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Television

Servicing Information

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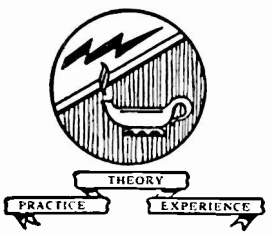

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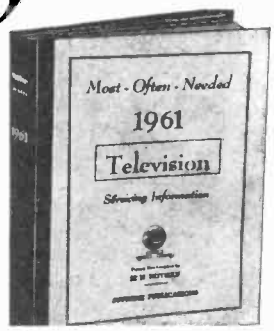

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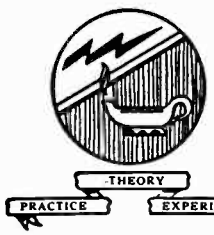

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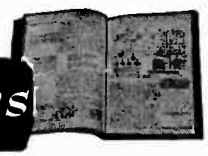

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(Continued on page 4)

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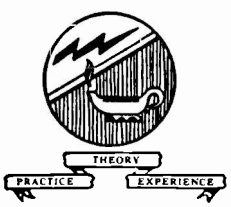
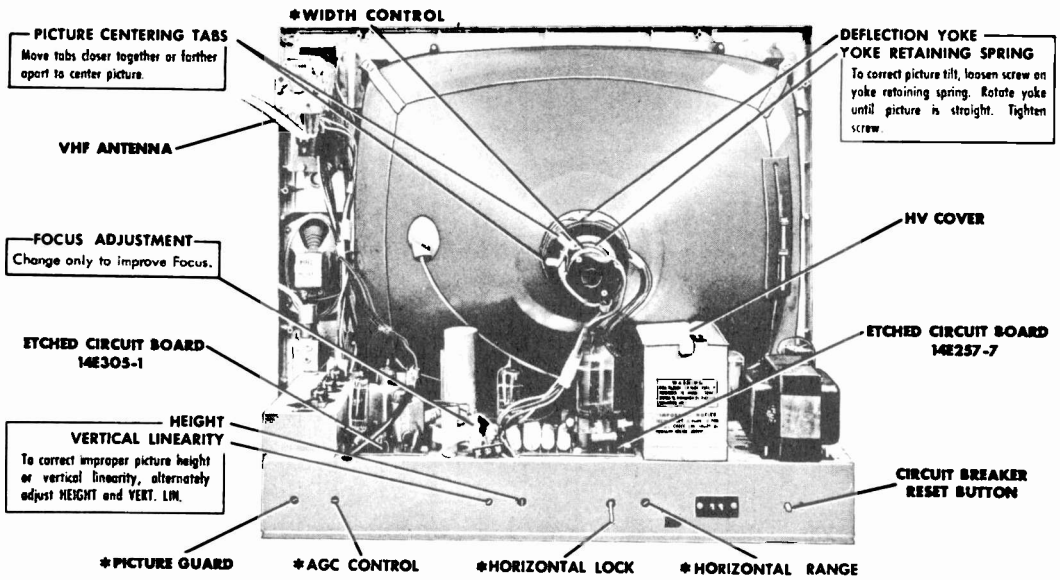


This manual is made up of factory prepared service material. Editorial changes and selections were made to conform with the objectives of this manual. Our sincere thanks and appreciation is extended to every manufacturer whose products are covered by the material in this manual and who aided us in the preparation of this book.

M. N. Beitman, Chief Editor of the Engineering Staff, Supreme Publications.

ADMIRAL®



*DETAILED ADJUSTMENT INFORMATION GIVEN ON PAGE 8

MODEL CHART	
Model	Chassis
TG310	19B8B
TGU310	19UB8B
TG311	19B8B
TGU311	19UB8B
TG312	19B8B
TGU312	19UB8B
TG313	19B8B
TGU313	19UB8B
LG301	19B8B
LGU301	19UB8B
LG302	19B8B
LGU302	19UB8B
LG303	19B8B
LGU303	19UB8B
LG311	19B8B
LGU311	19UB8B
LG312	19B8B
LGU312	19UB8B
LG313	19B8B
LGU313	19UB8B
LG321	19B8B
LGU321	19UB8B
LG322	19B8B
LGU322	19UB8B
LG323	19B8B
LGU323	19UB8B

PICTURE GUARD ADJUSTMENT

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

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

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

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

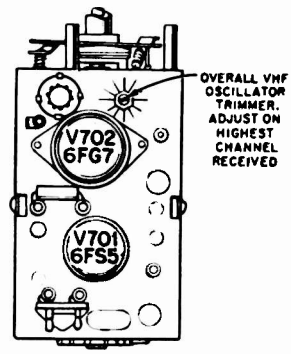
ALIGNMENT OF 4.5 MC TRAP

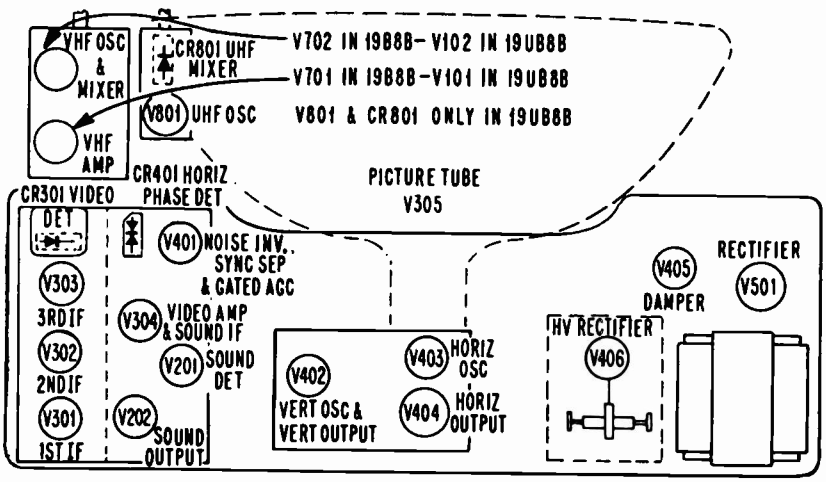
Alignment of 4.5 MC (beat interference) trap "A12" requires use of a hexagonal non-metallic alignment tool (part number 98A30-12).

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.

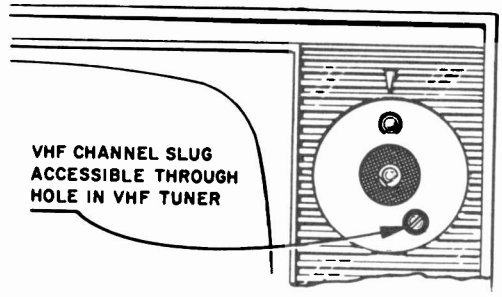
Note that adjustment "A12" is top slug (slug farthest from etched circuit board). Use caution so as not to disturb bottom slug (slug nearest etched circuit board) as sound IF alignment will be affected.

Channel Adjustments Location for VHF Only Sets.



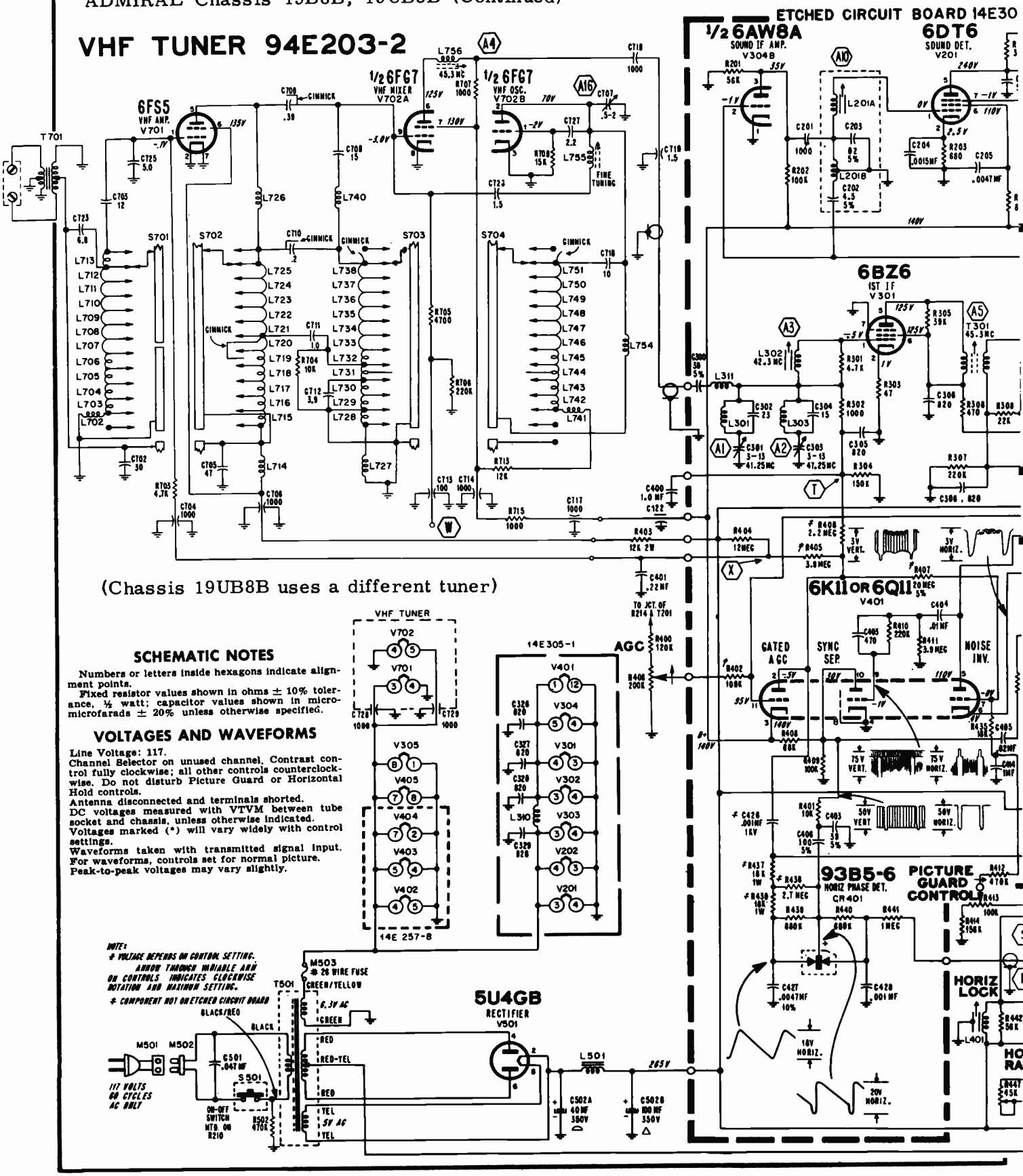


TUBE LOCATIONS

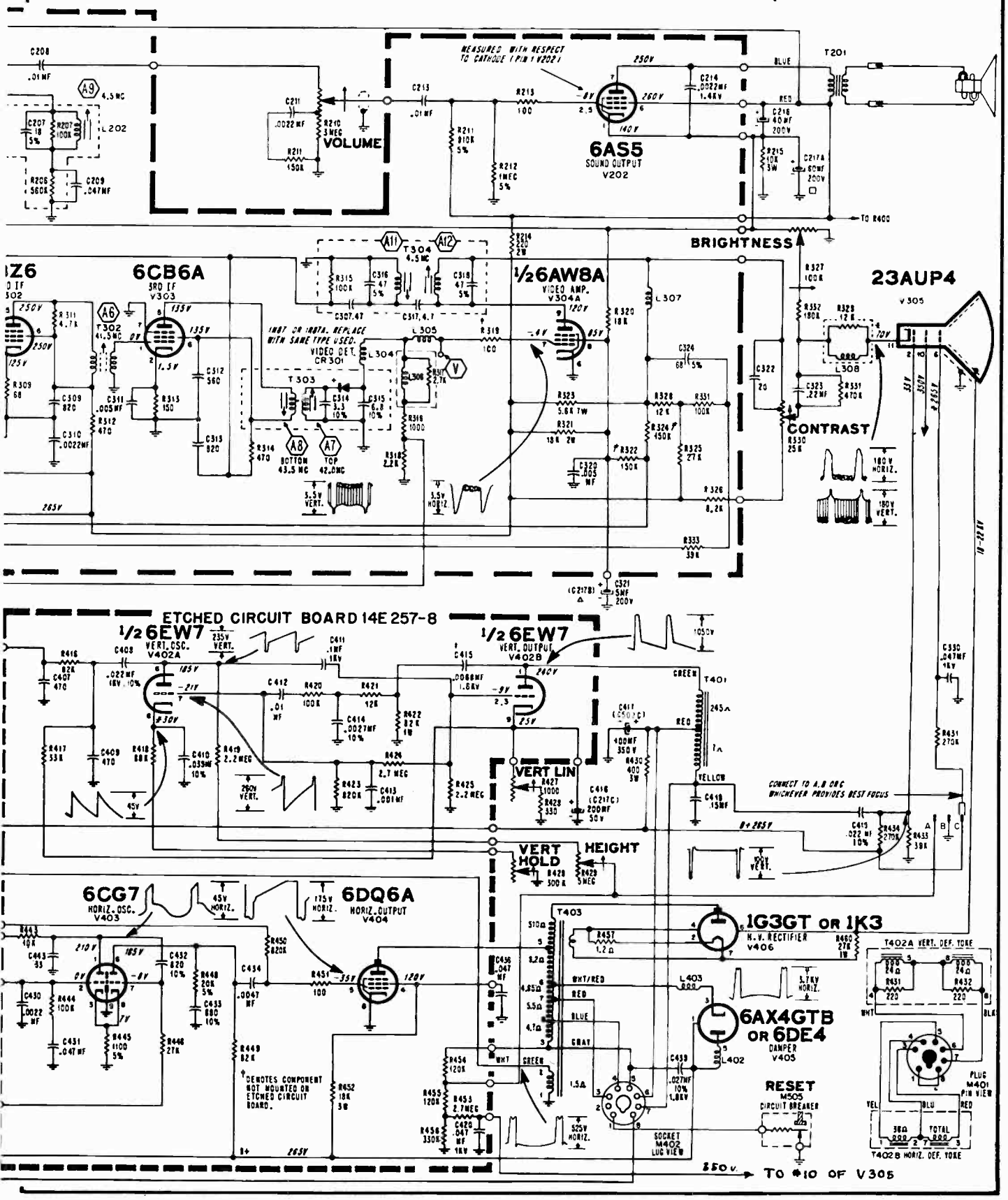


Channel Adjustment Location for VHF-UHF Sets.

ADMIRAL Chassis 19B8B, 19UB8B (Continued)



ADMIRAL **Schematic for 19B8B Television Chassis Stamped Run 10.**



ADMIRAL Chassis 19B8B and 19UB8B Service Information, Continued

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.

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.

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 (6CG7) 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, 6CG7) to chassis ground.

4. Connect a .22 mf. 400 volt capacitor from test point "S" (junction of horizontal lock coil L401 and resistor R443, 10,000 ohms) to chassis ground. Caution: To avoid B+ shock, turn receiver off when making this connection.

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

6. Remove the .22 mf capacitor from the horizontal lock coil. Set horizontal lock coil at point where picture is in horizontal sync and almost remains stationary with tendency to shift to left or right.

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

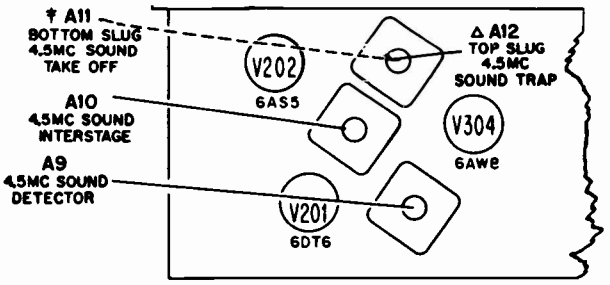
8. Set Channel Selector to weakest station. Switch Channel Selector on and off channel, picture should remain in horizontal sync. If necessary, adjust horizontal lock coil slightly to bring picture in sync.

WIDTH ADJUSTMENT

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.



† *SLUG NEAREST TO ETCHED CIRCUIT BOARD*

Figure B. View of Etched Circuit Board

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).

*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.

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 soond 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.

ADMIRAL®

Material on pages 9 through 14 is exact for Chassis 16G9B used in Models P901, P902, P909, and Chassis 16UG9B used in Models UP901, UP902, and UP909. A number of other chassis are very similar to these sets, but use different tuners some intended for remote control operation. These chassis are 16B9B used in Models P910, P911, P915, P918; Chassis 16UB9B used in UP910, UP911, UP915, UP918; and remote control sets 16A9, -U, 16C9, -U, used in Models PS921, -U, PS925, -U, and PS928, -U.

CHANNEL ADJUSTMENT FOR VHF ONLY SETS

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

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

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

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

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

CHANNEL ADJUSTMENT FOR VHF-UHF SETS

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

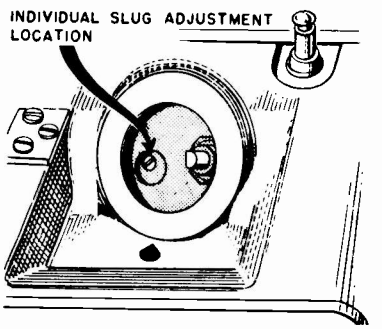
1. Turn receiver on and allow 15 minutes warm up.

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

3. Remove Channel Selector knob, Fine Tuning knob and plastic cup below knobs.

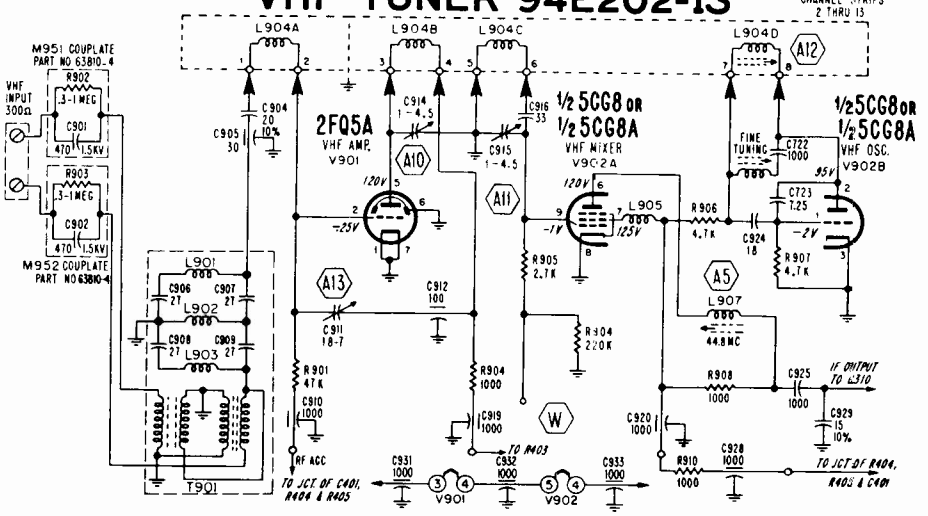
4. Rotate fine tuning shaft so that adjustment slug is visible through hole at front of VHF tuner.

5. Using a non-metallic alignment tool with $\frac{3}{16}$" blade (part number 98B30-22), carefully adjust channel slug for best picture. Note: Sound may not be loudest at this point. Repeat procedure for each channel to be adjusted.

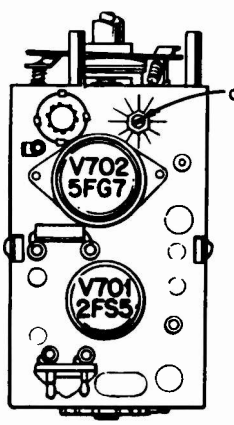


Channel Adjustment Location for VHF-UHF Sets.

VHF TUNER 94E202-13



VHF Tuner 94E202-13 used in Chassis 16A9U, 16C9U.



Channel Adjustment Location for VHF Only Sets.

ADMIRAL Chassis 16G9B, 16UG9B, etc., Alignment Information, 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). Connect negative of 9 volt bias supply to center terminal of picture guard control, positive to chassis. See figure B.

Connect signal generator high side to insulated tube shield over oscillator-mixer tube, low side to chassis near tube shield.

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

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

Allow about 15 minutes for receiver and test equipment to warm up. Use a non-metallic alignment tool, part no. 98A30-13.

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

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

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

3. Repeat adjustment of Step 1.

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

5. Connect wire jumper across IF input coil L301.

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

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

†8. Set generator at 42.7 MC and adjust A4 for maximum.

9. Set generator at 47.25 and adjust A14 for minimum.

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

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

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

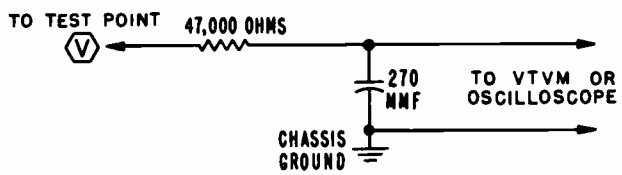
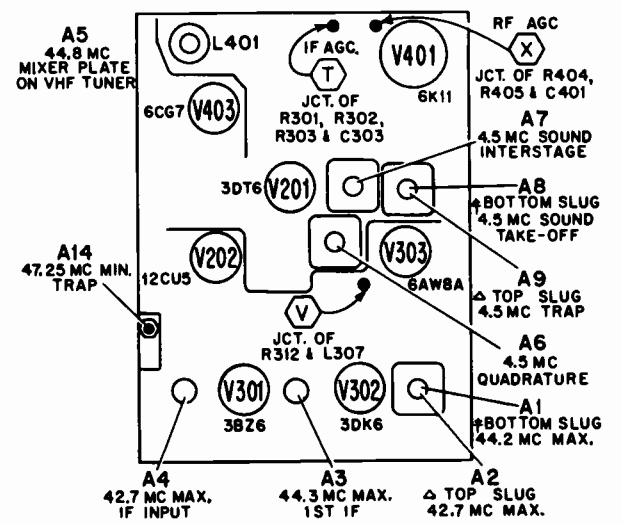


Figure A. Decoupling Filter.



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

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

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

3. Connect sweep generator high side to insulated tube shield over oscillator-mixer tube, low side to chassis near tube shield. 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 on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.

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

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

If video IF carrier marker (45.75 MC) does not fall at the 50 to 60% point on curve, position it with adjustment of A5. If curve is not symmetrical, adjust A3.

For sets with 16UG9B 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.

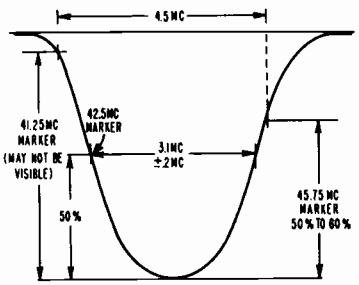


Figure C. Ideal IF Response Curve.

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

VHF AMPLIFIER AND MIXER ALIGNMENT FOR VHF TUNER 94E163-10

Connect isolation transformer between AC line and receiver. Allow about 15 minutes for receiver and test equipment to warm up. See figure F for adjustment locations.

Connect negative of 3.0 volt bias supply to test point "X" (RF AGC), positive to chassis, see figure B.

Connect sweep generator 300 ohm output to antenna terminals. If sweep generator does not have a built-in marker generator, loosely couple a marker generator to the antenna terminals. To avoid distortion of the response curve, keep sweep generator output at a minimum, marker pips just barely visible.

Connect oscilloscope high side through 15,000 ohm resistor to test point "W" on tuner, low side to chassis. Keep scope leads away from chassis.

Do not remove VHF Tuner bottom shield during alignment.

1. Set sweep generator sweeping channel 10. Video marker at 193.25 MC; sound marker at 197.75 MC. Set Channel Selector to channel 10. Check response obtained with VHF response curve shown in figure E. Alternately adjust A10 and A11 as required to obtain curve having maximum amplitude, symmetry and flat top appearance consistent with proper bandwidth and correct marker location.

2. Set sweep generator sweeping channel 6. Video marker at 83.25 MC; sound marker at 87.75 MC. Set Channel Selector to channel 6. Check response obtained with VHF response curve. If curve is not within limits, compromise adjustment is required. Alternately adjust A10 and A11 as required to obtain curve having maximum amplitude, symmetry and flat top appearance consistent with proper bandwidth and correct marker location. After adjustment, recheck adjustment of step 1.

ADMIRAL Chassis 16G9B, 16UG9B, etc., Alignment Information, Continued

3. Set the sweep generator to sweep the channel to be checked. Set the marker generator for the corresponding video carrier frequency and sound carrier frequency. Use 3 volts bias. Check each channel operating in the service area for curve shown. In general, adjustment performed in steps 1 and 2 are sufficient to give satisfactory response curves on all channels. However, if reasonable alignment is not obtained on an operating channel, repeat steps 1 and 2 as a compromise adjustment to favor the particular channel. If a compromise adjustment is made, other channels operating in the service area should be checked to make certain that they have not been appreciably affected.

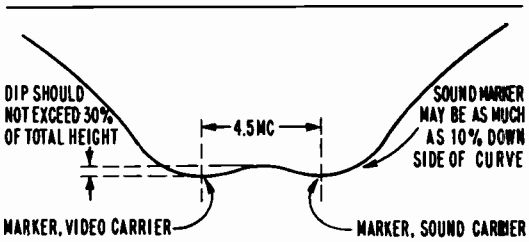


Figure E. Ideal VHF Response Curve.

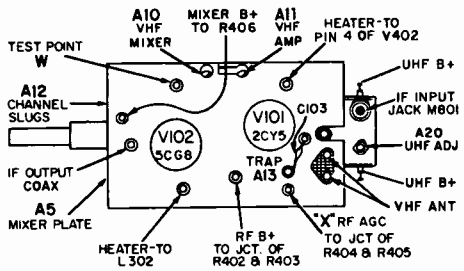


Figure F. Top View of VHF Tuner 94E163-10.

VHF AMPLIFIER AND MIXER ALIGNMENT FOR VHF TUNER 94E203-1

Tuner 94E203-1 is a switch type VHF tuner featuring high stability and trouble-free operation. The inductors of this tuner are an integral part of the channel switch and in general, alignment is permanent. However, an over-all oscillator adjustment screw A12 is provided at top of tuner, should channel oscillator adjustment be required after replacement of VHF oscillator tube. See figure G. If it is definitely determined that complete tuner alignment is required, return tuner to Admiral Distributor for repair or replacement.

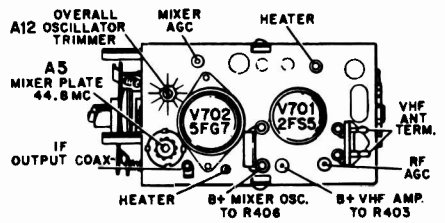


Figure G. Top View of VHF Tuner 94E203-1.

OVER-ALL VHF AND IF RESPONSE CURVE CHECK

Set AGC control fully to the left. Channel Selector on channel 12. Connect negative of 3V bias to test points "T" (IF AGC) and "X" (RF AGC), positive to chassis. Connect negative of 9 volt bias supply to center terminal of picture guard control, positive to chassis. See figure B.

Connect sweep generator to antenna terminals. Set sweep to channel 12 with sweep output as low as possible. If an external marker generator is used, loosely couple high side to sweep generator lead.

Connect oscilloscope high side to test point "V" through decoupling filter, low side to chassis.

Compare response curve obtained against ideal curve shown in figure H. If curve is not within tolerance, touch up the IF slugs, as instructed. It should never be necessary to turn slugs more than one turn in either direction. If curve is satisfactory on channel checked, all other channels should be satisfactory. IMPORTANT: When sweep output is reduced, response curve amplitude on scope should also decrease, but curve shape should remain the same. If curve shape changes, reduce sweep output and/or scope gain until shape does not change.

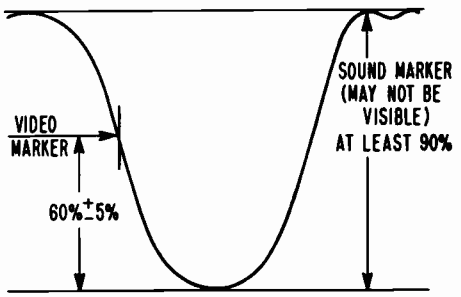


Figure H. Ideal Over-all VHF and IF Response Curve.

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.

4.5 MC SOUND IF ALIGNMENT

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

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

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

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

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

6. If above alignment is correctly made, no further adjustment is required. However, if sound remains distorted at normal volume level (when receiver is tuned for best sound), repeat entire procedure.

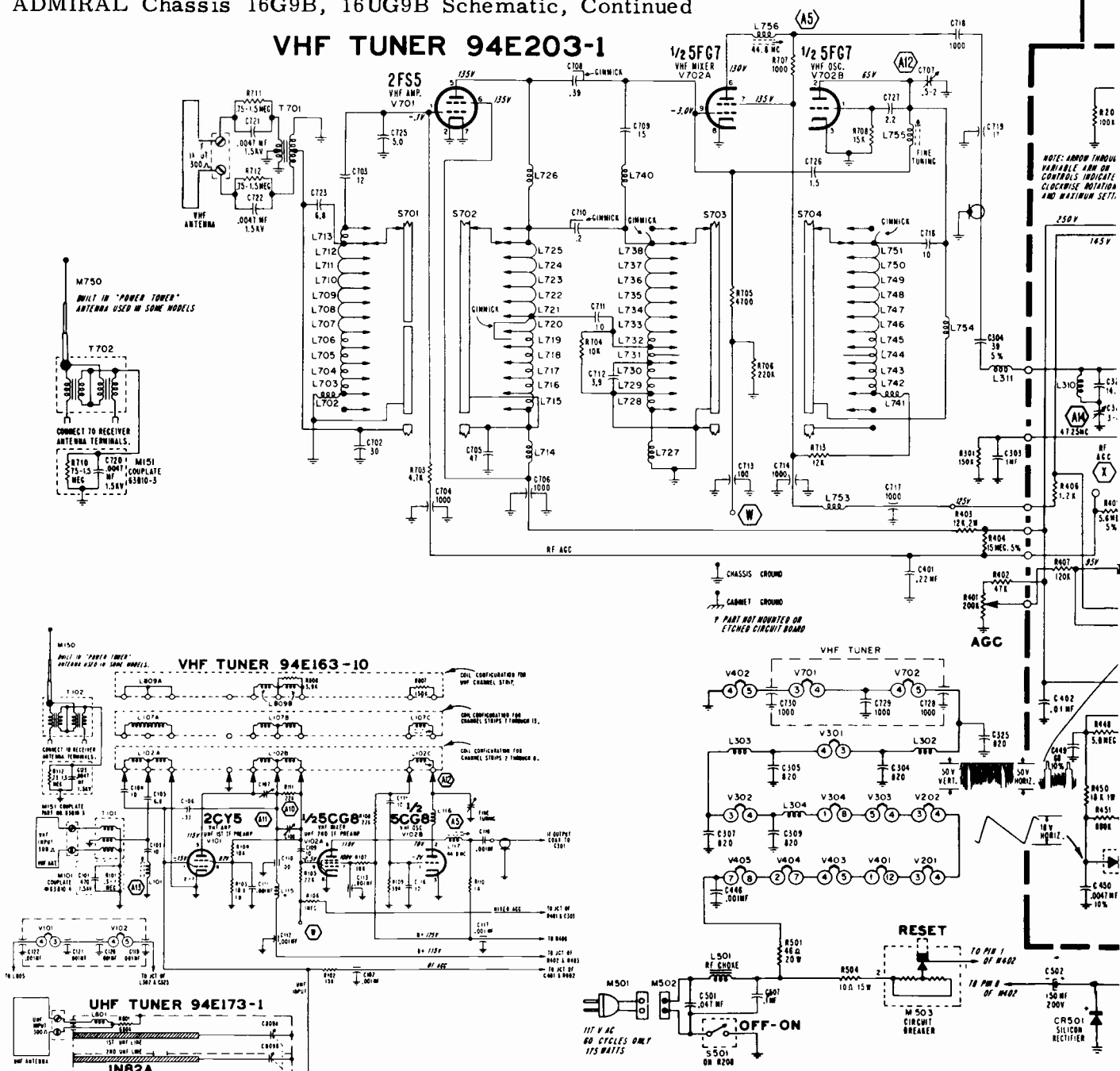
*CAUTION: Do not readjust slug "A6" unless sound is distorted. If "A6" is readjusted, all steps in alignment procedure should be repeated exactly as instructed.

ALIGNMENT OF UHF IF INPUT COIL USING A TRANSMITTED SIGNAL

Alignment of UHF IF input coil L807 (VHF Tuner 94E163-10) should be made if UHF reception is poor and after usual causes of poor UHF reception have been checked.

To align UHF IF input coil L807, tune in UHF channel with normal picture and sound. Using non-metallic alignment tool (Admiral part number 98A30-14) very carefully adjust slug A20 for best picture, consistent with good sound. For VHF tuner adjustment locations, see figure F.

ADMIRAL Chassis 16G9B, 16UG9B Schematic, Continued



SCHEMATIC NOTES

Numbers or letters inside hexagons indicate alignment points.

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

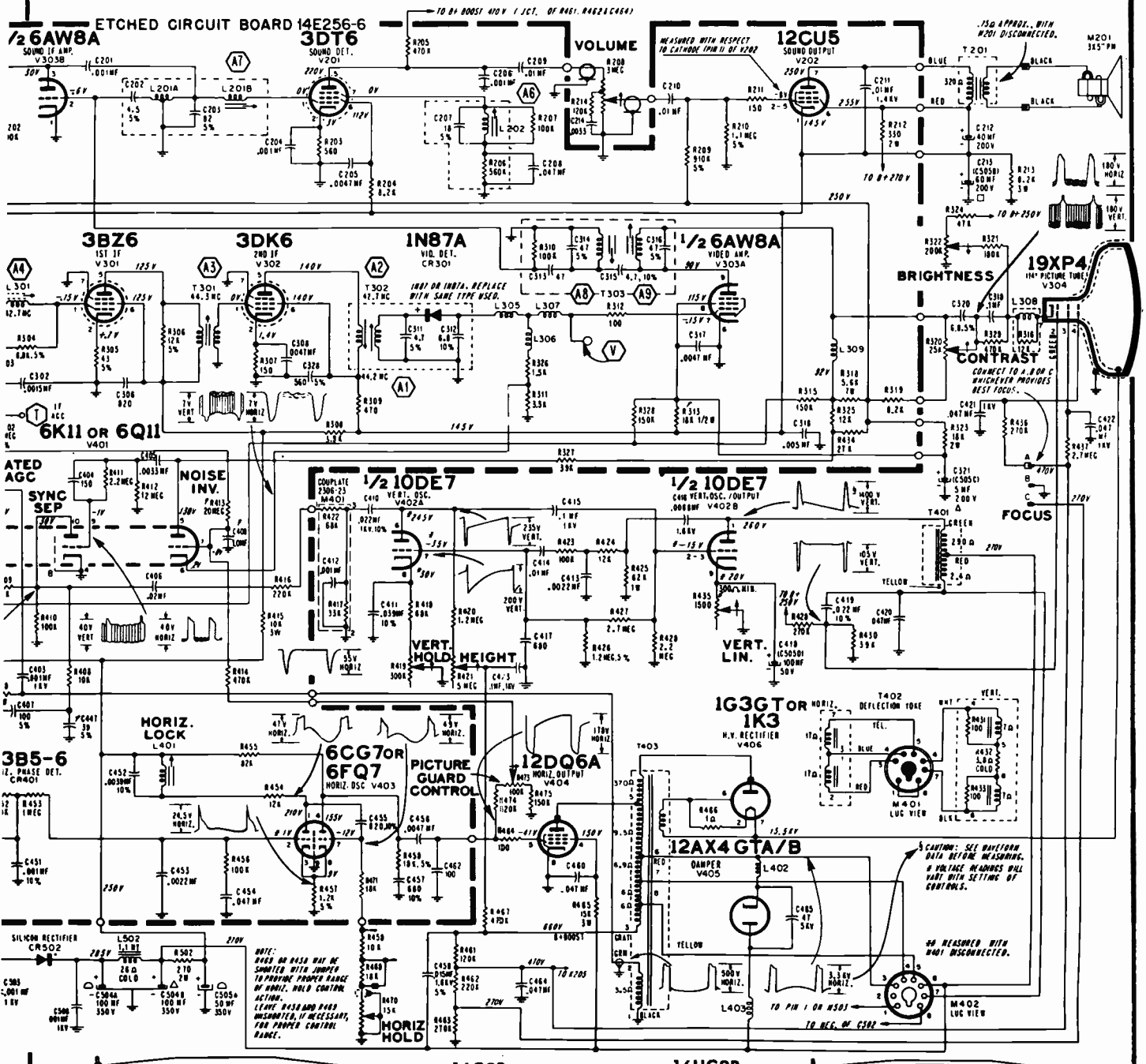
VOLTAGES AND WAVEFORMS

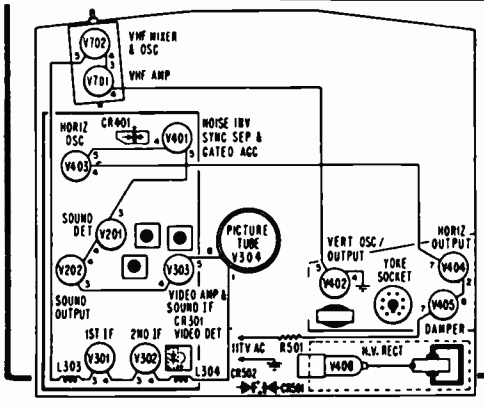
Isolation transformer used. Line Voltage: 117.
Channel Selector on unused channel. Contrast control fully clockwise; all other controls counterclockwise. Do not disturb Picture Guard or Horizontal Hold controls.
Antenna disconnected and terminals shorted.
DC voltages measured with VTVM between tube socket 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.

COILS AND TRANSFORMERS

L201	Phase Shift and Sound IF	72C 208-2
L202	Quadrature Coil	72B 132-52
L301	IF Input Coil	72C 132-41
L305	RF Choke Coil (Orange Dot)	73B 31-4
L306	Video Peaking Coil	73C 5-34
L307	Resonant Choke Coil	73B 31-3
L308	Video Peaking Coil	73C 5-40
L309	Video Peaking Coil	73C 5-20
L310	Trap Coil	73B 37-3
L401	Horizontal Lock Coil	94D 17-14
L402	RF Choke Coil	73B 37-9
L403	RF Choke Coil	73B 37-9
L501	RF Choke Coil	73B 31-1
L502	Filter Choke (1.1 henry)	74C 18-33
T201	Audio Output Transformer	79D 33-28
T301	1st IF Transformer	72C 132-42
T302	2nd IF Transformer	72B 207-3
T303	Sound Take-Off Transformer	72C 185-2
T401	Vertical Output Transformer	79D 43-20
T402	Deflection Yoke	750C 250-7
T403	Horizontal Output Trans.	79D 83-8

16G9B Television Chassis. Schematic for VHF Tuner 94E163-10 and UHF Tuner 94D173-1 Used in 16UG9B Also Shown.



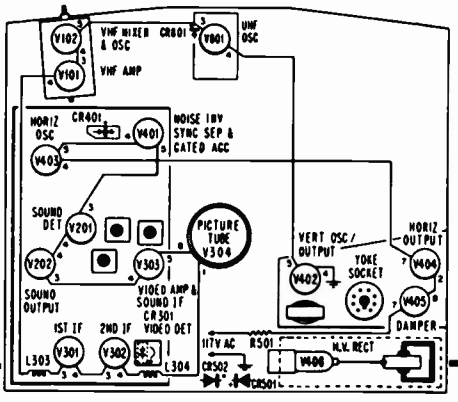


16G9B

V701—2FS5
V702—5FG7
V201—3DT6
V202—12CU5
V301—3BZ6
V302—3DK6
V303—6AW8A
V304—19XP4
V401—6K11 or 6Q11
V402—10DE7
V403—6CG7 or 6FQ7
V404—12DQ6A
V405—12AX4GTA/B
V406—1G3GT/1K3
CR301—1N87A

16UG9B

V101—2CY5
V102—5CG8
V201—3DT6
V202—12CU5
V301—3BZ6
V302—3DK6
V303—6AW8A
V304—19XP4
V401—6K11 or 6Q11
V402—10DE7
V403—6CG7 or 6FQ7
V404—12DQ6A
V405—12AX4GTA/B
V406—1G3GT/1K3
V801—2AF4B
CR301—1N87A
CR401—93B5-6



ADMIRAL Chassis 16G9B, 16UG9B, etc., Service Information, Continued

AGC CONTROL ADJUSTMENT

The AGC control is an AGC threshold control which is used solely to adjust the receiver for optimum operation under all signal conditions.

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

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

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

1. Turn set on and allow 15 minutes to warm up.
2. Turn Channel Selector to strongest station in the area.
3. Turn Contrast and Brightness controls 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.

Note: For Picture Guard Adjustment see following paragraph.

PICTURE GUARD ADJUSTMENT

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

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

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

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

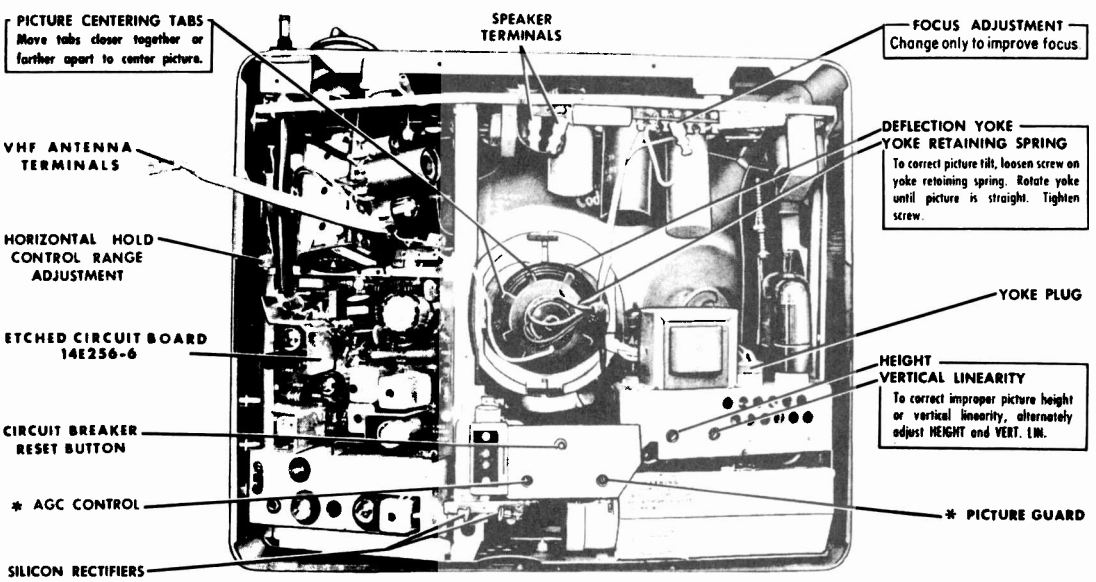
HORIZONTAL SWEEP ADJUSTMENT

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

1. Allow a few minutes for set to warm up. Tune in weakest station, set Brightness and Contrast controls for normal picture.
2. Adjust Horizontal Hold control to sync the horizontal sweep circuit. If the picture cannot be locked-in at approximately the mid-rotation setting of the Horizontal Hold control, perform the following steps for complete horizontal sweep circuit alignment.
3. Connect a jumper wire from junction of R452 (680K) and R453 (1 Meg) to ground to short out oscillator control voltage from Horizontal Phase Detector, CR401. Connect a jumper wire across C452 (.0039 MF) on Etched Circuit Board. This effectively shorts out the Horizontal Lock coil L401.

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

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

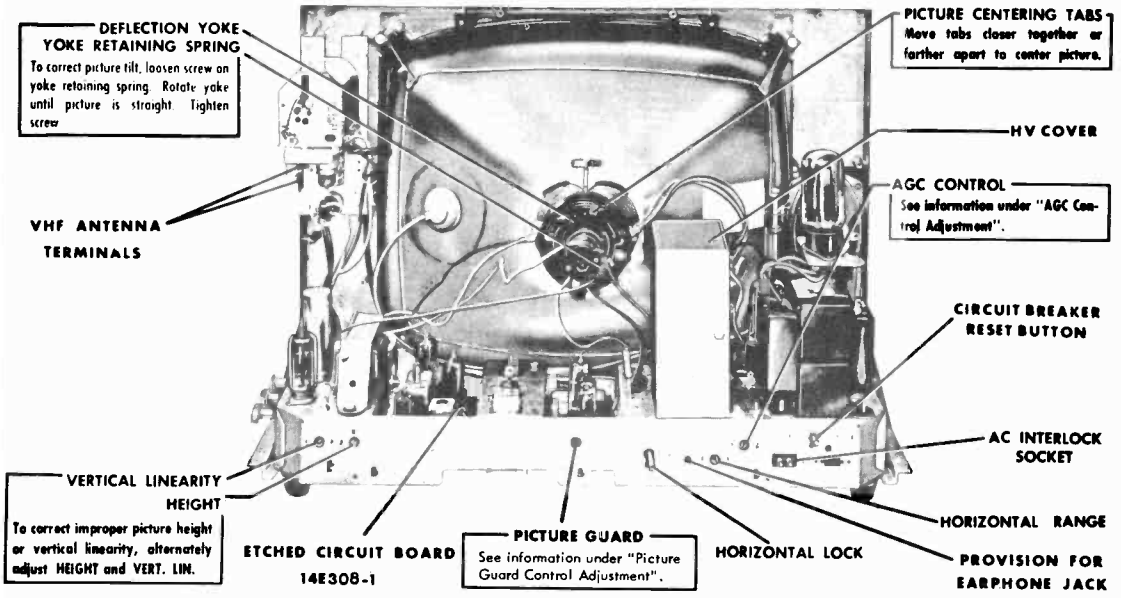


*DETAILED ADJUSTMENT INFORMATION GIVEN ON OTHER PAGES

Rear View of Chassis Showing Adjustment Locations (UHF Tuner in 16UG9B Chassis).

ADMIRAL

FOR MODELS USING
16D9, 16D9B, 16UD9, 16UD9B, 16F9, 16UF9



Model	Chassis
T930	16D9*
T931	16D9*
T935	16D9*
TU930	16UD9†
TU931	16UD9†
TU935	16UD9†
P931	16D9*
P935	16D9*
UP931	16UD9†
UP935	16UD9†
C951	16F9
C952	16F9
C953	16F9
C969	16F9
C971	16F9
CU951	16UF9
CU952	16UF9
CU953	16UF9
CU969	16UF9
CU971	16UF9

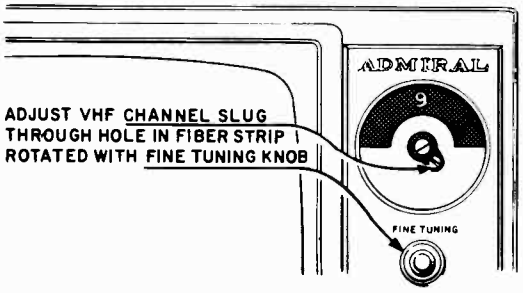
* or 16D9B
† or 16UD9B

The material on pages 15 through 20 is exact for sets listed above, at right. Remote control Chassis 16E9 and 16E9U, used in Models PS940, -U, PS942, -U, PS949, -U, have practically the same main chassis and different tuners. Also Chassis 16J9, -B, 16UJ9, -B, used in Models ST971, STU971, ST972, STU972, STF981, STFU981, STF982, STFU982, are similar but incorporate a stereo amplifier or a stereo amplifier and AM-FM radio, with switching network.

VHF CHANNEL ADJUSTMENT

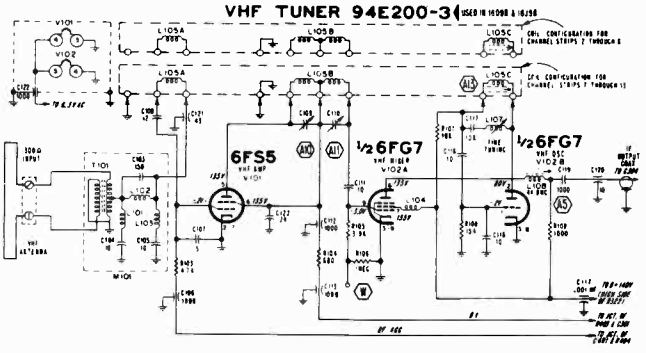
These sets are provided with a channel adjustment slug for each channel, see illustration. Adjust as follows:

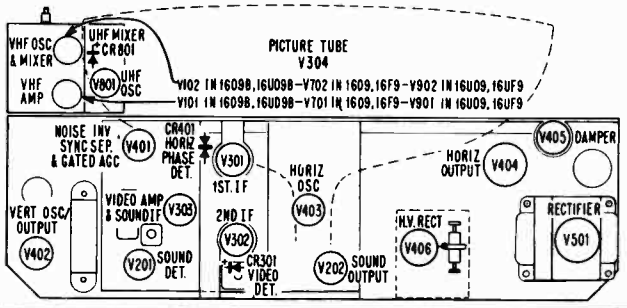
1. Turn receiver on and allow 15 minutes warm up.
2. Set Channel Selector at channel to be adjusted. Set other tuning controls for normal picture and sound.
3. Remove Channel Selector knob.
4. Turn Fine Tuning knob to left or right until channel slug is visible through hole in fiber strip at front of VHF tuner.
5. Using a non-metallic alignment tool with 3/32" blade (part number 98B30-22), carefully adjust channel slug for best picture. Note: Sound may not be loudest at this point. Repeat procedure for each channel to be adjusted.



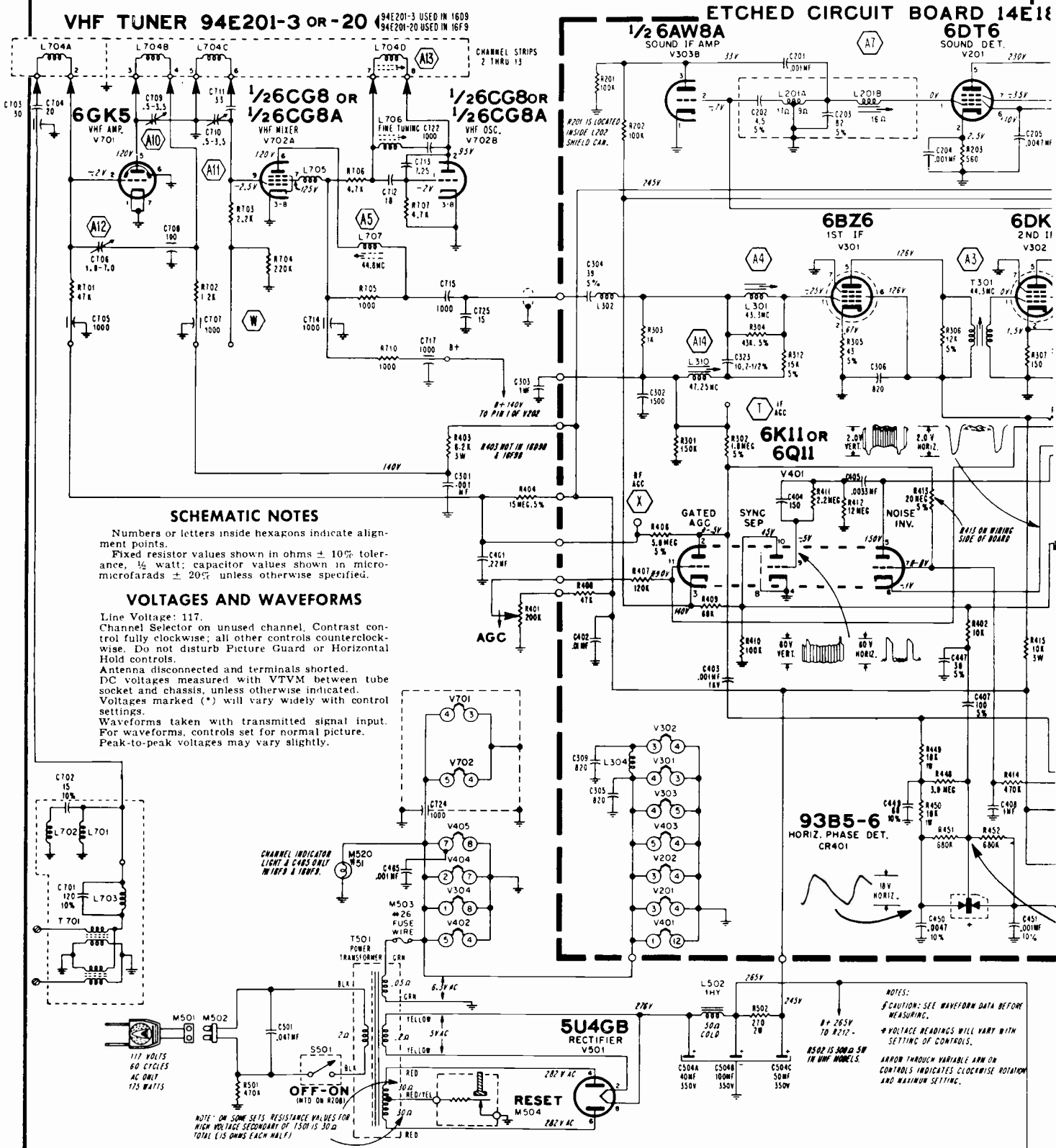
Front View of Escutcheon, Channel Knob Removed.

Schematic for Tuner used in 16D9B Chassis.

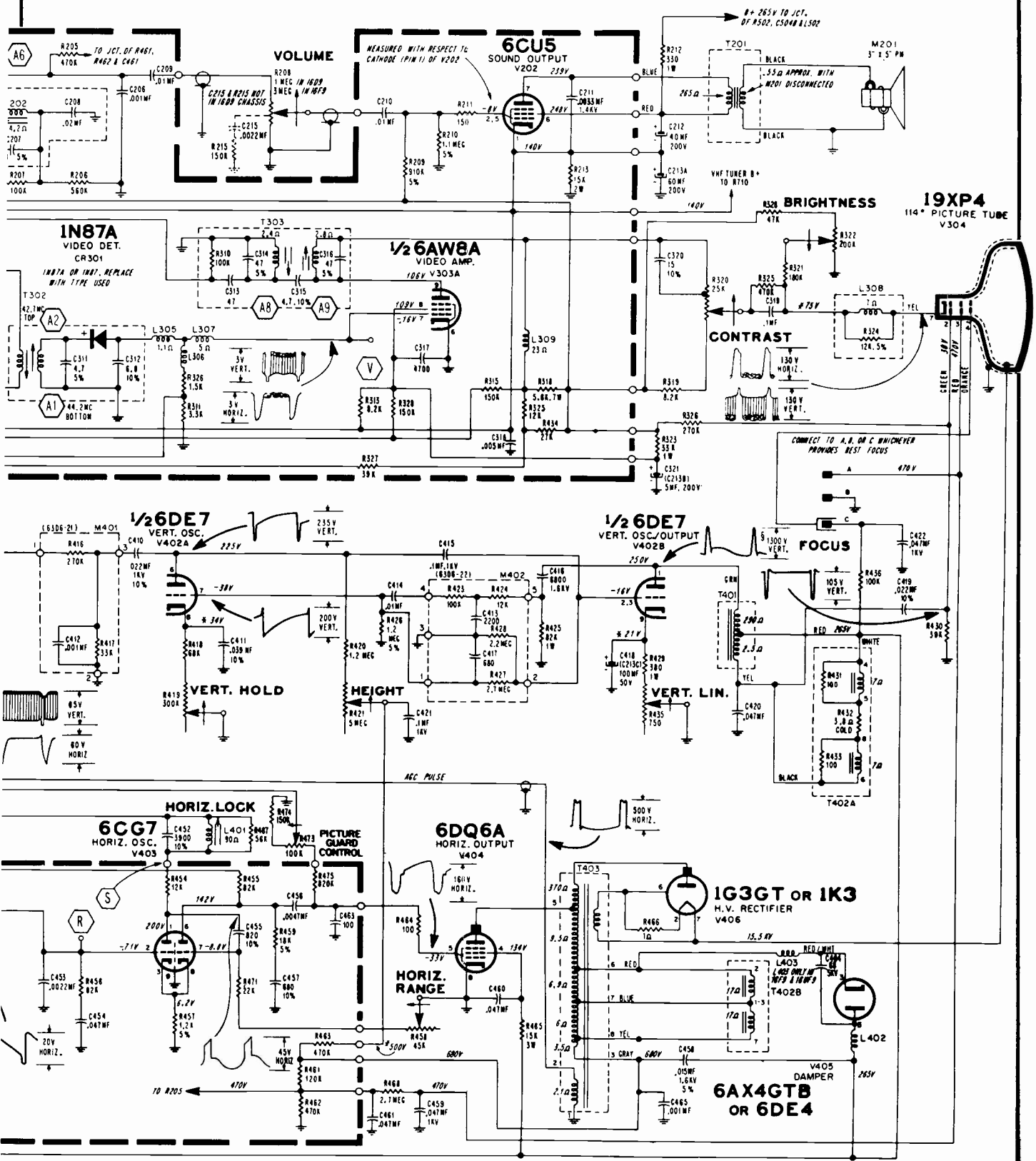




ADMIRAL Chassis 16D9, 16F9 (Chassis 16D9B, 16UD9, -B, 16UF9 use different tuners)

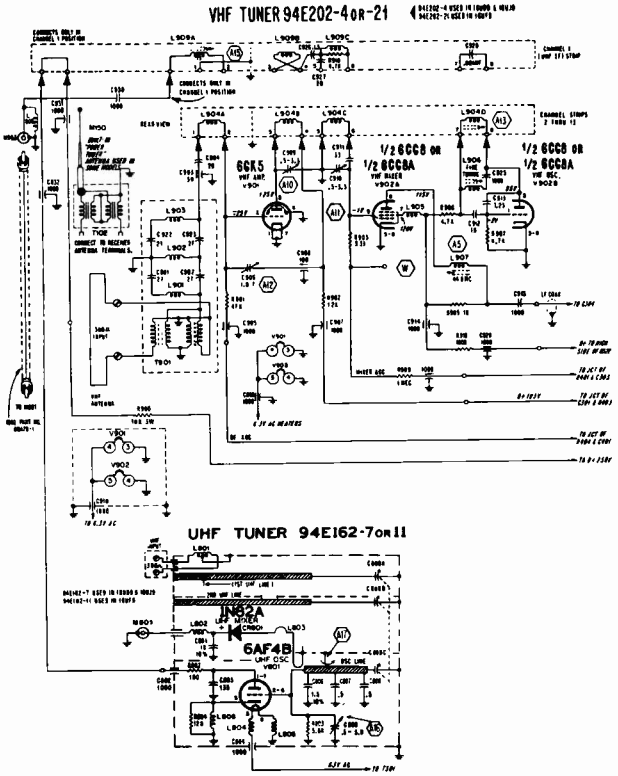


ADMIRAL Chassis 16D9, 16F9 (Chassis 16D9B, 16UD9,B, 16UF9 use different tuners)



ADMIRAL Chassis 16D9, -B, 16UD9, -B, 16F9, 16UF9, Service Material, Continued

Schematic for Tuners used in 16UD9 and 16UF9 Chassis.



AGC CONTROL ADJUSTMENT

The AGC control is an AGC threshold control which is used solely to adjust the receiver for optimum operation under all signal conditions.

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

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

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

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

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

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

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

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

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

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

Note: For Picture Guard Adjustment see following paragraph.

PICTURE GUARD ADJUSTMENT

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

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

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

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

HORIZONTAL LOCK ADJUSTMENT

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

1. Allow a few minutes for set to warm up. Tune in weakest station, set Brightness and Contrast controls for normal Picture. Important: Before proceeding, be sure that AGC control has been adjusted according to instructions in this manual.

2. Reduce Contrast to minimum. Very slowly turn Horizontal Lock adjustment to the right or left until picture is in sync. Interrupt the television signal by switching Channel Selector off and on channel. Picture should remain in sync. If picture bends or loses sync, adjust the Horizontal Lock so that picture remains in sync and bending of vertical lines does not appear at top of picture. Check adjustment on all channels; if necessary, repeat procedure.

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

HORIZONTAL RANGE ADJUSTMENT

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

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

1. Remove cabinet back. Connect interlock cord.

2. Allow a few minutes for set to warm up. Tune in weakest station, set Brightness and Contrast controls for a normal picture. Important: Before proceeding, be sure that the AGC control has been adjusted according to instructions in this manual.

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

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

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

6. Remove the .22 mf capacitor from the horizontal lock coil. Set horizontal lock coil at point where picture is in horizontal sync and almost remains stationary with tendency to shift to left or right.

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

8. Set Channel Selector to weakest station. Switch Channel Selector on and off channel, picture should remain in horizontal sync. If necessary, adjust horizontal lock coil slightly to bring picture in sync.

ADMIRAL Chassis 16D9, -B, 16UD9, -B, 16F9, 16UF9, Alignment Data, Continued

IF AMPLIFIER ALIGNMENT

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

Connect signal generator high side to insulated tube shield over oscillator-mixer tube, low side to chassis near tube shield.

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

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

Allow about 15 minutes for receiver and test equipment to warm up. Use a non-metallic alignment tool, part no. 98A30-13.

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

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

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

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

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

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

6. Place short jumper wire across L301.

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

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

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

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

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

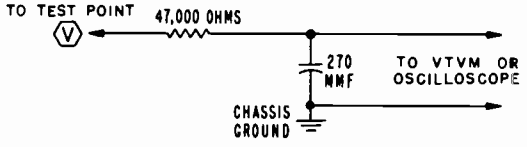


Figure A. Decoupling Filter.

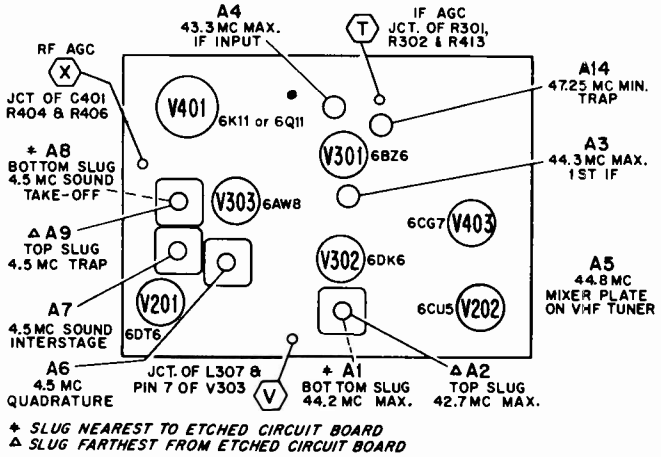


Figure B. View of Etched Circuit Board Showing Test Point Locations and IF Alignment Data.

IF RESPONSE CURVE CHECK AND IF TRAP ALIGNMENT

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

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

3. Connect sweep generator high side to insulated tube shield over oscillator-mixer tube, low side to chassis near tube shield. Set sweep frequency to 43 MC, sweep width approximately 7MC. If external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.

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

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

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

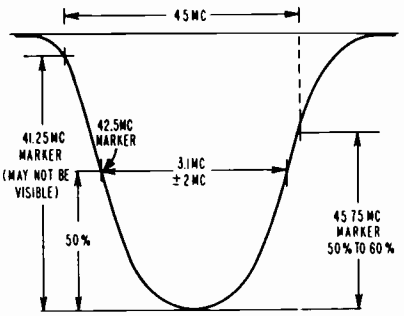


Figure C. Ideal IF Response Curve.

VHF AMPLIFIER AND MIXER ALIGNMENT

Connect negative of 3.0 volt bias supply to test point "X" (RF AGC), positive to chassis, see figure B.

Connect sweep generator 300 ohm output to antenna terminals. If sweep generator does not have a built-in marker generator, loosely couple a marker generator to the antenna terminals. To avoid distortion of the response curve, keep sweep generator output at a minimum, marker pips just barely visible.

Connect oscilloscope high side through 15,000 ohm resistor to test point "W" on tuner, low side to chassis. Keep scope leads away from chassis. Allow about 15 minutes for receiver and test equipment to warm up. See figures F1 through G2 for adjustment locations.

Do not remove VHF Tuner bottom shield during alignment.

1. Set sweep generator sweeping channel 10. Video marker at 193.25 MC; sound marker at 197.75 MC. Set Channel Selector to channel 10. Check response obtained with VHF response curve shown in figure E. Alternately adjust A10 and A11 as required to obtain curve having maximum amplitude, symmetry and flat top appearance consistent with proper bandwidth and correct marker location.

2. Set sweep generator sweeping channel 6. Video marker at 83.25 MC; sound marker at 87.75 MC. Set Channel Selector to channel 6. Check response obtained with VHF response curve. If curve is not within limits, compromise adjustment is required. Alternately adjust A10 and A11 as required to obtain curve having maximum amplitude, symmetry and flat top appearance consistent with proper bandwidth and correct marker location. After adjustment, recheck adjustment of step 1.

*3. Set sweep generator sweeping channel 10. Video marker at 193.25 MC; sound marker at 197.75 MC. Set Channel selector to channel 10. Use 15 volts bias. Increase sweep generator output to maximum and increase *oscilloscope gain as required for obtaining usable response curve. Adjust A12 for minimum response (amplitude). After adjusting A12, conclude by repeating steps 1, 2 and 4.

*Neutralizing adjustment (not in 94E200 tuners). If usable response curve is not obtained, connect oscilloscope to test point "V" through decoupling filter, see figures A and B. Note: IF amplifier must be in normal alignment. Adjust A12 for equal peak amplitudes with dip at center of curve.

ADMIRAL Chassis 16D9, -B, 16UD9, -B, 16F9, 16UF9, Alignment Data, Continued

4. Set the sweep generator to sweep the channel to be checked. Set the marker generator for the corresponding video carrier frequency and sound carrier frequency. Use 3 volts bias. Check each channel operating in the service area for curve shown. In general, adjustment performed in steps 1 and 2 are sufficient to give satisfactory response curves on all channels. However, if reasonable alignment is not obtained on an operating channel, repeat steps 1 and 2 as a compromise adjustment to favor the particular channel.

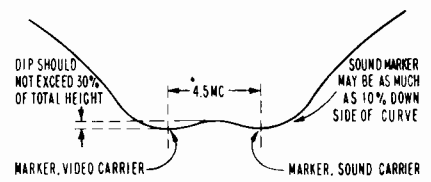


Figure E. Ideal VHF Response Curve.

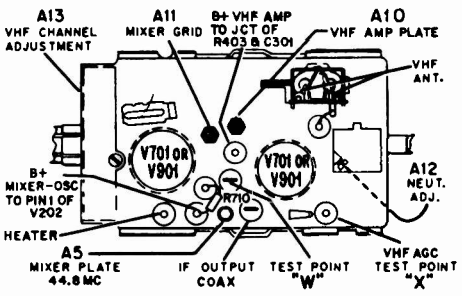


Figure F1. Top View of VHF Tuners 94E201-3 and -20.

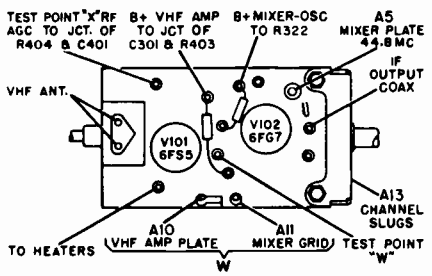


Figure F2. Top View of VHF Tuner 94E200-3.

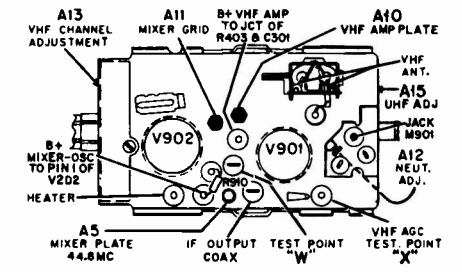


Figure G1. Top View of VHF Tuners 94E202-4 and -21.

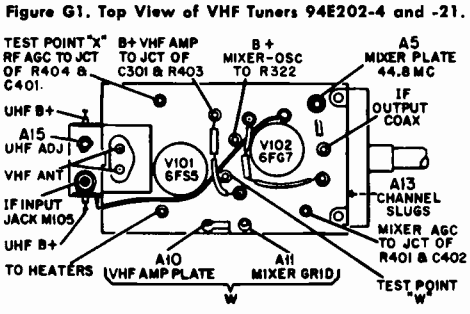


Figure G2. Top View of VHF Tuner 94E200-4.

OVER-ALL VHF AND IF RESPONSE CURVE CHECK

Set AGC control fully to the left. Channel Selector on channel 12. Connect negative of 3V bias to test points "T" (IF AGC) and "X" (RF AGC), positive to chassis. Connect negative of 9 volt bias supply to center terminal of picture guard control, positive to chassis. See figure B.

Connect sweep generator to antenna terminals. Set sweep to channel 12 with sweep output as low as possible. If an external marker generator is used, loosely couple high side to sweep generator lead.

Connect oscilloscope high side to test point "V" through decoupling filter, low side to chassis.

Compare response curve obtained against ideal curve shown in figure H. If the curve is not within tolerance, adjust A5 to position video marker; adjust A1 to correct shape of curve. It should never be necessary to turn slugs more than one turn in either direction. If curve is satisfactory on channel checked, all other channels should be satisfactory. IMPORTANT: When sweep output is reduced, response curve amplitude on scope should also decrease, but curve shape should remain the same. If curve shape changes, reduce sweep output and/or scope gain until shape does not change.

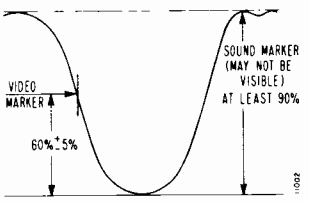


Figure H. Ideal Over-all VHF and IF Response Curve.

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).

4.5 MC SOUND IF ALIGNMENT

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

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

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

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

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

6. If above alignment is correctly made, no further adjustment is required. However, if sound remains distorted at normal volume level (when receiver is tuned for best sound), repeat entire procedure.

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

ALIGNMENT OF UHF IF INPUT COIL

To align UHF IF input coil, tune in UHF channel with normal picture and sound. Using non-metallic alignment tool (Admiral part number 98A30-14) very carefully adjust slug A15 for best picture, consistent with good sound. For VHF tuner adjustment locations, see figures G1 and G2.

ADMIRAL

MODEL CHART

Model	TV Chassis
C311	20A8
CU311	20UA8
C312	20A8
CU312	20UA8
C313	20A8
CU313	20UA8
C321	20A8
CU321	20UA8
C322	20A8
CU322	20UA8
C323	20A8
CU323	20UA8
C331	20A8
CU331	20UA8
C332	20A8
CU332	20UA8
C333	20A8
CU333	20UA8
L311	20A8
LU311	20UA8
L312	20A8
LU312	20UA8
L313	20A8
LU313	20UA8
L341	20A8
LU341	20UA8
L342	20A8
LU342	20UA8
L343	20A8
LU343	20UA8
L351	20A8
LU351	20UA8
L352	20A8
LU352	20UA8
L353	20A8
LU353	20UA8
L361	20B8
LU361	20UB8
L362	20B8
LU362	20UB8
L382	20B8
LU382	20UB8
L389	20B8
LU389	20UB8
L391	20B8
LU391	20UB8

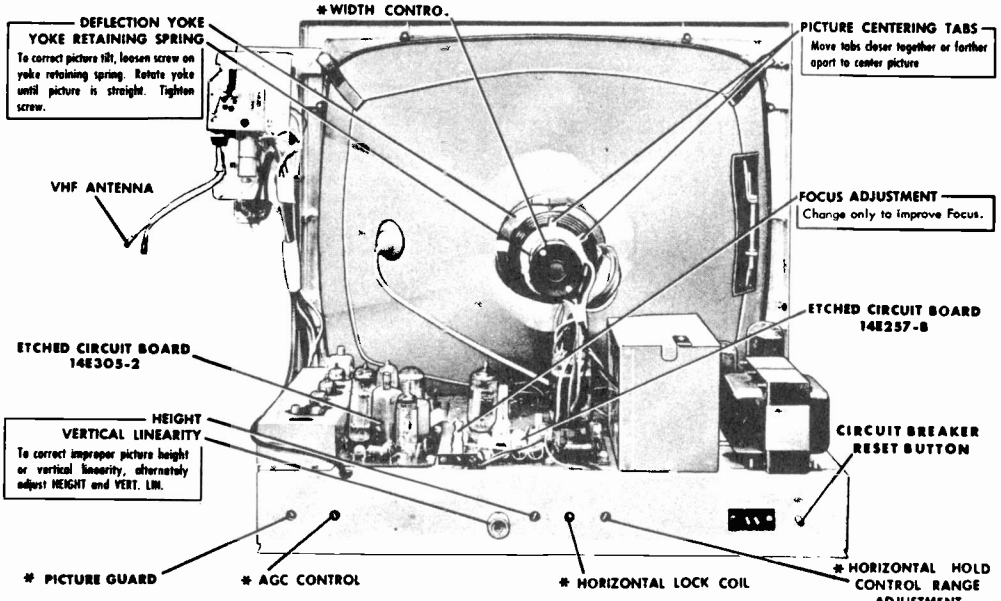
Service material on pages 21 through 26 is exact for chassis and their corresponding models as listed in the chart at left.

The group of chassis and their corresponding models as listed at right incorporate a stereo amplifier and some have AM-FM radio with stereo amplifier. The television section of these sets, except for required switching additions, is practically identical to sets described on these pages and this material is applicable.

MODEL CHART

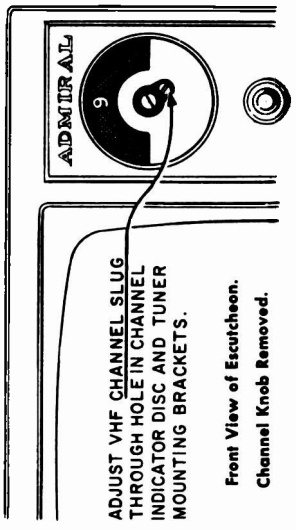
Model	TV CHASSIS△
ST311*	20D8
STU311*	20UD8
ST312*	20D8
STU312*	20UD8
ST313*	20D8
STU313*	20UD8
STF321†	20D8
STFU321†	20UD8
STF322†	20D8
STFU322†	20UD8
STF323†	20D8
STFU323†	20UD8
STF339†	20D8
STFU339†	20UD8
STF341§	20D8
STFU341§	20UD8
STF361†	20D8
STFU361†	20UD8
STF371‡	20D8
STFU371‡	20UD8
STF389‡	20D8
STFU389‡	20UD8

* With 3F2 Stereo amplifier
† With 6S3C AM-FM radio and 2PA5 stereo amplifier
‡ With 6S3B AM-FM radio and 2PA5 stereo amplifier
§ With 6S3 AM-FM radio and 2PA5 stereo amplifier
△ Suffix letter M after chassis number indicates separate tuning control panel



* DETAILED ADJUSTMENT INFORMATION GIVEN ON OTHER PAGES

Rear View of Chassis Showing Adjustment Locations. Tuner and controls mounted on separate panel in some models; on escutcheon in other models.



ADJUST PRESET FINE TUNING
(Sets with 20B8 or 20UB8 Chassis)

To insure good pictures and sound, it is important that this adjustment be made when set is initially installed and adjustment be checked each time receiver is serviced. Note: Adjustment of preset fine tuning is made from front of set with rotation of push-in fine tuning knob. Adjust as follows:

1. Turn set on and allow 15 minutes for warm up.
2. Set channel selector at channel to be adjusted. Set other tuning controls for normal picture and sound. Remove channel selector knob.
3. Press "push-in" fine tuning knob all the way in, until it engages slot in tuning mechanism. While holding knob in, turn it to the right until a definite stop is felt. Then very slowly, turn it to the left while tuning for best picture with clearest sound. Note: Sound may not be loudest at this point.
4. Release knob after making adjustment. Repeat steps 2 and 3 for each operating channel.

VHF CHANNEL ADJUSTMENT FOR SETS WITH 20A8, 20UA8 AND 20UA8M CHASSIS

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

1. Turn set on and allow 15 minutes for warm up.
2. Set Channel Selector at channel to be adjusted. Set other tuning controls for normal picture and sound.
3. Remove Channel Selector knob. Turn Fine Tuning knob to left or right until channel slug is visible through hole in rotating fiber strip at front of VHF tuner.
4. Carefully insert 3/32" screwdriver blade, flexible, nonmetallic alignment tool (part number 98B30-22) through hole in channel indicator disc and tuner mounting brackets. With slight inward pressure and rotation, work alignment tool into adjustment hole of tuner. When alignment tool engages channel slug, carefully adjust slug for best picture. Note: Sound may not be loudest at this point.
5. Repeat entire procedure for each operating channel.

ADMIRAL Chassis 20A8, 20UA8, 20B8, 20UB8, Alignment Information, Continued

IF AMPLIFIER ALIGNMENT

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

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

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

Set Channel Selector to channel 12. Connect jumper wire across antenna terminals. Set Contrast control fully to right, 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. 98B30-13.

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

*1. Set generator at 47.25 MC and adjust A1 for minimum.

*2. Set generator at 41.25 MC and adjust A2 for minimum.

*3. Set generator at 39.75 MC and adjust A3 for minimum.

4. Short out IF input coil L302 with jumper wire.

†5. Set generator at 45.3 MC and adjust A6 for maximum. Top of core A6 should be about level with top surface of tuner.

6. Remove short from IF input coil L302.

†7. With generator at 45.3 MC, adjust A7 for maximum.

†8. Set generator at 42.0 MC and adjust A4 and A5 for maximum.

9. Repeat step 1.

†10. Set generator at 42.3 MC and adjust A8 for maximum.

†11. Set generator at 44.2 MC and adjust A9 for maximum.

†12. Repeat steps 10 and 11. 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.

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

IF RESPONSE CURVE CHECK

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

2. Set VHF tuner on channel 12. Contrast control fully to right, 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. Connect negative of 9 volt bias supply to center terminal of Picture Guard control, positive to chassis. See figure B.

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

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

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

If video IF carrier marker (45.75 MC) does not fall at the 50 to 60% point on curve, position it with adjustment of A7. If curve is not symmetrical, adjust A9.

VHF AMPLIFIER AND MIXER ALIGNMENT

Connect negative of 3.0 volt bias supply to test point "X" (RF AGC), positive to chassis, see figure B.

Connect sweep generator 300 ohm output to antenna terminals. If sweep generator does not have a built-in marker generator, loosely couple a marker generator to the antenna terminals. To avoid distortion of the response curve, keep sweep generator output at a minimum, marker pips just barely visible.

Connect oscilloscope high side through 15,000 ohm resistor to test point "W" on tuner, low side to chassis. Keep scope leads away from chassis. Allow about 15 minutes for receiver and test equipment to warm up. See figures F and G for adjustment locations.

Do not remove VHF Tuner bottom shield during alignment.

1. Set sweep generator sweeping channel 10. Video marker at 193.25 MC; sound marker at 197.75 MC. Set Channel Selector to channel 10. Check response obtained with VHF response curve shown in figure E. Alternately adjust A14 and A15 as required to obtain curve having maximum amplitude, symmetry and flat top appearance consistent with proper bandwidth and correct marker location.

2. Set sweep generator sweeping channel 6. Video marker at 83.25 MC; sound marker at 87.75 MC. Set Channel Selector to channel 6. Check response obtained with VHF response curve. If curve is not within limits, compromise adjustment is required. Alternately adjust A14 and A15 as required to obtain curve having maximum amplitude, symmetry and flat top appearance consistent with proper bandwidth and correct marker location. After adjustment, recheck adjustment of step 1.

*3. Set sweep generator sweeping channel 10. Video marker at 193.25 MC; sound marker at 197.75 MC. Set Channel selector to channel 10. Use 15 volts bias. Increase sweep generator output to maximum and increase *oscilloscope gain as required for obtaining usable response curve. Adjust A16 for minimum response (amplitude). After adjusting A16, conclude by repeating steps 1, 2 and 4.

*Neutralizing adjustment. If usable response curve is not obtained, connect oscilloscope to test point "V" through decoupling filter, see figures A and B. Note: IF amplifier must be in normal alignment. Adjust A16 for equal peak amplitudes with dip at center of curve.

4. Set the sweep generator to sweep the channel to be checked. Set the marker generator for the corresponding video carrier frequency and sound carrier frequency. Use 3 volts bias. Check each channel operating in the service area for curve shown. In general, adjustments performed in steps 1 and 2 are sufficient to give satisfactory response curves on

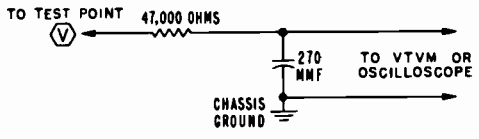


Figure A. Decoupling Filter.

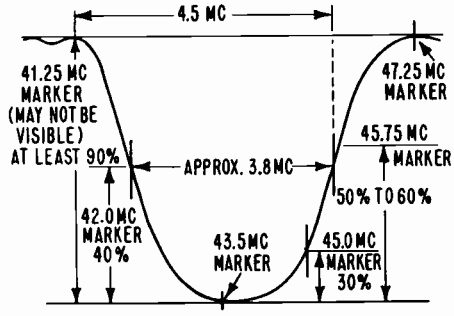
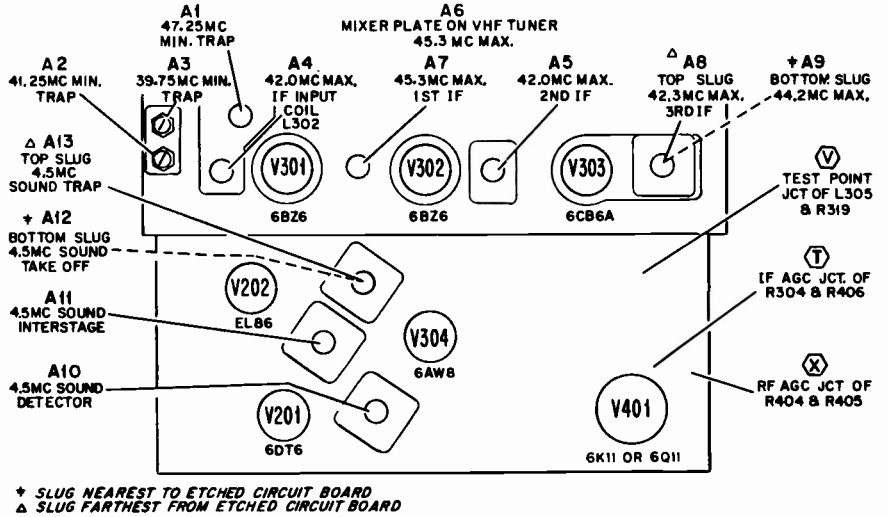


Figure C. Ideal IF Response Curve.



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

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

ADMIRAL Chassis 20A8, 20UA8, 20B8, 20UB8, Service Information, Continued

all channels. However, if reasonable alignment is not obtained on an operating channel, repeat steps 1 and 2 as a compromise adjustment to favor the particular channel. If a compromise adjustment is made, other channels operating in the service area should be checked to make certain that they have not been appreciably affected.

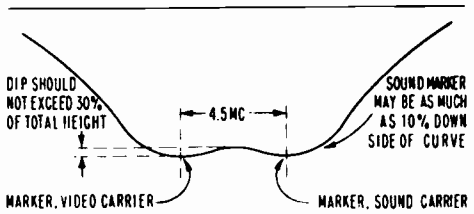


Figure E. Ideal VHF Response Curve.

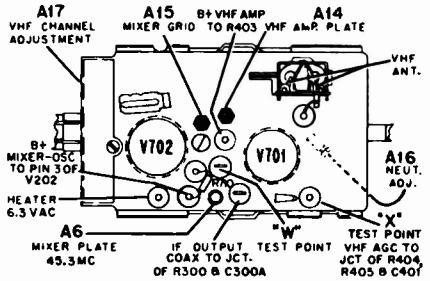


Figure F. Top View of VHF Tuners 94E201-8 and -14.

OVER-ALL VHF AND IF RESPONSE CURVE CHECK

Set AGC control fully to the left. Channel Selector on Channel 12. Connect negative of 3V bias supply to test points "T" (IF AGC) and "X" (RF AGC), positive to chassis. Connect negative of 9 volt bias supply to center terminal of picture guard control, positive to chassis. See figure B.

Connect sweep generator to antenna terminals. Set sweep to channel 12 with sweep output as low as possible. If an external marker generator is used, loosely couple high side to sweep generator lead.

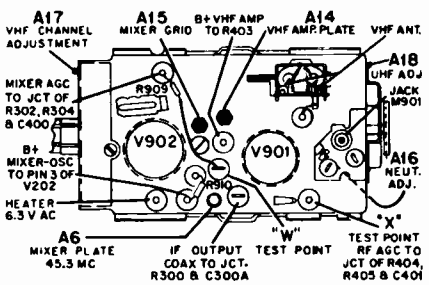


Figure G. Top View of VHF Tuner 94E202-15.

Connect oscilloscope high side to test point "V" through decoupling filter, low side to chassis.

Compare response curve obtained against ideal curve shown in figure H. If the curve is not within tolerance, adjust A7 to position video marker; adjust A9 to correct shape of curve. It should never be necessary to turn slugs more than one turn in either direction. If curve is satisfactory on channel checked, all other channels should be satisfactory. IMPORTANT: When sweep output is reduced, response curve amplitude on scope should also decrease, but curve shape should remain the same. If curve shape changes, reduce sweep output and/or scope gain until shape does not change.

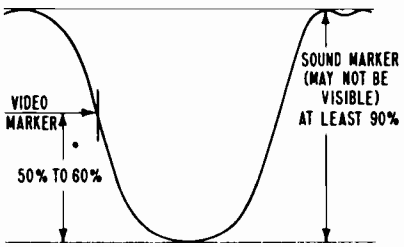


Figure H. Ideal Over-all VHF and IF Response Curve.

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.

PICTURE GUARD ADJUSTMENT

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

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

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

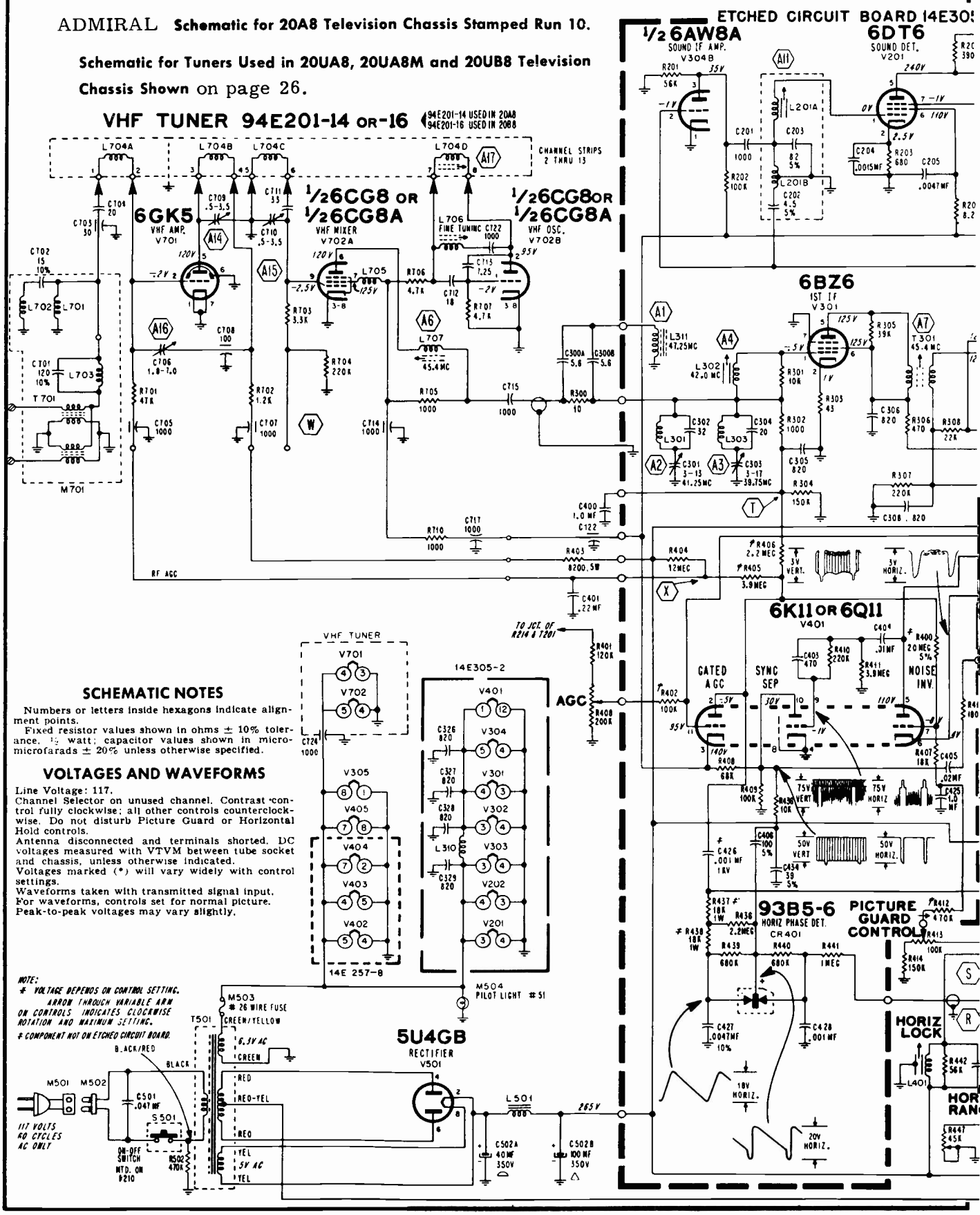
WIDTH ADJUSTMENT

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 **Schematic for 20A8 Television Chassis Stamped Run 10.**

Schematic for Tuners Used in 20UA8, 20UA8M and 20UB8 Television Chassis Shown on page 26.



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.

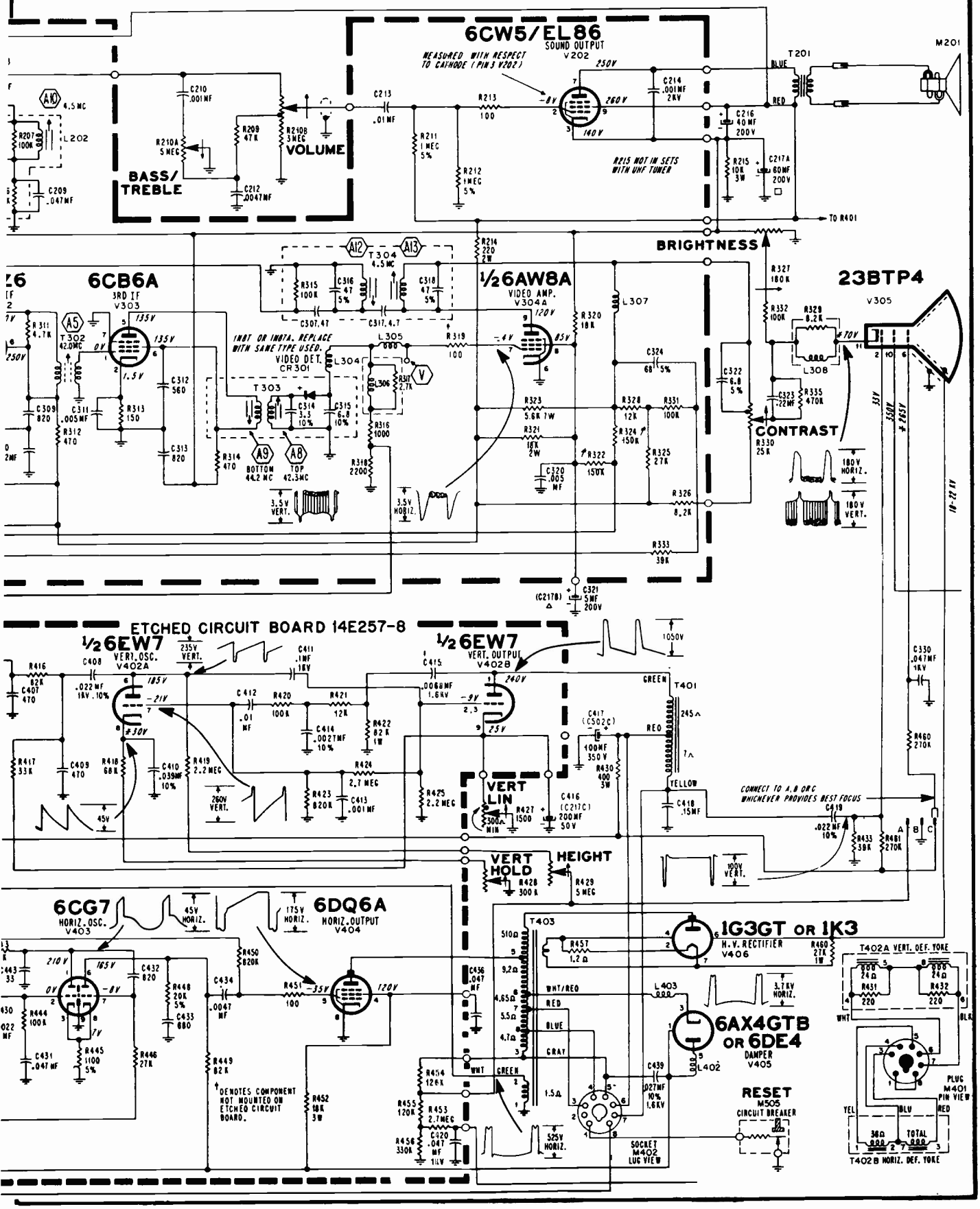
Channel Selector on unused channel. Contrast control fully clockwise; all other controls counterclockwise. Do not disturb Picture Guard or Horizontal Hold controls.

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.

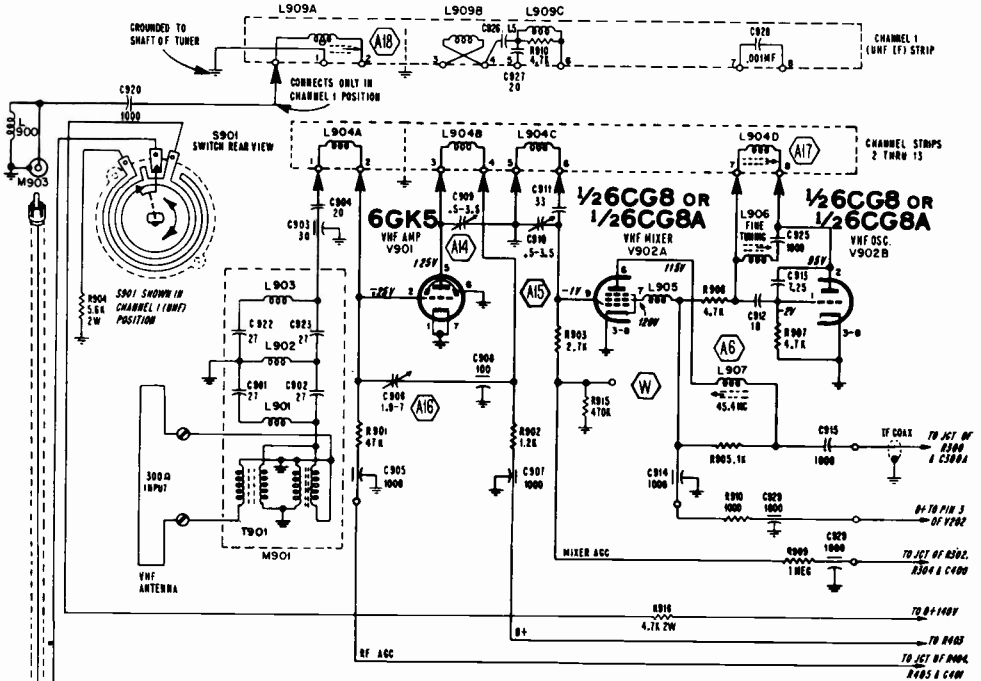
Waveforms taken with transmitted signal input. For waveforms, controls set for normal picture. Peak-to-peak voltages may vary slightly.

NOTE:
* VOLTAGE DEPENDS ON CONTROL SETTING. ARROW THROUGH VARIABLE ARM ON CONTROLS INDICATES CLOCKWISE ROTATION AND MAXIMUM SETTING.
COMPONENT NOT ON ETCHED CIRCUIT BOARD.


6CW5/EL86
SOUND OUTPUT
V202
MEASURED WITH RESPECT TO CATHODE (PIN 3 V202)
BASS/ TREBLE
VOLUME
R215 NOT IN SETS WITH UHF TUNER
T201
M201
BLUE
RED
TO R401
BRIGHTNESS
6CB6A
3RD IF
V303
1/26AW8A
VIDEO AMP.
V304A
23BTP4
V305
CONTRAST
VIDEO DET.
CR301
ETCHED CIRCUIT BOARD 14E257-8
1/26EW7
VERT. OSC.
V402A
1/26EW7
VERT. OUTPUT
V402B
VERT LIN
VERT HOLD
HEIGHT
6CG7
HORIZ. OSC.
V403
6DQ6A
HORIZ. OUTPUT
V404
1G3GT OR 1K3
H.V. RECTIFIER
V406
6AX4GTB OR 6DE4
DAMPER
V405
RESET
M505
CIRCUIT BREAKER
SOCKET M402 LUG VIEW
PLUG M401 PIN VIEW
T402A VERT. DEF. YOKE
T402B HORIZ. DEF. YOKE
CONNECT TO A, B OR C WHICHEVER PROVIDES BEST FOCUS
* DENOTES COMPONENT NOT MOUNTED ON ETCHED CIRCUIT BOARD.

ADMIRAL Chassis 20A8, 20UA8, 20B8, 20UB8, Service Information, Continued

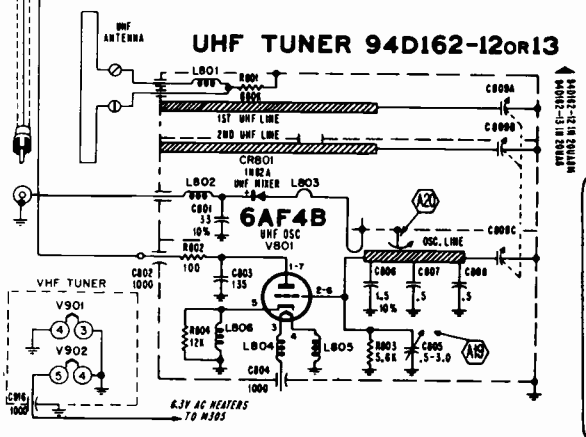
VHF TUNER 94E202-15



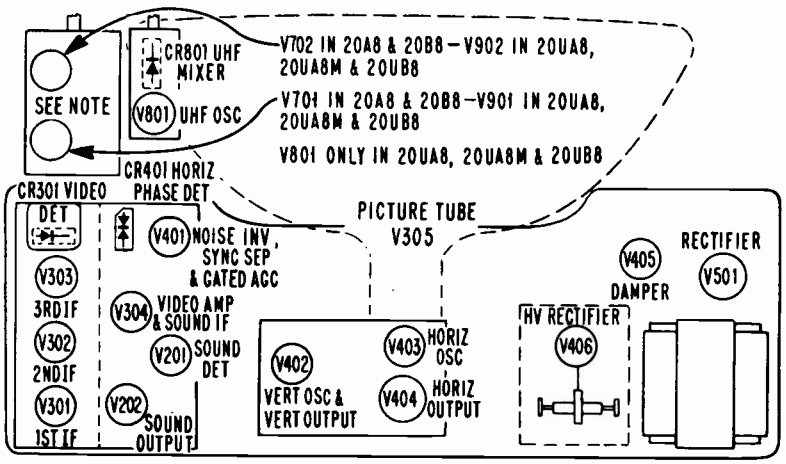
TUBE COMPLEMENT

20A8 and 20B8	20UA8, 20UA8M and 20UB8
V701—6GK5	V901—6GK5
V702—6CG8 or 6CG8A	V902—6CG8 or 6CG8A
V201—6DT6	V201—6DT6
V202—6CW5/EL86	V202—6CW5/EL86
V301—6BZ6	V301—6BZ6
V302—6BZ6	V302—6BZ6
V303—6CB6A	V303—6CB6A
V304—6AW8A	V304—6AW8A
V305—23BTP4	V305—23BTP4
V401—6K11 or 6Q11	V401—6K11 or 6Q11
V402—6EW7	V402—6EW7
V403—6CG7	V403—6CG7
V404—6DQ6A	V404—6DQ6A
V405—6AX4GTB or 6DE4	V405—6AX4GTB or 6DE4
V406—1G3GT/1K3	V406—1G3GT/1K3
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)

UHF TUNER 94D162-12 OR 13



TUBE LOCATIONS



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

1. Remove cabinet back. Connect interlock (jumper) cord.

2. Allow a few minutes for set to warm up. Tune in weakest station, set Brightness and Contrast controls for a normal picture. Important: Before proceeding, be sure that the AGC control has been adjusted according to instructions given in this manual.

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

4. Connect a .22 mf. 400 volt capacitor from test point "S" (junction of horizontal lock coil L401 and resistor R443, 10,000 ohms) to chassis ground. Caution: To avoid B+ shock, turn receiver off when making this connection.

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

6. Remove the .22 mf capacitor from the horizontal lock coil. Set horizontal lock coil at point where picture is in horizontal sync and almost remains stationary with tendency to shift to left or right.

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

Emerson Television

Models Using Chassis
120507-A, 120508-B
120515-C, 120516-D
120541-C, 120542-D
120564-C, 120565-D

VHF RECEIVERS (TV ONLY)

MODEL	CHASSIS	CABINET STYLE	C R T	TUNERS
1524	120507-A	Portable	17BJP4	471212
1526		Table Model		
1528	120515-C	Console	21CBP4A	471230
1530		Table Model		
1540	120541-C or 120564-C	Table Model	23XP4 On Chassis 120541-C or 23YP4 On Chassis 120564C	
1542		Consolette		
1544	120541-C	Table Model		
1546	120541-C or 120564-C	Console		
1548		Loboy		
1552	120541-C	Table Model		

UHF-VHF RECEIVERS (TV ONLY)

MODEL	CHASSIS	CABINET STYLE	C R T	TUNERS
1525	120508-B	Portable	17BJP4	471213 (VHF) 471220 (UHF)
1529	120516-D	Console	21CBP4A	471231 (VHF) 471220 (UHF)
1531		Table Model		
1541	120542-D or 120565-D	Table Model	23XP4 On Chassis 120542-D or 23YP4 On Chassis 120565-D	
1543		Consolette		
1545	120542-D	Table Model		
1547	120542-D or 120565-D	Console Loboy		
1549				
1553	120542-D	Table Model		

LOBOY COMBINATION MODELS (VHF & UHF-VHF)

Note: All Even Model Numbers Are VHF Only Receivers.
All Odd Model Numbers Are UHF-VHF Receivers.

MODEL	TV CHASSIS	AM/FM TUNER	STEREO AMPLIFIER	RECORD CHANGER	C R T	TUNERS
1532	120541-C	None Used	120535-B	819159 Four-Speed Stereo Changer	23XP4 (Chassis: 120541-C, 120542-D) OR 23YP4 (Chassis: 120564-C 120565-D	471230 (VHF) Chassis: 120541-C, 120564-C OR 471231 (VHF), 471220 (UHF) Chassis: 120542-D 120565-D
1533	120542-D					
1534	120541-C	120533-B	120536-B			
1534-A	120541-C or 120564-C					
1534-B	120564-C					
1535	120542-D					
1535-A	120542-D or 120565-D					
1535-B	120565-D					
1536	120541-C	None Used	120535-B			
1537	120542-D					
1538	120541-C	120534-B (Combined AM-Stereo)				
1539	120542-D					
1550	120564-C	120533-B	120536-B			
1551	120565-D					

GENERAL INFORMATION

The models described in this service note are TV receivers featuring a new high-gain chassis equipped with aluminized picture tube and glare-free faceplate which can be easily removed from the cabinet front. All 23" models employ the new square-cornered type of CRT with bonded faceplate, which requires only cleaning of the exposed screen surface. The front tuning system utilized provides for ease of channel selection as well as rapid adjustment of the Contrast, Brightness and Vertical Hold controls, while the "Magic Memory" volume control employed eliminates the need for re-setting of the audio level each time the set is turned on. A four-section "Hide-Away" dipole is supplied with portable models, remaining sets have a built-in antenna concealed within the cabinet.

OTHER FEATURES

All combination receivers in this series (models 1532 through 1539 and models 1550, 1551) feature a dual-channel stereophonic amplifier with matched speaker systems for each channel contained within the cabinet. The four-speed stereo record changer employed in these models is equipped with dual sapphire styli and supplied with a 45 RPM adaptor spindle to eliminate the need for individual center-hole inserts. Models 1538 and 1539 are TV-Phonoradio combinations utilizing a combined chassis for AM reception and stereophonic record reproduction; models 1534, 1535, 1550 and 1551 are similar, but feature a separate AM/FM simulcast tuner chassis in addition to the dual-channel stereo amplifier.

DISASSEMBLY PROCEDURE, TV CHASSIS

(See also separate instructions for removal of record changer, radio chassis and/or stereo amplifier chassis where combination sets are concerned.)

TO REMOVE PLASTIC FRONT (17" SETS);

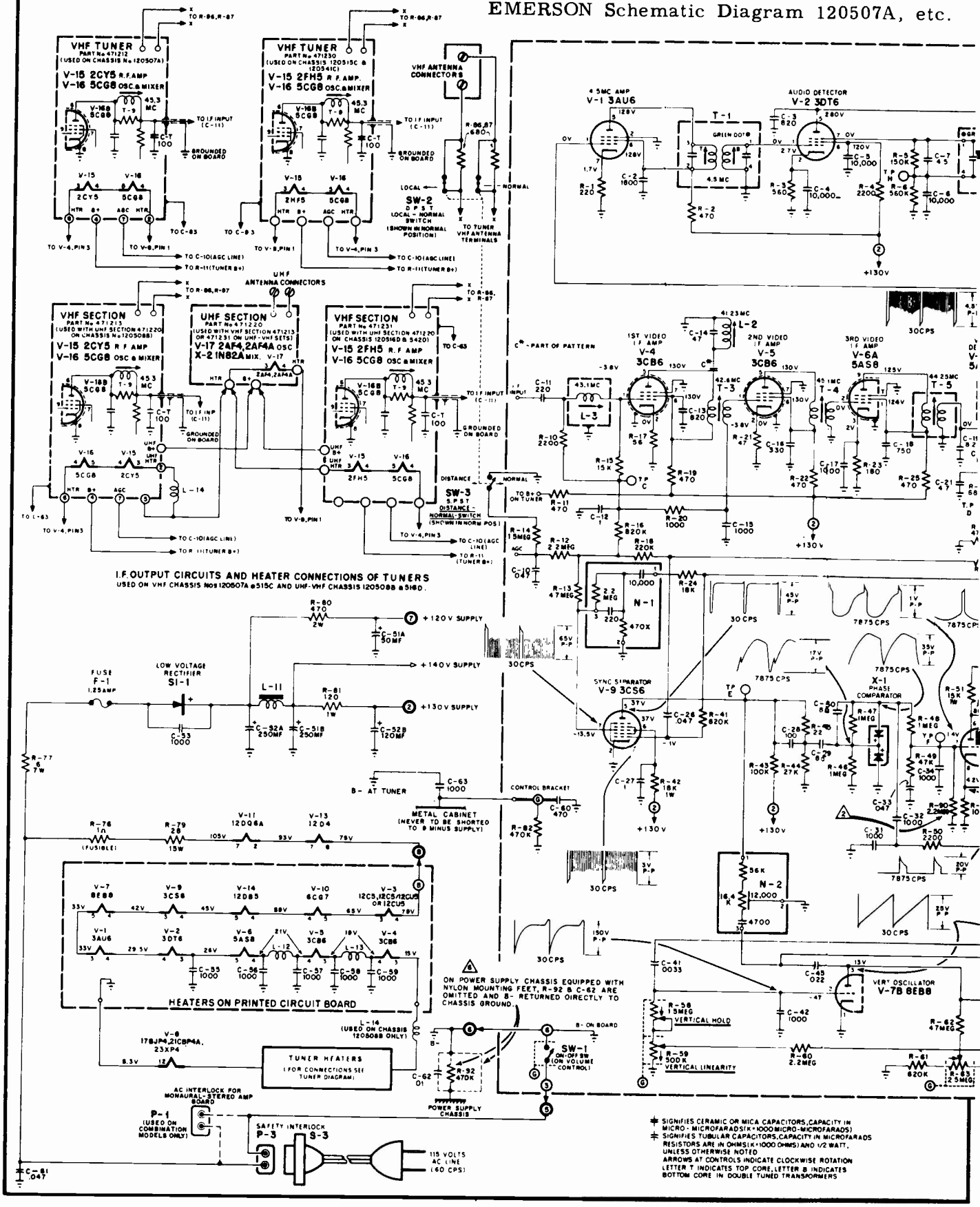
1. Remove line plug from wall outlet and knobs from cabinet front.
2. Remove three Phillips head screws located at bottom of plastic front, swing bottom edge out and unhook top edge from cabinet.
3. Re-assemble in reverse order.

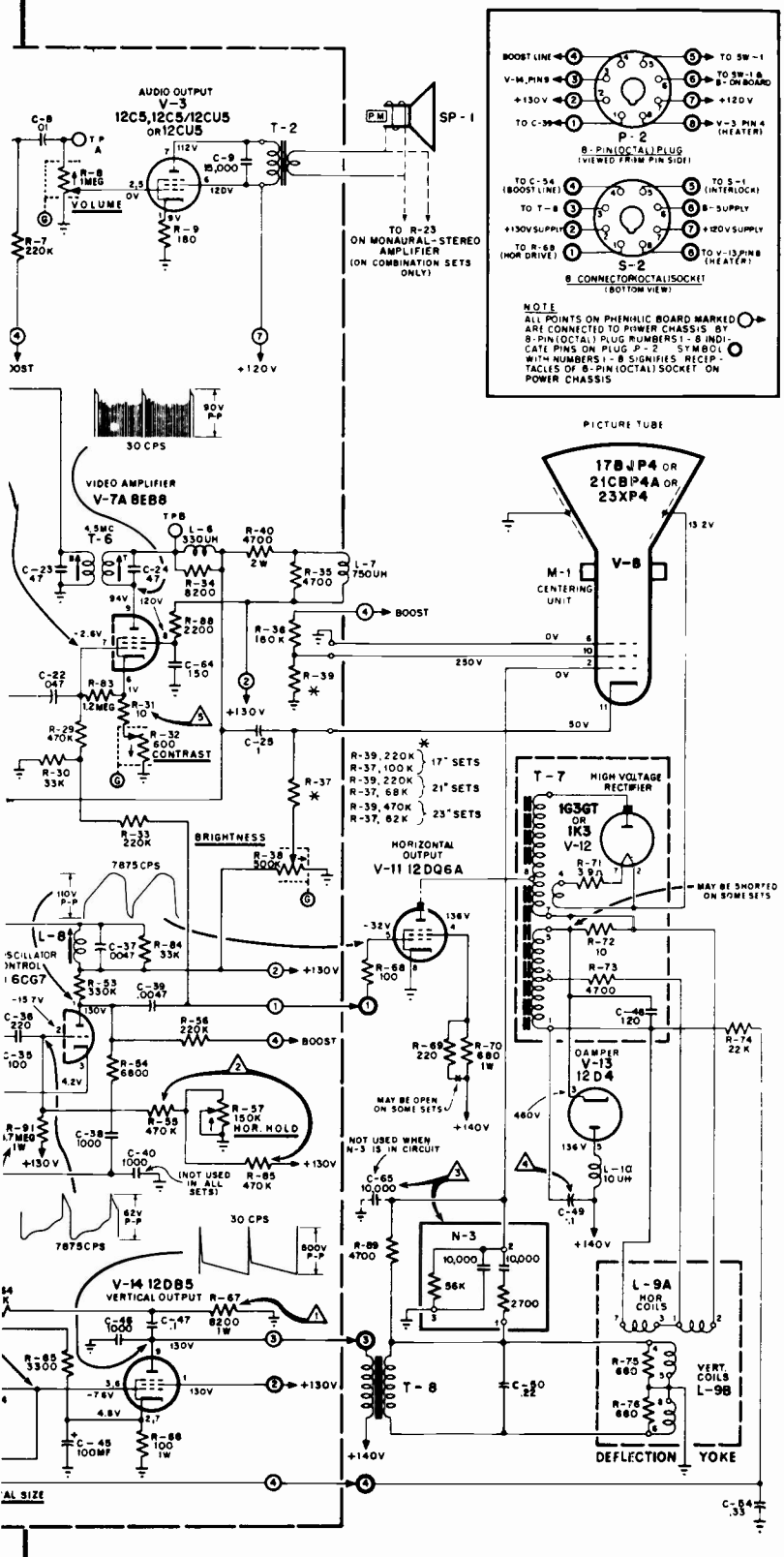
TO REMOVE SAFETY GLASS (21" SETS);

1. Remove line plug from wall outlet.
2. Remove screws used to secure retaining trim strip at top edge of safety glass and free strip from cabinet.
3. Tilt top edge of safety glass forward and lift up out of bottom retaining channel.
4. Re-assemble in reverse order.

NOTE: ALL 23 INCH MODELS utilize a bonded faceplate type of CRT which requires cleaning only of the exposed screen surface.

EMERSON Schematic Diagram 120507A, etc.





EMERSON Chassis 120507A, etc.

