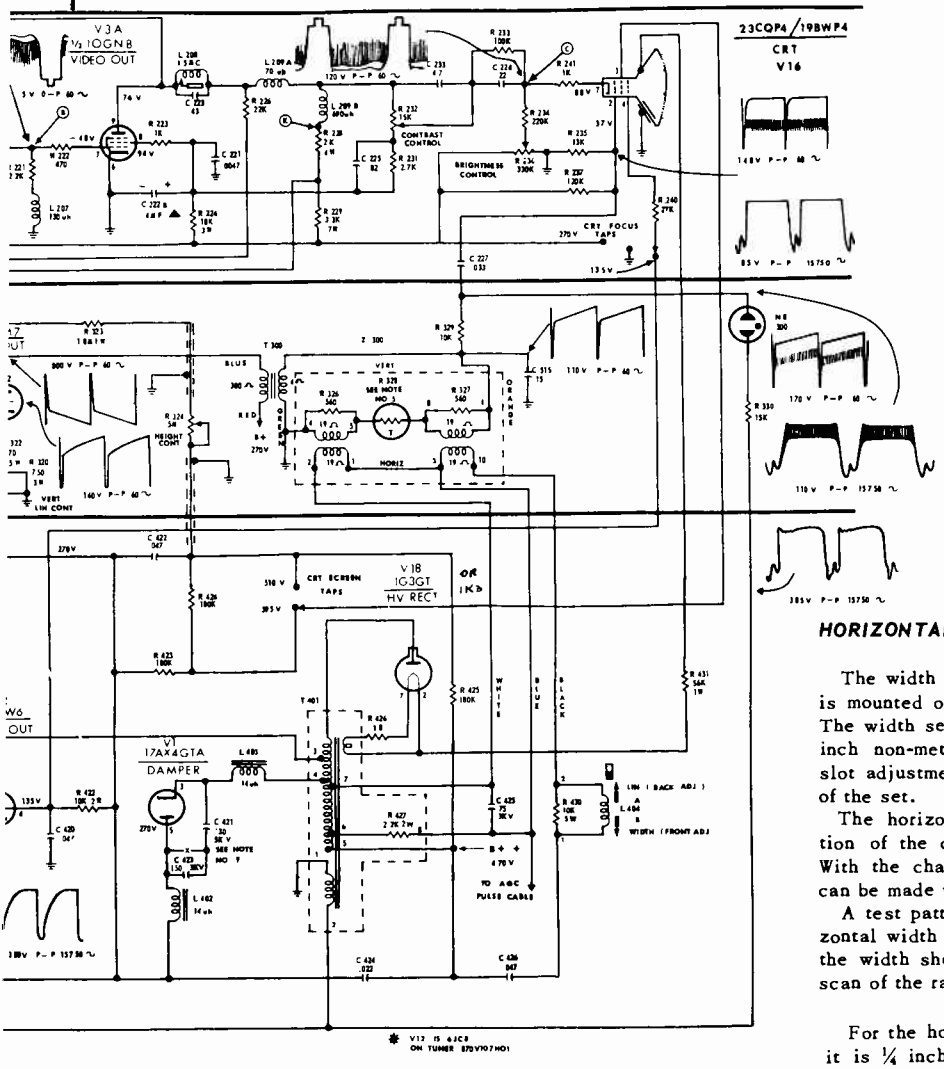


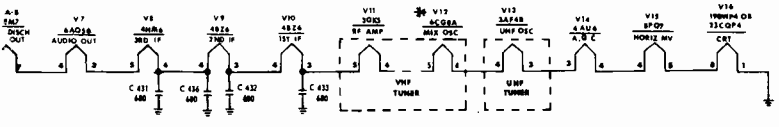
HORIZ. HOLD
R416

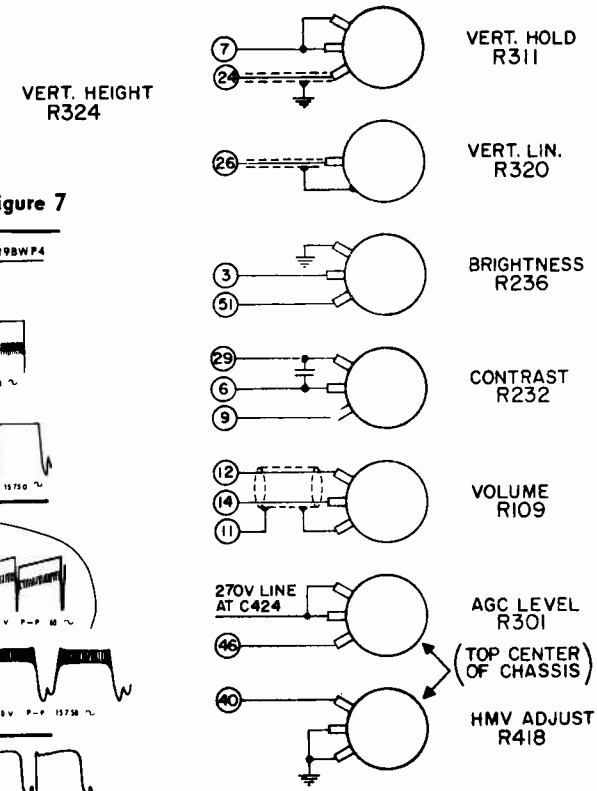


VERT. HEIGHT
R324

Schematic Diagram of Chassis V-2435-1 thru -11. **Figure 7**







Rear View of Control Panel

HORIZONTAL WIDTH AND LINEARITY COIL

The width and linearity coil, L404A,B (shown in Figure 8) is mounted on top of the horizontal output transformer cage. The width section of the coil, L404B, is adjusted by a 3/32 inch non-metallic hex alignment tool and/or a screwdriver slot adjustment and can be adjusted through the back cover of the set.

The horizontal linearity section, L404A, is the back section of the coil and can be adjusted using the same tool. With the chassis in the tilt-down position, this adjustment can be made with a screwdriver.

A test pattern should be used for best adjustment of horizontal width and linearity. If a test pattern is not available, the width should be adjusted for approximately 1 inch overscan of the raster.

For the horizontal linearity adjustment, turn the slug until it is ¼ inch from the round ferrite magnet. This should be the approximate horizontal linearity setting.

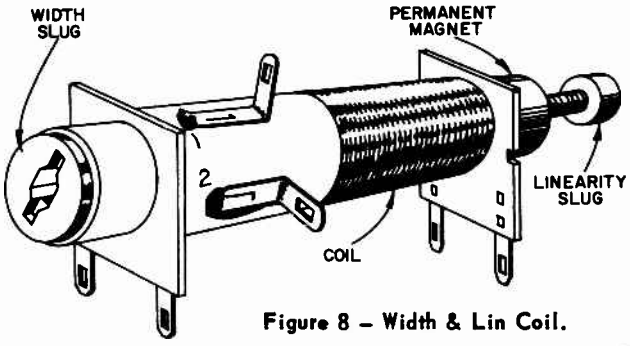


Figure 8 – Width & Lin Coil.

6. Switch makes contact on UHF position only.
7. To remote control stepping relay K400 Chassis V-2418-4.
8. R202 value: 4.7K Ohm 7W with 470V111H01, 470V119H01, 470V123H01 tuners.
   2.7K Ohm 7W with 470V105H02 tuner.
   No resistor used with 470V107H01 tuner.
   3.9K Ohm 7W with 470V105H03 Tuner
9. Factory and service adj. jumper in gives max. width.

WESTINGHOUSE Chassis V-2435-1 through V-2435-11 Removal Instructions

FRONT GLASS REMOVAL ON MODELS USING A 23" CRT

1. Remove the three screws that secure the retaining strip at the top of the glass.
2. Remove the top retaining strip, two side strips and carefully remove the glass.

PILOT LAMP REPLACEMENT

On Models H-P3470, H-P3471 and H-P3473, remove the back cover and tilt down the chassis. (See Chassis Removal Instructions). Remove the wing nut holding the pilot lamp socket to the tuner. Swing the socket to the rear of the cabinet and remove the pilot lamp. This is a Ⓦ #1866 bayonet type pilot lamp.

When re-installing the pilot lamp socket on to the tuner, slight adjustments may be required to "center" the light over the channel indicating number.

On 23" Models using a pilot lamp; remove the front knobs, then pull the plastic escutcheon in a straight, outward direction. Four plastic studs in each corner of the escutcheon, mount it into grooves on the front metal panel. When the escutcheon is removed, the pilot light is accessible for replacement.

PC BOARD ACCESSIBILITY & SERVICING (Refer to Fig. 1)

Screw Location for Chassis Removal

(1) and (4)	Screws, bracket rivet assy mounting.
(2) and (3)	Screws, chassis retaining, to bracket rivet assy.
(5)	Hinge, chassis support, right side.
(6) and (8)	Screws, chassis retaining, vertical position.
(7)	Foot, plastic, chassis stop (tilt down position).
(9)	Screw, retaining, CRT – chassis left support brace.
(10)	Hinge, chassis support, left side.
(11) and (15)	Slots for front control panel mounting.
(12), (13), (17), (18)	Screws, retaining, front control panel.
(14), (16)	Studs, front control panel mounting to chassis (#11 and 15).
(19)	Bracket, CRT and chassis support.

All chassis are designed for tilting down on support hinges, (5) and (10), for servicing and accessibility of parts.

Removing the two screws, (2) and (3), in the upper corner of the chassis and the two screws, (6) and (8), from the chassis support hinges, will permit tilting the chassis into a horizontal position for ease in servicing the PC board.

To keep the chassis in an upright or vertical position, replace the two screws, (6) and (8), into the chassis support hinges.

When the front control panel is disconnected, two studs, (14) and (16), on the side of the panel (all 23" and some 19" models) can hook into the slots, (11) and (15), located on the left side of the PC board chassis for ease in handling and servicing.

19" MODELS, DISASSEMBLY PROCEDURES

Chassis Removal

1. Remove back cover.
2. Remove front control knobs.
3. Disconnect ant. bkt.
4. Remove screws, (2) and (3), from upper corners of chassis and two screws, (6) and (8), from chassis plastic support hinges.
5. Disconnect CRT cap and high voltage lead, CRT dag contact spring ground connector; loosen yoke clamp screw and remove yoke from CRT neck.
6. Disconnect spkr leads.
7. Remove screws holding front control panel and tuner. (On some chassis, this panel will not include tuner).
8. Lift up chassis from plastic chassis support hinges, remove carefully with tuner and front control panel assy. (On some chassis – If one complete panel assy is used, two studs, (14) and (16), on the side of the panel can hook into slots, (11) and (15), for ease in handling.

Chassis Removal – Remote Models (V2435-10, -11)

1. Remove back cover screws, disconnect interlock, pull out back cover slightly and disconnect amp-lok cap and plugs before removing back cover.
2. Remove front control knobs.
3. Disconnect ant. bkt.
4. Remove screw from remote to main chassis support bracket (remote chassis side).
5. Remove screws (2), (3), (6), (8) and tilt down chassis.
6. Disconnect CRT cap, high voltage lead and CRT dag contact spring ground connector; loosen yoke clamp screw and remove yoke from CRT neck.
7. Disconnect transducer plug from remote receiver.
8. Remove two remote receiver retaining bolts from bottom of cabinet.
9. Disconnect remote receiver amp-lok cap and plug and remove remote receiver.
10. Remove four screws holding tuner bracket to cabinet and remove tuner assy.
11. Disconnect spkr leads.
12. Remove screws holding front control panel.
13. Lift up chassis from support hinges and remove carefully with tuner and front control panel assembly.

CRT Removal (19")

See 19" models, chassis removal, and perform steps 1 thru 5. (Use shatterproof goggles for eye protection).

1. Lift chassis up from support hinges and swing chassis to left. CRT can be removed without tuner, remote or chassis removal.
2. Remove four corner CRT mounting screws.
3. Carefully remove CRT with strap assy from cabinet.
4. Disconnect dag contact spring and loosen bolt in CRT strap assy, then carefully remove CRT (use heavy gloves.)

23" MODELS, DISASSEMBLY PROCEDURES

Chassis Removal With the CRT

1. Remove screws from back cover, disconnect interlock and remove back cover. (If the chassis has remote operation, disconnect amp-lok cap and plugs before removing back cover.)
2. Remove front control knobs.
3. Disconnect ant. brkt.
4. Disconnect spkr leads.
5. Remove four screws holding front control panel to cabinet front (nos. (12), (13), (17) and (18)).
6. Remove screws (nos. (1) and (4)) holding upper two chassis support brackets. Projecting from side of front control panel are two studs (nos. (14) and (16)). Hook these studs into slots located on side of the PC board chassis (nos. (11) and (15)). This keeps the front control panel mounted to chassis for easier handling and servicing.
7. Remove two screws from top corners of CRT strap rivet assy.
8. Remove chassis retaining bolts from bottom of cabinet.
9. Carefully remove chassis.

Chassis Removal Without the CRT

1. See chassis removal (with the CRT) step nos. 1 thru 6.
2. Remove bottom screw from chassis (CRT left support brace, no. (9)).
3. Remove screws from chassis plastic support hinges (nos. (6) and (8)) and tilt down chassis.
4. Disconnect CRT cap, CRT high voltage connector, dag contact spring ground connecting clip, loosen yoke clamp screw and remove yoke from CRT neck.
5. Lift up and pull out chassis from plastic support hinges. Move out slightly and pull front control panel cables and wires under chassis to CRT left support brace.
6. Carefully remove chassis.

WESTINGHOUSE Chassis V-2435-1 through V-2435-11 Removal Instructions

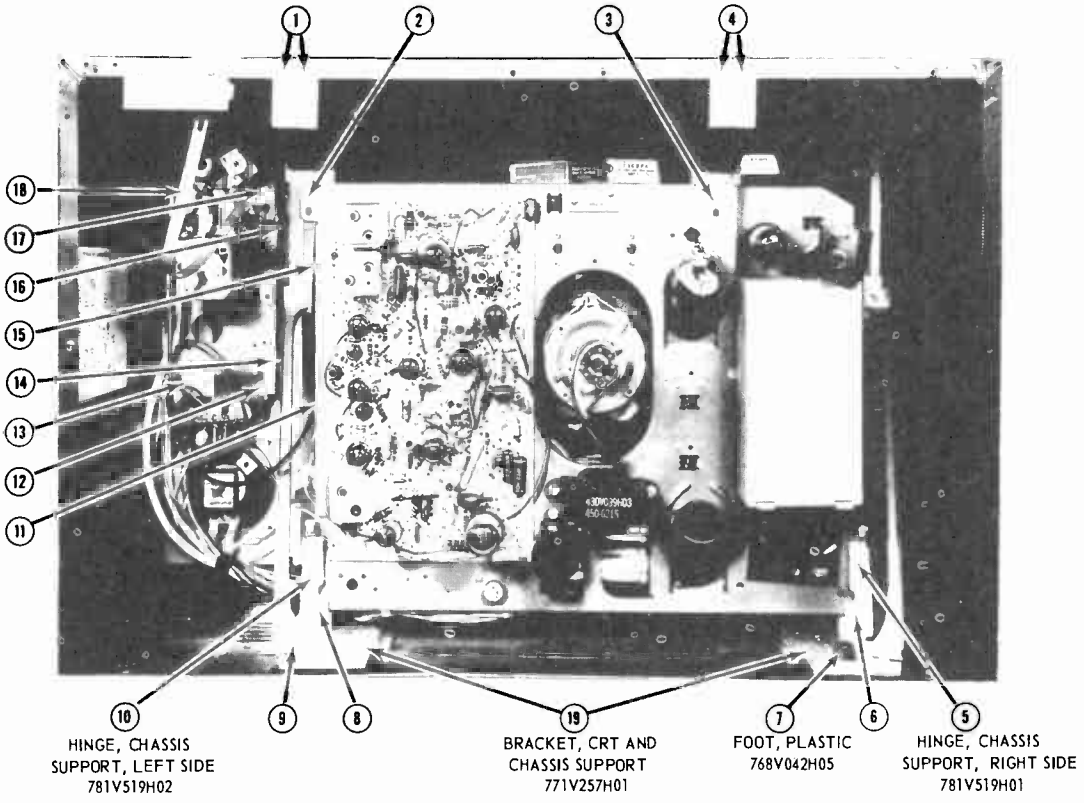


Figure 1 – Rear View of Chassis Showing Location of Screws for Chassis Removal.

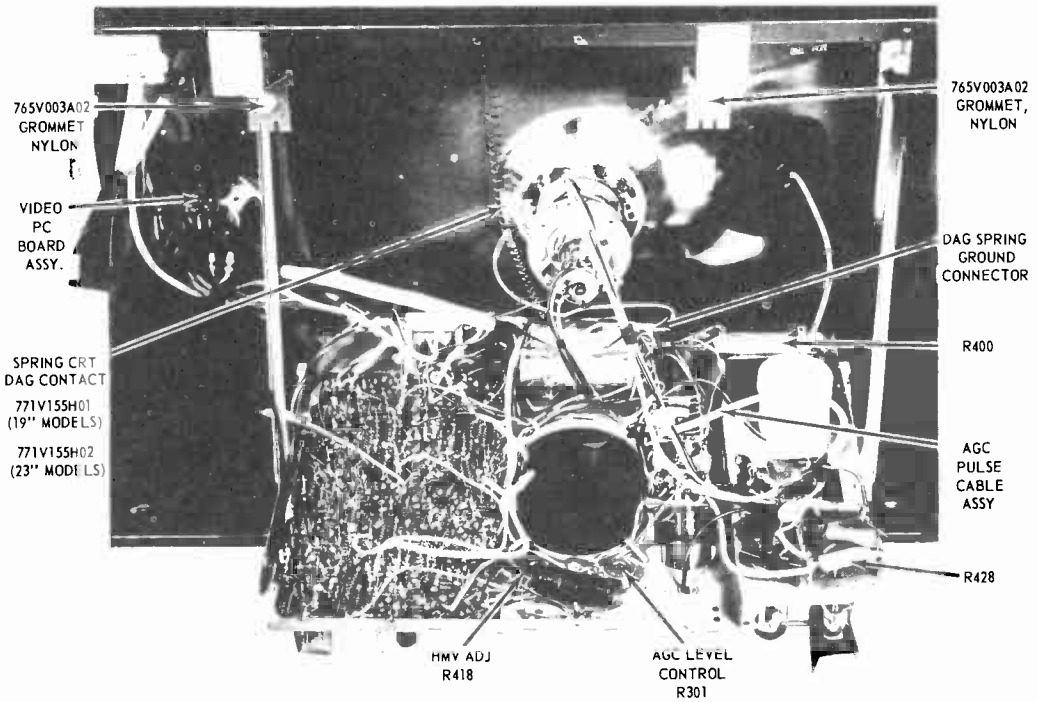


Figure 2 – Rear View of Chassis Tilted Down.

WESTINGHOUSE Chassis V-2435-1 through V-2435-11 Service Information

INSTANT ON

"Instant-On" is the feature designed to provide instant operation when the set is turned on. No tube warm-up time is necessary.

Silicon diode, X402, is connected in series with the AC line and the tube filament string. With the line cord plugged into an AC receptacle and the off-on switch in the off position, the AC line voltage is rectified by silicon diode X402. This permits a pulsating direct current to flow thru the tube filament string keeping the tubes warm. No B+ is present when the off-on switch is in the off position.

For chassis V-2435-3 thru -6, -8, -9, the off-on and "Instant-On" switch is a DPST switch.

In the on position, one section of this switch places a short across diode X402 and the other side completes the AC input to K400.

Two relay contacts of K400, SWA1 and SWA2, form the off-on and "Instant-On" switch for chassis V-2435-7, -10. When push switch, SW400 is pressed momentarily, SWA1 and SWA2 contacts close; SWA2 shunts the "Instant-On" diode, X402 and completes the AC input to the filament string thru R428. SWA1 completes the AC input to R400.

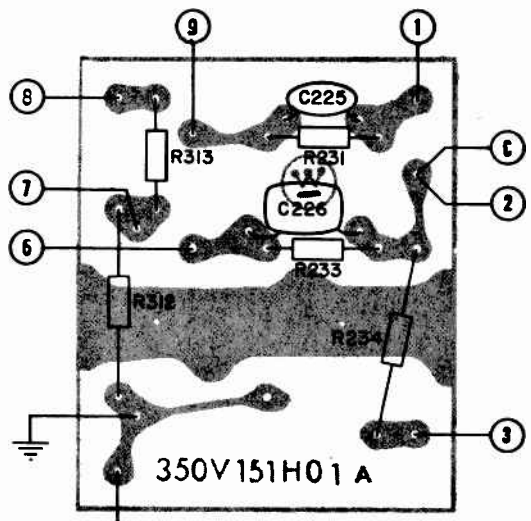
For chassis V-2435-11, when SW400 is pressed momentarily, SWA contacts (on relay K400) close completing the AC input to R400. B+ from the junction of L400, R402 is applied to the DC relay, K401, closing the contacts and placing a shunt across diode X402 for "Instant-On".

NE300 (Refer to Figure 7)

A new circuit, horizontal blanking, has been added to this chassis. It eliminates the vertical light bar usually seen during scene switching or under weak video conditions.

The circuit operation is as follows:

A negative pulse is developed across the secondary winding of the flyback and RC coupled to the grid of the CRT. The neon bulb is used to eliminate ripple on the positive portion of the blanking waveform. The bulb conducts only when a voltage is applied to it that is greater than its flashing or firing voltage. Only the negative portion of the waveform has sufficient amplitude to make the neon bulb conduct. Thus, NE300 conducts during the negative portion of the waveform and extinguishes during the positive portion, eliminating the ripple. Note the waveform arriving and leaving the neon bulb in Figure 7.



Video PC Board (mounted near control panel).

REMOTE OFF-ON SWITCH (SW401)

The V-2435-10-11 chassis has a remote off-on switch located at the back cover. To operate the TV set by remote transmitter, the remote Off-On switch must be turned to the On position.

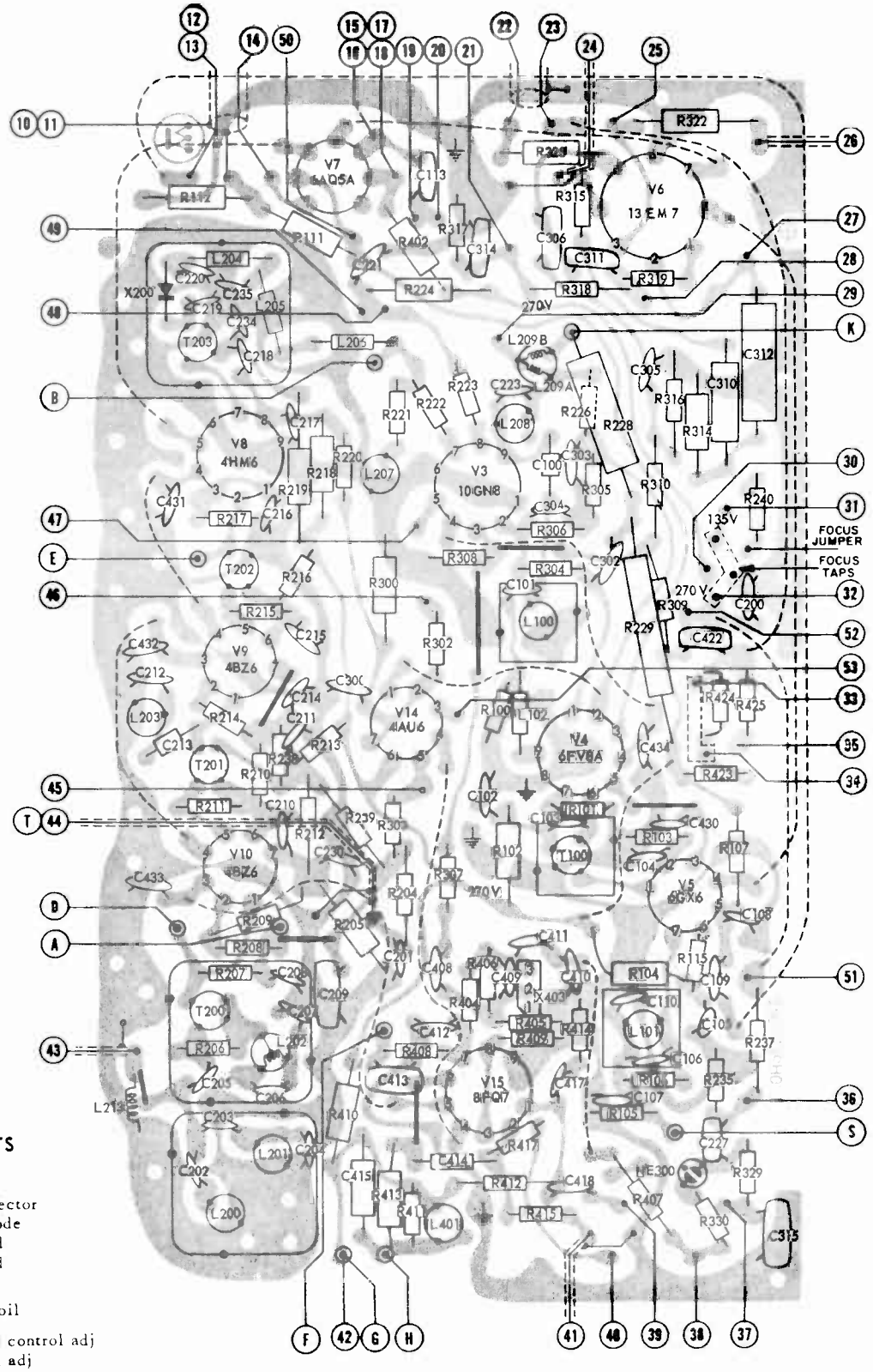
This switch is connected to an amp-lok connector, CA401, also mounted in the back cover. CA401 disconnects from PL401 when the back cover is removed. To operate the Remote Section with the back cover removed (and SW401 disconnected) place a jumper across PL401 pins 1 and 3.

PC BOARD LEGEND

#1 thru 9 are located on the small video PC board.
#10 thru 53 are located on the chassis PC board.

