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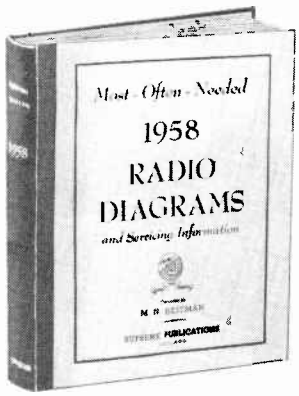

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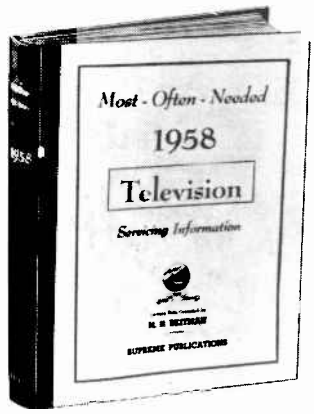

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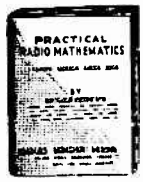

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CONTENTS

(Continued on page 4)

Table of Contents, Continued

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

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

Admiral

15C1 CHASSIS

Used in Models P17E31, P17E32, P17E33, P17E34, and P17E35. (Service material on pages 5 to 8)

CHANNEL ADJUSTMENT

IMPORTANT: Always make adjustment on lowest channels first, then work up, in order of channel number to the highest channel. For example, if channels 7, 5, 2 and 9 are being received, adjust channel 2 first, then 5, 7 and 9.

For VHF channel adjustments, refer to figure 2 and perform the following adjustments procedure:

a. Turn set on and allow 15 minutes warm up.
b. Set Channel Selector for lowest channel to be received. Set other controls for normal picture and sound.
c. Set Fine Tuning control at center of its range by rotating it approximately two turns in either direction and then one-quarter turn in the opposite direction.
d. Remove Channel Selector and Fine Tuning control knobs. Remove Phillips screw and escutcheon under control knobs.
e. Using a non-metallic alignment tool with 1/8" blade (part number 98A30-19), carefully adjust channel slug for best picture. (NOTE: The sound is not loudest at this point.) Repeat the procedure for each channel to be adjusted. ALWAYS adjust channels in order from the lowest to the highest number.

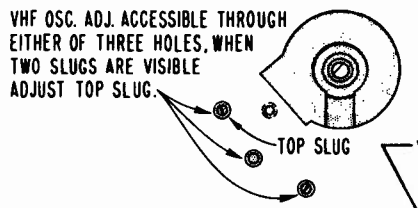


Figure 2. Side Cabinet View of Tuner. Tuning Knobs Removed.

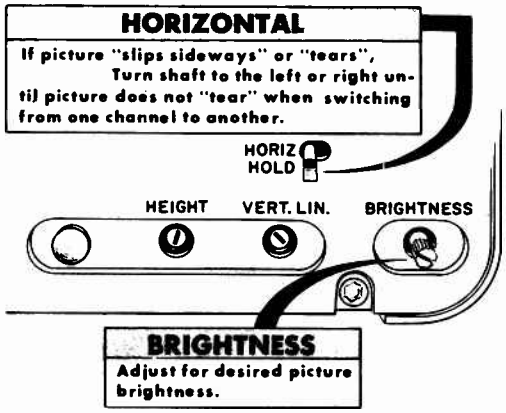


Figure 3. Auxiliary Controls at Rear of Set.

REMOVING CHASSIS FROM CABINET

The cabinet enclosure of these receivers consists of a cabinet wrap-around (shell), bottom plate, front bezel and cabinet back. The chassis, speaker and picture tube are mounted as a complete assembly to bottom plate of cabinet.

To remove chassis from cabinet, proceed as follows:

1. Remove Tuning knobs at side of cabinet.
2. Remove cabinet back. Be careful not to damage interlock socket or plastic shaft of **Horizontal Hold** control.
3. Remove picture window and front bezel after removing screws at side and bottom of bezel away from cabinet. Lift up to free bezel from top of cabinet.
4. Remove top cabinet mounting screw on cabinet top. This screw is located beneath carrying handle.
5. Remove reinforcing brackets at top corners of cabinet.
6. Disconnect antenna lead-in and terminal board from rear of cabinet.
7. Remove cabinet wrap-around after removing screws which mount it to bottom plate of cabinet.
8. To remove bottom plate from chassis, remove screws which mount it to chassis bottom. Caution: Do not allow bottom surface of chassis (printed wiring) to come in contact with metal bench, tools or other objects which may be lying on top surface of bench.
9. To reassemble chassis in cabinet, follow above procedure in reverse order.

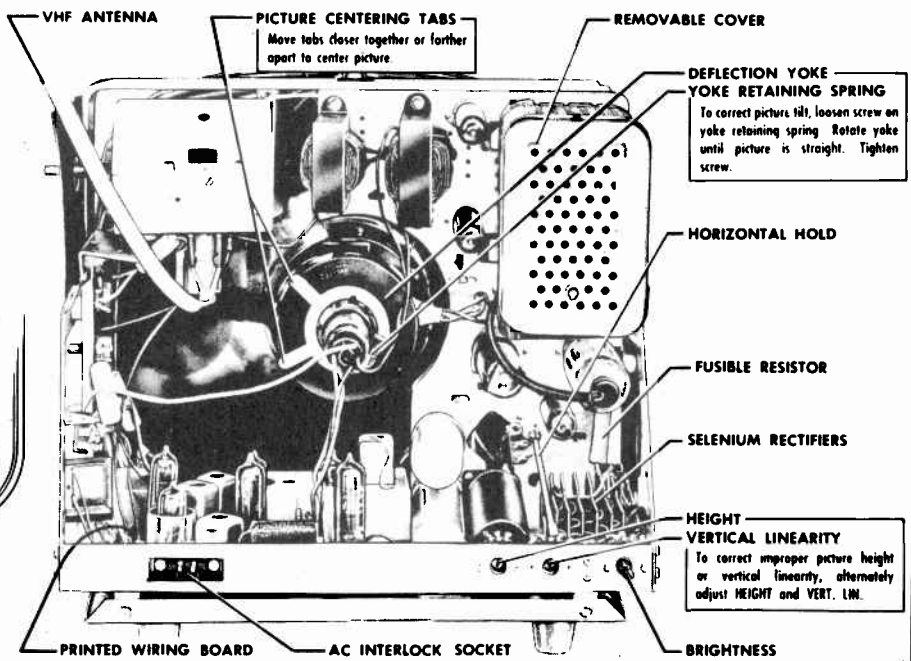


Figure 4. Rear View of Chassis Showing Adjustment Locations.

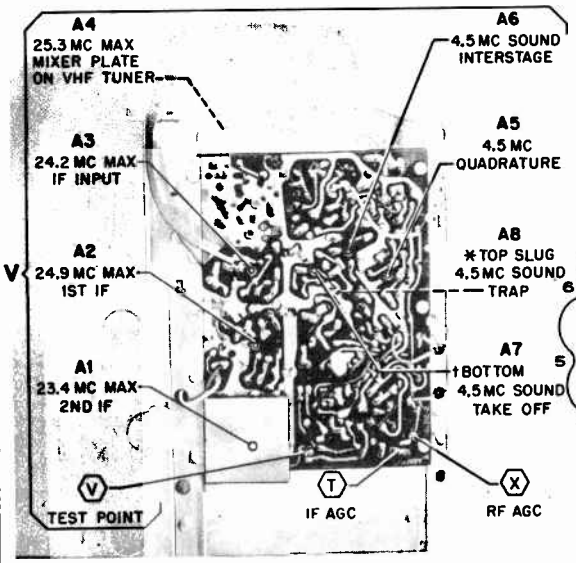
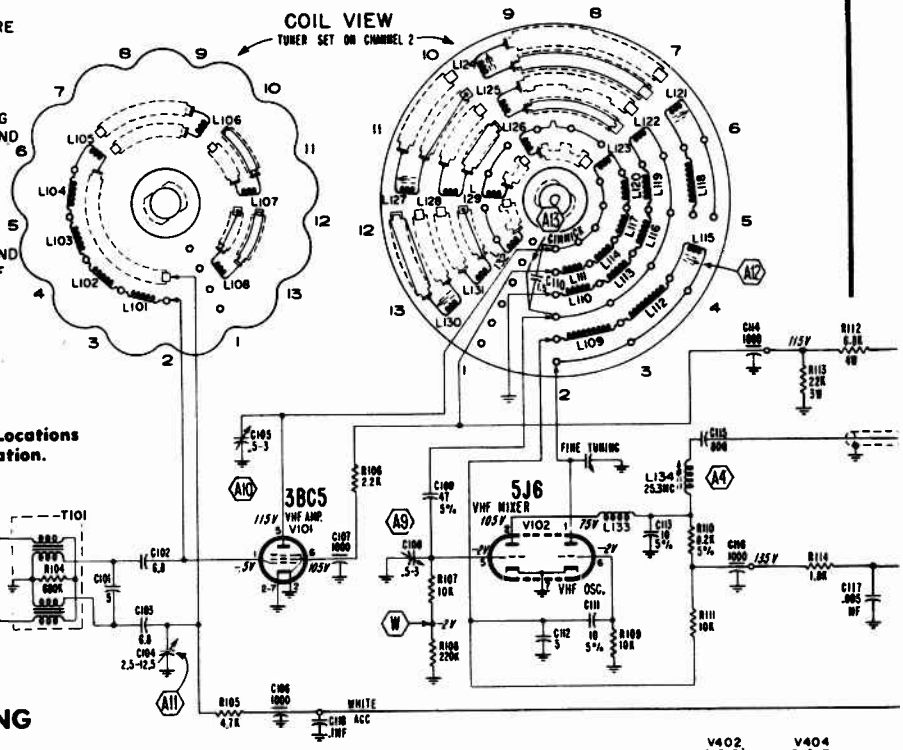


Figure 9. Bottom View of Chassis Showing Test Point Locations and IF Alignment Data. VHF Tuner at Top of Illustration.

†Bottom slug is nearest bottom of shield can.
*Top slug is nearest top of shield can.

ADMIRAL Chassis 15C1 Diagram

VHF TUNER 94E119-6



4.5 MC SOUND IF ALIGNMENT USING TELEVISION SIGNAL

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

Make alignment adjustments as follows:

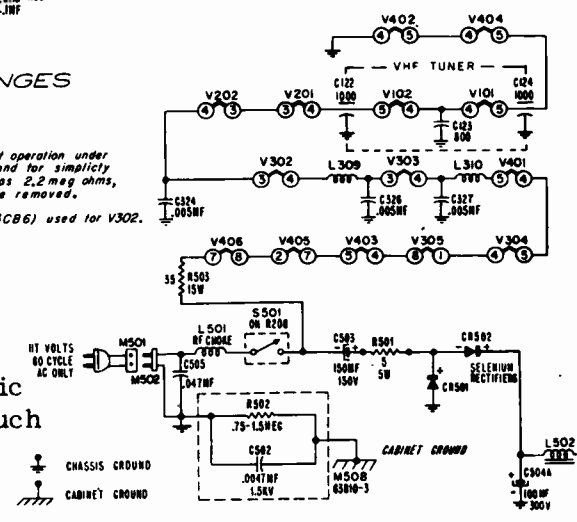
1. Remove cabinet back. Turn set on and allow 15 minutes for warm up.
2. Select the strongest TV station received. Adjust set for normal operation. See figure 8 for adjustment locations.
3. Using a non-metallic alignment tool (for hexagonal core IF slugs, Admiral Part No. 98A30-12), very slowly turn slug "A5" several turns counterclockwise until a buzz is heard in the sound. Then turn it clockwise until the loudest and clearest sound is obtained NOTE: There may be two points (approximately ½ turn apart) at which sound is loudest The slug should be set at the center range of the second point of loudest sound noted as the slug is turned in (toward printed circuit board).
4. Set Contrast control fully to the left (counterclockwise). Reduce the signal to the antenna terminals until there is a considerable amount of hiss in the sound. For best results, it is recommended that a step attenuator be connected between the antenna and the antenna terminals. The signal can also be reduced by disconnecting the antenna and placing it in close proximity of the antenna terminals or tuner antenna lead-in.

RUN CHANGES

(10) *Start of production 15C1.*

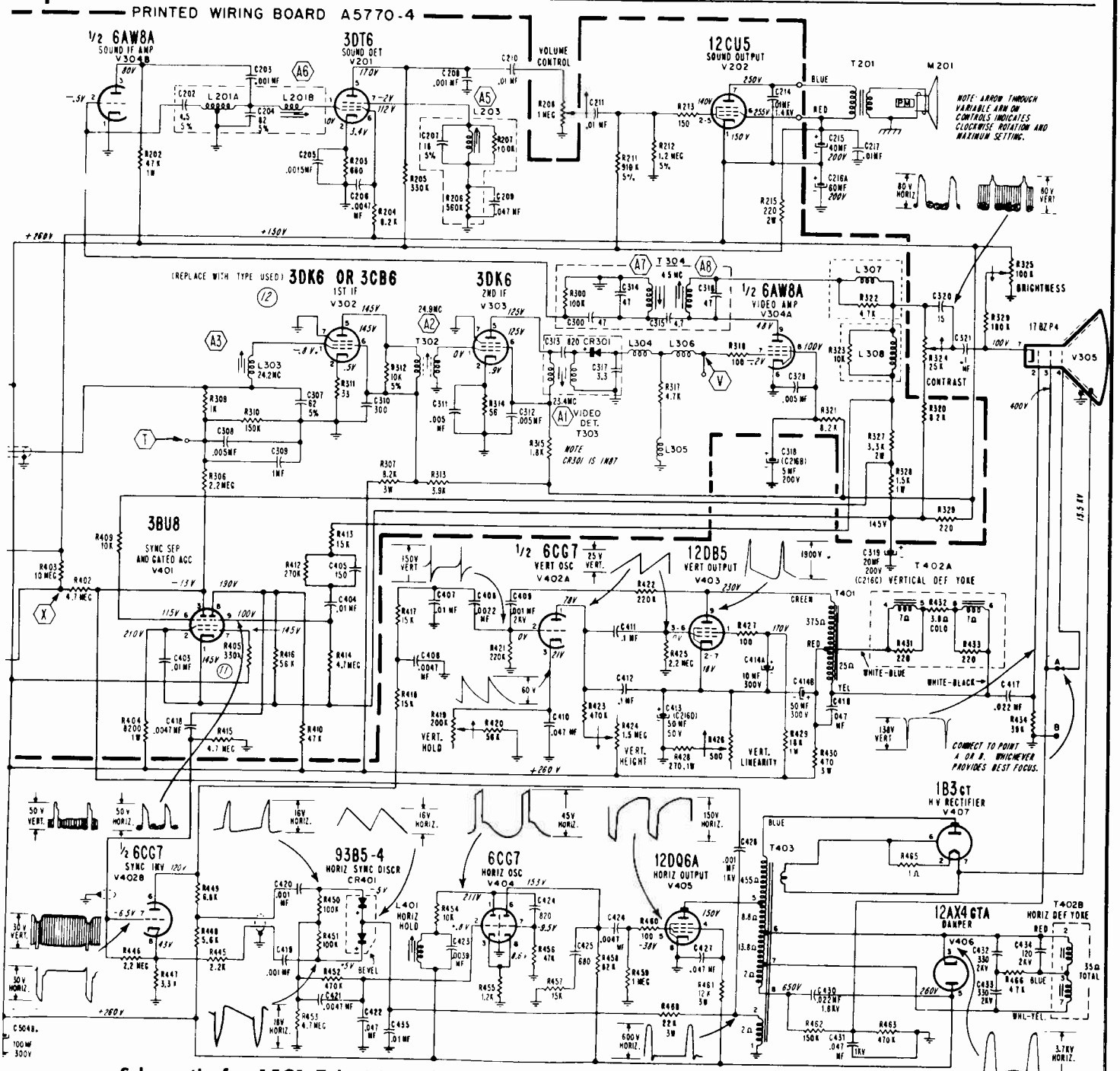
(11) *To improve uniformity of operation under all signal conditions and for simplicity of circuitry, R405 was 2.2 meg ohms, R408 and C402 were removed.*

(12) *Alternate tube type (3CB6) used for V302.*



For schematic notes, see such material on page 14.

5. Carefully adjust slug "A6" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A6".
6. Carefully adjust slug "A7" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A7". Caution: Adjustment "A7" is slug nearest bottom of shield can; use care so as not to disturb slug nearest top of shield can.
7. If the above steps are correctly made, no further adjustment should be required. However, if sound remains



Schematic for 15C1 Television Chassis Stamped Run 10 through Run 12.

distorted at normal volume level when receiver is tuned for best sound, repeat entire procedure.

Caution: Do not readjust slug "A5" unless sound is distorted. If "A5" is readjusted. all steps in alignment procedure should be repeated exactly as instructed above.

ALIGNMENT OF 4.5 MC TRAP USING A TELEVISION SIGNAL

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

To align the 4.5 MC trap (slug adjustment A8), tune in a television station with beat interference pattern in picture. While closely observing the picture, adjust slug A8 for minimum interference pattern.

Important: A hexagonal non-metallic alignment tool (Admiral part number 98A30-12) is required for making adjustment. Note that adjustment A8 is top slug (nearest top of shield can); use caution so as not to disturb bottom slug (nearest bottom of shield can) as sound IF alignment will be affected.

ADMIRAL Chassis 15C1 Service Information, Continued

IF AMPLIFIER ALIGNMENT

- Connect isolation transformer between power line and receiver.
- Connect negative of 4.5 volt bias supply to test point "T", see figure 8, positive to chassis..
- Disconnect antenna. Connect a jumper wire across the antenna terminals.
- Set the Contrast control fully to the left (counterclockwise).
- Allow about 15 minutes for receiver and test equipment to warm up.
- Use lowest DC scale on VTVM.

PRELIMINARY STEPS USING SIGNAL GENERATOR AND VTVM

Step	Signal Gen. Freq.	VTVM and Signal Generator Connections	Instructions	Adjust
Set Channel Selector to channel 1 position.				
1	24.2 MC	Connect scope and VTVM to test point "V" through a network as shown in figure 6. Couple IF input to V102 (5J6) through dummy tube shield.	Use lowest scale on VTVM when adjusting for maximum. Reduce generator output for VTVM reading approximately 2.5 volts or less. If output is unstable, refer to Section 1 of Alignment Hints.	A3 for maximum.
Set Channel Selector to channel 4 position.				
2	24.9 MC	Same as above.	Same as above.	A2 for maximum.
3	23.4 MC	Same as above.	Same as above.	A1 for maximum.
4	25.3 MC	Same as above.	Same as above.	A4 for maximum.

IF RESPONSE CURVE CHECK (using sweep generator and oscilloscope)

Step	Receiver Controls and Bias Supply	Sweep Generator	Marker Generator	Oscilloscope	Instructions
5	Same as in preliminary steps.	Connect high side to 5J6 tube shield. Connect low side to chassis near tube shield. Set sweep freq. to 23 MC and sweep width approx. 7 MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Keep marker and sweep outputs at very minimum to prevent overloading. A reduction in sweep output should reduce response curve amplitude without altering the shape of the response curve.	Connect high side to test point "V" thru a decoupling filter, see figure 6.	Compare response curve with fig. 7. If curve does not resemble fig. 7, A4 may be adjusted for most symmetrical curve.

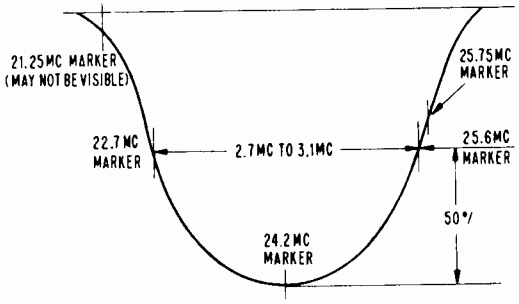
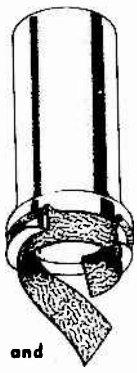


Figure 7. Ideal IF Response Curve.



INSULATE BOTTOM WITH MASKING TAPE

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

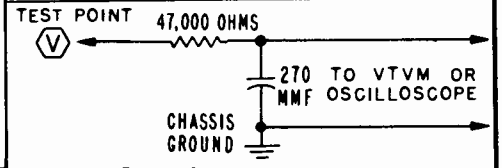


Figure 6. Decoupling Filter.

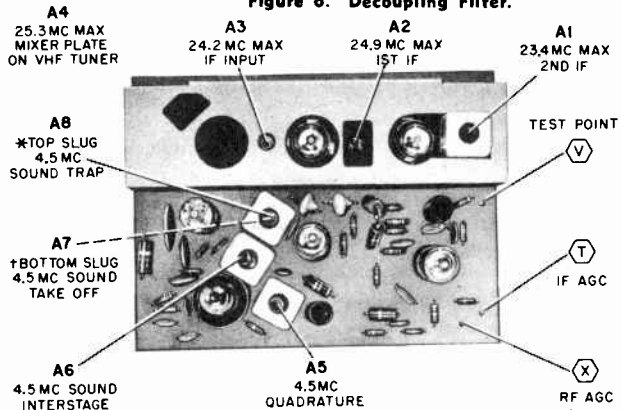


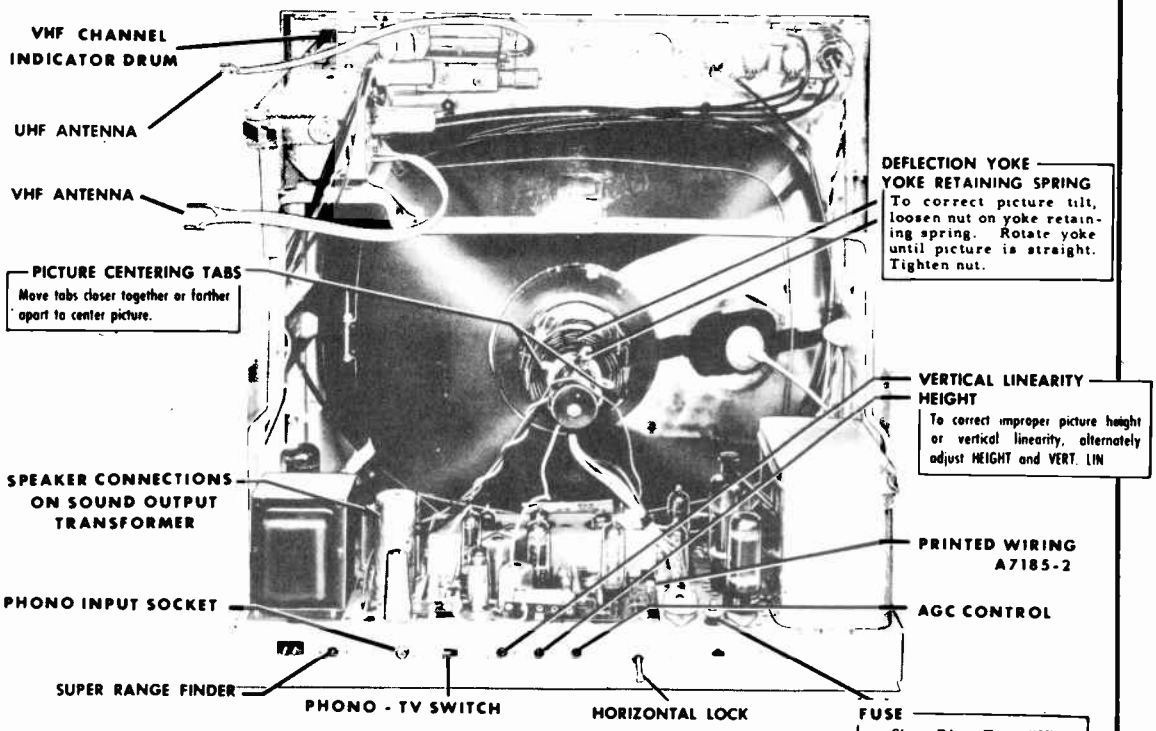
Figure 8. Inside Chassis View of Printed Wiring Board Showing Test Point Locations and IF Alignment Data.

Admiral

CHASSIS 20B6C, -CB, 20B6T, -TB, 20UB6C, -CB, 20UB6T, -TB, 20C6C

These sets are covered by material on pages 9 through 14. The suffix letter "C" or "T" indicates console or table model and not any electrical difference. The schematic on pages 12-13 is exact for 20B6C, 20B6T. Chassis 20UB6C, 20UB6T use a UHF tuner. The additional suffix "B" indicates the use of Neutrode type tuner with the balance of chassis being the same as the corresponding type. Chassis 20C6C also uses Neutrode tuner and incorporates necessary additional circuits for remote tuning operation. Models using these various chassis are listed below. Models with suffix "B" use one of the chassis with Neutrode tuner. Some of the models may also have a suffix letter "N."

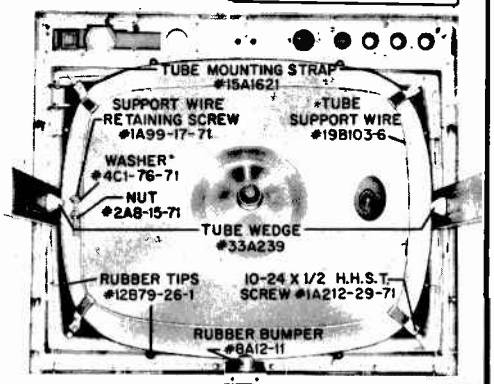
MODEL NUMBER (May have suffix letter "B" or "N")	TV CHASSIS
TH21H22	20B6T
TH21UH22	20UB6T
TH21H23	20B6T
TH21UH23	20UB6T
CH21H32	20B6C
CH21UH32	20UB6C
CH21H33	20B6C
CH21UH33	20UB6C
CH21H34	20B6C
CH21UH34	20UB6C
CH21H41	20B6C
CH21UH41	20UB6C
CH21H43	20B6C
CH21UH43	20UB6C
CH21H44	20B6C
CH21UH44	20UB6C
LH21H32	20B6C
LH21UH32	20UB6C
LH21H35	20B6C
LH21UH35	20UB6C
LH21H22	20B6C
LH21UH22	20UB6C
LH21H23	20B6C
LH21UH23	20UB6C
LH21H24	20B6C
LH21UH24	20UB6C
CHS21H72	20C6C
CHS21H77	20C6C
LHS21H51	20C6C
LHS21H53	20C6C
LHS21H54	20C6C
LHS21H62	20C6C
LHS21H69	20C6C



Rear View of 20B6C, 20B6T, 20UB6C and 20UB6T Chassis Showing Adjustments. (Actual view is of 20UB6C (VHF-UHF) Chassis)

CHASSIS REMOVAL

1. Disconnect leads from antenna terminals and remove cabinet back.
2. Remove the screws which mount rear of chassis support channels to sides and bottom of cabinet.
3. Remove speaker leads from sound output transformer.
4. Remove chassis, picture tube and front escutcheon as a unit through the front of the cabinet.
5. To reinstall chassis, insert chassis through front of cabinet. Use extreme care to see that metal locating pins (at rear of escutcheon) fit into holes provided in cabinet.



Rear View of Escutcheon with Picture Tube Mounted Chassis Removed.

ADMIRAL 20B6C, -T, 20UB6C, -T, 20C6C

IF AMPLIFIER ALIGNMENT

- Connect negative of 3.0 volt bias supply through 10K resistor to test point "T" (IF AGC), see figures 10 and 11, positive to chassis.
- Connect generator high side to 6CG8 mixer-osc. insulated tube shield. Connect low side to chassis near tube shield.
- Connect VTVM high side to test point "V" through a decoupling filter, see figures 7, 10 and 11.
- Set Channel Selector to channel 12 or other unassigned high channel, to prevent interference during alignment.
- Connect a jumper wire across the antenna terminals.
- Set Contrast control fully to the right (clockwise).
- Set AGC and Super Range Finder controls fully to the left (counterclockwise).

SUPER RANGE FINDER ADJUSTMENT

The Super Range Finder control cannot be set properly if the Horizontal Lock, Vertical Hold or AGC controls are out of adjustment.

The Super Range Finder 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: At the factory, this control is set completely to the left. It should only be turned from its original position if picture is unstable.**

To adjust, turn Super Range Finder 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.

IMPORTANT: Keep the Super Range Finder control as far to the left as possible while still maintaining good sync stability on all channels.

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

IF RESPONSE CURVE CHECK (Using sweep generator and oscilloscope)

Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Channel Selector on channel 3 or an unassigned low channel. Contrast control fully to the left. Connect negative of 3 volt bias supply to test point "T" (IF AGC); positive to chassis.	Connect high side to 6CG8 mixer-osc. insulated tube shield. Connect low side to chassis near tube shield. Set sweep frequency to 43 MC, and sweep width approximately 7 MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" thru a decoupling filter, see figs. 7, 10 and 11.	Check curve obtained against ideal response curve in fig. 8. Note tolerances on curve. Keep marker and sweep outputs at very minimum to prevent overloading. A reduction in sweep output should reduce response curve amplitude without altering the shape of the response curve. If the curve is not within tolerance or the markers are not in the proper location on the curve, touch-up with IF slugs as instructed below.

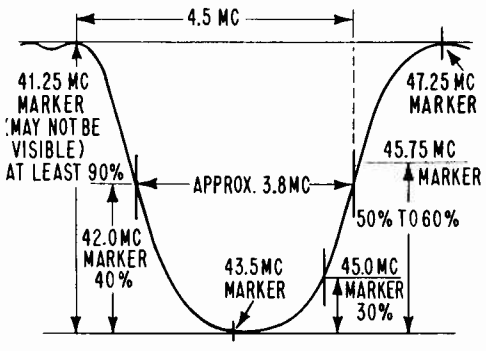


Figure 8. Ideal IF Response Curve.

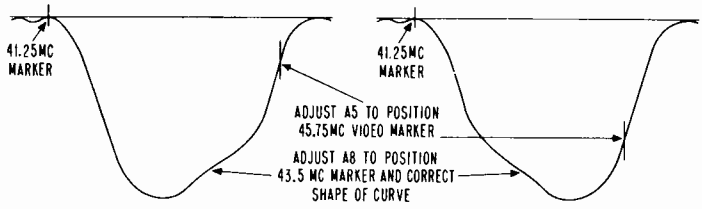


Figure 9. IF Response Curves, Incorrect Shape.

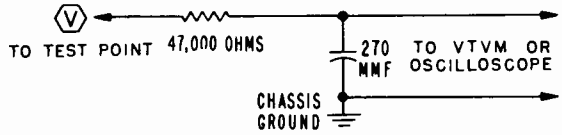


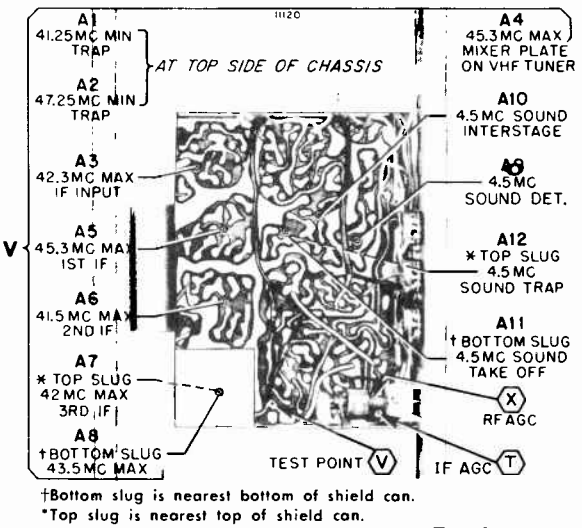
Figure 6. Alignment Network Used as a Decoupling Filter for VTVM or Oscilloscope.

ADMIRAL 20B6C, -T, 20UB6C, -T, 20C6C

HORIZONTAL LOCK ADJUSTMENT

Make adjustment if picture "slips sideways" or "tears" when switching channels. Adjustment is made by rotating plastic 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.
2. Reduce Contrast to minimum. Very slowly turn Horizontal Lock adjustment to the right or left until picture is in sync. Interrupt the 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.



†Bottom slug is nearest bottom of shield can.
*Top slug is nearest top of shield can.

Figure 10. Bottom View of Chassis Showing Test Point Locations and IF Alignment Data. VHF Tuner at Top of Illustration.

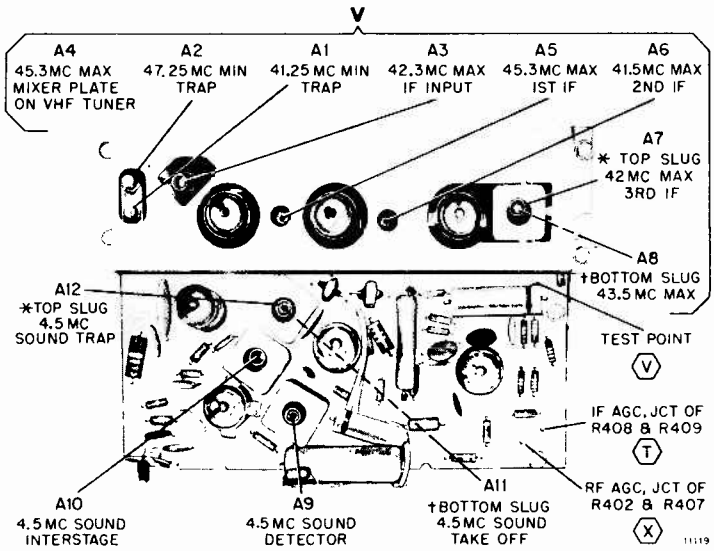


Figure 11. Inside Chassis View of Printed Wiring Board Showing Test Point Locations and IF Alignment Data.

4.5 MC SOUND IF ALIGNMENT USING TELEVISION SIGNAL

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

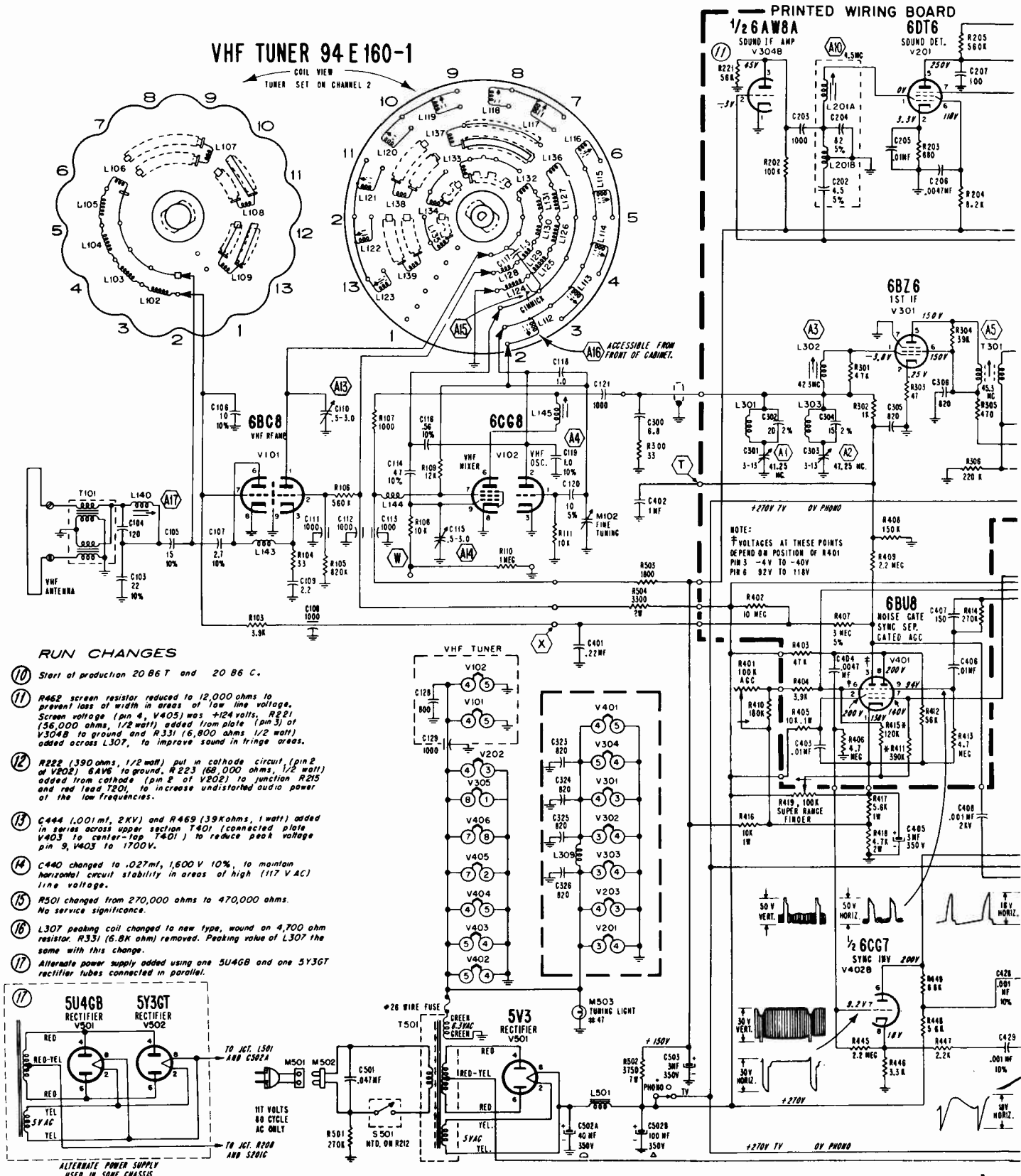
Important: Note that step 3 of the sound IF alignment procedure requires the use of a strong transmitted TV signal. Steps 5 and 6 requires the use of a weak (attenuated) TV signal. Failure to use a television signal of the required level as instructed for each of the steps will cause incorrect alignment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

Make alignment adjustments as follows:

1. Remove cabinet back. Turn set on and allow 15 minutes for warm up.
2. Select the strongest TV station received. AGC control must be in proper adjustment.
   Adjust other controls for normal operation. Turn Super Range Finder Control fully to the left (counterclockwise). See figures 10 and 11 for adjustment locations.
3. Using a non-metallic alignment tool (for hexagonal core IF slugs, Admiral Part No. 98A30-12), very slowly turn slug "A9" several turns counterclockwise until a buzz is heard in the sound. Then turn it clockwise until the loudest and clearest sound is obtained. NOTE: There may be two points (approximately ½ turn apart) at which sound is loudest. The slug should be set at the center range of the second point of loudest sound noted as the slug is turned in (toward printed circuit board).
4. Set Contrast control fully to the left (counterclockwise). Reduce the signal to the antenna terminals until there is a considerable amount of hiss in the sound. For best results, it is recommended that a step attenuator be connected between the antenna and the antenna terminals. The signal can also be reduced by disconnecting the antenna and placing it in close proximity of the antenna terminals or tuner antenna lead-in.
5. Carefully adjust slug "A10" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A10".
6. Carefully adjust slug "A11" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A11". Caution: Adjustment "A11" is slug nearest bottom of shield can; use care so as not to disturb slug nearest top of shield can.
7. If the above steps are correctly made, no further adjustment should be required. However, if sound remains distorted at normal volume level when receiver is tuned for best sound, repeat entire procedure.

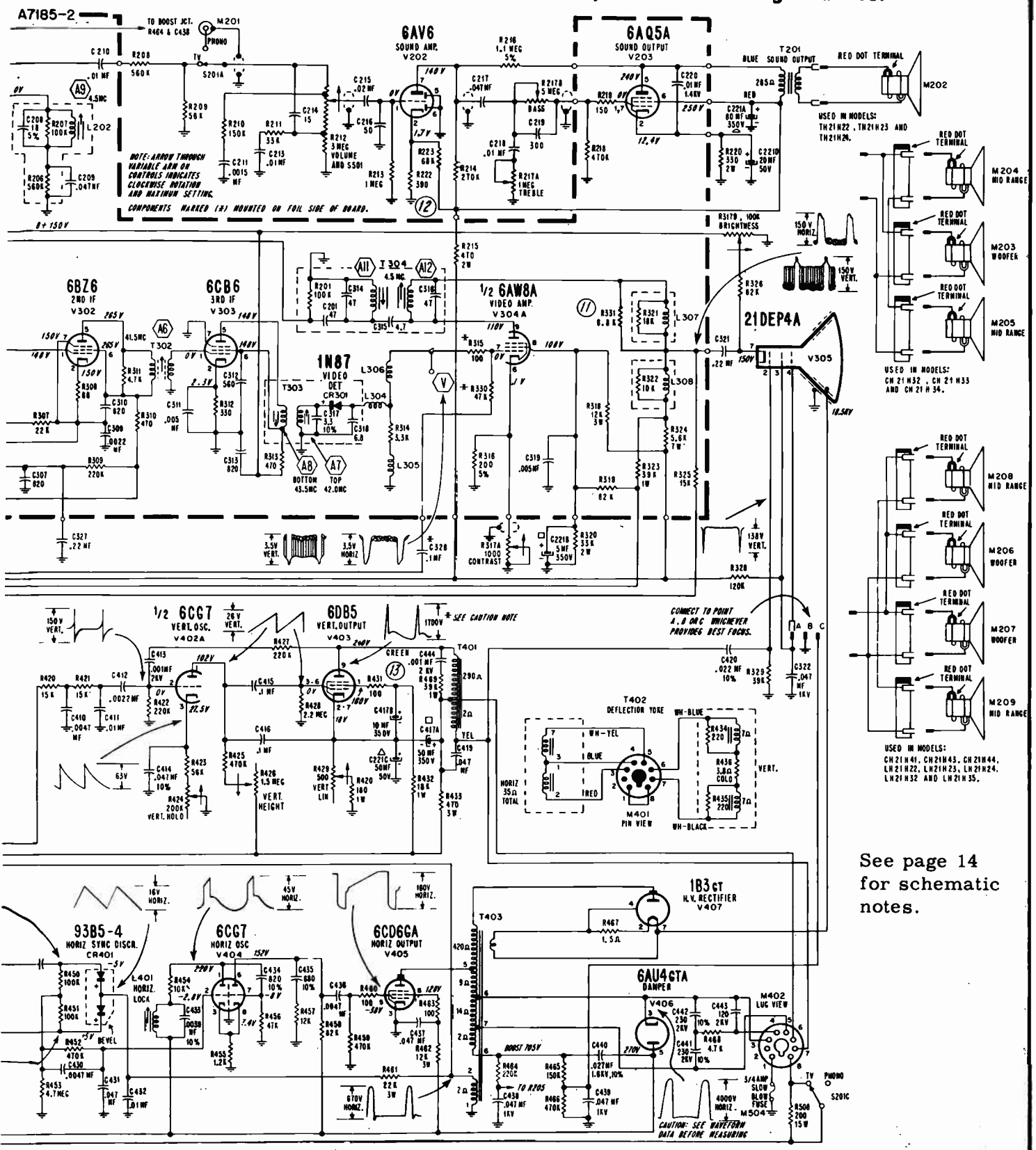
Caution: Do not readjust slug "A9" unless sound is distorted. If "A9" is readjusted, all steps in alignment procedure should be repeated exactly as instructed above.

ADMIRAL Schematic for Chassis 20B6C and 20B6T
(Chassis 20UB6C and 20UB6T are the same except for addition of UHF tuner)



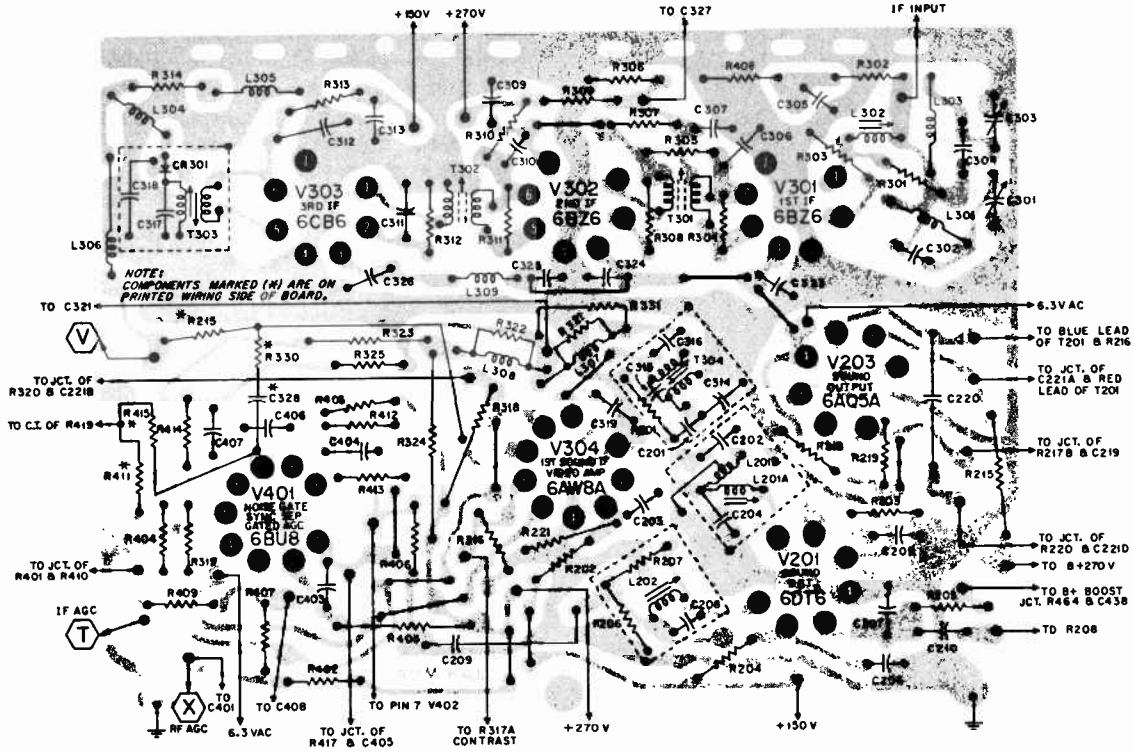
ADMIRAL

Schematic for 20B6C and 20B6T Television Chassis Stamped Run 10 through Run 13.



See page 14 for schematic notes.

ADMIRAL Chassis 20B6C, -CB, -T, -TB, 20UB6C, -CB, -T, -TB, 20C6C, Continued



View of WIRING SIDE of Printed Wiring Board, A7185-2. Gray area represents printed wiring; black symbols and lines represent components and connections on opposite side.

SCHEMATIC NOTES

②, ③, . . . indicate production changes covered by a Run number. Run numbers are rubber stamped on the chassis.

Ⓐ1, Ⓐ2, ... Ⓣ, Ⓥ, etc. indicate alignment points and alignment connections.

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

NOTE. K=R × 1,000. MEG=R × 1,000,000. MF=microfarad.

CONDITIONS FOR MEASURING VOLTAGES

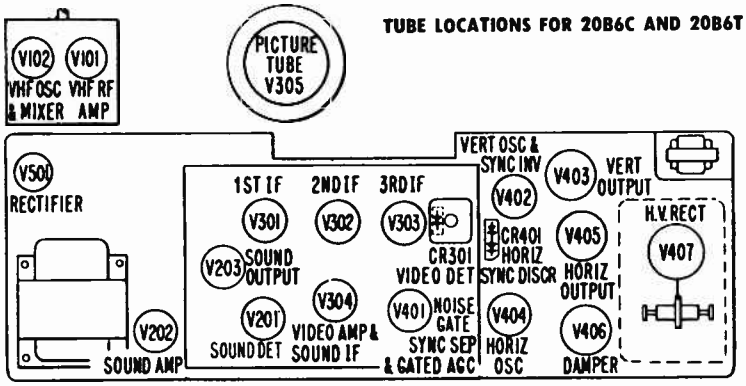
Warning: Pulsed high voltages are present at the caps of V405 and V407, and at pin 3 of V406. **Do not** attempt to measure voltages at these points without suitable test equipment. A VTVM with a high voltage probe should be used when measuring picture tube 2nd anode voltage.

- Set the **Channel Selector** on an unused channel. **Contrast** control fully clockwise. All other controls fully counterclockwise. Do not disturb **Horiz. Lock** and **AGC** control.
- Antenna disconnected and terminals shorted together.
- Line voltage 117 volts AC. B+ voltage 280 volts at pin 8 of V501.
- DC voltages measured with a VTVM between tube socket terminals and chassis, unless otherwise indicated.
- All voltages measured with tubes in sockets. Use of adapter sockets is recommended.

CONDITIONS FOR OBSERVING WAVEFORMS

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

- Set all controls for normal picture. After the receiver is set for a normal picture, turn the **Contrast** control fully clockwise.
- Oscilloscope sweep is set at 30 cycles for vertical waveforms and at 7,875 cycles for horizontal waveforms, to permit 2 complete cycles to be observed.
- Peak-to-Peak voltages will vary from those shown on the schematic depending on the input signal strength, test equipment employed and chassis parts tolerance.
- Waveforms were taken with a comparatively strong transmitted signal input to the television chassis.



TUBE LOCATIONS FOR 20B6C AND 20B6T CHASSIS

TUBE COMPLEMENT

V101—6BC8	V401—6BU8
V102—6CG8	V402—6CG7
V201—6DT6	V403—6DB5
V202—6AV6	V404—6CG7
V203—6AQSA	V40S—6CD6GA
V301—6BZ6	V406—6AU4GTA
V302—6BZ6	V407—1B3GT
V303—6CB6	V501—5V3
V304—6AW8A	CR301—1N87
V30S—21DEP4A	CR401—93B5-4

Admiral

16X1 and 16AX1 CHASSIS

MODELS PA17D41, PA17D42, PA17D43, PA17D44, PA17D45, P17D46, P17D47

(Material on pages 15 through 20. Schematic diagram on pages 16-17 is exact for 16X1; chassis 16AX1 is identical except for the addition of UHF tuner.)

HORIZONTAL HOLD ADJUSTMENT

If picture folds or tears, adjust **Horizontal Hold** control until the picture is steady and there is no bending of vertical lines in picture. Check adjustment by switching channels. If necessary, readjust **Horizontal Hold** control until picture remains steady when switching channels.

SUPER RANGE FINDER ADJUSTMENT

The **Super Range Finder** control is used to improve TV reception in fringe areas and in areas where there is interference. **This control should be set fully counter-clockwise (to the left), if satisfactory pictures can be obtained by using the main operating controls.**

Where the TV signal strength is weak, the picture can often be improved by turning the Range Finder part way to the right.

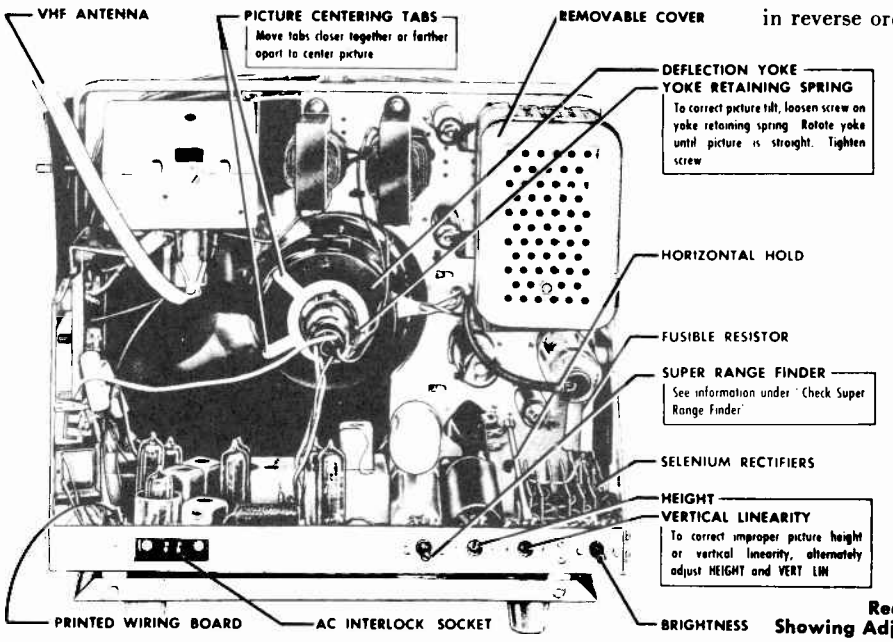
White flashes across the picture, or "snow" in the picture, can sometimes be minimized by careful adjustment of the Range Finder. **Caution:** If the Range Finder is turned too far to the right for a normal signal, the picture may have excessive contrast or may disappear completely.

If the signal strength changes, it may be desirable to change the setting of the Range Finder, however, it is generally possible to set it at a compromise position which gives reasonable reception for different signal strengths.

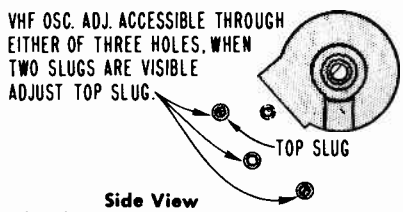
REMOVING CHASSIS FROM CABINET

The cabinet enclosure of these receivers consists of a cabinet wrap-around (shell), bottom plate, front bezel and cabinet back. The chassis, speaker and picture tube are mounted as a complete assembly to the bottom plate of the cabinet.

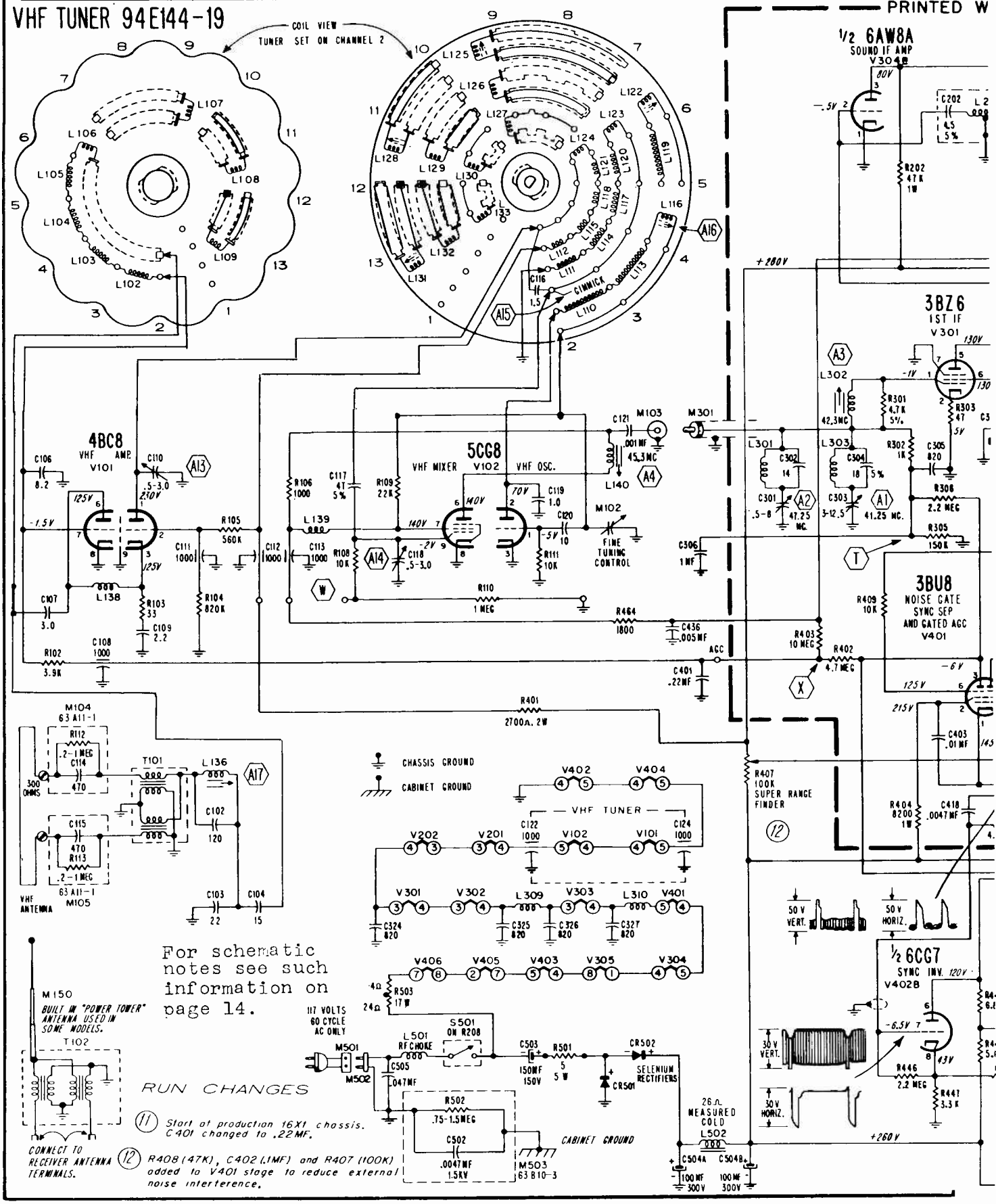
1. Remove Tuning knobs at side of cabinet.
2. Remove cabinet back, using care so as not to damage interlock socket or plastic shaft of Horizontal Hold control.
3. Remove picture window and bezel after removing screws at sides and bottom of bezel. Pull bottom of bezel away from cabinet. Lift up to free top of bezel from cabinet.
4. Remove top cabinet mounting screw located below carrying handle.
5. Remove reinforcing brackets at top corners of cabinet.
6. Remove antenna terminal board from rear of cabinet. On sets using "Power Tower" antenna, unplug "Power Tower" antenna leads from antenna terminal board.
7. Remove cabinet wrap-around after removing screws which mount it to the bottom plate of cabinet.
8. To remove bottom plate from chassis, remove screws which mount it to chassis bottom. Caution: Do not allow bottom surface of chassis (printed wiring) to come in contact with metal bench, tools or metal chips which may be lying on surface of bench.
9. To reassemble chassis in cabinet, follow above procedure in reverse order.



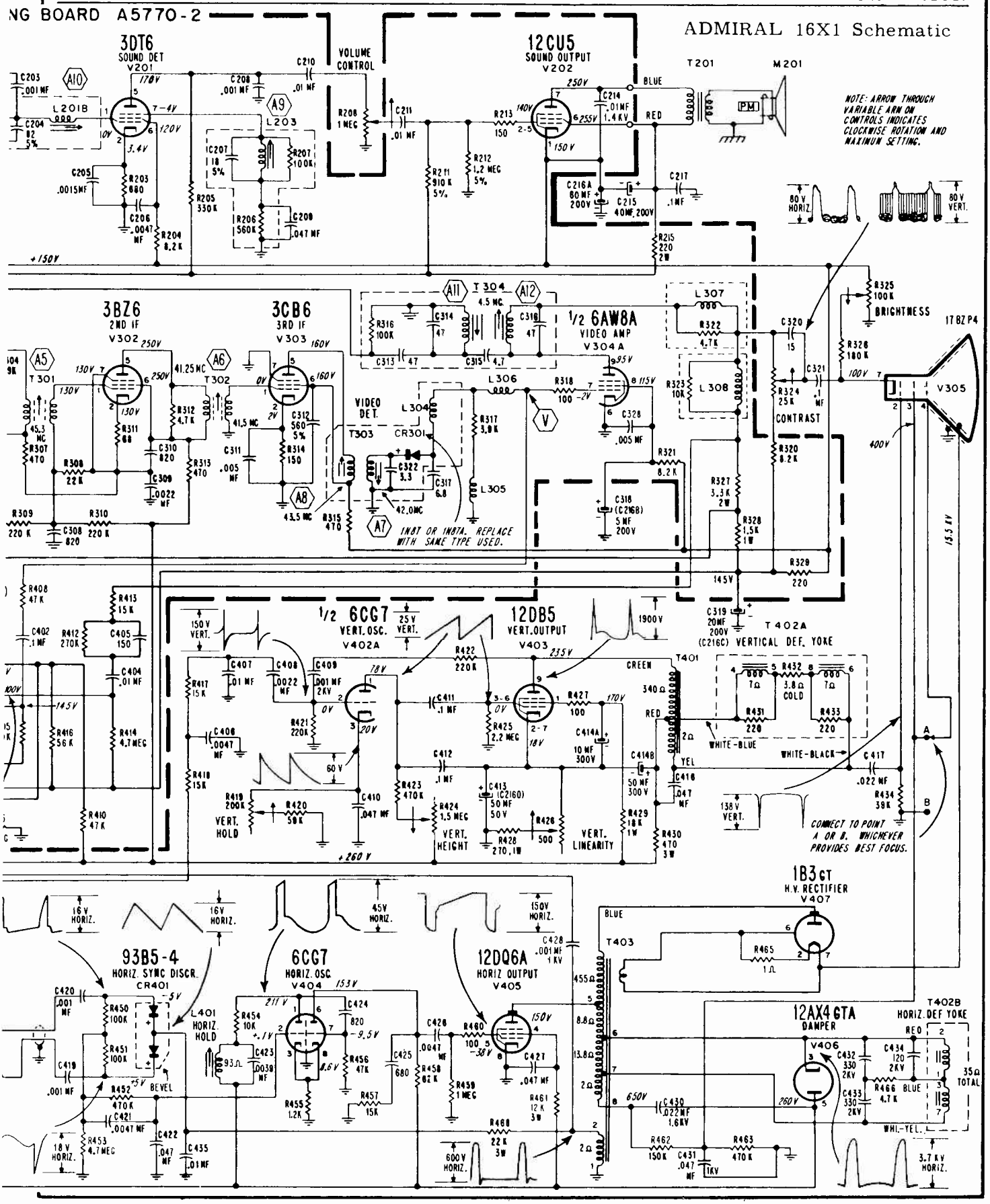
Rear View of VHF Set Showing Adjustment Locations.



Side View of Cabinet. Tuning Knobs Removed.



Schematic for 16X1 Television



Chassis Stamped Run 12.

ADMIRAL Chassis 16X1 and 16AX1 ALIGNMENT INFORMATION (Continued)

- Connect isolation transformer between power line and receiver.
- Connect negative of 3.0 volt bias supply through 10K resistor to test point "T" (IF AGC), see figures 12 and 13, positive to chassis.
- Disconnect antenna. Connect a jumper wire across the antenna terminals.
- Set Channel Selector to channel 12 or other unassigned high channel, to prevent interference during alignment.
- Use a non-metallic alignment tool, part number 98A30-12.
- If used, set Super Range Finder control fully to left (counterclockwise) and Contrast control fully to right (clockwise).
- Use lowest DC scale on VTVM.

SPECIAL TUBE SHIELD: For injecting 41 MC IF signal for IF alignment use in insulated tube shield over the VHF Oscillator-Mixer tube. Insulate bottom of tube shield with masking tape, see figure 7.

REMOVE BOTTOM PLATE FROM CHASSIS. All alignment adjustments are accessible from top of printed wiring board without need for removing picture tube or chassis bottom plate. However, for greater convenience in making alignment, it is recommended that the chassis bottom plate be removed.

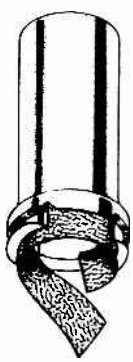
Note: If picture tube is removed during alignment, it will be necessary to connect a 10 ohm, 5 watt resistor across terminals 1 and 8 of the picture tube socket for completing the series heater circuit.

IF AMPLIFIER ALIGNMENT

Step	Signal Gen. Freq.	Instructions	Adjust
Before proceeding, be sure to check the signal generator used in alignment against a crystal calibrator or other frequency standard for absolute frequency calibration required for this operation.			
1	41.25 MC	If necessary, increase generator output and/or reduce bias to −1½ volts to obtain a definite indication on VTVM.	A1 for minimum.
2	47.25 MC		A2 for minimum.
3	42.3 MC	Use −3 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 2 volts.	A3 for maximum.
4	45.3 MC		A4 and A5 for max
5	41.5 MC		A6 for maximum
6	42.0 MC		A7 for maximum.
7	43.5 MC		A8 for maximum.

IF RESPONSE CURVE CHECK (Using sweep generator and oscilloscope)

Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Channel Selector on channel 3 or an unassigned low channel. Contrast control fully to the left. Connect negative of 3 volt bias supply to test point "T" (IF AGC); positive to chassis.	Connect high side to 5CG8 mixer-osc. insulated tube shield, see fig. 7. Connect low side to chassis near tube shield. Set sweep frequency to 43 MC, and sweep width approximately 7 MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" through a decoupling filter, see figs. 9, 12 and 13.	Check curve obtained against ideal response curve in fig. 10. Note tolerances on curve. Keep marker and sweep outputs at very minimum to prevent overloading. A reduction in sweep output should reduce response curve amplitude without altering the shape of the response curve. If the curve is not within tolerance or the markers are not in the proper location on the curve, touch-up with IF slugs as instructed below.



INSULATE BOTTOM WITH MASKING TAPE

Figure 7.

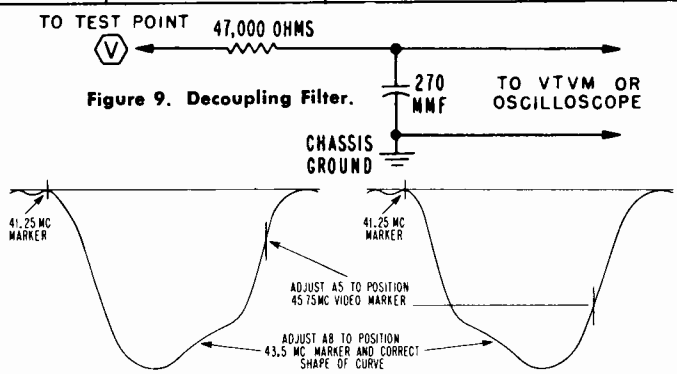


Figure 9. Decoupling Filter.