TO REMOVE POWER SUPPLY:

1. Remove line plug from wall outlet and back cover from rear of cabinet.

2. Remove socket from base of CRT and unplug green lead (pin 2 of CRT socket) from terminal strip on power supply.

3. Disengage 8 prong plug and cable assembly from video chassis at the power supply.

4. Remove two screws used to mount interlock bracket to floor of cabinet (combinations sets only).

5. Remove yoke clamp from yoke.

6. Disconnect high-voltage lead from second anode cavity of CRT and discharge by shorting to tuner chassis or aquadag coating on CRT.

7. Remove screws used to mount power supply chassis from underside of cabinet.

8. Slide chassis out through rear of cabinet while sliding yoke carefully from neck of CRT.

9. Re-assemble in reverse order.

TO REMOVE VIDEO CHASIS, FOLLOW STEPS 1 TO 3 AS OUTLINED FOR "REMOVAL OF POWER SUPPLY" AND;

4. Remove all TV control knobs from cabinet front.

5. Disengage speaker leads at the speaker (TV-only models) or from the speaker terminal strip mounted to floor of cabinet (combination sets).

6. Disconnect external VHF antenna (if used) and UHF antenna (UHF/VHF models only) from the ontenna terminal strip.

7. On sets utilizing an independently mounted antenna terminal strip, remove mounting screws and free strip from cabinet (Do not remove on sets where antenno terminal strip and mounting bracket are secured directly to chassis).

8. Remove two hex-head screws used to secure fibre mounting board at front of chassis to cabinet (21" and 23" sets only).

9. On 17" sets only, remove three hex-head screws used to secure rear chassis-mounting bracket to cabinet and slide chassis out to rear. On 21" and 23" sets, remove two Phillips head screws from top and two Phillips head screws from bottom of rear chassis-mounting rail and slide chassis out to rear.

10. Re-assemble in reverse order.

DISASSEMBLY PROCEDURES; RADIO, STEREO AMPLIFIER AND RECORD CHANGER

TO REMOVE RECORD CHANGER:

1. Remove line plug from wall outlet and back cover from rear of cabinet.

2. Disengage AC connector and both audio plugs from bottom of changer.

3. Remove plastic cable clamp used to secure audio cables to changer and disconnect remaining wire from ground lug located near dual sockets.

4. Remove "C" clips from bottom of three changer-mounting bolts and snap toggle clips (located on same three mounting bolts) into vertical position.

5. Set speed control on changer to 16 RPM.

6. Remove changer by lifting out through top of cabinet.

7. Re-assemble in reverse order, taking care to replace green audio cable in top, black audio cable in bottom of dual socket at base of record changer.

CHASSIS Nos. 120507A, 120508B, 120515C, 120516D, 120541C, 120542D

EMERSON Chassis 120564C, 120565D

TO REMOVE STEREO CHASSIS 120535B AND 120536B (USED IN MODELS 1532 TO 1536 AND 1550, 1551) FOLLOW STEPS 1 TO 3 AS OUTLINED FOR "REMOVAL OF RECORD CHANGER" AND:

4. Remove all stereo amplifier controls knobs from cabinet frant.

*5. Disconnect speaker leads from both left channel and right channel speakers.

6. Disconnect speaker leads from stereo amplifier at terminal strip mounted to floor of cabinet.

7. Disconnect th AC line cord (used to supply power to the stereo amplifier) fro n interlock on TV power supply. Mark interlocks in some manner to maintain proper line cord polarization during re-assembly (see page 2).

8. Remove pilot light assembly from bracket by sliding off to rear.

9. Disengage 9-prong power cable and 5-prong audio plug from tuner chassis (AM-FM-Phono combinations only).

10. Remove hex-head screw and washer from lower mounting bracket at front of chassis.

11. Remove hex-nut and washer from upper and lower mounting brackets at rear of chassis and remove chassis from cabinet.

12. Re-assemble in reverse order.

*NOTE: Mark speaker connections in some monner to ossure continued proper phasing of the stereo channels after re-assembly.

TO REMOVE AM/FM TUNER CHASSIS 120533B (USED IN MODELS 1534, 1535, 1550 AND 1551) REMOVE STEREO AMPLIFIER CHASSIS AS OUTLINED ABOVE AND;

1. Remove all tuner chassis knobs located inside record changer compartment.

2. Disconnect FM antenna, loosen screws used to secure FM antenna terminal strip and free strip from cabinet.

3. Disconnect both leads from AM loop antenna.

4. Remove three hex-head mounting screws located at lower left, lower right and center of plywood chassis mounting board and remove chassis from cabinet.

5. Re-assemble in reverse order.

TO REMOVE AM/STEREO CHASSIS 120534B (USED IN MODELS 1538 AND 1539) FOLLOW STEPS 1 TO 3 AS OUTLINED FOR "REMOVAL OF RECORD CHANGER", AND;

4. Remove AM tuning knob and stereo amplifier knobs locoted inside record changer compartment.

5. Disconnect both leads from AM loop antenno.

**6. Disconnect speaker leads from both left channel and right channel speakers.

7. Disconnect speaker leads from stereo-amplifier at terminal strip mounted to floor of cabinet.

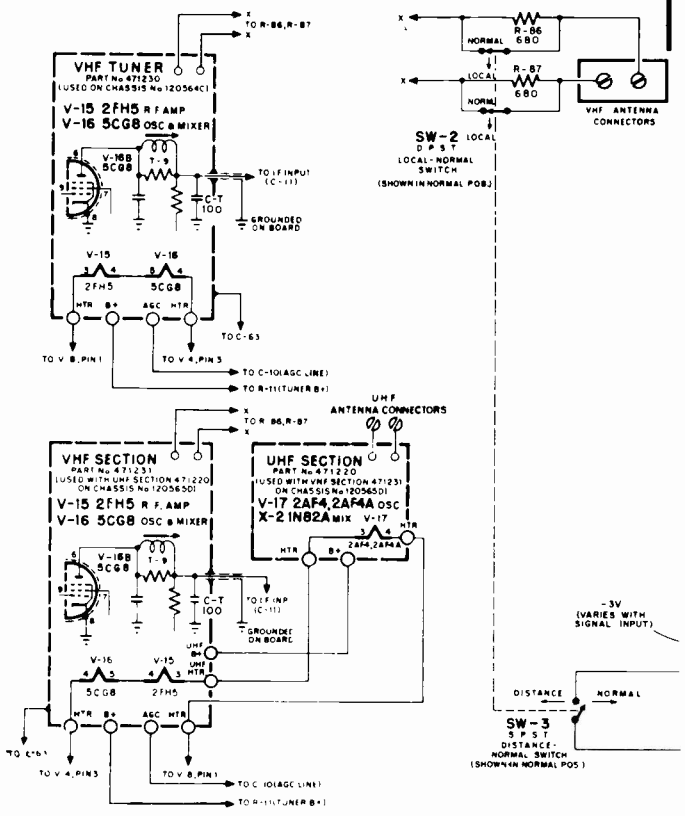
8. Disconnect AC line cord (used to supply power to stereo amplifier) from interlock on TV power supply. Mark interlock in some manner to maintain proper line cord polarization during re-assembly (see poge 2).

9. Remove pilot light assembly from bracket by sliding off to rear.

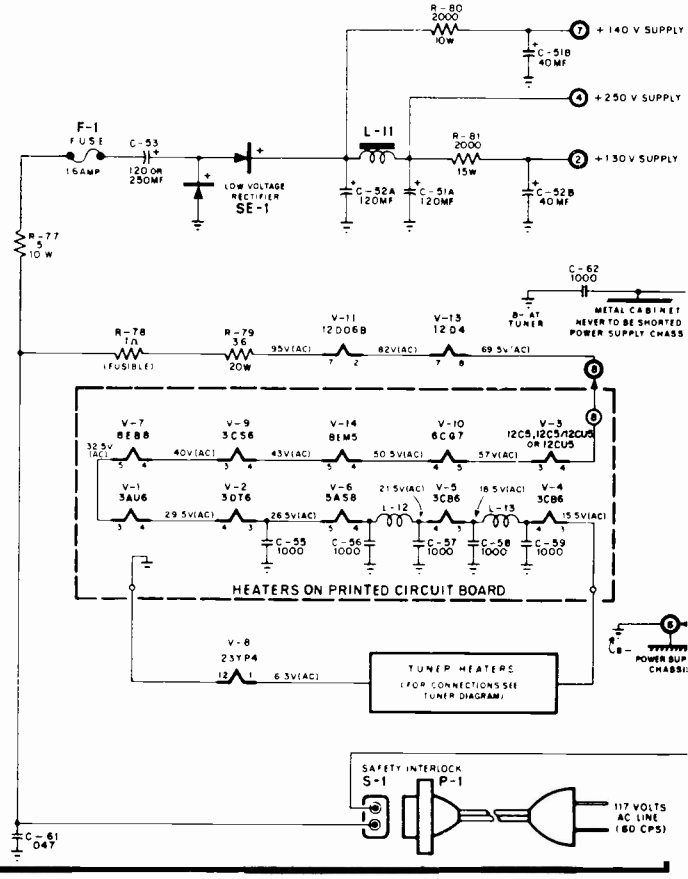
10. Remove four Palnuts used to secure chassis-mounting board to cabinet front and remove chassis through rear of cabinet.

11. Re-assemble in reverse order.

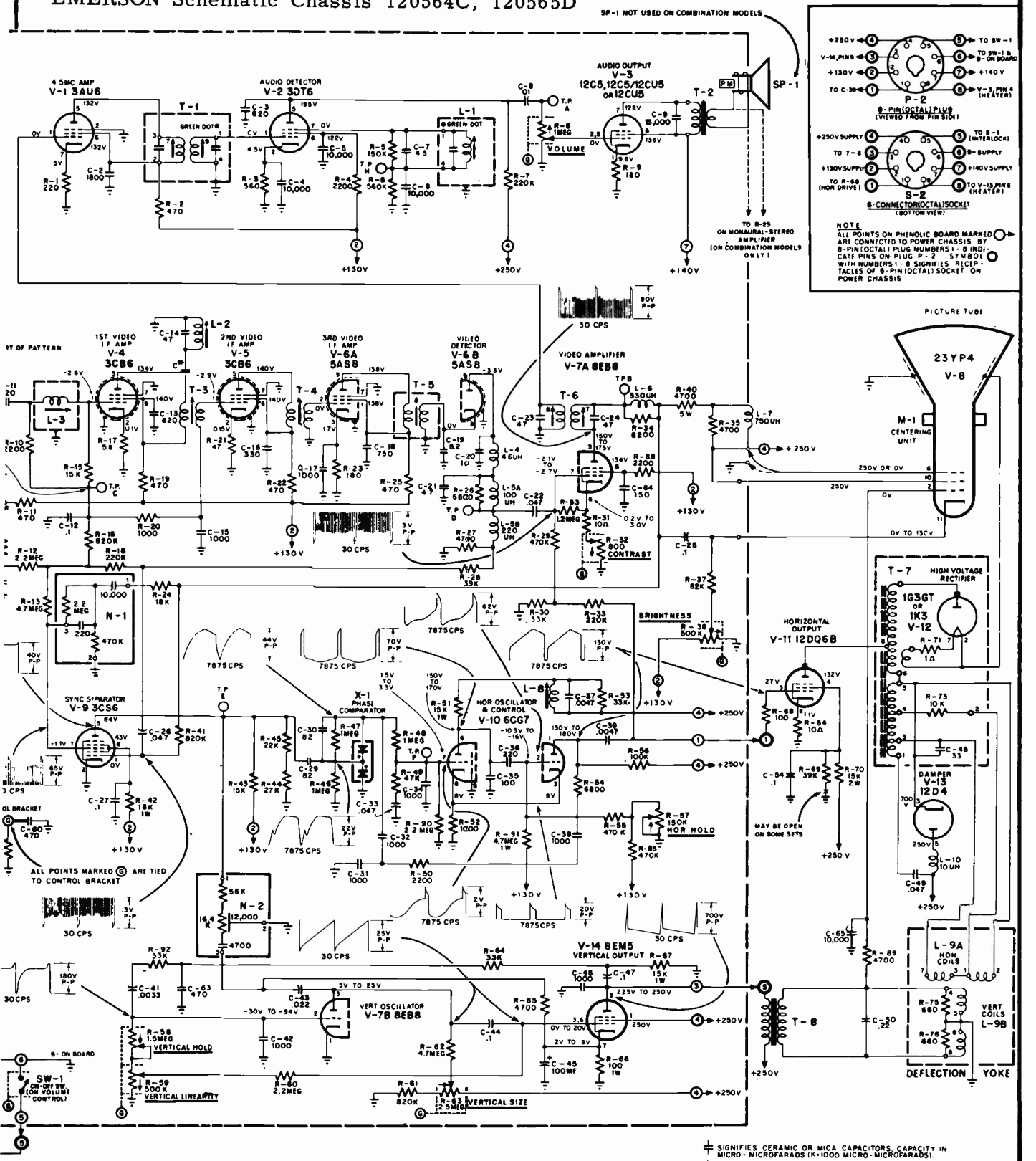
**NOTE: Mark speaker connections in some manner to ossure continued proper phasing of the stereo channels after re-assembly.



I F OUTPUT CIRCUITS AND HEATER CONNECTIONS OF TUNERS



EMERSON Schematic Chassis 120564C, 120565D



SIGNIFIES CERAMIC OR MICA CAPACITORS, CAPACITY IN MICRO-MICROFARADS (K=1000 MICRO-MICROFARADS)

SIGNIFIES TUBULAR CAPACITORS, CAPACITY IN MICROFARADS

RESISTORS ARE IN OHMS (K=1000 OHMS) AND 1/2 WATT, UNLESS OTHERWISE NOTED

ARROWS AT CONTROLS INDICATE CLOCKWISE ROTATION

LETTER T INDICATES TOP CORE, LETTER B INDICATES BOTTOM CORE IN DOUBLE TUNED TRANSFORMERS

CHASSIS Nos. 120564C, 120565D

EMERSON Alignment Information Chassis 120507A, 120508B, 120515C, etc.

GENERAL ALIGNMENT NOTES

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

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

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

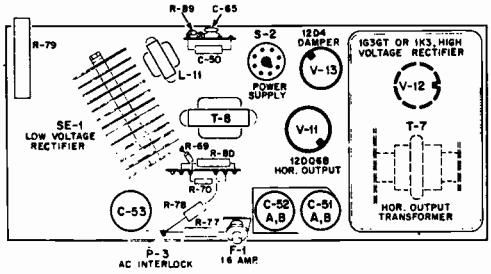
D. Maintain signal generator output no higher than necessary to produce readings not in excess of two volts and use insulated alignment tools for adjusting.

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

VIDEO IF ALIGNMENT

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

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



POWER SUPPLY, CHASSIS 120564C,565D, USING VOLTAGE DOUBLER SELENIUM RECTIFIER ASSEMBLY

POWER SUPPLY, CHASSIS 120507A,508B,515C,516D,541C,542D USING SINGLE SILICON HALF-WAVE RECTIFIER

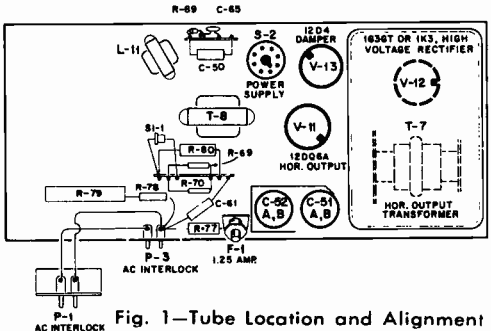


Fig. 1—Tube Location and Alignment Points Diagram, Power Supply and Etched Printed Circuit Board Chassis

SOUND IF ALIGNMENT

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

4.5 MC VIDEO TRAP ALIGNMENT

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

HORIZONTAL OSCILLATOR ALIGNMENT (RE. Fig. 1)

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

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

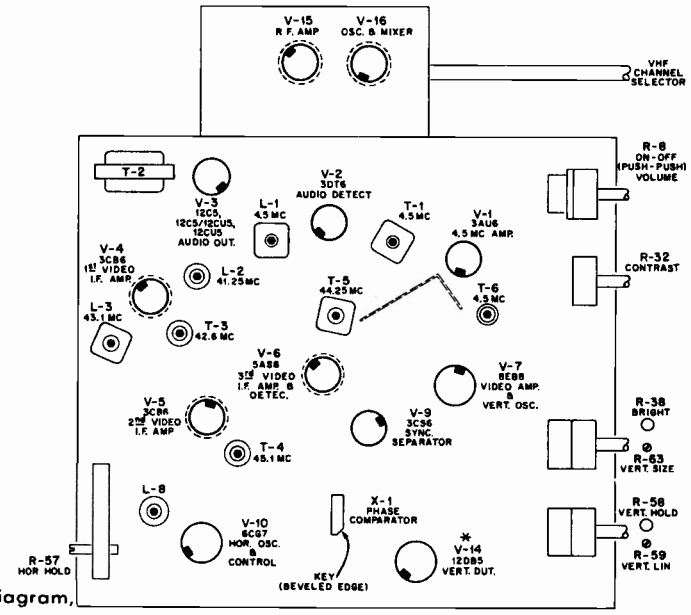
ADJUSTMENT OF 'LOCAL' AND 'FRINGE' SWITCHES

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

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

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

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



NOTE: * ON CHASSIS 120564C,565D, V-14 IS 6EM5

EMERSON Chassis 120507A, 120508B, etc., Servicing Information, Continued

HORIZONTAL SIZE ADJUSTMENT (REF: FIG. 1)

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

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

VERTICAL SIZE AND LINEARITY ADJUSTMENTS

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

PRODUCTION CHANGES:

CHASSIS 120507A, 508B, 515C, 516D, 541C, 542D.

The schematic diagram is shown in its latest condition at time of this printing. Previous chassis may differ slightly, as some changes were incorporated during the course of production. The chart given below lists all changes to date, as well as identifying the chassis concerned. It should be noted that any chassis marked with a given triangle also contains all previously affected changes. For example, a chassis marked △C will also have all modifications for that chassis under △A and △B.

NOTE: Any letter outside a triangle (Ex: △A) indicates a change in the RF/IF/VIDEO chassis; any letter inside a triangle (Ex: ⟨A⟩) indicates a change in the power supply chassis.

AREA INDICATED ON SCHEMATIC	MODIFICATIONS IN CHASSIS MARKED	PURPOSE OF MODIFICATION	CHANGES EFFECTED
△1	Chassis: 120507A △A	To improve vertical linearity at top of raster	R-67 changed to 8200Ω, 1 watt (was 6800Ω, 1 watt)
△2	Chassis: 120507A △B	To increase range of horizontal hold control	R-55 changed to 470K (formerly 820K in parallel with 220K) R-90 (2.2M) added between pin 7 of V-10 and B minus. R-91 added between pin 2 of V-10 and B plus, 130V. R-85 changed to 470K and re-wired from junction of R-55 & R-57 to B plus, 130V (formerly 330K from junction of R-55 and R-57 to B minus.
△3	Chassis: 120507A, 120508B, 120515C, 120516D ⟨A⟩	Couplate not necessary	N-3 (couplate) deleted from circuit C-65 (10,000 mmf—1KV added from grid (pin 2) of CRT to B minus.
△4	Chassis: 120507A, 120508B, 120515C, 120516D ⟨B⟩	Increased reliability factor	C-49 changed to .1 mfd—600V, (was .1—400V)
△5	Chassis: 120507A △C 120508B, 120515C, 120516D △A	To eliminate possibility of white compression	R-31 changed to 10 ohms, (was 3.9 ohms)
△6	Chassis: 120507A, 120508B, 120515C, 120516D △C 120541C, 120542D △A	Not needed on chassis with insulating grommets	R-92 (470K) and C-62 (10,000 mmf.) deleted from circuit. B minus grounded to power supply chassis.

CHASSIS: 120564C, 120565D

1) △A (or higher) coding indicates that the CRT focus electrode (red lead from base pin 6) has been re-wired to B+ 250V instead of B minus to improve picture focus. When replacing the CRT, both possible methods should be tried and the lead should be connected to the terminal which results in best overall focus.

2) △B (or higher) coding indicates that R-11 has been changed from 470 ohms to 220 ohms for the purpose of increasing tuner B+ to provide slightly higher RF gain.

EMERSON Chassis 120507A, 120508B, etc., Servicing Information, Continued

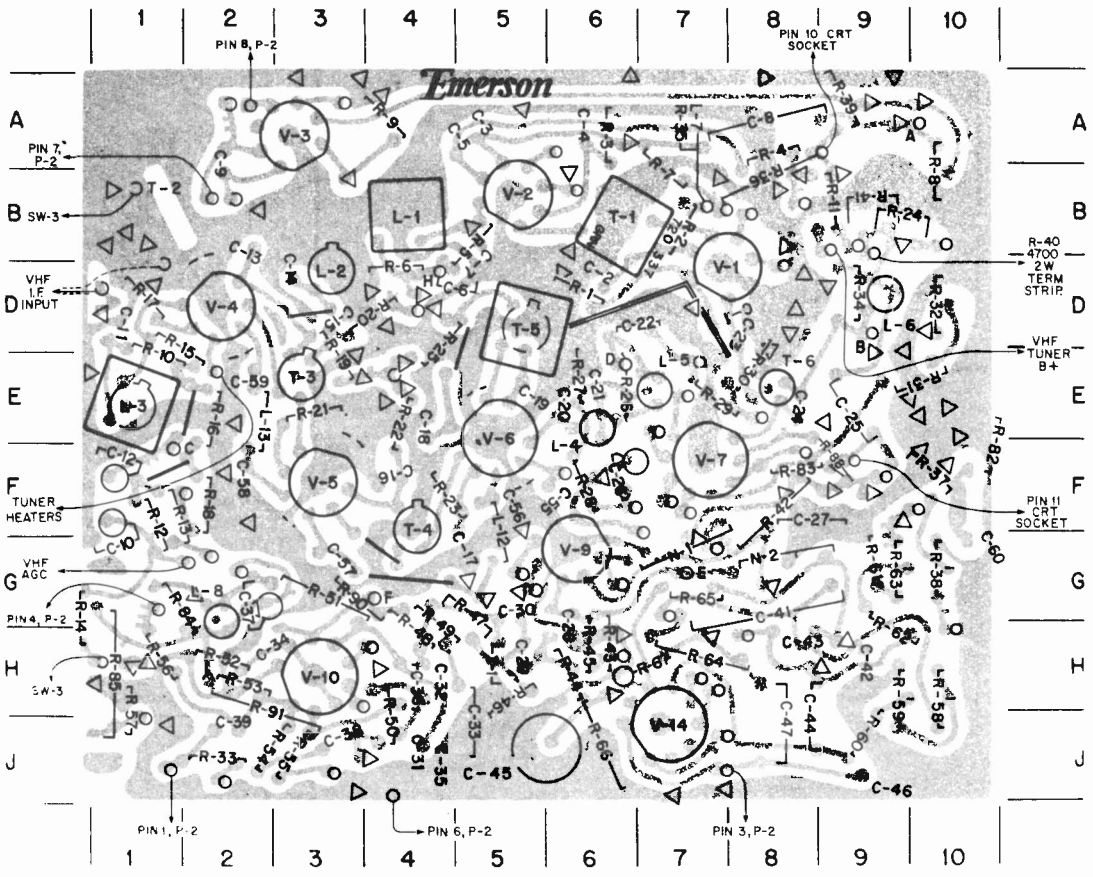


Fig. 2— Etched Printed Circuit Board Chassis (Top View)

CONDITIONS FOR VOLTAGE AND RESISTANCE READINGS, ALL TV CHASSIS

(Separate conditions apply to readings taken on AM, FM, or STEREO chassis. For details, refer to page 26 in section III of this service note.)

VOLTAGES AND WAVESHAPES were taken under actual operating conditions (normal picture and sound). AGC voltage developed at test point (C) (junction of R-15, R-16) was minus four volts. Voltage and waveshape readings obtained may vary ±20% in value due to component tolerances and strength of input signal to chassis under test.

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

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

RESISTANCE READINGS, TV CHASSIS 120507-A, 508-B, 515-C, 516-D, 541-C, 542-D.

SYMBOL	TUBE TYPE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V-1	3AU6	1	0	7	6.5	*1M	*1M	220	—	—
V-2	3DT6	4	560	6	6.5	*1.5M	*1M	560	—	—
V-3	12C5/12CU5	180	15Ω to 850K	14	16	15Ω to 850K	*1M	*2M	—	—
V-4	3CB6	1.1M	56	3.5	4.2	*1M	*1M	0	—	—
V-5	3CB6	1.1M	47	4.2	5	*1M	*1M	0	—	—
V-6	5AS8	*1M	0	180	5	6	4.7K	0	0	*1M
V-7	8EB8	0	500K to 1.9M	6M to 6.5M	9	7	10Ω to 600Ω	340K	*1M	*1M
V-9	3CS6	1.3M	0	9	10	*40K	*50K	1.7M	—	—
V-10	6CG7	*360K	450K to 600K	1K	14	12	*240K	1.3M	1K	0
V-11	12DQ6	N. C.	18	N. C.	*1.5M	260K	N. C.	22	0	Plate Cap 600K
V-12	1G3GT					I N F I N I T E				Plate Cap 600K
V-13	12D4	N. C.	N.C.	*390K	N. C.	*60K	N. C.	18	16	—
V-14	12DB5	*2M	100	2.3M to 2.8M	12	10	2.3M to 2.8M	100	N. C.	*2M
V-8	CRT	0	4.7K	Pin 6 0	Pin 10 190K or 320K	Pin 11 75K to 250K	Pin 12 1.5			

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

EMERSON Chassis 120507A, 120508B, etc., Servicing Information, Continued

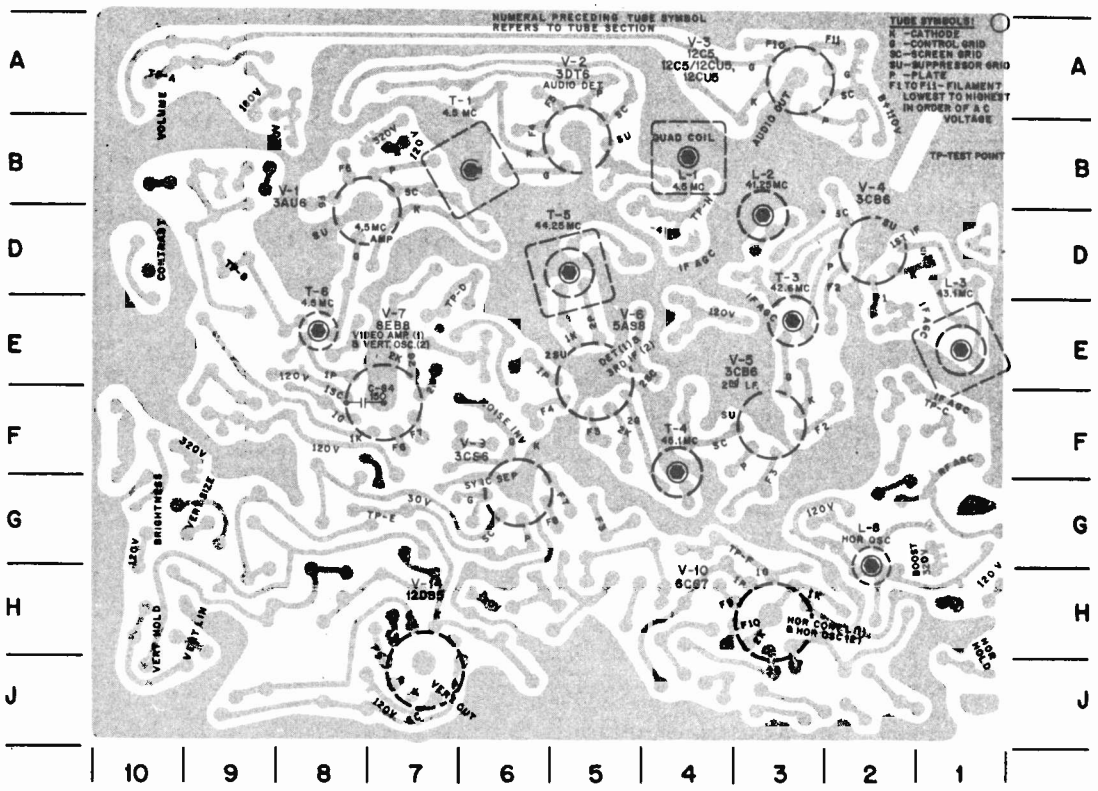


Fig 3—Etched Printed Circuit Board Chassis (Bot. View)

SYMBOL—COORDINATE CHART (REF.—Fig. 2 and 3)

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

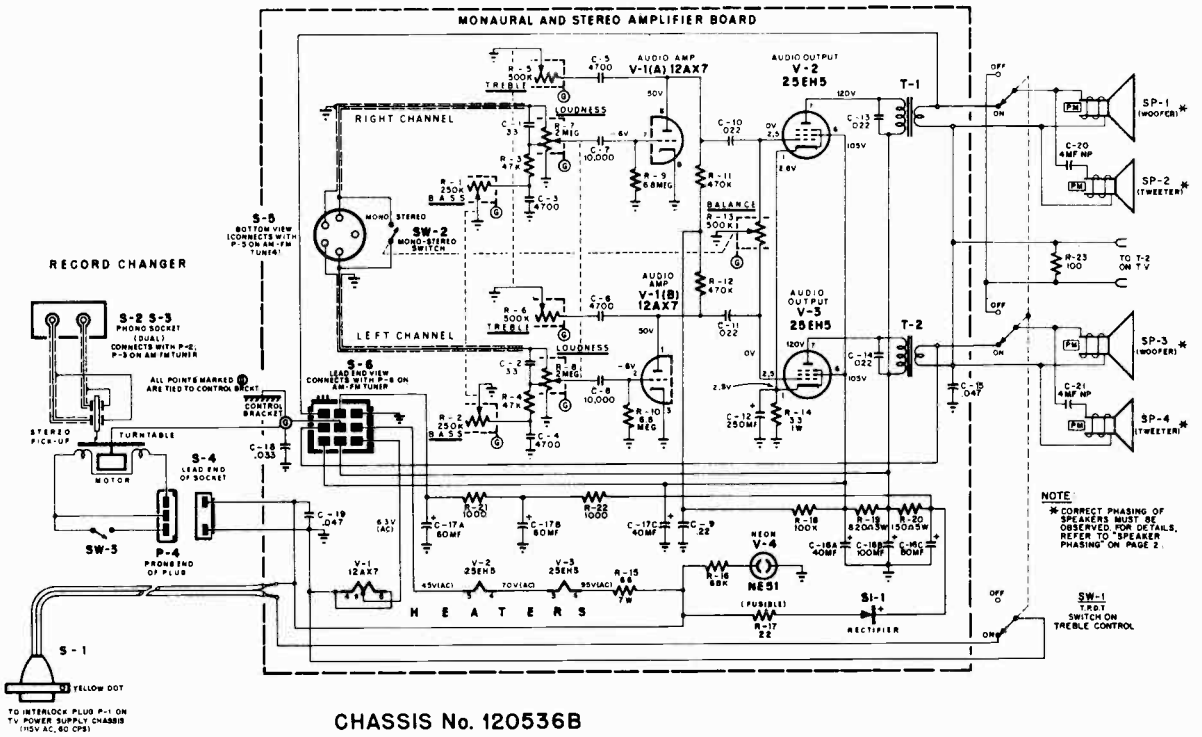
Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.	Sym.	Coor.
C-2	D-6	C-19	E-5	C-36	H-4	C-53		L-9		TP C	F-2
C-3	A-5	C-20	E-6	C-37	G-2	C-54		L-10		TP D	E-6
C-4	A-6	C-21	E-6	C-38	J-3	C-55	F-6	L-11		TP E	G-7
C-5	A-5	C-22	D-6	C-39	J-2	C-56	F-5	L-12	F-5	TP F	G-4
C-6	D-4	C-23	D-8	C-40		C-57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

RESISTANCE READINGS, TV CHASSIS 120564-C, 565D

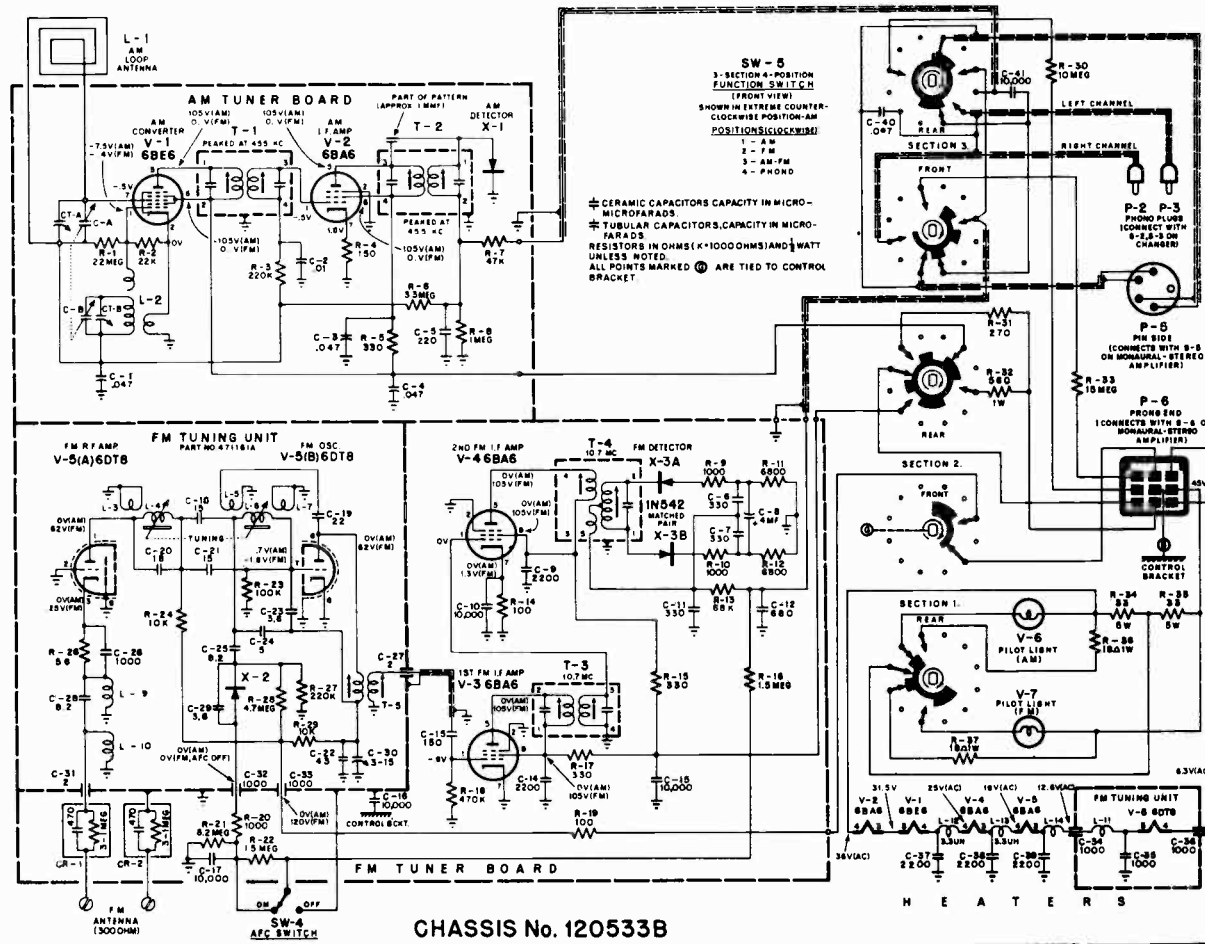
Symbol	Tube Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	PIN 9
V-1	3AU6	1	0	7	6.5	*25K	*25K	220	—	—
V-2	3DT6	4	560	6	6.5	*220K	*27K	560	—	—
V-3	12C5/12CU5	180	15Ω to 850K	14	16	15Ω to 850K	*25K	*25K	—	—
V-4	3CB6	1M	56	3.5	4.2	*25K	*25K	0	—	—
V-5	3CB6	1M	47	4.2	5	*25K	*25K	0	—	—
V-6	5AS8	*25K	0	180	5	6	4.7K	0	0	*25K
V-7	8EB8	0	500K to 1.9M	5M to 5.5M	9	7	10Ω to 600Ω	340K	*25K	*27K
V-9	3CS6	900K	0	9	10	*26K	*40K	1.5M	—	—
V-10	6CG7	*120K	400K to 500K	1K	14	12	*39K	1.3M	1K	0
V-11	12DQ6	N. C.	18	N. C.	*23K	260K	N. C.	22	10	Plate Cap ∞
V-12	1G3-GT				I N F I N I T E					Plate Cap ∞
V-13	12D4	N. C.	N. C.	∞	N. C.	23K	N. C.	18	16	—
V-14	8EM5	*23K	100	2.3M to 2.8M	12	10	2.3M to 2.8M	100	N.C.	24K
				Pin 6	Pin 10	Pin 11	Pin 12			
V-8	23XP4	0	4.7K	0	23K	82K to 220K	1.5			

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

EMERSON Chassis 120536B and 120533B used in 120541C, -564C, -565C



CHASSIS No. 120536B



CHASSIS No. 120533B

Emerson Television

Chassis: 120530C, 120549C, 550D, 551C, 120552E, 553F, 554E, 120555E, 556F, 557E

VHF TV RECEIVERS – MANUALLY OPERATED

MODEL	CHASSIS	STYLE	CRT	VHF TUNER
1626	120530–C	Table Model	19XP4	471251
1628	120552–E			471271
1632	120549–C	Console	23CP4	471225
1636				
1640		Loboy Console		
1644				
1648		Console		
1656				
1660				
1680		LOBOY		
1684		CONSOLE		
1672	120555–E	Table Model	19XP4	471228
1676		Portable		

UHF/VHF TV RECEIVERS – MANUALLY OPERATED

MODEL	CHASSIS	STYLE	CRT	VHF TUNER	UHF TUNER
1629	120553–F	Table Model	19XP4	471272	471260
1633	120550–D	Console	23CP4	471226	471227
1637					
1641		Loboy Console			
1645					
1649		Console			
1657					
1661					
1681		LOBOY			
1685		CONSOLE			
1673	120556–F	Table Model	19XP4	471229	
1677		Portable			

COMBINATION MODELS – VHF, UHF/VHF, VHF WITH WIRELESS REMOTE CONTROL

MODEL	TV CHASSIS	REMOTE CHASSIS	AM/FM–AUDIO CHASSIS	STEREO CHANGER	STYLE	CRT	VHF TUNER	UHF TUNER
1668	120549–C	–	120566–B	819167	Loboy Consoles	23CP4	471225	–
1669	120550–D	–					471226	471227
1670	120551–C	471235					471225	–

VHF TV RECEIVERS WITH WIRELESS REMOTE CONTROL

MODEL	TV CHASSIS	REMOTE CHASSIS	STYLE	CRT	VHF TUNER
1630	120554–E	471235	Table Model	19XP4	471271
1634	120551–C		Console	23CP4	471225
1638					
1642			Loboy Console		
1646					
1650			Console		
1658					
1662					
1674	120557–E		Table Model	19XP4	471228
1678			Portable		

FUSE REPLACEMENT (23" SETS)

Chassis 120549C, 550D and 551C (all 23" models) utilize a new chemical-type fuse and fuse holder not found in previous Emerson sets. This type of fuse, which affords maximum circuit protection while eliminating needless failures caused by momentary surge currents, is equipped with a keying arrangement which prevents insertion of similar type fuses of a different rating. When making replacements, use only Emerson part number 808232 or Belfuse number 500-1.

SPEAKER REPLACEMENT AND PHASING

Proper speaker phasing must be maintained in all models using more than a single loudspeaker, and particularly in combination models featuring stereophonic sound reproduction.

To check speaker phasing in TV-only models in this series, place a 3-volt battery across the secondary winding of the audio output transformer and note whether or not all cones move in the same direction at the same time. If they do, speakers are properly phased; if not, reverse connections to the speaker whose cone moves in opposition to the remaining speakers in the system and re-check.

To check for proper phasing in combination models, first set the ON-OFF switch on the AUDIO chassis to its OFF position. This will place both speaker systems in parallel and connect them to the TV chassis audio circuits. Speaker phasing may now be checked in the same manner as described above for "TV-only" models.

CAUTION: DO NOT OPERATE THE CHASSIS WITHOUT SPEAKERS OF A SUITABLE DUMMY LOAD.

PRE-DISASSEMBLY INFORMATION (SERVICE HINTS)

1. Removal of the TV receiver chassis is not necessary to service the remote control unit found in sets featuring wireless remote control. This can be easily performed by disengaging the plugs and connectors pertinent to the remote control chassis, removing the remote control chassis from the cabinet, and then reconnecting the appropriate plugs.
2. On 19 inch sets featuring top-mounted controls (models 1672 to 1678), both sides of the chassis can be serviced without removing it from the cabinet. To accomplish this remove the back cover, plastic front and the CRT, which is held in place by four self-topping screws. Turn the yoke completely around so that it faces the back, re-insert the CRT from the REAR of the set (anode cavity must face UP), and re-connect the socket and cable assembly to the CRT anode cavity, using a standard high-voltage extension.
3. When disassembling any model using more than a single loudspeaker, always identify each of the individual speaker leads in some manner to insure against improper phasing of speakers during re-assembly (See also "Speaker Replacement and Phasing" on this page).

DISASSEMBLY OF 19 INCH MODELS 1626 to 1630

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

1. Remove line cord plug from wall socket and back cover from rear of cabinet.
2. Remove all knobs from cabinet front.
3. Loosen screws used to secure antenno terminal strip and free strip from cabinet.
4. Unplug socket and cable assembly from base of CRT.
5. Remove yoke clamp from yoke.
6. Disconnect high-tension lead from anode cavity of CRT and discharge by shorting to chassis frame. Do not short to any metal parts on cabinet.
7. Disengage cable connector located between wireless remote control chassis and tuner assembly (remote sets only).
8. Remove two hex-head screws used to mount rear tuner bracket to cabinet.
9. Remove all hex-head screws used to mount speaker and control panel to front of cabinet.
10. Remove two hex-head screws used to secure top chassis-retaining brackets to cabinet.
11. Remove five hex-head chassis mounting screws from underside of cabinet and remove chassis through cabinet rear.
12. CRT may now be taken from cabinet by removing four mounting nuts and washers located at corners of CRT.
13. Re-assemble in reverse order.

EMERSON Chassis 120530C, 120549C, 120550D, etc., Servicing Information

DISASSEMBLY OF 19 INCH MODELS 1672 to 1678

To remove plastic front:

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

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

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

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

10. Remove VHF indicator dial from tuner shaft.
11. Remove hex-head screw used to secure VHF tuner to cabinet (located 2 inches above fine tuning shaft).
12. Remove two hex-head screws used to mount remote control chassis to cabinet (remote sets only).
13. Remove UHF indicator dial from UHF tuner shaft and remove mounting nut from threaded shaft bushing (UHF sets only).
14. Remove hex-head screws used to secure chassis to cabinet and remove by sliding out to rear.
15. Re-assembly in reverse order.

DISASSEMBLY OF ALL 23 INCH MODELS

To Remove CRT:

11. Remove line cord plug from wall outlet and back cover from rear of cabinet.
2. Disconnect CRT socket from base of CRT.
3. Remove yoke clamp from yoke cover.
4. Disengage high-tension lead from anode cavity of CRT and discharge by shorting to chassis frame. Do not short to metal cabinet parts.
5. Remove hex-head screws (used to secure lower edge of CRT mosk) from underside of cobinet front. Pull lower edge of mask out and down to free mask from cabinet.
6. Remove four screws from mounting lugs at corners of CRT and remove CRT through front of cabinet.

To Remove TV Chassis, follow steps 1-4 above, and:

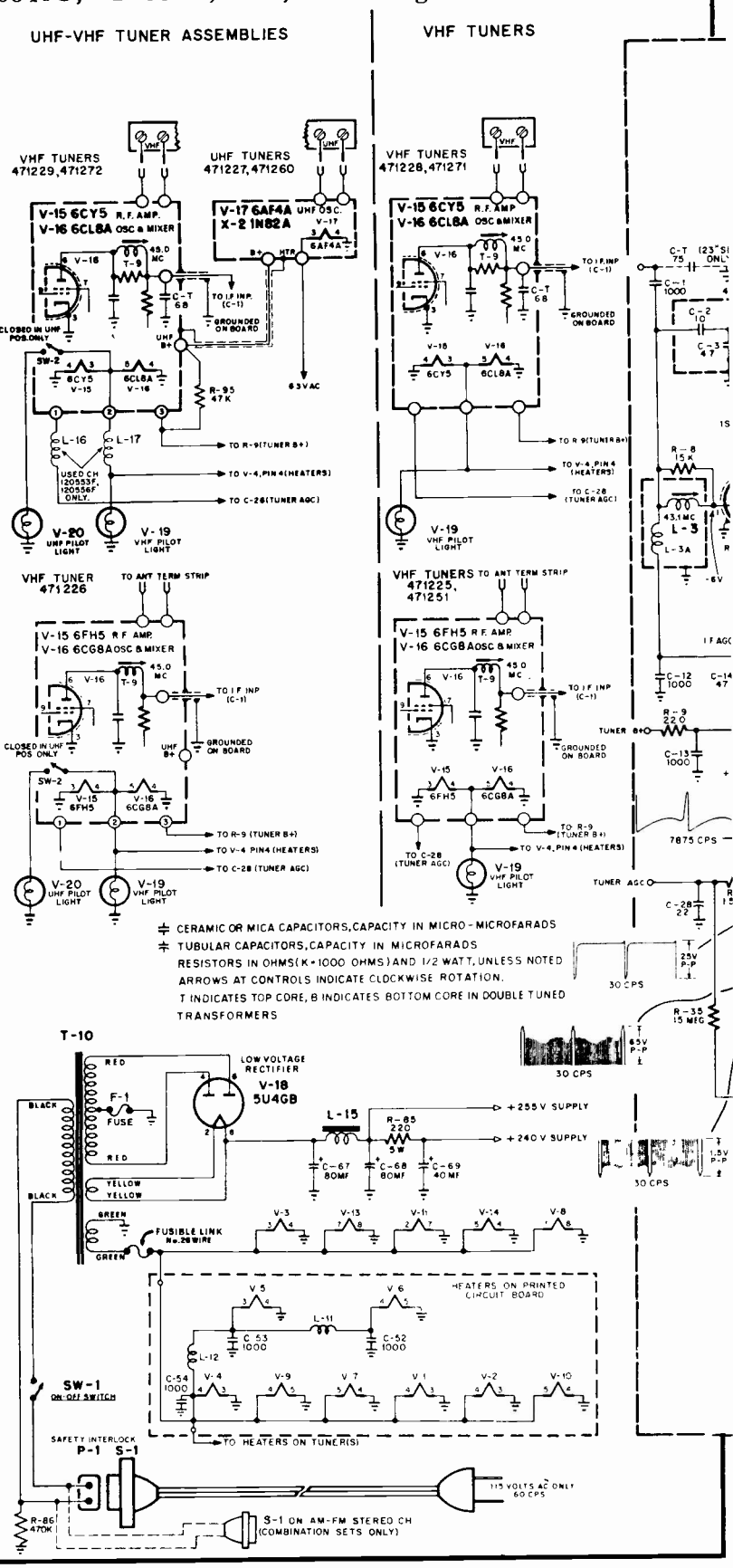
7. Remove all knobs from TV control panel at front of cabinet.
8. Loosen screws used to mount antenna terminal strip and free strip from cabinet.
9. Remove four nuts used to mount control panel to cabinet.
10. Remove two hex-head screws used to secure rear tuner-mounting bracket to cabinet.
11. Remove four screws used to mount UHF tuner to cabinet (UHF sets only).
12. Disconnect speaker leads at the speakers.
13. Disengage cable connector located between remote control chassis and tuner assembly (remote sets only).
14. Remove two screws used to secure top chassis-mounting brackets to cabinet.
15. Remove five chassis-mounting screws from underside of cabinet and remove chassis by sliding out to rear.
16. Reassemble in reverse order.

DISASSEMBLY OF AM-FM-STEREO CH. 120566B

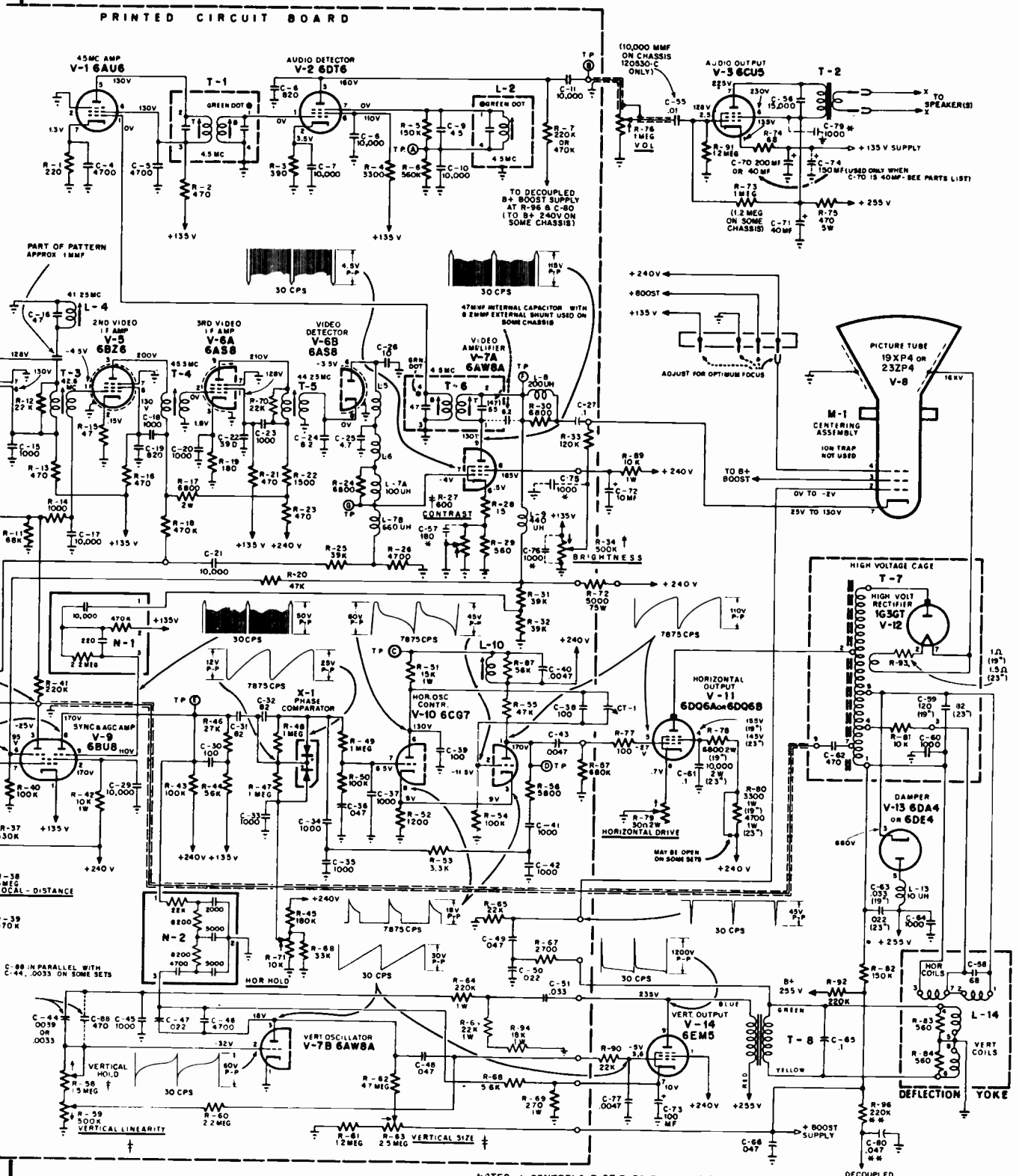
1. Remove line cord plug from wall outlet and back cover from rear of cabinet.
2. Remove all knobs from AM-FM-Stereo chassis (inside record changer compartment).
3. Disengage 3-prong AC connector from base of record changer.
4. Disconnect both the red and the blue shielded audio cables from dual socket at base of changer.

NOTE: Red cable must go to top, blue cable to bottom of dual socket during re-assembly.

5. Remove pilot light socket assembly from lower corner of cabinet front by sliding from bracket.
6. Disconnect FM antenna, loosen screws used to mount antenna terminal strip and free strip from cabinet.
7. Disengage AM antenna leads from loop inside cabinet.
8. Unplug AC interlock cord from rear of chassis.
9. Unplug speaker circuit transfer leads from terminal strip located at floor of cabinet.
10. Unplug speaker leads from both the left channel and the right channel speaker systems.
11. Remove two hex-head screws used to secure top edges of AM and FM dial backing-plates to cabinet.
12. Remove two palnuts used to secure lower edge of chassis-mounting board and remove chassis from cabinet.



EMERSON Schematic Diagram Chassis 120530C, 120549C, 120550D, 120551C, etc.



CHASSIS Nos. 120530C, 549C, 550D, 551C, 552E, 553F, 554E, 555E, 556F, 557E

NOTES: ‡ CONTRDLS R-27, R-58, R-59, R-63 AND R-34 NOT MOUNTED ON ETCHED CIRCUIT BOARD ON ALL CHASSIS.

* C-57, C-75, C-76 AND C-79 NOT USED ON CHASSIS 120555E, 556F AND 557E.

** R-96 AND C-80 NOT USED WHEN R-7 IS CONNECTED TO B+ 240V.

EMERSON Alignment Information Chassis 120530C, 120549C, 120550D, etc.

GENERAL ALIGNMENT NOTES:

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

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

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

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

VIDEO IF ALIGNMENT

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

To observe 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 generotor at the mixer tube in the manner described above. Adjust the output of the sweep generator to produce about 2 volts peak to peak curve on the oscilloscope and reduce the marker signal so as not to upset the response curve. The 45.75 MC marker should appear between 55% and 65% down with respect to the peak.

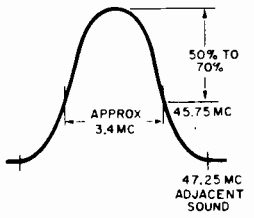


FIG. 1 – OVERALL I.F. RESPONSE CURVE

SOUND IF ALIGNMENT

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

4.5 MC VIDEO TRAP ALIGNMENT

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

HORIZONTAL OSCILLATOR ALIGNMENT

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

PROCEDURE:

1. Disable sync by shorting test point (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 counterclockwise position (minimum resistance in circuit). If overdrive bars (indicated by white vertical lines in the raster) appear at this setting, slowly advance R-79 in a clockwise direction until the lines *just* disappear.

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

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

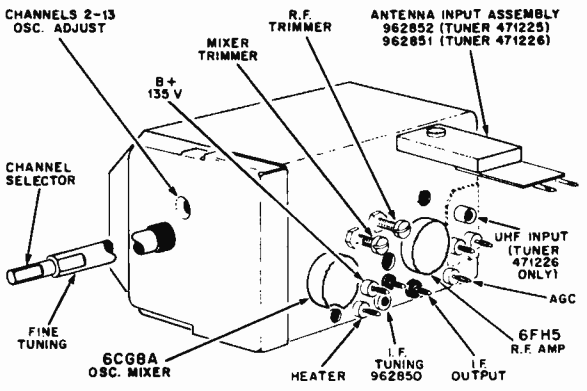
FOCUS ADJUSTMENT

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.

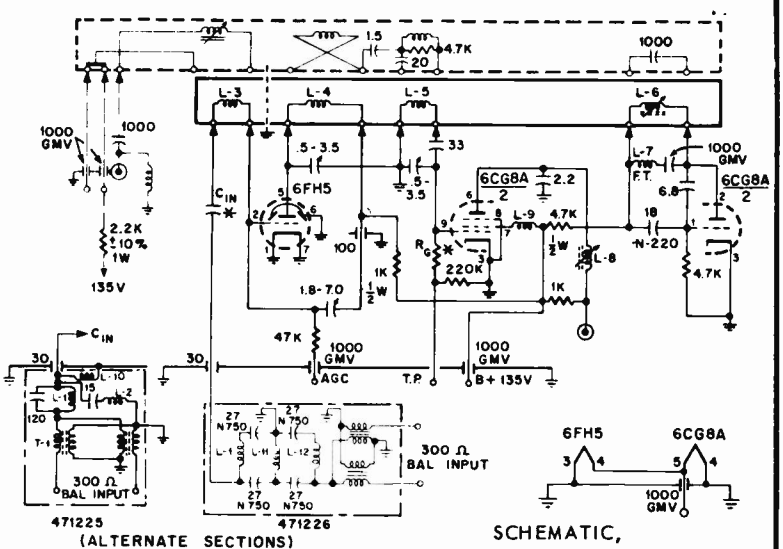
CRT REPLACEMENT INFORMATION (23" SETS)

All 23" sets in this series utilize the new square-cornered CRT with bonded safety faceplate, which serves to protect the tube as well as eliminating the "dust trap" commonly present behind the safety glass of sets using a conventional type of picture tube. Therefore, when replacing the CRT, replace only with the same type and number as originally supplied. DO NOT ATTEMPT TO SUBSTITUTE ANY OTHER TYPE OF CRT.

EMERSON Chassis 120530C, 120549C, 120550D, etc., Servicing Information, Continued



VHF TUNERS 471225, 471226



NOTES

ALL RESISTORS ARE 1/4 WATT, 20% TOL., UNLESS OTHERWISE NOTED.

ALL CAPACITOR VALUES GIVEN ARE IN MICRO-MICROFARADS.

CIRCUIT SHOWN IN DOTTED LINES USED ON TUNER 471226 ONLY

* R_G: 47K, 10% TOL., 1/4 WATT ON TUNER 471225; 2.7K, 10% TOL., 1/4 WATT ON TUNER 471226

* C_{IN}: 15 MMF, 10% TOL., 500V ON TUNER 471225; 28 MMF, 10% TOL., 500V ON TUNER 471226

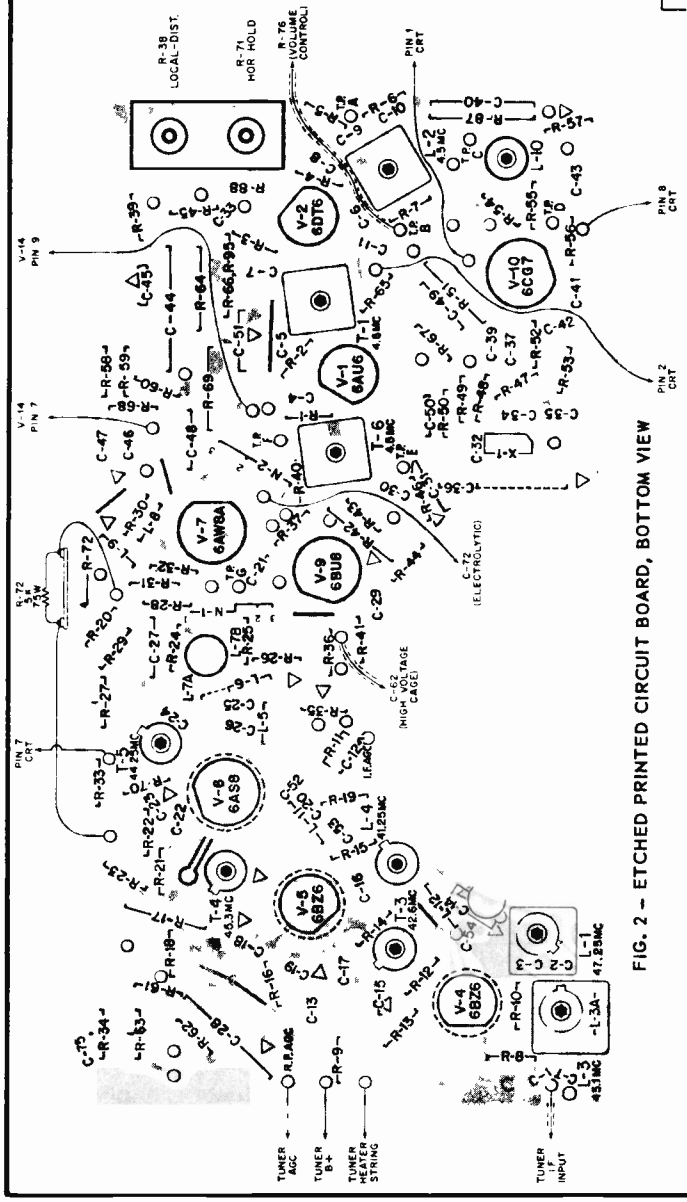


FIG. 2 – ETCHED PRINTED CIRCUIT BOARD, BOTTOM VIEW

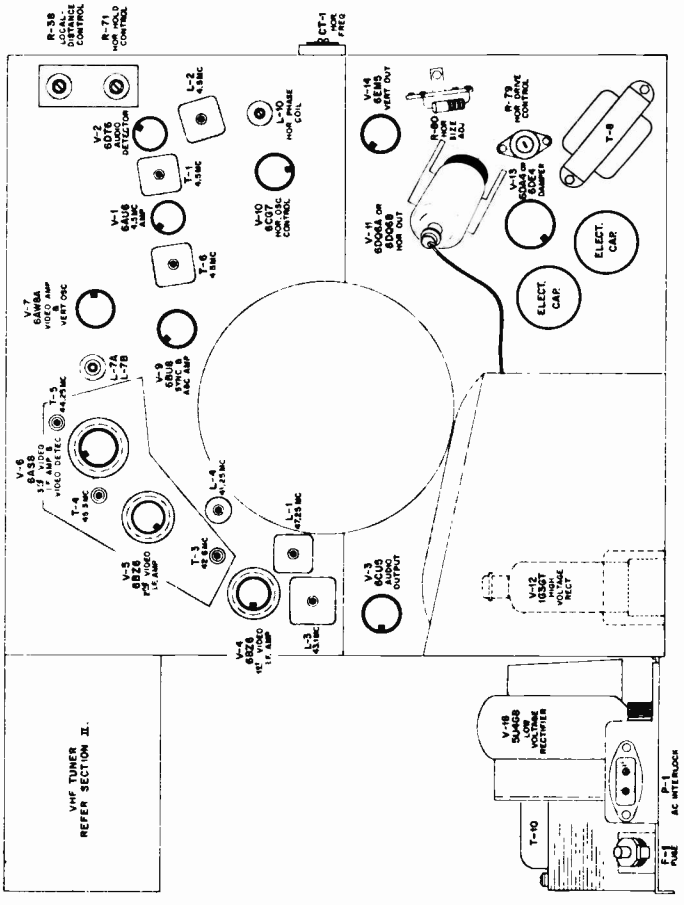


FIG. 3 – TUBE LOCATION AND ALIGNMENT POINTS

EMERSON Chassis 120530C, 120549C, 120550D, etc., Servicing Information, Continued

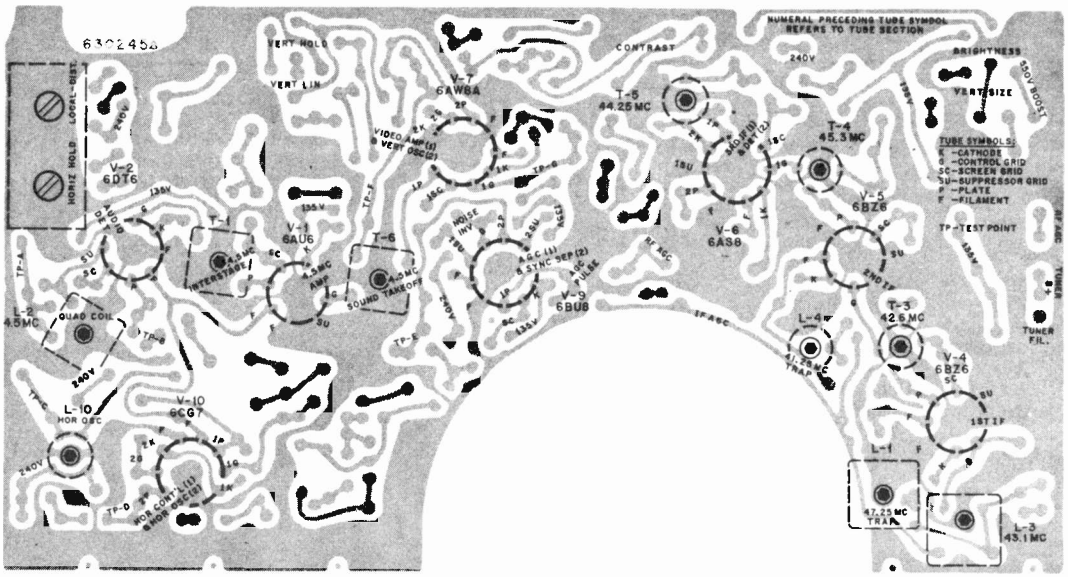


FIG. 5 – ETCHED PRINTED CIRCUIT BOARD, TOP VIEW

CONDITIONS FOR CHASSIS READINGS

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

RESISTANCE READINGS were taken with no power applied.

Where readings are affected by control settings, both maximum and minimum values are given. All resistance readings may vary 10% due to normal component tolerances.

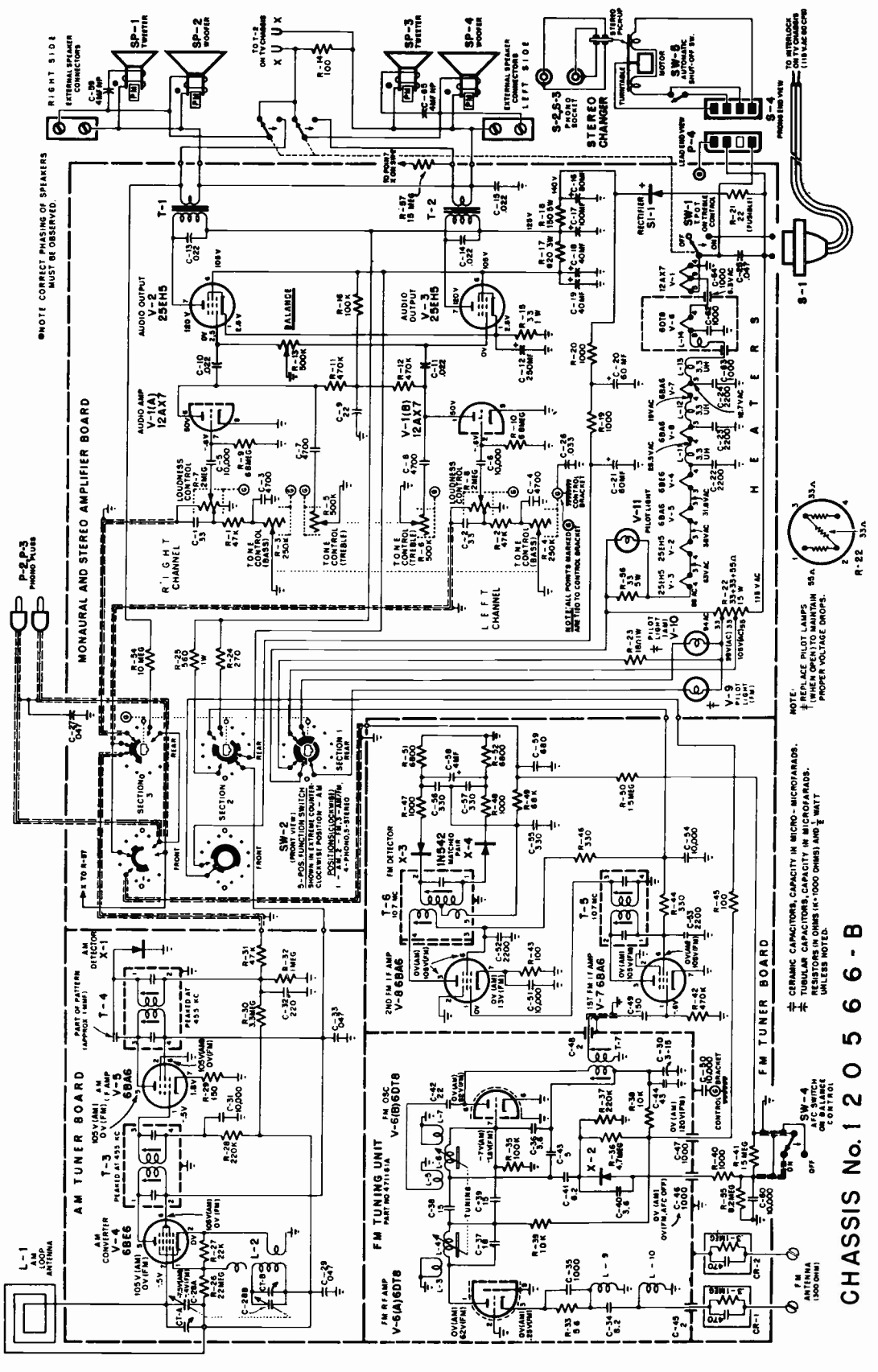
ALL MEASUREMENTS were taken between points indicated and chassis (unless otherwise noted), with line voltage maintained at 115 volts AC. A VTVM was used for all voltage and resistance measurements and a low capacity probe was used for all waveshapes shown.

RESISTANCE READINGS

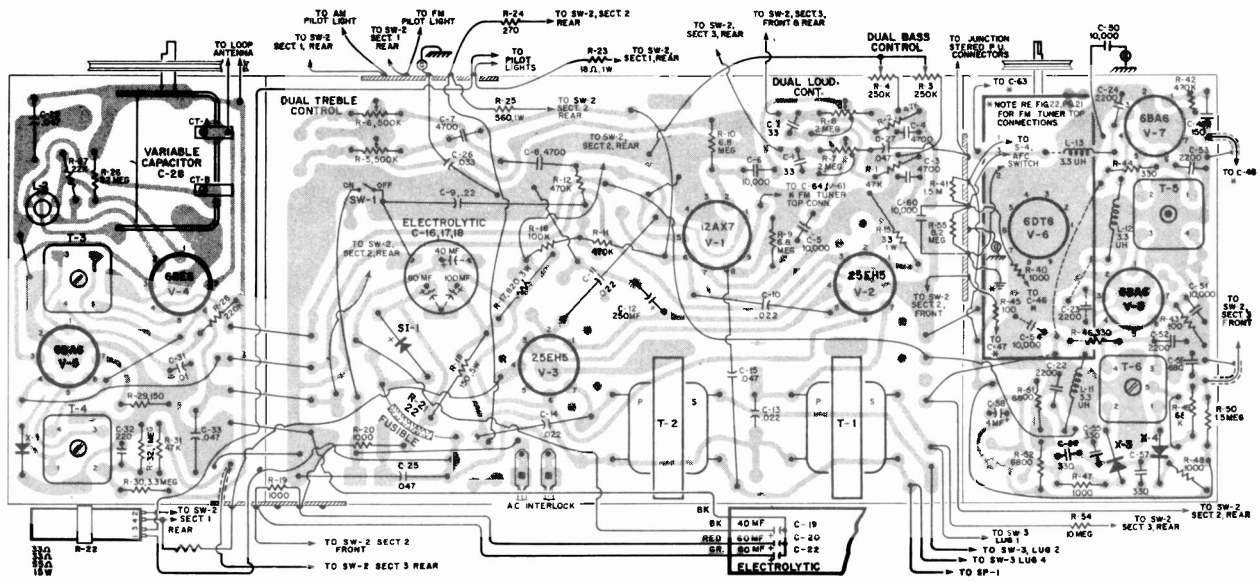
SYM	TUBE TYPE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V- 1	6AU6	1.5	0	0	.1	*50K	* 50K	220	–	–
V- 2	6DT6	5	390	0	.1	* 300K	* 50K	560K	–	–
V- 3	6CU5	* 50K	1.2 M	.1	0	N.C.	* 50K	* 50K	–	–
V- 4	6BZ6	68K	56	0	.1	* 55K	* 55K	0	–	–
V- 5	6BZ6	69K	47	.1	0	* 50K	* 52K	0	–	–
V- 6	6AS8	* 48K	0	180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

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

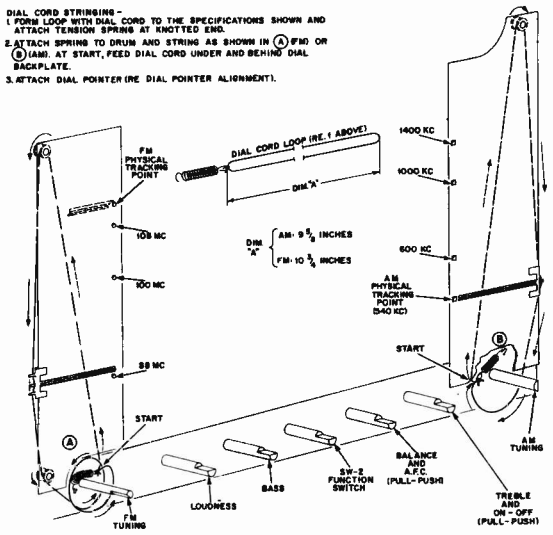
EMERSON Chassis 120566B, used in 120549C, -550C, -551C, Schematic Diagram



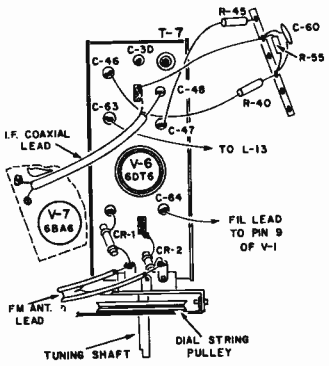
EMERSON Chassis 120566B used in 120549C, -550C, -551C, Continued



ETCHED PRINTED CIRCUIT BOARD CHASSIS 120566B (TOP VIEW)



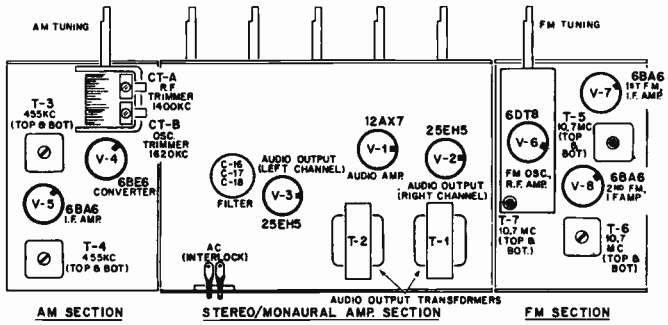
DIAL CORD STRINGING



FM TUNER 471161A – TOP CONNECTIONS FOR LIGHT SERVICING

FM OSCILLATOR TRACKING

When replacing the FM oscillator tube, select the tube which provides most accurate oscillator tracking with AFC switch in "off" position.



TUBE AND ALIGNMENT POINT LOCATIONS, CHASSIS 120566-B.

REMOVAL OF FM TUNER FOR SERVICE OR REPLACEMENT

1. Remove dial back plate assembly.
2. Remove FM dial pointer and FM dial string.
3. Unsolder all leads and components from top of tuner (including CR-1 and CR-2).
4. Remove V-7 and V-8 (1st and 2nd FM IF amplifiers) from their respective sockets.
5. Remove C-50 (10,000 mmf) and C-24 (2,200 mmf) from circuit board at left front of tuner.
6. Unsolder ground strap from left front side of tuner (as viewed from tuning shaft).
7. Loosen mounting nut behind FM dial pulley by turning counter-clockwise, using a ½" open-end wrench.
8. Slide front of tuner toward left until it clears notch in tuner mounting bracket and carefully remove tuner from chassis.
9. To replace FM tuner, reverse above procedure.

GENERAL ELECTRIC

"LW" Series used in Models M202, M203, M204, M205

HORIZONTAL HOLD -

1. Remove the cabinet back as described below.
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

YOKE POSITION - The yoke is secured to the neck of the picture tube by a "U" shaped clamp and spring, Figure 1. To adjust the yoke for picture tilt, loosen the clamp by squeezing points C and D with long nose pliers until the eye of the spring

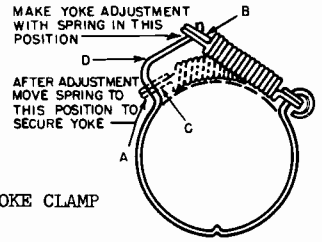


FIG. 1. YOKE CLAMP

slides over the bend in the clamp. The yoke can now be adjusted for correct picture tilt. To secure the yoke, the pliers are used in the same manner between points A and B until the spring eye slides over the bend to its clamping position.

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

FOCUS -The proper focus potential for the tube was chosen at the time the set was manufactured. If it becomes necessary to install a new picture tube or change the focus potential, any one of three potentials may be chosen for best focus. Connection points for these 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 V12.
2. To the B+1 wirewrap terminal nearest C210 on the front edge of the sweep board.
3. To the B+ boost wirewrap terminal just ahead of the spark gap on the front edge of the board.

REMOVAL OF CABINET BACK

Most servicing operations of the "LW" receivers may be accomplished with only the cabinet back removed. To remove the back, first disconnect any external connections from the antenna terminal board and then remove the eight screws (two underneath the chassis) which secure the cabinet back. Pull off the cabinet back. The power line connections at the interlock will be removed as the back is pulled away from the chassis.

REMOVAL OF FRONT ASSEMBLY

For those few servicing operations which require it (such as replacement of the picture tube, the vertical output transformer or the audio output transformer) the cabinet front assembly may be removed from the chassis as follows:

After removing the cabinet back as described above, discharge the picture tube anode to chassis.

Then remove the picture tube anode lead by squeezing the anode clip and withdrawing it from the tube.. Remove the picture tube socket.

Loosen the yoke clamp as previously described. Slide the yoke back off the neck of the picture tube, turning it slightly clockwise as it comes off to make sure it clears the projecting wirewrap terminals on the nearby sweep board.

Lay the set face down on a soft cloth to protect the cabinet face and remove the screws at the corners which secure the chassis to the molded cabinet front. Then carefully lift the chassis away from the front assembly.

Removal of Front Assembly: For normal servicing, the complete electrical disassembly described in this section need not be carried out. Instead, the front assembly may be dismounted and lifted carefully from the chassis. Then, with the channel-selector end resting against the chassis edge, the other end may be swung away from the chassis to provide access to the high-voltage terminals and other components.

PICTURE TUBE REMOVAL AND REPLACEMENT

Remove the front assembly from the chassis as described above to gain access to the picture tube. Then loosen the two screws securing the tube sling at the top and bottom of the tube and disengage the sling from the retaining hooks at each corner of the front assembly. Carefully lift the tube from the assembly.

When replacing the picture tube, take care to position the tube so that it aligns properly, with the anode button to the right when viewed from the chassis side.

REASSEMBLY NOTE

In reassembly, reverse the disassembly procedure. Caution should be taken in reassembling the cabinet back to assure that the "fingers" on the leading edge are aligned with the grooves in the front section. The edge should be pressed in slightly during reassembly to make sure that these fingers lock into place.

GENERAL ELECTRIC "LW" Series, Alignment Information, Continued

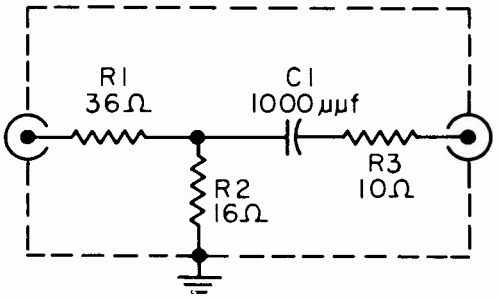


FIG. 2 I-F INJECTION NETWORK

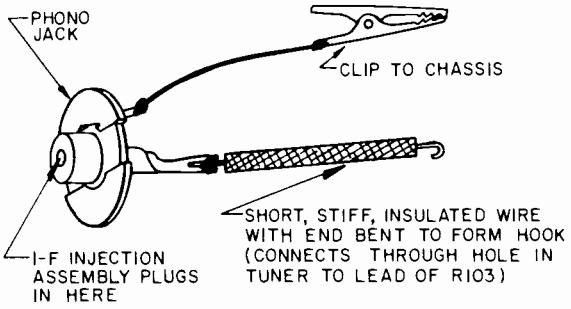


FIG. 3 INJECTION ADAPTER, 13-POSITION TUNER

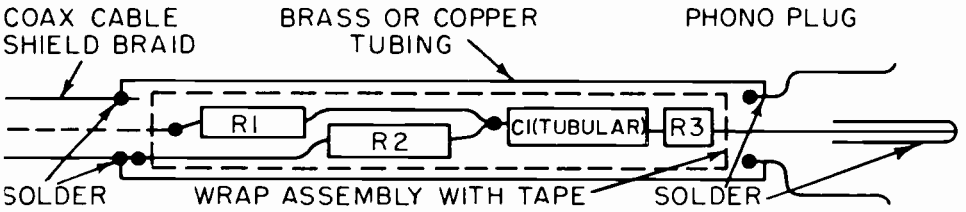


FIG. 4 I-F INJECTION NETWORK PLUG CONSTRUCTION

VIDEO I-F SYSTEM

INTRODUCTION:

The video I-F system must be in alignment in order to align most other sections of the receiver; therefore, it is treated first. A list of the frequencies of the tuned coils is given and may be used for pre-peaking these coils, but over-all sweep alignment is necessary to correctly align the I-F system.

AM PRE-PEAKING FREQUENCIES

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

GENERAL NOTES:

1. Allow receiver and alignment equipment at least 20 minutes of warm-up time before proceeding.
2. Turn the volume control to minimum position and the contrast control fully clockwise. Set the channel selector to Channel 9 or some other high band channel where oscillator influence is not noted as the fine tuning control is turned. Use a stripless channel if set has a 13-position tuner.
3. Short the antenna terminals together.
4. Connect oscilloscope to Test Point III thru 22,000 ohm resistor not more than 2.5 inches away from Test Point II.
5. Connect -3.5 volts bias between Test Point II and the chassis with the negative side of the bias voltage on Test Point II.
6. Inject signals from a properly terminated AM signal generator or sweep generator through the network in Figure 2 to the I-F injection jack*.

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

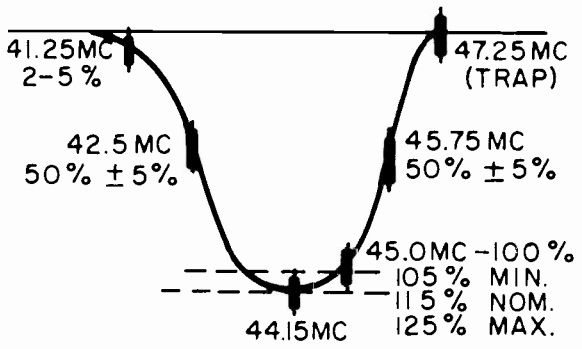


FIG. 5 I-F RESPONSE CURVE

*NOTE: On the 13-position (VHF - UHF) tuner, WT86X103, the IF injection point is not connected to a jack, but is accessible through a hole in the top of the tuner chassis at the base of the 6CG8A tube (V2). On either of the 12-position VHF tuners, WT86X104 and WT86X106, a jack is provided.

The plug-in assembly illustrated in Figure 4 can be plugged directly into the injection jack on a 12-position tuner, but must be connected to the 13-position tuner through an adapter of the type shown in Fig. 3. In this case, the insulated wire connected to the inner contact of the phono-jack adapter is inserted carefully through the hole in the tuner case and hooked securely around the lead of resistor R103 which passes directly beneath the hole. The ground lead from the adapter jack is clipped to a convenient chassis point nearby and the injection assembly plugged into the adapter to complete the coupling.

Proceed as follows:

GENERAL ELECTRIC "LW" Series, Alignment Information, Continued

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	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 & 45.75 MC	L135 (converter plate) for maximum deflection of the 45.75 MC marker.	Do not retouch this adjustment.
4.	SAME	L151 (1st I-F grid) for maximum deflection of the 42.5 MC marker and proper nose shaping	Symmetry of the nose in important. No portion of the nose should be out of symmetry of more than 3%.
5.	SAME	T152 (2nd I-F Plate) to place 45.75 MC marker properly on the curve	Repeat 5, 6, and 7 if necessary.
6.	SAME	T151 (1st I-F Plate) to place 42.5 MC marker properly on the curve.	
7.	SAME	L151 if necessary to shape the nose.	

4.5 MC TRAP ALIGNMENT

1. Connect a -7.5 bias to Test Point II, with the positive bias lead grounded to chassis.
2. Short Test Points X and XI together temporarily.
3. Turn contrast control to maximum, volume to minimum.
4. Connect the detector network shown in Figure 6 to Test Point IV and feed its output to an AC VTVM.
5. Apply a 4.5 MC AM signal through a 1000 μμf. capacitor at Test Point III.
6. Adjust the top core of T154 for minimum reading on the VTVM. 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.

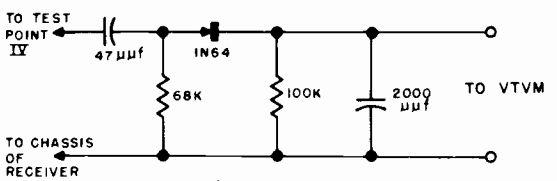


FIG. 6 DETECTOR NETWORK

AUDIO ALIGNMENT

(A) With Calibrated Test

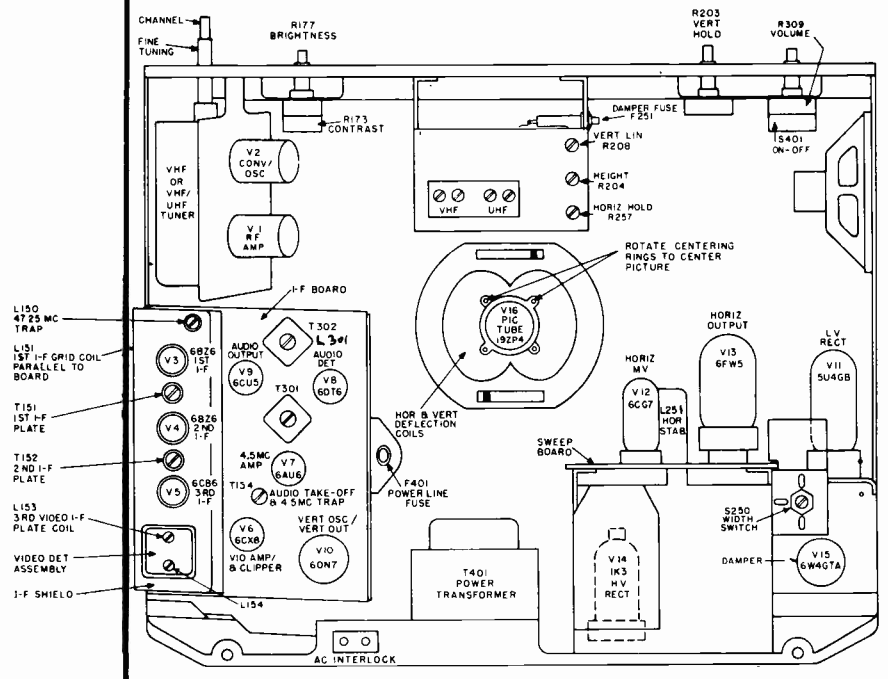
1. Repeat steps 1, 2, and 3 of 4.5 MC trap alignment procedure.
2. Connect DC VTVM (250V range) to Test Point XII with the negative lead grounded to chassis.
3. Apply a 4.5 MC AM signal through a 1000 μμf. capacitor to Test Point III.

   T301 for maximum meter deflection. Two positions of each core will give a maximum indication. The correct one for each core will be that nearest the respective end of the coil form.
4. Adjust the bottom core of T154 and both cores of T301 for maximum meter deflection. Two positions of each core will give a maximum indication. The correct position will be the one nearer that end of the coil form in which the core is located.
5. Switch to a strong 4.5 MC FM signal on Test Point III and remove the short between Test Point X and Test Point XI.
6. Turn the core of L301 to the end of the coil form away from the printed board, and then carefully tune inward for the SECOND peak indicating maximum undistorted output. (This position may be checked by connecting a scope probe to the ungrounded end of the volume control and tuning for maximum undistorted sine wave on the scope.)

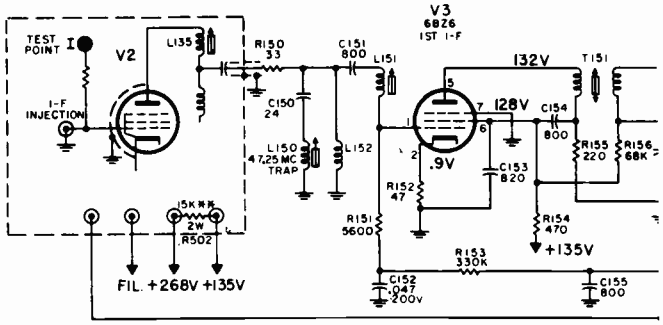
(B) With On-The-Air Signals

1. Tune in weak television signal and set the volume control to minimum.
2. Connect a DC VTVM to Test Point XII with the negative lead to chassis.
3. Adjust the bottom core of T154 and both cores of T301 for maximum as in Step 4 above. Observe previously outlined peaking procedures in tuning.
4. Switch to a strong television signal and adjust L301 for maximum as outlined in Step 6 above.

GENERAL ELECTRIC "LW" Series, Service Information, Continued



TUBE AND ADJUSTMENT LOCATIONS



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

• VARIES WITH CONTROL SETTINGS

ON-SIGNAL 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

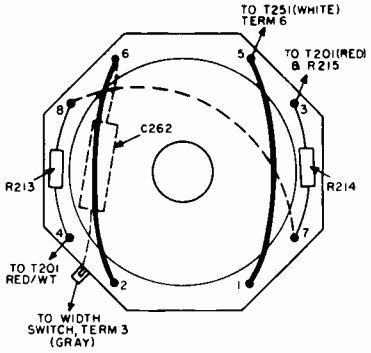
ALL OTHER CONTROLS ARE ADJUSTED FOR NORMAL OPERATION.

** SCOPE SYNCED AT 1/2 VERT FREQUENCY

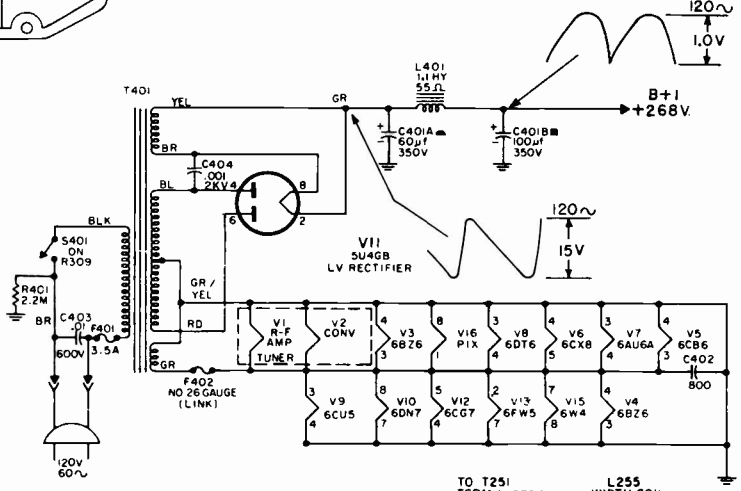
*** SCOPE SYNCED AT 1/2 HORIZ FREQUENCY

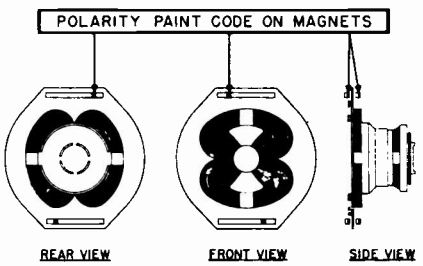
UNLESS OTHERWISE NO
K=1000 M=1,000
CAPACITORS MORE THA
CAPACITORS LESS THA
RESISTORS ARE 1/2 W

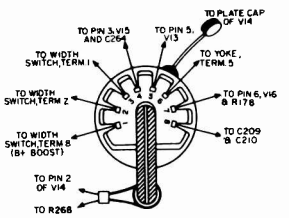
WIRE COLOR CODE
(USED IN MOST INSTAN
BROWN — FILAME
RED — HIGH B+
ORANGE — LOW B+
RED & WHITE — B+ BOO
WHITE — AGC



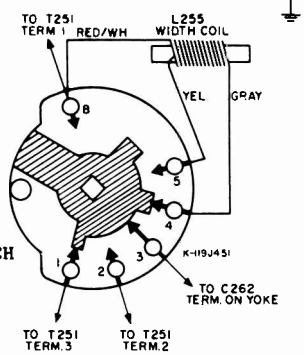
YOKE WIRING







HORIZONTAL OUTPUT TRANSFORMER



WIDTH SWITCH REAR VIEW

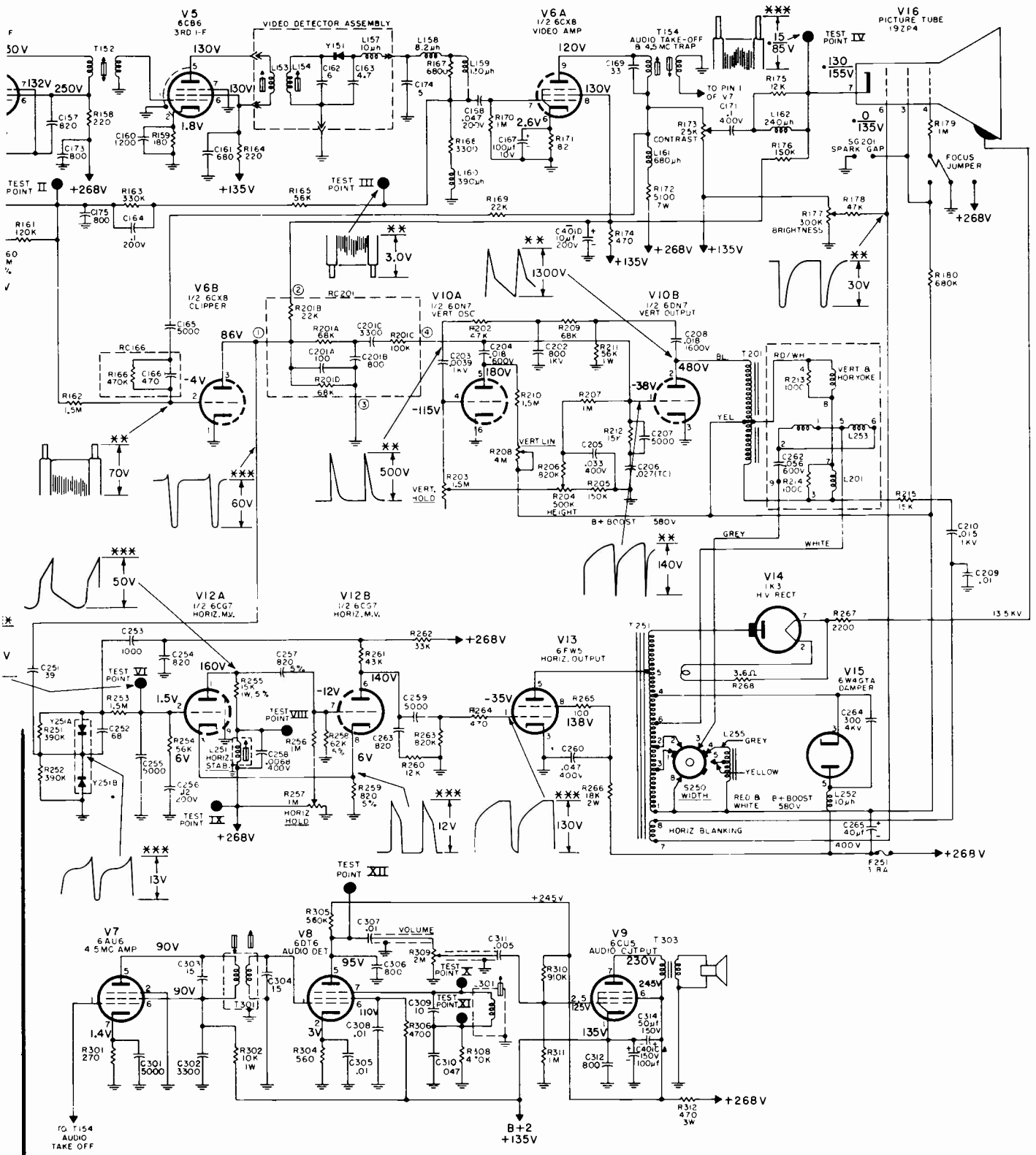
WT76X31 110° Deflection Yoke Replacement

Assembled to the replacement yoke flange are two pincushion correction magnets in easily removable plastic holders. Their use will provide several degrees of correction:
... where maximum correction is required - mount magnets on front side of flange.
... where no correction is needed - remove and discard magnets and holders.
... where moderate correction is required - mount magnets on rear side of flange.

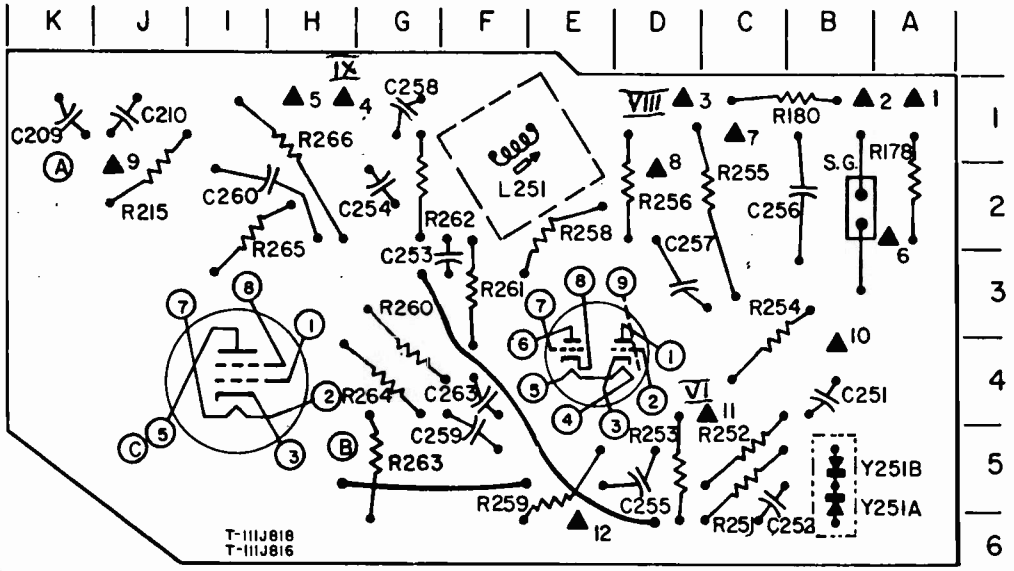
The degree of correction required can be readily determined by viewing the top and bottom of the raster with the vertical size reduced inside the mask opening.

It is important that the magnets be mounted with correct polarity as indicated by the red paint at one end. Observe as shown in Fig.

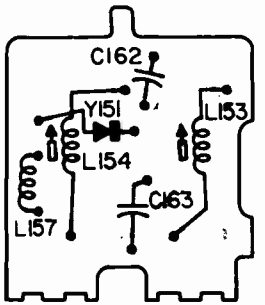
GENERAL ELECTRIC "LW" Series, Schematic Diagram, Continued



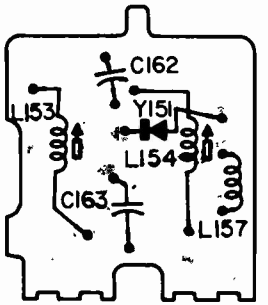
"LW" MAIN CHASSIS SCHEMATIC DIAGRAM WITH VOLTAGES AND WAVESHAPES



SWEEP BOARD COMPONENT LOCATIONS AS VIEWED FROM CONDUCTOR SIDE



VIDEO DETECTOR BOARD COMPONENT LOCATIONS AS VIEWED FROM COMPONENT SIDE OF BOARD.



VIDEO DETECTOR BOARD COMPONENT LOCATIONS AS VIEWED FROM CONDUCTOR SIDE OF BOARD.

PLUG INTO I-F BOARD WITH COMPONENTS FACING L158

TRIANGLE (▲3) NUMBERS

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

- ▲ 1. TO BRIGHTNESS CONTROL ARM
- ▲ 2. TO V16, PIN 3
- ▲ 3. TEST POINT VIII
- ▲ 4. TEST POINT IX; TO B+1 & R257 (HORIZ. HOLD CONTROL)
- ▲ 5. TO C265 – F251
- ▲ 6. TO V16, TERM. 6 & T251, TERM
- ▲ 7. TO C265 (B+ BOOST); R208, CONTROL ARM
- ▲ 8. TO R257, CONTROL ARM
- ▲ 9. TO YOKE, TERM. 3 & T201, RED LEAD
- ▲10. TO I-F BOARD (V6B, PIN 3 & RC201, TERM. 1)
- ▲11. TEST POINT VI
- ▲12. TO R257, R205

ROMAN VI NUMERALS

REPRESENT TEST POINTS

CIRCLED Ⓐ LETTERS

REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD

- Ⓐ TO T251, PIN 8
- Ⓑ TO FIL. (V15, PIN 7 & V16, PIN 1)
- Ⓒ TO T251, PIN 5

RESISTORS	CAPACITORS	WIRE CONNECTIONS
R178-A2	C209-K1	
R180-B1	C210-J1	△1-A1
R215-J2	C251-B4	△2-B1
R251-C5	C252-C5	△3-D1
R252-C5	C253-F3	△4-H1
R253-D5	C254-G2	△5-H1
R254-C4	C255-D5	△6-A2
R255-C2	C256-B2	△7-C1
R256-D2	C257-D3	△8-D2
R258-E2	C258-G1	△9-J2
R259-E5	C259-F5	△10-B4
R260-G4	C260-H2	△11-C4
R261-F3	C263-F4	△12-E6
R262-G2		Ⓐ-K2
R263-G5	COILS	Ⓑ-H5
R264-G4		Ⓒ-J5
R265-I3	L251-F1	
R266-H2		
	TUBES	
DIODE		
	V12-E4	
Y251A/B-B5	V13-I4	

ROMAN (II) NUMERALS

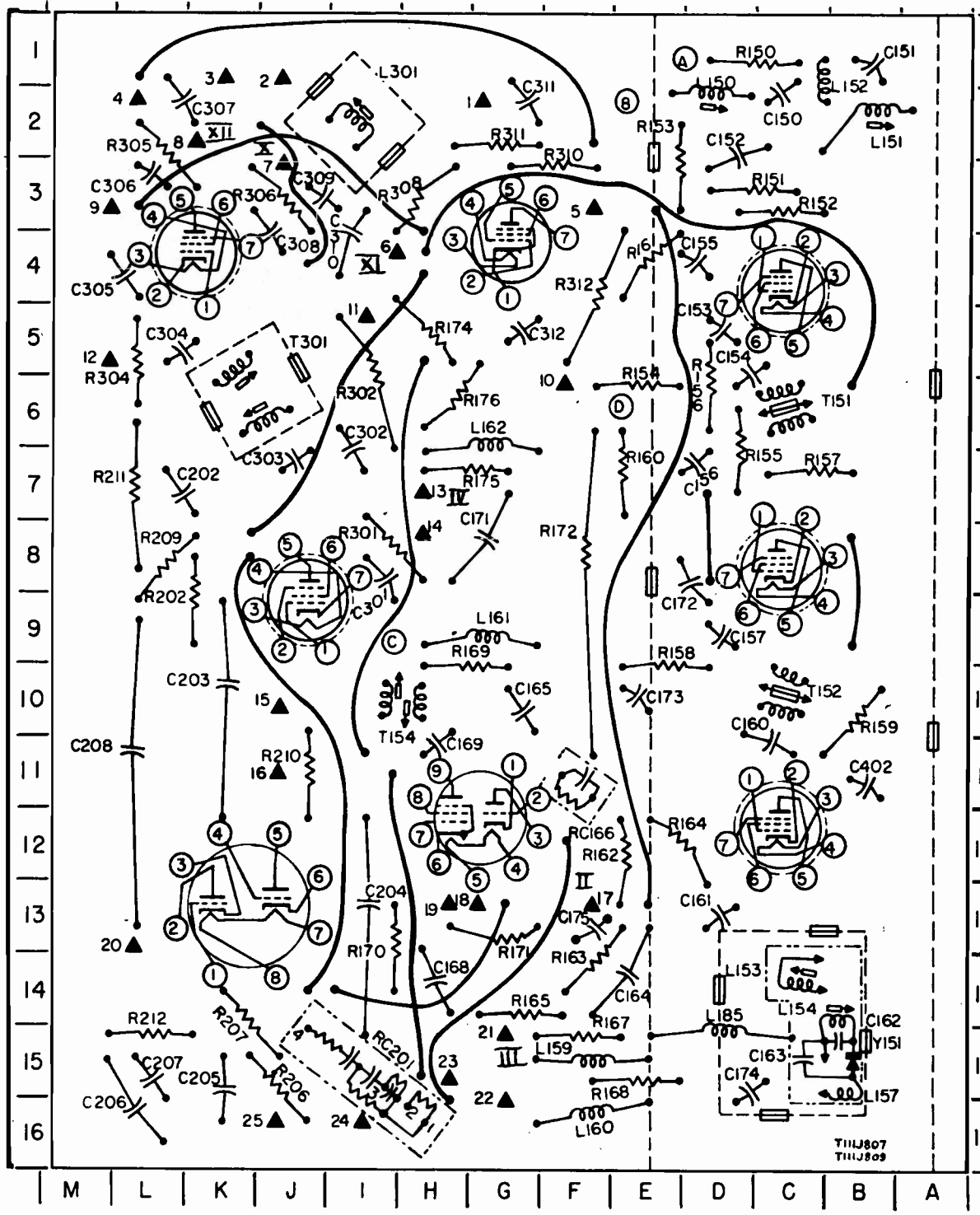
REPRESENT TEST POINTS

LETTERED Ⓐ CIRCLES

REPRESENT BOARD MOUNTED WIRES CONNECTED TO POINTS INDICATED.

- Ⓐ TUNER I-F LINK CABLE
- Ⓑ TUNER CABLE GROUND SHEATH
- Ⓒ TO R173 (CONTRAST)
- Ⓓ AGC TO TUNER
- Ⓔ TO R173 CONTROL ARM (BLUE)

GENERAL ELECTRIC "LW" Series, I.F. Board Information, Continued



I-F BOARD LOCATION AS SEEN FROM CONDUCTOR SIDE

CAPACITORS	RESISTORS	COILS & TRANSFORMERS	WIRE CONNECTIONS
C150-C2	R150-C1	L150-D2	ⓐ-D1
C151-B1	R151-C3	L151-B2	ⓑ-E2
C152-D3	R152-C3	L152-C1	ⓒ-I9
C153-D5	R153-E3	L153-C14	ⓓ-E6
C154-D6	R154-E6	L154-B14	ⓔ-H8
C155-D4	R155-D7	L157-B15	△1-G2
C156-D7	R156-D6	L158-D13	△2-J11
C157-D9	R157-B7	L159-F15	△3-K1
C160-C11	R158-E9	L160-F16	△4-L2
C161-D13	R159-B10	L161-G9	△5-F3
C162-B15	R160-E7	L162-G7	△6-I4
C163-C15	R161-E4	L301-I2	△7-J3
C164-E14	R162-E12	T151-C6	△8-K2
C165-G10	R163-F14	T152-C10	△9-M3
C168-H14	R164-D12	T154-H10	△10-F6
C169-H10	R165-G14	T301-J6	△11-I5
C171-G8	R167-F15		△12-M5
C172-D8	R168-E15	R/C NETWORKS	△13-H7
C173-E10	R169-G10		△15-J10
C174-D15	R170-I13	RC166-F11	△16-J11
C203-K10	R171-G13	RC201-I15	△17-F13
C204-I13	R172-F8		△18-G13
C205-K15	R174-H5	TUBES	△19-H13
C206-L16	R175-G7		△20-L13
C207-L15	R176-H6	V3-C4	△21-G15
C208-L11	R202-K8	V4-C8	△22-G16
C301-I8	R206-J15	V5-C12	△23-H15
C302-I7	R207-K14	V6-G12	△24-I16
C303-J7	R209-L8	V7-J9	△25-J16
C304-L5	R210-J11	V8-K4	
C305-L4	R211-L7	V9-G4	TEST POINTS
C306-L3	R212-L15		
C307-L2	R301-I8	DIODES	TPI-F13
C308-J4	R302-I5		TPIII-G15
C309-J3	R304-L5	Y151-B15	TPIV-H7
C310-I4	R305-L2		TPX-J3
C311-G2	R306-J3		TPXI-I4
C312-G5	R308-H3	R311-G2	TPXII-K2
C402-B11	R310-F3	R312-F5	

NUMBERED (▲3) TRIANGLES

REPRESENT WIRE WRAP TERMINALS ON BOARD FOR CONNECTION OF WIRES FROM POINTS INDICATED.

- ▲ 1 TO R309 CONTROL ARM
- ▲ 2 TO GROUND SHEATH OF VOLUME CONTROL
- ▲ 3 TO YELLOW WIRE AND VOLUME CONTROL
- ▲ 4 TO T303-C314
- ▲ 5 TO T303 (BLUE LEAD)
- ▲ 6 TEST POINT XI
- ▲ 7 TEST POINT X
- ▲ 8 TEST POINT XII
- ▲ 9 TO TUNER FIL & F402
- ▲ 10 TO TUNER B+ & C401B (RED LEAD)
- ▲ 11 TO TUNER +135V & C401C (ORANGE LEAD)
- ▲ 12 TO F402 & GREEN LEAD, T401
- ▲ 13 TEST POINT IV, TO PIN 7, V16
- ▲ 15 TO R208 (GREEN)
- ▲ 16 TO R203 (BLACK/WHITE)
- ▲ 17 TEST POINT II
- ▲ 18 TO PIN I, V16 & PIN 7, V15 (BROWN)
- ▲ 19 TO C167 (YELLOW)
- ▲ 20 TO T201 (BLUE)
- ▲ 21 TEST POINT III
- ▲ 22 TO T401 (GREEN/YELLOW)
- ▲ 23 TO C251 ON SWEEP BOARD (GREEN)
- ▲ 24 TO C401D
- ▲ 25 TO R204 CONTROL ARM (GRAY)

GENERAL ELECTRIC "LW" Series, Service Information, Continued

CLEANING THE CURVED PLASTIC SAFETY WINDOW AND PICTURE TUBE FACE

Remove the chassis and picture tube assembly as previously described. The inside of the safety window and the picture tube face may now be cleaned. A solution of pure soap and water and a soft cloth may be used for cleaning these.

HANDLE AND ESCUTCHEON REMOVAL

To remove the carrying handle from the "LW" chassis, first remove the cabinet back and unscrew the mounting screws (nuts in the case of the strap type handle used in some models) from underneath the chassis top.

To remove the escutcheon, first take off the panel control knobs and the handle or strap. Then loosen the two screws holding the chassis to the top of the front assembly and the three screws which hold the escutcheon in place along the front edge of the chassis. Finally, push the escutcheon toward the rear until the three slots along its rear edge disengage from the chassis.

TUNER AND TUNER BRACKET REMOVAL

The tuner may be dismantled from its mounting bracket by unsoldering leads going to other components and removing the four mounting screws which hold it to the bracket.

DISASSEMBLY OF CONTROLS

All of the "LW" chassis principal and secondary controls are accessible for service and removal once the cabinet back has been removed from the chassis. Those mounted on the top may be removed without dismantling the escutcheon simply by pulling off the control knobs and unscrewing the mounting nuts through the slots provided at the top of the chassis. The potentiometers mounted on the auxiliary platform, near the antenna terminal board, may be dismantled by straightening the twist tabs which hold them in place.

Disassembly of Controls: The vertical hold potentiometer and the dual contrast-brightness potentiometers in late-production models are held in place by twist tabs instead of nuts. These tabs may be straightened or twisted completely off to permit removal of the defective component.

CIRCUIT BOARD SERVICING

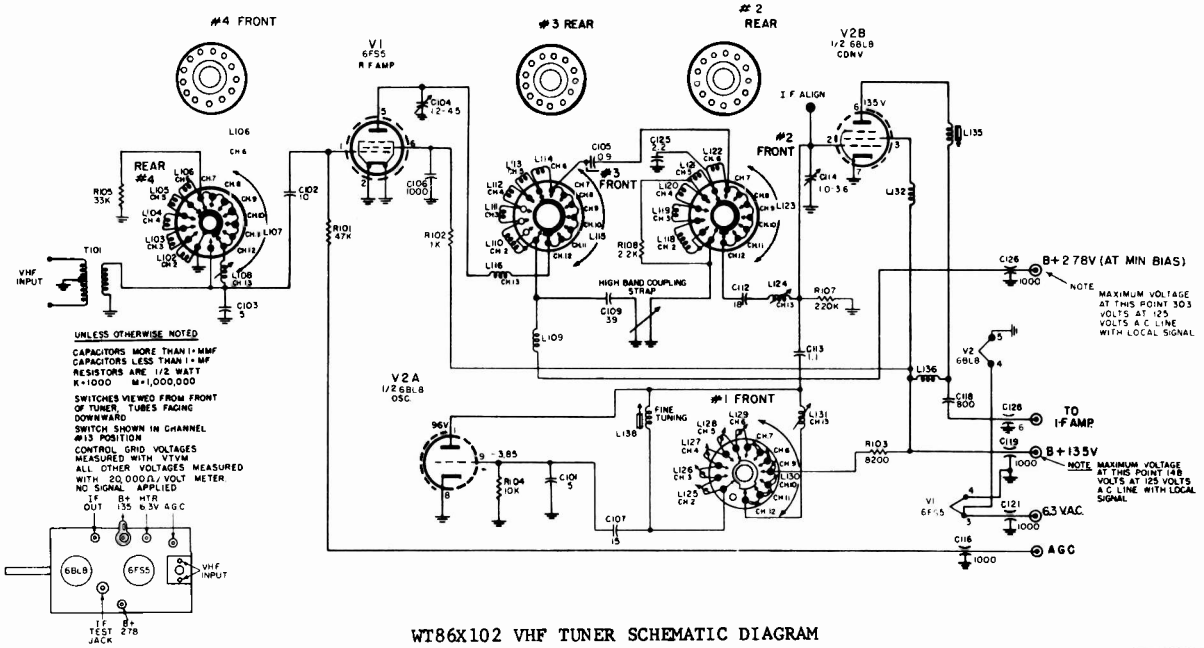
Both of the etched circuit boards in the "LW" chassis are so mounted that they may be serviced from the rear of the set once the cabinet back has been removed. The conductor side of the sweep board can be lifted into position for servicing after the three screws holding the board to the top of the high-voltage assembly are taken out. The IF board may be swiveled into position for servicing by removing three screws at the side and two at the bottom of the chassis and allowing the mounting frame to pivot on the remaining screw, which is the one nearest the rear edge at the bottom of the chassis.