1. PC board to #49
2. CRT pin 5 and R241
3. Brightness control, arm
4. —
5. To Z400 and ground wire for vert hold and vert lin control bracket
6. Contrast control, arm
7. Vert hold control, arm and low side
8. PC board to #28
9. Contrast control, low end
10. Junction R440, R441, C440 (V2435-7-10) on K400
    Junction R441, C440 (V2435-11) on Step relay
11. Volume control, low side
12. Volume control, high side
13. K400 step relay (V2435-7-10-11)
14. Volume control, arm
15. K400 Step relay (V2435-11)
16. T101 primary, blue wire
17. C405A
18. K400 Step relay, V2435-11
19. C407B
20. T101 primary, red wire
21. R421
22. Height control, low end
23. Height control, arm and high end
24. Vert hold control, high end
25. C313B
26. Vert. lin control, high side
27. T300 primary, blue wire
28. Video PC board #8
29. Contrast control, high end
30. Tuner B+
31. 17GW6, pin 4
32. Junction C406A, R422
33. CRT pin 3, brightness tap, 510V
34. CRT pin 3, brightness tap, 395V
35. T401 lug 5
36. CRT, pin 2
37. Junction C315, R329, Z300, orange wire
38. T401 lug #2
39. Junction R419, R420
40. HMV adj control (R418) high end
41. Horiz hold control (R416) arm
42. C416A
43. Tuner IF out.
44. Tuner AGC to R201
45. AGC pulse cable, shield side
46. AGC control (R301) low side
47. 17GW6 pin 2
48. C222B
49. Junction R231, C225 on video PC board #1
50. C112A
51. Brightness control, high side
52. Horiz hold control, high side
53. Tuner filament

WESTINGHOUSE Chassis V-2435-1 through V-2435-11 Service Information



TEST POINTS

A	IF AGC
B	Video Detector
C	CRT cathode
D	1st IF grid
E	3rd IF grid
F	Horiz MV
G	Ringing Coil
H	
J	Horiz hold control adj
K	AGC level adj
M	Mixer grid
S	FM sound
T	Tuner AGC

Bottom View of PC Board Showing Top Components in Solid Outline. Tube Pin Numbering Is for Bottom of Socket.

WESTINGHOUSE Chassis V-2435-1 through V-2435-11 Service Information

K401, Instant-On Relay (Chassis V-2435-11)

A DC relay is used in this chassis for the "Instant-On" operation.

The operation is as follows:

1. When SWA, K400 relay closes, AC is applied to the silicon diodes (X400 & X401).
2. The B+ Output at the junction of L400, R402 is applied to the DC relay (K401).
3. The contacts on K401 close and apply a shunt across the "Instant-On" diode, X402, and full AC voltage is applied to the filaments.

PUSH SWITCH (SW400)

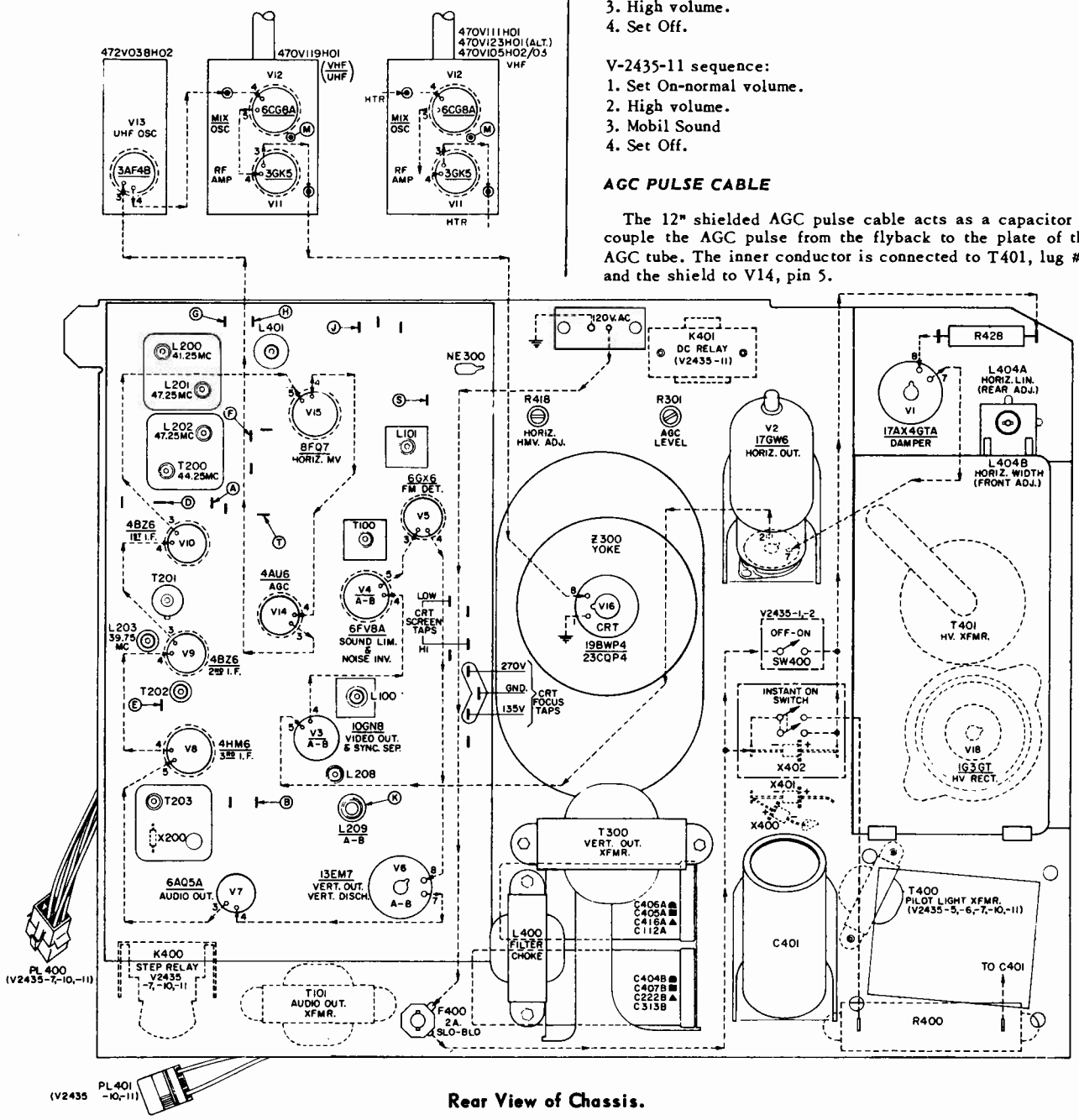
The remote controlled chassis V-2435-7-10-11 uses a push switch in place of the conventional Off-On switch. Depressing this switch momentarily will give the same effect and in the same sequence as with the remote transmitter Off-On Volume button. Each momentary contact of the switch will turn the stepping relay K400, through one of its positions. The sequence will vary between chassis V-2435-7-10 and V-2435-11 because of the difference in the stepping relays.

V-2435-7-10 sequence:
1. Set On-Low volume.
2. Medium volume.
3. High volume.
4. Set Off.

V-2435-11 sequence:
1. Set On-normal volume.
2. High volume.
3. Mobil Sound
4. Set Off.

AGC PULSE CABLE

The 12" shielded AGC pulse cable acts as a capacitor to couple the AGC pulse from the flyback to the plate of the AGC tube. The inner conductor is connected to T401, lug #8, and the shield to V14, pin 5.



Rear View of Chassis.

WESTINGHOUSE Chassis V-2435-1 through V-2435-11 Alignment Information

SOUND ALIGNMENT

EQUIPMENT: VTVM
PROCEDURE:

1. Select the strongest station available (preferably with test pattern and test tone) and adjust the FINE TUNING for best reception. Adjust the VOLUME control so that the station sound is audible.
2. Adjust the quad coil (L101) for maximum sound from the speaker.
3. Use a jumper wire to short the control grid of the 3rd IF amplifier to chassis ground and disconnect the antenna.
4. Connect the VTVM to TP Ⓢ.
5. Adjust interstage transformer T100 for maximum negative voltage on the VTVM (5 volt range).
6. Remove the jumper wire used to short the control grid of the 3rd IF amplifier.
7. Place the antenna close to the antenna terminals so that the signal is loosely coupled to the receiver and the picture is barely visible. A pronounced noisiness (hiss) should accompany the sound.
8. Adjust the limiter input coil (L100) for maximum negative voltage on the VTVM. If the VTVM indicates a broad response while making this adjustment, the receiver input signal is too strong. When the signal coupling described in step 7 is at the necessary low point, no limiting takes place and the VTVM will indicate a sharp response to the limiter input coil adjustment.

4.5 MC TRAP ALIGNMENT

Inject a 4.5 MC CW signal through a .001mf capacitor to TP(B). Couple 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 VTVM to 1.5V or 2V scale. Turn the set on and allow ten minutes for warmup. Then adjust L208 for minimum on the VTVM.

IF ALIGNMENT

EQUIPMENT

1. *Sweep Generator* with a 10 MC wide sweep at center frequencies from 10 MC to 90 MC and 170 MC to 216 MC.
2. *CW (Marker) Generator* which accurately produces the IF and RF frequencies from 4.5 MC to 216 MC.
3. *Oscilloscope* with good low frequency response characteristics.
4. *VTVM.*
5. *Bias Supply* of −2.5 volts.
6. Standard Alignment Tool with a 3/32" hexagonal tip.

TERMINATION AND ADJUSTMENT OF EQUIPMENT

A warmup period of at least 10 minutes should be allowed before alignment is started.

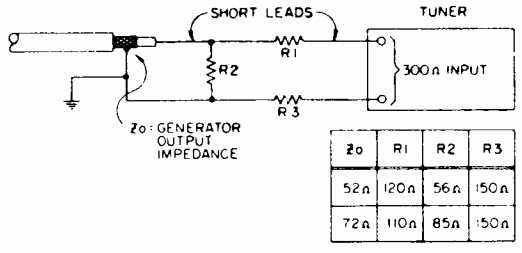
These instructions on termination and adjustment of equipment will apply throughout the IF Alignment procedure.

All test equipment cables and leads should be as short and direct as possible.

Oscilloscope and VTVM – Use a low-capacitance direct probe terminated with the decoupling network shown in Figure 11. Keep the oscilloscope calibrated for 2 volts peak to peak (P-P). Use a VTVM range suitable for measuring −1.5 volts.

Generators – Except where otherwise noted, all signal generating equipment should be terminated as shown in Figure 10. Connect the signal cable ground near the ground of the stage where the signal is injected.

Adjust the CW generator output so that: (1) When the VTVM is being used its reading remains near the −1 volt point. (2) When the oscilloscope is being used, the marker frequencies do not distort the response curve.



Zo	R1	R2	R3
52Ω	120Ω	56Ω	150Ω
72Ω	110Ω	85Ω	150Ω

Figure 9 – Impedance Matching Network

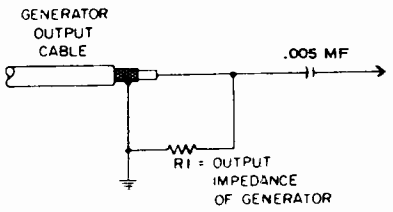


Figure 10 – Generator Cable Termination

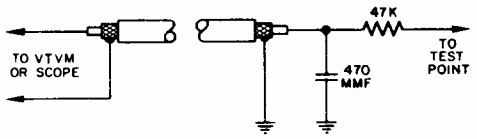


Figure 11 – Decoupling Network

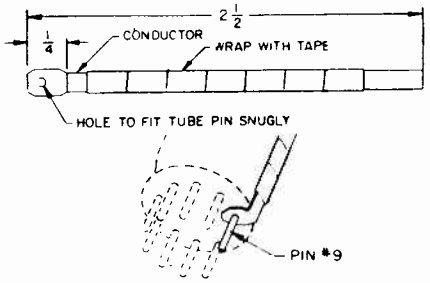


Figure 12 – Mixer Coupling Gimmick

WESTINGHOUSE Chassis V-2435-1 through V-2435-11 Alignment Information

IF ALIGNMENT

For all of the following steps, connect a jumper between TP (A) and circuit ground, 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, detune L200, L201, L202, T200 and mixer output coil. L200 should be detuned clockwise to the bottom of the coil form while L201, L202, T200 and the mixer output coil 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.	Remove sweep generator from TP (E).	
3.	CW generator to TP (D) at: a. 45.25 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.
4.	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.
5.	Remove sweep generator from TP (D).	
6.	VTVM to TP (B) and CW generator to TP (M)* 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 AGC jumper 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
7.	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).
8.	CW generator at 47.25 MC to TP (M) Repeat Step 6e.	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.
9.	Oscilloscope, 2V-PP to TP (B) Sweep generator thru impedance matching network (see Figure 9) to the antenna terminals. Set picture 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 at a point close to chassis. Keep marker amplitude at minimum to avoid distorting response.	Fine tuning screw to center of range on Memory Fine Tuning tuners 470V111H01 or on Continuous Fine Tuning tuners, set fine tuning to center of range. Channel selector to #13. Oscillator slug setting: picture should fall at 45.75 MC. (±300 KC) marker on oscilloscope (see Figure 16).
10.	Repeat step 9 for all channels, in descending order. Set generators to appropriate channel frequencies.	Channel selector to appropriate channel.

* On tuner 470V119H01, Use Gimmick shown in Figure 12.

▲ In early production, T203 part number is 235V094H01. The alignment above is for this IF transformer.
In later production, T203 part number is 235V094H04. In this IF transformer, the primary and secondary windings are reversed in relation to the early type, therefore, the top slug adjusts the primary and the bottom slug adjusts the secondary.
If alignment is required, check the part number of T203 (located on the coil form) and align as described above.

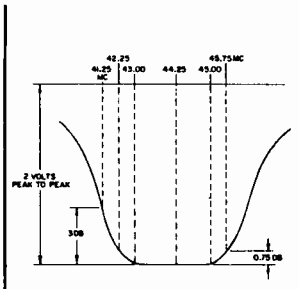


Figure 13 – IF Response, 3rd IF Amp Grid to 2nd Det

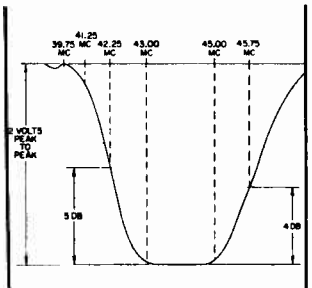


Figure 14 – IF Response, 1st IF Amp Grid to 2nd Det

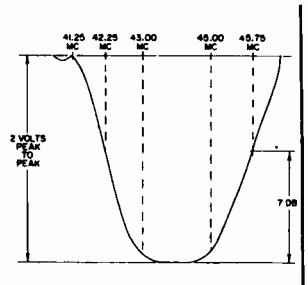


Figure 15 – Response, Mixer Grid to 2nd Det

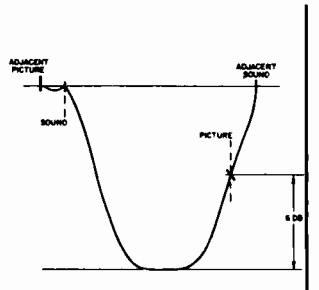


Figure 16 – Typical RF-IF Response

Westinghouse

CHASSIS ASSEMBLIES

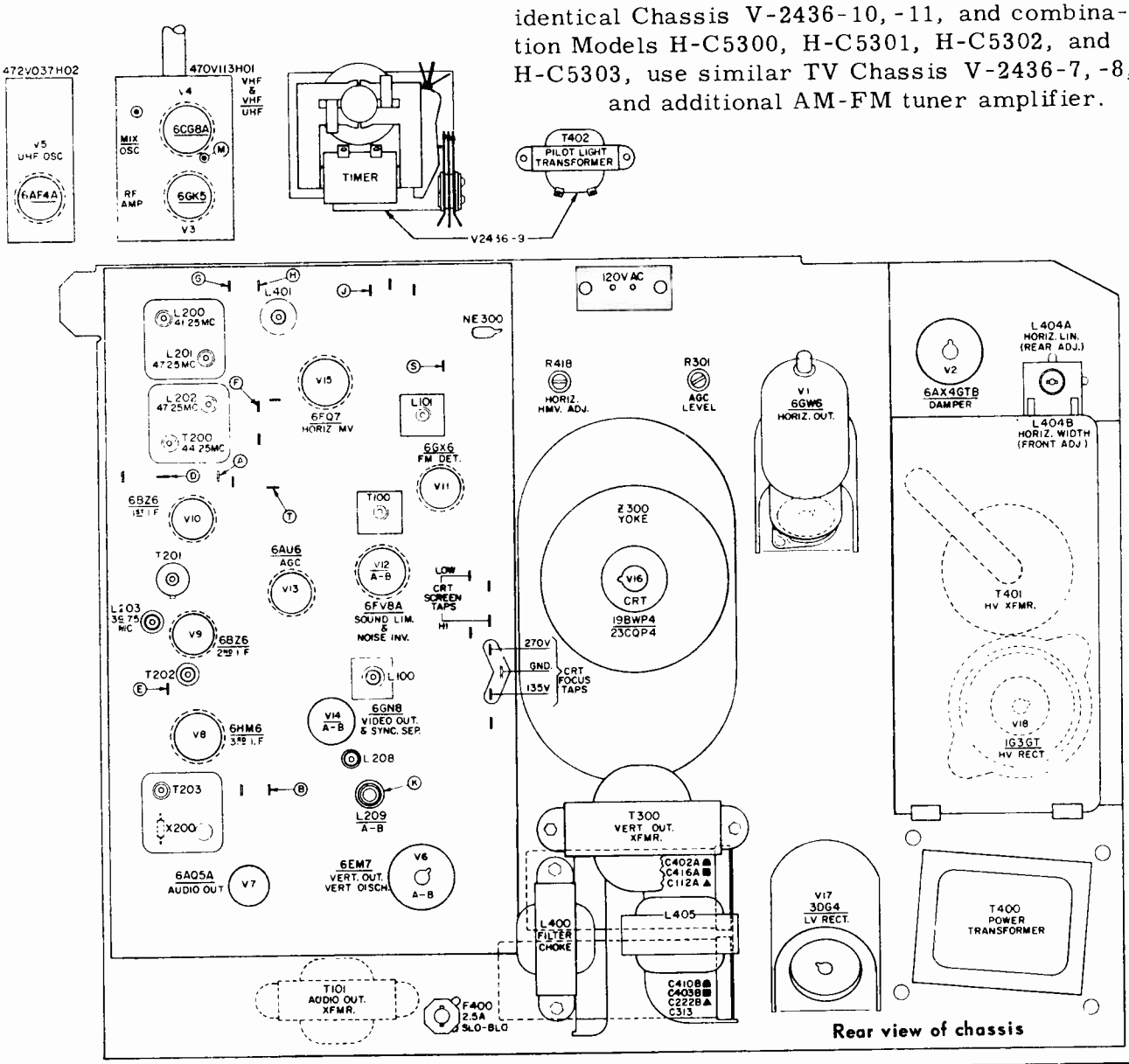
V-2436-1, -2

V-2436-9

MODELS	CHASSIS	TUNERS
H-K3910 H-T3740 H-K3911 H-T3741 H-K3912 H-T3743 H-K3913	V-2436-1	470V113H01
H-K3910U H-T3740U H-K3911U H-T3741U H-K3912U H-T3743U H-K3913U	V-2436-2	470V113H01 472V037H02
H-P3423 H-P3424 H-P3425	V-2436-9	470V113H01

Schematic diagram and other service data on pages 153 through 156. Alignment material on pages 151 and 152, and other data for Chassis V-2435 group applicable to these sets.

Models H-K3960, U, H-K3961, U, use practically identical Chassis V-2436-10, -11, and combination Models H-C5300, H-C5301, H-C5302, and H-C5303, use similar TV Chassis V-2436-7, -8, and additional AM-FM tuner amplifier.



Rear view of chassis

WESTINGHOUSE Chassis V-2436-1, -2, -9, Schematic Diagram (Continued)

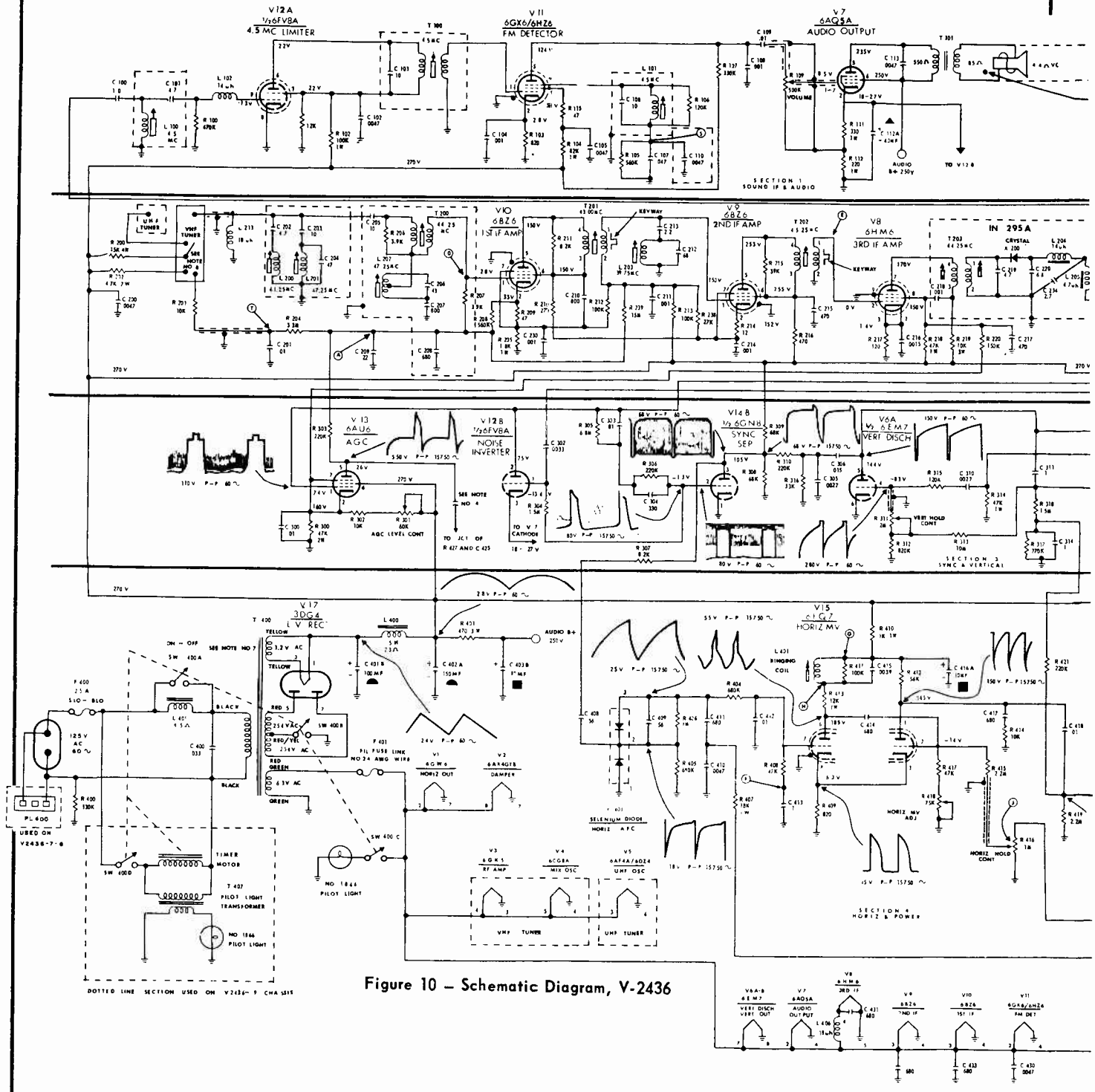


Figure 10 – Schematic Diagram, V-2436

HORIZONTAL WIDTH AND LINEARITY COIL

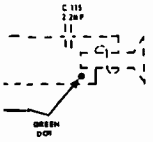
The width and linearity coil, L404A,B is mounted on top of the horizontal output transformer cage. The width section of the coil, L404B, is adjusted by either a 3/32 inch hex non-metallic alignment tool or a screwdriver, and can be adjusted through the back cover of the set.

The horizontal linearity section, L404A, is the back section of the coil and has the same type of adjustment as the width section. The horizontal linearity should be adjusted with the chassis in the tilt down position.

A test pattern should be used for best adjustment of horizontal width and linearity. If a test pattern is not available, the width should be adjusted for approximately 1 inch overscan of the raster.

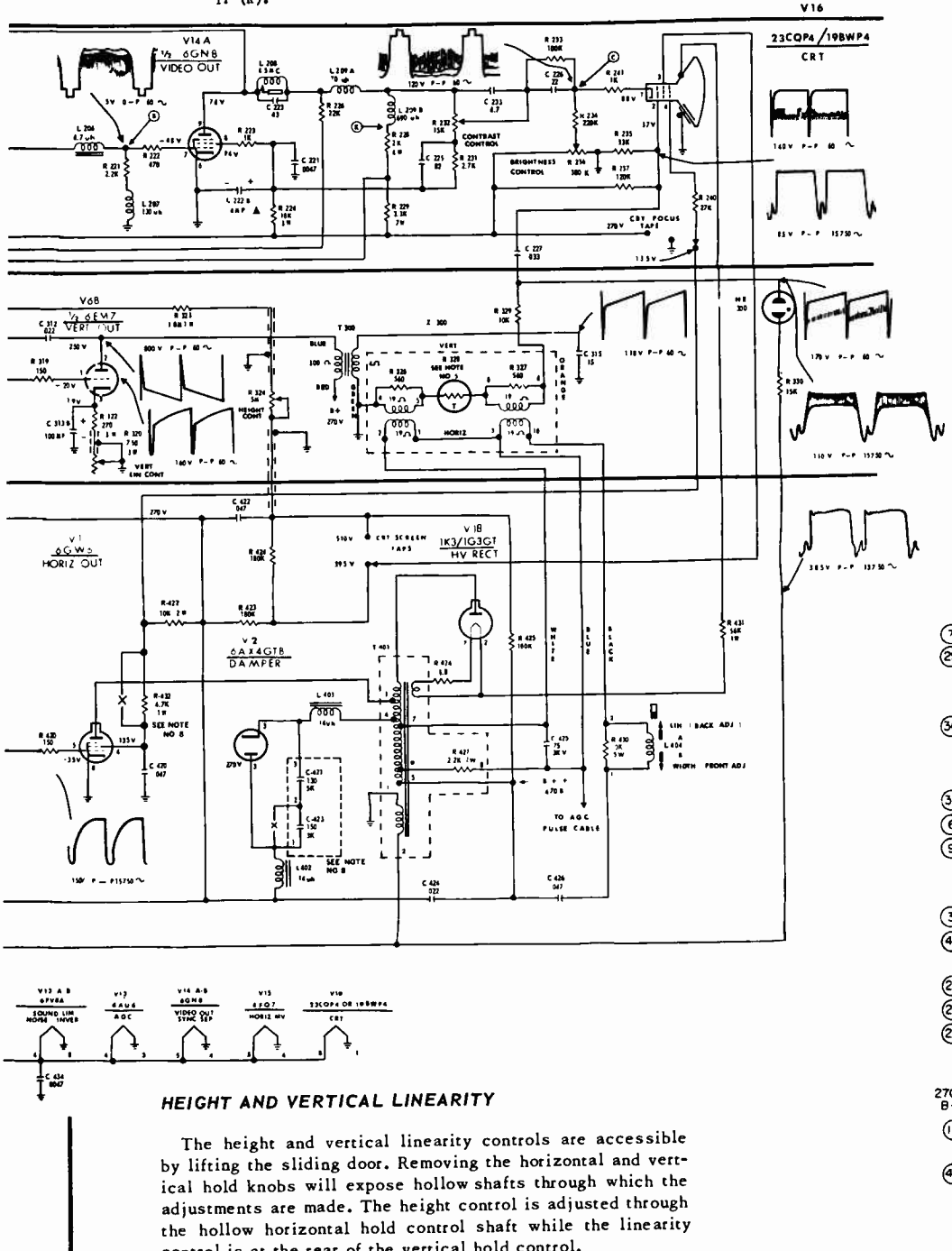
For horizontal linearity adjustment, turn the slug until it is ¼ inch from the round ferrite magnet. This should be the approximate linearity setting.