Figure 11. IF Response Curves, Incorrect Shape.

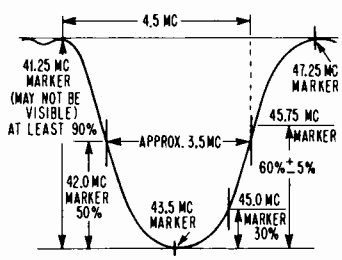
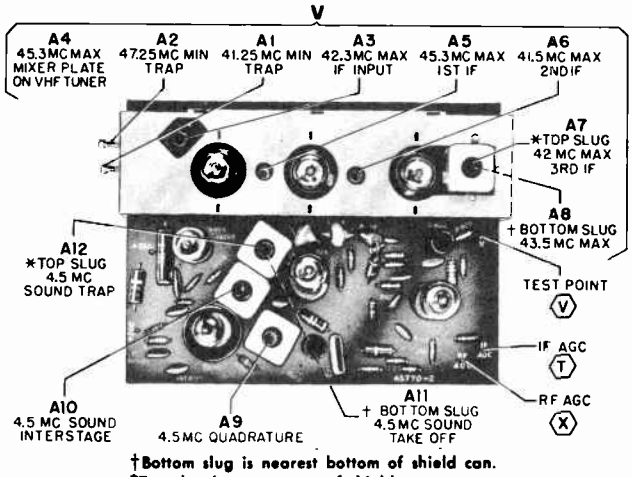


Figure 10. Ideal IF Response Curve.

If it is necessary to adjust for approximate equal peaks and marker location, carefully adjust alignment slugs as instructed under the above figures. It should not be necessary to turn the slugs more than one turn in either direction.

ADMIRAL Chassis 16X1 and 16AX1 ALIGNMENT INFORMATION (Continued)



†Bottom slug is nearest bottom of shield can.
*Top slug is nearest top of shield can.

Figure 12. Inside Chassis View of Printed Wiring Board Showing Test Point Locations and IF Alignment Data.

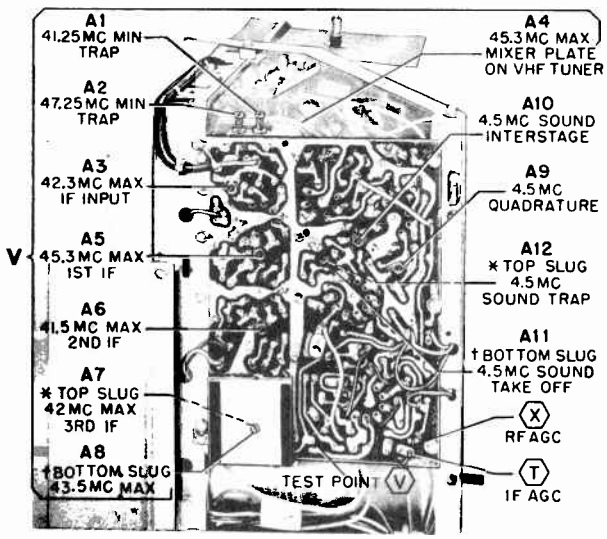


Figure 13. Bottom View of Chassis Showing Test Point Locations and IF Alignment Data. VHF Tuner at Top of Illustration.

4.5 MC SOUND IF ALIGNMENT USING TELEVISION SIGNAL

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

Make alignment adjustments as follows:

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

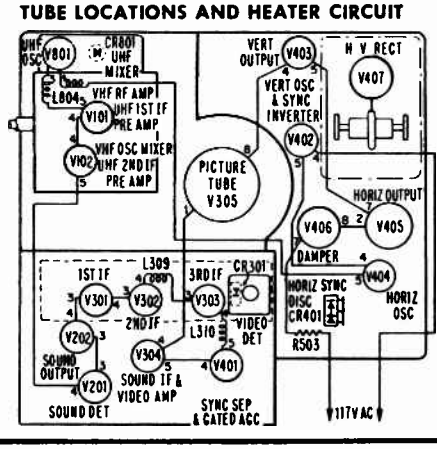
Caution: Do not readjust slug "A9" unless sound is distorted. If "A9" is readjusted, all steps in alignment procedure should be repeated exactly as instructed above.

ALIGNMENT OF 4.5 MC TRAP USING A TELEVISION SIGNAL

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

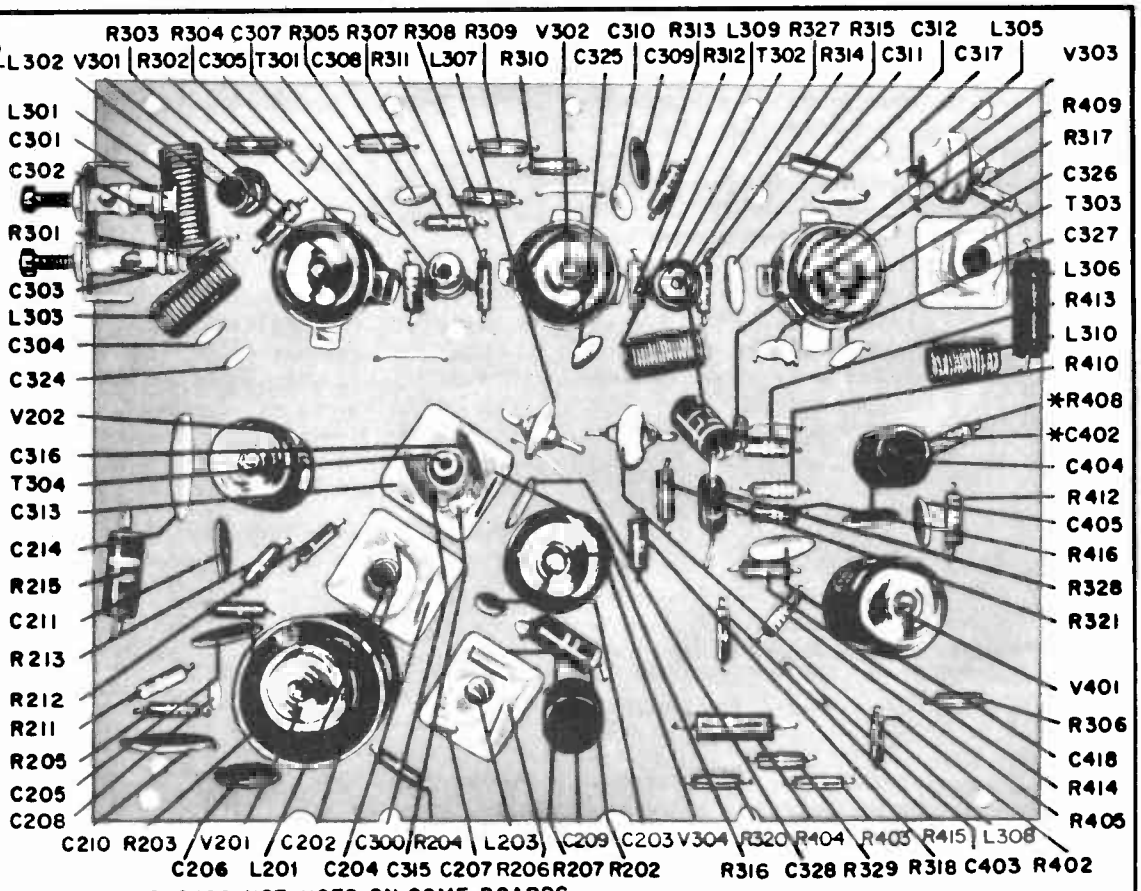
To align the 4.5 MC trap (slug adjustment A12), tune in a television station with beat interference pattern in picture. While closely observing the picture, adjust slug A12 for minimum interference pattern. A12 is top slug (nearest top of shield can); use caution so as not to disturb bottom slug (nearest bottom of shield can)

TUBE LOCATIONS AND HEATER CIRCUIT



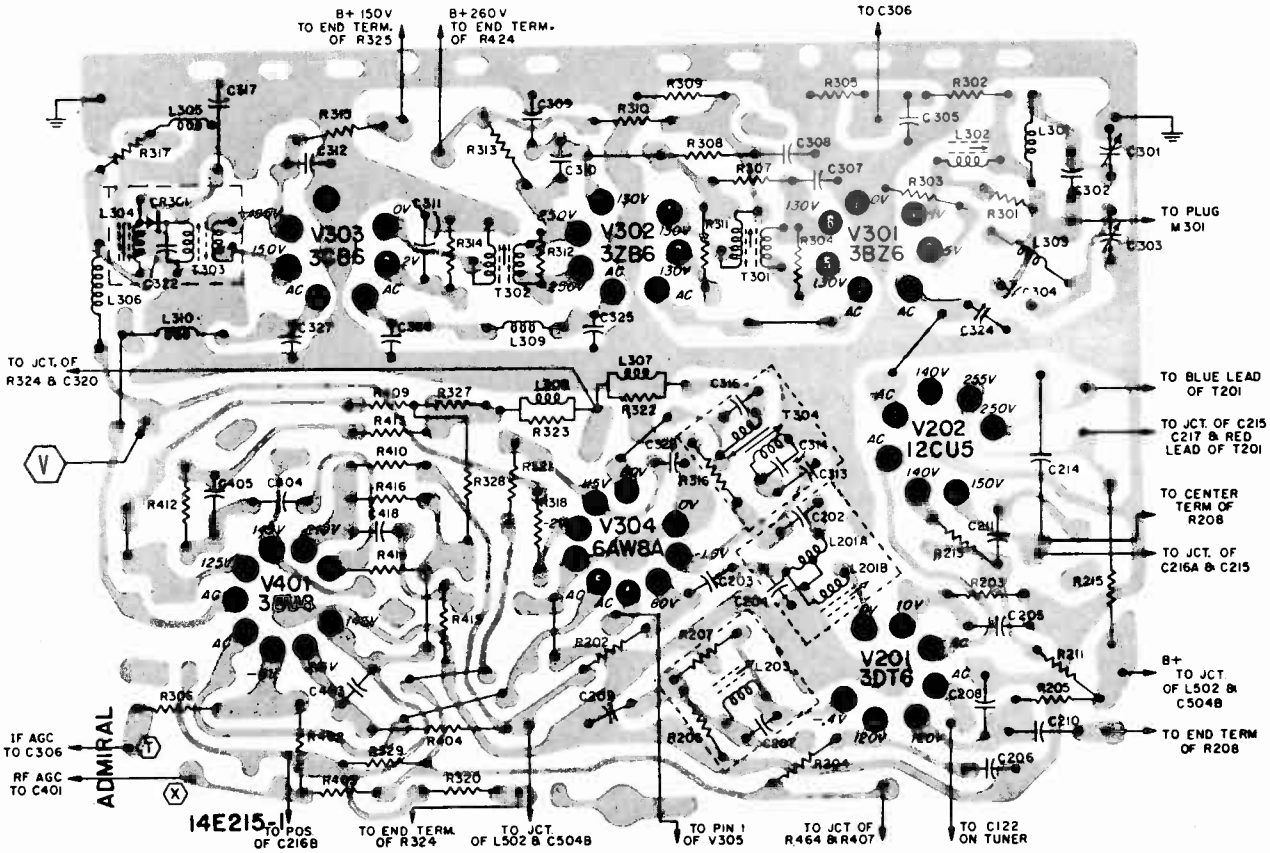
CR801—1N82A
V801—2AF4A
V101—4BC8
V102—5CG8
V201—3DT6
V202—12CU5
V301—3BZ6
V302—3BZ6
V303—3CB6
CR301—1N87 or 1N87A
V304—6AW8A
V305—17BZP4
CR401—Dual Selenium Diode 93B5-4
V401—3BU8
V402—6CG7
V403—12DB5
V404—6CG7
V405—12DQ6A
V406—12AXAGTA
V407—1B3GT

ADMIRAL
Chassis 16X1
and 16AX1,
(Continued)



* R408 & C402 NOT USED ON SOME BOARDS.

View of Component Side of Printed Wiring Board. Location of Components Shown.



View of Wiring Side of Printed Wiring Board. Gray Area Represents Printed Wiring; Black Symbols and lines represent components and connections on opposite side.

Admiral

CHASSIS 18A6C, -CB, 18UA6C, -CB, 18A6T, -TB, 18UA6T, -TB, 18B6C, -CB, 18UB6C, -CB, 18B6T, -TB, 18UB6T, -TB, 18C6C, 18C6T

These sets are covered by material on pages 21 through 28. The suffix letter "C" or "T" indicates console or table model and not any electrical difference. The schematic on pages 26-27 is exact for UHF chassis with disc type VHF tuners. VHF chassis types are identical except for tuner. The additional suffix "B" indicates the use of Neutrode type tuner with the balance of chassis being the same as the corresponding type. Chassis 18C6C and 18C6T also use Neutrode tuner and incorporate necessary additional circuits for remote tuning operation. Models using these various chassis are listed below. Models with suffix "B" added to these numbers, use the corresponding chassis with Neutrode tuner.

MODEL NUMBER	TV CHASSIS
T21G1	18A6T
T21UG1	18UA6T
T21G2	18A6T
T21UG2	18UA6T
T21G11	18B6T
T21UG11	18UB6T
T21G12	18B6T
T21UG12	18UB6T
T21G13	18B6T
T21UG13	18UB6T
C21G2	18A6C
C21UG2	18UA6C
C21G3	18A6C
C21UG3	18UA6C
C21G12	18B6C
C21UG12	18UB6C
C21G13	18B6C
C21UG13	18UB6C
C21G14	18B6C
C21UG14	18UB6C
C21G22	18B6C
C21UG22	18UB6C
C21G23	18B6C
C21UG23	18UB6C
C21G24	18B6C
C21UG24	18UB6C
L21G12	18B6C
L21UG12	18UB6C
L21G13	18B6C
L21UG13	18UB6C
L21G14	18B6C
L21UG14	18UB6C
TS21G22	18C6T
TS21G23	18C6T
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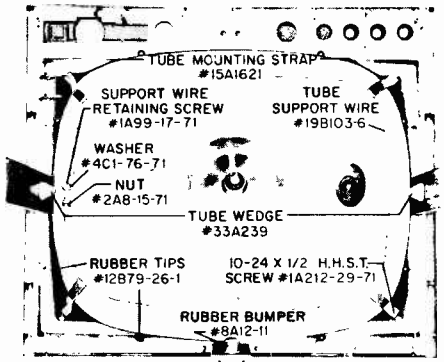
CS21G63	18C6C
CS21G64	18C6C
LS21G42	18C6C
LS21G43	18C6C



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

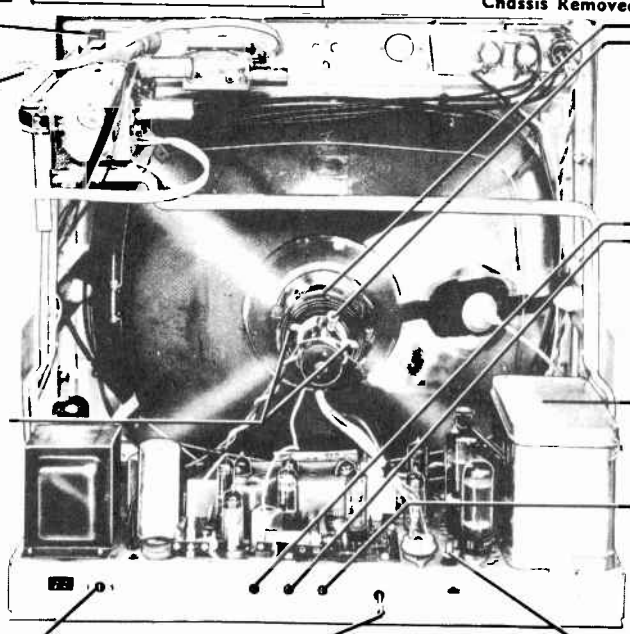


Figure 2. Rear View of Chassis Showing Adjustment Locations. UHF Tuner in VHF-UHF Sets Only. VHF Channel Indicator Drum Only in 18B6C, 18B6T, 18UB6C and 18UB6T Chassis.

ADMIRAL Chassis 18A6C, -T, 18UA6C, -T, 18B6C, -T, 18UB6C, -T, 18C6C, -T

AGC CONTROL ADJUSTMENT

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

If adjustment is required, it should be made exactly 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 the right).
4. Set Super Range Finder and AGC controls at rear of set, to minimum (fully to the left).
5. Adjust Horizontal Lock (at rear of set) and Vertical Hold control (at front 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.

SUPER RANGE FINDER ADJUSTMENT

The Super Range Finder 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 Super Range Finder 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: At the factory, this control is set completely to the left. It should only be turned from its original position if picture is unstable.**

To adjust, turn Super Range Finder 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 Super Range Finder control as far to the left as possible while still maintaining good sync stability on all 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 and Super Range Finder controls have 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 if necessary, repeat procedure.

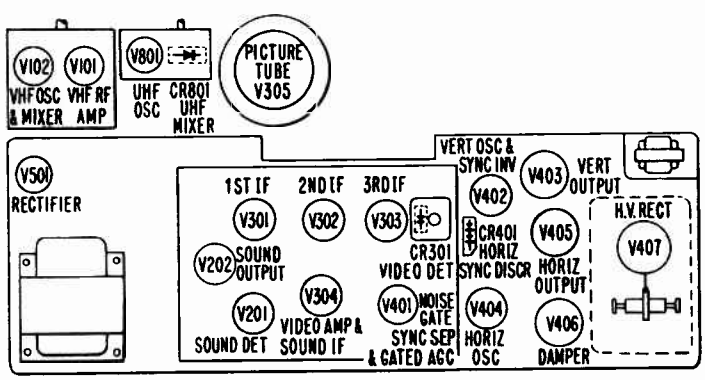
REMOVING CHASSIS FROM CABINET

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

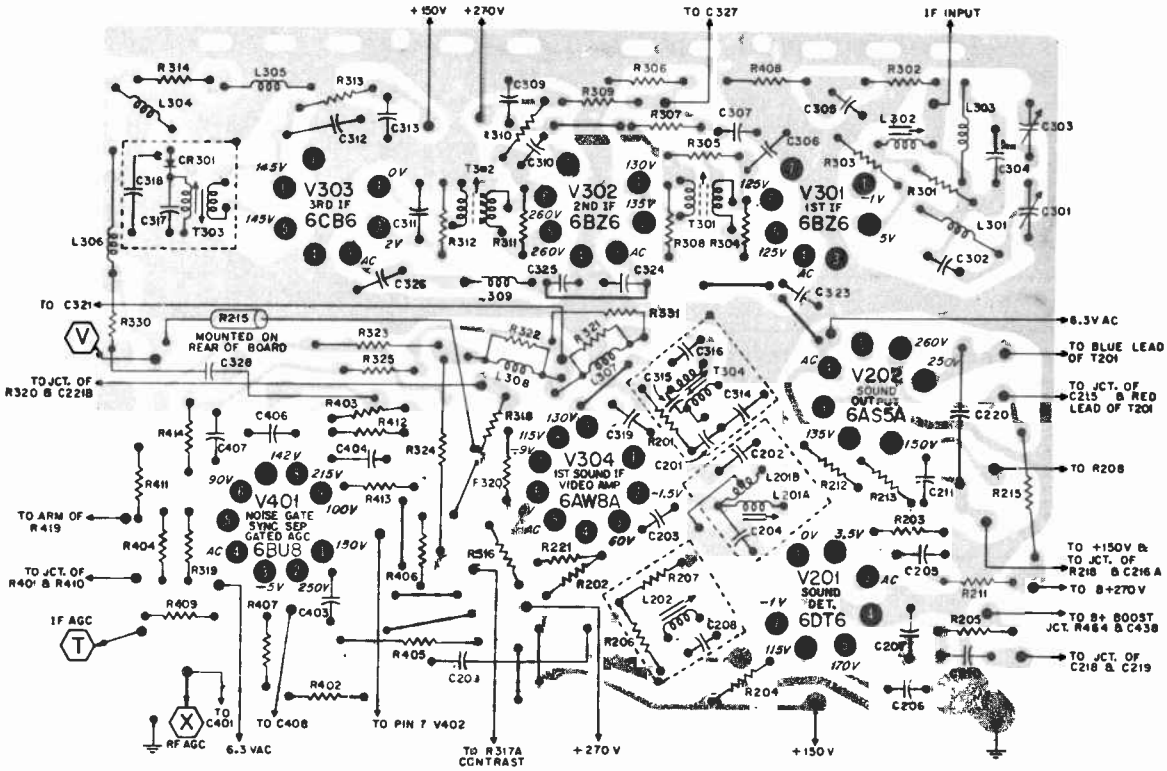
1. Remove cabinet back. Disconnect antenna and speaker.
2. At rear of cabinet, remove screws which mount side and bottom support channels to rear of cabinet. Also remove chassis mounting screws at bottom of cabinet.
3. Remove chassis from cabinet by securely grasping sides of front escutcheon.
4. To reinstall chassis in cabinet, carefully insert chassis through front of cabinet. Very carefully guide chassis into cabinet so that mounting channels line up with holes at sides and bottom of cabinet. In metal cabinet models, the front edges of the cabinet must fit firmly into grooved surfaces at rear of metal escutcheon. In wood cabinet models, guide metal locating pins (at rear of escutcheon) into matching holes in cabinet.

TUBE COMPLEMENT

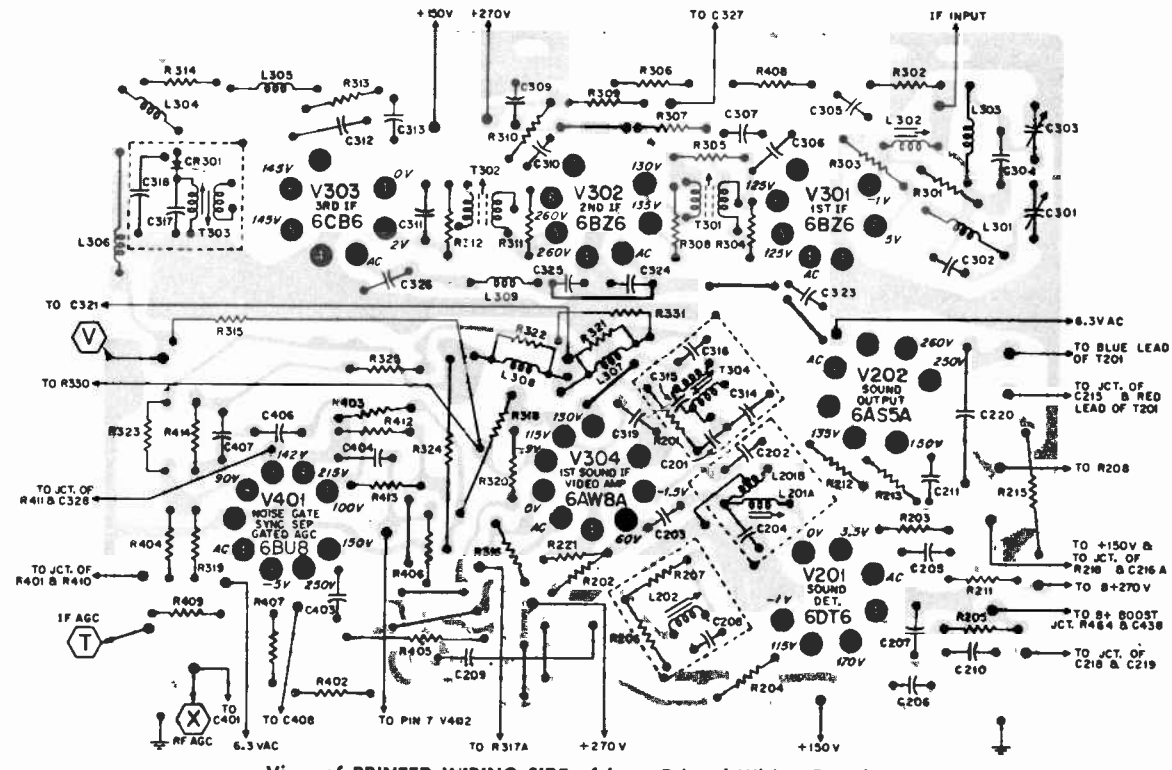
CR801—1N82A	CR301—1N87 or 1N87A (Crystal Diode)	V402—6CG7
V801—6AF4A	V304—6AW8A	V403—6DB5
V101—6BC8	V305—21DEP4A	V404—6CG7
V102—6CG8	V401—6BU8	V405—6DQ6A
V201—6DT6	CR401—9385-4 (Dual Selenium Diode)	V406—6AU4GTA
V202—6AS5A		V407—1B3GT
V301—6BZ6		V501—5V3
V302—6BZ6		
V303—6CB6		



ADMIRAL Chassis 18A6C, -T, 18UA6C, -T, 18B6C, -T, 18UB6C, -T, 18C6C, -T



View of PRINTED WIRING SIDE of early Printed Wiring Board A7185-1.



View of PRINTED WIRING SIDE of later Printed Wiring Board A7185-1.

Gray area represents printed wiring; black symbols and lines represent components and connections on opposite side.

ADMIRAL Chassis 18A6C, -T, 18UA6C, -T, 18B6C, -T, 18UB6C, -T, 18C6C, -T

IF AMPLIFIER ALIGNMENT

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

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

IF RESPONSE CURVE CHECK (Using sweep generator and oscilloscope)

Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Channel Selector on channel 3 or an unassigned low channel. Contrast control fully to the left. Connect negative of 3 volt bias supply to test point "T" (IF AGC); positive to chassis.	Connect high side to 6CG8 mixer-osc. insulated tube shield, see fig. 5. Connect low side to chassis near tube shield. Set sweep frequency to 43 MC, and sweep width approximately 7 MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" thru a decoupling filter, see figs. 7, 10 and 11.	Check curve obtained against ideal response curve in fig. 8. Note tolerances on curve. Keep marker and sweep outputs at very minimum to prevent overloading. A reduction in sweep output should reduce response curve amplitude without altering the shape of the response curve. If the curve is not within tolerance or the markers are not in the proper location on the curve, touch-up with IF slugs as instructed below.

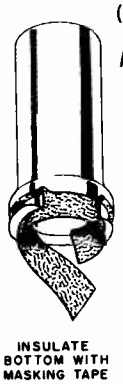


Figure 5. Special Tube Shield for IF Alignment and IF Response Curve Check.

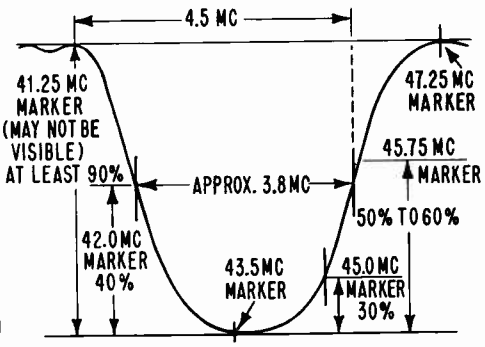


Figure 8. Ideal IF Response Curve.

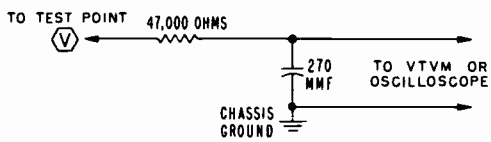


Figure 7. Decoupling Filter.

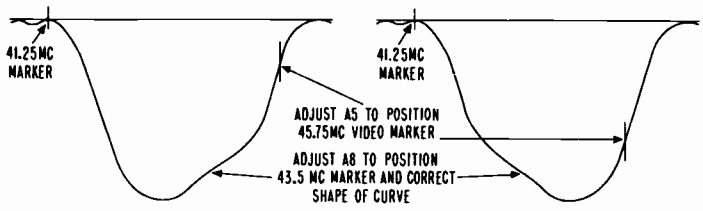
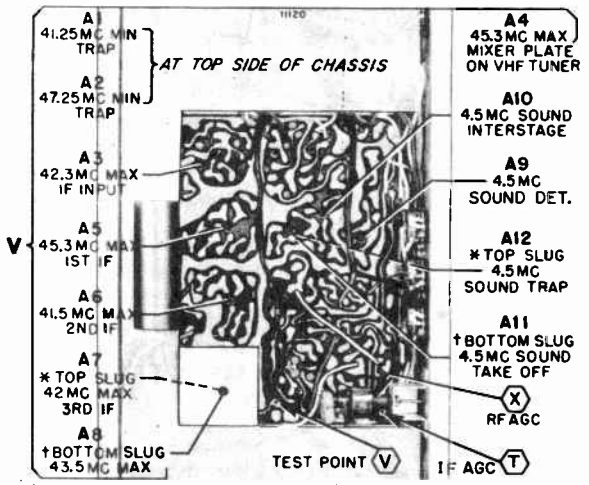


Figure 9. IF Response Curves, Incorrect Shape.

ADMIRAL Chassis 18A6C, -T, 18UA6C, -T, 18B6C, -T, 18UB6C, -T, 18C6C, -T



†Bottom slug is nearest bottom of shield can.
*Top slug is nearest top of shield can.

Figure 10. Bottom View of Chassis Showing Test Point Locations and IF Alignment Data. VHF Tuner at Top of Illustration.

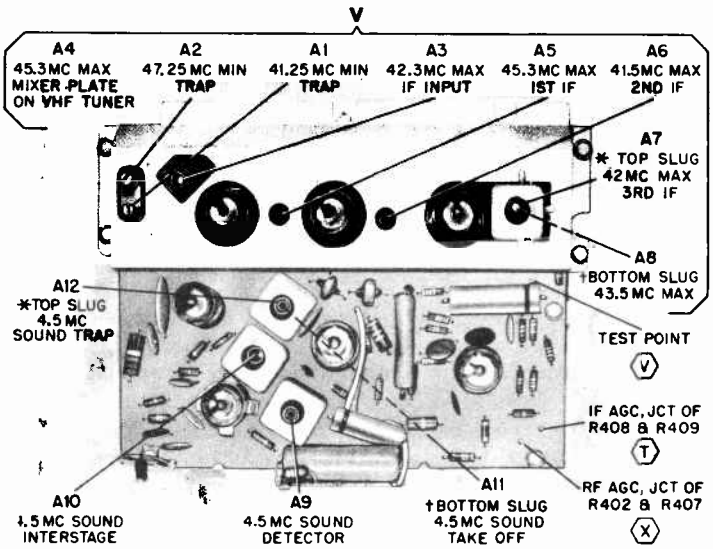


Figure 11. Inside Chassis View of Printed Wiring Board Showing Test Point Locations and IF Alignment Data.

4.5 MC SOUND IF ALIGNMENT USING TELEVISION SIGNAL

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

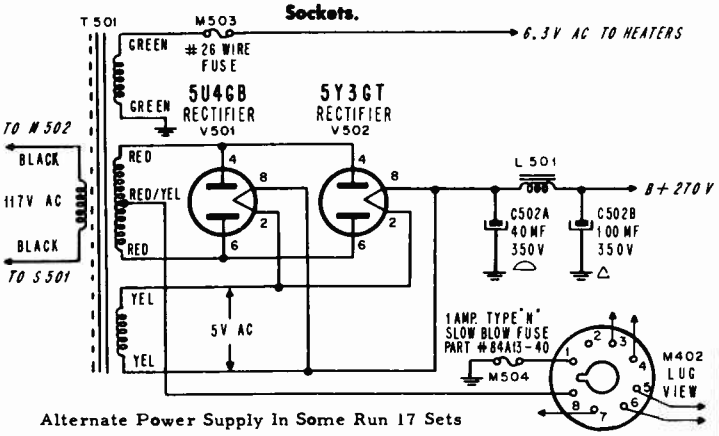
Important: Note that step 3 of the sound IF alignment procedure requires the use of a strong transmitted TV signal. Steps 5 and 6 requires the use of a weak (attenuated) TV signal. Failure to use a television signal of the required level as instructed for each of the steps will cause incorrect alignment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

Make alignment adjustments as follows:

1. Remove cabinet back. Turn set on and allow 15 minutes for warm up.
2. Select the strongest TV station received. AGC control must be in proper adjustment.
   Adjust other controls for normal operation. Turn Super Range Finder Control fully to the left (counterclockwise). See figures 10 and 11 for adjustment locations.
3. Using a non-metallic alignment tool (for hexagonal core IF slugs, Admiral Part No. 98A30-12), very slowly turn slug "A9" several turns counterclockwise until a buzz is heard in the sound. Then turn it clockwise until the loudest and clearest sound is obtained. NOTE: There may be two points (approximately ½ turn apart) at which sound is loudest. The slug should be set at the center range of the second point of loudest sound noted as the slug is turned in (toward printed circuit board).
4. Set Contrast control fully to the left (counterclockwise). Reduce the signal to the antenna terminals until there is a considerable amount of hiss in the sound. For best results, it is recommended that a step attenuator be connected between the antenna and the antenna terminals. The signal can also be reduced by disconnecting the antenna and placing it in close proximity of the antenna terminals or tuner antenna lead-in.
5. Carefully adjust slug "A10" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A10".
6. Carefully adjust slug "A11" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A11". Caution: Adjustment "A11" is slug nearest bottom of shield can; use care so as not to disturb slug nearest top of shield can.
7. If the above steps are correctly made, no further adjustment should be required. However, if sound remains distorted at normal volume level when receiver is tuned for best sound, repeat entire procedure.

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

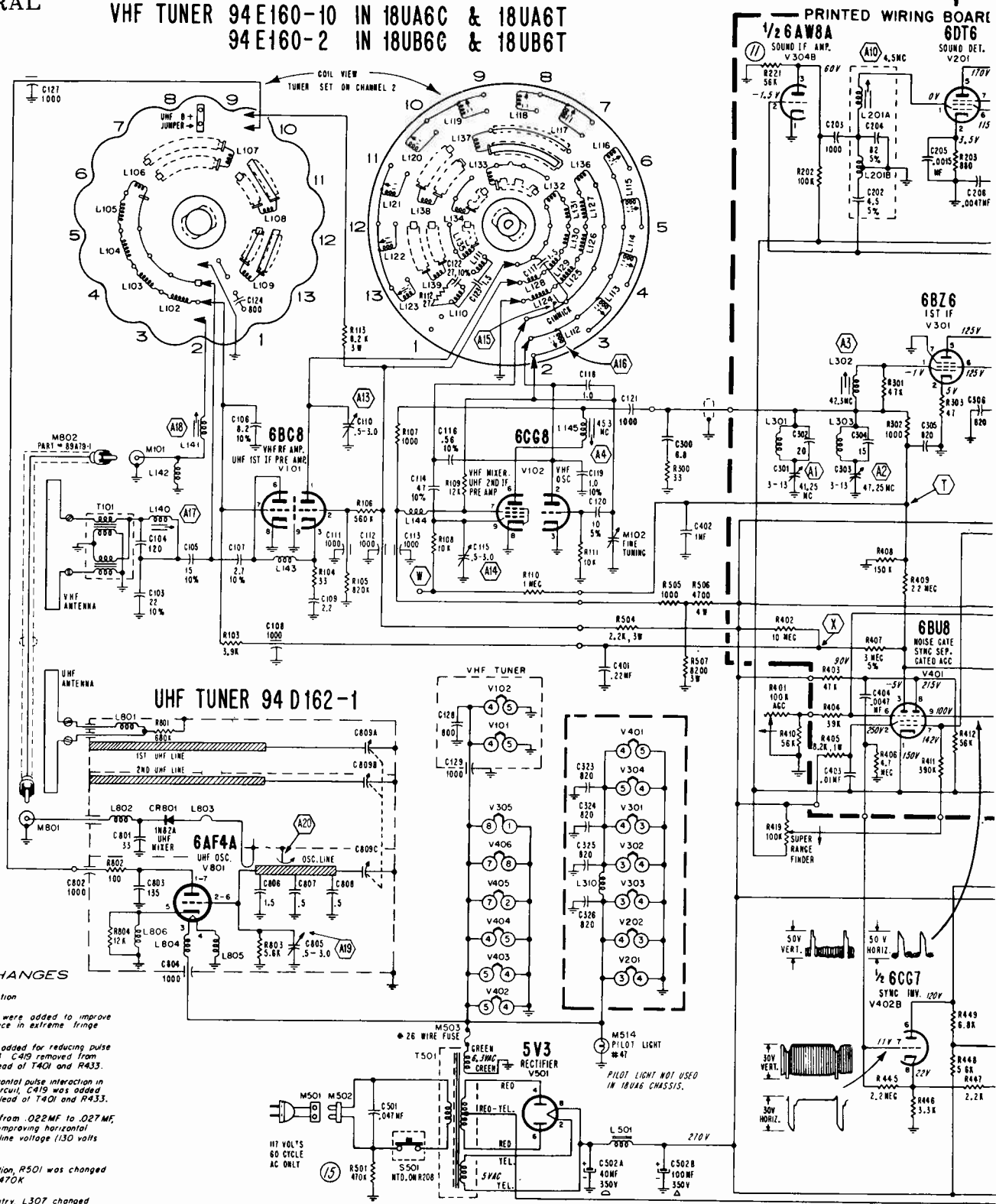
Power Supply in Some VHF-UHF Chassis Wired with Two Rectifier Sockets.



Alternate Power Supply In Some Run 17 Sets

ADMIRAL

VHF TUNER 94E160-10 IN 18UA6C & 18UA6T
94E160-2 IN 18UB6C & 18UB6T



RUN CHANGES

(10) Start of production

(11) R221 and R331 were added to improve sound performance in extreme fringe areas

(12) C421 and R437 added for reducing pulse voltage at V403. C419 removed from between yellow lead of T401 and R433.

(13) To minimize horizontal pulse interaction in vertical output circuit, C419 was added between yellow lead of T401 and R433.

(14) C440 changed from .022MF to .027MF, 16KV, 10% for improving horizontal stability at high line voltage (130 volts or higher).

(15) For standardization, R501 was changed from 270K to 470K

(16) To simplify circuitry, L307 changed from orange and red dot coil (part number 73C5-32, wound on 18K resistor) to brown and green dot coil (part number 73C5-23, wound on 47K resistor) R331 (68K) removed from across L307 when brown and green dot coil is used

(17) Alternate tubes used for V501. 1 amp slow-blow fuse used for M504. See Run 17 change on page **25**.

(18) No changes made.

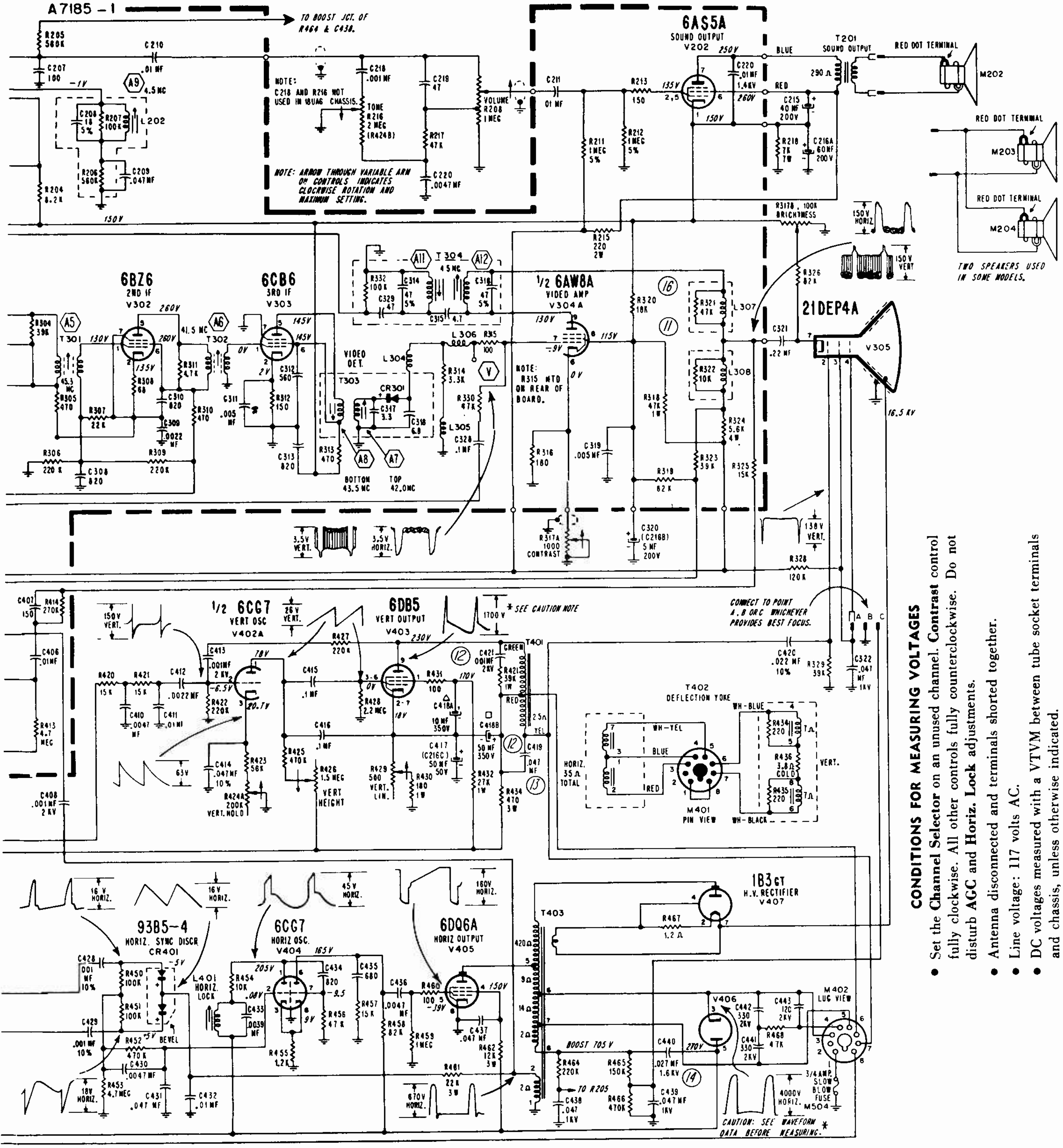
(19) Some chassis had T501 HV center tap (red-yellow lead) connected directly to hot side of fuse M504 with no connection to pins 1 and 8 of yoke socket M402.

CONDITIONS FOR OBSERVING WAVEFORMS

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

- Set tuning controls for normal picture. Set **Super Range Finder** control fully counterclockwise. Do not disturb **AGC** and **Horiz.**

Schematic for 18UA6C, 18UA6T, 18UB6C and 18UB6T Television Chassis Stamped Run 10 Through Run 16.



CONDITIONS FOR MEASURING VOLTAGES

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

Lock adjustments. After the receiver is set for a normal picture turn the **Contrast** control fully clockwise.

- Oscilloscope sweep is set at 30 cycles for vertical waveforms and at 7,875 cycles for horizontal waveforms, to permit 2 complete cycles to be observed.
- Peak-to-peak voltages will vary from those shown on the schematic depending on the input signal strength, test equipment employed and chassis parts tolerance.
- Waveforms were taken with a comparatively strong transmitted signal input to the television chassis.

ADMIRAL Chassis 18A6C, -T, etc. SERVICE HINTS (Continued)

NO RASTER, LOSS OF HORIZONTAL SYNC OR INTERMITTENT SYNC

No raster, loss of horizontal sync or intermittent ("touchy") horizontal sync can be due to a faulty dual selenium diode (horizontal sync discriminator) CR401 or other component in the sync circuit or horizontal sweep circuit.

If a section of the dual selenium diode should become shorted or open, complete loss of raster or no horizontal sync will result. If the leads of the dual selenium diode should become loose or make poor contact in socket or if the diode is inserted incorrectly, loss of horizontal sync or intermittent horizontal sync will result. Important: When inserting diode, beveled corner of diode must line up with beveled corner of diode socket, see figure at right.

Check the dual selenium diode CR401 as instructed in paragraphs below. If the dual selenium diode is not at fault, check capacitors C407, C428, C429, C430 and C431 for short, leakage or open circuit. Check value of resistors R450 and R451 (100,000 ohms). As a further aid in localizing trouble, make an oscilloscope waveform check of the important test points in the sync, horizontal oscillator and horizontal output circuits.

SERVICING VIDEO DETECTOR (CR301)

In these receivers, a germanium diode (1N87 or 1N87A) is used as the video detector CR301. The detector diode is connected across the top terminals of the 3rd IF transformer T303. The detector diode is accessible for checking or replacement after removing the snap-on cover shield from the 3rd IF transformer.

Note: The germanium diode functions with excellent stability, has long life expectancy and ability to withstand severe mechanical shock without damage. However, the diode may be permanently damaged by application of high current or excessive heat to the connecting leads. To avoid damage when soldering diode leads, clamp nose end of long nose pliers between the body of the diode and end of lead to be soldered. Any damaging heat will be conducted by the pliers and thus diverted from the diode.

A rough check for determining if a diode is open or shorted can be made using an ohmmeter. Check as follows: Disconnect one end of the diode from the circuit and connect an ohmmeter (Rx1000 scale) across the diode terminals. A relatively low resistance (several hundred ohms or less) should be noted in one direction and a relatively high reading (many thousand ohms) should be noted in the other direction as the ohmmeter leads are reversed.

IMPORTANT: A defective detector diode will cause insufficient picture contrast, with weak or no sound, intermittent sync, no sync or AGC blocking. Connecting an oscilloscope to test point "V" will generally indicate no video, low video output with compression of sync pulses. **Note:** Normal peak-to-peak voltage at test point "V" output of video detector should be approximately 3.5 volts peak-to-peak. If the diode is suspected as being at fault, disconnect one end of the original diode and try a substitute diode, preferably of the same type number as the original. **Important:** Note polarity when connecting the diode.

POSSIBLE CAUSES OF ARCING OR CORONA

The following points should be checked should arcing be experienced.

a. Internal arcing can occur in the horizontal output or damper tubes.

b. Arcing or corona can occur at the cavity for the high voltage connection on the picture tube to either the dag coating or to the chassis. This can result from moisture accumulation and can usually be cured by coating with one of the commercial insulators available in spray-type cans.

c. Improper dress of the high voltage lead either inside the high voltage can or between the can and the picture tube can result in arc-over. Reroute lead for greater clearance. **Note:** If arcing has occurred for any length of time it may be necessary to replace the lead or wrap it with a vinyl electrical tape.

d. Arcing or corona can occur from bottom of 1B3 rectifier socket to cabinet, if the nylon cap (part number 33D206-3) at bottom of 1B3 socket is removed or damaged.

e. Arcing or corona can be due to a shorted deflection yoke.

f. As a further preventive against arcing, it is recommended that the focus anode connection (from pin 4 of V305) be placed at ground potential "B." In this position any arc-over that might occur within the picture tube will be dissipated directly to chassis ground, thus reducing audible arcing. **Note:** An occasional slight arcing within an electrostatic type picture tube can be considered as normal.

ELIMINATING CORONA AT ANODE BUTTON OF THE PICTURE TUBE

Under extreme conditions of high humidity, corona discharge may occur from the 2nd anode button of the picture tube to the dag coated area surrounding it.

If corona discharge is experienced, remove the electrostatic charge on the picture tube by shorting the 2nd anode button to the dag coating.

Clean the area surrounding the 2nd anode button with carbon tet and wipe dry. Then paint the area between the 2nd anode button and the dag coating with a good commercial high voltage insulating dope.

DISTORTION AND BUZZ IN SOUND

If the sound is distorted or has buzz, touch-up adjustment of 4.5 MC intercarrier sound IF amplifier is required. Instructions for making "4.5 MC Sound IF Alignment Using A Television Signal" is given on alignment pages.

FAILURE OF RESISTOR R215

Failure of resistor R215 (220 ohms, 2 watts) can be due to shorted elements within the 3rd IF tube V303 (6CB6) or sound output tube V202 (6AS5A). **Note:** Resistor R215 is located in the B+ circuit tubes V202 and V303.

If elements within the 3rd IF tube V303 are shorted, failure of resistor R313 (470 ohms, ½ watt) will also result. Note: Resistor R313 is located in the B+ circuit to V303.

Admiral

16B1, 16AB1, 16D1, 16AD1, 16E1, 16AE1, 16G1, 16AG1, 16J1, 16K1, 16L1, 16AL1, 16U1C, 16AU1C, 16W1C, and 16AW1C CHASSIS

The material on pages 29 through 34 is applicable to all chassis listed above. The list of models using these chassis is below. Material in "Most-Often-Needed 1958 Television" manual, Volume TV-14, pages 5-7, has an earlier schematic and other service data on some of these sets. Please refer there if necessary. For example, diagram of UHF tuner is there. Pages 32-33 in this manual have an exact schematic for latest run of Chassis 16B1, 16D1, 16E1, 16G1, 16L1, (all with suffix "C" added to indicate a change in Horizontal Output Circuit). The group 16AB1, 16AD1, 16AE1, 16AG1, 16AL1, are identical to the ones covered by this diagram except for the addition of UHF tuner. The group 16U1C, 16W1C, VHF (18-tube) chassis and 16AU1C, 16AW1C, UHF-VHF (19-tube) sets differ in the audio section and other minor variations. Chassis 16J1, 16K1, (and with suffix "C" as explained above) are remote control models but their main circuits are identical to others described.

MODEL IDENTIFICATION CHART

MODEL NUMBER	TV CHASSIS
T21E1 T21E1C	16G1 16G1C
TA21E1 TA21E1C	16AG1 16AG1C
T21E2 T21E2C	16G1 16G1C
TA21E2 TA21E2C	16AG1 16AG1C
T21E3 T21E3C	16G1 16G1C
TA21E3 TA21E3C	16AG1 16AG1C
T21E21 T21E21C	16B1 16B1C
TA21E21 TA21E21C	16AB1 16AB1C
T21E22 T21E22C	16B1 16B1C
TA21E22 TA21E22C	16AB1 16AB1C
T21E23 T21E23C	16B1 16B1C
TA21E23 TA21E23C	16AB1 16AB1C
TH21E51C	16W1C
THA21E51C	16AW1C
TH21E52C	16W1C
THA21E52C	16AW1C
TH21E53C	16W1C
THA21E53C	16AW1C
TR21E21	16J1
TR21E22	16J1
TR21E23	16J1
C21E2 C21E2C	16L1 16L1C
CA21E2 CA21E2C	16AL1 16AL1C
C21E3 C21E3C	16L1 16L1C
CA21E3 CA21E3C	16AL1 16AL1C
C21E6 C21E6C	16L1 16L1C
CA21E6 CA21E6C	16AL1 16AL1C
C21E7 C21E7C	16L1 16L1C
CA21E7 CA21E7C	16AL1 16AL1C
C21E12 C21E12C	16D1 or 16E1 16E1C
CA21E12 CA21E12C	16AD1 or 16AE1 16AE1C
C21E13 C21E13C	16D1 or 16E1 16E1C
CA21E13 CA21E13C	16AD1 or 16AE1 16AE1C
C21E14 C21E14C	16D1 or 16E1 16E1C
CA21E14 CA21E14C	16AD1 or 16AE1 16AE1C
C21E16 C21E16C	16E1 16E1C
CA21E16 CA21E16C	16AE1 16AE1C
C21E17 C21E17C	16E1 16E1C
CA21E17 CA21E17C	16AE1 16AE1C
C21E22 C21E22C	16E1 16E1C
CA21E22 CA21E22C	16AE1 16AE1C
C21E23 C21E23C	16E1 16E1C
CA21E23 CA21E23C	16AE1 16AE1C
C21E24 C21E24C	16E1 16E1C
CA21E24 CA21E24C	16AE1 16AE1C
CH21E26C	16U1C
CHA21E26C	16AU1C
CH21E27C	16U1C
CHA21E27C	16AU1C
CH21E29C	16U1C
CHA21E39C	16AU1C
CR21E12	16K1
CR21E13	16K1
CR21E14	16K1
L21E22 L21E22C	16E1 16E1C
LA21E22 LA21E22C	16AE1 16AE1C
L21E23 L21E23C	16E1 16E1C
LA21E23 LA21E23C	16AE1 16AE1C
L21E24 L21E24C	16E1 16E1C
LA21E24 LA21E24C	16AE1 16AE1C

ADMIRAL 16B1, 16AB1, etc. ALIGNMENT INFORMATION, (Continued)

IF AMPLIFIER ALIGNMENT

- Connect isolation transformer between power line and receiver.
- Connect negative of 3.0 volt bias supply through 10K resistor to test point "T" (IF AGC), see figures 24 and 25, positive to chassis.
- Connect generator high side to 5CG8 mixer-osc. insulated tube shield, see figure 19. Connect low side to chassis near tube shield.
- Connect VTVM high side to test point "V" through a decoupling filter, see figures 21, 24 and 25.
- Connect a jumper wire across the antenna terminals.
- Set Channel Selector to channel 12 or other unassigned high channel, to prevent interference during alignment.
- Set Super Range Finder control fully to left (counterclockwise) and Contrast control fully to right (clockwise).
- Allow about 15 minutes for receiver and test equipment to warm up.
- Use a non-metallic alignment tool, part number 98A30-12.

Step	Signal Gen. Freq.	Instructions	Adjust
Before proceeding, be sure to check the signal generator used in alignment against a crystal calibrator or other frequency standard for absolute frequency calibration required for this operation.			
1	41.25 MC	If necessary, increase generator output and/or reduce bias to −1½ volts to obtain a definite indication on VTVM.	A1 for minimum.
2	47.25 MC		A2 for minimum.
3	42.3 MC	Use −3 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 2 volts.	A3 for maximum.
4	45.3 MC		A4 and A5 for max.
5	41.5 MC		A6 for maximum.
6	42.0 MC		A7 for maximum.
7	43.5 MC		A8 for maximum.
8	To insure correct IF alignment, make "IF Response Curve Check".		

IF RESPONSE CURVE CHECK (Using sweep generator and oscilloscope)

Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Channel Selector on channel 3 or an unassigned low channel. Contrast control fully to the left. Connect negative of 3 volt bias supply to test point "T" (IF AGC); positive to chassis.	Connect high side to 5CG8 mixer-osc. insulated tube shield, see fig. 19. Connect low side to chassis near tube shield. Set sweep frequency to 43 MC, and sweep width approximately 7 MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" through a decoupling filter, see figs. 21, 24 and 25.	Check curve obtained against ideal response curve in fig. 22. Note tolerances on curve. Keep marker and sweep outputs at very minimum to prevent overloading. A reduction in sweep output should reduce response curve amplitude without altering the shape of the response curve. If the curve is not within tolerance or the markers are not in the proper location on the curve, touch-up with IF slugs as instructed below.

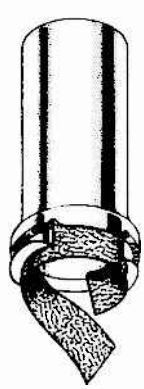


Figure 19. Special Tube Shield for IF Alignment and IF Response Curve Check.

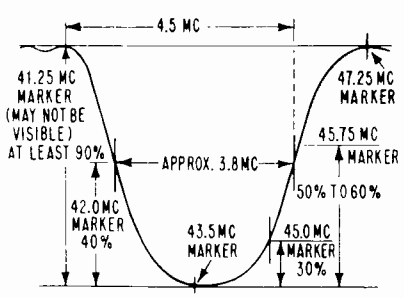


Figure 22. Ideal IF Response Curve.

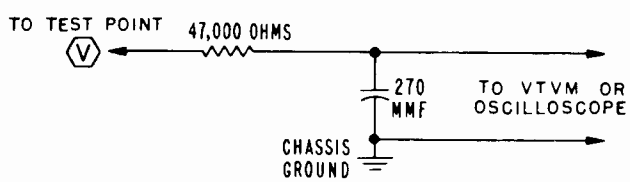


Figure 21. Decoupling Filter.

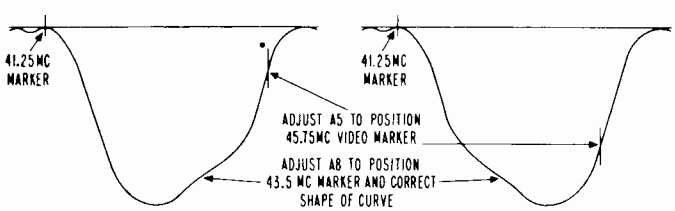


Figure 23. IF Response Curves, Incorrect Shape.

ADMIRAL 16B1, 16AB1, etc. (Continued)
4.5 MC SOUND IF ALIGNMENT

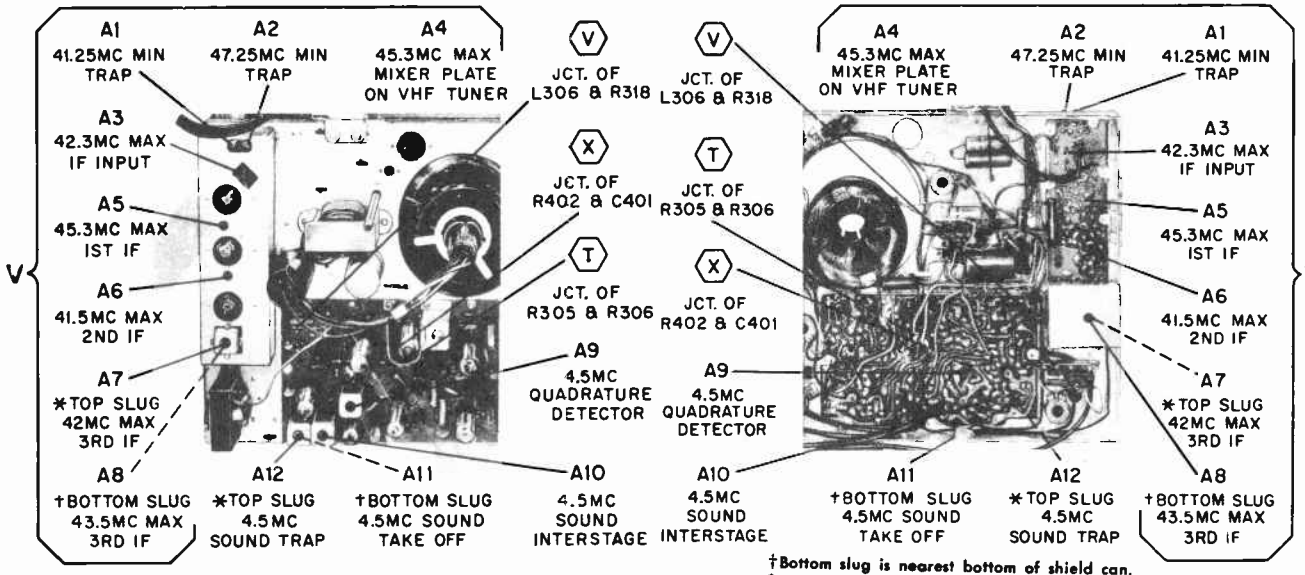
Select the strongest TV station received. Adjust set for normal operation. Turn Super Range Finder Control fully to the left (counterclockwise). See figures 24 and 25 for adjustment locations.

Using a non-metallic alignment tool (for hexagonal core IF slugs, Admiral Part No. 98A30-12), very slowly turn slug "A9" several turns counterclockwise until a buzz is heard in the sound. Then turn it clockwise until the loudest and clearest sound is obtained.

Set Contrast control fully to the left (counterclockwise). Reduce the signal to the antenna terminals until there is a considerable amount of hiss in the sound.

Carefully adjust slug "A10" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A10".

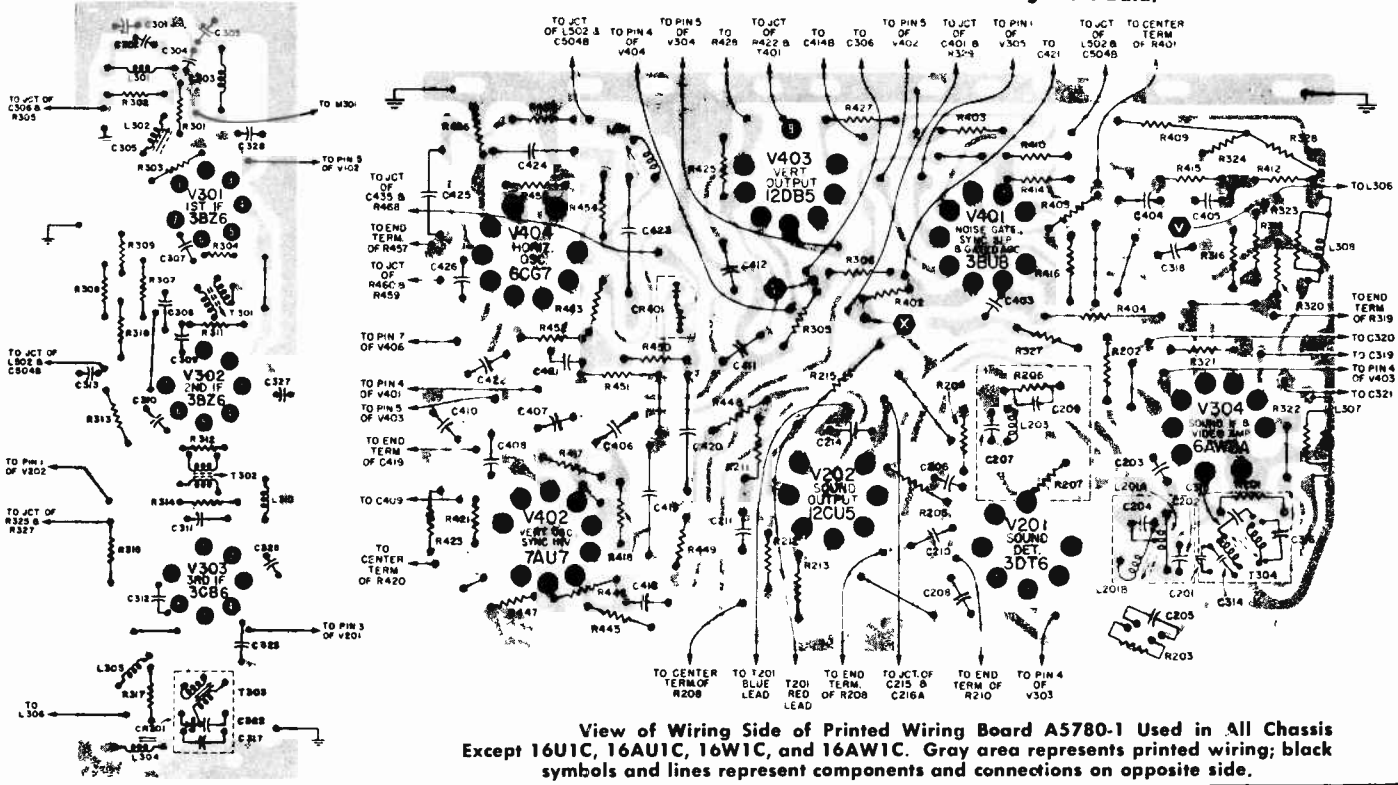
Carefully adjust slug "A11" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; re-adjust "A11".



†Bottom slug is nearest bottom of shield can.
*Top slug is nearest top of shield can.

Component View of Printed Wiring Board Showing Test Point Locations and IF Alignment Data.

Wiring View of Printed Wiring Board Showing Test Point Locations and IF Alignment Data.



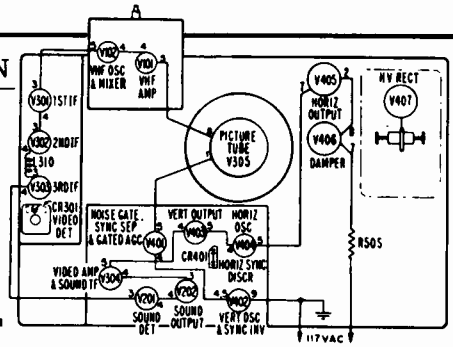
View of Wiring Side of Printed Wiring Board A5780-1 Used in All Chassis Except 16U1C, 16AU1C, 16W1C, and 16AW1C. Gray area represents printed wiring; black symbols and lines represent components and connections on opposite side.

View of PRINTED WIRING SIDE of IF Board A5775-1.

ADMIRAL Chassis 16B1, 16D1, 16E1, 16G1, 16L1, Schematic Diagram

Warning: The chassis of this receiver is connected directly to one side of the 117 volt, 60 cycle power line. Depending upon the position of the line cord plug in the wall outlet, the total AC line voltage may exist between the chassis and any ground object. When installing or servicing, do not touch the chassis unless adequate safety precautions are taken. Never touch the chassis and a ground (radiators, pipes, etc.) at the same time.

V101—4BC8
V102—5CG8
V201—3DT6
V202—12CU5
V301—3BZ6
V302—3BZ6
V303—3CB6
CR301—1N60, 1N87 or 1N295
V304—5AW8A
V305—21CEP4A
CR401—Dual Selenium Diode 93B5-4
V401—3BU8
V402—7AU7
V403—12DB5
404—6CG7
405—†
V406—19AU4GTA
V407—1B3GT



†25CD6GB in chassis Run 10 thru 22; 12DQ6A in chassis Run 23 or higher.