Eleven screws hold the IF board to the metal frame. These must be removed only if replacement of the board itself is necessary.

The IF shield mounts on four clips attached to the board. It may be removed after the single screw holding it to the bottom of the board mounting frame is loosened.

HIGH VOLTAGE ASSEMBLY SERVICING

The metal box encasing the high-voltage rectifier and transformer is held to the chassis bottom by four screws, and may be tilted for better service accessibility after these screws and the wires soldered to the transformer have been removed. To change rectifier tubes, it is only necessary to loosen one screw at the rear of the assembly and drop the hinged "door" at the left rear of the HV box. To replace the transformer, the rectifier socket or either of the two resistors (R267 & R268) beneath the socket, it will be necessary to remove the entire rear panel of the HV box as well as the screws holding the box to the chassis.



WT86X102 VHF TUNER SCHEMATIC DIAGRAM

GENERAL ELECTRIC

U5 CHASSIS LINE

U5 CHASSIS
COVERS
MODELS
WITH OR WITHOUT UHF
M870VWD
M871VWD
R870VML
R870VWD

ELECTRICAL ADJUSTMENTS

HEIGHT AND VERTICAL LINEARITY

The vertical framing controls, R305 and R310, should be adjusted simultaneously to give proper vertical size consistent with good vertical linearity. Final adjustment should be made to allow the picture to extend approximately 1/8 inch beyond the top and bottom edges of the mask.

WIDTH CONTROL

The width switch S351, located at the right side of the cabinet back, has 3 positions. Select the position that completely fills the screen without having the picture extend much greater than 1/4 inch beyond the mask.

HORIZONTAL AFC ADJUSTMENT

1. Remove the cabinet back.
2. Tune the receiver to a weak signal and adjust the controls for normal operation.
3. Short Test Point IX to the chassis with a jumper wire.
4. Connect a 1000 ohm resistor from Test Point X to Test Point XI (in parallel with L350).
5. Adjust the horizontal hold potentiometer R357 until the picture just "Floats" back and forth across the screen. Leave R357 in this position.
6. Remove the 1000 ohm resistor from Test Point X and Test Point XI. Adjust L350 stabilizer coil so that the picture again just "Floats" across the screen. Leave L350 set in this postion.
7. Remove the jumper from Test Point IX and the chassis.

AGC CONTROL

Two methods which can be used to adjust the AGC control, R254, are described below. The first is the most accurate. However it may be necessary to use the second method when adjustments are made outside the service shop.

METHOD 1—

1. Tune in a TV signal, preferable a test pattern or signal that is monitored to insure that the percentage of sync does not exceed 25%.
2. Connect a scope to TPVIII (Clipper Plate).
3. Set the scope to sync at the vertical sync rate so that one vertical sync pulse and the horizontal pulses for one frame can be observed.
4. Tune the channel for maximum gain (into smear). Adjust the AGC control counterclockwise until the front of the vertical sync pulse drops into a hole; then clockwise until the horizontal pulses appear to decrease at the bottom of the scope display. Set the control approximately at the midpoint between the limits.

METHOD 2—

Tune in the strongest TV station signal in the area for maximum gain. Adjust the AGC control clockwise until an overload condition exists which will appear as tearing of the picture. Turn the control counterclockwise until the overload condition disappears and then slightly beyond this point is the proper setting of the control.

ION TRAP. The straight gun picture tubes used do not normally require an ion trap. However, a low gauss ion trap is used on a few tubes in order to optimize focus. Power should not be applied to the receiver for extended periods of time without proper adjustment of the ion trap. Rotate and slide the ion trap on the neck of the picture tube to obtain maximum picture brightness without neck shadow and consistent with good focus. Brightness should be kept moderate during the ion trap adjustment.

PICTURE TUBE ADJUSTMENTS

YOKE POSITION

The yoke is secured to the neck of the picture tube by a "U" shaped clamp and spring, Figure 3. To adjust the yoke for picture tilt, loosen the clamp by squeezing points C and D with long nose pliers until the eye of the spring slides over the bend in the clamp. The yoke can now be adjusted for correct picture tilt. To secure the yoke, the pliers are used in the same manner between points A and B until the spring eye slides over the bend to its clamping position.

PICTURE CENTERING

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

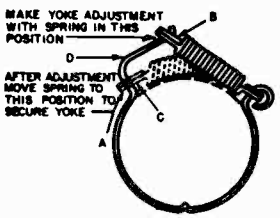


Fig. 3. Yoke clamp

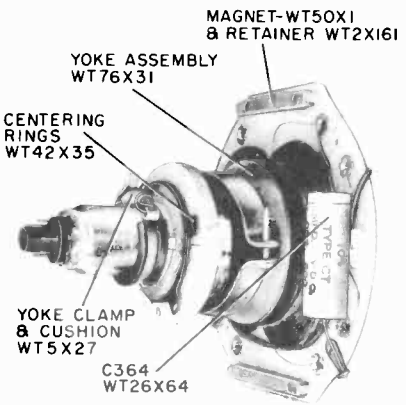


Fig. 4. Picture tube neck components

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.

The four connection points for focus potential are located on the horizontally mounted printed board behind the rear adjustment controls. The lead from R216 mounted on the picture tube socket may be connected to one of the following points to obtain best focus.

1. Ground potential—wire wrap terminal at the front of V9 as viewed from the rear of the chassis. This point also connects to pin 8 of the picture tube.
2. B+ 135V—wire wrap terminal to the left of the vertical height control R305, as viewed from the rear of the chassis.
3. B+ 280V—wire wrap terminal to the left of the vertical linearity control R310, as viewed from the rear of the chassis.
4. B+ Boost—wire wrap terminal at the spark gap to the rear and right side of the vertical height control R305, viewed from the rear of the chassis.

(Continued on pages 54 through 60)

GENERAL ELECTRIC U5 Chassis, Service Information, Continued

TO REMOVE THE CHASSIS FROM THE CABINET

Remove the knobs from the shafts on the front of the cabinet. Disconnect any antennas from the antenna terminal board. Remove the cabinet back by taking out the screws securing the back to the cabinet, the interlock bracket, and the antenna terminal board support bracket. Disconnect the speaker plug and remote control cable plug (where used). Connect one end of an insulated wire to the chassis and touch the other end to the anode button of the picture tube to discharge the tube. Remove the anode lead from the picture tube by squeezing the anode clip and withdrawing it from the tube. Remove the picture tube socket, the yoke clamp and the deflection yoke assembly. Remove three screws holding the tuner and bracket assembly to the front of the cabinet. Hook the tuner bracket to the chassis. Remove four chassis retaining screws from the bottom of the cabinet. Remove the chassis from the cabinet.

REMOVAL AND REPLACEMENT OF THE PICTURE TUBE

The chassis must be removed from the cabinet as described above before the picture tube can be removed.

After removing the chassis, remove four screws which go through the bottom of the cabinet into the tube strap brackets. Remove the top left hand nut holding the tube bracket to the top front of the cabinet. Hold the neck of the tube in the left hand and remove the top right hand nut. Carefully remove the tube from the cabinet.

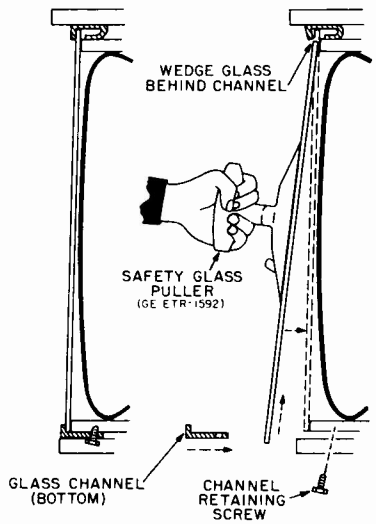


Fig. 21. Replacement of safety window

To replace the picture tube, lay the tube face down on a clean cloth so that the tube face does not become scratched. Loosen the nuts on the spade bolts at each side of the tube strap. Remove the tube strap from the tube. Place the strap on the new tube so that when facing the back of the tube the anode button is to the right with the tube strap ears at the top. Tighten the nuts on the spade bolts with equal torque to secure the strap to the tube. Replace the tube assembly in the cabinet and observe if the tube aligns properly with the mask. If it does not align properly, remove the tube from the cabinet and reposition the strap as necessary to effect proper alignment of the picture tube with the mask.

PINCUSHION MAGNETS ON REPLACEMENT YOKES

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 will correct pin cushion effects (bowing of the scanning lines) at the top and bottom of the raster. This effect may be seen by reducing the vertical size sufficiently with R305 so that the top and bottom of the raster may be seen.

The magnets may be postioned to provide several degrees of pin cushion correction 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—mount the magnets on the rear of the yoke flange.
3. Where no correction is needed—remove the magnets and holders.
4. Any of the above may be used in combination—one on the top rear, one on the bottom front, etc.

It is important that the magnets be mounted with correct polarity as indicated by the red paint code at the end of each magnet. Observe the polarity shown in Figure 22.

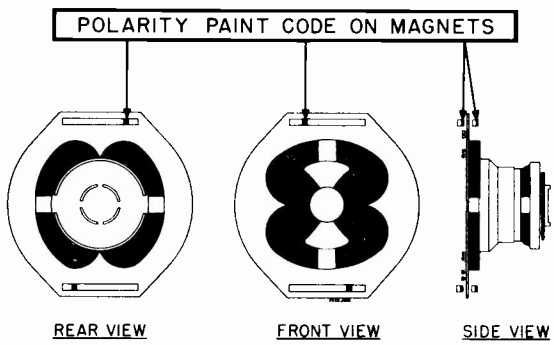


Fig. 22. Pincushion magnet polarity

VIDEO I-F ALIGNMENT

The alignment of the video I-F system involves the proper adjustment of three traps and the tuned pass band circuits. These adjustments are all accomplished by core positioning with a hexagon core alignment tool. All adjustment points are accessible from the rear of the receiver without removing the chassis from the cabinet. Fig. 45 indicates the position of the alignment points. Figs. 41 and 42 indicate the correct test point locations.

PROCEDURE:

1. Turn the volume control fully counterclockwise and the contrast control fully clockwise. Set the channel selector to channel 11 or some other high band channel where oscillator influence is not noted as the fine tuning control is turned. Turn the fine tuning control fully counterclockwise.
2. Adjust the AGC control, R254, to mid-range.
3. Connect the oscilloscope to Test Point IV through a 22,000 ohm resistor. The resistor should not be more than 2.5 inches away from Test Point IV.
4. Connect a bias voltage between Test Point VII and the chassis with the *positive* side of the bias voltage on Test Point VII.
5. Inject signal from a properly terminated AM signal generator or sweep generator through the network in Figure 5 to the I-F injection jack.

The I-F injection jack is not a phono type receptacle. The connection is made by the end of the phono plug touching the contact inside the injection jack. The outside shell of the plug grips the injection jack firmly. Press the plug firmly into place without excess pressure. See Figure 5 for plug construction.

6. Align the receiver to produce the response curve shown in Figure 11.

NOTES:

1. Always allow the equipment and the receiver under test to warm up at least 20 minutes before adjustments are made.
2. Always have a speaker or dummy load connected to the audio output transformer secondary.
3. Where difficulty is encountered in obtaining correct alignment, the individual pre-peaking of each tuned circuit may be made to bring the tuning close to frequency but overall swept alignment should be completed for correct response. See pre-peaking chart and procedure.
4. After completion of I-F alignment, reset the AGC control according to information outlined.

GENERAL ELECTRIC U5 Chassis, Alignment Information, Continued

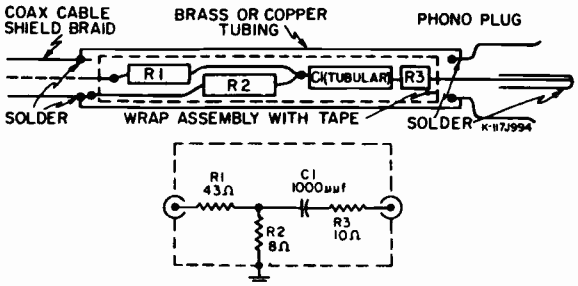


Fig. 5. I-F injection network

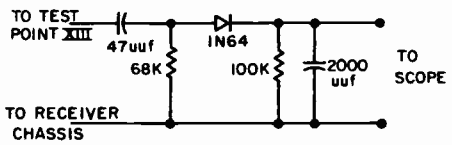


Fig. 7. 4.5 MC detector network

PRE-PEAKING:

If each coil is peaked as indicated in the frequency chart, an over-all I-F response curve which closely approximates the proper curve will be achieved. This peaking may be done by using an AM signal or the sweep method may be used by adjusting the coils for maximum amplitude at the desired marker points. After this is done, the over-all sweep method should be used to permit proper final shaping of the curve.

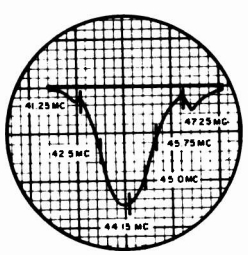
Further aids to response trouble shooting are the I-F system curves in Fig. 10. These were obtained by progressively inserting the sweep signal stage-by-stage starting from the first I-F grid. When observing these responses use the same equipment and bias battery connections as for the sweep alignment procedure above, except for the sweep generator output cable. The bias voltage used is +3.5 volts.

AM PRE-PEAKING AND TRAP FREQUENCIES

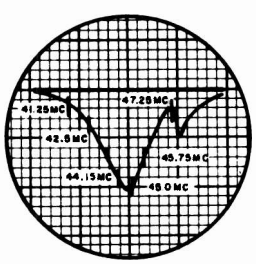
L135	Max. at 45.75 MC
L151 Trap	Min. at 47.25 MC
L152	Max. at 42.50 MC
L153 Trap	Min. at 41.25 MC
L154 Trap	Min. at 47.25 MC
L155	Max. at 44.15 MC
T151	Max. at 42.90 MC
T152	Max. at 45.30 MC

VIDEO I-F ALIGNMENT CHART

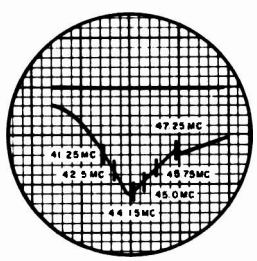
STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1	47.25 MC AM	Short out the Junction of C151 and L151 (TP III) to ground by inserting a small screw driver in hole at top of I-F shield, and adjust L154 for minimum scope deflection.	Use maximum scope sensitivity and the lowest possible signal level for the 47.25 MC and 41.25 MC AM adjustments.
2		Remove short from TP III and adjust L151 for minimum scope deflection.	Apply +7 volts bias between TP VII and the chassis with the positive bias connected to TP VII.
3	41.25 MC AM	L153 for minimum scope deflection.	The tuning cores of L153 and L154 must be positioned at the tuning point closest to the printed board. (It is possible to attain two tuning points.)
4	38-48 MC sweep generator. Scope calibrated 3 volts peak for 2 inch deflection.	L135 (converter plate) to obtain maximum distance from base line of 45.75 MC marker.	Do not retouch this adjustment.
5		L152 (1st I-F grid) to obtain maximum distance from base line of 42.5 MC marker.	Adjust bias as above to obtain +3.5 volts.
6		L155 (video detector) to obtain maximum distance from base line of 44.15 MC marker.	Maintain as near as possible marker position and limits shown in desired response Fig. 11. Peak region of curve may vary from 103% to 123% using 45.0 MC point as 100% reference.
7		T151 (1st I-F Plate) for proper location of the 42.5 MC marker.	
8		T152 (2nd I-F Plate) for proper location of the 45.75 MC marker.	
9		L152 and L155 slightly to "rock the nose" for proper shape and symmetry at 44.15 MC.	T151 and T152 may require readjustment, after L152 and L155 are set, to bring the markers within tolerance. The curve should be symmetrical in appearance.



L155, T152 & T151 RESPONSE (SWEEP AT PIN 1 OF V3 THRU .001μf)



L155 & T152 RESPONSE (SWEEP AT PIN 1 OF V4 THRU .001μf)



L155 RESPONSE (SWEEP AT PIN 1 OF V5 THRU .001μf)

Fig. 10. Progressive I-F response curves

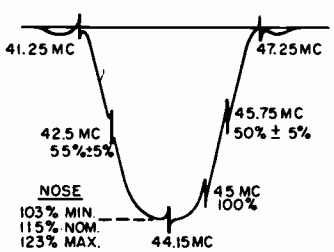


Fig. 11. Desired I-F response curve

GENERAL ELECTRIC U5 Chassis, Alignment Information, Continued

AUDIO I-F ALIGNMENT

PROCEDURE:

1. Apply power to the receiver for at least 20 minutes before making adjustments.

2. Connect an antenna to the receiver and tune in a weak television signal. This will provide a 4.5 MC FM signal source for audio I-F alignment. Keep the volume control turned down unless the speaker is connected.

3. Connect two matched 100,000 ohm resistors in series between Pin 2 of V15B (6T8) and the chassis as shown in Figure 12.

4. Follow instructions in the Audio Alignment Chart.

NOTE: The top core of T200 has two positions showing minimum. The bottom core has two positions showing maximum. The correct position for each core is the position nearest the respective end of the coil.

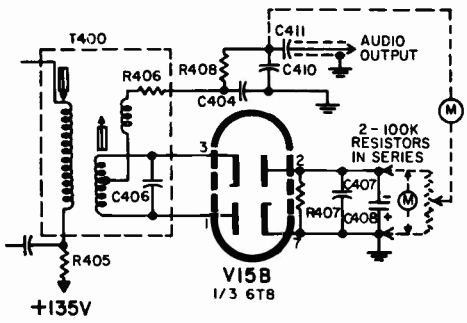


Fig. 12. Audio alignment connection

AUDIO ALIGNMENT CHART

STEP	CONNECT VTVM	ADJUST	METER INDICATION	REMARKS
1	Between Pin 2 of V15B and chassis.	T200 Secondary (Bottom)	Adjust for maximum.	Repeat Steps 1, 2, and 3 to assure proper alignment.
2		T400 Primary (Top)	Adjust for maximum.	
3	Between Junction of R408, C411, and the center of the two 100,000 ohm resistors.	T400 Secondary (Bottom)	Adjust for zero volts D-C output. Where possible set meter for zero center.	

4.5 MC TRAP AND AUDIO TAKEOFF ALIGNMENT

1. Connect a −7 volt bias between Test Point VII and the chassis with the negative terminal to Test Point VII.
2. Connect an accurate 4.5 MC AM signal to Test Point IV through a 1000 uufd capacitor.
3. Connect the detector network, Figure 7, to Test Point XIII. Connect a scope to the network.
4. Connect AC VTVM to the speaker terminals.
5. Tune the top core of T200 for minimum deflection on the scope at Test Point XIII. (See Note under Audio I-F Alignment.)
6. Tune the bottom core of T200 for maximum reading on the VTVM.
7. Retune the top core of T200 again for minimum deflection on the scope.

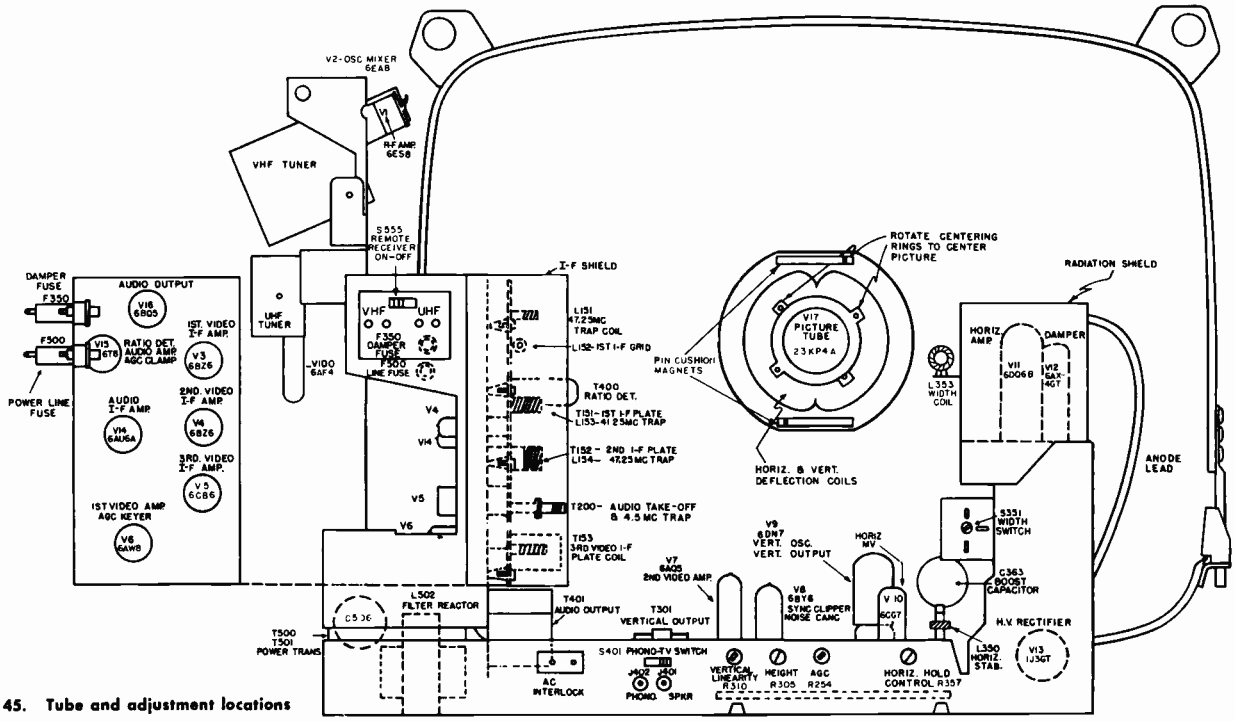
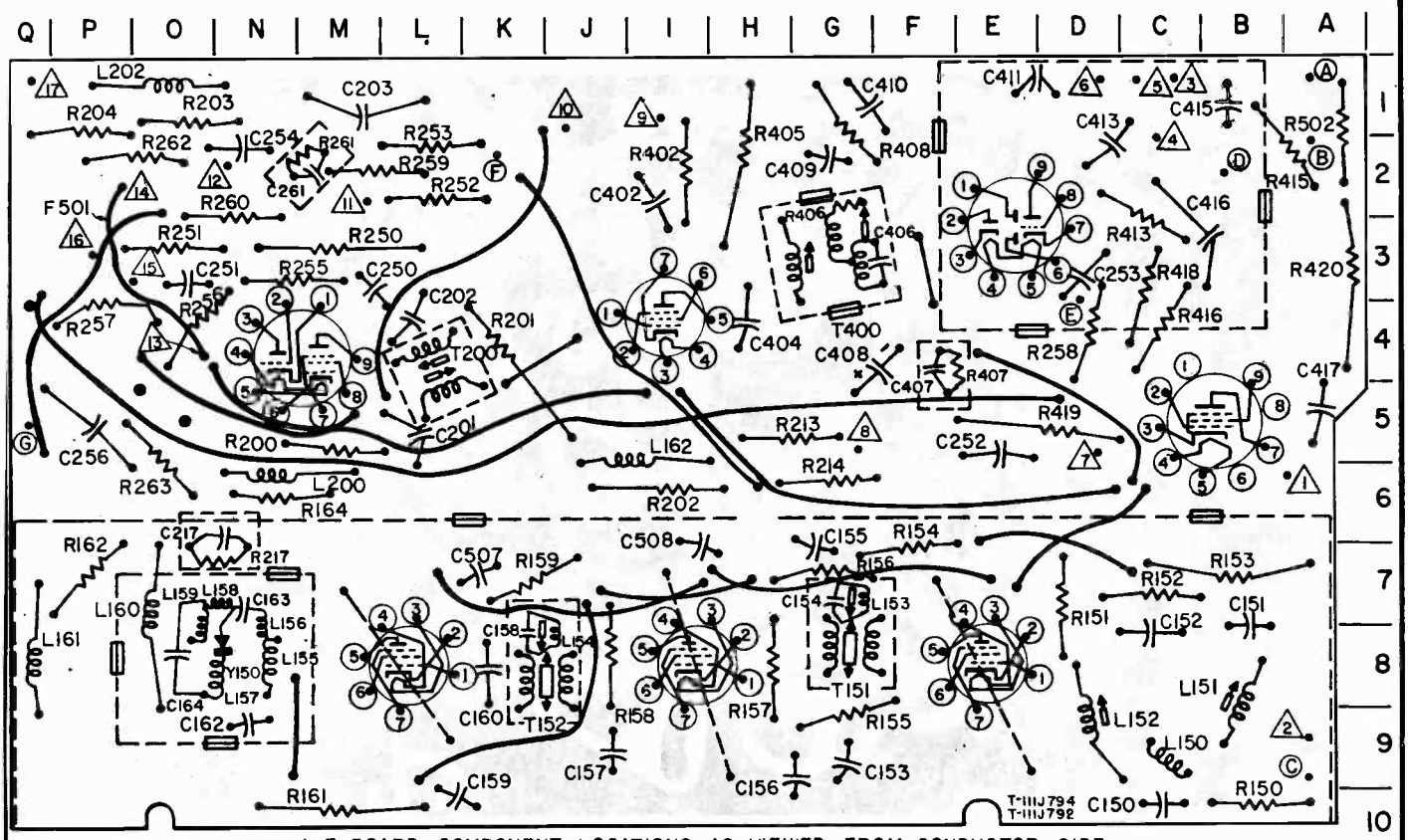


Fig. 45. Tube and adjustment locations

GENERAL ELECTRIC U5 Chassis, I.F. Board Information, Continued



I-F BOARD COMPONENT LOCATIONS AS VIEWED FROM CONDUCTOR SIDE

Fig. 41. I-F Board component locations

NUMBERED △3▽ TRIANGLES

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

△1▽ T401 Blue, C418

△2▽ Shield Wire of Ⓒ

△3▽ R417 (Treble) Term. 2

△4▽ R410 (Volume) Term. 2

△5▽ S401, Term. 3; P502, Term. 1

△6▽ P502, Term. 3

△7▽ C506B—

△8▽ R206 (Contrast) Term. 3

△9▽ Audio Muting Switch

△10▽ C506A■, △8▽ on Sweep Board

△12▽ △6▽ on Sweep Board

△14▽ T500/T501 Green

△15▽ △12▽ on Sweep Board

△16▽ Shield of △15▽

△17▽ Ⓐ on Sweep Board

COMPONENT LOCATIONS

RESISTORS

R150—A10
R151—D7
R152—C7
R153—B7
R154—F7
R155—G9
R156—G7
R157—H8
R158—J8
R159—K7
R161—M10
R162—P7
R164—N6
R200—M5
R201—K4
R202—I6
R203—O1
R204—P1
R213—G5
R214—G6
R217—N7
R226—M2
R250—M3
R251—O3
R252—L2
R253—L2
R255—M3
R256—O3
R257—P4
R258—D4
R259—M2
R260—N2
R262—O2
R263—O5
R402—I2
R405—H2
R406—G2
R407—E4
R408—G1
R413—C3
R415—A2
R416—C4
R418—C3
R419—D5
R420—A3
R502—A1

TUBES

V3—E8
V4—I8
V5—L8
V6—M4
V14—I4
V15—E3
V16—B5

DIODES

Y150—N8

TEST POINTS

III—B8
IV—O5
V—P4
VI—Q1
VII—Q3
XII—D1

CAPACITORS

C150—C10
C151—B7
C152—C8
C153—G9
C154—G7
C155—G7
C156—H9
C157—J9
C158—K8
C159—L10
C160—K8
C162—N8
C163—N7
C164—O8
C201—L5
C202—L4
C203—M1
C217—N6
C250—M3
C251—O3
C252—E5
C253—D3
C254—N2
C256—P5
C261—M2
C402—I2
C404—H4
C406—F3
C407—F4
C408—F4
C409—G2
C410—G1
C411—E1
C413—D2
C415—B1
C416—B3
C417—A5
C507—K7
C508—I7

COILS

L150—C9
L151—B8
L152—D9
L153—G7
L154—J8
L155—N8
L156—N7
L157—N8
L158—N7
L159—O7
L160—O7
L161—Q8
L162—I5
L200—N6
L202—O1

TRANSFORMERS

T151—G8
T152—K8
T200—L4
T400—G3

WIRE COLOR CODE

(Used In Most Instances)

Brown	—Filament
Red	—High B +
Orange	—Low B +
Red and White	—B + Boost
White	—AGC

ROMAN (V) NUMERALS

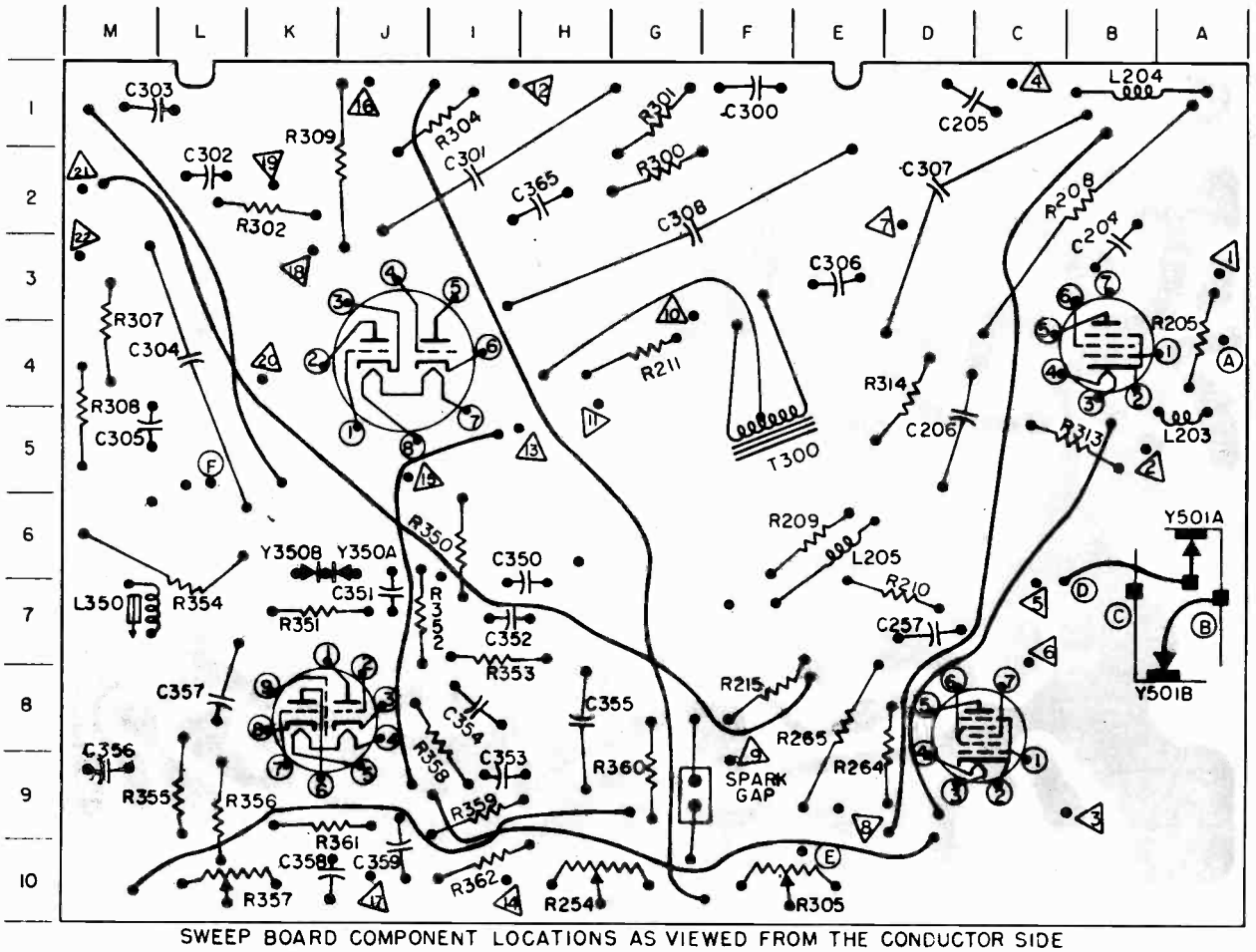
REPRESENT TEST POINTS

LETTERED Ⓐ CIRCLES

REPRESENT BOARD MOUNTED WIRES CONNECTED TO POINTS INDICATED.

Ⓐ C505A—■
Ⓑ C505B—▲
Ⓒ Shielded Lead From Tuner
Ⓓ To Shield Wires of Shielded Audio Cables
Ⓔ AGC Terminal on Tuner
Ⓕ C505C◗
Ⓖ △3▽ on Sweep Board

GENERAL ELECTRIC U5 Chassis, Sweep Board Information, Continued



SWEEP BOARD COMPONENT LOCATIONS AS VIEWED FROM THE CONDUCTOR SIDE

Fig. 42. Sweep board component locations

COMPONENT LOCATIONS

RESISTORS

R205—A4
R208—B2
R209—E6
R210—D5
R211—F4
R215—F8
R254—H10
R264—D8
R265—E8
R300—G2
R301—G1
R302—K2
R304—I1
R305—E10
R307—M3
R308—M4
R309—J2
R313—B5
R314—D4
R350—I6
R351—K7
R352—J7
R353—I7
R354—L7
R355—L9
R356—L9
R357—L10
R358—I8
R359—I9
R360—G9
R361—K9
R362—I10

CAPACITORS

C204—B3
C205—D1
C206—D5
C300—F1
C301—I2
C302—L2
C303—L1
C304—L4
C305—M5
C306—E3
C307—D2
C308—G3
C350—H7
C351—J7
C352—I7
C353—I9
C354—I8
C355—H8
C356—M9
C357—L8
C358—K10
C359—J10
C365—H2

TUBES

V7—B4
V8—C8
V9—J4
V10—K8

TRANSFORMERS

T300—F5

COILS

L203—A5
L204—B1
L205—E6
L350—M7

DIODES

Y501A—A6
Y501B—A8
Y350A—J6

TEST POINTS

VIII—H7
IX—I7
X—M6
XI—L6
XIII—F7

SPARK GAP

G9

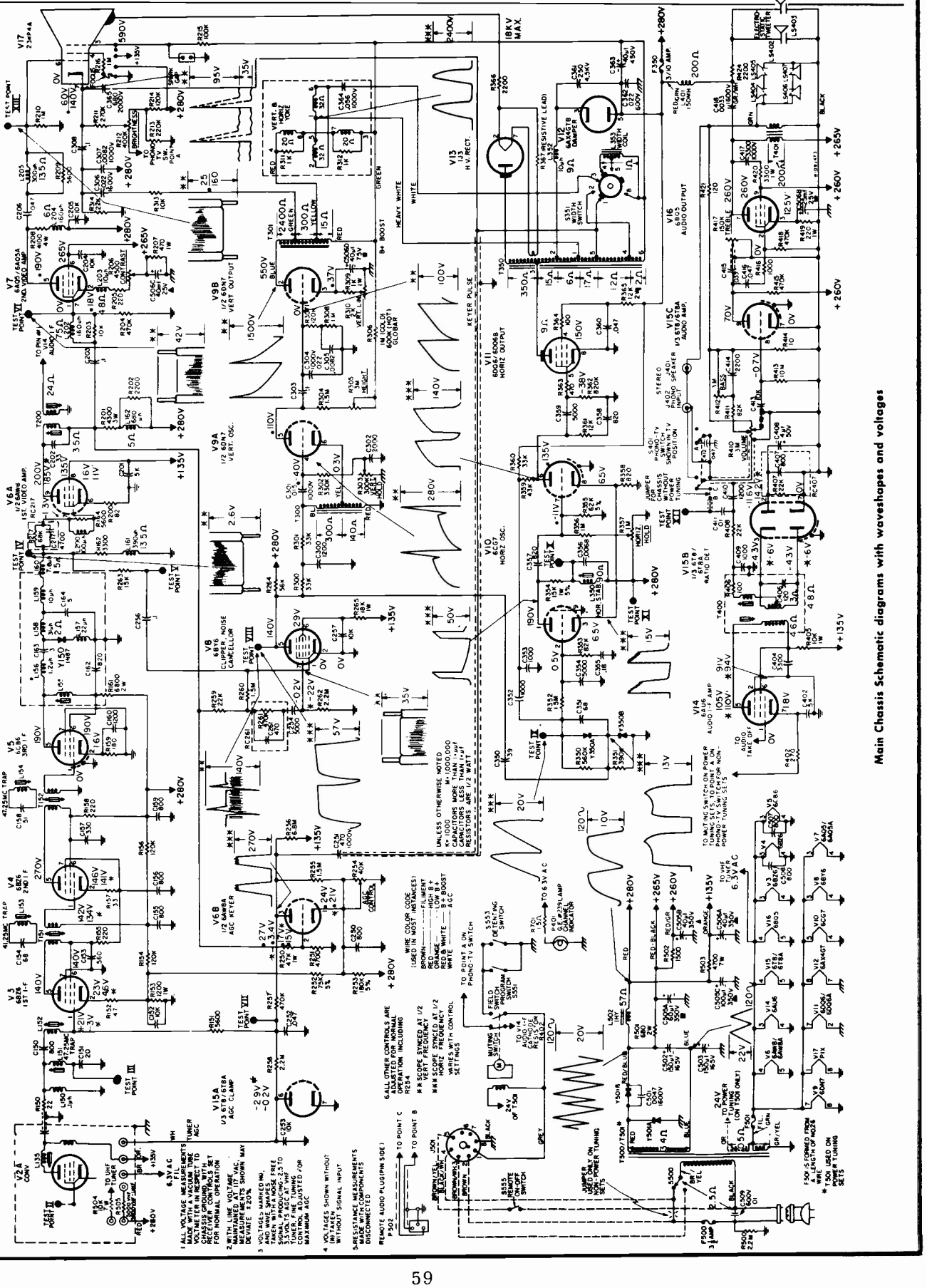
ROMAN (VIII) NUMERALS REPRESENT TEST POINTS

NUMBERED △ TRIANGLES

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

△1 R206 (Contrast) Term. 1
△2 T301, Green
△3 Ⓖ on I-F Board
△4 C505C, L502 Red
△5 T500/T501 Yellow & Green
△6 △12 on I-F Board
△7 C505A, T401 Red
△8 △10 on I-F Board, CRT Socket Pin 5
△9 CRT Socket Pin 3
△10 R212 (Brite) Term. 2
△11 CRT Socket Pin 7
△12 △15 on I-F Board
△13 △13 on I-F Board
△14 △11 on I-F Board
△15 CRT Socket Pin 8
△16 R310 (Vert. Lin.)
△17 Junction R362, R363
△18 C506D
△19 R303 (Vert. Hold) Term. 2
△20 T301 Blue
△21 C363+
△22 T301 Yellow, Yoke Term. 4

GENERAL ELECTRIC "U5" SCHEMATIC WITH VOLTAGES AND WAVESHAPES



Main Chassis Schematic diagrams with waveshapes and voltages

GENERAL ELECTRIC U5 Chassis, Service Information, Continued

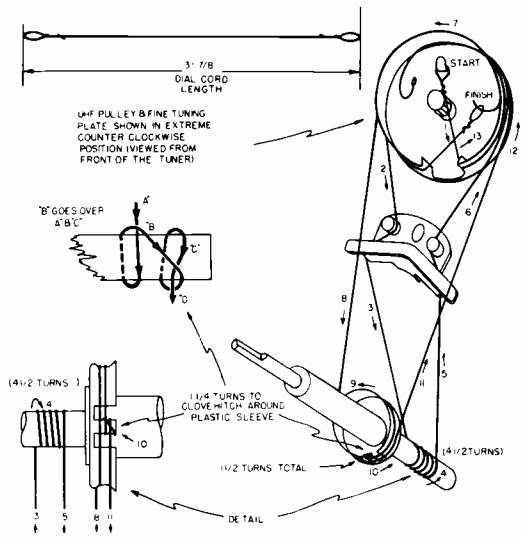


Fig. 49. UHF tuner dial stringing diagram

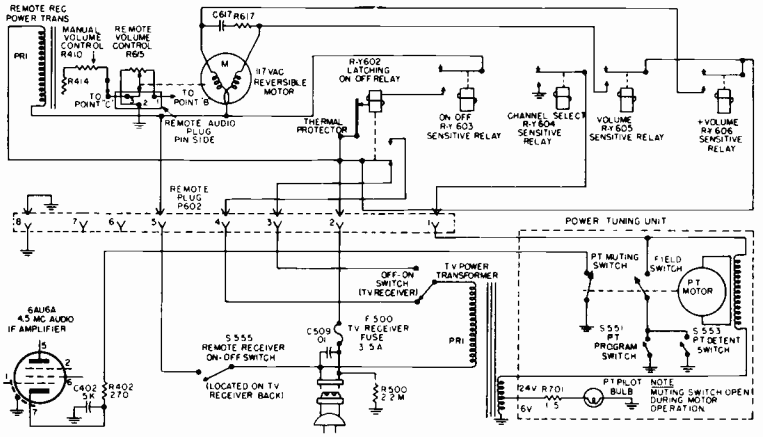


Fig. 50. TV and remote control wiring diagram

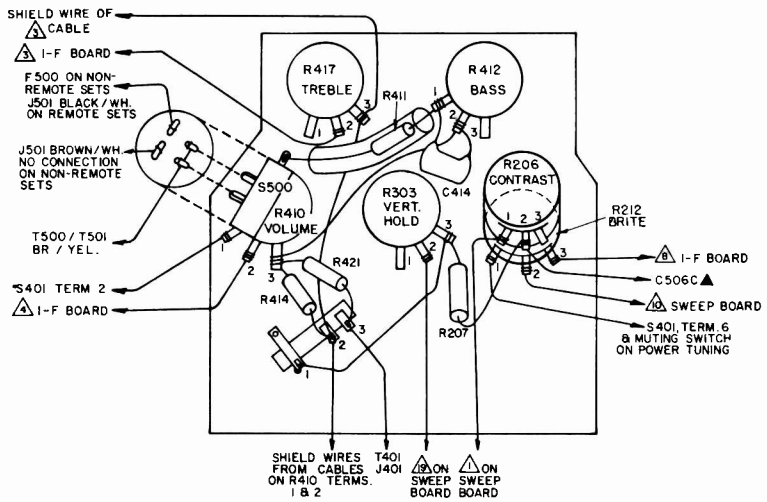


Fig. 51. Control panel wiring

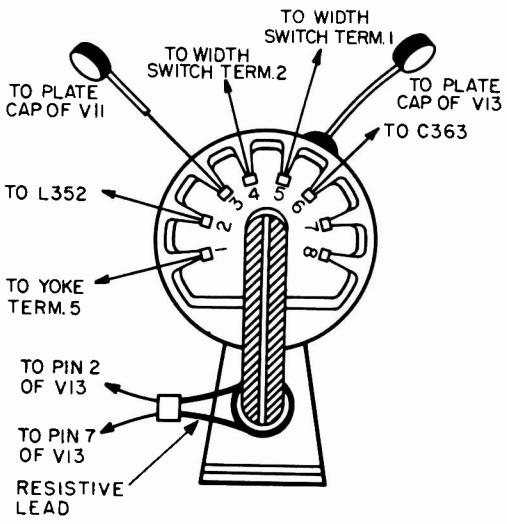


Fig. 58. Horizontal output transformer

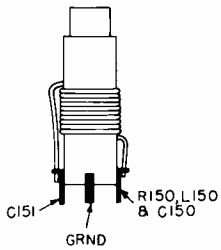


Fig. 59. L151 47.25 trap

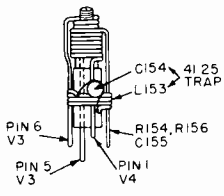


Fig. 61. T151 1st I-F transformer

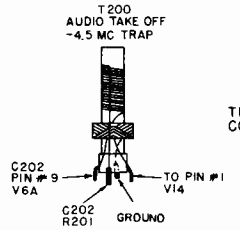
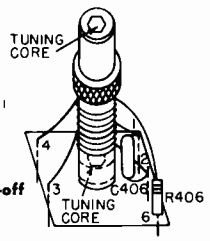


Fig. 63. T200 audio take-off and 4.5MC trap



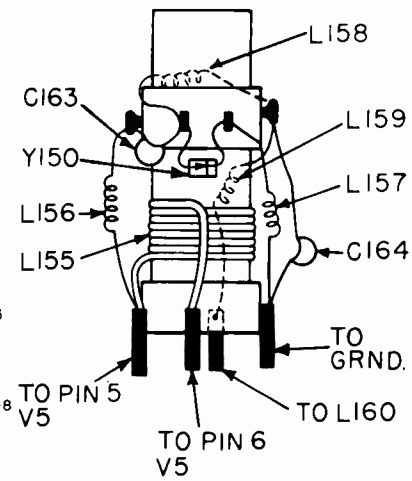


Fig. 54. Video detector coil assembly

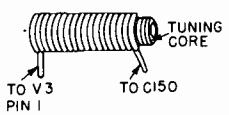


Fig. 60. L152 1st I-F grid coil

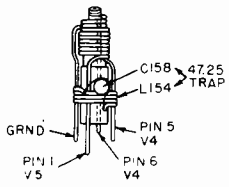


Fig. 62. T152 2nd I-F transformer

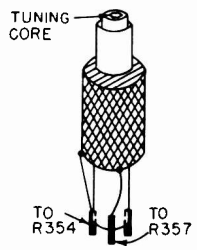


Fig. 64. L350 horizontal stab. coil

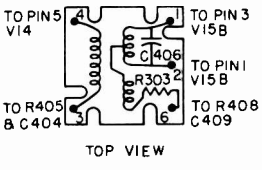


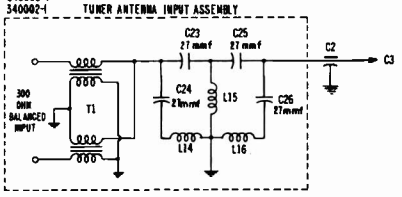
Fig. 65. T400 ratio detector

Magnavox

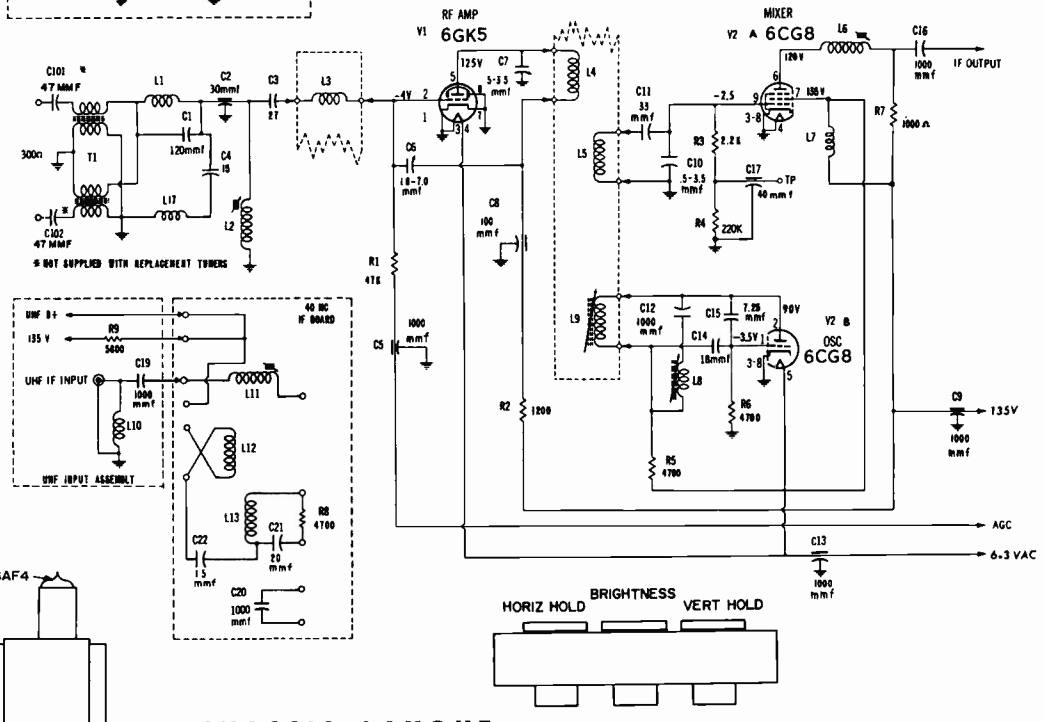
35 SERIES TELEVISION CHASSIS

TUNER NO.	WHERE USED
340001-1	VHF ONLY MODELS
340002-1	VHF/UHF MODELS WITH 700688-2
340003-1	VHF MODELS ADAPTABLE TO UHF WITH STRIPS

340003-1
340002-1 TUNER ANTENNA INPUT ASSEMBLY



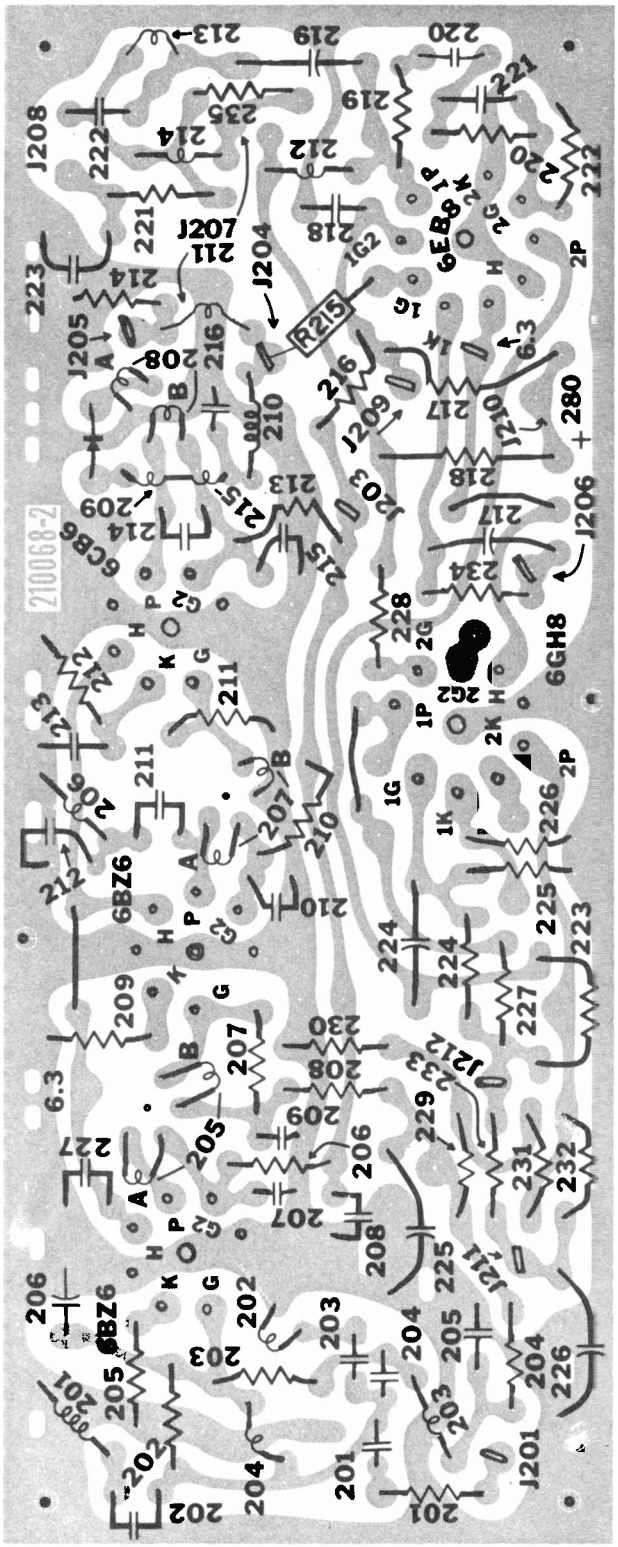
VHF TUNER SCHEMATIC



* NOT SUPPLIED WITH REPLACEMENT TUNERS

CHASSIS LAYOUT

MAGNAVOX Chassis 35 Series Service Information, .Continued



The 35 Series is a deluxe transformer powered television chassis featuring printed-wiring construction. VHF versions employ 16 tubes (VHF/UHF versions 17) plus a germanium diode detector, a dual-selenium diode Horizontal AFC Detector and two Silicon Diode Rectifiers. The VHF tuner used is a modification of the Guided-Grid Tuner incorporating a new R-F Amplifier tube, the 6GK5 tube. This manual includes a schematic diagram for this new VHF tuner and you are referred to Manual 7261 for alignment and other Tuner service information. The 35-01 version of this chassis is designed to be used with the 23ASP4 picture tube and the 35-02 version with the 27XP4 tube.

The entire chassis is designed for easy servicing. All tubes plus the Silicon Diode Rectifiers and detector diodes are accessible from the rear of the set. For access to the wiring side the chassis can be swung out from the cabinet after removing three of the chassis mounting bolts.

ADJUSTMENTS

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

FOCUSING--These chassis employ electrostatic focus picture tubes. The focus is accomplished by varying the boost voltage applied to the focusing anode of the tube. On the 35-01 version this is accomplished by connecting the jumper spring on the CRT socket from pin 6 to either pin 1 or pin 10. On the 35-02 version a variable Focus control (R518) is provided.

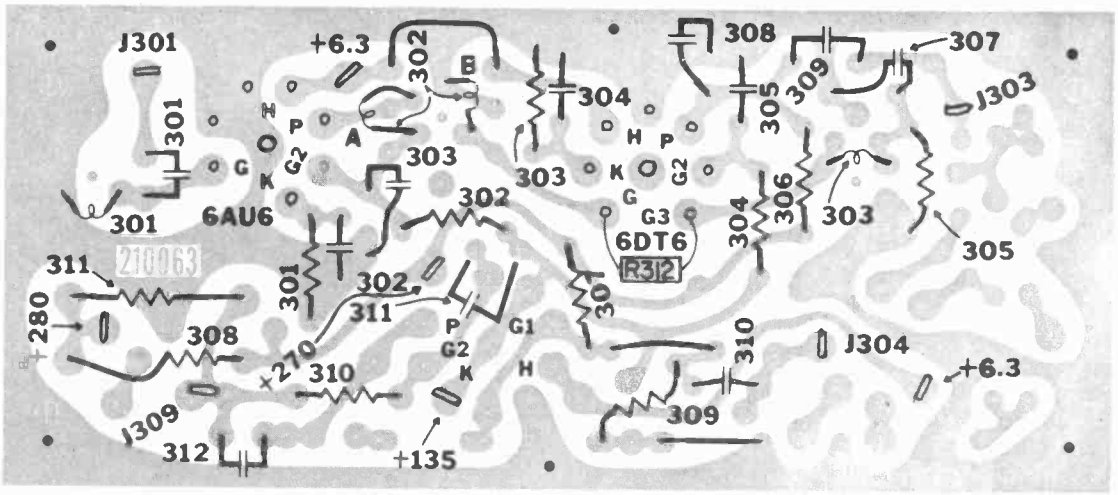
PICTURE WIDTH--Adjust the Width control (use a hex tip alignment tool) until the raster is just slightly wider than necessary to fill the mask opening.

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

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

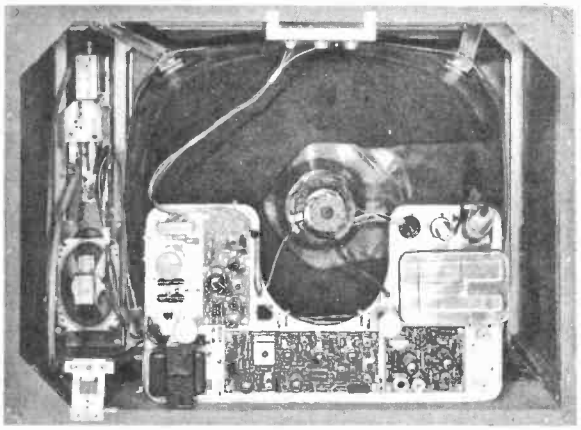
VHF OSCILLATOR--The VHF tuner is equipped with individual oscillator adjustment "slugs" for each channel. The oscillator "slug" for the channel to which the tuner is set is accessible, from the front of the instrument with the Channel Selector knob removed. Use a thin blade (1/8" diameter) non-metalic alignment screw driver for these adjustments. Set the Channel Selector to the channel to be adjusted, rotate the Fine Tuning control to its mid-range position and adjust the oscillator for correct picture. Repeat this for all channels received in your area.

MAGNAVOX Chassis 35 Series, Service Information, Continued



SOUND IF—AUDIO BOARD

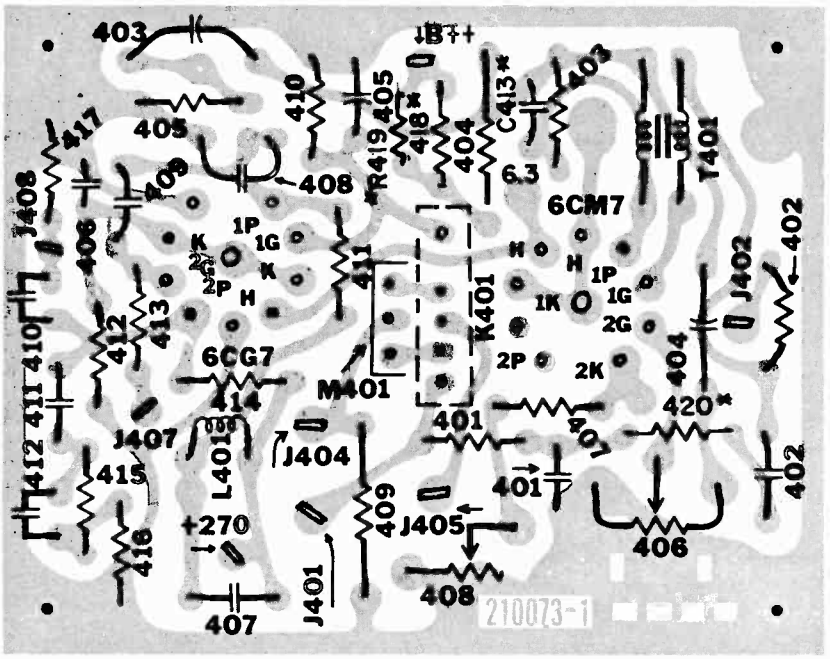
BOTTOM VIEW



REAR VIEW SHOWING CHASSIS MOUNTED IN CABINET

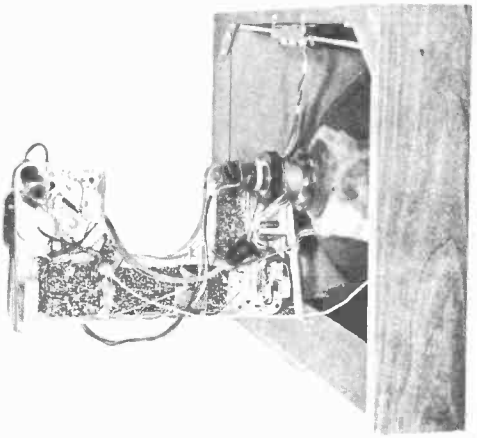
All circuit tubes and the silicon diode rectifiers are accessible from the rear with the chassis in place.

Components which are most often replaced such as resistors and capacitors can be checked and replaced from the rear without having to remove chassis.



SWEEP BOARD

*R418, 419, 420 and C413 are used on all chassis, however, some boards do not show symbols for these items. Some boards show a solid line connection for R418, R419 and for R420.



REAR VIEW SHOWING CHASSIS IN SERVICE POSITION

Chassis swings-out from cabinet for access to printed wiring side.

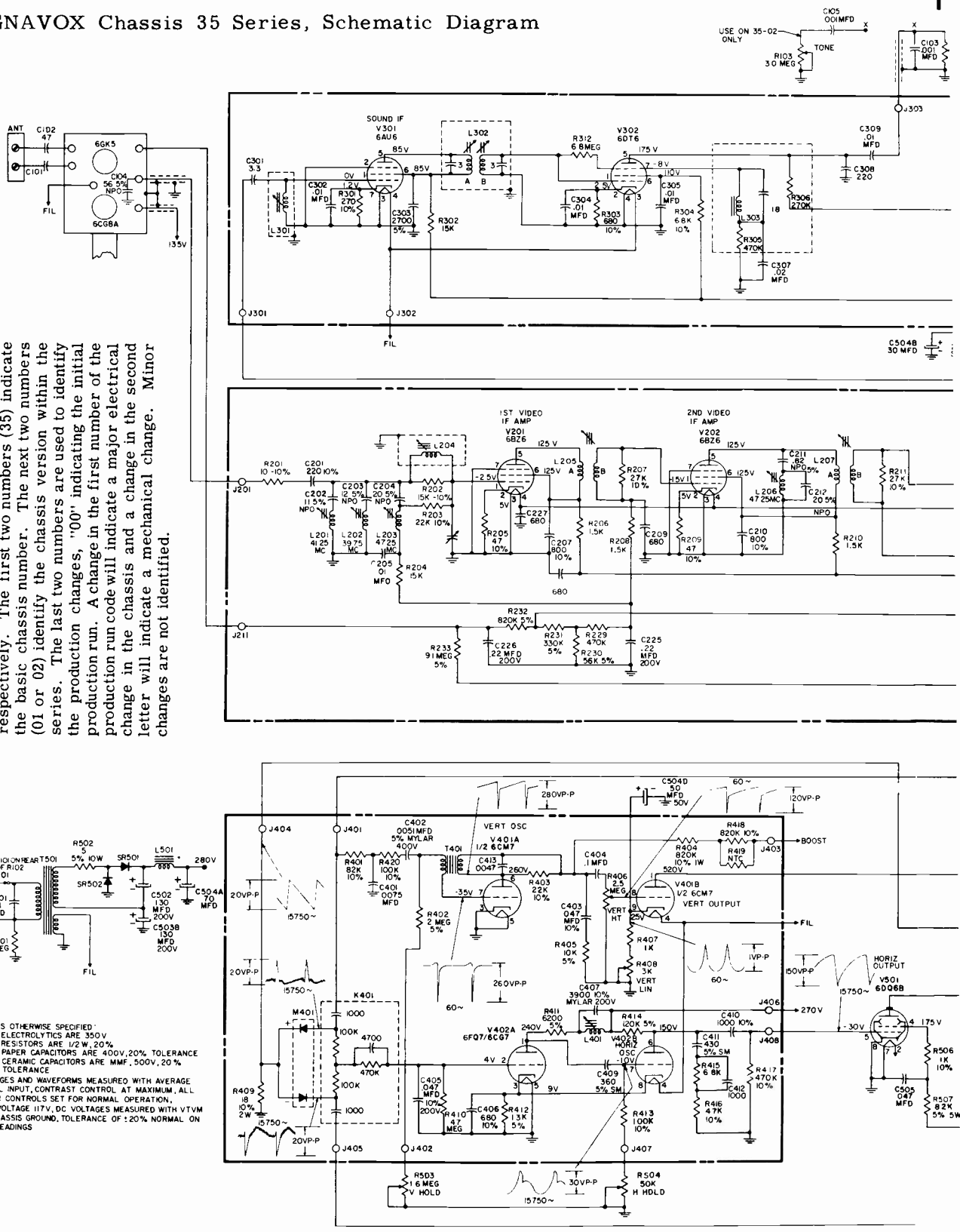
Chassis can be operated in this position by using extension cables. To swing chassis out:

1. Disconnect CRT socket, Yoke and H.V. Cables.
2. Remove chassis bolts, except one on extreme left.
3. Swing chassis out to the left. Connect extension cables for CRT, Yoke and H.V.

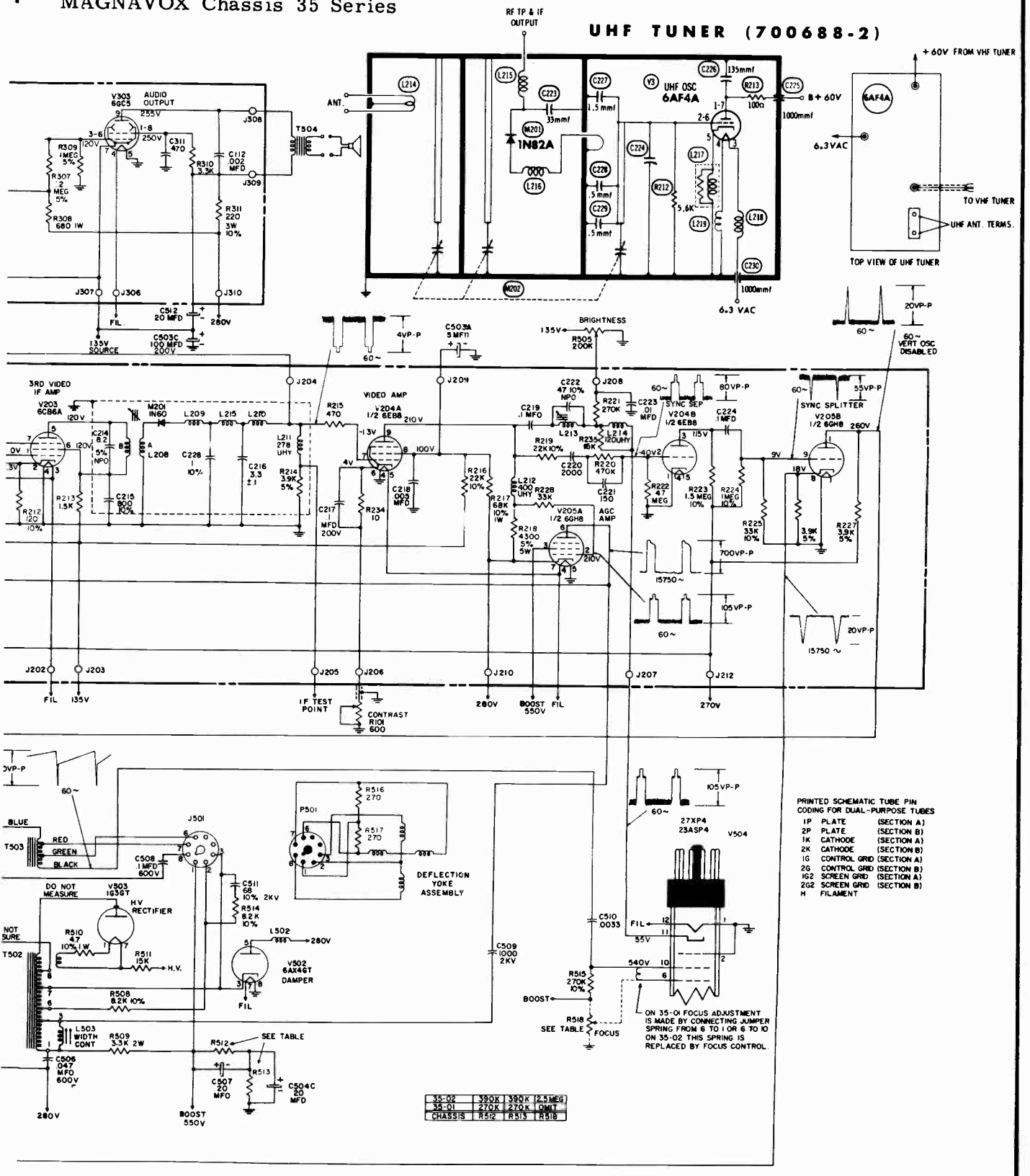
MAGNAVOX Chassis 35 Series, Schematic Diagram

CHASSIS IDENTIFICATION

The chassis are identified by a production code which is stenciled on the chassis pan. The first letter, "T", "U" or "C" indicates the chassis is VHF ONLY, VHF/UHF or VHF (Adaptable to UHF with strips) respectively. The first two numbers (35) indicate the basic chassis number. The next two numbers (01 or 02) identify the chassis version within the series. The last two numbers are used to identify the production run. A change in the first number of the production run code will indicate a major electrical change in the chassis and a change in the second letter will indicate a mechanical change. Minor changes are not identified.



MAGNAVOX Chassis 35 Series



35-02	390K	390K	2.5MEG
35-01	270K	270K	OMIT
CHASSIS	R512	R513	R518

MAGNAVOX Chassis 35 Series, Alignment Information, Continued

ALIGNMENT

VIDEO ALIGNMENT

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

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

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

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

SWEEP GEN. COUPLING	SWEEP GEN. FREQUENCY	MARKER GEN. COUPLING	MARKER GEN. FREQUENCY	CONNECT SCOPE	ADJUSTMENTS
1st I-F grid (Pin 1 of V201). Detune mixer plate coil by adjusting slug fully out.	43 mc. Adjust gain so trap suckout is visible.	Converter grid (use test point indicated on tuner)	47.25 mc Adjust gain so pip is just visible.	I-F Test Point J205. Place 10K res. in series with probe.	Adjust trap L206 to center marker pip in suckout. See Fig. 1. Maximum attenuation is at two positions Use one with slug farthest out.
"	43 mc Note 3	"	42.25 mc 45.0 mc 45.75 mc	"	Check for response curve similar to Fig. 1. Tune L208 for max. gain between 42.25 mc and 45.75 mc. Tune L207 to place 45.75 mc marker at 65% response. Tune L205 to place 42.25 mc marker at 65% response. Repeat adjustments to optimize curve. Recheck 47.25 mc trap.
Converter grid (accessible thru hole in top of tuner)	43 mc Note 3	Loosely couple to converter tube.	42.25 mc 45.0 mc 45.75 mc	"	Set VHF Tuner to channel 11*. Tune converter plate coil (L6 on VHF tuner) for max. gain between 42.25 mc and 45.75 mc markers. *Or to any channel where sweep harmonics do not cause distortion of curve.
"	43 mc Adjust gain for max. with trap suckout still visible on scope	"	41.25 mc 47.25 mc 39.75 mc	"	SHORTOUT AGC BIAS. Set VHF Tuner between channels. Adjust trap L201 until 41.25 mc marker falls in center of trap suckout. Adjust L202 until 39.75 mc marker falls in center of trap. Adjust L203 until 47.25 mc marker falls in center of trap suckout. Adjust L204 for maximum attenuation of 47.25 mc. Recheck trap settings.
"	43 mc Note 3	"	45.75 mc	"	Set VHF Tuner to Channel 11. Set Bias as in Note 2. Adjust converter plate coil (L6 on VHF tuner) and I-F trimmer C206 for max. gain and proper tilt maintaining the 45.75 marker as shown in Figure 2.
UHF Input on VHF Tuner. Use 1K isolation resistor.	43 mc Note 3 (This adjustment for VHF/UHF Chassis only)	"	45.75 mc 45.0 mc 42.25 mc	"	Set VHF tuner to UHF position. Adjust R-F amp. grid coil (L11 located on UHF position strip) for min. tilt. Response should conform to Figure 2.
VHF OSCILLATOR ALIGNMENT					
VHF antenna terms.	Channels 2 thru 13 R-F	Loosely couple to VHF ant. terminals.	Picture and sound carrier for individual channel.	"	Check all channels for bandwidth, slope and position of carrier. Use oscillator trimmers if necessary to set Osc. for center of fine tuning range.

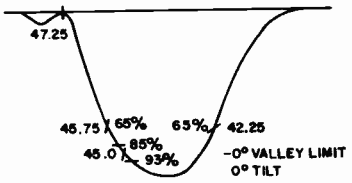


FIGURE 1

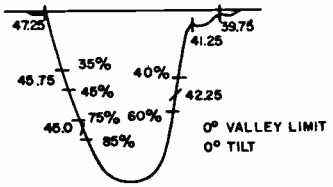


FIGURE 2

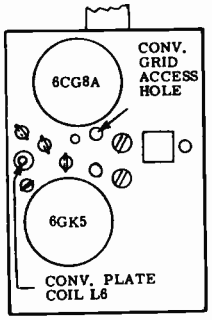


FIGURE 3

SOUND ALIGNMENT

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

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

MODELS

WG-4225A (VHF) WG-4325A (VHF-UHF)

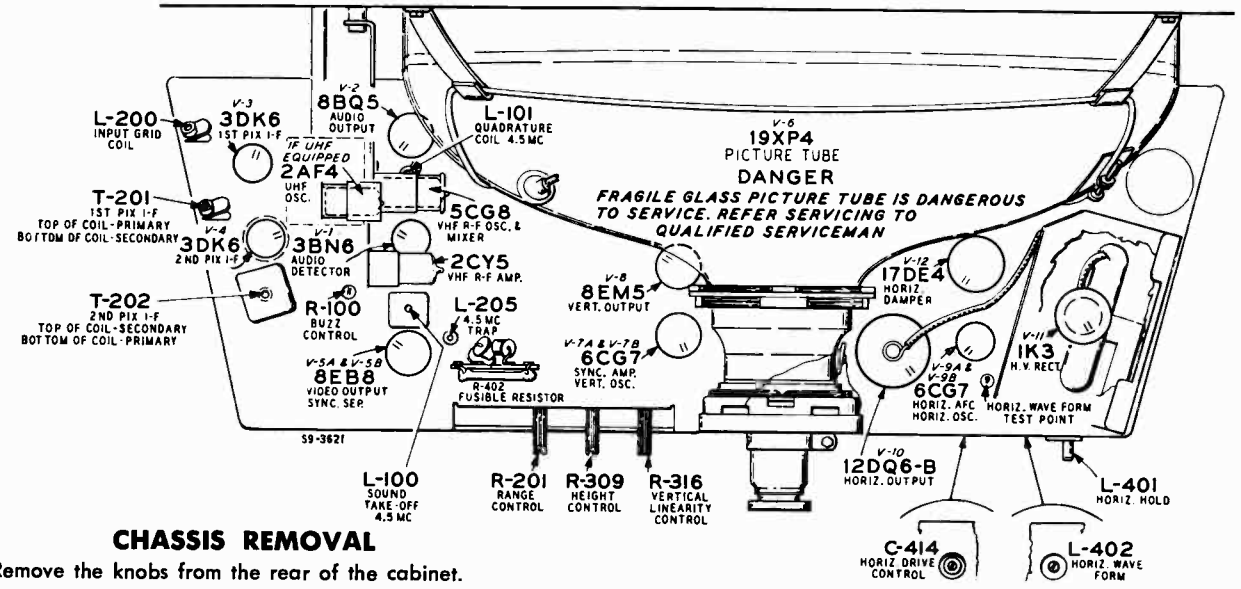


Fig. 1—Chassis Tube Layout and Trimmers

CHASSIS REMOVAL

1. Remove the knobs from the rear of the cabinet.
2. Remove cabinet back by removing the 11 screws holding it in place. NOTE: The quantity of eleven (11) includes the 3 screws at the bottom.
3. Disconnect the leads from inside cabinet back to tuner.
4. Disconnect the yoke plug, anode lead, the ground lead from high voltage can to the pix tube, the speaker leads, and the tuner support shaft from the chassis.
5. There are four (4) (in late production 5 screws are used) chassis mounting screws located underneath the cabinet. Remove the screws and carefully remove the chassis from the cabinet.

PIX TUBE REMOVAL AND REPLACEMENT

1. Place entire receiver face down on a cushioned surface.
2. Remove the chassis assembly (in accordance with the instructions in paragraph "Chassis Removal") and lay the chassis over to one side of the cabinet so as to give access to the pix tube mounting assembly.
3. Remove the screw (marked "A" in illustration), washer, screw terminal end of ground wire and nut holding pix tube mounting ring in place.
4. Remove the pix tube mounting ring and move the 4 pix tube mounting brackets over to one side.
5. Carefully lift the pix tube out, making sure not to disturb the gasket around the pix glass.
6. Install the new tube, and with a blunt instrument gently position the gasket completely around the picture tube until it fits snugly in place.
7. Position the tube mounting brackets over the four corners of the tube, slip the mounting ring around the four brackets and replace the screw, washer, screw terminal end of ground wire and nut removed in step #3.
8. WARNING—DO NOT TIGHTEN THE PIX TUBE MOUNTING RING SCREW IN UNTIL YOU ARE SURE THAT THE 4 PLASTIC INSULATORS ARE IN PLACE (between the bracket and the frame).

(Material on pages 67 through 70.)

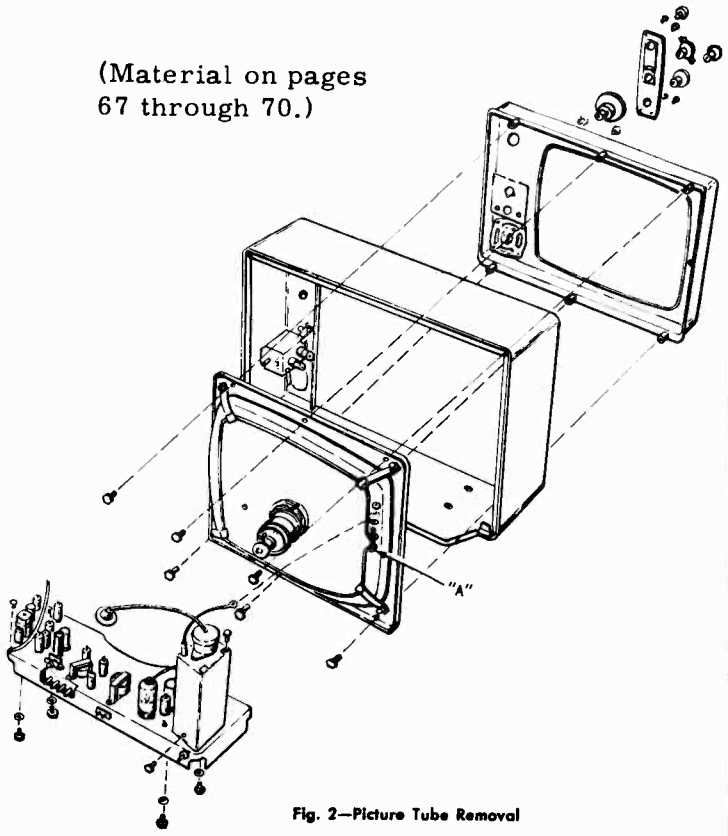


Fig. 2—Picture Tube Removal

MONTGOMERY WARD Models WG-4225A, WG-4325A, Service Information, Continued

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.

CHECK OF HORIZONTAL OSCILLATOR ALIGNMENT—Turn the horizontal hold control clockwise. The picture should be out of sync with a minimum of 5 or 6 bars slanting downward to the left. Turn the control slowly counter-clockwise. The number of diagonal bars will be gradually reduced and when only 2 to 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional counter-clockwise rotation of the control. Continue turning counter-clockwise at least one full turn of the control until the picture pulls to the right. Turn the control clockwise until the picture is centered and steady. Momentarily remove the signal by switching off channel and then back. The picture should remain in sync.

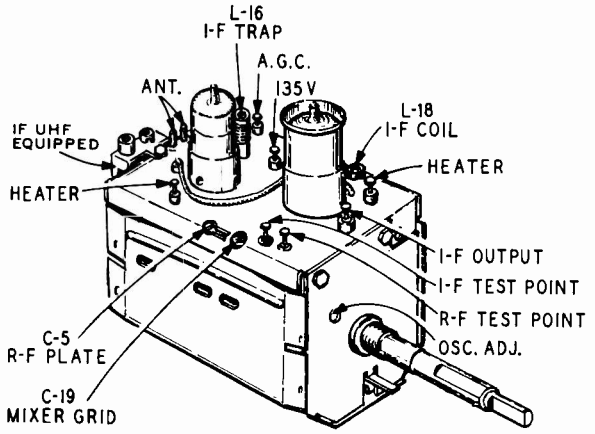
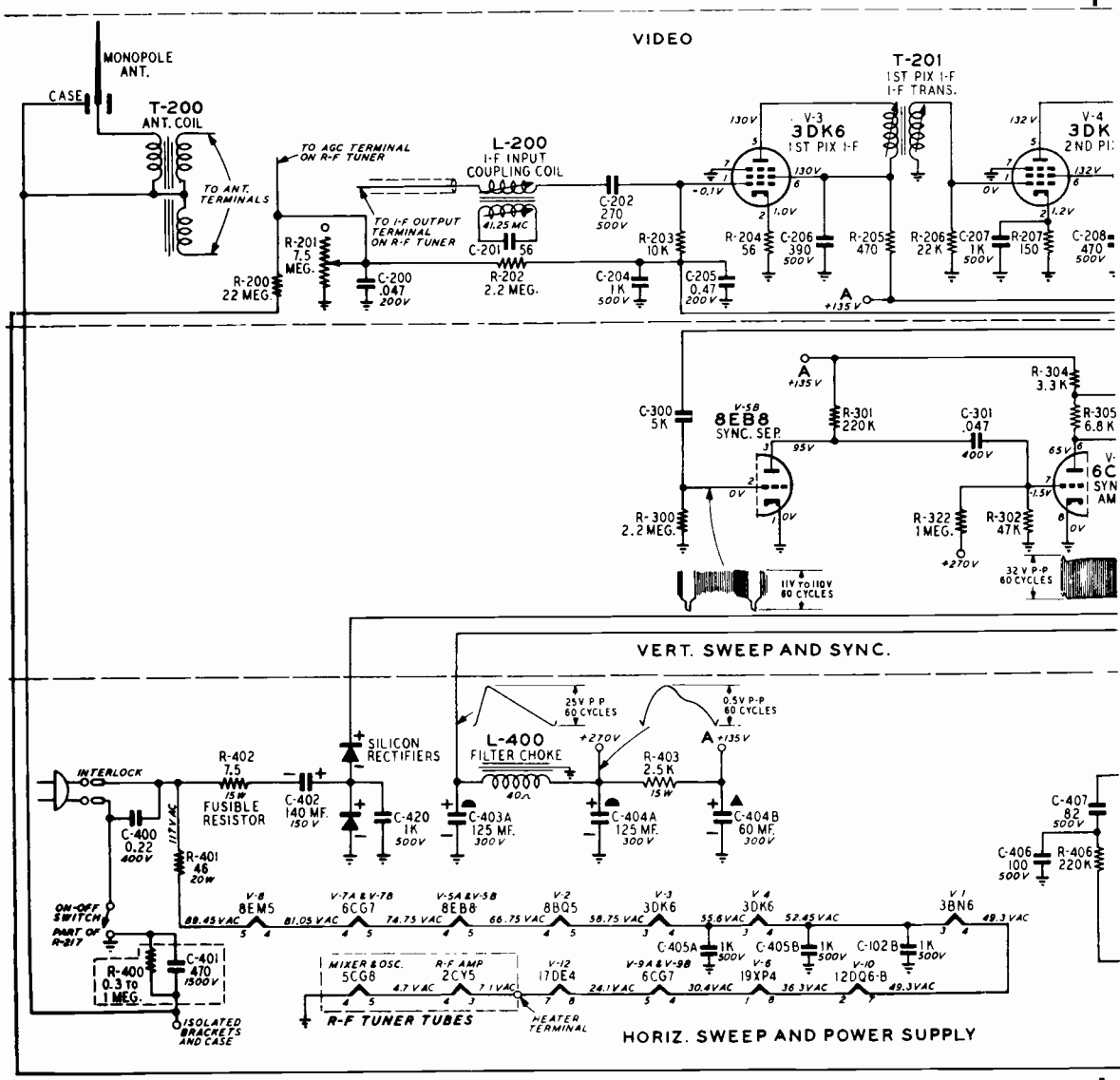


Fig. 7—Pix & Audio Markers

DC SOCKET VOLTAGES

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



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

MONTGOMERY WARD Models WG-4225A, WG-4325A, Schematic Diagram, Continued

OSCILLOSCOPE WAVEFORM PATTERNS

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

CONTROLS REAR OF CHASSIS

Horizontal Drive	C-414
Vertical Linearity	R-316
Height	R-309
Horizontal Wave Form	L-402
Buzz (On Top of Chassis)	R-100
Horizontal Hold	L-401
Range	R-201

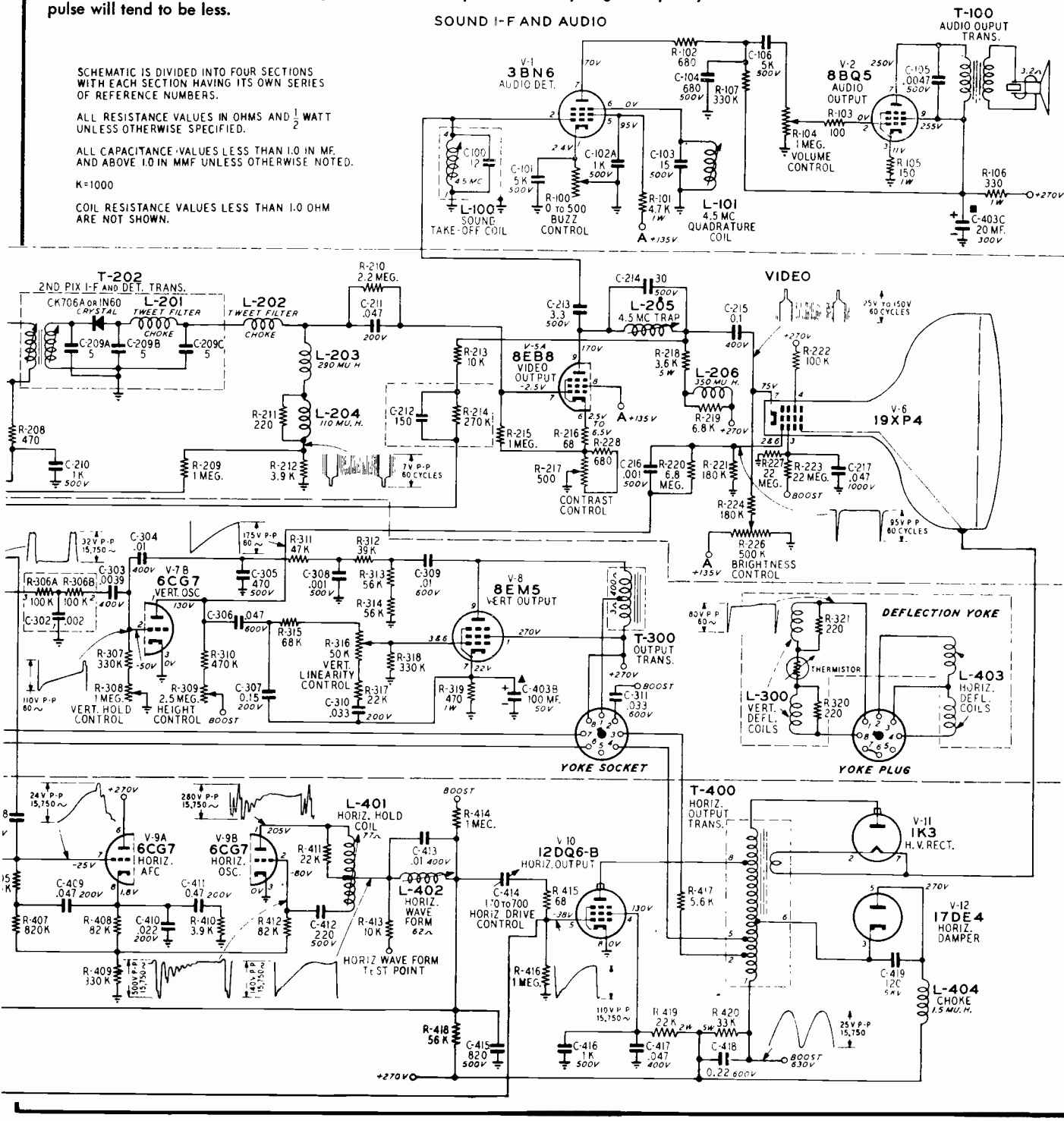
SCHEMATIC IS DIVIDED INTO FOUR SECTIONS WITH EACH SECTION HAVING ITS OWN SERIES OF REFERENCE NUMBERS.

ALL RESISTANCE VALUES IN OHMS AND 1/2 WATT UNLESS OTHERWISE SPECIFIED.

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

K=1000

COIL RESISTANCE VALUES LESS THAN 1.0 OHM ARE NOT SHOWN.



MONTGOMERY WARD Models WG-4225A, WG-4325A, Alignment Information

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

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

ALIGNMENT PROCEDURE

1. Connect sweep output to 2nd I-F grid (pin #1-V4), oscilloscope to Test Point "A". Set output of sweeper so that some output is indicated in oscilloscope. Adjust 2nd PIF transformer (T-202) primary (bottom) and secondary (top) simultaneously for maximum output and symmetry. Readjust sweeper output for 4.0V P-P on oscilloscope. Touch-up to give the waveform shown in figure 4.

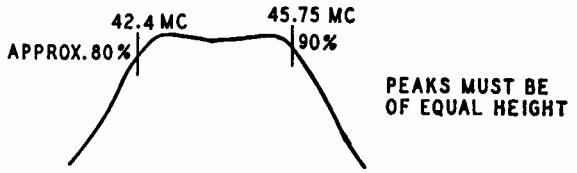


Fig. 4—2nd Pix I-F Response

2. With approximately —3.0V bias on AGC line (Test Point "B") connect sweeper to 1st I-F grid (Pin #1-V3.) Reduce sweeper output to compensate for additional gain of 1st stage (4.0V. P-P on oscilloscope). Adjust 1st I-F transformer primary (top) and secondary (bottom) for maximum gain and symmetry with 45.75 mc marker. (See Figure 5.)

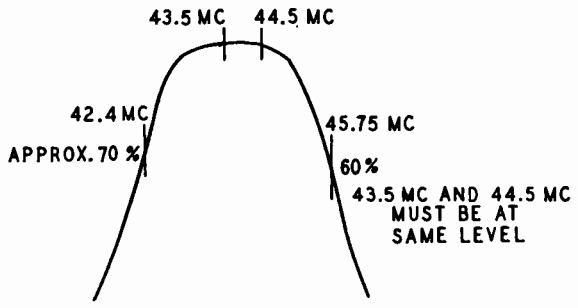


Fig. 5—Pix I-F Response From 1st Pix I-F Grid

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

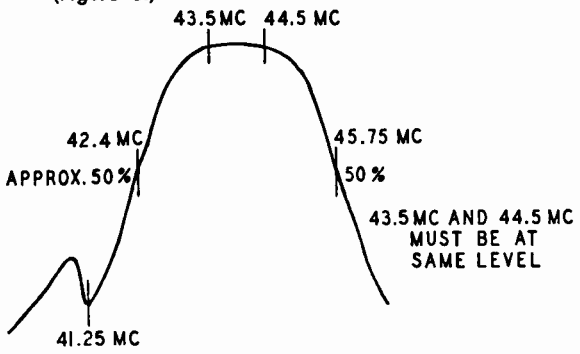


Fig. 6—Overall Pix I-F Response Curve

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

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

VIDEO

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

AUDIO

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

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

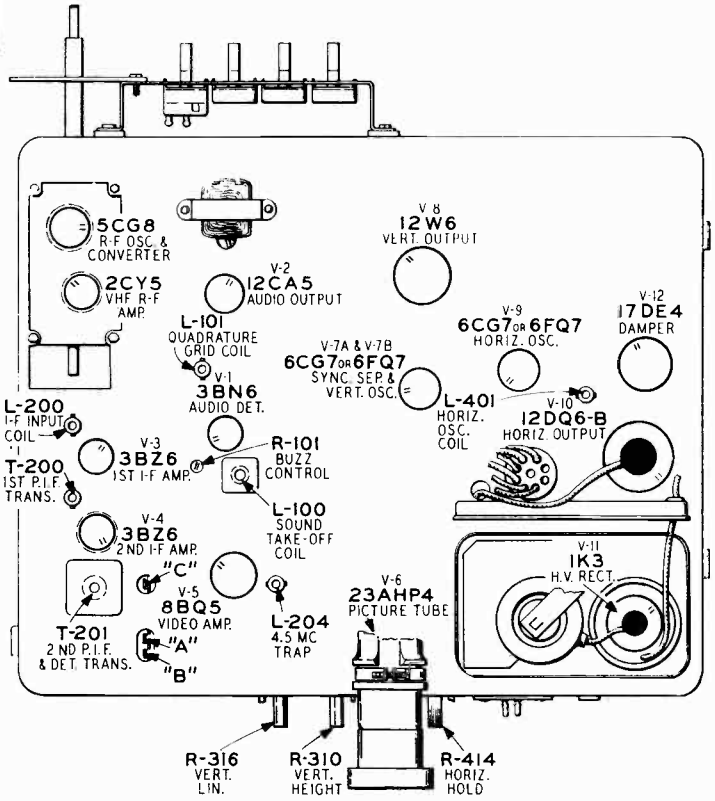


Fig. 1—Chassis Tube Layout and Trimmers

MODELS

WG-5221A—5227A
WG-5231A—5321A
WG-5327A—5331A

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.

PICTURE TUBE REMOVAL AND REPLACEMENT

1. Remove the chassis etc. as outlined in "Instructions Chassis Removal" above.
2. Place the cabinet face down on a cushioned and clean surface so as not to scratch or mar the cabinet.
3. Remove the screw (marked "A" in illustration), washer, screw terminal end of ground wire, spring and nut holding pix tube mounting ring in place.

(Continued on page 72)

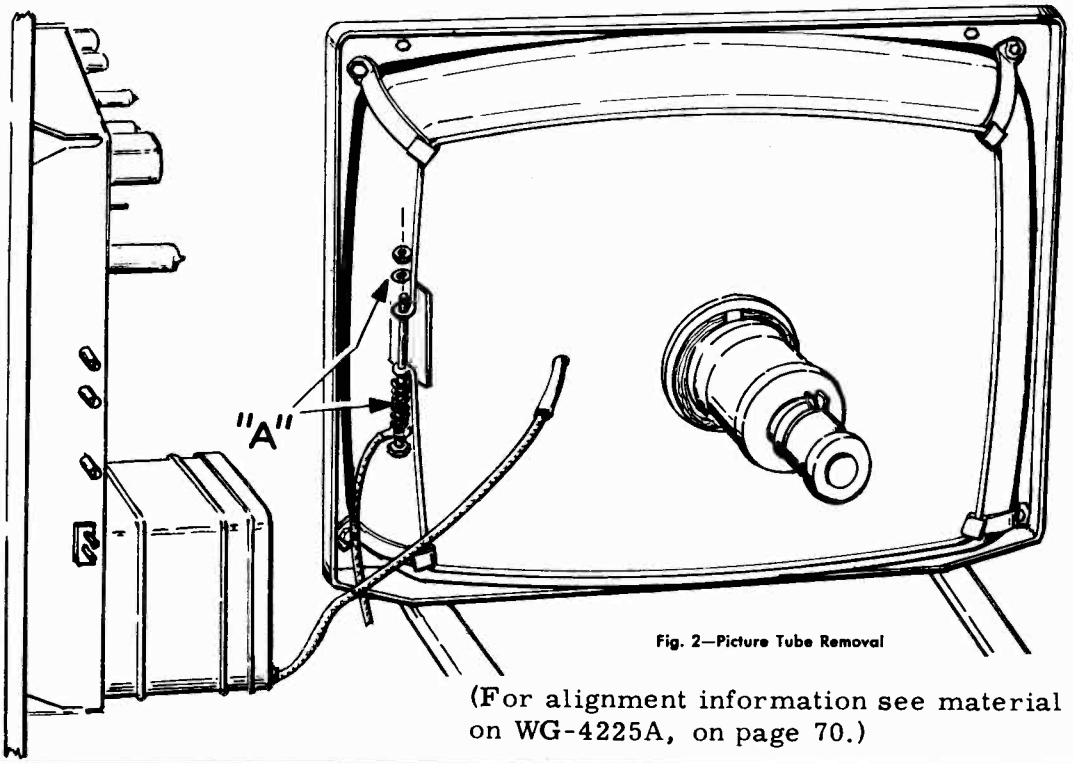


Fig. 2—Picture Tube Removal

(For alignment information see material on WG-4225A, on page 70.)

MONTGOMERY WARD Models WG-5221A, etc., Service Information, Continued

4. Remove the pix tube mounting ring and move the 4 pix tube mounting brackets over to one side.
5. Carefully lift the pix tube out, making sure not to disturb the gasket around the pix glass.
   IMPORTANT—Unless absolutely necessary, do not remove the gasket from the pix glass. Use a 26A712 Pix Glass and Gasket Assembly for replacement purposes.
6. Install the new tube, and with a blunt instrument gently position the gasket completely around the picture tube until it fits snugly in place.
7. Position the tube mounting brackets over the four corners of the tube, slip the mounting ring around the four brackets and replace the screw, washer, screw terminal end of ground wire, spring and nut removed in step #3.
8. WARNING—DO NOT TIGHTEN THE PIX TUBE MOUNTING RING SCREW IN UNTIL YOU ARE SURE THAT THE 4 PLASTIC INSULATORS ARE IN PLACE (between the bracket and the frame). If this precaution is not observed, severe shock may result.
9. Stand the cabinet upright and reassemble into the cabinet all the items previously removed.

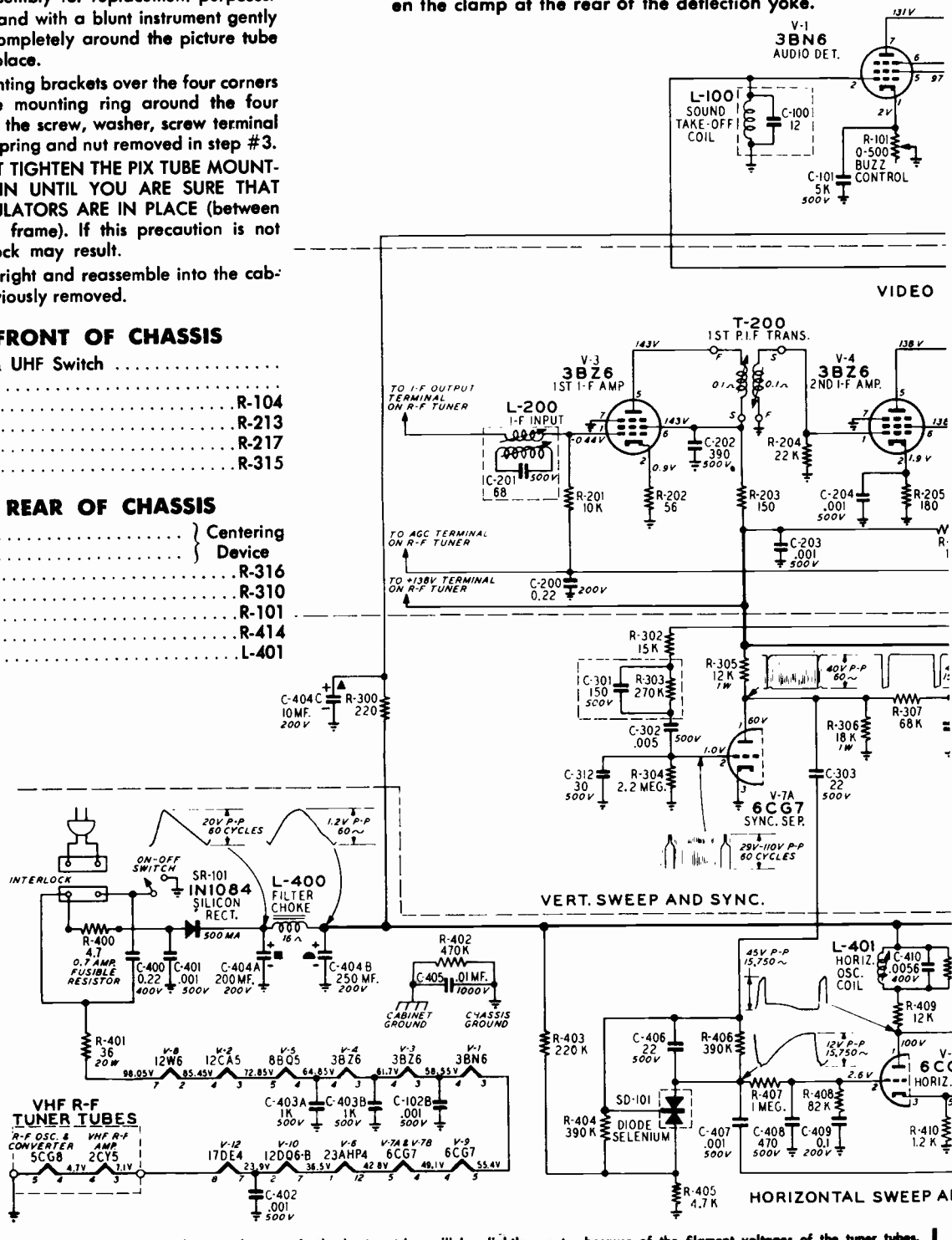
CONTROLS FRONT OF CHASSIS

VHF Channel Selector & UHF Switch	
Fine Tuning	
Off-On Volume	R-104
Contrast	R-213
Brightness	R-217
Vertical Hold	R-315

CONTROLS REAR OF CHASSIS

Horizontal Centering	Centering Device
Vertical Centering	Centering Device
Vertical Linearity	R-316
Height	R-310
Buzz	R-101
Horizontal Hold	R-414
Horizontal Oscillator	L-401

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.



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.

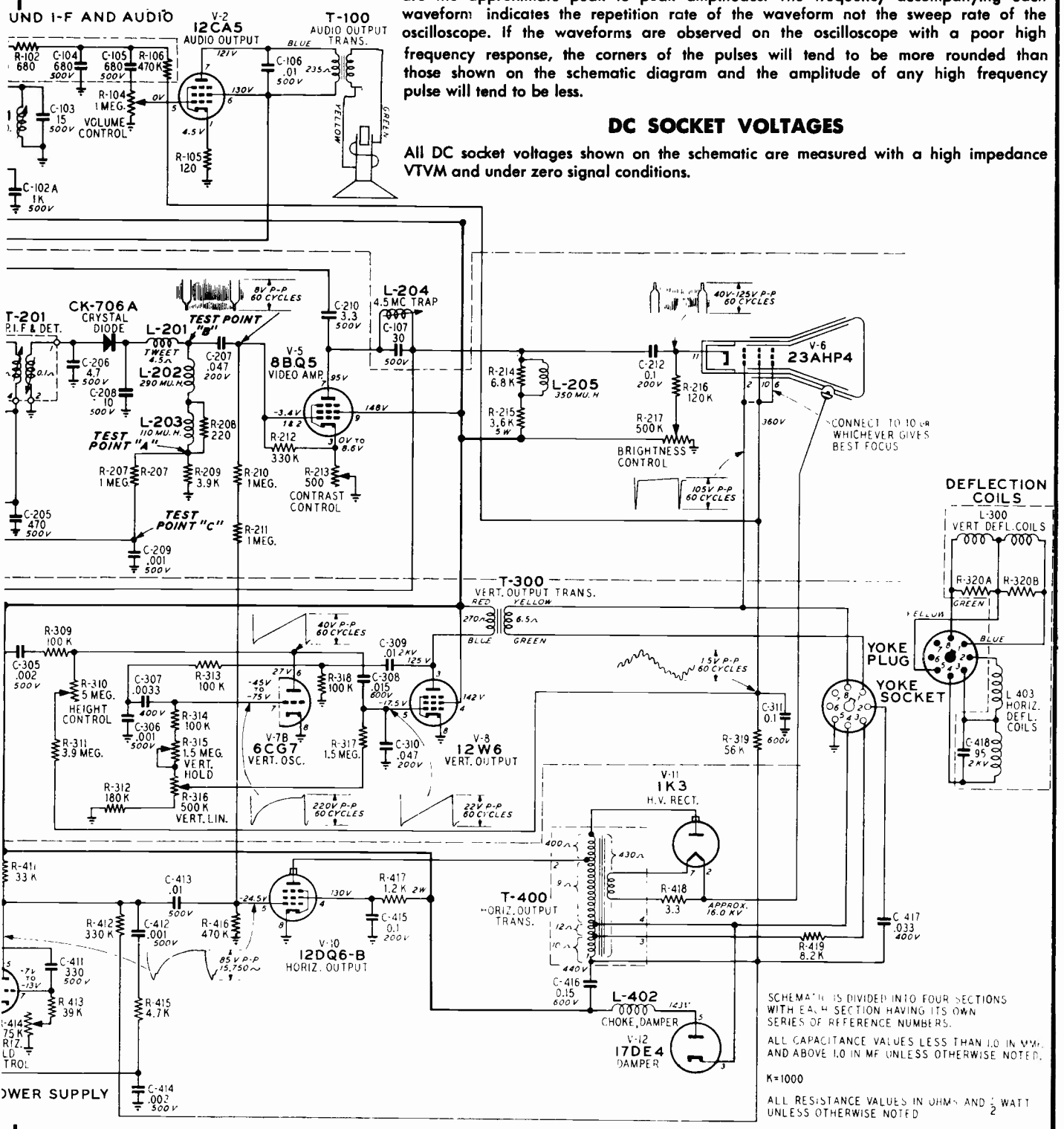
MONTGOMERY WARD Models WG-5221A, WG-5227A, etc., Schematic Diagram

OSCILLOSCOPE WAVEFORM PATTERNS

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

DC SOCKET VOLTAGES

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



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

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

K=1000

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

MONTGOMERY WARD Models WG-5221A, WG-5227A, etc., Service Hints

SERVICE SUGGESTIONS

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

1. V-7B or V-8 inoperative. Check socket voltages.
2. Vertical oscillator transformer defective.
3. Vertical output transformer open or shorted.
4. Yoke vertical coils open or shorted.
5. Vertical hold, height or linearity controls may be defective.

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

1. Check variable resistors R-310, R-315 and R-316.
2. Vertical output transformer defective.
3. V-7B or V-8 defective, check voltages.
4. Excess leakage or incorrect value of capacitors C-306C, C-307, C-308, C-309, C-310 or open or incorrect value of resistors R-312, R-313, R-314 and R-318.
5. Low plate voltages. Check power supply.
6. Vertical deflection coils defective.

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

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

SMALL RASTER — This condition can be caused by:

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

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

1. No signal on picture tube grid. Check V-5 tube and associated circuits.
2. Bad contact to picture tube grid (lead to socket broken).

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

1. Defective V-7A.
2. If tubes are all right. Check voltages and associated circuits.

POOR HORIZONTAL LINEARITY

1. Check or replace V-10 & V-12.
2. Check capacitor C-417 for defects.
3. Horizontal deflection coils defective.

TRAPEZOIDAL OR NONSYMMETRICAL RASTER

1. Defective yoke.
2. Wiring of yoke socket.

SIGNAL ON PICTURE TUBE GRID AND VERTICAL SYNC ONLY

1. V-9 defective. Replace.
2. Improper setting of horizontal hold control.
3. Check V-9 socket voltages.
4. Capacitor C-303 defective.

PICTURE STABLE BUT WITH POOR RESOLUTION—If the picture resolution is not up to standard, it may be caused by any of the following:

1. Defective pix 1-F tubes V-3 & V-4.
2. Defective pix detector crystal. (CK-706A.)
3. V-5 Defective.
4. Defective picture tube
5. Open video peaking coil. Check all peaking coils L-202, L-203, L-205 for continuity.

   Note that L-203 & L-205 have shunting resistors.
6. Leakage in V-5 grid capacitors C-207 or C-212. If the capacitors are not found to be defective, check the following:
   A. This trouble can also originate at the transmitter. Check reception from another station.
   B. Check all potentials in video circuits.
   C. Check picture tube grid circuit for poor or dirty contact.
   D. Check and realign, if necessary, the picture I-F and R-F circuits.
7. Incorrect setting of fine tuning control.

BUZZ IN SOUND

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

BENDING OR S-ING

1. Check capacitors C-404A & C-404B.
2. V-9 or V-10 tubes defective.
3. Check V-5 & V-7A tubes.

PICTURE NORMAL — NO SOUND OR WEAK OR DISTORTED SOUND

1. Check sound I-F alignment.
2. Check V-1 & V-2 tubes and associated circuits.

MOTOROLA

CHASSIS **MODELS**

STS-570 & ST-570 (SEE CHART)

Exact material for these sets is on pages 75 through 78. Alignment and much of service data are similar to such material for TS-436 group beginning on page 79.

SERVICING CHASSIS IN CABINET

By removing the back and bottom covers, the chassis is completely exposed (see Figure 2). Nine (9) screws secure the bottom panel to the cabinet. Voltages and waveforms can be taken and all chassis components are accessible.

REMOVING CABINET WRAPAROUND

When removal of the cabinet wraparound is necessary, the bottom cover should be in place.

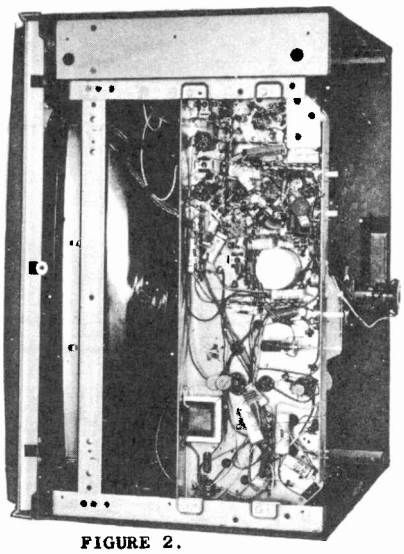


FIGURE 2.

Remove the two (2) hex head screws that secure the inside channels to the bezel. There is one (1) screw on each side (see Figure 3). Next, remove three (3) decorative Phillips head screws from each side of the cabinet wraparound. (When removing screws, avoid twisting the wraparound, since this may cause the screws to bind, making removal and reassembly difficult.) Disconnect the speaker leads and separate the wraparound from the bezel by pulling the wraparound away from the bezel.

WRAPAROUND DISASSEMBLY

The side-panels are held to the top-panel by five (5) screws in each inside corner channel. These screws tighten into the outside corner channels which match the cabinet color.

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.

Remove the cabinet wraparound as described previously. Remove the three (3) screws that secure the bezel to the bottom cover, but do not remove the bottom cover. Swing the bezel away from the picture tube.

MODEL CHART

Model	Chassis	VHF Tuner	UHF Tuner
TABLE MODELS			
23T4BR	STS-570	TT-300**	-
Y23T4BR	STS-570Y	TT-305Y	RTT-601
23T4BRA*	STS-570	TT-300**	-
Y23T4BRA*	STS-570Y	TT-305Y	RTT-601
23T5B	TS-570	TT-305**	-
Y23T5B	TS-570Y	TT-305Y	RTT-601
23T5BA*	TS-570	TT-305**	-
Y23T5BA*	TS-570Y	TT-305Y	RTT-601
23T5BW	TS-570	TT-305**	-
Y23T5BW	TS-570Y	TT-305Y	RTT-601
23T5BWA*	TS-570	TT-305**	-
Y23T5BWA*	TS-570Y	TT-305Y	RTT-601
23T5CW	TS-570	TT-305**	-
Y23T5CW	TS-570Y	TT-305Y	RTT-601
23T5CWA*	TS-570	TT-305**	-
Y23T5CWA*	TS-570Y	TT-305Y	RTT-601
23T5M	TS-570	TT-305**	-
Y23T5M	TS-570Y	TT-305Y	RTT-601
23T5MA*	TS-570	TT-305**	-
Y23T5MA*	TS-570Y	TT-305Y	RTT-601
23T5W	TS-570	TT-305**	-
Y23T5W	TS-570Y	TT-305Y	RTT-601
23T5WA*	TS-570	TT-305**	-
Y23T5WA*	TS-570Y	TT-305Y	RTT-601

*A 23YP4 picture tube with a bonded safety glass is used in these models. All other models incorporate a picture tube which requires a separate safety glass.

**VHF tuners VTT-300 and VTT-305 may have been used in place of the TT-300 and TT-305 tuners.

NOISE GATE CONTROL

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

FINE TUNING ADJUSTMENTS

If the fine tuning control is out of range, individual master oscillator adjustments are provided for each channel.

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

PRODUCTION CHANGES

Chassis Coding	Change
570A-03	TO INCREASE AUDIO OUTPUT: C312 (.0015 mf) re-located from chassis to control bracket; C313 (.0033 mf) changed to .0015 mf; C313 and tone control (R310B) re-wired, See Schematic Diagram for wiring change. NOTE: The wiring change affects chassis with a tone control only.
570A-04	DESIGN CHANGE: C121 (560 mmf) changed to .001 mf; L107 (390 µh) changed to 200 µh; L110 (240 µh) changed to 270 µh; L111 (500 µh) changed to 240 µh; L201 (100 µh) removed; L112 (900 µh) added in series with R123; R128 (1K) added in series with L107 to ground; R111 (3.9K) changed to 1.8K. See Schematic Diagram for wiring changes.
570A-05	TO REDUCE AUDIO REGENERATION: Jumper lead between pins 1 & 3 of Audio Output tube (V10) removed and suppressor grid (pin 3) connected to chassis ground.
570A-06	TO REDUCE HIGH FREQUENCY NOISE WHEN CHANGING CHANNELS: C314 (.001) changed to .0027 mf.