WESTINGHOUSE Chassis V-2436-1, -2, -9, Schematic Diagram



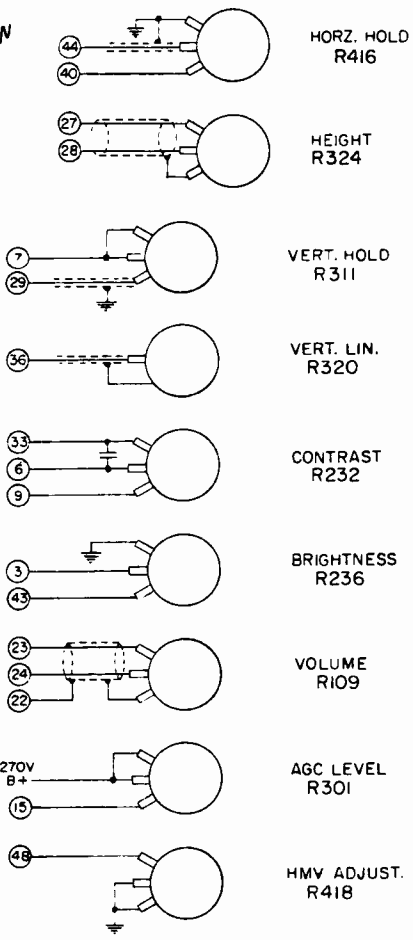
NOTES:

1. ALL CAPACITOR VALUES LESS THAN 1 ARE IN MF, AND VALUES GREATER THAN 1 ARE PF. ALL RESISTANCE VALUES ARE IN OHMS 1/2 WATT UNLESS OTHERWISE INDICATED.
2. DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CIRCUIT GROUND WITH A VTVM. LINE VOLTAGE AT 120V A.C., NO SIGNAL APPLIED.
3. WAVEFORMS WERE TAKEN WITH CONTROLS SET FOR A NORMAL PICTURE WITH LEVEL CONTROL SET FOR VIDEO SYNC TIPS 80V BELOW B+ AT TP (K).
4. CAPACITOR MADE FROM 75OV071H09 CABLE.
5. RESISTANCE MEASURES 8 OHMS COLD, 1 OHMS HOT.
6. SWITCH MAKES CONTACT ON UHF POSITION ONLY.
7. SWITCH 400A, 400B AND 400C IS PART OF VOLUME CONTROL ON CHASSIS V-2436-1-2.
8. SERVICE AND FACTORY ADJUSTMENT: JUMPER IN GIVES MAX. WIDTH.
9. SWITCH 400A, 400B and 400D IS PART OF TIMER ON CHASSIS V-2436-9.



TEST POINTS

- A IF AGC
- B Video Detector
- C CRT cathode
- D 1st IF grid
- E 3rd IF grid
- F Horiz MV
- G Ringing Coil
- H
- J Horiz hold control adj
- K AGC level adj
- M Tuner mixer grid
- S FM sound
- T Tuner AGC



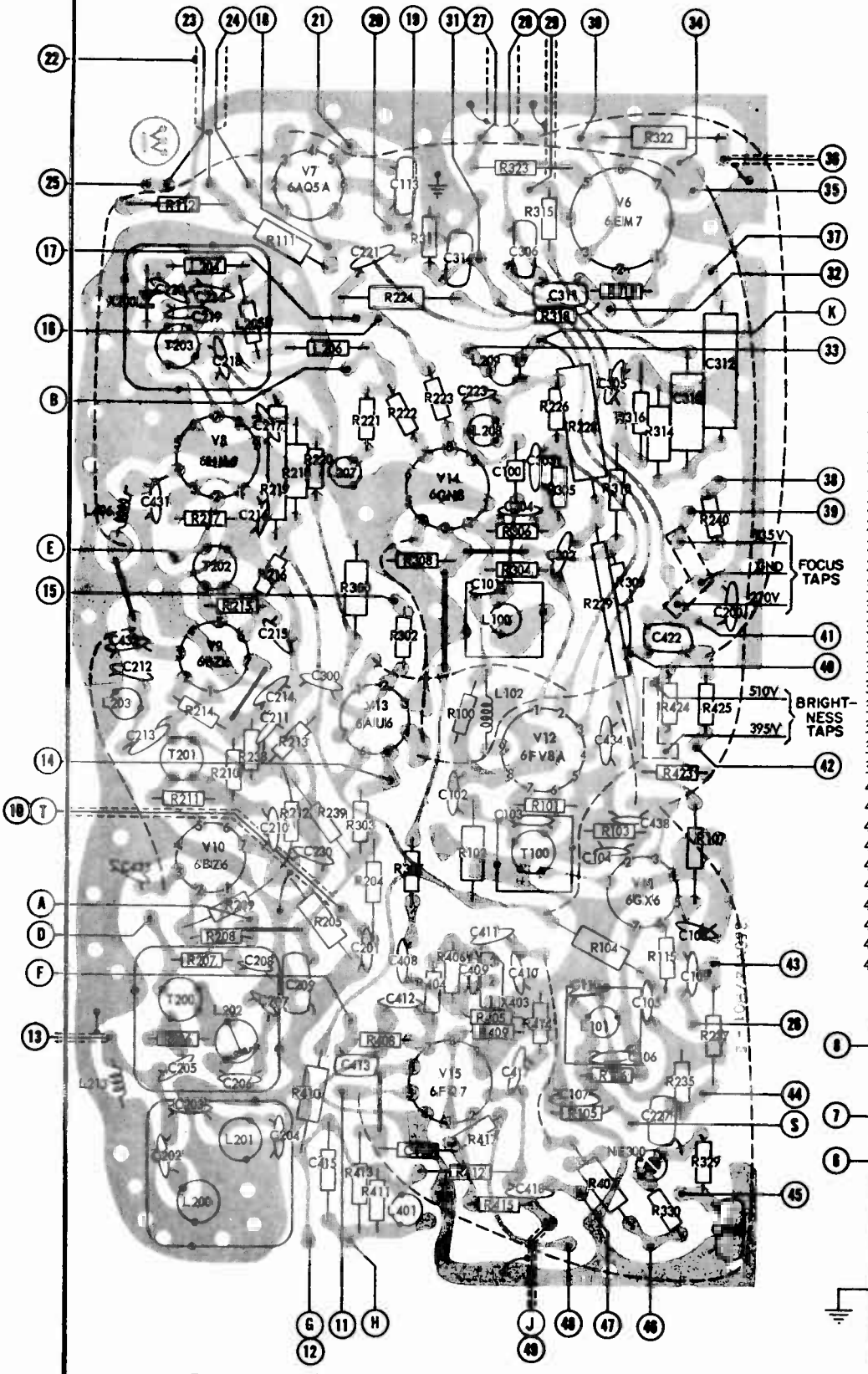
Control wiring diagram. All views seen from the rear.

HEIGHT AND VERTICAL LINEARITY

The height and vertical linearity controls are accessible by lifting the sliding door. Removing the horizontal and vertical hold knobs will expose hollow shafts through which the adjustments are made. The height control is adjusted through the hollow horizontal hold control shaft while the linearity control is at the rear of the vertical hold control.

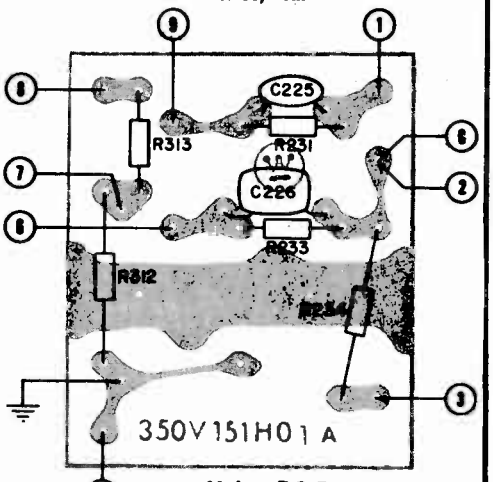
Adjust the height and vertical linearity controls to get a picture of proper height and proportion.

WESTINGHOUSE Chassis V-2436-1, -2, -9, Service Information



PC BOARD LEGEND

1. PC board to #16
2. CRT pin 5 and R241
3. Brightness control, arm
5. Ground wire for vert hold bracket
6. Contrast control, arm
7. Vert hold control, arm and low side
8. PC board to #32
9. Contrast control, low end
10. To R201 on tuner
11. CRT pin 8
12. C416A
13. Tuner IF out.
14. To AGC pulse cable, shield side
15. AGC control, R301, low side
16. To #1 on video PC board
17. C222B
18. C112A
19. C403B
20. T101 red wire
21. T101 blue wire
22. Junction R111, R112
23. Volume control, hi end
24. Volume control, arm
25. To #26
26. To #25
27. Height control, hi side
28. Height control, arm and low side
29. Vert hold, hi side
30. C313B
31. Junction R421 and terminal board lug
32. To #8, video PC board
33. Contrast control, low side
34. Tuner filament
35. Junction, fil fuse link and fil of 6GW6
36. Vert lin control, hi side
37. T300 blue wire
38. CRT pin 4
39. Junction R422, R432
40. B+ to horiz hold control, hi side,
41. Junction R401, R422
42. Junction C424, C426
43. Brightness control, hi end
44. CRT pin 2
45. Junction, yoke and T300 orange wire
46. T401 lug #2
47. Junction R419, R420
48. HMV adj control (R418) hi side
49. Horiz hold control, arm



Bottom view of PC Board, showing top components in solid outline. Tube pin numbering is for bottom of socket.

Video PC Board (mounted near control panel).

Westinghouse

CHASSIS ASSEMBLIES

V-2437-1, -3, -7, -9, -11, -12 VHF

V-2437-2, -4, -8, -10 VHF/UHF

MODEL	CHASSIS	TUNERS USED
H-P3169 H-P3179 H-P3180 H-P3181 H-P3185	V-2437-1	470V105H02/03 470V123H01 (ALTERNATE) 470V107H01 (ALTERNATE)
H-P3169U H-P3179U H-P3180U H-P3181U H-P3185U	V-2437-2	(VHF) 470V119H01 (UHF) 472V035H01
H-P3190	V-2437-3 "INSTANT ON"	470V105H02/03 470V123H01 (ALTERNATE) 470V107H01 (ALTERNATE)
H-P3190U	V-2437-4 "INSTANT ON"	(VHF) 470V119H01 (UHF) 472V035H01
H-P3370 H-P3371 H-P3373	V-2437-7 "INSTANT ON"	470V121H01
H-P3370U H-P3371U H-P3373U	V-2437-8 "INSTANT ON"	(VHF) 470V120H01 (UHF) 472V035H01
H-P3380	V-2437-9 "INSTANT ON" V-2430-3 "MOBIL SOUND"	470V120H01
H-P3381U	V-2437-10 "INSTANT ON" V-2430-3 "MOBIL SOUND"	(VHF) 470V120H01 (UHF) 472V035H01
H-P3363	V-2437-11 "INSTANT ON"	470V120H01
H-P3381	V-2437-12 "INSTANT ON" V-2430-3 "MOBIL SOUND"	470V121H01

PC BOARD ACCESSIBILITY

To provide easy access to the PC board, the CRT assembly can be partially disassembled (see Figures 1 and 2).
1. Remove the 4 screws shown in Figure 1.
2. Remove the 3 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.

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).
5. Remove three ¼" screws securing control panel and chassis to cabinet front.
6. Remove screws holding chassis to cabinet base.
7. Carefully remove chassis, tuner end first.

Caution: Be extra careful not be 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.

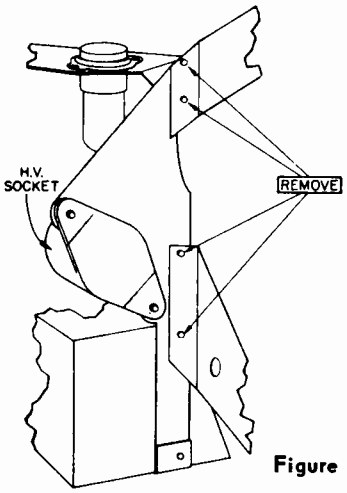


Figure 1 – Bracket Screw Removal

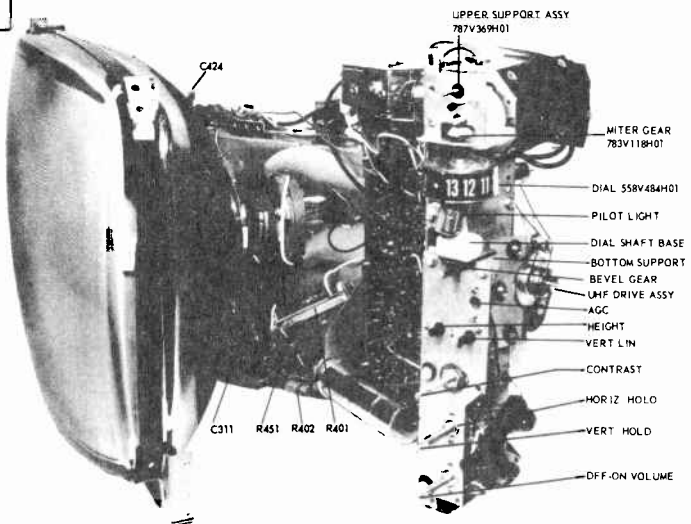


Figure 2 – PC Board Accessibility

WESTINGHOUSE Chassis V-2437-1 through V-2437-12, Service Information

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 (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.

FOCUS TAPS

The focus tap has been set at the factory. If the CRT is replaced, use the tap that provides the best focus.

WIDTH ADJUSTMENT

EARLY PRODUCTION – 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.

LATE PRODUCTION – A separate width winding and coil L403 was added to the horizontal output transformer. The tap can be moved to change width (see schematic).

HEIGHT AND VERTICAL LINEARITY

The HEIGHT AND VERT. LIN. controls are accessible through two holes in the front escutcheon, just below the Channel Selector knob, with HEIGHT on the left and VERT. LIN. on the right. With a narrow screwdriver, adjust them alternately until a picture of proper height and linearity is obtained.

AGC LEVEL CONTROL

This adjustment is factory set. Normally, no adjustment will be needed in the field.

Should adjustment be necessary, select the channel with the strongest signal. Turn the control clockwise until a slight bend appears at the top of the picture. Then turn the control slowly counter-clockwise about ¼ turn past the point at which the bend disappears.

"INSTANT ON"

"Instant On" is a new feature designed to provide instant operation when the set is turned on. No tube warmup time is necessary.

Silicon diode X403 is connected in series with the AC line, R400 (18ohm 7 watt) and the filament string. With the line cord plugged into an AC receptacle and the On-Off switch (SW400) in the OFF position, the AC line voltage is rectified by diode X403. This permits a steady current to flow through the filament string, keeping the tubes warm. No B+ is present when SW400 is in the OFF position.

When the On-Off switch is turned ON, one section of the switch provides voltage for B+ and the other section shorts out diode X403.

TUBE COMPLEMENT AND RESISTANCE CHART

Tube	Type	Function	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	17AX46TA	Damper					*47		40	3.3	
V2	17DQ6B	Horiz Out.	470K	28		*12K	470K		33	0	CAP ▲13
V3	6AQ5A	Audio Out.	330-500K	660	25	33	2K	1.5K	330-500K		
V4	10GN8	Vid Out & Sync Sep	0	*2M	*33K	20	25	12	2.2K	*12K	*5K
V5	6FV8A	Noise Inv & AGC	3.6M	*30K	660	17	19	*780K	*47	*15K	*30K
V6	6GX6	FM Det.	4	820	16	17	▲680K	*82K	560K		
V7	4AU6	Sound Lim.	100K	0	15	16	12K	12K	0		
V8	8CS7	Vert Disc & Out.	▲3K		1.3M	15	13	*680K	1.5M	0	100
V9	4HM6	3rd IF Amp.	120	.1	120	11	13	0	*10K	*40K	0
V10	4BZ6.	2nd IF Amp.	■27K		10	13	*470	*470	■12		
V11	4BZ6	1st IF Amp.	*550	1.8K	8.5	10	■270	■270	1.8K		
V12	3GK5	RF Amp	0	*4M	8.5	7.5	*5.9K	0	0		
V13	6CG8A	Mixer-Osc	4.7K	*9K	0	6.0	7.5	*5.7K	*4.7K	0	220K
V14	3AF4A/B	UHF Osc	*15K	5.6K	5.5	6	.1	5.6K	*15K		
V15	8FQ7	Horiz MV	*57K	250K	1.1K	2.5	5.5	*48K	1.7M	1.1K	0
V16	19BWP4	CRT	0	22K	▲16.5K	*12K			*300K	2.5	
V17	1G3GT	HV Rect.	INFINITE								

Resistances measured from tube pin indicated to circuit ground
* Resistances measured from tube pin indicated to junction X401, L400.
▲ Resistances measured from tube pin indicated to Pin 3, V1.
■ Resistances measured from tube pin indicated to Pin 2, V10

WESTINGHOUSE Chassis V-2437-1 through V-2437-12, Service Information

KEY TO PC BOARD LAYOUT

1. Audio output transformer, red lead
2. Audio output transformer, blue lead
3. Volume control, R108
4. Mobil Sound B+, 23 volts
5. Volume control, R108
6. Horiz drive to R416
7. CRT pin 8, filament
8. IF input cable from tuner
9. Tuner filament
10. Tuner AGC
11. Tuner filament
12. Vertical lin control, R320
13. Vertical hold control, R319
14. Vertical output transformer, blue lead
15. Height control, R328
16. Vertical lin control, R320
17. Contrast control, R216
18. Contrast control, R216
19. Contrast control, R216
20. Volume control, R108
21. Mobil Sound modulation
22. CRT pin 7, cathode
23. Brightness control, R222
24. Vertical output transformer, orange wire from yoke
25. CRT pin 2, grid
26. CRT pin 3, grid
27. B++, 550 volts from R421
28. Height control, R328
29. B+, 270 volts
30. Brightness control, R222 (early prod only)
31. CRT pin 4, focus
32. Junction R418 and C423, 130 volts
33. AGC control, R301
34. V2, pin 2
35. Horizontal hold control, R415
36. Junction R402 and C406A, 235 volts

TEST POINTS

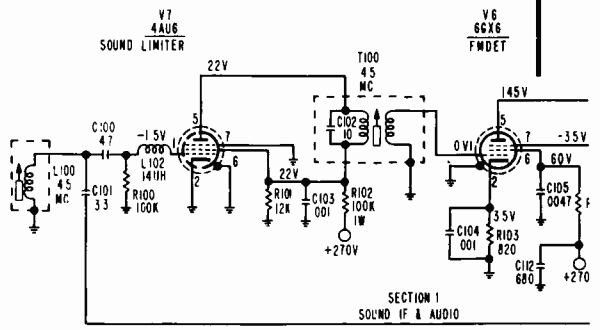
A. AGC for IF
B. Video detector
C. CRT cathode
D. 1st IF grid
E. 3rd IF grid
F. Horizontal MV
G. Ringing coil
H. Ringing coil
M. Tuner mixer grid (on tuner)
S. Quad coil
T. AGC for tuner

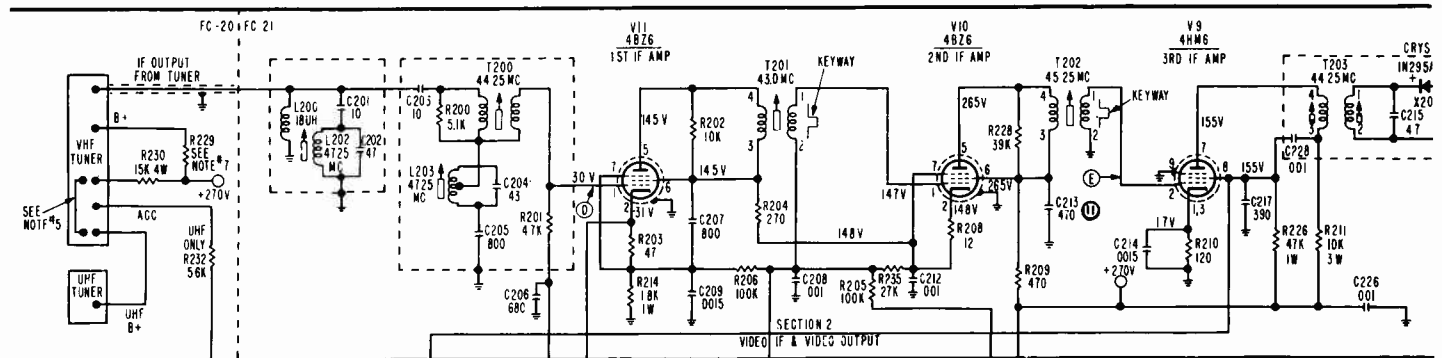
Bottom View of PC Board showing top components in solid outline.
Tube pin numbering is for bottom of socket.

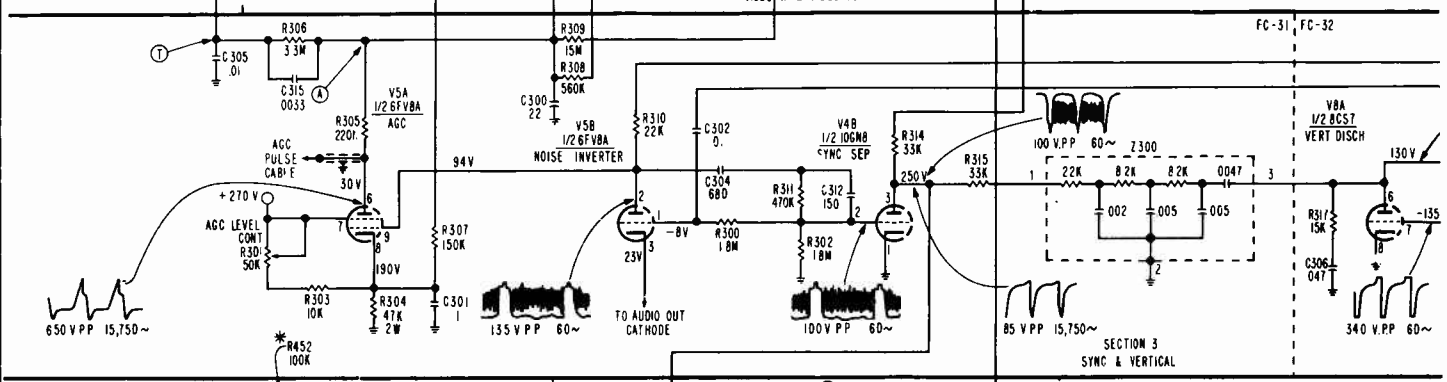
WESTINGHOUSE Chassis V-2437-1 through V-2437-12, Schematic Diagram

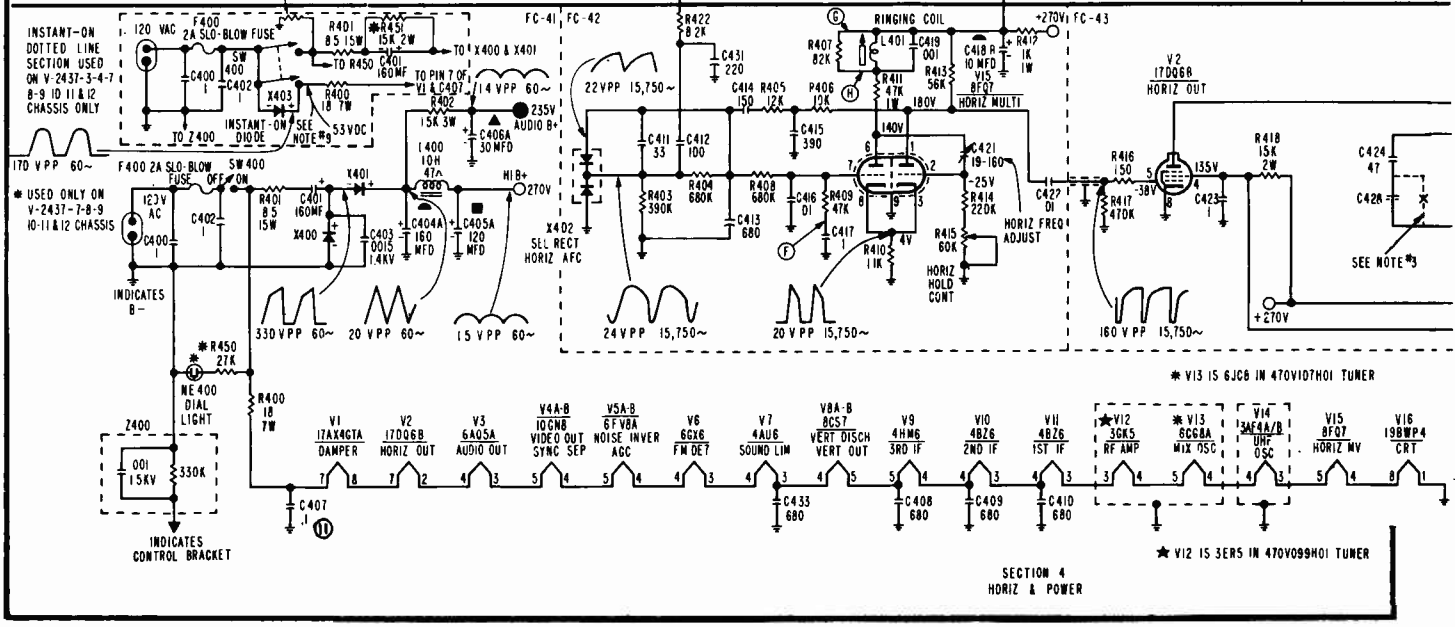
NOTES:

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 120 VAC
3. SERVICE & FACTORY ADJ JUMPER IN GIVES MAXIMUM WIDTH (EARLY PROD.)
4. WAVEFORMS WERE TAKEN WITH CONTROLS SET FOR NORMAL PICTURE WITH CONTRAST CONTROL SET FOR 65 VPP AT TP "C"
5. MAKES CONTACT ON CHAN #1
6. CONNECTIONS FOR MOBIL SOUND - CHASSIS V-2430-3
7. R-229 - 4.7K 7W WHEN 470V119H01, 470V120H01, 470V121H01, OR 470V123H01 TUNERS ARE USED
   R-229 IS SHORTED WHEN 470V107H01 TUNER IS USED
   R-229 - 2.7K 7W WHEN 470V105H02 TUNER IS USED
   R-229 3.9K 7W WHEN 470V099H01 OR 470V105H03 TUNER IS USED.
8. CAPACITOR MADE OF 750V071H09 CABLE.
9. THIS VOLTAGE READ WITH SW400 IN "OFF" POSITION
10. SOME PRODUCTION R419 WAS 3.3 OR 4.7 OHMS IF T400 IS REPLACED USE 5.1 OHMS.