TUBE LOCATIONS AND HEATER CIRCUIT

RUN CHANGES

(10) Start of production

(11) To improve AGC action, C428 was changed from 300mmf to .001 mf 1.6KV

(12) To reduce voltage to VHF oscillator, R503 was changed from 470 to 1,800 ohms.

(13) To prevent possible breakdown of C431 due to arc over in V305, R470 was relocated from between junction of R462 and R463 and focus connection "A" to opposite side of connection "A".

(14) To improve operation at horizontal oscillator, R456 was changed from 120K to 110K, 5%

(15) To prevent AGC overload due to tube variation, R329 was changed from 7.5 to 10 megohms

(16) To prevent possible frequency drift with resulting sound distortion, R207 was changed from 220 K to 100 K

(17) R471 was added to prevent possible breakdown of C431 due to arc over in V305

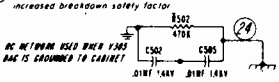
(18) To center usable range of contrast control, R320 was changed from 470 to 220 ohms

(19) (20) (21) No changes made.

(22) To prevent possible damage to V405 due to arc-over in V406, heaters of V405 and V406 relocated in heater circuit

(23) Start of production chassis with suffix letter "C" new horizontal output circuit used

(24) C502 changed from .005mf to .01mf C505 added in series with C502 for increased breakdown safety factor

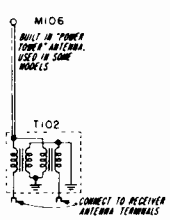


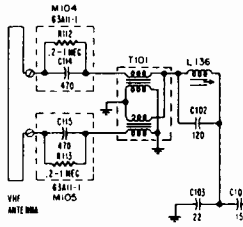
(25) C432 & C433 changed from 150mmf to 210mmf for improving efficiency of horizontal output circuit C416 changed from 200 to 400 volt rating for improved breakdown safety factor

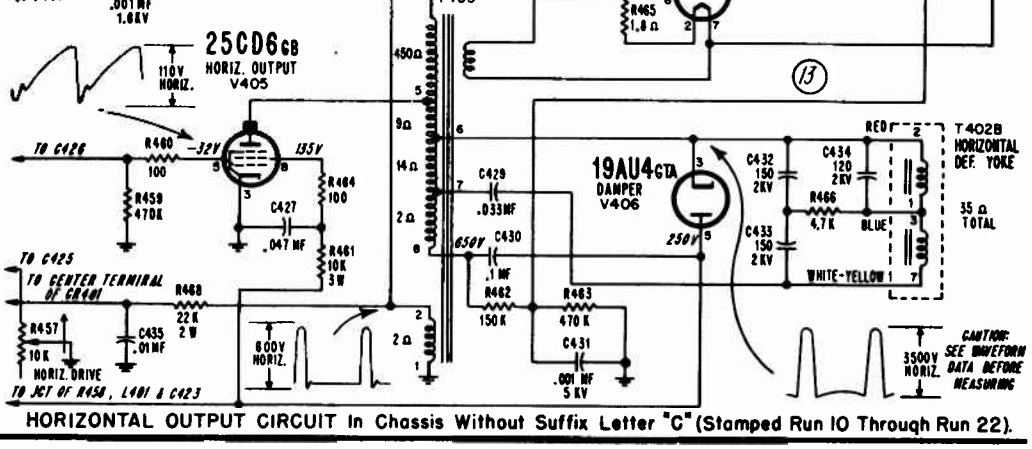
(26) V305 dag changed from cabinet to chassis ground. Complete M508 used for AC network R502 & C502. C409 rating changed from 1.6 to 2KV

(27) R210 circuit changed to provide more constant sound level through range of tone control C213 was .0047mf, R209 was 22k.

(28) No changes made

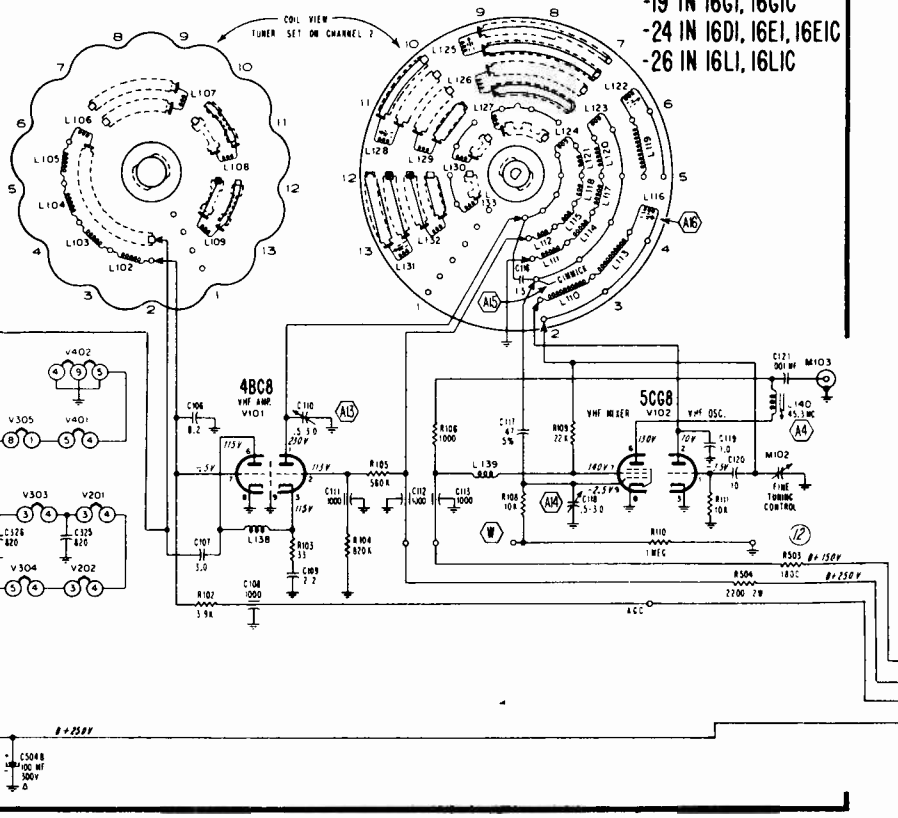


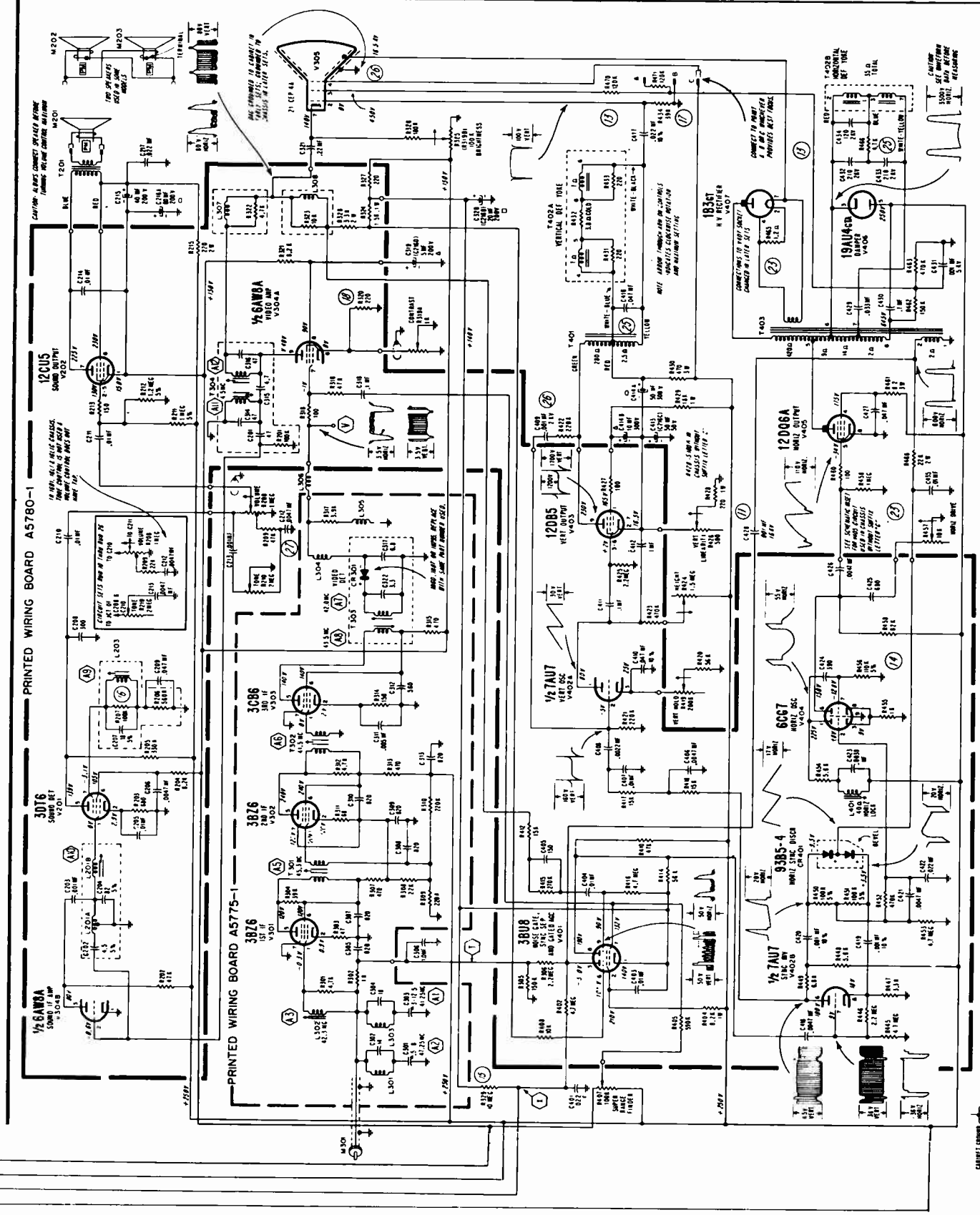




HORIZONTAL OUTPUT CIRCUIT In Chassis Without Suffix Letter "C" (Stamped Run 10 Through Run 22).

VHF TUNER 94E144-13 IN 16B1, 16B1C
-19 IN 16G1, 16G1C
-24 IN 16D1, 16E1, 16E1C
-26 IN 16L1, 16L1C

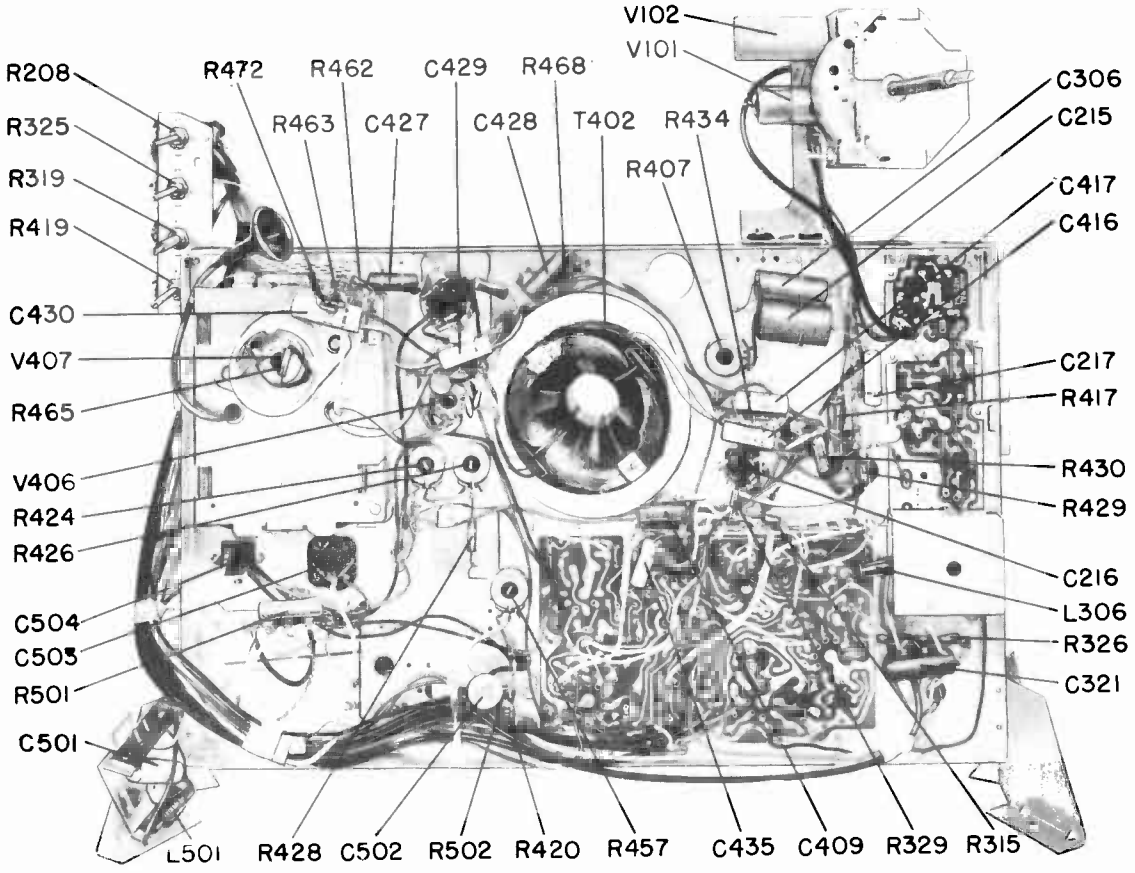




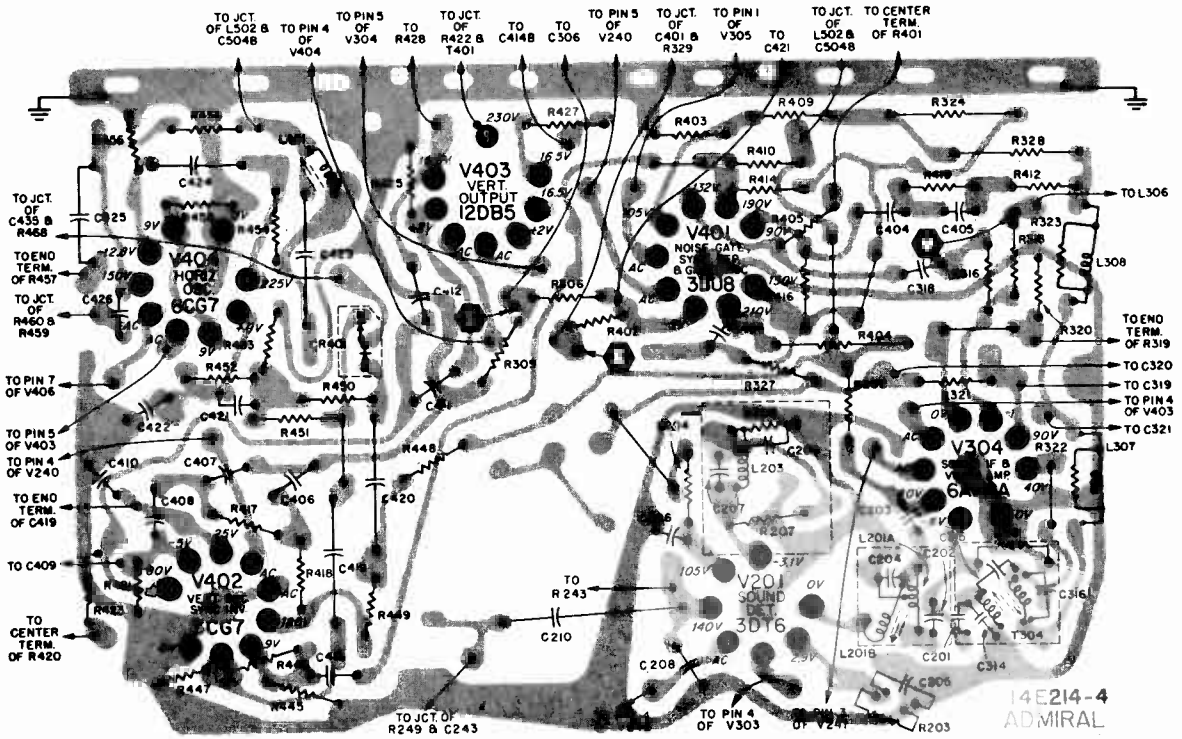
For conditions for observing waveforms and measuring voltages see notes on page 14.

Schematic for 16B1, 16B1C, 16D1, 16E1, 16E1C, 16G1, 16G1C, 16L1, and 16L1C Television Chassis Suffix Letter "C" Added to Chassis Number.

ADMIRAL Chassis 16B1, 16AB1, etc. (Continued)



Wiring Side of Chassis With Single Ended Sound Amplifier.



View of Printed Wiring Side of Main Board A5780-4 Used in 16U1C, 16AU1C, 16W1C and 16AW1C Chassis. Gray area represents printed wiring; black symbols and lines represent components and connections on opposite side.

Emerson Television

MODELS USING CHASSIS:
120407S, 417S, 422S,
120420S, 408U, 418U,
120423U, 120421U

TYPE	STYLE	MODEL NO.	TV CHASSIS	KINESCOPE	TV TUNER
VHF RECEIVERS	CONSOLE, SHORT LEGS	1414	120407S	21DAP4	471080
	LOW-BOY, AM-RADIO PHON.	1438	120417S		
	LOW-BOY, AM-FM, PHONO.	1440	120417S		
	LOW-BOY	1432	120422S		
	CONSOLE, SHORT LEGS	1434	120420S	24AHP4	471096
UHF/VHF RECEIVERS	CONSOLE, SHORT LEGS	1415	120408U	21DAP4	471081 (VHF) 471037 (UHF)
	LOW-BOY, AM-RADIO, PHONO	1439	120418U		
	LOW-BOY, AM-FM, PHONO	1441	120418U		
	LOW-BOY	1433	120423U		
	CONSOLE, SHORT LEGS	1435	120421U	24AHP4	471097 (VHF SECT) 471037 (UHF SECT)

(Service material on these sets is presented on pages 35 through 40)

DISASSEMBLY INSTRUCTIONS

TO REMOVE SAFETY GLASS

Pull off knobs at front of cabinet. Remove screws located in recess underneath top molding of cabinet and remove metal strip. Insert fingers into holes where shafts protrude through glass; pull top of glass away from cabinet about 3" and lift out of bottom rail. To replace glass, reverse above procedure.

TO REMOVE MASK

Remove safety glass and remove two Phillips head screws holding mask to picture tube top corner brackets.

TO REMOVE PICTURE TUBE

1. Remove safety glass, mask and masonite back.
2. Remove picture tube socket, width shim and high voltage lead. (Be sure to discharge high voltage.)
3. Loosen yoke clamp.
4. Remove four screws holding picture tube support strap ears to bracket.
5. Remove picture tube through front of cabinet, being careful to guide and support deflection yoke as it slides off picture tube neck.

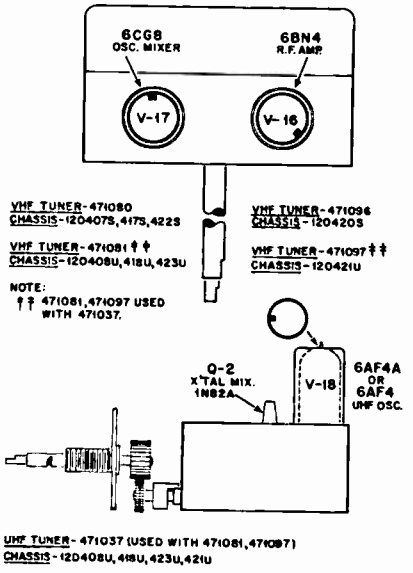
TO REMOVE TV CHASSIS

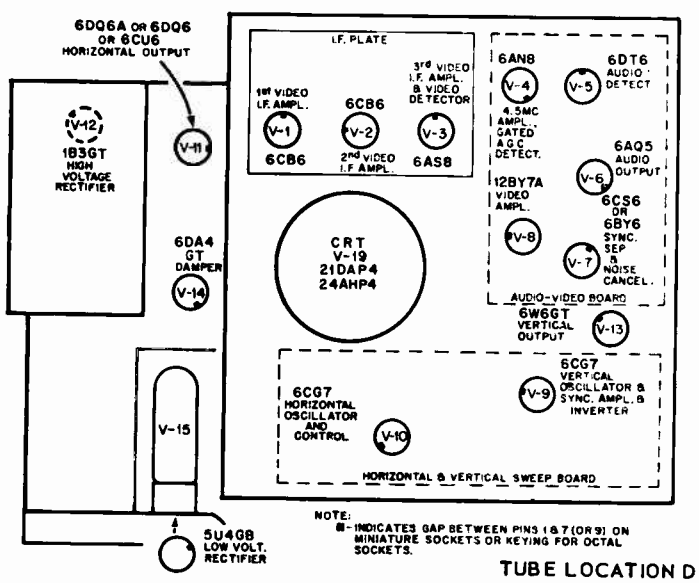
All receiving type tubes and many components may be changed while the chassis is still in the cabinet. If it is necessary to remove the chassis from the cabinet, the following general method may be followed:

1. Remove knobs, safety glass and mask as described above.
2. From front of set remove screw holding tuner bracket to picture tube corner bracket and nut which holds the dual contrast, volume, and on-off control to cabinet bracket.
3. Remove rear cover, antenna terminal strip and disconnect speaker leads or remove speaker.
4. From the rear: (a) Remove one screw holding VHF tuner extension support to side control bracket. (b) Remove two screws mounting UHF tuner to underside of top of cabinet.
5. Remove two screws which hold control escutcheon to side control assembly.
6. Remove two screws, which are facing rear of cabinet, holding chassis base to floor mounting bracket, two screws holding power transformer bracket and two screws holding the two top chassis braces to roof of the cabinet.
7. Remove picture tube socket, and high voltage lead. (Be sure to discharge high voltage.)
8. Loosen yoke clamp and pull chassis out towards rear of cabinet, being careful to guide and support deflection yoke as it slides off picture tube neck.

TO REMOVE AM RADIO CHASSIS

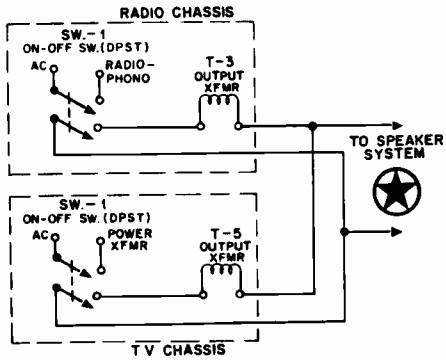
AM Radio chassis can be removed through rear of cabinet after removing 4 front knobs, 2 rear plugs, A.C. interlock, speaker connections and 2 radio chassis board mounting screws.





TUBE LOCATION DIAGRAM

EMERSON 120407S, 120417S, etc. (Continued)



SPEAKER SWITCHING SYSTEM

SERVICING OF PRINTED BOARDS

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

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

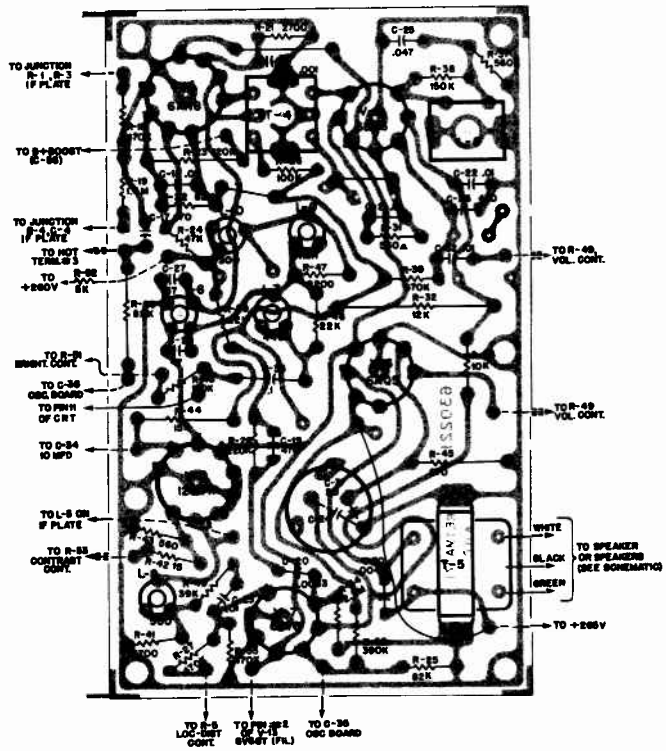


FIGURE 3 – AUDIO AND VIDEO PRINTED CIRCUIT BOARD

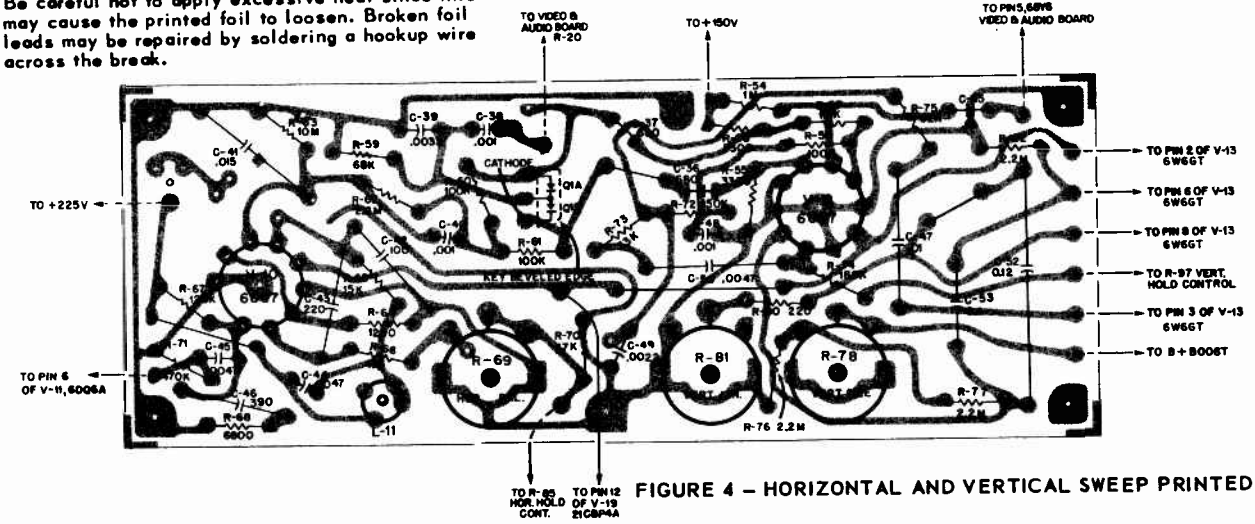


FIGURE 4 – HORIZONTAL AND VERTICAL SWEEP PRINTED BOARD

ALIGNMENT OF MIRACLE PICTURE LOCK (HORIZONTAL OSCILLATOR AND A.F.C.)

This can be accomplished without removing chassis from cabinet as follows:

1. Tune set to a known good channel. Turn the "local-distance" control (R-5) fully counterclock-wise (local).
2. Short phasing coil (L-11) by placing a jumper lead across C-44 which is connected in parallel with L-11. Short horizontal oscillator grid, pin 7 of V-10 (6CG7), to chassis.
3. Set "Horizontal Hold" control (R-85) to center of its range.
4. Adjust the "Horizontal Balance" contral (R-69) until picture pulls into synchronization (In most cases picture will sway from side to side).
5. Remove short from horizantal phase coil (L-11) and adjust L-11 (with hex head tool) for same synchronous condition as in step 4 – above.
6. Remove short fram horizontal oscillator grid. Horizontal circuits are now properly aligned. If area permits, readjust "Local-Distant" control to distant position (fully clockwise – see follawing pracedure).

ADJUSTMENT OF LOCAL-DISTANCE CONTROL (R-5)

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 overlaad (buzz in sound, poor synch stability, high distorted contrast (washout), etc.) is noted on the stronger channels. If overload exists, set contrast control to max. position and adjust "Local-Distant" control in a counterclock-wise direction to a point just under an overload condition.

EMERSON Chassis 120407S, 120408U, 120417S, 120418U, 120420S, 120421U, 120422S, etc.

VIDEO I.F. ALIGNMENT

1. Connect 3 volt bias to A.G.C. line. Negative terminal thru 10K resistor to junction R-3, C-5, positive terminal to chassis. (R-5 maximum ccw position).
2. Connect I.F. marker generator to floating shield of tuner mixer tube (See Note Below) and V.T.V.M. to junction of L-8, R-41.

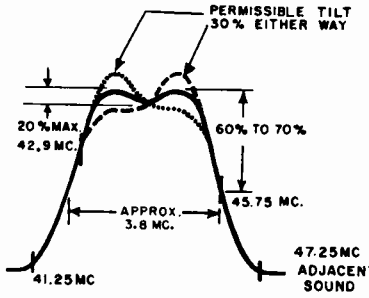


FIG 1 – OVERALL I.F. RESPONSE CURVE

3. Adjust output of signal generator so that peaking of coils does not produce more than -2v D.C. on V.T.V.M.
4. Peak the following for maximum response: T-3, 44.25MC; T-2 42.6MC; T-1, 45.3MC; L-1 bottom 42.9MC and T-11 45.3MC.
5. Peak the following for minimum response increasing generator output if necessary: L-2, 41.25 MC and L-1 top, 47.25MC.
6. Re-adjust L-1 bottom (42.9MC) and T-11 (45.3MC) for maximum response. (T-10 on UHF-VHF sets).
7. Connect an oscilloscope through a 20,000 ohm isolation resistor in place of the V.T.V.M. and connect a sweep generator to floating shield of tuner mixer tube along with marker generator. Adjust output of sweep to produce about 2 volts peak to peak at oscilloscope and reduce marker signal so as not to upset the response curve.
8. The 45.75MC marker should appear between 60% and 70% down with respect to its related peak. If necessary, adjust T-3 slightly.
9. The 42.9MC marker (See Fig. No. 1) should not fall below 20% of its related peak. Limits of response curve are 30% tilt and 20% peak to valley ratio.

NOTE: Part of the procedure calls for use of a "floating" shield over the mixer tube of the tuner. The tube shields now used in the tuner cannot be removed from their mounts. Instead of a "floating" shield the following method is used.

Take a thin piece of copper or brass foil ½" by 2" and paste on to a thin piece of onion skin insulation. The insulation should extend about 1/8" beyond the two long sides and one short side while the foil should extend beyond the insulation on the other short side.

The shim assembly is then slipped lengthwise to fit between the mixer tube and its shield with the metal foil facing the tube. The short side with the extended insulation is placed towards chassis while the side with the foil extending beyond the insulation is connected to the sweep generator. The shim may now be rotated for maximum coupling as observed on the oscilloscope.

4.5 MC VIDEO TRAP ALIGNMENT, T-6 Top (See Fig. 6)

Using a good signal, set the fine tuning control to the point where you begin to see 4.5 mc beat in the picture. Then adjust T-6 top for minimum 4.5 mc beat in the picture.

SOUND IF ALIGNMENT (See Fig. 6).

Allow set to warm up (about 10 minutes), then:
1. Using a strong signal, adjust T-6 bottom and T-4 top and bottom, for loudest sound.
2. Adjust L-6 for clearest and loudest sound. If two peaks are encountered use position with slug closest to chassis.
3. With antenna loosely coupled to set, adjust receiver to a weak signal channel and repeat step #1, tuning for maximum volume and minimum distortion.
4. If a V.T.V.M. is available, the measured voltage across R-37, 560KΩ should not vary more than 2 volts between strong and weak signals. Voltages should read between -4 and -9 volts.
5. Check sound on all channels and repeat entire procedure if necessary.

ADJUSTMENT OF HORIZONTAL DRIVE CONTROL (R-65). This trimmer should be left in the full clock-wise (CW) position (minimum resistance). If there is evidence of drive lines, adjust trimmer counterclock-wise (CCW) until drive lines disappear. Do not adjust beyond this correct setting. The horizontal drive control, (R-64) is located on the top side of the oscillator board).

HORIZONTAL SIZE ADJUSTMENT

Picture width is controlled by means of a width coil, L16, located under the high voltage cage.

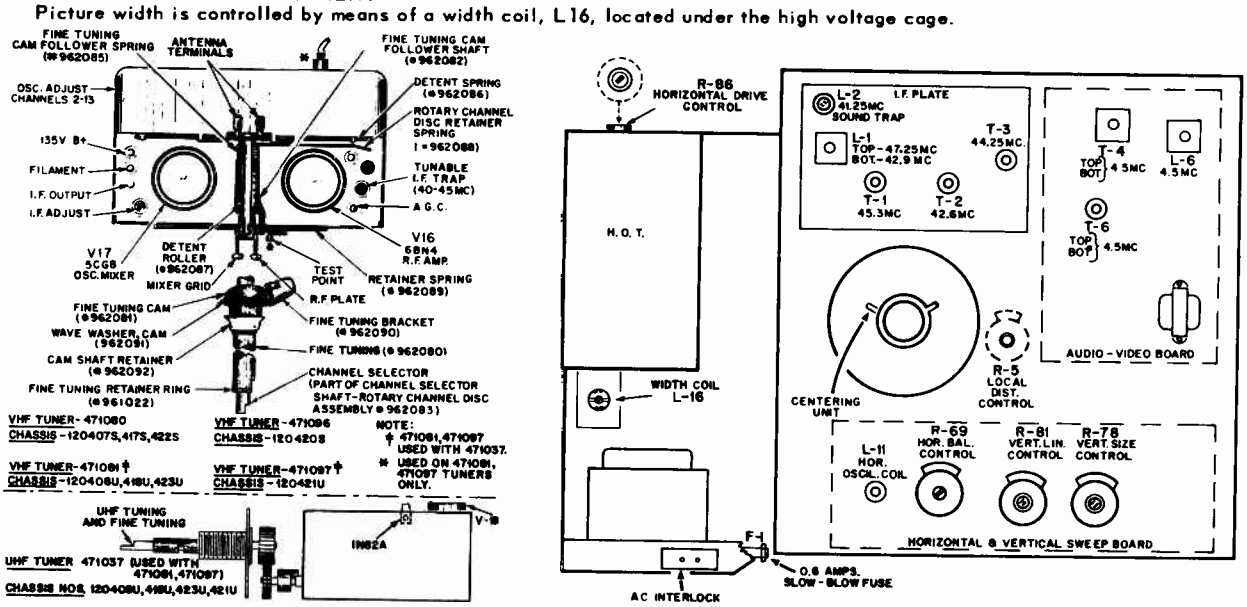


FIGURE 6 – ALIGNMENT POINT DIAGRAM

EMERSON 120407S, 120408U, 120417S, 120418U, 120420S, 120421U, 120422S, 120423U

(Continued)

CONDITIONS FOR TAKING VOLTAGE AND RESISTANCE READINGS

The voltage and resistance measurements listed were taken on Chassis 120407SΔ.

Due to component variations, voltage and resistance readings may vary slightly from those given here. Slight variations may also be noticed if chassis is not coded as mentioned above.

The picture tube, deflection yoke and high voltage circuits were connected to take the following readings and waveshapes:

(1) Antenna disconnected and antenna terminals shorted on tuner and connected to chassis (use short leads).
(2) Line voltage 117 volts (Disconnect power for resistance readings).
(3) 3 volt bias battery connected to A.G.C. circuit, positive terminal to chassis, negative terminal to junction of C-5, R-3. BIAS BATTERY USED FOR VOLTAGE READINGS ONLY. R-5 maximum ccw position – (local).
(4) All controls in position for normal picture. (Varied when it directly affects reading).
(5) All measurements taken with a vacuum tube voltmeter and ohmmeter.
(6) Resistance readings are given in ohms unless otherwise noted.
(7) N.C. denotes no connection.

WAVE SHAPE ANALYSIS CHART

The waveshapes shown were taken on chassis 120407SΔ.

Slight peak-to-peak voltage differences may be noticed on chassis of later triangle codes.

The peak-to-peak voltage given may also vary slightly depending on signal strength and component variations.

To accurately observe the wave shapes, the relatively high input capacity of an oscilloscope must be reduced so as not to change the operating characteristics of the television set. Failure to do this will result in wrong wave shape readings. This is accomplished by using an Emerson low capacity probe as outlined previously in the service note for 686L models 687L, and 696L using chassis 120-142-B which was issued at an earlier date:

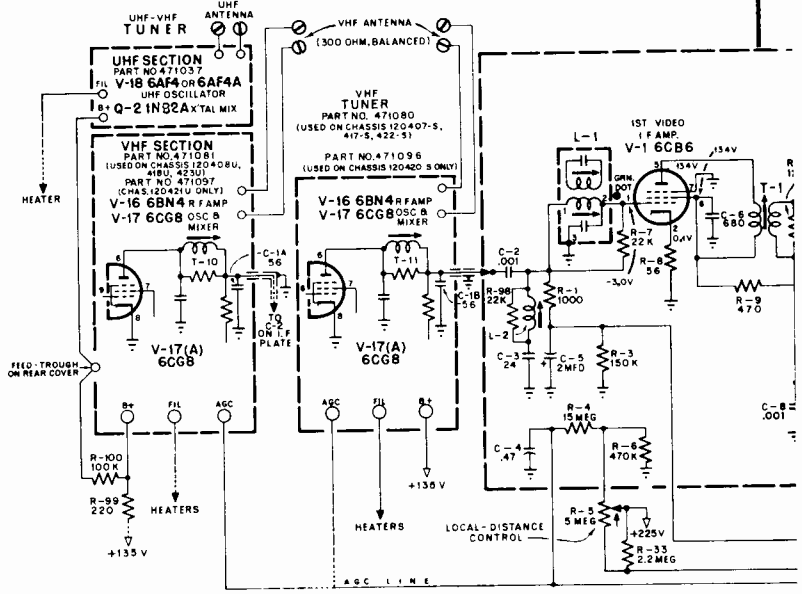
1. Connect antenna and tune receiver to channel where best reception has been obtained in the past.
2. Low end of the probe is connected to CHASSIS and the contrast control is set for MAXIMUM UNDISTORTED CONTRAST.
3. The 30 and 7875 C.P.S. oscilloscope sweep settings are used so as to permit observation of two cycles of the wave shape.

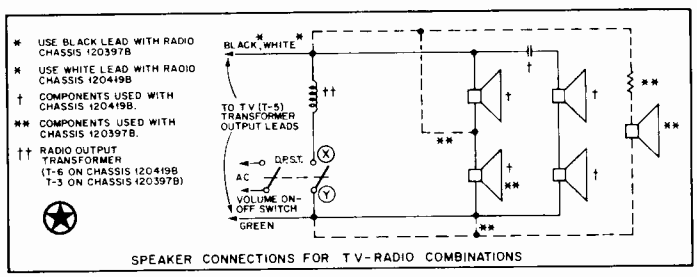
NOTE: A wave shape seen on your oscilloscope may be upside down from same wave shape shown here. This will depend on the number of stages of amplification in the oscilloscope used.

PRODUCTION CHANGES

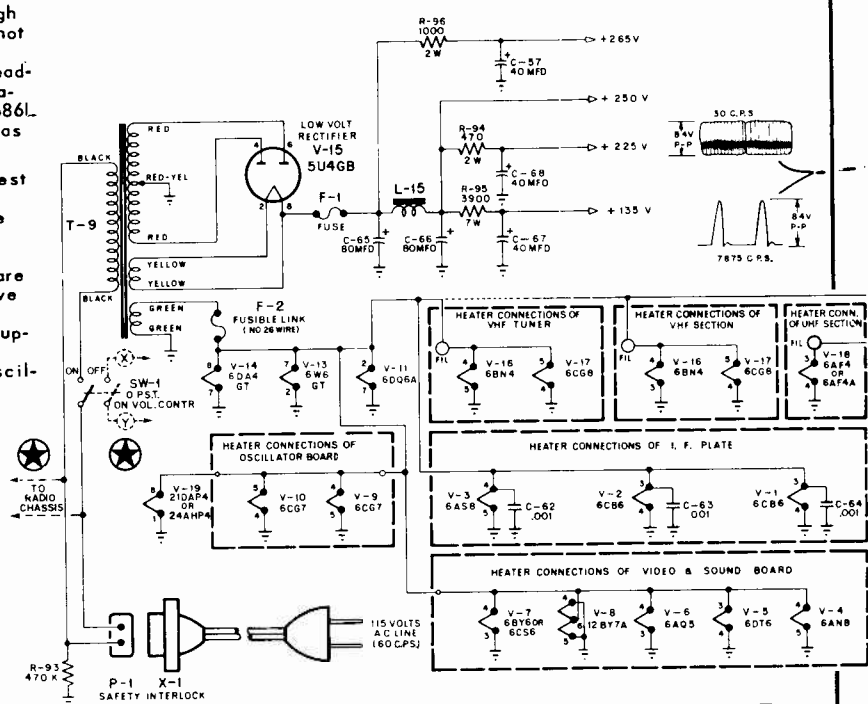
Chassis coded Ⓐ have the following circuit changes.
NOTE: Chassis 120420S and 120421U will have these changes initially Δ.

1. C-54 is changed to .033 uf, 600 volts to improve horizontal linearity.
2. R-45 is changed to 470 ohms, 1 watt to improve power supply regulation.
3. R-79 is changed to 22K, ½ W to increase vertical size range in low line voltage areas.
4. To prevent audio distortion resulting from possible drift in the quadrature circuit, a 4.7 mmf ceramic temperature compensated capacitor type N-750 (pt. #928884) has been added across R-38 (150 K). Chassis already incorporating this change are coded Ⓐ.



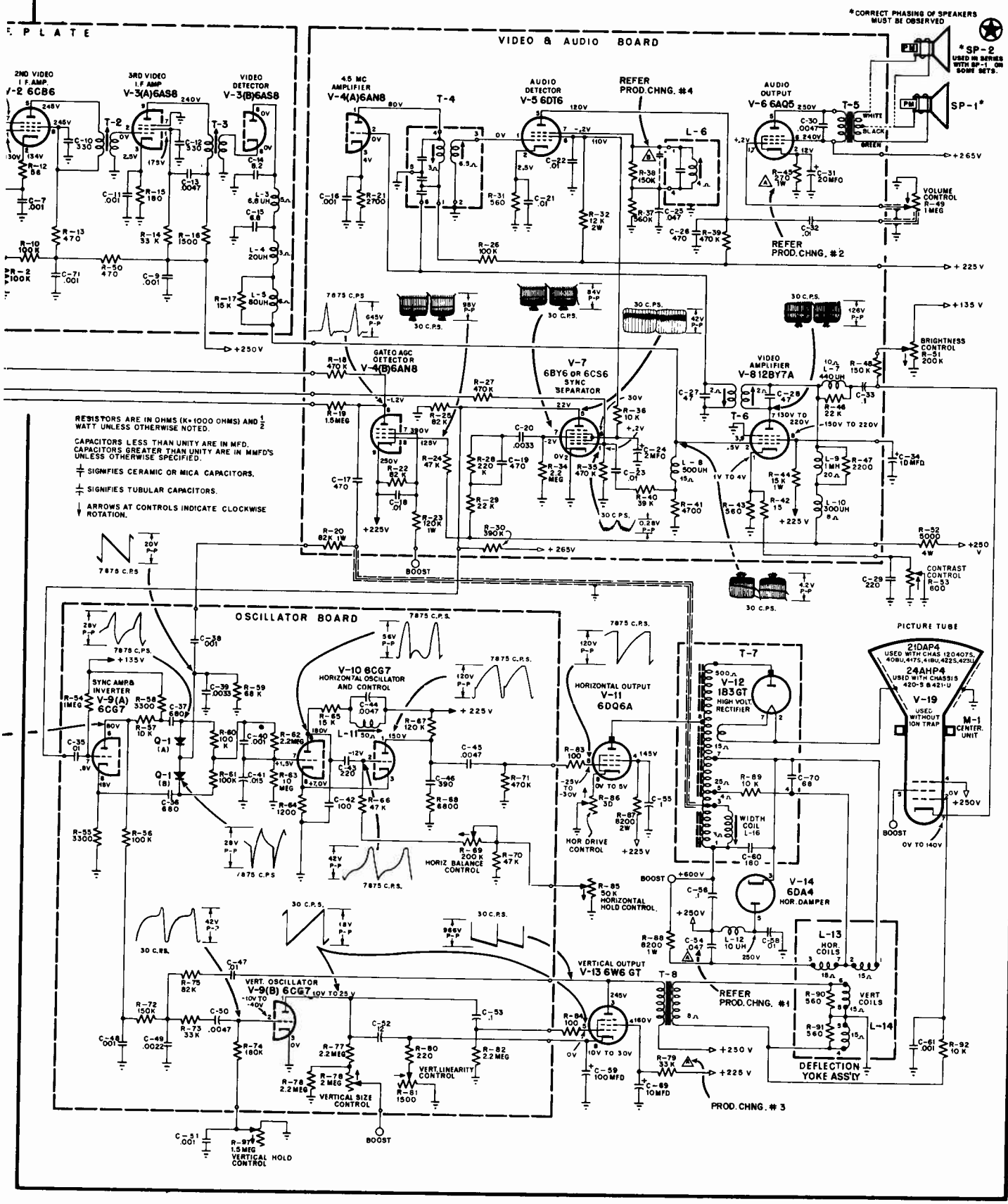


SPEAKER CONNECTIONS FOR TV-RADIO COMBINATIONS

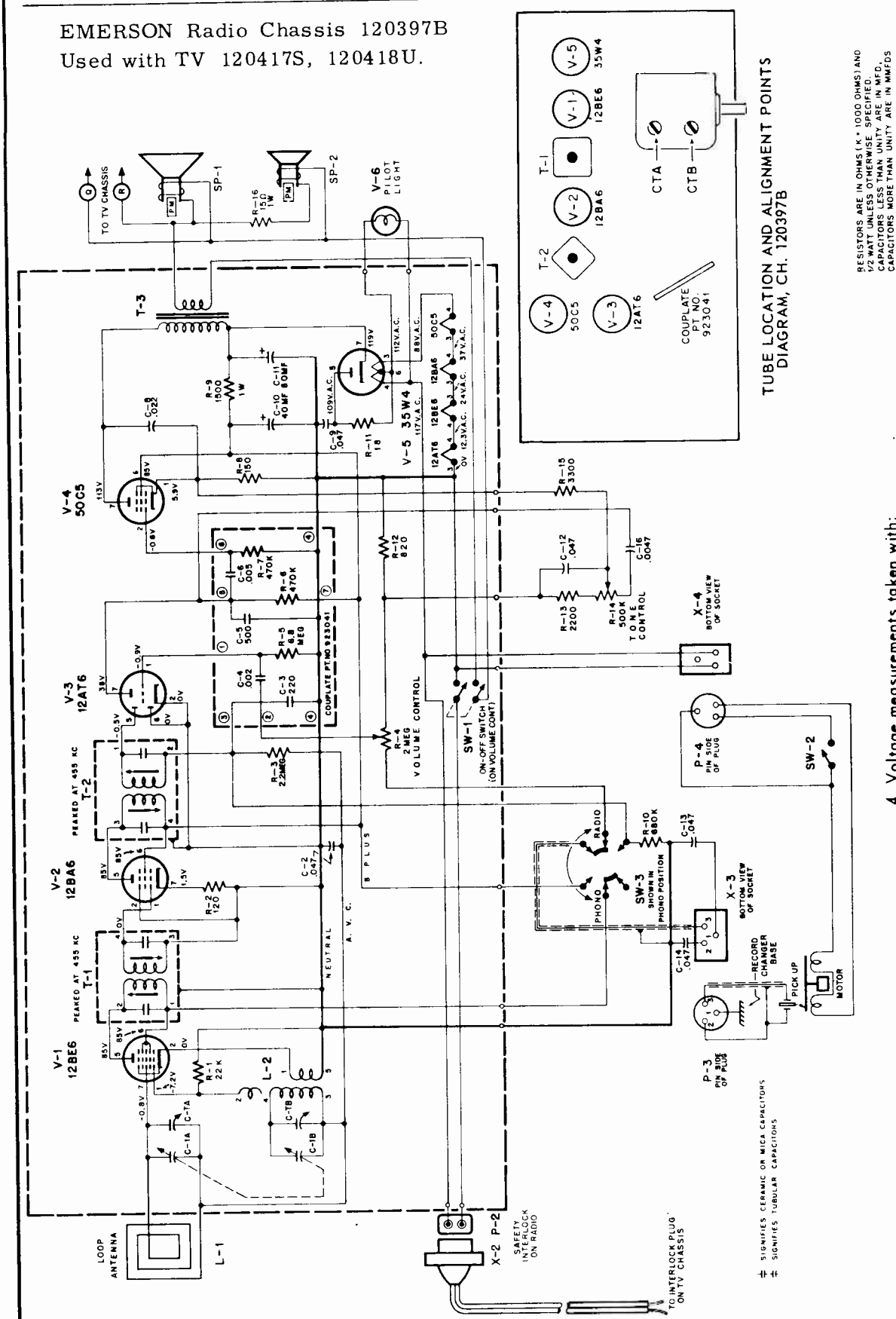


CHASSIS NOS. 120407S, 120408U, 120417S, 120418U, 120420S, 120421U, 120422S, 120423U

EMERSON 120407S, 120408U, 120417S, 120418U, 120420S, 120421U, 120422S, 120423U



EMERSON Radio Chassis 120397B
Used with TV 120417S, 120418U.



CHASSIS NO. 120397-B

1. Voltages indicated are positive d.c., resistances in ohms, unless otherwise indicated.
2. Measurements made with voltohmyst or equivalent.
3. All measurements taken from pin to B neutral unless otherwise indicated.
4. Voltage measurements taken with:
   a) Line voltage maintained at 117 volts a.c.
   b) Volume control set for maximum volume. Phono Radio Switch (SW-3) in "Radio" position.
   c) Variable condenser fully closed and no signal applied.
5. N.C. denotes no connection, K is kilohms, Meg. is megohms.

Emerson Television

MODELS USING CHASSIS:
120412H, 120413M,
120414H,
120437HC, 120438MC

TYPE	STYLE	MODEL	CHASSIS	KINESCOPE	TUNER
VHF RECEIVERS	TABLE MODEL	1282	120412H	21DAP4	471077
		1282X	120437HC*		
	PORTABLE MODEL	1284	120412H		
		1284X	120437HC*		
	PORTABLE (W/AM RADIO)	1286	120414H		
UHF/VHF RECEIVERS	TABLE MODEL	1283	120413M		471056
		1283X	120438MC*		
	PORTABLE MODEL	1285	120413M		

*Indicates chassis using couplate board and omitting phono jack, listening attachment and phono-radio switch.

Chassis listed above are practically identical to the group of chassis covered in previous volume TV-14, "Most-Often-Needed 1958 Television Servicing Information," pages 23 through 28. The main differences are in horizontal AFC system. The service material below and exact circuit diagrams on pages 42-43, and 44, should be used with alignment and other data in previous volume.

ALIGNMENT OF HORIZONTAL OSCILLATOR AND A.F.C.

This can be accomplished without removing chassis from cabinet as follows:

1. Tune set to a known "good" channel and turn "Picture Stabilizer" control (R-31) fully clockwise.
2. Short phasing coil (L-9) by placing a jumper wire across C-43 which is in parallel with L-9. See Fig. 4 for location of C-43. Short horizontal oscillator grid pin 7 of V8, 6CG7, to chassis.
3. Set "Horizontal Hold" control to center of its range.
4. Adjust the "Horizontal Balance" control R-60 until picture pulls into synchronization (in most cases picture will sway from side to side).
5. Remove short from horizontal phase coil (L-9) and adjust L-9 for same synchronous condition as in step 4 above.
6. Remove short from the horizontal oscillator grid. Horizontal frequency circuits are now properly aligned.

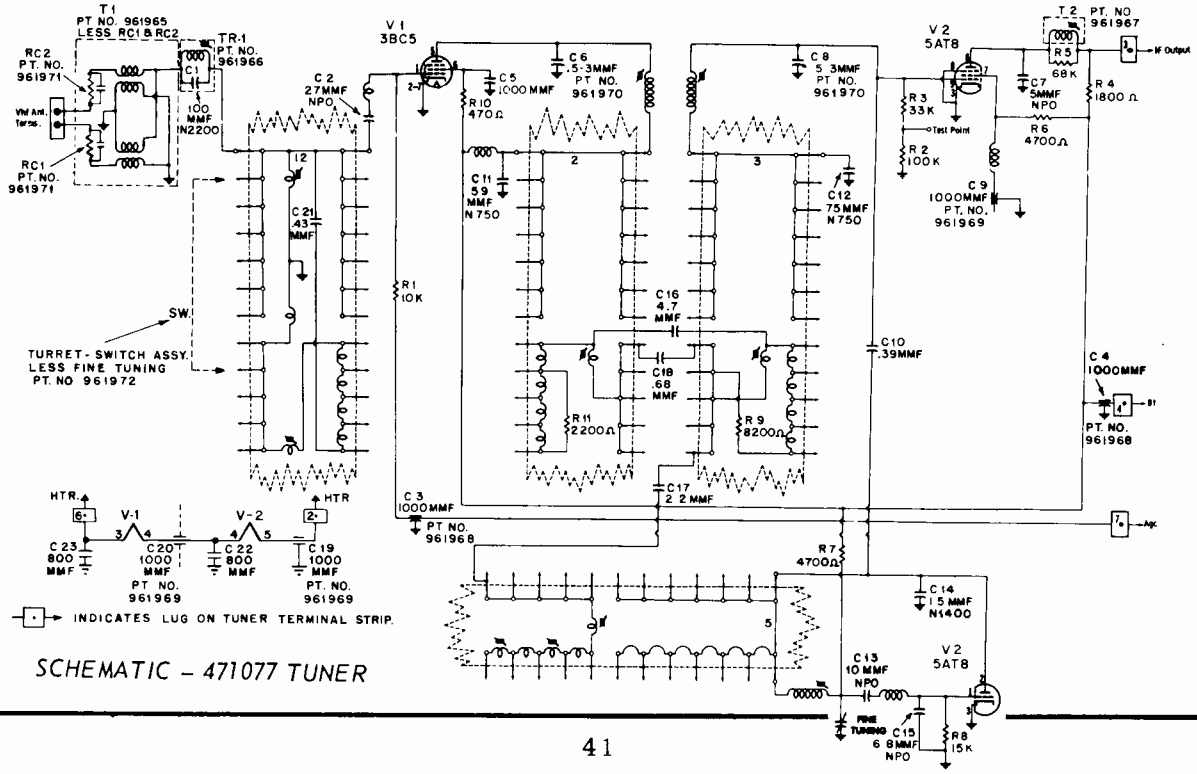
NOTE: (1) Adjustment of Horizontal Drive Control (R-64) –

This trimmer should be left in the full clock-wise (CW) position (minimum resistance). If there is evidence of drive lines, adjust trimmer counterclockwise (CCW) until drive lines disappear.

Do not adjust beyond this correct setting. The horizontal drive control (R-64) is located on the top side of the Oscillator Board.

(2) Adjustment of Horizontal Size –

Should you encounter insufficient sweep width due to low line voltage, shunt R-85, (4700 ohm, 1 watt resistor), with a ½ watt, 4700 ohm resistor. If horizontal oversweep develops because of high line voltage, remove the shunting resistor, R-91, 4700 ohm, which may be found on some sets. The shunting or removal operation can be performed without removing the chassis from the cabinet. Remove the masonite back. R-85, located on a terminal strip near V-7, becomes accessible.



SCHEMATIC – 471077 TUNER

EMERSON Chassis 120412H, 120413M, 120414H, 120437HC, 120438MC

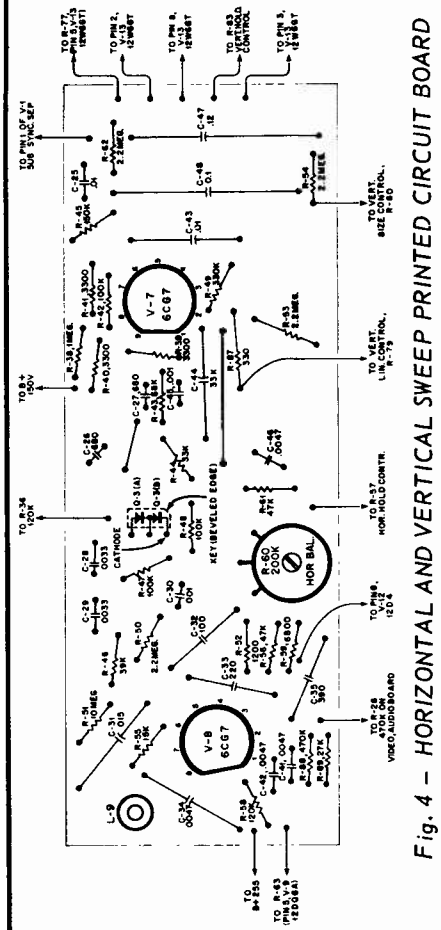
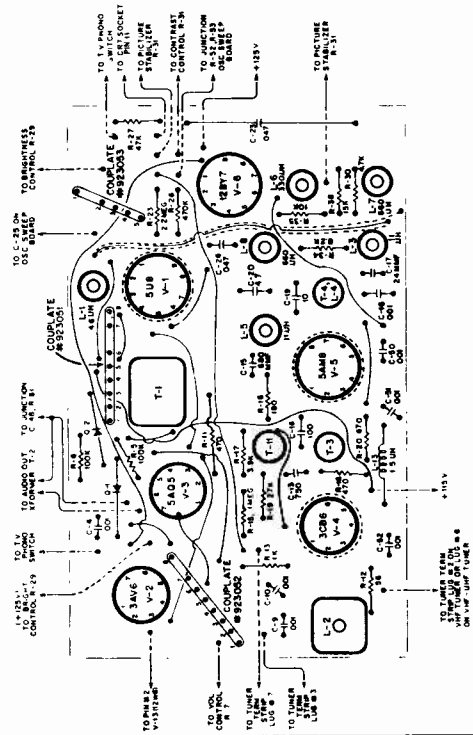


Fig. 4 – HORIZONTAL AND VERTICAL SWEEP PRINTED CIRCUIT BOARD

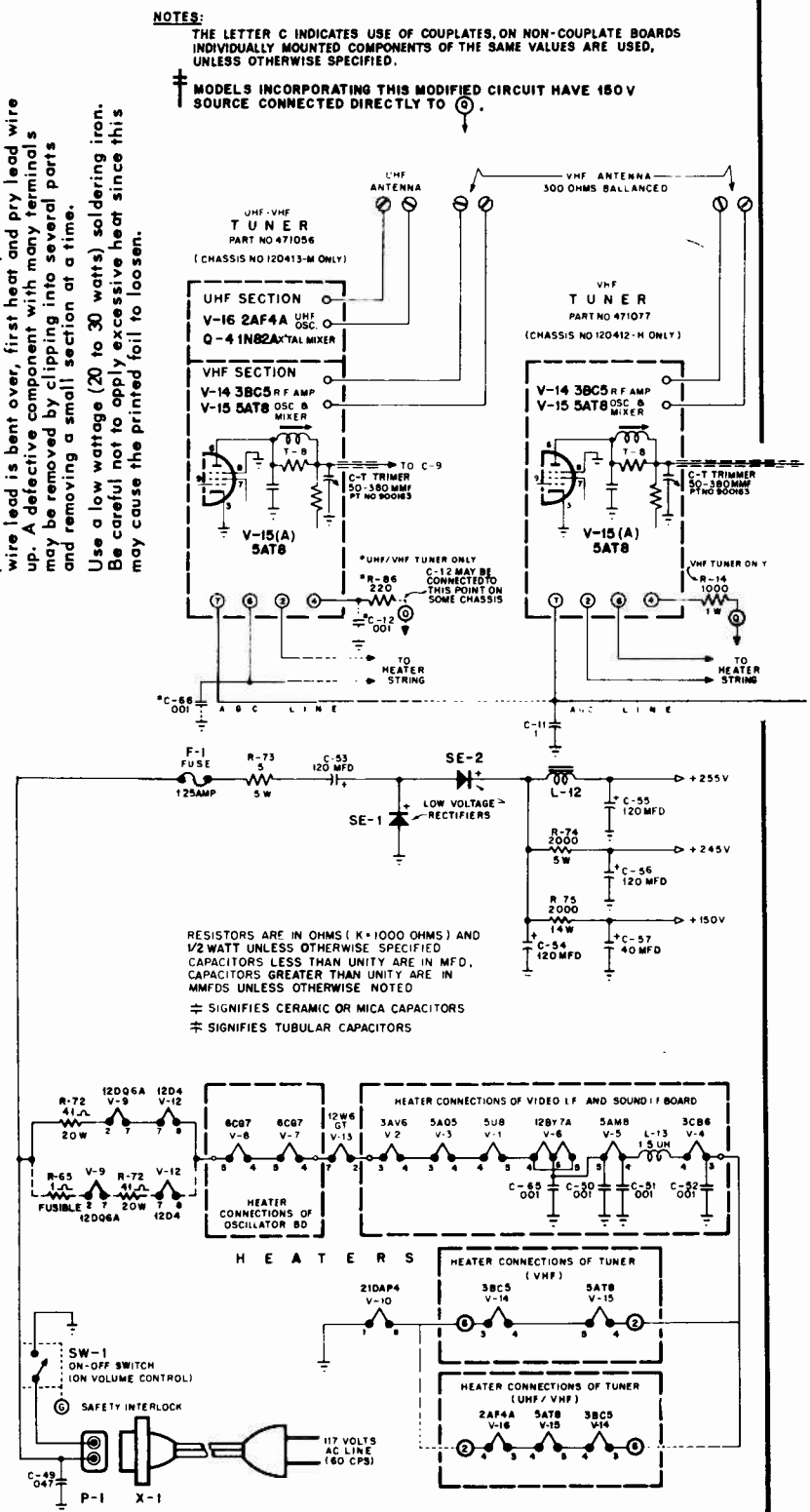
SERVICING OF PRINTED BOARDS

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

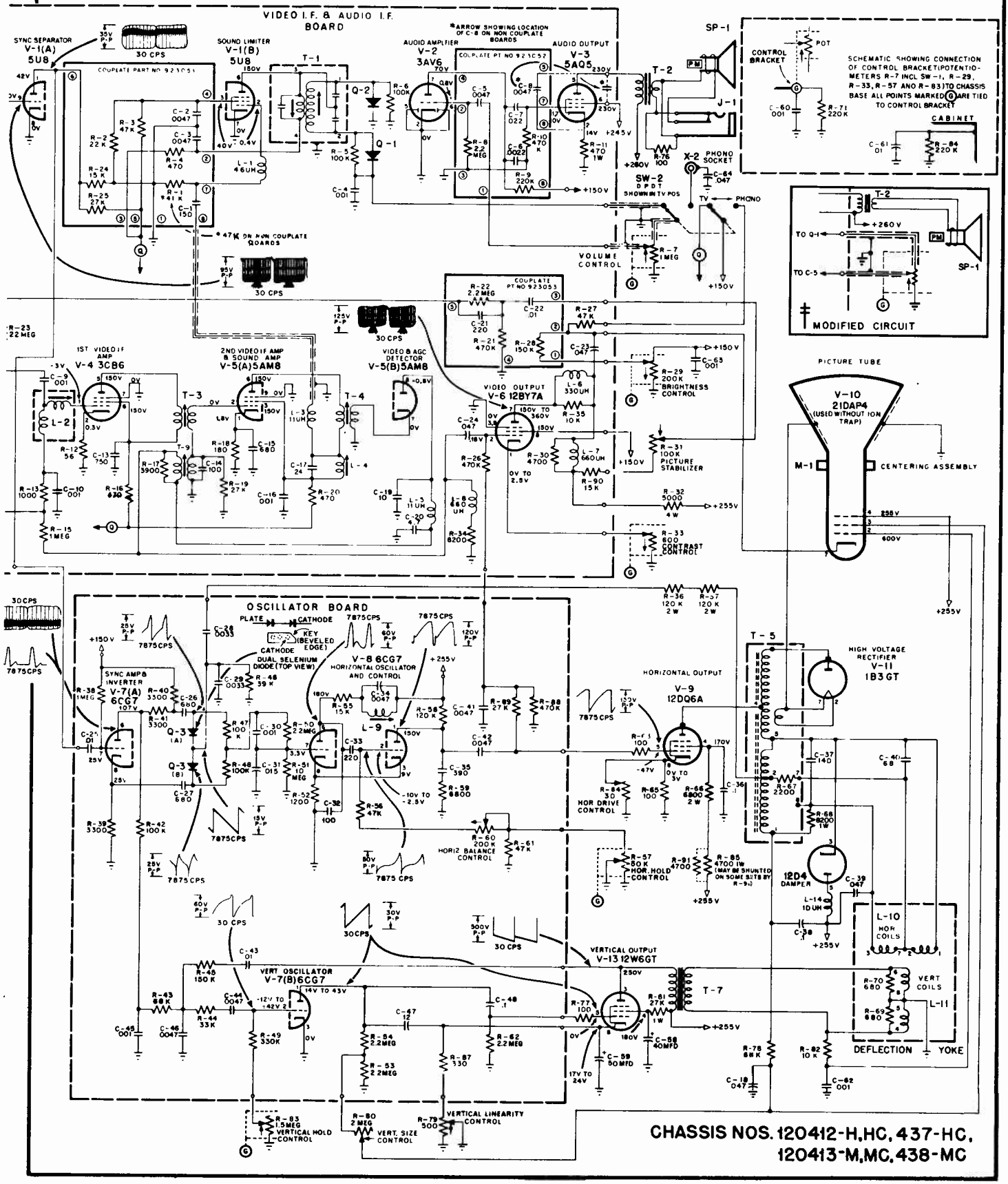
Use a low wattage (20 to 30 watts) soldering iron. Be careful not to apply excessive heat since this may cause the printed foil to loosen.