MOTOROLA TELEVISION CHASSIS TS & STS-570A-00 THRU A-06

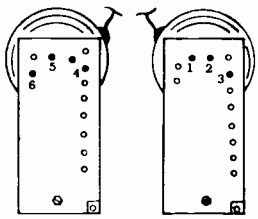
NOTES:

VOLTAGE MEASUREMENTS

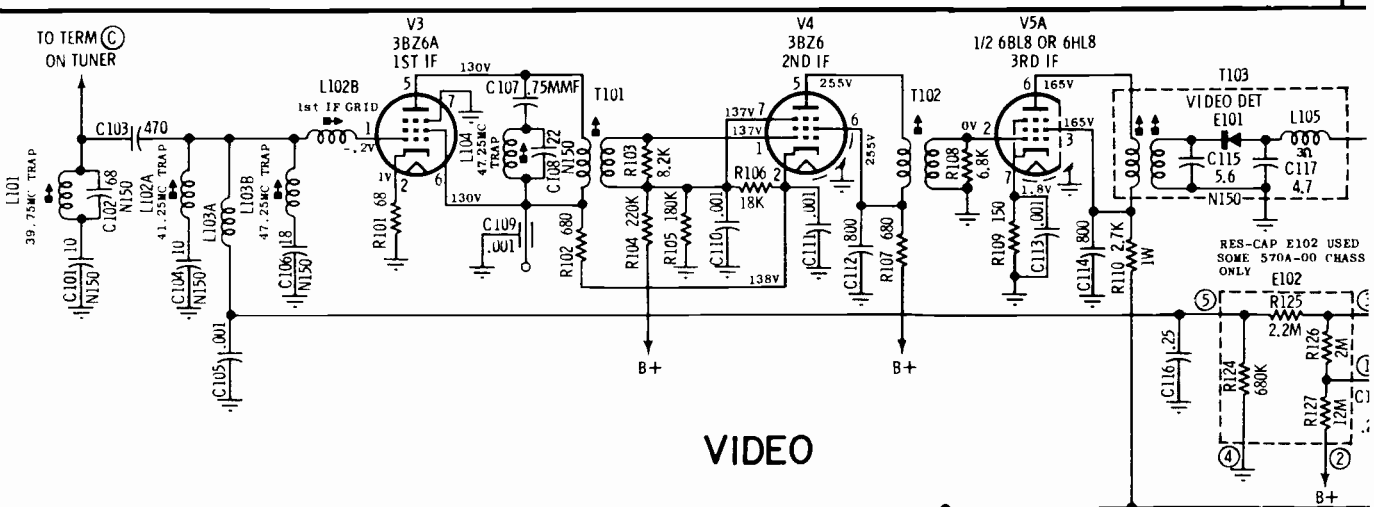
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM, ±10%.
2. LINE VOLTAGE MAINTAINED AT 120V AC.
3. VOLTAGES INDICATED BY AN ASTERISK WILL VARY WITH ASSOCIATED CONTROL SETTINGS.
4. TAKEN WITH CONTRAST CONTROL AT MINIMUM AND ALL OTHER CONTROLS IN NORMAL OPERATING POSITION WITH NO SIGNAL INPUT.
5. TUNER ON CHANNEL 13 OR CHANNEL OF LEAST NOISE WITH ANTENNA TERMINALS SHORTED.

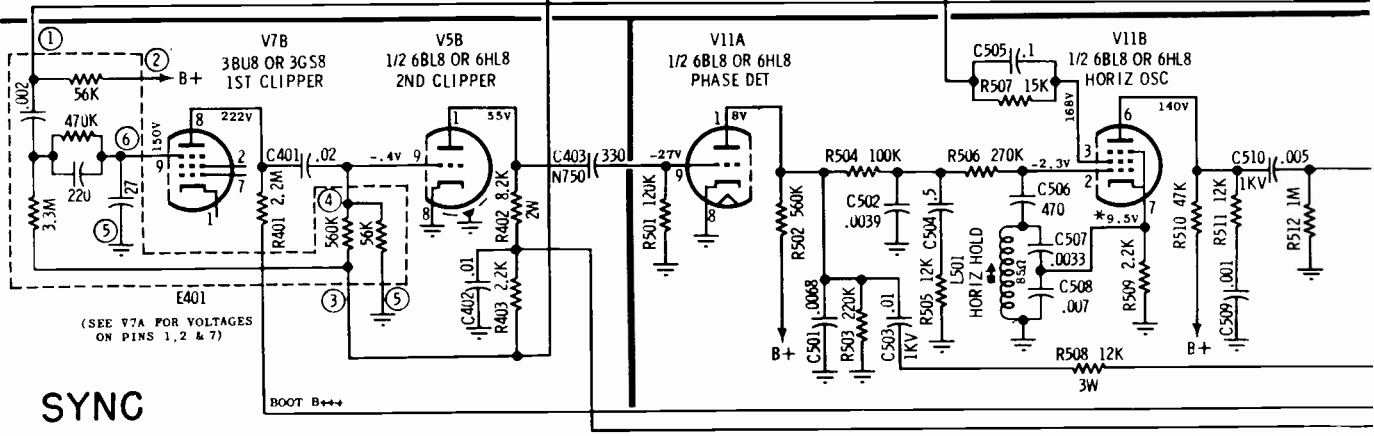
CAPACITORS: UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

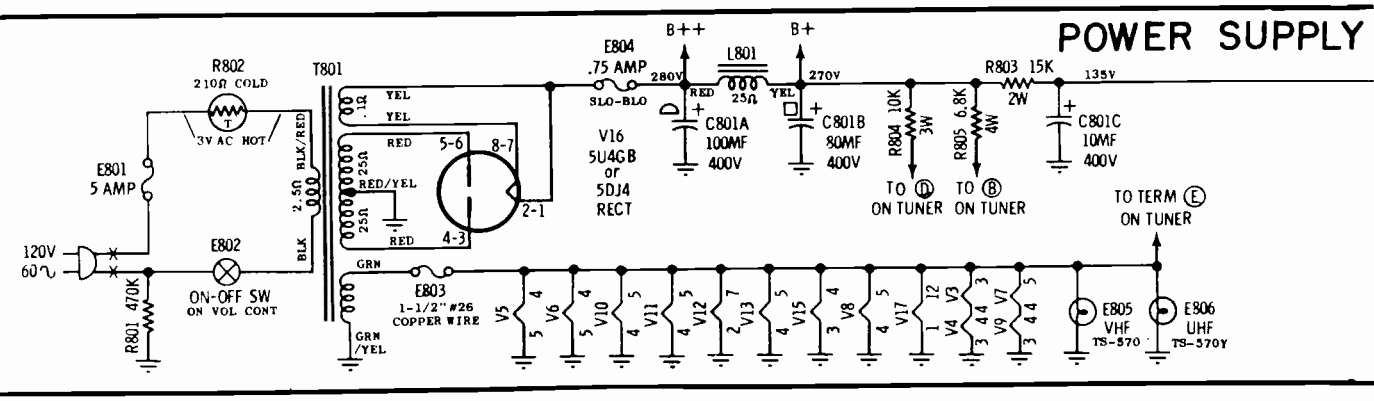
** INDICATES SPECIAL CAPACITOR.

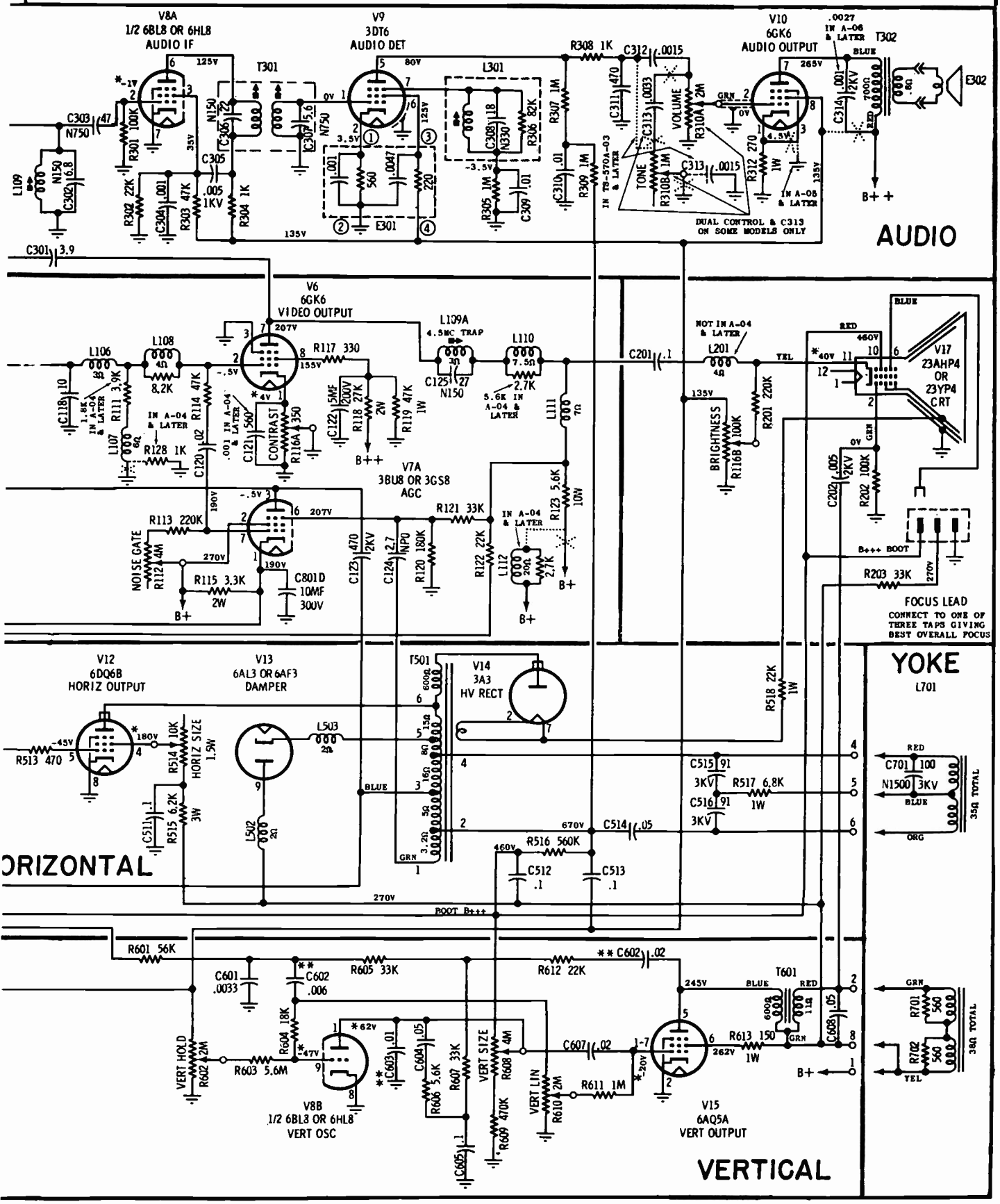


T501 CONN

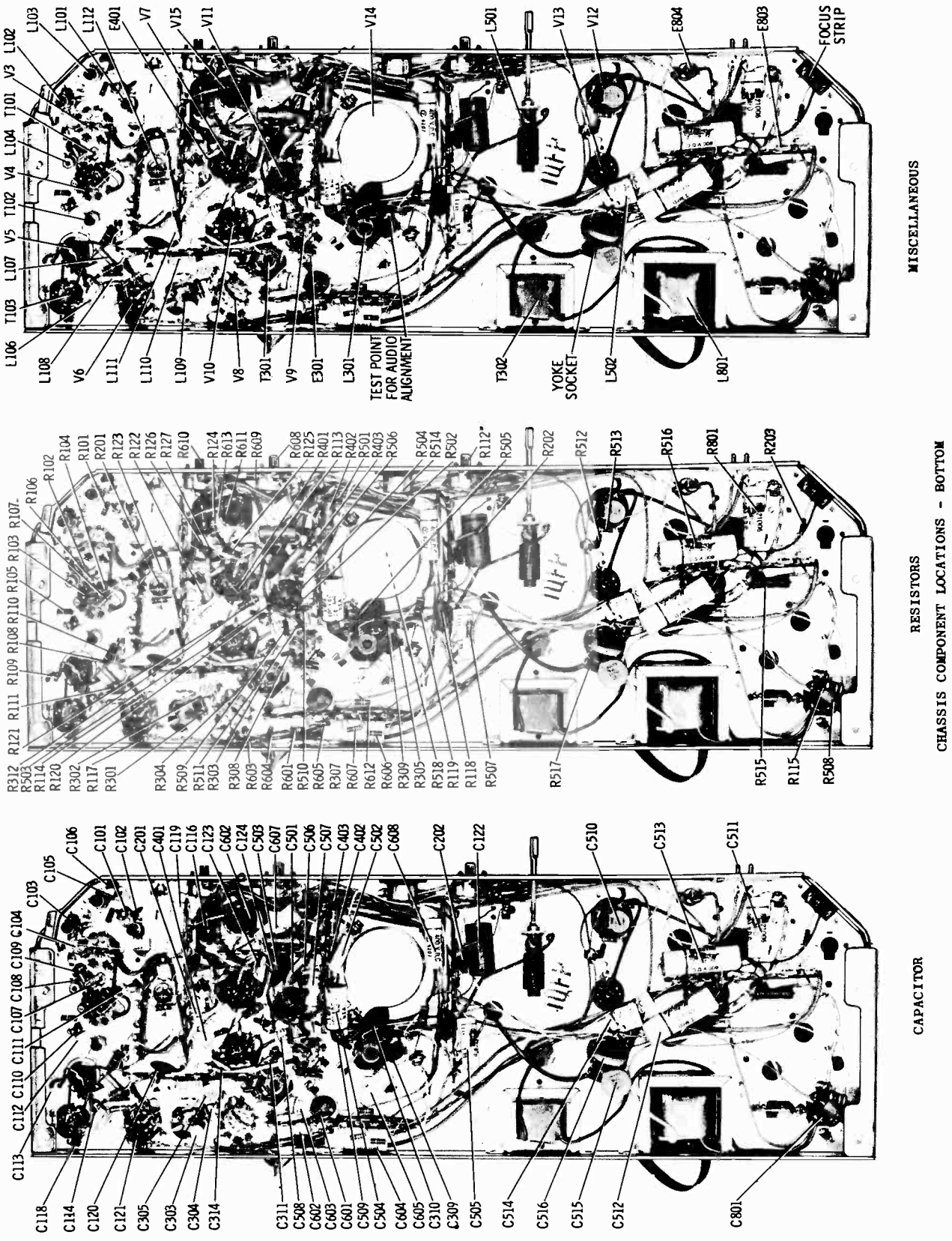







V8A
1/2 6BL8 OR 6HL8
AUDIO IF
V9
3DT6
AUDIO DET
V10
6GK6
AUDIO OUTPUT
T301
T302
L301
E301
E302
AUDIO
V6
6GK6
VIDEO OUTPUT
V7A
3BU8 OR 3GS8
AGC
V17
23AHP4
OR
23YP4
CRT
FOCUS LEAD
CONNECT TO ONE OF THREE TAPS GIVING BEST OVERALL FOCUS
YOKE
L701
V12
6DQ6B
HORIZ OUTPUT
V13
6AL3 OR 6AF3
DAMPER
V14
3A3
HV RECT
T501
L503
L502
HORIZONTAL
V8B
1/2 6BL8 OR 6HL8
VERT OSC
V15
6AQ5A
VERT OUTPUT
T601
VERTICAL
B+
B+ +
B+ + + BOOST
BOOST B+ + +

MOTOROLA Chassis TS-570, -Y, STS-570, -Y, Servicing Information, Continued



MOTOROLA

CHASSIS
TS, QTS, RTS, STS & WTS-436
MODELS

(See Model Breakdown Chart)

CHASSIS DESCRIPTION

TS-436 Golden M chassis is a horizontally mounted type containing 16 tubes plus a 19XP4 picture tube, germanium video detector crystal, miniature dual selenium plug-in type horizontal phase detector and transformer-type power supply with the Tube Sentry system.

QTS-436 version does not have the Tube Sentry system or pilot lamps for illuminating the channel numbers, otherwise it is electrically identical to the TS-436.

RTS-436 version uses a turret type VHF tuner which requires different value B+ dropping resistors for the tuner, otherwise it is electrically identical to the TS-436.

STS-436 version does not have pilot lamps for illuminating the channel numbers, otherwise it is identical to the TS-436.

WTS-436 version contains an automatic tuner assembly and function switch, otherwise it is electrically identical to the RTS-436.

Chassis with a "Y" suffix contain a UHF, single conversion type tuner (STT-601) which uses an additional tube and a B+ dropping resistor for the UHF tuner.

PIN CUSHION CORRECTOR MAGNETS

The pin cushion corrector magnets found on all four sides of the deflection yoke are used to straighten the sides of the raster in both the horizontal and vertical planes. These magnets are provided as part of the yoke and are glued into place. No adjustment is required.

DEFLECTION YOKE ADJUSTMENT

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

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

PICTURE CENTERING

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

FINE TUNING ADJUSTMENTS

Switch Type Tuners

If the fine tuning control is out of range, individual master oscillator adjustments are provided for each channel.

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

Turret Type Tuners

Remove channel selector, fine tuning knobs and pilot lamp window mask or fine tune knob at rear of receiver on automatic tuning models to expose adjustment hole in tuner. Center the fine tuning control mechanically and adjust oscillator core for best picture and sound. Use adjustment tool with bit size width of .09" or less to avoid ruining threads in strip coil forms.

MODEL BREAKDOWN CHART

Model	Chassis	VHF Tuner	UHF Tuner
19T5CH	STS-436	TT-300	-
Y19T5CH	STS-436Y	TT-305Y	STT-601
19T5CHD*	STS-436	TT-300	-
Y19T5CHD*	STS-436Y	TT-305Y	STT-601
19T7-1	TS-436	TT-305	-
Y19T7-1	TS-436Y	TT-305Y	STT-601
19T7-1D	TS-436	TT-305	-
Y19T7-1D	TS-436Y	TT-305Y	STT-601
19T7-2	TS-436	TT-305	-
Y19T7-2	TS-436Y	TT-305Y	STT-601
19T7-2D	TS-436	TT-305	-
Y19T7-2D	TS-436Y	TT-305Y	STT-601
19T7-3	TS-436	TT-305	-
Y19T7-3	TS-436Y	TT-305Y	STT-601
19T7-3A	RTS-436	TT-306**	-
19T7-4	TS-436	TT-305	-
Y19T7-4	TS-436Y	TT-305Y	STT-601
19T7-4A	RTS-436	BTT-306**	-
A19T8-1***	WTS-436	BTT-302**	-
A19T8-1A***	WTS-436	BTT-302**	-
A19T8-1D***	WTS-436	BTT-302**	-
A19T8-2***	WTS-436	BTT-302**	-
A19T8-2A***	WTS-436	BTT-302**	-
A19T8-2D***	WTS-436	BTT-302**	-
A19T8-3***	WTS-436	BTT-302**	-
A19T8-3A***	WTS-436	BTT-302**	-
A19T8-4***	WTS-436	BTT-302**	-
A19T8-4A***	WTS-436	BTT-302**	-
A19T8CH***	WTS-436	BTT-302**	-
A19T8-CHA***	WTS-436	BTT-302**	-
19T11CH*	QTS-436	TT-300	-
Y19T11CH*	QTS-436Y	TT-305Y	STT-601
19T11CHA*	QTS-436	TT-300	-
Y19T11CHA*	QTS-436Y	TT-305Y	STT-601
19T11WD	QTS-436	TT-300	-
19T12-1*	STS-436	TT-300	-
Y19T12-1*	STS-436Y	TT-305Y	STT-601
19T12-1A*	STS-436	TT-300	-
Y19T12-1A*	STS-436Y	TT-305Y	STT-601
19T12-2*	STS-436	TT-300	-
Y19T12-2*	STS-436Y	TT-305Y	STT-601
19T12-2A*	STS-436	TT-300	-
Y19T12-2A*	STS-436Y	TT-305Y	STT-601
19T13-1*	TS-436	TT-305	-
Y19T13-1*	TS-436Y	TT-305Y	STT-601
19T13-1A*	TS-436	TT-305	-
Y19T13-1A*	TS-436Y	TT-305Y	STT-601
19T13-2*	TS-436	TT-305	-
Y19T13-2*	TS-436Y	TT-305Y	STT-601
19T13-2A*	TS-436	TT-305	-
Y19T13-2A*	TS-436Y	TT-305Y	STT-601
19T14CW	TS-436	TT-305	-
Y19T14CW	TS-436Y	TT-305Y	STT-601
19T14CWA	TS-436	TT-305	-
Y19T14CWA	TS-436Y	TT-305Y	STT-601
19T14CWD	RTS-436	TT-306**	-
19T14CWF	RTS-436	TT-306**	-
19T14W	TS-436	TT-305	-
Y19T14W	TS-436Y	TT-305Y	STT-601
19T14WA	TS-436	TT-305	-
Y19T14WA	TS-436Y	TT-305Y	STT-601
19T14WD	RTS-436	TT-306**	-
19T14WF	RTS-436	TT-306**	-

*A carrying handle is incorporated in these models.

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

***Automatic tuning models using the TR-10 remote control receiver.

(Continued on pages 80 through 88)

MOTOROLA **CHASSIS TS, QTS, RTS, STS & WTS-436A-00 THRU A-03**

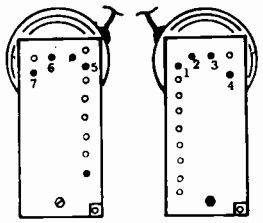
NOTES:

VOLTAGE MEASUREMENTS

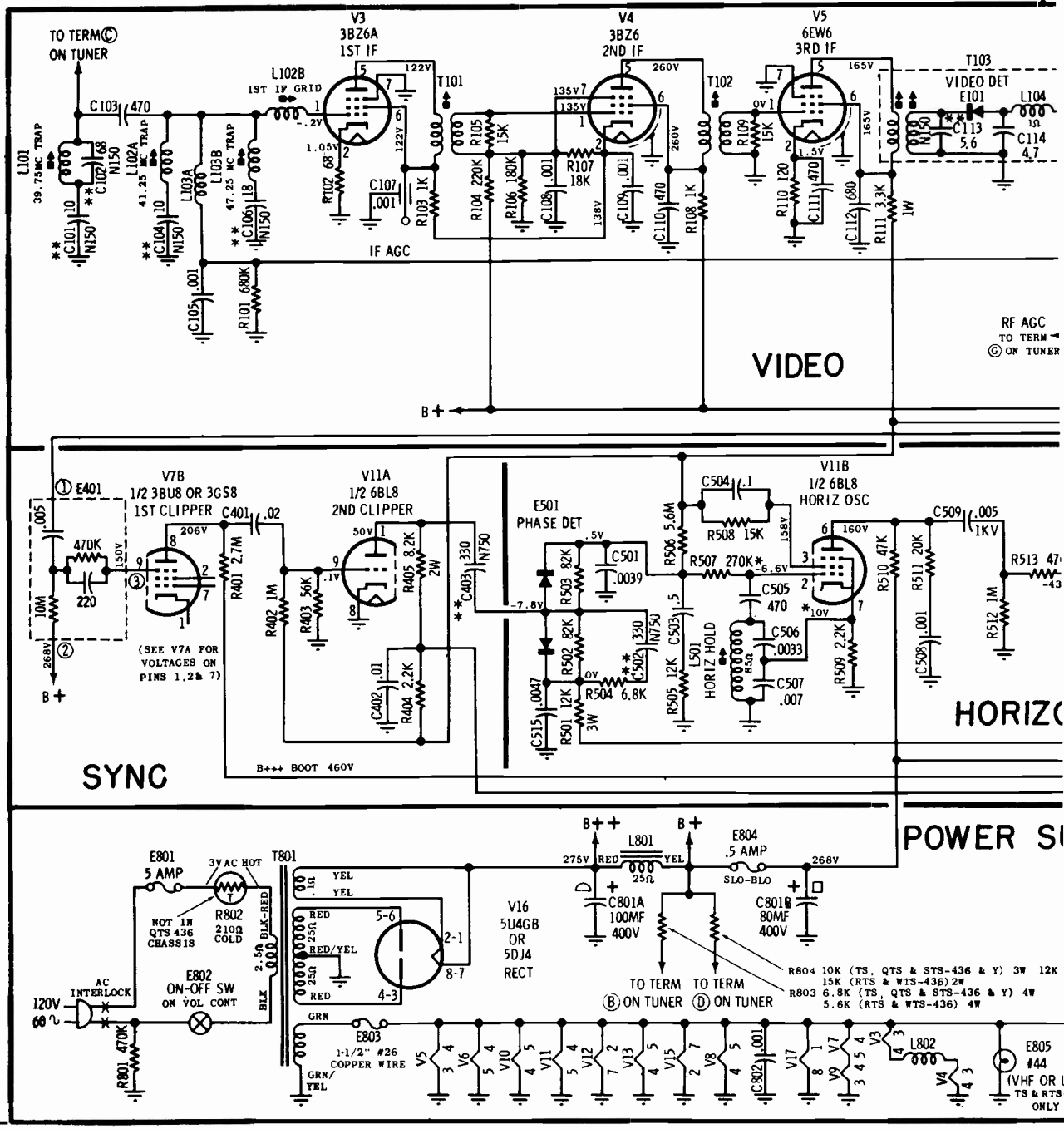
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM, ±10%.
2. LINE VOLTAGE MAINTAINED AT 120V AC.
3. VOLTAGES INDICATED BY AN ASTERISK WILL VARY WITH ASSOCIATED CONTROL SETTINGS.
4. TAKEN WITH CONTRAST CONTROL AT MINIMUM AND ALL OTHER CONTROLS IN NORMAL OPERATING POSITION WITH NO SIGNAL INPUT.
5. TUNER ON CHANNEL 13 OR CHANNEL OF LEAST NOISE WITH ANTENNA TERMINALS SHORTED.

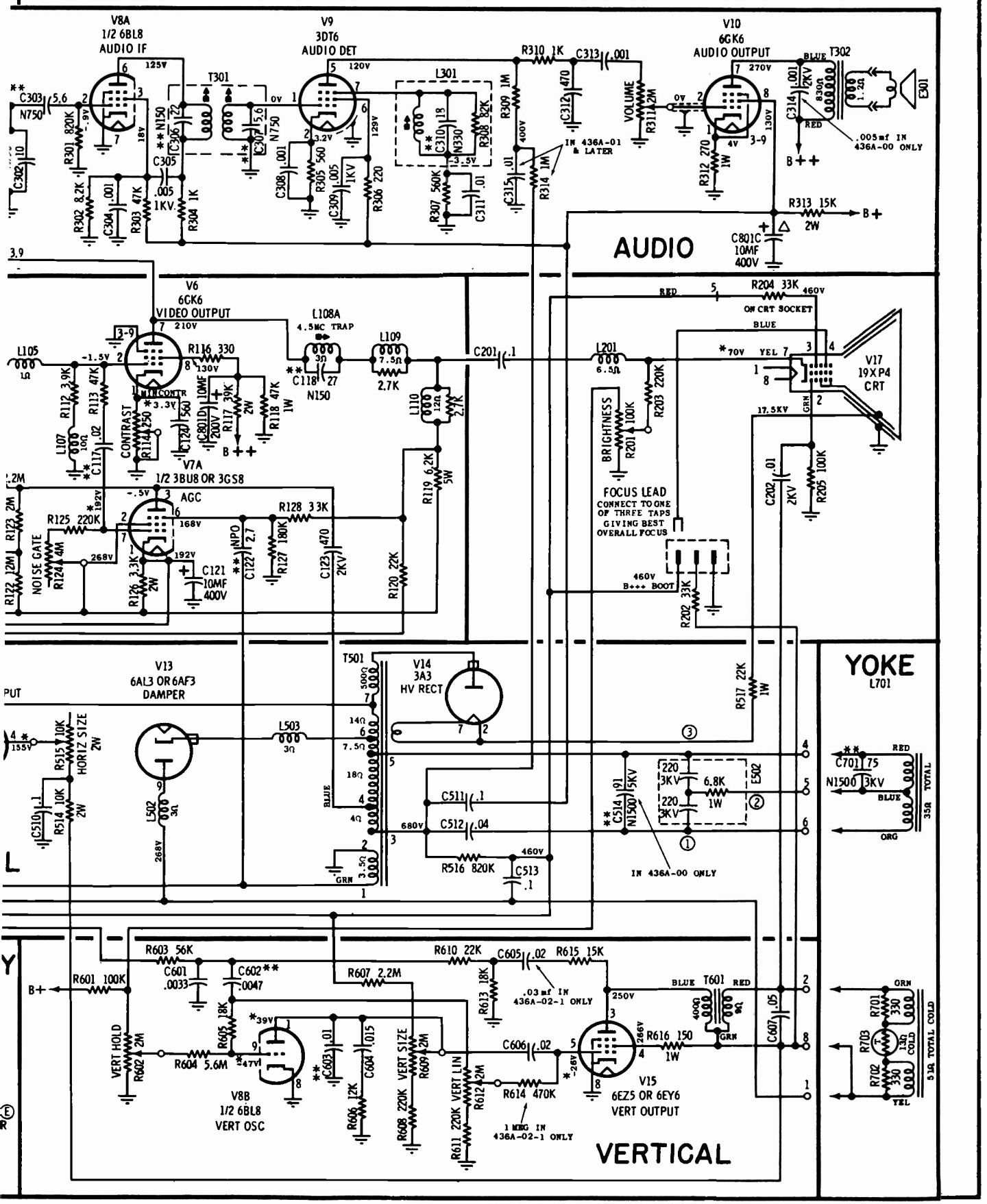
CAPACITORS: UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

** INDICATES SPECIAL CAPACITOR.



T501 CONN




V8A
1/2 6BL8
AUDIO IF
V9
3DT6
AUDIO DET
V10
6GK6
AUDIO OUTPUT
T301
L301
T302
R310 1K
C313 .001
R309 1M
C312 470
VOLUME
R311 2M
R312 270 1W
C314 .001 2KV
E301
.005mf IN 436A-00 ONLY
IN 436A-01 & LATER
R313 15K 2W
B+
C801C 10MF 400V
AUDIO
V6
6GK6
VIDEO OUTPUT
L108A
4.5MC TRAP
L109
7.5Ω
2.7K
C201 .1
L201
6.5Ω
R204 33K
ON CRT SOCKET
V17
19XP4
CRT
17.5KV
C202 .01 2KV
R205 100K
BRIGHTNESS
R201 100K
R203 220K
FOCUS LEAD
CONNECT TO ONE OF THREE TAPS GIVING BEST OVERALL FOCUS
460V B+++ BOOST
R202 33K
L105 1Ω
R116 330
C118 27 N150
L110 12n 2.7K
R119 6.2K 5W
R112 3.9K
R113 47K
CONTRAST R114 250
C124 560
C801D 10MF 200V
R117 39K 2W
R118 47K 1W
L107 10Ω
C117 .02
V7A
1/2 3BU8 OR 3GS8
AGC
R125 220K
R128 33K
R127 180K
C122 NPO 2.7
C123 470 2KV
R120 22K
NOISE GATE
R124 4M
R122 12M
R123 2M
R126 3.3K 2W
C121 10MF 400V
V13
6AL3 OR 6AF3
DAMPER
L503 3Ω
L502 3Ω
R515 10K HORIZ SIZE 2W
R514 10K 2W
C510 .1
T501
V14
3A3
HV RECT
R517 22K 1W
YOKE
L701
C511 .1
C512 .04
R516 820K
C513 .1
C514 .01 5KV N1500
E502
220 3KV
6.8K 1W
220 3KV
IN 436A-00 ONLY
C701 .75 N1500 3KV
R603 56K
C601 .0033
C602** .0047
R601 100K
R607 2.2M
R610 22K
C605 .02
R615 15K
.03 mf IN 436A-02-1 ONLY
R613 18K
T601
C607 .05
R616 150 1W
R605 18K
VERT HOLD R602 2M
R604 5.6M
V8B
1/2 6BL8
VERT OSC
C603 .01
C604 .015
VERT SIZE R609 2M
R606 12K
R608 220K
VERT LIN R612 2M
R611 220K
R614 470K
1 MEG IN 436A-02-1 ONLY
V15
6EZ5 OR 6EY6
VERT OUTPUT
R701 330
R703 3K COLD
R702 330
5.3Ω TOTAL COLD
VERTICAL

MOTOROLA Chassis TS-436, QTS-, RTS-, STS-, WTS-436, Service Data, Continued

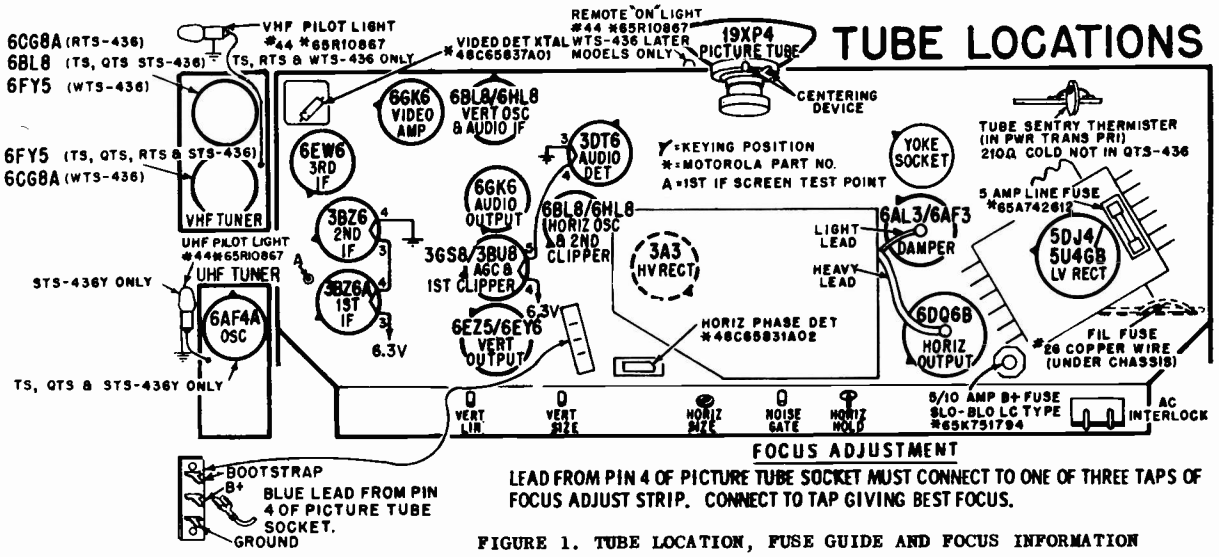


FIGURE 1. TUBE LOCATION, FUSE GUIDE AND FOCUS INFORMATION

HORIZONTAL OSCILLATOR ADJUSTMENT

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

FOCUSING ADJUSTMENTS

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

NOISE GATE CONTROL

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

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

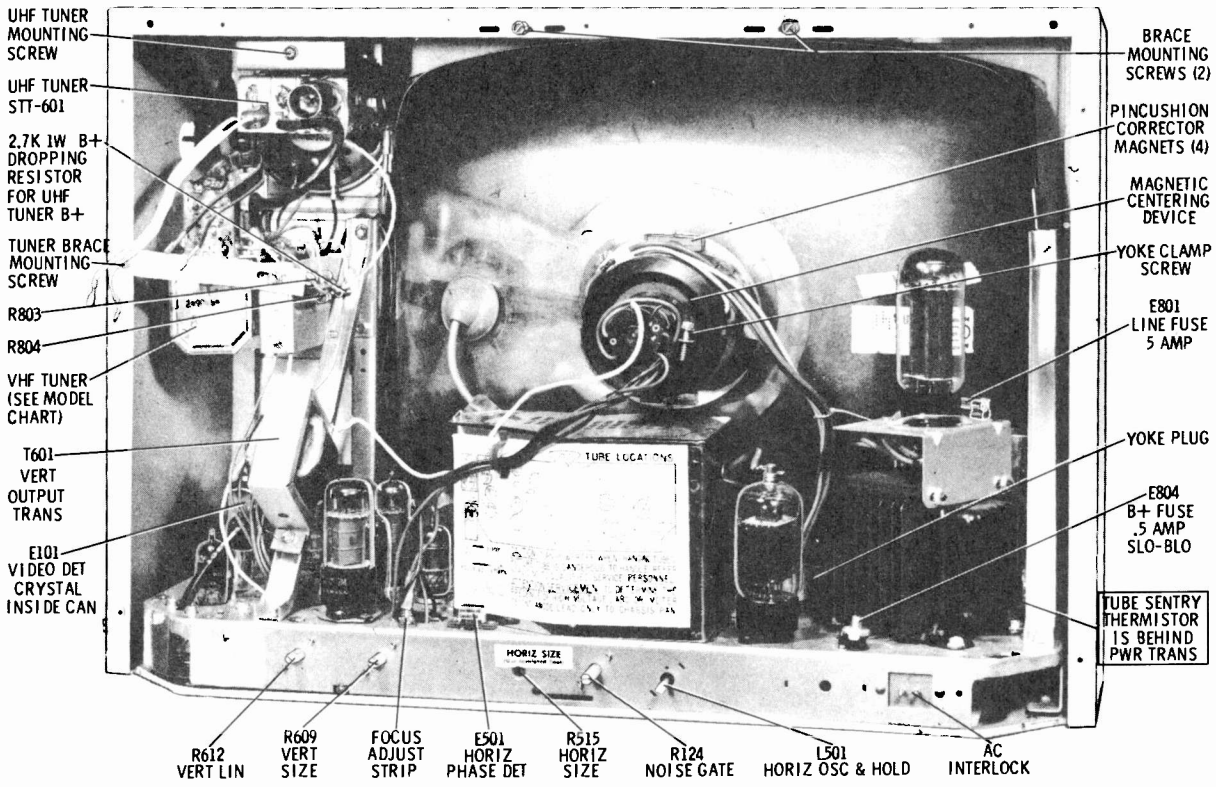


FIGURE 2. REAR VIEW OF MANUAL TUNING MODELS

MOTOROLA Chassis TS-436, etc., Alignment Information, Continued

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 tuners BTT302 and TT306 (turret type), set tuner between stations. On tuners TT300 and TT305 (switch type), short out pins 8 & 9 of mix-osc tube with a fine piece of bare wire or short pin 9 to tube shield with a fine piece of wire.

4. Apply the negative lead of a 6.0 volt bias supply to IF AGC (jct of R121, C119 & R101) and the 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).

7. Short across tuner input terminals.

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

9. Refer to Video IF and Sound Alignment Detail for component and test point locations (Figure 10).

10. All coil slug tuning positions, in relation to chassis, are given in the procedure chart and in the separate detail of Figure 9.

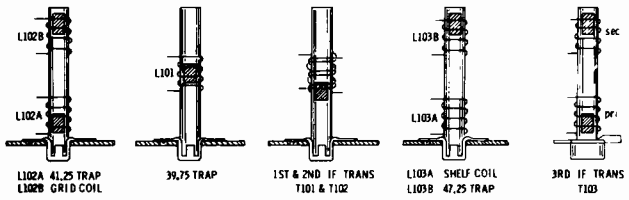


FIGURE 9. COIL CORE POSITIONS

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GEN. & MARKER	INDICATOR	ADJUST	ADJ. FOR AND/OR REMARKS
1.	To grid of 3rd IF thru .001 mf cap. Set sweep to approx. 44 Mc markers as required.	Scope to grid of Video Amp thru 47K ohm resistor.	Both cores of 3rd IF trans (T103)	Equal peaks & marker placement as shown in curve #1.
2.	To mixer T.P. Ⓜ thru .001 cap. on tuners TT300 & TT-305. To grid of mixer tube (pin 9 of V2) thru .001 cap. on tuners BTT302 & TT306. Connect to grid lead thru hole provided, adjacent to pin 9 of V2.	Same as step #1.	a) 47.25 Mc trap (L103B) b) 41.25 Mc trap (L102A)	a) Minimum response (tune core at end of coil away from chassis). See curve #2. b) Minimum response (tune core at end of coil toward chassis). See curve #2. 39.75 Mc trap (L101) core is turned fully into coil, toward chassis, at a trap freq. of 36 Mc or lower. This trap is set at 39.75 Mc only when upper adjacent video interference is present.*
3.	Same as step #2 except output set for 1 v.p.p.	To output of diode det. connected to plate of 1st IF plate (See Fig. 10 for detail of diode detector.)	a) Converter plate trans. T1 on tuner b) 1st IF grid coil (L102B)	Converter plate trans & 1st IF grid coil to obtain curve #3. The plate trans affects the center peak & the grid coil affects the two outside peaks. If suck-out appears in the converter band pass, detune 1st IF trans T101 by turning core into coil. As part of alignment, adjust L101 for max at 38.25Mc, (this coil is adjusted to 39.75Mc only when adjacent video interference is present.*
4.	Same as step #2, output set for 3 v.p.p.	Scope to grid of Video Amp thru 47K ohm resistor.	1st IF trans (T101) 2nd IF trans (T102)	Proper 42.25Mc marker placement; tune core at end of coil toward chassis. Proper 45.75Mc marker placement. Tune core at end of coil toward chassis See curve #4.
5.	Same as step #4	Same as step #4		If tilt occurs, readjust mixer plate trans T1 on tuner to compensate for tilt in response curve and if necessary, re-adjust 1st & 2nd IF coils (T101 & T102) for proper response curve shown in curve #4.

*The 39.75Mc trap (L101B) is factory adjusted to 36Mc and is not tuned to 39.75Mc unless adjacent video interference is present. Adjust trap by tuning core away from chassis, until adjacent video interference is visually no longer present on CRT.

4.5 MC TRAP ADJUSTMENT (L108A)

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

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

3. Adjust sound trap (L108A) to find the two points of adjustment at which the sound beat is just noticeable on the picture tube screen. Rotate the core toward center of the two points. Use minimum amount of inductance (core out of coil) that will result in no apparent beat interference.

MOTOROLA Chassis TS-436, etc., Alignment Information, Continued

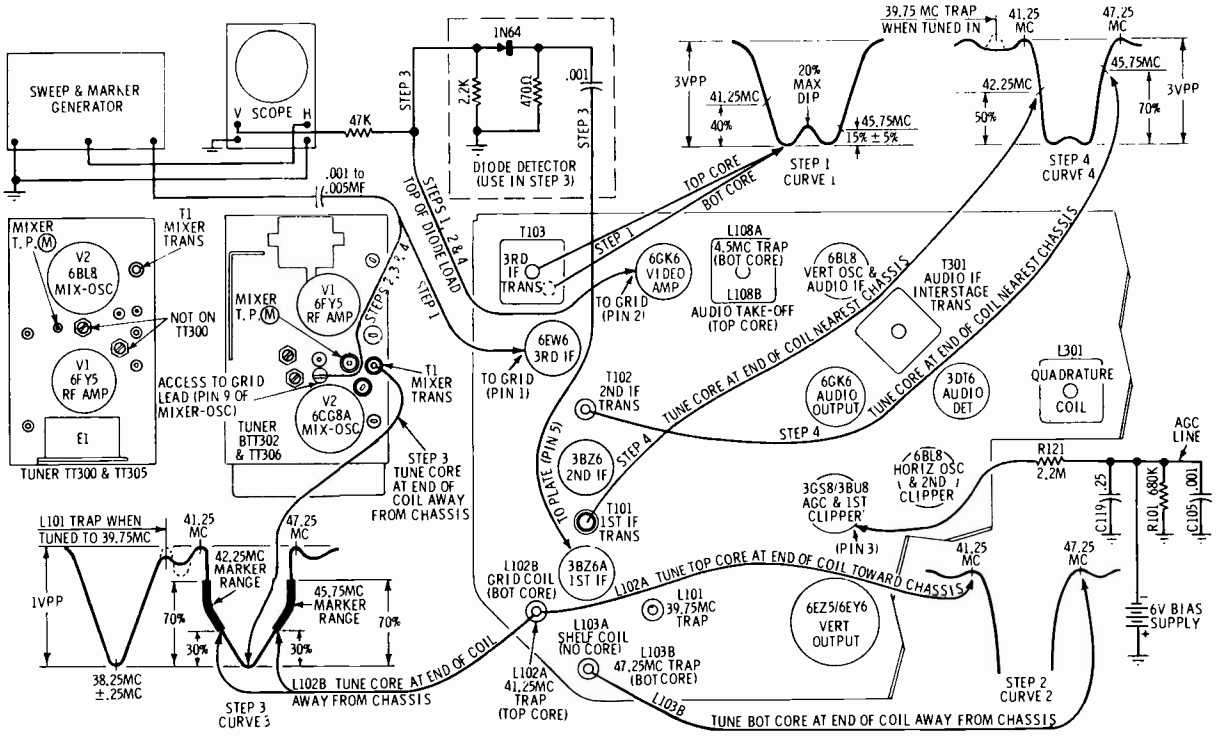


FIGURE 10. VIDEO IF & SOUND ALIGNMENT DETAIL

SOUND ALIGNMENT (Station Signal Method)

The sound system used in this receiver consists of an audio IF amplifier stage, a 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 (Figure 10).

SOUND ALIGNMENT PROCEDURE

STEP	STATION	INDICATOR	ADJUST	REMARKS
1.	Strong signal	VTVM to jct of R307 (560K) & C311 (.01) located under L301 under chassis (See Fig. 21). NOTE: In some models R307 & C311 are mounted inside the quadrature coil can. Connect VTVM to exposed terminal of quadrature coil. See Fig. 20 for location.	L301 (quad. coil)	Max deflection (coarse adj.) of two possible max tuning points, use that giving the largest voltage reading.*
2.	"	Listening test	"	Max sound with minimum distortion (fine adj.)
3.	Weak signal	"	T301 (interstage coil)	Max sound with minimum distortion (maintain hiss level).**
4.	"	"	L108B (take off coil)	Max sound with minimum distortion.

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

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

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

MOTOROLA Chassis TS-436, QTS-, RTS-, STS-, WTS-436, Changes, Continued

PRODUCTION CHANGES

CHASSIS PRODUCTION CHANGES

Chassis Coding	Change
436A-01	TO IMPROVE HIGH FREQUENCY AUDIO RESPONSE: C314 (.005 mf) changed to .001 mf, 2000V. TO REMOVE HORIZONTAL AND VERTICAL PULSES FROM AUDIO: R309 (1 meg, 1 W) changed to 1/2 W resistor; R314 (1 meg, 1/2W) added in series with R309 to terminal #3 of T501; C315 (.01 mf) added between the junction of R309 and R314 and chassis ground. TO INCREASE HIGH VOLTAGE: C514 (91 mmf) removed. TO REDUCE VERTICAL BUZZ IN AUDIO: T601 (vertical output trans) relocated from underside of the tuner support bracket to the top of the bracket. Two (2) rectangular washers (4A65734A01) are used between the screw heads and the transformer mounting flanges when repositioned to top of bracket. Use original screws and mounting holes.
436A-02	TO ATTAIN MAXIMUM EFFICIENCY IN THE TUNER OSCILLATOR STAGE: R804 (12K, 3W) changed to 10K, 3W.
436-02-1	TO IMPROVE VERTICAL LINEARITY: C605 (.02 mf) changed to .03 mf; R614 (470K) changed to 1 meg. NOTE: See Vertical Stability Change under 436B-00 for additional information.
436A-03	TO FUSE TUNER MOTOR: Relocate one end of gray lead wired between tuner motor and AC interlock receptacle to the junction of fuse (E801) and thermistor (R802).
436B-00	TO FACILITATE IF PHASING: 3rd IF trans T103 (1V65811A52) changed to 1V65816A97. TO INCREASE AUDIO SENSITIVITY: Audio IF interstage trans T301 (24D65949A01) replaced with 24D65949A02; Audio takeoff & 4.5Mc trap coils L108 (24D65950A01) replaced with 24D65950A02; C311 (.01 mf) and R307 (560K) are now mounted on the Quadrature coil base (L301) inside the can; resonant coils L104 and L105 (8.5 microhenries) changed to 8.8 microhenries; R301 (820K) changed to 100K; R302 (8.2K) changed to 22K; C302 (10 mmf) changed to 6.8 mmf; C303 (5.6 mmf) changed to 47 mmf. TO IMPROVE VERTICAL SYNC STABILITY AND LINEARITY: C602 (.0047 mf) changed to .006 mf; C605 (.02 mf) changed to .03 mf; R614 (470K) changed to 1 meg; R617 (220K) added in series with the Vertical Hold control (R602) to ground in place of the jumper lead.
436B-01	TO REMOVE AC POWER FROM TUNER MOTOR WHEN THE RECEIVER IS TURNED OFF REMOTELY: The automatic portion of the receiver was rewired so that the power applied to the tuner motor (E57) is now in series with the Remote On-Off Switch (E51A).
436B-02	DESIGN CHANGE: C801 (100-80-10 mf/400V, 10 mf/200V) changed to 100-80-10-10 mf/400V; section C801D (10 mf, 400V) relocated to the cathode of V7A (3BU8); C121 (10 mf, 400V) removed; C125 (5 mf, 300V) added between the junction of R116, R117 and R118 and chassis ground; R117 (39K, 2W), R118 (47K, 1W) and R126 (3.3K, 2W) physically re-located. See TS-436 B-00 component location photo Fig. 20.
436B-03	DESIGN CHANGE: E401 (sync rescap) changed to a type which incorporates more components; R402 (1 meg) and R403 (56K) removed. NOTE: The new rescap incorporates R402 and R403 plus two other components which were not in the chassis previously. For new sync circuit diagram see Figure 18.
436B-04	TO REDUCE AUDIO DROP-OUT DUE TO MOISTURE AFFECTING AUDIO COILS IN HIGH HUMIDITY AREAS: Audio IF interstage trans T301 (24D65949A02) replaced with 1V66241A48, which includes C306, C307, shield and leads; Quadrature coil L301 (24D65948A01) replaced with 1V66099A99 which includes C310, C311, R307, R308, shield and leads; R311 (82K) changed to 270K. NOTE: The new coils are dipped in candywax. Individual components should not be replaced on these coils in high humidity areas.

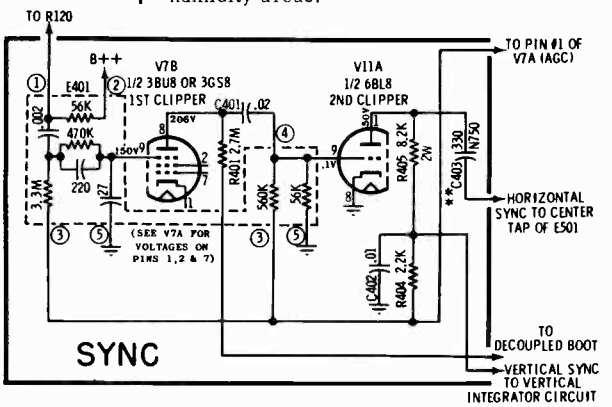


FIGURE 18. SYNC CIRCUIT FOR CHASSIS B-03 AND LATER

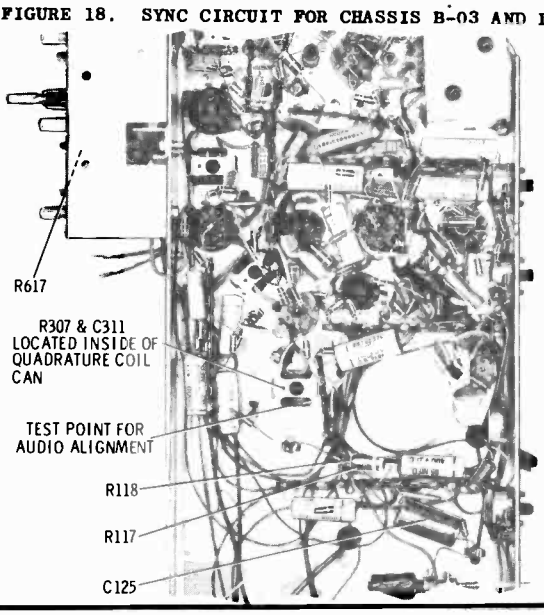


FIGURE 20. LOCATION OF RELOCATED & ADDED COMPONENTS IN CHASSIS CODED B-00 & LATER

MOTOROLA **CHASSIS TS, QTS, RTS, STS & WTS-436B-00 THRU B-04**

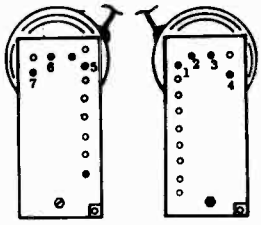
NOTES:

VOLTAGE MEASUREMENTS

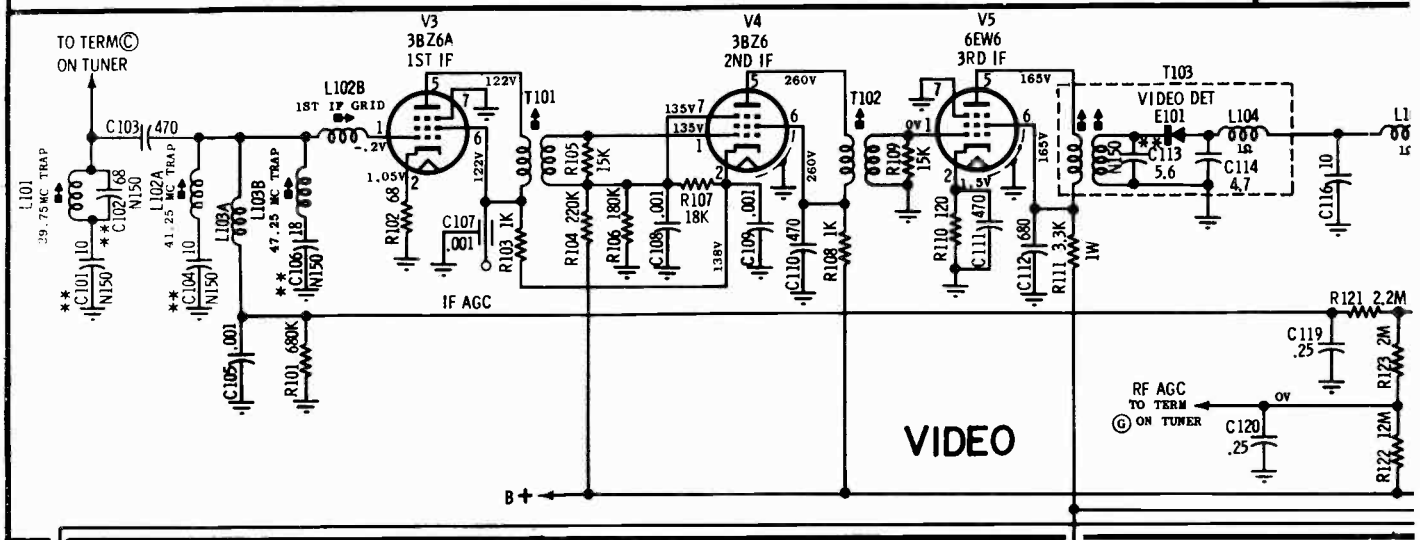
1. TAKEN FROM POINT INDICATED TO CHASSIS WITH A VTVM. ± 10%.
2. LINE VOLTAGE MAINTAINED AT 120V AC.
3. VOLTAGES INDICATED BY AN ASTERISK WILL VARY WITH ASSOCIATED CONTROL SETTINGS.
4. TAKEN WITH CONTRAST CONTROL AT MINIMUM AND ALL OTHER CONTROLS IN NORMAL OPERATING POSITION WITH NO SIGNAL INPUT.
5. TUNER ON CHANNEL 13 OR CHANNEL OF LEAST NOISE WITH ANTENNA TERMINALS SHORTED.

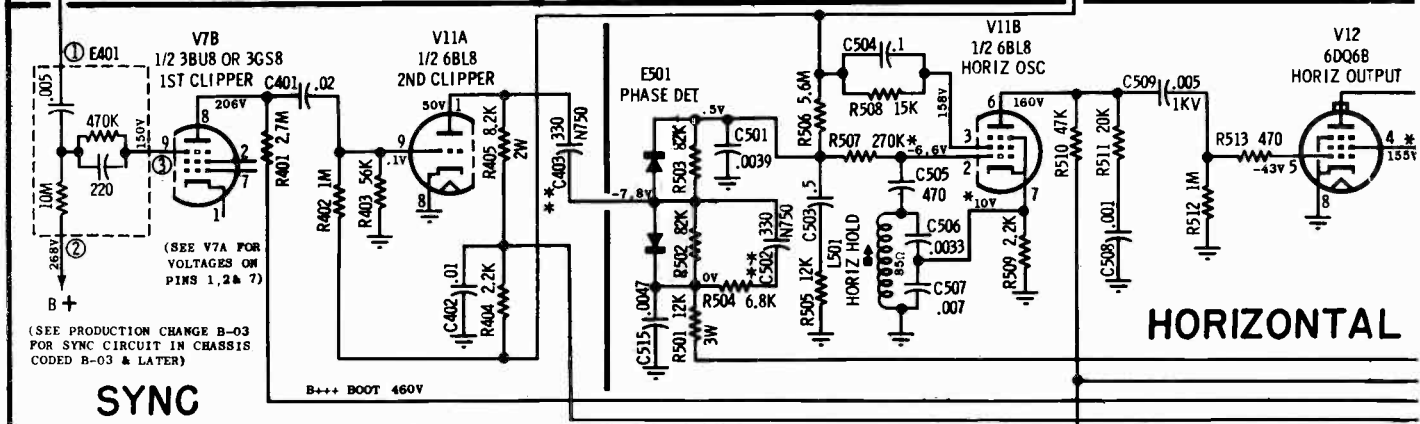
CAPACITORS: UNLESS OTHERWISE SPECIFIED, VALUES LESS THAN ONE IN MF; ALL OTHERS IN MMF.

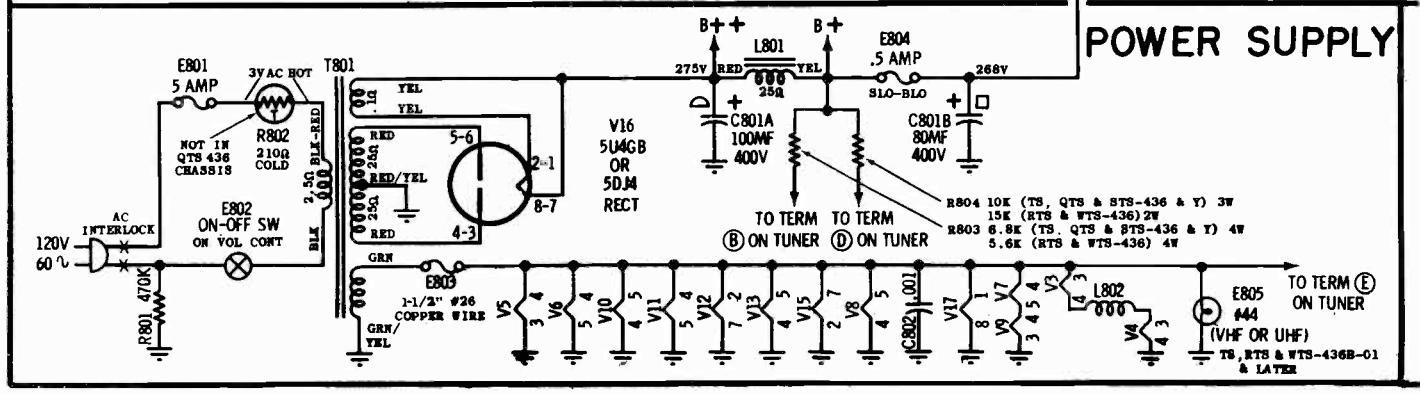
** INDICATES SPECIAL CAPACITOR.

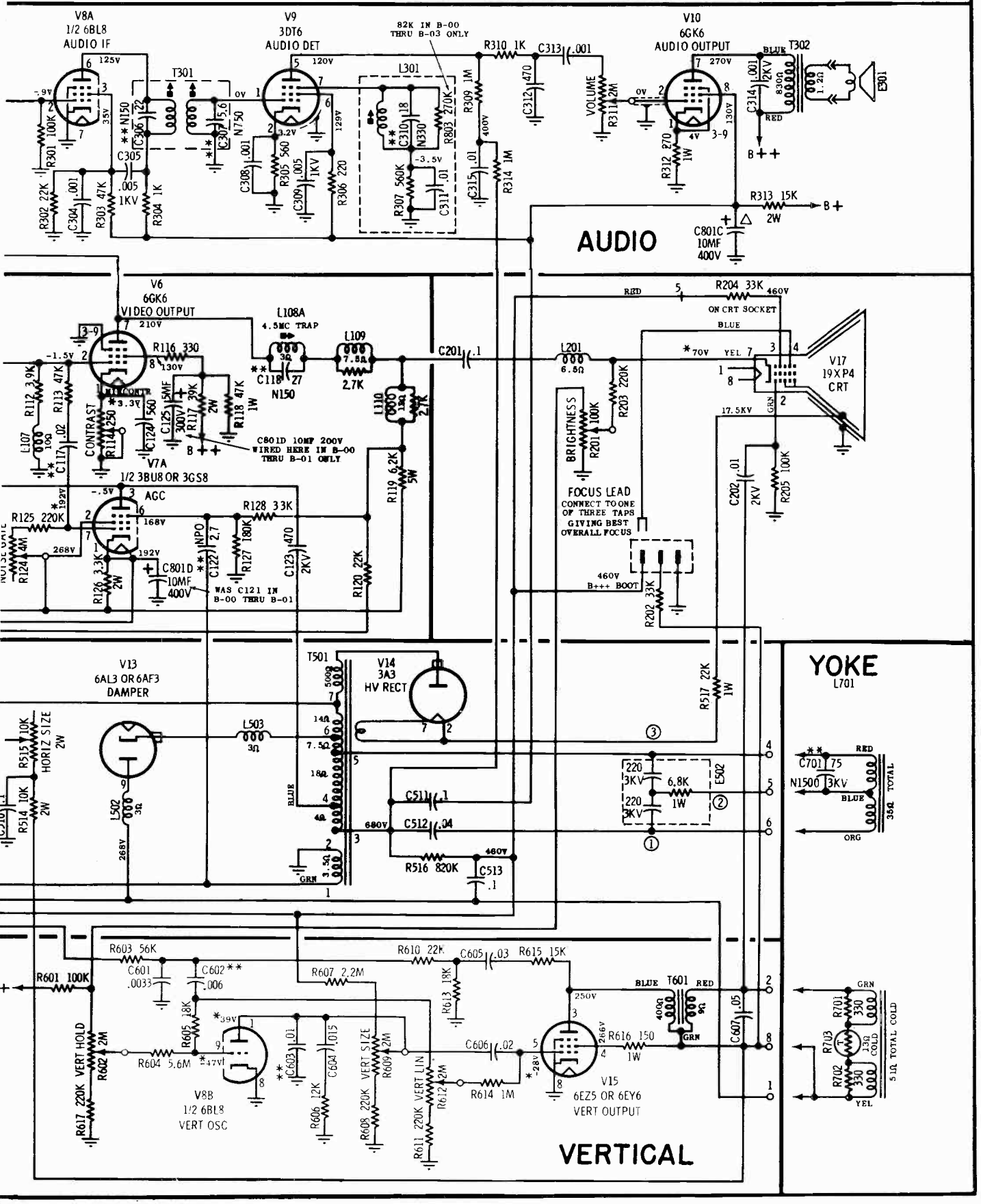


T501 CONN








V8A
1/2 6BL8
AUDIO IF
V9
3DT6
AUDIO DET
82K IN B-00 THRU B-03 ONLY
V10
6GK6
AUDIO OUTPUT
T301
L301
T302
E301
R310 1K
C313 .001
C312 470
VOLUME R311 2M
R312 270 1W
C314 .001 2KV
R313 15K 2W
B+
B++
C801C 10MF 400V
AUDIO
V6
6GK6
VIDEO OUTPUT
L108A
4.5MC TRAP
L109
C118 Z7 N150
2.7K
C201 .1
L201 6.5Ω
R204 33K 460V
ON CRT SOCKET
BLUE
YEL
V17
19XP4
CRT
17.5KV
GRN
R116 330
R112 3.9K
R113 47K
CONTRAST R114 250
R117 39K 2W
R118 47K 1W
C125 .5MF 300V
C124 560
C107 10Ω
C117 .02
C801D 10MF 200V WIRED HERE IN B-00 THRU B-01 ONLY
V7A
1/2 3BU8 OR 3GS8
AGC
R125 220K
R124 4M
R126 3.3K 2W
C801D 10MF 400V
WAS C121 IN B-00 THRU B-01
R128 33K
C122 2.7 NPO
R127 180K
C123 470 2KV
R120 22K
R119 6.2K 5W
L110 15Ω
2.7K
BRIGHTNESS R201 100K
R203 220K
FOCUS LEAD
CONNECT TO ONE OF THREE TAPS GIVING BEST OVERALL FOCUS
460V B+++ BOOST
R202 33K
C202 .01 2KV
R205 100K
V13
6AL3 OR 6AF3
DAMPER
T501
V14
3A3
HV RECT
L503 3Ω
L502 3Ω
R515 10K HORIZ SIZE 2W
R514 10K 2W
C511 .1
C512 .04
R516 820K
C513 .1
R517 22K 1W
YOKE
L701
E502
C701 75 N1500 3KV
R603 56K
C601 .0033
C602** .006
R601 100K
R607 2.2M
R610 22K
C605 .03
R615 15K
R613 18K
T601
R602 2M VERT HOLD
R604 5.6M
R605 18K
C603 .01
C604 .015
VERT SIZE R609 2M
R608 220K
R606 12K
R611 220K VERT LIN
R612 2M
C606 .02
R614 1M
R616 150 1W
C607 .05
V8B
1/2 6BL8
VERT OSC
V15
6EZ5 OR 6EY6
VERT OUTPUT
R701 330
R703 15Ω COLD
R702 330
5Ω TOTAL COLD
VERTICAL

MOTOROLA Chassis TS-436, QTS-, RTS-, STS-, WTS-436, Service Data, Continued

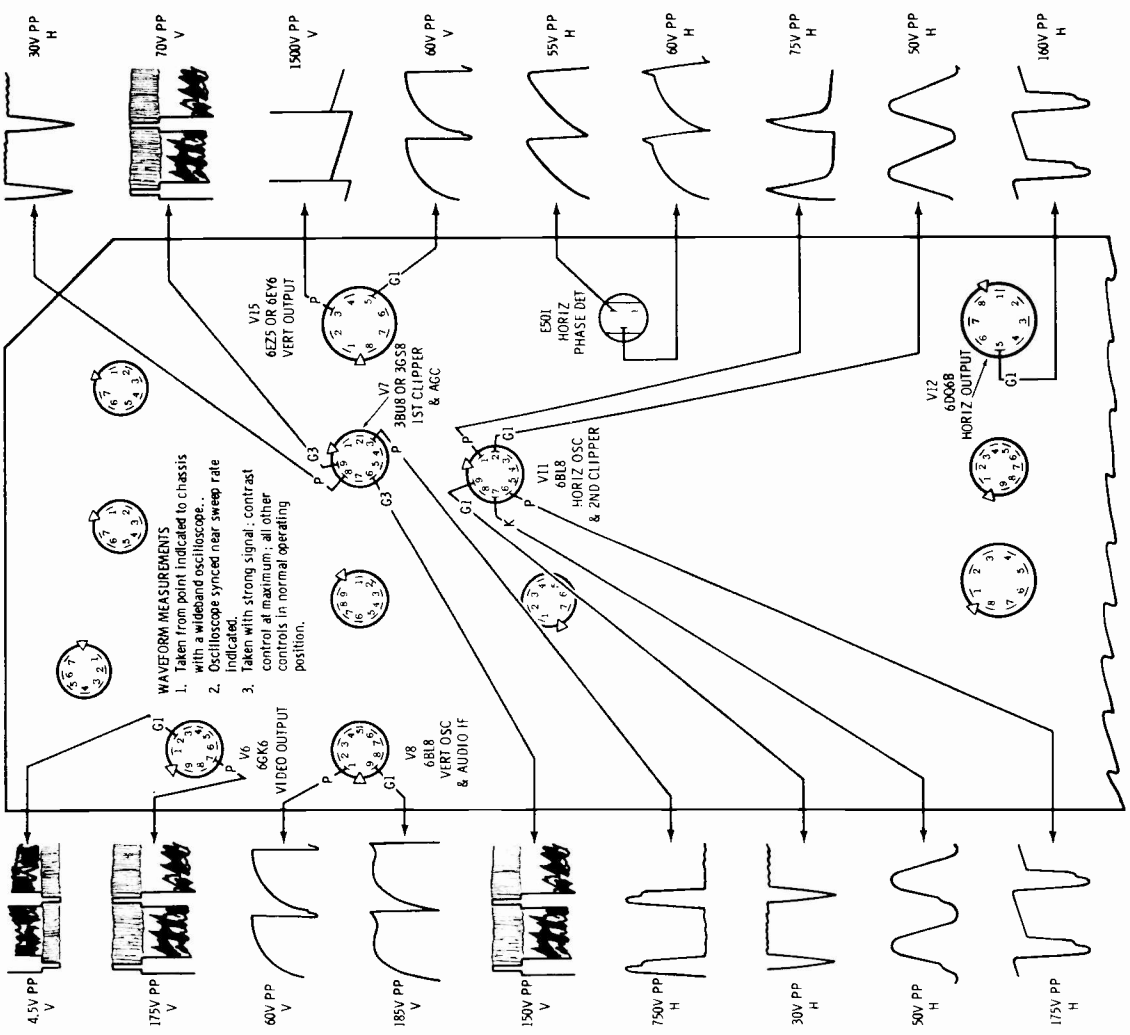


FIGURE 23. WAVE FORM MEASUREMENTS

FIGURE 22. VOLTAGE MEASUREMENTS

MOTOROLA

CHASSIS
TS-432

MODELS
19P1-1 & 19P1-2

TS-432 Custom Golden M Chassis is a vertically mounted type containing 25 transistors, 10 diodes, a vacuum tube high voltage rectifier and a 19EAP4 picture tube. The chassis may be operated from the AC line or from its own rechargeable Energy Cell. The switch-over from AC to Energy Cell operation is accomplished automatically when the AC line cord is removed from the back of the set. When the receiver is operated from the AC line and turned off, a trial charge is automatically placed on the Energy Cell. If the cell is fully charged, the charging circuit will turn itself off. If the cell needs charging, the charging circuit will function until the cell is charged to full capacity, then turn off automatically. The Energy Cell is automatically tested every time the receiver is turned off when operating from the AC line. This assures a fully charged Energy Cell at all times.

The Energy Cell is constructed of long-life silver cadmium. It is fully sealed and requires no maintenance. The cell's nominal operating voltage is 17.4 volts. The receiver will operate up to 5 hours on a fully charged cell and may be recharged by plugging the receiver power cord into an AC outlet for a period of 15 hours after complete discharge. The charging rate is approximately 3 hours for every hour of portable operation.

1. REMOVE FRONT COVER

Unsnap the two latches located on either side of the front cover by pressing front edges of latches towards the rear of receiver and at the same time lifting out.

2. REMOVE CONTROL PANEL ESCUTCHEON

Remove all control knobs by pulling straight up. Remove two (2) Phillips head screws located under handle and lift panel off receiver.

3. REMOVE BACK COVER (CABINET BACK)

Remove four (4) back cover retaining screws; two (2) on top and two (2) on bottom of receiver. Place receiver on its safety window (face down) and lift back cover up from receiver until the green speaker leads are visible at the lower left hand corner of the receiver. Unplug the speaker leads then completely remove cover. Protect the safety window with a cloth.

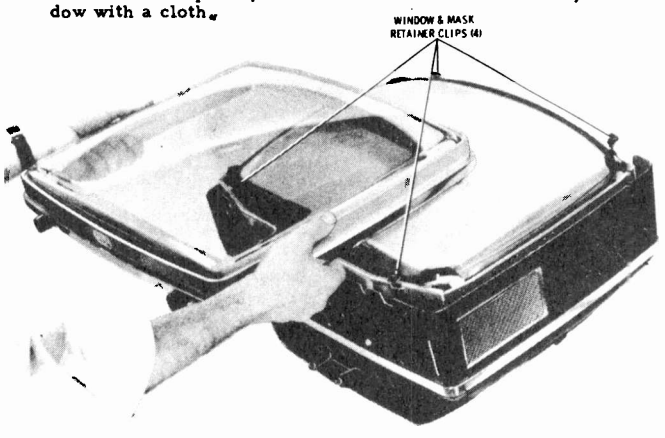


FIGURE 8. REMOVING BEZEL

4. REMOVE BEZEL

Remove four (4) bezel mounting screws; two (2) on top and two (2) on bottom of receiver. The picture tube mask and window are not secured to the bezel. Place receiver on its back and slide fingers under edges of bezel when removing (see Figure 8).

When replacing bezel place receiver on its back and make sure that the four (4) window and mask retainer clips are in place and seated properly. Grasp complete bezel as shown and place on receiver. Start the four (4) bezel mounting screws then turn receiver on its side and tighten the screws. Do not force bezel, it should slide into place with ease.

5. REMOVE CHASSIS FROM PICTURE TUBE ASSEMBLY

Disconnect the picture tube socket and yoke plug. Remove eight (8) chassis mounting screws. Lift chassis from right hand side of picture tube assembly and remove second anode lead from picture tube. Carefully remove chassis.

6. PICTURE TUBE REPLACEMENT

Loosen the picture tube retainer strap bolt until the strap and its retainers can be lifted off the assembly. Remove the deflection yoke by loosening the yoke clamp screw. Remove the picture tube by lifting it up from the assembly. Make sure that the four, 2-inch pieces of protective insulating tape are in place on the assembly. Insert replacement picture tube (2nd anode button on right hand side), replace retainer strap and tighten the retainer strap bolt. Replace the deflection yoke and tighten the yoke clamp screw.

Assemble the chassis to the picture tube assembly and apply power with a service line cord. Check receiver operation; adjust the deflection yoke, centering device and focus (if applicable).

INSTALLATION AND SERVICE ADJUSTMENTS

WARM-UP PERIOD

Allow a warm-up period of approximately five minutes before performing the adjustments listed in this section.

OPERATING CONTROLS

All operating controls are illustrated on the Transistor, Tube & Control Location Detail (Figure 15). Refer to this detail for the following adjustments.

DEFLECTION YOKE ADJUSTMENT

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

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

PICTURE CENTERING

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

PIN CUSHION CORRECTOR MAGNETS

The pin cushion corrector magnets found on all four sides of the deflection yoke are used to straighten the sides of the raster in both the horizontal and vertical planes. These magnets are provided as part of the yoke and are glued into place. No adjustment is required.

B++SET CONTROL ADJUSTMENT

The B++voltage should range from 16.5V DC at 105V AC line to 19.5V DC at 122V AC line input. B++at normal line (117V AC) voltage should be approximately 17.5V.

HORIZONTAL SIZE ADJUSTMENT

An adjustable air-gap in the high voltage transformer secondary core changes the size of the raster. To adjust, turn the Horizontal Size adjustment screw either direction until desired size is obtained.

This adjustment effects the vertical size of the raster to some extent. After adjustment it may be necessary to adjust the Vertical Size Control.

VERTICAL SIZE AND LINEARITY ADJUSTMENTS

Before attempting to adjust the Vertical Size and Linearity Controls the Vertical Bias Control which sets the operating point of the Vertical Output Transistor must be properly adjusted. If the Vertical Output Transistor is not biased properly, compression or creeping may occur at the top and bottom of the raster.

(Continued on pages 90 through 102)

MOTOROLA Chassis TS-432 Service Information, Continued

To adjust the Vertical Bias Control, turn the Vertical Size Control to reduce the size of the raster approximately one inch from the top of the picture tube. Set the Vertical Bias Control fully clockwise (maximum resistance) when viewed from top of receiver, then slowly turn the control counterclockwise until compression of the upper portion of the raster is noted and back-off slightly.

Adjust the Vertical Size and Linearity Controls for best overall linearity with desired raster size.

HORIZONTAL OSCILLATOR ADJUSTMENTS

Set the Horizontal Hold Control to its mechanical center. Place the Horizontal Test Receptacle Jumper as shown in Figure 13. In this position AFC voltage is removed and the Horizontal Ringing Coil is shorted. Adjust the Horizontal Blocking Oscillator Coil so picture is as close to horizontal sync as possible. Remove the jumper completely (this removes the short across the Ringing Coil - AFC still removed) and adjust the Horizontal Ringing Coil so picture is as close to horizontal sync as possible. Replace the jumper as shown in Figure 14 and lock-in picture with Horizontal Hold Control.

AGC CONTROL ADJUSTMENT

The AGC Control is used to set the operating point of the Video Output Transistor. When the control is adjusted properly, maximum contrast, without white picture information limiting, will be obtained. There are two methods of adjusting the AGC Control. One method is to adjust the control and watch the picture tube screen, and the other is to use an oscilloscope to observe the video waveform at the picture tube cathode.

FIGURE 13.

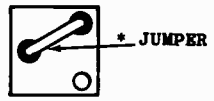


FIGURE 14.

*Jumper must be insulated from body capacity or horizontal output transistors may be damaged.

HORIZONTAL TEST RECEPTACLE

To adjust the AGC Control, tune in a channel that produces a satisfactory picture. Turn the Contrast Control for maximum contrast (extreme clockwise rotation). Turn the AGC Control clockwise (as viewed from bottom of receiver) until loss of light gray picture information and/or white limiting is observed. Then back-off until no limiting is observed. A complete loss of video information will result if the control is turned toward either end stop.

Adjust the Auxilliary Contrast Control after making this adjustment.

AUXILLIARY CONTRAST CONTROL ADJUSTMENT

The Auxiliary Contrast Control is used to set the range of the Contrast Control. To adjust, tune in a channel that produces a satisfactory picture. Turn the Contrast Control to minimum (extreme counterclockwise). Set the Auxiliary Contrast Control for minimum contrast with good sync. This adjustment should be made after the AGC Control is adjusted.

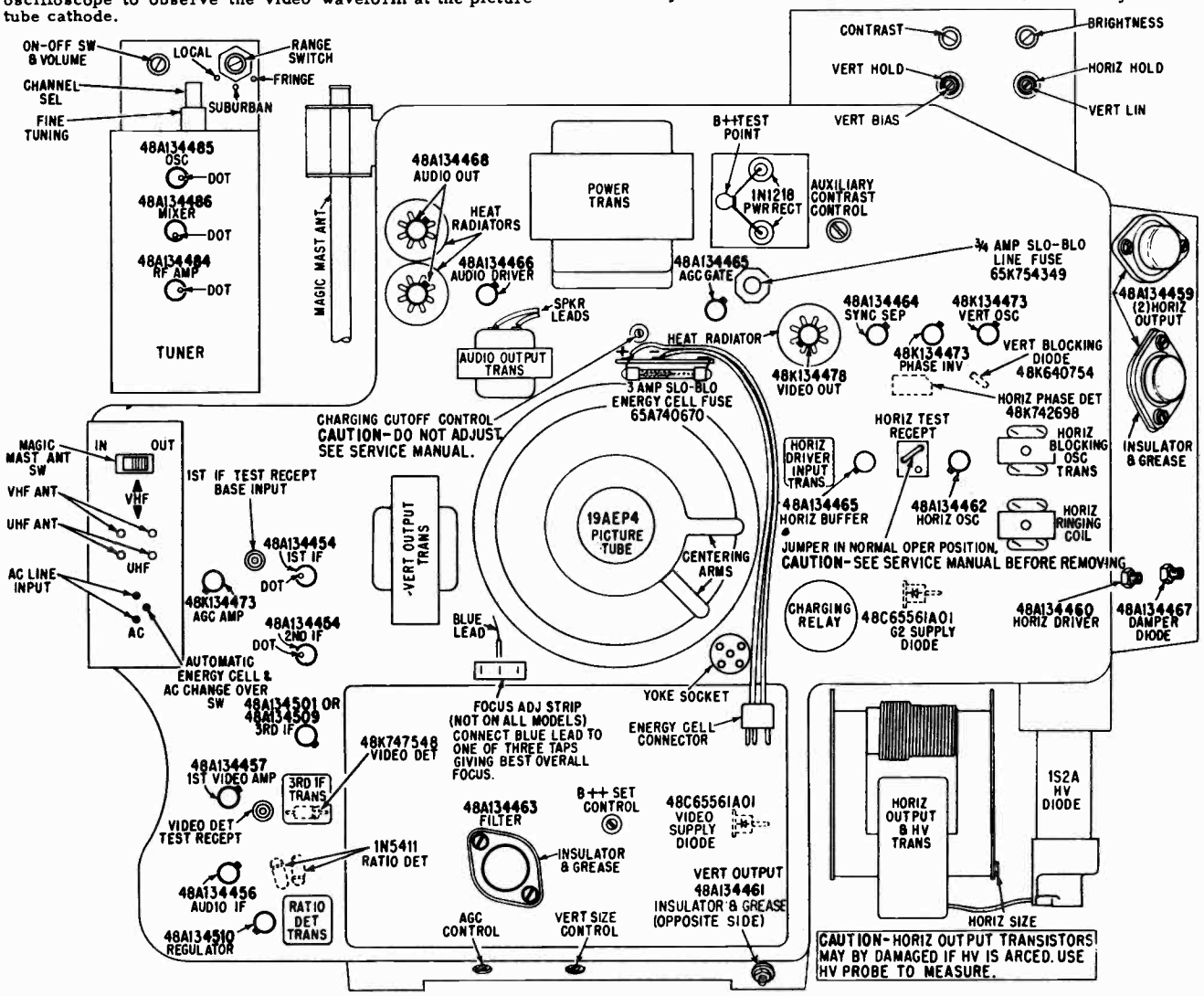


FIGURE 15. TRANSISTOR TUBE, DIODE AND CONTROL LOCATIONS

MOTOROLA Chassis TS-432 Service Information, Continued

CHARGING CUTOFF CONTROL ADJUSTMENT

The Charging Cutoff Control controls the amount of charge available for the Energy Cell. The open circuit full charge voltage of the Energy Cell is 22.1 to 22.6 volts. The control must be adjusted when the charging relay is replaced or when Energy Cell voltage checks indicate an under charge.

To adjust the Charging Cutoff Control, substitute an accurate, well regulated, 26 volt supply in place of the Energy Cell. The supply must have a current meter, or an external current meter must be used in series with one of the supply leads. Use the terminal strip that mounts the energy cell fuse for supply connections. Close the charging circuit by inserting a dummy AC line cord into the AC line input terminals. Turn the Charging Cutoff Control to the extreme clockwise position as viewed from rear of receiver (maximum resistance). Then very slowly, turn the control counterclockwise until the current meter indicator drops to zero (relay open). The relay has a 10 second delay which must be observed when making this adjustment. This is the reason for adjusting the control slowly.

NOTE: Allow about 10 seconds for relay to catch up between each slight turn.

To check for proper adjustment, decrease supply voltage to 20V, then increase slowly while watching the current meter. If the current drops to zero at 26 volts the control is adjusted properly. Re-adjust if not correct. Again observe the delay action of the relay as described above.

To check the operation of the Charging Relay, completely charge the Energy Cell. Then operate the receiver for approximately one minute from the cell. Connect a voltmeter with the accuracy of ±.4 volts at 26 volts across the cell. Use the terminal strip that mounts the energy cell fuse for voltmeter connections. Place the receiver on charge. The voltage should rise when the receiver is charging to exactly 26 volts DC, then drop (the relay opens) to the full charge open circuit voltage of the Energy Cell (22.1 to 22.6 volts). If the cutoff voltage was above or below 26 volts the Charging Cutoff Control must be adjusted.

TRANSISTOR CHASSIS SERVICE INSTRUCTIONS

SERVICING SET-UPS

For control adjustments, transistor and fuse replacement and other field service work, the chassis may be set up as shown in Figure 16, with the back cover removed. Refer to Figure 15 for transistor, tube, diode and control locations.

For voltage measurements, waveform measurements, resistance measurements, chassis alignment and other bench servicing, the chassis may be set up as shown in Figure 17. In this set-up, the chassis is removed from the picture tube assembly (see Receiver Disassembly and Service Instructions), turned around, positioned as shown and mounted to the picture tube assembly with two (2) 9-inch ground straps (Motorola Part No. 42K485718). Use screws from chassis disassembly to secure straps. Also, a 2nd anode extension lead must be used, and the yoke plug and picture tube socket must be connected when complete operation of the receiver is desired. Refer to Figures 24, 25 and 26 for voltage, waveform and resistance measurements and Figures 20, 21 and 22 for parts locations.

SERVICE EQUIPMENT REQUIRED

The equipment now being used to service tube type receivers (VTVM, oscilloscope, signal generator and sweep generator) are equally suitable for servicing this receiver.

To facilitate testing transistors, a Motorola transistor tester (Motorola Part No. 67P65108A07) has been devised. This tester rapidly tests all transistors used in this receiver for shorted, open or high leakage current defects. It does not indicate transistor parameters.

SERVICING PROCEDURE

Basically the same methods employed in trouble shooting tube type receivers apply to servicing transistor TV receivers. The methods vary according to the section of the receiver which may be suspected. In the RF and IF stages some method of signal injection or tracing has been found most effective while in the sync circuits, observing the waveforms with an oscilloscope is more suitable.

Some transistor circuits are sensitive to the addition of body capacity such as touching parts of the circuit. Momentary grounding of circuit elements or drawing an arc from a high voltage point may damage a transistor. In order to eliminate possible damage to transistors it is best to form habits which will eliminate these effects from servicing procedures. Make sure that oscilloscopes and signal injection or tracing devices include suitable isolation in series with the probe. Devices which have input impedance in the meg-ohms or employ series capacitors may be considered safe.

When signal injection is used (in the RF, IF, and Video circuits) the signal is usually injected at the base of the transistor. In signal tracing the signal is taken off at the collector of the transistor. When a defective stage is found, measurement of the emitter base and collector voltage will be quite usefull. If the voltages are correct it is usually a good indication that the transistor and the bias networks are not faulty. This would indicate a problem in the signal circuits such as an open coupling capacitor or a defective interstage transformer. If the voltages are not correct, the transistor may be checked. If it is found to be alright the fault is usually in the bias network. This could be a shorted bypass, a faulty resistor or a circuit problem such as open or shorted connection.

In tracing sync problems it is best to make a waveform analysis. Checks are made at the base, collector and emitter as outlined in this manual. When a defective stage is found the transistors may be removed for testing. Since most sync stages involve few circuit components, a circuit check will usually reveal the defect if the transistor is not at fault.

See Service Aid Chart for more servicing information.

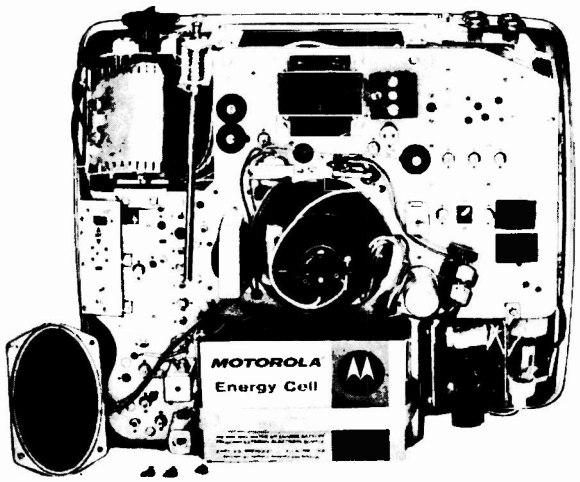


FIGURE 16. CHASSIS EXPOSED FOR FIELD SERVICE

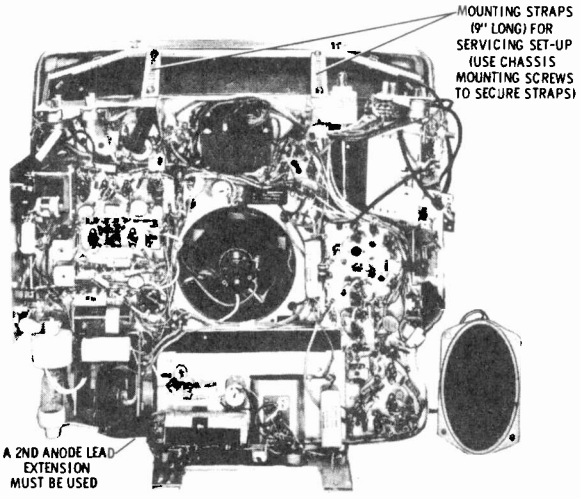


FIGURE 17. CHASSIS SET-UP FOR SHOP SERVICE

MOTOROLA
Chassis TS-432
(Continued)

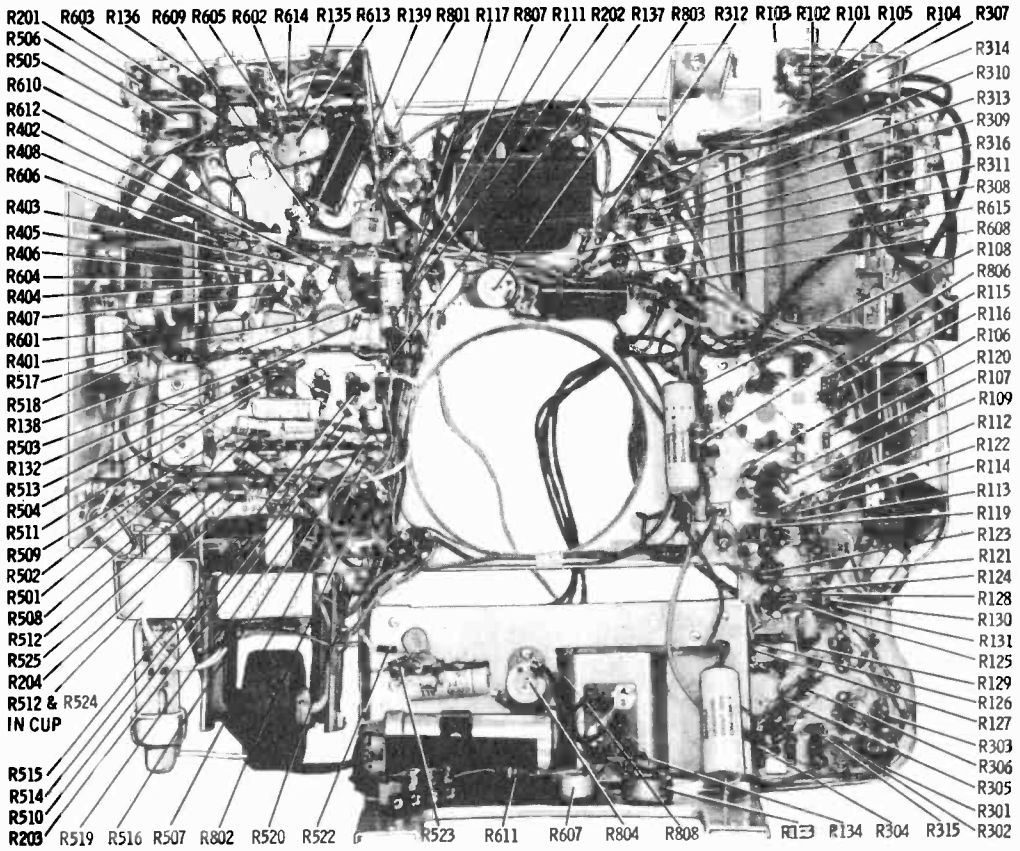


FIGURE 20. CHASSIS TS-432C-00 RESISTOR LOCATIONS (BOT)

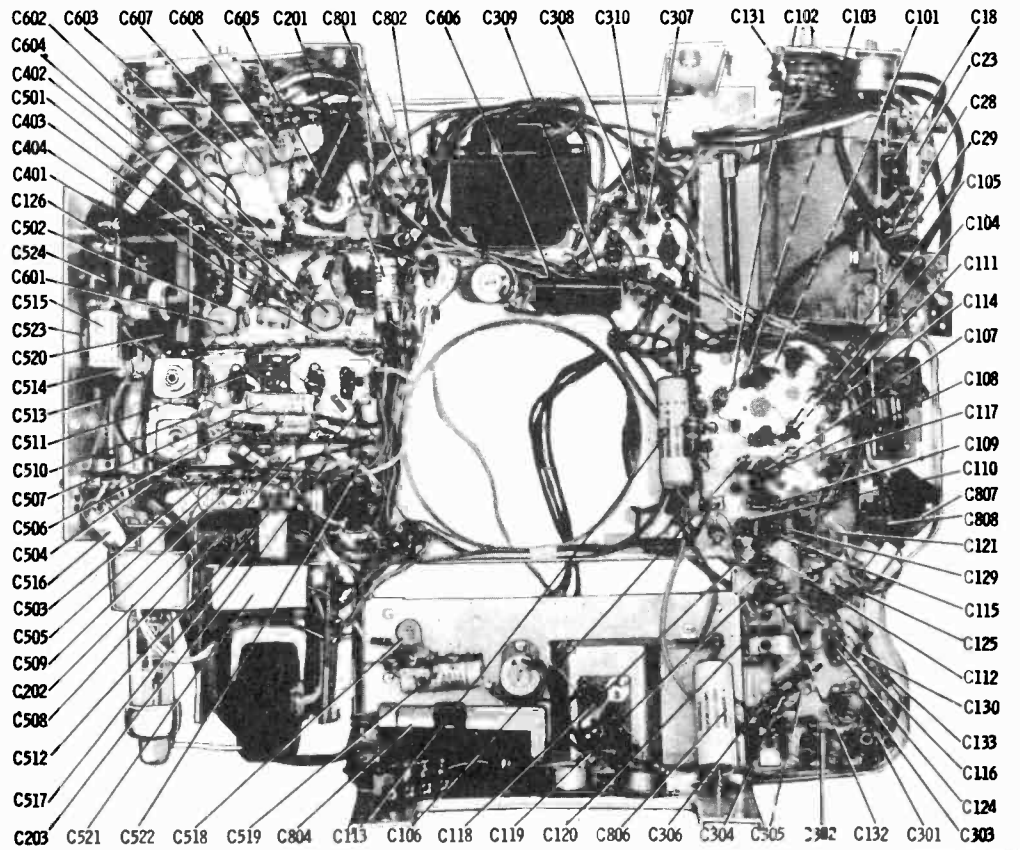
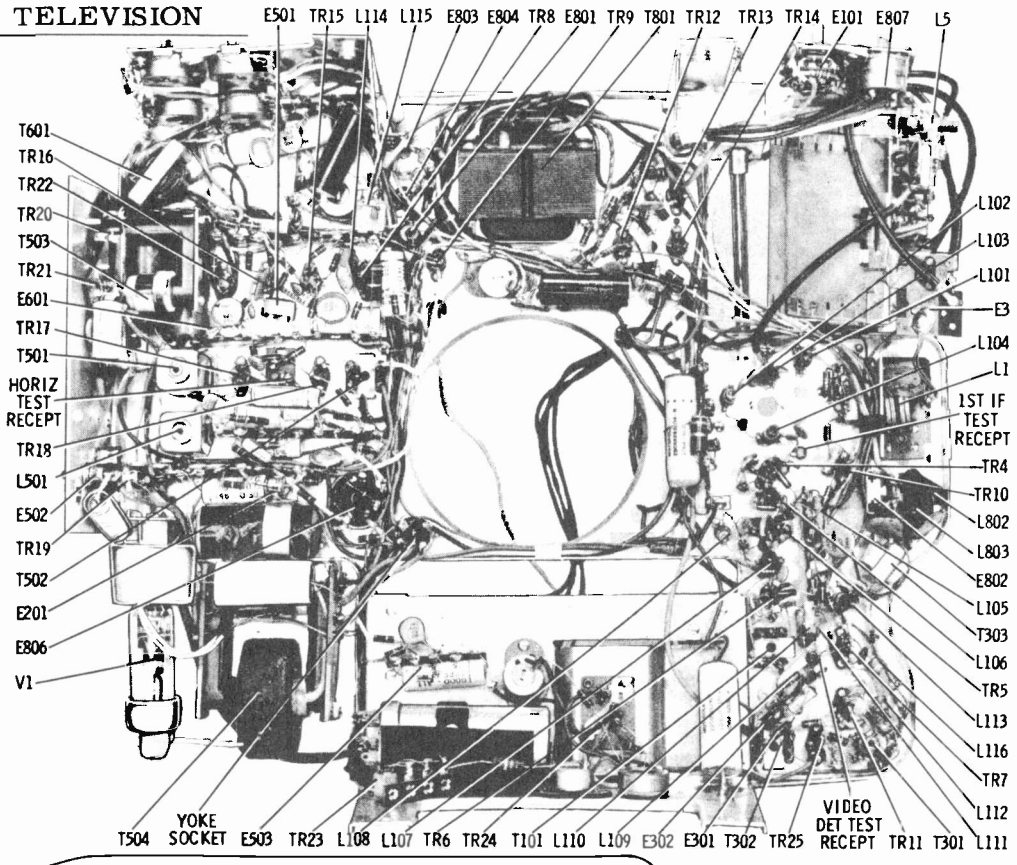


FIGURE 21. CHASSIS TS-432C-00 CAPACITOR LOCATIONS (BOT)

MOTOROLA
Chassis TS-432
(Continued)

FIGURE 22. CHASSIS TS-432C-00 MISCELLANEOUS PARTS LOCATION (BOT)



RESISTANCE MEASUREMENTS

1. Completely remove all power to the receiver by removing the power cord and disconnecting the energy cell plug.
2. Transistors must be removed from circuit. All readings taken with transistors removed from their associated circuits.
3. Readings above the divider bar show resistance to ground: Readings below the divider bar indicate resistance to B++.
4. In circuits containing controls, the readings above and below the divider bar taken with controls in normal operating positions.
5. * - Reading taken with horizontal test jumper removed.
6. Range switch set to 'Fringe' position.
7. Crt and yoke plugs connected to chassis.
8. Meter polarity: Ground lead of meter connected to either ground or B++.

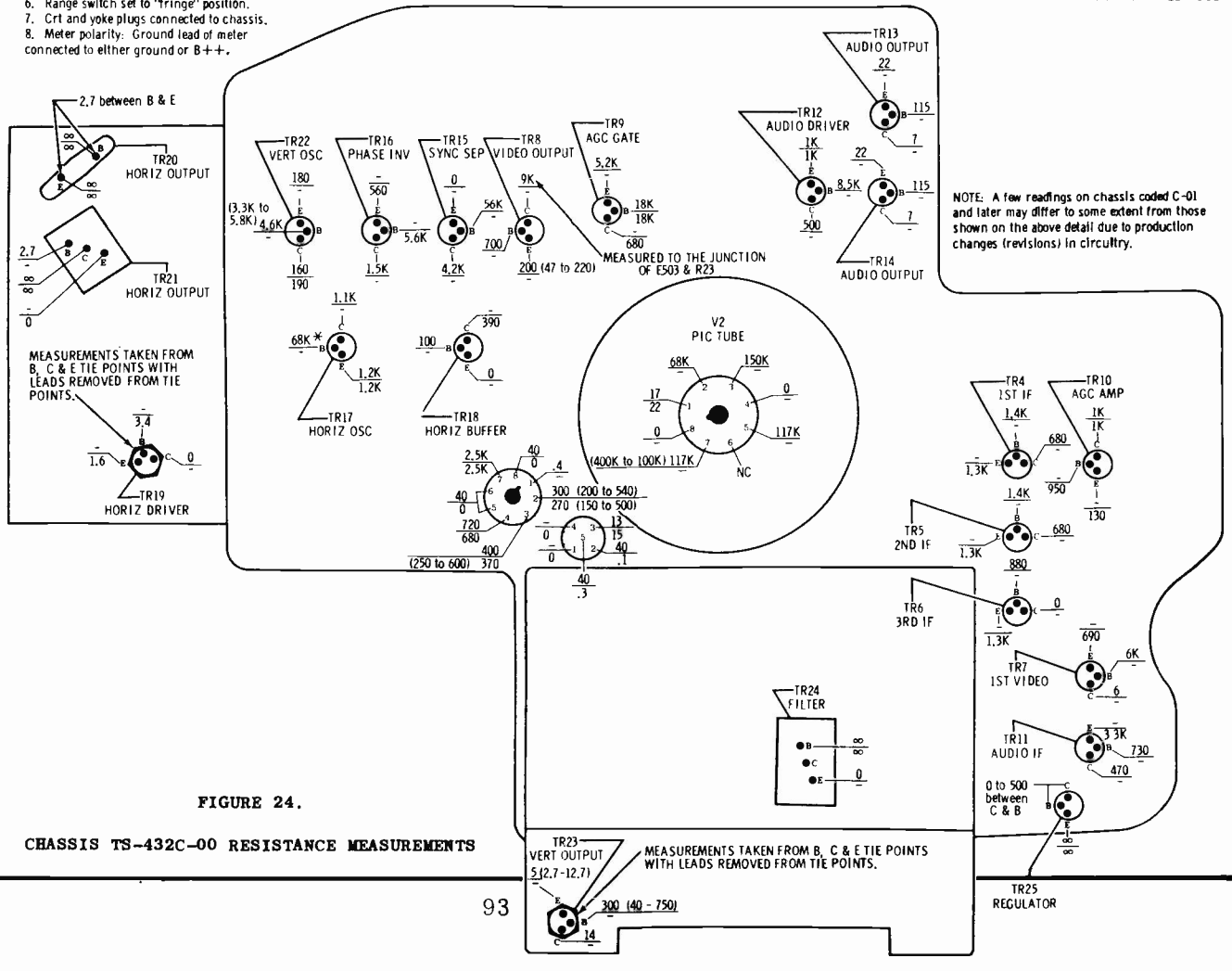


FIGURE 24.

CHASSIS TS-432C-00 RESISTANCE MEASUREMENTS

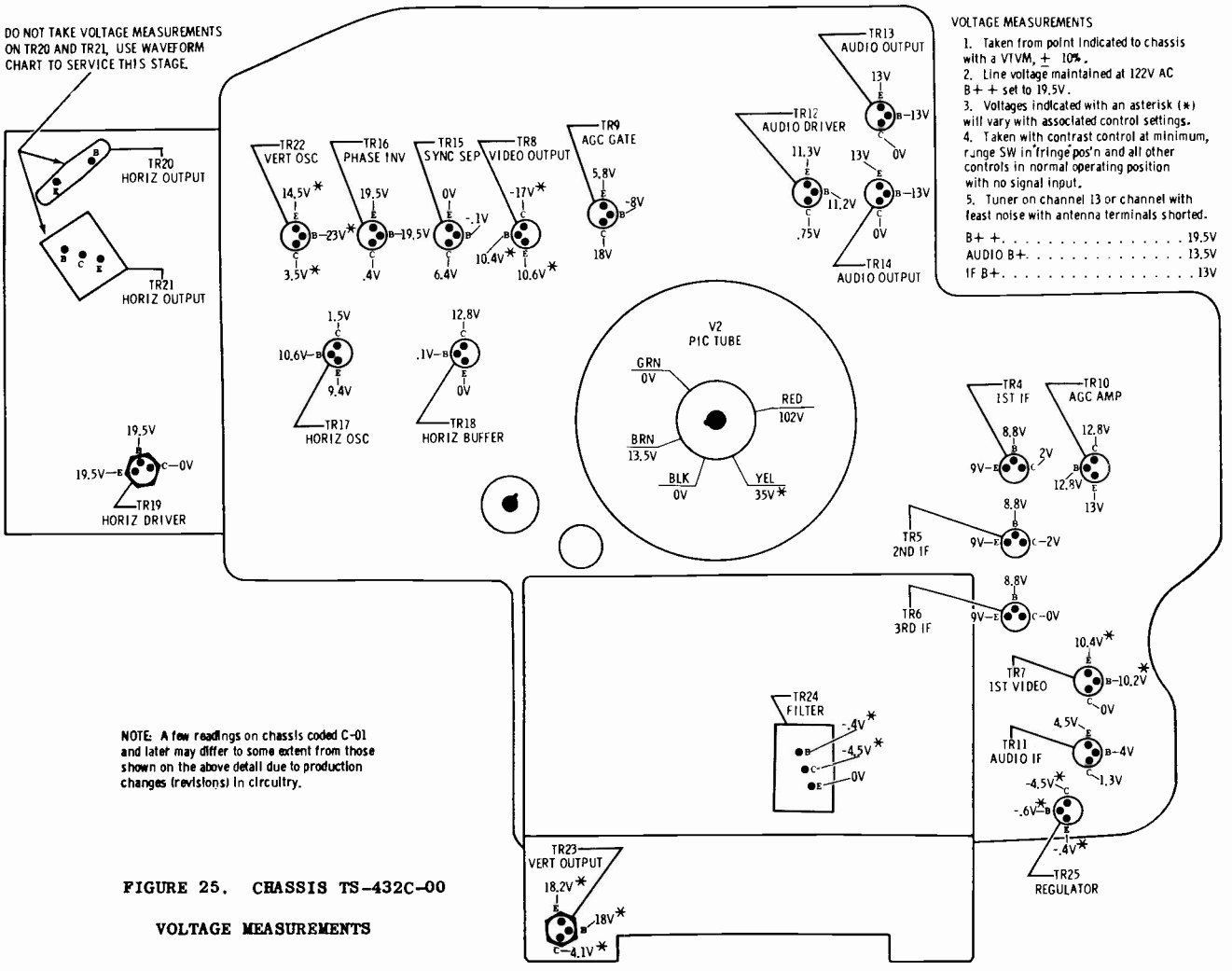


FIGURE 25. CHASSIS TS-432C-00

VOLTAGE MEASUREMENTS

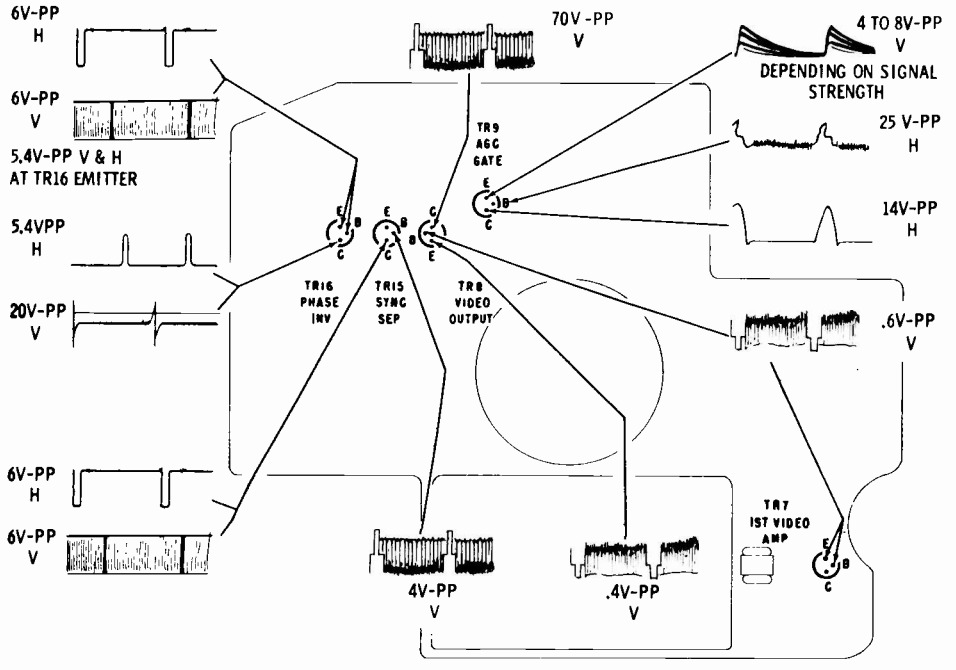


FIGURE 26A. CHASSIS TS-432C-00 VIDEO, SYNC AND AGC WAVEFORM MEASUREMENTS

MOTOROLA Chassis TS-432 Service Information, Continued

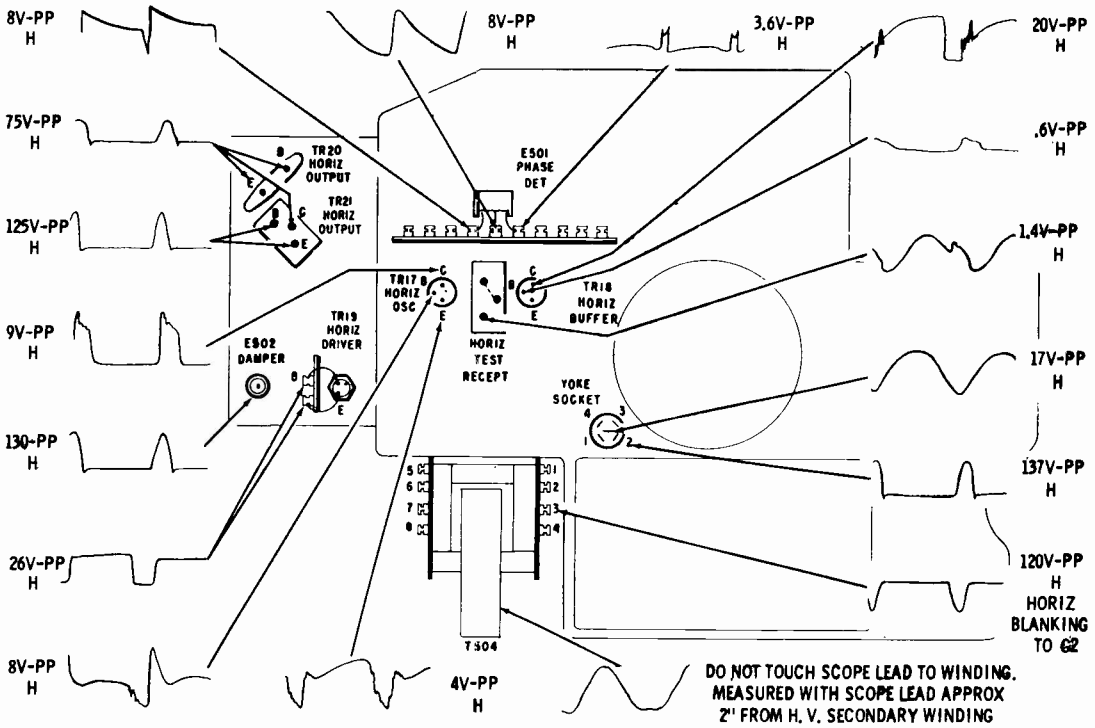
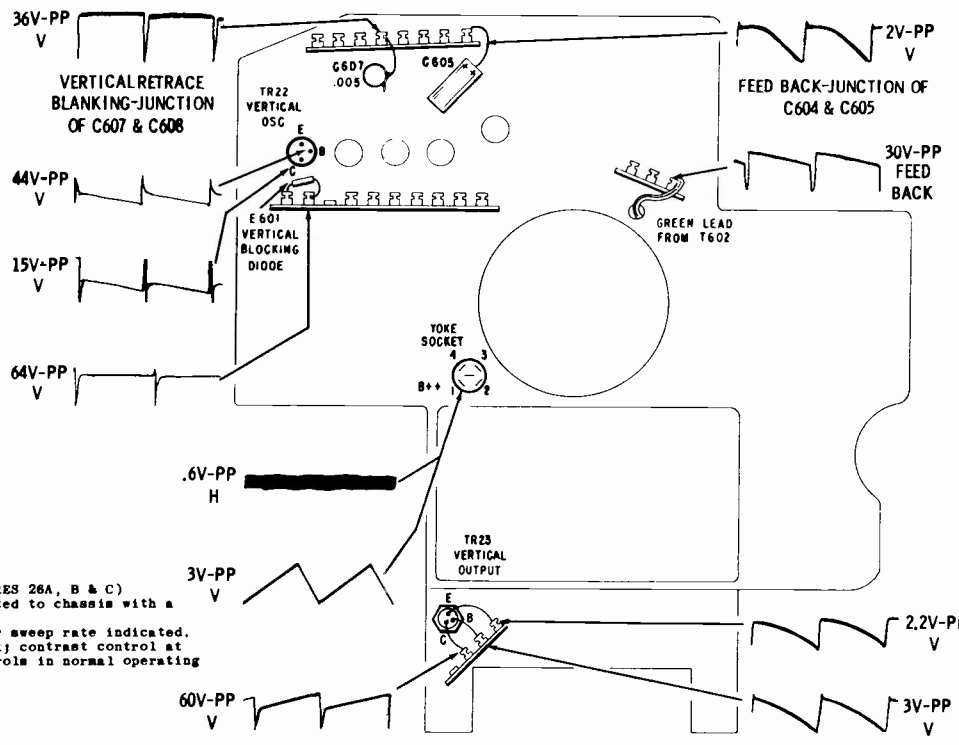


FIGURE 26B. CHASSIS TS-432C-00 HORIZONTAL SWEEP WAVEFORM MEASUREMENTS



WAVEFORM MEASUREMENTS (FIGURES 26A, B & C)
1. Taken from point indicated to chassis with a wideband oscilloscope.
2. Oscilloscope synced near sweep rate indicated.
3. Taken with strong signal; contrast control at maximum; all other controls in normal operating position.

FIGURE 26C. CHASSIS TS-432C-00 VERTICAL SWEEP WAVEFORM MEASUREMENTS

MOTOROLA Chassis TS-432 Service Information and Alignment, Continued

SAFETY CHECKS

Before returning a serviced receiver (of any type) to the owner, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock.

In reference to Figure 23, a 1000 ohm per volt AC voltmeter is prepared by shunting it with a 1500 ohm, 10W resistor. The safety test is made by contacting one meter probe to any portion of the receiver exposed to the consumer or operator such as the cabinet trim, hardware, controls, knobs, etc., while the other probe is held in contact with a good "earth" ground such as a cold water pipe.