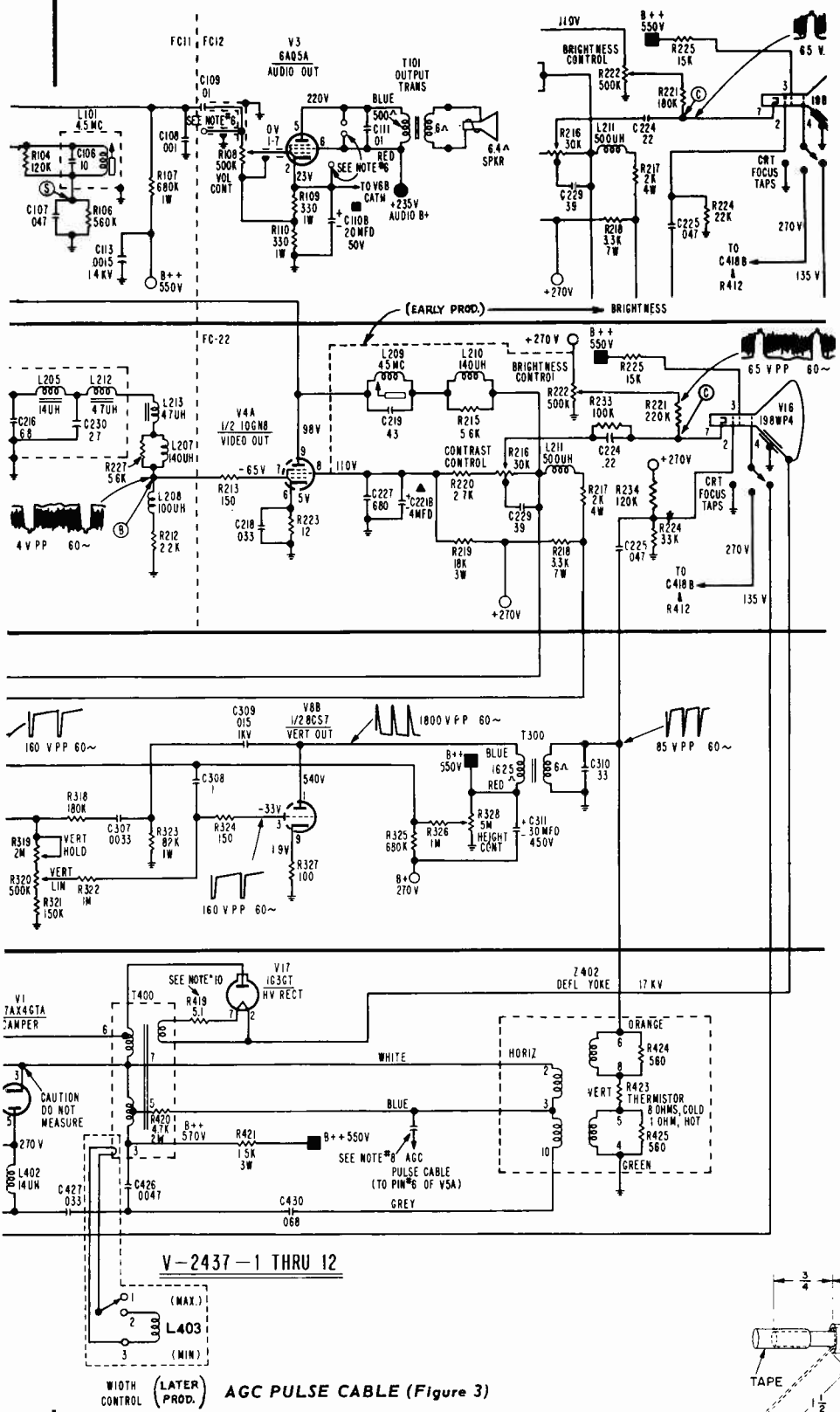


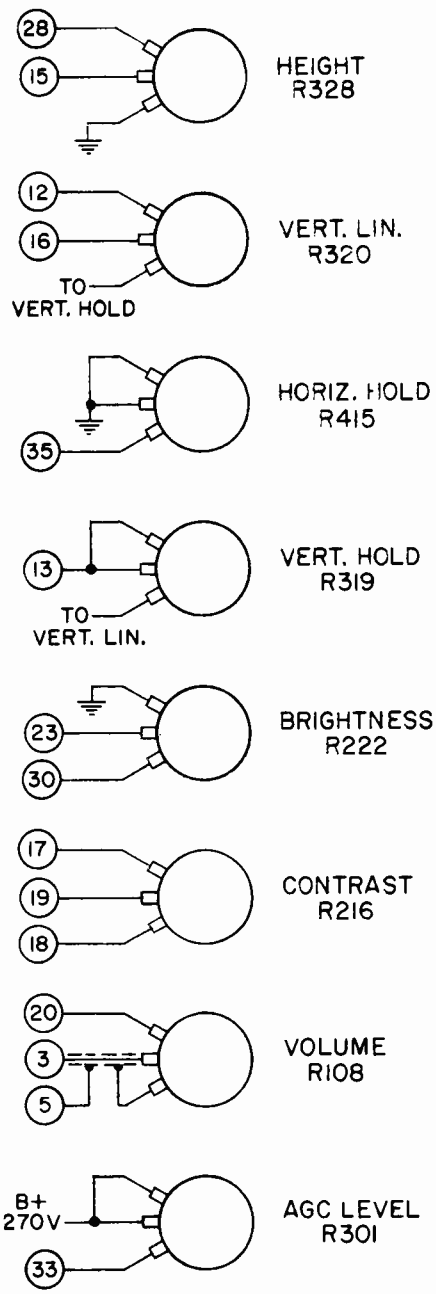






WESTINGHOUSE Chassis V-2437-1 through V-2437-12, Schematic Diagram





Control Wiring Diagram. All Views Seen From Rear.

AGC PULSE CABLE (Figure 3)

The pulse cable is connected to act as a capacitor. The shield is one plate and the center conductor is the other. The unused ends are insulated.

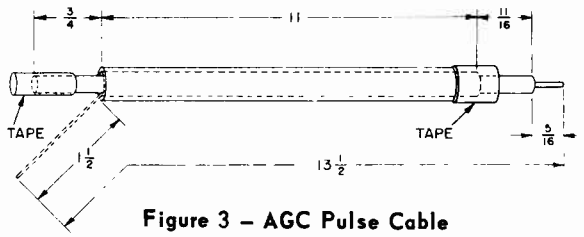


Figure 3 – AGC Pulse Cable

WESTINGHOUSE Chassis V-2437-1 through V-2437-12, Service Information

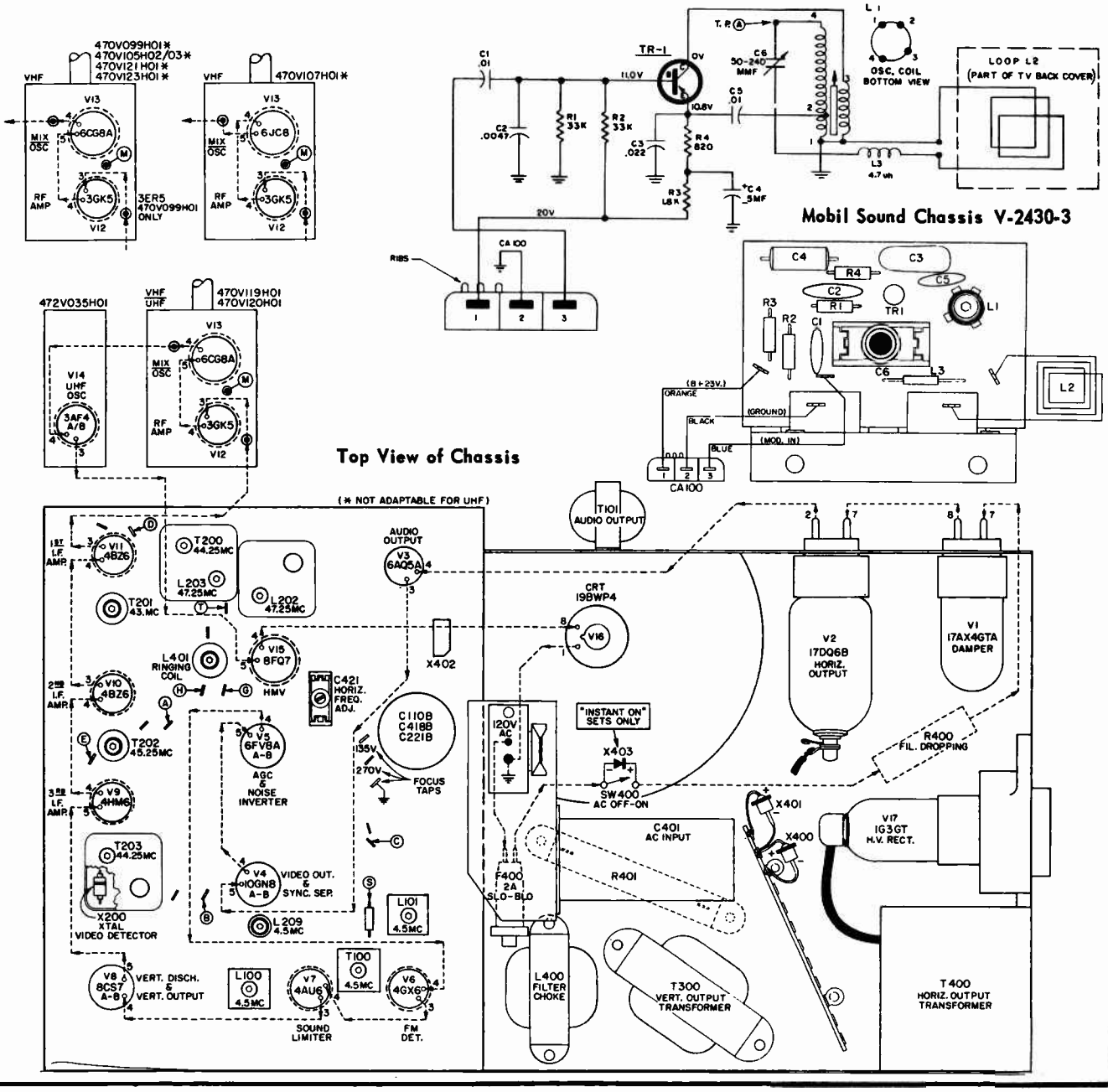
"MOBIL SOUND"

Mobil Sound is a feature by which the sound from a TV receiver is broadcast through the air and received by an AM radio in the same room as the TV receiver. The Mobil Sound chassis and its radiating loop antenna is mounted on the TV back cover and is connected to the TV chassis by an amplok plug and cap.

When the Mobil Sound slide switch (SW100) is placed in the RADIO position, a short is placed across the primary of the TV audio output transformer. At the same time, the Mobil Sound chassis is modulated by the TV audio from the FM detector and transmitted by the loop antenna at a frequency between 600KC and 1000KC. The DC voltage for the Mobil Sound chassis is taken from the cathode of the audio output tube.

A small knob projects through the back cover of the TV receiver for adjusting the transmitting frequency of the oscillator. To adjust the oscillator:

1. Set SW100 (on top of the cabinet in the speaker well) to the RADIO position.
2. Turn on the radio, either tube or transistor, and turn to an unused part of the dial between 600KC and 1000KC.
3. Turn the oscillator control knob at the rear of the TV receiver until the TV audio is heard coming from the radio speaker. Once the oscillator control is adjusted there is no need to reset the control every time Mobil Sound is desired. If interference is present on the sound from the radio, try another unused area on the radio dial and retune the oscillator control.



WESTINGHOUSE Chassis V-2437-1 through V-2437-12, Alignment Information

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 Ⓑ to B−.
4. Connect the VTVM to TP Ⓢ.
5. Adjust interstage transformer T100 for maximum negative voltage on the VTVM.
6. Remove the jumper wire used to short TP Ⓑ to B−.
7. Place the antenna input close to the antenna terminals so that the signal is loosely coupled to the receiver and the picture is barely visible. A pronounced noisiness (hiss) should accompany the sound.
8. Adjust the limiter input coil (L100) for maximum negative voltage on the VTVM. If the VTVM indicates a broad response while making this adjustment, the receiver input signal is too strong. When the signal coupling described in step 7 is at the necessary low point, no limiting takes place and the VTVM will indicate a sharp response to the limiter input coil adjustment.

4.5 MC TRAP ALIGNMENT

Disconnect the antenna and turn contrast control to maximum clockwise. Inject a 4.5 MC CW signal through a .001mf capacitor to TP Ⓑ. Connect a .001mf capacitor to a demodulation probe tip. Connect the other end of the probe to a VTVM and the capacitor to TP Ⓒ. 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

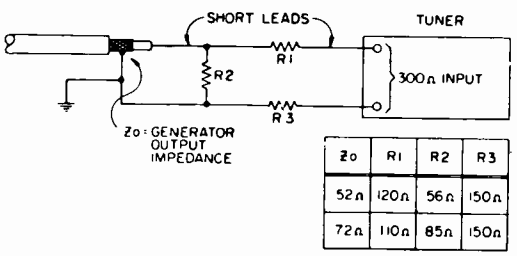
EQUIPMENT

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 −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.



Zo	R1	R2	R3
52Ω	120Ω	56Ω	150Ω
72Ω	110Ω	85Ω	150Ω

Figure 12 – Impedance Matching Network

Oscilloscope and VTVM – Use a low-capacitance direct probe terminated with the decoupling network shown in Figure 14. Keep the oscilloscope calibrated for 2 volts peak to peak (P-P). Use a VTVM range suitable for measuring -1.5 volts.

Generators – Except where otherwise noted, all signal generating equipment should be terminated as shown in Figure 10. Connect the signal cable ground near the ground of the stage where the signal is injected.
Adjust the CW generator output so that: (1) When the VTVM is being used its reading remains near the -1 volt point. (2) When the oscilloscope is being used the marker frequencies do not distort the response curve.

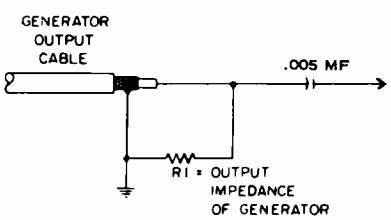


Figure 13 – Generator Cable Termination

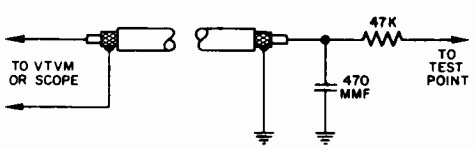


Figure 14 – Decoupling Network

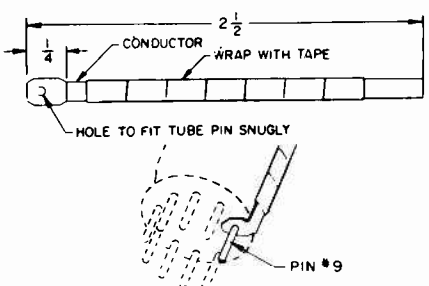


Figure 15 – Mixer Coupling Device

WESTINGHOUSE Chassis V-2437-1 through V-2437-12, Alignment Information

STEP	TEST EQUIPMENT AND CONNECTION	ADJUSTMENT
1.	Jumper from B– 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 (top slug): Maximum amplitude. T203 secondary (bottom slug): Rocking symmetrical response (see Figure 16)
3.	CW generator to TP (D) at: a. 45.25 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 17. Use T203 (bottom 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 device shown in Figure 15 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.	Adjust mixer output coil and T200 for a "rocking" symmetrical response at approximately 44.25 MC. with maximum amplitude and markers as shown in Figure 18.
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 18.
9.	Oscilloscope, 2V–PP. Sweep generator thru impedance matching network (See Figure 12) 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 19).
10.	Repeat step 8 for all channels	

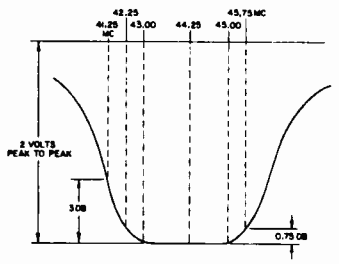


Figure 16 – Typical IF response, 3rd IF Amp grid to 2nd Det.

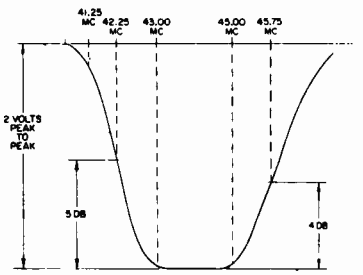


Figure 17 – Typical IF response, 1st IF Amp grid to 2nd Det.

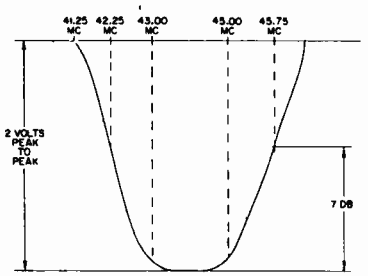


Figure 18 – Typical IF response, Mixer Amp grid to 2nd Det.

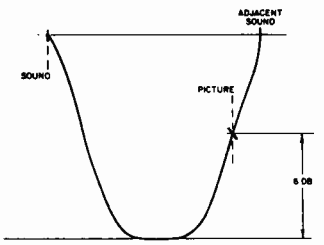


Figure 19 – Typical RF-IF response.

Westinghouse

MODEL AND CHASSIS CHART

MODEL	CHASSIS	TUNER
H-P3000 H-P3001 H-P3002	V-2438-1	470V105H03
H-P3000U H-P3001U H-P3002U	V-2438-2	470V119H01 472V035H01

MONTGOMERY WARD

Models GTM1084A, GTM1583A, GTM2084A, and GTM2583A, use these identical chassis.

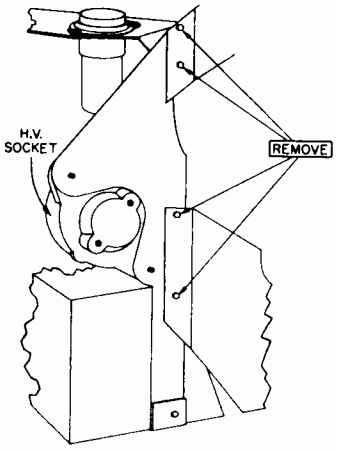


Figure 1 – Bracket Screw Removal For PC Board Accessibility.

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. Remove speaker and grill.
5. Remove three ¼" screws securing control panel and chassis to cabinet front, and screws from top of CRT strap to cabinet front.
6. Remove 7 screws holding chassis to cabinet base.
7. Carefully remove chassis, tuner end first.

PC BOARD ACCESSIBILITY

To provide easy access to the PC board, the CRT assembly can be partially disassembled (see Figures 1 and 2).

1. Remove the 4 screws shown in Figure 1.
2. Remove the 3 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.

CENTERING

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

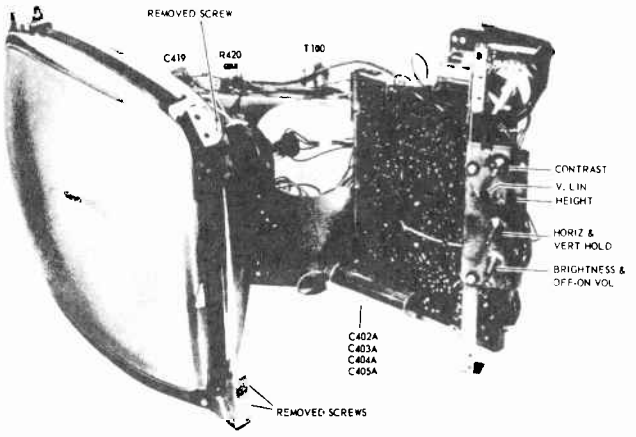


Figure 2 – PC Board Accessibility.

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.

HEIGHT AND VERTICAL LINEARITY

The HEIGHT AND VERT. LIN. controls are accessible through two holes in the front escutcheon, just above the Contrast knob, with HEIGHT on the left and VERT. LIN. on the right. With a narrow screwdriver, adjust them alternately until a picture of proper height and linearity is obtained.

AGC ADJUSTMENT

Connect a scope to TP ⑧. Tune in the strongest station and use an insulated screwdriver to adjust C420 for a zero to peak reading of 2.75 volts.

If a scope is not available, tune in the strongest station. Adjust C420 with an insulated screwdriver until the picture bends at the top. Then turn the screw back slightly until the bend disappears.

HORIZONTAL FREQUENCY AND RINGING COIL

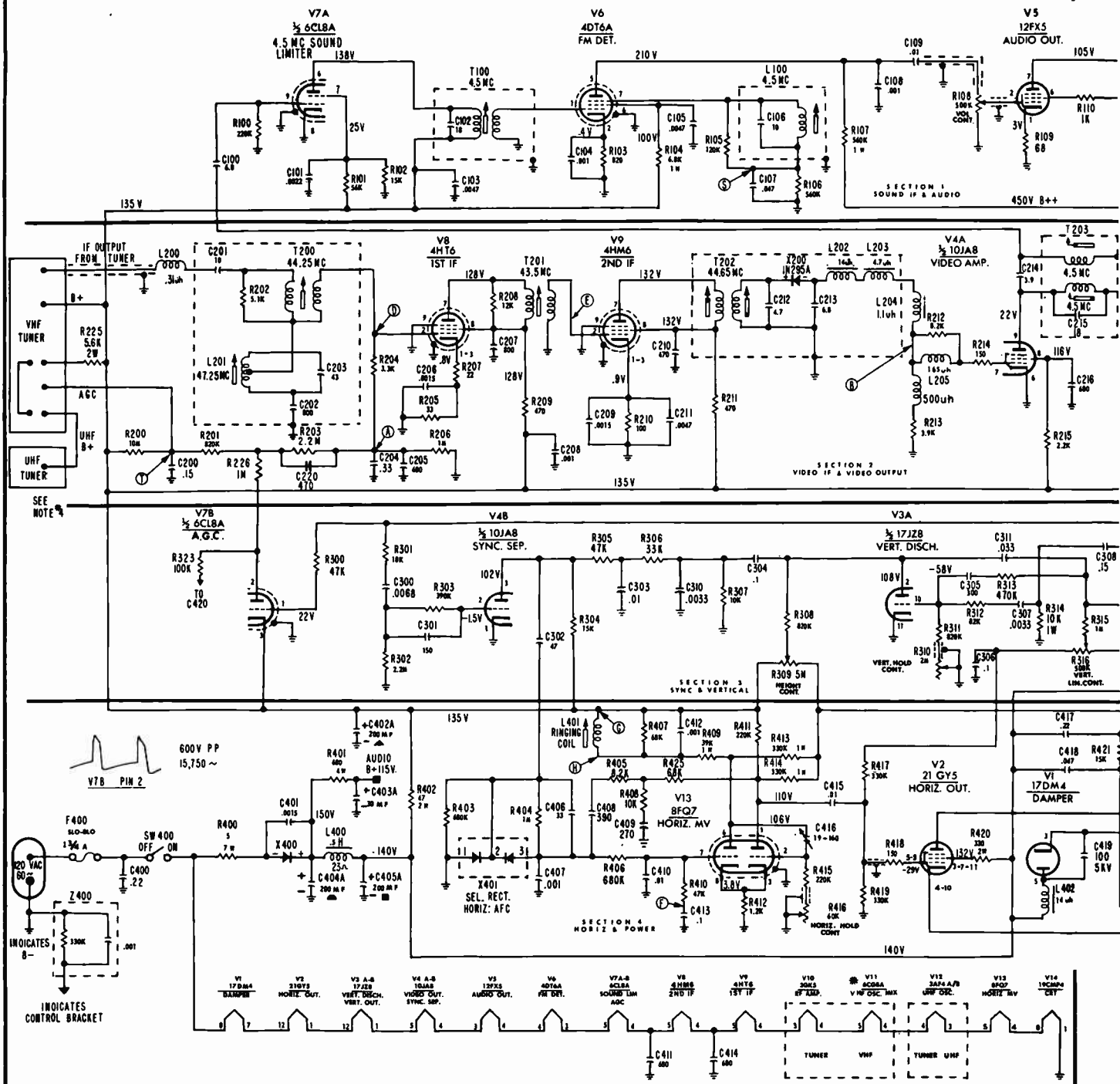
1. Short out the ringing coil with a jumper wire between G & H.
2. Set the horizontal hold control to the center of its range. Do not change this setting during the steps that follow.
3. Connect a VTVM to TP Ⓔ for measuring the DC voltage between TP Ⓔ and B–. Set meter to center scale.
4. With the receiver tuned to a station of normal signal strength, adjust C416 for 0 volts DC on the meter.
5. Remove the jumper from the ringing coil.
6. With horizontal sync locked in, adjust the ringing coil for –0.5 volts DC on the meter. Check the adjustment by switching to another channel and back again. The receiver should pull into horizontal sync on all channels.

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 up 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.