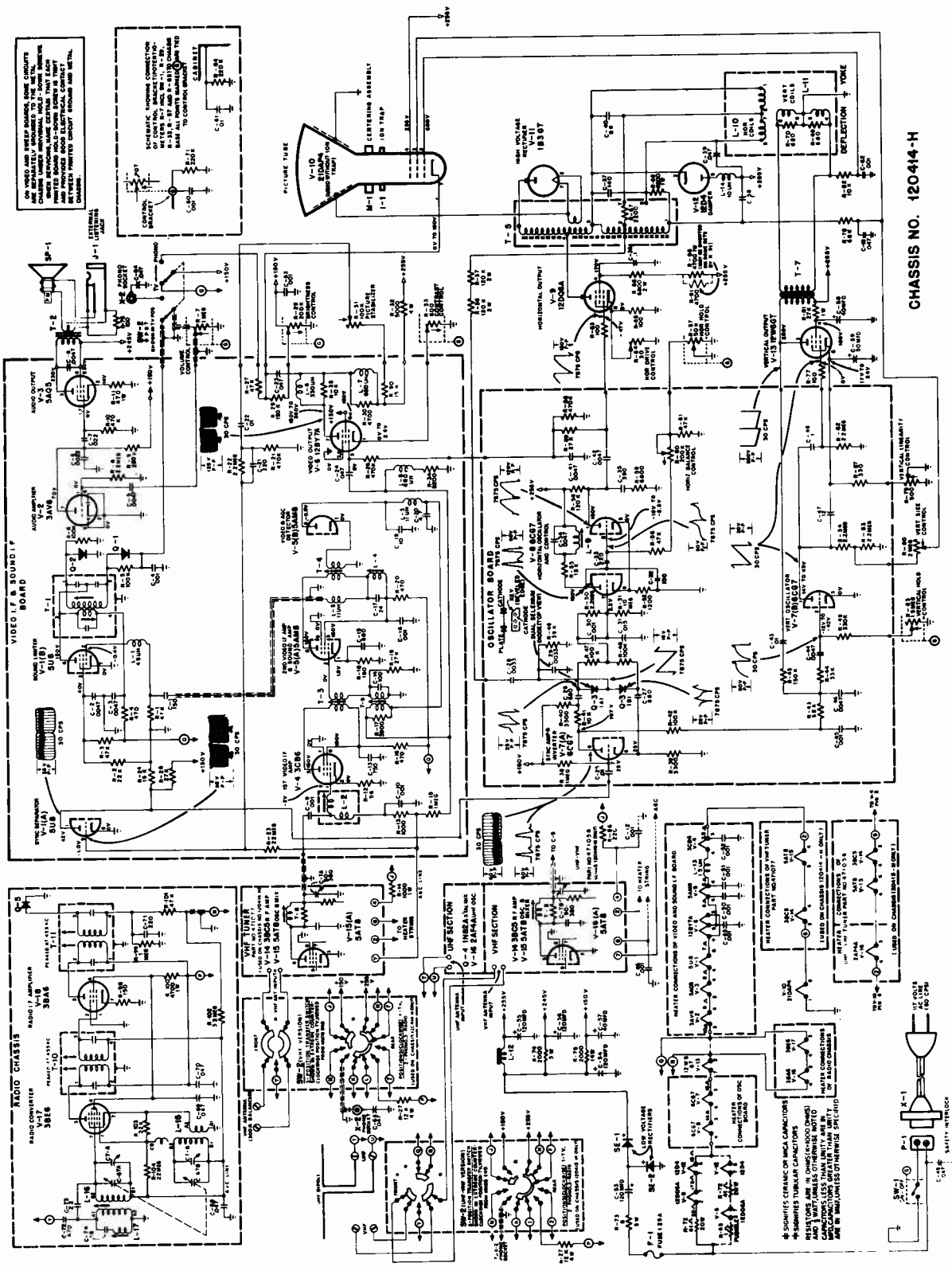
AUDIO, VIDEO & I.F. PRINTED CIRCUIT BOARD (COUPLATE VERSION)



EMERSON Chassis 120412H, 120413M, 120437HC, 120438MC, Circuit Diagram



EMERSON Chassis 120414H Schematic Diagram



EMERSON Chassis 120414H Schematic Diagram. Use this material with data on pages 41 and 42 in this manual, and material in Volume TV-14, "Most-Often-Needed 1958 Television Servicing Information," pages 23-28.

Emerson Television

120424 W, 120434 N, W
120445 W
120425 Y, 120435 Y, P
120446 Y

TYPE	STYLE	MODEL NO.	TV CHASSIS	KINESCOPE	TUNER
VHF RECEIVERS	PORTABLE T.M.	1452	120424 W	17BZP4	471103
	TABLE MODEL	1466	120434 N 120434 W	21DAP4	471112 471103
	CONSOLE	1470	120445 W		471120
UHF-VHF RECEIVERS	PORTABLE T.M.	1453	120425 Y	17BZP4	471104-VHF 471105-UHF
	TABLE MODEL	1467	120435 P 120435 Y	21DAP4	471115-VHF 471105-UHF 471104-VHF 471105-UHF
	CONSOLE	1471	120446 Y		471128

(Service material on pages 45 through 50)

DISASSEMBLY INSTRUCTIONS

Note 1: To prevent possible overload of the horizontal output tube, due to removal of negative grid voltage, do not operate power chassis with the cable disconnected from the board.

Note 2: Provide a grounding jumper between the board and the power chassis when servicing the chassis outside the cabinet.

MODELS 1452/1453:

To Remove Plastic Lens and Mask (a single unit)

Remove 2 screws from the side of the knob-overlay and then remove overlay, control panel insert and all knobs. Remove 3 screws from bottom of cabinet front. Pull bottom of front away from cabinet to separate the plastic lens and mask.

NOTE: To clean the Plastic Lens use only a soft cloth dampened with water (a dry cloth may be abrasive). If necessary, a mild soap solution may be applied. DO NOT USE CLEANSERS, POLISHES, OILS OR WAXES.

To Remove Picture Tube (in its metal mtg. bracket & plate).

Remove Plastic Lens and Mask. Disengage cardboard barrier by unscrewing the 4 nut and washer combinations. Disconnect antenna leads, then remove back. Disengage CRT socket, clamp and yoke assembly and high voltage lead from CRT (after discharging H.V.). Carefully, so as not to mar the cabinet, pry up the 2 snap-on covers on either side of the handle. Remove the 4 screws securing the handle to the metal plate inside the cabinet. The CRT can now be removed from the front.

To Remove Chassis: (Etched Printed Circuit Board and Power Chassis)

Unscrew 2 screws from the side of the knob overlay, located in the front. Remove knob overlay, control panel insert and all knobs. Disconnect antenna leads and cabinet back.

a) Etched Printed Circuit Board

The etched printed circuit board is kept in place by 5 screws thru the metal strap and into the cabinet at the rear of the board. The front of the board is positioned by 2 screws, set in the right hand CRT mounting brackets, and service as locating pins. These screws do not screw into the board but fit into 2 clearance holes located in a bracket on the front of the board. To remove the circuit board, unscrew the rear 5 screws only. Do not remove the screws holding the tuner bracket to the board. The board can now carefully be removed from the cabinet. To remove the cardboard protector under the board, push up on the snap-on fasteners. NOTE: The complete receiver can be operated conveniently with the board out of the cabinet. To completely separate the board from the cabinet unplug 2 cables from the power chassis, disconnect the speaker leads, disengage the CRT socket. (Note: Yellow lead to cathode of CRT is taped to the speaker leads. Retain the lead dress in reassembly). Should you encounter any difficulty in inserting the printed board into the cabinet, it may be necessary to remove the Lens and Mask in order to line up the two guide screws for the board.

b) Power Chassis

From the underside, remove the six screws that secure the power chassis to the cabinet. Disengage the CRT socket, high voltage lead (after discharging the H.V.), CRT clamp yoke assembly. Reassembly can be accomplished in the reverse order.

MODELS 1466/1467

To Remove glass and mask:

Remove retainer bracket from across glass. Glass can be brought forward, up and out. Mask is secured by 2 screws in top of mask.

To Remove chassis (Etched Printed Circuit Board and Power chassis):

a) Etched Printed Circuit Board:

Remove knobs from the front and the cabinet back. Disengage CRT cable and speaker leads. Board is mounted on the side wall bracket. The front of the Board is secured by 2 screws thru a plate attached by the Board. Remove these from the inside. Remove the screws securing the rear of the Board to the cabinet. Remove the cardboard protector as explained above.

b) Power chassis:

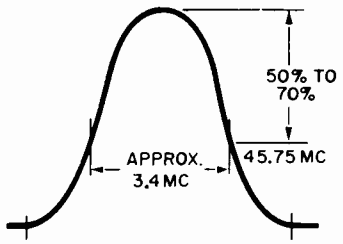
Disengage H.V. lead (after discharging it), yoke clamp and assembly and 2 power cables. From the underside of the cabinet, remove six screws to free the power chassis.

EMERSON Alignment Information, Chassis 120424W, 120425Y, 120434N, -W, etc.

VIDEO I.F. ALIGNMENT

1. Connect 3 volt bias to the AGC bias point with the negative terminal to junction of R-15 and C-15, positive terminal to chassis and R-43 (Local-Distance control) in extreme CCW position (maximum resistance in circuit).
2. Signal injection can easily be accomplished in the following manner:
   Paste a piece of thin copper or brass foil ½ x 2" on onion skin insulation.

   The insulation should extend about 1/8" beyond the two long sides and one short side of the foil. At the other short side, the foil should extend approximately ½" beyond the insulation.



OVERALL I.F. RESPONSE CURVE

   This shim assembly is then slipped in lengthwise between the mixer tube and its shield with the metal foil facing the tube. Set the short side with the extended insulation towards the chassis; this will permit the generator lead to be connected to the foil extending beyond the insulation at the other short side.

   Inject the signal by connecting the I.F. marker generator to the metal foil wrapped about the mixer tube as suggested above and place a V.T.V.M. across junction of L-7 and L-8 (IF Test Point) to ground. Adjust output of signal generator so that peaking of coils does not produce more than -2V DC on V.T.V.M.
3. Peak the following for maximum response: T-5, 44.25 mc; T-4, 45.3 mc; T-3, 42.6 mc.
4. Adjust the following for minimum response, increasing generator output as necessary: L-5, 41.25 mc and L-3, 47.25 mc.

   At this point set generator to 45.3 mc and adjust L-4 for minimum output on meter.
5. Peak T-10 on tuner at 45.3 mc for maximum output.
6. Peak L-4 at 43.1 mc for maximum output.

To observe the IF response curve, connect an oscilloscope, thru a 10,000 ohm isolation resistor, in place of the V.T.V.M. Inject a swept signal (40 to 50 mc) along with a loosely coupled marker generator at the mixer tube in the manner described above. Adjust the output of the sweep generator to produce about 2 volts peak to peak curve on the oscilloscope and reduce the marker signal so as not to upset the response curve. The 45.75 mc marker should appear between 50% and 70% down with respect to the peak.

4.5 mc Video Trap Alignment

Using a good signal, set the fine tuning control to the point where you begin to see 4.5 mc beat in the picture. Then adjust T-6, top, for minimum 4.5 mc beat in the picture.

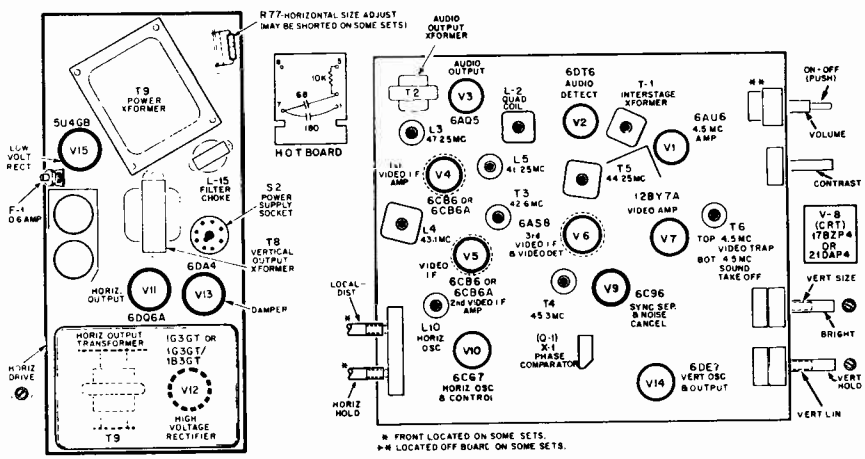
Sound I.F. Alignment

1. Using a strong T.V. tronsmitted 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 #1, tuning for maximum volume and minimum distortion.
4. If a V.T.V.M. is available, measure the voltage across R-7, 560K Ω 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.

Alignment of Horizontal Oscillator

This can be accomplished without removing circuit board from the cabinet as follows:
1. Tune receiver to a known "good" channel. Turn "Local-Distance" control, R-43, fully counter-clockwise (local position).
2. Short horizontal phasing coil (L-10) by placing a jumper lead across it. Insert a jumper wire across R-49.
3. Adjust the horizontal hold control, R-61, until picture pulls into synchronization. (In most cases the picture will sway from side to side).
4. Remove short from horizontal phase coil (L-10) and then adjust L-10 (use a hex-head tool) for the same synchronous condition as in step 3 above.
5. Remove short from across R-49. Horizontal circuit is now properly aligned. If area permits readjust "Local-Distance" control to distant position (fully clockwise). See below for "Local-Distance" control.

NOTE:
A regular 1B3GT tube is physically too tall and can't be used.



TUBE LOCATION AND ALIGNMENT POINTS DIAGRAM,
POWER SUPPLY & BOARD CHASSIS

EMERSON Service Material, Chassis 120424W, 120425Y, 120424N, -W, etc. (Continued)

Adjustment of "Local-Distance" Control (R-43)

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-Distant" control in a counterclockwise direction to a point just under an overload condition.

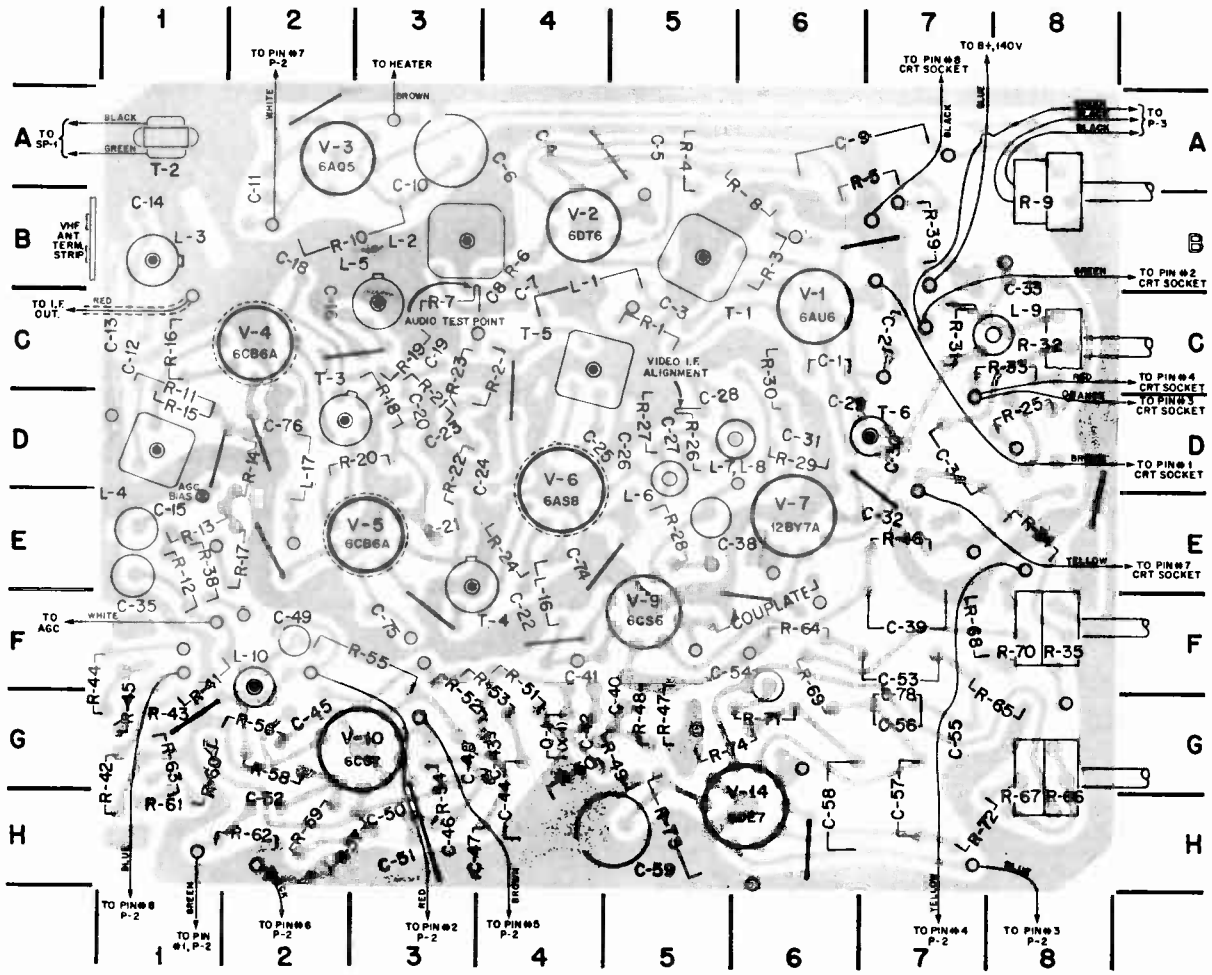
Horizontal Size Adjustment (R-77)

These "Tru-Slim" 110° chassis have been designed to provide proper horizontal sweep under normally encountered line voltage variations. Should you, however, encounter insufficient sweep due to low line voltage, short out R-77, 3300 Ω, 1 watt resistor, located on a terminal strip on the power chassis near the power transformer. If horizontal oversweep is present, as a result of high line voltage, remove the short from across R-77.

The shorting or the elimination of the short from across R-77 can be achieved without removing the power chassis from the cabinet. R-77 becomes accessible upon removal of the back.

Horizontal Drive Adjustment (R-76)

Normally, this control should be in the most counter-clockwise position (minimum resistance in the circuit). If overdrive bars (white vertical bars in the raster are present, they can be eliminated by slowly advancing R-76, accessible thru the rear apron of the power chassis, in the clockwise direction until the lines just disappear.



PRINTED CIRCUIT BOARD CHASSIS (Top View) (COORDINATE LISTINGS ON CH-PARTS LIST)

SERVICING OF PRINTED BOARDS

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

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

EMERSON Television

CONDITIONS FOR TAKING VOLTAGE AND RESISTANCE READINGS (Static Conditions)

The voltage measurements were taken on Chassis 120424W.

Due to component variations, voltage and resistance readings may vary slightly from those given here. Slight variations may also be noticed if chassis is not coded as mentioned above. The picture tube, deflection yoke and high voltage circuits were in the circuit when the readings were taken.

1. Antenna disconnected and antenna terminals shorted on tuner and connected to chassis (use short leads).
2. Line voltage 117 volts (Disconnect power from resistance readings).
3. Bias battery (3V) connected to AGC Bias Point with negative terminal of battery to junction of R-15 and C-15 and positive terminal to chassis. (BIAS BATTERY USED FOR STATIC VOLTAGE READINGS ONLY).
4. Local-Distance control (R-43) is not varied but is kept at maximum clockwise (CW) position. All other controls in position for normal picture. (Varied when it directly affects reading).
5. All measurements taken with a vacuum tube voltmeter and ohmmeter.
6. All readings listed in table were taken between points shown and chassis.
7. Resistance readings are given in ohms unless otherwise noted.
8. N.C. denotes no connection.

WAVE SHAPE ANALYSIS CHART – (Operational conditions)

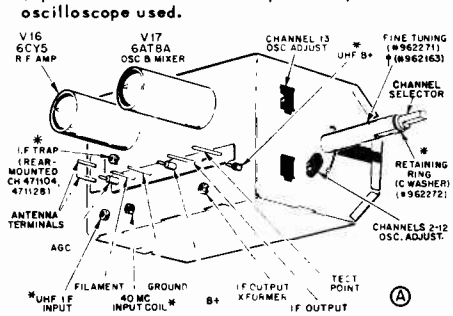
The waveshapes shown on pages were taken on chassis 120424W. Slight peak to peak voltage differences may be noted on chassis of later triangle codes.

The peak to peak voltage given may also vary slightly depending on signal strength and component variations.

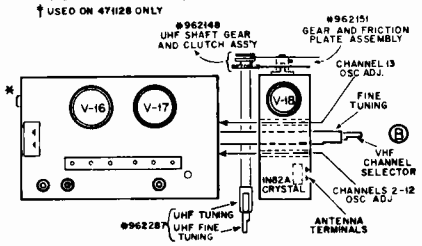
To accurately observe the wave shapes, the relatively high input capacity of an oscilloscope must be reduced so as not to change the operating characteristics of the television set. (Failure to do this will result in wrong wave shape readings).

1. Connect antenna and tune receiver to known "good" channel for best reception.
2. Adjust CONTRAST control for maximum undistorted contrast.
3. Set LOCAL-DISTANCE control for "Distant" location (i.e. maximum clockwise position).
4. Voltages (using V.T.V.M., with respect to chassis) noted at time of readings:
   AGC bias = -4.5V D.C.
   Tuner bias = -3.5 V DC
   Sync. separator grid (Pin 7 of V-9) = -30V.
5. Connect low end of probe to chassis. The 30 and 7875 cps oscilloscope sweep settings are used so as to permit observation of two cycles of the wave shape.

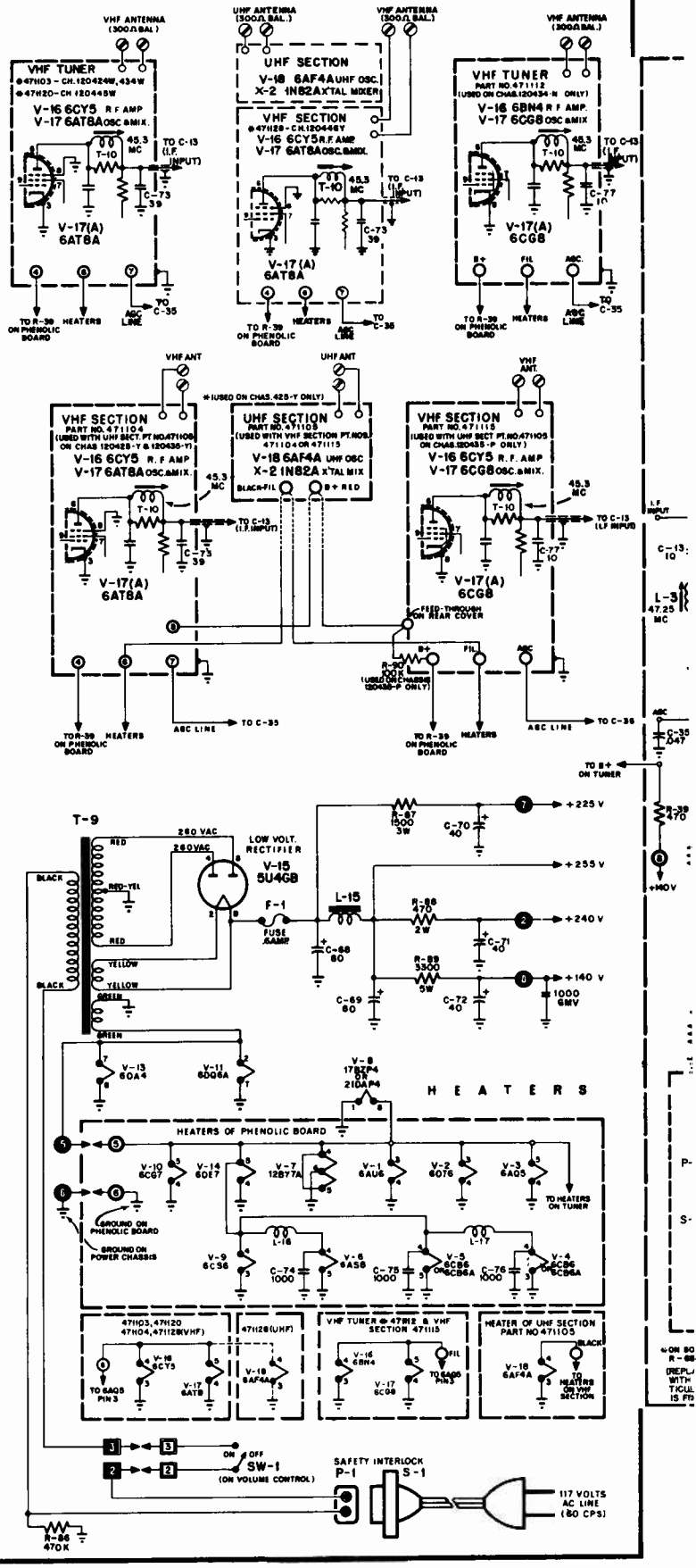
NOTE: A wave shape seen on your oscilloscope may be upside down from same wave shape shown here. This will depend on the number of stages of amplification in the oscilloscope used.



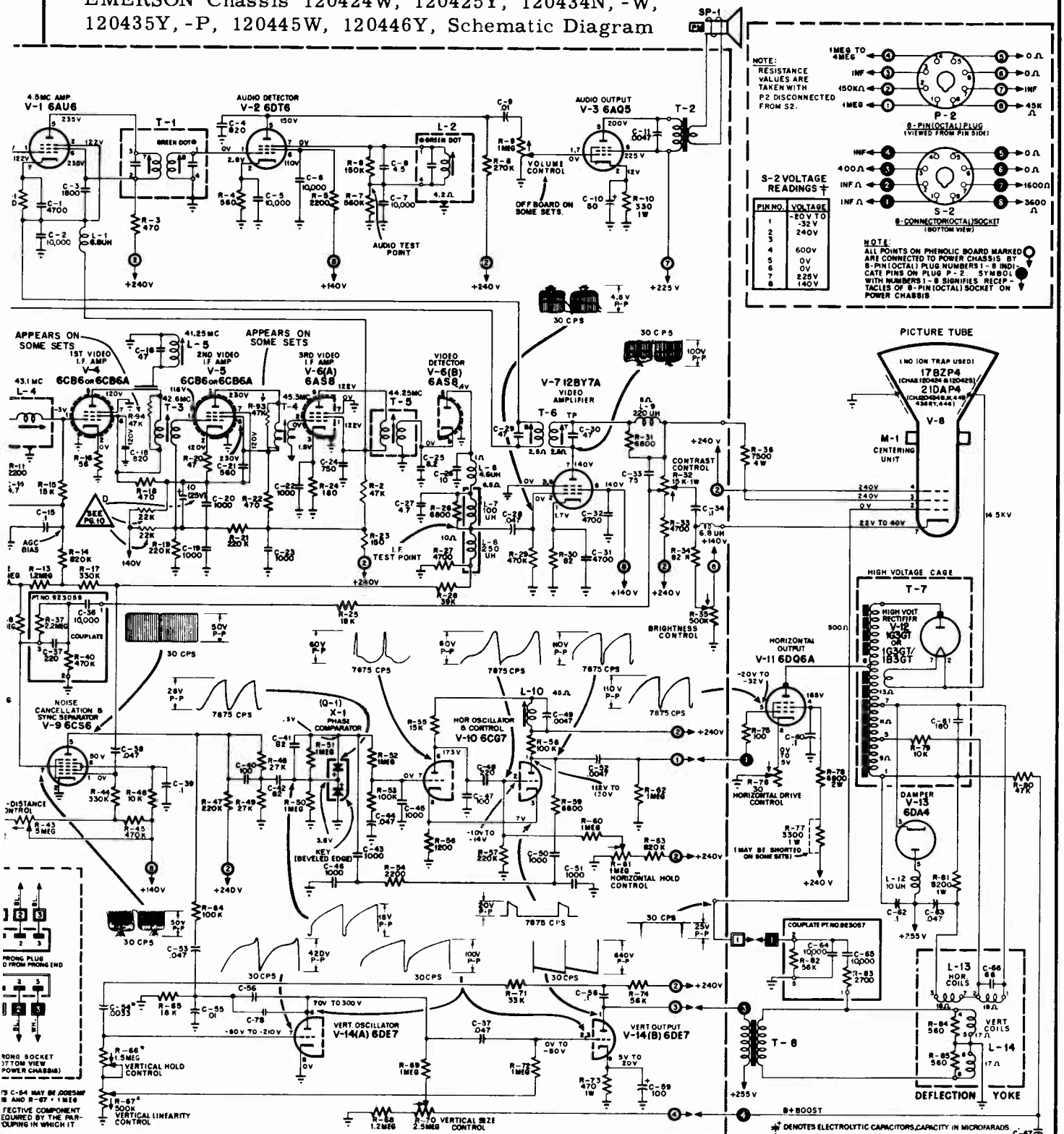
NOTE:
* USED ON TUNERS 471104, 471128 ONLY
† USED ON 471128 ONLY



ALIGNMENT POINTS DIAGRAM, TUNER CH. 471103, 20, 471104, 28



EMERSON Chassis 120424W, 120425Y, 120434N, -W, 120435Y, -P, 120445W, 120446Y, Schematic Diagram



CHASSIS NOS. 120424W,425Y,434N,435P, 120434W,435Y,445W,446Y

INITIAL RELEASES WILL BE CODED △B (CIRCUIT BOARD).
(TRIANGLES WITH LETTER INSIDE WILL REFER TO POWER CHASSIS CHANGES)

NOTES:

CAPACITOR	445,446	424,425 434,435
C-56 (MYLAR)	.015 8921520	.01 8921514
C-78 (CERAMIC) (SPECIAL)	.01 8928893X ORDER BY PT. NO.	.015 8926999X

WHEN SERVICING CHASSIS OUTSIDE THE CABINET, PROVIDE AN ADDITIONAL GROUND BETWEEN THE POWER CHASSIS AND THE CIRCUIT BOARD.

SLUGS OF TRANSFORMERS ARE DESIGNATED AS FOLLOWS; "T" AWAY FROM CIRCUIT BOARD. "B" CLOSER TO CIRCUIT BOARD.

ARROWS AT CONTROLS INDICATE CLOCKWISE ROTATION.

* DENOTES ELECTROLYTIC CAPACITORS, CAPACITY IN MICROFARADS.
+ SIGNIFIES CERAMIC OR MICA CAPACITORS
‡ SIGNIFIES TUBULAR CAPACITORS
RESISTORS ARE IN OHMS (K = 1000 OHMS) AND 1/2 WATT, UNLESS OTHERWISE NOTED.
CAPACITORS LESS THAN UNITY ARE IN MFD. CAPACITORS GREATER THAN UNITY ARE IN MMF, UNLESS OTHERWISE NOTED.
† TO PREVENT POSSIBLE OVERLOAD OF HORIZONTAL OUTPUT TUBE, DO NOT OPERATE POWER CHASSIS WHILE DISCONNECTED FROM CIRCUIT BOARD.
VOLTAGES AT PINS 5 & 7 OF V-9, 6CS6, WILL VARY WITH AMOUNT OF SIGNAL AND NOISE GETTING THRU.

EMERSON Parts List for Chassis 120424W, 120425Y, 120434N, -W, 120435Y, -P, etc.

SYM.	COORD.**	PART NO.	DESCRIPTION		
R-1	C5	340332	220 Ohm – Carbon	±10%	1/2W.
R-2	C4	340892	47,000 Ohm – Carbon	±10%	1/2W.
R-3	B6	350412	470 Ohm – Carbon	±20%	1/2W.
R-4	A5	340432	560 Ohm – Carbon	±10%	1/2W.
R-5	B7	340572	2,200 Ohm – Carbon	±10%	1/2W.
R-6	B4	341012	150,000 Ohm – Carbon	±10%	1/2W.
R-7	C3	341152	560,000 Ohm – Carbon	±10%	1/2W.
R-8	B6	341072	270,000 Ohm – Carbon	±10%	1/2W.
R-9	B8	390545/ 390545A	1 Megohm – Volume Control		
R-10	B3	370372	330 Ohm – Carbon	±10%	1W.
R-11	D1	340572	2,200 Ohm – Carbon	±10%	1/2W.
R-12	E1	341292	2.2 Megohm – Carbon	±10%	1/2W.
R-13	E1	341232	1.2 Megohm – Carbon	±10%	1/2W.
R-14	D2	341292	2.2 Megohm – Carbon	±10%	1/2W.
R-15	D1	340772	15,000 Ohm – Carbon	±10%	1/2W.
R-16	C1	340192	56 Ohm – Carbon	±10%	1/2W.
R-17	E2	341092	330,000 Ohm – Carbon	±10%	1/2W.
R-18	D3	350412	470 Ohm – Carbon	±20%	1/2W.
R-19	C3	341052	220,000 Ohm – Carbon	±10%	1/2W.
R-20	D3	340172	47 Ohm – Carbon	±10%	1/2W.
R-21	D3	341052	220,000 Ohm – Carbon	±10%	1/2W.
R-22	D3	350412	470 Ohm – Carbon	±20%	1/2W.
R-23	C3	350292	150 Ohm – Carbon	±20%	1/2W.
R-24	E4	340312	180 Ohm – Carbon	±10%	1/2W.
R-25	D8	340792	18,000 Ohm – Carbon	±10%	1/2W.
R-26	D5	340692	6,800 Ohm – Carbon	±10%	1/2W.
R-27	D5	340652	4,700 Ohm – Carbon	±10%	1/2W.
R-28	E5	340872	39,000 Ohm – Carbon	±10%	1/2W.
R-29	D6	351132	470,000 Ohm – Carbon	±20%	1/2W.
R-30	C6	340232	82 Ohm – Carbon	±10%	1/2W.
R-31	C7	340692	6,800 Ohm – Carbon	±10%	1/2W.
R-32	C8	390456/ 390546A	15,000 Ohm – Contrast Control		1W.
R-32	C8	390567- (445-W,446-Y)	15,000 Ohm – Contrast Control		1W.
R-33	C8	340652	4,700 Ohm – Carbon	±10%	1/2W.
R-34	E8	340952	82,000 Ohm – Carbon	±10%	1/2W.
R-35	F8	390547/ 390547A	500,000 Ohm – Brightness Control		
R-36		397125	7,500 Ohm – Glassohm	±10%	4W.
R-37		Pt. of Couplate	* 923059		
R-38	E1	341252	1.5 Megohm – Carbon	±10%	1/2W.
R-39	B7	350412	470 Ohm – Carbon	±20%	1/2W.
R-40		Pt. of Couplate	* 923059		
R-41	G1	397126	33 Megohm – Carbon	±10%	1/2W.
R-42	H1	340972	100,000 Ohm – Carbon	±10%	1/2W.
R-43	G1	390549	5 Megohm – Local Distance Control		
R-43	G1	390560- (445-W,446-Y)	5 Megohm – Local Distance Control		
R-44	G1	341092	330,000 Ohm – Carbon	±10%	1/2W.
R-45	G1	351132	470,000 Ohm – Carbon	±20%	1/2W.
R-46	E7	340732	10,000 Ohm – Carbon	±10%	1/2W.
R-46	E7	340732- (445-W,446-Y)	10,000 Ohm – Carbon	±10%	1W.
R-47	G5	351052	220,000 Ohm – Carbon	±20%	1/2W.
R-48	G5	340832	27,000 Ohm – Carbon	±10%	1/2W.
R-49	G5	340832	27,000 Ohm – Carbon	±10%	1/2W.
R-50	G4	341212	1 Megohm – Carbon	±10%	1/2W.
R-51	G4	341212	1 Megohm – Carbon	±10%	1/2W.
R-52	G3	341212	1 Megohm – Carbon	±10%	1/2W.
R-53	G4	340972	100,000 Ohm – Carbon	±10%	1/2W.
R-54	H3	340572	2,200 Ohm – Carbon	±10%	1/2W.
R-55	F3	370772	15,000 Ohm – Carbon	±10%	1W.
R-56	G2	340512	1,200 Ohm – Carbon	±10%	1/2W.
R-57	H3	341052	220,000 Ohm – Carbon	±10%	1/2W.
R-58	G2	340972	100,000 Ohm – Carbon	±10%	1/2W.
R-59	H2	340692	6,800 Ohm – Carbon	±10%	1/2W.
R-60	G1	340212	1 Megohm – Carbon	±10%	1/2W.
R-61	H1	Pt. of R-43	1 Megohm – Horizontal Hold Control		
R-61	H1	390558A- (445-W,446-Y)	1 Megohm – Horizontal Hold Control		
R-62	H2	351212	1 Megohm – Carbon	±20%	1/2W.
R-63	G1	341192	820,000 Ohm – Carbon	±10%	1/2W.
R-64	F6	340972	100,000 Ohm – Carbon	±10%	1/2W.
R-65	G8	340792	18,000 Ohm – Carbon	±10%	1/2W.
R-66	H8	390561*/ 390561A*	1.5 Megohm – Vertical Hold Control		
R-67	H8	Pt. of R-66*	.5 Megohm – Vertical Linearity Control		
R-68	F7	341232	1.2 Megohm – Carbon	±10%	1/2W.
R-69	G6	341212	1 Megohm – Carbon	±10%	1/2W.
R-70	F8	Pt. of R-35	2.5 Megohm – Vertical Size Control		
R-71	G6	340852	33,000 Ohm – Carbon	±10%	1/2W.
R-72	H7	341212	1 Megohm – Carbon	±10%	1/2W.
R-73	H5	380412	470 Ohm – Carbon	±20%	1W.
R-74	G5	340912	56,000 Ohm – Carbon	±10%	1/2W.
R-75		350252	100 Ohm – Carbon	±20%	1/2W.
R-76		390544	30 Ohm – Horizontal Drive Control		
R-77		370612	3,300 Ohm – Carbon	±10%	1W.
R-78		780692	6,800 Ohm – Carbon	±10%	2W.
R-79		340732	10,000 Ohm – Carbon	±10%	1/2W.
R-80		340892	47,000 Ohm – Carbon	±10%	1/2W.
R-81		370712	8,200 Ohm – Carbon	±10%	1W.
R-82		* 923057	56,000 Ohm – Carbon	±20%	1/2W.
R-83		Pt. of Couplate	2,700 Ohm – Carbon	±20%	1/2W.
R-84		340432	560 Ohm – Carbon	±10%	1/2W.
R-85		340432	560 Ohm – Carbon	±10%	1/2W.
R-86		351132	470,000 Ohm – Carbon	±20%	1/2W.
R-87		397117	1,500 Ohm – Wire Wound	±10%	3W.
R-88		780412	470 Ohm – Carbon	±10%	2W.
R-89		394206	3,300 Ohm – Wire Wound	±10%	5W.
R-90		350972	100,000 Ohm – (Chas. 120435-P Only)		
R-93		340892- (445-W,446-Y)	47,000 Ohm – Mylar	±10%	1/2W.
R-94		340892- (445-W,446-Y)	47,000 Ohm – Mylar	±10%	1/2W.
C-1	C6	928922X	4,700 MMF – Ceramic	±20%	500V.
C-2	C7	928924X	10,000 MMF – Ceramic GMV		500V.
C-3	C5	928987X	1,800 MMF – Ceramic Stab.	±10%	500V.
C-4	A4	928984X	820 MMF – Ceramic Stab.	±10%	500V.
C-5	A5	928955X	10,000 MMF – Ceramic	±20%	500V.
C-6	A4	928924X	10,000 MMF – Ceramic GMV		500V.
C-7	C4	928955X	10,000 MMF – Ceramic	±20%	500V.
C-8	C4	928992	4.5 MMF – Ceramic	±5%	500V.
C-9	A7	924414	.01 MFD – Molded Durez	±20%	400V.

SYM.	COORD.**	PART NO.	DESCRIPTION		
C-10	B3	925457	50 MFD – Electrolytic		25V.
C-11	B2	921753	.0047 MFD – Molded Durez	±20%	600V.
C-12	C1	928991X	220 MMF – Ceramic Stab.	±20%	500V.
C-13	C1	928804X	10 MMF – Ceramic NPO	±5%	500V.
C-14	B1	928800X	4.7 MMF – Ceramic N330	±5%	500V.
C-15	E1	923127	.1 MFD – Molded Upright	±20%	200V.
C-16	C2	928990X	47 MMF – Ceramic NPO	±10%	500V.
C-18	B2	928984X	820 MMF – Ceramic Stab.	±10%	500V.
C-19	C3	928933X	1,000 MMF – Ceramic GMV		500V.
C-20	D3	928933X	1,000 MMF – Ceramic GMV		500V.
C-21	E3	928908X	560 MMF – Ceramic Stab.	±10%	500V.
C-22	F4	928911X	1,000 MMF – Ceramic Stab.	±10%	500V.
C-23	D3	928933X	1,000 MMF – Ceramic GMV		500V.
C-24	D4	928980X	750 MMF – Ceramic Stab.	±10%	500V.
C-25	D4	928975X	8.2 MMF – Ceramic Stab.	±10%	500V.
C-26	D5	928989X	10 MMF – Ceramic Stab.	±10%	500V.
C-27	D5	928974X	4.7 MMF – Ceramic Stab.	±10%	500V.
C-28	D5	921354	.047 MFD – Molded Durez	±20%	200V.
C-29	D6	928990X	47 MMF – Ceramic NPO	±10%	500V.
C-30	D7	928990X	47 MMF – Ceramic NPO	±10%	500V.
C-31	D6	928922X	4,700 MMF – Ceramic	±10%	500V.
C-32	E7	928923X	4,700 MMF – Ceramic GMV		500V.
C-33	C8	928976X	75 MMF – Ceramic Stab.	±10%	500V.
C-34	D7	921515	.1 MFD – Molded Durez	±20%	400V.
C-35	F1	923127	.047 MFD – Molded Upright	±20%	200V.
C-36		* 923059			
C-37		Pt. of Couplate			
C-38	E5	923126	.047 MFD – Molded Upright	±20%	400V.
C-39	F7	921515	.1 MFD – Molded Durez	±20%	400V.
C-40	G5	928902X	100 MMF – Ceramic Stab.	±10%	500V.
C-41	F4	928977X	82 MMF – Ceramic Stab.	±10%	500V.
C-42	G4	928977X	82 MMF – Ceramic Stab.	±10%	500V.
C-43	G4	928911X	1,000 MMF – Ceramic Stab.	±10%	500V.
C-44	H4	921554	.047 MFD – Molded Durez	±20%	400V.
C-45	G2	928911	1,000 MMF – Ceramic Stab.	±10%	500V.
C-46	H3	928911X	1,000 MMF – Ceramic Stab.	±10%	500V.
C-47	H3	915039	100 MMF – Silver Mica Dur.	±10%	500V.
C-48	G3	915042	220 MMF – Silver Mica Dur.	±10%	500V.
C-49	F2	923125	.0047 MFD – Molded Upright	±10%	600V.
C-50	H3	928911X	1,000 MMF – Ceramic Stab.	±10%	500V.
C-51	H3	928911X	1,000 MMF – Ceramic Stab.	±10%	500V.
C-52	H2	921553	.0047 MFD – Molded Durez	±20%	400V.
C-53	F7	921554	.047 MFD – Molded Durez	±20%	400V.
C-54*	F6	923132	.0033 MFD – Molded Upright	±10%	1KV.
C-55	G7	921514	.01 MFD – Molded Durez	±20%	400V.
C-56	G7	921514- (424-W,425-Y, 434-N, 435Y, P)	.01 MFD – Mylar	±20%	400V.
C-56	G7	921520 (445-W,446-Y)	.015 MFD – Mylar	±20%	400V.
C-57	H7	921554	.047 MFD – Molded Durez	±20%	400V.
C-58	H6	921715	.1 MFD – Molded Durez	±20%	600V.
C-59	H5	925442	100 MFD – Electrolytic		50V.
C-60		924515	.1 MFD – Molded	±20%	400V.
C-61		928965	180 MMF – Ceramic	±5%	4KV.
C-62		924715	.1 MFD – Molded	±20%	600V.
C-63		924754	.047 MFD – Molded	±20%	600V.
C-64		* 923057	10,000 MMF – Ceramic	±20%	1,000V.
C-65		Pt. of Couplate	10,000 MMF – Ceramic	±20%	1,000V.
C-66		928936	68 MMF – Ceramic High Q	±10%	2KV.
C-67		924754	.047 MFD – Molded	±20%	600V.
C-68		925437	80 MFD – Electrolytic		300V.
C-69		925438	80 MFD – Electrolytic		300V.
C-70		Pt. of C-68	40 MFD – Electrolytic		300V.
C-71		Pt. of C-69	40 MFD – Electrolytic		300V.
C-72		Pt. of C-68	40 MFD – Electrolytic		300V.
C-73		928931- (424/434-W, 445-W,425/ 435-Y,446-Y)	39 MMF – Ceramic N750	±5%	500V.
C-74	E4	928933X	1,000 MMF – Ceramic GMV		500V.
C-75	F3	928933X	1,000 MMF – Ceramic GMV		500V.
C-76	D2	928933X	1,000 MMF – Ceramic GMV		500V.
C-77		928870- (434-N,435-P)	10 MMF – Ceramic	±5%	500V.
C-78	G7	928999X (424-W,425-Y, 434-N,435-P)	.015 MFD – Ceramic (special)	±20%	500V.
C-78	G7	928995X- (445-W,446-Y)	.01 MFD Ceramic(special)	±20%	500V.
		923057	Couplate		
	F6	923059	Couplate		
T-1	B5	720337 (424-W,425-Y, 445-W,446-Y)	Sound Interstage Transformer		
T-2	B1	734172	Audio Output Transformer		
T-3	D2	720318	1st. Bifilar Video I. F. Transformer		
T-4	F4	720318	2nd. Bifilar Video I. F. Transformer		
T-5	C4	720318	3rd. Bifilar Video I. F. Transformer		
T-6	D7	720297	Sound Take-Off Transformer		
T-7		738155	Horizontal Output Transformer		
T-8		738156	Vertical Output Transformer		
T-9		730079	Power Transformer		
T-10		Part of Tuner			
L-1	C4	705024	R. F. Choke – 6.8 UH		
L-2	B3	720336	Quodrature Coil		
L-3	B1	720317	Sound Trap		
L-4	D1	720316	I. F. Input Coil		
L-5	C3	720315	Adj. Sound Trap		
L-6	D5	708271	R. F. Choke – 4.6 UH		
L-7	D5	708346	Peaking Coil – 100 UH		
L-8			Peaking Coil – 250 UH		
L-9	C8	708349	Peaking Coil – 220 UH		
L-10	F2	716121	Horizontal Osc. Coil		
L-12		705021	R. F. Choke – 10 UH		
L-13		708344	Deflection Yoke Assembly		
L-14					
L-15		737039	Filter Choke		
L-16	F4	705031	Filament Choke		
L-17	D2	705031	Filament Choke		
V-1	B6	800533	Vacuum Tube – 6AU6		
V-2	B6	800189	Vacuum Tube – 6DT6		
V-3	A2	800031	Vacuum Tube – 6AQ5		

** Coordinates for Board Diagrams

* R-66 may be 1 Megohm (Pt. No. 390548).

R-67 = 1 Megohm and C-54 = .0025 MFD (Pt. No. 923124)

GENERAL ELECTRIC

"M4" Chassis, used in Models 17T2405, 17T2410, 17T2411, 17T2412, 21T2419, 21T2420, 21T2421, 24T2425, 21T2426, 21C2440, 21C2441, 21C2445, 24C2446, & UHF.

Material on the next eight pages is exact for the above listed General Electric sets as well as Hotpoint sets listed below.

Hotpoint Co.

"M4" Chassis, used in Models 17S320, 17S321, 17S322, 21S412, 21S420, 21S421, 21S530, 21S531, 21S532, 21S533, 21S630, 21S631, and UHF types.

TO REMOVE THE CHASSIS FROM THE CABINET

Remove the knobs from the shafts on the front of the cabinet. Disconnect any antenna connected to 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 bracket. Remove the speaker leads from the speaker (the speaker network terminal board on some models.) On some models it will be necessary to unsolder the speaker leads to remove them from the speaker. Connect one end of a lead to the chassis and touch the other end to the anode of the picture tube to discharge it. Remove the anode lead from the picture tube by squeezing the anode clip and withdrawing it from the tube. Remove five screws (four on some models) from the bottom of the cabinet which hold the chassis. Loosen the yoke clamp and slide the yoke back over the neck of the picture tube. Remove the chassis from the cabinet.

TO REMOVE THE PICTURE TUBE

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.

VIDEO I-F SYSTEM

AM Pre-Peaking and Trap Frequencies

L135-45.75 MC	T153-44.15 MC
L151-42.50 MC	L150-47.25 MC TRAP
T151-43.00 MC	L161-47.25 MC TRAP
T152-45.30 MC	

General Notes:

1. The tuning core of T152 has a smaller hex opening than the other cores. Use a smaller alignment tool. This allows T152 to be aligned without misadjusting L161 as the tool is withdrawn.
2. Allow receiver and alignment equipment at least 20 minutes of warm-up time before preceeding.
3. Turn the volume control fully counter clockwise and the contrast control fully clockwise. Set the channel selector to channel 9 or some other high band channel where oscillator influence is not noted as the fine tuning control is turned.
4. Short the antenna terminals together with a jumper wire.
5. Connect oscilloscope to Test Point III thru a 22,000 ohm resistor not more than 2.5 inches away from Test Point III.
6. Connect -4 volts bias between Test Point II and the chassis with the negative side of the bias voltage on Test Point II.
7. Inject signals from a properly terminated AM signal generator or sweep generator through the network in Figure 4 to the I-F injection jack* . General Electric test equipment, if used, need not be terminated as the termination is in the attenuator.

Align the receiver to produce the response curve in Figure 2 under "Remarks".

*NOTE: The I-F injection jack is not a phono type receptacle. The connection is made by the end of the phono plug touching the contact inside the injection jack. The outside shell of the plug grips the injection jack firmly. Press plug firmly into place without excess pressure. See Figure 3 for plug construction.

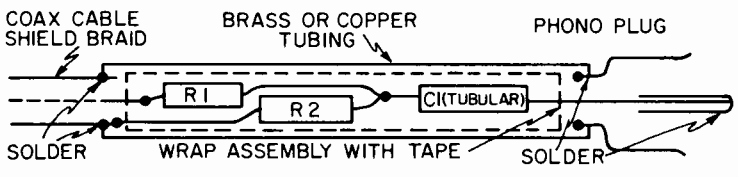


FIGURE 3. I-F INJECTION PLUG CONSTRUCTION

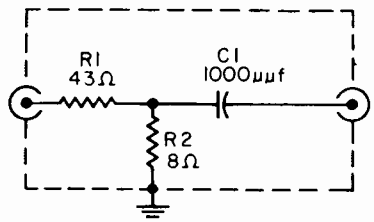
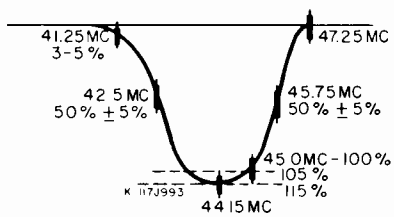


FIGURE 4. I-F INJECTION NETWORK

GENERAL ELECTRIC M4 Chassis, Alignment Information, Continued

VIDEO I-F ALIGNMENT CHART

STEP	SIGNAL FREQUENCY	ADJUST	REMARKS
1.	47.25 MC AM	L161 for minimum scope deflection.	Position core between trap coil and top end of coil form.
2.	SAME	Short ends of L161. Adjust L150 for minimum scope deflection. Remove L161 short.	Use maximum scope sensitivity and smallest possible signal for the 47.25 MC AM adjustments.
3.	38-48 MC sweep generator, scope calibrated 3 volts peak to peak for 2 " deflection.	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.	 FIGURE 2. I-F RESPONSE CURVE
5.	SAME	L153 (Video Detector) for maximum deflection of the 44.15 MC marker.	
6.	SAME	T152 (2nd I-F Plate) to place 45.75 MC marker properly on the curve.	
7.	SAME	T151 (1st I-F Plate) to place 42.5 MC marker properly on the curve.	Repeat 6, 7 and 8 if necessary.
8.	SAME	L153 if necessary to shape the nose.	Symmetry of the nose is important. No portion of the nose should be out of symmetry by more than 3%.

4.5 MC TRAP ALIGNMENT

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

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

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

AUDIO I-F ALIGNMENT

1. Connect an antenna to the receiver and tune in a weak television signal. This will provide a 4.5 MC FM signal source for audio I-F alignment. Keep the volume control turned down unless the speaker is connected.
2. Connect two matched 100,000 ohm resistors in series between pin No. 2 of V108 (6T8) and chassis.
3. Follow instructions in Audio Alignment Chart.

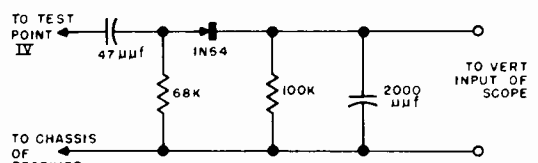
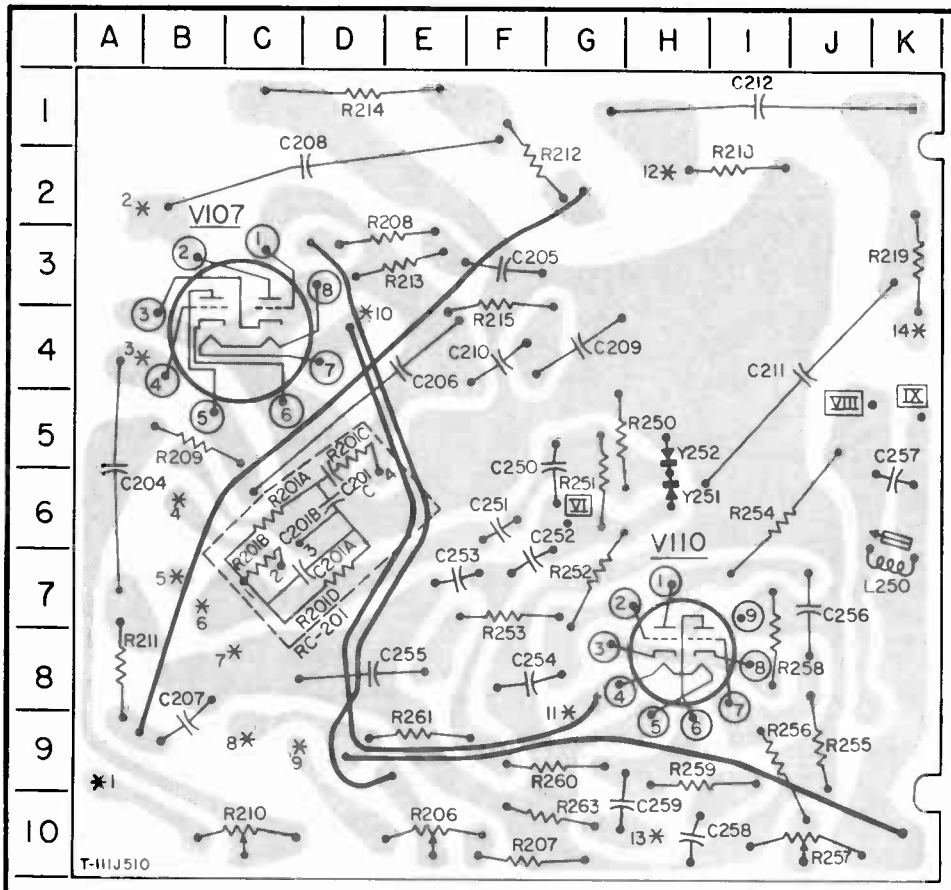


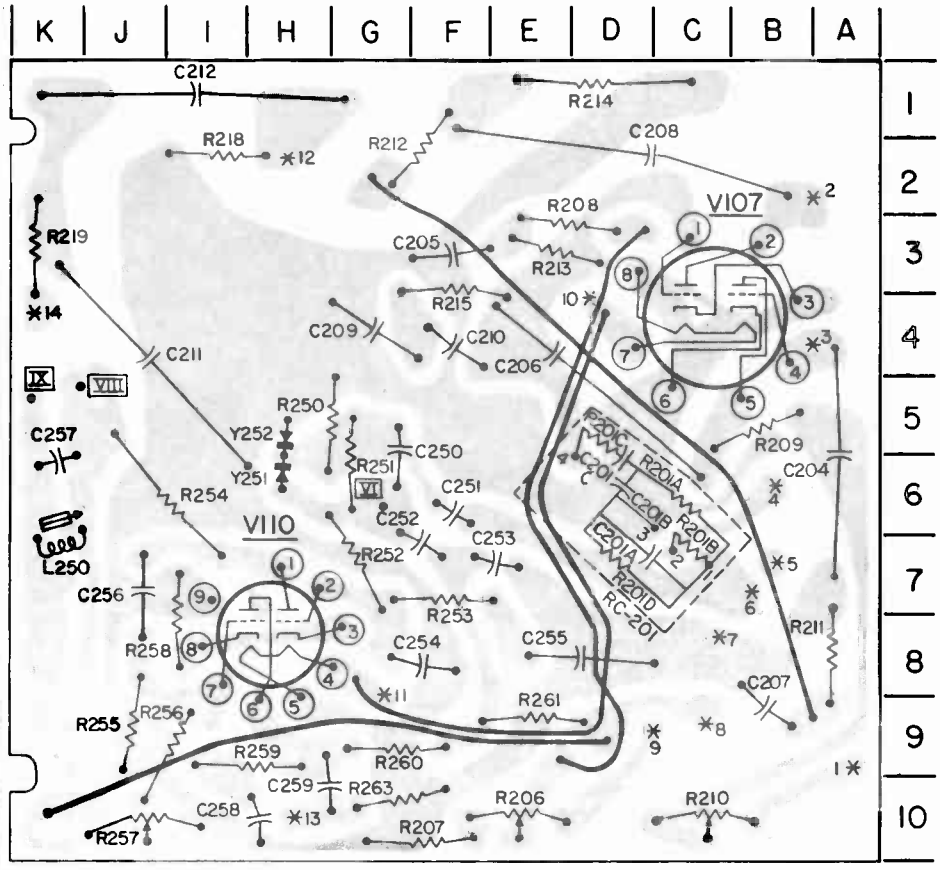
FIGURE 5. DETECTOR NETWORK

AUDIO ALIGNMENT CHART

STEP	CONNECT VTVM OR 20,000 OHMS/VOLTMETER	ADJUST	METER INDICATION	REMARKS
1	Between Pin No. 2 of V108 and chassis.	Bottom core T154	Adjust for maximum deflection.	Repeat steps 1,2, and 3 to assure proper adjustments. Each core has two positions. Select position for each core nearest respective end of the coil.
2		T301 primary(Top)	Adjust for maximum deflection.	
3	Between terminal 2 of RC-304 and the center of the two 100,000ohm resistors.	T301 secondary (Bottom)	Adjust for zero volts d-c output.	



SWEEP BOARD COMPONENT LOCATION AS VIEWED FROM COMPONENT SIDE



SWEEP BOARD COMPONENT LOCATION AS VIEWED FROM CONDUCTOR SIDE

SERVICING INFORMATION

GENERAL ELECTRIC
M4 Chassis, Continued

SWEEP BOARD VIEWED FROM COMPONENT AND CONDUCTOR SIDES

BY SYMBOLS					
RESISTORS			R256 - I9	C254 - F8	
			R257 - J10	C255 - D8	
R206 - E10			R258 - I8	C256 - J7	
R207 - F10			R259 - H9	C257 - K6	
R208 - D2			R260 - G9	C258 - H10	
R206 - B5			R261 - E9	C259 - G10	
R210 - C10			R263 - G10		
R211 - A8		CAPACITORS		RC NETWORK	
R212 - F2		C204 - A5		RC201 - D7	
R213 - E3		C205 - F3		COIL	
R214 - D1		C206 - E4		L250 - K7	
R215 - F3		C207 - B9		TUBES	
R218 - I2		C209 - G4		V107 - B2	
R219 - K3		C210 - F4		V110 - H6	
R250 - G5		C211 - J4		DIODES	
R251 - G5		C212 - I1		Y251 - H6	
R252 - G7		C250 - G5		Y252 - H5	
R253 - F7		C251 - F6			
R254 - I6		C252 - F7			
R255 - J9		C253 - E7			

BY CO-ORDINATES					
		E9 - R261		H6 - Y251	
		E10 - R206		H6 - V110	
				H9 - R259	
		F2 - R212		H10 - C258	
		F3 - C205			
A5 - C204		F3 - R215		I1 - C212	
A8 - R211		F4 - C210		I2 - R218	
		F6 - C251		I6 - R254	
B2 - V107		F7 - C252		I8 - R258	
B5 - R209		F7 - R253		I9 - R256	
B9 - C207		F8 - C254			
		F10 - R207			
C10 - R210				J4 - C211	
		G4 - C209		J7 - C256	
D1 - R214		G5 - R250		J9 - R255	
D2 - R208		G5 - R251		J10 - R257	
D7 - RC201		G5 - C250			
D8 - C255		G7 - R252			
		G9 - R260			
E3 - R213		G10 - C259		K3 - R219	
E4 - C206		G10 - R263		K6 - C257	
E7 - C253		H5 - Y252		K7 - L250	

ASTERISKED ⊛ NUMBERS

DENOTE WIRE WRAP TERMINALS MOUNTED ON COMPONENT BOARD FOR CONNECTING WIRES FROM OTHER COMPONENTS.