The AC voltage indicated by the meter may not exceed 7-1/2 volts. A reading exceeding 7-1/2 volts indicates that a potentially dangerous leakage path exists between the exposed portion of the receiver and "earth" ground. Such a receiver represents a potentially serious shock hazard to the operator.

The above test should be repeated with the receiver power plug reversed in its connection to the mains.

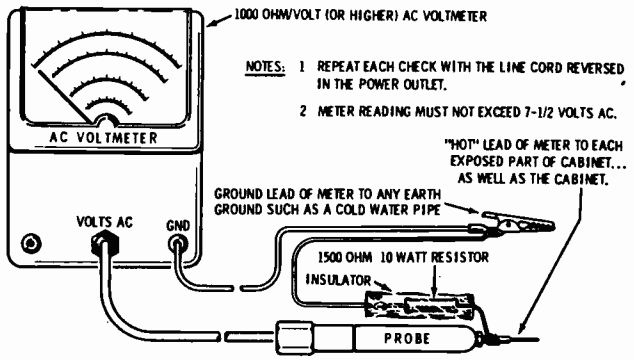


FIGURE 23. VOLTMETER HOOK-UP

CHASSIS ALIGNMENT

Pre-Alignment Instructions

Before aligning the video IF and audio systems, 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 transistor substitution (make sure transistors are inserted in their sockets properly), voltage and resistance measurements as described in the Chassis Service Instructions section, routine checks for bad soldering connections, and visual inspection of the circuits for overheated components as well as for obvious wiring defects.

In most cases it may be desireable to observe the overall response curve before completely aligning the receiver. To observe the curve, perform Pre-Alignment Steps 1, 2, 3, 4, 6. 7 and 9. Then, refer to Mixer Alignment Detail (Figure 29) and Mixer Alignment Procedure (Step 5) for generator and scope hook-up, and curve information.

VIDEO IF, TRAP AND MIXER ALIGNMENT

Pre-Alignment Steps

1. Remove the deflection yoke plug to eliminate RF interference radiation.
2. Connect a 17 ohm 20 watt voltage normalizing resistor from the B++ buss (pin 4 on yoke socket) to ground. See Video IF, Trap and Mixer Alignment Details.
3. Remove the Video Output Transistor (TR8) from its socket.
4. Remove the AGC Gate Transistor (TR9) from its socket.
5. Short the mixer secondary coil (L103) to ground. Detune the mixer secondary coil (L103), 47.25 Mc trap coils (L102 and L104), and the IF interstage coils (L106 and L107) by setting the cores as far away from the chassis as possible. Detune the 41.25 Mc trap (L108) by centering the core in the coil.
6. Set the range switch to the fringe position (extreme counterclockwise).
7. Set channel selector on channel #13 and fine tuning to mechanical mid-point.
8. Set bandwidth trimmer (C23 on tuner) set screw to the extreme counterclockwise position (minimum capacity).
9. Turn set on. IF B+ buss voltage should be between 12.4 and 13.6 volts. See Installation & Service Adjustments section if voltage is not within this range.
10. Refer to Video IF, Trap and Mixer Alignment Details (Figs. 27, 28 and 29) for component and test point locations, and Coil Core Positions Detail (Fig. 30) for core locations in relation to chassis.

CAUTION: Sweep generator output cable must be properly terminated.

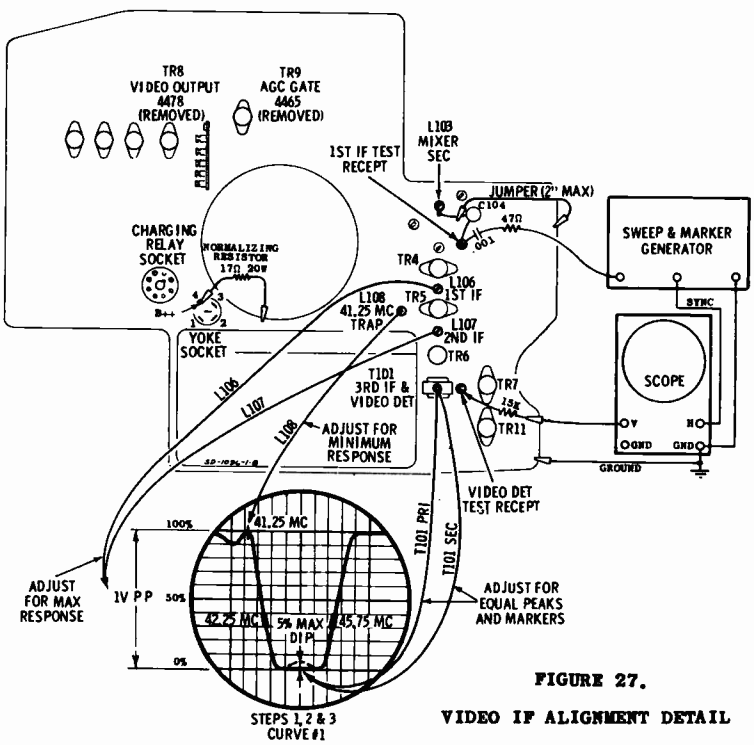


FIGURE 27. VIDEO IF ALIGNMENT DETAIL

VIDEO IF, TRAP AND MIXER ALIGNMENT PROCEDURE

VIDEO IF ALIGNMENT (Refer to Figure 27)

Step	Sweep Generator and Marker	Indicator	Adjust	Adjust for and/or Remarks
1.	To 1st IF Test Recept thru a .001 mf capacitor and a 47 ohm resistor. Set sweep to approx 44 Mc, and for output of 1V-PP on scope. Set markers as required.	Scope thru a 15K ohm resistor to Video Det Test Recept.	Primary & secondary cores of 3rd IF trans (T101).	Equal peaks and markers as shown on curve #1. NOTE: Core at crystal end (secondary) can be reached by inserting tool thru unobstructed core. Tune both cores near the ends of their respective coils. See Fig 30 for core positions.

MOTOROLA Chassis TS-432 Alignment Information, Continued

VIDEO IF ALIGNMENT (Contd)

Step	Sweep Generator and Marker	Indicator	Adjust	Adjust for and/or Remarks
2.	"	"	1st & 2nd IF coil (L106 and L107)	Maximum response of curve #1. NOTE: Should curve indicate a narrow bandwidth, adjust bandwidth control (located on side of 3rd IF trans, T101) for correct response as shown in curve #1. Tune both cores at end of coils towards chassis. If unequal markers appear, repeat step 1.
3.	Generator connection same as step 1. Set marker to 41.25 Mc.	"	41.25 Mc trap (L108)	Minimum response as shown on curve #1. Tune core at end of coil away from chassis. NOTE: A tilt will be noted when adjusting the 41.25 Mc trap.
4.	To mixer TP Ⓜ thru a .001 mf capacitor and a 47 ohm resistor. Set sweep to approx 44 Mc.	"		
	a. Set marker gen to 39.75 Mc.		a. 39.75 Mc traps (L5 and L101) (L5 located on tuner)	Minimum response (tune core at end of coil away from chassis). Adjust the 39.75 Mc trap (L101) located on chassis first.
	b. Set marker gen to 47.25 Mc.		b. 47.25 Mc traps (L104 and L102)	Minimum response (tune core at end of coil away from chassis). Adjust L104 first (toward chassis) for a minimum dip, then adjust L102 (toward chassis). A dip will appear at a frequency higher than 47.25 Mc. Tune thru first dip to a second dip which is at a lower frequency than 47.25 Mc. Then back-off both coils alternately (away from chassis) until the 47.25 Mc marker is in the second dip. NOTE: Check proper adjustment of the 47.25 Mc traps by tuning the core of L104 slowly towards chassis until a pip appears near the 45.75 Mc marker on the skirt of the curve. If the pip does not appear, turn cores out and repeat 47.25 Mc trap alignment. See curve #2 for above responses.
	NOTE: Remove the mixer secondary short and short the antenna input terminal to ground. If markers are not visable in dips, use external marker gen and with an insulated lead, couple loosely to 1st IF coil (L106).			

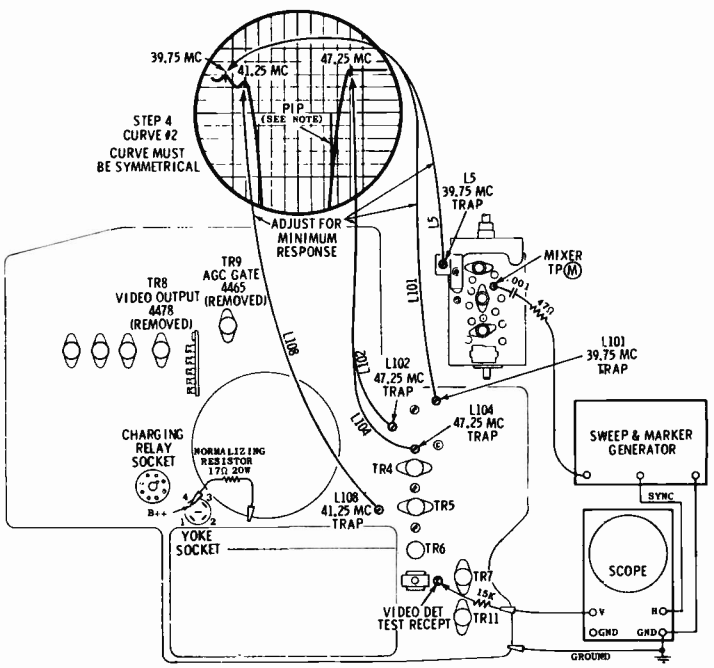


FIGURE 28. TRAP ALIGNMENT DETAIL

REMOVING TUNER FROM CHASSIS

Unsolder all connections to tuner. Remove all five (5) screws shown in Figure 34. Remove the rear tuner mounting bracket by removing the two (2) mounting screws.

NOTE: C5, C18, C23, C28, C29 and L5 are not furnished with a replacement tuner.

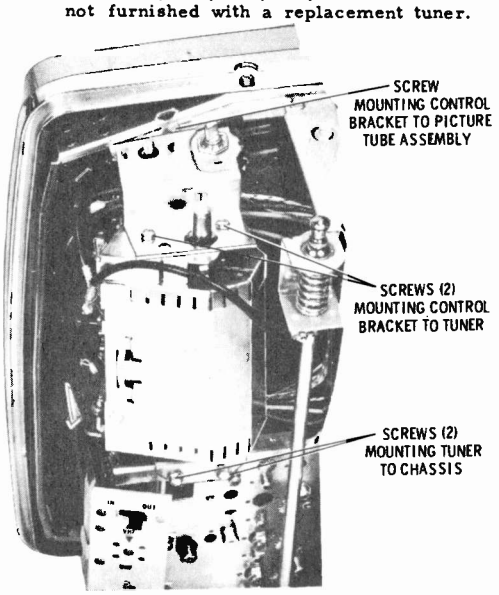


FIGURE 34. TUNER REMOVAL

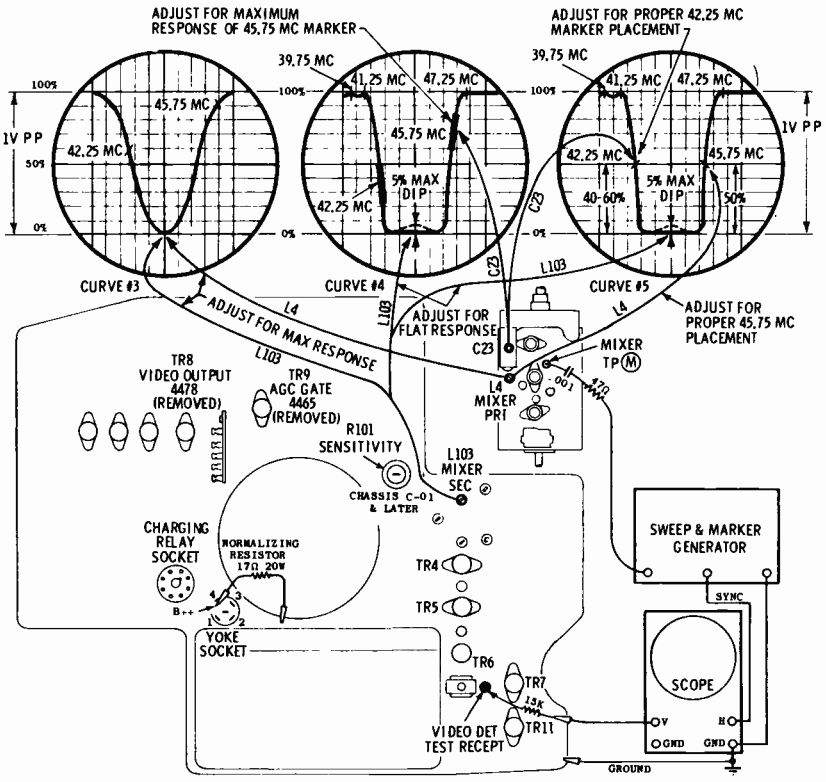


FIGURE 29. MIXER ALIGNMENT DETAIL

MOTOROLA
Chassis TS-432
(Continued)

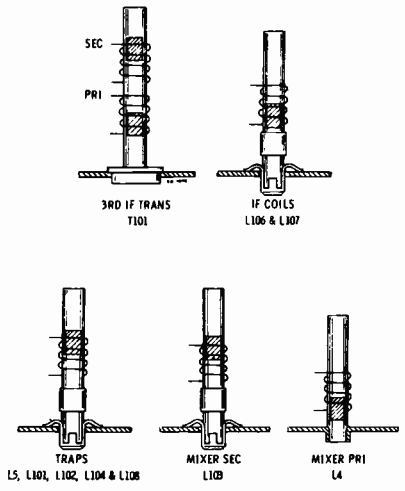


FIGURE 30. COIL CORE POSITIONS

MIXER ALIGNMENT (Refer to Figure 29)

Step	Sweep Generator and Marker	Indicator	Adjust	Adjust for and/or Remarks
5.	*Gen connection same as step 4. Set markers as required. NOTE: Set Range Switch to suburban position (center position). Adjust the Sensitivity Control (R101) for 1/10 of response (.1V-PP), then increase gen gain for 1V-PP on scope.	"	a. Mixer primary coil (L4) on tuner.	Maximum response of curve #3 Tune core at end of coil towards tuner chassis. Use setting when core is furthest from tuner chassis.
			b. Mixer secondary coil (L103)	Maximum response of curve #3. Tune core towards chassis. See Fig. 30 for core position.
			c. Bandwidth trimmer (C23) on tuner.	Proper response, curve #4. Tune the mixer secondary coil (L103) to maintain a flat response as shown in curve #4.
6.	"	"	Mixer primary coil (L4) on tuner.	Proper 45.75 Mc marker placement. See curve #5.
7.	"	"	a. Bandwidth trimmer (C23) on tuner.	Proper 42.25 Mc marker placement.
			b. Mixer secondary coil (L103)	Flat response. See curve #5 for proper response
8.	"	"	Mixer primary coil (L4) on tuner.	Proper 45.75 Mc marker placement. See curve #5.
Repeat steps 6, 7, and 8 until proper response (curve #5) is attained.				
9.	Gen connection same as step 4. Set marker gen to 47.25 Mc. NOTE: Set range Switch to the fringe position.	"	47.25 Mc traps (L102 and L104)	Minimum response (see step 4 for remarks). NOTE: Whenever the mixer secondary coil (L103) is adjusted the 47.25 Mc traps must be readjusted. When the adjustments of the 47.25 Mc traps are accomplished, the mixer secondary coil should be rechecked. If no adjustment is necessary on the mixer secondary coil, the 47.25 Mc traps need not be retouched.

*Chassis coded C-00 does not have the Sensitivity Control. Insert a 2500 ohm bias potentiometer in series with the AGC Amp (TR10) collector lead and adjust the same as the Sensitivity Control. Do not set Range Switch to the suburban position.

MOTOROLA Chassis TS-432 Alignment Information, Continued

AUDIO ALIGNMENT

Pre-Alignment Steps

1. Remove the Video Output Transistor (TR8) from its socket.
2. Remove the Video Detector Diode (E102) from the 3rd IF transformer (T101).
3. Remove the deflection yoke plug to eliminate RF interference radiation.
4. Connect a 17 ohm 20 watt voltage normalizing resistor from the B++ buss (pin 4 on yoke socket) to ground (see Audio Alignment Detail).
5. Connect a 5% 62K and a 5% 33K ohm resistor in series from point Ⓐ to ground (see Audio Alignment Detail).
6. Connect speaker leads.
7. Turn set on. Set volume control to minimum (counter-clockwise position).
8. Refer to Audio Alignment Detail (Fig. 31) for component and test point locations, and Coil Core Positions Detail (Fig. 32) for core locations in relation to chassis.
9. Signal generator should be crystal controlled at 4.5 Mc or calibrated against a 4.5 Mc signal. This is very important for proper audio alignment.

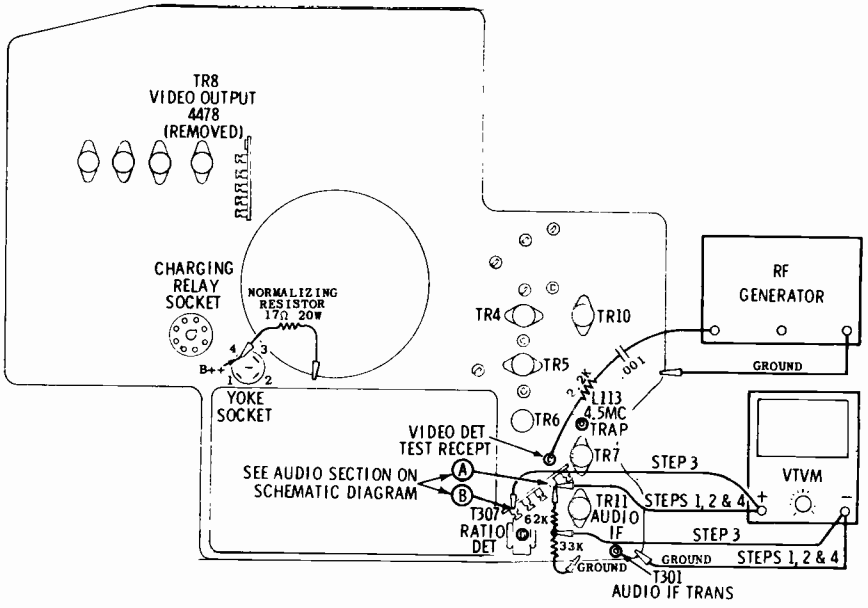


FIGURE 31. AUDIO ALIGNMENT DETAIL

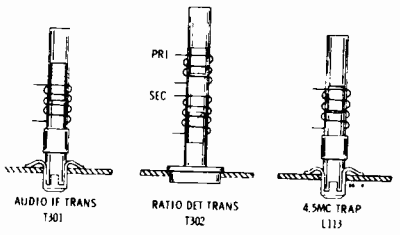
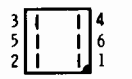


FIGURE 32. COIL CORE POSITIONS

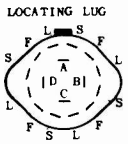
AUDIO ALIGNMENT PROCEDURE

Step	Generator	Indicator	Adjust	Adjust for and/or Remarks
1.	To Video Det Test Recept thru a .001 mf capacitor and 2.2K ohm resistor. Set generator to 4.5 Mc (crystal controlled).	VTVM between point Ⓐ and chassis ground.	Audio IF trans (T301)	Maximum deflection.
2.	Same as step 1 except set output for .3 to .4 volts DC indication on VTVM to prevent overloading.	"	Ratio Det trans (T302) primary. (Core furthest from chassis.)	Maximum deflection. NOTE: Core can be reached by inserting tool through unobstructed core.
Repeat steps 1 and 2				
3.	"	VTVM, positive lead to point Ⓑ (lead from top of volume control), negative lead to junction of the 33K & 62K ohm resistors (see Fig. 5).	Ratio Det trans (T302) secondary. (Core closest to chassis.)	Zero voltage reading. NOTE: Adjustment is correct when a negative and positive swing around zero reference is noted.
Repeat steps 1, 2, and 3				
4.	"	VTVM, between point Ⓐ and chassis ground.	4.5 Mc trap (L113)	Maximum deflection.

MOTOROLA **CHASSIS TS-432C-00 THRU C-07**



T101, T302, L501, T501&T502
BOT VIEW



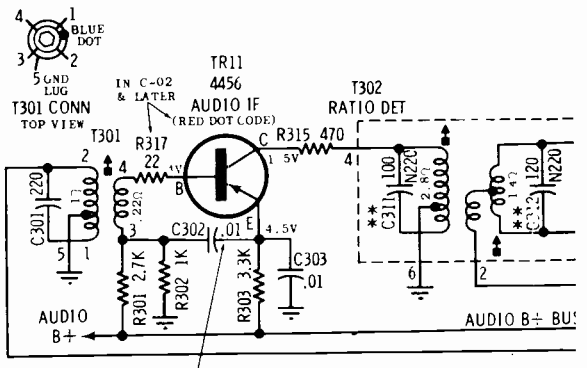
NOTES:

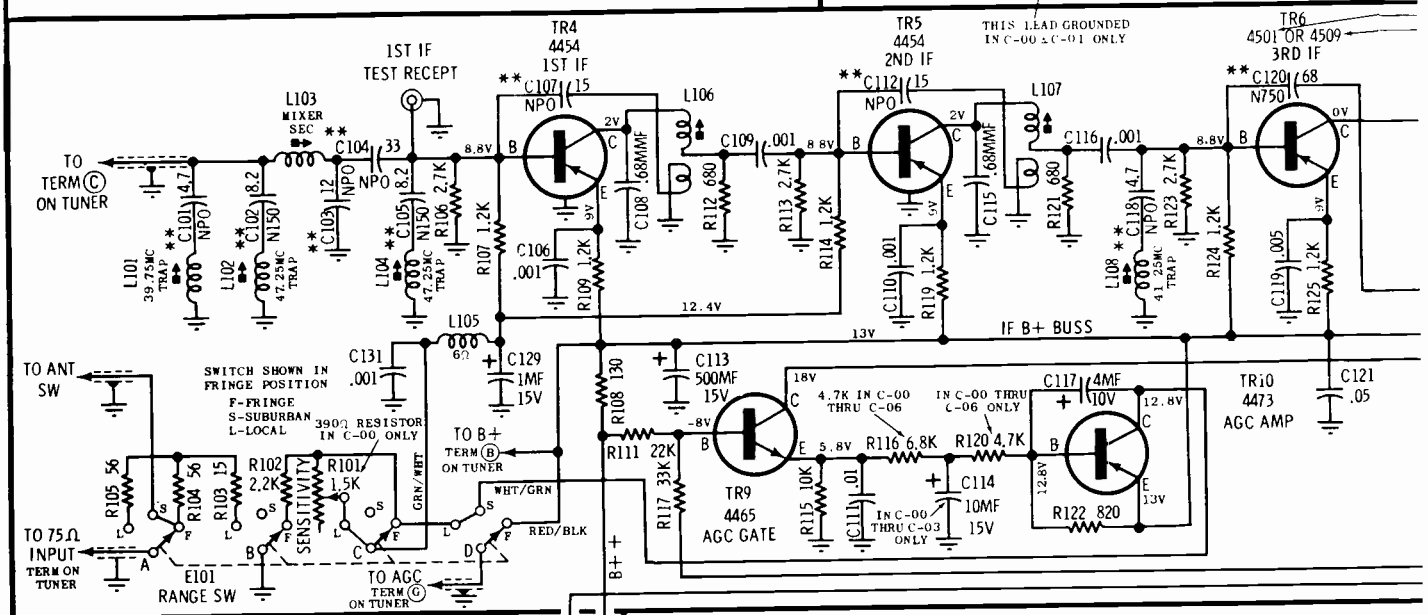
VOLTAGE MEASUREMENTS

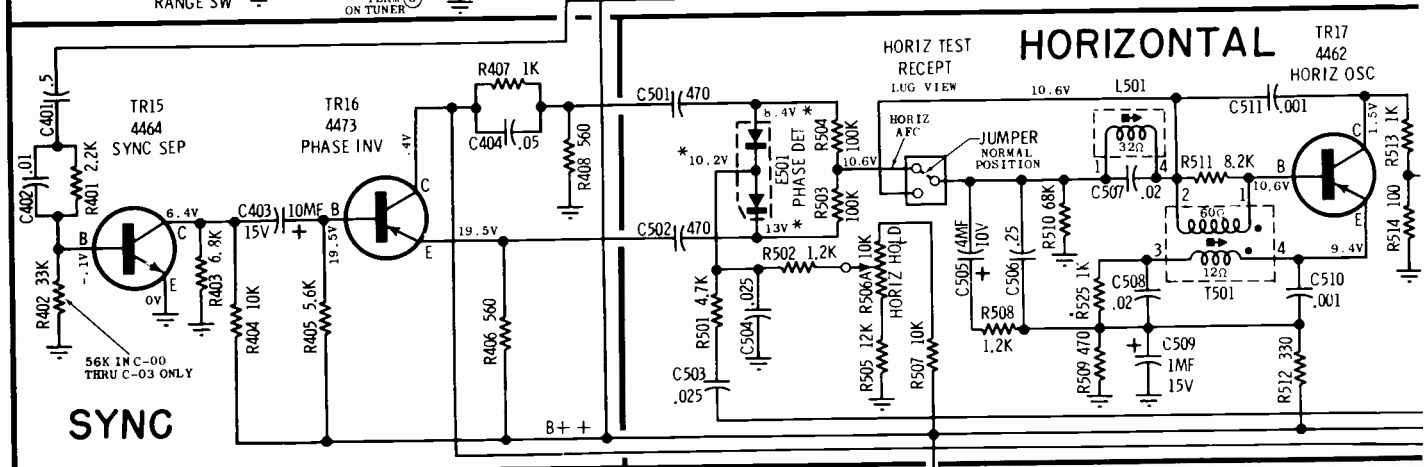
1. Taken from point indicated to chassis with a VTVM. ± 10%.
2. Line voltage maintained at 122V AC. B++ Set to 19.5V.
3. Voltages indicated by an asterisk will vary with associated control settings.
4. Taken with contrast control at minimum, range switch in fringe position, and all other controls in normal operating position with no signal input.
5. Tuner on Channel 13 or channel of least noise with antenna terminals shorted.

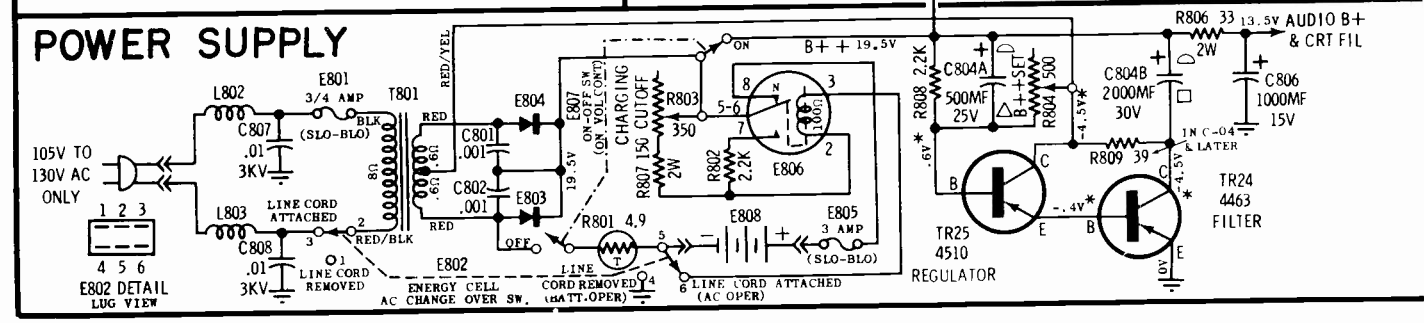
CAPACITORS - Unless otherwise specified, values less than one in MF; all others in MMF.

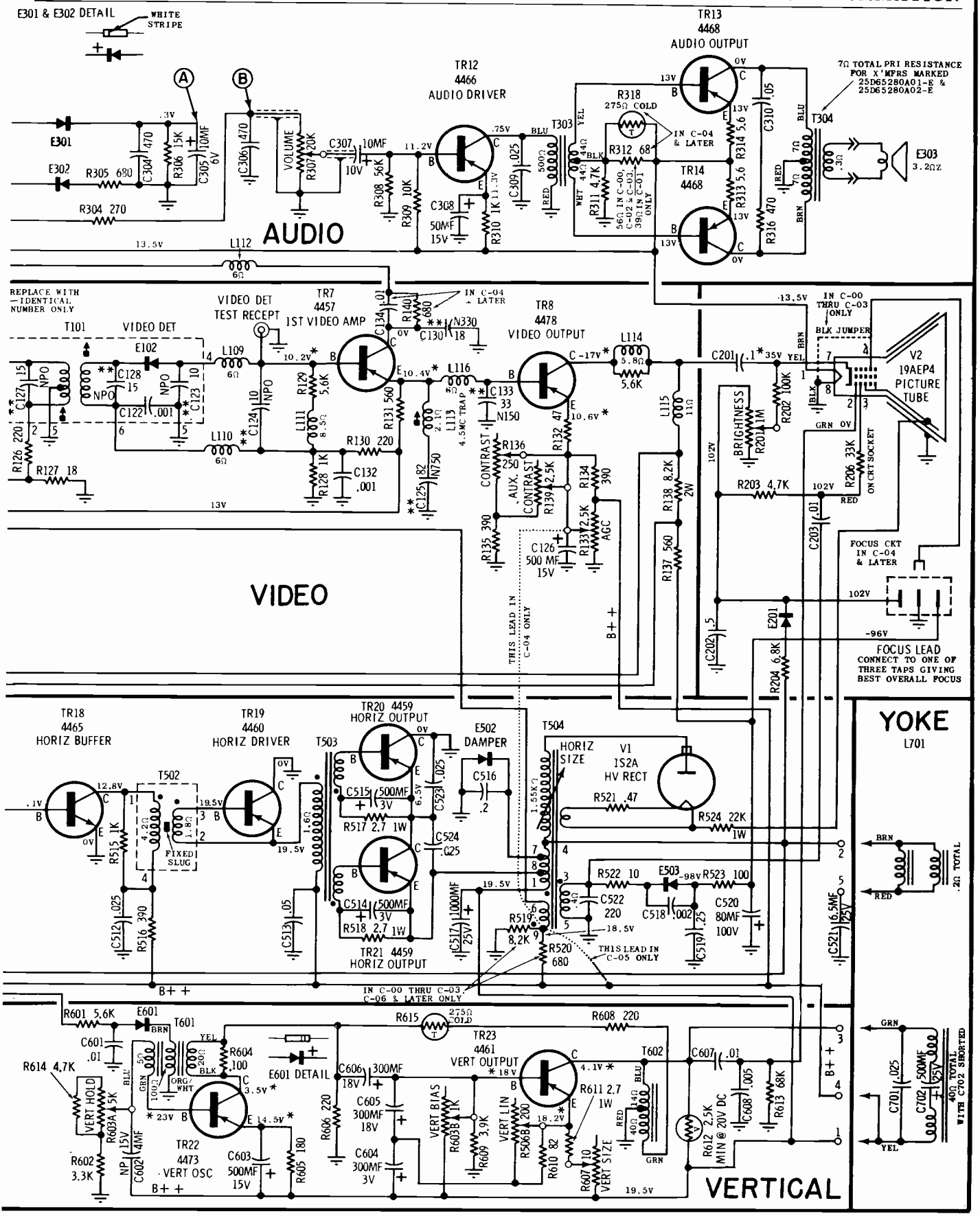
** Indicates special capacitor.










E301 & E302 DETAIL
WHITE STRIPE
AUDIO
TR12 4466 AUDIO DRIVER
TR13 4468 AUDIO OUTPUT
TR14 4468
7Ω TOTAL PRI RESISTANCE FOR X'MFRS MARKED 25D65280A01-E & 25D65280A02-E
E303 3.2ΩZ
VIDEO
TR7 4457 1ST VIDEO AMP
TR8 4478 VIDEO OUTPUT
VIDEO DET TEST RECEPT
REPLACE WITH IDENTICAL NUMBER ONLY
IN C-04 & LATER
IN C-00 THRU C-03 ONLY
BLK JUMPER
V2 19AEP4 PICTURE TUBE
BRIGHTNESS
CONTRAST
AUX. CONTRAST
FOCUS CKT IN C-04 & LATER
FOCUS LEAD
CONNECT TO ONE OF THREE TAPS GIVING BEST OVERALL FOCUS
THIS LEAD IN C-04 ONLY
YOKE
L701
TR18 4465 HORIZ BUFFER
TR19 4460 HORIZ DRIVER
TR20 4459 HORIZ OUTPUT
TR21 4459 HORIZ OUTPUT
E502 DAMPER
V1 1S2A HV RECT
HORIZ SIZE
FIXED SLUG
THIS LEAD IN C-05 ONLY
IN C-00 THRU C-03 C-06 & LATER ONLY
VERTICAL
TR22 4473 VERT OSC
TR23 4461 VERT OUTPUT
VERT HOLD
VERT SIZE
VERT BIAS
VERT LIN

MOTOROLA Chassis TS-432 Service Information, Continued

SERVICE AID CHART

SYMPTOMS	CONTROLS	CHECK OR ADJUST	TRANSISTORS	MICELLANEOUS CHECKS
DEAD SET AC OPERATION	On-off switch.	Is line cord attached? Is ac line voltage available at outlet?	TR19, TR20, TR21, TR13 and TR14	E801, AC primary fuse. If new fuse opens check C806. E803 and E804, rectifiers.
DEAD SET DC OPERATION (operates on ac)	On-off switch.	Is line cord removed from receiver interlock? Is Energy Cell charged? Is cell plug connected?		E808, Energy Cell E806, charging relay. E805, Cell fuse.
NO PICTURE, NO SOUND, RASTER NORMAL	AGC (R133). Channel selector on station.	Antenna connections. Antenna selector switch. Is station on air?	TR7, TR8, TR1, TR2, TR3, TR4, TR5 and TR6.	E102, video det. Check voltages and waveforms in video circuits. See Chassis Production Change C-04.
NO SOUND, RASTER AND PICTURE NORMAL (also weak sound)	Fine tuning. Volume.	Are speaker leads connected? Has speaker been damaged?	TR11 and TR12.	Output and driver transformers. E301 and E302 detector diodes. Voltages in audio circuits.
NO PICTURE, RASTER AND SOUND NORMAL	Fine tuning.		TR8 and TR7.	E503, video supply diode Check voltages in video amp and video supply circuits.
WEAK PICTURE (insufficient contrast)	AGC (R133). Contrast. Channel selector on correct channel. Range Switch.	Antenna connections. Antenna selector switch.	TR8, TR10 and TR9.	Check voltages and waveforms in AGC and video output stages.
LOW BRIGHTNESS OR NO BRIGHTNESS	Brightness		TR13, TR14, V1 and V2.	Check C806, audio B+ filter and E201, G_2 supply diode. Check voltages at picture tube.
NO VERTICAL SWEEP (thin horizontal line)			TR22	Check all electrolytics in the vertical circuits. Check voltages and waveforms in vertical oscillator stage.
HORIZONTAL INSTABILITY (critical hold)	Horizontal hold AGC (R133)	Perform horizontal oscillator adjustment.	TR17	E501, horizontal phase detector. Arcing from T504 (HV trans.) will cause instability. Check voltages and waveforms in horizontal oscillator circuits.
LOSS OF VERTICAL AND HORIZONTAL SYNC	Vertical hold. Horizontal hold.	Is incoming signal too weak (check ant.)?	TR15, TR16 and TR9.	Check voltages and waveforms in sync and AGC gate circuits.
INSUFFICIENT HORIZONTAL SIZE	Size. B++ set (R804).	Picture centering.		Check B++ voltage. C521
INSUFFICIENT RASTER SIZE (horizontally and vertically)	B++ set (R804).	Line voltage. Energy Cell.		Check B++ voltage.
EXCESSIVE CONTRAST OR NEGATIVE PICTURE	AGC (R133)		TR10 and TR9.	E102, video detector. Check voltages and waveforms in AGC circuits.
ENERGY CELL NOT CHARGING	Charging cutoff (R803). NOTE: Make checks in last column before adjusting this control.	Energy Cell. Is cell plug connected?		E805, cell fuse. E806, charging relay. R801.
AC OR HUM IN RASTER	B++ set, set to high.		TR25 and TR24.	E803 and E804, rectifiers.

MOTOROLA

CHASSIS TS-STS & WTS-435

The TS-435Y is identical to the TS -435 except for the tuner type. Chassis having the "Y" suffix contain a factory-installed "continuous tuning" UHF tuner. The WTS-435 chassis is identical to the TS-435 except for the tuner type. Chassis having a "WTS" prefix contain a factory-installed "remote control tuning system." For tuner types, refer to the Model Breakdown Chart.

MODEL BREAKDOWN CHART

Model	Chassis	VHF Tuner	UHF Tuner
CONSOLE MODELS			
19K11W	TS-435	TT-133	-
Y19K11W	TS-435Y	TT-133Y	VTT-600
19K11WA	TS-435	TT-133	-
Y19K11WA	TS-435Y	TT-133Y	VTT-600
19K12W	TS-435	TT-133	-
Y19K12W	TS-435Y	TT-133Y	VTT-600
19K12WA	TS-435	TT-133	-
Y19K12WA	TS-435Y	TT-133Y	VTT-600
19K12M	TS-435	TT-133	-
Y19K12M	TS-435Y	TT-133Y	VTT-600
19K12MA	TS-435	TT-133	-
Y19K12MA	TS-435Y	TT-133Y	VTT-600
19K13CW	TS-435	TT-133	-
Y19K13CW	TS-435Y	TT-133Y	VTT-600
19K13CWA	TS-435	TT-133	-
Y19K13CWA	TS-435Y	TT-133Y	VTT-600
19K14W	TS-435	TT-133	-
Y19K14W	TS-435Y	TT-133Y	VTT-600
19K14WA	TS-435	TT-133	-
Y19K14WA	TS-435Y	TT-133Y	VTT-600
19K14M	TS-435	TT-133	-
Y19K14M	TS-435Y	TT-133Y	VTT-600
19K14MA	TS-435	TT-133	-
Y19K14MA	TS-435Y	TT-133Y	VTT-600
19K15CW	TS-435	TT-133	-
Y19K15CW	TS-435Y	TT-133Y	VTT-600
19K15CWA	TS-435	TT-133	-
Y19K15CWA	TS-435Y	TT-133Y	VTT-600
PORTABLE MODELS			
19P3-1	STS-435	TT-133	-
Y19P3-1	STS-435Y	TT-133Y	VTT-600
19P3-2	STS-435	TT-133	-
Y19P3-2	STS-435Y	TT-133Y	VTT-600
19P10-1	TS-435	TT-133	-
Y19P10-1	TS-435Y	TT-133Y	VTT-600
19P10-2	TS-435	TT-133	-
Y19P10-2	TS-435Y	TT-133Y	VTT-600
TABLE MODELS			
19T1-3	TS-435	TT-133	-
Y19T1-3	TS-435Y	TT-133Y	VTT-600
19T1-4	TS-435	TT-133	-
Y19T1-4	TS-435Y	TT-133Y	VTT-600
19T1-5	TS-435	TT-133	-
Y19T1-5	TS-435Y	TT-133Y	VTT-600
AUTOMATIC TUNING MODELS			
A19T2-3	WTS-435	2ATT-133	-
A19T2-4	WTS-435	2ATT-133	-
A19T2-5	WTS-435	2ATT-133	-

VERTICAL SIZE AND LINEARITY ADJUSTMENTS

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

DEFLECTION YOKE ADJUSTMENT

Raster distortions can occur if the yoke is not tight against the flare. To adjust, loosen the yoke retainer clamp screw and push the yoke as far forward as possible, then rotate until the picture is straight. When adjustment is satisfactory, tighten yoke retainer clamp screw

FOCUS INFORMATION

To provide for differences in picture tube gun structures a focus adjustment is provided by three lugs located on the plated chassis. They provide a ground potential point, a 280 volt point and a 520 volt point. To adjust, plug the blue focus lead from the picture tube socket into each of the focus positions consecutively. Leave the focus lead plugged into the position affording optimum focus conditions.

HORIZONTAL OSCILLATOR ADJUSTMENT

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

PICTURE CENTERING

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

PINCUSHION MAGNETS

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

CIRCUIT GUARD

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

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

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

DIAL SCALE ADJUSTMENT

The small hole located below the Motorola symbol M (Channel #1 position) is provided to align the dial scale with channel window. Use a fine pointed tool, insert into the hole through the channel window, and turn dial scale to proper position.

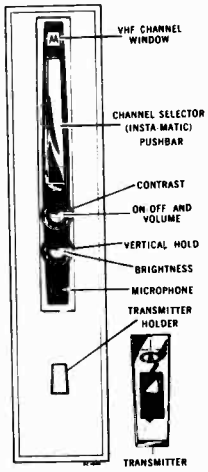
NOISE GATE CONTROL

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

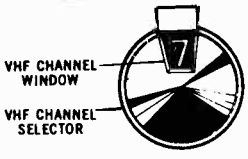
(Continued on pages 104 through 114)

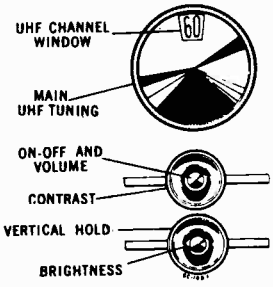
MOTOROLA Chassis TS-435, STS-435, WTS-435, Service Information, Continued

FRONT CONTROLS

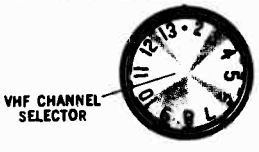


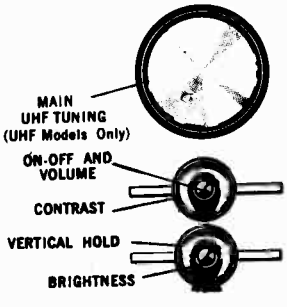
AUTOMATIC MODELS





CONSOLE & TABLE MODELS





PORTABLE MODELS

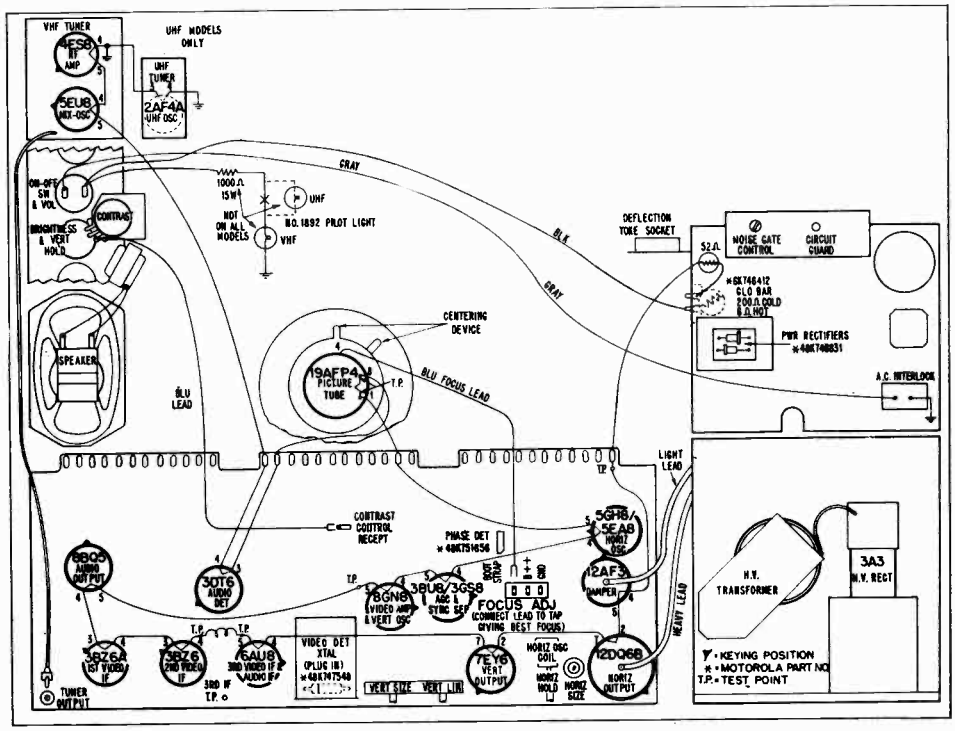


FIGURE 1. TUBE LOCATION, FILAMENT GUIDE AND FOCUS INFORMATION

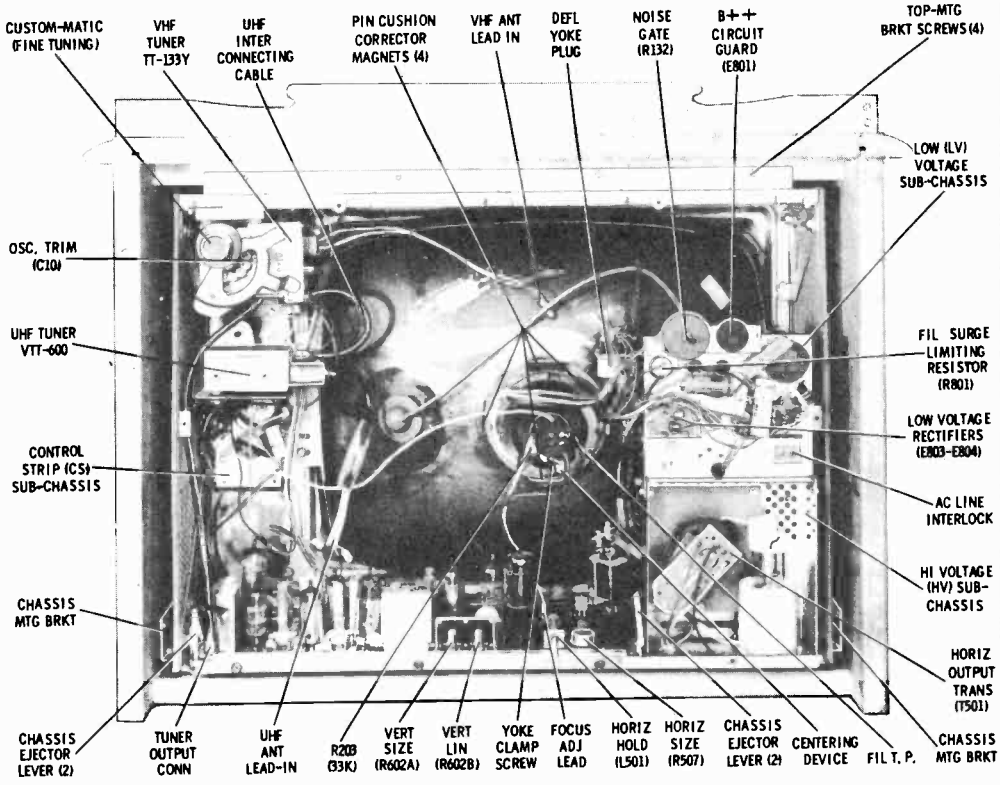


FIGURE 2-1. REAR VIEW OF CONSOLE MODELS - UHF EQUIPPED

MOTOROLA Chassis TS-435, etc., Cont.

PRINTED CHASSIS BOARD REMOVAL

THE FIRST STEP IN REMOVING THE CHASSIS BOARD is to remove the three (3) screws at the rear edge of the chassis and the metal strip they secure (see Fig. 8-1). Now remove the four (4) tie down screws that hold the board to the framework. These four screws are distributed along the top of the board in the positions shown in Fig. 8-2.

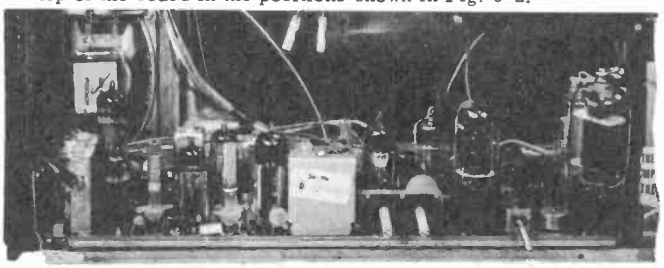


FIGURE 8-1.

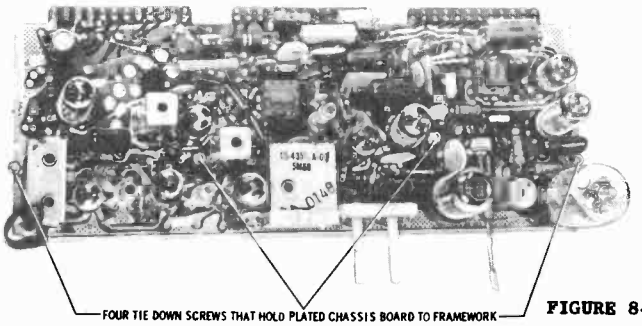


FIGURE 8-2.

THE SECOND STEP IN REMOVING THE CHASSIS BOARD is ejection of the chassis out of the framework by thumb pressure on the ejector levers, located at the left and right hand sides of the plated chassis board, as shown in Fig. 8-3.

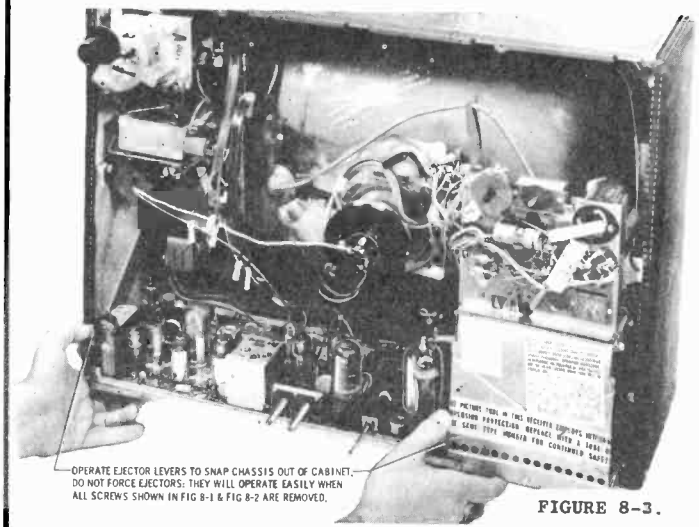


FIGURE 8-3.

THE PLATED CHASSIS BOARD IN SEMI-REMOVED POSITION is shown in Fig. 8-4. You will notice that the tuner's output cable as well as the horizontal output and damper tube's plate caps are off. Only two remaining leads hold the chassis to the framework; the focus and contrast wires. They have been left connected in the photo for two reasons: to help locate their connections on the board and to remind you that they should be replaced first when returning the plated chassis board back into the cabinet; they are easier to reach in this position.

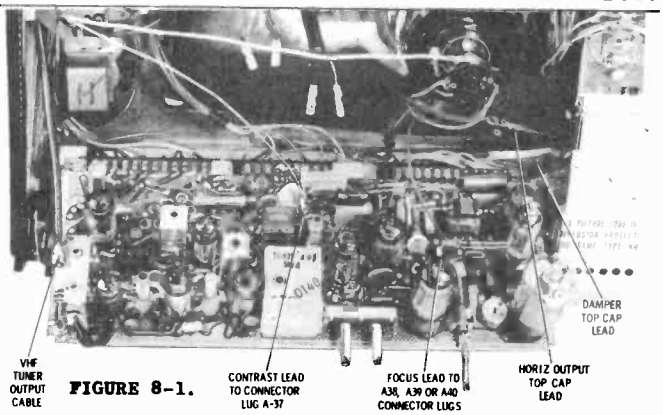


FIGURE 8-1.

COMPONENT PART REPLACEMENT ON HV & LV SUB-CHASSIS

To replace component parts on low (LV) voltage and hi (HV) voltage sub-chassis, pull chassis out as shown in Fig. 9-1 for easy accessibility.

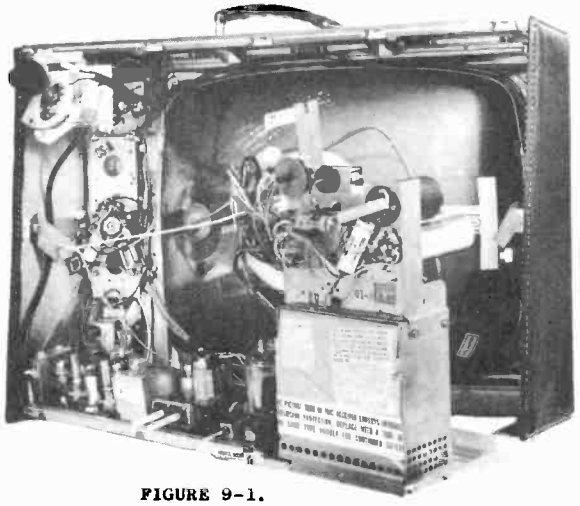


FIGURE 9-1.

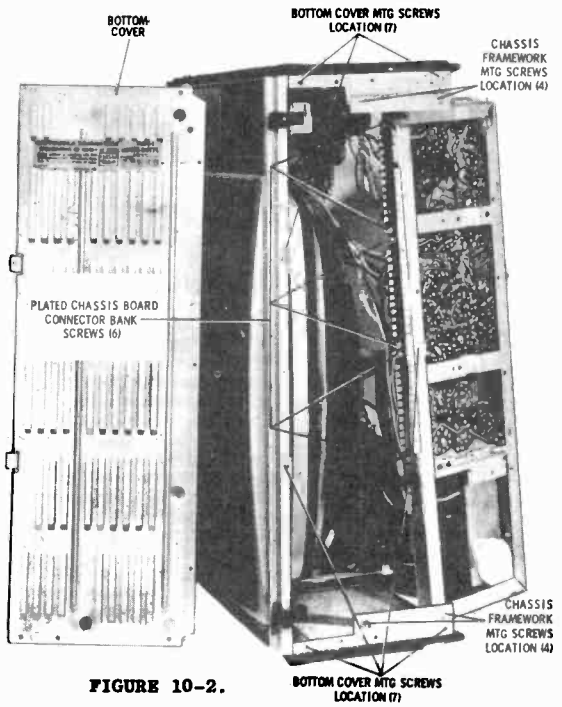


FIGURE 10-2.

MOTOROLA Chassis TS-435, STS-435, WTS-435, Continued

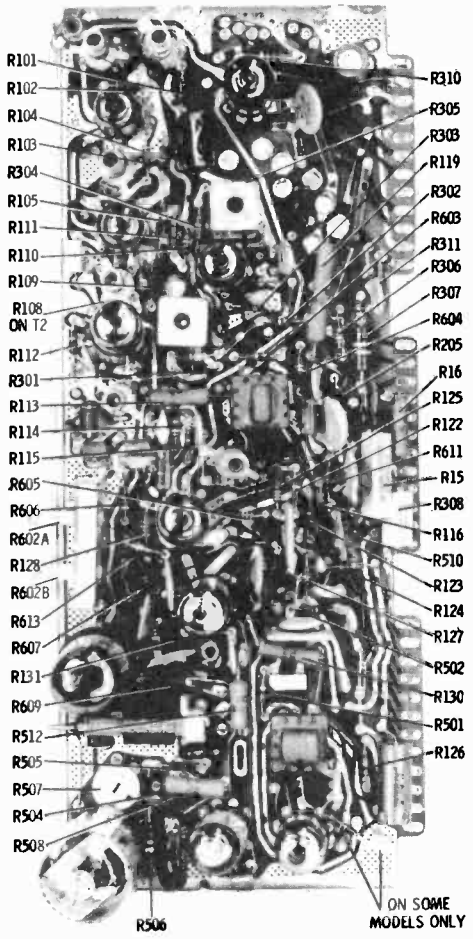


FIGURE 14. RESISTOR LOCATIONS

RESISTANCE READINGS

1. Completely remove all power to the receiver by removing the power cord from the interlock.

2. Readings above the divider bar show resistance to ground. Readings below the divider bar indicate resistance to B++.

3. In circuits containing controls, the readings above and below the divider bar taken with controls in normal operating positions. The individual reading gives maximum and minimum readings.

* Readings taken with video detector crystal (E-101) removed.

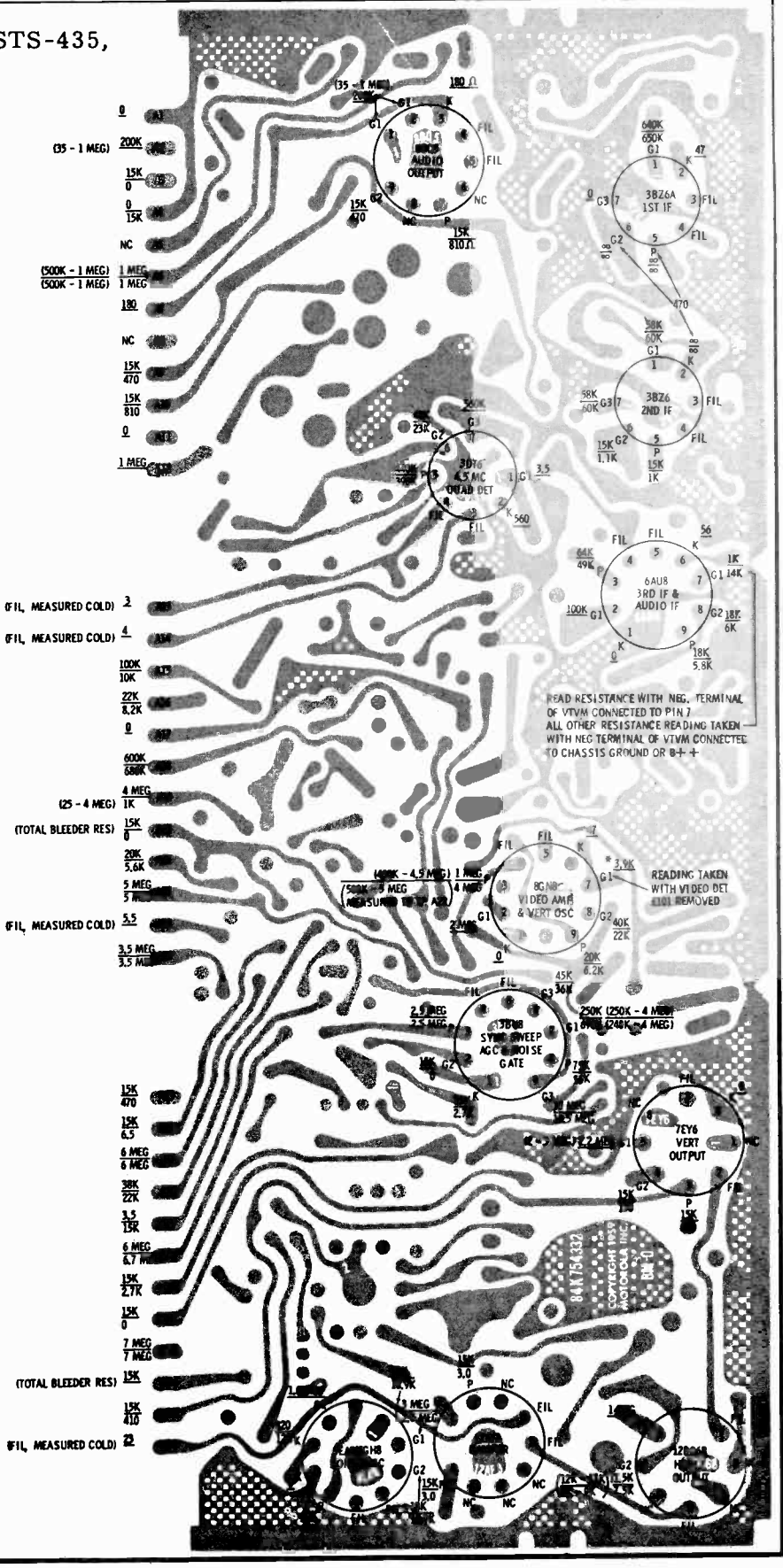


FIGURE 12. RESISTANCE READINGS

MOTOROLA Chassis TS-435, STS-435, WTS-435, Continued

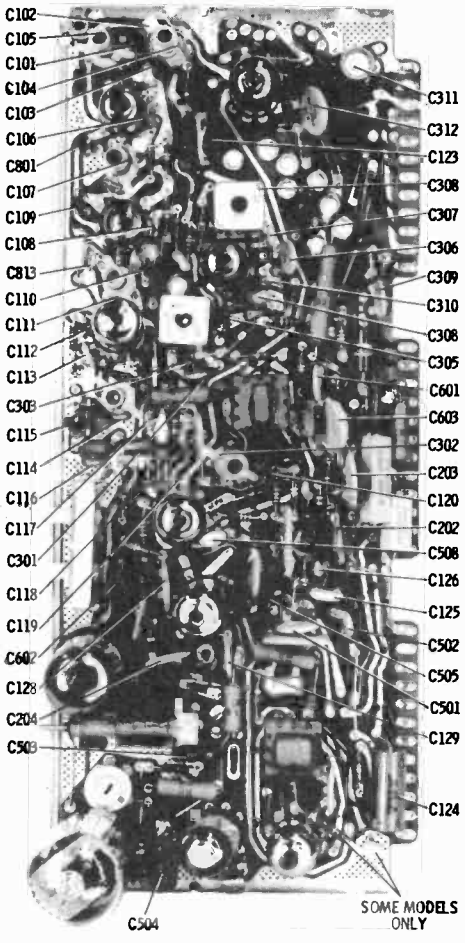


FIGURE 15. CAPACITOR LOCATIONS

VOLTAGE READINGS

1. Taken from point indicated to chassis with a VTVM. ±10%.

2. Line voltage maintained at 120V AC.

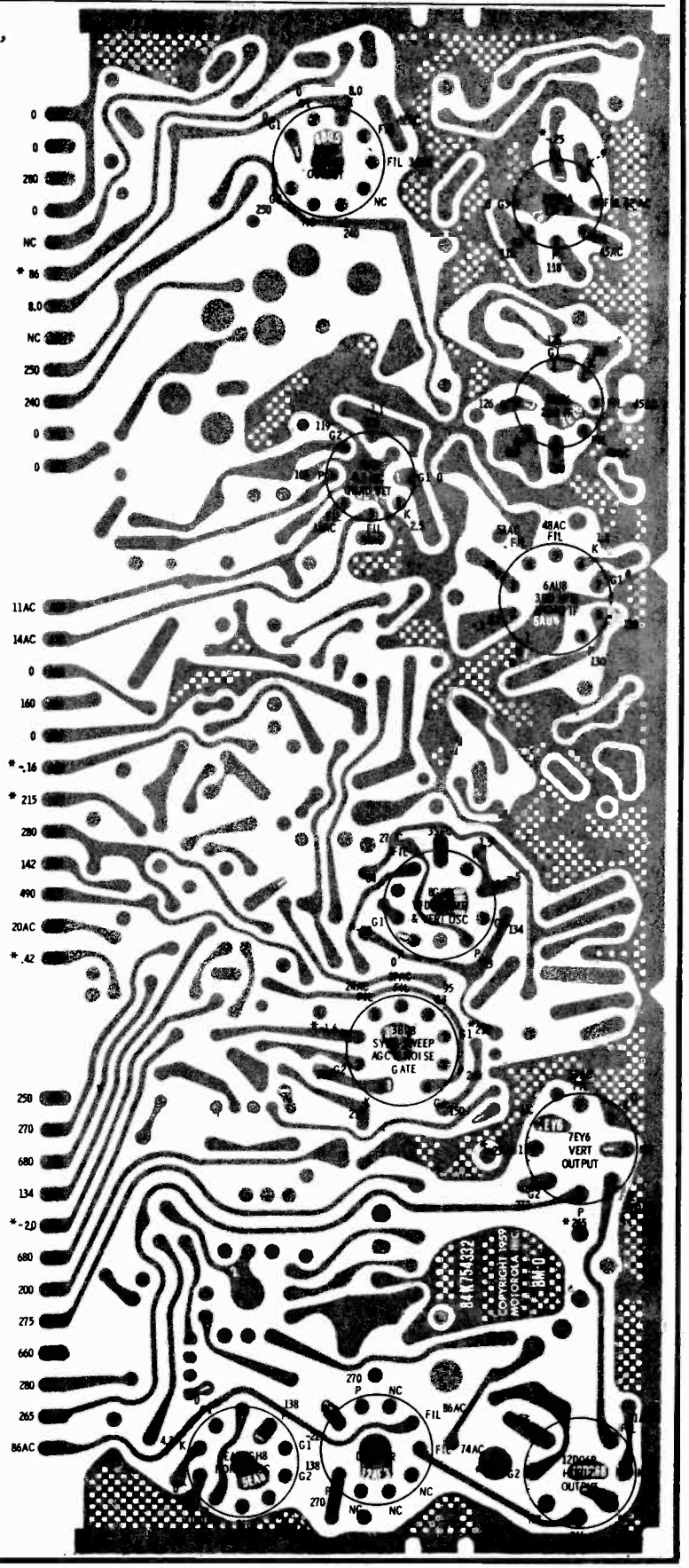
3. Voltages indicated by an asterisk will vary with associated control settings.

4. Taken with contrast control at minimum and all other controls in normal operating positions with no signal input.

5. Tuner on Channel 13 or channel of least noise with antenna terminals shorted.

6. All voltages are DC unless otherwise indicated.

FIGURE 13. VOLTAGE READINGS



MOTOROLA Chassis TS-435, etc., Continued

PICTURE TUBE HANDLING PRECAUTIONS

An unpleasant high voltage, low current, shock may result at the second anode of the picture tube. Use care when working in this general area. If the second anode plug is to be removed, first short the anode to ground through a well-insulated piece of wire after the power has been turned off.

TO REMOVE THE PICTURE TUBE

REMOVAL OF THE PICTURE TUBE begins by disconnecting the deflection yoke from its socket, unplugging the picture tube socket and the high voltage anode connector at the rear of the receiver. Remove the LV mounting strap screw shown in Fig. 10-1.

Place receiver on its side and remove the seven (7) bottom cover mounting screws and the four (4) chassis framework mounting screws as shown in Fig. 10-2. Pull out chassis framework as shown in Fig. 10-2 to gain easy access to the six (6) connector bank screws and remove same. Remove the three (3) connector banks by pulling straight away from the plated chassis board. DO NOT twist or bend to avoid possible damage to plated chassis board.

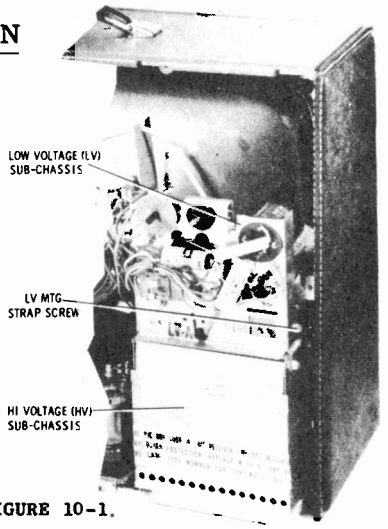


FIGURE 10-1.

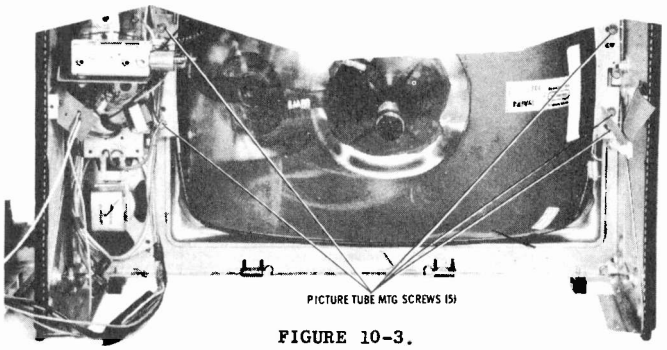


FIGURE 10-3.

Place chassis alongside receiver as shown in Fig. 10-4. No further dismantling of chassis is necessary. Next remove the five (5) picture tube mounting screws shown in Fig. 10-3. Make certain the tube is held securely before the last screw is removed. Remove the picture tube by pulling the right side out (partially) first, this will allow the left hand picture tube bracket to clear the components on the control strip (CS) sub-chassis. Place tube on a soft clean cloth to avoid scratching face.

To remove picture tube mounting strap, loosen the two (2) bolts shown in Fig. 10-4.

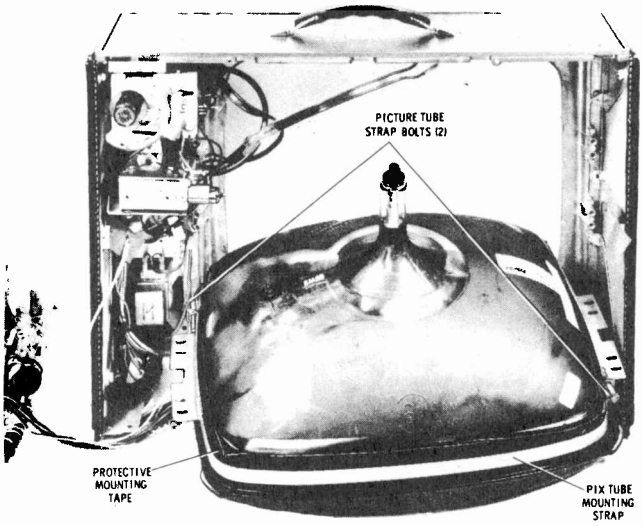


FIGURE 10-4.

Prepare the replacement picture tube by placing duplicate pieces of tape around the screen edges, as found on the original picture tube.

ALIGNMENT SECTION

VIDEO IF & MIXER ALIGNMENT

Pre-Alignment Steps

1. Remove the back cover and bottom cover as illustrated in Fig. 10-2, disconnect bottom cover isolation network. Remove the one (1) tuner mounting screw and slide tuner out partially to gain easy access to test points.

2. Set the Channel Selector on channel 13 and the Contrast control to minimum (extreme counterclockwise rotation).

VIDEO IF & SOUND ALIGNMENT

PRE-ALIGNMENT INSTRUCTIONS

Before alignment of the video IF section is attempted, it is advisable to thoroughly check the system. If alignment is started 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.

3. Disable the tuner's local oscillator by shorting point Ⓛ, located near oscillator tube V-2, to the tuner chassis with a piece of wire. See Alignment Detail for location.

4. Short across the tuner's antenna with a piece of wire.

5. Remove the deflection yoke plug to eliminate RF interference radiation. Then connect a 1500 ohm 50 watt resistor from B+ + (contact A-3) to ground (contact A-4) for normalization of the receiver's voltages.

6. Apply the negative lead of a 4.5 volt bias supply to contact A-18 (IF AGC test point) and the positive lead to contact A-17 (chassis ground) of the plated chassis board.

7. Maintain line voltage at 120 volts AC by use of a variac. IMPORTANT: Use an isolation transformer to protect the test equipment, the receiver and yourself from shock hazard.

8. Make all alignment adjustments from the top (component side) of the plated chassis board.

9. Refer to the Video IF & Sound Alignment Detail for component and test point locations. For proper positions of the coil cores, see the Coil Core Positions Detail.

MOTOROLA Chassis TS-435, STS-435, WTS-435, Alignment Information, Continued

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GEN AND MARKER	INDICATOR (OSCILLOSCOPE)	ADJUST	ADJUST FOR AND/OR REMARKS
1.	To grid of 3rd IF amp thru a .001 mmf capacitor. Set sweep to approx 44Mc. Markers to 45.75 & 41.25 Mc. Set gen output for 2 to 5 volts P to P waveform on oscilloscope.	Connect thru a 47K ohm resistor to grid (pin 7) of video amp See Alignment Detail for location	Top and bottom slugs of 3rd IF coil (T-103)	Equal peaks with 45.75 and 41.25 Mc markers as shown on curve #1. Tune both cores away from each other & near the ends of their respective coils. See Core Detail for core positions.
2.	To tuner's mixer TP (M) thru a .001 mmf capacitor. The TP is adjacent to mixer tube. See Alignment Detail. See Note in last column.	Same as step #1		Note: Temporary removal of bias battery or increased generator amplitude may be required to see trap responses.
	a. Set marker gen for 47.25 Mc.		a. 47.25 Mc trap coils: L-101C & L-103	a. Minimum response (tune both cores at end of coil away from plated chassis). See curve #2 of Alignment Detail.
	b. Set marker gen for 41.25 Mc.		b. 41.25 Mc trap coil, L-102A (top core)	b. Minimum response (tune core at end of coil away from plated chassis). See curve #2 of Alignment Detail:
3.	Connect same as step #2 except set output for exactly 3 volts P to P waveform on scope.	Connect to plate (pin #5) of 1st IF tube. It may be expedient to connect from underneath side of board: See Align. Detail for location. NOTE: Connect a jumper lead from pin #5 (plate) to pin #6 (screen) of the 1st IF tube when adjusting T-2 & L-102B	Mixer trans. (T-2) located on tuner: Also 1st IF grid coil slug (L-102B) located at bot of coil form.	Tune both T-2 & L-102B for response shown in curve #3, step #3 of the Alignment Detail. T-2 affects the center peak & L-102B affects the two outside peaks. As part of alignment, adjust L-108 for max frequency response about 38.5 Mc (this trap is tuned to 39.75 Mc when evidence of strong adjacent video interference is present) to make sure it does not interfere in the response curve. * See curve #4. If a suck-out (trap effect) occurs, detune 1st IF trans (T-101). Tune both coil cores at end of coil toward plated chassis.
4.	Same as step #2 with same output & markers.	Same as step #1	1st IF trans (T-101)	Tune for proper 42.25 Mc marker placement (tune core toward plated chassis).
			2nd IF trans (T-102)	Tune for proper 45.75 Mc marker placement (tune core toward plated chassis).
5.	Same as step #4	Same as step #4		If a tilt occurs, readjust the mixer trans (T-2, on tuner) & if necessary touch-up the 1st & 2nd IF trans (T-101 & T-102) for the response shown in curve #4 of the Alignment Detail.

* The 39.75 Mc trap (L-101B) is factory adjusted to 36 Mc and is not tuned to 39.75 Mc unless adjacent video interference is present. Adjust trap by turning core toward chassis, until adjacent video interference is visually no longer present on picture tube.

4.5 MC TRAP ADJUSTMENT

1. Carefully tune receiver to local station and advance contrast control.
2. Adjust local oscillator (with fine tuning control) to bring 4.5 Mc interference strongly into the picture.
3. Adjust sound trap (L-109A) bottom core to find the two points of adjustment at which the sound beat is just noticeable on the picture tube screen. Rotate the core toward center of the two points. Use minimum amount of inductance (core out of coil) that will result in no apparent beat interference.

SOUND ALIGNMENT (Station Signal Method)

The sound system used in the TS-435 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 & Sound Alignment Detail for coil and test point locations (Fig. 22).

MOTOROLA Chassis TS-435, STS-435, WTS-435, Alignment Information, Continued

SOUND ALIGNMENT PROCEDURE

STEP	STATION	INDICATOR	ADJUST	REMARKS
1.	Strong signal	VTVM to jct of R 305 (560K) and R 304 (82K) located near L-301 (See fig 22)	L-301 (quad coil)	Maximum deflection (coarse adj.). Of two possible maximum tuning points, use that giving the largest voltage reading. **
2.	"	Listening test	"	Maximum sound with minimum distortion (find adj.).
3.	Weak signal*	"	T-301 (inter-stage)	Maximum sound with minimum distortion (maintain hiss level). *
4.	"	"	L-109B top core (take-off)	Maximum sound with minimum distortion.

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

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

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

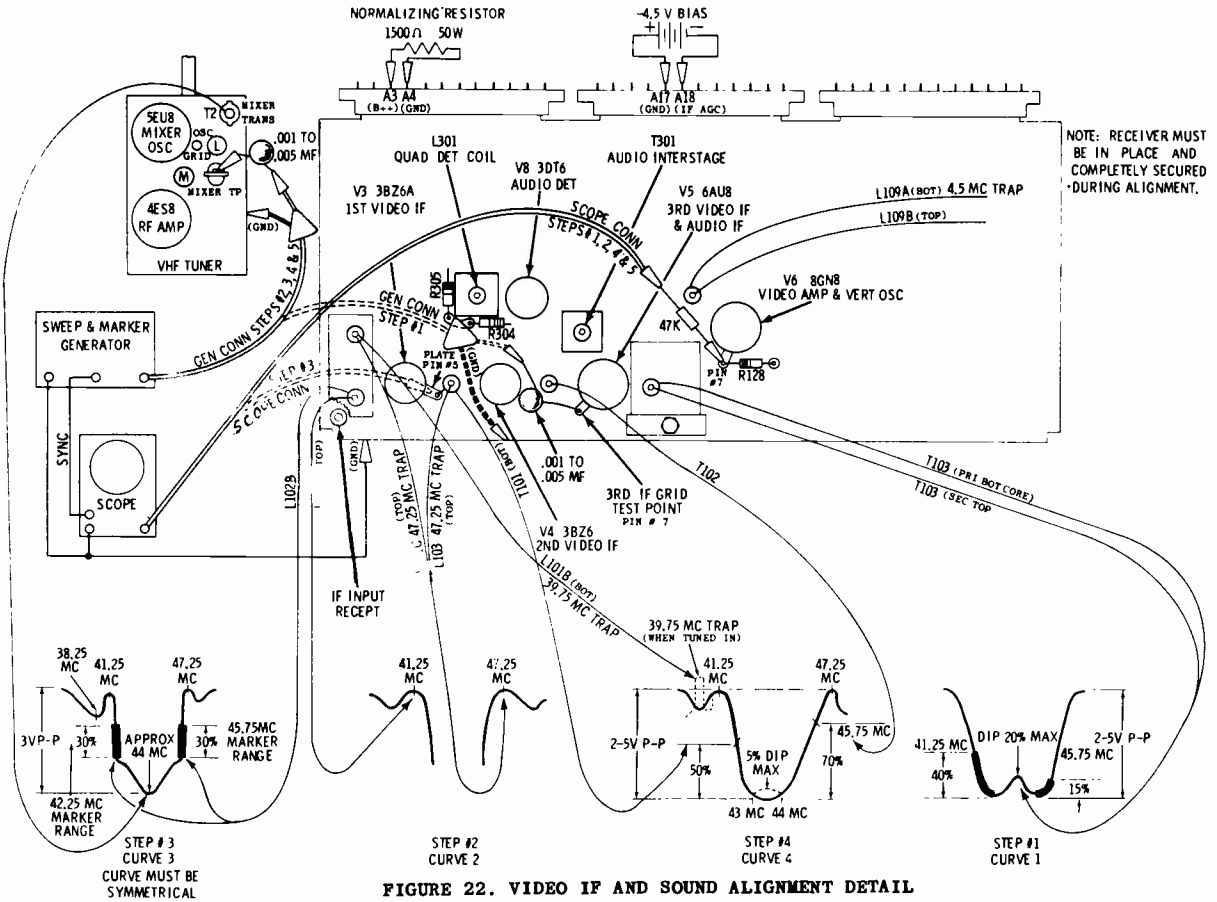


FIGURE 22. VIDEO IF AND SOUND ALIGNMENT DETAIL

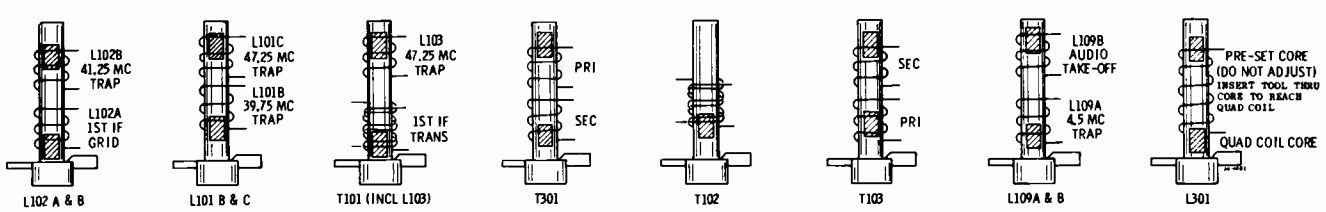
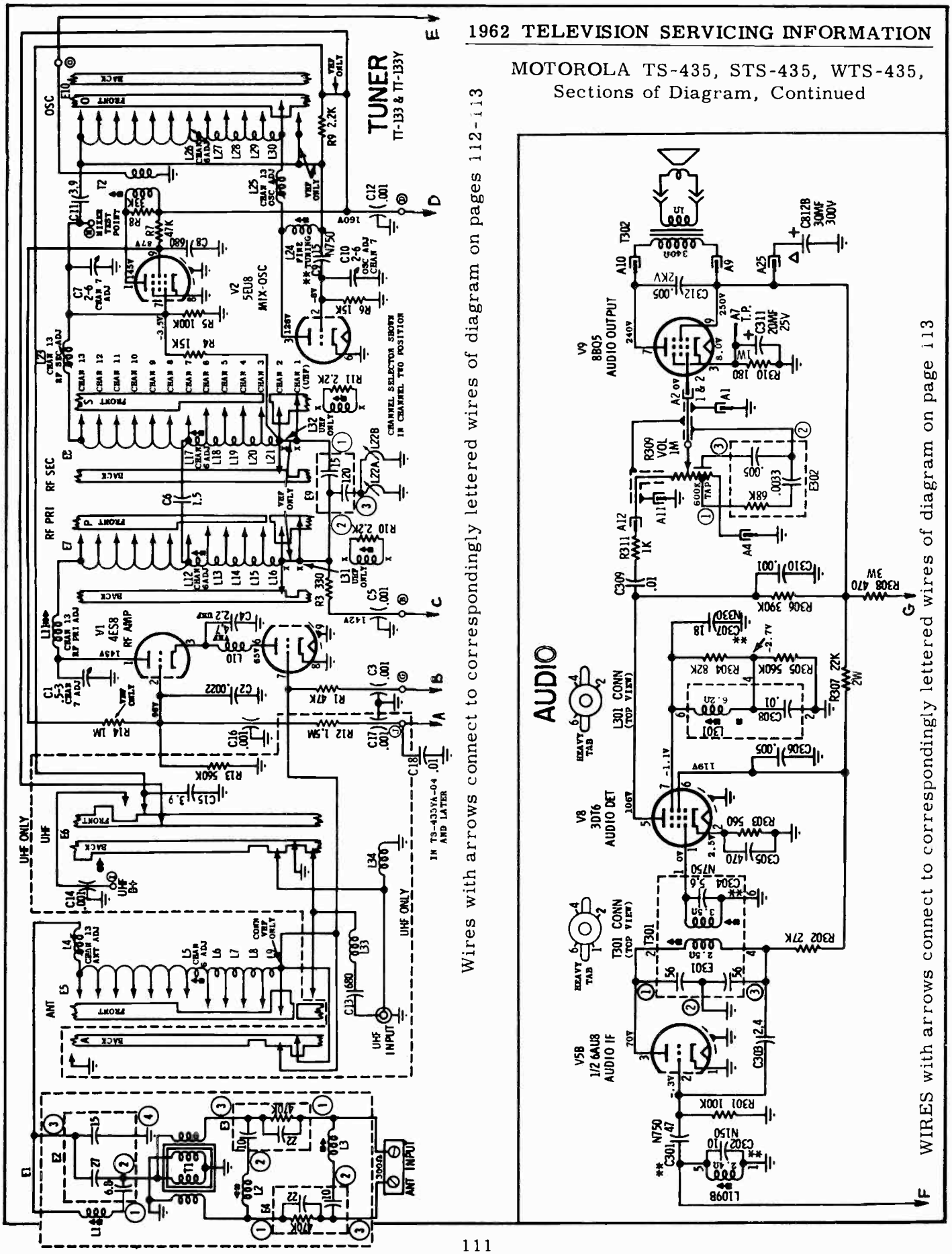


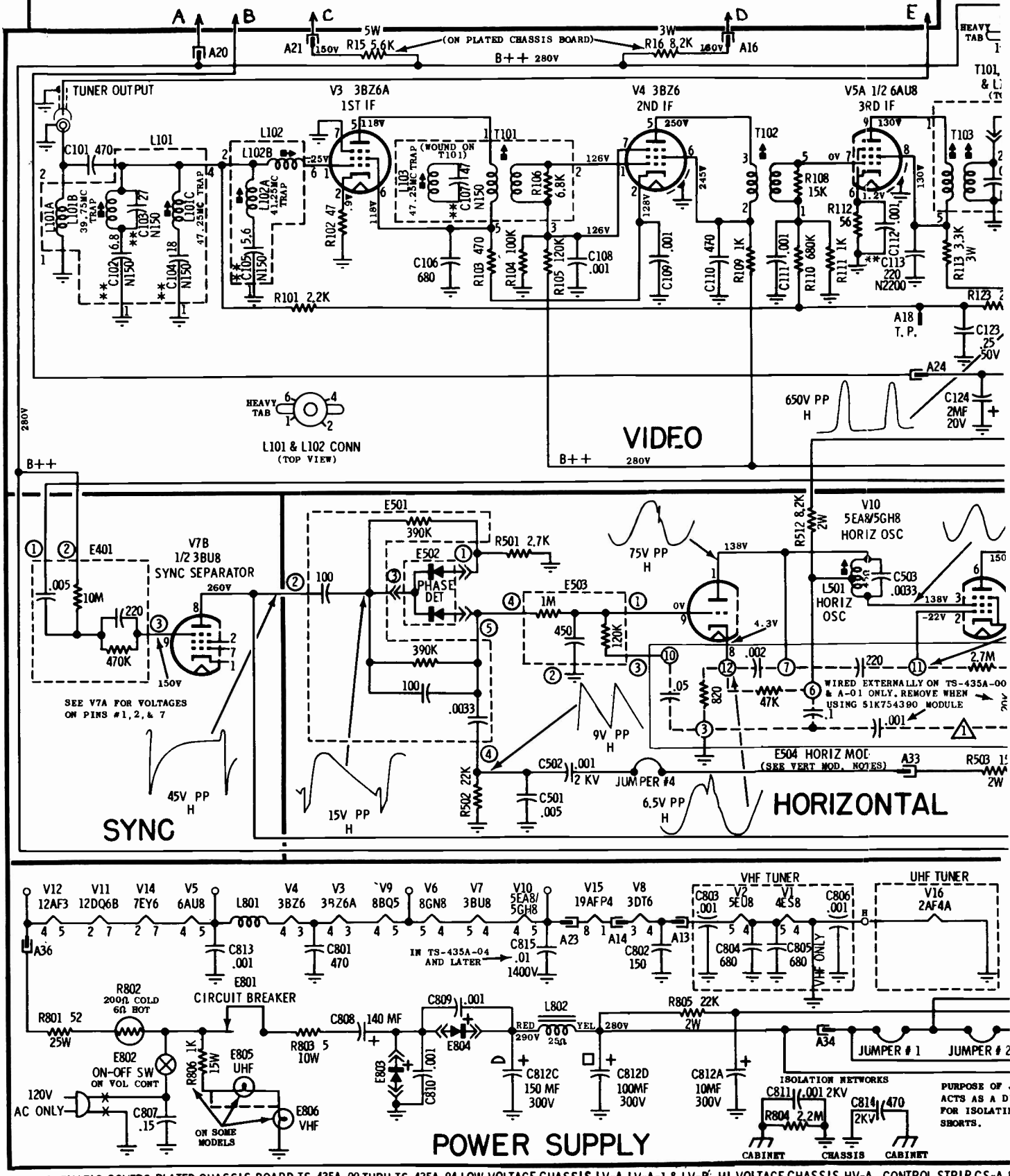
FIGURE 23. COIL CORE POSITIONS

MOTOROLA TS-435, STS-435, WTS-435,
Sections of Diagram, Continued



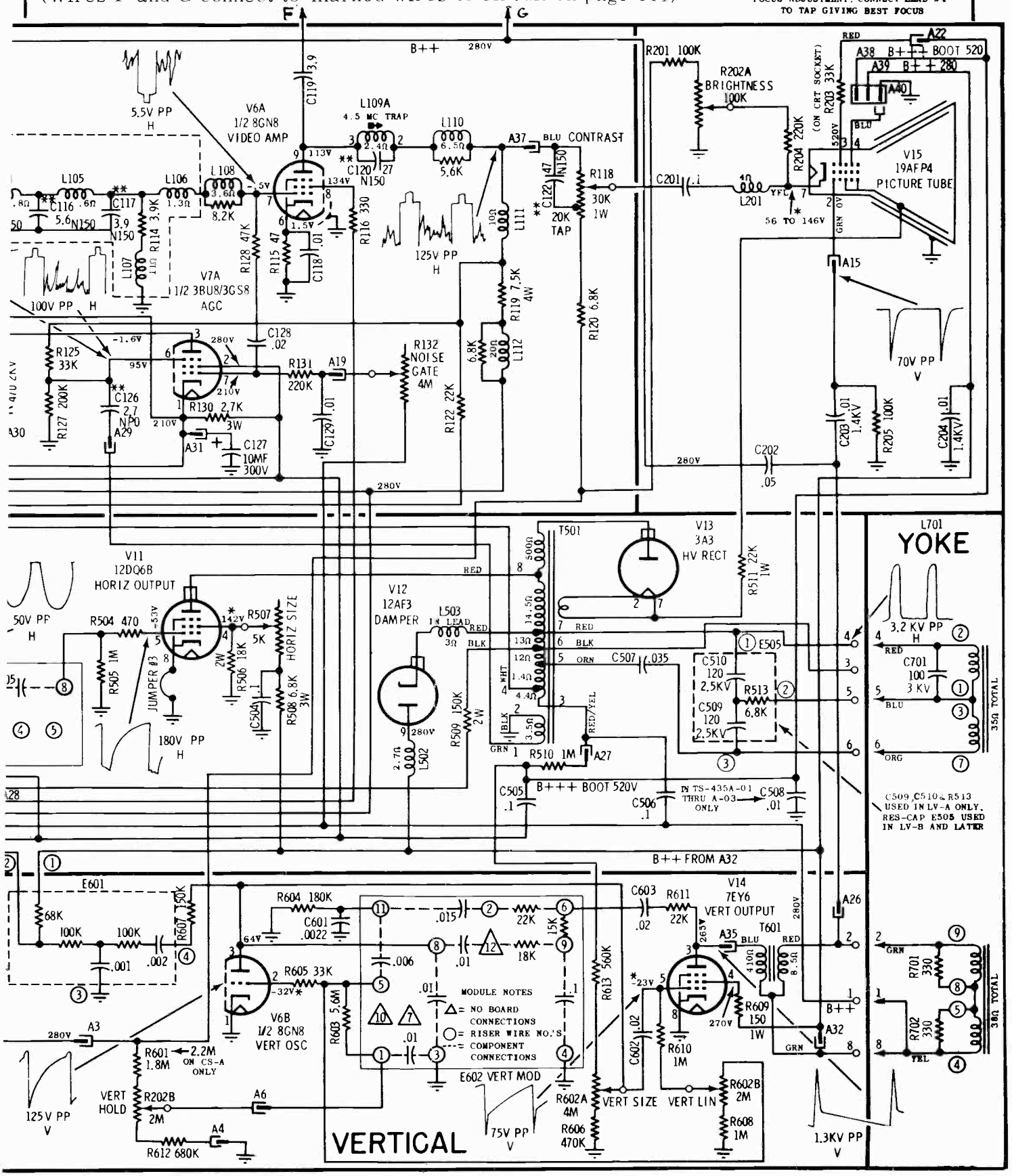
MOTOROLA Chassis TS-435, STS-435, WTS-435, Schematic Diagram, Continued

(Wires with arrows connect to correspondingly lettered wires of diagram on page 111)



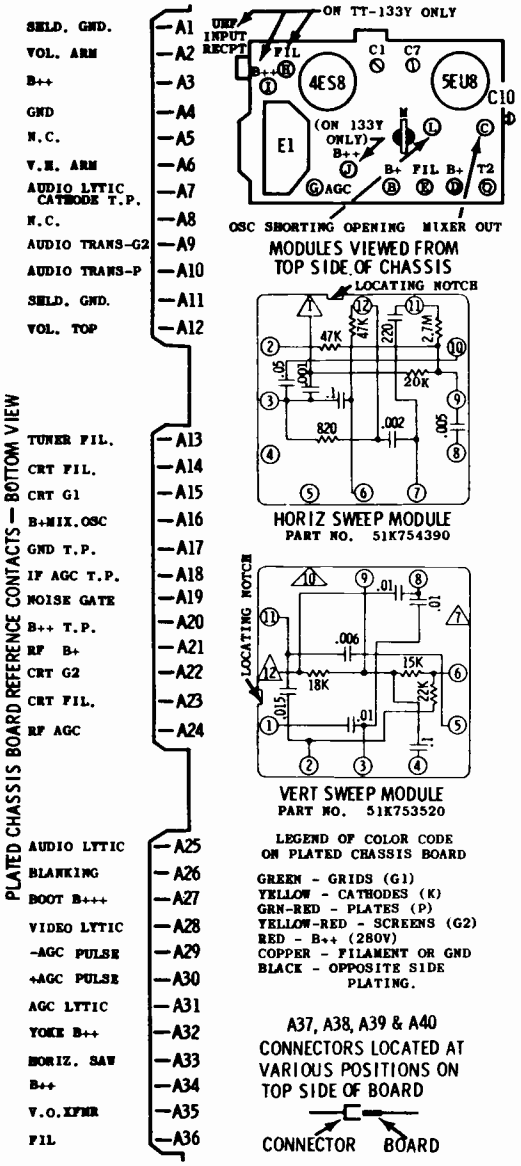
THIS SCHEMATIC COVERS PLATED CHASSIS BOARD TS-435A-00 THRU TS-435A-04 LOW VOLTAGE CHASSIS LV-A, LV-A-1 & LV-B; HI VOLTAGE CHASSIS HV-A, CONTROL STRIP CS-A, ON SHOULD HAVE A PLATED CHASSIS BOARD, OR RELATED SECTION, WHICH IS STAMPED WITH A CODE LETTER OR NUMBER LATER THAN THAT SHOWN ON THIS SCHEMATIC.... THE DI

(Wires F and G connect to marked wires of circuit on page 111)



ERS TT-133 & TT-133Y. IF THE RECEIVER YOU ARE WORKING
L STILL BE APPLICABLE SINCE THE CHANGES WILL BE SLIGHT.

MOTOROLA Chassis TS-435, STS-435, WTS-435, Service Information, Continued



NOTES:

VOLTAGE MEASUREMENTS

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

WAVEFORM MEASUREMENTS

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

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

** Indicates special capacitor.

PRODUCTION CHANGES

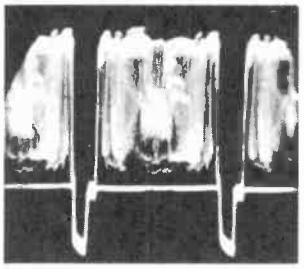
Chassis Coding	Changes
TS-435 A-01	.01 mf 1400V cap (C508) added; to prevent other component breakdown if crt arcs. Connected between Boot B++ to ground, pin #1 of V6B (ground) to C505.
TS-435 A-02	Horizontal osc module (E504), part no. 51K754365, changed to module part no. 51K754390; 20K res and .001 cap previously wired externally from riser #9 of module to ground are now incorporated in new module.
TS-435 A-03	Resistor, R308 (470 ohm), physical location changed to eliminate possibility of burning insulation of tuner and crt cabling.
TS-435 A-04	.01 mf 1400V capacitor (C508) removed. .01 mf 1400V capacitor (C815) added; to prevent damage to filament string if crt arcs. Connected from TP A23 to ground (crt fil to ground). .01 mf 1400V capacitor (C18) added to VHF (TT-133Y) tuner versions only; connected to feed-thru terminal "J" and ground. To prevent damaging feed-thru capacitor if crt arcs.
TS-435 A-05	R602 (Vert Size 4 meg & Vert Lin 2 meg) changed to Vert Size 2 meg & Vert Lin 2 meg; R613 (560K) in series with Vert Size changed to 2.2 meg. Changes were made to center Vertical Size range. NOTE: When using the 18K754414 control as a replacement, be sure to change value of R613 to 2.2 meg on chassis coded A-00 thru A-04.
TS-435 A-06	Horiz Size control, R507 (5K) changed to 10K; R508 (6.8K) in series with Horiz Size changed to 15K - 2W; R506(18K) removed from lug #4 of 12DQ6B Horiz Output tube; Jumper #3 removed from lug #8 to ground and replaced by R514 (22-2W). These changes were made to reduce overdrive.
TS-435 A-07	C130 (.01 mf -1400V) added between the B++ side of resistor R105 (120K) and the ground side of R111 (1K) to prevent pop arc between B++ and ground on board.
TS-435 A-08	C129 (.01 mf - 500V) changed to .01 mf - 1400V to prevent failure of Noise Gate control.
CS-B	2.2 meg res (R601) in series with Vertical Hold control changed to 1.8 meg; change was made to center up Vert Hold control.
CS-C	R807 (100) was added between R806 (1K) and pilot light on tuner mounting bracket to increase life of pilot light.
HV-A-1	Core clamp pad, part no. 75A65636A01, located between horizontal output transformer core and mounting plate removed; to reduce strain on mounting plate. Horizontal output transformer assembly without the core clamp pad will carry part no. 24D65410A02-B-1.
HV-A-2	Same as HV-B change.
HV-B	R515 (2.2) was added between lug #2 and lug #6 of 3A3 H. V. Rect; white lead was moved from lug #2 to lug #6. Changes were made to improve reliability of the 3A3.
LV-A-1	Yoke socket mounted from bottom side of sub-chassis (LV) to prevent arcing to chassis.
LV-B	DESIGN CHANGE: Cap C509, C510 and Res R513 located on yoke socket, replaced with Res-Cap E505.

PHILCO

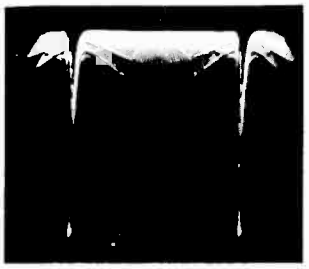
TELEVISION
12J27 SERIES

CHASSIS CROSS REFERENCE

Model	Chassis for VHF Models	Chassis for UHF Models	12 Position VHF Tuner	13 Position VHF-UHF Tuner	All Channel UHF Tuner	CRT Type
K3058CG	12J27		76-12405-1 (T-106)			17DRP4
UK3058CG		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	17DRP4
K3059LB	12J27		76-12405-1 (T-106)			17DRP4
UK3059LB		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	17DRP4
K3060BL	12J27		76-12405-1 (T-106)			17DRP4
K3060GY	12J27		76-12405-1 (T-106)			17DRP4
K3060WH	12J27		76-12405-1 (T-106)			17DRP4
K3218GD	12J27TS		76-12405-2 (T-106TS)			19ABP4
K3220GD	12J27		76-12405-1 (T-106)			19ABP4
UK3220GD		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	19ABP4
K3220BE	12J27		76-12405-1 (T-106)			19ABP4
UK3220BE		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	19ABP4
K3220WB	12J27		76-12405-1 (T-106)			19ABP4
UK3220WB		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	19ABP4
K3220GR	12J27		76-12405-1 (T-106)			19ABP4
UK3220GR		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	19ABP4
K3222WH	12J27		76-12405-1 (T-106)			19ABP4
UK3222WH		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	19ABP4
K3222SA	12J27		76-12405-1 (T-106)			19ABP4
UK3222SA		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	19ABP4
K3224GD	12J27		76-12405-1 (T-106)			19ABP4
K3224SI	12J27		76-12405-1 (T-106)			19ABP4
UK3226GD		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	19ABP4
UK3226SI		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	19ABP4
K3230GD	12J27		76-12405-1 (T-106)			19ABP4
UK3230GD		12J27U		76-12432-1 (T-105R)	76-12320-1 (T-130)	19ABP4



Composite video signal, 2nd detector output at video input (L15 of VIFS panel) **contrast set fully clockwise** 2.4 volts p-p, 15,750 c.p.s.



Sync separator output, plate of V4, (pin 3 of 8AW8A) or (L19 of VIFS panel) 36 volts p-p, 60 c.p.s.

RECEIVER SET UP CONTROL LOCATIONS

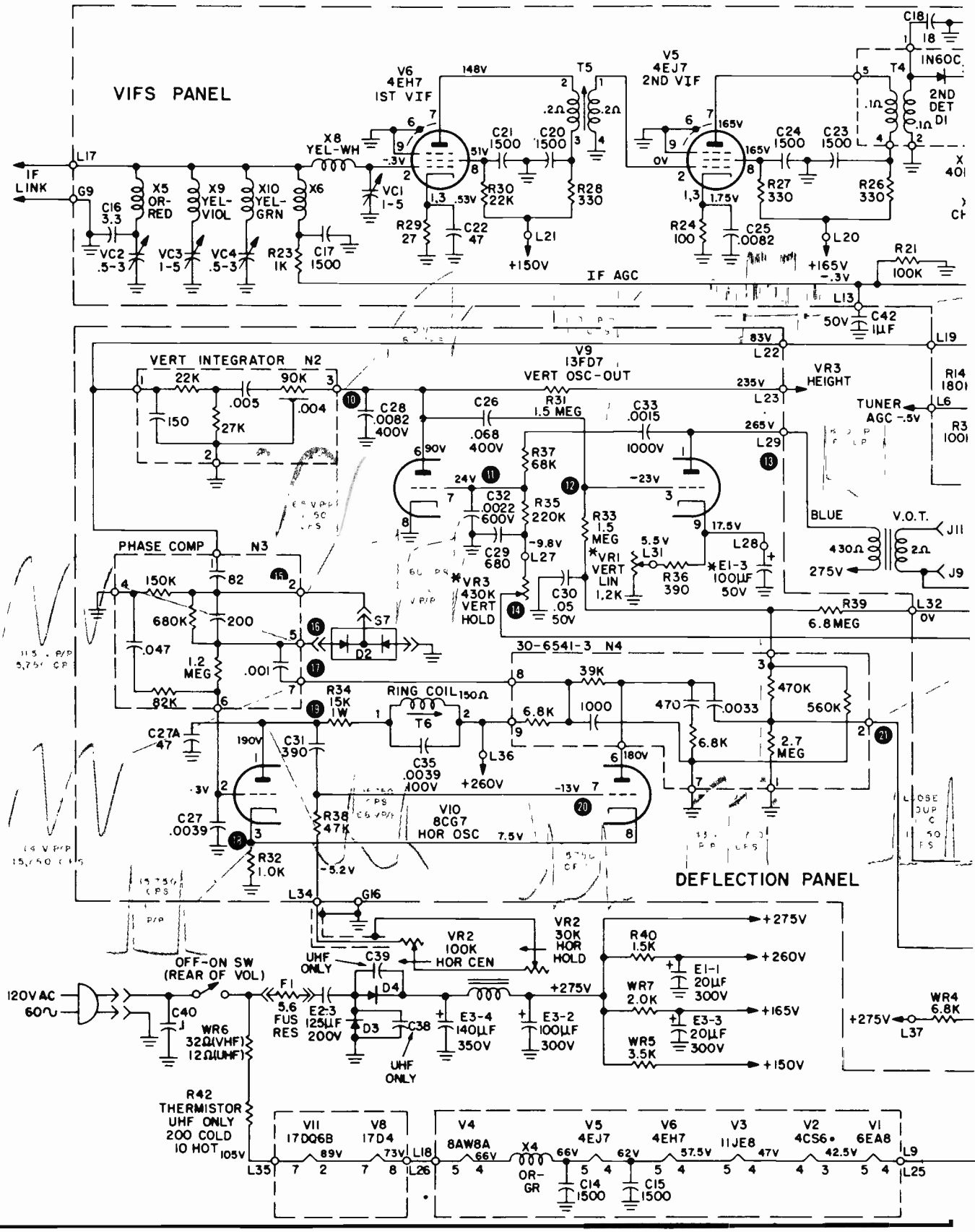
1. Height—Adjust with a thin screw driver through the hollow knob and vertical hold shaft.
2. Horizontal Hold Centering—Adjust with a thin screw driver through the hollow horizontal hold shaft and knob.
3. Vertical Linearity—Adjust with a thin screw driver through hollow shaft of brightness control and knob.
4. Width Adjustment—Remove volume and contrast knobs, the width control VR5 can be adjusted through the opening.
5. Fusible B+ Resistor—Remove cabinet back. Resistor is a plug-in unit at top right corner.
6. Tubes—All tubes (except CRT) are accessible after removing back. 1G3GT, high voltage rectifier, is in cage.

HORIZONTAL OSCILLATOR ADJUSTMENT

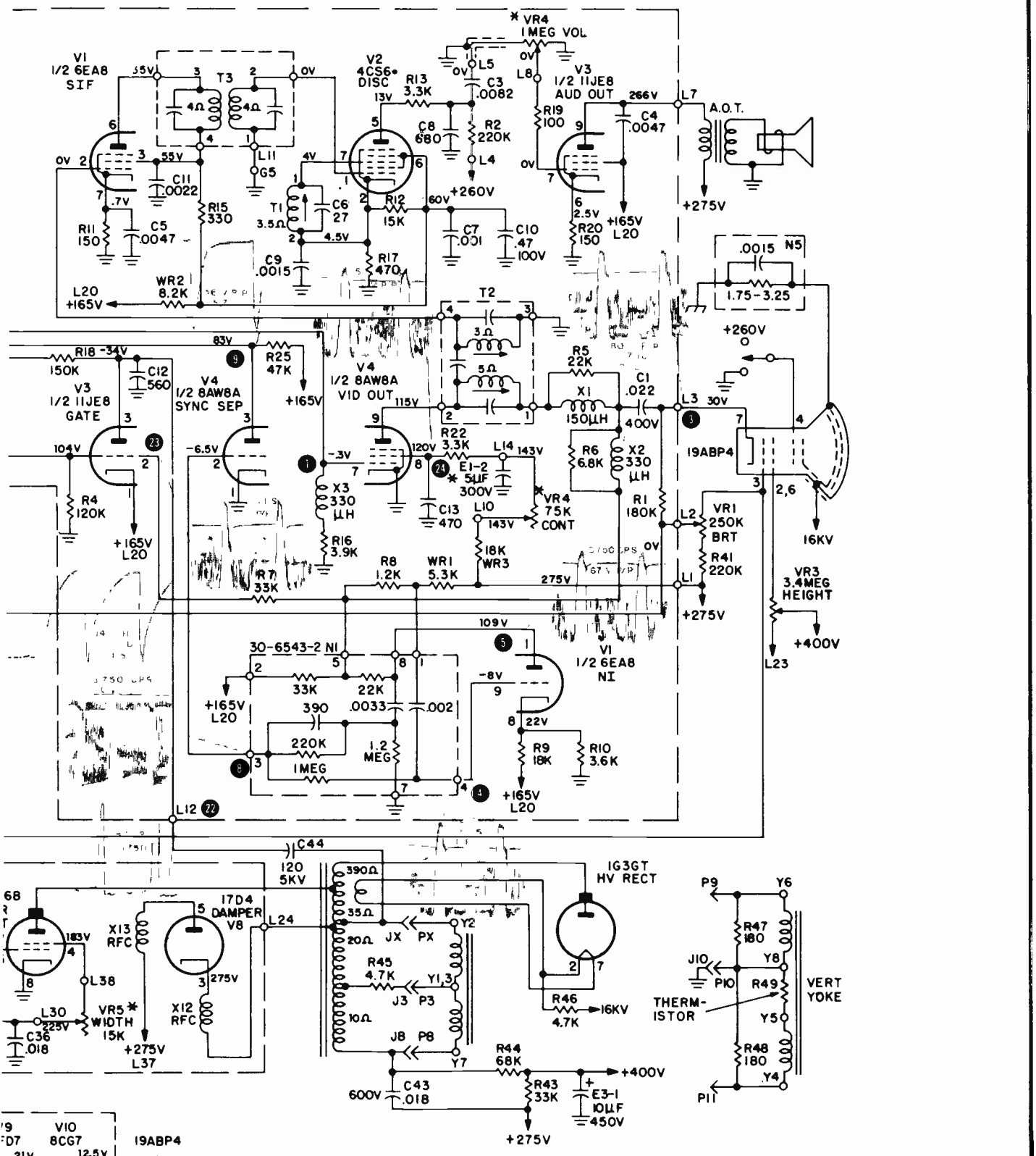
Allow set to warm up. Tune in a picture.

1. Short out the horizontal ringing coil, T6 by placing a jumper across terminals 1 and 3.
2. Set the horizontal hold control, VR2 shaft, to the center of its range.
3. Adjust the horizontal hold control centering control, VR2 screw driver adjustment, to set the oscillator to the correct horizontal line frequency (to stop the picture; it will not be stable). Bring picture into sync from high frequency side (black bars sloping up to the left).
4. Remove the shorting jumper from across T-6 and adjust the ringing coil core for stable picture sync. Bring picture into sync from high frequency side.

PHILCO Chassis 12J27 Series, Schematic Diagram, Continued



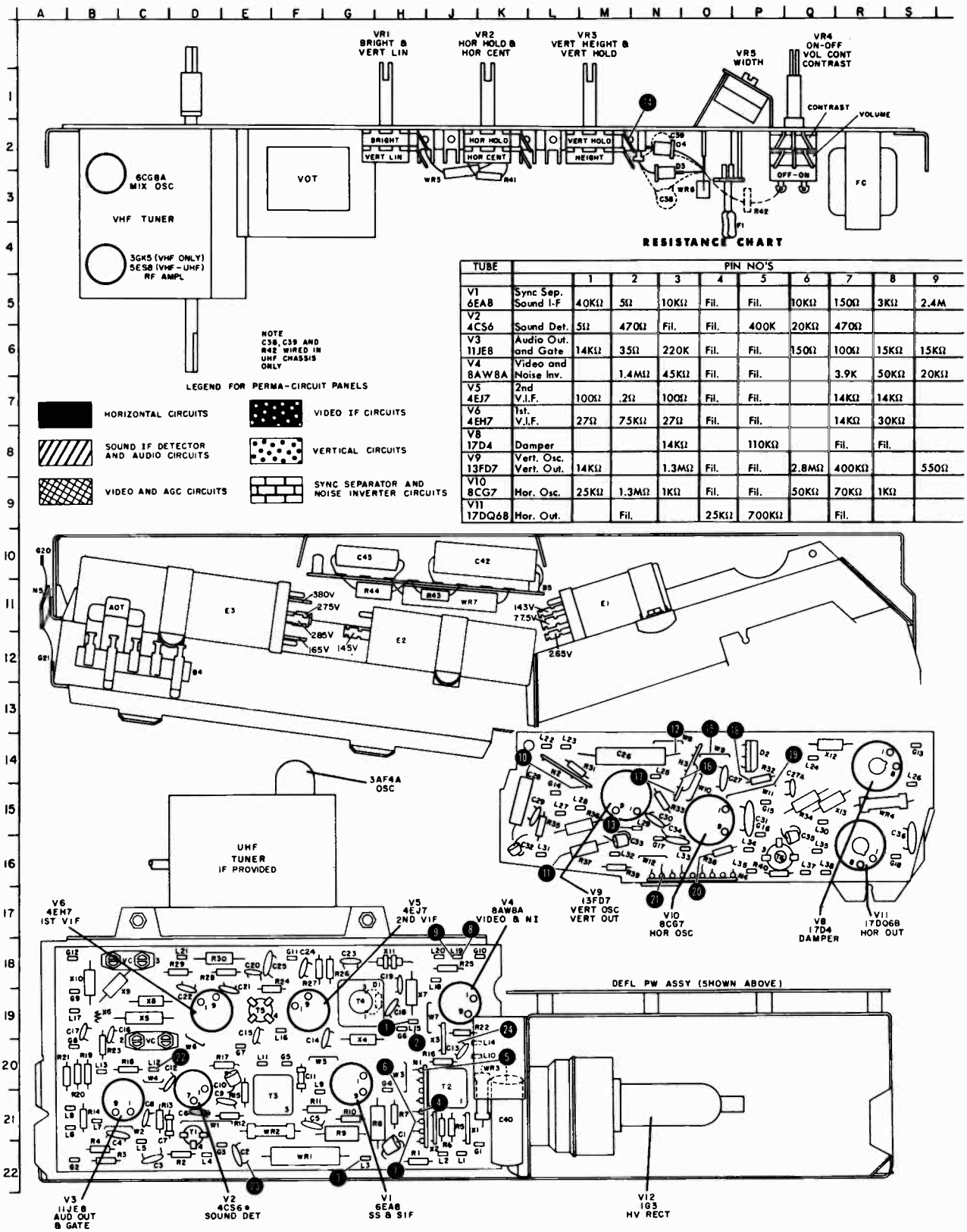
PHILCO Chassis 12J27 Series, Schematic Diagram, Continued



SCHEMATIC DIAGRAM, TELEVISON CHASSIS 12J27

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

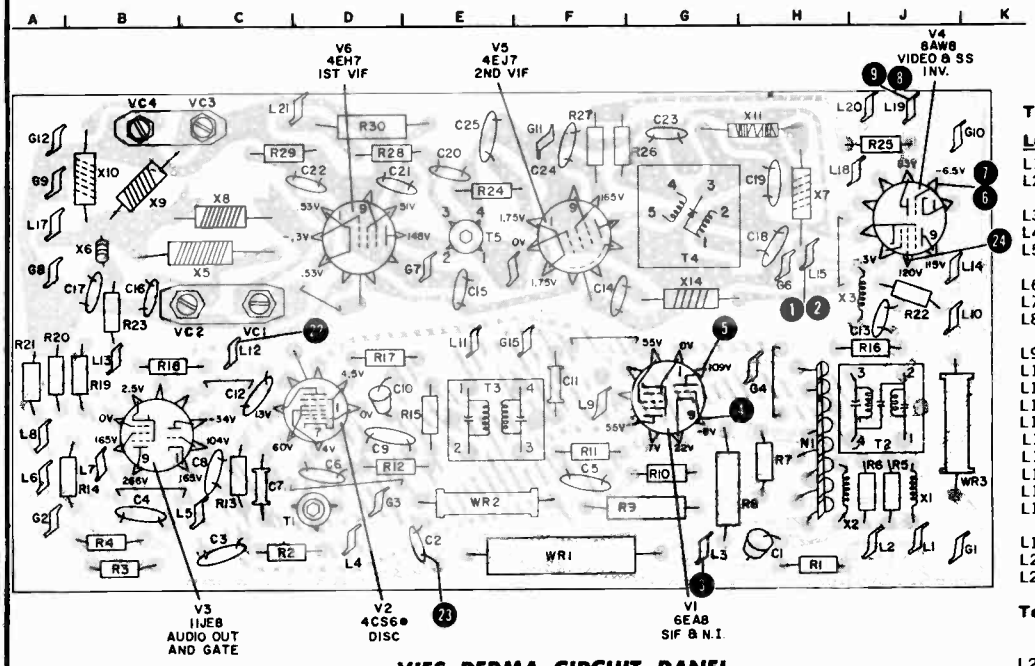
PHILCO Chassis 12J27 Series, Service Information, Continued



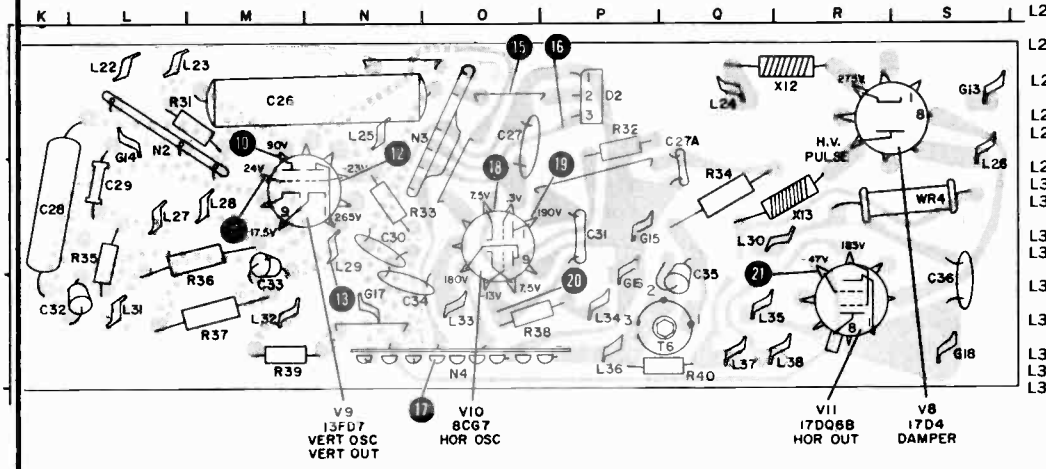
TUBE		PIN NO'S								
		1	2	3	4	5	6	7	8	9
V1 6EA8	Sync Sep. Sound I-F	40KΩ	5Ω	10KΩ	Fil.	Fil.	10KΩ	150Ω	3KΩ	2.4M
V2 4CS6	Sound Det.	5Ω	470Ω	Fil.	Fil.	400K	20KΩ	470Ω		
V3 11JE8	Audio Out. and Gate	14KΩ	35Ω	220K	Fil.	Fil.	150Ω	100Ω	15KΩ	15KΩ
V4 8AW8A	Video and Noise Inv.		1.4MΩ	45KΩ	Fil.	Fil.		3.9K	50KΩ	20KΩ
V5 4EJ7	2nd V.I.F.	100Ω	.2Ω	100Ω	Fil.	Fil.		14KΩ	14KΩ	
V6 4EH7	1st. V.I.F.	27Ω	75KΩ	27Ω	Fil.	Fil.		14KΩ	30KΩ	
V8 17D4	Damper			14KΩ		110KΩ		Fil.	Fil.	
V9 13FD7	Vert. Osc. Vert. Out.	14KΩ		1.3MΩ	Fil.	Fil.	2.8MΩ	400KΩ		550Ω
V10 8CG7	Hor. Osc.	25KΩ	1.3MΩ	1KΩ	Fil.	Fil.	50KΩ	70KΩ	1KΩ	
V11 17DQ68	Hor. Out.		Fil.		25KΩ	700KΩ		Fil.		