WESTINGHOUSE Chassis V-2438-1, -2, Schematic Diagram (Continued)



NOTES:

1. ALL CAPACITOR VALUES LESS THAN 1 ARE IN MFD, AND VALUES GREATER THAN 1 ARE IN PF.(MICROMICROFARADS) ALL RESISTANCE VALUES ARE IN OHMS 1/2 WATT UNLESS OTHERWISE INDICATED.
2. DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CIRCUIT GROUND WITH A VTVM. LINE VOLTAGE AT 120 V.A.C., NO SIGNAL APPLIED.
3. WAVEFORMS WERE TAKEN WITH CONTROLS SET FOR A NORMAL PICTURE. C-420 WAS SET FOR 2.75V (ZERO TO PEAK) AT T.P. (B).
4. SWITCH MAKES CONTACT ON UHF POSITION ONLY.

WESTINGHOUSE Chassis V-2438-1, -2, Schematic Diagram (Continued)

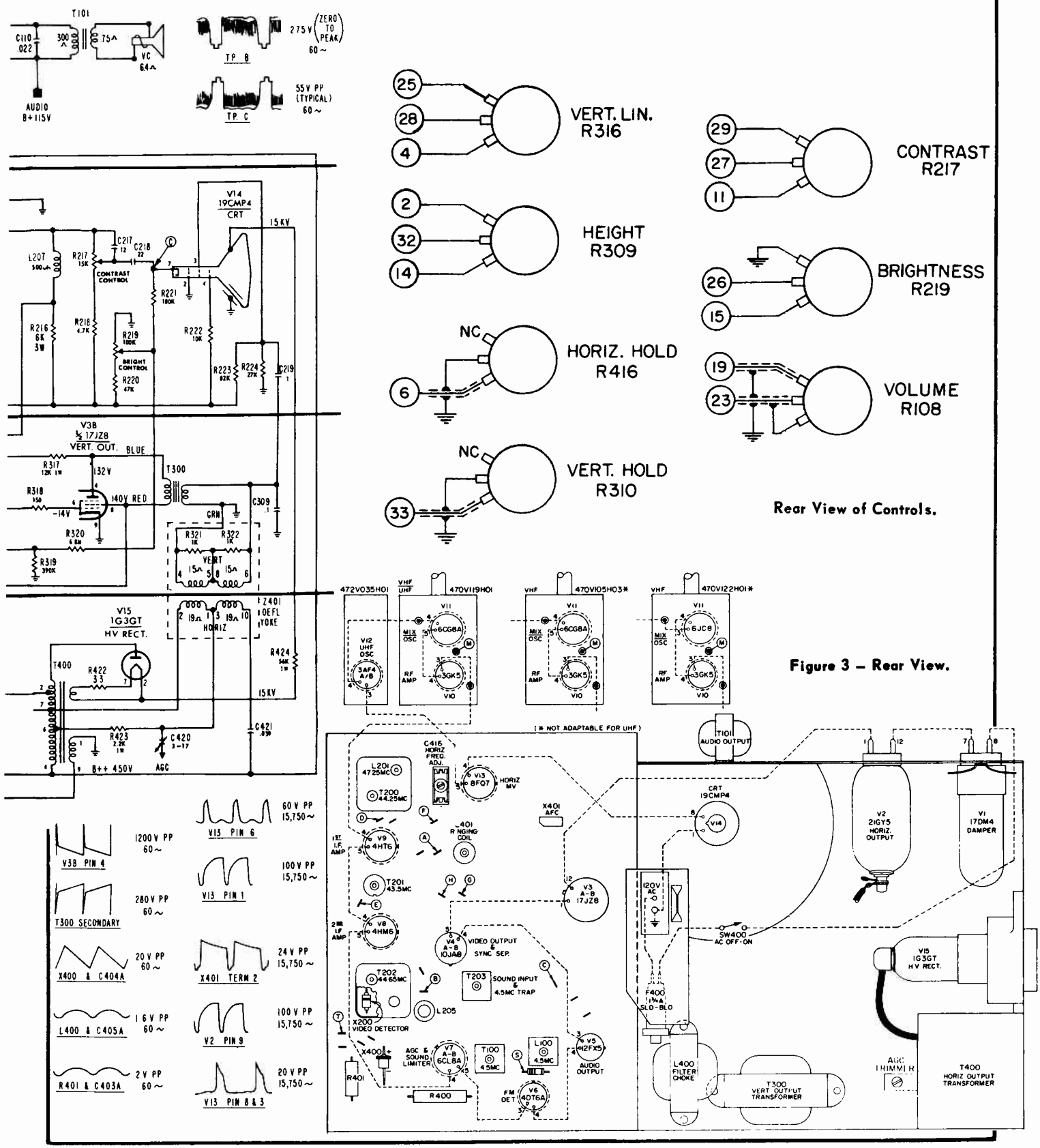


Figure 3 – Rear View.

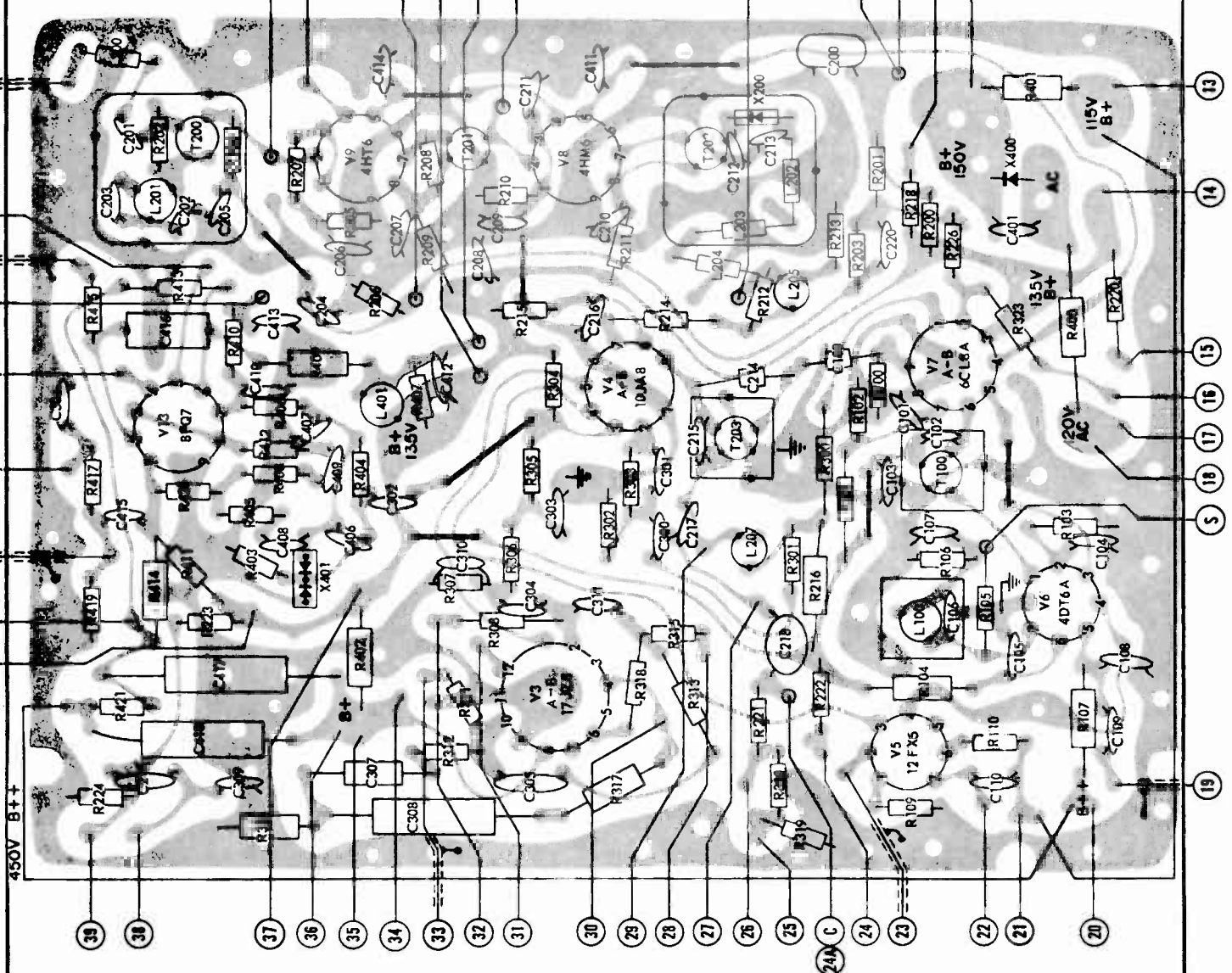
WESTINGHOUSE Chassis V-2438-1, -2, Service Information

KEY TO PC BOARD LAYOUT

1. B+ to tuner, 135V
2. Height control, R309
3. Horizontal drive to R418
4. Vertical Lin control, R316
5. CRT pin 8
6. Horizontal hold control, R416
7. Tuner filament
8. Tuner to IF input cable
9. Tuner filament
10. Tuner AGC
11. Contrast control, R217
12. B+ to C404A, L400
13. Audio B+ to C403A
14. B+ to height control, R309
15. B+ to brightness control, R219
16. C420, AGC pulse
17. 120V AC from SW400
18. Pin 8 of 17DM4
19. Audio to volume control
20. B++, pin 4 of T400
21. Audio output transformer, red wire
22. Audio output transformer, blue wire
23. Volume control, R108
24. CRT pin 4
24A. CRT pin 7
25. Vertical Lin control, R316
26. Brightness control, R219
27. Contrast control, R217
28. Vertical Lin control, R316
29. Contrast control, R217
30. Vertical output transformer, blue wire
31. 21GY5 pin 1, filament
32. Height control, R309
33. Vertical Hold control, R310
34. Vertical output transformer, red wire
35. B+ from L400 and C405
36. B+, 140 volts to L402 and R420
37. B+, 135 volts to C402A
38. Vertical output transformer, orange wire
39. CRT pin 3

TEST POINTS

(A) AGC for IF
(B) Video detector
(C) CRT cathode
(D) 1st IF input
(E) 2nd IF grid
(F) Horizontal MV
(G) Ringing coil
(H) Ringing coil
(S) Quad coil
(T) AGC for tuner



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

WESTINGHOUSE Chassis V-2438-1, -2, Alignment Information (Continued)

SOUND ALIGNMENT

EQUIPMENT: VTVM

PROCEDURE:

1. Select the strongest station available (preferably with test pattern and test tone) and adjust the FINE TUNING for best reception. Adjust the VOLUME control so that the station sound is audible.
2. Adjust the quad coil (L100) for maximum sound from the speaker.
3. Disconnect the antenna. Use a jumper wire to short TP Ⓑ to B–.
4. Connect the VTVM to TP Ⓢ.
5. Adjust interstage transformer T100 for maximum negative voltage on the VTVM.
6. Remove the jumper wire used to short TP Ⓑ 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 (T203 top slug) for maximum negative voltage on the VTVM. If the VTVM indicates a broad response while making this adjustment, the receiver input signal is too strong. When the signal coupling described in step 7 is at the necessary low point, no limiting takes place and the VTVM will indicate a sharp response to the limiter input coil adjustment.

4.5 MC TRAP ALIGNMENT

Disconnect the antenna and turn contrast control to maximum clockwise. Inject a 4.5 MC CW signal through a .001mf capacitor to TP Ⓑ. Connect a .001mf capacitor to a demodulation probe tip. Connect the other end of the probe to a VTVM and the capacitor to TP Ⓒ. Set the VTVM to 1.5-2V DC range. Turn the set on and allow ten minutes for warmup. Then adjust T203 bottom slug 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 –2.5 volts and –3 volts.
6. ***Standard Alignment Tool*** with a 3/32" hexagonal tip (long enough to reach bottom slugs).

TERMINATION AND ADJUSTMENT OF EQUIPMENT

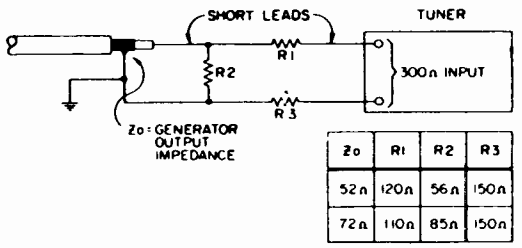
These instructions on termination and adjustment of equipment will apply throughout the IF Alignment procedure.

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.

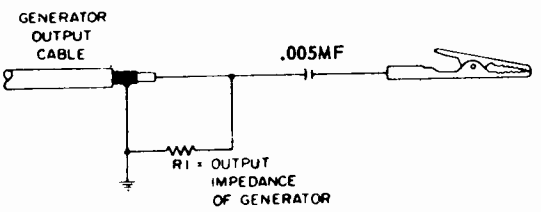


Figure 8 – Generator Cable Termination.

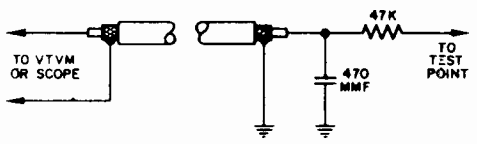


Figure 9 – VHF Decoupling Network.

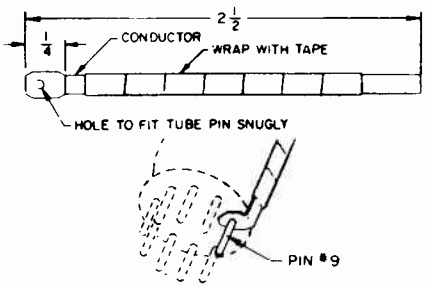


Figure 10 – Mixer Coupling Device.

WESTINGHOUSE Chassis V-2438-1, -2, Alignment Information (Continued)

Step	*Test Equipment and Connection*	*Adjustment*
1.	−3V bias to TP Ⓐ and −2.5V bias to TP Ⓓ. Short antenna terminals. Channel selector to channel 10. Connect jumper from bracket side of C420 to B− to disable the AGC pulse.	
2.	Oscilloscope and VTVM to TP Ⓑ. IF sweep generator with CW marker to TP Ⓔ. a. 44.65 MC. b. 45.75 MC.	a. T202 primary (top slug): Maximum amplitude on VTVM. T202 secondary (bottom slug): Rocking symmetrical response at 44.65 MC. b. Place 45.75 MC marker at 70% of peak response (see Figure 11) for waveshape and marker placement.
3.	CW generator to TP Ⓓ at: a. 43.50 MC.	a. T201: Maximum amplitude on VTVM.
4.	CW generator to TP Ⓜ. Use mixer coupling device shown in Figure 10 for tuner 470V119H01: a. 44.25 MC. b. 44.25 MC. c. 47.25 MC. It may be necessary to increase generator output and/or decrease bias.	a. Tuner mixer output coil: Maximum on VTVM. b. T200: Maximum on VTVM. c. L201: Minimum on VTVM.
5.	Connect sweep generator to TP Ⓜ at 44.25 MC. Couple CW generator with marker at 44.25 MC to sweep generator cable. Keep marker amplitude low to avoid distorting response. Adjust scope for 2V PP.	Mixer output coil for maximum amplitude. T200 for "rocking symmetrical response with waveshape and markers" as shown in Figure 13.
6.	CW generator to TP Ⓜ at 47.25 MC.	Repeat step 4c.
7.	Oscilloscope, 2V PP. Sweep generator thru impedance matching network (see Figure 7) 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 (± 300 KC) marker on scope. (See Figure 14).
8.	Repeat step 7 for all channels in descending order.	

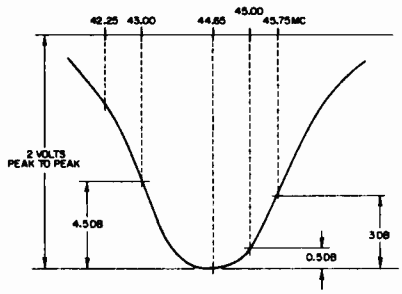


Figure 11 – Typical IF Response, 2nd IF Amp Grid to 2nd Det.

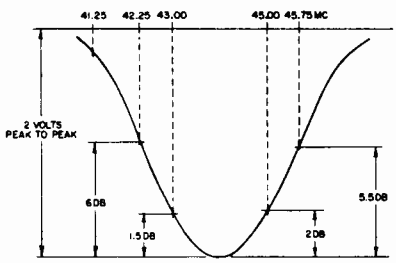


Figure 12 – Typical IF response, 1st IF Amp Grid to 2nd Det.

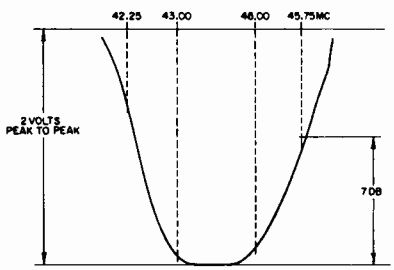


Figure 13 – Typical IF response, Mixer Amp grid to 2nd Det.

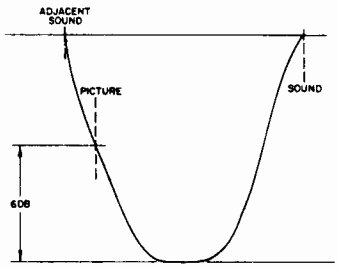


Figure 14 – Typical RF-IF response.

ZENITH RADIO CORPORATION

ZENITH

CHASSIS

16K20, 16K22, 16K22QS, 16K23, 16K23Q, 16K23QS, 16K26, 16K27, 16K27Q, 16K27T, 16K27QT, 16K28QS

MODEL	SPACE COMMAND	TYPE	CHASSIS	TUNER	PICTURE TUBE
K2000W		Table	16K20	Bandswitch	19CRP4
K2005C,F		Table	16K20	Bandswitch	19CRP4
K2015W		Table	16K26	Super Bandswitch	19CQP4
K2015W1		Table	16K27	Super Bandswitch	19CQP4
K2020J		Table	16K26	Super Bandswitch	19CQP4
K2020J1		Table	16K27	Super Bandswitch	19CQP4
K2100G,L		Table	16K20	Bandswitch	19CRP4
K2108B,L		Table	16K27	Super Target Turret	19CQP4
K2109F,J		Table	16K27	Super Target Turret	19CQP4
K2110L		Table	16K27	Gold Video Guard Turret	19CQP4
K2123L		Table	16K27	Super Target Turret	19CQP4
K2127L,R,W		Table	16K27T	Gold Video Guard Turret	19CQP4
K2211J	"300"	Table	16K20QS	Super Target Turret	19CRP4
K2213L	"300"	Table	16K27QS	Super Target Turret	19CQP4
K2214F,J	"300"	Table	16K27QS	Gold Video Guard Turret	19CQP4
K2228L,R,W	"300"	Table	16K27Q	Gold Video Guard Turret	19CQP4
K2231L	"300"	Table	16K27QT	Gold Video Guard Turret	19CQP4
K2705R,Y		Table	16K23	Super Bandswitch	23ANP4
K2707L,Y		Table	16K23	Super Target Turret	23ANP4
K2717E,R,W		Table	16K22	Gold Video Guard Turret	23BTP4
K2735E,L,R,W		Console	16K23	Super Target Turret	23ANP4
K2735L1,R1,W1		Console	16J23	Super Target Turret	23ANP4
K2736E,M,R,W		Console	16K23	Super Target Turret	23ANP4
K2737E,R,W		Console	16K23	Super Target Turret	23ANP4
K2738E,R,W		Console	16K23	Super Target Turret	23ANP4
K2739E,L,R,W		Console	16K23	Super Target Turret	23ANP4
K2742H,M,R,W		Console	16K22	Gold Video Guard Turret	23BTP4
K2748H,M,R,W		Console	16K22	Gold Video Guard Turret	23BTP4
K2756L,R,W,Y		Console	16K22	Gold Video Guard Turret	23BTP4
K3308R,Y	"300"	Table	16K23Q	Super Target Turret	23ANP4
K3310E,R,W	"300"	Table	16K22QS	Gold Video Guard Turret	23BTP4
K3311R,W,Y	"400"	Table	16K22QS	Gold Video Guard Turret	23BTP4
K3340E,R,W	"300"	Console	16K23QS	Super Target Turret	23ANP4
K3341H,M,R,W	"300"	Console	16K23QS	Super Target Turret	23ANP4
K3342H,M,R,W	"300"	Console	16K23QS	Super Target Turret	23ANP4
K3345L,R,W	"300"	Console	16K23QS	Super Target Turret	23ANP4
K3350L,R,W,Y	"400"	Console	16K22QS	Gold Video Guard Turret	23BTP4
K3350L1,R1,W1	"400"	Console	16J22QS	Gold Video Guard Turret	23ANP4
K3358W,Y	"400"	Console	16K28QS	Gold Video Guard Turret	23AFP4
K3368M,R	"400"	Console	16K28QS	Gold Video Guard Turret	23AFP4
K3385H	"400"	Console	16K28QS	Gold Video Guard Turret	23AFP4
MK2784M,R,W		Console	16K23/4K22/9H20LZ1	Super Target Turret	23ANP4
MK2786L,R,W		Console	16K23/4K21/9H20LZ1	Super Target Turret	23ANP4
MK2787M,R		Console	16K23/8H30Z/9H20LZ1	Super Target Turret	23ANP4
MK2789M,R		Console	16K22/8H30Z/9H20LZ1	Gold Video Guard Turret	23ANP4
MK3386L,R,W	"300"	Console	16K23QS/4K21/9H20LZ1	Super Target Turret	23ANP4
MK3388H	"400"	Console	16K22QS/8H30Z/9H20LZ1	Gold Video Guard Turret	23BTP4
RK2784M.R.W		Console	16K23/4K22/7F20L	Super Target Turret	23ANP4
T1980C,G		Table	16K20	Bandswitch	19CRP4
T1985C,J		Table	16K26	Super Bandswitch	19CQP4
T1990G		Table	16K26	Super Target Turret	19CQP4
T2025WA		Console	16K23	Super Target Turret	23ANP4
T2026HA,RA		Console	16K23	Super Target Turret	23ANP4
T2027MA		Console	16K23	Super Target Turret	23ANP4
T2050MA,RA,WA		Console	16K23	Super Target Turret	23ANP4
T2052M,R,W		Console	16K23	Super Target Turret	23ANP4
T2070EA,RA,WA		Console	16K23	Super Target Turret	23ANP4
T2072HA,WA		Console	16K23	Super Target Turret	23ANP4
T2073MA		Console	16K23	Super Target Turret	23ANP4

(Listing continued on page 172; service material continued through page 190)

ZENITH Chassis of the 16K Series, Service Adjustments, Continued

MODEL	SPACE COMMAND	TYPE	CHASSIS	TUNER	PICTURE TUBE
T2075LA,WA		Console	16K23	Super Target Turret	23ANP4
T2077H,R		Console	16K23	Super Target Turret	23ANP4
T2079M		Console	16K23	Super Target Turret	23ANP4
T2080E,R,W		Console	16K23	Super Target Turret	23ANP4
T2706EA,RA,WA		Table	16K23	Super Bandswitch	23ANP4
T3025WA	"300"	Console	16K23Q	Super Target Turret	23ANP4
T3026HA,RA	"300"	Console	16K23Q	Super Target Turret	23ANP4
T3027MA	"300"	Console	16K23Q	Super Target Turret	23ANP4
T3074LA,WA	"300"	Console	16K23Q	Super Target Turret	23ANP4
T3075LA,WA	"400"	Console	16K23Q	Super Target Turret	23ANP4
T3077H,R	"400"	Console	16K23Q	Super Target Turret	23ANP4
T3079M	"400"	Console	16K23Q	Super Target Turret	23ANP4
T3080E,R,W	"400"	Console	16K23Q	Super Target Turret	23ANP4

BANDSWITCH TUNER OSCILLATOR ADJUSTMENTS

1. Set the fine tuning control to the center of its mechanical range. Pull off the fine tuning and channel selector knobs.

2. Refer to Fig. 1. Use a 68-33 alignment tool and adjust each operating channel to resonance starting with the highest channel following each lower channel in sequence.

The bandswitch tuner uses a series inductance in the oscillator circuit and if more than one turn of the screw is required to tune a particular channel or if adjustment cannot be made, it may be necessary to touch up the channel 13 screw to tune channels 7 thru 13 and the channel 6 screw for channels 2 thru 6.

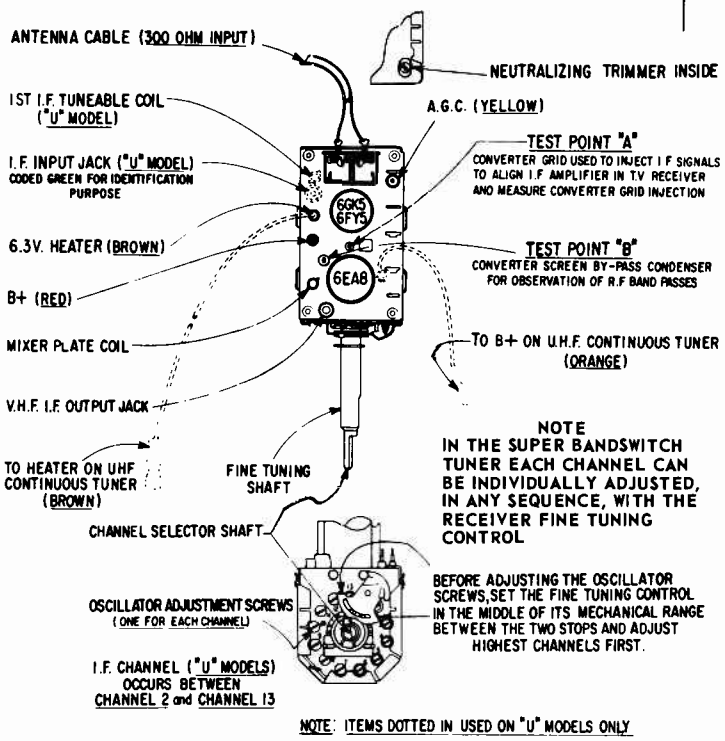


Fig. 1. Tube and Trimmer Layout, Bandswitch Tuner.

OSCILLATOR ADJUSTMENTS

GOLD VIDEO GUARD TUNER
SUPER TARGET TUNER
SUPER BANDSWITCH TUNER

Each channel can be individually adjusted with the fine tuning knob at the front of the receiver. The tuning mechanism does not have a stop and several turns of the tuning knob is permissible, in either direction, to obtain proper adjustment.

FOCUS

A screwdriver type focus adjustment is provided in all chassis except 16K26 and 16K27.

In the 16K27 chassis, the focus control is part of the picture tube socket. Adjustment is made by rotating the outer rim of the socket.

In the 16K26 chassis a 3 position tap is used.

WIDTH AND HORIZONTAL LINEARITY ADJUSTMENTS

Adjustment in most models is made by sliding the metal width sleeve along the neck of the picture tube until proper width and linearity is obtained.