- *1. TO C260, T201 & T251 TERM. 4
- *2. TO T201
- *3. TO R205
- *4. TO R302 & *7 ON I-F BOARD
- *5. TO C260
- *6. TO V106 PIN 3 & *2 ON I-F BOARD
- *7. TO V116 PIN 8
- *8. TO C401B & L401
- *9. TO R205
- *10. TO F402
- *11. TO V116 PIN 1
- *12. TO V116 PIN 2
- *13. TO R262
- *14. TO L201 TERM. 3

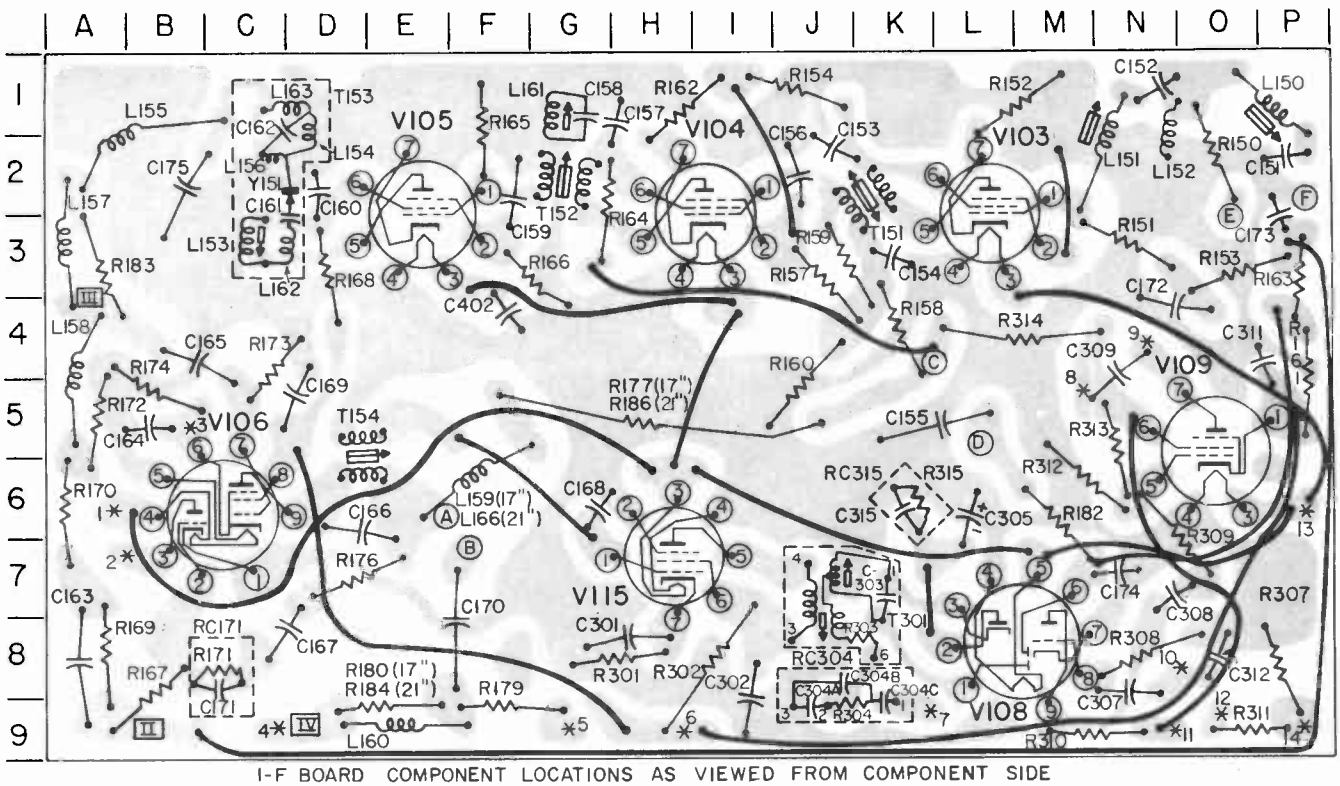
ROMAN NUMERALS Ⅴ IN SQUARES

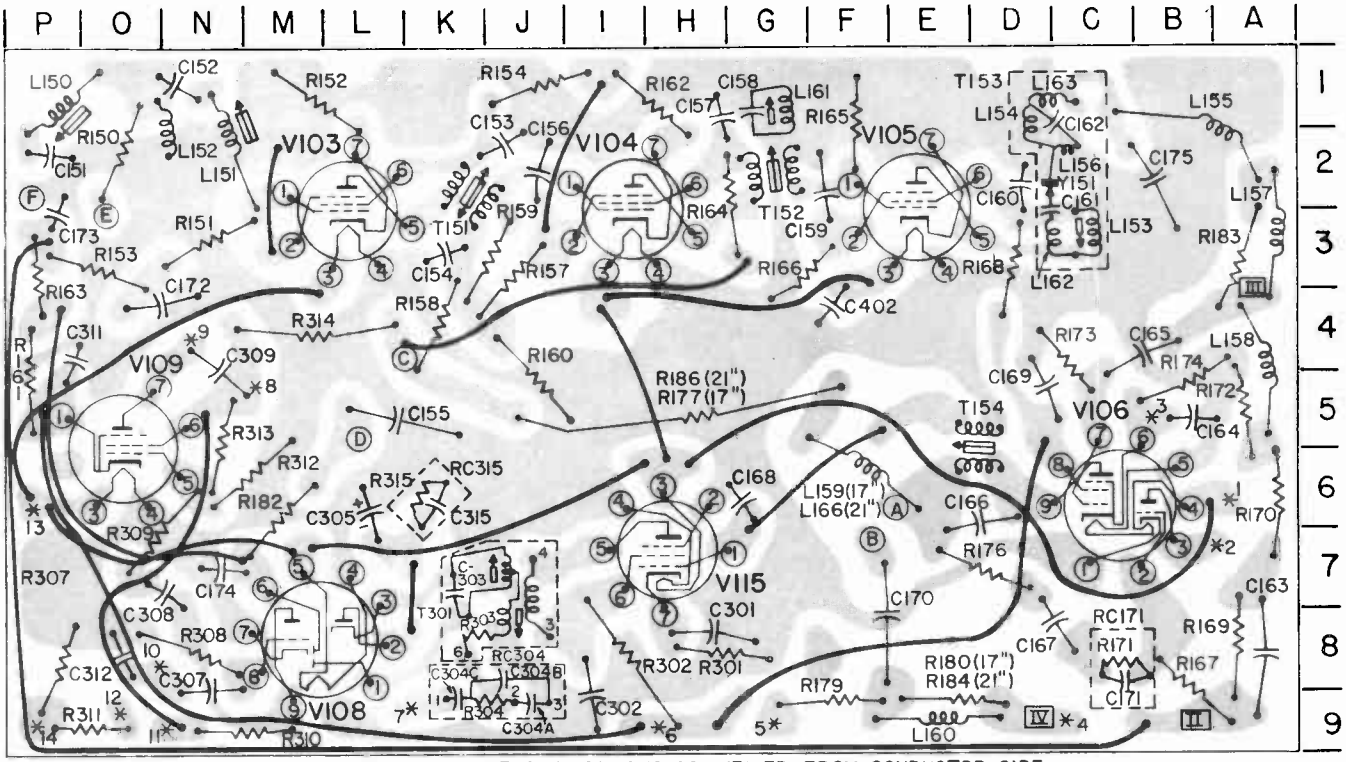
REPRESENT TEST POINTS

UNLESS OTHERWISE NOTED

K=1,000 M=1,000,000
CAPACITORS MORE THAN 1=μμf
CAPACITORS LESS THAN 1=μf

GENERAL ELECTRIC M4 Chassis, IF Boards Service Material, Continued





I-F BOARD VIEWED FROM COMPONENT AND CONDUCTOR SIDES

GENERAL ELECTRIC M4 Chassis, Service Information, Continued

This tabular material refers to IF boards as illustrated on the page adjacent at left.

ASTERISKED (*) NUMBERS

DENOTE WIRE WRAP TERMINALS MOUNTED ON COMPONENT BOARD FOR CONNECTING WIRES FROM OTHER COMPONENTS.

*1. TO F402
*2. TO RC201,TERM.1
*3. TO C401D
*4. TO V116, PIN 7
*5. TO R178
*6. TO RC201, TERM.2
*7. TO R316 (17") OR R306 (21")
*8. TO T303 (17") OR T302 (21") RED
*9. TO T303 (17") OR T302 (21") BLUE
*10. TO R316 (17") OR R306 (21")
*11. TO C310
*12. TO T303 (17") OR T302 (21") SECONDARY
*13. TO VHF TUNER FILAMENT
*14. TO R316 (17") OR R306 (21")

ROMAN NUMERALS [V] IN SQUARES

REPRESENT TEST POINTS.

BY SYMBOL							
RESISTORS							
R150	-	O2	R179	-	F9	C160	-	D2	L155	-	A1
R151	-	N3	R180	-	B9	C163	-	A8	L157	-	A3
R152	-	L1	R182	-	M6	C164	-	B5	L158	-	A4
R153	-	O3	R183	-	A3	C165	-	B4	L159	-	F6
R154	-	J1	R184	-	E9	C166	-	D6	L160	-	E9
R157	-	J3	R186	-	H5	C167	-	C8	L161	-	G1
R158	-	K4	R301	-	H8	C168	-	G6	L166	-	F6
R159	-	J3	R302	-	I8	C169	-	D5	T151	-	K2
R160	-	J5	R307	-	F8	C170	-	E8	T152	-	G2
R161	-	P5	R308	-	N8	C172	-	H4	T153	-	D1
R162	-	H1	R309	-	O7	C173	-	P3	T154	-	D5
R163	-	P3	R310	-	M9	C174	-	N7	T301	-	K8
R164	-	G2	R311	-	O9	C175	-	B2	RC NETWORKS		
R165	-	F1	R312	-	M6	C301	-	H8	RC171	-	C8
R166	-	F3	R313	-	N5	C302	-	I9	RC304	-	J8
R167	-	B8	R314	-	M4	C305	-	L6	RC315	-	K6
R168	-	D3	CAPACITORS			C307	-	N8	TUBES		
R169	-	A8	C151	-	P2	C308	-	N7	V103	-	L2
R170	-	A6	C152	-	N1	C309	-	N4	V104	-	I2
R172	-	A5	C153	-	J2	C311	-	P4	V105	-	E2
R173	-	C4	C154	-	K3	C312	-	O8	V106	-	C5
R174	-	B5	C155	-	L5	COILS & TRANSFORMERS			V108	-	L9
R176	-	D7	C156	-	J2	L150	-	P1	V109	-	N4
R177	-	H5	C157	-	H1	L151	-	N2	V115	-	G7
			C158	-	G1	L152	-	N2			
			C159	-	F2						

BY CO-ORDINATES											
A1	-	L155	D6	-	C166	H8	-	R301	M6	-	R312
A3	-	R183	D7	-	R176	H8	-	C301	M9	-	R310
A3	-	L157	E2	-	V105	I2	-	V104	N1	-	C152
A4	-	L158	E8	-	C170	I8	-	R302	N2	-	L151
A5	-	R172	E9	-	R180	I9	-	C302	N2	-	L152
A6	-	R170	E9	-	R184	J1	-	R154	N3	-	R151
A8	-	R169	E9	-	L160	J2	-	C153	N4	-	V109
A8	-	C163	F1	-	R165	J2	-	C156	N4	-	C309
			F2	-	C159	J3	-	R157	N5	-	R313
B2	-	C175	F3	-	R166	J3	-	R159	N7	-	C308
B4	-	C165	F6	-	L159	J5	-	R160	N7	-	C174
B5	-	C164	F6	-	L166	J8	-	RC304	N8	-	R308
B5	-	R174	F9	-	R179	K2	-	T151	N8	-	C306
B8	-	R167	G1	-	C158	K3	-	C154	O2	-	R150
			G1	-	L161	K4	-	R158	O3	-	R153
C4	-	R173	G2	-	R164	K6	-	RC315	O7	-	R309
C5	-	V106	G2	-	T152	K8	-	T301	O8	-	C312
C8	-	RC171	G6	-	C168	L1	-	P152	O9	-	R311
C8	-	C167	G7	-	V115	L2	-	V103	P1	-	L150
						L5	-	C155	P2	-	C151
D1	-	T153	H1	-	R162	L6	-	C305	P3	-	R163
D2	-	C160	H1	-	C157	L9	-	V108	P3	-	C173
D3	-	R168	H4	-	C172	M4	-	R314	P4	-	C311
D5	-	T154	H5	-	R177	M6	-	R182	P5	-	R161
D5	-	C169	H5	-	R186	M6	-	R182	P8	-	R307

CIRCLED (A) LETTERS

REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD.

(A) TO R181 (17") OR R175 (21")
(B) TO R181 (17") OR R175 (21")
(C) TO F251
(D) TO VHF TUNER-AGC TERMINAL
(E) TO VHF TUNER-OUTPUT TERMINAL
(F) TO SHIELD OF (E)

HORIZONTAL HOLD -

1. Remove the cabinet back as described.
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 L250.)
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 L250 stabilizer coil so that the picture again just"floats"across the screen. Leave L250 set in this position.
7. Remove the jumper from Test Point VI and the chassis.

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

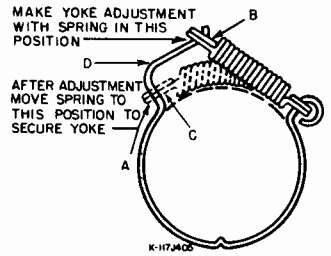


FIG. 1.YOKE CLAMP

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

FOCUS - The proper focus potential for the tube was chosen at the time the set was manufactured. If it becomes necessary to install a new picture tube or change the focus potential, any one of three potentials may be chosen for best focus. The three connection points for focus potential are located on the small printed board behind the vertical linearity potentiometer. The lead from R269 in the picture tube socket may be connected to the proper point for best focus as follows:

1. B+ Boost. Connect to pin that is directly connected to the (+) side of C260 boost capacitor.
2. B+ 278. Connect to pin that is directly connected to the (-) side of C260 boost capacitor.
3. Ground. Connect to pin that is directly connected to Pin 8 of the picture tube socket.

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 alide the ion trap on the neck of the picture tube to abtain maximum picture brightness without neck shadow and consistent with good focus. Brightness should be kept moderate during the ion trap adjustment.

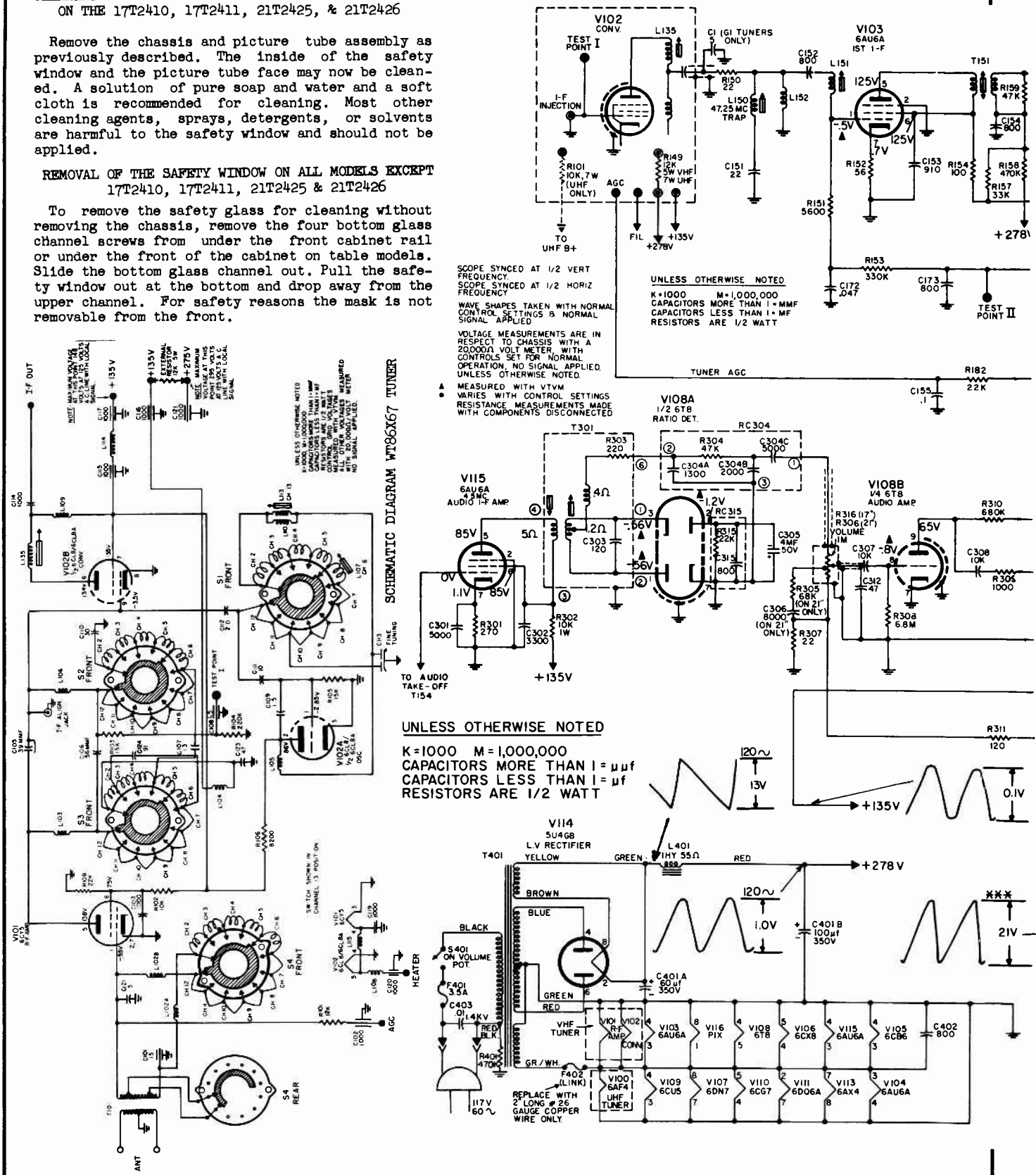
GENERAL ELECTRIC M4 Chassis, Service Material and Schematic Diagram

CLEANING THE SAFETY WINDOW AND PICTURE TUBE FACE ON THE 17T2410, 17T2411, 21T2425, & 21T2426

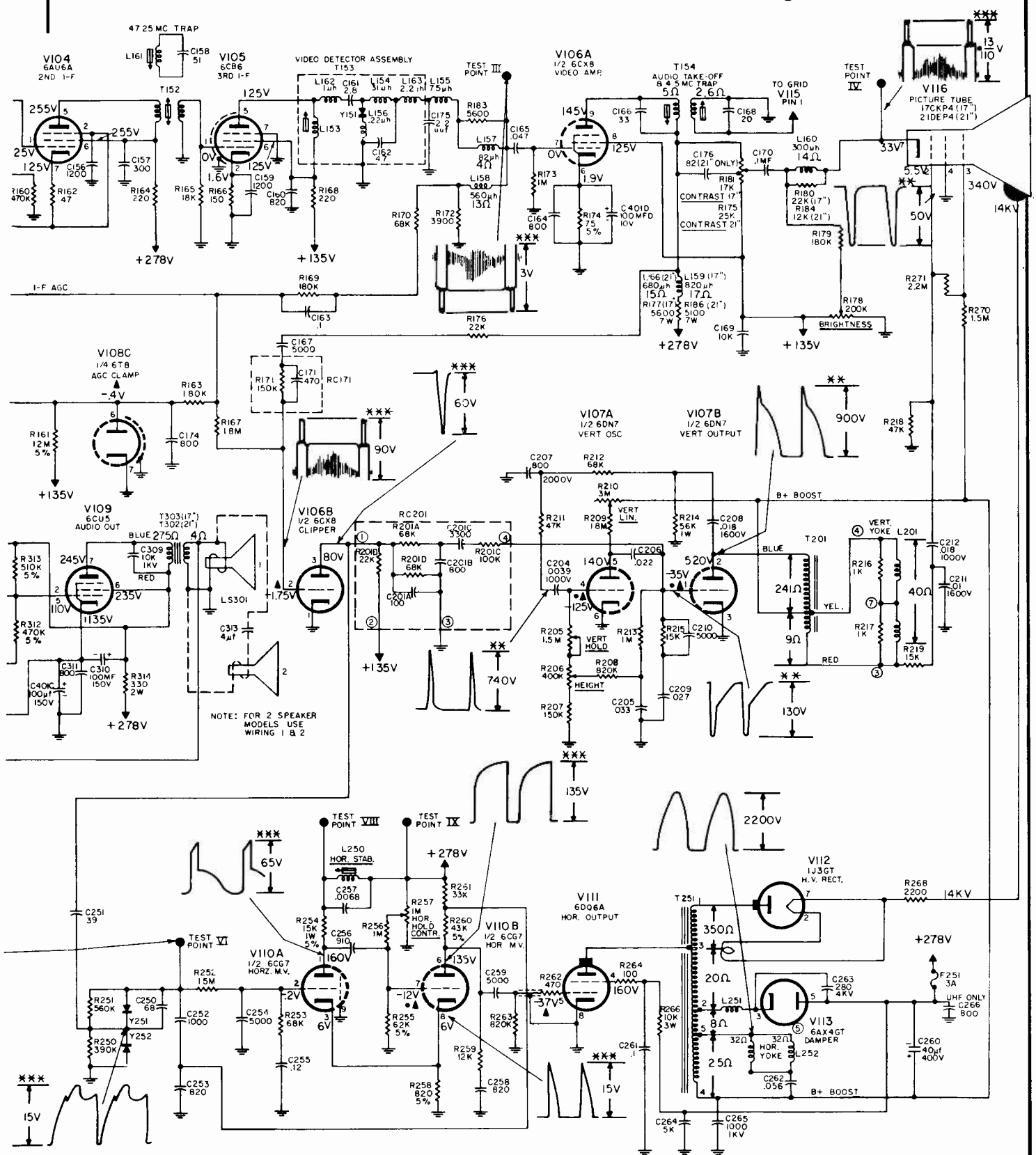
Remove the chassis and picture tube assembly as previously described. The inside of the safety window and the picture tube face may now be cleaned. A solution of pure soap and water and a soft cloth is recommended for cleaning. Most other cleaning agents, sprays, detergents, or solvents are harmful to the safety window and should not be applied.

REMOVAL OF THE SAFETY WINDOW ON ALL MODELS EXCEPT 17T2410, 17T2411, 21T2425 & 21T2426

To remove the safety glass for cleaning without removing the chassis, remove the four bottom glass channel screws from under the front cabinet rail or under the front of the cabinet on table models. Slide the bottom glass channel out. Pull the safety window out at the bottom and drop away from the upper channel. For safety reasons the mask is not removable from the front.

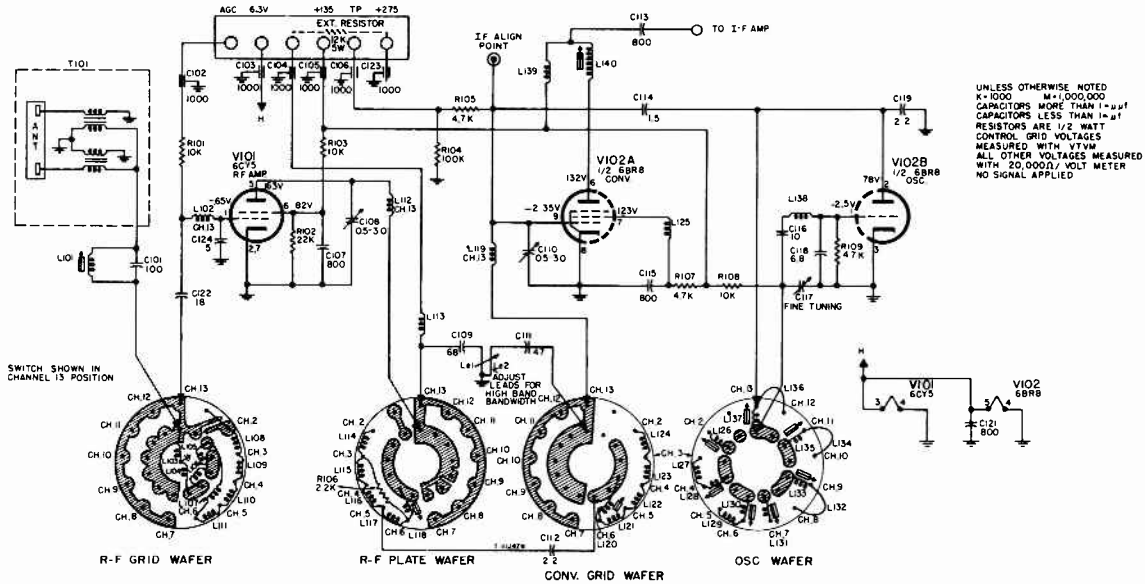


GENERAL ELECTRIC M4 Chassis, Schematic Diagram

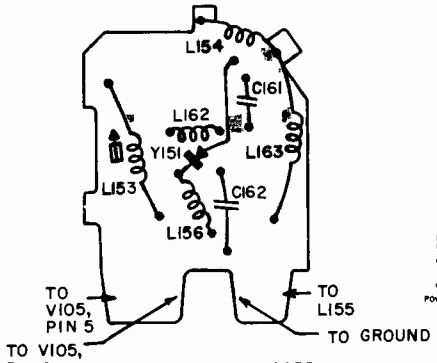


SCHEMATIC DIAGRAM, MAIN CHASSIS, WITH VOLTAGES AND WAVESHAPES

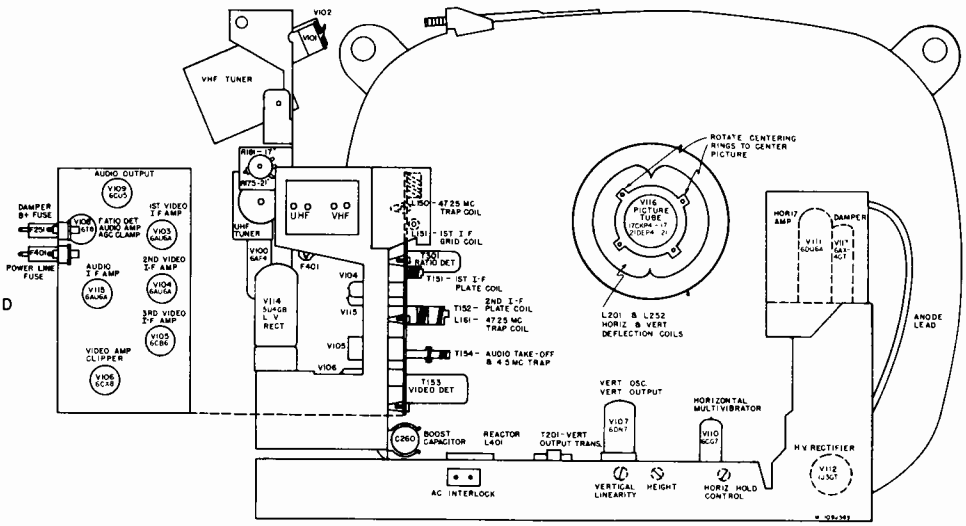
GENERAL ELECTRIC M4 Chassis, Service Material, Continued



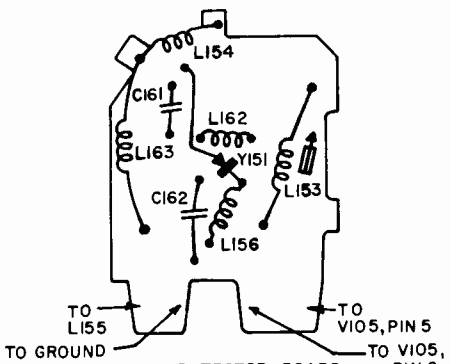
SCHEMATIC DIAGRAM WT86X71 TUNER



VIDEO DETECTOR BOARD COMPONENT LOCATION AS VIEWED FROM CONDUCTOR SIDE.



TUBE AND ADJUSTMENT LOCATION

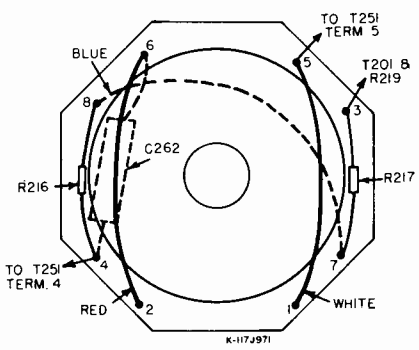


VIDEO DETECTOR BOARD COMPONENT LOCATION AS VIEWED FROM COMPONENT SIDE

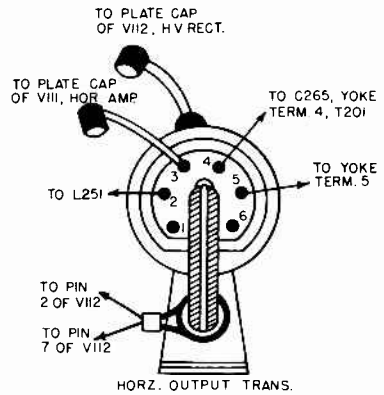
C161	L156
C162	L162
L153	L163
L154	Y151

DETECTOR BOARD COMPONENTS

DETECTOR BOARD - BOTH SIDES



YOKE WIRING



HIGH VOLTAGE TRANSFORMER

GENERAL ELECTRIC

"Q-3" Line Receivers, Models 14P1208, 14P1215, 14P1216, and UHF, material is on the next eight pages and is exact for above listed General Electric sets, as well as the Hotpoint sets listed below.

Hotpoint Co.

A DIVISION OF GENERAL ELECTRIC COMPANY

"Q-3" Line Chassis, used in Models 14S208, 14S209, and UHF.

ELECTRICAL SAFETY TEST

Should the receiver become damaged, or the chassis removed to effect repairs, or for any other desirable reason; the following advised safety test should be performed.

The receiver, on which the safety test is to be made, must be in good operating condition and completely assembled.

With no power applied to the receiver, short the two prongs of the power plug together and connect one probe of an ohmmeter to the shorted prongs of the power plug.

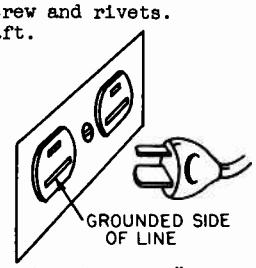
The power switch of the receiver should be "ON" and the channel selector knob removed. All built-in antennas should be connected to their proper connections on the antenna terminal board.

All readings obtained between the power plug and the following listed points should be over 125,000 ohms to be considered within the safety limits.

1. Cabinet body (to insure proper contact, use a cabinet back retaining screw for test point).
2. Each individual antenna terminal.
3. Interlock retaining screw and rivets.
4. VHF tuner selector shaft.
5. Cabinet foot.
6. Handle.

FIGURE 1.

POLARIZED POWER PLUG



In addition to the above safety test, a "Polarization" check should be performed. Connect an ohmmeter between the wide blade of the power plug and the main chassis. If polarization of the power plug is correct, with respect to chassis, a zero ohms reading should be obtained.

ELECTRICAL ADJUSTMENTS

HEIGHT & VERTICAL LINEARITY--These controls, R211 and R212, 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 edges of the mask.

Horizontal Hold

1. Tune receiver to a weak signal and adjust controls for normal operation.
2. Short Test Point VI to VII.
3. Shunt L251 (horizontal stabilizer coil) with 2200 ohms.
4. Adjust horizontal hold potentiometer R261 so that the picture " floats" back and forth across the screen. Leave R261 set like this.
5. Remove 2200 ohm shunt across L251 and adjust L251 so that picture again "floats" back and forth across the screen. Leave L251 set like this.
6. Remove connection from Test Point VI and VII.

PICTURE TUBE ADJUSTMENTS

Yoke Position--The yoke is secured to the neck of the picture tube by a "U" shaped clamp and spring, Figure 2. To adjust the yoke for picture tilt, loosen the clamp by squeezing points C & 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 and is squared in the mask. To secure the yoke, the pliers are used in the same manner between points A & B until the spring eye slides over the bend to its clamping position.

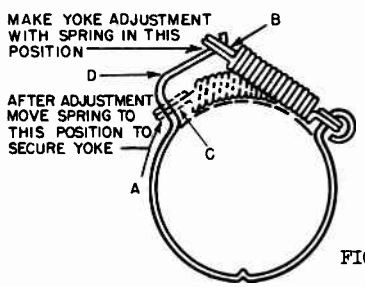


FIGURE 2. YOKE CLAMP

Picture Centering--The picture centering device is located on the rear of the yoke assembly. The two tabs through which holes have been punched should be rotated towards or away from each other to center the picture on the face of the tube. The holes are provided in the tabs so that an insulated alignment tool may be inserted in them to provide an easy means of rotating the rings.

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

GENERAL ELECTRIC "Q-3" Line, Service Information, Continued

potentials may be chosen for best focus. Two different potentials may be obtained at the horizontal control by connecting the focus lead from Pin 4 of the picture tube to either the right terminal (B+)or the left terminal which is ground potential. On the left side of the interlock and line filter board located to the right of the horizontal control is a terminal to which Boost voltage is applied. This point may also be used for focus potential.

Ion Trap--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 at maximum during the ion trap adjustment.

TO REMOVE THE CHASSIS FROM THE CABINET

Disconnect any antenna connected to the antenna terminal board. Remove the cabinet back by taking out the screws securing the back to the cabinet and the interlock bracket. Remove the knobs from the shafts on the top of the cabinet. Take out the three bottom screws located at the middle and rear of the cabinet bottom. Remove the two Phillips Head screws from the top of the cabinet located to the rear of the contrast and brightness control. Extend the outer section of the telescoping antenna to its full length. Disconnect the picture tube socket and remove the ion trap. Tilt the chassis out from the bottom as viewed from the rear,at the same time, slide the chassis out over the neck of the tube. Loosen the yoke clamp and slide the yoke back over the neck of the picture tube.

The anode should be discharged with a jumper connected first to the chassis. The anode lead is disconnected by squeezing the anode clip. The leads attached to the speaker can be unsoldered from the speaker terminals or the nuts securing the speaker to the cabinet can be removed and the complete speaker can be taken out.

To install the chassis, reverse the above procedure, making sure that the anode and speaker leads are connected and the phosphor bronze terminal which is soldered to the by-pass condenser on the tuner is inserted in the bottom of the nylon nut so that the bottom screw secures the terminal to the bottom of the cabinet.

REMOVAL OF THE SAFETY WINDOW AND/OR PICTURE TUBE

Remove the two bottom screws securing the cabinet front to the cabinet bottom. Remove the two screws located on the top of the cabinet front. The cabinet front is now removed by tilting the front out at the bottom.

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 is recommended for cleaning. Most other cleaning agents, sprays, detergents, or solvents are harmful to the safety window and should not be applied.

In order to remove the picture tube from the cabinet, it is necessary to first remove the chassis from the cabinet as outlined.

The picture tube is secured by the clamping action of the picture tube strap assembly against the rim of the picture tube. Remove the two clamping screws from the top of the tube strap assembly while supporting the rear of the picture tube with one hand--slide the tube out through the front of the cabinet.

To replace the tube, reverse the above procedure remembering the following: the anode button should be positioned on the left side of the cabinet as you face the front.

VIDEO I-F ALIGNMENT

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.

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 sound output and contrast fully clockwise to maximum. Set channel selector to Channel 11 or some other high-band channel where oscillator influence is not noted as the fine tuning control is turned.
3. Connect sweep generator to converter stage using a test jig made up of an ungrounded tube shield terminated to ground as specified by the generator manufacturer. Users of General Electric test equipment need not terminate as the attenuator is terminated -- see Fig. 3.
4. Connect a 3 volt bias battery to Test Point II with positive battery lead to chassis.
5. Connect the scope through a 10,000 ohm resistor to Test Point III. Calibrate the vertical gain of the scope for 3 volts peak to peak to give 2 inches of deflection. When aligning, keep 2 inches as the 100% base line.

AM PRE-PEAKING FREQUENCIES
L135 - 44.3 MC
L151 - 44.3 MC
L152 - 43.3 MC
T151 - 45.3 MC

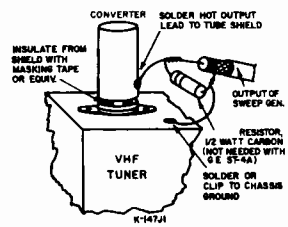
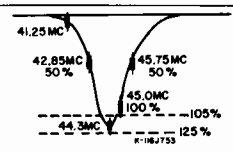


FIGURE 3. I-F SWEEP JIG

VIDEO I-F ALIGNMENT CHART

STEP	ADJUST	DESIRED RESPONSE	REMARKS
1.	L152 to set 42.85 mc marker at 50%.		Adjust L135 simultaneously with L151. Peak of curve may fall between limits of 105% and 125% using 45 mc as the 100% reference.
2.	T151 to set 45.75 mc marker at 50%.		
3.	L135 and L151 for peak region symmetry.		

GENERAL ELECTRIC "Q-3" Line, Alignment Information, Continued

4.5 MC TRAP ALIGNMENT

1. Turn contrast control fully clockwise.
2. Connect detector network (Figure 4) to Test Point IV and set contrast to maximum. Connect oscilloscope to network.
3. Apply a 4.5 mc AM signal through .001 uf. to Test Point III.
4. Tune the core of L159 for minimum signal observed on oscilloscope.

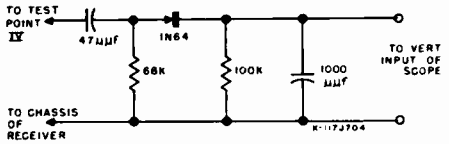


FIGURE 4. DETECTOR NETWORK

AUDIO I-F ALIGNMENT

The tuned circuits of the new "Delta" sound system may be aligned by the use of a television channel as the signal source or by the use of a crystal calibrated 4.5 mc FM signal generator with 400 cycle modulation and ±25kc deviation.

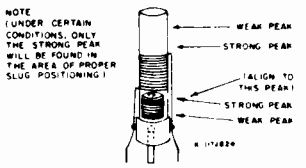


FIGURE 5. DISCRIMINATOR COIL

AUDIO I-F ALIGNMENT USING A SIGNAL GENERATOR

General Notes:
1. Adjust AM Rejection Control (R305) to its mechanical center.
2. Allow receiver and alignment equipment at least 20 minutes of warm up time before proceeding.
3. Turn volume control to maximum clockwise position. PROCEED AS FOLLOWS:

STEP	CONNECT SCOPE (CALIBRATED FOR 3 VOLTS P.P. FOR 2" OF DEFLECTION)	CONNECT 4.5 MC SIGNAL GENERATOR	ADJUST	METER INDICATION
1.	Across the speaker voice coil	Thru a .001 ufd. capacitor to Test Point III (attenuate input level for 2 inches of deflection or less on the scope)	L302	Adjust for maximum deflection. (See Fig. 5 for proper setting)
2.			L301	Adjust for maximum deflection.
3.			T301	Adjust for maximum deflection. (Proper setting is the peak farthest from printed wiring board)
4.		Repeat Steps 1, 2, and 3 to assure proper adjustments.		
5.	Connect the antenna leads directly to the antenna terminals of the receiver and tune to a strong television signal. Select a channel that exhibits the most buzz when tuned slightly into audio.			
6.	Set fine tuning to a point into audio where the picture is still in sync. This will amplify any existing buzz that is present.			
7.	Adjust R305, the AM Rejection Control, for minimum buzz. In some cases, it will be found that no buzz is present regardless of where the fine tuning control is positioned. In this event, the AM Rejection Control R305 should be set at its mechanical center. R305 should never be set at its full clockwise position. (NOTE: During the short intervals, such as station breaks when no audio is present, a much finer setting of R305 may be obtained.)			

AUDIO I-F ALIGNMENT USING A TELEVISION CHANNEL AS THE SIGNAL SOURCE

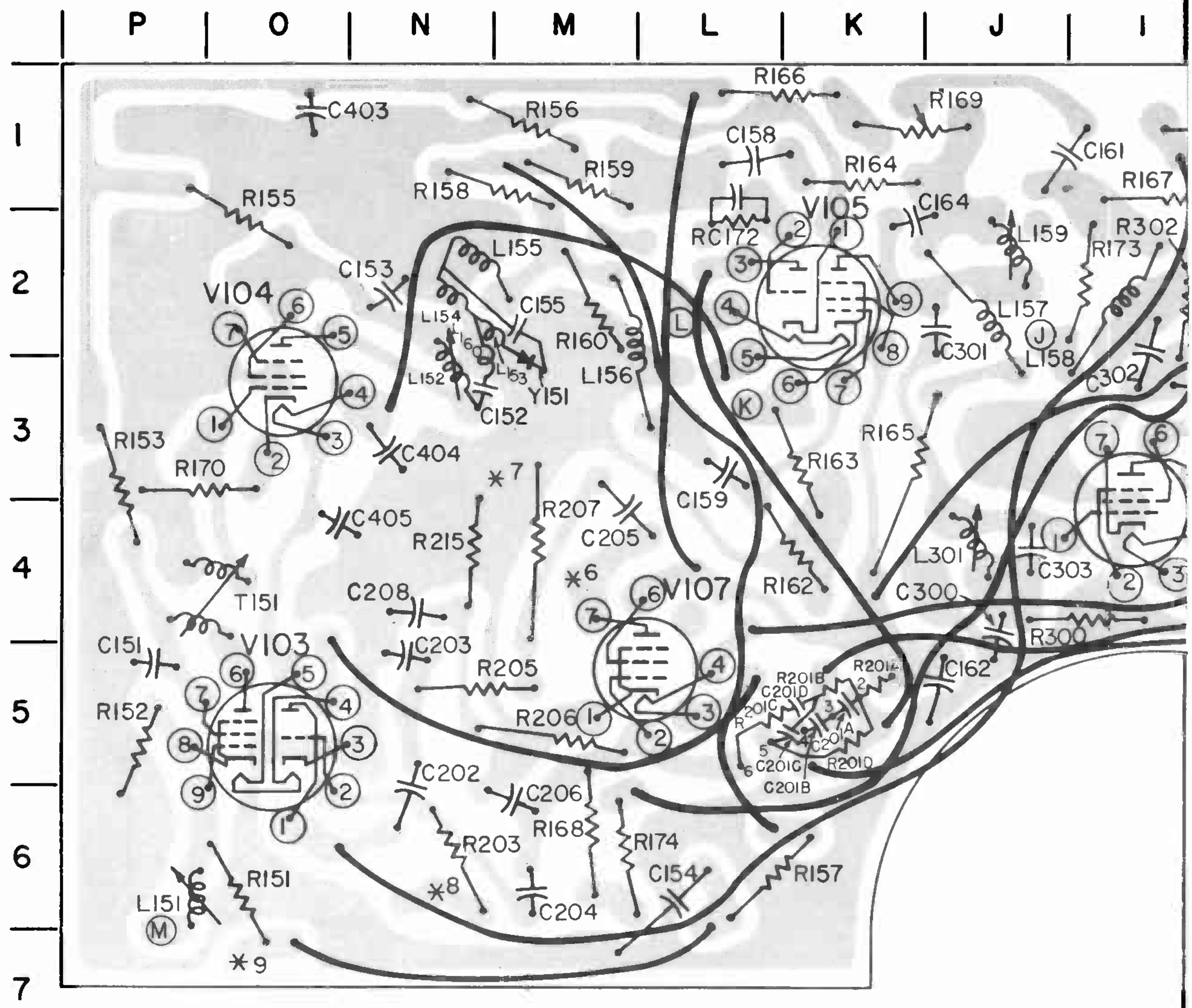
1. With the antenna connected, tune in a television signal (preferably a test pattern with tone modulation). This will provide a 4.5 mc signal source for audio alignment. With the speaker connected, turn the volume control to its full clockwise position.
2. Disconnect, but loosely couple the antenna leads to the antenna terminals of the receiver. The degree of coupling is proper when it is possible to barely hear audio above the background noise. (If desired, a scope may be connected across the speaker voice coil to help distinguish audio peaks from background noise.)
3. Peak each coil for maximum audio in the following sequence.
   a. L302 audio discriminator coil (L302 will tune thru 4 peaks. For proper setting refer to Figure 5. This coil must be peaked for maximum audio with minimum buzz.)
   b. L301 sound take-off coil.
   c. T301 audio I-F transformer.

(NOTE: As each coil is peaked, attenuate audio by further decoupling the antenna leads from the receiver.)

4. Connect the antenna leads directly to the antenna terminals of the receiver and tune to a strong television signal. Select a channel that exhibits the most buzz when tuned slightly into audio.
5. Set fine tuning to a point into audio where the picture is still in sync. This will amplify any existing buzz that is present.
6. Adjust R305, the AM Rejection Control, for minimum buzz. In some cases it will be found that no buzz is present regardless of where the fine tuning control is positioned. In this event, the AM Rejection Control (R305) should be set at its mechanical center. R305 should never be set at its full clockwise position.

(NOTE: During the short intervals, such as station breaks when no audio is present, a much finer setting of R305 may be obtained.)

GENERAL ELECTRIC "Q-3" Line, Service Information, Continued



BY SYMBOLS

CAPACITORS

C151	P5	270uuf.
C152	N3	1.8uuf.
C153	N2	820uuf.
C154	L6	.1uf.
C155	M2	5uuf.
C158	L1	5000uuf.
C159	L3	.047uf.
C161	J1	.1uf.
C162	J5	5000uuf.
C164	K2	33uuf.
C202	N6	3300uuf.
C203	N5	800uuf.
C204	M6	.015uf.
C205	M3	.047uf.
C206	M6	.047uf.
C208	N4	.027uf.
C251	G4	1200uuf.
C252	F3	820uuf.
C253	D3	10,000uuf.
C254	E4	.1uf.
C255	C3	1000uuf.
C256	C2	2200uuf.
C257	E4	3900uuf.
C258	D5	300uuf.
C259	D6	1200uuf.
C261	B4	570uuf.
C300	J4	100uuf.
C301	J2	5uuf.
C302	I3	5000uuf.
C303	J4	20uuf.
C304	H2	2200uuf.
C305	G1	.15uf.
C306	E1	100uuf.
C307	E1	.047uf.
C308	E3	150uuf.
C309	F3	680uuf.
C310	D1	10,000uuf.
C311	A1	10,000uuf.
C403	O1	800uuf.
C404	N3	800uuf.
C405	O3	800uuf.
C406	H4	800uuf.
C407	E1	800uuf.
C408	G5	800uuf.

RESISTORS

R151	O6	8.2K ohms
R152	P5	47 ohms
R153	P3	560 ohms
R155	O1	220 ohms
R156	M1	20M ohms
R157	L6	2.2M ohms
R158	N1	180K ohms
R159	M1	1.5M ohms
R160	M2	4.7K ohms
R162	L4	1M ohms
R163	K3	82 ohms
R164	K1	33K ohms
R165	K3	4.7K ohms
R166	K1	5.6K ohms
R167	I2	220K ohms
R168	M6	18M ohms
R169	J1	12K ohms
R170	P3	56 ohms
R171	F1	200K ohms
R173	I2	27K ohms
R174	M6	18M ohms
R203	N6	1.5M ohms
R205	N5	47K ohms
R206	M5	330K ohms
R207	M4	22K ohms
R210	H1	1.5M ohms
R215	N4	330K ohms
R251	H4	270K ohms
R252	G3	220K ohms
R253	D6	4.7M ohms
R254	H4	75K ohms
R255	E3	1M ohms
R256	E4	47K ohms
R257	C3	15K ohms
R258	B4	820K ohms
R259	C4	120K ohms
R260	C4	1100 ohms
R262	D5	150K ohms
R263	D5	220K ohms
R264	F5	470 ohms
R265	E5	18K ohms
R266	F4	1.5M ohms
R267	B7	270K ohms
R268	B6	270K ohms
R300	I4	47K ohms
R301	H3	12K ohms
R302	I2	100 ohms
R303	H2	12K ohms
R304	G2	150K ohms
R306	D1	10M ohms
R307	D2	1M ohms
R308	D1	500K ohms
R309	C1	120 ohms
R311	E3	22K ohms
R404	E6	22 ohms

COILS & TRANSFORMERS

L151	P6	
L152	N3	
L154	N2	31 uh
L155	N2	7.5 uh
L156	M2	82 uh
L157	J2	510 uh
L158	I2	270 uh
L159	J2	
L160	N2	1.2 uh
L251	B3	
L253	C4	8.2 uh
L254	B6	8.2 uh
L301	J4	
L302	E2	
T301	H3	
T151	P4	

TUBES

V103	O5
V104	O2
V105	K2
V107	M4
V108	I4
V109	D3
V110	F6
V112	C6
V113	F2
V114	B2

MISCELLANEOUS

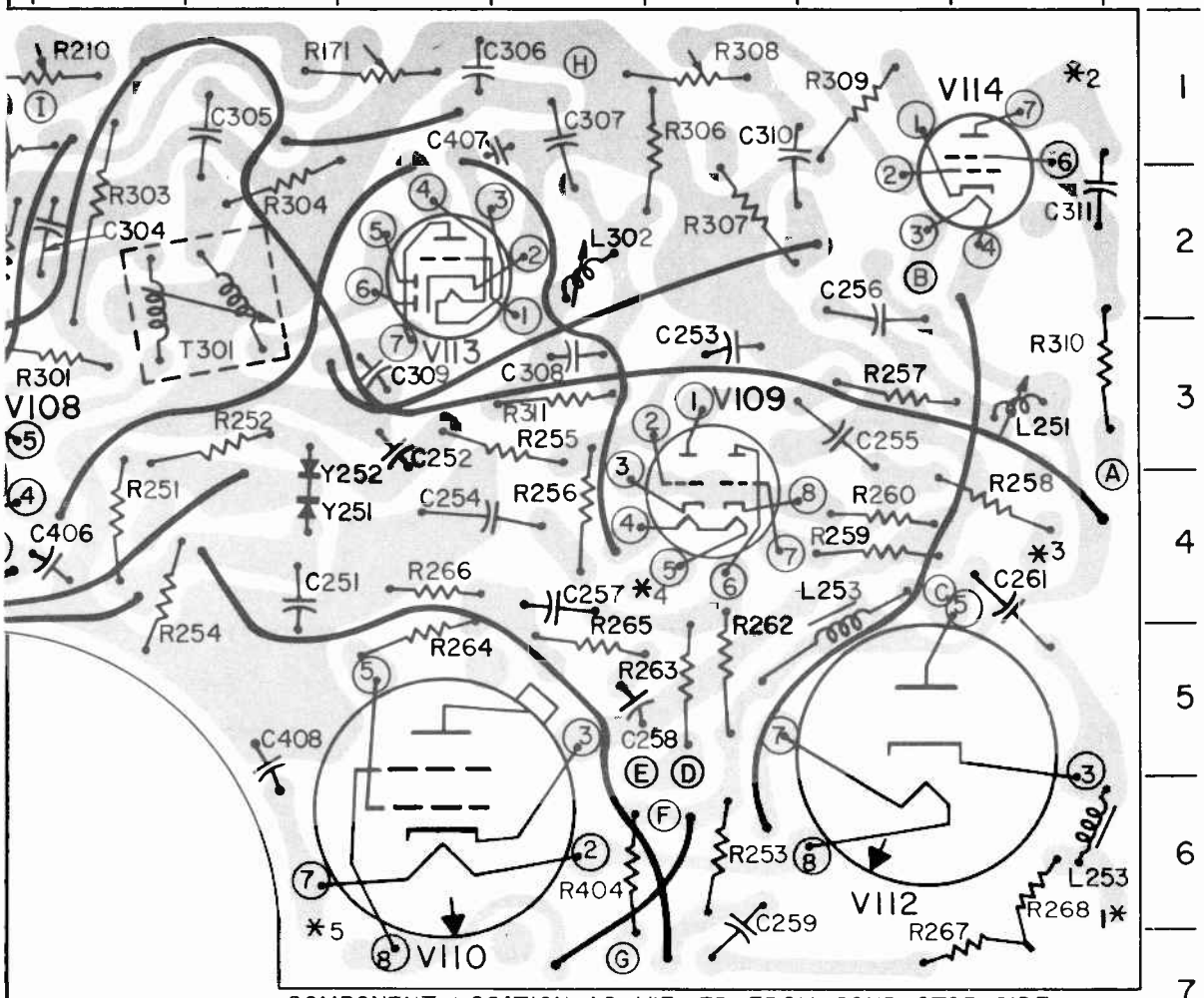
RC172	L2
RC201	K5
Y151	M2
Y251	G4
Y252	G3

BY CO-ORDINATES

A1	C311
A3	R307
B2	V114
B3	L251
B4	R258
B4	C261
B6	L254
B6	R268
B7	R267
C1	R309
C2	C256
C3	R257
C3	C255
C4	R260
C4	R259
C4	L253
C6	V112
D1	C310
D1	R308
D1	R306
D2	R307
D3	C253
D3	V109
D5	R262
D5	R263
D5	C258
D6	R253
D6	C259
E1	C306
E1	C307
E1	C407
E2	L302
E3	C308
E3	R311
E3	R255
E4	R256
E4	C254
E4	C257
E5	R265
E6	R404
F1	R171
F2	V113
F3	C309
F3	C252
F4	R266
F5	R264
F6	V110
G1	C305
G2	R304
G3	R252
G3	Y252
G4	Y251
G4	C251
G5	C408
H1	R210
H2	R303
H2	C304
H3	T301
H3	R301
H4	R251
H4	R254
H4	C406
I2	R167
I2	R302
I2	L158
I2	R173
I3	C302
I4	V108
I4	R300
J1	C161
J1	R169
J2	L159
J2	L157
J2	C301
J4	C303
J4	L301
J4	C300
J5	C162
K1	R169
K1	R164
K1	R166
K2	C164
K2	V105
K3	R165
K3	R163
K5	RC201
L1	C158
L2	RC172
L3	C159
L4	R162
L6	R157
L6	C154
M1	R156
M1	R159
M2	R160
M2	L156
M2	C155
M2	Y151
M3	C205
M4	R207
M4	V107
M5	R206
M6	R168
M6	R174
M6	C204
M6	C206
N1	R158
N2	L155
N2	L154
N2	L160
N2	C153
N3	L152
N3	C152
N3	C404
N4	R215
N4	C208
N5	C203
N5	R205
N6	C202
N6	R203
O1	C403
O1	R255
O2	V104
O3	C405
O5	V103
O6	R151
P3	R170
P3	R153
P4	T151
P5	C151
P5	R152
P6	L151

Separation is made only for printing convenience.

GENERAL ELECTRIC "Q-3" Line, Service Information, Continued



COMPONENT LOCATION AS VIEWED FROM CONDUCTOR SIDE

CIRCLED (A) LETTERS

REPRESENT INTERCONNECTING WIRES SOLDERED INTO BOARD.

- (A) TO C402B
- (B) TO PIN 1 OF CRT
- (C) TO C402A
- (D) TO TERM. 6 OF HORIZ. OUTPUT TRANS. T251
- (E) TO C260 & TERM. BOARD
- (F) TO TERM. 4 OF VERT. DEFLECTION COILS L201
- (G) TO C402D
- (H) TO R305
- (I) TO R212 VERT. HEIGHT CONTROL (TOP)
- (J) TO PIN 7 OF CRT
- (K) TO C402C
- (L) TO PIN 8 OF CRT
- (M) I-F INPUT CABLE TO TUNER

ASTERISKED (*) NUMBERS

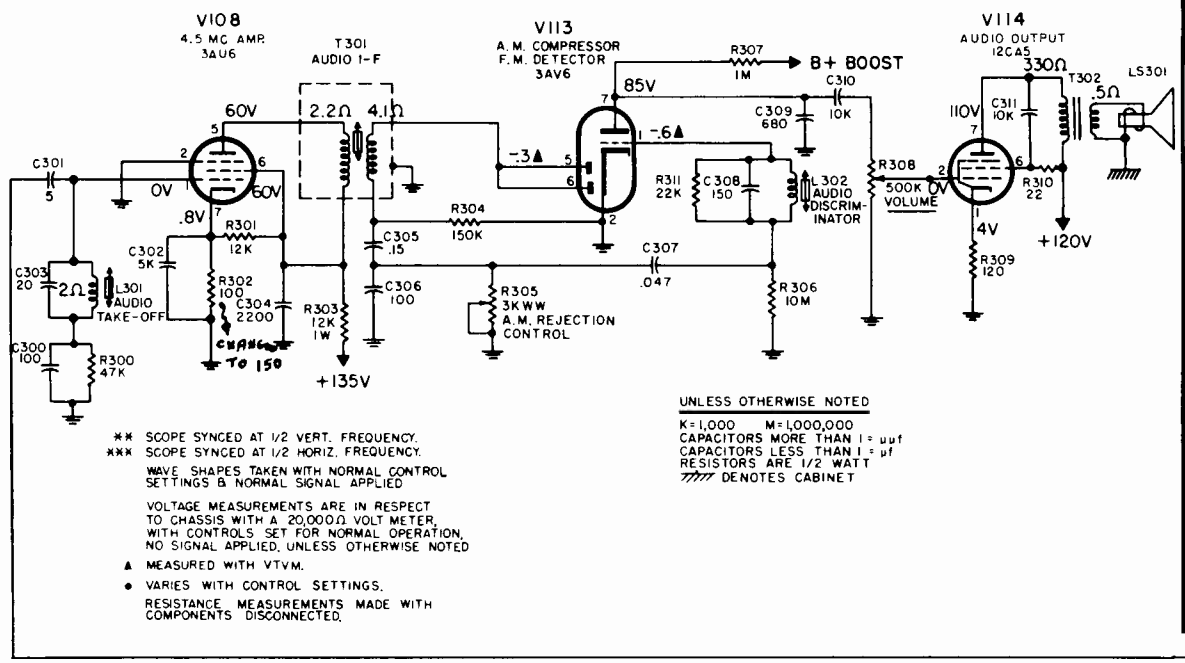
DENOTE WIRE WRAP TERMINALS MOUNTED ON COMPONENT BOARD FOR CONNECTING WIRES FROM OTHER COMPONENTS.

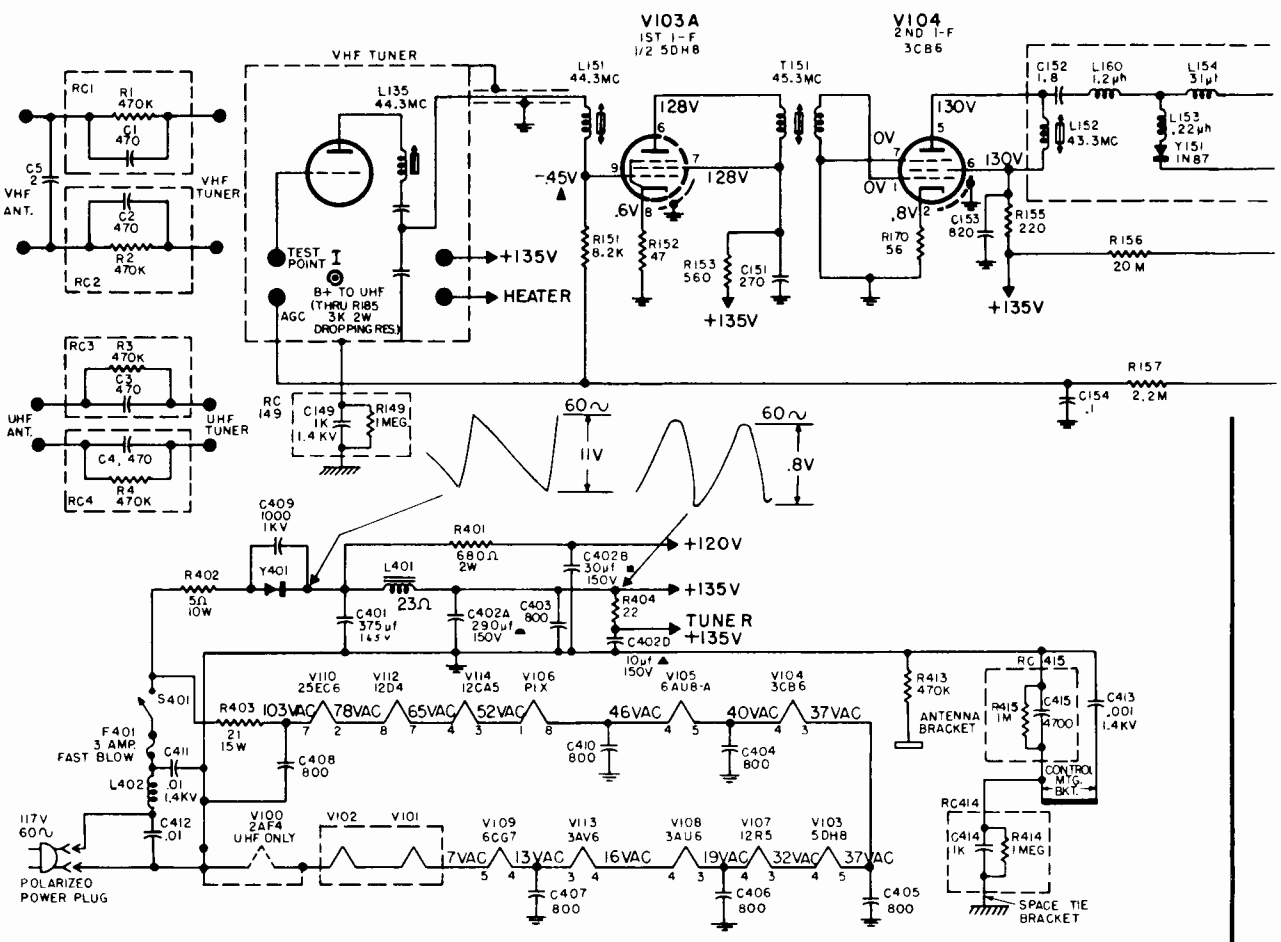
- *1 TO TERM. 5 OF HORIZ. OUTPUT TRANS. T251 & TERM. 1 OF YOKE
- *2 TO AUDIO OUTPUT TRANS. T302
- *3 TO HORIZ. HOLD CONTROL R261
- *4 TO FILAMENT TERM. ON VHF TUNER
- *5 TO R403 ON BACK CONTROL BRACKET
- *6 TO T201 VERT. OUTPUT TRANS.
- *7 TO VERT. HEIGHT CONTROL R212
- *8 TO VERT. LINEAR CONTROL R211
- *9 AGC TO VHF TUNER

UNLESS OTHERWISE NOTED

K = 1000 M = 1,000,000
CAPACITORS MORE THAN 1 = μμf
CAPACITORS LESS THAN 1 = μf

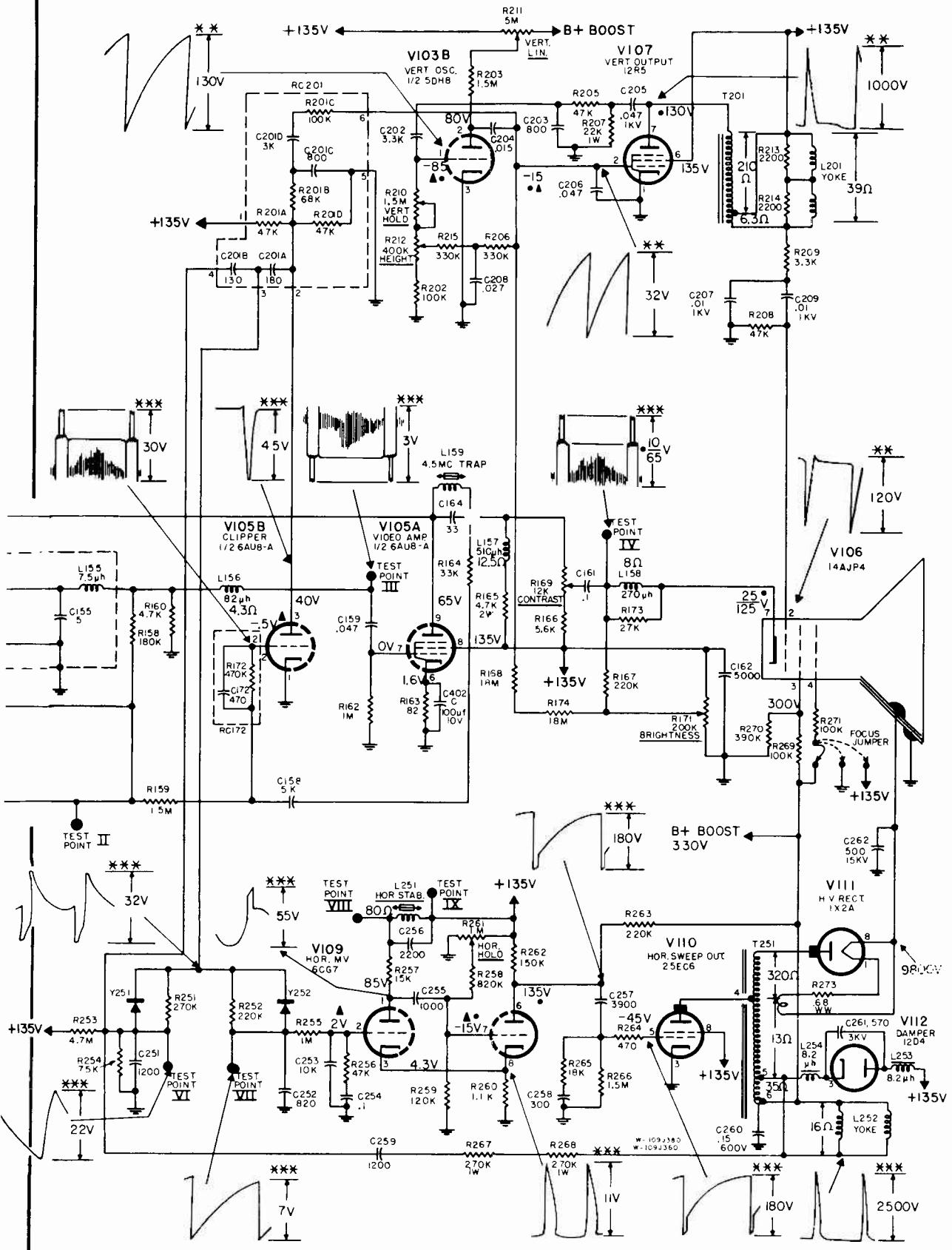
GENERAL ELECTRIC "Q-3" Line, Schematic Diagram



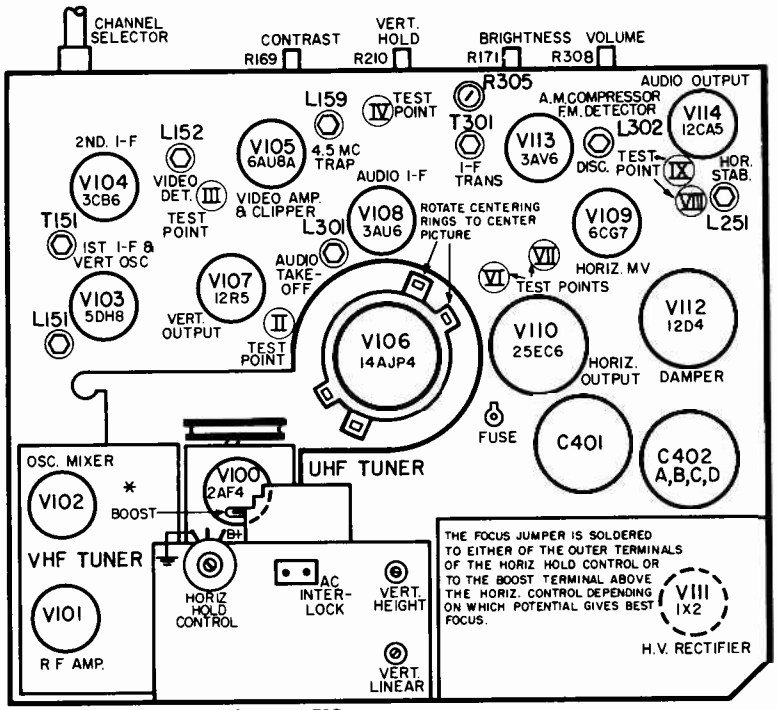


SCHEMATIC DIAGRAM OF MAIN CHASSIS WITH VOLTAGES AND WAVESHAPES

GENERAL ELECTRIC "Q-3" Line, Schematic Diagram

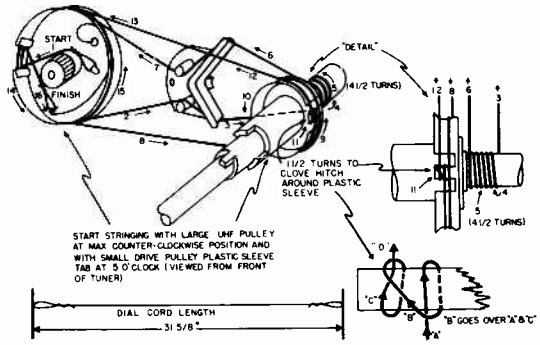


GENERAL ELECTRIC "Q-3" Line
Service Information, Continued

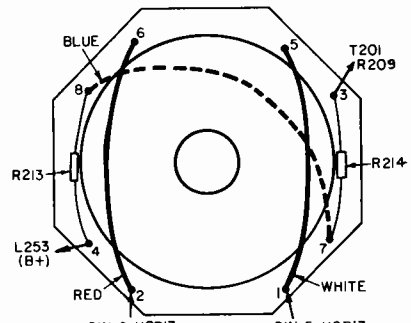


* REFER TO TUNER DRAWINGS FOR LOCATION OF ADJUSTMENTS

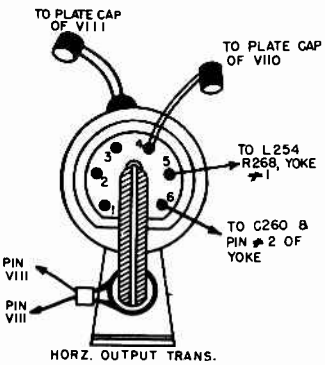
TUBE AND ADJUSTMENT LOCATION



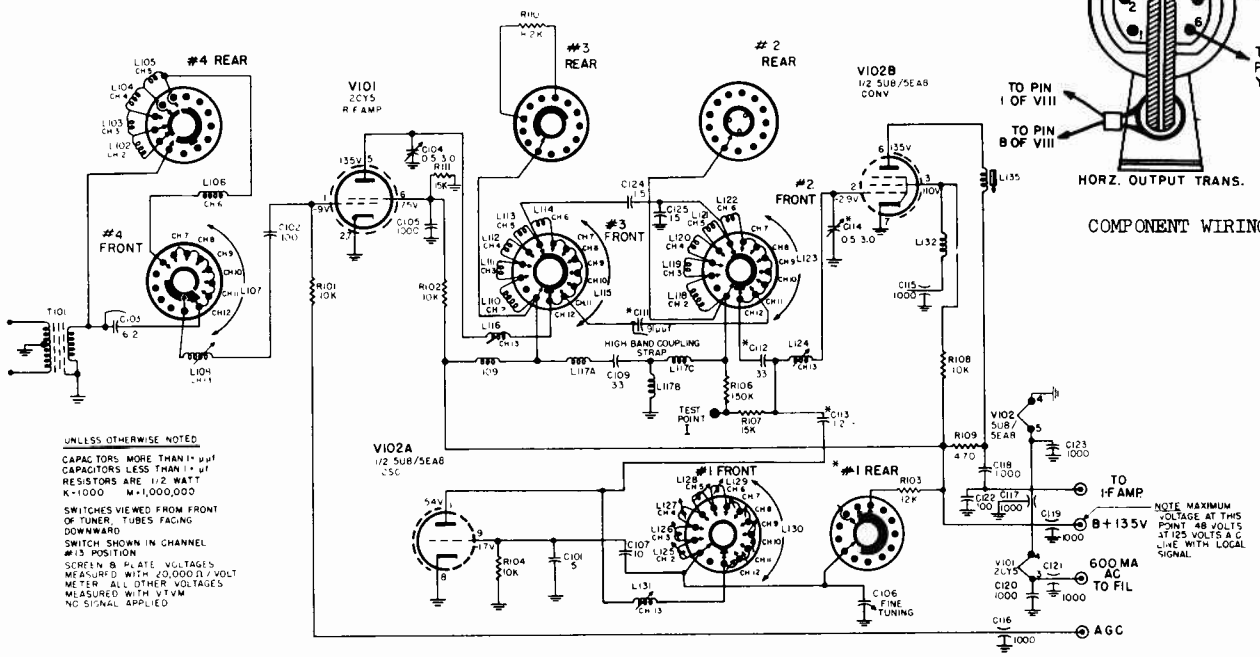
UHF TUNER DRIVE STRINGING



YOKE WIRING



COMPONENT WIRING



SCHEMATIC DIAGRAM VHF TUNER RJX-099

GENERAL ELECTRIC

"U3" Chassis, used in Models 21C2535, 21C2536, 21C2550, 21C2551, 21L2555, 21L2556, 21L2557, 21C2560, 21C2561, & UHF types. (Material on pages 67 through 71.)