COMPONENT PLACEMENT, 12J27 CHASSIS

PHILCO Chassis 12J27 Series, Service Information, Continued



VIFS PERMA CIRCUIT PANEL



DEFLECTION PERMA-CIRCUIT PANEL

PANEL LUG CONNECTIONS

Terminal Lug Identification VIFS Panel

Lug	Identification
L1	275V B+ lead
L2	Lead to center lug of brightness control, VR1
L3	Video output to CRT cathode, pin 7
L4	260V B+ lead
L5	Shielded lead to top of volume control VR4
L6	Tuner AGC lead
L7	Blue lead of A.O.T. to audio output plate
L8	Shielded lead from arm of volume control VR4
L9	Filament lead to L25 of sweep panel
L10	Lead to contrast control VR4, lug 3
L11	Test point for sound detector
L12	Gate pulse from H.O.T.
L13	I-F A.G.C.
L14	Lead to lug 2 of VR4, the contrast control
L15	Video output from video 2nd detector
L16	Test Point: Grid of second I-F
L17	I-F input link from tuner
L18	Filament input from L26 of deflection panel
L19	Sync output to L22 of sweep panel
L20	165V B+ lead
L21	150V B+ lead

Terminal Lug Identification Deflection Panel

Deflection Panel

L22	Sync input from VIFS panel L19
L23	Lead to top of height control VR3
L24	Lead from damper cathode to H.O.T. terminal #3 and pin 2 on yoke
L25	Filament lead to V9 13DF7 pin 4 from L9 of VIFS panel
L26	Filament lead from V8 17D4 pin 7 to VIFS panel L18
L27	Lead to top of vertical hold control VR3
L28	Vertical output cathode, lead to E1 by-pass electrolytic
L29	Vertical output plate, blue lead to V.O.T.
L30	Lead to center tap of width control VR5
L31	Lead to center tap of vertical linearity control VR1
L32	Vertical output bias, lead to VIFS panel L2
L33	Filament lead from pin 4 of V10-8CG7 to CRT pin 1
L34	Shielded lead to horizontal hold centering control VR2
L35	Filament lead from surge resistor to V11 17DQ6B
L36	De-coupled B+, 260V
L37	275V B+
L38	Lead from top of width control VR5

SYMBOL	LOCATION
A.L.	
A.O.T.	B 12
C1	H 22
C2	E 22
C3	C 22
C4	B 21
C5	F 21
C6	D 21
C7	C 21
C8	C 21
C9	E 21
C10	E 20
C11	F 20
C12	C 20
C13	J 20
C14	G 19
C15	E 19
C16	B 20
C17	B 19
C18	H 19
C19	H 19
C20	E 18
C21	E 19
C22	D 19
C23	G 18
C24	F 18
C25	E 18
C26	M 14
C27	O 15
C27A	Q 15
C28	K 15
C29	L 15
C30	N 15
C31	P 15
C32	K 16
C33	M 16
C34	N 16
C35	Q 16
C36	S 16
C38	N 4
C39	N 2
C40	K 21
C42	K 10
C43	G 10
C44	
D1	H 19
D2	D 14
D3	N 3
D4	N 2
E1	M 11
E2	J 11
E3	D 11
F1	P 4
FC	R 3
N1	H 21
N2	M 14
N3	O 14
N4	O 16
N5	A 11
R1	H 22
R2	D 22
R3	B 22
R4	B 22
R5	J 21
R6	J 21
R7	H 21
R8	G 21
R9	G 22
R10	G 21
R11	F 21
R12	E 21
R13	C 21
R14	B 21
R15	E 21
R16	J 20
R17	E 20
R18	C 20
R19	B 20
R20	A 20
R21	A 20
R22	J 20
R23	B 20
R24	F 19
R25	J 18
R26	G 18
R27	F 18
R28	E 18
R29	D 18
R30	E 18
R31	L 14
R32	P 15
R33	N 15
R34	Q 15
R35	L 15
R36	M 16
R37	M 16
R38	O 16
R39	M 16
R40	P 16
R41	K 3
R42	P 4
R43	J 11
R44	H 11
T1	D 22
T2	J 21
T3	F 21
T4	G 19
T5	E 19
T6	P 16
V.O.T.	F 3
VC1	C 18
VC2	C 18
VC3	C 20
VC4	C 20
VR1	H 2
VR2	K 2
VR3	M 2
VR4	Q 3
VR5	P 1
WR1	F 22
WR2	E 22
WR3	K 21
WR4	S 15
WR5	J 3
WR6	Q 3
WR6	Q 3
WR7	J 11
X1	J 21
X2	J 21
X3	J 20
X4	G 20
X5	C 19
X6	B 19
X7	H 19
X8	C 19
X9	B 18
X10	B 18
X11	H 18
X12	R 14
X13	R 15

PHILCO Chassis 12J27 Series, Alignment Information, Continued

VIDEO I-F ALIGNMENT

AM ALIGNMENT

CONTRAST CONTROL: set for maximum.
CHANNEL SELECTOR: set tuner to channel 4 position.
SIGNAL INJECTION: to tuner feed-thru capacitor in mixer grid circuit.
BIAS: −8 volts to L13 on VIFS panel.
SCOPE: connect to L15 on VIFS panel, video detector output.
OUTPUT LEVEL: not to exceed 1.0 volt peak to peak during pole and sweep alignment. Not less than .2 volt peak to peak as null, during trap alignment, is approached.

1. Adjust tuner pole, T1T for maximum at 42.9mc. This is a temporary setting for trap alignment.
2. Adjust trap VC3 for minimum at 41.25mc.*
3. Adjust traps VC2 and VC4 for minimum at 47.25mc.*
4. Repeat steps 2 and 3. Bias may be reduced as trap minimum is approached.
5. Adjust tuner pole, T1T (tuner) for maximum at 42.9mc.
6. Adjust VC1 for maximum at 45.5mc.
7. Adjust T5 for maximum at 44.3mc.
8. Adjust T4 (top) for maximum at 45.0mc.
9. Adjust T4 (bottom) for maximum at 42.7mc.
10. Repeat step 8 only.

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

SWEEP ALIGNMENT

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

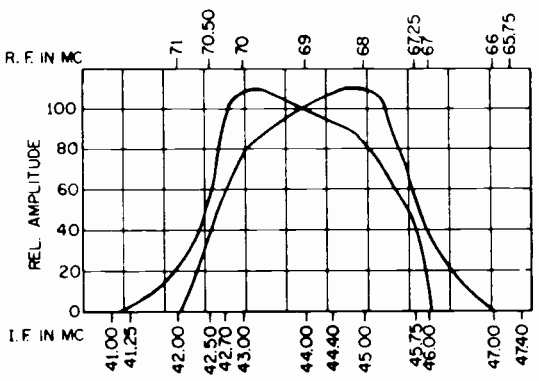


FIGURE 1—1 OVERALL R.F., I.F. RESPONSE CURVE, CHANNEL 4

1. Inject 65.75mc, AM, 30% modulated signal, into antenna adjust fine tuning control for minimum output. Do not disturb fine tuning during balance of I-F adjustment.
2. Inject channel 4 sweep signal (69mc with 6mc sweep width) into antenna. If necessary, adjust the following poles to bring the curve within limits. Refer to Fig. (1-1)
   a. VC1, to set carrier level.
   b. T1T on tuner, to adjust 42.5mc (sound side) slope.
   c. T5, adjust for *flat* response curve.
   d. Detune T5, to set knee on sound side 20% lower than knee on carrier side.

4.5 MC TRAP ALIGNMENT

1. Inject 4.5mc AM signal into L15 or use station signal.
2. Connect 4.5mc detector Fig. 1-2 to L3 (pin 7 of CRT).
   NOTE: Preliminary padding of 4.5mc test detector connect detector to an accurate source of 4.5mc signal and pad core of transformer for maximum dc output voltage.
   NOTE: When using generator calibrate by zero beating with sound I-F developed from station signal.
3. Connect 20,000 ohms/voltmeter, set to 2.5 volt range, to detector output.
4. Turn contrast control fully clockwise (to maximum).
5. Adjust 4.5mc trap (T2 bottom) for minimum indication.

SOUND I-F ALIGNMENT

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

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

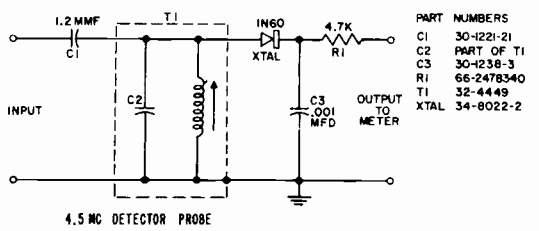


FIGURE 1—2 4.5MC DETECTOR PROBE CIRCUIT

PHILCO

1962 "K"-LINE TELEVISION
12N50 SERIES

MODEL CHASSIS CROSS REFERENCE

MODEL	CHASSIS FOR VHF MODELS	CHASSIS FOR UHF MODELS	12 POSITION VHF TUNER	13 POSITION VHF/UHF TUNER	ALL CHANNEL UHF TUNER	CRT TYPE
K3720CB	12N51		76-12380-1 (TT-140)			19BLP4
UK3720CB		12N51U		76-12381-1 (TT-144)	76-12343-2 (TT-132)	19BLP4
K3722BE	12N51		76-12380-1 (TT-140)			19BLP4
UK3722BE		12N51U		76-12381-1 (TT-144)	76-12343-2 (TT-132)	19BLP4
K3722CG	12N51		76-12380-1 (TT-140)			19BLP4
UK3722CG		12N51U		76-12381-1 (TT-144)	76-12343-2 (TT-132)	19BLP4
K3724GD	12N51		76-12380-1 (TT-140)			19BLP4
K3724SI	12N51		76-12380-1 (TT-140)			19BLP4
K3724WA	12N51		76-12380-1 (TT-140)			19BLP4

NOTES: Cabinet Colors — BE = Beige, CB = Charcoal Blue, CG = Coral Green, GD = Gold, SI = Silver, WA = Walnut.

PICTURE TUBE REMOVAL, MODELS 3720, 3722 AND 3724

1. Remove chassis.
2. Remove ⅜" bolt at top center of CRT mounting ring.
3. Pull mounting ring open.
4. Remove CRT.

CLEANING SAFETY GLASS

CAUTION: WHEN CLEANING SAFETY GLASS ALWAYS USE A SOFT CLOTH WITH SOAP AND WARM WATER.

12N51 NOISE CONTROL SETUP (VR2)

The "Noise Control", VR2, adjusts the bias of the noise inverter stage for optimum performance at all signal levels. The procedure for adjustment is as follows:

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

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

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

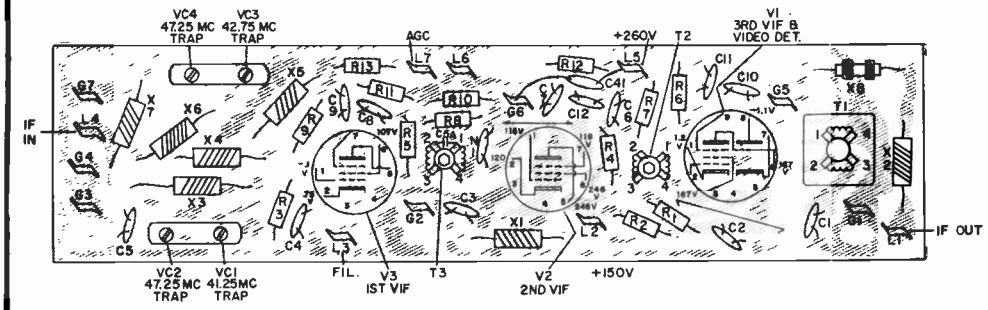
A 20,000 ohm/volt meter is employed. On the 10K scale the forward resistance (meter connected in the same polarity as the diode) should be a maximum of 6000 ohms. The ratio of the forward resistances of the two diodes should be less than 2 to 1. On the 100K scale the back resistance (meter connected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

HORIZONTAL OSCILLATOR ADJUSTMENT

Allow set to warm up. Tune in a picture.

1. Short out the horizontal ringing coil, T6, by placing a jumper across C33, place jumper between lugs L37 and L40.
2. Set the horizontal hold control, VR6, to the center of its range.
3. Adjust the horizontal hold centering control, VR1B, to set the oscillator to the correct horizontal line frequency (to stop the picture; it will not be stable).
4. Remove the shorting jumper from across C33 and adjust the ringing coil T6 core for stable picture sync.

PHILCO Chassis 12N51, 12N51U, Service Information, Continued



Video IF Perma-Circuit Panel — Top View

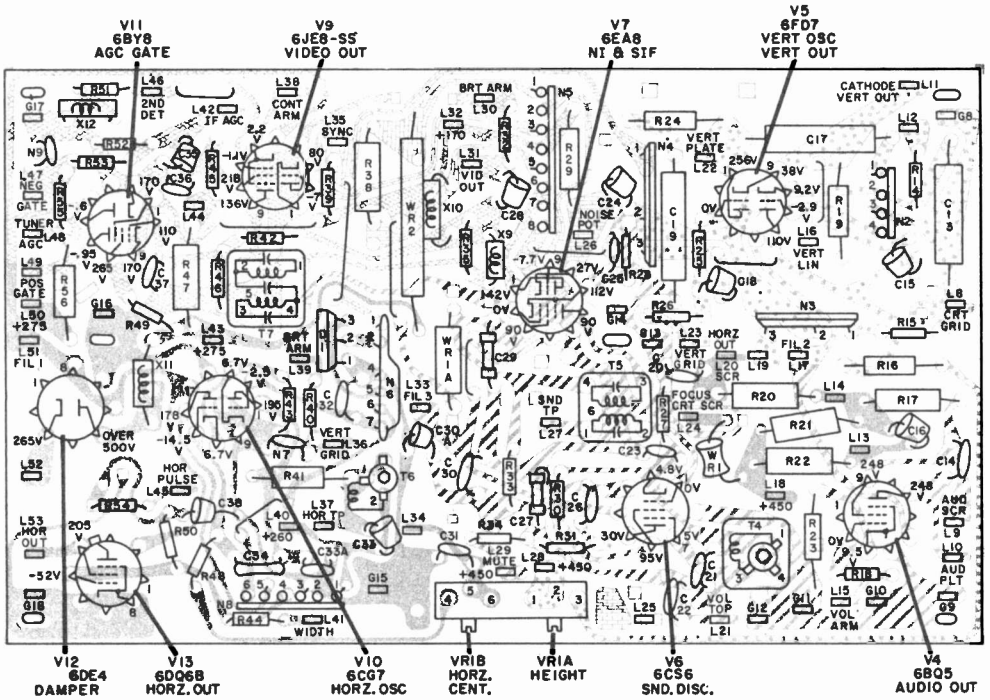
LEGEND FOR PERMA-CIRCUIT PANELS

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

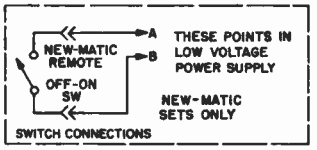
PANEL LUG CONNECTIONS—12N51—CHASSIS

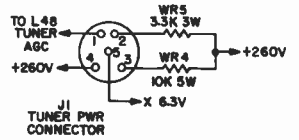
VIF PANEL
- L1 Lead to L46 VOS Panel
- L2 Lead to L32 VOS Panel
- L3 Lead to L51
- L4 I-F Output
- L5 Lead to Electrolytic Capacitor E2-2
- L6 B+ 140 volts
- L7 Lead to L42 VOS Panel

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



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

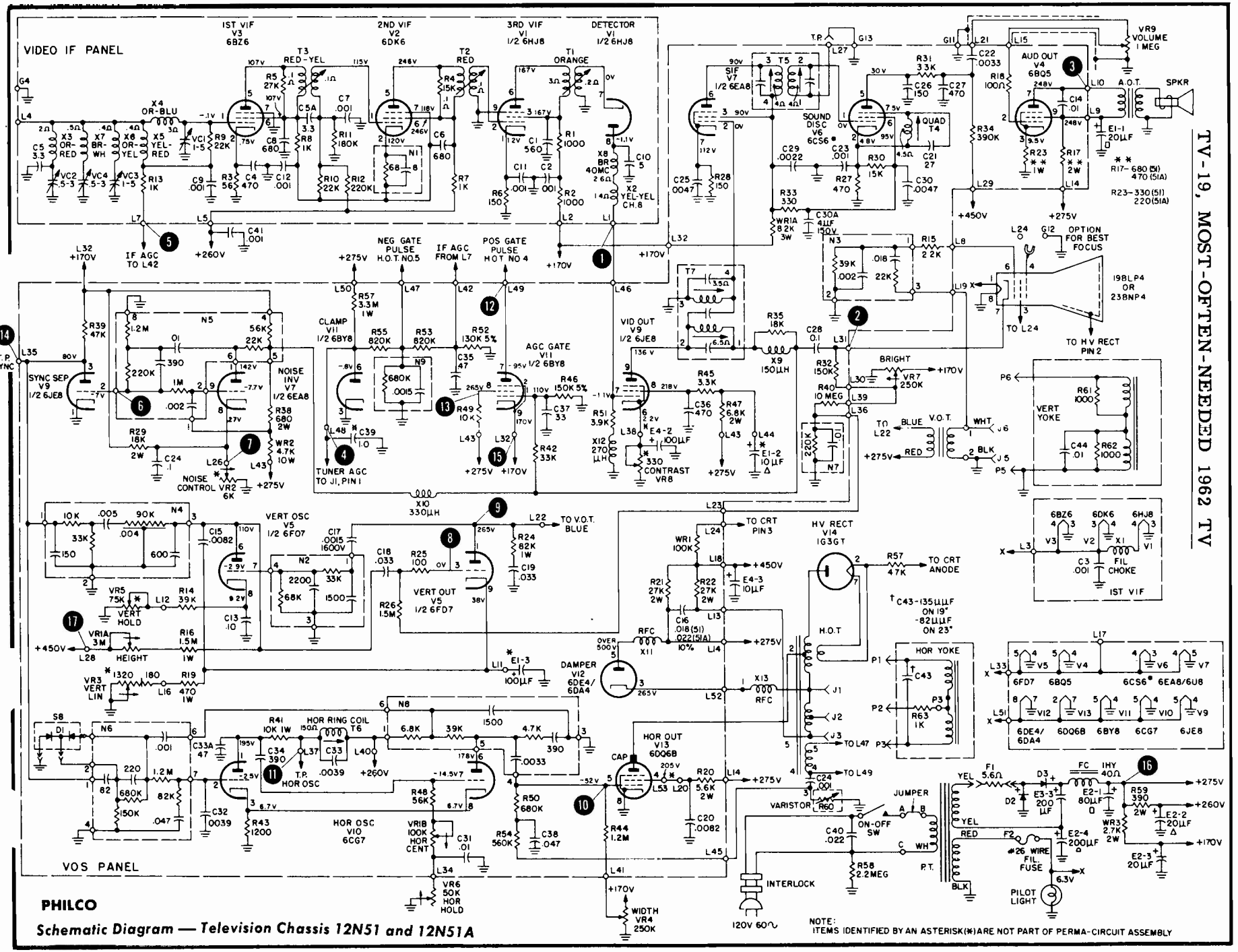




VIDEO I-F ALIGNMENT 12N51

AM Alignment

1. Connect tuner to receiver.
2. Remove 6BY8 gate tube.
3. Apply 2VDC to tuner AGC bus. (L49) on V.O.S. panel.
4. Apply 10V to I-F AGC bus. (L42) on V.O.S. panel.
5. Connect scope through 10K isolating resistor to I-F output (L46) on V.O.S. panel.
6. Apply AM signal to mixer grid through .001 capacitor.
7. With AM signal, 400 cycles modulated, 30%, make the following I-F trap and pole adjustments. Input level should keep signal out of overload.
   a. 41.25 mc.—null with VC3 (bias may be lowered).
   b. 47.25 mc.—null with VC2 and VC4 (bias may be lowered).
   c. Repeat "b" to insure maximum rejection. Reduce bias and increase signal level so that accurate null may be obtained.
   d. 42.75 mc.—VC1 and T2 for maximum.
   e. 45.0 mc.—T3 for maximum.
   f. 45.75 mc.—T1T (on tuner), for maximum.
   g. 44.3 mc.—adjust T1 for maximum.
   h. Adjustment of all cores should be made from top of coil downward.


VIDEO IF PANEL
IST VIF V3 6BZ6
2ND VIF V2 6DK6
3RD VIF VI 1/2 6HJ8
DETECTOR VI 1/2 6HJ8
SIF V7 1/2 6EA8
SOUND DISC V6 6CS6
AUD OUT V4 6BQ5
VOLUME 1 MEG
SPKR
A.O.T.
VID OUT V9 1/2 6JE8
SYNC SEP V9 1/2 6JE8
NOISE INV V7 1/2 6EA8
CLAMP VII 1/2 6BY8
AGC GATE VII 1/2 6BY8
VERT OSC V5 1/2 6FD7
VERT OUT V5 1/2 6FD7
HV RECT VI4 1G3GT
HOR OUT V13 6DQ6B
DAMPER VI2 6DE4/6DA4
HOR OSC V10 6CG7
19BLP4 OR 23BNP4
TO HV RECT PIN2
TO CRT PIN3
TO CRT ANODE
IST VIF
VERT YOKE
HOR YOKE
TO V.O.T. BLUE
TO L22
TO L24
TO L47
TO L49
IF AGC TO L42
IF AGC FROM L7
NEG GATE PULSE H.O.T. NO.5
POS GATE PULSE HOT NO 4
TUNER AGC TO J1, PIN 1
NOISE CONTROL VR2 6K
VERT HOLD
HEIGHT
VERT LIN
HOR HOLD
WIDTH VR4 250K
CONTRAST VR8
BRIGHT VR7 250K
H.O.T
RFC
HOR RING COIL T6
HOR OSC
T.P. SYNC
OPTION FOR BEST FOCUS
VOS PANEL
JUMPER
ON-OFF SW
INTERLOCK
PILOT LIGHT
#26 WIRE FIL. FUSE
P.T.
VARISTOR
120V 60~
+450V
+275V
+260V
+170V
PHILCO
Schematic Diagram — Television Chassis 12N51 and 12N51A
NOTE: ITEMS IDENTIFIED BY AN ASTERISK(*) ARE NOT PART OF PERMA-CIRCUIT ASSEMBLY

PHILCO Chassis 12N51, 12N51U, Alignment Information, Continued

(Continued from page 122)

Sweep Alignment

1. Repeat steps 1 to 5 inclusive in a.m. padding procedure.
2. Inject R-F sweep at channel 4 (R-F response should meet tuner specifications). Connect generator to antenna terminals.
3. Set detected sweep level at 3V, P to P, by adjusting R-F input level.
4. Adjust local oscillator for zero beat between R-F pix carrier and 45.75 mc. I-F pix carrier.
5. Observe sweep response (Figure 1-1) and make the following touch-up adjustments:
   a. 45.75 mc. position adjusted with T3.
   b. 42.5 mc. position adjusted with VC1 and T2. If 42.5 mc. is high, adjust with VC1. If 42.5 mc. is low, adjust with T2.
   c. Tilt curve (balance top for equal peaks) with T1.
6. *Don't* make any adjustments with T1T.

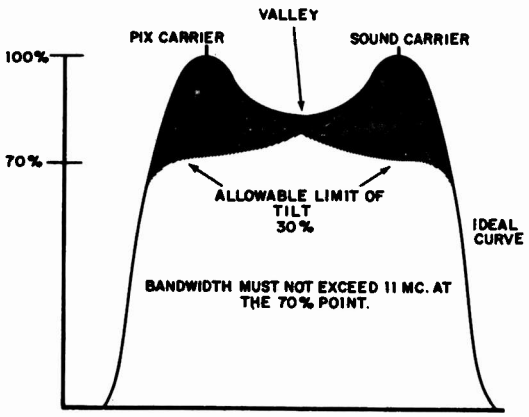


Figure 1-1. Tuner Response Curve Showing Bandpass Limits

Picture Quality Adjustment

1. Repeat steps 1 to 5 inclusive in a.m. padding procedure.
2. Apply 45.5 mc. a.m. signal, 400 cycle, 30%, modulated to mixer grid through .001 capacitor and make the following adjustment, making sure signal does not overload:
   a. Maximize with T1T (on tuner).

   NOTE: Due to the broadness of the mixer pole, it may be necessary to use a d.c. meter at the I-F output. Retuning the mixer from 45.75 mc. to 45.5 mc. will represent approximately ¼ turn of T1T core downward.
3. Repeat steps 1 to 4 inclusive in sweep alignment procedure.
4. Observe sweep response at padding bias.
5. Remove I-F and tuner bias (replace 6BY8 gate tube) and observe sweep response. The detector level is 1 volt, P to P.
6. Make no additional adjustments.

4.5 mc. Trap Alignment

1. Inject 4.5 mc. a.m. signal into L46 or use station signal.
2. Connect 4.5 mc. detector (see circuit Figure 1-2) to L31 (pin 7 of CRT).

   NOTE: Preliminary padding of 4.5 mc. test detector.

Connect detector to an accurate source of 4.5 mc. signal and pad core of transformer for maximum d.c. output voltage.

NOTE: When using generator, calibrate by zero beating with sound I-F developed from station signal.

3. Connect 20,000 ohms/volt meter, set to 2.5 volt range, to detector output.
4. Turn contrast control fully clockwise (to maximum).
5. Adjust 4.5 mc. trap (bottom core T7) for minimum indication.

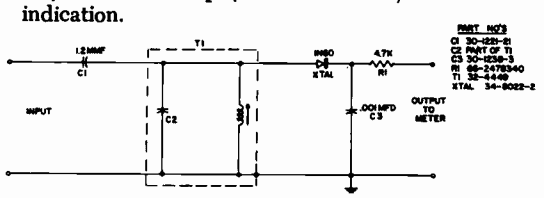
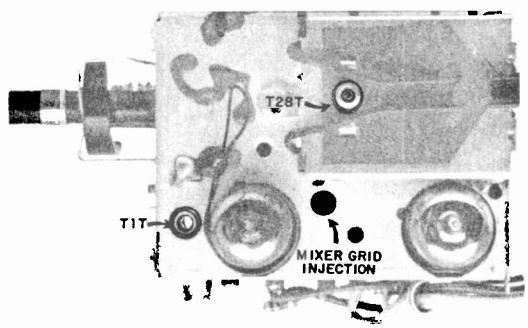


Figure 1-2. 4.5 mc. Detector Circuit

SOUND TAKE-OFF AND INTERSTAGE ALIGNMENT

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

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



RCA VICTOR

MODEL AND CHASSIS REFERENCE

MODEL	CABINET TYPE	CHASSIS	TUNER MOUNTING ASSEMBLY	TUNER	DEFLECTION	KINESCOPE
191-A-192 & 4	Portable	KCS133A	TMA18A	KRK96N	114°	19AVP4
191-A-192U & 4U	Portable	KCS133B	TMA18B	KRK97N KRK66AH	114°	19AVP4
191-AE-202 & 5 191-AE-208 & 9	Portable	KCS133F	TMA18C	KRK98E	114°	19AVP4
191-AE-202U & 5U 191-AE-208U & 9U	Portable	KCS133H	TMA18D	KRK99E KRK66AH	114°	19AVP4
*191-AER-204	Portable	KCS133C	TMA17A	KRK102H	114°	19AVP4

The final numeral in the model number designates the cabinet finish, as follows:—2-BLACK, 4-IVORY (4-GRAY for Model 191-AER-204 only), 5-VERMILION, 8-BLUE and 9-MAPLE. The suffix "U" in the model number identifies instruments with provision for UHF reception.
* This model incorporates a KRT1B (2 Button) Remote Control Transmitter and a KRS24C Remote Control Amplifier.

ADDITIONAL MODELS

MODEL	CHASSIS
192-A-094-MV	KCS133F
192-A-094-MU	KCS133H
192-A-098-MV	KCS133F
192-A-098-MU	KCS133H
192-A-099-MV	KCS133F
192-A-099-MU	KCS133H

(Material on pages 125 through 132)

CENTERING ADJUSTMENT

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

DEFLECTION YOKE ADJUSTMENT

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

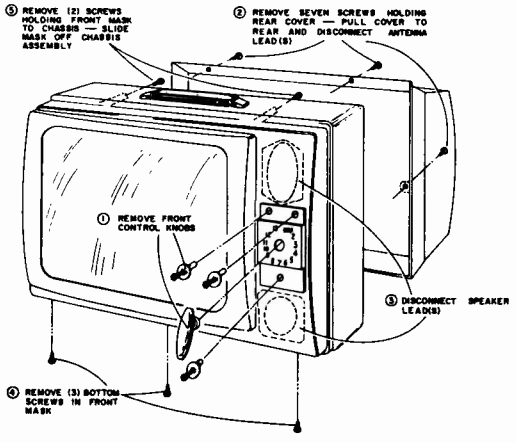


Figure 4—Chassis Removal and Safety Glass Cleaning

WIDTH ADJUSTMENT

The width adjustment is L101 and is located at the top of the chassis, between the horizontal output tube and the high voltage compartment.

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

VERTICAL SIZE AND LINEARITY ADJUSTMENTS

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

AGC & SYNC STABILIZER CONTROL ADJUSTMENTS

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

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

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

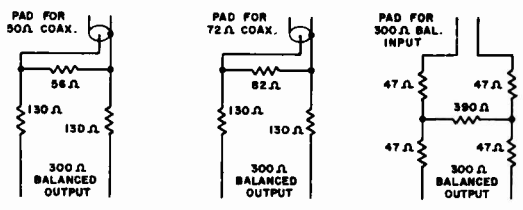


Figure 7—Sweep Attenuator Pads

RCA Victor Chassis KCS-133A, B, C, F, H, Alignment Information

PICTURE I-F TRANSFORMER AND TRAP ADJUSTMENTS

TEST EQUIPMENT CONNECTIONS:

BIAS ..... Ground the I-F AGC bus at terminal "N" of PW200.
OSCILLOSCOPE ..... Connect to 2nd Detector output at test point TP204. Set scope for 5v. p-p.
SIGNAL GENERATOR ..... Connect to mixer grid, at strap on S1B for KRK96, KRK97, KRK98 and KRK99 series tuners or to test point TP2 for KRK102 series tuners, in series with 1500 mmf. capacitor. (See Figure 14 or 16.)
SWEEP GENERATOR ..... Connect to the grid of the 3rd picture I-F amplifier, pin 1 of V206, through hole in board. Use shortest leads possible. (See Figure 20.)
VACUUM TUBE VOLTMETER.... Connect to 2nd Detector output at test point TP204. Use DC probe.
MISCELLANEOUS ..... Refer to Figure 20 for adjustment locations.

STEP		SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
1	Peak 2nd pix. I-F transformer	——	45.5 mc.	T207	Peak T207 and T206 on frequency for max. output on meter. Adjust generator for 3 volts on meter when finally peaked.
2	Peak 1st pix. I-F transformer	——	43.0 mc.	T206	
3	Adjust 3rd pix. I-F transformer	40-50 mc. (I-F)	41.25 mc. 45.75 mc.	T208 (top & bottom cores)	Adjust for maximum with response shown in Figure 8. Use 5v. p-p on scope.
4	Adjust 47.25 mc. trap	——	47.25 mc.	T205 (bottom)	Adjust for minimum output indication on meter.
5	Adjust 39.25 mc. trap	——	39.25 mc.	T205 (top)	Adjust for minimum output indication on meter.
6	Adjust 41.25 mc. trap	——	41.25 mc.	T204 (top)	Adjust for minimum output indication on meter.

SWEEP ALIGNMENT OF PICTURE I-F

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Set for 0.0 volts on I-F AGC bus at "N" of PW200, and —3.5 volts to tuner AGC terminal.
OSCILLOSCOPE ..... Connect a .001 mf. capacitor in series with a 180 ohm resistor from TP202 to ground, with the capacitor connected to TP202. Connect oscilloscope to the junction of the resistor and capacitor, using diode probe. (See Figure 20.)
SWEEP GENERATOR ..... Connect in series with 1500 mmf. to S1B (or TP2 on KRK102 series tuners) at mixer grid. Use shortest leads possible. (See Figure 14 or 16.)
SIGNAL GENERATOR ..... Couple loosely to sweep output cable to provide markers.
VACUUM TUBE VOLTMETER.... Connect to 2nd Detector output at test point TP204. Use DC probe.
MISCELLANEOUS ..... Refer to Figures 14, 16 and 20 for adjustment locations.

STEP		SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
Set channel selector to channel 4.					
7	Adjust mixer plate coil	40 - 50 mc. (I-F)	42.5 mc. 45.75 mc.	L11—KRK98 & 102 L17—KRK99 L50—KRK96 L51—KRK97	Sweep output set for 0.5 v. P-P on scope. Adjust for max. gain and response "A" in Figure 9. Max. allow. tilt 20%.
8	Adjust I-F input	40 - 50 mc. (I-F)	42.5 mc. 45.75 mc.	T204 (bottom)	
Repeat step 4 above, if necessary, for minimum output at 47. 25 mc. Remove 180 ohm, .001 capacitor and scope from TP202. Connect scope to test point TP204, using direct probe. Set bias supply for —6 volts at terminal "N" of PW200.					
9	Retouch I-F transformers	40 - 50 mc. (I-F)	42.5 mc. 45.0 mc. 45.75 mc.	T208 T207 T206	Adjust for response "B" in Figure 9. Use 5 v. P-P on scope.
Remove sweep from mixer grid. Couple signal generator to mixer, in series with pad shown in Figure 5. Set generator to 45.75 mc. and adjust output for exactly one and one-half (1½) volts on the "VoltOhmyst". Remove the pad and connect generator direct to mixer grid. Do not change generator output in step 10.					
10	Set 41.25 mc. attenuation	——	41.25 mc.	T206 & T208	Adjust for 1.2 to 1.5 volts on VTVM with response "B".
11	Connect sweep generator to antenna terminals using pad shown in Figure 7.				
	Check overall	Chans. 13 to 2	42.5 mc., 45.0 mc. 45.75 mc.	T207 & T208	Retouch slightly to correct overall tilt. Maintain response "B".

RCA Victor Chassis KCS-133A, etc., Alignment Information, Continued

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

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Apply —10 volts to the I-F AGC bus at terminal "N" on PW200.
OSCILLOSCOPE ..... Connect across speaker voice coil.
SIGNAL GENERATOR ..... Connect to test point TP204 on PW200.
VACUUM TUBE VOLTMETER .... Connect to output of diode detector shown in Figure 11. Set meter for negative voltage readings.
MISCELLANEOUS ..... Connect test diode detector, see Figure 11, to pin 7 of V202. Refer to Figure 20 for adjustment locations.

STEP		SIGNAL GENERATOR	ADJUST	REMARKS
Set contrast control maximum clockwise.				
12	Adjust Driver Transformer Primary and Secondary	4.5 mc.	T202 (top & bottom)	Adjust T202 top & bottom for maximum on meter. Set generator for 1.0 to 1.5 volts when peaked. Peak cores at open end of coils.
13	Adjust Sound Take-Off Trans.	4.5 mc.	T201	Adjust T201 for maximum negative DC on meter. Set generator for 1.0 to 1.5 volts on meter.
14	Disconnect the diode test detector. Turn off signal generator and tune in strongest signal in area adjusting volume control for normal volume (approx. ¼ turn from c.c.w.). Turn core of T203 flush with top of coil form.			
15	Adjust Sound Detector Trans.	Observing oscilloscope and listening to audio output adjust T203 clockwise to a peak. Continue clockwise to second louder peak and adjust for maximum on this peak.		
Move the oscilloscope to the kinescope cathode. Use the diode probe. Set the contrast control to maximum clockwise position.				
16	Adjust 4.5 mc. trap	4.5 mc., A-M Mod., 400 Cycles	T209	Adjust for minimum 400 cycle indication on oscilloscope.
	Alternate Method Using Generators With F-M Modulation Provided.			
12	Same as step 12 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation.			
13	Same as step 13 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation.			
14	Adjust Sound Detector Trans.	4.5 mc., 400 cycle F-M Mod., 7½ kc. Dev.	T203	Adjust T203 for max. 400~ output on scope using max. amplitude peak. Set volume control for .70 v. p-p on scope when peaked. See response in Figure 10.
15	Retouch Driver and Sound Take-Off. Trans. for breakout	4.5 mc., 400 cycle F-M Mod., 7½ kc. Dev.	T201 & T202	Decrease input to minimum usable signal. Retouch T201 & T202 for symmetrical breakout. Response in Figure 10.
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.		

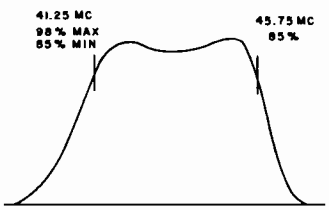


Figure 8—T208 3rd Pix I-F Response

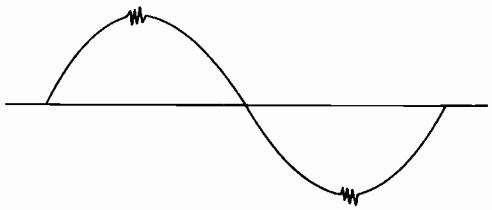


Figure 10—Sound Detector Response

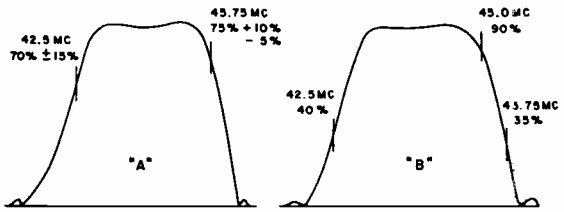


Figure 9—Mixer Plate and Overall I-F Response

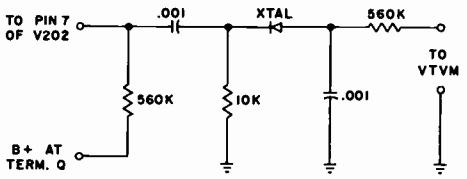


Figure 11—Sound Diode Detector

RCA Victor Chassis KCS-133A, etc., Service Information, Continued

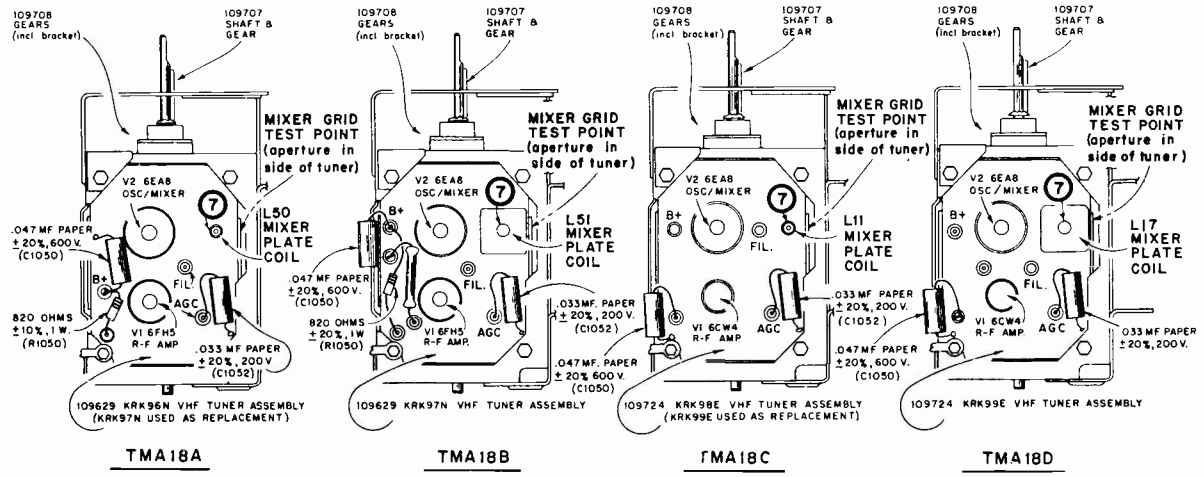


Figure 16—TMA18A, B, C & D Tuner Mounting Assemblies

PW200 SECURITY SEALED CIRCUIT ASSEMBLY

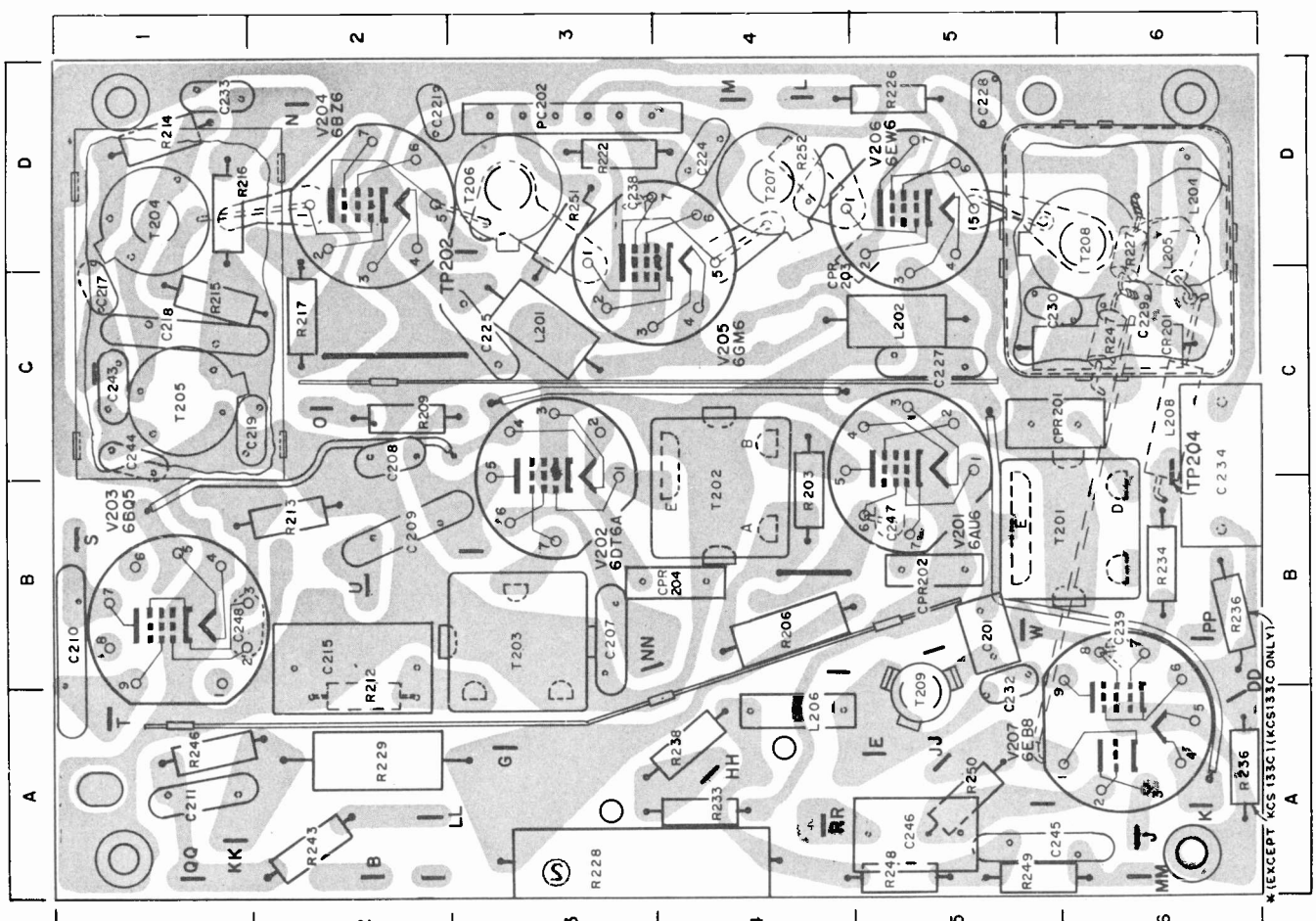


Figure 18—PW200 Sealed Circuit I-F and Video Assembly Composite Diagram

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	D5
C228	C6
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	A4
L206	C6
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	B6
R238	A4
R243	A2
R246	A1
R247	C6
R248	A5
R249	A5
R250	A5
R251	D3
R252	D4
T201	B6
T202	B4
T203	B3
T204	D1
T205	C1
T206	D3
T207	D4
T208	D6
T209	A5

*See note on illustration.

RCA Victor Chassis KCS-133A, etc., Service Information, Continued

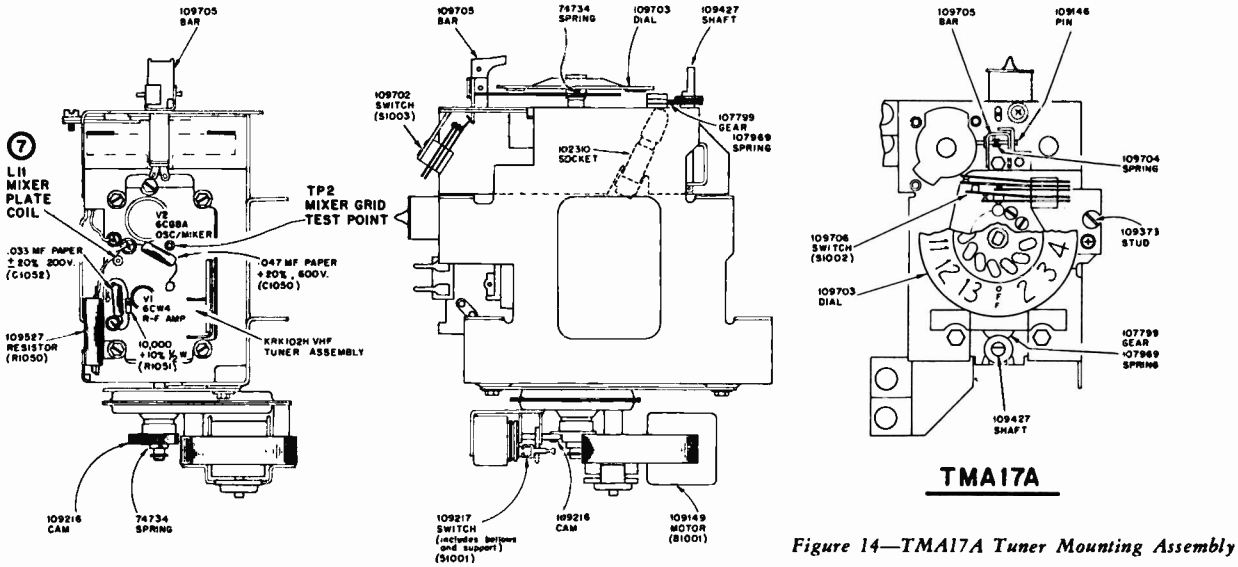


Figure 14—TMA17A Tuner Mounting Assembly

PW500 COMPONENT LOCATION GUIDE

C501	C1
C502	D1
C504	A4
C505	A4
C506	B4
C508	B3
C509	C1
C510	B1
C511	B3
C512	A1
C514	B1
C515	A2
C516	C3
C517	C3
C518	D3
C519	C3
C520	D3
C521	D3
C522	D4
C523	C5
C524	C4
C525	C3
C526	D5
C529	C4
L501	C5
PC501	B4
PC502	A3
PC503	A1
R502	C1
R504	D2
R506	D2
R507	D2
R508	D2
R509	D2
R510	D1
R511	C1
R514	A4
R516	A4
R517	A5
R518	A5
R521	B4
R522	B4
R523	B3
R525	B4
R528	B1
R529	C3
R531	A3
R532	A2
R533	C2
R535	A1
R536	A1
R537	C3
R538	D3
R539	D3
R540	D4
R541	C4
R542	C4
R543	C4
R544	C4
R545	D5
R546	C3
R547	B3
R548	C3
R549	A3
R555	C1
SR501	D3

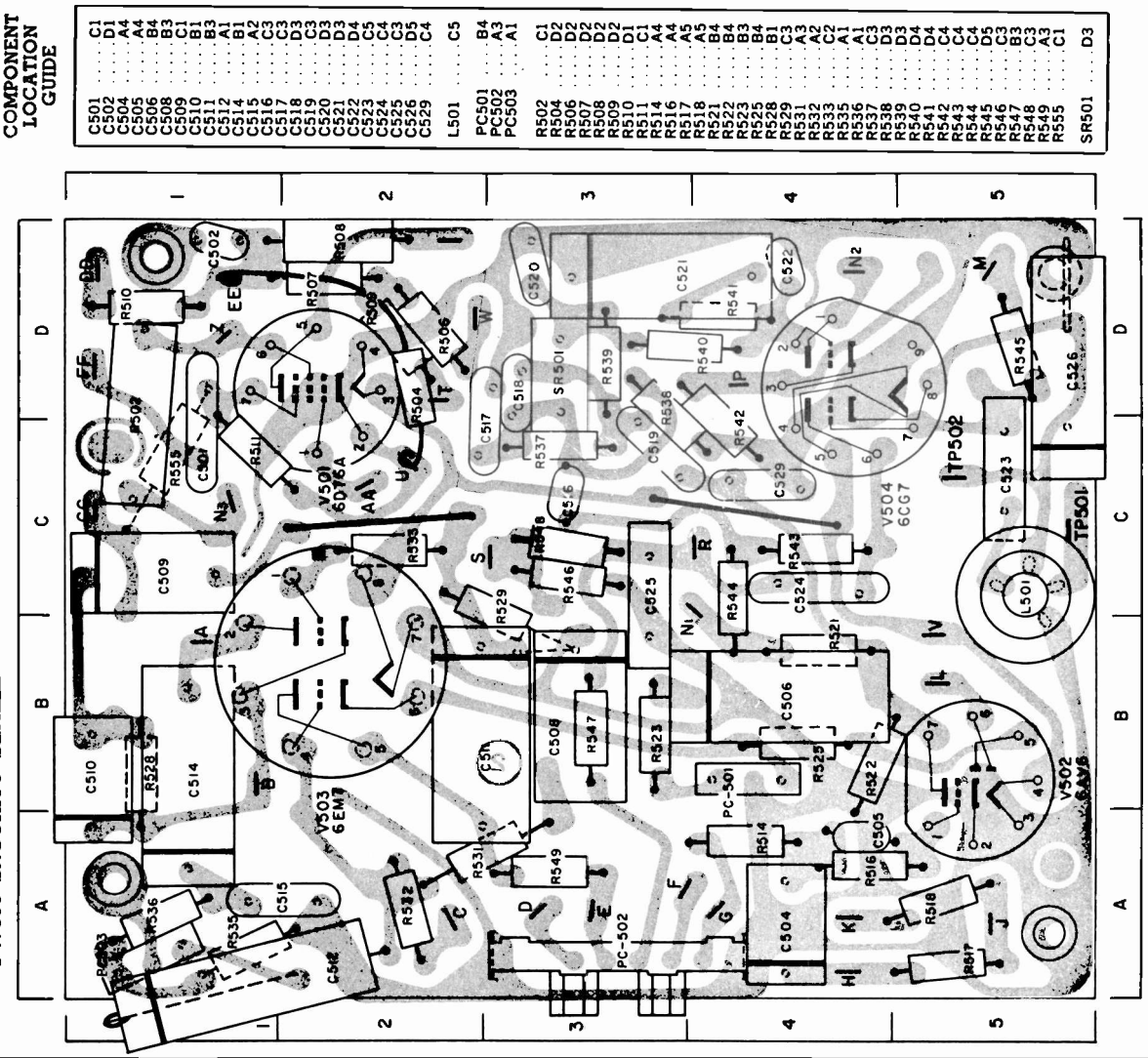


Figure 19—PW500 Sealed Circuit Deflection Assembly Composite Diagram

Figures 18 and 19 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.

RCA Victor Chassis KCS-133B,C,F, Tuner Diagrams, Continued

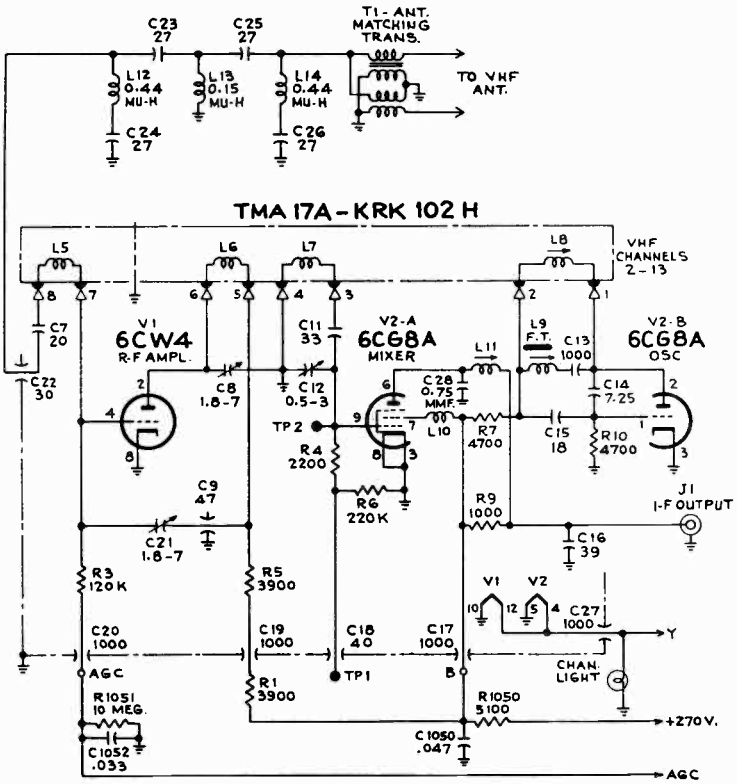


Figure 12—KRK102H VHF Tuner Schematic Diagram for KCS133C Chassis

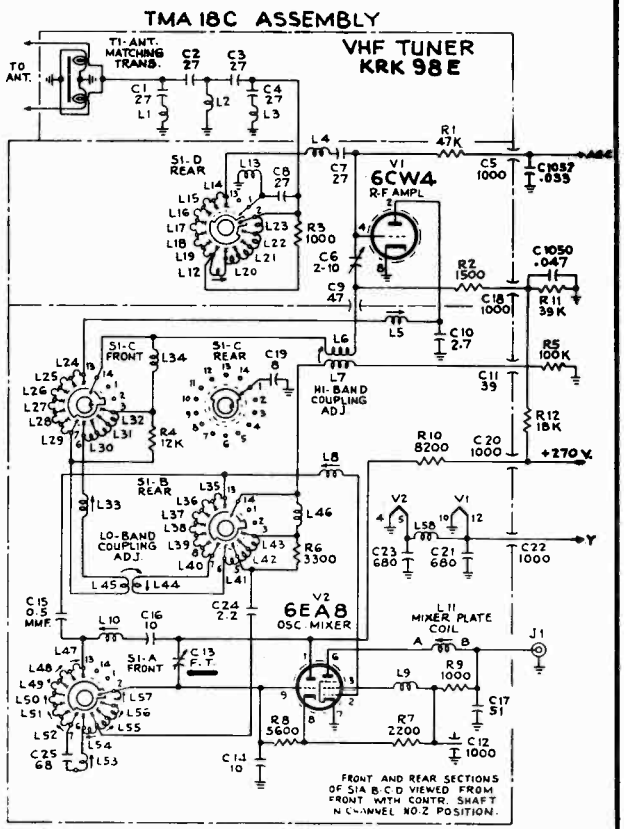
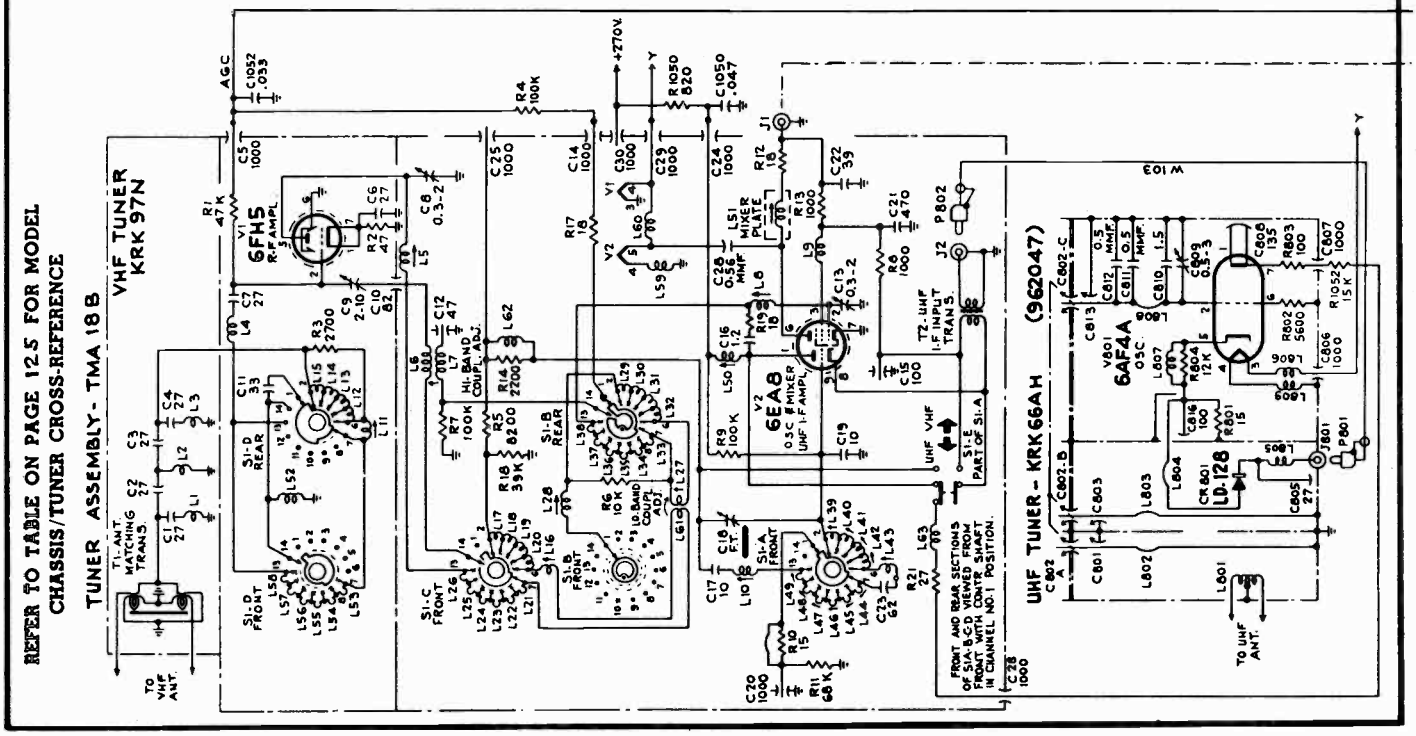
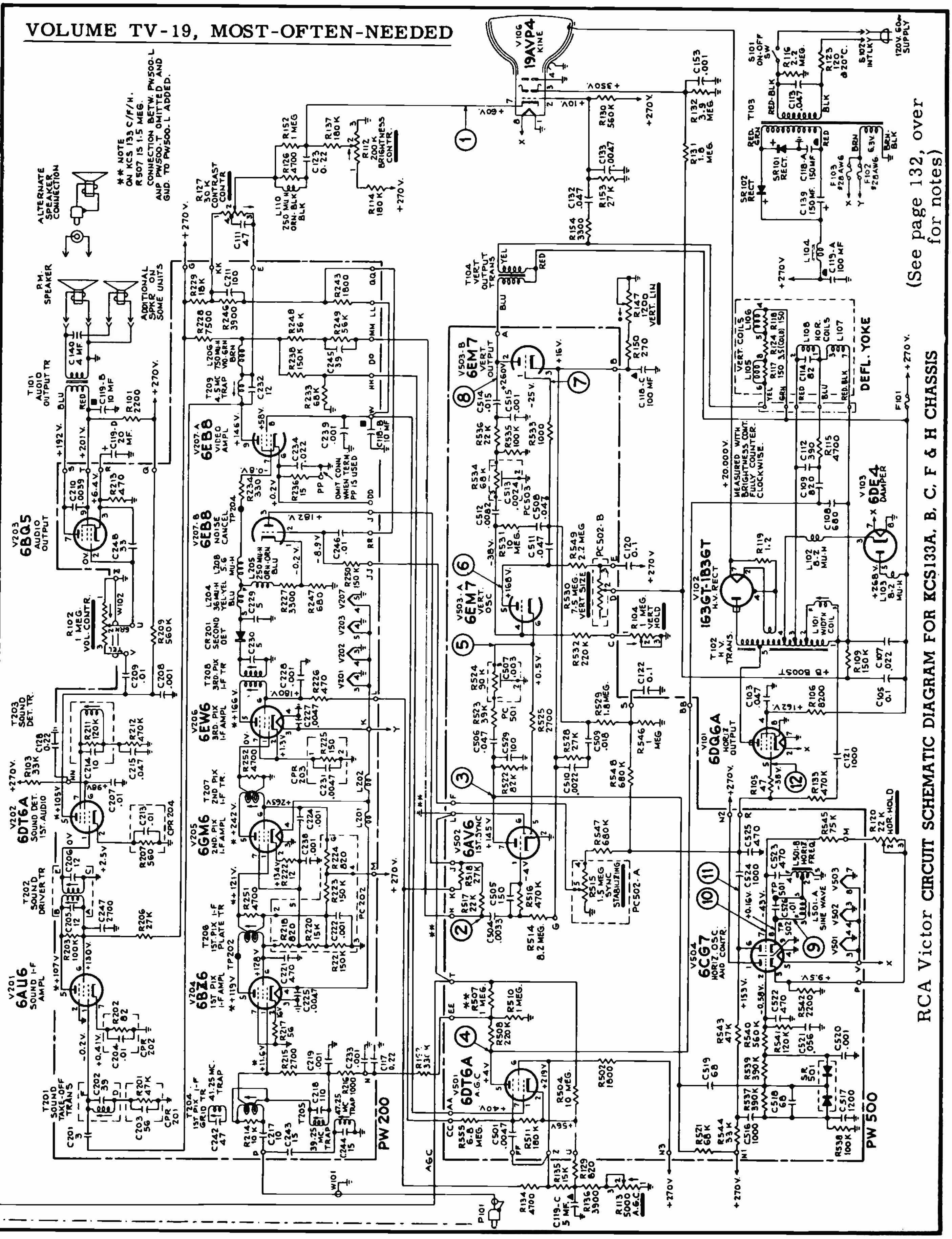


Figure 15—KRK98E VHF Tuner Circuit Schematic Diagram for KCS133F Chassis





RCA Victor CIRCUIT SCHEMATIC DIAGRAM FOR KCS133A, B, C, F & H CHASSIS

(See page 132, over for notes)

RCA Victor Chassis KCS-133A, etc., Service Information, Continued

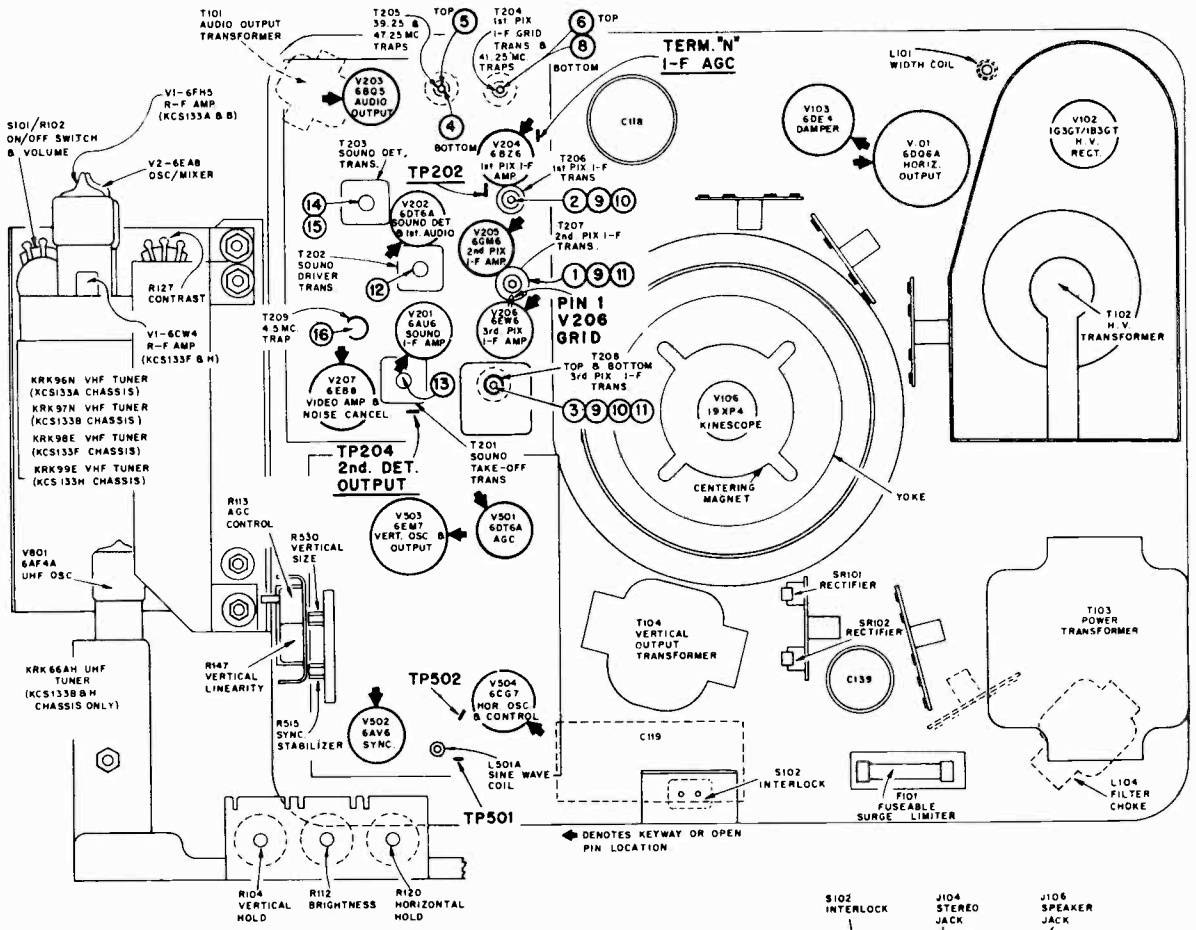


Figure 20 Chassis Rear View

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

All resistance values in ohms. K = 1000.

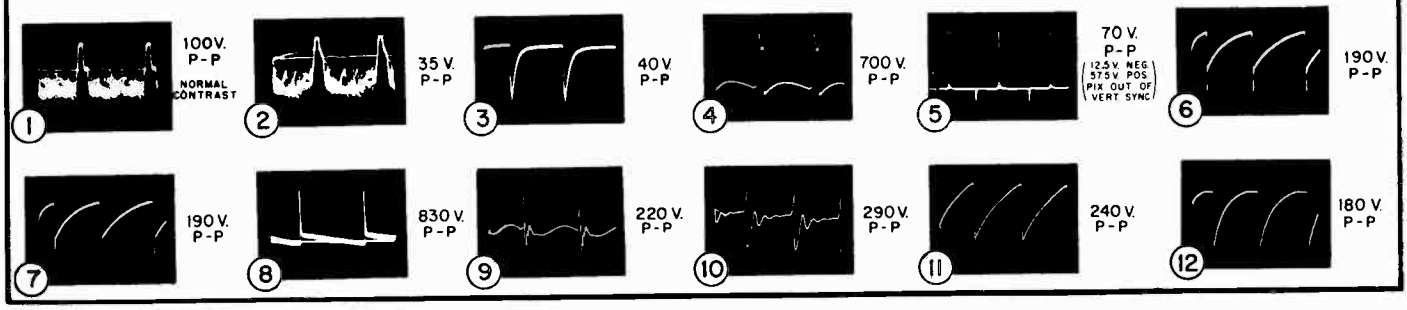
All capacitance values less than 1 in F and above 1 in MF unless otherwise noted.

Direction of arrows at controls indicates clockwise rotation.

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

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

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



RCA VICTOR

MODEL	CHASSIS	NAME
192-A-062MV	KCS138A	*The "TRIMETTE" Series Sportabout*
192-A-062MU	KCS138B	
192-A-064MV	KCS138A	
192-A-064MU	KCS138B	
192-A-072MV	KCS137A	*The "TRAVEL-MATE" Series Sportabout*
192-A-072MU	KCS137B	
192-A-075MV	KCS137A	
192-A-075MU	KCS137B	
192-A-078MV	KCS137A	
192-A-078MU	KCS137B	
192-A-079MV	KCS137A	
192-A-079MU	KCS137B	
*192-A-072RS	KCS137P	*The "CASUAL" Series Sportabout*
*192-A-075RS	KCS137P	
*192-A-078RS	KCS137P	
*192-A-079RS	KCS137P	

*These models incorporate a KRT3A (3-Button) Remote Control Transmitter, and a KRS25A Remote Control Amplifier.

Chassis KCS137 & KCS138 Series

CHASSIS DESIGNATIONS

CHASSIS	TUNERS	TUNER MOUNTING ASSEMBLY
KCS138A	KRK103A	———
KCS138B	KRK104A, KRK66AJ	———
KCS137A	KRK103B	TMA25A
KCS137B	KRK104B, KRK66AJ	TMA25B
KCS137P	KRK102L	TMA26A

WIDTH ADJUSTMENT

The width adjustment L101 is located on the rear of the chassis just above the yoke socket.

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

HEIGHT AND VERTICAL LINEARITY ADJUSTMENTS

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

AGC CONTROL ADJUSTMENT

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

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

NOISE STABILIZER CONTROL ADJUSTMENT KCS137 CHASSIS ONLY

Before adjustment of the Noise Stabilizer control is attempted, the AGC control should be properly adjusted.

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

CENTERING ADJUSTMENT

Centering is accomplished by adjustment of two discs located at the back of the deflection yoke. By alternately rotating one disc with respect to the other, then rotating both discs simultaneously around the neck of the tube, proper centering of the picture can be obtained.

HORIZONTAL OSCILLATOR ADJUSTMENT

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

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

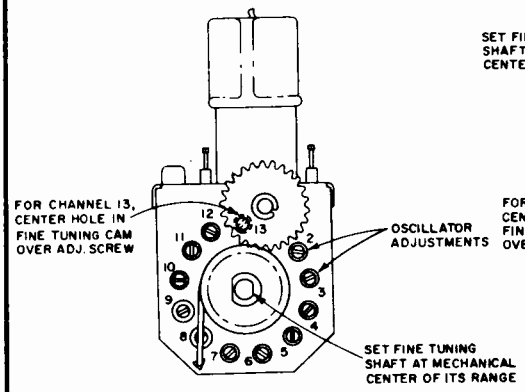
If the above check is satisfactory, no adjustment of L501A should be necessary. If the check is unsatisfactory, or doubtful, then perform the following check:

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

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

(Cont'd. next page)

RCA Victor Chassis KCS-137 & KCS-138 Series, Service Information, Continued



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

Figure 2—Oscillator Adjustments

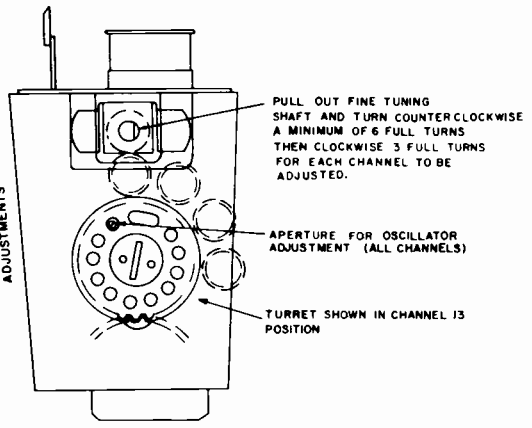
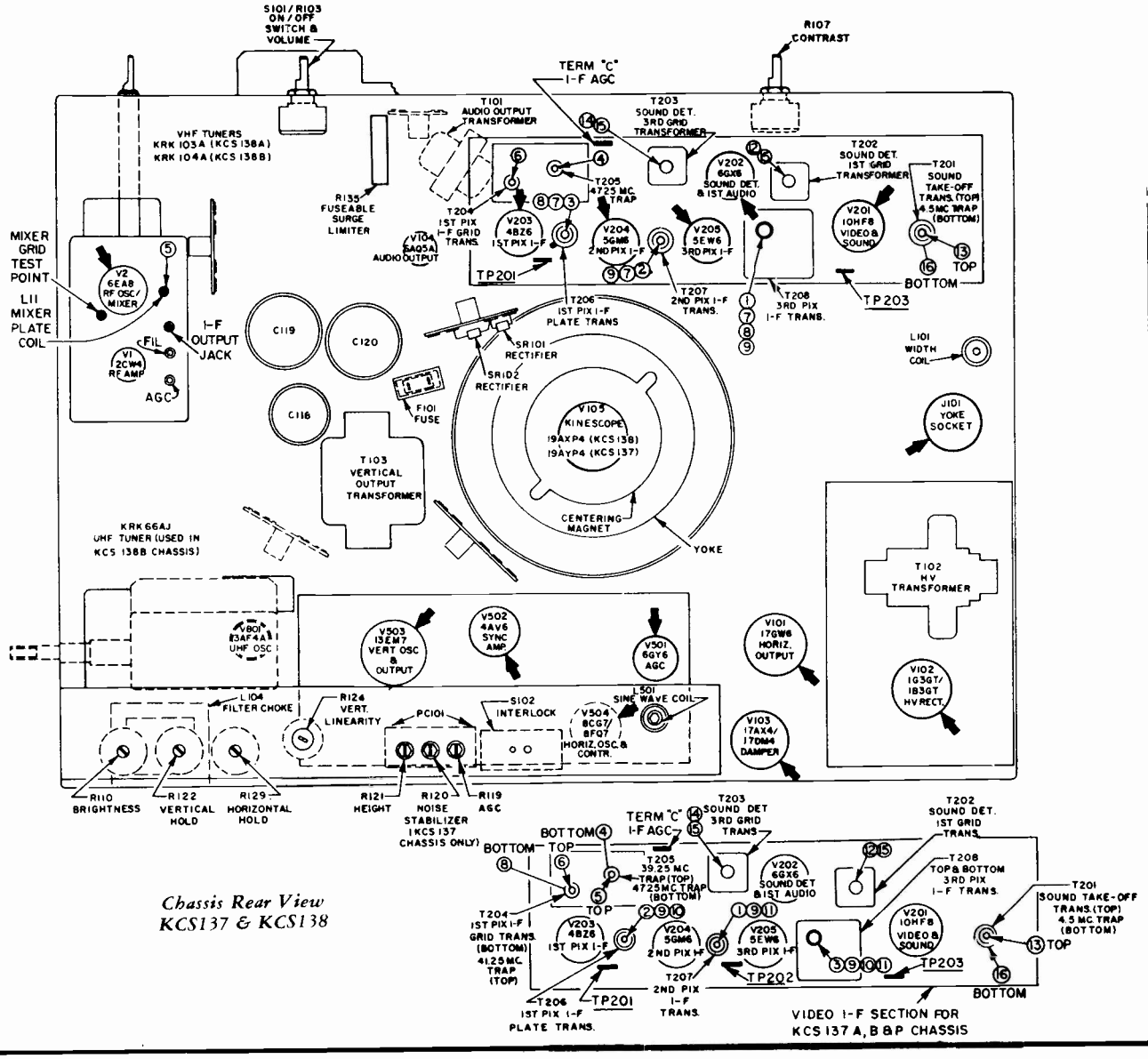


Figure 3—Oscillator Adjustments (One-Set Fine Tuning)



Chassis Rear View KCS137 & KCS138

RCA Victor Chassis KCS-137 & KCS-138 Series, Alignment Information, Continued

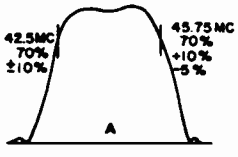
SOUND I-F, SOUND DETECTOR AND 4.5 MC TRAP ALIGNMENT

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Apply −10 volts to the IF AGC bus at terminal "C" on PW200.
OSCILLOSCOPE ..... Connect across speaker voice coil.
SIGNAL GENERATOR ..... Connect to test point TP203 on PW200.
VACUUM TUBE VOLTMETER..... Connect to output of diode detector shown in Figure 12. Set meter for negative voltage readings.
MISCELLANEOUS ..... Connect test diode detector, see Figure 12, to Pin 7 of V202. Refer to Figure 24 for adjustment locations.

	STEP	SIGNAL GENERATOR	ADJUST	REMARKS
12	Adjust detector grid transformer	4.5 mc.	T202	Adjust for maximum negative DC on meter. Set generator for 1.0 to 1.5 volts when peaked. T201A top core and T202 core should penetrate the coil from top of can when finally peaked.
13	Adjust sound take-off transformer	4.5 mc.	T201A (top)	
14	Disconnect the diode test detector. Turn off signal generator and tune in strongest signal in area, adjusting volume control for normal volume (approx. ¼ turn from C.C.W.). Turn core of T203 flush with top of coil form.			
15	Adjust sound detector transformer	Observing oscilloscope and listening to audio output, adjust T203 clockwise to a peak. Continue clockwise to second louder peak and adjust for maximum on this peak.		
	Move the oscilloscope to terminal "U" on PW200 or KCS138 chassis. (Connect to kinescope end of C105 on KCS137 chassis.) Use diode probe. Set contrast control to maximum clockwise position.			
16	Adjust 4.5 mc. trap	4.5 mc., 400 cycle, AM mod.	T201B (bottom)	Adjust for minimum 400 cycle indication on oscilloscope. The core should penetrate the coil from the bottom of the can when finally adjusted.
	Alternate Method Using Generators With F-M Modulation Provided.			
12	Same as Step 12 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation.			
13	Same as Step 13 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation.			
14	Adjust sound detector transformer	4.5 mc., 400 cycle F-M mod., 7½ kc. dev.	T203	Adjust for max. 400 cycle output on scope using max. amplitude peak. Set volume control for .70 v. p-p on scope when peaked. See response in Figure 11.
15	Retouch grid trans. and sound take-off transformer for breakout	4.5 mc., 400 cycle F-M mod; 7½ kc. dev.	T201A & T202	Decrease input to minimum usable signal. Retouch T201A and T202 for symmetrical breakout response in Figure 11. The top core of T201A and core of T202 should penetrate the coil from top of can when finally peaked.
	Move the oscilloscope to terminal "U" on PW 200 on KCS138 chassis. (Connect to kinescope cathode side of C105 on KCS137 chassis.) 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 8—T208 3rd Pix I-F Response (KCS137 Chassis)



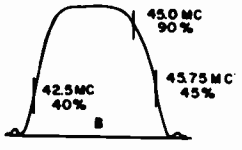
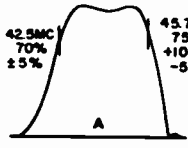


Figure 9—Mixer Plate and Overall I-F Response (KCS137 Chassis)



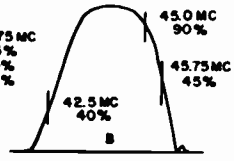


Figure 10—Mixer Plate and Overall I-F Response (KCS138 Chassis)

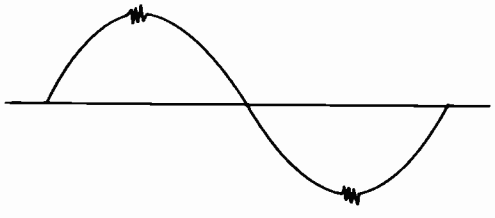


Figure 11—Sound Detector Response

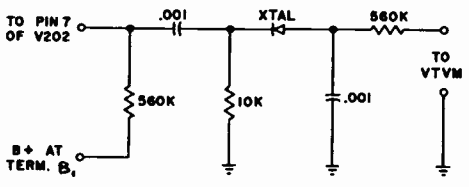


Figure 12—Sound Diode Detector

RCA Victor Chassis KCS-137 & KCS-138 Series, Service Information, Continued

PW200 SECURITY SEALED CIRCUIT ASSEMBLY

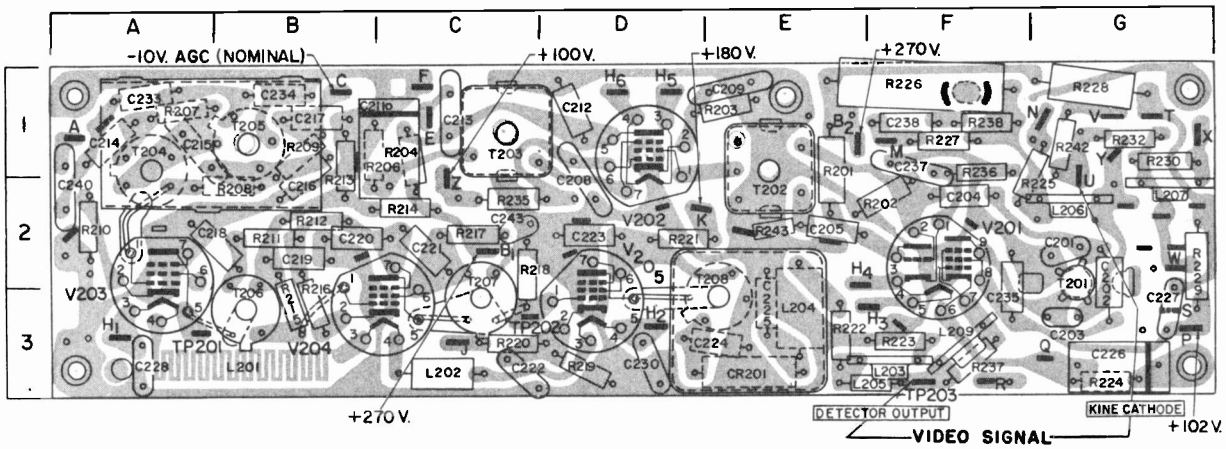


Figure 19—PW200 Sealed Circuit I-F and Video Assembly Composite Diagram (KCS137)

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	

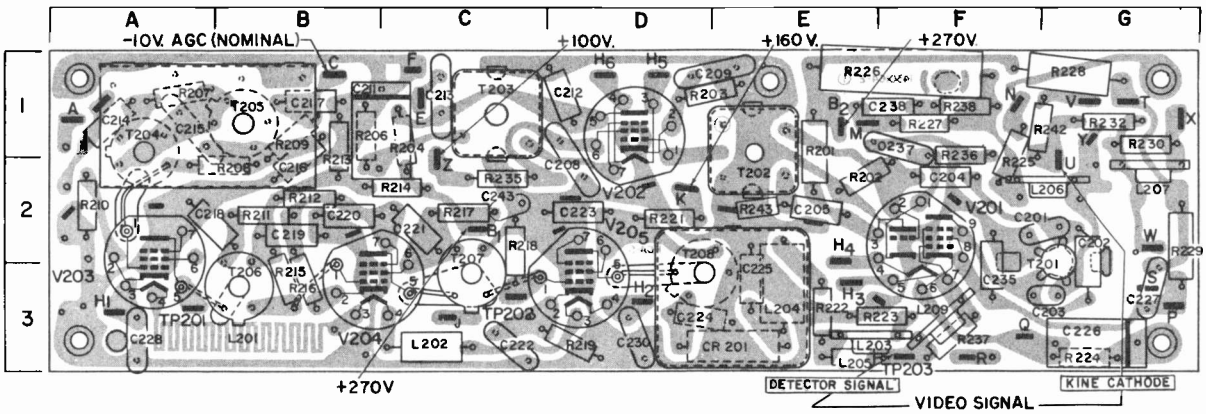


Figure 20—PW200 Sealed Circuit I-F and Video Assembly Composite Diagram (KCS138)

PW200 COMPONENT LOCATION GUIDE

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

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

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

RCA Victor Chassis KCS-137 & KCS-138 Series, Service Information, Continued

PW500 SECURITY SEALED CIRCUIT ASSEMBLY

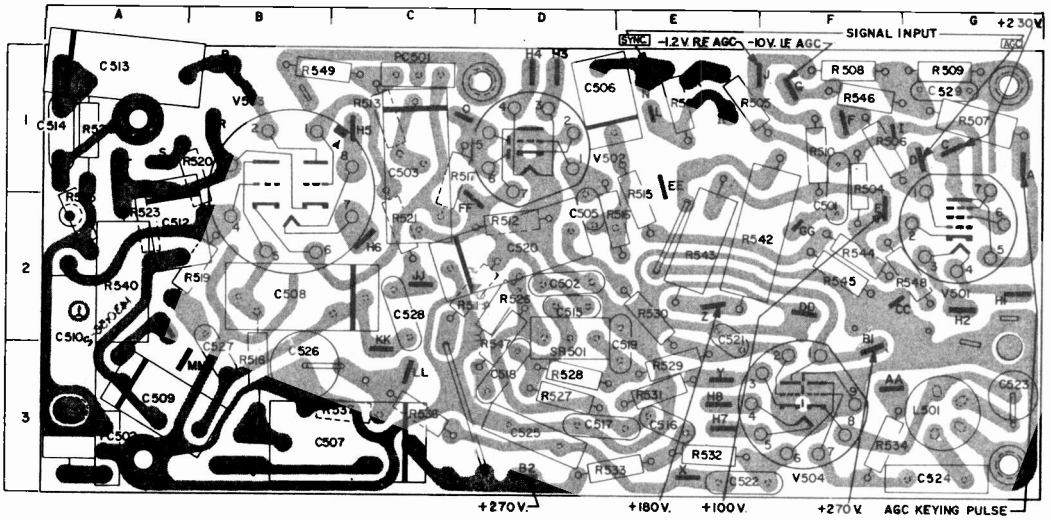


Figure 21—PW500 Sealed Circuit Deflection Assembly Composite Diagram (KCS137)

PW500 COMPONENT LOCATION GUIDE

C501.....F1 C502.....D2 C503.....C1 C505.....D2 C506.....D1 C507.....C3 C508.....B2 C509.....A3 C510.....A3 C512.....A2	C513.....A1 C514.....A1 C515.....D2 C516.....E3 C517.....D3 C518.....D3 C519.....E2 C520.....D2 C521.....E2 C522.....E3	C523.....G3 C524.....G3 C525.....D3 C526.....B3 C527.....B3 C528.....C2 C529.....G1 L501.....G3	PC501...C1 PC502...A3 R501.....E1 R504.....F1 R505.....E1 R506.....F1 R507.....G1 R508.....F1 R509.....G1	R510.....F1 R511.....D2 R512.....D2 R513.....C1 R515.....E2 R516.....E2 R517.....C1 R518.....B3 R519.....B2 R520.....B1	R521.....C2 R523.....A2 R524.....A1 R525.....A2 R526.....D2 R527.....D3 R528.....D3 R529.....E3 R530.....E2 R531.....E3	R532.....E3 R533.....E3 R534.....F3 R536.....C3 R537.....C3 R540.....A2 R542.....F2 R543.....E2 R544.....F2 R545.....F2	R546.....F1 R547.....D2 R548.....G2 R549.....B1 SR501....D2

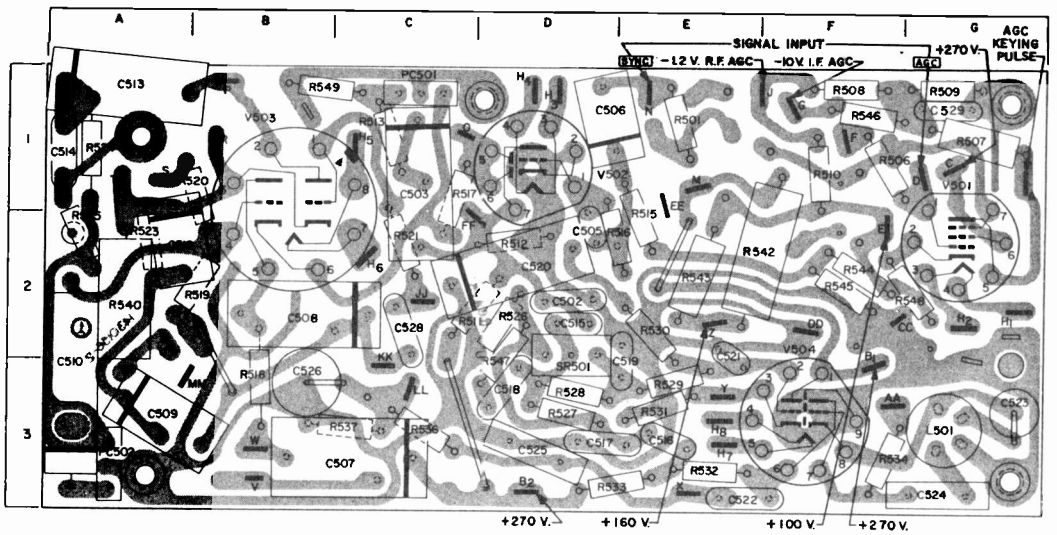
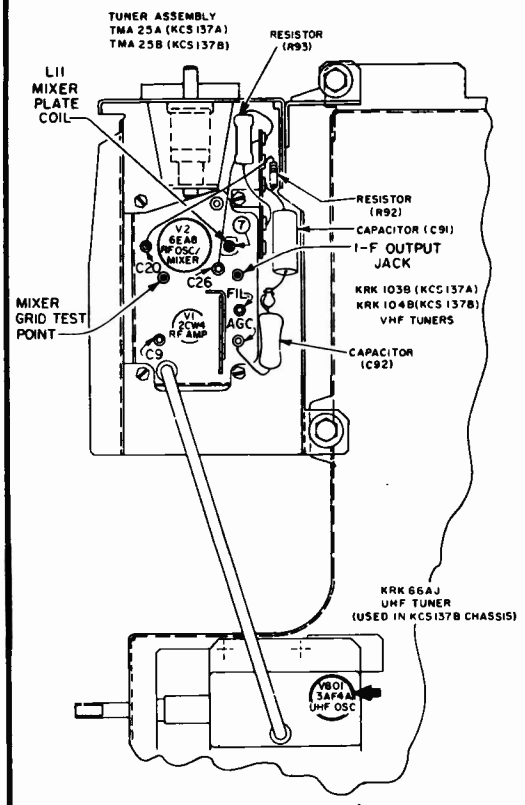


Figure 22—PW500 Sealed Circuit Deflection Assembly Composite Diagram (KCS138)

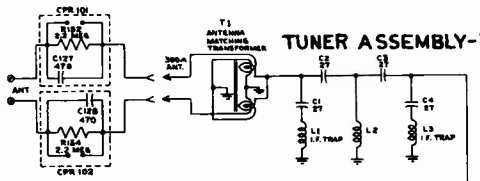
PW500 COMPONENT LOCATION GUIDE

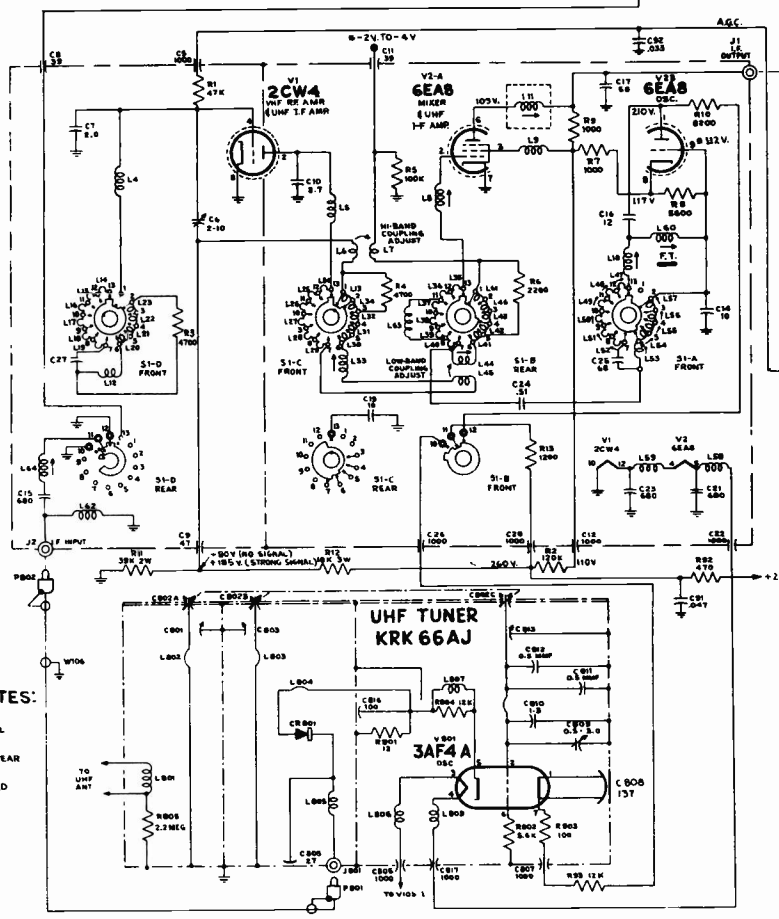
C502.....D2 C503.....C1 C505.....D2 C506.....D1 C507.....C3 C508.....B2 C509.....A3 C510.....A3 C512.....A2	C513.....A1 C514.....A1 C515.....D2 C516.....E3 C517.....D3 C518.....D3 C519.....E2 C520.....D2 C521.....E2	C522.....E3 C523.....G3 C524.....G3 C525.....D3 C526.....B3 C528.....C2 C529.....G1 L501.....G3	PC501....C1 PC502....A3 R501.....E1 R506.....F1 R507.....G1 R508.....F1 R509.....G1 R510.....F1	R511.....D2 R512.....D2 R513.....C1 R515.....E2 R516.....E2 R517.....C1 R518.....B3 R519.....B2 R520.....B1	R521.....C2 R523.....A2 R524.....A1 R525.....A2 R526.....D2 R527.....D3 R528.....D3 R529.....E3 R530.....E2	R531.....E3 R532.....E3 R533.....E3 R534.....F3 R536.....C3 R537.....C3 R540.....A2 R542.....F2 R543.....E2	R544.....F2 R545.....F2 R546.....F1 R547.....D2 R548.....G2 R549.....B1 SR501....D2

RCA Victor Chassis KCS-137 & KCS-138 Series, Continued



Tuner Section for KCS137A and KCS137B Chassis





FILAMENT CONTINUITY CHECK DIAGRAM

BALLOONS ① & ② ETC. INDICATE CONTINUITY CHECK POINTS ACCESSIBLE FROM TUBE SIDE OF CHASSIS.

BALLOONS MARKED WITH AN ASTERISK ✱ INDICATE CHECK POINTS WHICH INCLUDE 2 TUBES FROM PRECEEDING CHECK POINT.

TO LOCATE OPEN FILAMENT.

A SET "VOLTOHMYST" TO 150V. AC RANGE

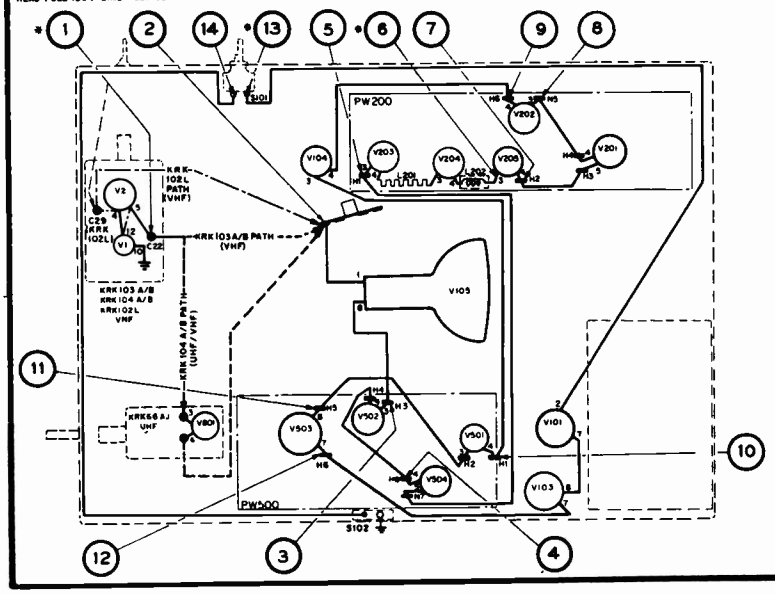
B CLIP "GROUND" LEAD TO CHASSIS APPLY A.C. PROBE TO CHECK POINTS INDICATED, BEGINNING AT ① ON TUNER

C ALL CHECK POINTS AHEAD OF OPEN FILAMENT WILL READ ZERO VOLTS — ALL CHECK POINTS PAST OPEN FILAMENT WILL READ FULL 120V LINE VOLTAGE.

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. O—O INDICATES THRU CONNECTION FROM FRONT TO REAR OF SWITCH.
3. O INDICATES CONTACTS INSULATED-NOT CONNECTED FROM FRONT TO REAR OF SWITCH.

✱USE 100 K ISOLATION RESISTOR IN SERIES WITH PROBE.



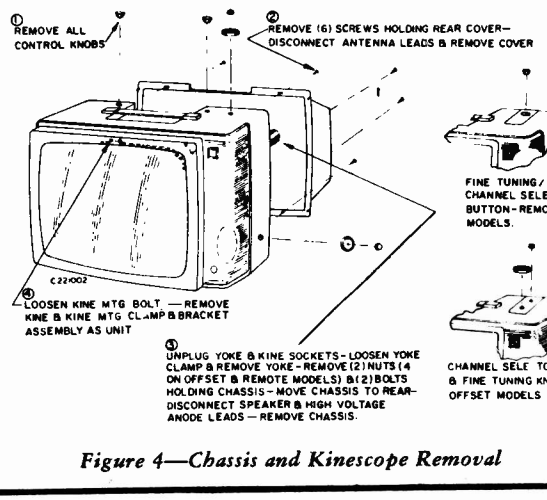
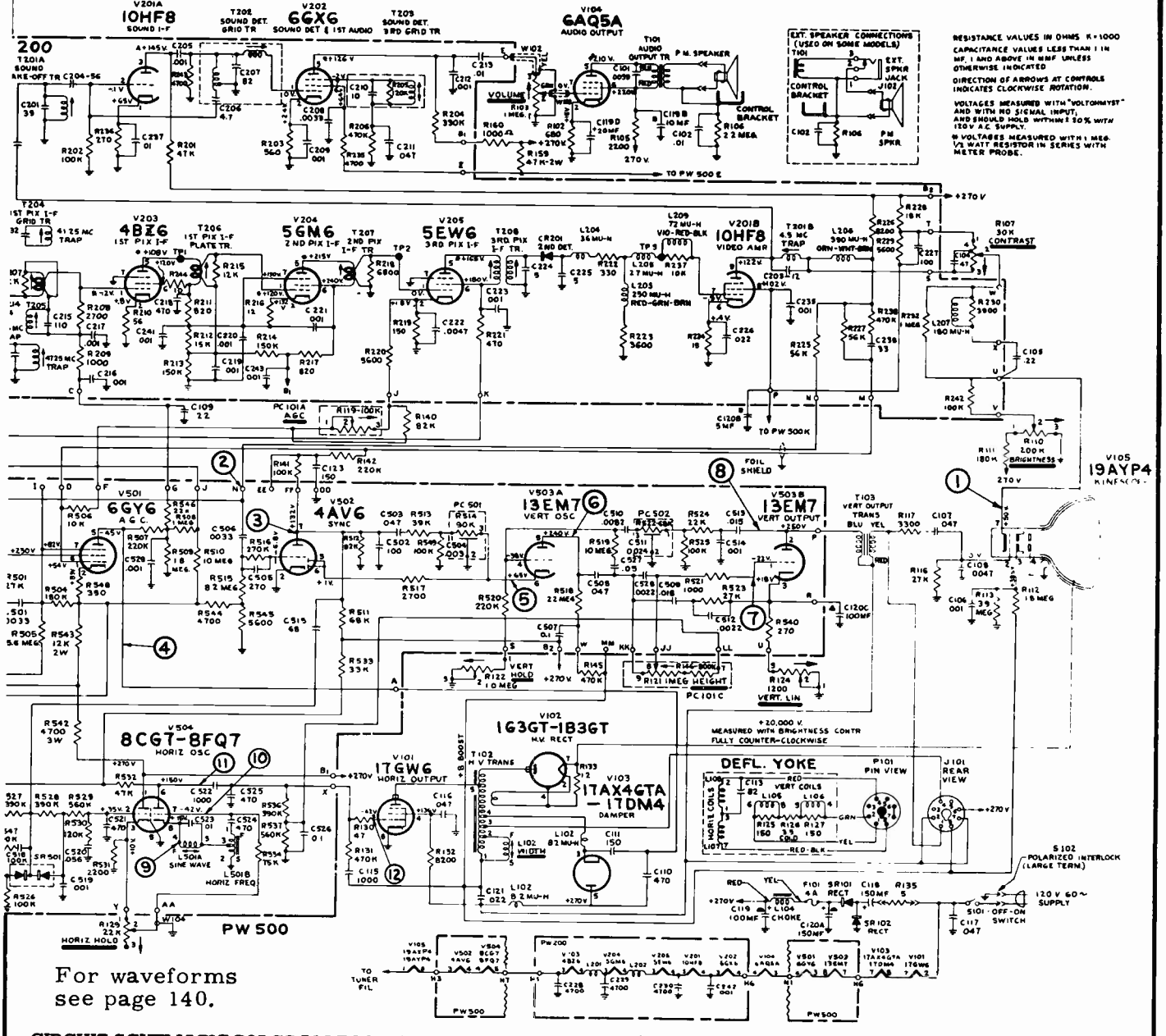


Figure 4—Chassis and Kinescope Removal

RCA Victor Chassis KCS-137A, B, P, Schematic Diagram, Continued



CIRCUIT SCHEMATIC DIAGRAM FOR KCS137A, B & P CHASSIS (Tuner shown used with KCS-137B)

CHASSIS REMOVAL

Remove the volume, contrast, channel selector and fine tuning knobs from the top of the cabinet by pulling the knobs upward and off their shafts. (On UHF models, also remove the concentric UHF dial and tuning knobs from the lower right-hand side of the cabinet by pulling the knobs outward and off their shafts.) Refer to Fig. 4.

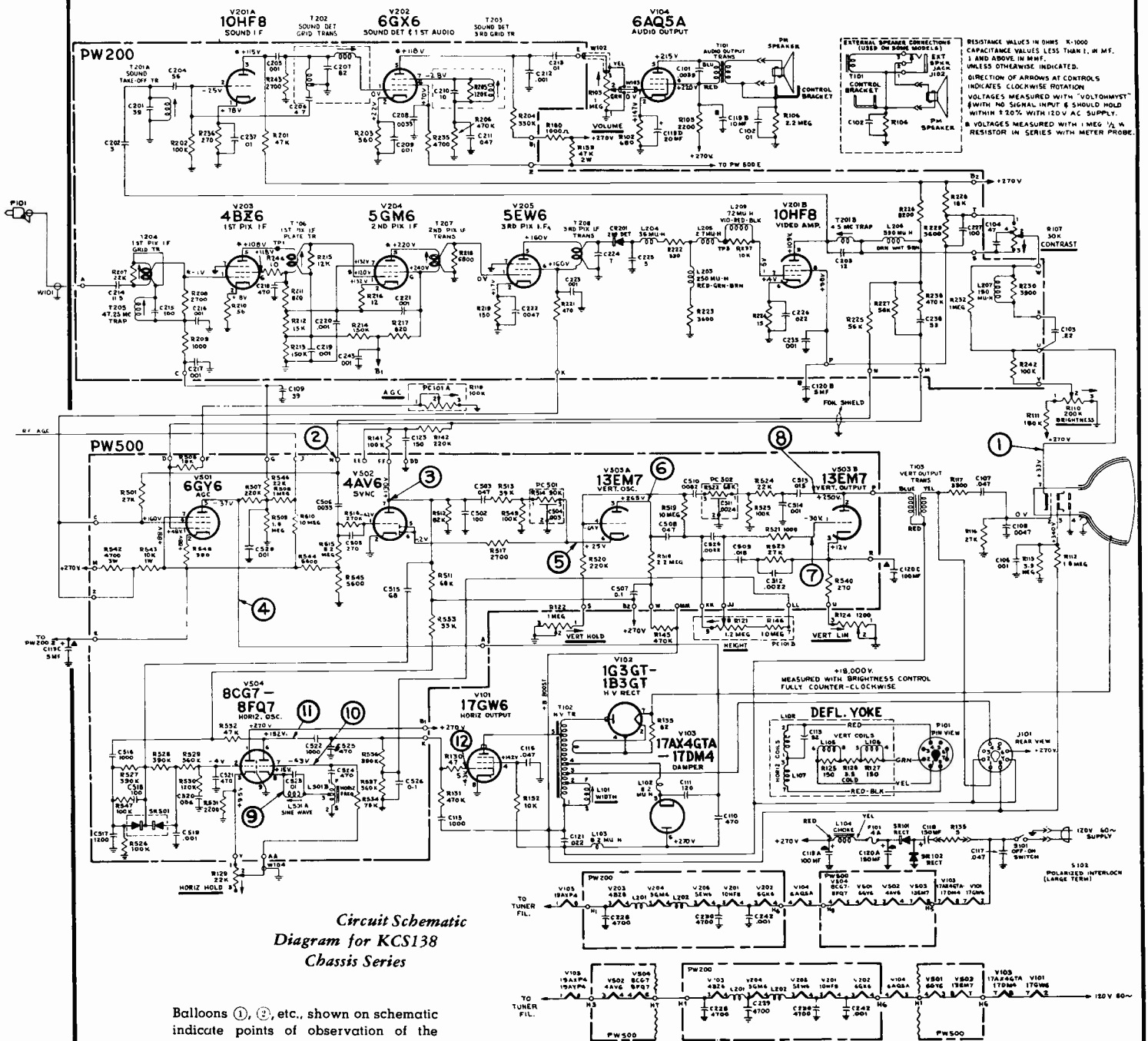
Remove the six screws in the rear cover—two at the top, two at the bottom, one at the antenna terminals, and one at the line cord interlock. Disconnect the cabinet antenna leads and pull the cover off to the rear. (On UHF models, also disconnect the UHF loop antenna before removing the rear cover.)

Unplug the deflection yoke and kinescope sockets. Loosen the clamp on the yoke and slide the yoke off the kinescope neck. Take out the two bolts holding the chassis to the bottom of the cabinet and remove the two nuts holding the chassis to the top of the cabinet. (On models having offset fine tuning, and on remote control models, also remove the two nuts holding the tuner mounting assembly to the side of the cabinet.) Move the chassis to the rear until there is sufficient clearance to disconnect the speaker leads and to unclip the high-voltage anode lead from the kinescope, then remove the chassis. To replace the chassis, reverse the above procedure.

KINESCOPE REMOVAL AND SAFETY GLASS CLEANING

The kinescope is mounted in the front part of the cabinet with a mounting clamp and bracket assembly. To remove the kinescope, loosen the kinescope mounting clamp compression bolt located at the top of the kinescope bell, and remove the entire assembly from the cabinet. Observe the position of the clamp and bracket assembly and make certain they are installed in the proper position when remounting a kinescope in the cabinet.

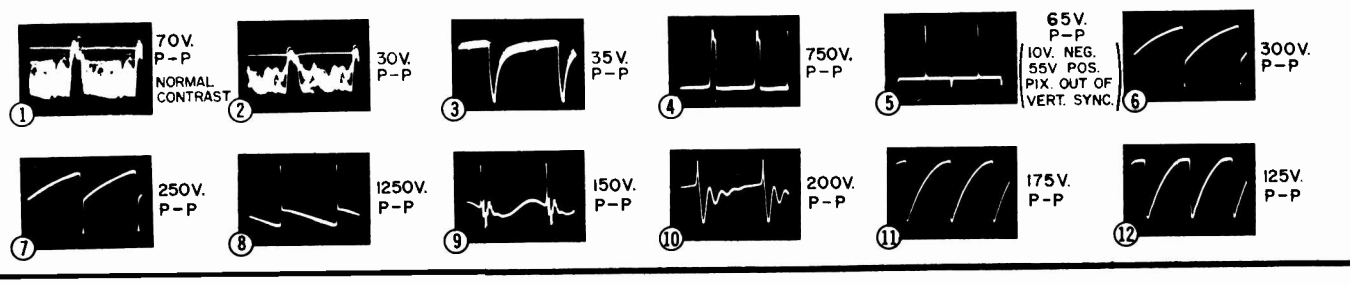
RCA Victor Chassis KCS-138A,B, Schematic Diagram, Continued



Circuit Schematic Diagram for KCS138 Chassis Series

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.

Late production of the above chassis have incorporated a rearrangement of the filament circuitry.