In the 16K26 and 16K27 chassis the sleeve, which is installed with the slot facing the picture tube anode button, is used to control linearity and a screwdriver adjustment at the rear of the chassis is used to adjust width. The initial adjustment is made by turning the width control to its maximum counterclockwise position then sliding the sleeve to optimize linearity. The width control is then advanced to obtain correct width.

AGC ADJUSTMENT

Tune in a strong TV signal and slowly turn the delay control until a point is reached where the picture distorts and buzz is heard in the sound. The control should then be backed down from this position and set at a point comfortably below the level of intercarrier buzz, picture distortion and improper sync.

This setting will correspond to approximately 3 V. peak to peak output from the video detector.

CAUTION: Misadjustment of the AGC control can result in a washed-out picture, distorted picture, buzz in the sound or complete loss of picture and sound.

ZENITH Chassis of 16K- Series, Service Adjustments, 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.

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.

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.

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.

PEAK PICTURE CONTROL

ALL 23" MODELS

This is a front panel control. 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.

ADJACENT CHANNEL REJECT SWITCH 16K28 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.

If adjacent channel sound interference is experienced, switch the trap to the "in" position.

G2 ADJUSTMENT 16K28 CHASSIS

1. Connect the negative lead of a variable bias supply (0-6V) to the grid (Pin 7) of the 6JT8 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 of 16K- Series, Alignment Information

ALIGNMENT

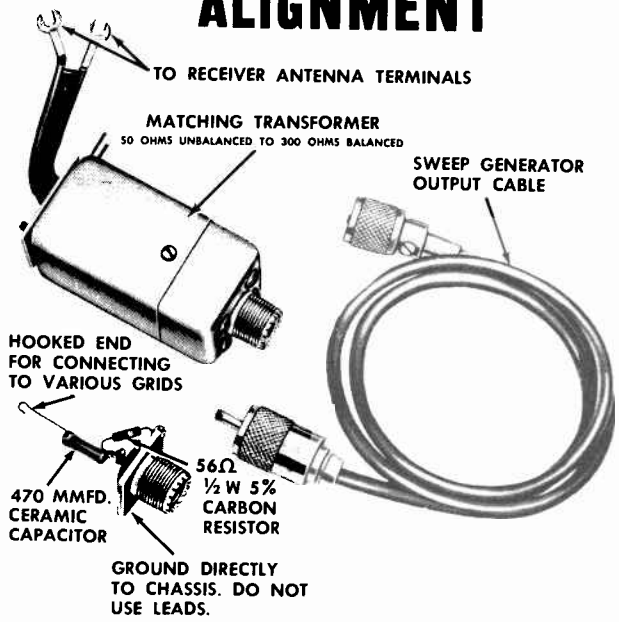


Fig. 4 IF-RF Alignment Fixtures

A suitable VHF and UHF sweep generator in conjunction with an accurate marker must be used for alignment work. It is extremely important to terminate the output cable properly and to check if the attenuator is reactive. If the attenuator is reactive or if the output cable is improperly terminated, correct alignment cannot be made since the degree of attenuation may change the shape as well as the amplitude of the response curve. The attenuator should only vary the amplitude and not the shape of the response curve.

SOUND ALIGNMENT

Proper alignment of the 4.5 Mc intercarrier sound channel can only be made if the signal to the receiver antenna terminals is reduced to a level below the limiting point of the 6BN6 Gated Beam Detector. This level can be easily identified by the "hiss" which then accompanies the sound. Various methods may be used to reduce the signal level; however, a step attenuator is recommended for most satisfactory results.

1. Connect the step attenuator between the antenna and the receiver antenna terminals.

2. Tune in a tone modulated TV signal. Adjust the step attenuator until the signal is reduced to a level where a "hiss" is heard in the sound.

3. Adjust the sound take-off coil (top and bottom cores), intercarrier transformer, quadrature coil and buzz control for the best quality sound and minimum buzz. It must be remembered that any of these adjustments may cause the "hiss" to disappear and further reduction of the signal will be necessary to prevent the "hiss" from disappearing during alignment.

VIDEO IF ALIGNMENT
(EXCEPT 16K20, 16K26 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 23" models 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

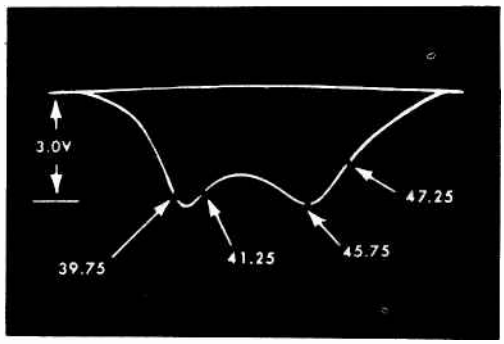


Fig. 5 4th IF Response

peak 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, 13, or 14 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 16K27 chassis) and 1500 ohm resistors in the cathode of the first IF. This provides an additional "blow up" of the 47.25 Mc traps (Fig. 7). In the 16K28 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

ZENITH Chassis of 16K- Series, Alignment Information, Continued

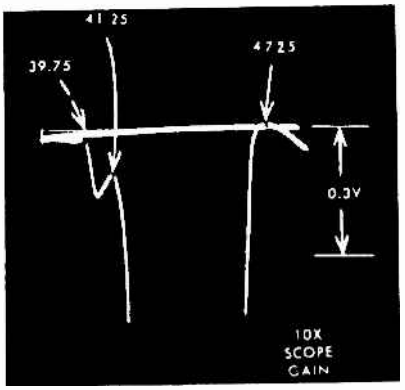


Fig. 6 Expanded View of Traps

be in the "in" position. Adjust the 47.25 Mc traps (the 16K27 chassis has one 47.25 Mc trap) for minimum marker amplitude.

7. Disconnect the jumper between "E" and the 22 and 1500 ohm cathode resistors. Connect this

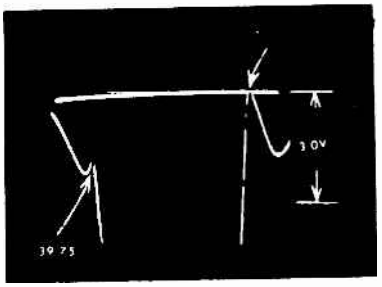


Fig. 7 Further Expansion of Fig. 6 for Detail View of the 39.75 and 47.25 Mc Traps.

jumper between "E" and chassis. In the 16K28 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 IF and the converter plate coil until an overall response similar to Fig. 8 (Fig. 9 for the 16K27 chassis) is obtained. It will be found that the 2nd IF affects the low side (42.75 Mc) and the 3rd IF the high side of the response.

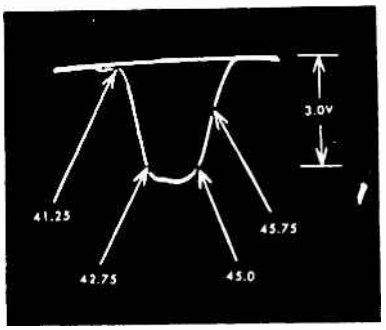


Fig. 8 Overall IF Response

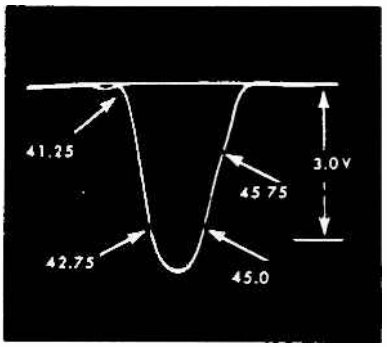


Fig. 9 Overall IF Response 16K27 Chassis

IF ALIGNMENT
16K20 AND 16K26 CHASSIS

Refer to the appropriate 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.

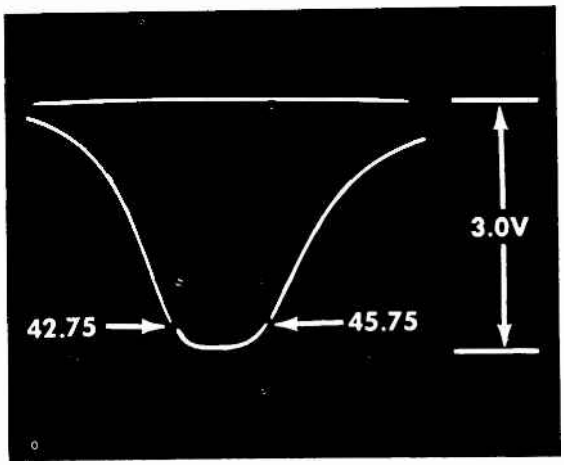


Fig. 10 4th IF Response 16K20,16K26 Chassis

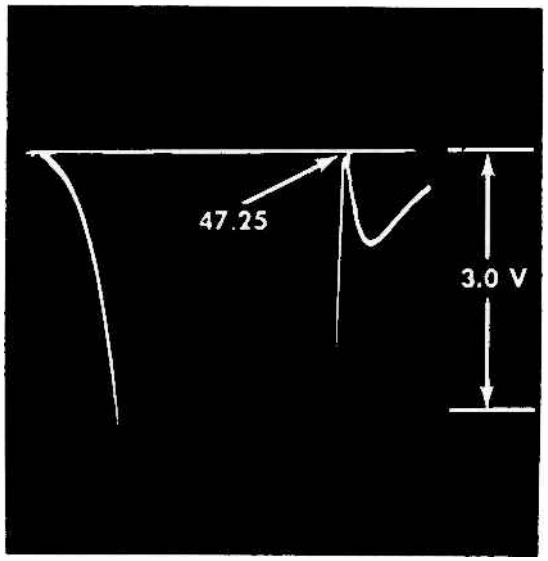


Fig. 11 Expanded View of the 47.25 Mc Trap, 16K20, 16K26 Chassis

5. Connect the sweep generator to terminal "A" (converter grid, Fig. 1, or 13 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.

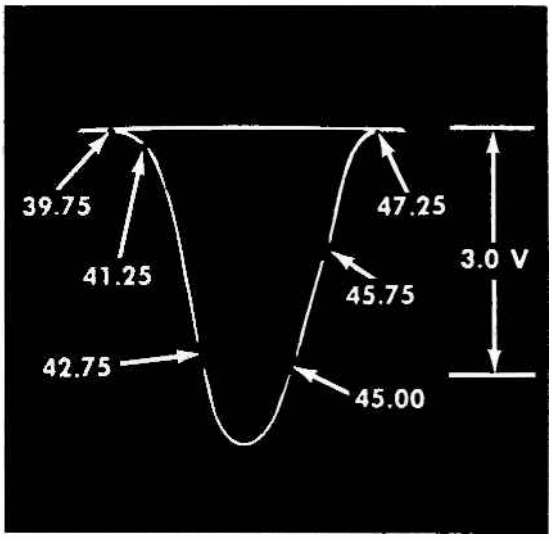
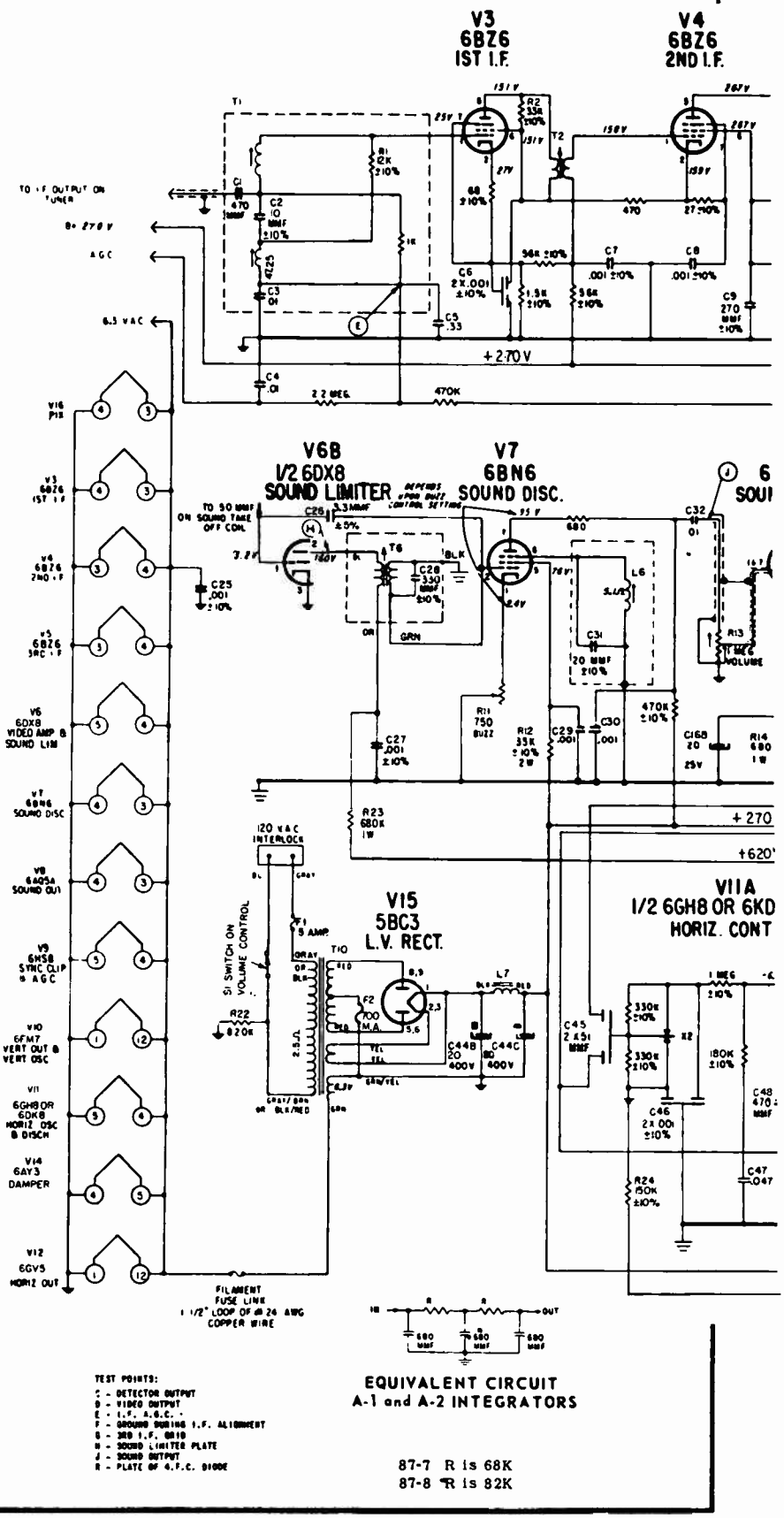


Fig. 12 Overall IF Response 16K20,16K26 Chassis

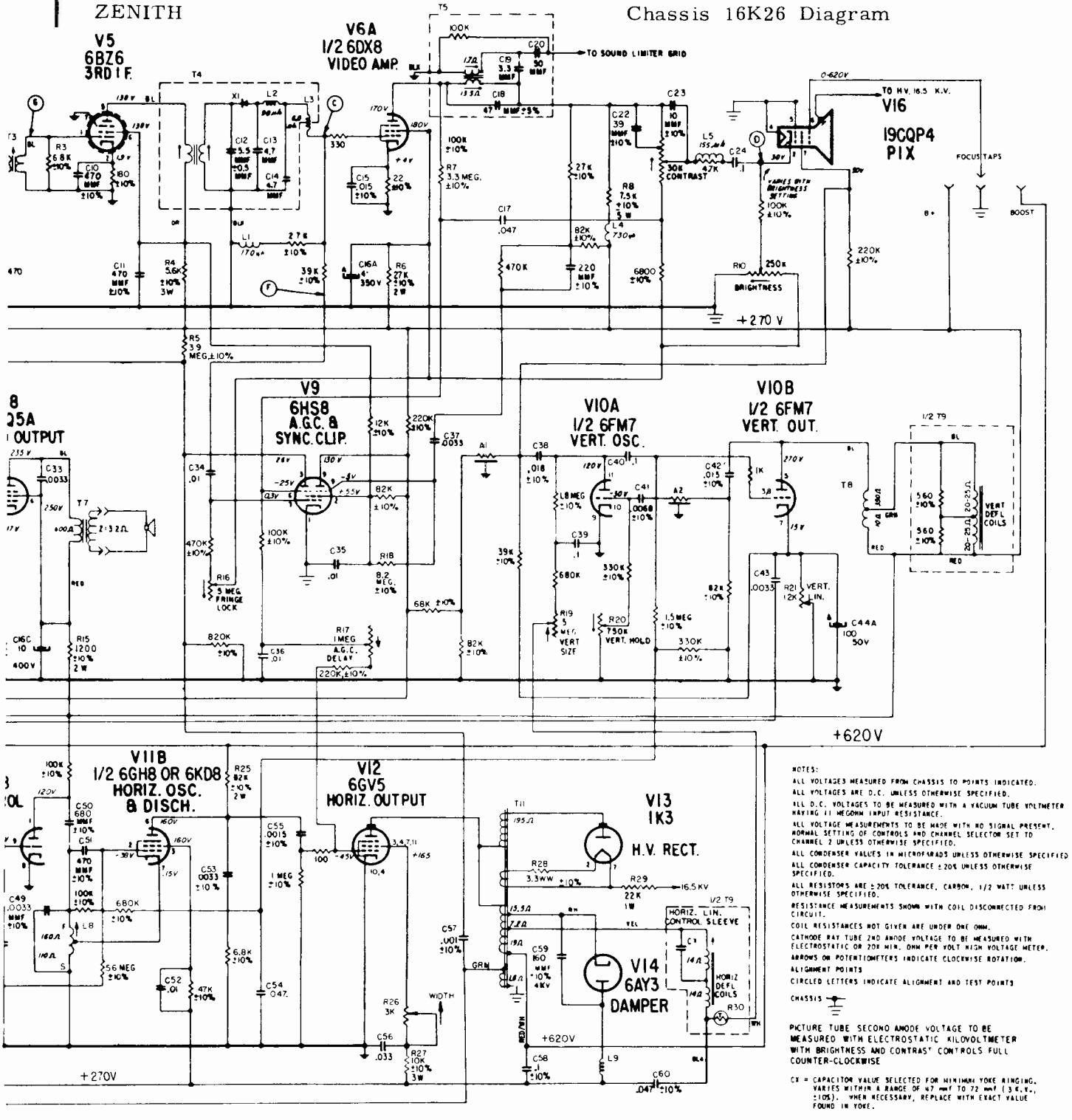
6. Disconnect the jumper between "E" and the 68 and 1500 ohm cathode resistors. Connect this jumper between "E" and chassis. Adjust sweep generator for 3 volts peak to peak output. Alternately adjust the 2nd, 3rd, 1st IF and the converter plate coil until an overall response similar to Fig. 12 is obtained. 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.

ZENITH Chassis 16K26 Diagram



ZENITH

Chassis 16K26 Diagram



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 ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.

ALIGNMENT POINTS

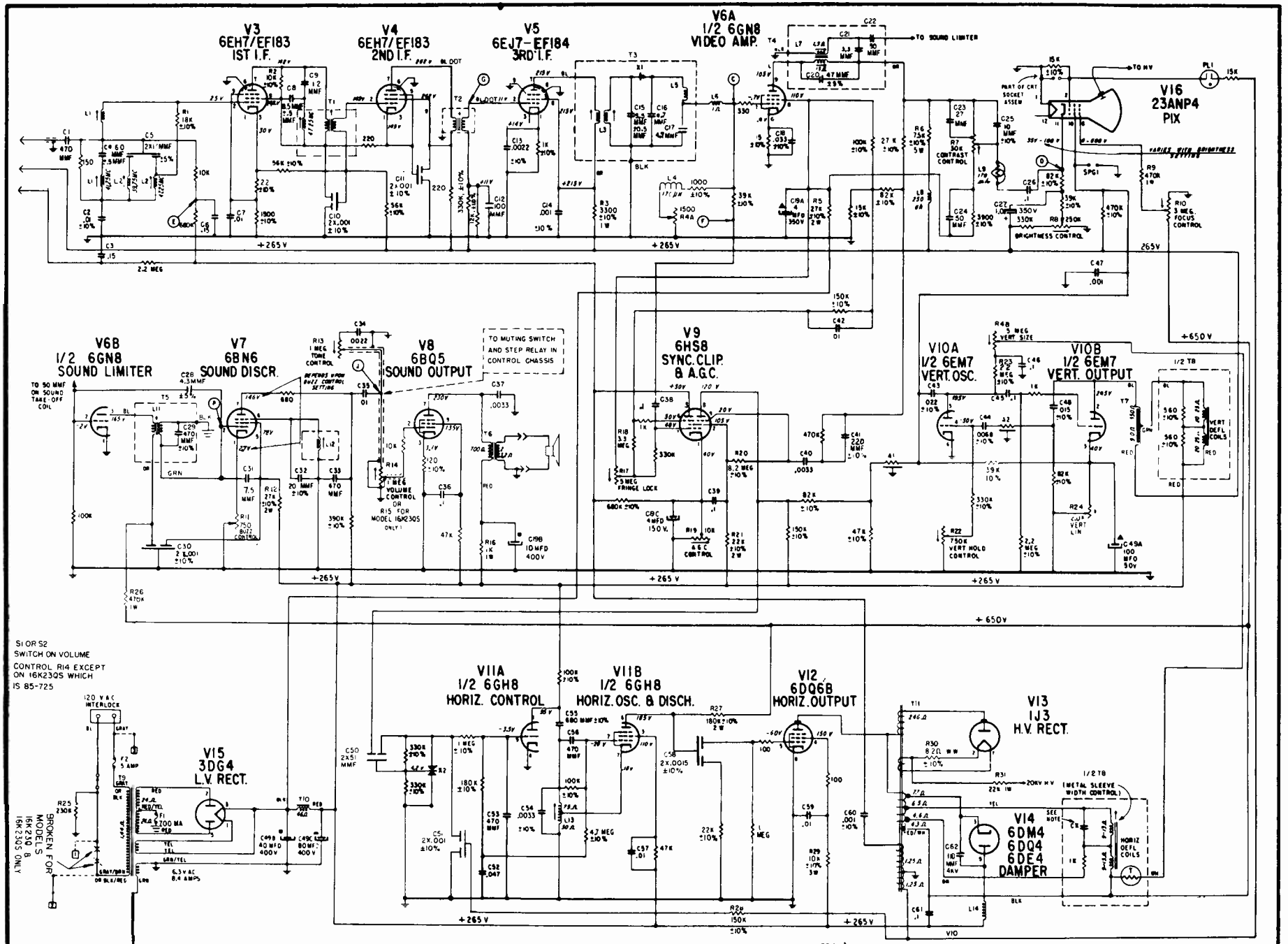
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS

CHASSIS

PICTURE TUBE SECOND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER-CLOCKWISE

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.

Schematic Diagram, Tube and Trimmer Layout and Signal Path Chart 16K26 Chassis.



(Applicable notes are the same as those on page 177)

Schematic Diagram 16K23, 16K23Q and 16K23QS Chassis.