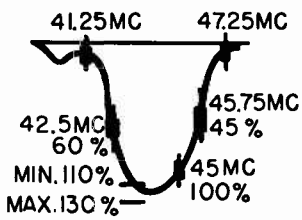
Hotpoint Co.

"U3" Chassis is also used in Hotpoint Co. Models 21S415, 21S416, 21S560, 21S561, & UHF.

I-F ALIGNMENT

1. Set channel selector to some unused high channel and volume control to minimum. Set the fine tuning control for maximum capacity of C117. Set contrast control fully clockwise.
2. Connect sweep generator to the I-F injection jack on the VHF tuner with the probe shown in Figure 5 or capacity jig. If General Electric sweep equipment is used, the indicated resistor should be omitted.
3. Connect a 3-volt battery from Test Point II to chassis (positive battery lead to chassis).
4. Remove horizontal sweep output tube V110.
5. Connect scope through 10,000 ohms to Test Point III. After Step 1 (below), calibrate vertical gain of scope for 5-volts peak-to-peak for two inch deflection. When aligning, base line to 45 mc marker should be kept at 2 inches.

VIDEO I-F ALIGNMENT CHART

STEP	ADJUST	DESIRED RESPONSE	REMARKS
1.	L151, L159 for minimum at 47.25 mc.		"Blow-up" scope pattern to see traps. After setting traps, set scope gain per above. L159 and L173 slug should be positioned at resonant point nearest chassis. T151, T152 and T153 should be set first. L135 and L152 should be adjusted to set 45.75 mc marker at maximum from base line. T151 & T152 may require slight "touch-up" after setting L135 and L152.
2.	L173 for minimum at 41.25 mc.		
3.	T151 to set 42.5 mc marker at 60%.		
4.	T152 to set 45.75 mc marker at 45%.		
5.	T153 for peak region symmetry. (tilt)		
6.	Set L135 & L152 to place 45.75 mc at maximum from base line.		

4.5 MC TRAP ALIGNMENT

1. Turn contrast control fully clockwise.
2. Connect detector network (Figure 3) to Test Point IV and set contrast to maximum. Connect oscilloscope to network.
3. Apply a 4.5 mc AM signal through .001 mf. to Test Point III.
4. Tune the bottom core of T171 for minimum signal observed on oscilloscope.

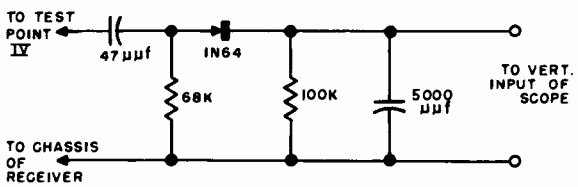


FIG. 3. 4.5Mc DETECTOR NETWORK

AUDIO I-F ALIGNMENT

1. Tune in a weak television signal to provide a 4.5 mc signal source for audio I-F alignment. Do not attempt adjustment unless the speaker is connected.

2. Connect two 100,000 ohm resistors (in series) between Pin 2 of V114 (6T8) and chassis. (Fig. 4)

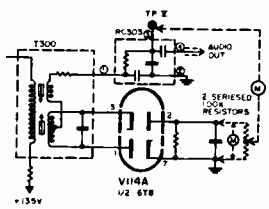
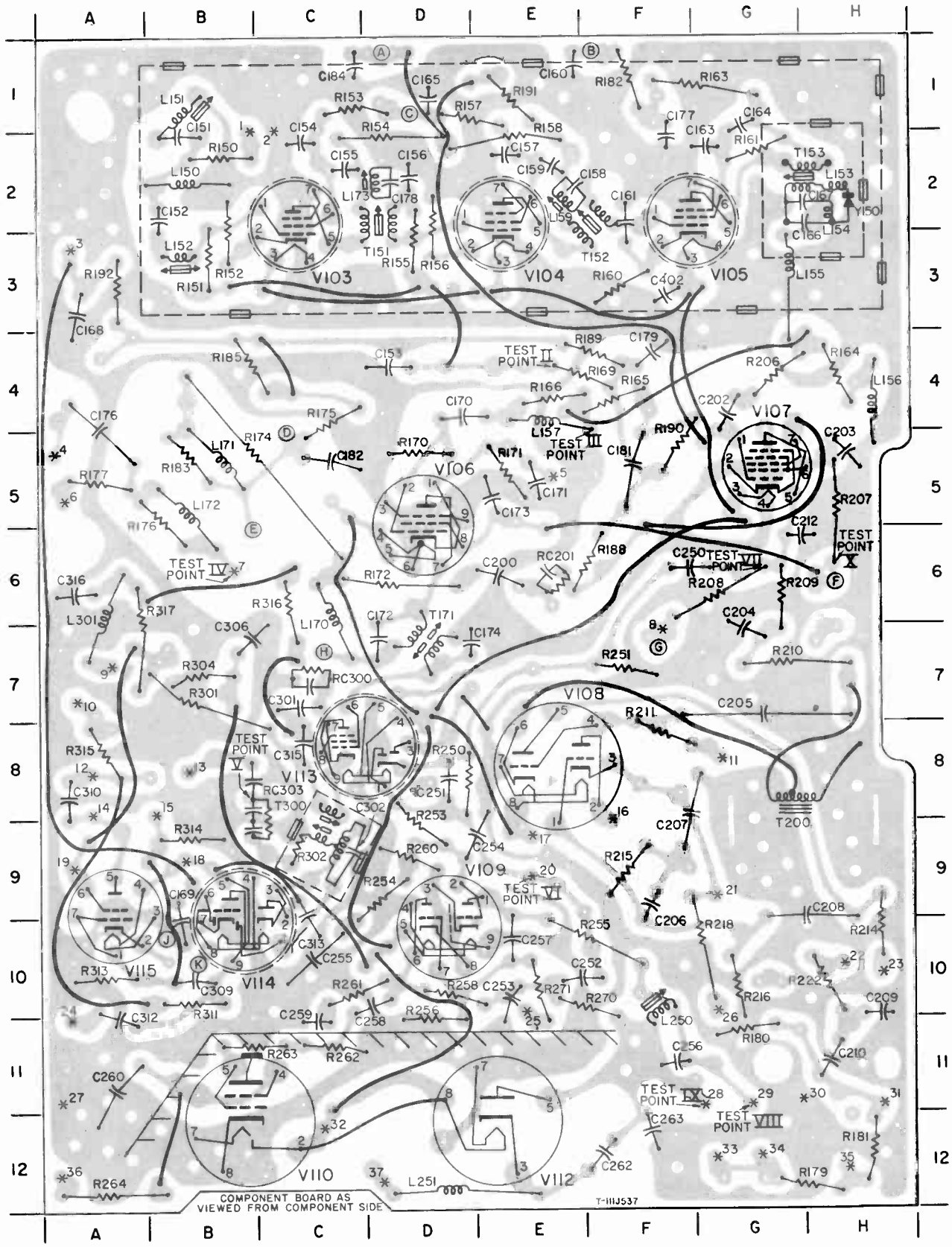


FIG. 4. AUDIO ALIGNMENT CONNECTION

AUDIO ALIGNMENT CHART

STEP	CONNECT VTVM OR 20,000 OHMS/VOLT METER	ADJUST	METER INDICATION	REMARKS
1.	Between Pin 2 of V114 and chassis.	T171 secondary (top)	Adjust for maximum deflection.	Repeat Steps 1, 2, and 3 to assure proper alignment.
2.		T300 primary (bottom)	Adjust for maximum deflection.	
3.	Between Test Point V and the center of the two 100,000 ohm resistors.	T300 secondary (top)	Adjust for zero volts d-c output	

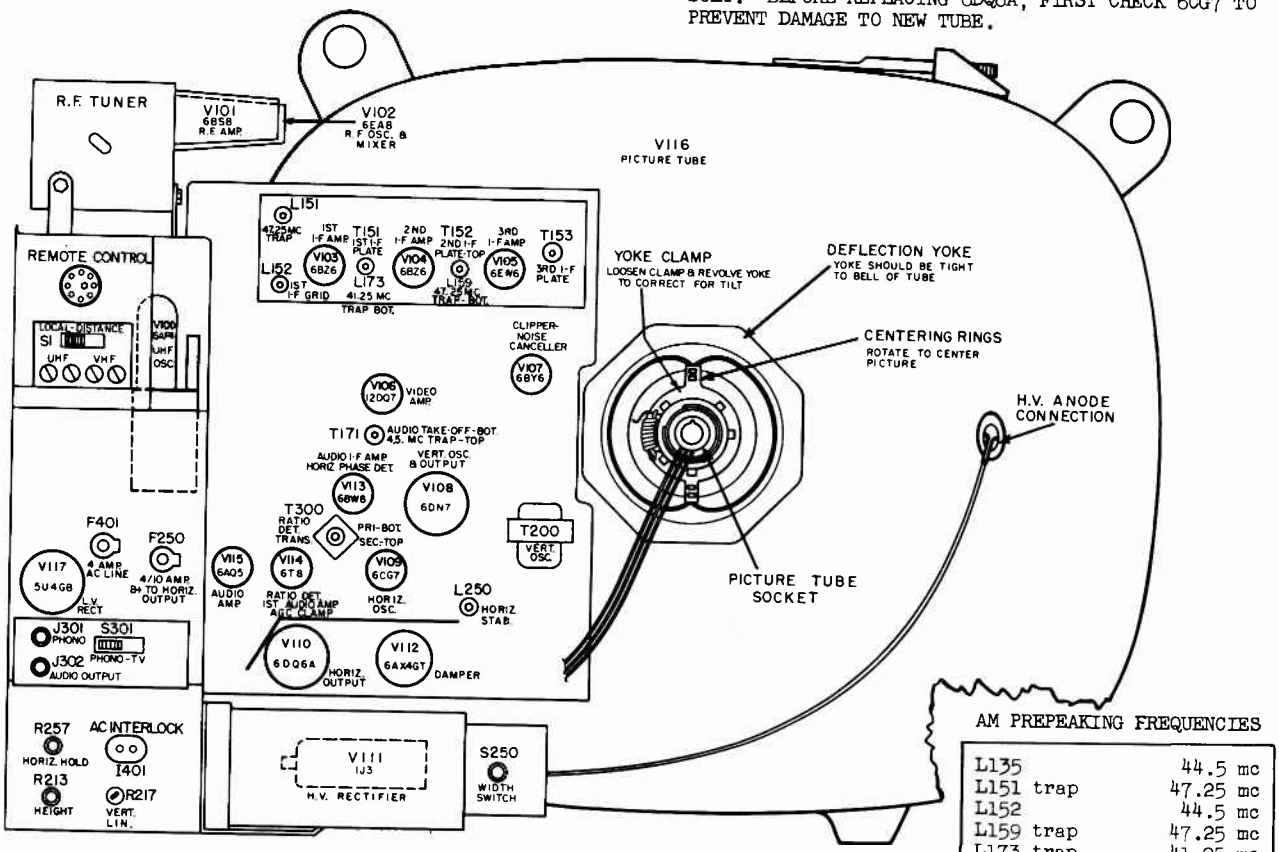
GENERAL ELECTRIC Chassis U3, Component Board (Continued)



COMPONENT BOARD, VIEWED FROM COMPONENT SIDE

GENERAL ELECTRIC Chassis U3, Service Material (Continued)

CAUTION: DO NOT REMOVE 6CG7 HORIZONTAL OSCILLATOR WITH SET TURNED ON. DAMAGE TO 6DQ6A TUBE WILL RESULT. BEFORE REPLACING 6DQ6A, FIRST CHECK 6CG7 TO PREVENT DAMAGE TO NEW TUBE.



TUBE LOCATION DIAGRAM

AM PREPEAKING FREQUENCIES

L135	44.5 mc
L151 trap	47.25 mc
L152	44.5 mc
L159 trap	47.25 mc
L173 trap	41.25 mc
T151	42.9 mc
T152	45.25 mc
T153	44.15 mc

COMPONENT LOCATION BY CO-ORDINATE

A-3	C168	A-12	R264	B-5	R176	C-1	C184	C-8	V113	D-2	C156	D-7	T171	E-2	C157	E-10	C252	F-4	C179	F-10	L250	G-6	C212	H-2	L153
A-3	R192			B-5	R183	C-1	R153	C-9	T300	D-2	C178	D-8	C251	E-2	C159	E-10	C253	F-4	R165	F-11	C256	G-6	R208	H-2	L154
A-4	C176	B-1	L151	B-7	C306	C-2	C154	C-9	T302	D-2	R156	D-8	R250	E-2	R158	E-10	C257	F-4	R189	F-12	C262	G-6	R209	H-2	T153
A-5	R177	B-2	C151	B-7	R301	C-2	C155	C-9	R302	D-2	L173	D-9	R253	E-2	V104	E-10	R271	F-5	C181	F-12	C263	G-7	C204	H-2	Y150
A-6	C316	B-2	C152	B-7	R304	C-2	V103	C-10	C255	D-2	T151	D-9	R254	E-4	L157	E-12	V112	F-5	R190			G-7	C205	H-4	L156
A-6	L301	B-2	L150	B-8	RC303	C-4	R175	C-10	C313	D-3	R155	D-9	R260	E-4	R166			F-6	C250	G-1	C164	G-7	R210	H-4	R164
A-6	R317	B-2	R150	B-9	R314	C-5	C182	C-10	R261	D-4	C153	D-10	C258	E-4	R169	F-1	R182	F-6	R188	G-1	R163	G-8	T200	H-5	C203
A-8	C310	B-3	L152	B-9	V114	C-5	R174	C-11	C259	D-4	J170	D-10	R258	E-5	C171	F-2	C158	F-7	R251	G-2	C163	G-10	R216	H-5	R207
A-8	R315	B-3	R151	B-10	C169	C-6	L170	C-11	R262	D-5	R170	D-10	V109	E-5	C173	F-2	C161	F-8	C207	G-2	R161	G-10	R218	H-9	C208
A-9	V115	B-3	R152	B-10	C309	C-6	R316			D-5	V106	D-11	R256	E-5	R171	F-2	C177	R-9	R211	G-2	V105	G-11	R180	H-10	C209
A-10	R313	B-4	R185	B-10	R311	C-7	C301	D-1	C165	D-6	R172	D-12	L251	E-6	C200	F-2	L159	F-9	C206	G-3	L155	G-12	R179	H-10	R214
A-11	C312	B-5	L171	B-11	R263	C-7	RC300	D-1	R154	D-7	C172			E-6	RC201	F-2	T152	F-9	R215	G-4	C202			H-10	R222
A-11	C260	B-5	L172	B-12	V110	C-8	C315	D-1	R157	D-7	C174	E-1	C160	E-8	V108	F-3	C402	F-10	R255	G-4	R206	H-2	C166	H-11	C210
												E-1	R191	E-9	C254	F-3	R160	F-10	R270	G-5	V107	H-2	C167	H-12	R181

ASTERISKED (*) NUMBERS

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

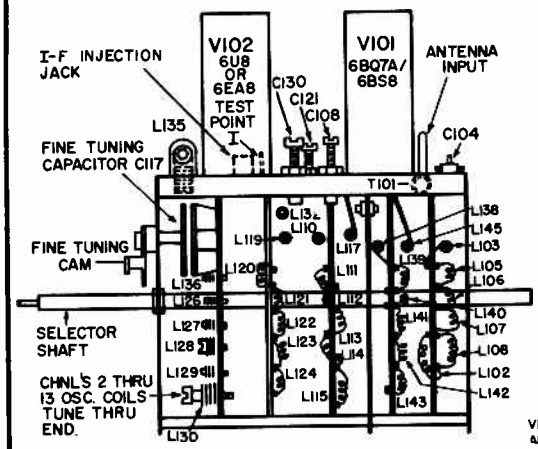
* 1. VHF TUNER LINK CONDUCTOR
* 2. VHF TUNER LINK GROUND
* 3. VHF TUNER AGC
* 4. CENTER ARM R173 (CONTRAST)
* 5. C311C
* 6. CENTER ARM R193 (BRIGHTNESS)
* 7. PIN 7 OF V116 (CRT) (YELLOW)
* 8. Ⓓ
* 9. PIN D OF J401, AUDIO CONTACTS S504
* 10. Ⓑ, Ⓒ, VHF TUNER +275V, C400B
* 11. CENTER ARM R212 (VERT. HOLD)
* 12. C311A, T301 (RED)
* 13. S301 (CENTER CONDUCTOR OF SHIELDED LEAD)
* 14. T301 (BLUE)
* 15. C311B
* 16. T201 (BLUE)
* 17. PIN 1 OF V116 (CRT) (BROWN)
* 18. PL401, PILOT LAMP A.C.
* 19. R173 (TOP) C, VHF TUNER +135V
*20. TEST POINT VI
*21. C400D
*22. YOKE TERMINAL 3 (RED), T201 (RED)
*23. CENTER ARM R213 (HEIGHT)
*24. BOTTOM TERMINAL R312 (TONE)
*25. CENTER ARM R257 (HORIZ. HOLD)
*26. AFM R217 (VERT. LIN.)
*27. T400 GROUND LEAD (GREEN)
*28. F250, TEST POINT IX
*29. TEST POINT VIII
*30. PIN 8 OF V116 (CRT), (PIN 4 OF V116, FOCUS OPTIONAL) GROUND
*31. PIN 6 OF V116 (CRT SOCKET)
*32. 6.3V A.C., T400 (BROWN)
*33. UNUSED - SAME AS *34
*34. C264+, YOKE TERMINAL 4, S250 TERMINAL C
*35. PIN 3 OF V116 (CRT) (PIN 4 OF V116, FOCUS OPTIONAL)
*36. F250
*37. T250 TERMINAL 3

CIRCLED Ⓐ LETTERS

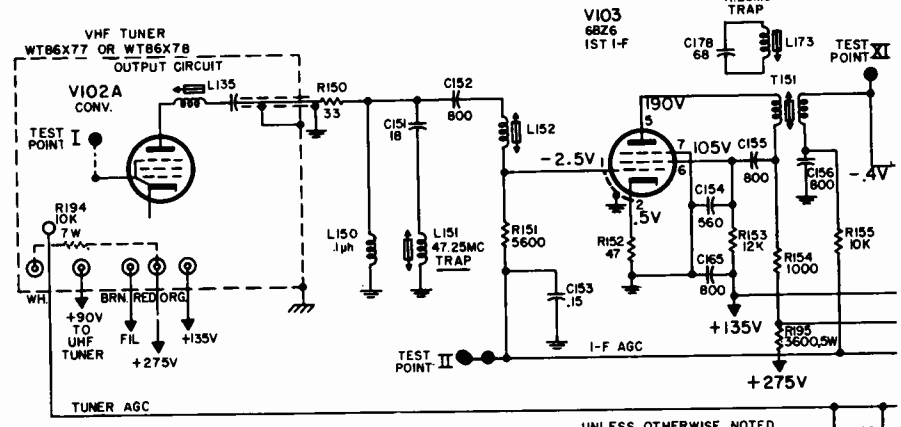
REPRESENT BOARD MOUNTED WIRES CONNECTED TO POINTS INDICATED

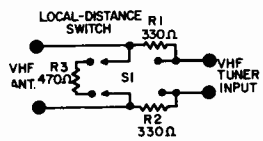
Ⓐ R195
Ⓑ * 10
Ⓒ * 19
Ⓓ * 8
Ⓔ * 19
Ⓕ C400C
Ⓖ R401, R195 (B+275)
Ⓗ R173 BOTTOM TERMINAL (CONTRAST)
Ⓙ AUDIO CABLE TO FRONT TERMINAL BOARD GROUND
Ⓚ AUDIO CABLE TO FRONT TERMINAL BOARD (C308, C309)

GENERAL ELECTRIC Chassis U3, Schematic Diagram (Continued)



VHF TUNER ADJUSTMENTS





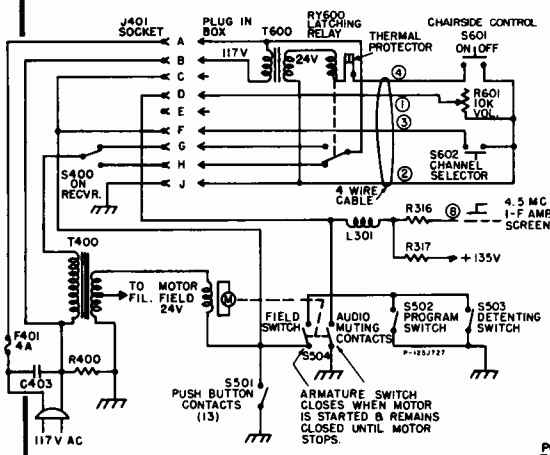
VOLTAGE MEASUREMENTS ARE IN RESPECT TO CHASSIS MEASURED WITH A VTVM. CONTROLS SET FOR NORMAL OPERATION. 117V NOMINAL LINE. ANTENNA TERMINALS SHORTED.

• VARIES WITH CONTROL SETTINGS.

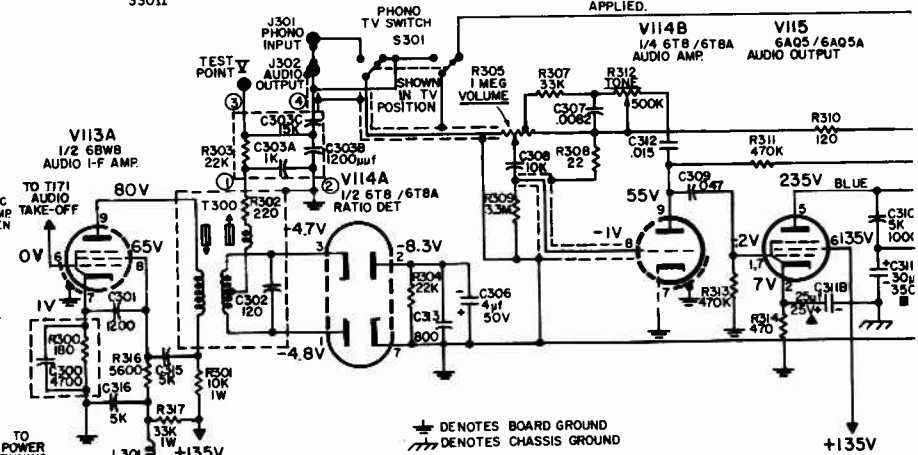
UNLESS OTHERWISE NOTED
K = 1,000 M = 1,000,000
CAPACITORS MORE THAN 1 = μμf
CAPACITORS LESS THAN 1 = μf
RESISTORS ARE 1/2 WATT

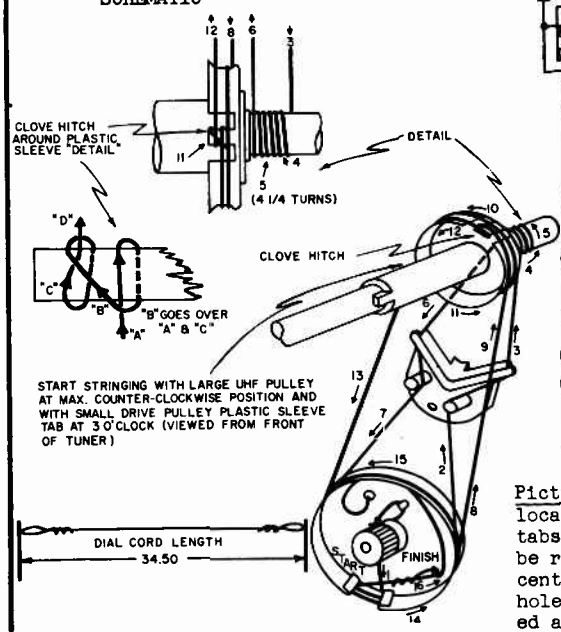
* SCOPE SYNCED AT 1/2 VERT. FREQUENCY.
** SCOPE SYNCED AT 1/2 HORIZ. FREQUENCY.
WAVESHAPES TAKEN WITH NORMAL SIGNAL APPLIED.

C168 .047
C169 5K

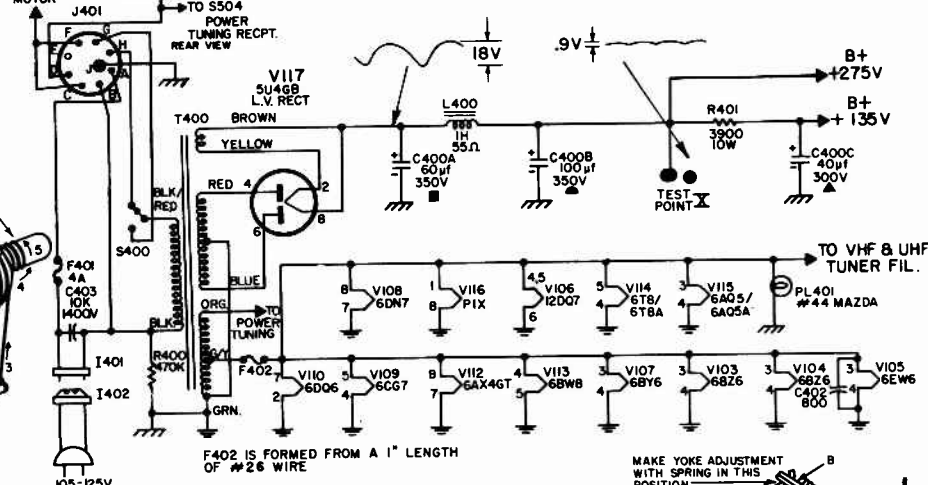


SIMPLIFIED POWER TUNING WIRING SCHEMATIC

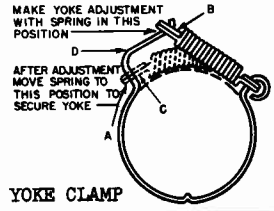




UHF DIAL STRINGING DIAGRAM

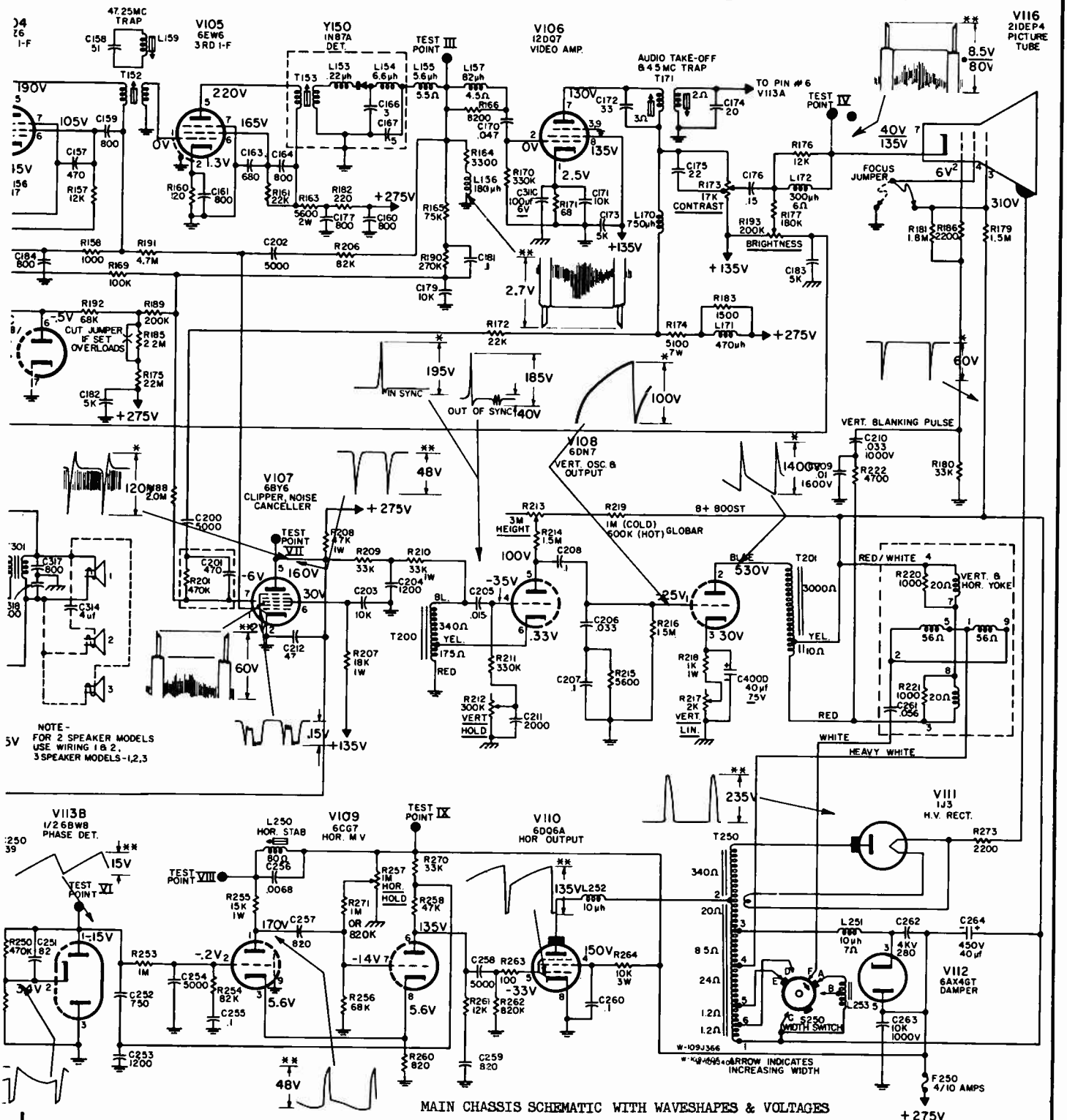


Picture Centering -The picture centering device is located on the rear of the yoke assembly. The two tabs through which holes have been punched should be rotated towards or away from each other to center the picture on the face of the tube. The holes are provided in the tabs so that an insulated alignment tool can be inserted in them to provide an easy means of rotating the rings.



YOKE CLAMP

GENERAL ELECTRIC Chassis U3, Schematic Diagram (Continued)



MAIN CHASSIS SCHEMATIC WITH WAVESHAPES & VOLTAGES

Horizontal Stabilizer Adjustments -

1. Tune receiver to a weak signal and adjust controls for normal operation.
2. Short Test Point VI to ground.
3. Shunt L250 (horizontal stabilizer coil) with 1000 ohms. (Connect resistor between Test Points VIII and IX.)
4. Adjust Horizontal hold potentiometer R257 so that the picture appears upright and just "Floats" back and forth across the screen. Leave R257 set like this.
5. Remove the 1000 ohms shunt across L250, and adjust L251 so that the picture again "floats" back and forth across the screen. Make no further adjustments.
6. Remove the short connection.

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

MODELS WG-5040A and WG-5140A (material on pages 72 through 74)

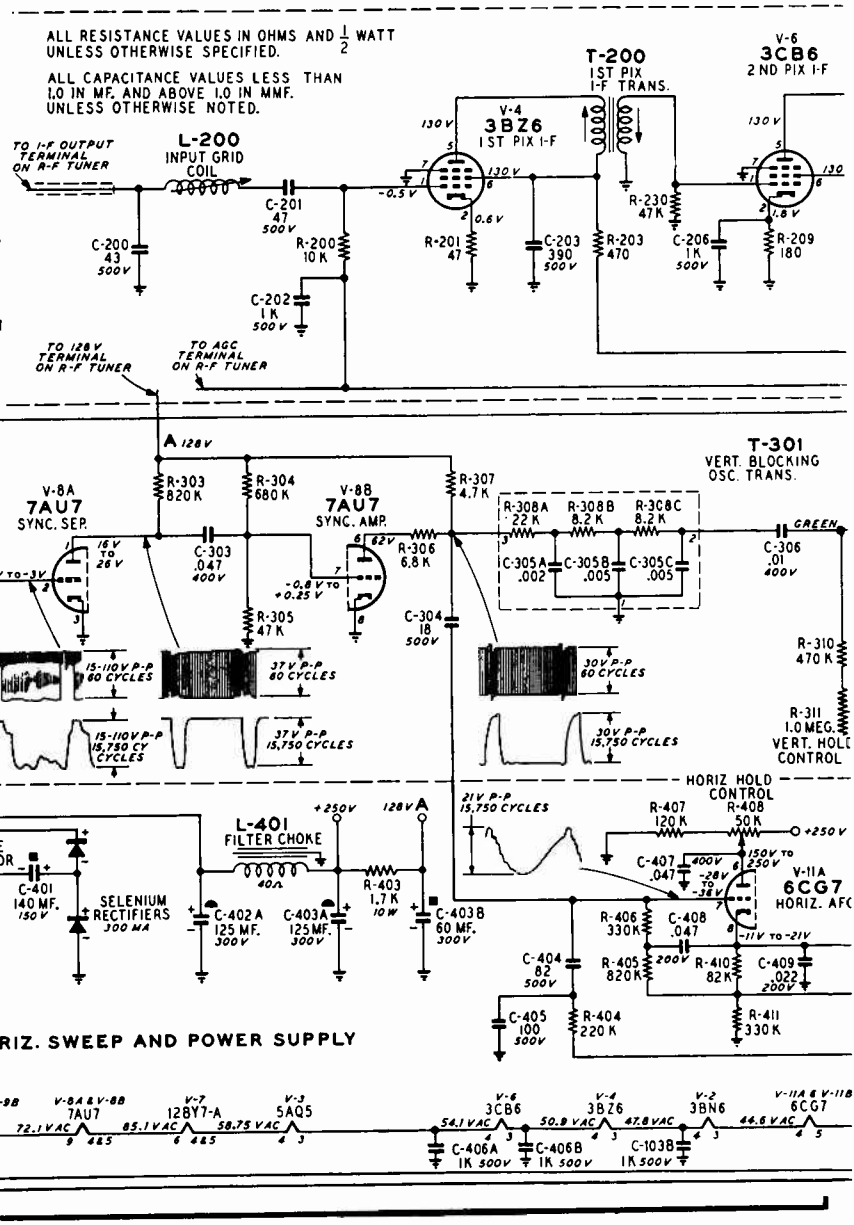
CHASSIS ASSEMBLY REMOVAL

1. Remove knobs from the side of the cabinet.
2. Remove cabinet back.
3. Disconnect the antenna and speaker leads.
4. Remove screw used in mounting control bracket to side of cabinet.
5. Remove screw (painted red) at top of vertical output transformer.
6. Push entire control bracket assembly to the right until the shafts clear the cabinet.
7. Remove screws holding chassis brackets to top of cabinet.
8. Remove only 4 screws (2 at each side) from the bottom side of the shelf.
9. Gently pull the chassis assembly out from the cabinet.

CAUTION – DO NOT LOOSEN OR REMOVE ANY OTHER SHELF SCREWS INSIDE CHASSIS COMPARTMENT.

10. Place entire assembly face down on a cushioned surface which should be thick enough to allow for clearance of control shaft. Disconnect the yoke plug, picture tube socket, anode lead and remove the beam aligner magnet and deflection yoke.

MAGNET ADJUSTMENT—The beam aligner magnet should be positioned close to the base of the tube. From this position adjust the magnet by moving it back and forth and at the same time rotating it slightly around the neck of the picture tube until the brightest raster and best focus is obtained on the picture screen. MAXIMUM RASTER BRILLIANCE AND BEST FOCUS OCCUR AT THE SAME POINT. Do not sacrifice brilliance for best focus. The magnet adjustment is a very critical one, especially with the electrostatic type zero focus picture tube. Consequently, great care should be taken to make sure that the magnet is correctly adjusted.



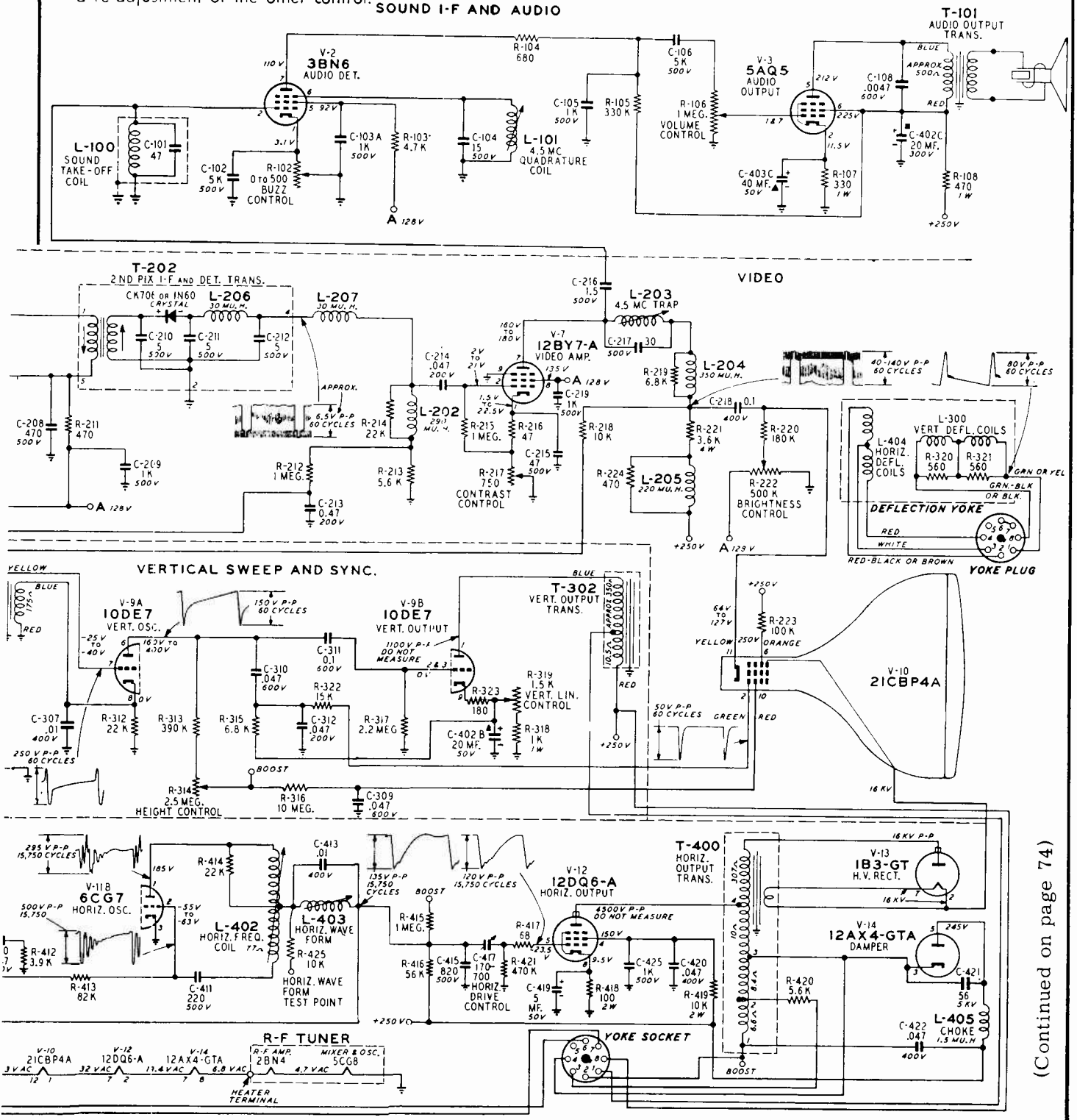
OSCILLOSCOPE WAVEFORM PATTERNS

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.

MODELS WG-5040A & WG-5140A

HEIGHT AND VERTICAL LINEARITY ADJUSTMENT
Adjust the height control until the picture fills the mask vertically. Adjust the vertical linearity control until the picture is symmetrical from top to bottom. Adjust the picture centering device to align picture with the mask. Adjustment of any control will require a re-adjustment of the other control.

HORIZONTAL DRIVE ADJUSTMENT—While receiving a signal from a station (with picture locked in sync) turn contrast control fully counter-clockwise, turn the brightness control up so that the picture appears washed out. Turn the horizontal drive control clockwise until white bars appear in the left center portion of the raster, then turn counter-clockwise until the white bars just disappear.



(Continued on page 74)

MONTGOMERY WARD Models WG-5040A and WG-5140A (Continued)

SERVICE SUGGESTIONS

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-314 and R-319.
2. Vertical output transformer defective.
3. Capacitor C-402B defective.
4. V-9 defective, check voltages.
5. Excess leakage or incorrect value of capacitors C-310, C-312 or open or incorrect value of resistors R-313 and R-315.
6. Low plate voltages. Check power supply.
7. Capacitor C-311 defective.
8. Vertical deflection coils defective.

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

1. Check or replace V-12 & V-14.
2. Check capacitor C-422 for defects.
3. Horizontal deflection coils defective.

SMALL RASTER—This condition can be caused by:

1. Low +B or line voltage. Check selenium rectifiers.
2. Insufficient output from V-12. Replace tube.
3. Insufficient output from V-8 and V-9. Replace tubes.
4. Incorrect setting of horizontal drive control.

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

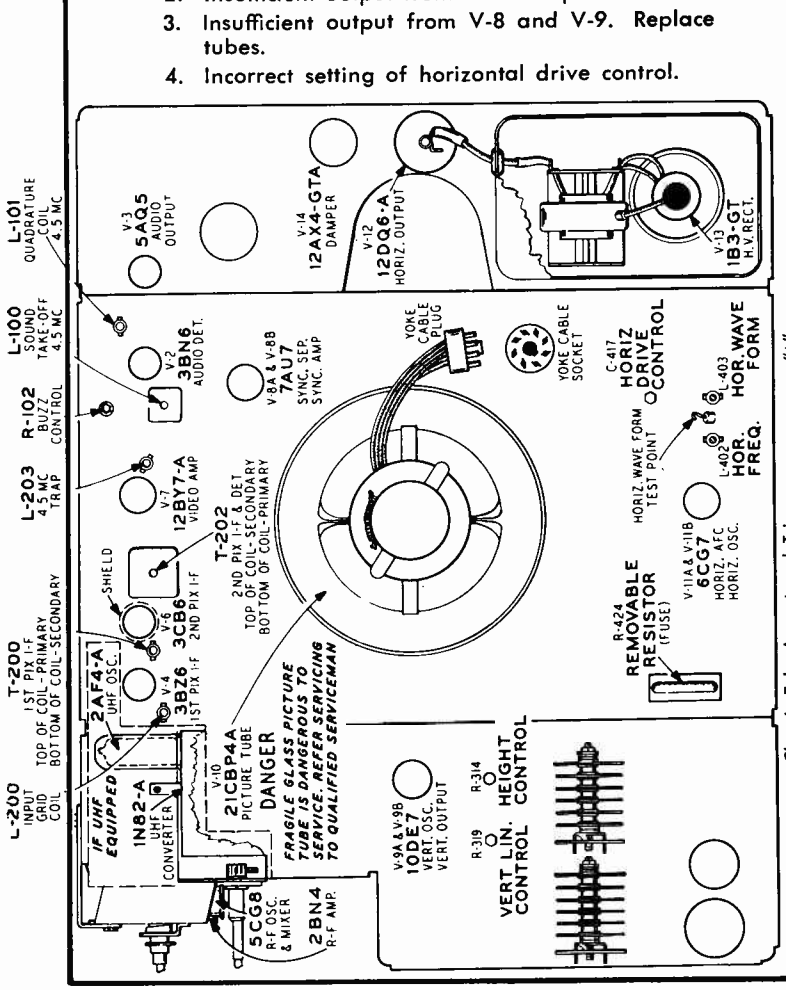
1. Defective pix I-F tubes V-4 & V-6.
2. Defective pix detector crystal. (Part of T-202.)
3. V-7 defective.
4. Defective picture tube.
5. Open video peaking coil. Check all peaking coils L-202, L-204, L-205 for continuity.
   Note that L-202, L-204 & L-205 have shunting resistors.
6. Leakage in V-7 grid capacitors C-214 or C-218.

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

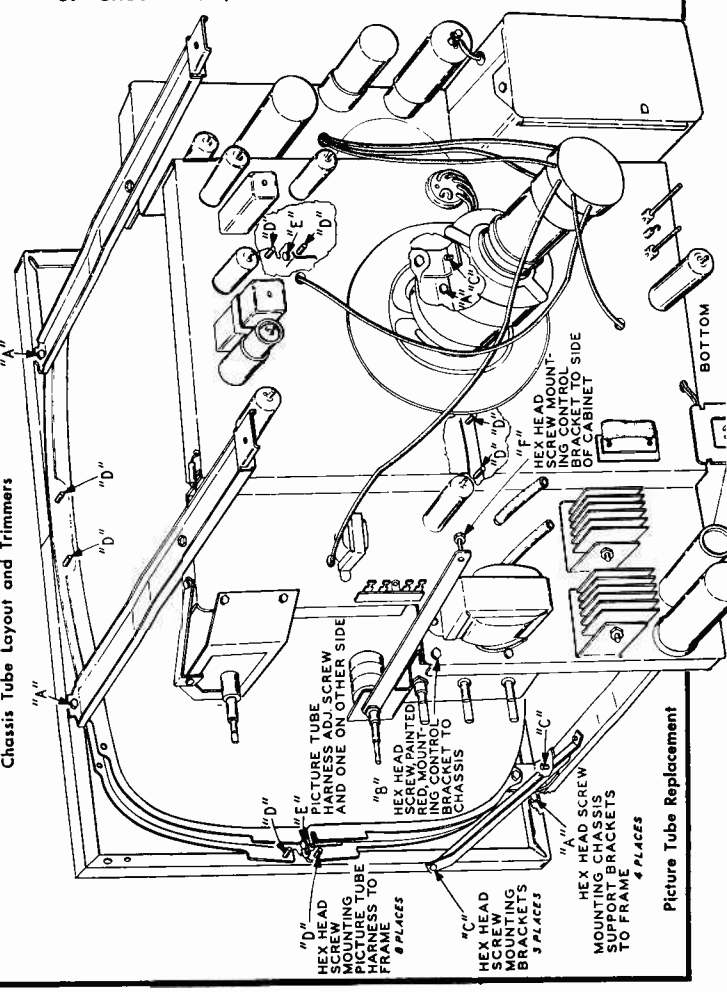
1. Defective pix I-F tubes V-4 or V-6.
2. Defective pix detector crystal or video amplifier tube V-7. Check tube, crystal and their associated circuits.
3. Defective R-F amplifier or oscillator mixer tube in the tuner.

BENDING OR S-ING

1. Check capacitors C-402A & C-403A.
2. V-12 or V-11B tubes defective.
3. Check V-8A, V-8B and V-7 tubes.



Chassis Tube Layout and Trimmers



Picture Tube Replacement

MOTOROLA

MODEL BREAKDOWN CHART

Model	Cabinet	Chassis	VHF Tuner	UHF Tuner
21F8B	Comb	TS-544	TT-99	-
Y21F8B	Comb	TS-544	WTT-99Y	77K744280
Y21F8BA	Comb	TS-544Y	TT-99Y	VTT-89
21F8BA	Comb	TS-544	TT-99	—
21F8W	Comb	TS-544	TT-99	—
Y21F8W	Comb	TS-544Y	TT-99Y	77K744280
21F8WA	Comb	TS-544	TT-99	—
Y21F8WA	Comb	TS-544Y	TT-99Y	VTT-89
21K73B	Console	TS-544	TT-98	-
Y21K73B	Console	TS-544Y	WTT-98Y	77K744280
Y21K73BA	Console	TS-544Y	TT-98Y	VTT-89
21K73M	Console	TS-544	TT-98	-
Y21K73M	Console	TS-544Y	WTT-98Y	77K744280
Y21K73MA	Console	TS-544Y	TT-98Y	VTT-89
21K75B	Console	TS-544	TT-98	-
Y21K75B	Console	TS-544Y	WTT-98Y	77K744280
Y21K75BA	Console	TS-544Y	TT-98Y	VTT-89
21K75CW	Console	TS-544	TT-98	-
Y21K75CW	Console	TS-544Y	WTT-98Y	77K744280
Y21K75CW	Console	TS-544Y	TT-98Y	VTT-89
21K75M	Console	TS-544	TT-98	-
Y21K75M	Console	TS-544Y	WTT-98Y	77K744280
Y21K75MA	Console	TS-544Y	TT-98Y	VTT-89
21K76B	Console	TS-544	VTT-99	-
Y21K76B	Console	TS-544Y	RTT-99Y	77K744280
Y21K76BA	Console	TS-544Y	VTT-99Y	VTT-89
21K76CW	Console	TS-544	VTT-99	-
Y21K76CW	Console	TS-544Y	RTT-99Y	77K744280
Y21K76CWA	Console	TS-544Y	VTT-99Y	VTT-89
21K76M	Console	TS-544	VTT-99	-
Y21K76M	Console	TS-544Y	RTT-99Y	77K744280
Y21K76MA	Console	TS-544Y	VTT-99Y	VTT-89
21K80CW	Console	TS-544	TT-99	-
Y21K80CW	Console	TS-544Y	WTT-99Y	77K744280
Y21K80CWA	Console	TS-544Y	TT-99Y	VTT-89
21T40BG	Table	TS-544	TT-98	-
Y21T40BG	Table	TS-544Y	WTT-98Y	77K744280
Y21T40BGA	Table	TS-544Y	TT-98Y	VTT-89
21T40MG	Table	TS-544	TT-98	-
Y21T40MG	Table	TS-544Y	WTT-98Y	77K744280
Y21T40MGA	Table	TS-544Y	TT-98Y	VTT-89
21T42B	Table	TS-544	TT-99	-
Y21T42B	Table	TS-544Y	WTT-99Y	77K744280
Y21T42BA	Table	TS-544Y	TT-99Y	VTT-89
21T42M	Table	TS-544	TT-99	-
Y21T42M	Table	TS-544Y	WTT-99Y	77K744280
Y21T42MA	Table	TS-544Y	TT-99Y	VTT-89
21V1W	Corner	TS-544	TT-99	-
Y21V1W	Corner	TS-544Y	WTT-99Y	77K744280
Y21V1WA	Corner	TS-544Y	TT-99Y	VTT-89
Y21K75CWA	Console	TS-544Y	TT-98Y	VTT-89
21K77B	Console	TS-544	TT-98	—
Y21K77B	Console	TS-544Y	TT-98Y	77K744280
21K77M	Console	TS-544	TT-98	—
Y21K77M	Console	TS-544Y	TT-98Y	77K744280
21K80CWA	Console	TS-544	TT-99	—
21K81B	Console	WTS-544	TT-99	—
Y21K81B	Console	WTS-544Y	TT-99Y	VTT-89
21K81M	Console	WTS-544	TT-99	—
Y21K81M	Console	WTS-544Y	TT-99Y	VTT-89
21V1WA	Corner	TS-544	TT-99	—
21K90CW	Console	TS-544	TT-99	—
Y21K90CW	Console	TS-544Y	TT-99Y	VTT-89

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 be defocused, have non-linear distortions or neck shadow. To adjust the yoke, loosen the yoke retainer clamp screw until the yoke is movable. Push the yoke as far forward as possible, then rotate until the picture is straight. Recheck Horizontal Size device; if satisfactory, retighten yoke retainer clamp screw.

RASTER CORRECTOR MAGNETS

Raster corrector (pin cushion) magnets, found on each side of the deflection yoke, are used to straighten the sides of the raster. They are correctly set at the factory but, if moved in shipping, or if the yoke has been replaced, they may require readjustment. Adjust in the following manner:

1. Reduce raster size so that its sides are just visible.
2. Loosen screws holding magnet mountings.
3. Move corrector magnets forward, backward or tilt until raster distortion is eliminated.
4. Re-tighten screws holding magnet mountings.

HORIZONTAL SIZE ADJUSTMENT

The horizontal size control consists of a piece of insulated metallic foil around the picture tube neck, just under the deflection yoke. To adjust Horizontal Size:

1. Loosen the yoke retainer clamp screw until the foil is movable.
2. Adjust for proper amount of width by sliding foil forward or backward: then, rotate slightly for minimum effect on vertical size.

NOTE: Maximum width is obtained when the foil is out of the yoke as far as possible.

3. Retighten yoke retainer clamp screw.

FUSE REPLACEMENT

Fuse	Type & Rating	Purpose	Location
E-801	5 amp standard type	Power	Top of chassis near vertical output transformer
E-803	1-1/2" length of No. 26 copper wire	Filament circuit	Underside of chassis on terminal strip adjacent to AC line interlock
E-805	3/10 amp "limited current" type	B+ system	Top of chassis close to 5 amp fuse. To remove, push down and rotate until fuse pops up

HORIZONTAL OSCILLATOR ADJUSTMENT

The HORIZONTAL HOLD should have a sync range of approximately 30 degrees. If the control is too critical, adjust as follows:

1. Set all controls for a normal picture.
2. Using a piece of wire, short SERVICE TEST RECEPTACLE S-4 pin #4 labeled "HORIZ AFC" to ground.

(Service material continued on the next 7 pages.)

MOTOROLA Chassis TS-544, etc. Service Information, Continued

3. Connect a .1 mfd 400 volt capacitor in parallel with the HORIZONTAL OSCILLATOR COIL (L-501). Use pins #2 and #3 of the SERVICE TEST RECEPTACLE.

4. Adjust the HORIZONTAL HOLD control to the point where the picture almost remains stationary...as far as horizontal sync is concerned. Picture must be in vertical sync during this adjustment.

5. Remove the .1 mfd capacitor shunting the HORIZ COIL and without turning the HORIZONTAL HOLD control, adjust the HORIZ COIL slug to the center of the range in which the picture almost remains in sync horizontally. The coil adjustment slug is located just to the left of the high voltage cage (receiver viewed from rear).

6. Remove the wire shorting the HORIZ AFC to ground and adjust the HORIZONTAL HOLD control so that no fold-over appears on either side of the raster.

PICTURE TUBE REPLACEMENT AND/OR RECEIVER REMOVAL

1. Remove the back cover.

2. Remove channel selector and fine tuning knobs. If desired, the metal insert hidden by the knob may be removed.

3. Unplug speaker lead from speaker receptacle.

4. Remove the four (4) bottom chassis retaining screws.

5. Remove the two (2) tuner bracket screws securing the bracket to the cabinet.

6. Unplug the operating control cable.

7. Remove chassis and picture tube from the rear.

8. Unplug the picture tube socket and yoke.

9. Remove the yoke and picture tube high voltage anode connector.

10. Loosen the two (2) picture tube retainer strap bolts sufficiently to enable removal of the picture tube.

11. Replace black tape around mounting area of new tube and install in reverse order to that given above.

LOCAL OSCILLATOR ADJUSTMENTS

The local oscillator slugs are adjustable from the front of the cabinet after tuner knob removal. On some models, the INSTA-MATIC bar and/or knob retainer plate must also be removed.

After receiver has had a few minutes of warm-up time, run the receiver through the station list and observe sound and picture; if sound and picture are not properly received within the range of the fine tuning control, it may be necessary to adjust the local oscillator. On automatic tuning receivers, the indexed stations should be received without the necessity of changing the fine tuning control due to automatic re-centering of the control each time the station is changed.

TO ADJUST OSCILLATOR SLUGS

1. Remove channel selector and fine tuning knobs. If desired, the metal insert hidden by the knob may be removed.

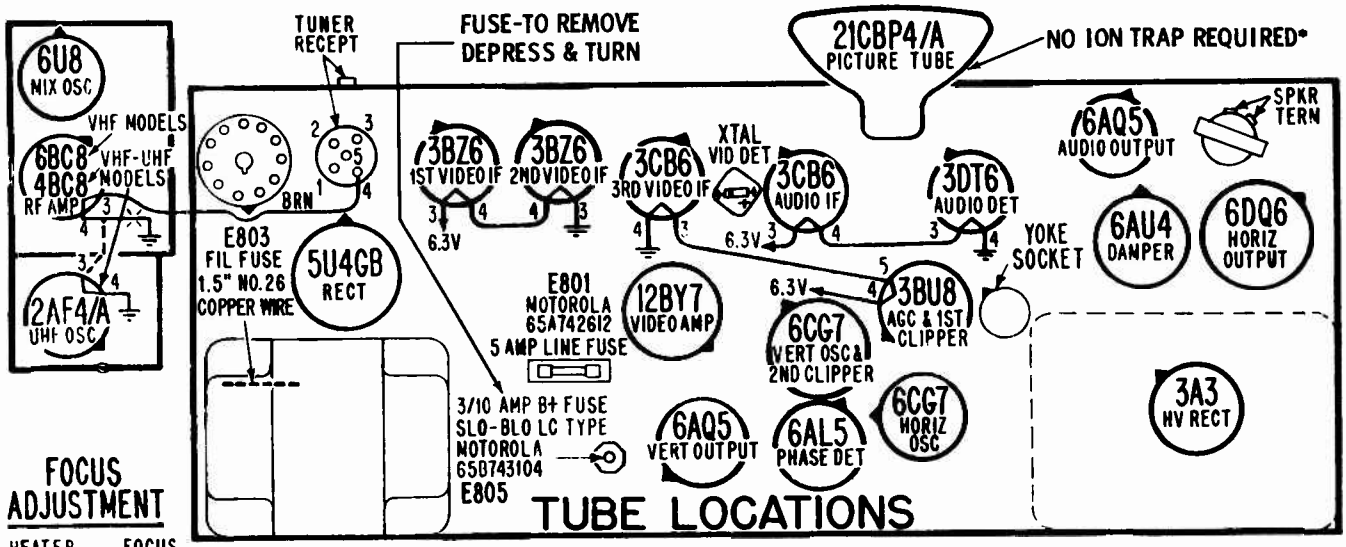
2. Tune to the highest numbered channel that is giving trouble.

3. Set the fine tuner to mid-position. This position is correct when channel number holes #2 and #13 are open as viewed through cabinet opening. On automatic tuning receivers this position will automatically be correct if the tuner is switched off channel and then returned to the desired channel.

NOTES:

To eliminate false tuning, use a non-metallic tool.

Do not turn oscillator screw counterclockwise to the extent of disengagement from tuner. To insure that the screw is within the range of its threads...tighten the screw (clockwise) until it stops, then turn counterclockwise until the sta-



FOCUS

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

*NOTE: DUE TO DIFFERENCES IN GUN STRUCTURE OF PRODUCTION TYPE 21CBP4/A PICTURE TUBES, IT HAS BEEN FOUND HELPFUL TO ADD AN ION TRAP FOR OPTIMUM FOCUSING ON SOME TUBES. WHEN A RECEIVER IS ENCOUNTERED EQUIPPED WITH AN ION TRAP, ADJUST THE TRAP FOR OPTIMUM FOCUS CONDITIONS ONLY.

FIGURE 1. TUBE LOCATION, FUSE GUIDE, FOCUS INFORMATION & FILAMENT WIRING

MOTOROLA Chassis TS-544, etc. Service Information, Continued

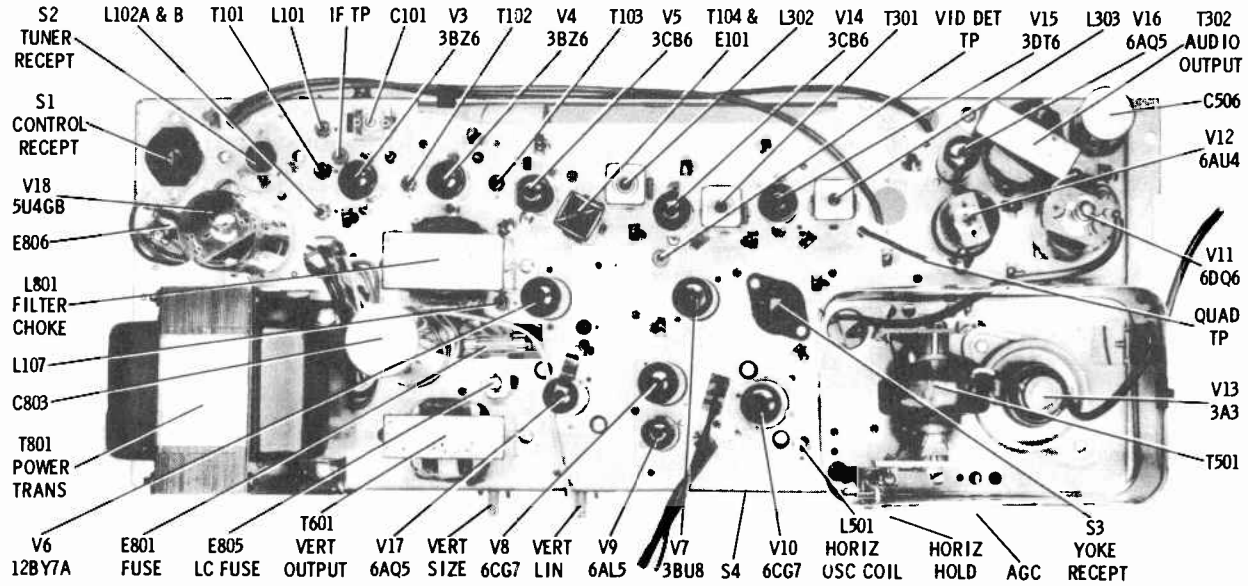


FIGURE 4. CHASSIS TS-544A-00 PARTS LOCATION

ALIGNMENT

SERVICING THE IF SECTION

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.