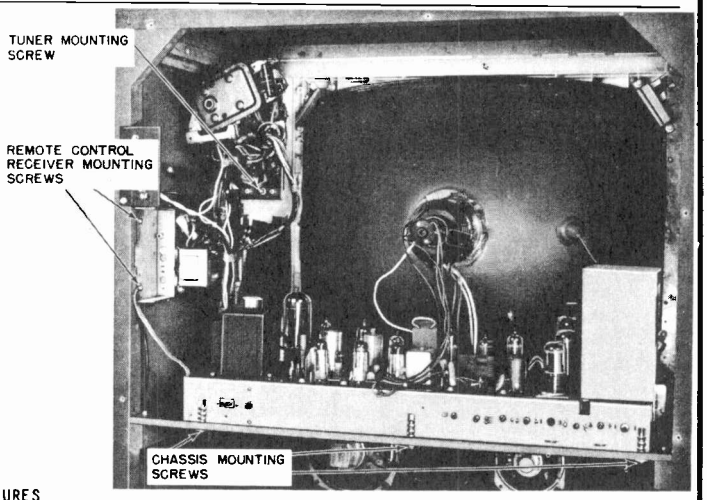


SYLVANIA

CHASSIS 555-1,-2,-3,-5,-6,-7

Models 23L48, 23L49, 23L52

(Material on pages 141 through 146)



CHASSIS REMOVAL

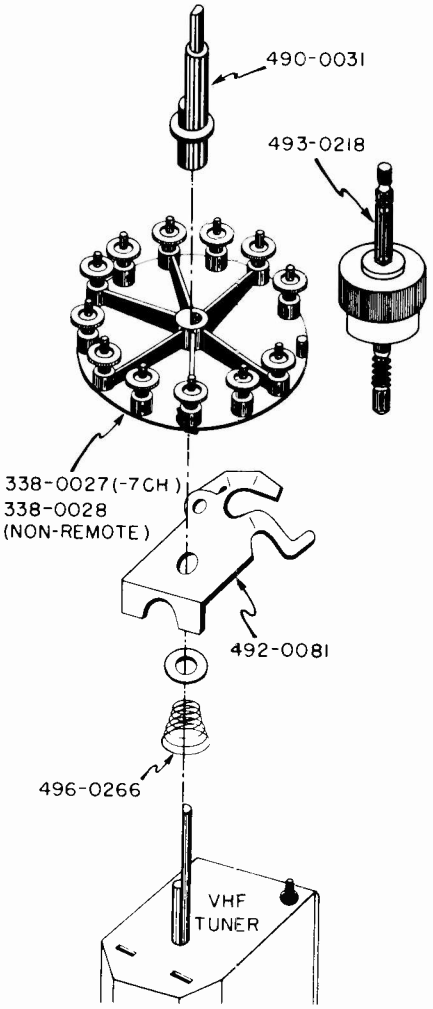
VIDEO IF, SOUND IF AND 4.5MC TRAP ALIGNMENT PROCEDURES

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 a 3V peak to peak response curve on the scope.
7. Receiver and test equipment should warm up for approximately 15 minutes before alignment.

4.5 MC TRAP, SOUND IF AND RATIO DETECTOR ALIGNMENT

STEP	ALIGNMENT SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1	Set contrast control to maximum and brightness control to minimum. Connect -30 volts DC source (-) terminal to test point (E) and (+) terminal to chassis. Connect a 4.5 MC series tuned circuit between yellow cathode lead of picture tube and ground.	VTVM - Ground or "common" lead to junction of two matched 100K resistors connected in series across R110 (27K). DC probe through 100K resistor to terminal 4 of T100. Isolate VTVM from ground. SIGNAL GENERATOR - to test point (C). Set signal generator to 4.5 MC preferably crystal calibrated or controlled.	For MAXIMUM neg. reading: [T100] (Top core) [T100] (Bottom core) [T206] (Bottom core) [T206] (Top core) Note: Use peak resulting in greatest separation of cores.
2	Same as Step 1.	VTVM - RF probe connected across coil of series tuned 4.5 MC circuit. SIGNAL GENERATOR - Same as Step 1.	For MINIMUM reading: [T206] (Bottom core) Using lowest signal generator output level, repeat Step 1 except [T206] (Bottom core).
3	Same as Step 1.	Same as Step 1.	For zero reading: [T100] (Top core) Set VTVM to zero reading using lowest meter scale. At correct setting for [T100] (Top core), a slight turn of core will give a reading either up or down the scale.



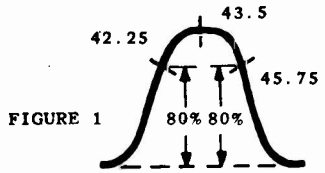
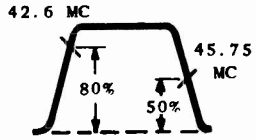
PIX. PROMPTER ASSEMBLY

SYLVANIA Chassis 555-1, -2, -3, -5, -6, -7, Alignment Information, Continued

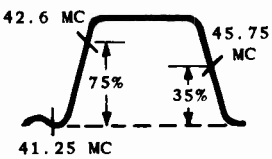
ALTERNATE 4.5 MC TRAP ALIGNMENT

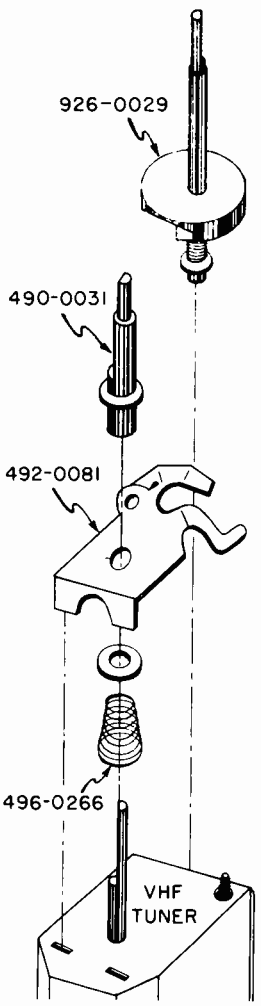
Connect a good antenna to the receiver and properly tune in a strong station. Adjust T206 (Bottom core) for minimum 4.5 MC interference in the picture. This interference takes the form of a "grainy" appearance or a fine line pattern through the picture.

VIDEO IF ALIGNMENT

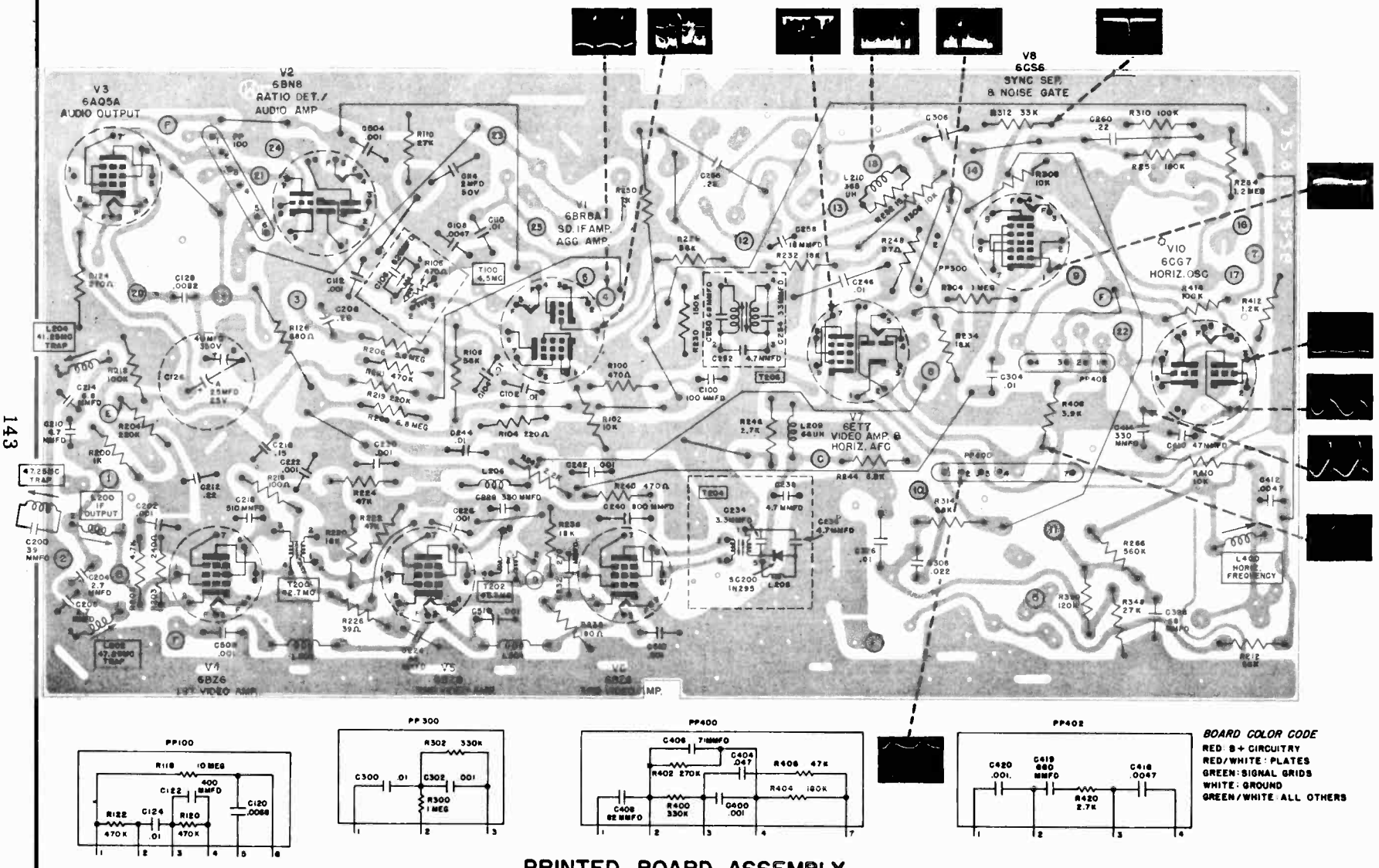
STEP	ALIGNMENT SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1	Set VHF tuner to a free channel that does not disturb the response curve. Connect -3.5 V DC source (-) terminal to point (E) (+) terminal to chassis. Connect -25V DC source (-) terminal to point (3) (+) terminal to chassis.	SWEEP GENERATOR -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

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

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

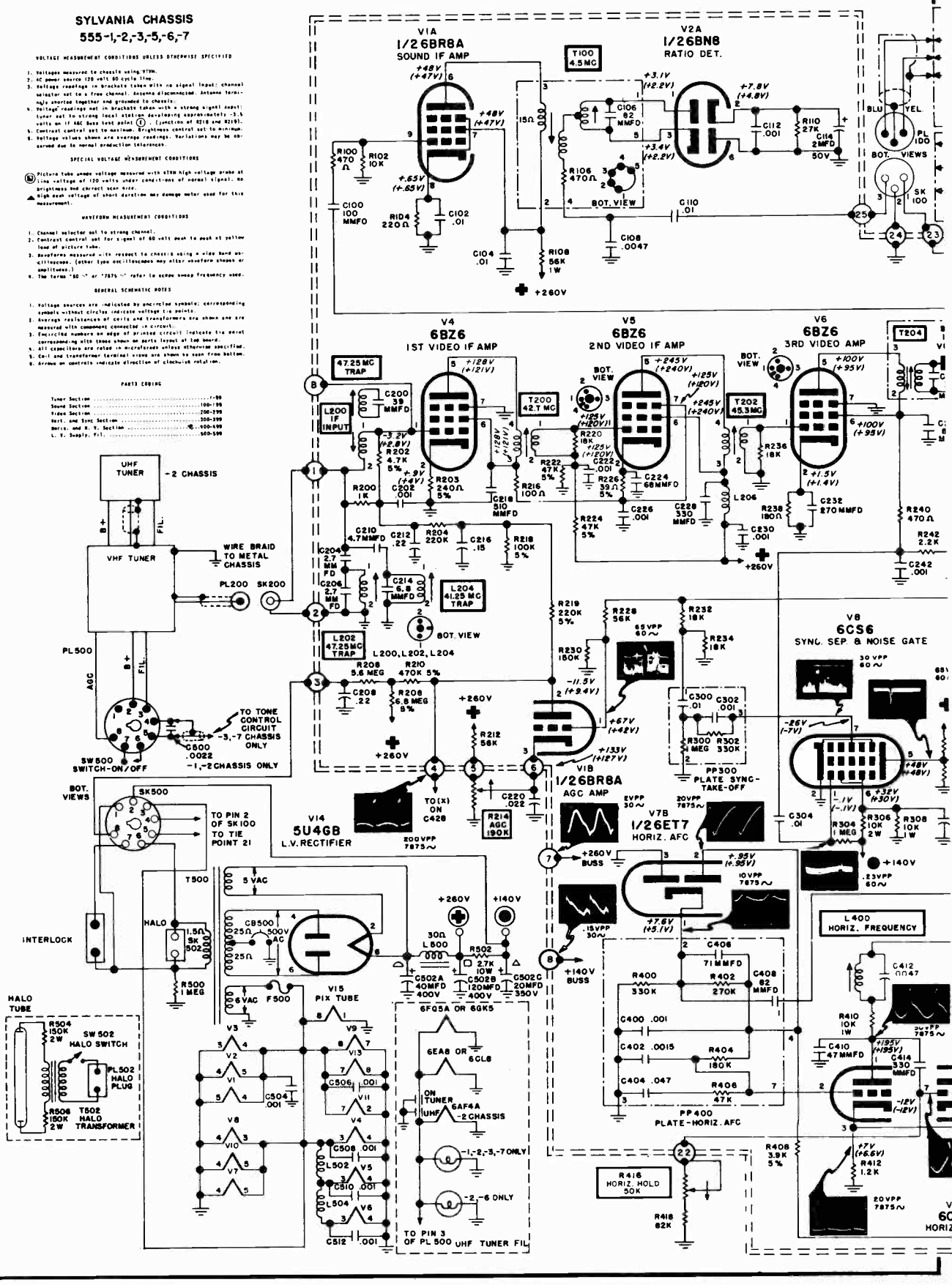


FINE TUNE ASSEMBLY

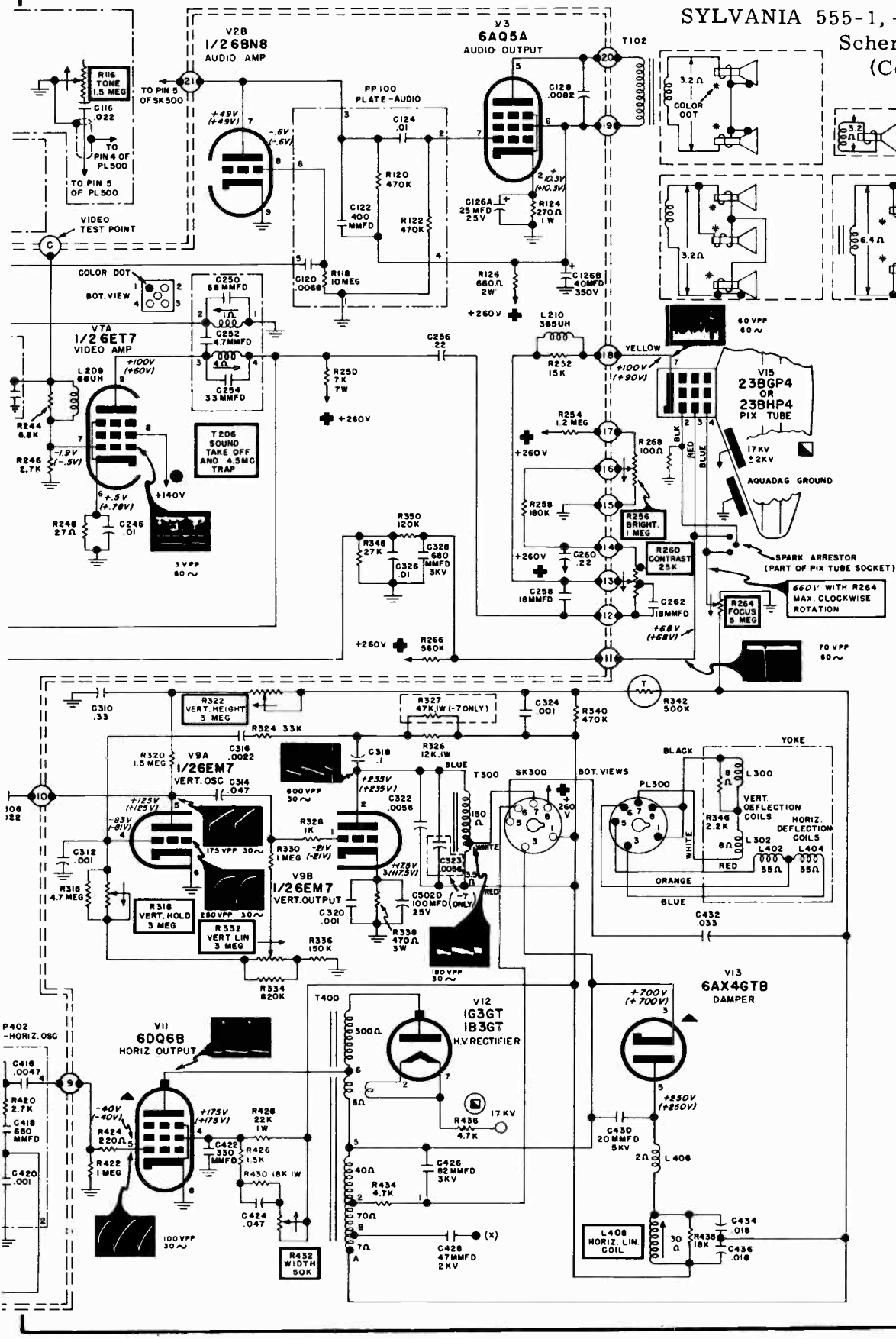


PRINTED BOARD ASSEMBLY

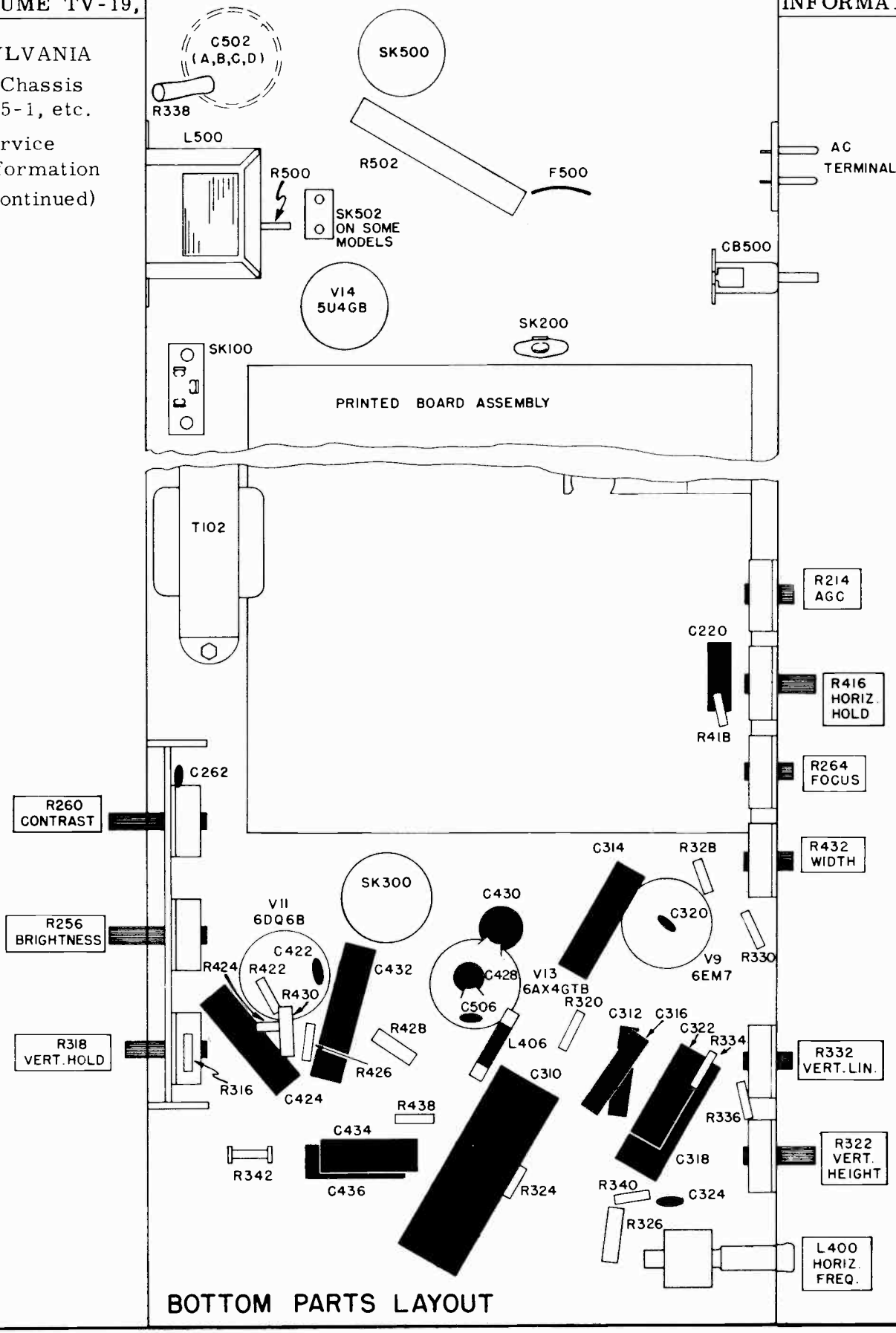
SYLVANIA Chassis 555-1, -2, -3, -5, -6, -7, Printed Board Assembly and Waveforms


SYLVANIA CHASSIS
555-1,-2,-3,-5,-6,-7
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 signal input; channel selector set to a free channel; Antenna disconnected. Antenna terminals shorted together and grounded to chassis.
4. Voltage readings not in brackets taken with a strong signal input; tuner set to strong local station developing approximately -3.5 volts on 1st AGC bus test point (1) (junction of R218 and R219).
5. Contrast control set to maximum. Brightness control set to minimum.
6. Voltage values shown are average readings. Variations may be observed due to normal production tolerances.
SPECIAL VOLTAGE MEASUREMENT CONDITIONS
Picture tube anode voltage measured with 5TH4 high voltage probe at line voltage of 120 volts under conditions of normal signal, no brightness and correct scan size.
High scan voltage of short duration may damage meter used for this measurement.
WAVEFORM MEASUREMENT CONDITIONS
1. Channel selector set to strong channel.
2. Contrast control set for signal of 60 volt peak to peak at yellow lead of picture tube.
3. Waveforms measured with respect to chassis using a wide band oscilloscope. (other type oscilloscopes may alter waveform shapes or amplitudes.)
4. The terms "60 ~" or "7875 ~" refer to screen sweep frequency used.
GENERAL SCHEMATIC NOTES
1. Voltage sources are indicated by encircled symbols; corresponding symbols without circles indicate voltage tie points.
2. Average resistances of coils and transformers are shown and are measured with components connected in circuit.
3. Encircled numbers on edge of printed circuit indicate tie point correspondence with views shown on parts layout at end of book.
4. All capacitors are rated in microfarads unless otherwise specified.
5. Coil and transformer terminal views are shown as seen from bottom.
6. Arrows on controls indicate direction of clockwise rotation.
PARTS CODING
Tuner Section 1-99
Sound Section 100-199
Video Section 200-299
Vert. and Sync Section 300-399
Horiz. and H. V. Section 400-499
L. V. Supply, Fil. 500-599
V1A 1/2 6BR8A SOUND IF AMP
V2A 1/2 6BN8 RATIO DET.
T100 4.5 MC
V4 6BZ6 1ST VIDEO IF AMP
V5 6BZ6 2ND VIDEO IF AMP
V6 6BZ6 3RD VIDEO AMP
T204
47.25 MC TRAP
L200 IF INPUT
T200 42.7 MC
T202 45.3 MC
L204 41.25 MC TRAP
L202 47.25 MC TRAP
L200, L202, L204
UHF TUNER -2 CHASSIS
VHF TUNER
WIRE BRAID TO METAL CHASSIS
PL200 SK200
PL500
SW500 SWITCH-ON/OFF
TO TONE CONTROL CIRCUIT -3,-7 CHASSIS ONLY
C600 .0022 -1,-2 CHASSIS ONLY
BOT. VIEWS
SK500
TO PIN 2 OF SK100
TO TIE POINT 21
V8 6CS6 SYNC. SEP. & NOISE GATE
V1B 1/26BR8A AGC AMP
V7B 1/26ET7 HORIZ. AFC
PP300 PLATE SYNC-TAKE-OFF
PP400 PLATE-HORIZ. AFC
V14 5U4GB L.V. RECTIFIER
T500
INTERLOCK
HALO
SW502 HALO SWITCH
PL502 HALO PLUG
T502 HALO TRANSFORMER
HALO TUBE
V15 PIX TUBE
6FQ5A OR 6GK5
6EA8 OR 6GL8
6AF4A -2 CHASSIS
TO PIN 3 OF PL500 UHF TUNER FIL
L400 HORIZ. FREQUENCY
R416 HORIZ. HOLD 50K
+260V BUSS
+140V BUSS

SYLVANIA 555-1, -2, -3, -5, -6, -7,
Schematic Diagram
(Continued)



SYLVANIA
Chassis
555-1, etc.
Service
Information
(Continued)



SYLVANIA

CHASSIS: 546-3,-4,-5
MODELS: 19T10,19T11 SERIES

Exact material on the above listed sets is below and on pages 148 through 152.

AGC ADJUSTMENT

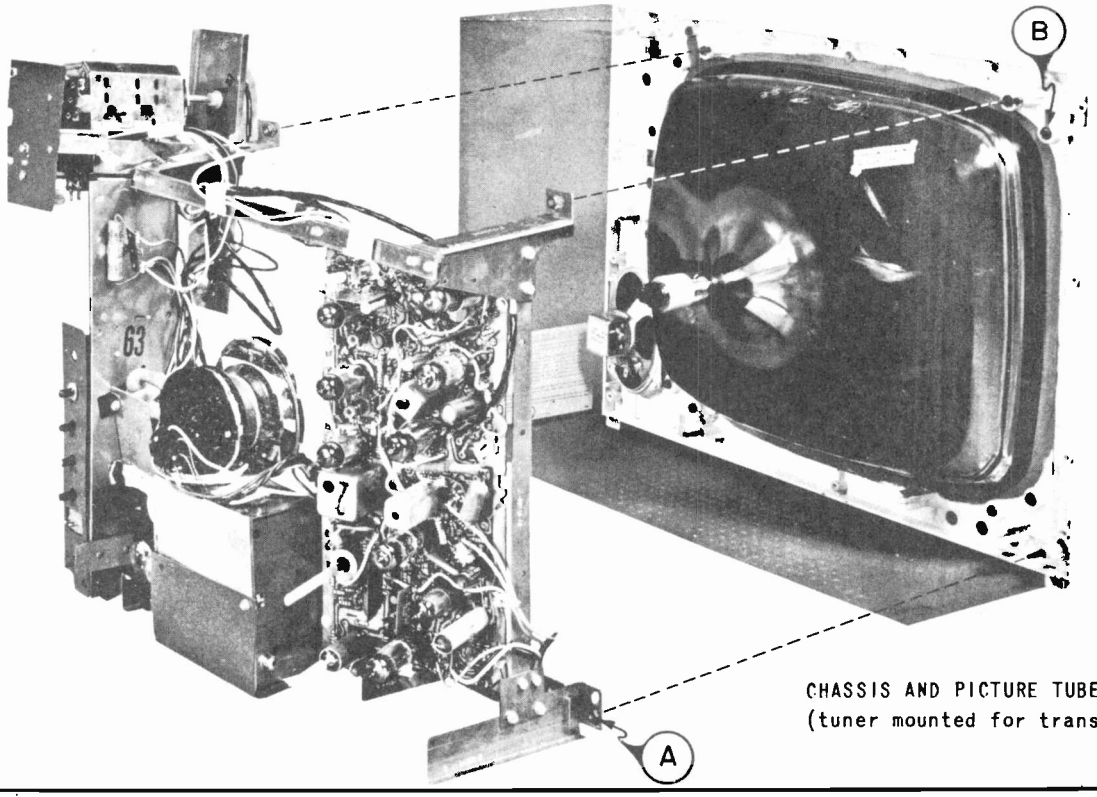
1. Set channel selector to strongest channel in area and adjust fine tuning control to correct tuning point.
2. Set contrast and brightness controls to maximum.
3. Rotate AGC control R228 clockwise until picture "bends" or "jumps" sideways.
4. Reverse rotation of the AGC control (counterclockwise) until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

CHASSIS: 546-1,-2
MODELS: 19P10, 19P11

The sets listed above are similar to the group covered by this material.

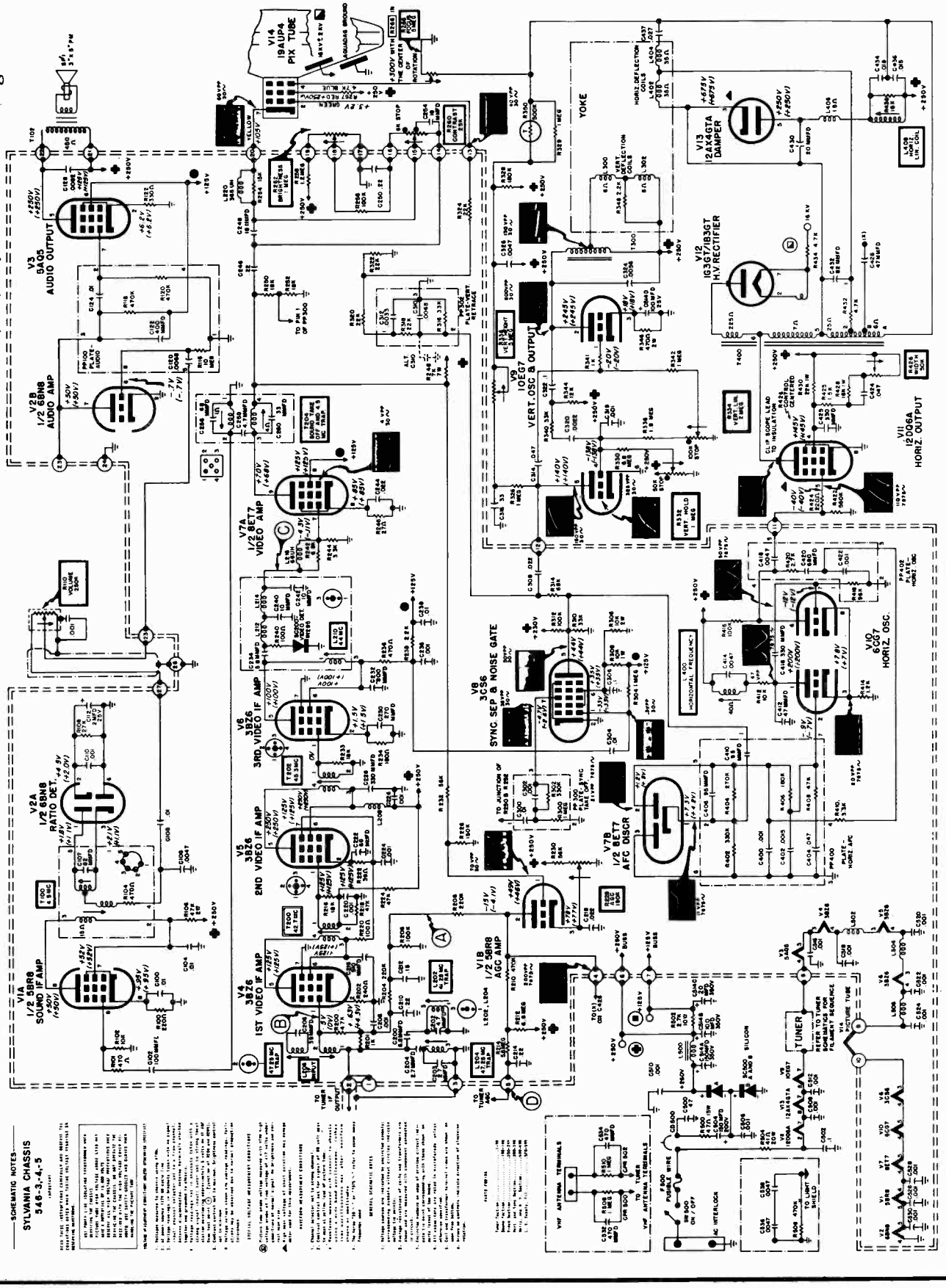
HORIZONTAL AFC ADJUSTMENT

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.



CHASSIS AND PICTURE TUBE REMOVAL
(tuner mounted for transporting)

SYLVANIA Chassis 546-3, -4, -5, Schematic Diagram

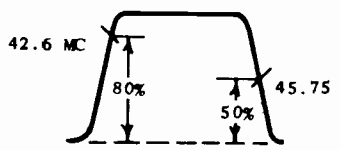


SYLVANIA Chassis 546-3, -4, -5, Alignment Information, Continued

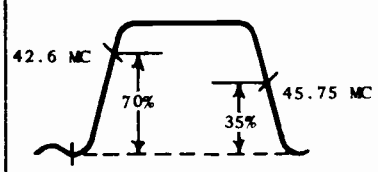
VIDEO IF, SOUND IF AND 4.5MC TRAP ALIGNMENT PROCEDURES

1. Connect an isolation transformer and a variable transformer between chassis and power line. Line voltage should be maintained at 117 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 a 3V peak to peak response curve on the scope.
7. Receiver and test equipment should warm up for approximately 15 minutes before alignment.

VIDEO IF ALIGNMENT

STEP	ALIGNMENT SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1.	Set VHF tuner to a free channel that does not disturb the response curve. Detune tuner converter coil by turning core fully counter-clockwise. Connect -3.5V DC source (-) term. to point (A) , (+) term. to chassis. Connect -25V DC source (-) term. to point (D) , (+) term. to chassis.	SWEEP GENERATOR - through a .0047 Mfd capacitor to point (B) . Set generator to 43.5 MC with 10 MC sweep. SIGNAL GENERATOR - loosely coupled as a marker to sweep generator lead. OSCILLOSCOPE - connected to test point (C)  FIGURE 1	a. Adjust L210 for maximum response at 44.0 MC. b. Adjust T202 for maximum response at 45.3 MC. c. Adjust T200 for maximum response at 42.7 MC. Repeat steps A, B, C to obtain response curve shown in Figure 1. Adjust L210 to remove tilt. Adjust T202 to position 45.75 MC marker. Adjust T200 to position 42.6 MC marker. (See Fig. 1)
2.	Same as Step 1. Note: to observe results it may be necessary to disconnect the -3.5V DC source at point (A)	SWEEP GENERATOR - through a .0047 Mfd capacitor to a jig shield on mixer tube of tuner. Do not allow shield to short to tuner frame. SIGNAL GENERATOR - loosely coupled to jig shield. OSCILLOSCOPE - Same as Step 1.	a. Set signal generator at 47.25 MC. Detune L204 then adjust trap L206 (top core) for maximum dip. Adjust L204 for maximum dip at 47.25 MC. b. Set signal generator at 41.25 MC and adjust L202 for maximum dip.

ALTERNATE STEP 2 - Remove -3.5V DC source from point (A) . Connect a VTVM on - DC scale to point (C) . 1. Insert 47.25 MC CW signal from signal generator to jig shield. Adjust L206 (top core) and L204 for minimum DC reading on meter. 2. Insert 41.25 MC CW signal to jig shield and adjust L202 for minimum DC reading on meter.

3.	Same as Step 1.  FIGURE 2	SWEEP GENERATOR - Same as Step 2. SIGNAL GENERATOR - Same as Step 2. OSCILLOSCOPE - Same as Step 2.	a. Adjust converter coil in tuner and L206 (bottom core) to position 42.6 and 45.75 markers as shown in Fig. 2. Note: If 42.6 marker will not position properly, adjust T200 and L210 slightly. DO THIS ONLY IF NECESSARY.

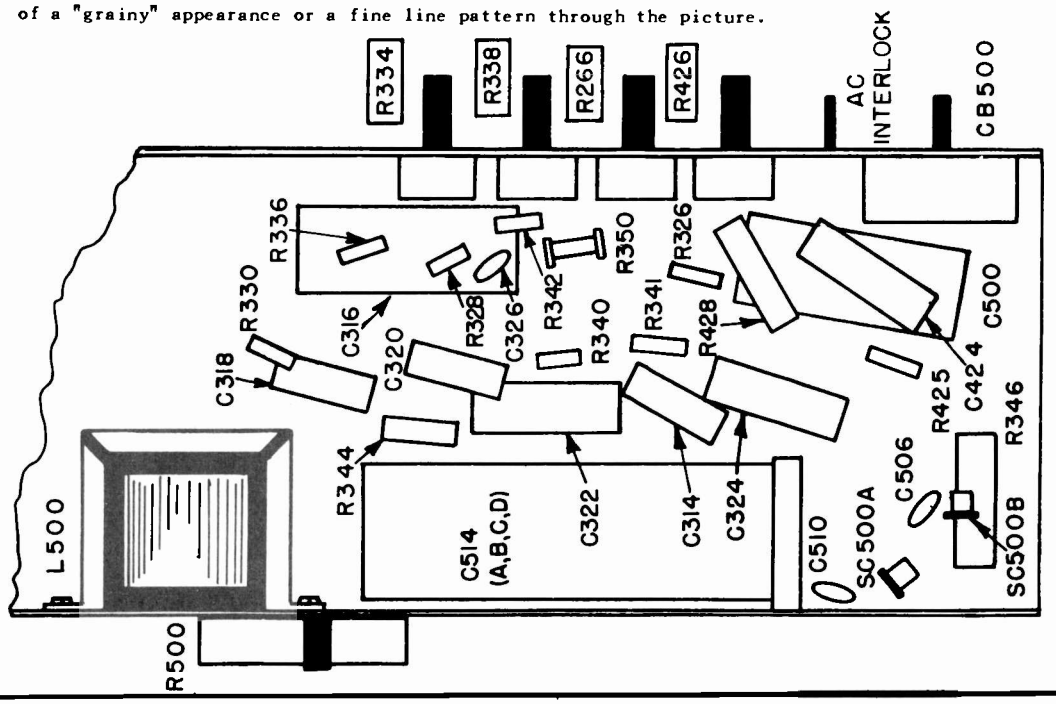
SYLVANIA Chassis 546-3, -4, -5, Alignment Information, Continued

4.5 MC TRAP, SOUND IF AND RATIO DETECTOR ALIGNMENT

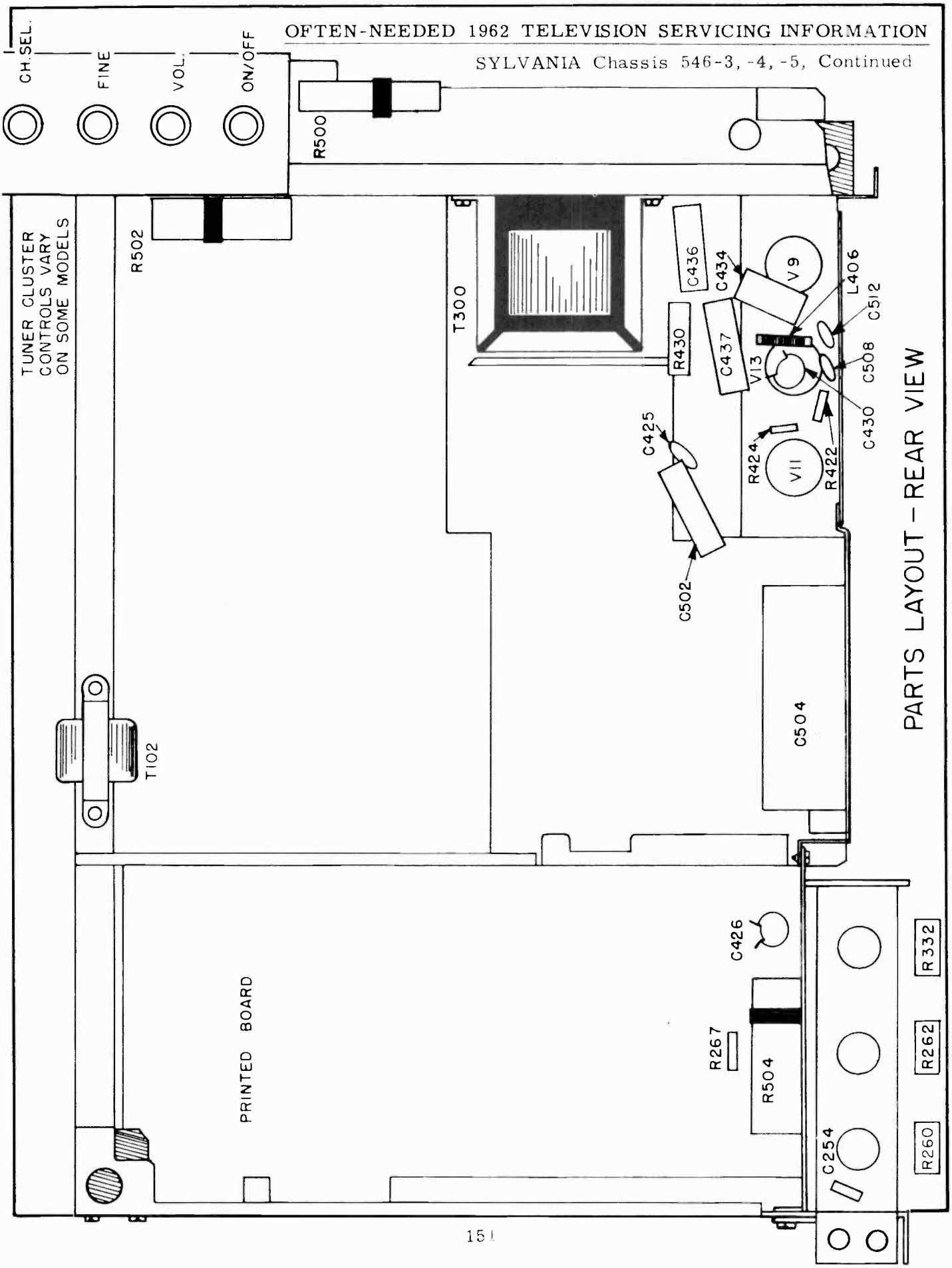
STEP	ALIGNMENT SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1.	Set contrast control to maximum and brightness control to minimum. Connect -30 volts DC source (-) term. to test point (A) and (+) term. to chassis. Connect a 4.5 MC series tuned circuit between yellow cathode lead of picture tube and ground.	VTVM - Ground or "common" lead to junction of two matched 100K resistors connected in series across R108 (27K). DC probe through 100K resistor to terminal 4 of T100. Isolate VTVM from ground. SIGNAL GENERATOR - to test point (C). Set signal generator to 4.5 MC perferably crystal calibrated or controlled.	For MAXIMUM neg. reading: T100 (Top core) T100 (Bottom core) T204 (Bottom core) T204 (Top core) Note: Use peak resulting in greatest separation of cores.
2.	Same as Step 1.	VTVM - RF probe connected across coil of series tuned 4.5 MC circuit. SIGNAL GENERATOR - Same as Step 1.	For MINIMUM reading: T204 (Bottom core) Using lowest signal generator output level, repeat Step 1 except T204 (bottom core).
3.	Same as Step 1.	Same as Step 1.	For zero reading: T100 (Top core) Set VTVM to zero reading using lowest meter scale. At correct setting for T100 (top core), a slight turn of core will give a reading either up or down the scale.

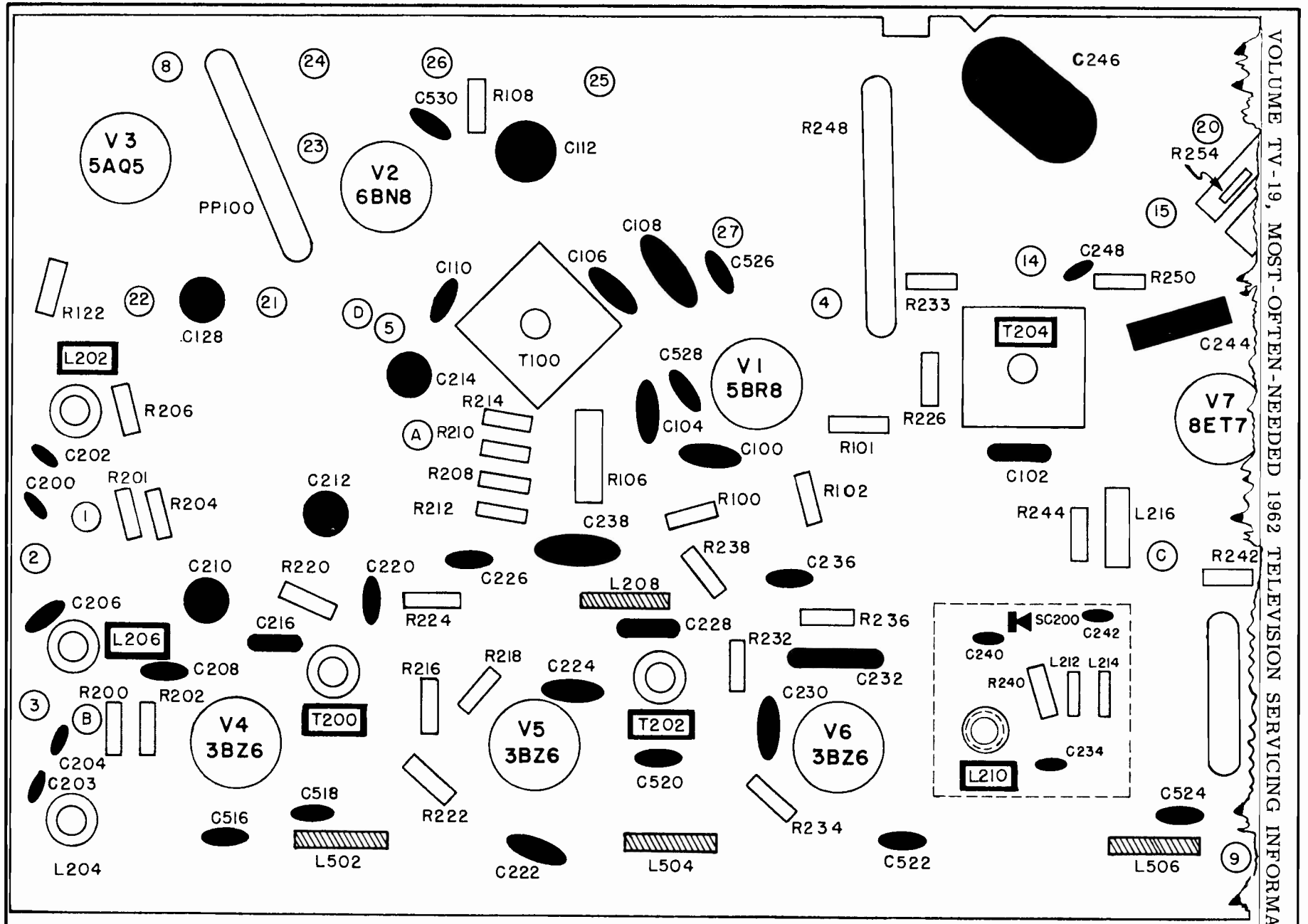
ALTERNATE 4.5 MC TRAP ALIGNMENT

Connect a good antenna to the receiver and properly tune in a strong station. Adjust (T204 bottom core) for minimum 4.5 MC interference in the picture. This interference takes the form of a "grainy" appearance or a fine line pattern through the picture.



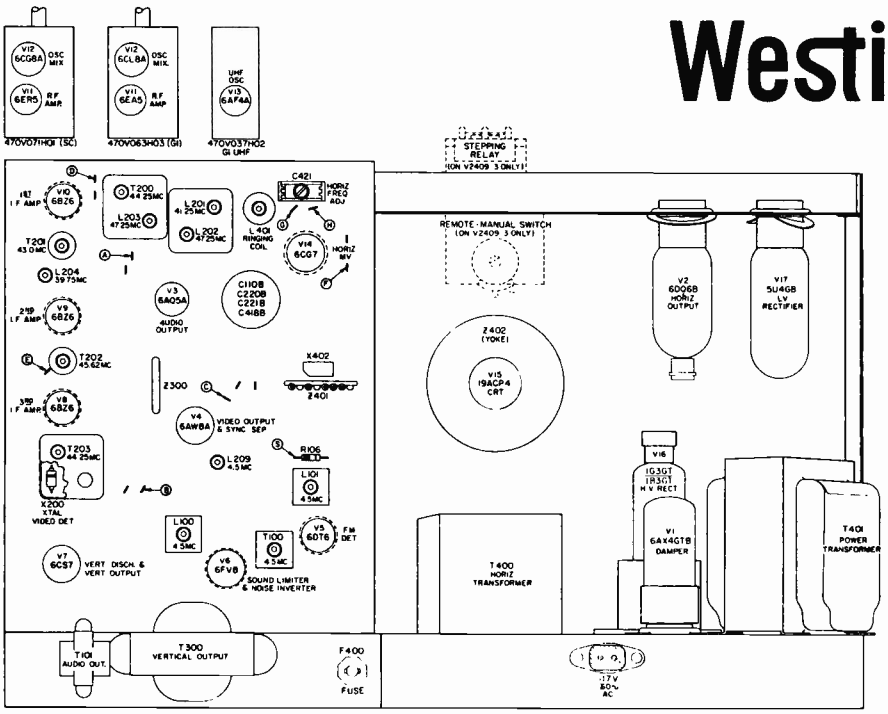
SYLVANIA Chassis 546-3, -4, -5, Continued





PRINTED BOARD ASSEMBLY

SYLVANIA Chassis 546-3, -4, -5, Models 19T10, 19T11 Series, Continued



Westinghouse

MANUAL, VHF ONLY V-2409-1

MANUAL, VHF/UHF V-2409-2

REMOTE CONTROLLED V-2409-3

MODEL AND CHASSIS CHART

Model	*Chassis*	*Tuners Used*
H-P3400 H-P3401 H-P3402	V-2409-1	470V071H01 VHF
H-P3400U H-P3401U H-P3402U	V-2409-2	470V063H03 VHF 472V037H02 UHF
H-P3450 H-P3451 H-P3452	V-2409-3 V-2408 Remote Director	470V071H01 VHF

PILOT LAMP REPLACEMENT

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

(Material on pages 153 through 156)

FUSE INFORMATION

The power supply fuse is located in the rear of the chassis near the vertical output transformer. The fuse is a 3.5A slo blow type.

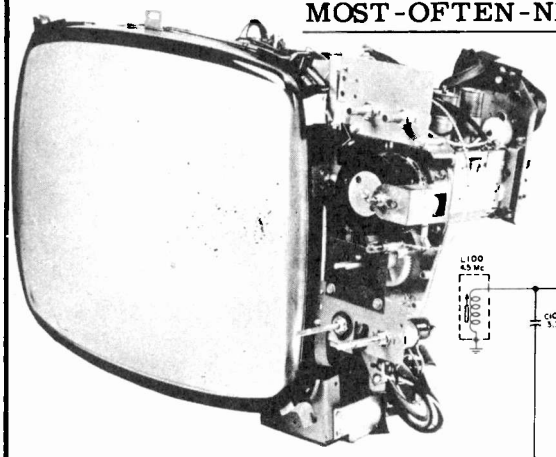
A 2½ inch piece of #24 copper wire is used as fuse link F401. It protects the power transformer from tube filament shorts. If F401 blows no tubes will light.

CAUTION: After replacing fuse link, check for shorts before turning on set. Be sure to replace flame proof fuse covering.

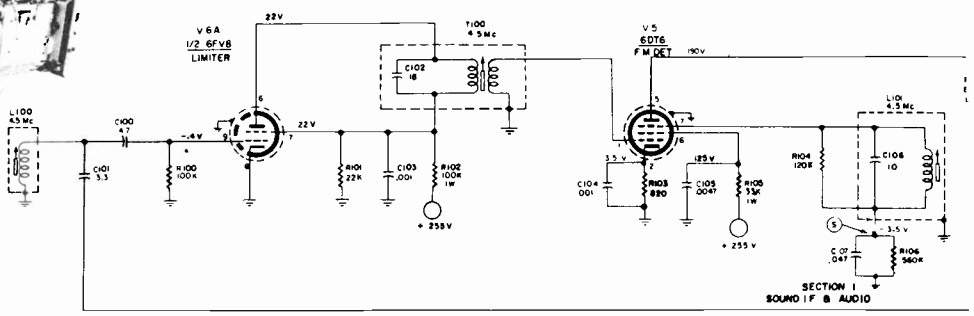
TUBE COMPLEMENT AND RESISTANCE MEASUREMENTS

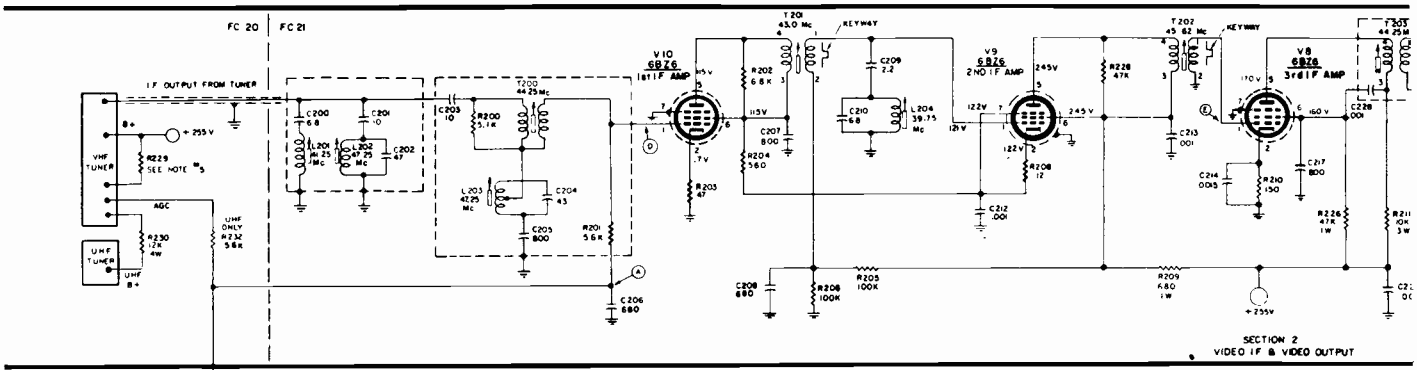
Tube Type	Tube Function	Resistance Measurements								
		Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1: 6AX4GTB	Damper			2.5M*		23*		FIL	FIL	
V2: 6DQ6B	Horiz Output	NC	FIL	15K*	15K*	470K	NC	FIL	0	†Cap. 16
V3: 6AQ5A	Audio Output	0–500K	330	FIL	FIL	2K	1.5K	0-500K		
V4: 6AW8A	Video Output & Sync Sep	0	2M*	80K	FIL	FIL	47K	1M	10K*	4.4K*
V5: 6DT6	FM Detector	4	820	FIL	FIL	2M*	33K	600K		
V6: 6FV8	Sound Lim & Noise Inv	1.2M	26K	330	FIL	FIL	20K	20K	0	100K
V7: 6CS7	Vert Disch & Vert Out	1.2M*	NC	1.3M	FIL	FIL	500K*	1.5M	0	100
V8: 6BZ6	3rd IF Amp	.1	150	FIL	FIL	10K*	47K*	0		
V9: 6BZ6	2nd IF Amp	60K	INF	FIL	FIL	680	680	INF		
V10: 6BZ6	1st IF Amp	600K*	47	FIL	FIL	INF	INF	0		
V11: 6EA5	VHF RF Amp	600K*	0	FIL	FIL	1.3K	40K*	0		
6ER5	VHF RF Amp (1)	0	620K	FIL	FIL	6.6K	0	0		
V12: 6CL8A	VHF Mix – Osc	INF	800*	INF	FIL	FIL	INF	INF	0	100K
6CG8A	VHF Mix – Osc (1)	4.7K	15.6K*	0	FIL	FIL	6.6K	27.6K*	0	223K
V13: 6AF4A	UHF Osc	15K*	5.6K	FIL	FIL	.1	5.6K	15K*		
V14: 6CG7	Horiz MV	57K*	200K	1K	FIL	FIL	48K*	2.3M	1K	0
V15: 19ACP4	CRT	FIL	0	85K	0	NC	NC	150K	FIL	
V16; 1G3GT	H V Rectifier			INFINITE						†Cap. 500
V17: 5U4GB	L V Rectifier	NC	FIL	NC	21	NC	21	NC	FIL	

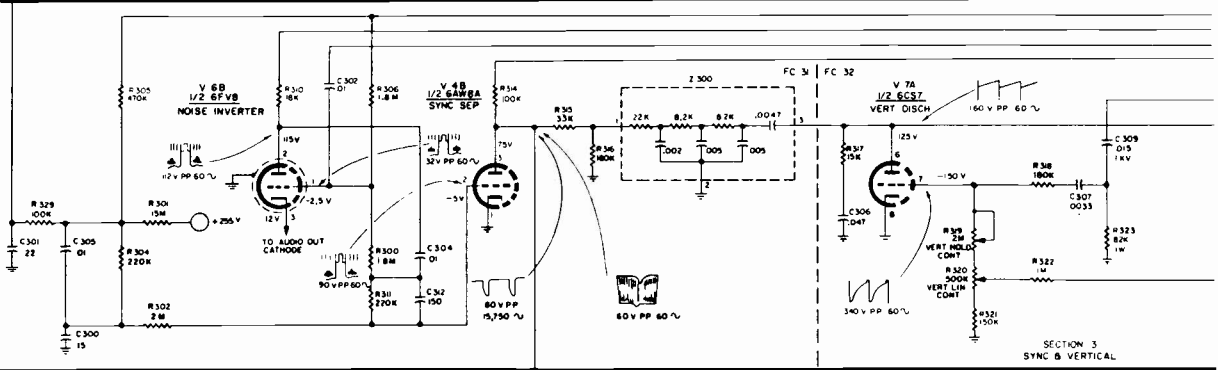
(1) Used in Chassis V–2409–1, 3.
All resistance in ohms from tube pin to chassis ground except (*)
*Resistance measured from tube pin to pin #8 of V17.
†Measured from cap of tube to pin 3 of V1 (Damper) NC No connection

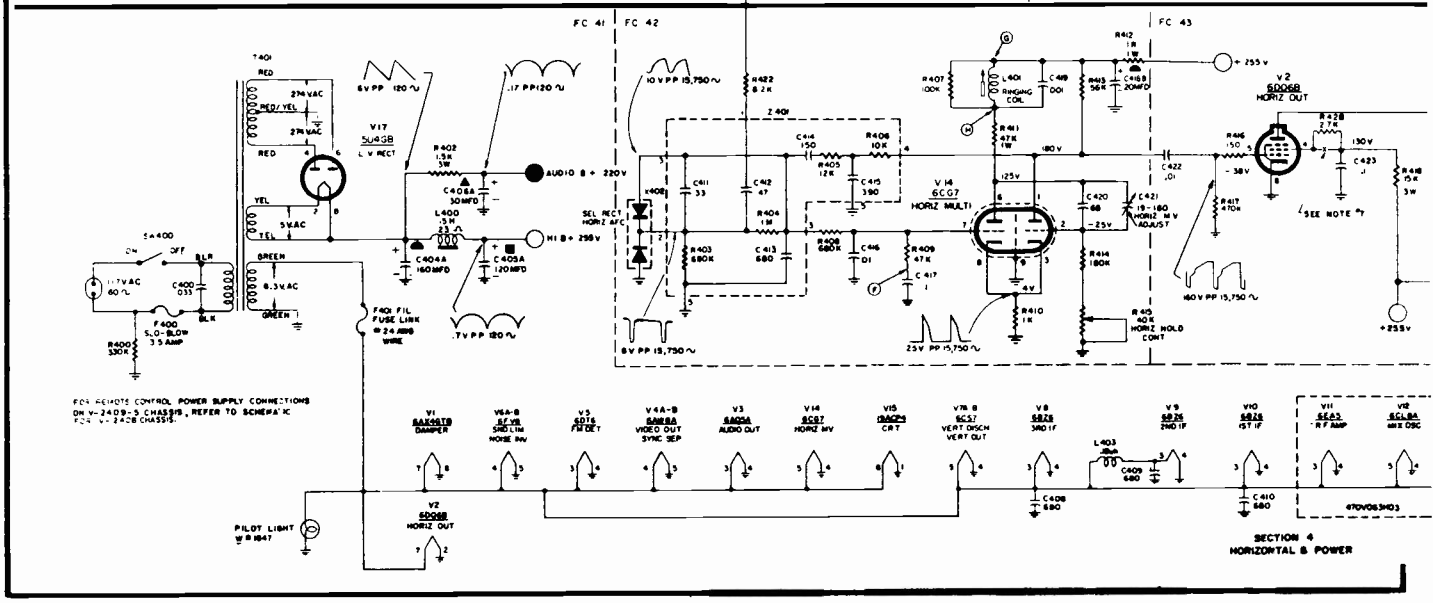


WESTINGHOUSE Chassis V-2409-1, -2, -3, Schematic Diagram

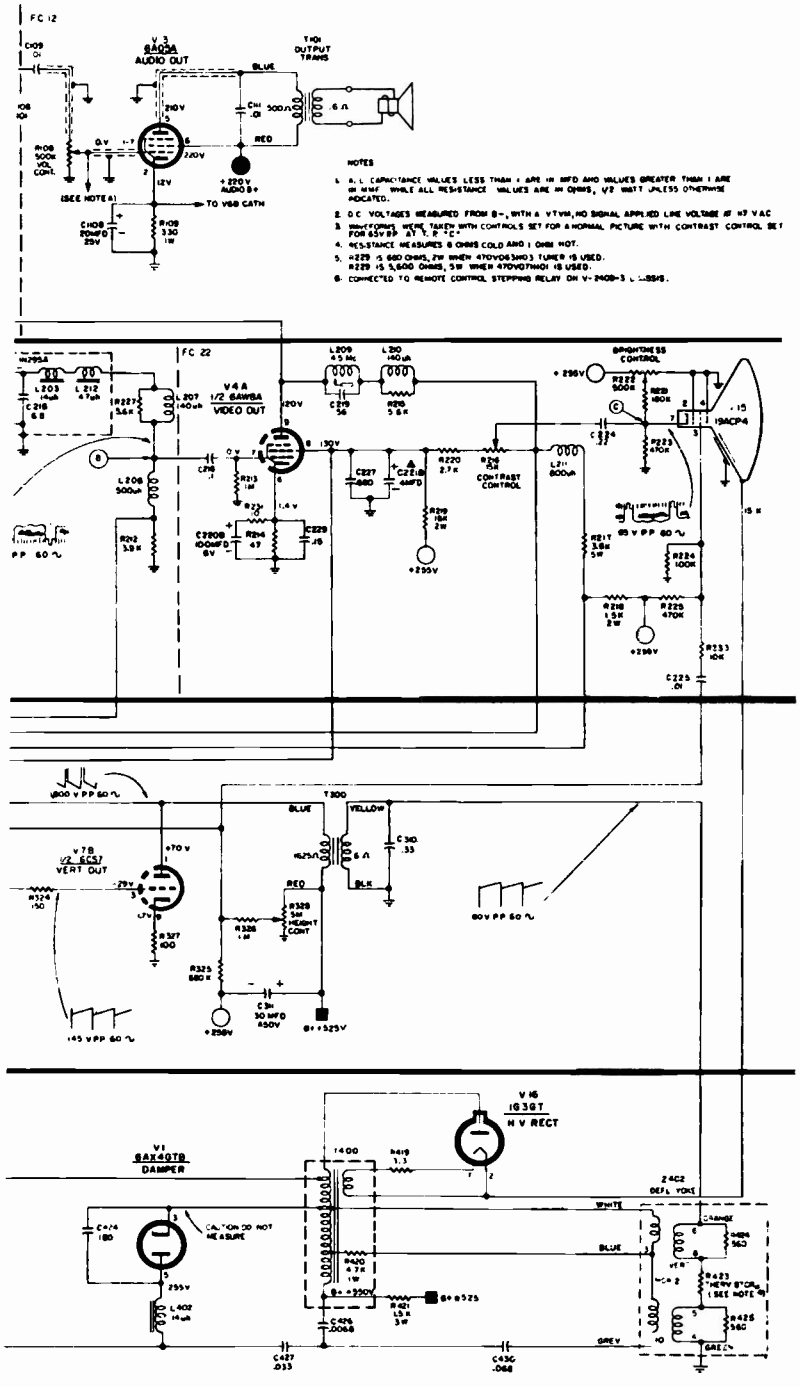








WESTINGHOUSE Chassis V-2409-1, -2, -3, Service Information, Continued



Schematic Diagram

CHASSIS REMOVAL

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

RINGING COIL AND HORIZONTAL FREQUENCY ADJUSTMENT

1. Short out the ringing coil (L401) with a jumper wire.
2. Set the horizontal hold control to the center of its mechanical range. Do not change this setting during the steps that follow.
3. Calibrate a VTVM to OV 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.

HEIGHT AND VERTICAL LINEARITY

The height and vertical linearity controls are accessible through the slide plate. The height control can be 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.

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.

WIDTH ADJUSTMENT

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

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

WESTINGHOUSE Chassis V-2409-1, -2, -3, Service Information, Continued

KEY TO PC BOARD LAYOUT

1 Horizontal hold control, R415
2 Contrast control, R216
3 Volume control, R108
4 IF input from tuner
5 Tuner filament
6 Tuner AGC, white wire
7 Audio transformer R101, blue wire
8 Audio transformer R101, red wire
9 Audio, B+, junction of R402 & C406A, red wire
10 Vertical linearity, R320
11 Vertical hold, R319
12 Vertical output transformer, T300
13 Height, R328 (see diagram at right)
14 Vertical linearity, R320
15 Filament, 6.3V AC
16 Contrast control, R216
17 Contrast control, R216
18 B++, R421, red wire
19 Vertical output transformer, T300, black wire
20 Yoke, Z402, green wire
21 CRT filament, pin 8
22 Volume control, R108 (see diagram at right)
23 225 V B+, junction of L400 & C405A
24 Vert output transformer, T300, yellow wire
25 Yoke, Z402, orange wire
26 CRT cathode, pin 7
27 CRT screen grid, pin 3
28 CRT filament, pin 1
29 CRT grid, pin 2
30 Brightness control, R222
31 Brightness control, R222
32 CRT focus, pin 4
33 Horizontal output to R416

TEST POINTS

(A) AGC
(B) Video detector
(C) CRT cathode
(D) 1st IF grid
(E) 3rd IF grid
(F) Horizontal multivibrator
(G) Ringing coil L401
(H) Ringing coil L401
(S) Sound

• USE R403, R404, R405, R406, C411, C412, C413, C415, WHEN Z401 IS OMITTED.

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

Westinghouse

VHF: 2414-1

VHF/UHF: 2414-2

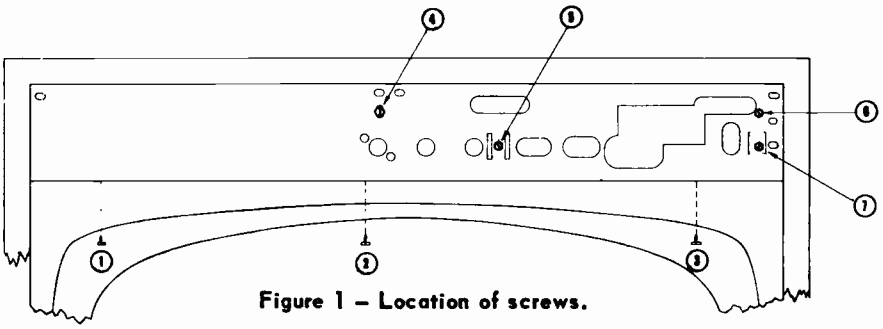


Figure 1 – Location of screws.

Models		Chassis	Tuners Used
H-T3560	H-K3850	V2414-1	VHF: 470V055H02 470V087H01
H-T3561	H-K3851		
H-T3562	H-K3852		
H-T3563	H-K3810		
H-K3811			
H-T3560U	H-K3851U	V2414-2	470V088H01 VHF: 470V056H02
H-T3561U	H-K3852U		
H-T3562U	H-K3810U		
H-T3563U	H-K3811U		
H-K3850U			UHF: 472V034H04

CHASSIS REMOVAL

1. Remove control knobs, external antenna leads, back cover, antenna bracket, and speaker leads.
2. Remove front escutcheon. It is held by screws 1, 2, and 3 (Figure 1). Remove thumbwheel knobs.
3. Remove screws 4, 5, 6, and 7 (Figure 1) which hold the control panel to the front plate.
4. Remove the bolts, on the bottom of the cabinet, which hold the chassis.
5. On UHF models: Remove screw holding UHF tuner-support rod to cabinet. Remove screw holding UHF tuner-support strap to cabinet.

FRONT PLATE GLASS REMOVAL

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

RINGING COIL AND HORIZONTAL FREQUENCY ADJUSTMENT

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

CIRCUIT BREAKER RESET

The thermal circuit breaker will open the receiver AC input in event of an overload (short) and will remain open until reset. Push the button on the rear of the receiver to reset. Immediate reopening of the circuit breaker (button pops out) indicates a short. DO NOT HOLD THE BUTTON IN. *Component damage may result.*

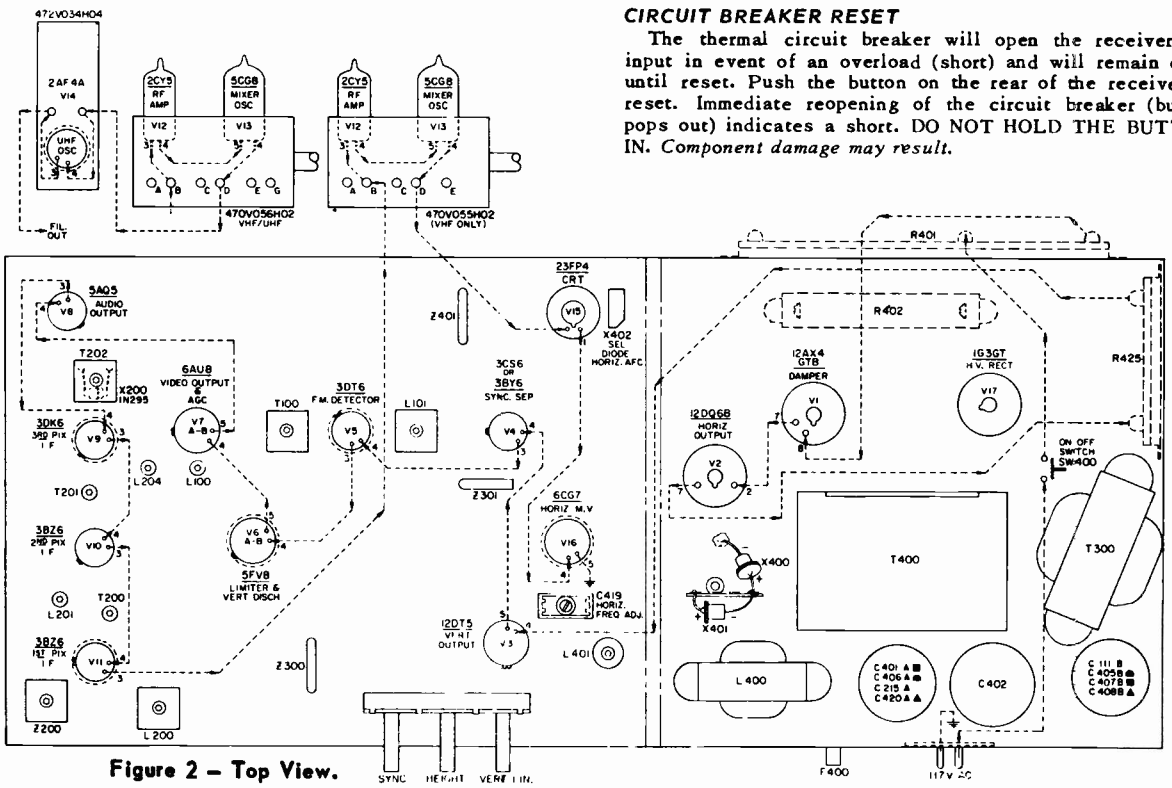
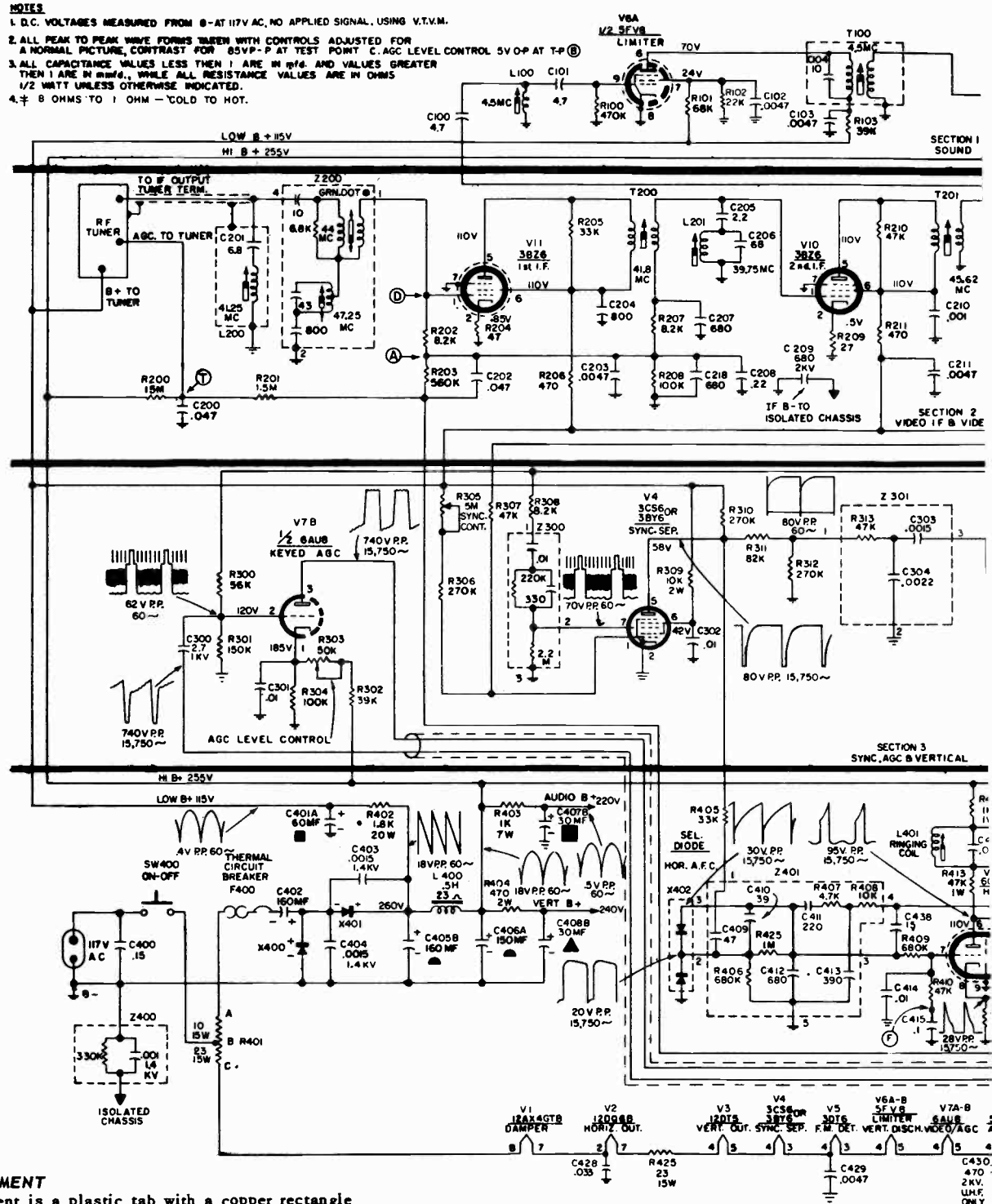


Figure 2 – Top View.

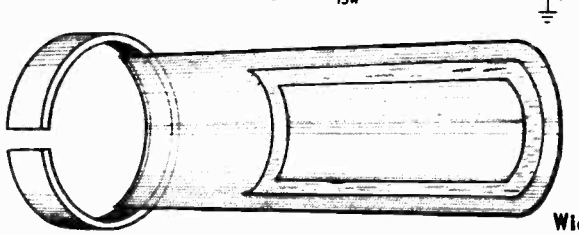
WESTINGHOUSE Chassis V-2414-1, V-2414-2, Schematic Diagram, Continued



WIDTH ADJUSTMENT

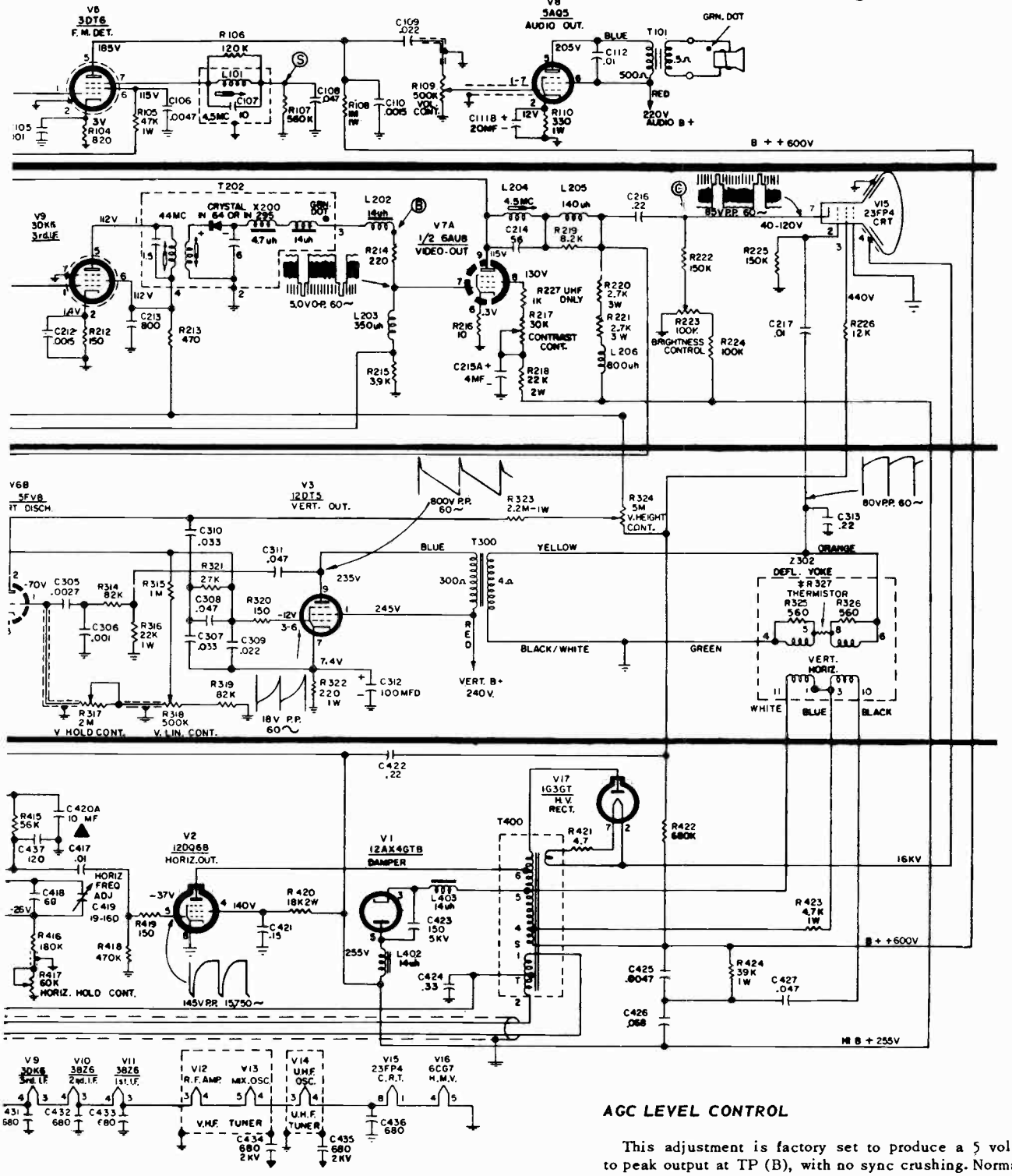
This adjustment is a plastic tab with a copper rectangle bonded on one side. It protrudes from between the yoke and the bottom of the neck of the picture tube. The shiny side of the copper rectangle goes down against the picture tube and the clamp opening goes to the top of the tube. The rectangle must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

To adjust the width, loosen the yoke clamp. Pushing the tab into the yoke decreases the width. Pulling the tab out of the yoke increases the width. Best linearity, however, is provided with the width tab pushed all the way in.



Width Insert.

WESTINGHOUSE Chassis V-2414-1, V-2414-2, Schematic Diagram, Continued



CENTERING

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

DEFLECTION YOKE

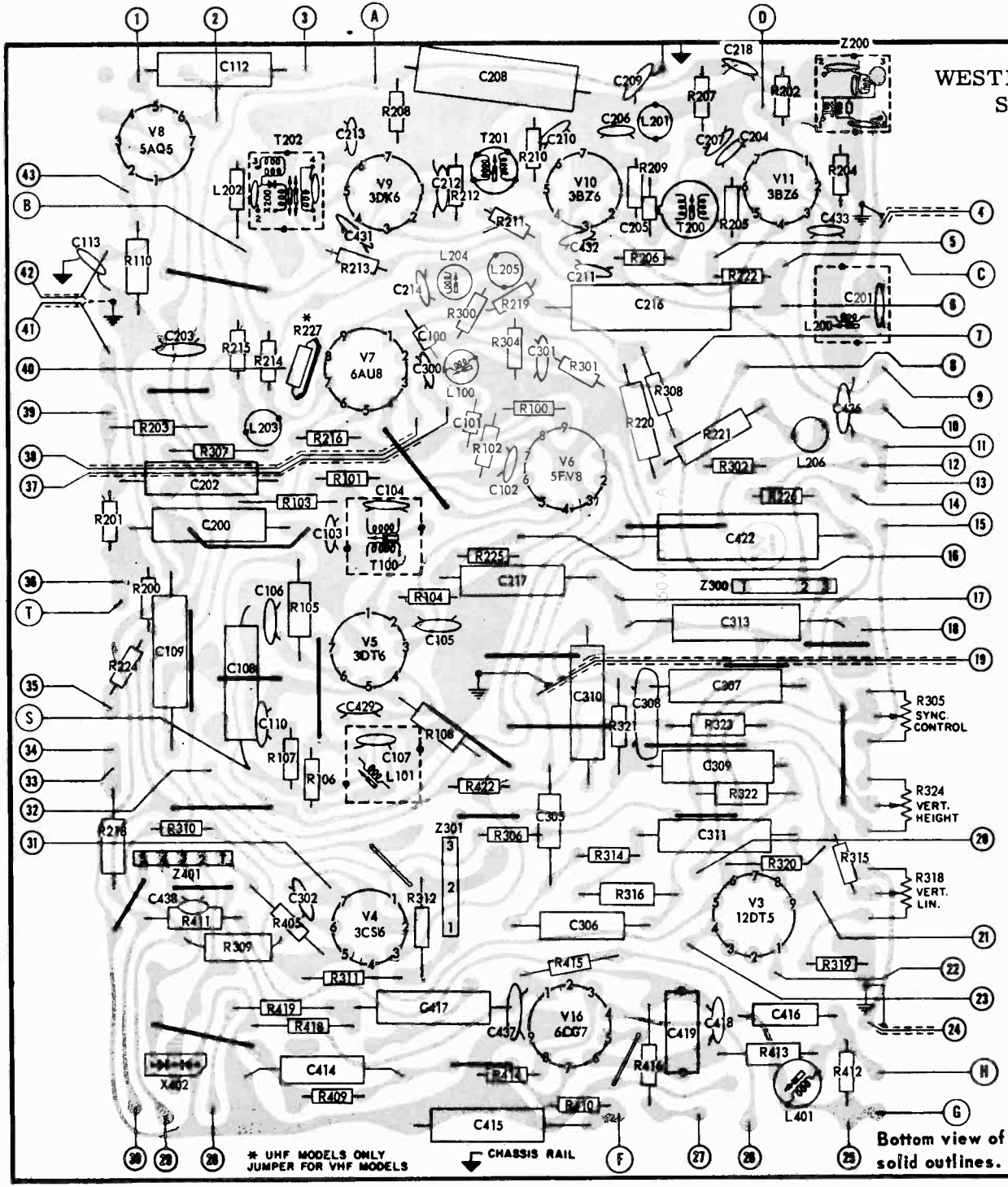
The deflection yoke should be as far forward as possible (touching the bell of the CRT). Rotation of the deflection yoke is used to level the raster.

AGC LEVEL CONTROL

This adjustment is factory set to produce a 5 volt, zero to peak output at TP (B), with no sync crushing. Normally no adjustment will be needed in the field.

Should adjustment be necessary, select the channel with the strongest signal. Turn the AGC level control clockwise ( ) until a slight bend appears at the top of the picture (sync crushing). Then turn the AGC level control slowly counter clockwise ( ) to about ¼ of a turn past the point at which the bend disappears.

WESTINGHOUSE Chassis V-2414-1, -2, Service Information, Continued



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

KEY TO PC BOARD LAYOUT

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

TEST POINTS

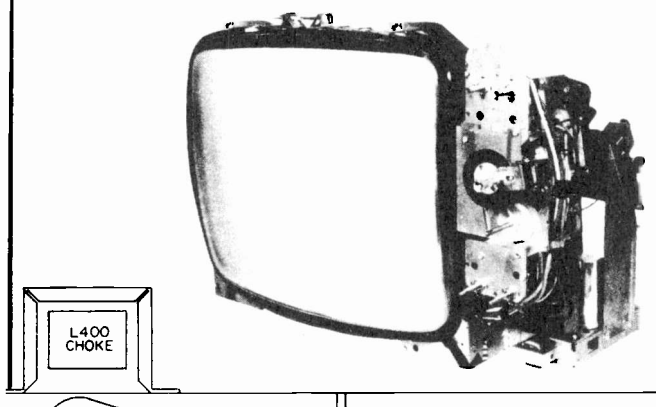
(A) AGC for IF
(B) Video detector
(C) CRT cathode
(D) 1st IF input
(F) Horiz. MV
(G) Ringing Coil
(H) Ringing Coil
(S) Quad coil
(T) AGC for tuner

Westinghouse

MODEL AND CHASSIS CHART

MODEL		CHASSIS	TUNERS USED	TUNER TUBES
H-T3710	H-K4010	V-2411-1	470V071H01 VHF	MIX-OSC:6CG8A R.F. AMP:6ER5
H-T3711	H-K4011			
H-T3712	H-K4012			
	H-K4013			
H-T3710U	H-K4010U	V-2411-2	470V063H02 VHF	MIX-OSC:6CL8A R.F. AMP:6EA5
H-T3711U	H-K4011U			
H-T3712U	H-K4012U		472V037H01 UHF	OSC: 6AF4A CRYSTAL 1N82A
	H-K4013U			
H-K4110	H-K4210	V-2411-3	470V071H01 VHF	MIX-OSC:6CG8A R.F. AMP:6ER5
H-K4111	H-K4211			
H-K4112	H-K4212			
H-K4113	H-K4213			
	H-K4214			
	H-K4215			
H-K4110U	H-K4211U	V-2411-4	470V063H02 VHF	MIX-OSC:6CL8A R.F. AMP:6EA5
H-K4111U	H-K4212U			
H-K4112U	H-K4213U		472V037H01 UHF	OSC:6AF4A CRYSTAL:1N82A
H-K4113U	H-K4214U			
	H-K4215U			
H-K4050		V-2411-5 (V-2408 Remote Director)	470V071H01 VHF	MIX-OSC:6CG8A R.F. AMP:6ER5
H-K4051				
H-K4052				
H-K4053				
H-K4150		V-2411-6 (V-2408 Remote Director)	470V071H01 VHF	MIX-OSC:6CG8A R.F. AMP:6ER5
H-K4151				
H-K4152				
H-K4153				

Chassis V-2411-3, V-2411-4 and V-2411-6 have tone controls.



CHASSIS REMOVAL

1. Remove control knobs.
2. Remove back cover and antenna terminal bracket.
3. Remove the five screws which secure control panel to front escutcheon.
4. Remove the screws which secure chassis to cabinet.
5. Remove speaker leads from terminal lugs on chassis.
6. On receivers having Remote Director, remove remote receiver plugs and disconnect remote pilot light.
7. Carefully slide chassis out from cabinet.

CRT REMOVAL

1. Remove chassis from cabinet.
2. Remove CRT socket, yoke clamp, width control and second anode lead.
3. Loosen bolt at top of CRT to release strap.
4. Remove CRT.

FRONT PLATE REMOVAL

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

PILOT LIGHT REPLACEMENT

To replace the pilot light, remove the pilot light bracket from the rear of the set (held on by one screw). Insert the new bulb in the socket and replace the bracket with the slot in the shield facing the front of the set.

With the set turned on, check to see that the channel numbers appear correctly. Adjust the pilot light bracket until all channel numbers are centered.

MOTOR DRIVE REMOVAL

1. Disconnect wires from motor and switch.
2. Remove screw from motor drive support rod.
3. Remove motor drive from bracket (held on by 3 screws).
4. Disconnect antenna wire from motor drive.
5. Gently pull motor drive out from tuner shaft.

(Continued on the next five pages)

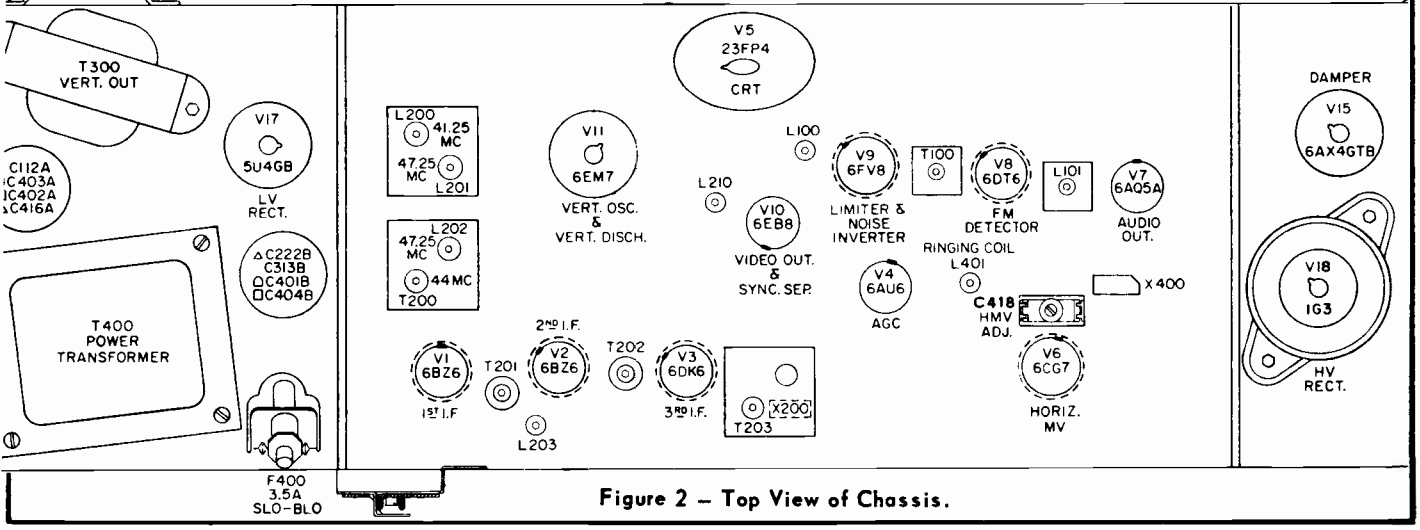


Figure 2 – Top View of Chassis.

WESTINGHOUSE Chassis V-2411-1 through V-2411-6 Schematic Diagram

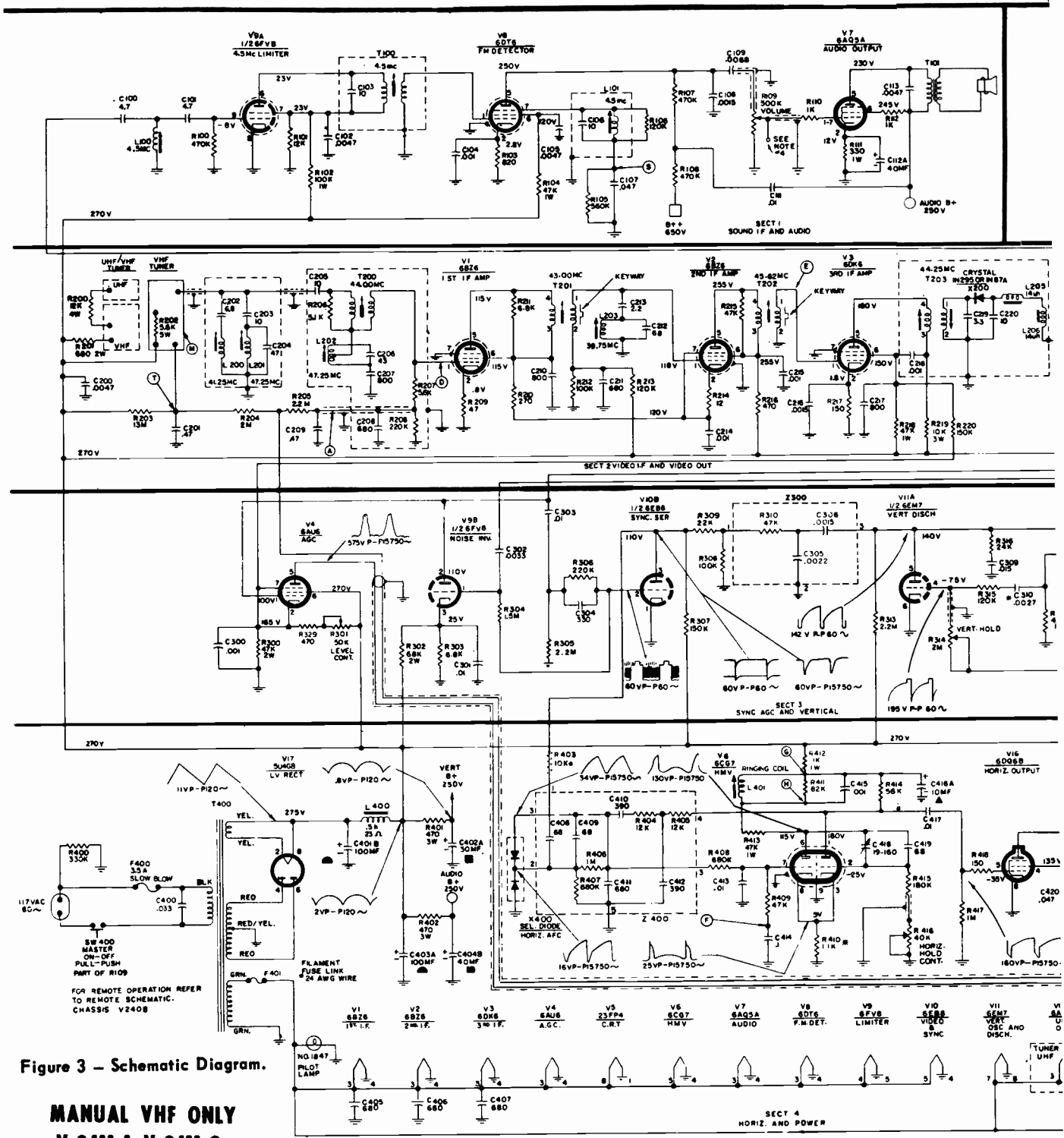


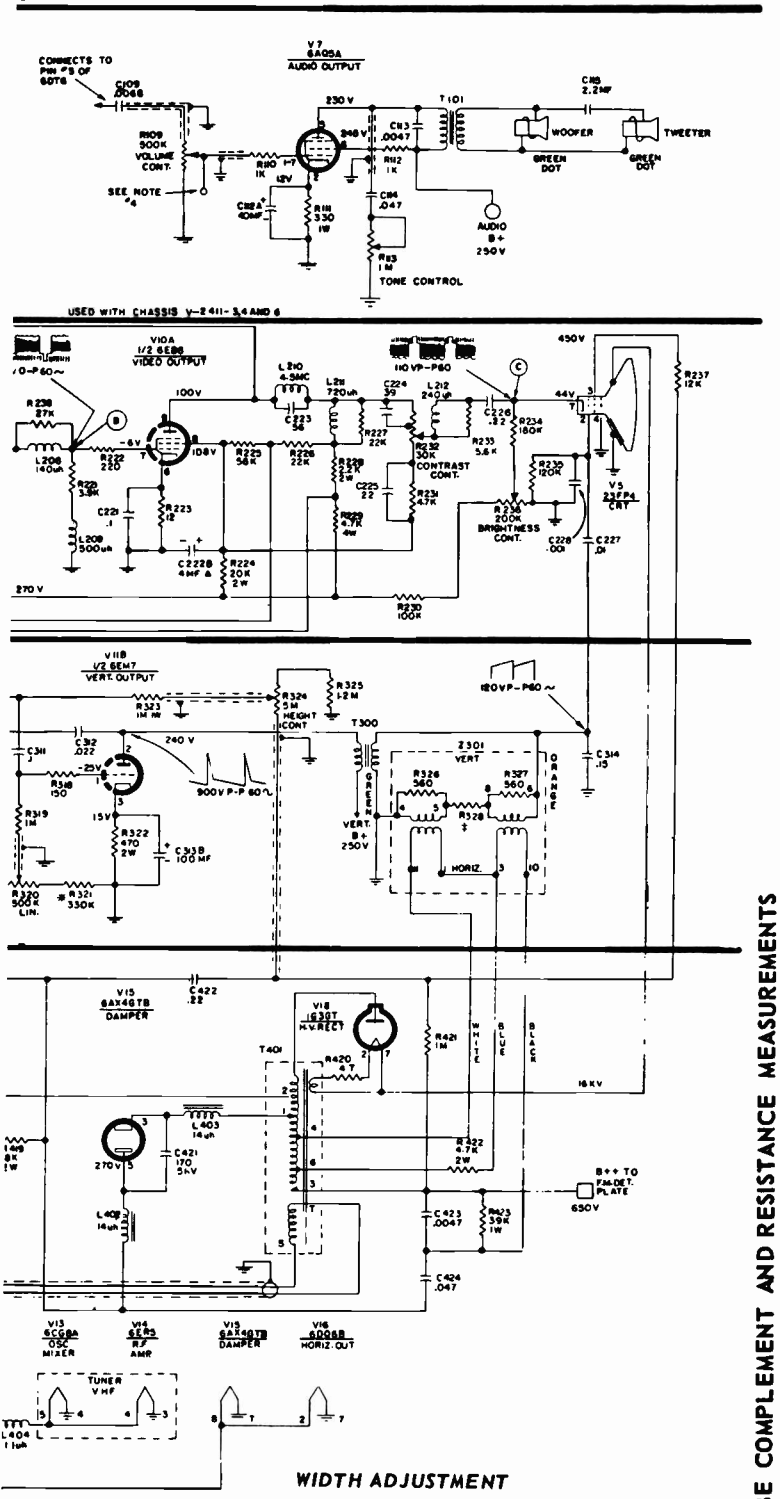
Figure 3 – Schematic Diagram.

MANUAL VHF ONLY
V-2411-1 V-2411-3
MANUAL VHF/UHF
V-2411-2 V-2411-4
POWER TUNED
V-2411-5 V-2411-6

NOTES:
1. D.C VOLTAGES MEASURED FROM CHASSIS GROUND; NO APPLIED SIGNAL USING A V.T.V.M., LINE VOLTAGE 117 A.C
2. ALL PEAK TO PEAK WAVEFORMS AND DC VOLTAGES TAKEN WITH ALL CONTROLS SET FOR NORMAL PICTURE, WITH LEVEL CONTROL SET FOR 3V 0-P AT T.P. (B)
3. ALL CAPACITANCE VALUES LESS THAN 1 ARE IN MFD, AND VALUES GREATER THAN 1 ARE MMFD. ALL RESISTANCE VALUES ARE IN OHMS & 1/2 WATT UNLESS OTHERWISE INDICATED.
4. TO REMOTE CONTROL STEPPING RELAY, CHASSIS 2411-5-6

* PRODUCTION CHANGES: C310 WAS .0033, R321 WAS 150K, R 403 REMOVED, R 410 WAS 1K.
+ 8 OHMS COLD 1 OHM HOT

WESTINGHOUSE Chassis V-2411-1 through V-2411-6 Service Information



WIDTH ADJUSTMENT

This adjustment is a plastic tab with a copper rectangle bonded on to one side, It protrudes out from between the yoke and the bottom of the neck of the picture tube. The shiny side of the copper rectangle goes down against the picture tube. It 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. Set this tab for approximately 1/2" overscan, then tighten the yoke clamp.

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 vertical linearity controls are accessible through the slide plate. The height control can be 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.

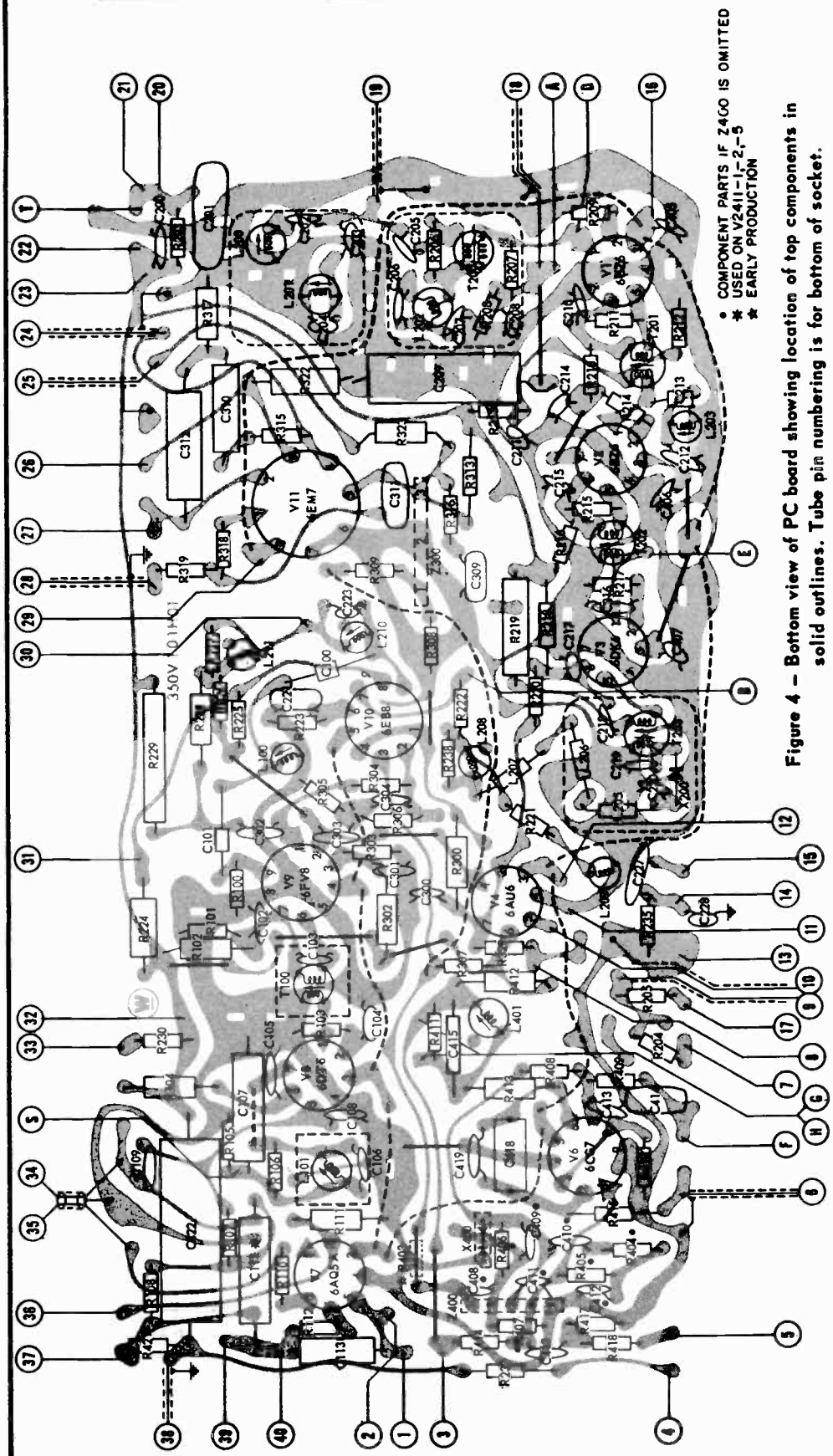
RINGING COIL AND HORIZONTAL FREQUENCY ADJUSTMENT

1. Short out the ringing coil (L401) with a jumper wire.
2. Set the horizontal hold control to the center of its mechanical range. Do not change this setting during the steps that follow.
3. Calibrate a VTVM to 0V Center scale on the 1.5V range and connect to test point (F) for measuring the DC voltage between (F) and ground.
4. With the receiver tuned to a station of normal signal strength, adjust trimmer C418 so that moving it one way causes the meter to swing to the left and moving it the other way causes it to swing to the right. Then carefully adjust trimmer C418 for center scale on this meter.
5. Remove the jumper from the ringing coil.
6. Adjust the 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.

TUBE COMPLEMENT AND RESISTANCE MEASUREMENTS

Tube Type	Resistance Measurements								
	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1: 6BZ6	225K	47	FIL	FIL	INF	INF	0		
V2: 6BZ6	•60K	INF	FIL	FIL	•490	•490	INF		
V3: 6DK6	.1	150	FIL	FIL	•10K	•40K	0		
V4: 6AU6	•22K	•14K	FIL	FIL	2.4M	•22	•14K		
V5: 23FP4	FIL	120K	•1M	0	NC	NC	240K	FIL	
V6: 6CG7	•57K	210K	1K	FIL	FIL	•48K	2.4M	1K	0
V7: 6AQ5	90K	330	FIL	FIL	•1K	•1.5K	90K		
V8: 6DT6	4	820	FIL	FIL	•1M	•47K	560K		
V9: 6FV8	4M	•22K	6.8K	FIL	FIL	12K	12K	0	470K
V10: 6EB8	0	2.4M	•70K	FIL	FIL	12	▲450	•13K	•6.4K
V11: 6EM7	1.4M	•800	470	1.5M	•5.4M	0	FIL	FIL	
V12: 6AF4A	•12.8K	5.6K	FIL	FIL	.1	5.6K	•12.8K		
V13: 6CG8A	4.7K	•16K	0	FIL	FIL	•6.6K	•27K	0	223K
V14: 6ER5	0	3.5M	FIL	FIL	•6.6K	0	0		
V15: 6AX4GTB	NC	NC	•6.5M	NC	•22	NC	FIL	FIL	
V16: 6DQ6B	0	FIL	NC	•1.8K	1M	NC	FIL	0	Cap •16
V17: 5U4GB	NC	INFINITE		30	NC	30	NC		Cap •500
V18: 1G3GT									

All resistance in ohms from tube pin to chassis ground except (*). • Resistance measured from tube pin to pin #8 of V11, controls set for normal picture and sound.
▲ VTVM set on Rx100 scale
NC No connection • Measured from tube pin to pin 3 of V15.



• COMPONENT PARTS IF Z400 IS OMITTED
* USED ON V2411-1,-2,-5
★ EARLY PRODUCTION

Figure 4 – Bottom view of PC board showing location of top components in solid outlines. Tube pin numbering is for bottom of socket.

WESTINGHOUSE

(Continued)

CHASSIS ASSEMBLIES

MANUAL VHF ONLY
V-2411-1 V-2411-3
MANUAL VHF/UHF
V-2411-2 V-2411-4
POWER TUNED
V-2411-5 V-2411-6

KEY TO PC BOARD LAYOUT

1. T101, blue wire
2. Tone Control, to C114
3. C416A
4. CRT, pin 3
5. V16 pin 5
6. Horizontal hold control, high side
7. Jumper to (20)
8. AGC level control, high side
9. T401 (black wire) to "S" terminal
10. T402 (White wire) to "T" terminal
11. CRT, pin 1
12. CRT, pin 8
13. CRT, pin 4
14. CRT, pin 2
15. Z301, yoke, lug #6
16. Fil-input from F401
17. Cable jumper to (18)
18. Cable jumper to (17)
19. Tuner IF output cable lug
20. Jumper to (7)
21. Tuner AGC lug
22. Junction L400, R401 and R402
23. Tuner B+
24. Vert hold control, high end
25. Height control, wiper arm
26. C313B
27. T300, blue wire
28. Vertical lin control, wiper arm
29. Tuner filament lug
30. Junction C224 and high side of contrast control
31. C222B
32. Junction L402, C424, R419
33. Brightness control, high end
34. Volume control, high end
35. Volume control, wiper arm
36. C112A
37. Junction T401 lug #3, C423, R423
38. Height control, high side
39. Junction C404B, R402
40. T101, red wire

TEST POINTS

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

WESTINGHOUSE Chassis V-2411-1 through V-2411-6 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 (S).
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 T.P. (B). Couple a .001mf capacitor to a demodulation probe tip. Connect the other end of the probe to a VTVM and the capacitor to T.P. (C). Set the VTVM to 1.5 - 2V scale. Turn the set on and allow five minutes for warmup. Then adjust L210 for minimum on the VTVM. Due to a one way interaction, it may be necessary to touch up the limiter input coil (L100) as outlined above.

IF ALIGNMENT

EQUIPMENT

1. *Sweep Generator* with a 10 MC wide sweep at center frequencies from 10 MC to 90 MC and 170 MC to 216 MC.
2. *CW (Marker) Generator* which accurately produces the IF and RF frequencies from 4.5 MC to 216 MC.
3. *Oscilloscope* with good low frequency response characteristics.
4. *VTVM.*
5. *Bias Supplies* of -4 volts and -2.5 volts.
6. Standard Alignment Tool with a 3/32" hexagonal tip.

TERMINATION AND ADJUSTMENT OF EQUIPMENT

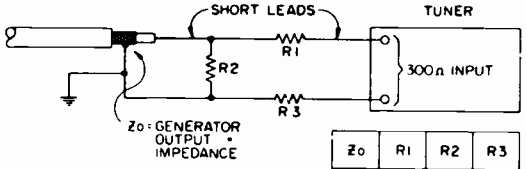
These instructions on termination and adjustment of equipment will apply throughout the IF Alignment procedure.

All test equipment cables and leads should be as short and direct as possible.

Oscilloscope and VTVM – Use a low-capacitance direct probe terminated with the decoupling network shown in Figure 7. Keep the oscilloscope calibrated for 2 volts peak to peak (P-P). Use a VTVM range suitable for measuring -1.5 volts.

Generators – Except where otherwise noted, all signal generating equipment should be terminated as shown in Figure 6. Connect the signal cable ground near the ground of the stage where the signal is injected.

Adjust the CW generator output so that: (1) When the VTVM is being used its reading remains near the -1 volt point. (2) When the oscilloscope is being used the marker frequencies do not distort the response curve.



Zo	R1	R2	R3
52Ω	120Ω	56Ω	50Ω
72Ω	110Ω	85Ω	50Ω

Figure 5 – Impedance matching network.

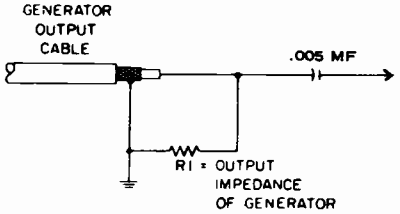


Figure 6 – Generator cable termination.

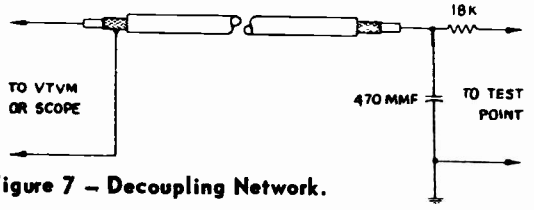


Figure 7 – Decoupling Network.

AGC LEVEL CONTROL

This adjustment is factory set to produce a 3.25 volt, zero to peak output at TP (B), with no sync crushing. Normally no adjustment will be needed in the field.

Should adjustment be necessary, select the channel with the strongest signal. Turn the AGC level control clockwise (↷) until a slight bend appears at the top of the picture (sync crushing). Then turn the AGC level control slowly counter clockwise (↶) to about 1/4 of a turn past the point at which the bend disappears.

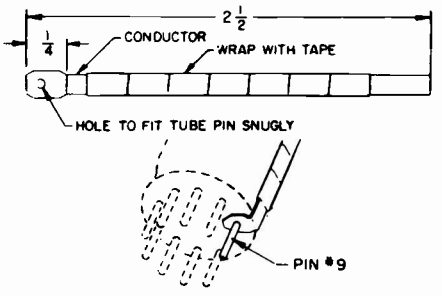


Figure 8 – Mixer Coupling gimmick.

CENTERING

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

WESTINGHOUSE Chassis V-2411-1 through V-2411-6 Alignment, Continued

IF ALIGNMENT

For all of the following steps, connect a -4 volt bias to TP (A), a -2.5V bias to TP (T) and an oscilloscope and a VTVM to TP (B). Channel selector should be set to channel 13 for steps 1 to 5. Fine tuning screws should be set to center of range.

Before beginning alignment, pull out the AGC tube (V4) and detune L200, L201, L202, T200 and mixer output coil. L200 should be detuned clockwise to the bottom of the coil form while L201, L202 and T200 should be detuned to maximum counter clockwise.