ZENITH

Chassis 16K23, -Q, -QS

Service Material

(Continued)

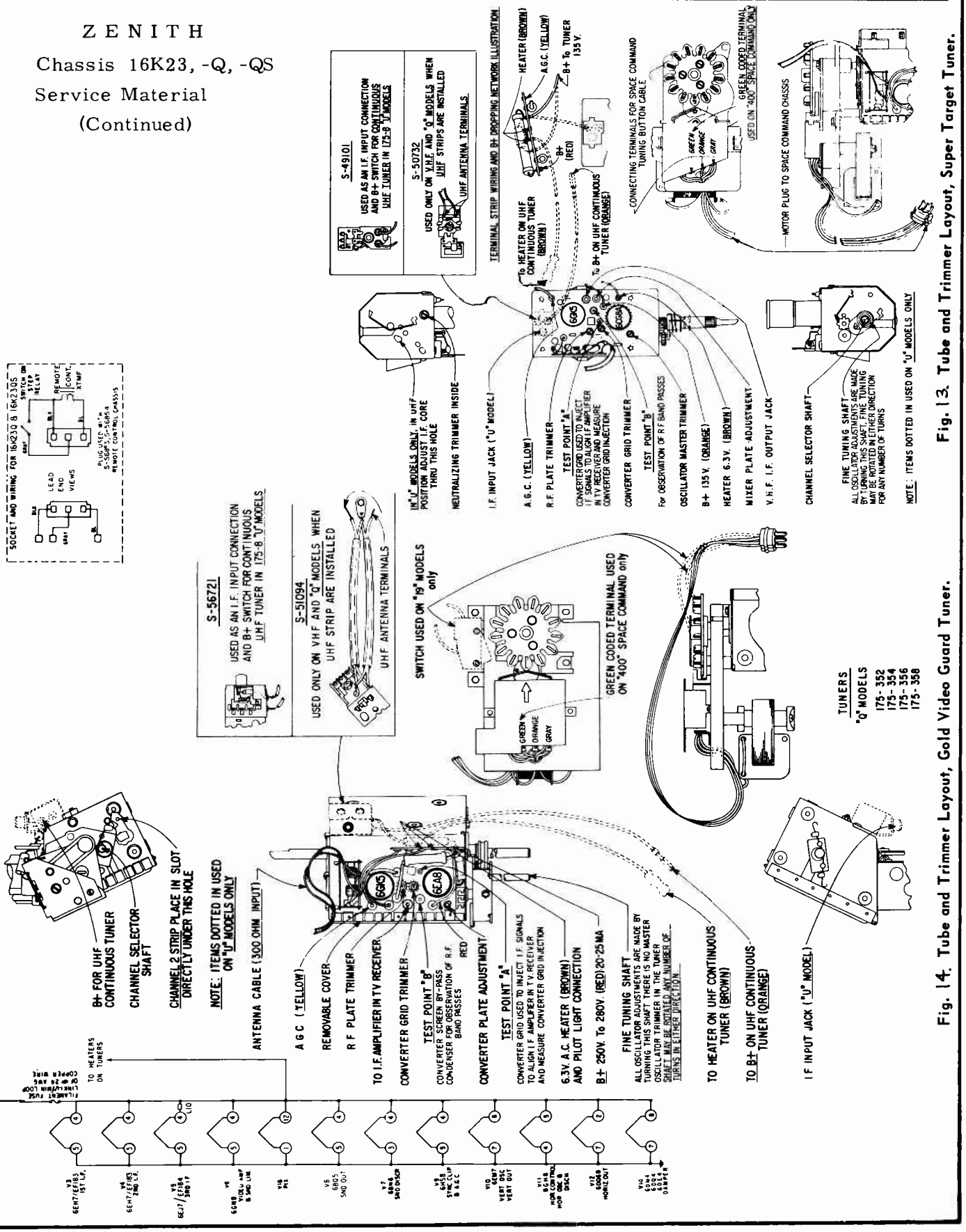
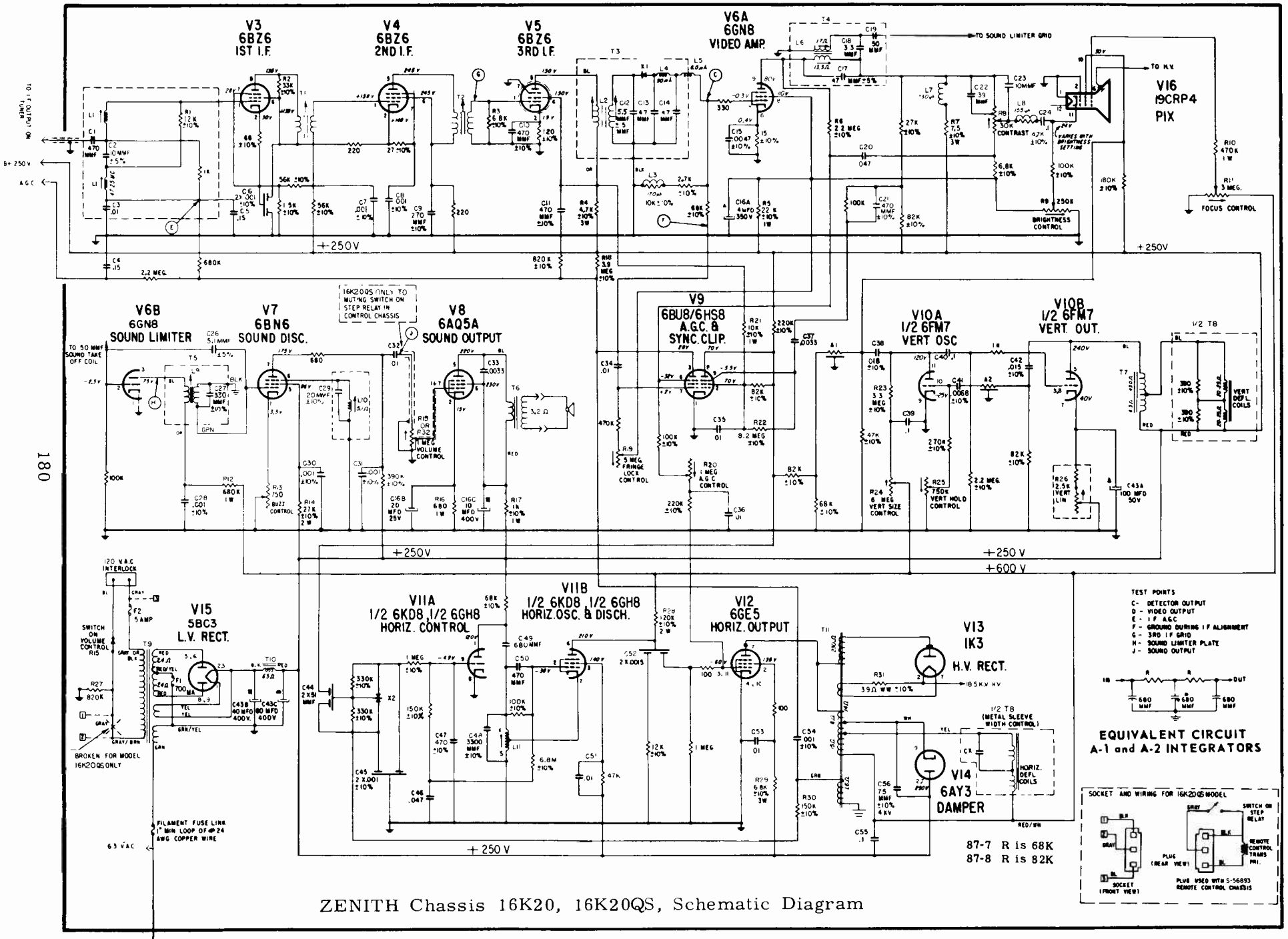


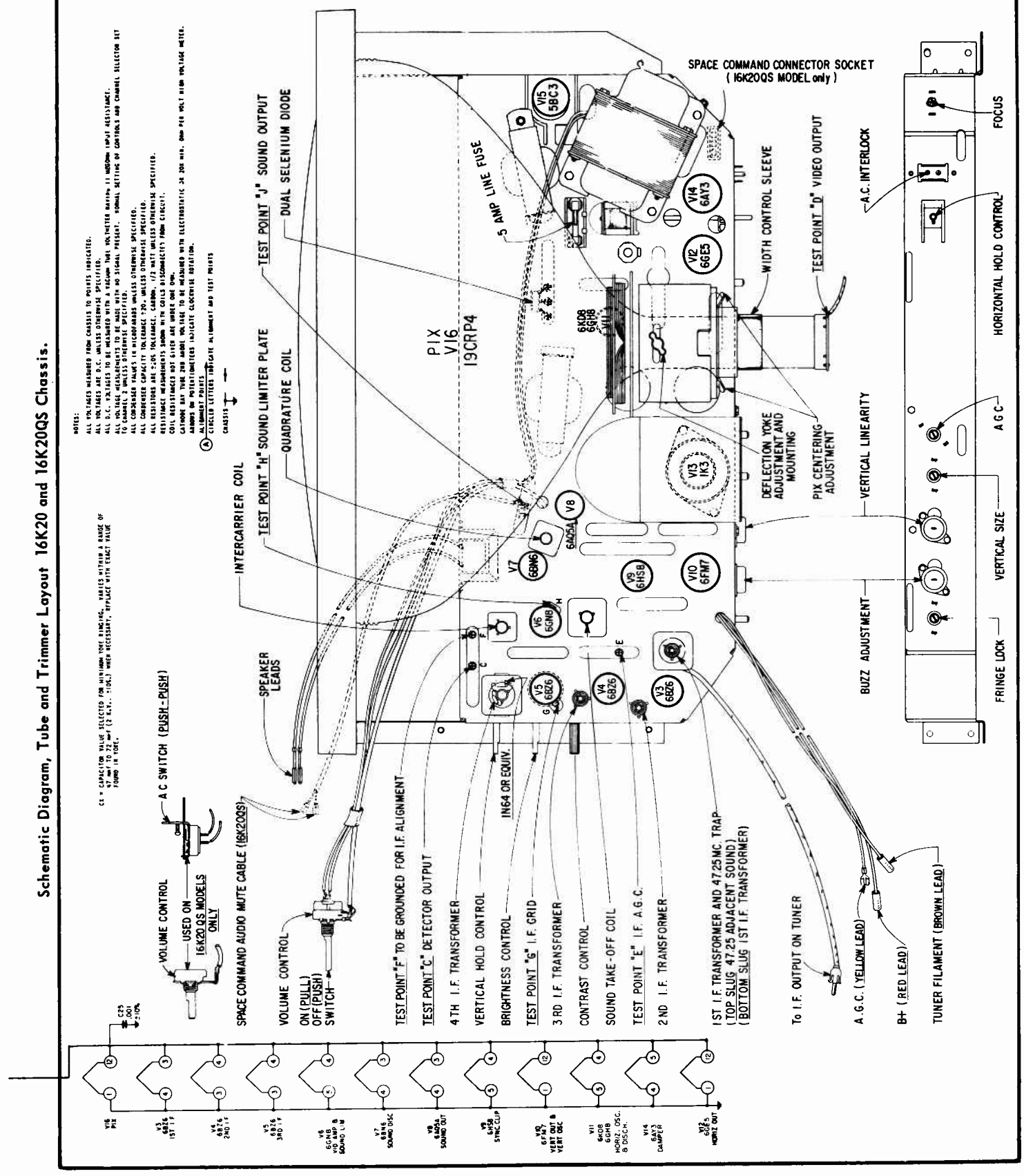
Fig. 13. Tube and Trimmer Layout, Super Target Tuner.

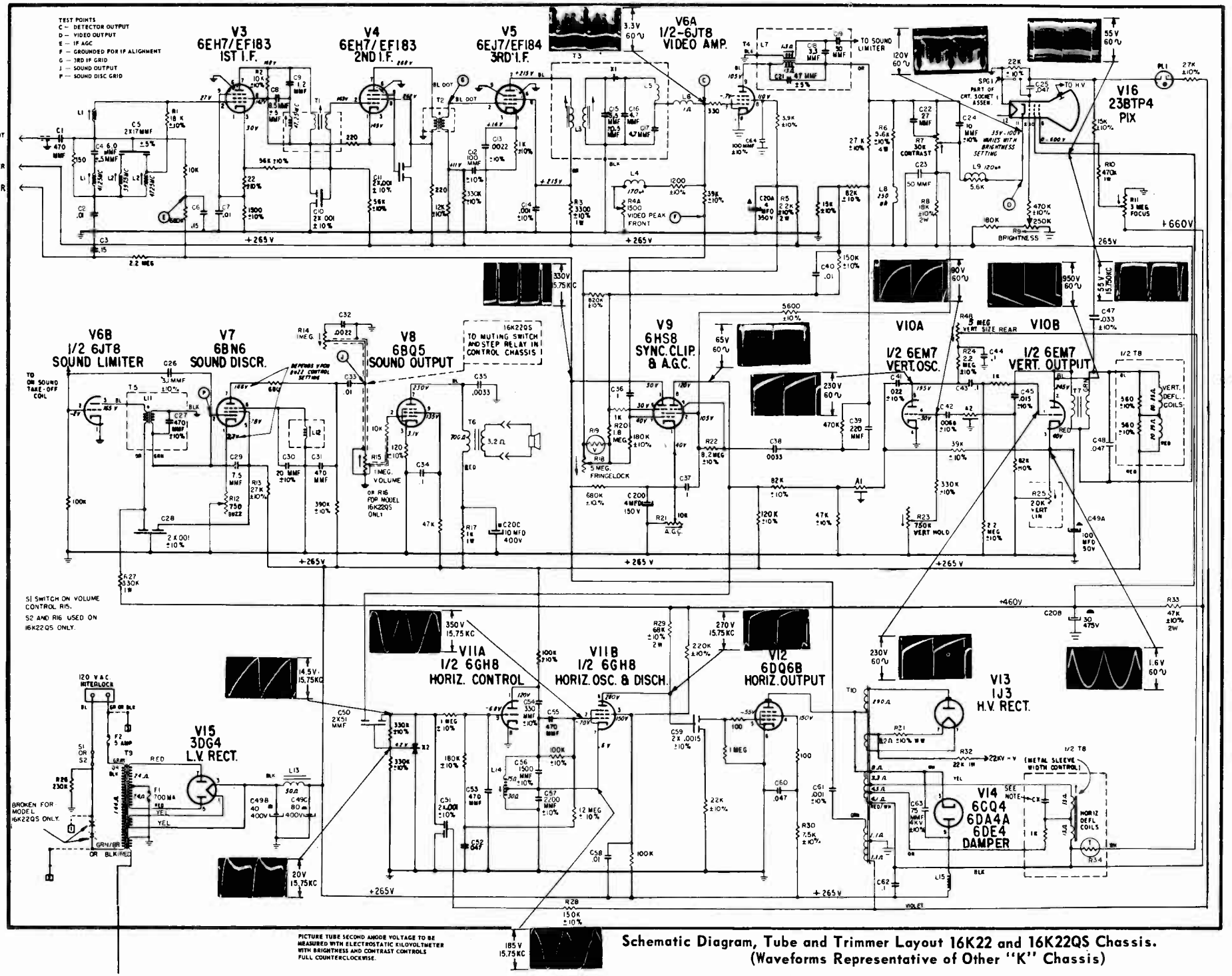
Fig. 14. Tube and Trimmer Layout, Gold Video Guard Tuner.



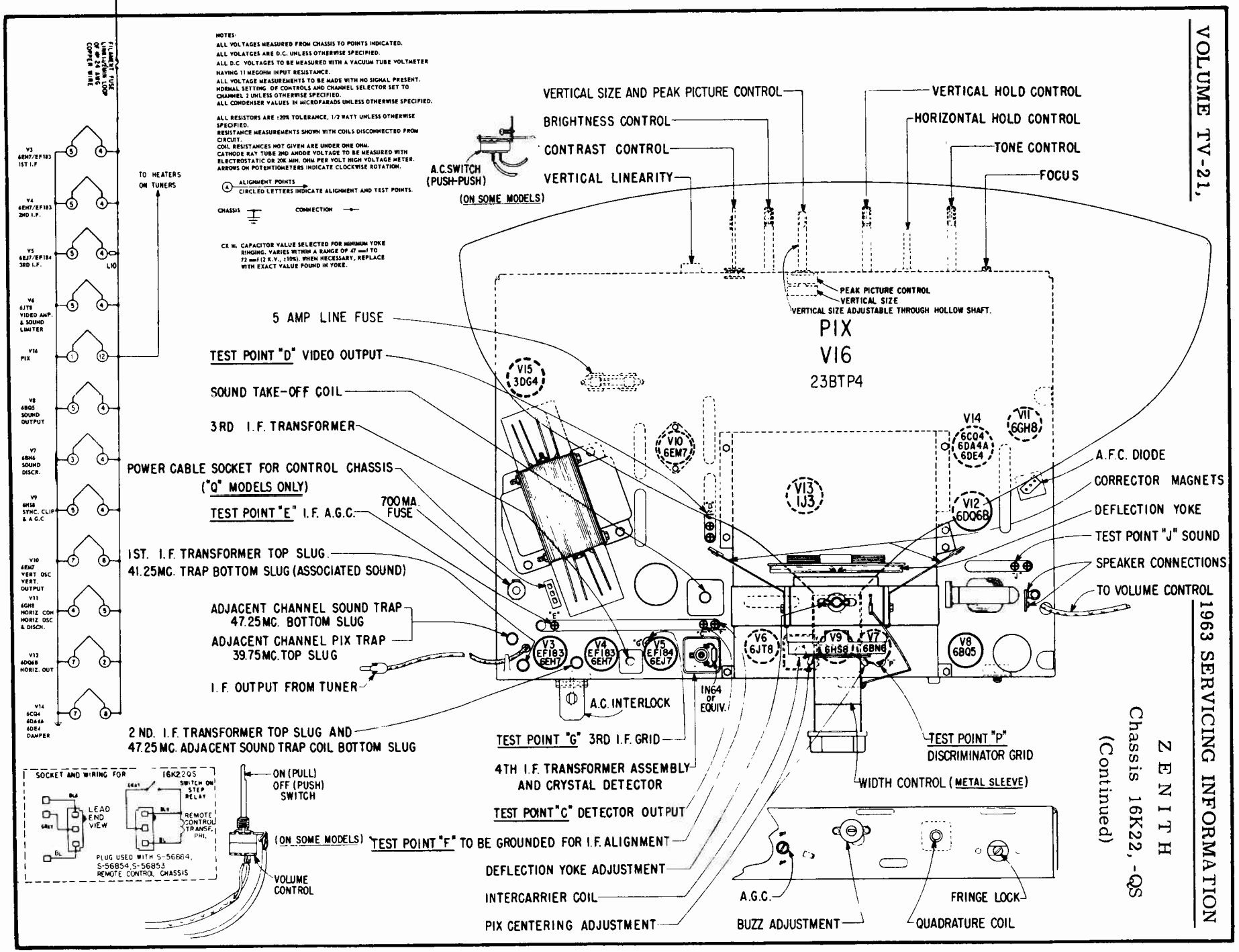
ZENITH Chassis 16K20, 16K20QS, Schematic Diagram

ZENITH Chassis 16K20, 16K20QS, Schematic Diagram, Continued





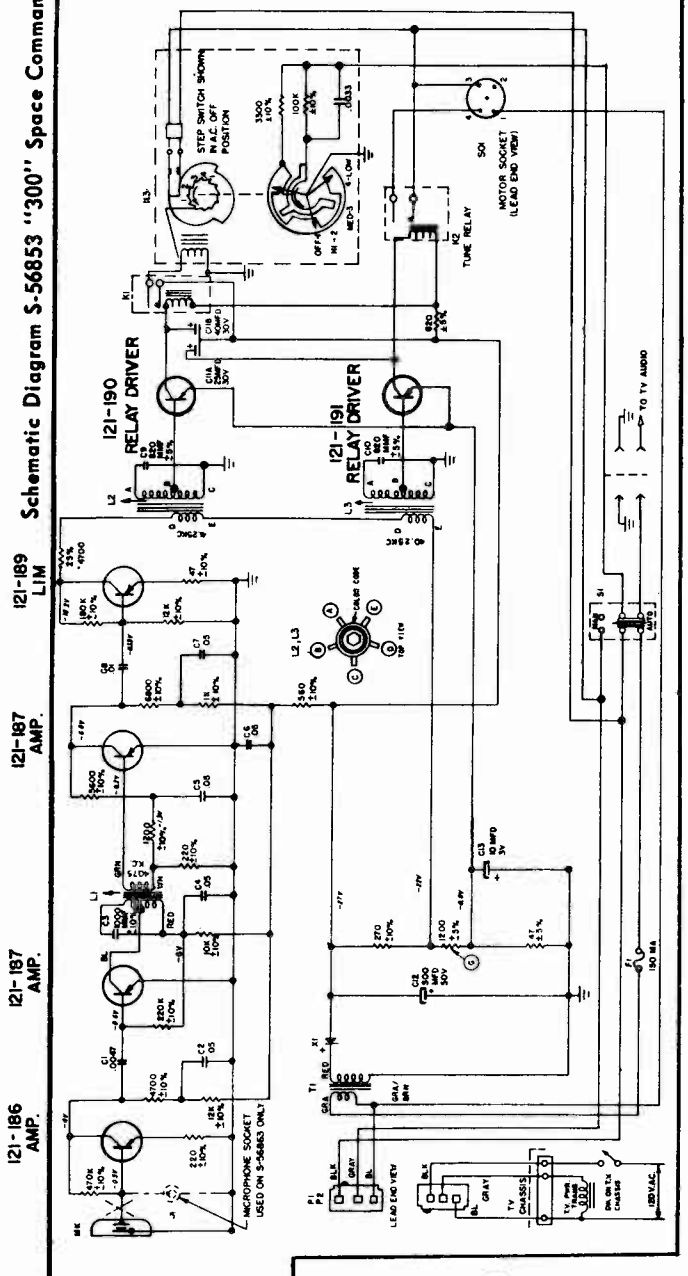
Schematic Diagram, Tube and Trimmer Layout 16K22 and 16K22QS Chassis.
(Waveforms Representative of Other "K" Chassis)



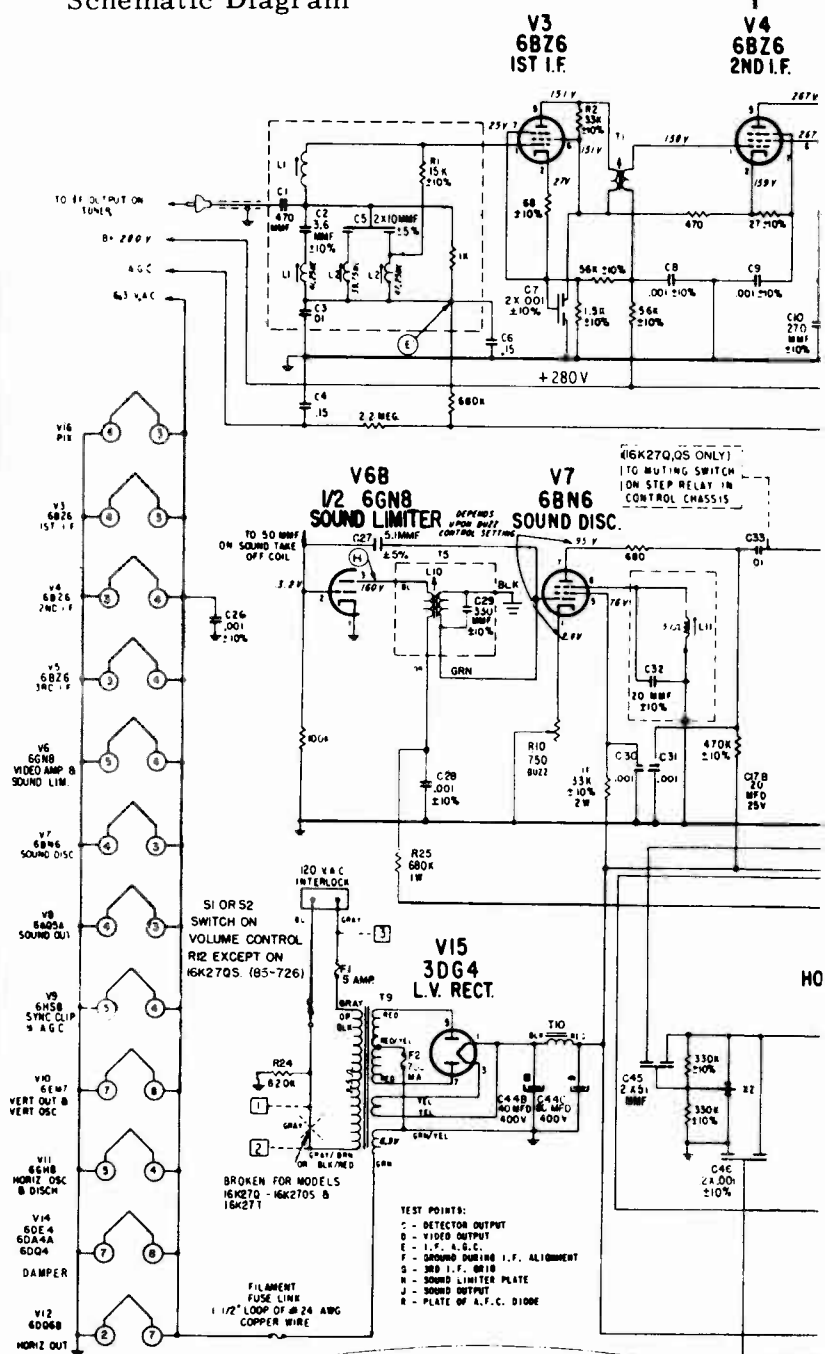
ZENITH
Chassis 16K22, -QS
(Continued)

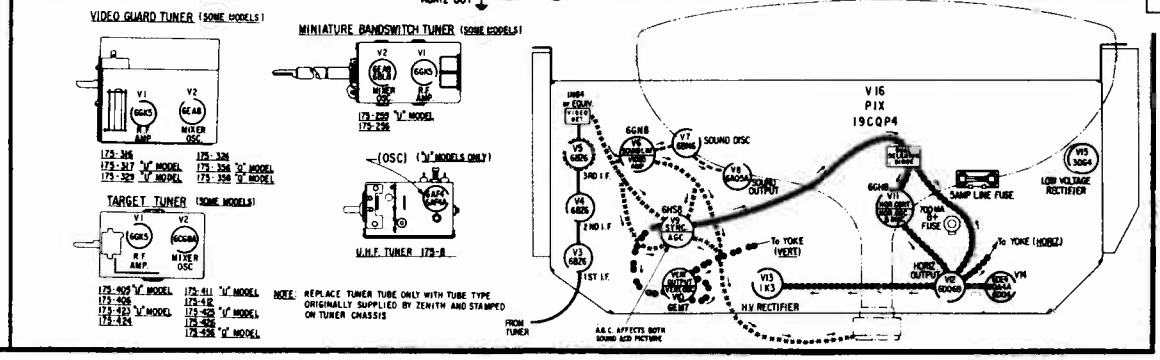
Schematic Diagram S-56853 "300" Space Command Control Chassis.

Zenith Space Command Control Chassis
Chassis "300" Diagram S-56853



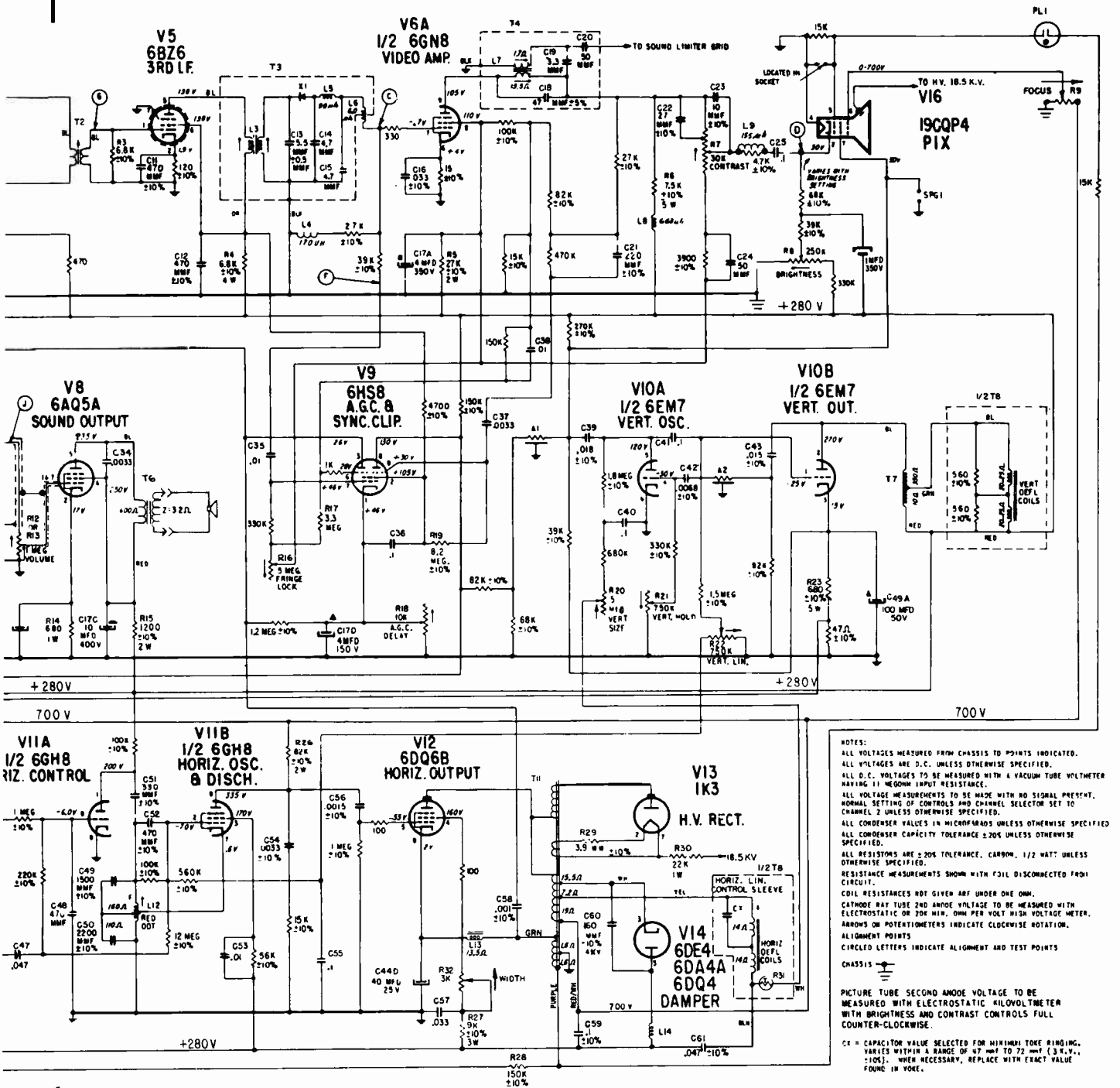
ZENITH Chassis 16K27, -Q, -QT, -T
Schematic Diagram





SOUND CIRCUIT
COMPOSITE VIDEO
VERTICAL CIRCUIT
HORIZONTAL CIRCUIT
INTERMEDIATE FREQUENCY

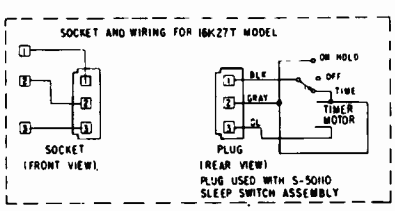
ZENITH Chassis 16K27, -Q, -QT, -T, Schematic Diagram, Continued

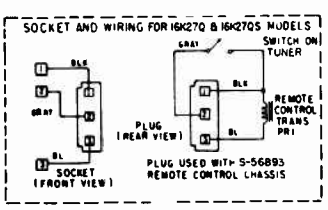


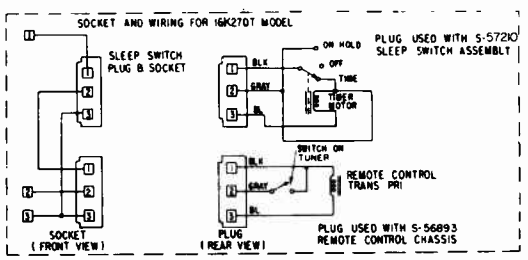
NOTES:
ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.
ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT, NORMAL SETTING OF CONTROLS AND 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 FOIL 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.
ALIGNMENT POINTS
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS
CHASSIS

PICTURE TUBE SECOND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER-CLOCKWISE.