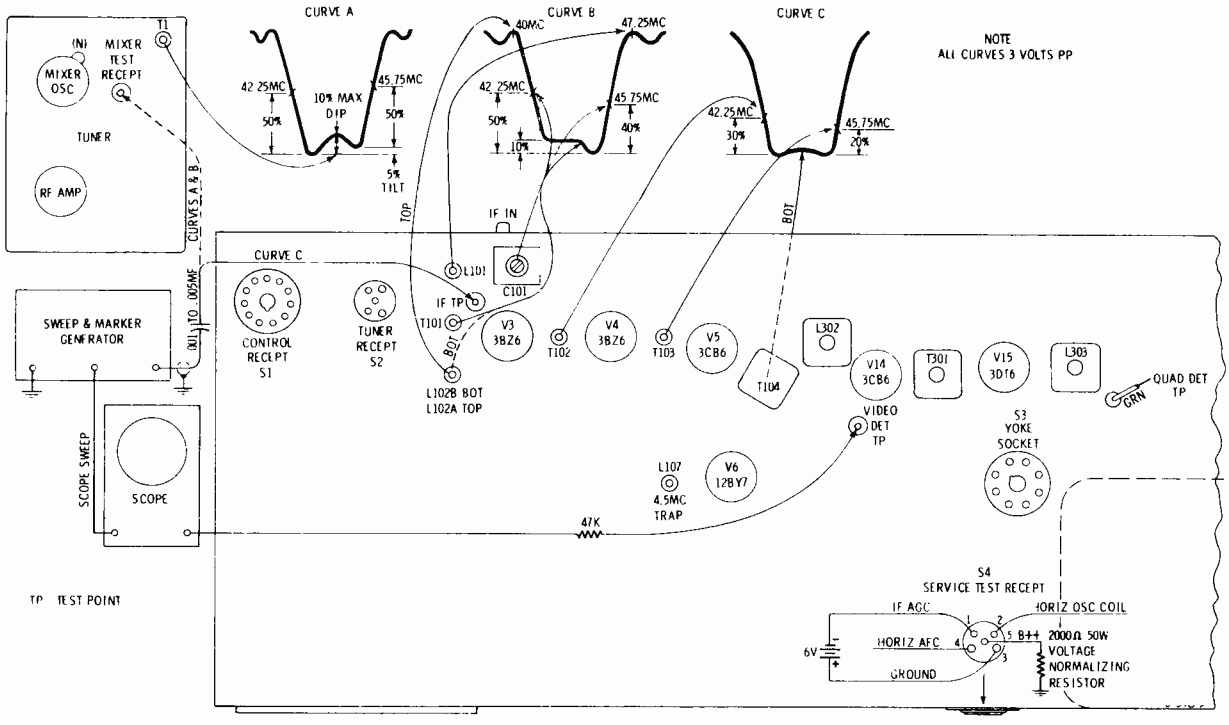


FIGURE 6. VIDEO IF AND SOUND ALIGNMENT DETAIL

MOTOROLA Chassis TS-544, 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. Short Point (N), near oscillator tube (V-2), to chassis.
4. Apply...negative lead of a 6V bias supply to pin #1 of the Service Test Receptacle and the positive lead to pin #3.
5. All coil slugs should be tuned away from the chassis except 3rd IF, mixer secondary coil and 40 Mc trap coil which are tuned toward chassis.
6. Refer to Video IF & Mixer Alignment Detail for component and test point location (Figure 6).
7. Set channel selector on channel #13 and connect a 2000 ohm 50W voltage normalizing resistor from B++ to chassis. (Use pins #5 and #3 of the Service Test Receptacle.)

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GENERATOR	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
1.	To IF TP thru .001 mf capacitor at 44 Mc. Set to 10 Mc sweep width	Scope thru 47K resistor to video det TP	T-102	Correct 42.25 Mc marker position as shown in curve C.
2.	"	"	T-103	Correct 45.75 Mc marker position (curve C).
3.	"	"	T-104	Flat response with minimum curve tilt (curve C).
4.	To MIXER TEST RECEPT thru .001 mf capacitor at 44 Mc. Set to 10 Mc sweep width	"	T-1	Adjust until its effect is out of the IF bandpass.
5.	"	"	L-101	47.25 Mc trap dip. See curve B.
6.	"	"	L-102A (top slug)	40 Mc trap dip. Temporary removal of bias may be necessary to make the trap dip more pronounced (curve B).
7.	"	"	C-101, T-101 & L-102B (bot slug)	Alternately adjust for correct curve and marker positions as shown in curve B.
8.	"	"	T-1	Flat response with 5% tilt as shown in curve A.

NOTE: Repeat any portion of the above procedure until the proper overall curve A is obtained.

SOUND ALIGNMENT (Station Signal Method)

The sound system used in the TS-544 receiver consists of an audio IF amplifier stage, a quadrature grid detector and an output stage. Since this type of sound system is extremely sensitive, relatively small input signal voltage will cause grid current to flow in both the IF amplifier and the detector stages. Grid current through the tuned coils will load them down making the adjustment extremely broad and alignment impossible. For this reason, it is necessary to use a very weak signal when aligning the driver and the detector input coils. Actually, the signal should be well down into the noise level for proper tuning action.

Preliminary Steps

1. Tune in a strong TV station.
2. Adjust all controls for normal picture and sound.
3. Refer to Video IF & Mixer Alignment Detail for coil and test point locations (Figure 6).

SOUND ALIGNMENT PROCEDURE

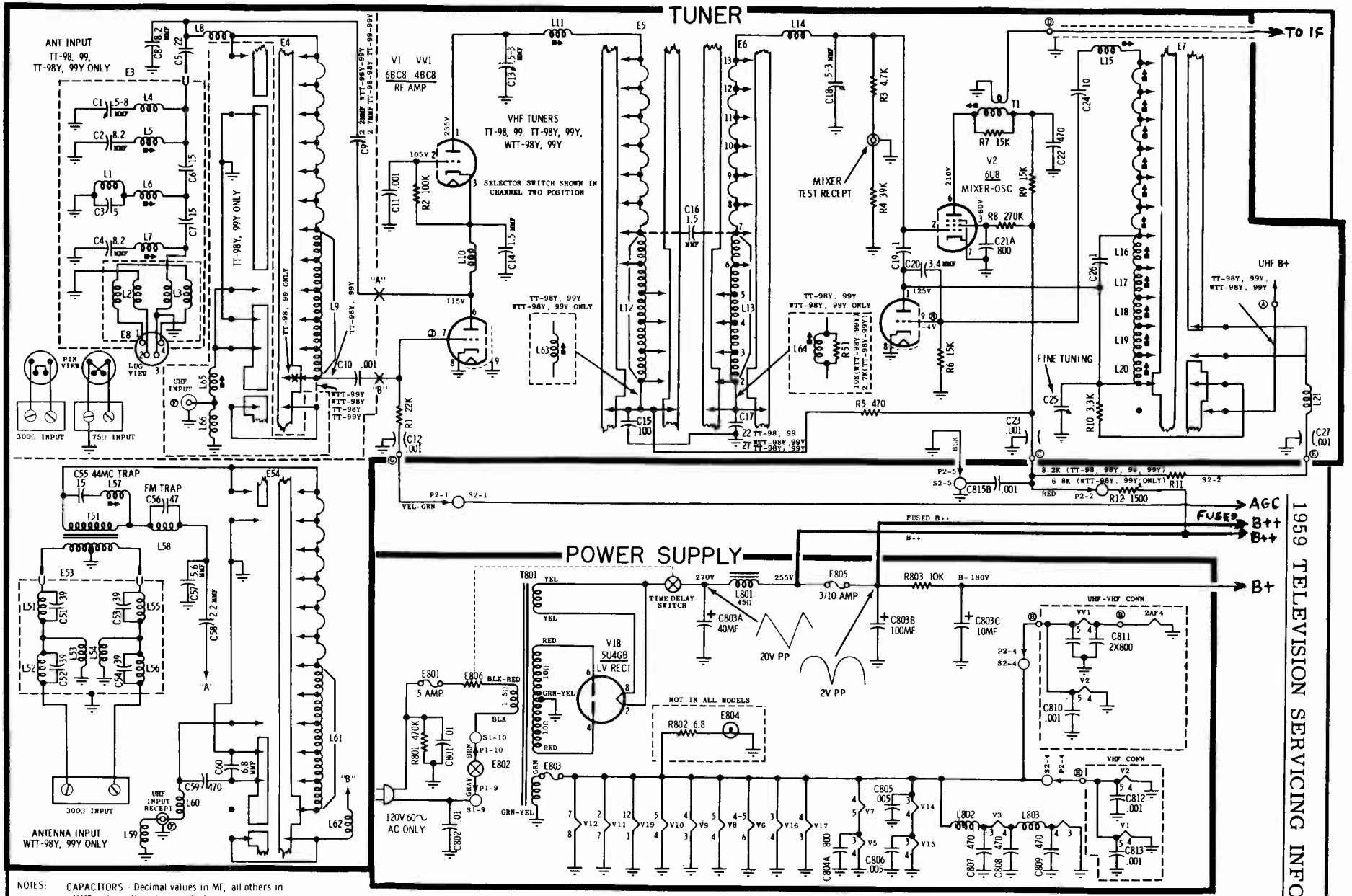
STEP	STATION	INDICATOR	ADJUST	REMARKS
1.	Strong signal	VTVM to quad det test point (grn lead)	L-303	Maximum deflection (coarse adj.). Of two possible maximum tuning points, use that giving the largest voltage reading.
2.	"	Listening test	"	Maximum sound with minimum distortion (fine adj.).
3.	Weak signal*	"	T-301	Maximum sound with minimum distortion (maintain hiss level).
4.	"	"	L-302	"

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.

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-107) 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.



NOTES:

CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.

VOLTAGE MEASUREMENTS
1. Taken with a VTVM from point indicated to chassis. ±20%
2. Line voltage 120VAC
3. Voltages indicated by an asterisk (*) will vary with associated control setting.
4. Voltages taken with contrast control at minimum and all other controls in normal operating position with no signal input.

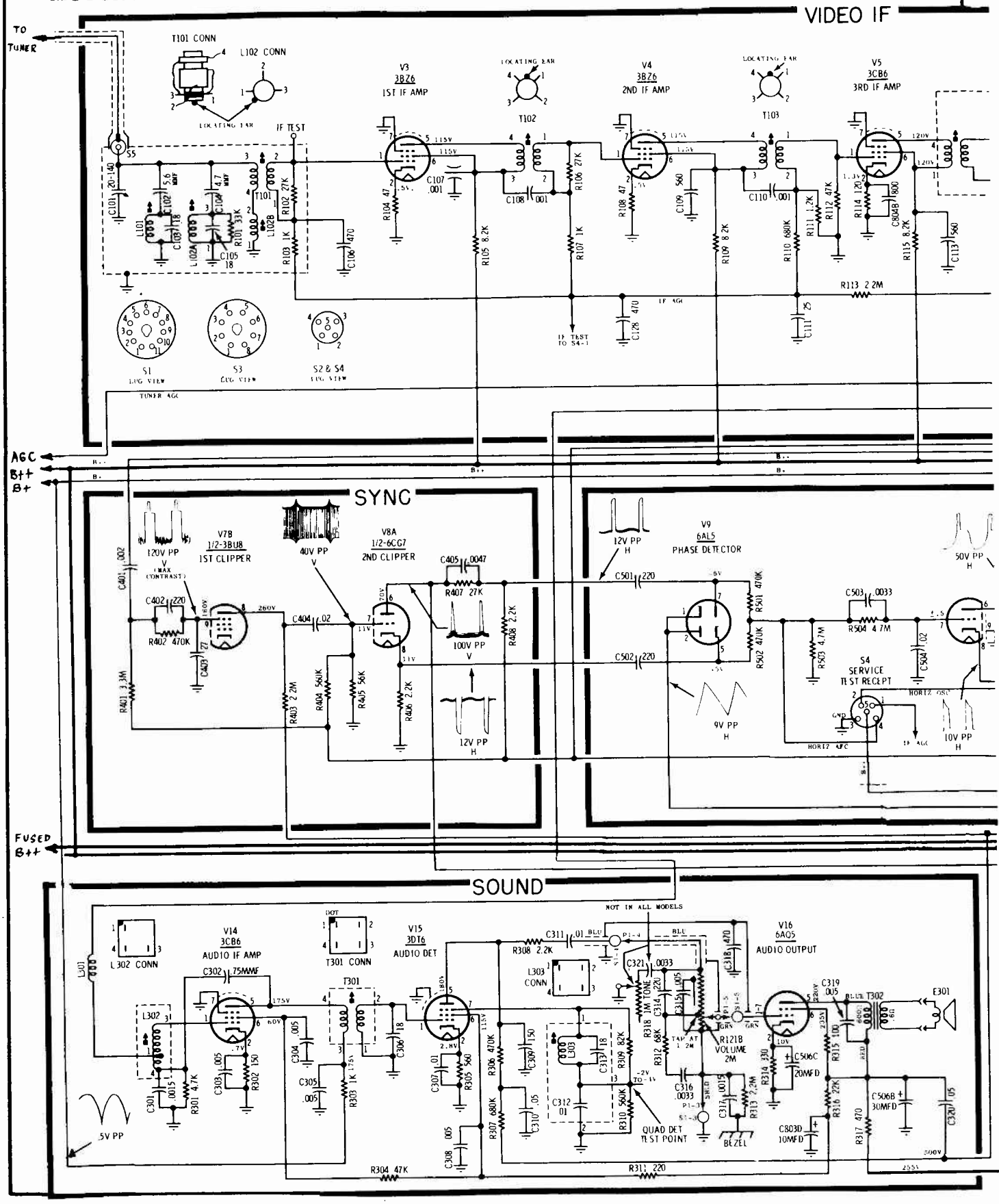
WAVEFORMS
1. Taken with a wide-band oscilloscope.
2. Receiver in operating condition and showing a normal picture.

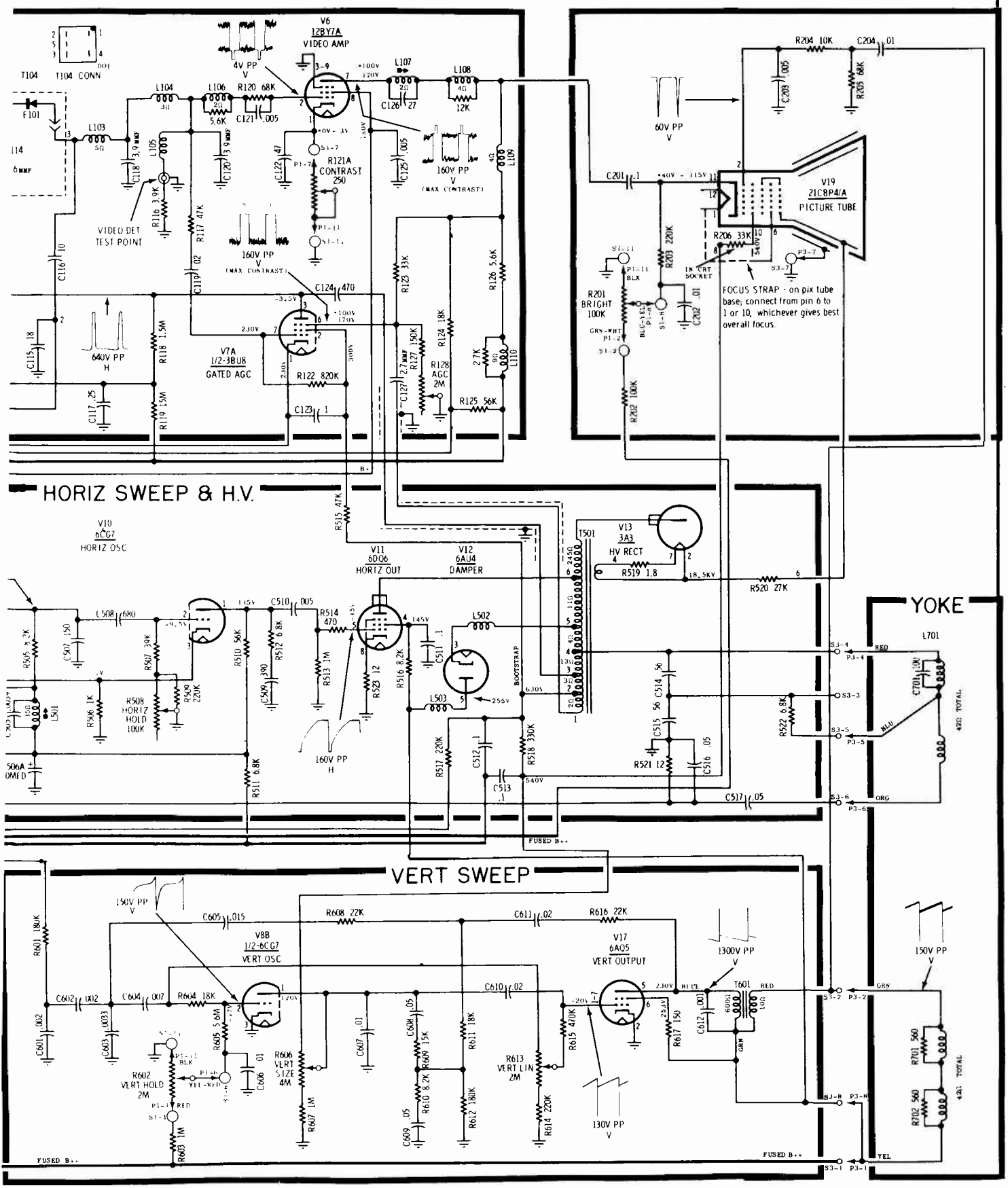
V = VERTICAL
H = HORIZONTAL
TP = TEST POINT

Part of schematic diagram of Motorola Chassis TS-544. Wires with arrows, above at right, connect to correspondingly marked wires of main schematic printed on the next two pages, over.

MOTOROLA Chassis TS-544 Partial Schematic Diagram

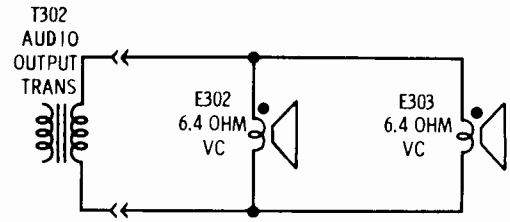
Wires with arrows connect to corresponding wires of balance of circuit on previous page.



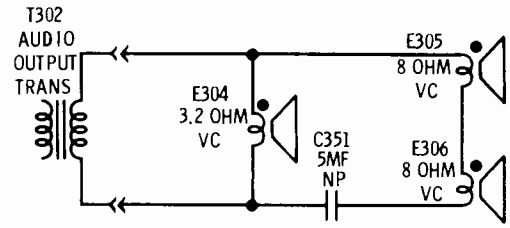

HORIZ SWEEP & H.V.
VERT SWEEP
YOKE
V6 12BY7A VIDEO AMP
V7A 1/2-3BU8 GATED AGC
V10 6CG7 HORIZ OSC
V11 6DQ6 HORIZ OUT
V12 6AU4 DAMPER
V13 3A3 HV RECT
V8B 1/2-6CG7 VERT OSC
V17 6AQ5 VERT OUTPUT
V19 21CBP4/A PICTURE TUBE
T104 T104 CONN
F101
R121A CONTRAST 250
R201 BRIGHT 100K
R602 VERT HOLD 2M
R606 VERT SIZE 4M
R613 VERT LIN 2M
R508 HORIZ HOLD 100K
VIDEO DET TEST POINT
IN CRT SOCKET
FOCUS STRAP - on pix tube base; connect from pin 6 to 1 or 10, whichever gives best overall focus.
4V PP V
160V PP V (MAX CONTRAST)
640V PP H
160V PP H
60V PP V
150V PP V
1300V PP V
130V PP V
FUSED B++
B+

MOTOROLA Chassis TS-544, etc. PRODUCTION CHANGES

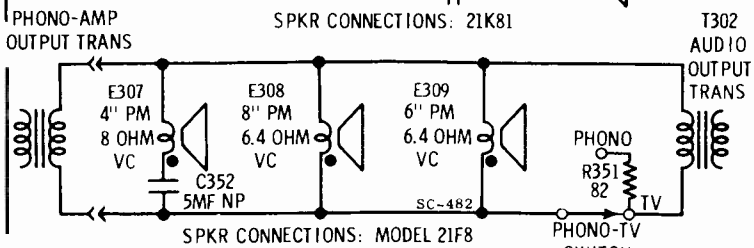
Chassis Coding	Changes
A-01	TO MINIMIZE HORIZ OVERDRIVE: R-523 (12) changed to 22 ohms: T-501 (HV trans) changed. NOTE: Three HV transformers and HV transformer secondary coils have been used on the TS-544 chassis. Only orange coded coils and transformers will be furnished as replacements; with this transformer a 12 ohm resistor MUST be used in the cathode circuit of the horizontal output tube. When replacing either the secondary coil or HV transformers, change the cathode resistor to 12 ohms if any other value is used.
A-02	C-318 (470 mmf) removed.
A-03	TO MINIMIZE HORIZ OVERDRIVE: T-501 (HV trans) changed: R-523 (22) changed to 12 ohms.
A-04 A-05	TO BROADEN RANGE OF VERT HOLD CONTROL C-601 (.002) changed to .001 mf.
A-06	Chassis receptacle (S-1) rewired.
A-07 A-08	FILAMENT REWIRING: Filament of V-17 (Vert Output) connected directly to filament transformer to prevent line losses.
A-09	RELIABILITY CHANGE: V-11 cathode resistor, R-523 (12 ohms, 1/2 watt) changed to 12 ohms 1 watt.
A-10	PHASE DETECTOR CHANGE: V-9 (6AL5 phase detector) replaced with E-501 (selenium rectifier phase detector). See figure.



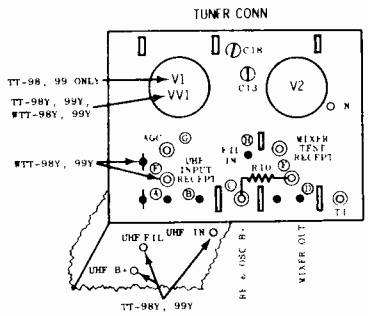
SPKR CONNECTIONS: MODELS 21K80, 21T42 & 21V1

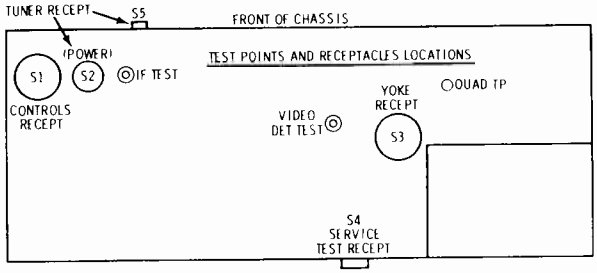


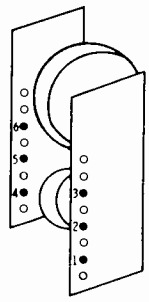
SPKR CONNECTIONS: 21K81



SPKR CONNECTIONS: MODEL 21F8



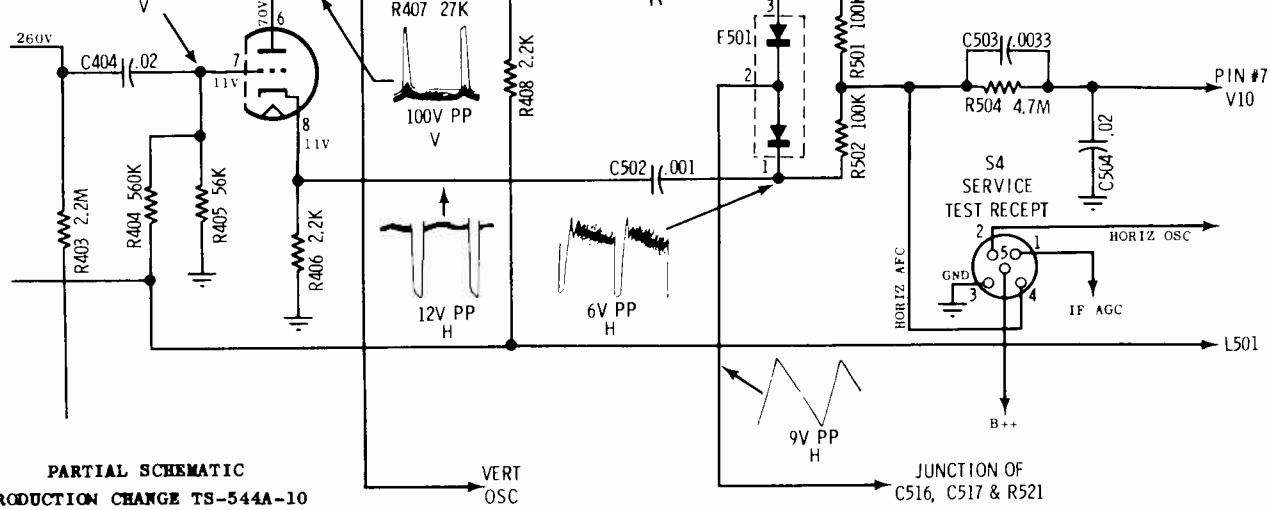




PHASE DETECTOR

V8A
1/2 - 6CG7
2ND CLIPPER

40V PP
V



PARTIAL SCHEMATIC
PRODUCTION CHANGE TS-544A-10

MOTOROLA

Chassis RTS-544, -Y, used in various models listed below, are similar to TS-544, -Y, covered in preceding section. Main changes are explained.

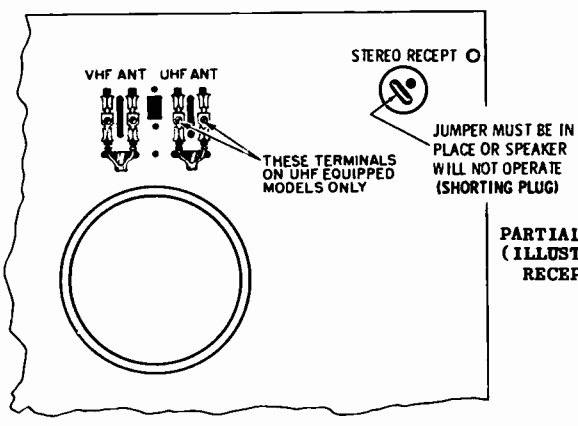
MODEL BREAKDOWN CHART

Model	Type	TV Chassis	VHF Tuner	UHF Tuner
21K98BA	Console	RTS-544	TT-108	-
Y21K98BA	Console	RTS-544Y	TT-108Y	TT-89
21K98MA	Console	RTS-544	TT-108	-
Y21K98MA	Console	RTS-544Y	TT-108Y	TT-89
21K98WA	Console	RTS-544	TT-108	-
Y21K98WA	Console	RTS-544Y	TT-108Y	TT-89
21K100BA	Console	RTS-544	TT-108	-
21K100MA	Console	RTS-544	TT-108	-
21K101BA	Console	RTS-544	TT-108	-
Y21K101BA	Console	RTS-544Y	TT-108Y	TT-89
21K101MA	Console	RTS-544	TT-108	-
Y21K101MA	Console	RTS-544Y	TT-108Y	TT-89
21K101WA	Console	RTS-544	TT-108	-
Y21K101WA	Console	RTS-544Y	TT-108Y	TT-89
21K102CWA	Console	RTS-544	TT-108	-
21K103BA	Console	RTS-544	TT-108	-
Y21K103BA	Console	RTS-544Y	TT-108Y	TT-89
21K103CWA	Console	RTS-544	TT-108	-
Y21K103CWA	Console	RTS-544Y	TT-108Y	TT-89
21K103MA	Console	RTS-544	TT-108	-
Y21K103MA	Console	RTS-544Y	TT-108Y	TT-89
21K103MCA	Console	RTS-544	TT-108	-
Y21K103MCA	Console	RTS-544Y	TT-108Y	TT-89
21T58BGA	Table	RTS-544	TT-108	-
Y21T58BGA	Table	RTS-544Y	TT-108Y	TT-89
21T58CHA	Table	RTS-544	TT-108	-
Y21T58CHA	Table	RTS-544Y	TT-108Y	TT-89
21T58MGA	Table	RTS-544	TT-108	-
Y21T58MGA	Table	RTS-544Y	TT-108Y	TT-89
21T61B	Table	RTS-544	TT-108	-
Y21T61B	Table	RTS-544Y	TT-108Y	TT-89
21T61M	Table	RTS-544	TT-108	-
Y21T61M	Table	RTS-544Y	TT-108Y	TT-89
21T61BA	Table	RTS-544	TT-108	-
Y21T61BA	Table	RTS-544Y	TT-108Y	TT-89
21T61MA	Table	RTS-544	TT-108	-
Y21T61MA	Table	RTS-544Y	TT-108Y	TT-89

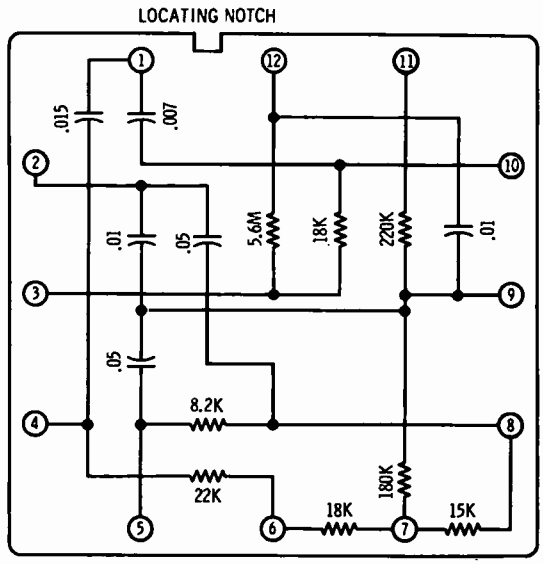
NOTE: Suffix "A" indicates the addition of a stereophonic receptacle to the cabinet rear cover.

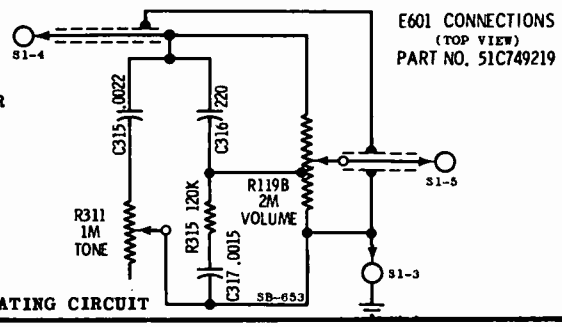
PRODUCTION CHANGES

Chassis Coding	Changes
B-00	STEREO RECEPTACLE ADDED: T-302 (audio output transformer) changed for impedance matching purposes. Speakers changed to 8 ohm impedance; R-314 (82) added; stereo receptacle added to back cover.
B-01	CRYSTAL PROTECTION CIRCUIT ADDED: C-128 (.005 mf) and R-125 (68K) placed in parallel and added between pin #2 of V6 (12BY7A) and junction of R-118 (3.9K), R-117 (47K) and L-107.
C-00	MODULES ADDED TO HORIZONTAL AND VERTICAL SWEEP CIRCUITS: Two modules, E-503 and E-601 are added replacing the following components: a) E-503 (horizontal module -Part No. 51C749191) replaces C-502 through C-507 also R-502, R-504 and R-506 through R-509; b) E-601 (vertical module - Part No. 51C749219) replaces C-601 through C-606 also R-603, R-604, R-607 through R-611 and R-613.
No coding change	TONE COMPENSATING CIRCUIT CHANGE: E-301 (tone res-cap) removed; C-315 (.0022 mf) C-316 (220 mmf), C-317 (.0015 mf) and R-315 (120,000) added. See illustration.



PARTIAL VIEW OF BACK COVER (ILLUSTRATES STEREOPHONIC RECEPTACLE AND JUMPER)





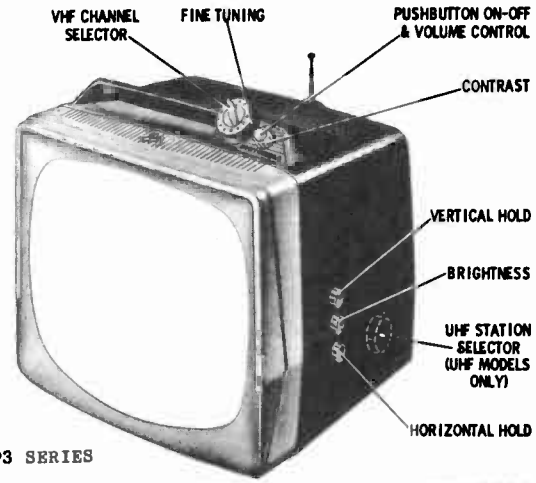
TONE COMPENSATING CIRCUIT

MOTOROLA

MODEL BREAKDOWN CHART

Model	Type	TV Chassis	VHF Tuner	UHF Tuner
17P3-1	Portable	TS-427	TT-100	-
Y17P3-1	Portable	TS-427Y	TT-100Y	WTT-89
17P3-2	Portable	TS-427	TT-100	-
Y17P3-2	Portable	TS-427Y	TT-100Y	WTT-89
17P3-3	Portable	TS-427	TT-100	-
Y17P3-3	Portable	TS-427Y	TT-100Y	WTT-89

(Service material on the next six pages)



17P3 SERIES

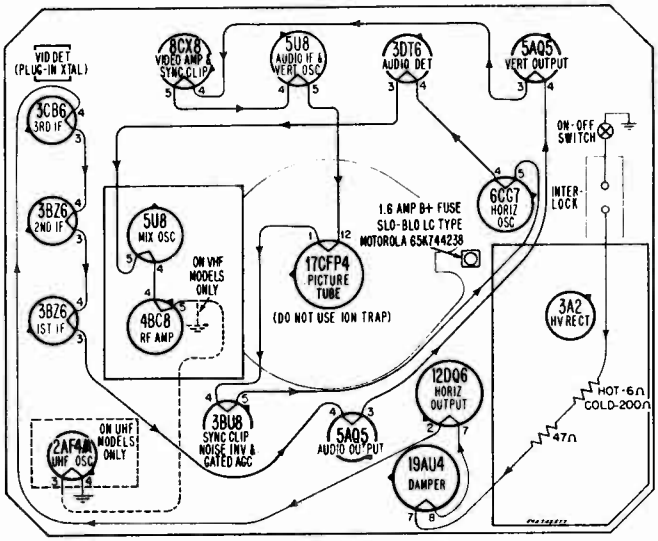


FIGURE 1. TUBE LOCATIONS & FILAMENT WIRING

FOCUS ADJUSTMENT ADJUSTMENT OF SHUNTING STRAP LOCATED ON PICTURE TUBE BASE PROVIDES OPTIMUM FOCUSING. TEMPORARILY CONNECT STRAP BETWEEN PINS 6 AND 10, THEN 6 AND 1. LOCATE STRAP PERMANENTLY IN POSITION PRODUCING BEST OVERALL FOCUS.

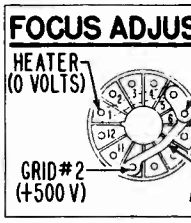
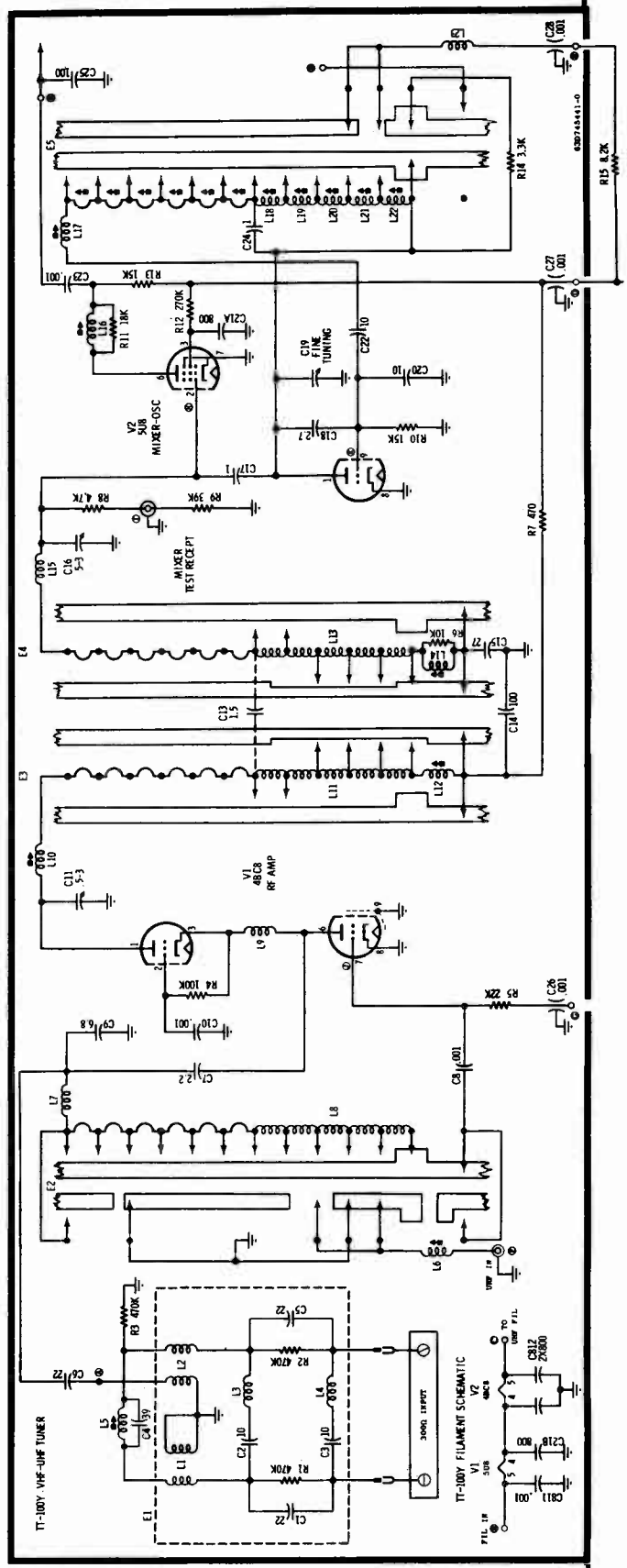
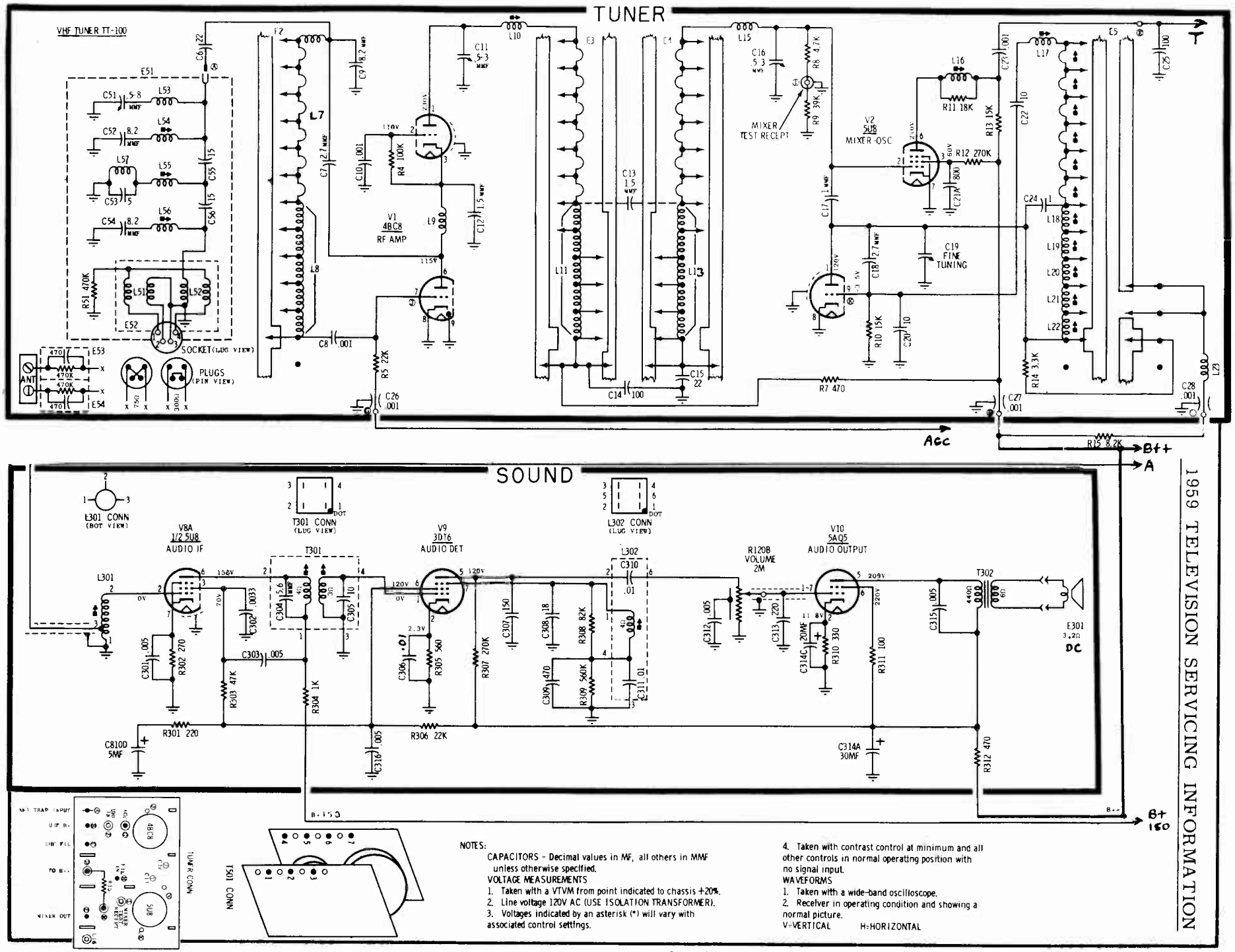


FIGURE 2. FOCUS STRAP ILLUSTRATION



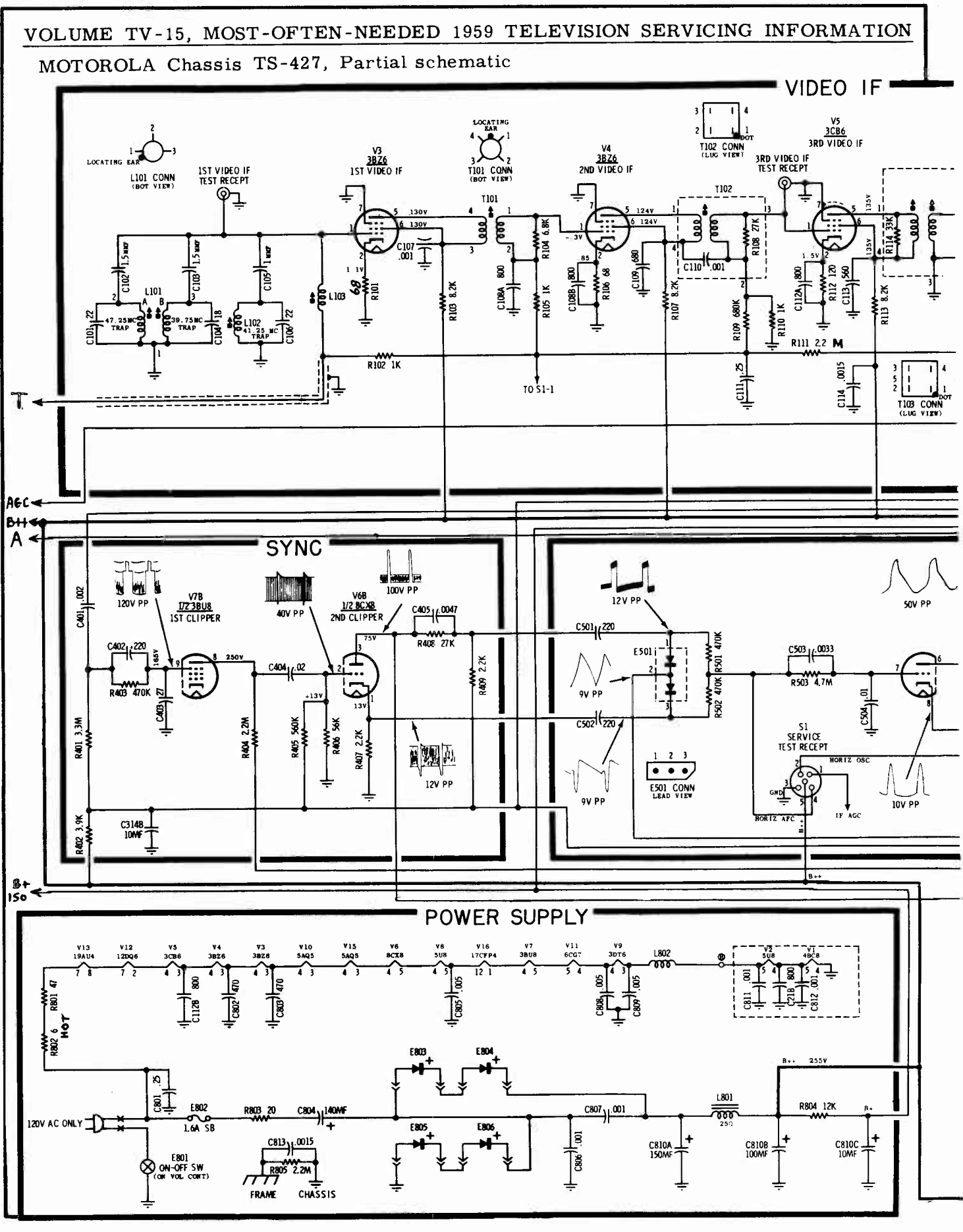
TT-100Y TUNER SCHEMATIC



Wires with arrows connect to correspondingly marked wires of main schematic, over.

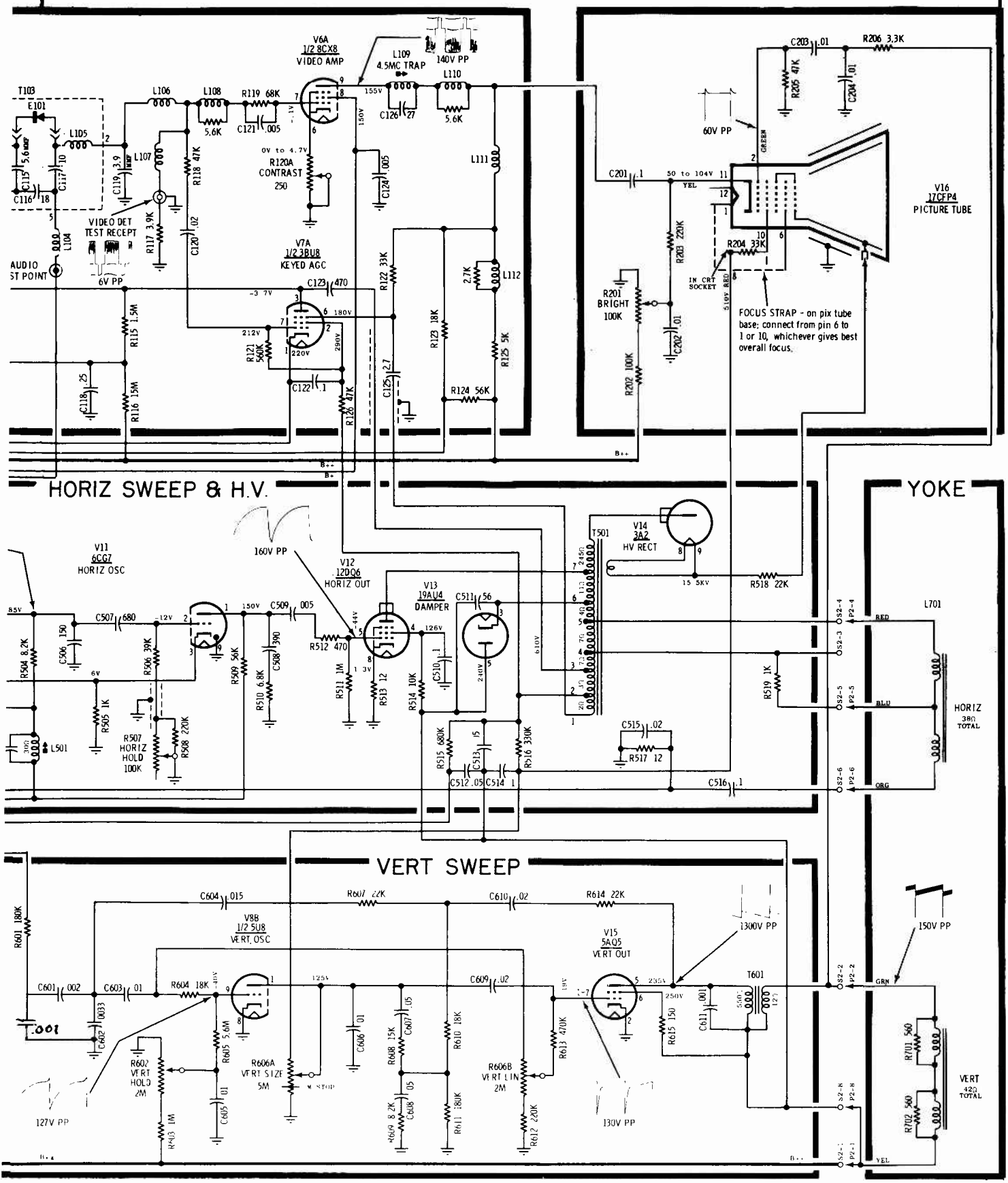
MOTOROLA Chassis TS-427, Partial schematic

Wires with arrows connect to correspondingly marked wires of schematic on previous page.



MOTOROLA

TELEVISION CHASSIS TS-427A SERIES



MOTOROLA Chassis TS-427, Service Instructions and Alignment

HORIZONTAL SIZE ADJUSTMENT

The horizontal size control consists of a piece of insulated metallic foil around the picture tube neck, just under the deflection yoke. To adjust Horizontal Size:

1. Loosen the yoke retainer clamp screw until the foil is movable.
2. Adjust for proper amount of width by sliding foil forward or backward; then, rotate slightly for minimum effect on vertical size.

   NOTE: Maximum width is obtained when the foil is out of the yoke as far as possible.

3. Retighten yoke retainer clamp screw.

DEFLECTION YOKE ADJUSTMENT

If the deflection yoke is not correctly positioned rotationally, the picture will be tilted. If the deflection yoke is not tight against the flare of the picture tube, the picture may be de-focused, have non-linear distortions and neck shadow. To adjust the yoke; loosen the metal clamp, push the yoke as far forward as possible, then rotate until the picture is straight. Loosen clamp and push tight against rear of yoke; tighten metal clamp.

PICTURE CENTERING

Picture centering is accomplished magnetically by means of the centering device located on the picture tube neck. Use the following procedure:

1. Starting with the magnetic centering device arms together (for minimum field strength) and positioned in the horizontal plane.
2. Separate the arms of the centering device to center the picture vertically.
3. Adjust horizontal centering by rotating the magnetic centering device, as a unit, one way or the other. Readjust vertical centering by slightly rotating the relative position of the arms.

SILICON RECTIFIER REPLACEMENT

Silicon rectifiers 1N1082 (Motorola Part No. 48K745525) must be replaced in pairs, as failure of one rectifier normally results in damage to the other. If 1N1082 rectifiers are unavailable, use one 1N1084 (Motorola Part No. 48C743273 as a substitute for each pair of rectifiers, and complete the circuit by shorting the adjoining rectifier holder with a piece of wire.

ALIGNMENT

VIDEO IF & MIXER ALIGNMENT

Pre-Alignment Information

1. Remove the deflection yoke plug from its socket.
2. Maintain 122 line volts with variac.
3. Short point (K) near oscillator tube (V2) to chassis.
4. Apply negative lead of a 6V bias supply to pin #1 of the Service Test Receptacle and the positive lead to pin #3.
5. Begin adjustment of cores so that they are coming from a position outside of the coil and away from the chassis... tune into the coil to obtain required response.
6. Set channel selector on channel #13 and connect an 1800 ohm 50 Watt voltage normalizing resistor from B++ to chassis. (Use pins #5 and #3 of the Service Test Receptacle.

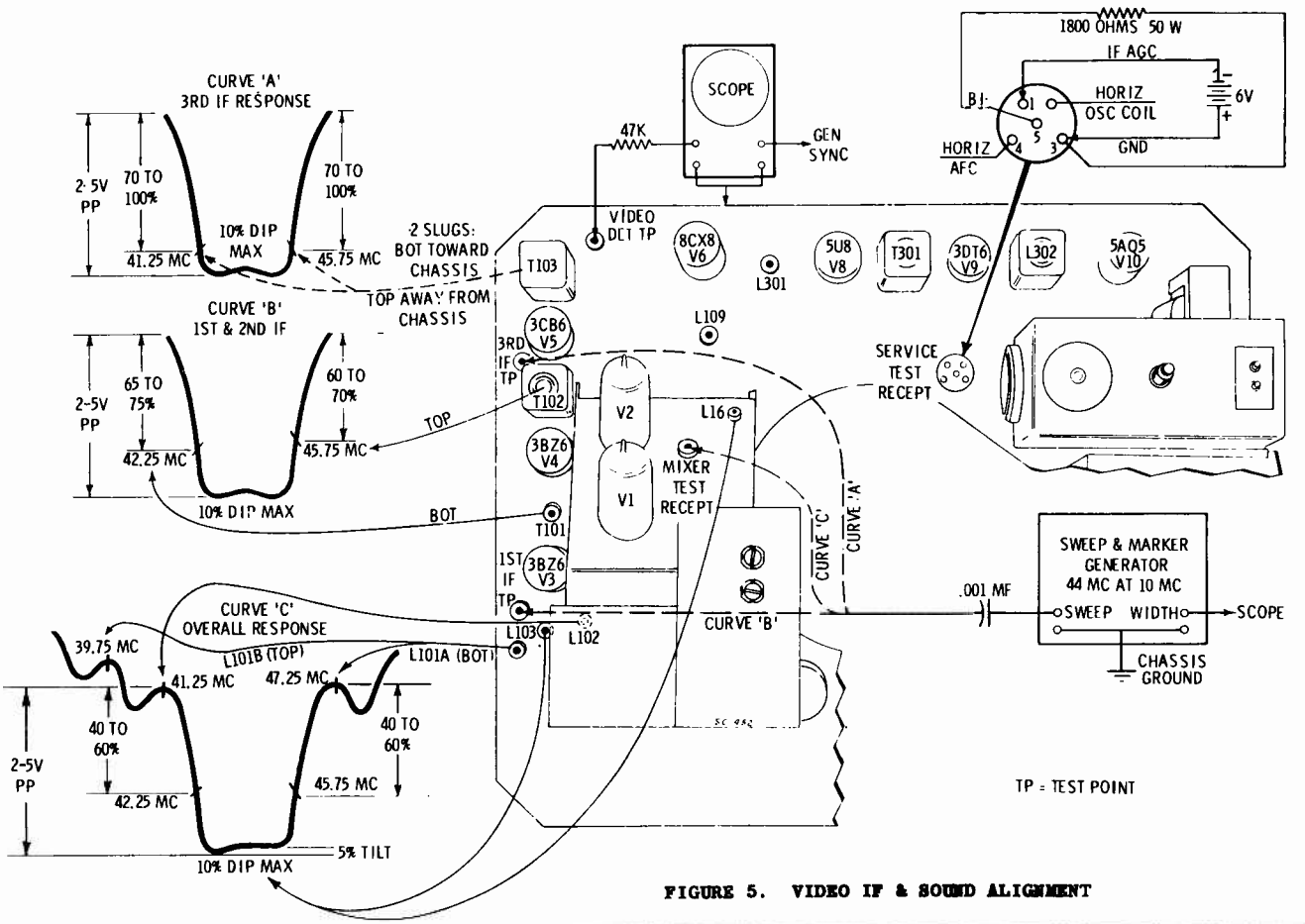


FIGURE 5. VIDEO IF & SOUND ALIGNMENT

MOTOROLA Chassis TS-427, Alignment Procedure, Continued

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GENERATOR	INDICATOR	ADJUST	REMARKS
1.	To 3rd IF TP thru .001 mf capacitor. Set to 44 Mc with 10 Mc sweep width	Scope thru 47K resistor to video det TP	T-103 (3rd IF)	Maximum gain and marker positions (see curve A). Both slugs may be reached from bottom side of T-103 "can".
2.	To 1st IF TP thru .001 mf capacitor. Set to 44 Mc with 10 Mc sweep width	"	T-102 (2nd IF)	Maximum gain and 45.75 Mc marker position (see curve B).
3.	"	"	T-101 (1st IF)	Maximum gain and 42.25 Mc marker position. If curve is tilted, readjust T-103 (3rd IF) (see curve B).
4.	To mixer test recept thru .001 mf capacitor. Set to 44 Mc with 10 Mc sweep width	"	L-16	Adjust until its effect is out of the IF bandpass.
5.				Temporarily remove the bias battery for the following adjustments:
6.	Same as step #4	Same as step #1	L-102	41.25 Mc trap dip (see curve C).
7.	"	"	L-101A (bot)	47.25 Mc trap dip (see curve C).
8.	"	"	L-101B (top)	39.75 Mc trap dip (see curve C).
9.				Replace bias battery
10.	"	"	L-16 & L-103	Closest approach to that of curve C.

NOTE: Repeat any portion of the above procedure until the proper overall curve "C" is obtained.

SOUND ALIGNMENT
(Station Signal Method)

The sound system used in the TS-427 receiver consists of an audio IF amplifier stage, a quadrature grid detector and an output stage. Since this type of sound system is extremely sensitive, relatively small input signal voltage will cause grid current to flow in both the IF amplifier and the detector stages. Grid current through the tuned coils will load them down making the adjustment extremely broad and alignment impossible. For this reason, it is necessary to use a very weak signal when aligning the driver and the detector input coils. Actually, the signal should be well down into the noise level for proper tuning action.

Preliminary Steps

1. Tune in a strong TV station.
2. Adjust all controls for normal picture and sound.
3. Refer to Video IF & Mixer Alignment Detail for coil and test point locations (Figure 5).

SOUND ALIGNMENT PROCEDURE

STEP	STATION	INDICATOR	ADJUST	REMARKS
1.	Strong signal	VTVM to quad det test point pin #4 of quad coil (see base detail on schematic. This point is jct. of R-308 (82K) & R-309 (560K)	L-302	Maximum deflection (coarse adj.). Of two possible maximum tuning points, use that giving the largest voltage reading (DC).
2.	"	Listening test	"	Maximum sound with minimum distortion (fine adj.)
3.	Weak signal*	"	T-301(bot slug)	Maximum sound with minimum distortion (maintain hiss level)
4.	"	"	T-301(top slug)	Maximum sound (maximum sensitivity)
5.	"	"	L-301	Maximum sound with minimum distortion

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

*NOTE: 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. This hiss level must be maintained for proper alignment.

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 the 4.5 Mc interference strongly into the picture.

3. ADJUST... sound trap (L-109) to find the two points of adjustment at which the sound beat is just noticeable on the picture tube screen. Rotate the core toward center of the two points. Use minimum amount of inductance (core out of coil) that will result in no apparent beat interference.

MOTOROLA

CHASSIS PTS-546 and PTS-546Y

(Material on the next 11 pages)

MODEL BREAKDOWN CHART

Model	Cabinet	Chassis	VHF Tuner	UHF Tuner
21P1B	Portable	PTS-546	TT-110	—
Y21P1B	Portable	PTS-546Y	TT-110Y	VTT-89
21P1BR	Portable	PTS-546	TT-110	—
Y21P1BR	Portable	PTS-546Y	TT-110Y	VTT-89
21P1GY	Portable	PTS-546	TT-110	—
Y21P1GY	Portable	PTS-546Y	TT-110Y	VTT-89

FUSE REPLACEMENT GUIDE

Fuse	Type & Rating	Purpose	Location
E-804	1-3/4 amp slo-blo LC type	B++ system	Top of chassis near vert output tube. To remove, push down & rotate until fuse pops up.

PICTURE CENTERING

Picture centering is accomplished magnetically by means of the centering device located on rear of yoke cover. Use the following procedure:

1. Start with the magnetic centering device arms together (for minimum field strength) and positioned in the horizontal plane.

2. Separate the arms of the centering device to center the picture vertically. Keep arms as close together as possible commensurate with proper centering; excessive separation may result in de-focusing.

3. Adjust horizontal centering by rotating the magnetic centering device, as a unit, one way or the other. Readjust vertical centering by slightly rotating the relative position of the arms.

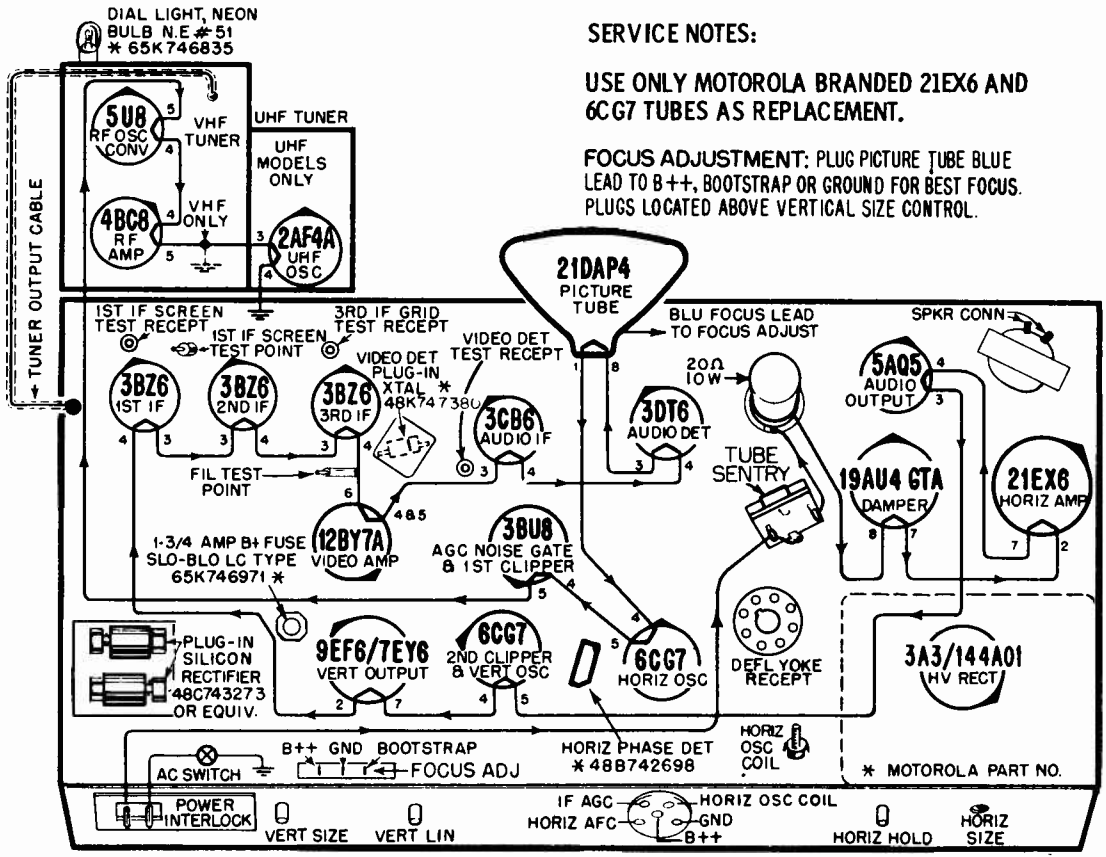
DEFLECTION YOKE COMPONENTS

Temperature compensating resistor for stabilization of vertical size

To maintain constant vertical size during warm up, a temperature compensating resistor (R-703) is incorporated in series with the vertical winding. This resistor is located on the yoke itself. A defect in the temperature compensating resistor could result in loss of vertical sweep, poor vertical linearity or reduction in vertical size of the raster and picture.

Pincushion magnets

Pincushion magnets, in both the vertical and horizontal planes, are provided as part of the yoke. The magnets are glued into pockets provided in the yoke flare and under normal operating circumstances require no service or adjustment. If it should be necessary to replace a magnet, polarize magnet in same direction as other three magnets.