Step	*Test Equipment and Connection*	*Adjustment*
1.	Sweep generator at TP (E), 44.25 MC center. Loosely couple CW marker generator to sweep generator. Set CW generator to 44.25 MC.	T203 Primary (bottom slug): Maximum amplitude at 44.25 MC. T203 Secondary (top slug): Rocking symmetrical response at 44.25 MC (see Figure 9).
2.	CW generator to TP (D) at. a. 45.62 MC b. 39.75 MC c. 43.00 MC	T202: Maximum amplitude. L203: Minimum amplitude. Reduce bias if necessary to produce sharp indication. T201: Maximum amplitude.
3.	Sweep generator at TP (D), 44.25 MC center. Loosely couple CW marker generator to sweep generator. Vary CW marker generator to produce markers at frequencies indicated on Figure 10.	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 10.
4.	Sweep generator to TP (M), 44.25 MC center. (For tuner 470V071H01, use gimmick shown in Figure 8 to connect generator to TP (M). For tuner 470V063H02, see Figure 13 to locate TP (M).) Loosely couple CW generator to sweep generator. a. Vary CW generator for markers at frequencies indicated on Figure 11. b. CW generator to 41.25 MC c. CW generator to 47.25 MC (It may be necessary to increase signal level or reduce bias to produce shap indication.) d. Check step 4a. e. Check step 4c.	Mixer output coil: Maximum amplitude at 44.25 MC. T200: Rocking symmetrical response at 44.00 MC with picture carrier (45.75 MC about 7DB down from peak response (see Figure 11). L200: Minimum amplitude. L201, L202: Minimum amplitude. T200: Touch up, if necessary. L202: Touch up, if necessary.
5.	Sweep generator thru matching network shown in Figure 5 to antenna terminals. Adjust sweep generator to sweep channel 13. Loosely couple CW marker generator at 211.25 MC to sweep generator. Keep marker generator output low.	Tuner oscillator slug: 211.25 MC picture marker should appear about 6DB down from peak response (see Figure 12).
6.	Repeat step 5 for all channels. Set generators to appropriate frequencies.	Channel selector to appropriate channels.

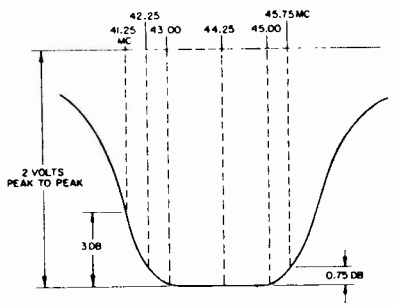


Figure 9 – Typical IF response, 3rd IF Amp grid to 2nd Det.

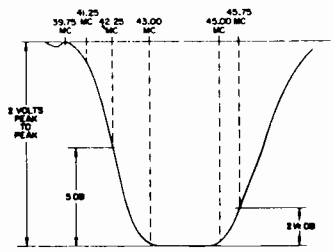


Figure 10 – IF Response, 1st IF Amp. Grid to 2nd Det.

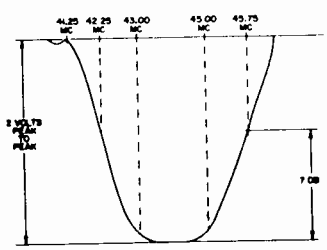


Figure 11 – IF Response, Mixer Grid to 2nd Det.

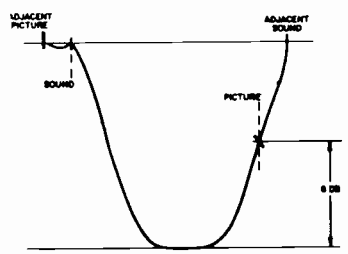


Figure 12 – Typical RF-IF Response.

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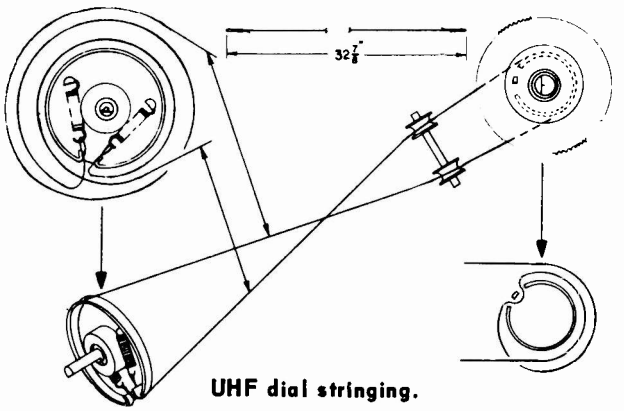
Chassis V-2412-1, V-2412-2, V-2412-5, V-2412-6, V-2412-11, V-2412-12, used in Models H-P3310, U, H-P3311, U, H-P3312, U, H-P3160, U, B, BU, H-P3161, U, B, BU.



UHF dial stringing.

CHASSIS REMOVAL

1. Remove control knobs.
2. Remove back cover and disconnect antenna lead-in.
3. Remove screw holding metal brace behind tuner and swing brace out of the way.
4. Disconnect speaker leads at the output transformer. Remove speaker and grill (2 screws and 4 trimounts).
5. Remove three ¼" screws securing control panel and chassis to cabinet front.
6. Remove 7 screws holding chassis to cabinet base.
7. Carefully remove chassis, tuner end first.

Caution: Be extra careful not to break off feed-thru capacitor on tuner.

PICTURE TUBE REMOVAL

1. Remove chassis as described under Chassis Removal.
2. Discharge high voltage button at CRT.
3. Remove high voltage lead, CRT socket and yoke.
4. Loosen the two screws from upper strap of CRT.
5. Remove picture tube from front of chassis.
6. Install in reverse order.

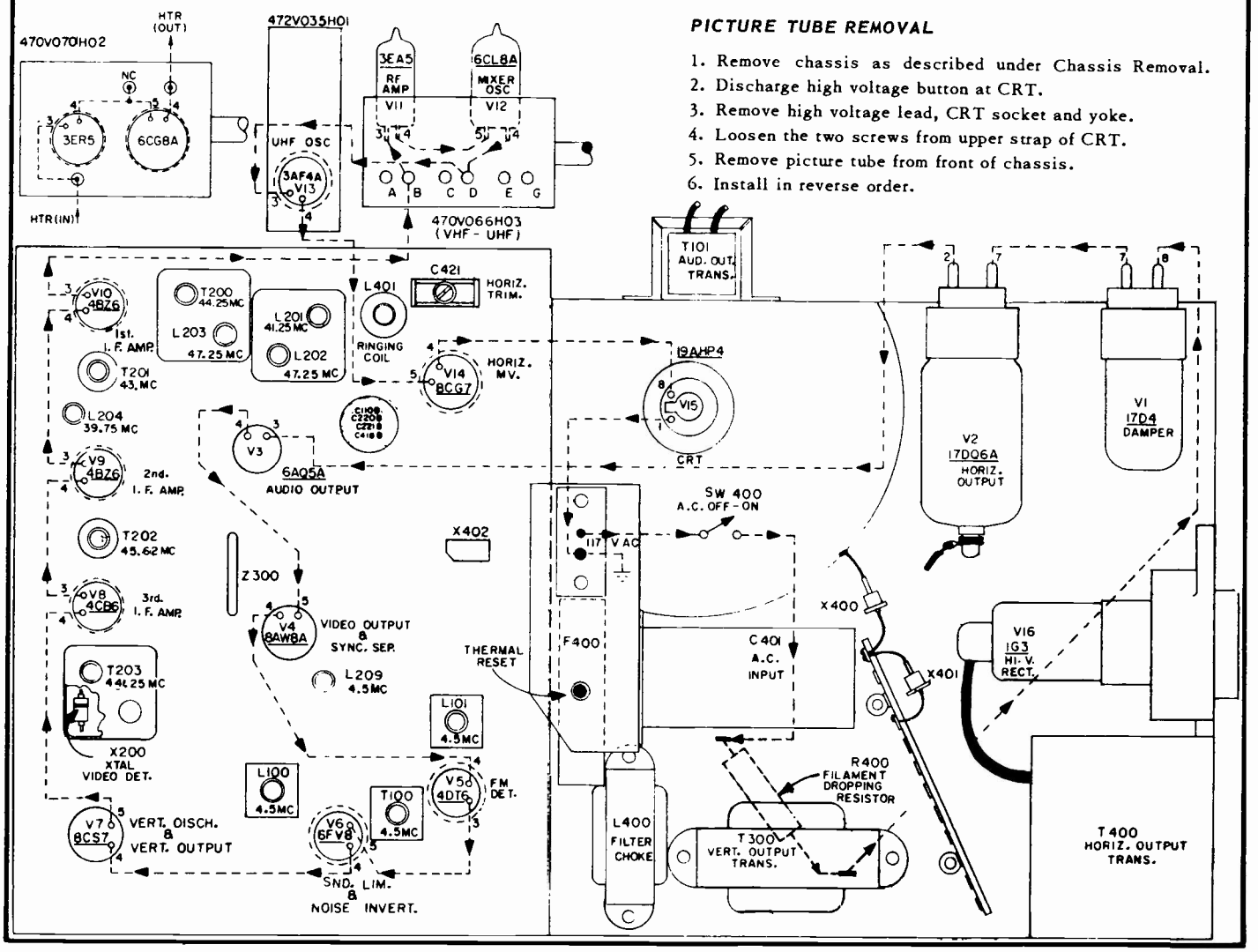
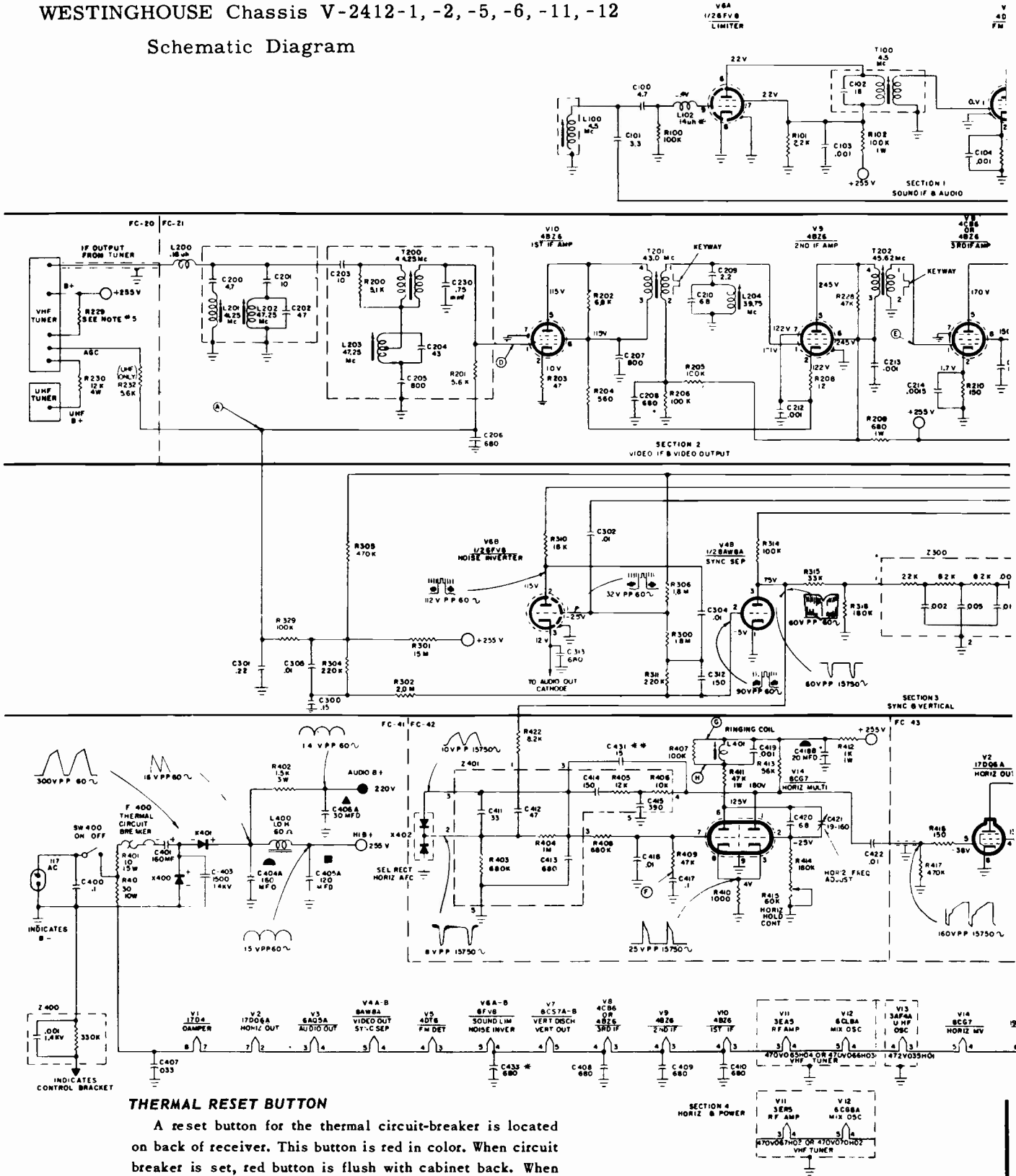


Figure 3 – Top View of Chassis

WESTINGHOUSE Chassis V-2412-1, -2, -5, -6, -11, -12

Schematic Diagram



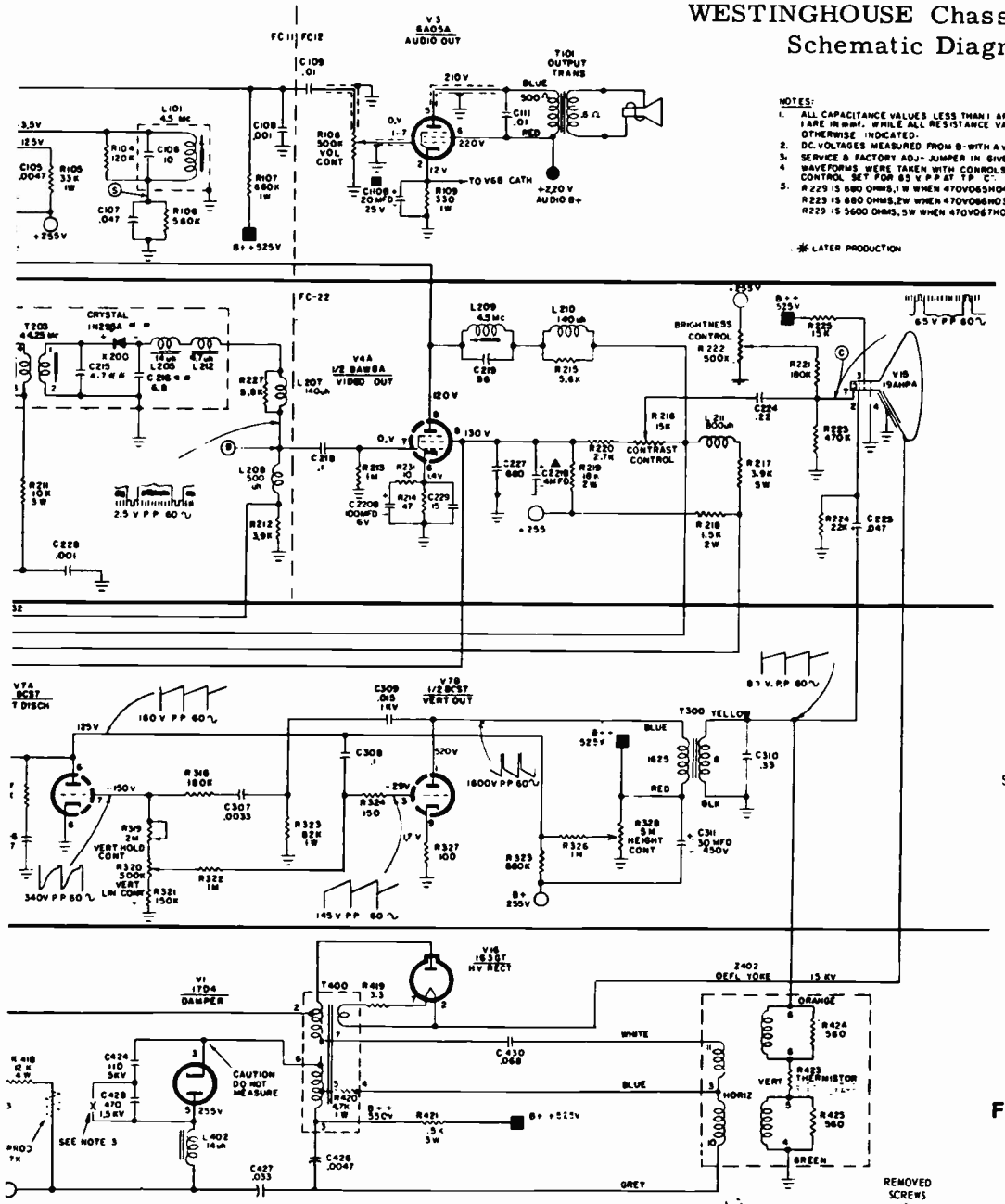
THERMAL RESET BUTTON

A reset button for the thermal circuit-breaker is located on back of receiver. This button is red in color. When circuit breaker is set, red button is flush with cabinet back. When circuit-breaker is open red button will project about 1/8" from back cover. To reset, turn off receiver, push in button then turn receiver back on.

Figure 5 – Schematic Diagram

WESTINGHOUSE Chassis V-2412-1, -2, etc.

Schematic Diagram



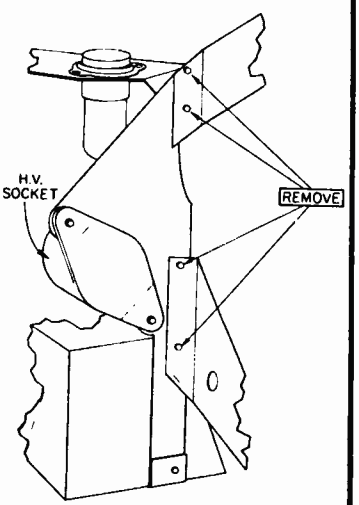


Figure 1 – Bracket Removal.

PC BOARD ACCESSABILITY

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

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

JUMPER

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

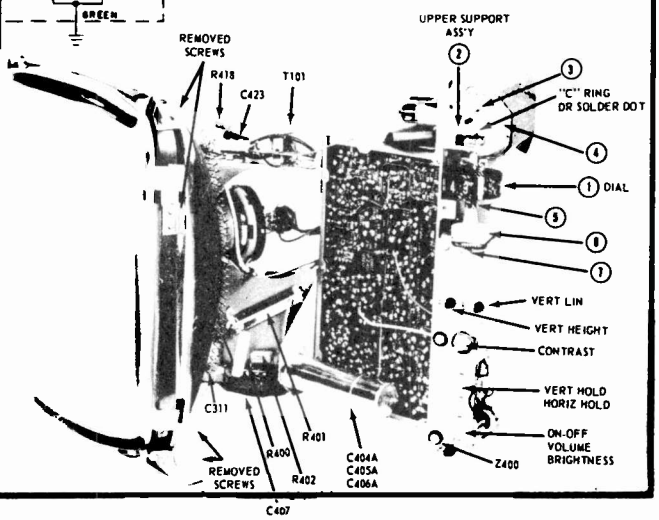
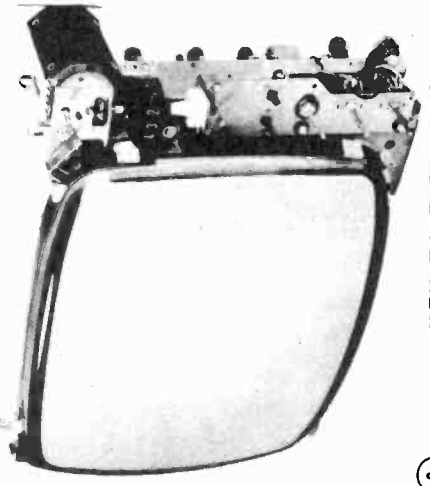


Figure 2 – PC Board Accessibility.

WESTINGHOUSE Chassis V-2412-1, -2, etc. (Continued)



KEY TO FIGURE 6

1. Horiz Hold R415
2. Tuner filament
4. Tuner to IF input
5. Pin 2 of 17DQ6A
6. Tuner AGC
7. Tuner filament
8. T101 primary
9. Audio B+
10. Junction of C406A, R402
11. R320, Vert Lin, bottom
12. R319 Vert Hold
13. T300 Vert output
14. R320 Vert Lin Control, Arm
15. R328 Height control, arm
16. Junction of C427, C311
17. R216 Contrast control, top
18. R216 Contrast control, arm
19. R108 Volume control, top
20. CRT pin #3
21. T300 Vert output, yellow wire
22. CRT pin #2
23. R222 Brightness control, arm
24. R222 Brightness control, top
25. CRT pin #7
25A CRT pin #4
26. R216 Contrast control, bottom
27. R416 grid of Horiz output
28. R108 Volume control, arm
29. CRT pin #8

TEST POINTS

A. AGC for 1st IF; also AGC for tuner.
B. Video detector
C. CRT cathode
D. 1st IF input
E. 3rd IF grid
F. Horiz MV
G. Ringing coil
H. Ringing coil
S. FM sound

• USED WHEN Z401 IS OMITTED
⊗ JUMPER WIRE

Figure 6 – Bottom view of PC board showing location of top components in solid outlines. Tube pin numbering is for bottom of socket.

WESTINGHOUSE Chassis V-2412-1, -2, etc. Adjustment and Alignment 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 with a jumper wire.
2. Set the horizontal hold control to the center of its range. Do not change this setting during the steps that follow.
3. Connect a VTVM to TP (F) for measuring the DC voltage between TP (F) and B–.
4. With the receiver tuned to a station of normal signal strength, adjust C421 for 0 volts DC on the meter.
5. Remove the jumper from the ringing coil.
6. Adjust the ringing coil for 0 volts DC on the meter. Check the adjustment by switching to another channel and back again. The receiver should pull into horizontal sync on all channels.

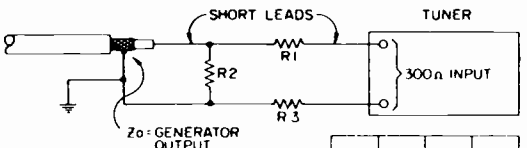
HEIGHT AND VERTICAL LINEARITY

The HEIGHT AND VERT. LIN. controls are accessible through two holes in the front escutcheon, just below the Channel Selector knob, with HEIGHT on the left and VERT. LIN. on the right. With a narrow screwdriver, adjust them alternately until a picture of proper height and linearity is obtained.

SOUND ALIGNMENT

PROCEDURE:

1. Select the strongest station available (preferably with test pattern and test tone) and adjust the MEMORY FINE TUNING for best reception. Adjust the VOLUME control so that the station sound is audible.
2. Adjust the quad coil (L101) for maximum sound from the speaker.
3. Disconnect the antenna. Use a jumper wire to short TP (B) to B–.
4. Connect the VTVM to TP (S).
5. Adjust interstage transformer T100 for maximum negative voltage on the VTVM.
6. Remove the jumper wire used to short TP (B) to B–.
7. Place the antenna input close to the antenna terminals so that the signal is loosely coupled to the receiver and the picture is barely visible. A pronounced noisiness (hiss) should accompany the sound.



Zo	R1	R2	R3
52Ω	120Ω	56Ω	150Ω
72Ω	110Ω	85Ω	150Ω

Figure 7 – Impedance matching network.

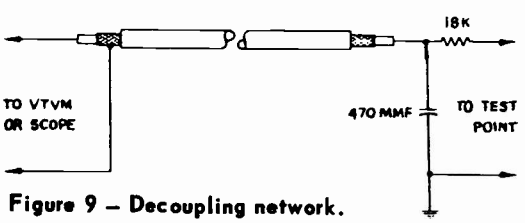


Figure 9 – Decoupling network.

8. Adjust the limiter input coil (L100) for maximum negative voltage on the VTVM. If the VTVM indicates a broad response while making this adjustment, the receiver input signal is too strong. When the signal coupling described in step 7 is at the necessary low point, no limiting takes place and the VTVM will indicate a sharp response to the limiter input coil adjustment.

4.5 MC TRAP ALIGNMENT

Disconnect the antenna and turn contrast control to maximum clockwise. Inject a 4.5 MC CW signal through a .001mf capacitor to TP (B). Connect a .001mf capacitor to a demodulation probe tip. Connect the other end of the probe to a VTVM and the capacitor to TP (C). Set the VTVM to 1.5-2V DC range. Turn the set on and allow five minutes for warmup. Then adjust L209 for minimum on the VTVM.

IF ALIGNMENT

EQUIPMENT

1. **Sweep Generator** with a 10 MC wide sweep at center frequencies from 10 MC to 90 MC and 170 MC to 216 MC.
2. **CW (Marker) Generator** which accurately produces the IF and RF frequencies from 4.5 MC to 216 MC.
3. **Oscilloscope** with good low frequency response characteristics.
4. **VTVM**
5. **Bias Supply** of –4 volts.
6. **Standard Alignment Tool** with a 3/32" hexagonal tip. (long enough to reach bottom slugs)

TERMINATION AND ADJUSTMENT OF EQUIPMENT

These instructions on termination and adjustment of equipment will apply throughout the IF Alignment procedure. All test equipment cables and leads should be as short and direct as possible.

Oscilloscope and VTVM – Use a low-capacitance direct probe terminated with the decoupling network shown in Figure 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.

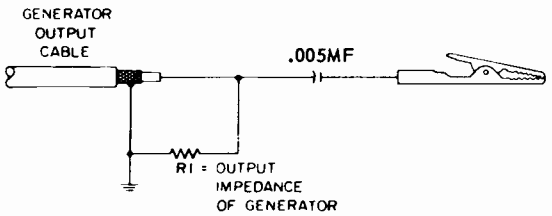


Figure 8 – Generator cable termination.

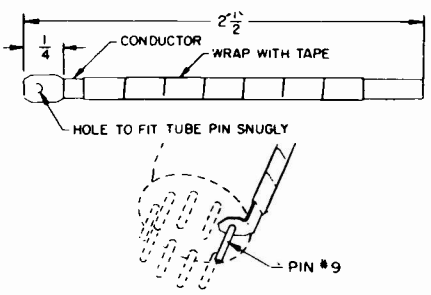


Figure 10 – Mixer coupling gimmick.

WESTINGHOUSE Chassis V-2412-1, -2, etc. Alignment Information (Continued)

IF ALIGNMENT

STEP	*TEST EQUIPMENT AND CONNECTION*	*ADJUSTMENT*
1.	−4 Bias to TP (A)	Channel selector to channel 10
2.	Oscilloscope and VTVM to TP (B) IF sweep generator with CW Marker at 44.25 MC to TP (E)	Short antenna terminals. T203 primary (bottom slug): Maximum amplitude T203 secondary (top slug): Rocking symmetrical response (see Figure 11)
3.	CW generator to TP (D) at: a. 45.62 MC b. 39.75 MC c. 43.00 MC	 T202: Maximum amplitude L204: Minimum amplitude T201: Maximum amplitude
4.	Sweep generator at 44.25 MC to TP (D). Couple CW marker generator to sweep generator cable. Keep marker amplitude at minimum to avoid distorting response.	T201, T202, T203: Slight retouching may be necessary to obtain response curve with correctly placed markers as shown in Figure 12. Use T203 (top slug) to flatten peak of curve, T201 to adjust low frequency slope and T202 to adjust high frequency slope. If curve cannot be obtained, traps listed in Step 5 may be badly misaligned.
5.	CW generator to TP (M) (for 470V070H02 tuner, use gimmick shown in Figure 10) at: a. 44.25 MC b. 44.25 MC c. 41.25 MC d. 47.25 MC } It may be necessary to increase e. 47.25 MC } generator output and/or decrease bias.	 Tuner mixer output coil: Maximum on VTVM T200: Maximum on VTVM L201: Minimum on VTVM L202: Minimum on VTVM L203: Minimum on VTVM
6.	Connect sweep generator to TP (M) at 44.25 MC. Couple CW generator with marker at 44.25 MC to sweep generator cable. Keep marker amplitude low to avoid distorting response. Adjust scope for 2V–PP.	Mixer output coil and T200: Rocking symmetrical response. Tune for maximum amplitude with waveshape and markers as shown in Figure 13.
7.	CW generator to TP (M) at 47.25 MC.	L203: Minimum amplitude (wave shape should be as shown in Figure 13)
8.	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 (±400KC) marker on scope. (See Figure 14).
9.	Repeat step 8 for all channels	

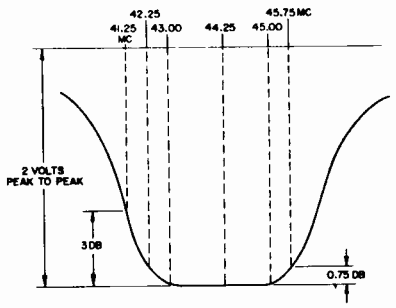


Figure 11 – Typical IF response, 3rd IF Amp grid to 2nd Det.

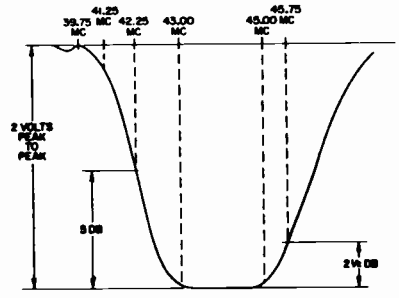


Figure 12 – Typical IF response, 1st IF Amp grid to 2nd Det.

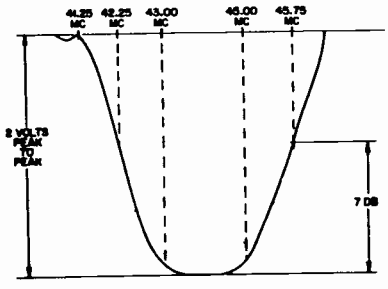


Figure 13 – Typical IF response, Mixer Amp grid to 2nd Det.

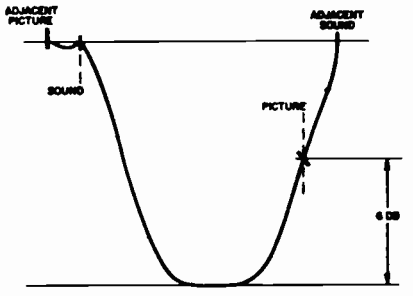


Figure 14 – Typical RF-IF response

ZENITH RADIO CORPORATION

ZENITH

TELEVISION RECEIVERS

CHASSIS 16F27, 16F27Q, 16F27T, 16G20, 16G20Q, 16G21, 16G21Q, 16G22, 16G22Q, 16G23, 16G23Q, 16G27, 16G27Q, 16G27QT, 16G27T, 17G28 AND 17G28Q

MODEL AND CHASSIS INFORMATION

MODEL	SPACE COMMAND	TYPE	CHASSIS	TUNER	PICTURE TUBE
F2105C		Table	16F27 - 16G27	Bandswitch	19AJP4
F2110G		Table	16F27 - 16G27	Target Turret	19AJP4
F2111L,P		Table	16F27 - 16G27	Target Turret	19AJP4
F2112W		Table	16F27T* - 16G27T*	Target Turret	19AJP4
G2101C,F		Table	16G20	Bandswitch	19BDP4
G2102L,R,W		Table	16G20	Bandswitch	19BDP4
G2105C,L		Table	16G27	Bandswitch	19AJP4
G2110B,G		Table	16G27	Target Turret	19AJP4
G2112J,W		Table	16G27T*	Target Turret	19AJP4
G2120E,M,R,W		Console	16G20	Target Turret	19BDP4
G2213G	"300"	Table	16G20Q	Gold Video Guard Turret	19BDP4
G2214L	"300"	Table	16G27Q	Gold Video Guard Turret	19AJP4
G2215J,L	"300"	Table	16G27Q	Gold Video Guard Turret	19AJP4
G2216L	"300"	Table	16G27QT*	Gold Video Guard Turret	19AJP4
G2304R,W		Table	16G21	Bandswitch	21CXP4
G2705R,Y		Table	16G23	Bandswitch	23ANP4
G2707R,Y		Table	16G23	Bandswitch	23ANP4
G2715Y		Table	16G22	Gold Video Guard Turret	23ANP4
G2717E,R,W		Table	16G22	Gold Video Guard Turret	23ANP4
G2730E,R,M,W		Console	16G23	Target Turret	23ANP4
G2735L,R,W		Console	16G23	Target Turret	23ANP4
G2737E,R,W		Console	16G23	Target Turret	23ANP4
G2738E,M,R,W,		Console	16G23	Target Turret	23ANP4
G2740H,R,W		Console	16G23	Target Turret	23ANP4
G2752R,W,Y		Console	16G23	Target Turret	23ANP4
G2755H,M,R,W		Console	16G22	Gold Video Guard Turret	23ANP4
G2756E,R,W		Console	16G22	Gold Video Guard Turret	23ANP4
G2762W		Console	16G22	Gold Video Guard Turret	23ANP4
G2780E,R,W		Comb.	16G23/4G21	Target Turret	23ANP4
G2786E,M,R,W		Comb.	16G23/4G21/7F20	Target Turret	23ANP4
G2787W		Comb.	16G23/4G21/7F20	Target Turret	23ANP4
G3310E,R,W	"300"	Table	16G22Q	Gold Video Guard Turret	23ANP4
G3311R,W,Y	"400"	Table	16G22Q	Gold Video Guard Turret	23ANP4
G3341E,M,R,W	"300"	Console	16G23Q	Target Turret	23ANP4
G3346E,M,R,W	"400"	Console	16G23Q	Target Turret	23ANP4
G3348R,W	"400"	Console	16G23Q	Target Turret	23ANP4
G3350E,R,W	"400"	Console	16G23Q	Target Turret	23ANP4
G3353E,W	"400"	Console	16G22Q	Gold Video Guard Turret	23ANP4
G3354M,R	"400"	Console	16G22Q	Gold Video Guard Turret	23ANP4
G3360W,Y	"400"	Console	17G28Q	Gold Video Guard Turret	23AFP4
G3368M,R	"400"	Console	17G28Q	Gold Video Guard Turret	23AFP4
G3375L	"400"	Console	17G28Q	Gold Video Guard Turret	23AFP4
G3385H	"400"	Console	17G28Q	Gold Video Guard Turret	23AFP4
G3388W	"400"	Comb.	16G22Q/5G29/7F20	Gold Video Guard Turret	23ANP4

* Equipped with electric timer.
**Target turret tuner used in early production models.

Suffix "Q" following the chassis number identifies a receiver equipped with Zenith's Space Command remote control

Suffix "U" is added to chassis and model number if receiver is factory equipped with UHF continuous tuner.

ZENITH Television Receivers Information on Adjustments

ADJUSTMENTS

BANDSWITCH TUNER

Oscillator adjustment screws are accessible from the front of the cabinet. The knobs and the trim plate for each model is slightly different. To gain accessibility to the adjustment screws refer to the instruction booklet shipped with the receiver.

Set the fine tuning control to the center of its mechanical range. Without further adjustment of the fine tuning control, insert a 68-33 alignment tool into the tuner and adjust each operating channel to resonance starting with the highest channel and following each lower channel in sequence. (Series inductance circuit.) Be certain not to move the fine tuning shaft when switching channels. It will be noted that turning the oscillator screw to one side of resonance results in a faded, washed-out picture with the spacings between the wedge lines "fogged" and turning in the opposite direction causes the spaces between the lines to clear up, however, going beyond this point will cause the picture to take on a "wormy" appearance from sound getting into the picture. Correct adjustment is obtained by adjusting for a "wormy" picture and then back down the adjustment screw slightly until the picture clears up. (If more than one turn of the screw is required to tune in a channel or if adjustment cannot be made, it may be necessary to touch up the channel 13 screw to bring channels 7 thru 13 within range and 6 for channels 2 thru 6.)

TARGET TUNER

1. To adjust oscillator slugs, turn the fine tuning control to the center of its mechanical range.

2. Without further adjustment of the control, insert a 68-36 alignment wrench through the hole provided in the front of the tuner and adjust each operating channel to resonance. It will be noted that turning the adjustment screw to one side of resonance results in a faded, washed-out picture with the spacings between the wedge lines "fogged" and turning the screw in the opposite direction causes the spaces to clear up, however, going beyond this point will cause the picture to take on a "wormy" appearance from sound getting into the picture. Correct adjustment is obtained by adjusting for a "wormy" picture and then back down the adjustment screw slightly, until the picture clears up.

GOLD VIDEO GUARD TUNER

The contacts in this tuner are 16K gold filled (not plated) using an alloy consisting of 69% gold, 25% silver and 6% platinum for improved performance and greater reliability. There is only one oscillator adjustment (per channel) and this is the front panel tuning knob which when turned causes the nylon gear mechanism to engage the oscillator adjustment screw on the channel strip in use. There is no stop in the tuning mechanism and the knob can be rotated several turns either direction from resonance. It will be noted that turning the tuning knob to one side of resonance results in a faded washed out picture. Turning the tuning control in the opposite direction will cause the picture to clear up, however, going beyond this point, the picture will take on a "wormy" appearance from sound getting into the picture. Correct adjustment is obtained by adjusting for a "wormy" picture and then backing down the control slightly until the picture clears up. Repeat this procedure on each operating channel.

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.

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.

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.

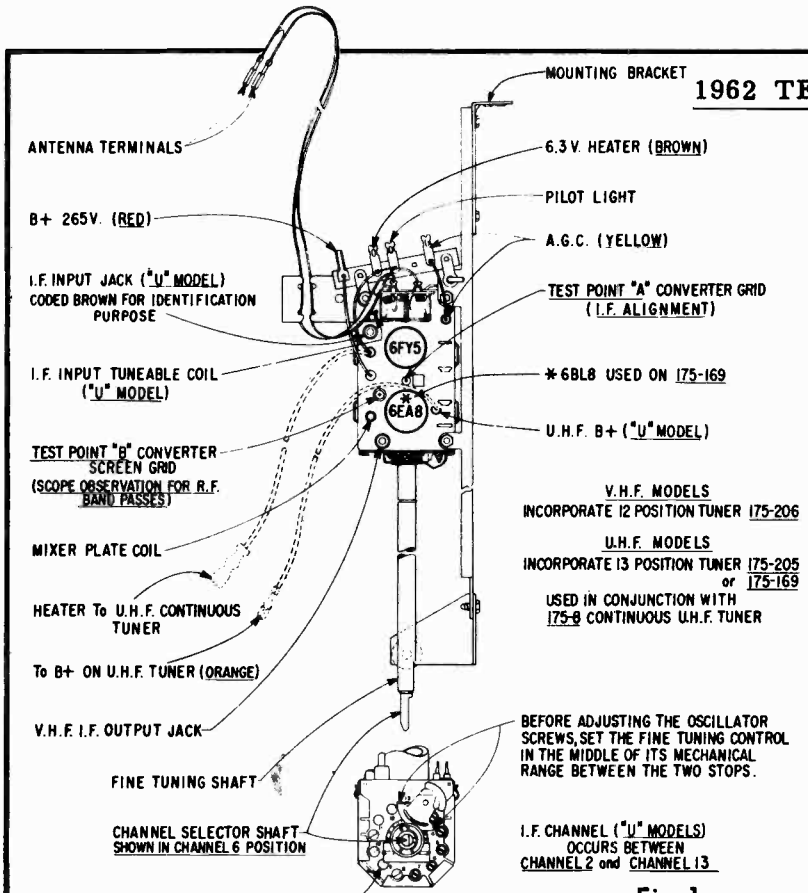


Fig. 1. Tube and Trimmer Layout, Bandswitch Tuner

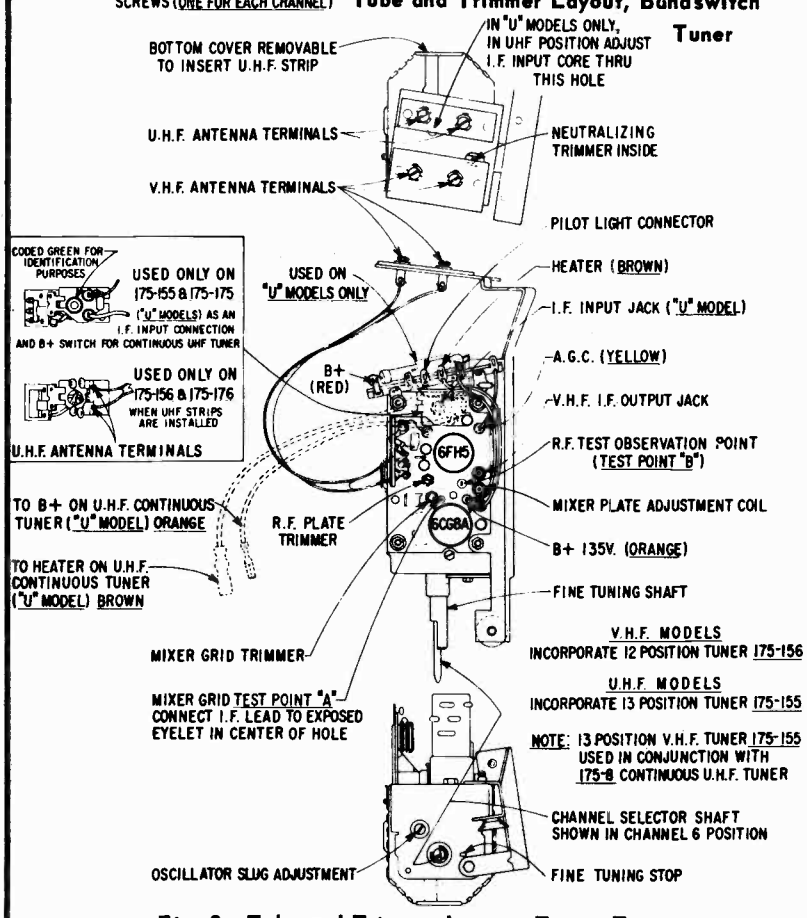


Fig. 2. Tube and Trimmer Layout, Target Tuner

ZENITH Adjustment Information

WIDTH ADJUSTMENT

To obtain proper width, slide the metal sleeve along the neck of the picture tube until a position is found which results in proper width and linearity. In the 16F27 and 16G27 chassis, the sleeve must be installed with the open side facing the picture tube high voltage connector button.

CENTERING ADJUSTMENT

The centering assembly is built into the yoke housing. This assembly is made of two magnetic rings which can be rotated by means of tabs. Centering is accomplished by gradually rotating the tabs with respect to each other, then rotating both tabs simultaneously until the picture is centered.

CORRECTOR MAGNET ADJUSTMENT

Two corrector magnets are used in 21, 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.

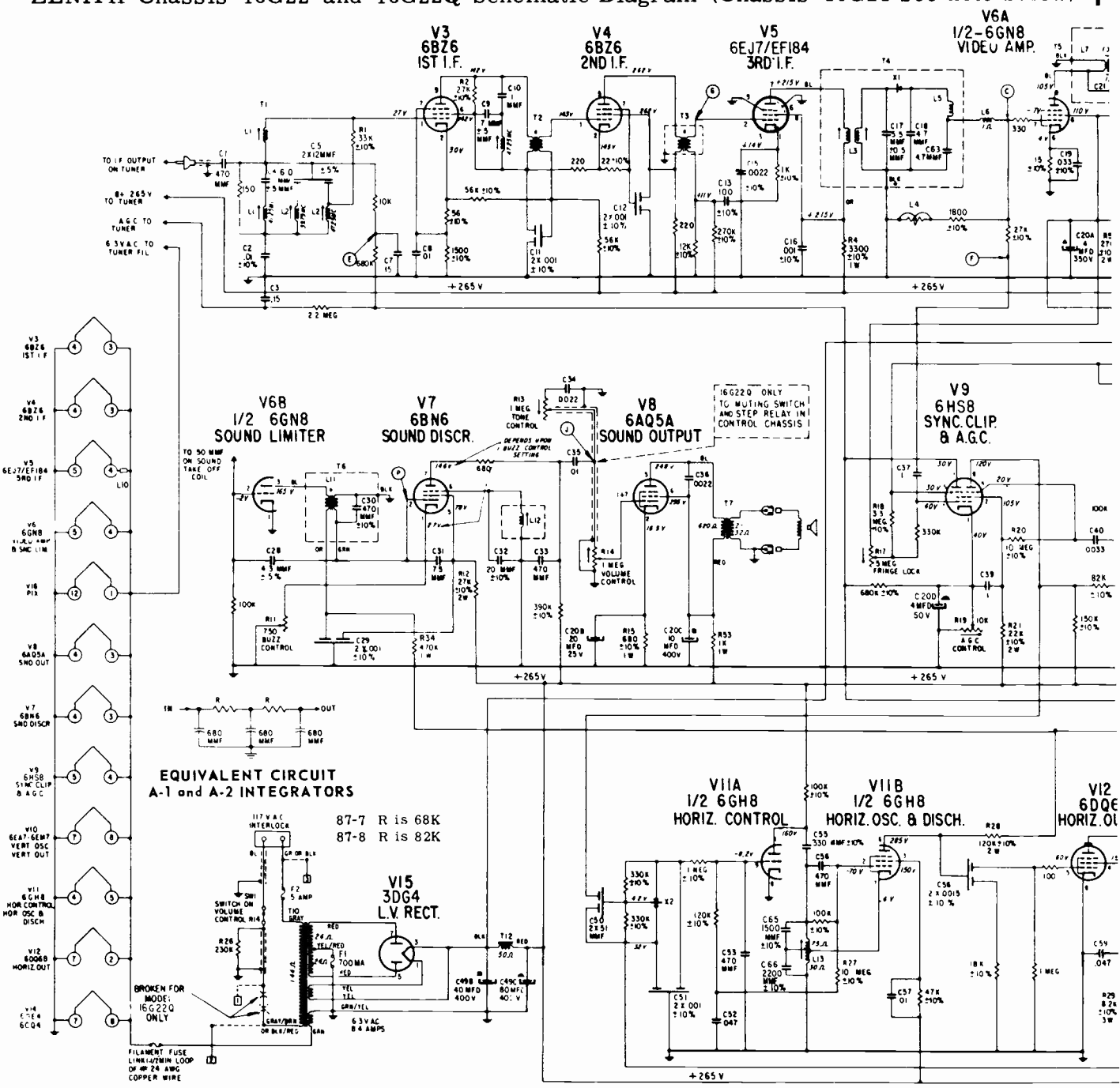
NOTE: Misadjustment of the corrector magnets may cause pincushioning, barreling, keystoning, poor linearity, etc.

PEAK PICTURE CONTROL 17G28 CHASSIS

This control is at the rear of the chassis. It is part of the video detector load and has a decided effect on the video response of the receiver. The response can be changed from a slight smear at the extreme counter-clockwise position of the control to an exaggerated overshoot in the maximum clockwise position.

The control is adjusted at the factory for best picture detail under normal signal conditions, however, it can be changed in the field to suit a particular signal or program condition. As an example, an old movie can be "crispened" or the texture of "snow" in a fringe area can be changed for a more pleasing picture.

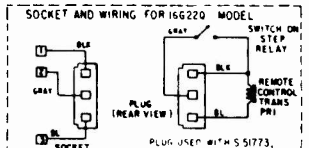
ZENITH Chassis 16G22 and 16G22Q Schematic Diagram (Chassis 16G21 see note below)



Schematic Diagram, Tube and Trimmer Layout and Signal Path Chart 16G22 and 16G22Q Chassis.

PICTURE TUBE SECOND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER CLOCKWISE

SOCKET AND WIRING FOR 16G22Q MODEL



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 COILS DISCONNECTED FROM CIRCUIT

COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.

CATHODE RAY TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC OR 20K MIN. OHM PER VOLT HIGH VOLTAGE METER.

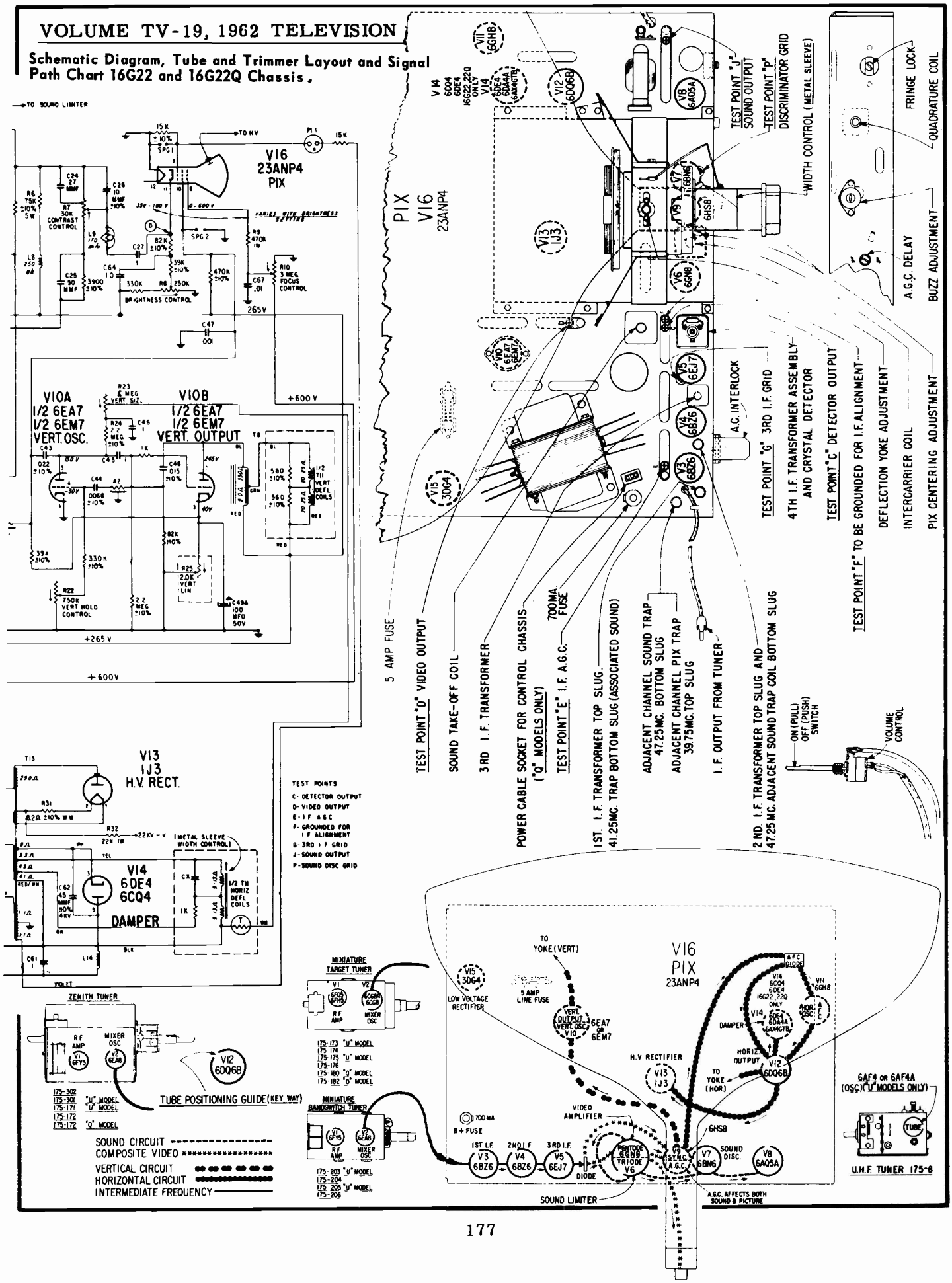
ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.

(A) ALIGNMENT POINTS
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS

CHASSIS

ZENITH Chassis 16G21 uses 21CXP4 picture tube, a 6DK6 for V5, but its circuitry is practically the same as Chassis 16G22 shown on these pages.

Schematic Diagram, Tube and Trimmer Layout and Signal Path Chart 16G22 and 16G22Q Chassis.



ZENITH Gold Video Guard Turret Tuner Information

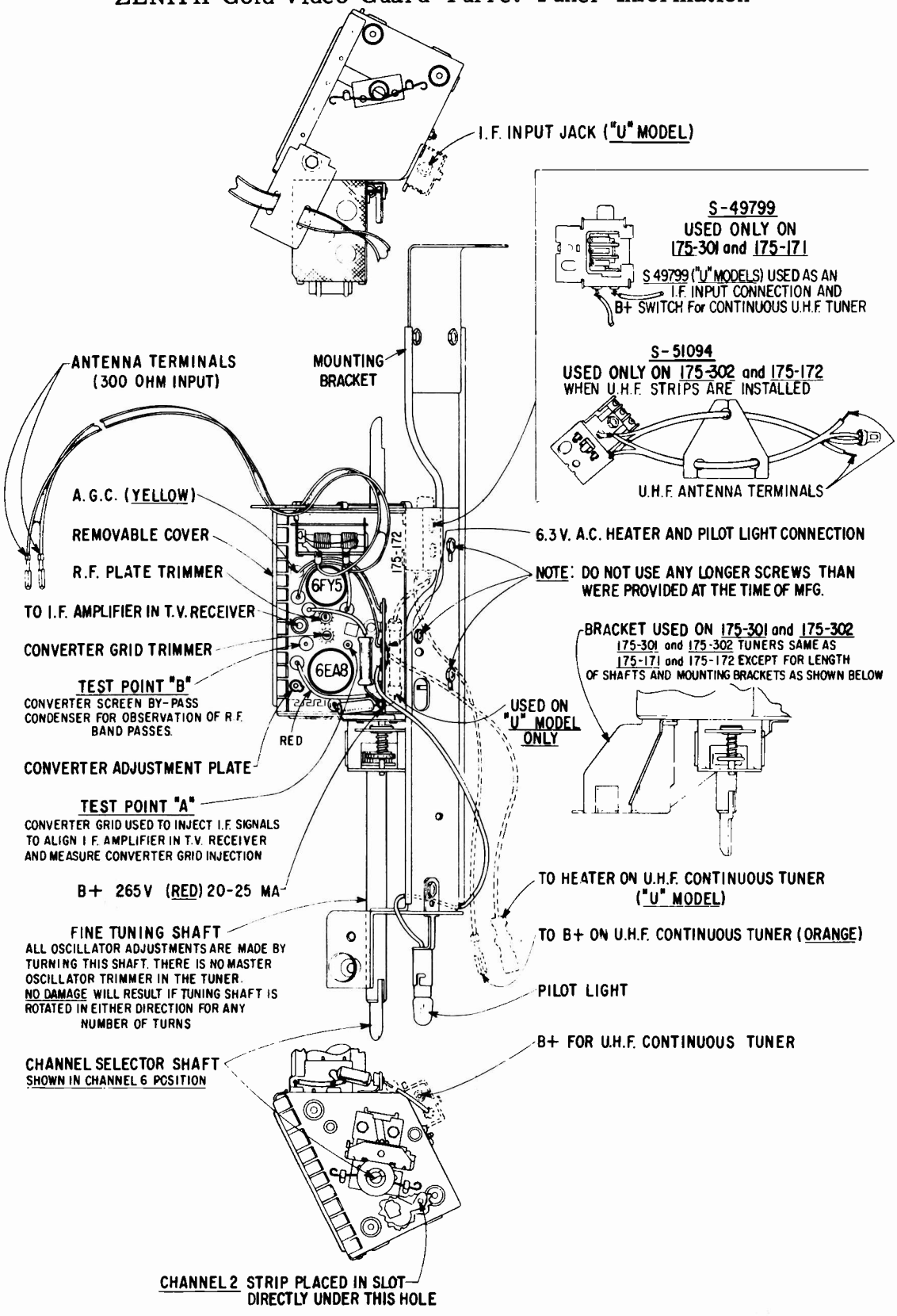


Fig. 3. Tube and Trimmer Layout, Gold Video Guard Turret Tuner

ADJACENT CHANNEL REJECT SWITCH 17G28 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 17G28 CHASSIS

1. Connect the negative lead of a variable bias supply (0-6V) to the grid (pin 7) of the 6GN8 video amplifier and the positive lead to chassis. Switch the tuner to a blank channel. Pull the dynamic contrast switch out (DC position).

2. Connect a VTVM to the cathode of the picture tube (pin 11) and adjust the bias supply until this voltage reads 150V.

3. Connect the VTVM to grid 1 (pin 2) and adjust the brightness control for 95 volts indication on the meter.

4. Leave the meter connected to grid 1 and adjust G2 until the raster is just extinguished.

NOTE: An alternate and reasonably accurate method of adjustment is to tune in a TV signal and adjust the G2 control for 450 volts on grid 2 (pin 10) .

ALIGNMENT

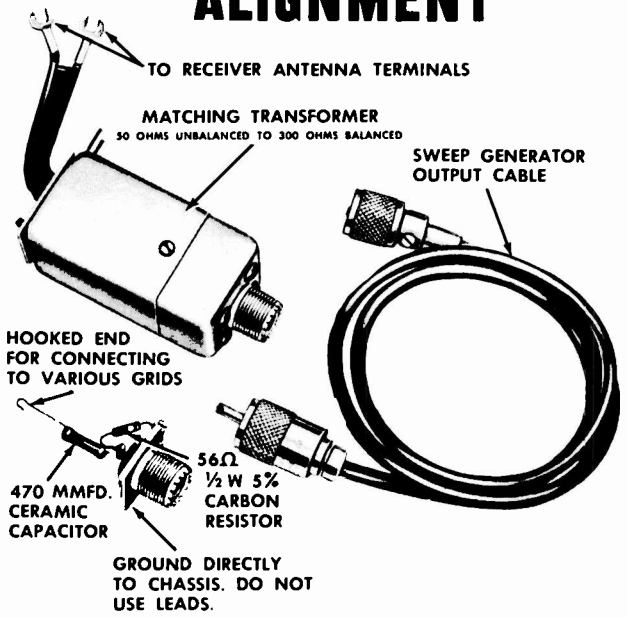


Fig. 4 IF-RF Alignment Fixtures

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

Refer to the appropriate schematic diagram and tube and trimmer layout for reference test points.

1. Slowly turn the channel selector until the tuner rotor is made to rest between two channels. This will prevent an erroneous response.

2. Connect an oscilloscope through a 10,000 ohm isolation resistor to terminal "C" (detector). Connect the ground lead to chassis. In the 17G28 chassis turn the Peak Picture Control to the extreme counterclockwise position.

3. Feed the sweep generator through the special terminating network shown in Fig. 4 to point "G" (Pin 1 of the 3rd IF). Adjust generator to obtain a response similar to Fig. 5 with a detector output of 3 volts peak to peak. Do not exceed this level during any of the adjustments.

4. Set the marker generator to 45.75 Mc and alternately adjust the top and bottom cores of the 4th IF for maximum gain and symmetry with the 45.75 Mc marker positioned as shown in Fig.5. The two peaks must be equal in height and the high frequency peak

ZENITH Television Receivers Alignment Information, Continued

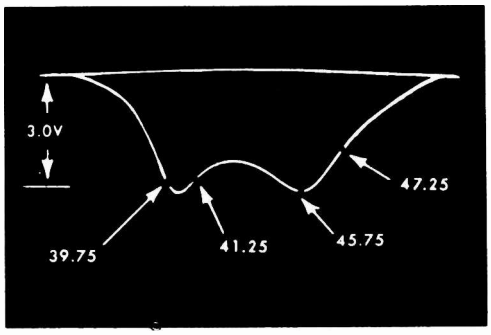


Fig. 5 4th IF Response

at 45.75 Mc. If the correct response cannot be obtained, check the position of the cores to see that they are not butted but are entering their respective windings from the opposite ends of the coils.

5. Connect the sweep generator to terminal "A" (mix grid, see Fig. 1, 2 or 3 depending on tuner). Connect terminal "F" to chassis and connect a jumper between terminal "E" and chassis. Adjust sweep to obtain a 3V.P.P. response somewhat similar to Fig. 8. Switch oscilloscope to 10X gain to "blow up" the traps, (Fig. 6).

6. Refer to Fig. 6 and adjust the 39.75 Mc and the 41.25 Mc traps for minimum marker amplitude. Disconnect the jumper between "E" and chassis Connect this jumper between "E" and the junction of the 56 (68 in the 16G20 and 16G27 chassis) and 1500 ohm resistors in the cathode of the first I.F. This provides an additional "Blow Up" of the 47.25 Mc traps. (Fig. 7). In the 17G28 chassis the receiver is shipped from the factory with the adjacent channel reject switch (at the rear of the chassis) in the "out" position. For alignment, the switch should be in the "in" position. Adjust the 47.25 Mc traps (the 16G20 and 16G27 chassis have one 47.25 Mc trap) for minimum marker amplitude.

7. Disconnect the jumper between "E" and the 56 and 1500 ohm cathode resistors. Connect this jumper between "E" and chassis. In the 17G28 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 16G20 and 16G27 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.

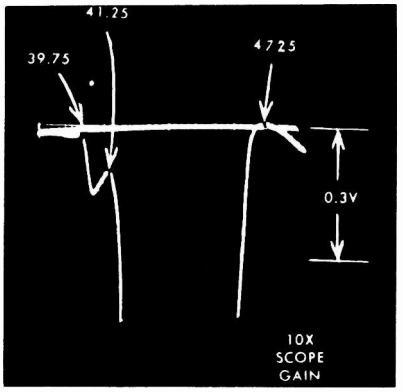


Fig. 6 Expanded View of Traps

SPECIFICATIONS

POWER SUPPLY
117 Volts, 60 Cycles AC

CHASSIS	WATTS
16F27 & 16F27T	215
16F27Q	290*
16G20 & U	185
16G20Q	265*
16G21 & U	215
16G22 & U	220
16G22Q	300*
16G23 & U	215
16G23Q	295*
16G27 & 16G27T	205
16G27Q & 16G27QT	285*
17G28	225
17G28Q	305*

*With Space Command motor drive in operation

TV AUDIO OUTPUT

All Chassis Except 17G28

1.6 Watts	Undistorted
2.8 Watts	Maximum

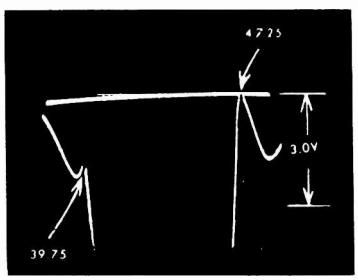


Fig. 7 Further Expansion of Fig. 6 for Detail View of the 39.75 and 47.25 Mc Traps.

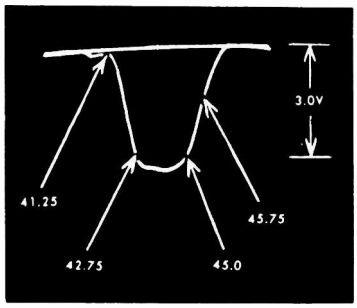


Fig. 8 Overall IF Response

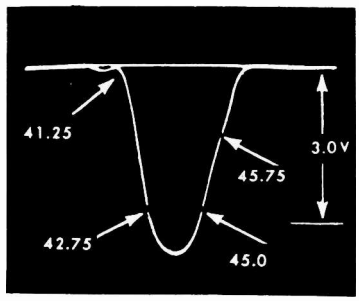
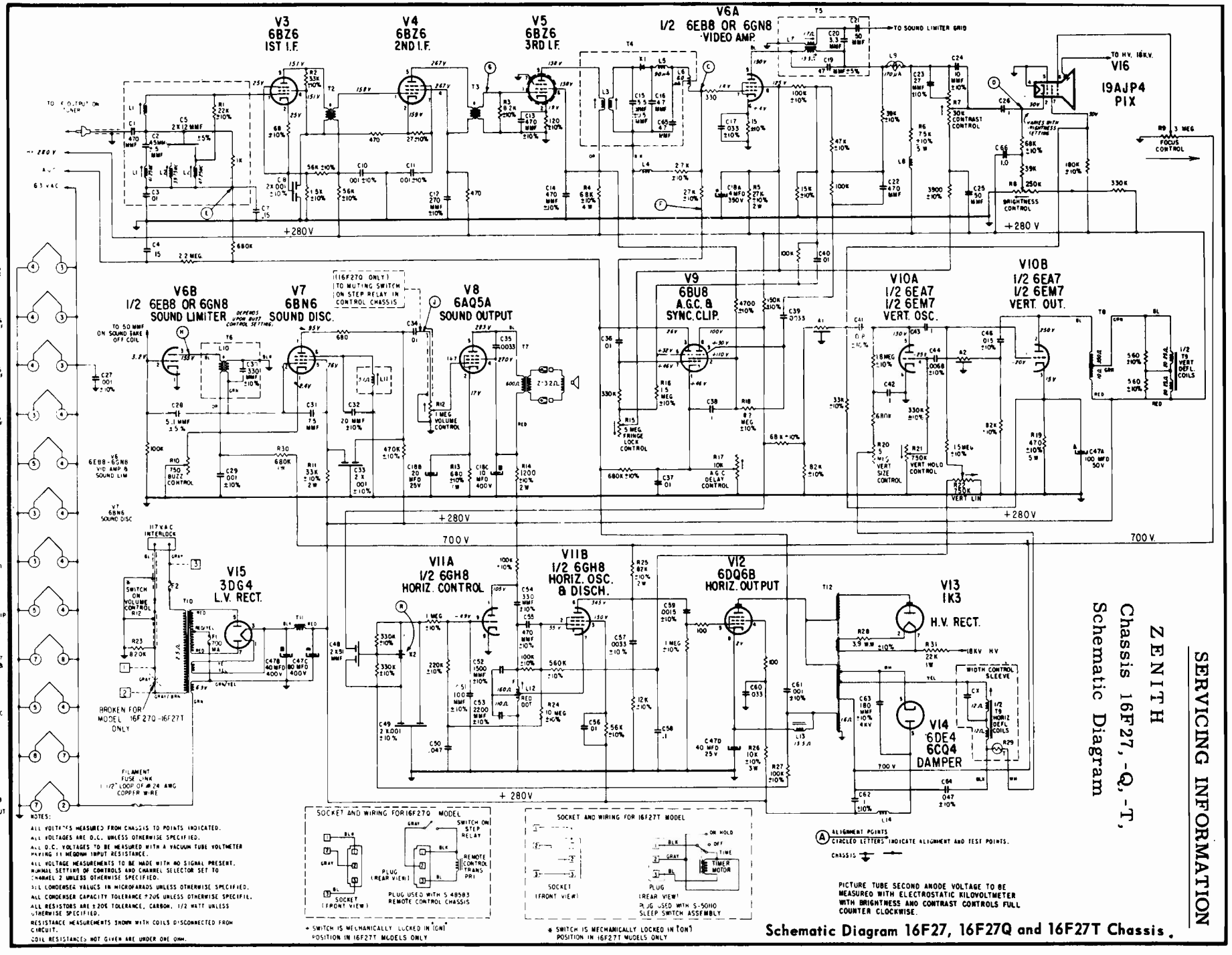


Fig. 9 Overall IF Response 16G20 & 16G27 Chassis



NOTES:

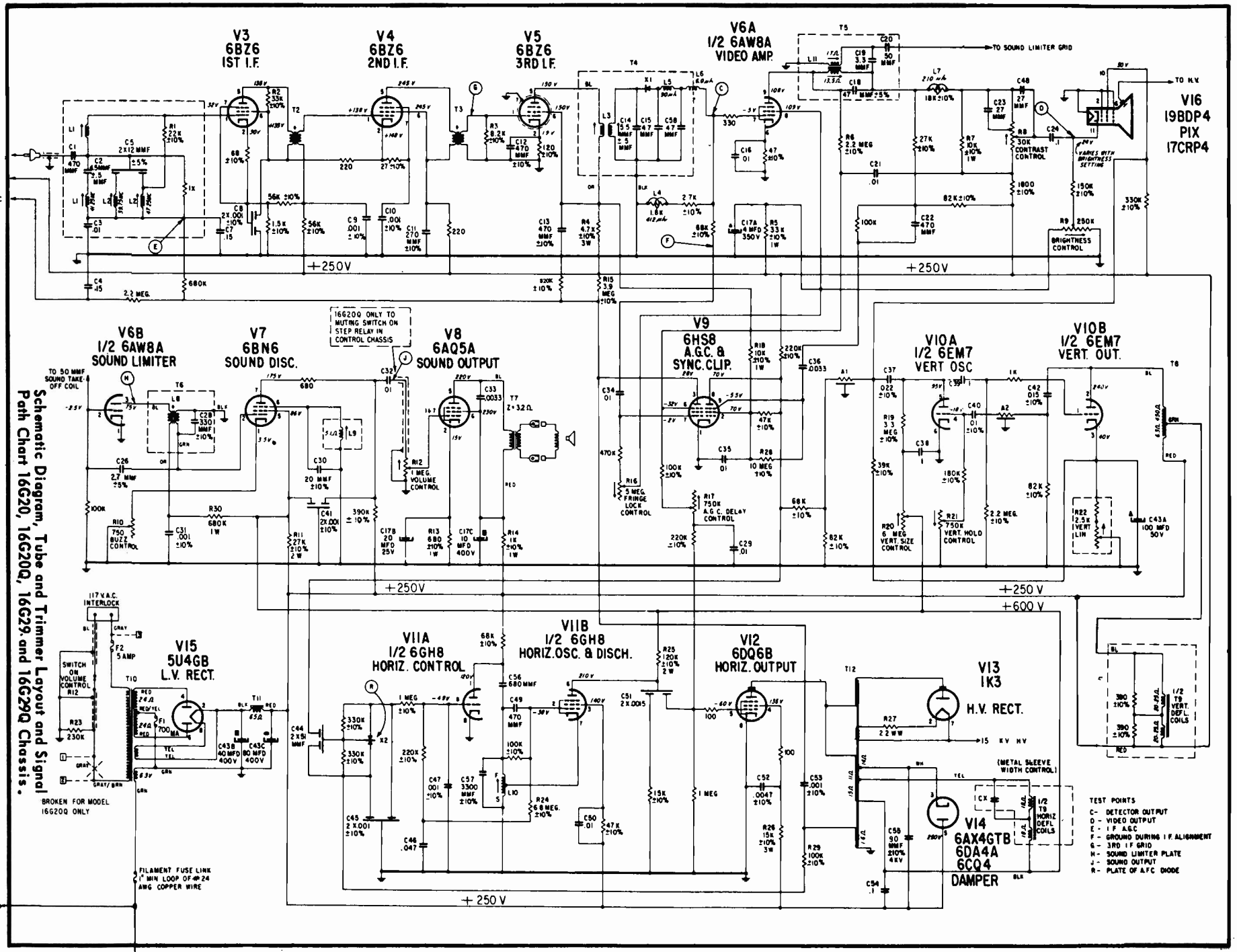
ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.
ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT, NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER CAPACITY TOLERANCE ±20% UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS ARE ±20% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.
RESISTANCE MEASUREMENTS SHOWN WITH COILS DISCONNECTED FROM CIRCUIT.
COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.

ZENITH

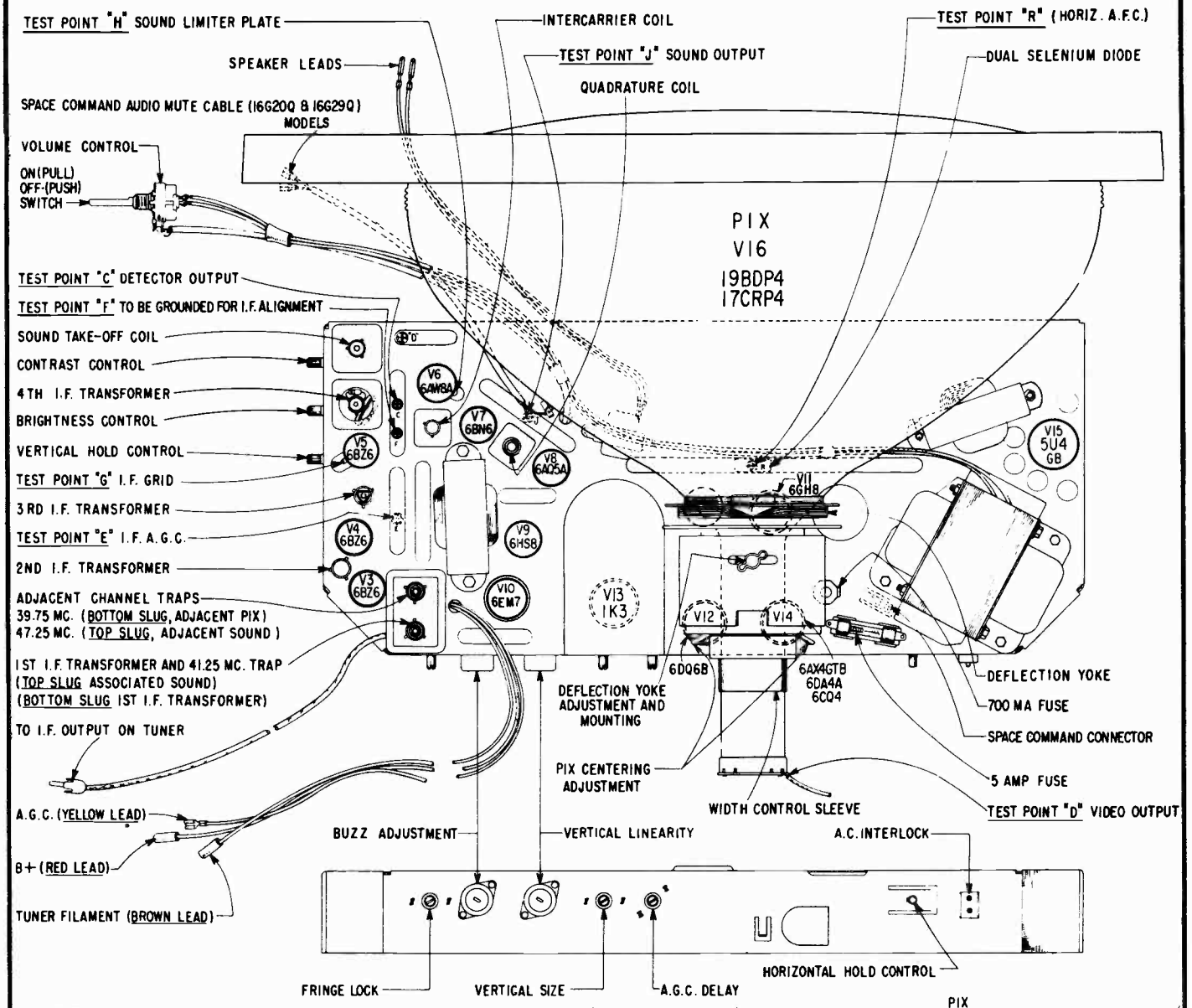
Chassis 16F27, -Q, -T, Schematic Diagram

SERVICING INFORMATION

Schematic Diagram 16F27, 16F27Q and 16F27T Chassis.



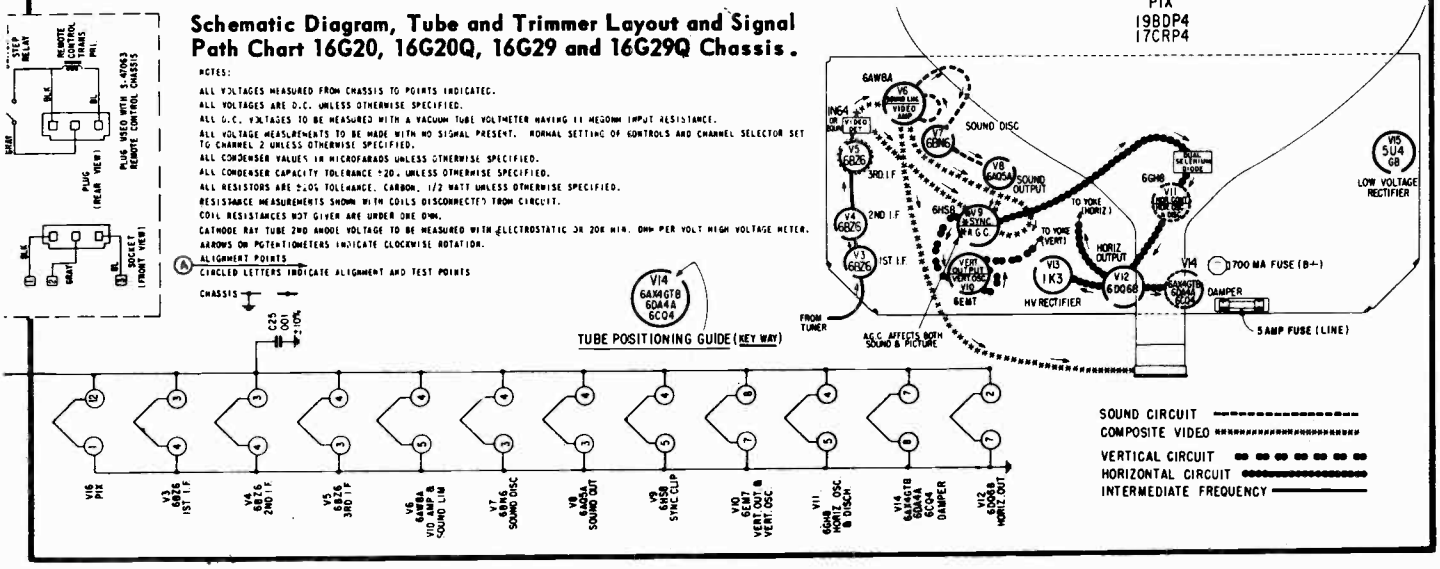
Schematic Diagram, Tube and Trimmer Layout and Signal Path Chart 16G20, 16G20Q, 16G29, and 16G29Q Chassis.

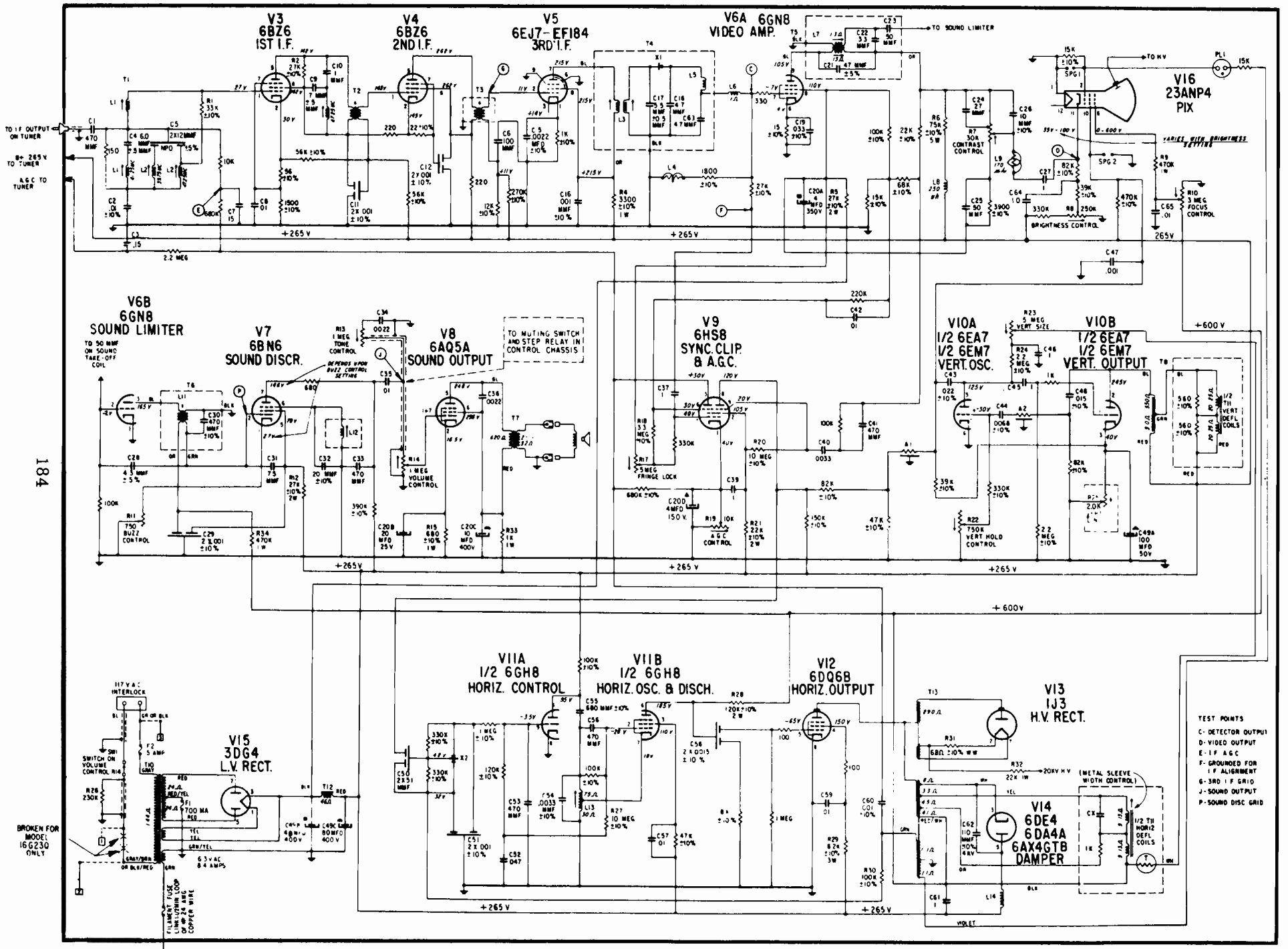


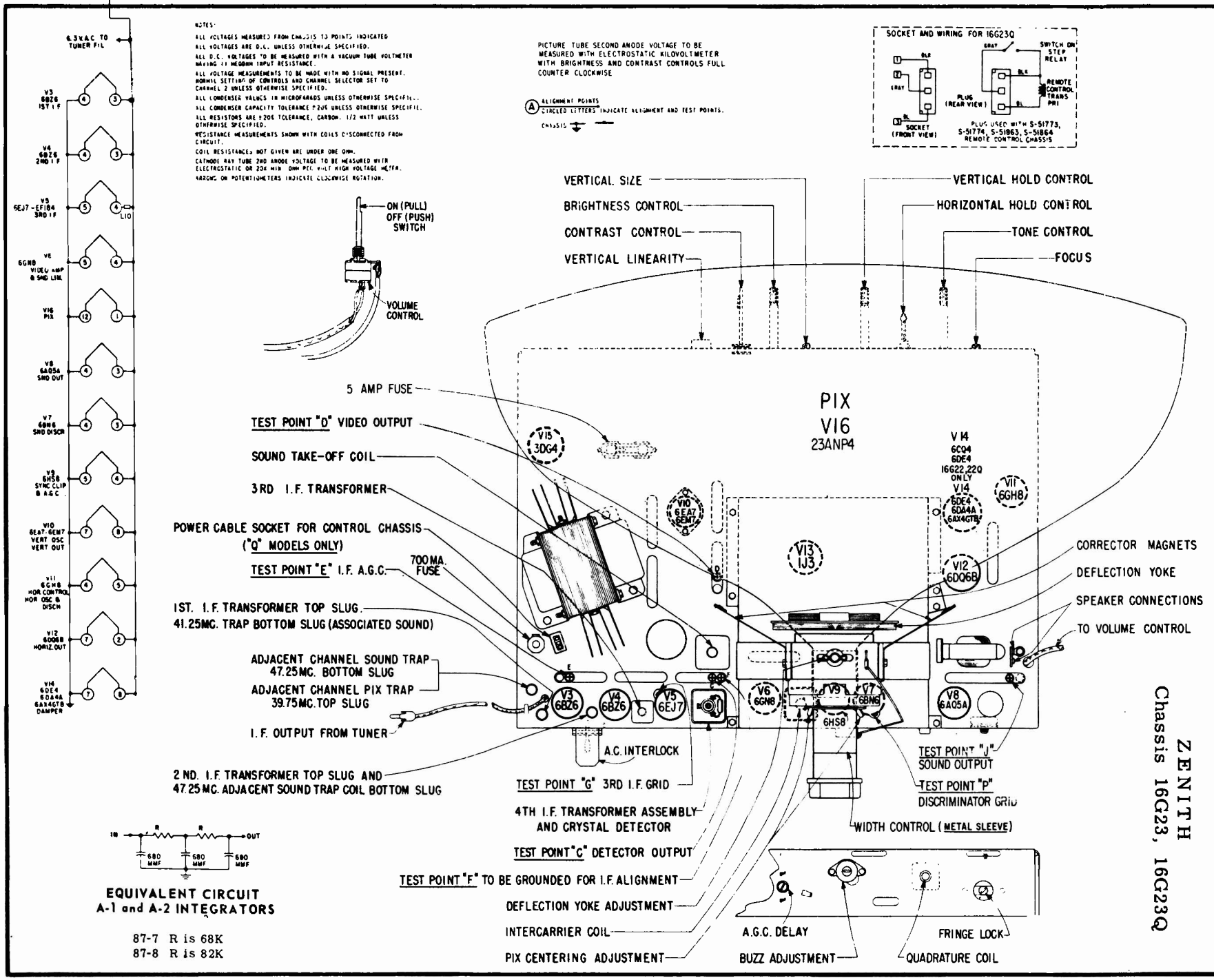
Schematic Diagram, Tube and Trimmer Layout and Signal Path Chart 16G20, 16G20Q, 16G29 and 16G29Q Chassis.

NOTES:

ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
ALL D.C. VOLTAGES TO BE MEASURED WITH A VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.
ALL VOLTAGE MEASUREMENTS TO BE MADE WITH NO SIGNAL PRESENT. NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO CHANNEL 2 UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER CAPACITY TOLERANCE +20, UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS ARE ±10% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED.
RESISTANCE MEASUREMENTS SHOWN WITH COILS DISCONNECTED FROM CIRCUIT.
COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.
CATHODE RAY TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC 3R 20K MIN. OHMS PER VOLT HIGH VOLTAGE METER.
ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.
ALIGNMENT POINTS
(A) CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS

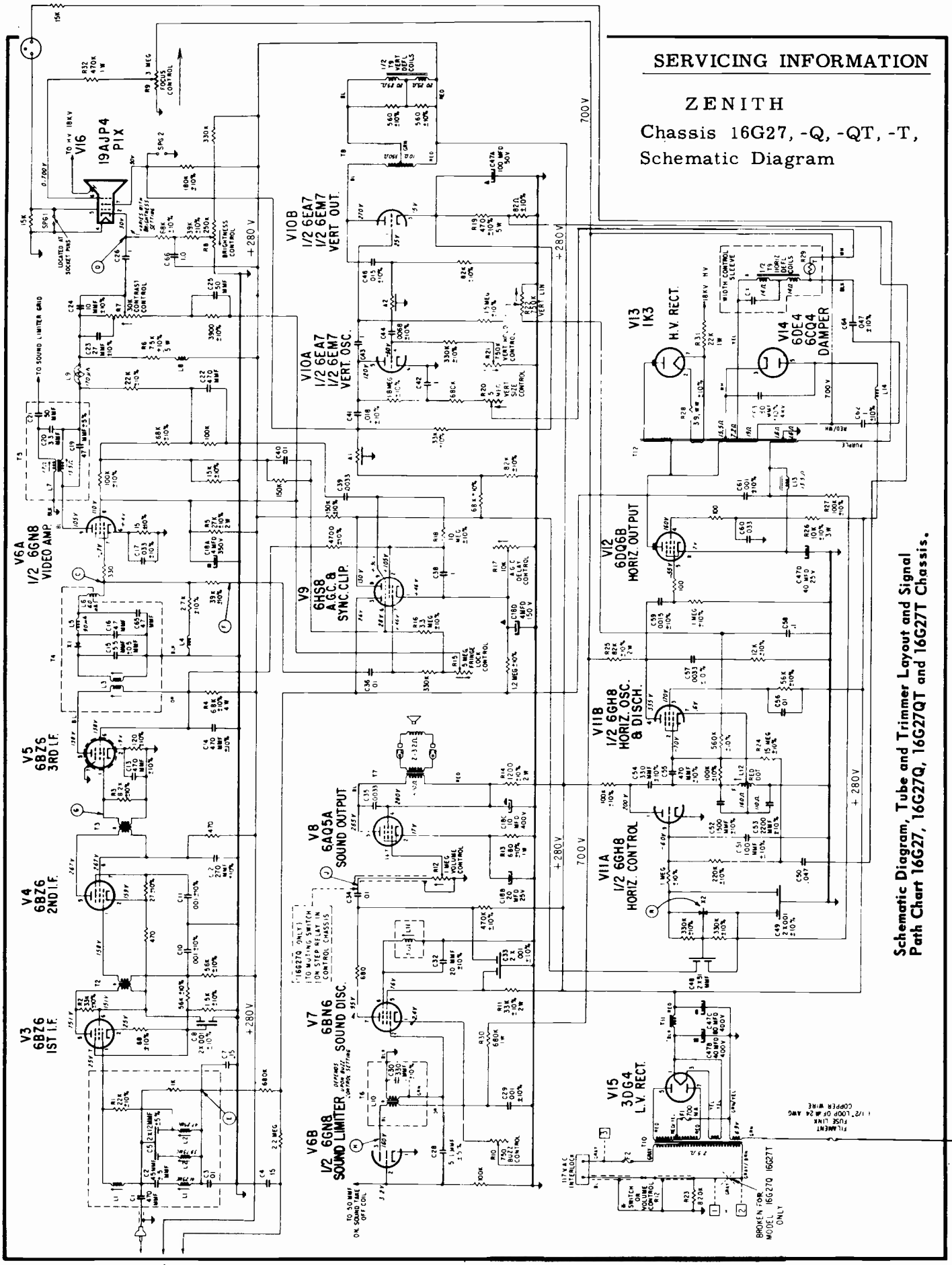



V3
6BZ6
IST I.F.
V4
6BZ6
2ND I.F.
V5
6EJ7-EFI84
3RD I.F.
V6A 6GN8
VIDEO AMP.
V16
23ANP4
PIX
V6B
6GN8
SOUND LIMITER
V7
6BN6
SOUND DISCR.
V8
6AQ5A
SOUND OUTPUT
V9
6HS8
SYNC. CLIP.
& A.G.C.
V10A
1/2 6EA7
1/2 6EM7
VERT. OSC.
V10B
1/2 6EA7
1/2 6EM7
VERT. OUTPUT
V11A
1/2 6GH8
HORIZ. CONTROL
V11B
1/2 6GH8
HORIZ. OSC. & DISCH.
V12
6DQ6B
HORIZ. OUTPUT
V13
1J3
H.V. RECT.
V14
6DE4
6DA4A
6AX4GTB
DAMPER
V15
3DG4
L.V. RECT.
TO I.F. OUTPUT ON TUNER
B+ 265 V TO TUNER
A.G.C. TO TUNER
TO SOUND LIMITER
TO H.V.
+265 V
+600 V
TO MUTING SWITCH AND STEP RELAY IN CONTROL CHASSIS
BRIGHTNESS CONTROL
VERT HOLD CONTROL
VOLUME CONTROL
A.G.C. CONTROL
FRINGE LOCK
SWITCH ON VOLUME CONTROL R14
BROKEN FOR MODEL 16G230 ONLY
TEST POINTS
C- DETECTOR OUTPUT
D- VIDEO OUTPUT
E- I.F. A.G.C.
F- GROUNDED FOR I.F. ALIGNMENT
G- 3RD I.F. GRID
J- SOUND OUTPUT
P- SOUND DISC GRID


6.3V A.C. TO TUNER FIL
V3 6BZ6 1ST I F
V4 6BZ6 2ND I F
V5 6EJ7 - EF184 3RD I F
V6 6GN8 VIDEO AMP & SND LIM
V7 6BN6 SND DISCR
V8 6A05A SND OUT
V9 6HS8 SYNC CLIP & A.G.C.
V10 6EA7 - 6EN7 VERT OSC VERT OUT
V11 6GH8 HOR CONTROL HOR OSC & DISCR
V12 6DQ6B HORIZ OUT
V14 6DE4 6DA4A 6AX4GTB DAMPER
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 COILS DISCONNECTED FROM CIRCUIT.
COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM.
CATHODE RAY TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC OR 20K MIN. OHM PER VOLT HIGH VOLTAGE METER.
ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.
PICTURE TUBE SECOND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC KILOVOLTMETER WITH BRIGHTNESS AND CONTRAST CONTROLS FULL COUNTER CLOCKWISE
(A) ALIGNMENT POINTS CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS.
CHASSIS
SOCKET AND WIRING FOR 16G23Q
SOCKET (FRONT VIEW)
PLUG (REAR VIEW)
SWITCH ON STEP RELAY
REMOTE CONTROL TRANS PRI
PLUG USED WITH S-51773, S-51774, S-51863, S-51864 REMOTE CONTROL CHASSIS
ON (PULL) OFF (PUSH) SWITCH
VOLUME CONTROL
VERTICAL SIZE
BRIGHTNESS CONTROL
CONTRAST CONTROL
VERTICAL LINEARITY
VERTICAL HOLD CONTROL
HORIZONTAL HOLD CONTROL
TONE CONTROL
FOCUS
PIX
V16
23ANP4
V15 3DG4
V10 6EA7 6EN7
V13 1J3
V14 6CQ4 6DE4 16G22,22Q ONLY
V14 6DE4 6DA4A 6AX4GTB
V11 6GH8
V12 6DQ6B
V3 6BZ6
V4 6BZ6
V5 6EJ7
V6 6GN8
V9
V7 6BN6
6HS8
V8 6A05A
5 AMP FUSE
TEST POINT "D" VIDEO OUTPUT
SOUND TAKE-OFF COIL
3RD I.F. TRANSFORMER
POWER CABLE SOCKET FOR CONTROL CHASSIS ("Q" MODELS ONLY)
TEST POINT "E" I.F. A.G.C.
700 MA. FUSE
1ST. I.F. TRANSFORMER TOP SLUG. 41.25MC. TRAP BOTTOM SLUG (ASSOCIATED SOUND)
ADJACENT CHANNEL SOUND TRAP 47.25MC. BOTTOM SLUG
ADJACENT CHANNEL PIX TRAP 39.75MC. TOP SLUG
I.F. OUTPUT FROM TUNER
2 ND. I.F. TRANSFORMER TOP SLUG AND 47.25 MC. ADJACENT SOUND TRAP COIL BOTTOM SLUG
A.C. INTERLOCK
TEST POINT "G" 3RD I.F. GRID
4TH I.F. TRANSFORMER ASSEMBLY AND CRYSTAL DETECTOR
TEST POINT "C" DETECTOR OUTPUT
TEST POINT "F" TO BE GROUNDED FOR I.F. ALIGNMENT
DEFLECTION YOKE ADJUSTMENT
INTERCARRIER COIL
PIX CENTERING ADJUSTMENT
CORRECTOR MAGNETS
DEFLECTION YOKE
SPEAKER CONNECTIONS
TO VOLUME CONTROL
TEST POINT "J" SOUND OUTPUT
TEST POINT "P" DISCRIMINATOR GRID
WIDTH CONTROL (METAL SLEEVE)
A.G.C. DELAY
BUZZ ADJUSTMENT
FRINGE LOCK
QUADRATURE COIL
IN
R
R
OUT
680 MMF
680 MMF
680 MMF
EQUIVALENT CIRCUIT
A-1 and A-2 INTEGRATORS
87-7 R is 68K
87-8 R is 82K
ZENITH
Chassis 16G23, 16G23Q

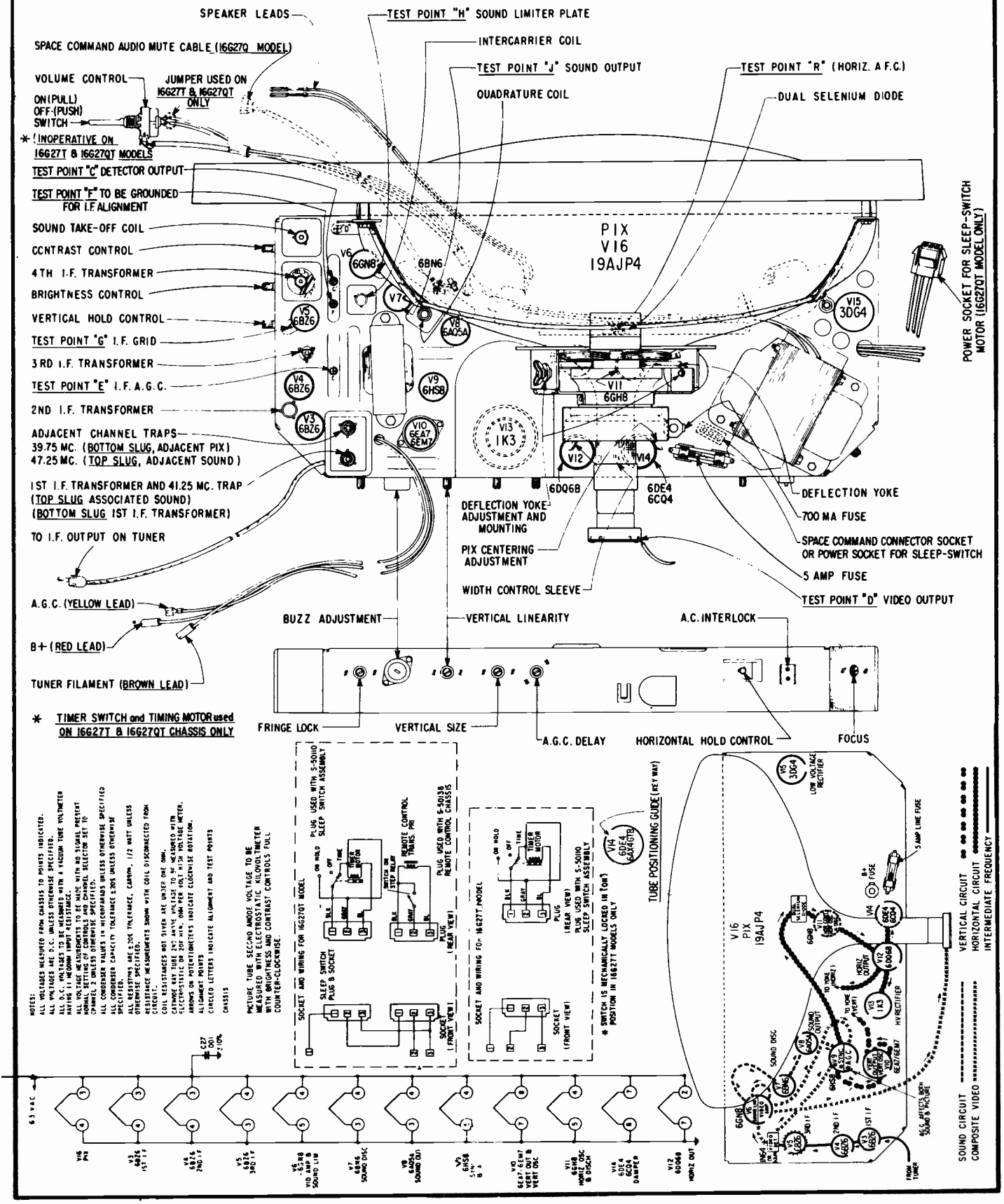
ZENITH

Chassis 16G27, -Q, -QT, -T, Schematic Diagram

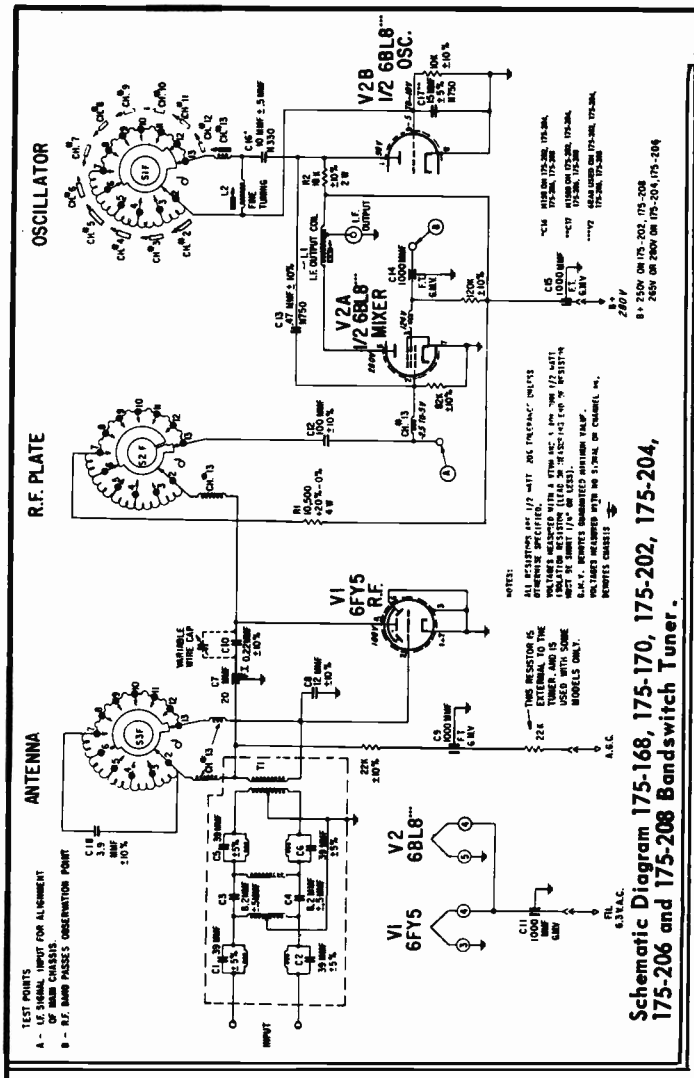


Schematic Diagram, Tube and Trimmer Layout and Signal Path Chart 16G27, 16G27Q, 16G27QT and 16G27T Chassis.

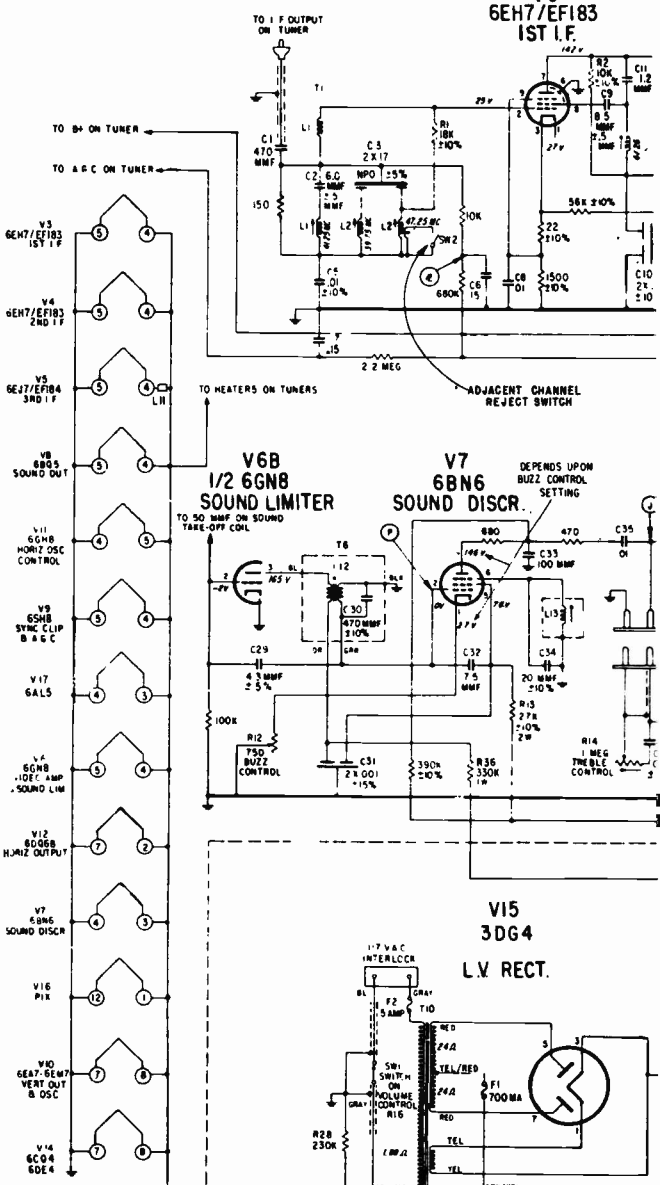
ZENITH Chassis 16G27, -Q, -QT, -T, Tube and Trimmer Layout and Signal Path Chart

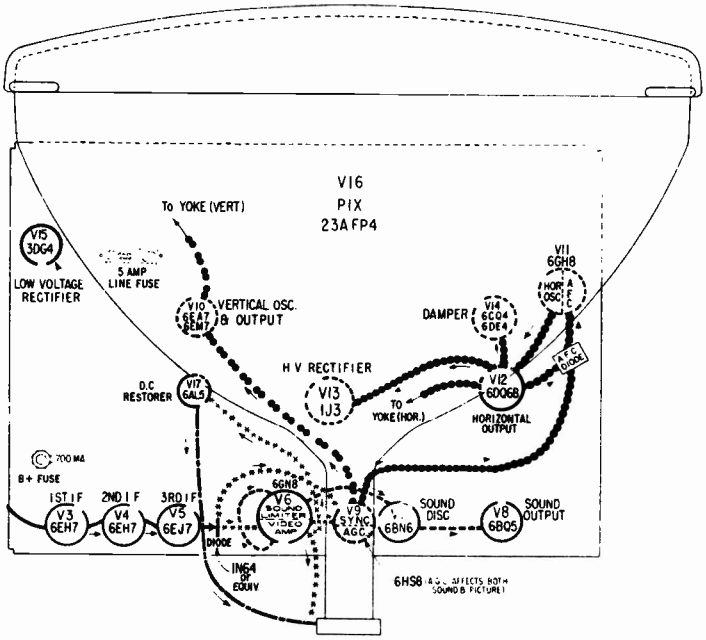


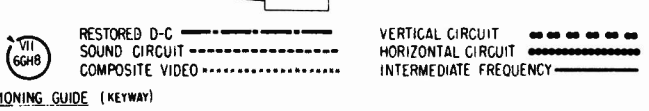
ZENITH Chassis 17G28 and 17G28Q



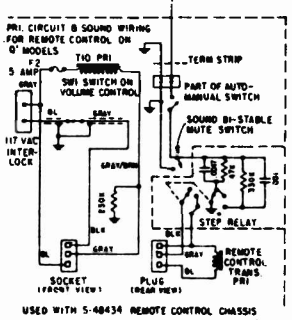
Schematic Diagram 175-168, 175-170, 175-202, 175-204, 175-206 and 175-208 Bandswitch Tuner.

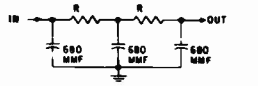






TUBE POSITIONING GUIDE (KEYWAY)



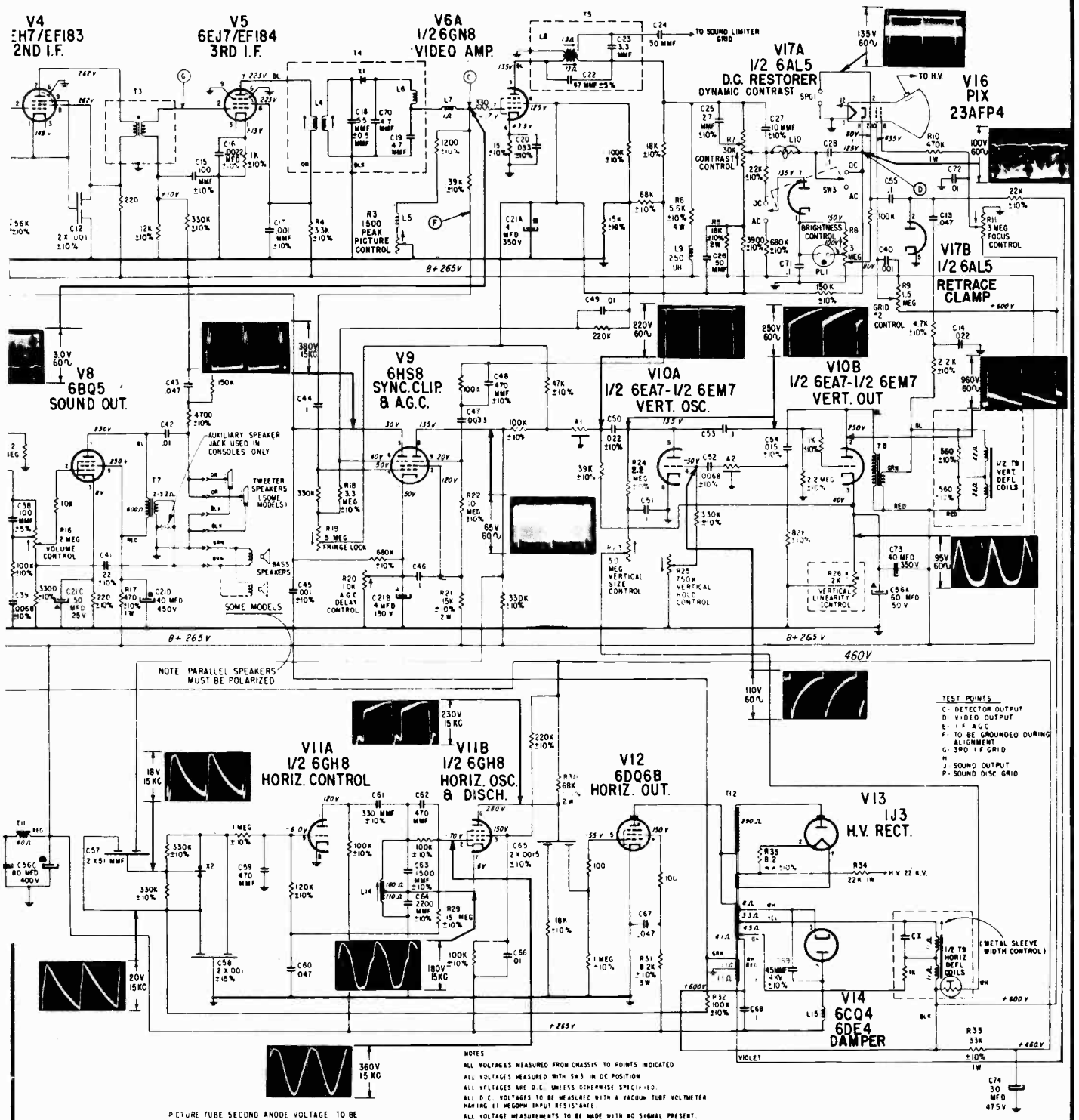


EQUIVALENT CIRCUIT
A-1 and A-2 INTEGRATORS

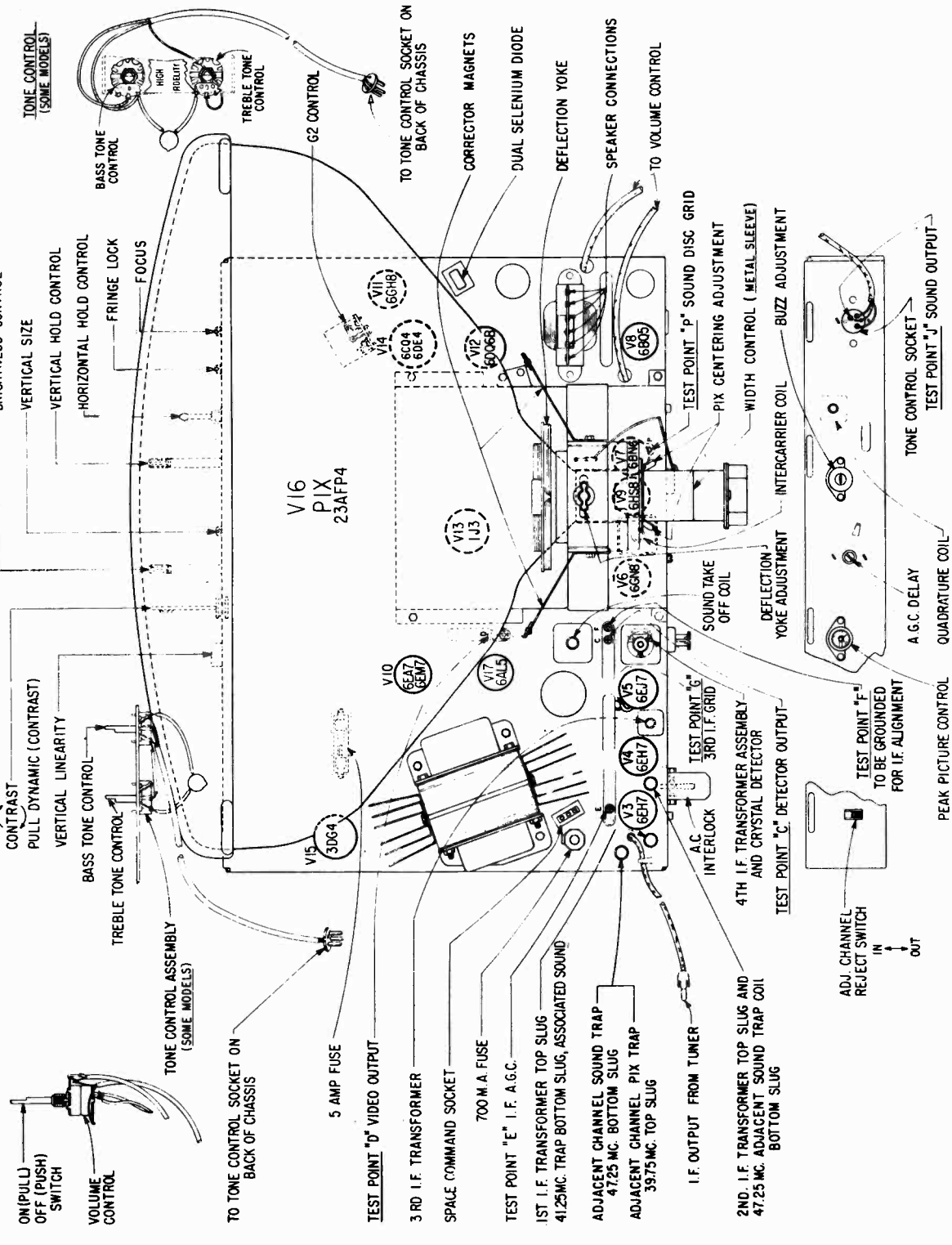
87-7 R is 68K
87-8 R is 82K

ZENITH Chassis 17G28, -Q

Schematic Diagram 17G28 and 17G28Q Chassis. Waveforms and Peak to Peak Voltages Representative of all "G" Chassis.



ZENITH Chassis 17G28 and 17G28Q Tube and Trimmer Layout Diagram



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.

Another

Supreme Publications

Service Manual