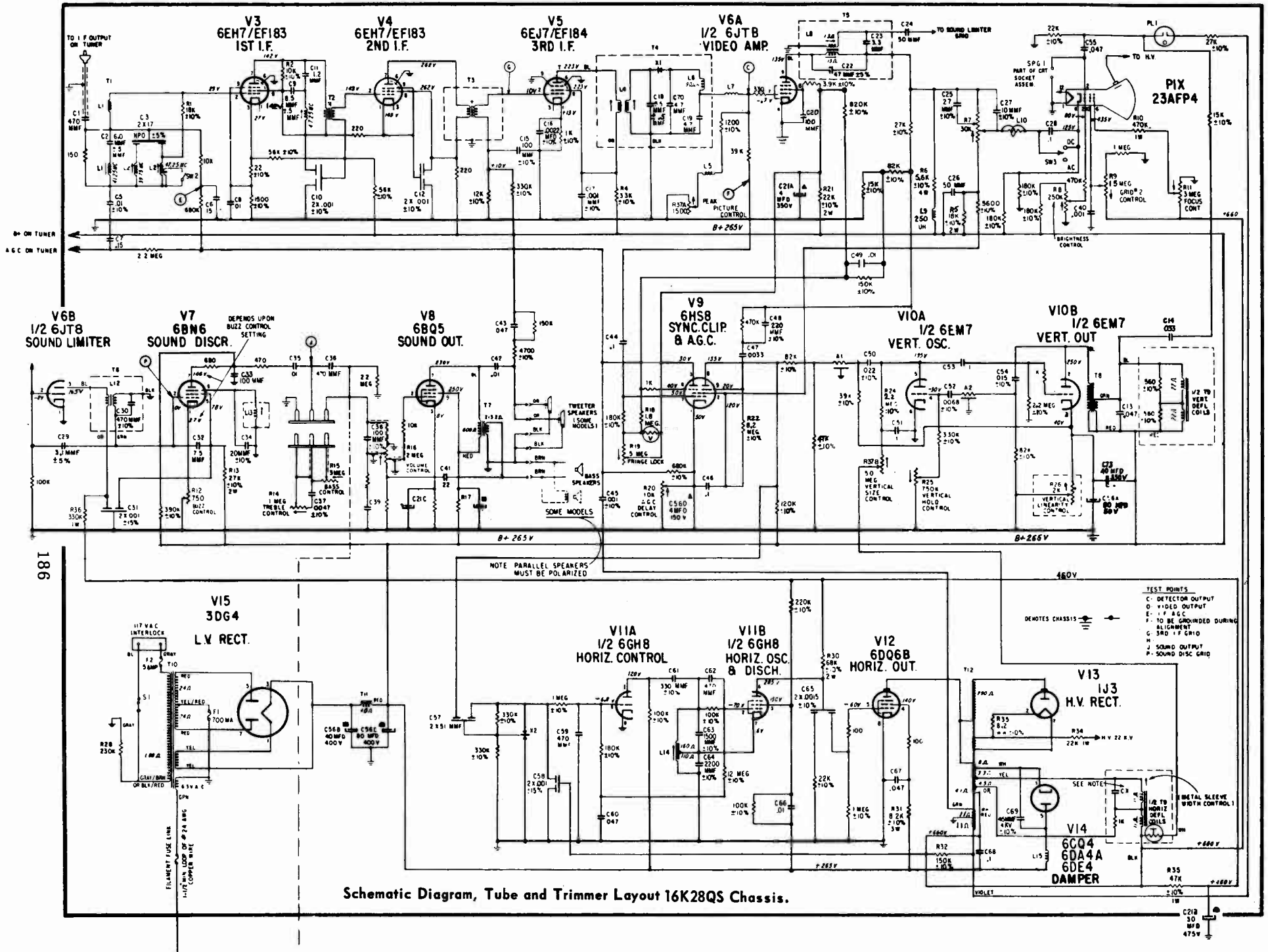
CX = CAPACITOR VALUE SELECTED FOR MINIMUM TOKE RINGING. VARIES WITHIN A RANGE OF 47 mmf TO 72 mmf (3 K.V., ±10%). WHEN NECESSARY, REPLACE WITH EXACT VALUE FOUND IN YOKE.



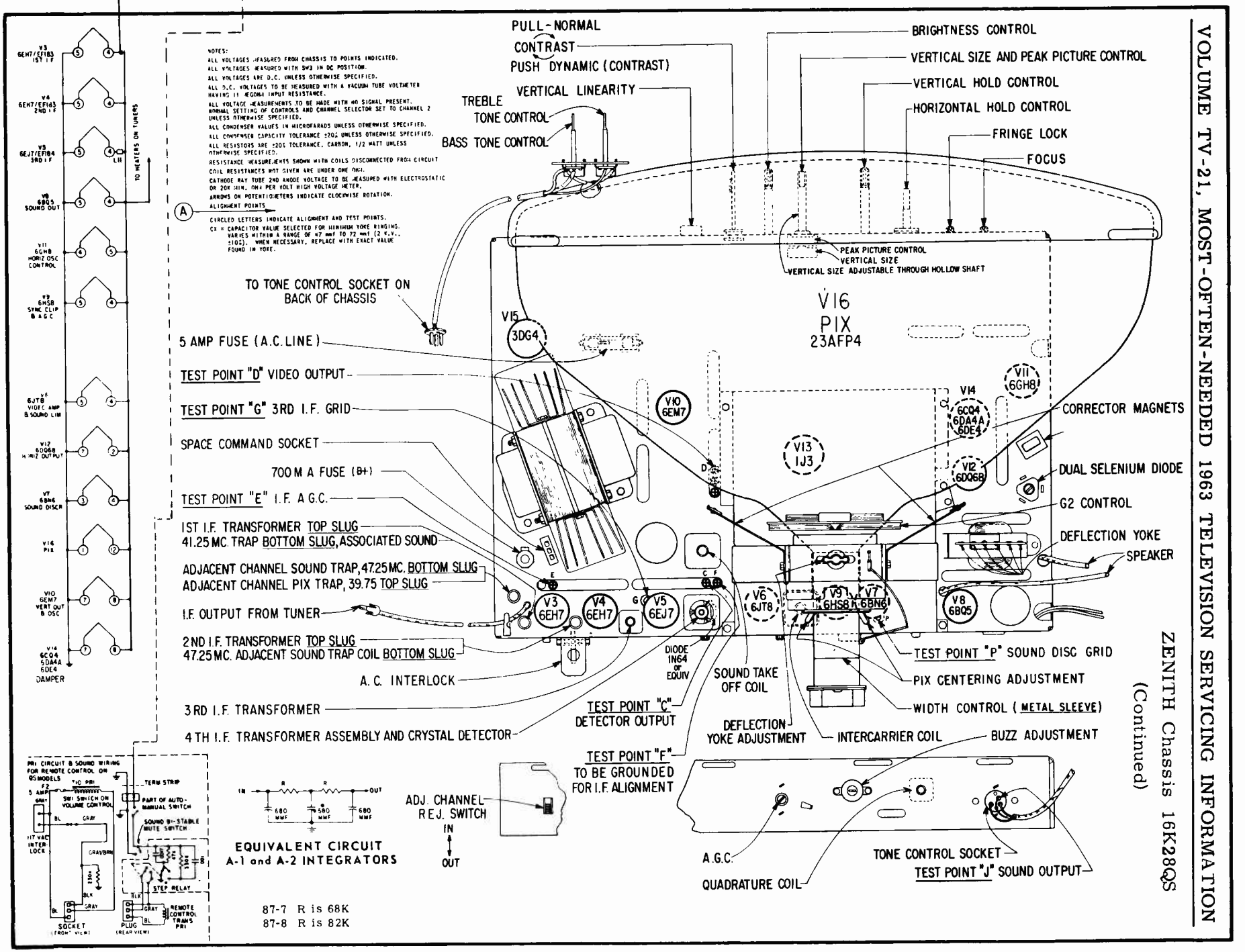




Schematic Diagram, Tube and Signal Path Chart
16K27, 16K27Q, 16K27T and 16K27QT Chassis.

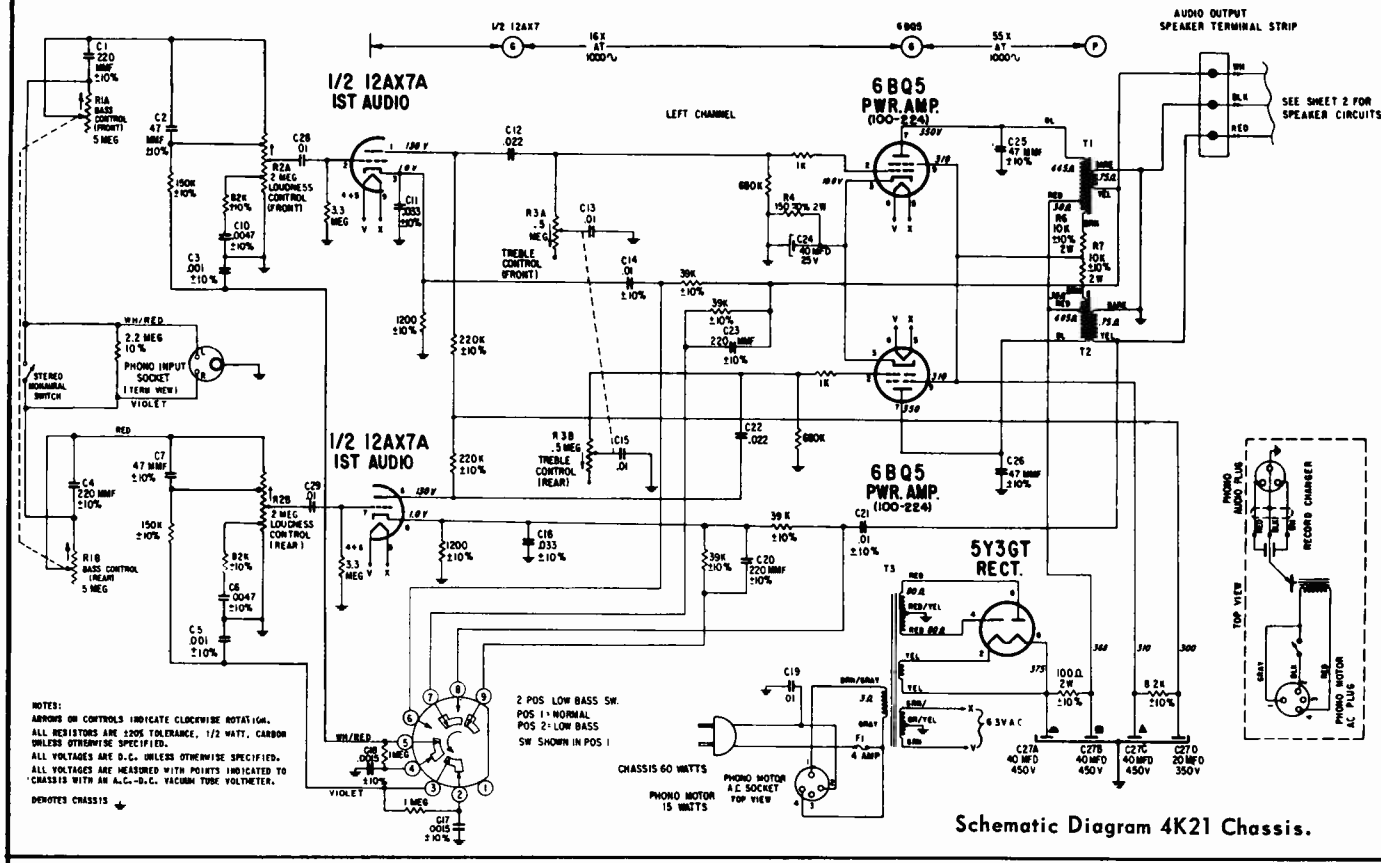


Schematic Diagram, Tube and Trimmer Layout 16K28QS Chassis.



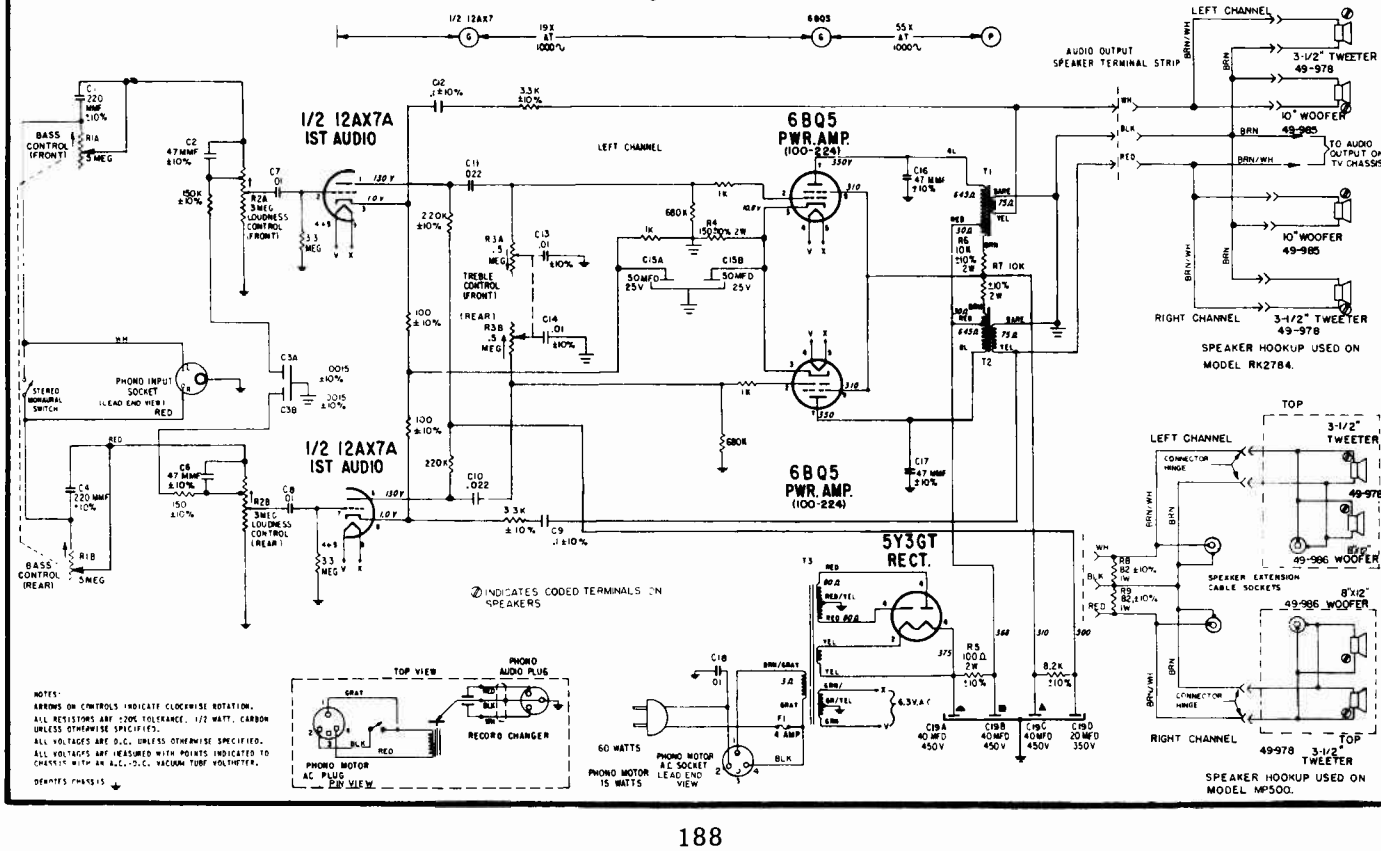
ZENITH Chassis 16K28QS (Continued)

ZENITH Schematic Diagrams of Chassis 4K21 and 4K22

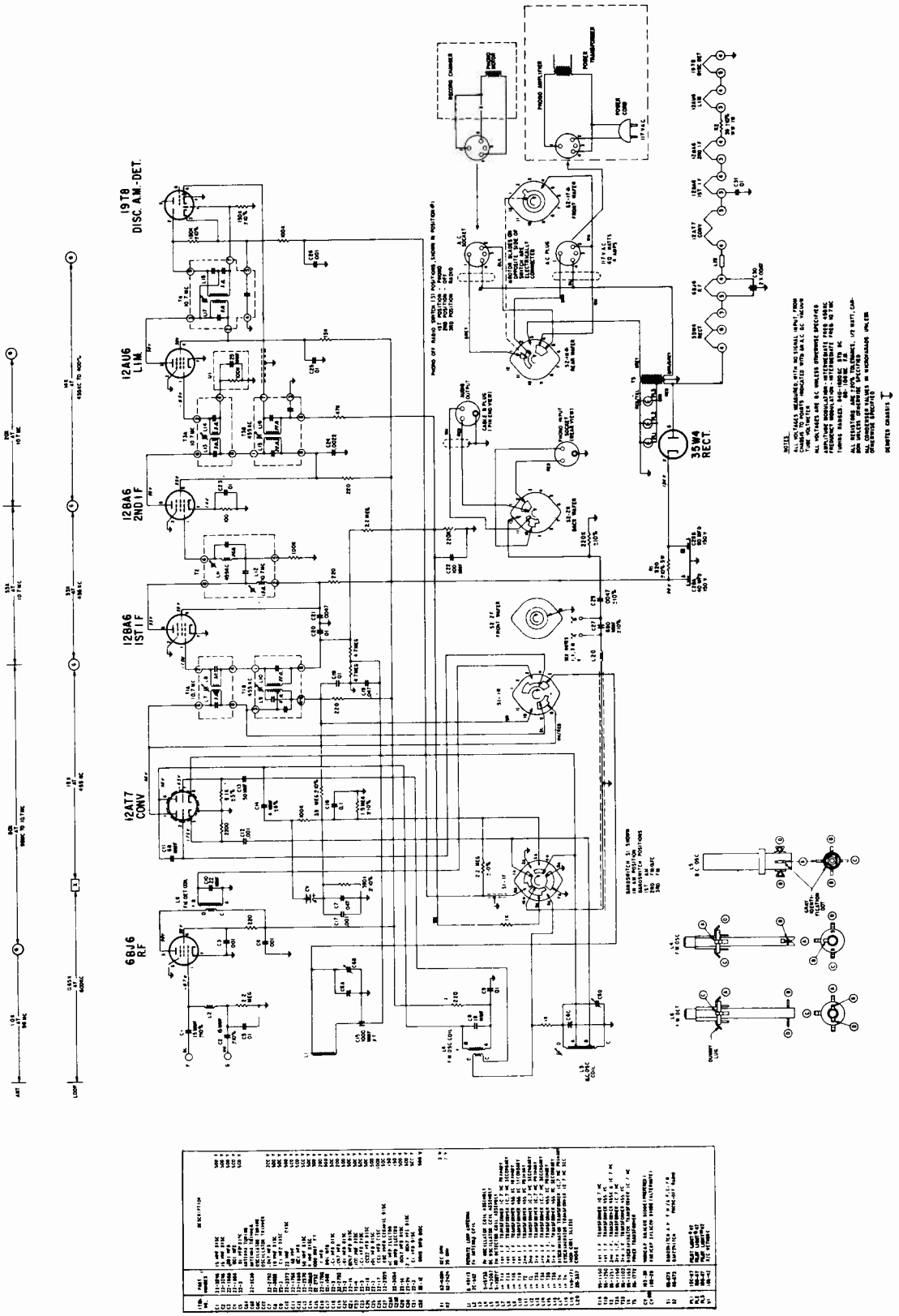


Schematic Diagram 4K21 Chassis.

Schematic Diagram 4K22 Chassis.

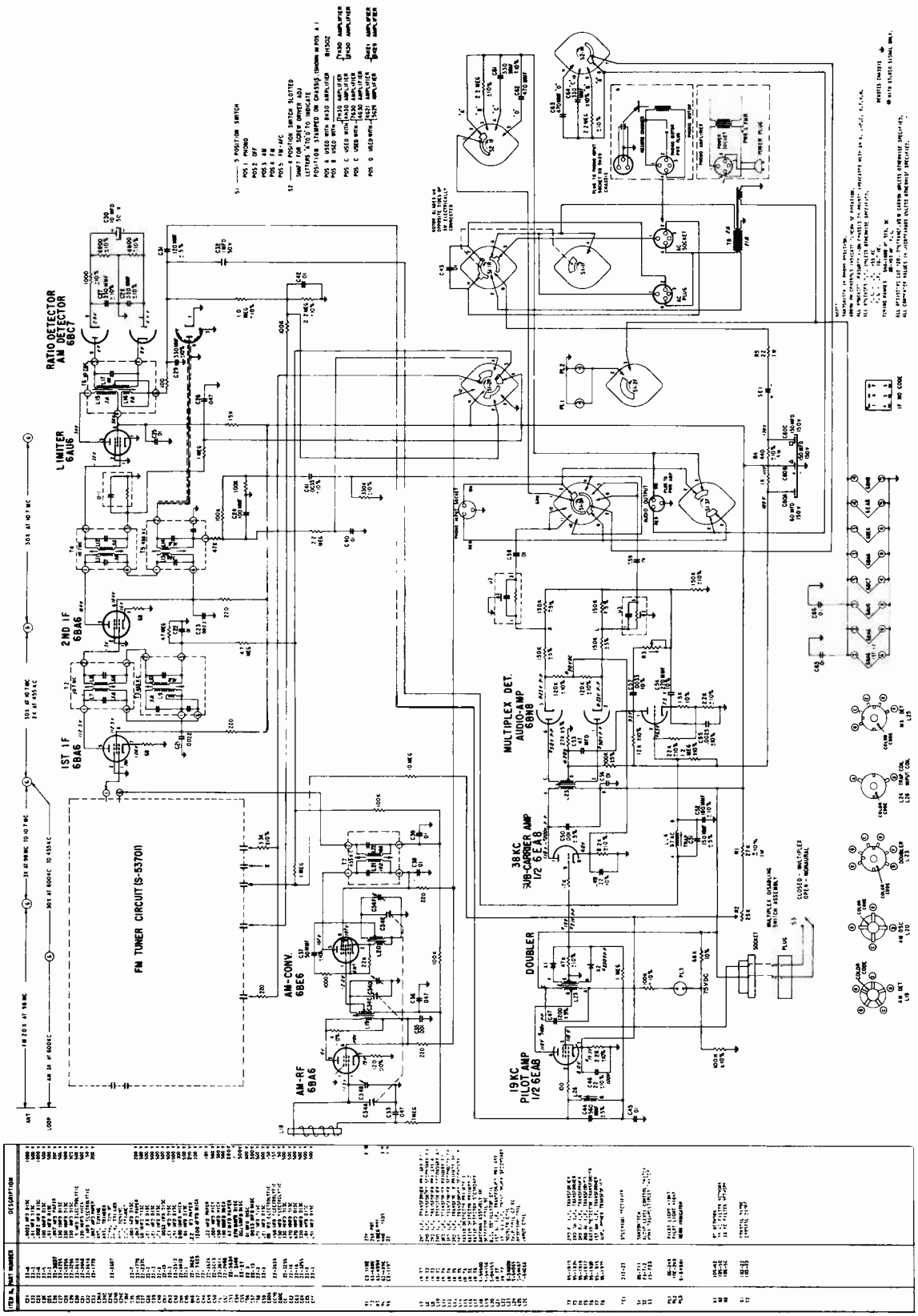


ZENITH Schematic Diagram of Chassis 7F20L



Schematic Diagram 7F20L Chassis.

ZENITH Schematic Diagram of Chassis 9H20LZ1



Schematic Diagram 9H20LZ1 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.

(Index continued on page 192)

INDEX Continued

This manual is made up of factory prepared service material. Editorial changes and selections were made to conform with the objectives of this manual. Our sincere thanks and appreciation is extended to every manufacturer whose products are covered by the material in this manual and who aided us in the preparation of this book.

M. N. Beitman, Chief Editor of the Engineering Staff, Supreme Publications.

Another

Supreme Publications

Service Manual