SERVICE NOTES:

USE ONLY MOTOROLA BRANDED 21EX6 AND 6CG7 TUBES AS REPLACEMENT.

FOCUS ADJUSTMENT: PLUG PICTURE TUBE BLUE LEAD TO B++, BOOTSTRAP OR GROUND FOR BEST FOCUS. PLUGS LOCATED ABOVE VERTICAL SIZE CONTROL.

FIGURE 1. TUBE LOCATION, FUSE GUIDE, FOCUS INFORMATION & FILAMENT WIRING.

MOTOROLA Chassis PTS-546, -Y, Service Information, Continued

HORIZONTAL OSCILLATOR ADJUSTMENT

The HORIZONTAL HOLD should have a sync range of approximately 30 degrees. If the control is too critical, adjust as follows:

1. Set all controls for a normal picture.

2. Using a piece of wire, short SERVICE TEST RECEPTACLE pin #4 labeled "HORIZ AFC" to ground. See Figure 2 for test point pins.

3. Connect a .1 mfd 400 volt capacitor in parallel with the HORIZONTAL OSCILLATOR COIL (L-501). Use pins #2 and #3 of the SERVICE TEST RECEPTACLE.

4. Adjust the HORIZONTAL HOLD control to the point where the picture almost remains stationary...as far as horizontal sync is concerned. Picture must be in vertical sync during this adjustment.

5. Remove the .1 mfd capacitor shunting the HORIZ COIL and without turning the HORIZONTAL HOLD control, adjust the HORIZ COIL slug to the center of the range in which the picture almost remains in sync horizontally. The coil adjustment slug is located just to the left of the high voltage cage (receiver viewed from rear).

6. Remove the wire shorting the HORIZ AFC to ground and adjust the HORIZONTAL HOLD control so that no fold-over appears on either side of the raster.

SERVICING THE VHF TUNER

The tuner has been provided with removable wafers for the tuning sections, to facilitate checking of the component parts as well as provide a simple method of replacement should one of the tuned sections be damaged.

SERVICING THE TS-546 PORTABLE RECEIVER

In addition to the service test receptable, numerous individual test points are provided on the chassis. All tubes are accessible from the top of the chassis and a comprehensive check of the receiver can be made by removal of the rear cover only.

If it is necessary to get to the under side of the chassis, the most practical method is to remove the cabinet wrap around. This method is usually easier and provides a completely exposed chassis without the disadvantages of a separate chassis, tuner and picture tube with their connecting wiring.

TO REMOVE THE CABINET

Follow the dismantling steps shown in Figure 2A. Upon completion of these steps, position the receiver with the picture screen down using a protective pad to eliminate scratching of the screen. Then lift the cabinet (wrap-around) up and off of the chassis and bezel.

To replace cabinet wrap-around, follow the dismantling steps in reverse order.

NOTE: Do not tighten grounding rod or other assembly parts to the extent of damage to the fiberglass cabinet.

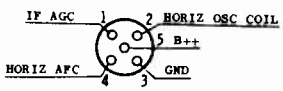


FIGURE 2.

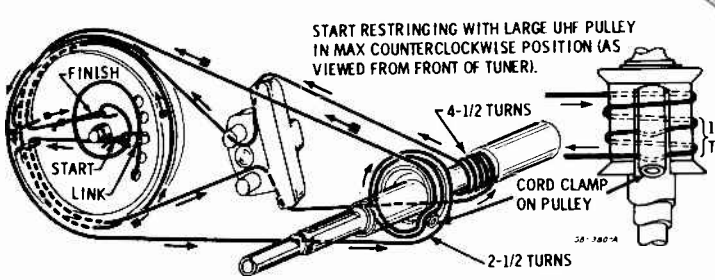


FIGURE 3. UHF TUNER DRIVE STRINGING.

FIGURE 2A. CABINET REMOVAL.

MOTOROLA Chassis PTS-546, -Y, Alignment Information

ALIGNMENT

SERVICING THE IF SECTION

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.

VIDEO IF & MIXER ALIGNMENT

Pre-Alignment Steps

1. Maintain line voltage at 120 with variac.

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

3. Disable oscillator by shorting point "N" located near oscillator tube V-2, to chassis.

4. Apply the negative lead of a 6 volt bias supply to pin #1 (IF AGC) of the SERVICE TEST RECEPTACLE and the positive lead to pin #3 (chassis ground).

5. All coil slug tuning positions, in relation to chassis, are given in the procedure chart and in the separate detail of fig. 7.

6. Set channel selector on channel #13 and connect a 1500 ohm 50W voltage normalizing resistor from B++ to chassis (use pins #5 (B++) and #3 (ground) of the SERVICE TEST RECEPTACLE.

7. Set the contrast control at minimum (maximum resistance).

8. Maintain 2 to 5 volts peak-to-peak at the diode load (Det TP) except when specific values are given in the procedure chart.

9. Refer to Video IF & Mixer Alignment Detail for component and test point locations (Figure 6).

VIDEO IF & MIXER ALIGNMENT PROCEDURE

STEP	SWEEP GEN AND MARKER	INDICATOR	ADJUST	ADJUST FOR AND/OR REMARKS
1.	To 3rd-IF-grid test-recept thru a .001 mf capacitor. Set sweep approx. to 44Mc: markers as required.	Scope thru a 47K ohm resistor to Video Det test recept	Both slugs of 3rd IF coil (T-103)	Equal peaks and 45.75 Mc marker as as shown on curve #1. Note: Slug at crystal end can be reached by inserting tool through unohstructed slug. Tune both slugs near the ends of their respective coils. See detail for slug position.
2.	To mixer grid thru .001 mf capacitor. (Use opening adjacent to mixer, point "N"). Set sweep to approx 44 a. Set marker to 47.25 Mc b. Set marker to 41.25 Mc c. Set marker to 39.75 Mc	Scope connection same as step #1	a. Both 47.25 Mc traps (L-101 & L-104) b. 41.25 trap (L-102B) c. 39.75 trap (L-103)	Note: temporary removal of bias or increased generator input may be required to see traps. a. Minimum response (tune slugs at end of coils away from chassis). b. Minimum response (tune slugs at end of coil toward chassis). c. Minimum response (tune slugs at end of coil away from chassis). See curve #2 for above responses
3.	Generator connection same as step #2, except set output for 3V P-P on scope.	Scope to "1st IF screen test recept or test point." Pin #6 of tube.	Mixer trans, located on tuner (T-1) 1st IF grid coil (L-102A) slug located away from chassis.	Tune both T-1 & L-102A for curve shown in curve #3. The pri affects the center peak and the sec affects the two outside peaks. If a suck-out (trap effect) occurs, detune 1st IF transformer (T-101) to remove. Tune both coil slugs at end of coil away from chassis
4.	Gen connection same as step #2. Reset for 2-5V P-P on scope	Scope thru a 47K ohm resistor to Video Det test recept.	1st IF trans (T-101) 2nd IF trans (T-102)	Proper 42.25 Mc marker placement (tune slug at end of coil toward chassis) Proper 45.75 Mc marker placement (tune slug at end of coil toward chassis). See curve #4.
5.	Same as step #4	Same as step #4	——→	If a tilt occurs, readjust the mixer pri coil (T-1 on tuner) and if necessary touch-up the 1st and 2nd IF trans (T-101 & T-102) for response shown in curve #4.

SOUND ALIGNMENT
(Station Signal Method)

The sound system used in the TS-546 receiver consists of an audio IF amplifier stage, a quadrature grid detector and an output stage. Since this type of sound system is extremely sensitive, relatively small input signal voltage will cause grid current to flow in both the IF amplifier and the detector stages. Grid current through the tuned coils will load them down making the adjustment extremely broad and alignment impossible. For this reason, it is necessary to use a very weak signal when aligning the driver and the detector input coils. Actually, the signal should be well down into the noise level for proper tuning action.

Preliminary Steps

1. Tune in a strong TV station.

2. Adjust all controls for normal picture and sound.

3. Refer to Video IF & Mixer Alignment Detail for coil and test point locations (Figure 6).

MOTOROLA Chassis PTS-546, -Y, Alignment Information, Continued

SOUND ALIGNMENT PROCEDURE

STEP	STATION	INDICATOR	ADJUST	REMARKS
1.	Strong signal	VTVM to jct. of R-309 (82K) and R-310 (560K) located on L-303 (under chassis).	L-303 (quad coil)	Maximum deflection (coarse adj.). Of two possible maximum tuning points, use that giving the largest voltage reading.
2.	"	Listening test	"	Maximum sound with minimum distortion (fine adj.).
3.	Weak signal*	"	T-301 (interstage)	Maximum sound with minimum distortion (maintain hiss level). Do not change pre-set core at top end of "can". **
4.	"	"	L-302 (take-off)	

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

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

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

4.5 MC TRAP ADJUSTMENT

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

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

3. ADJUST...sound trap (L-110) to find the two 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.

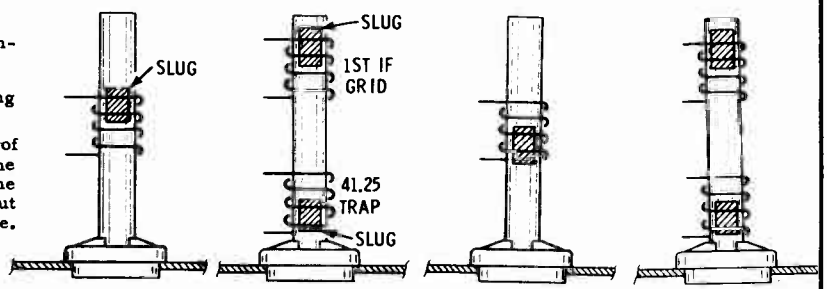


FIGURE 7. COIL SLUG POSITIONS FOR ALIGNMENT.

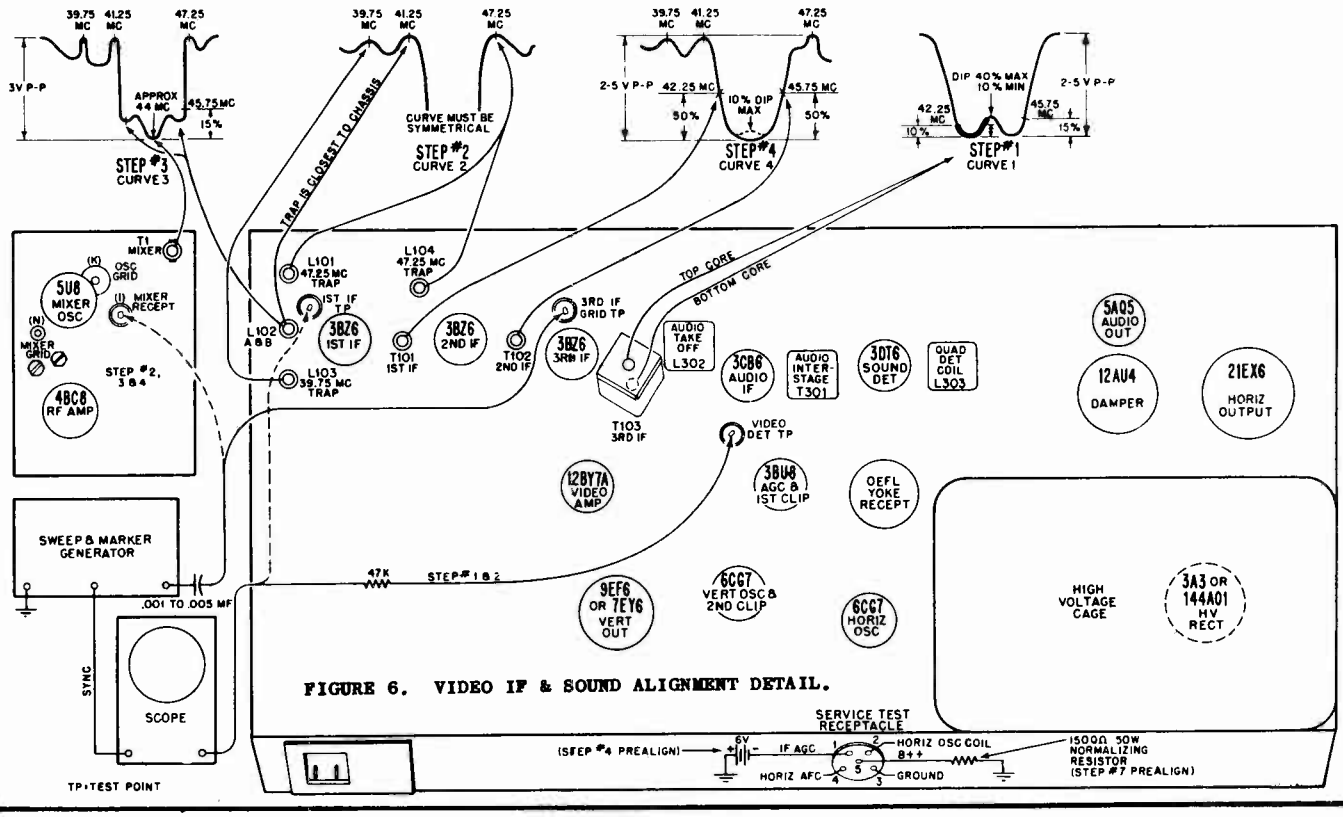


FIGURE 6. VIDEO IF & SOUND ALIGNMENT DETAIL.

MOTOROLA Chassis PTS-546, -Y, Service Information, Continued

SERVICE AID CHART

Be certain that all applicable remedies of each section have been applied before continuing to the next column.

Before any adjustments...even the most minor repairs ...are attempted, it is recommended that you examine the television screen very carefully, as it supplies an abundance of visible information. After viewing the screen, determine the possible source of trouble and proceed with the necessary adjustments and repairs as outlined in the chart. Return the controls to their original position, if making the adjustments or moving the controls does not rectify the trouble.

It is common knowledge that tube failures account for a majority of the TV troubles and that these failures can be corrected by changing the defective tubes. However, it is not necessary to remove and test all the tubes when the set is inoperative. It is recommended that you localize the trouble with the aid of the chart and remove only the tubes listed under the "Tubes" column in the chart. Always return removed tubes into the exact tube socket from which they were removed, even though there are many identical tubes (tubes having identical numbers).

LINE VOLTAGE VARIATIONS

Low-line-voltages could create any or all of the following conditions: 1. Decrease in Horizontal and/or Vertical Size: 2. No Picture or Intermittent Picture: 3. Dark Screen: 4. Weak and/or Hazy Picture: 5. Weak and/or Distorted Sound. These operating difficulties are usually temporary and are rectified when normal operating voltages are supplied.

High-line-voltages, however, create a more serious problem as tubes and components may be damaged permanently during these peak periods.

FILAMENT WIRING

The filaments in the TS-546 chassis are wired in series. Series wired receivers have all the tube filaments placed in series with one another and this string is then wired across the AC line. A surge resistor is also wired in series with the AC line and the first tube in the filament string. This special resistor prevents damage to the tubes during the initial voltage surge. In the series filament string one defective tube filament "breaks" the electrical circuit causing the entire string to become inoperative; none of the tubes will "lite-up" when one tube becomes defective.

SYMPTOMS	CONTROLS	CHECK or ADJUST	TUBES	MISCELLANEOUS CHECKS
I. INOPERATIVE RECEIVER				
SET DEAD (tubes not lighting)	ON-OFF switch	Is set plugged in? Check AC line cord and plug. Is AC line voltage available at outlet (check with lamp). Is back cover interlock in place?	Check the filaments of each tube - as the failure of one tube heater in a series filament string will cause the whole string to become inoperative.	Isolate defective filament by using appropriate Test Points. Tube Sentry. Filament dropping resistor. On-Off Switch.
SET DEAD (no sound or picture but tubes are lit)	Volume Brightness			B++ Fuse (1.75 amp). Dropping Resistor. Silicon Rectifiers. Electrolytics. Filter choke. B++ voltages. Tube sentry.
NO RASTER OR LOW BRIGHTNESS (sound normal)	Brightness	Ion trap	Horiz Osc Horiz Output HV Rectifier Damper Picture tube	Second anode voltage. Voltage at Hi Voltage Rect. Bootstrap voltage. Drive voltage at Horiz Amp. Voltages & waveforms at Horiz Osc & Horiz Output. Solder connections at base of CRT. Horiz Output transf. Deflection yoke. B++ voltages.
NORMAL RASTER (no picture-no sound) visible black and white specs (snow)	Channel selector	Try "tuning in" another channel. Check antenna & lead-in. Check connections at antenna terminals.	RF Amp Mixer-Osc 1st, 2nd & 3rd IF Amp. AGC	Components and voltages in the following circuits. RF Amp, osc-mixer, IF amp, AGC, B+ & B++. Oscillator coil not tuned. Crystal diode (detector)
II. DEFECTIVE SIZE				
SMALL VERT SIZE	Vert size. Vert Lin.		Vert Osc Vert output	Voltages in Vert Osc & Vert output circuits. Bootstrap voltage. Vertical output transformer. Deflection yoke.
(Thin horiz white line) : poor vert lin	(Caution-Brightness must be decreased to prevent permanent damage to the CRT)		"	"
SMALL HORIZ SIZE	Horiz size	Picture centering	Horiz osc Horiz output Damper	Second anode voltage. Bootstrap voltage. Drive voltage. B++ voltage. Horizontal output transformer. Deflection yoke.
SMALL SIZE - HORIZ & VERT	Vert size	Horiz size control Check AC line voltage	Horiz output Vert output Damper	Power supply voltages. Low AC line voltage.

MOTOROLA

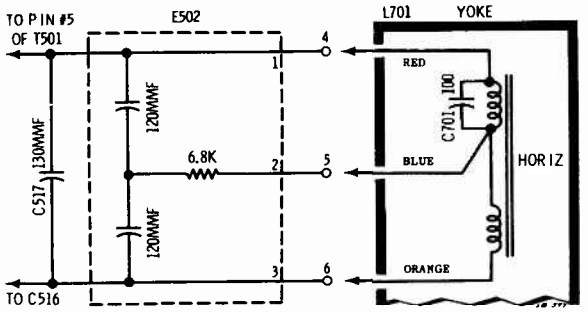
SERVICE AID CHART (Cont'd)

SYMPTOMS	CONTROLS	CHECK or ADJUST	TUBES	MISCELLANEOUS CHECKS
III. LOSS OF SYNCHRONIZATION				
POOR HORIZONTAL "LOCK-IN" (diagonal black & white bars or picture rolls from side to side)	Horiz hold	Horiz Osc Coil	Phase Detector (tube or selenium rectifier) 1st & 2nd Clipper, Horiz osc, AGC.	Bootstrap, B++, Clipper, Phase det, Horiz Osc & AGC voltages & waveforms. Also refer to "WEAK PICTURES".
POOR VERTICAL "LOCK-IN" (picture rolls up or down)	Vert hold Vert size Vert lin	Antenna & lead-in	1st & 2nd Clipper Vert Osc Vert Output AGC	Bootstrap, B++, Clipper, Vert Osc & AGC voltages & waveforms. Interference, sync clipping at video amp. Abnormal power supply ripple. Insufficient bootstrap filtering. Also refer to "WEAK PICTURE".
POOR HORIZONTAL & VERTICAL "LOCK-IN"	Horiz hold Vert hold	Weak signal. Antenna lead-in.	1st & 2nd Clipper, AGC	Bootstrap, B++, AGC and clipper voltages. Sync clipping at video detector. Also refer to "WEAK PICTURE", POOR HORIZONTAL "LOCK-IN" & POOR VERTICAL "LOCK-IN".
IV. POOR PICTURE QUALITY				
WEAK PICTURE (picture appears gray and may have thin horizontal diagonal lines) sound normal	Contrast Fine tuning	Check for proper channel selector setting. Check antenna system. If trouble appears on only one or two channels, the tuner tubes are likely at fault.	RF Amp Mixer-Osc 1st, 2nd and 3rd Video IF amp. Video amp. Picture Tube Diode detector (crystal)	B+, B++, AGC, RF Amp, Mixer-Osc & video amp voltages & waveforms. Crystal detector. Contrast control.
EXCESSIVE CONTRAST	Contrast (Control has no effect on picture)		AGC Mixer-osc RF amp 1st, 2nd & 3rd IF amp Video amp Picture tube	AGC voltage and circuit. Proper pulse from horiz output to AGC tube. Pulse coupling capacitor to AGC plate. RF-AGC delay network. To check AGC (IF) use service test recept on back panel.
NEGATIVE PICTURE (picture has "silkish appearance" as brightness is advanced).	Brightness Contrast		1st, 2nd & 3rd video IF amp. Video amp. Mixer-osc. Picture tube. AGC.	AGC voltage and circuit. Video detector circuit. Leakage between primary & secondary of video IF transformers. Video IF amp circuits.
WIDE HORIZONTAL BAR OR GRADUATION IN SHADING-VERTICALLY (set may have poor vertical sync).			RF amp Mixer-osc 1st, 2nd & 3rd video IF amp. Video amp. Picture tube.	Heater-cathode short in any video circuit. Excessive power supply ripple (may have hum in audio). Power supply filters. Selenium rectifiers. Picture tube.
PICTURE TOO DARK (size may increase with loss of focus as brightness is advanced)	Brightness		HV Rectifier Picture tube Horiz output	Brightness control. Ion trap out of adjustment (ion trap not on all models). Horizontal output or hi-voltage stages. Check boost and B++ voltages.
INTERFERENCE IN PICTURE	Fine tuning	Antenna location Antenna lead-in location. Check neighboring set for comparison or possible interference source.	Horiz output Video amp	Improper adjustment of 40 Mc & 47.25 Mc trap. Improper IF alignment. Open screen & decoupling by-pass capacitors. Hi-voltage arc-corona. Interference from neighboring television receivers in immediate vicinity.
MICROPHONICS VISUAL & AUDIBLE		Binding knobs & control shafts. Lightly tap to locate defective tube.		Tap tubes - look & listen for microphonic tube.
LOSS OF PICTURE-SOUND NORMAL NORMAL RASTER	Contrast		Video amp	B+ & B++ voltages.

MOTOROLA Chassis PTS-546, -Y

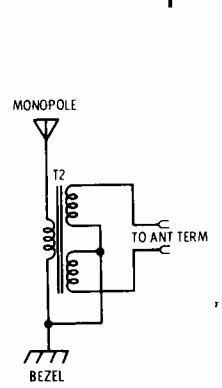
PRODUCTION CHANGES

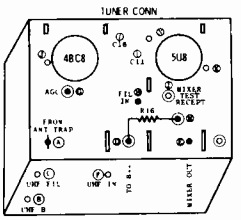
Chassis Coding	Changes
A-00-1	Same as A-02 production change.
A-01	TO IMPROVE VIDEO RESPONSE: L-109 (500 microhenries) changed to 180 microhenries; L-112 (500 microhenries) changed to 400 microhenries.
A-02	TO MINIMIZE AUDIO REGENERATION: C-313 (30 mmf) changed to 18 mmf; C-307 (.22 mmf) removed; C-301 (.0015 mf) changed to .001 mf; C-306 (18 mmf) relocated; fixed iron core added to L-303; L-303 changed.
A-03	TO REDUCE AUDIO DISTORTION AT CERTAIN FINE TUNING SETTINGS: R-125 (15K) added across secondary of T-102 (2nd IF Trans).
A-04	Reliability Change: C-514 (390 mmf, 2KV), C-515 (390 mmf, 2KV) and R-521 (6.8K) replaced with E-502 (Res Cap - 120 mmf, 2.5KV/120 mmf, 2.5 KV/6800 20% 1/4W); C-517 (130 mmf, 5KV) added between pins #4 and #6 of deflection yoke socket. See drawing for res-cap connections.

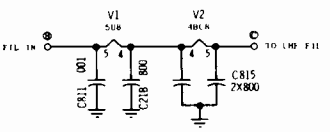


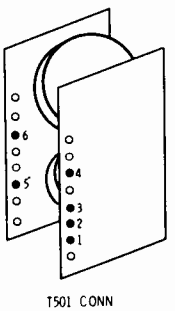
YOKE RES-CAP CONNECTIONS (PROD CHANGE A-04)

A-05	PICTURE SHADING CHANGE: Focus terminal bootstrap lead moved from unfiltered end of bootstrap (junction of R518, R517 & C512) to filtered end of bootstrap (junction of R518-1 meg & C-513-.1 mf); R-608 (15K 20% 1/2W) changed to 15K 10% 1/2W.
A-05-1	Same as Production Change A-06-Tuning Range change.
A-06	TO DECREASE AUDIO DISTORTION AT CERTAIN FINE TUNING SETTINGS: Fine tuning range decreased on tuner. Tuner changed to TT-110C. TO INCREASE TUNING RANGE OF THIRD IF TRANSFORMER: One turn is removed from T-103 secondary. HORIZONTAL SYNC STABILITY CHANGE: C-506 (150 mmf) changed to 100 mmf; R-512 (12K) changed to 6800 ohms.

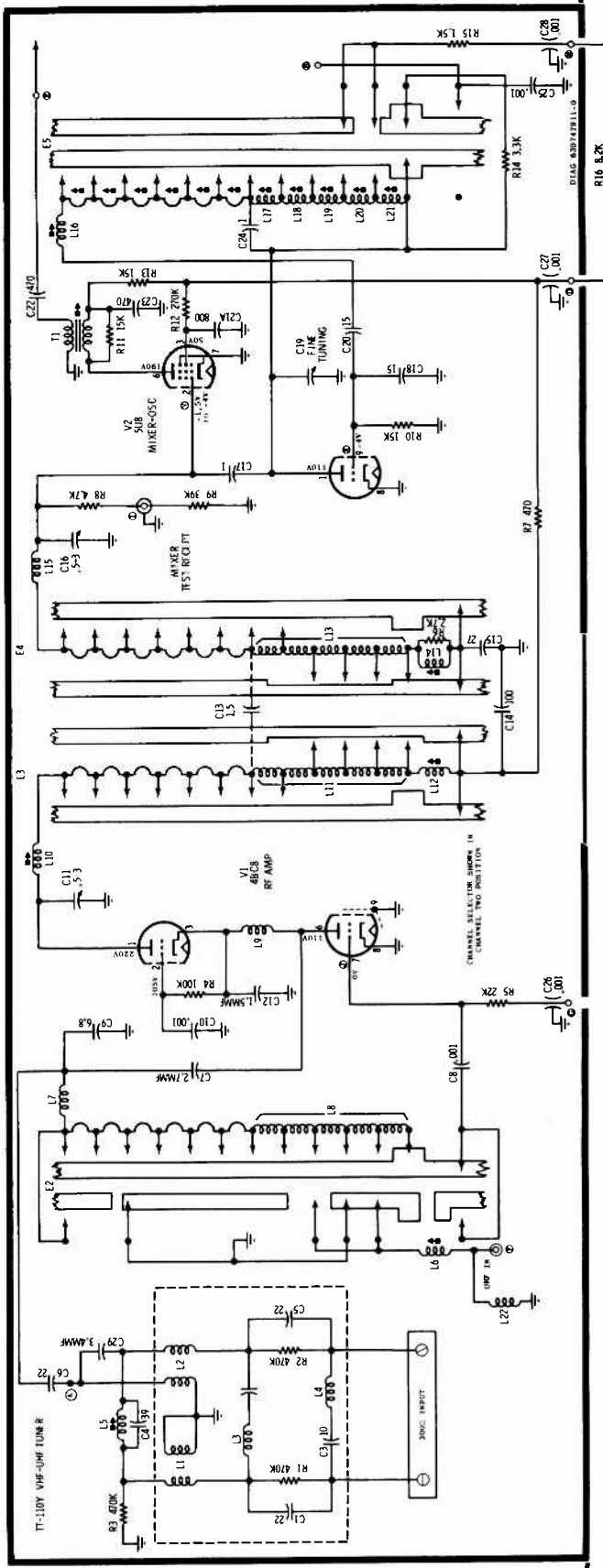




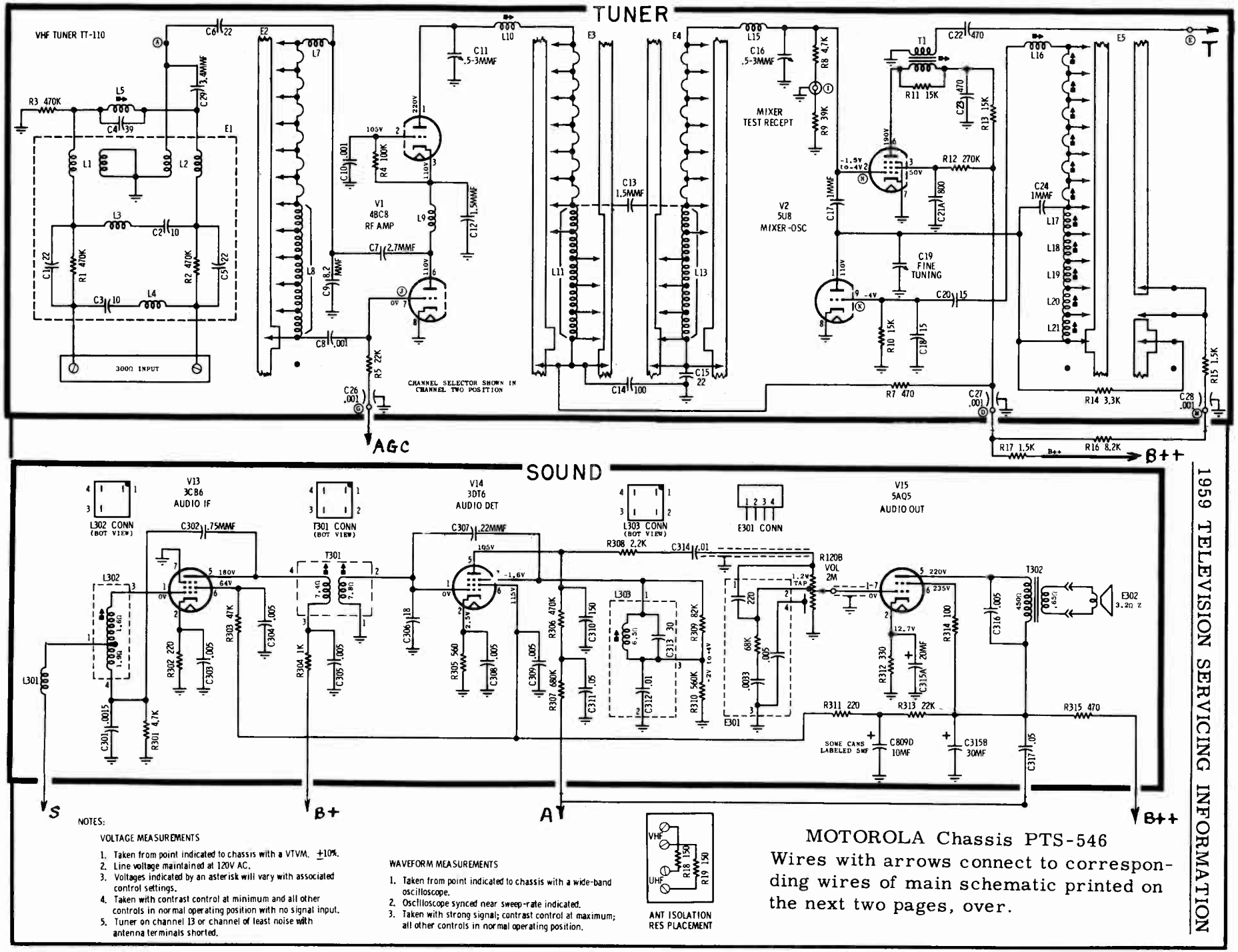




T501 CONN



TT-110Y TUNER SCHEMATIC



NOTES:

VOLTAGE MEASUREMENTS

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

WAVEFORM MEASUREMENTS

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

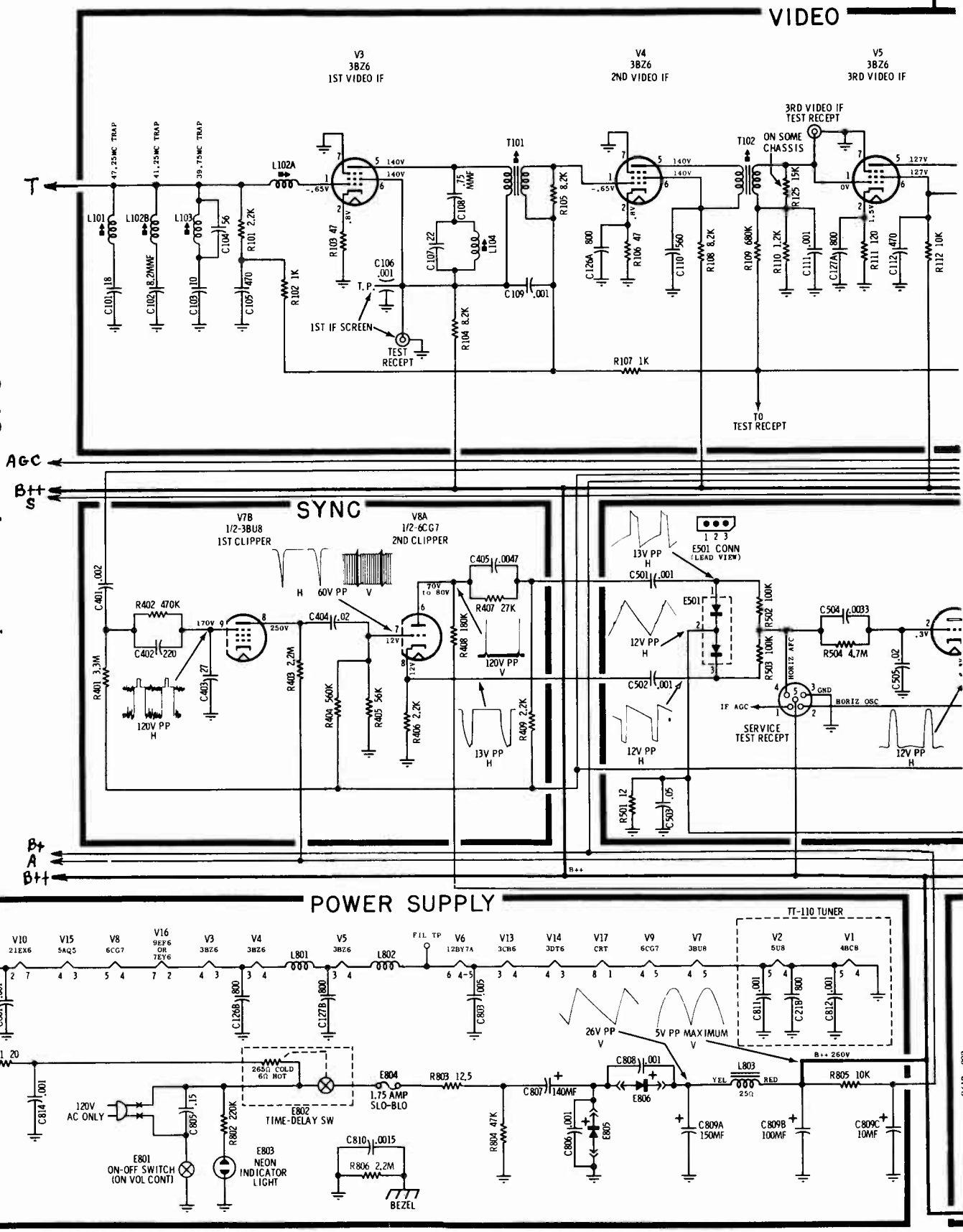
ANT ISOLATION RES PLACEMENT

MOTOROLA Chassis PTS-546

Wires with arrows connect to corresponding wires of main schematic printed on the next two pages, over.

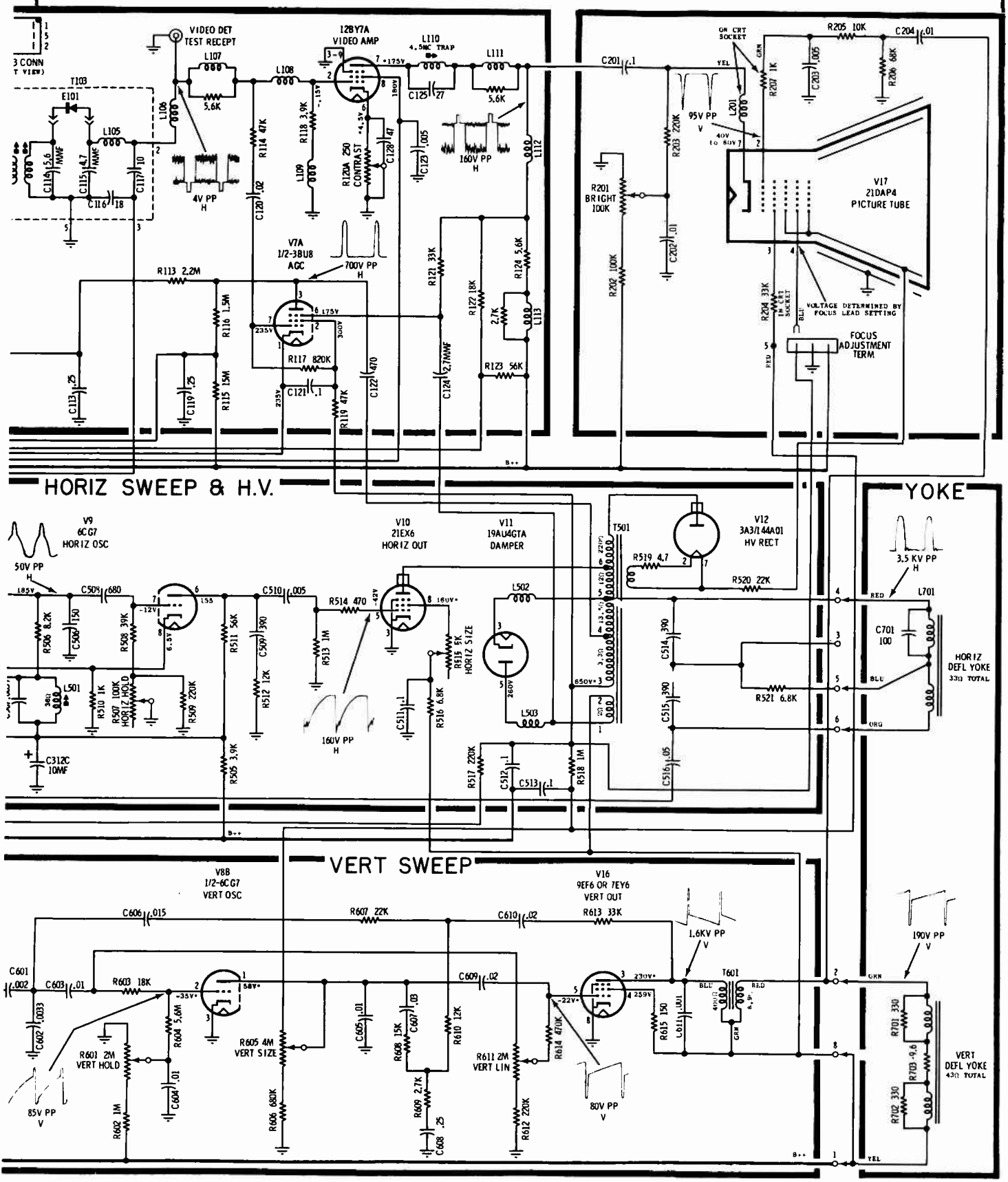
MOTOROLA Chassis PTS-546, Part of Schematic Diagram

Wires with arrows connect to corresponding wires of balance of schematic printed on preceding page.

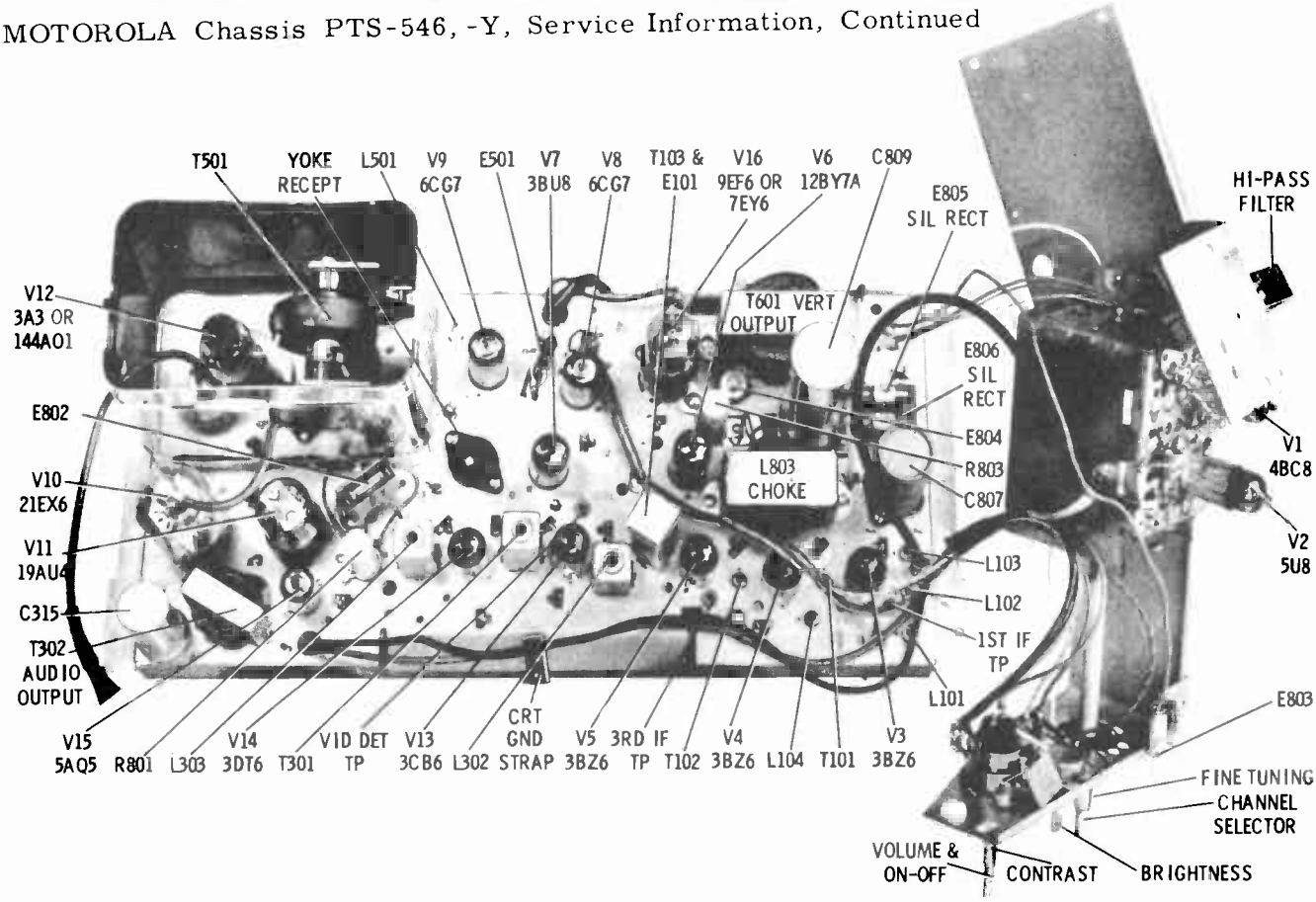


MOTOROLA

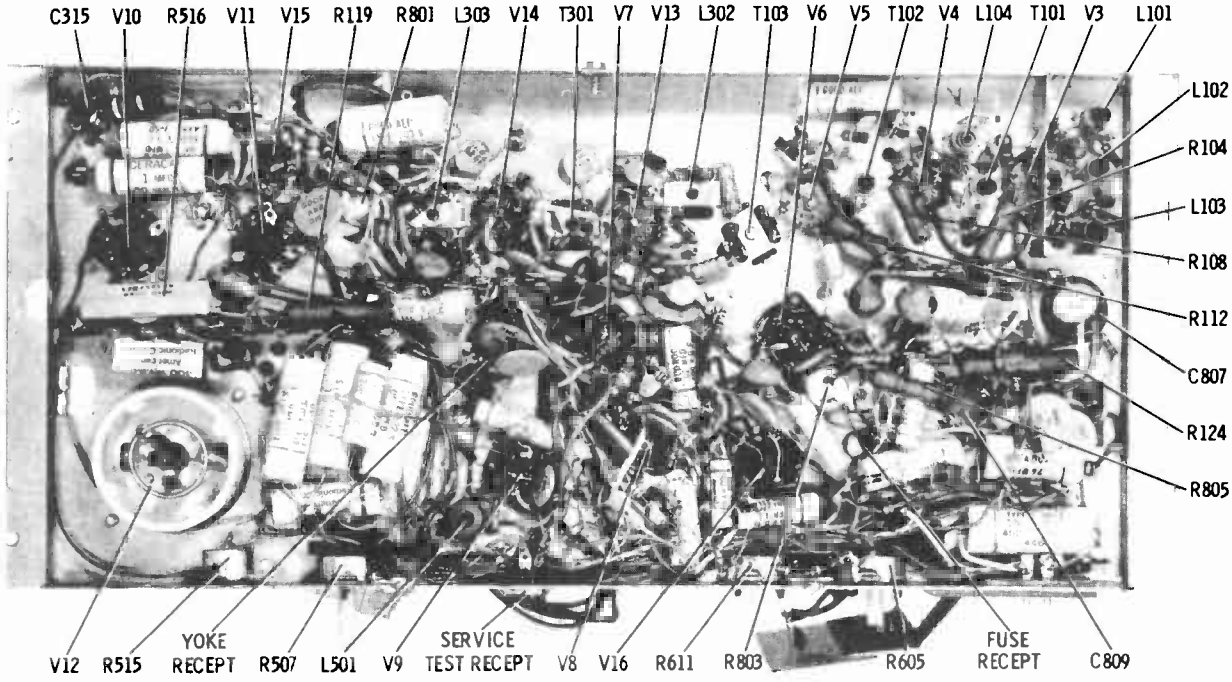
TELEVISION CHASSIS PTS-546A-00



MOTOROLA Chassis PTS-546, -Y, Service Information, Continued



CHASSIS TS-546A-00 PARTS LOCATION.



CHASSIS TS-546A-00 PARTS LOCATION.

PACKARD BELL

MODELS 21T1, 21C1, 21C2, & 24C1 (CHASSIS 88-5)

PICTURE I-F ALIGNMENT:

1. Connect VTVM between point "B" and ground.
2. Connect signal generator to mixer grid in RF tuner through the .001 mfd capacitor.* Connection may be made to exposed end of resistor visible through hole in tuner chassis adjacent to the 6CG8.
3. Set signal generator output so as to obtain 3 to 4 volts VTVM reading for the next five steps.

STEP	SIG GEN FREQUENCY	ADJUST	FOR
4.	44.80 mc	S-1 (on RF tuner)	MAXIMUM
5.	42.50 mc	S-5	MAXIMUM
6.	45.00 mc	S-6	MAXIMUM
7.	43.25 mc	S-7	MAXIMUM
8.	44.00 mc	S-8	MAXIMUM

REPEAT STEPS FOUR THROUGH EIGHT

9. Connect scope to point "B" through a 22,000 ohm isolating resistor. Connect VTVM to point "A".
10. Connect sweep generator to antenna terminals through the impedance matching network. (Antenna terminals 300 ohms balanced.)
11. Rotate tuner to channel 3, and set sweep generator to center frequency of channel (63 mc). With a sweep width of 8 mc, adjust generator output to develop about minus 4 volts of AGC at point "A".
12. Adjust AGC control at rear of set so that voltages at points "A" and "D" are the same. Then, if necessary, readjust sweep generator output so that AGC voltage is again four volts.
13. Disconnect signal generator from mixer grid and connect between bottom of tuner shield and ground connection of tuner I-F output cable. Generator ground lead goes to tuner shield.

NOTE: When coupled to the VHF/UHF tuner, (see footnote) replace 6AT8 shield and connect as in step 13.

14. Adjust signal generator output to provide the markers shown on the illustrated response curve. Check position of markers one at a time. Some slight touching-up of the I-F adjustments may be needed to make the curve correspond to the illustration.

* In models using VHF/UHF tuner 10609, lift the 6AT8 tube shield and connect generator between shield and ground.

15. The adjustments have the following effects:

S-1 moves the 45.75 mc marker up or down the curve (should be 50%).

S-5 controls tilt, or flatness of response, and also affects the overall bandwidth.

S-6 controls the position of the 45.00 mc marker (should be at a maximum of 97% response).

S-7 helps to establish band width on sound side of curve.

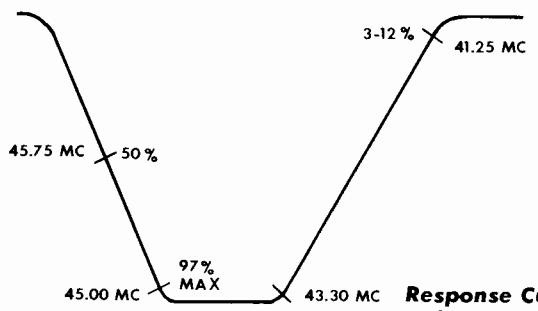
S-8 affects tilt or flatness of response.

IMPORTANT: The 45.00 mc marker must not exceed 97% on channel three or picture may smear on higher channels.

ALIGNMENT OF 4.5 MC TRAP:

1. Connect signal generator between point "B" and ground.
2. Turn contrast control to maximum.
3. Connect RF probe of VTVM to point "C".
4. Set signal generator to 4.50 mc, with the output at one volt or more.
5. Adjust trap, S-9, for minimum VTVM reading.

NOTE: If generator is not capable of one volt output, trap may be adjusted by visual means. Observe the picture and detune the signal to accentuate the 4.5 mc beat. Then adjust S-9 for minimum beat.

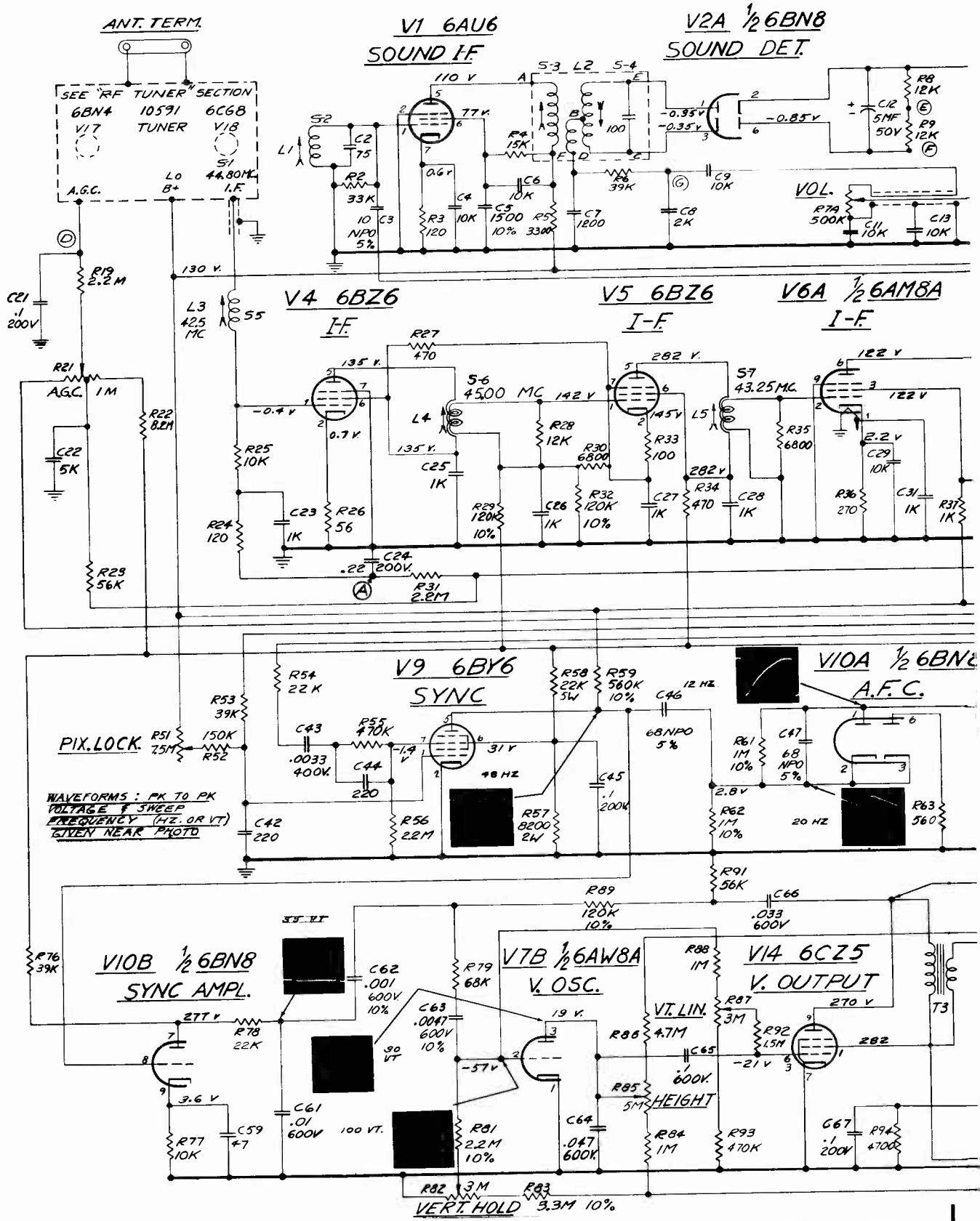


Response Curve Chassis 88-5

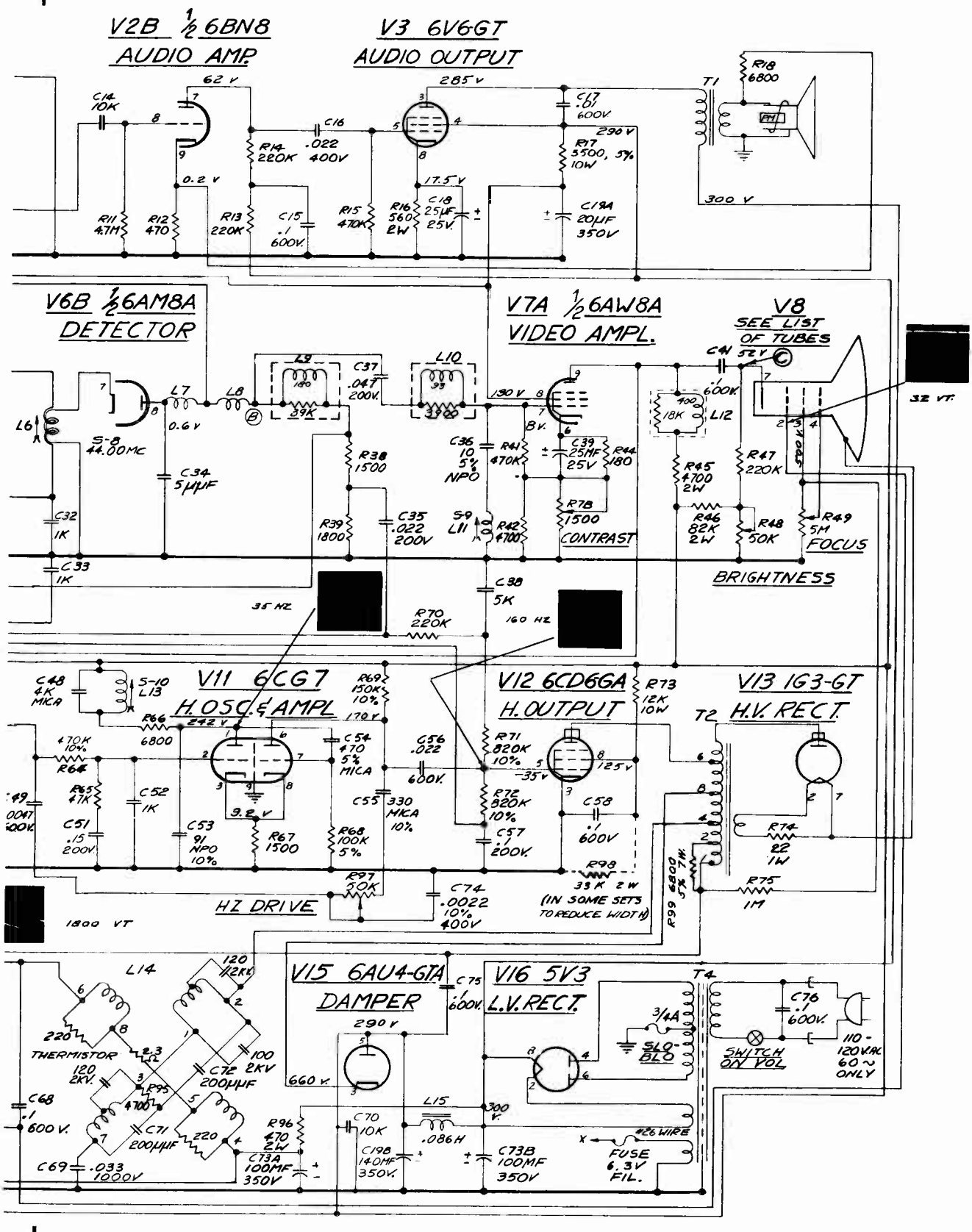
SOUND I-F AND RATIO DETECTOR ALIGNMENT:

1. Connect signal generator between point "B" and ground.
2. Connect VTVM between point "F" and ground.
3. With generator frequency at 4.50 mc, adjust S-2 and S-3 for MAXIMUM VTVM reading.
4. Connect VTVM between points "E" and "G".
5. Adjust ratio detector secondary, S-4, for zero between positive and negative peaks.
6. Repeat steps 2 thru 5.

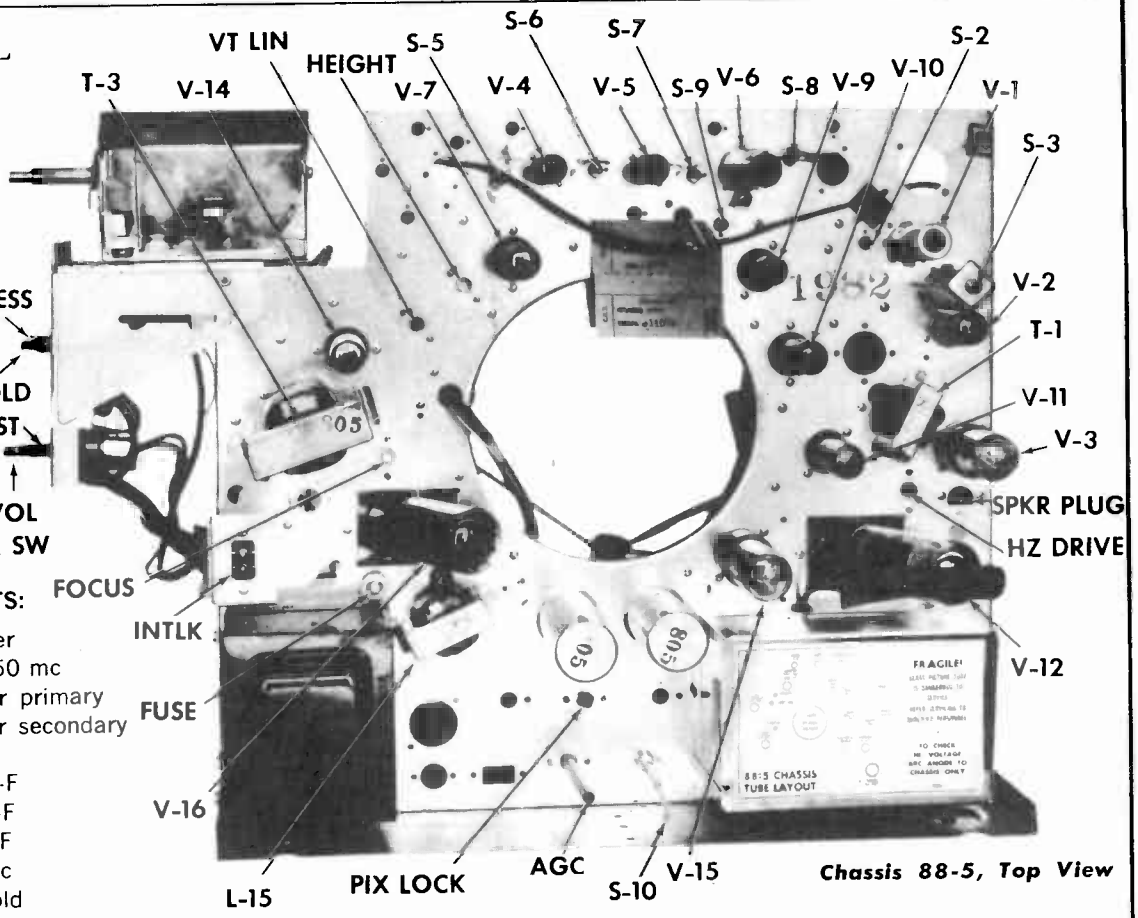
PACKARD BELL Chassis 88-5 Schematic Diagram



PACKARD BELL Chassis 88-5 Schematic Diagram



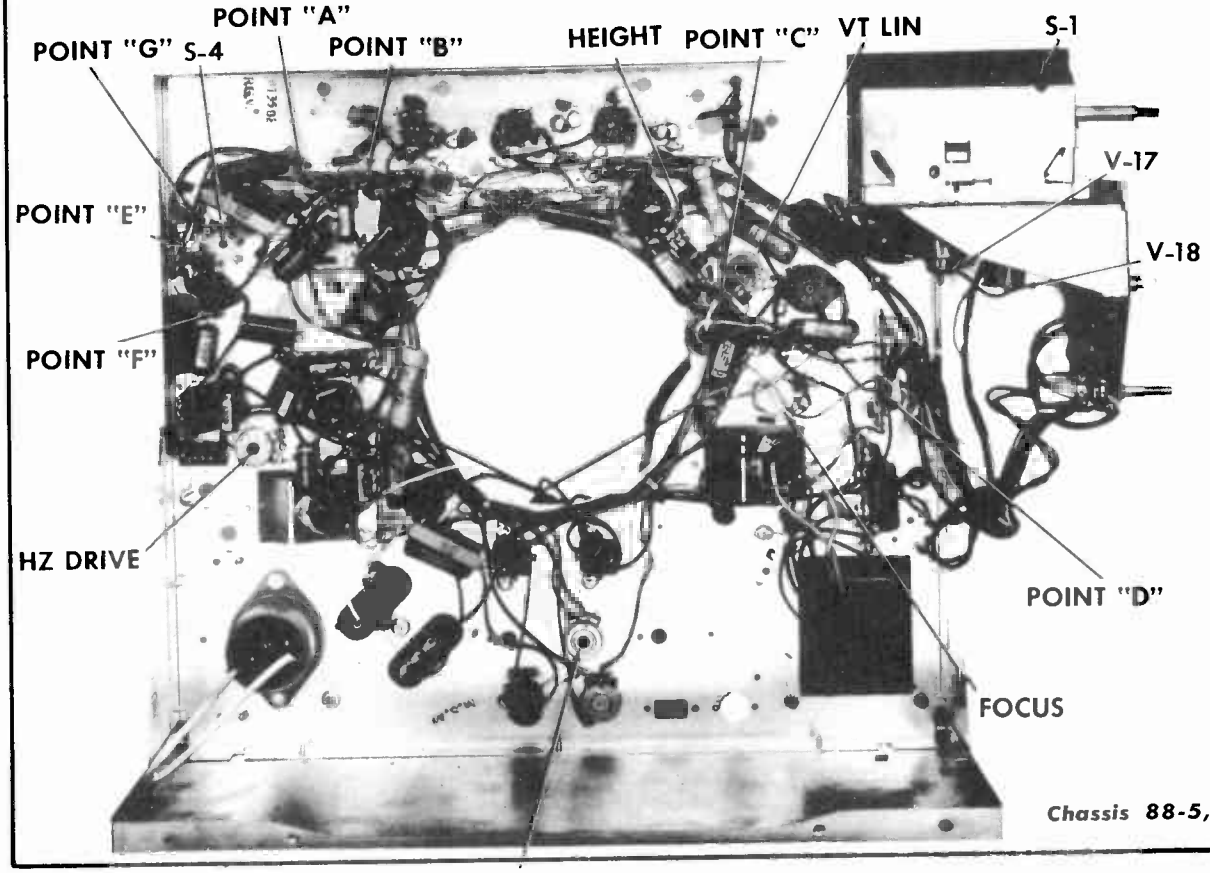
PACKARD BELL
Chassis 88-5
Models
21C1, 21C2,
21T1, 24C1.



Chassis 88-5, Top View

LIST OF ADJUSTMENTS:

S-1	I-F on RF tuner
S-2	Sound I-F, 4.50 mc
S-3	Ratio detector primary
S-4	Ratio detector secondary
S-5	1st picture I-F
S-6	2nd picture I-F
S-7	3rd picture I-F
S-8	4th picture I-F
S-9	Trap, 4.50 mc
S-10	Horizontal hold



Chassis 88-5, Bottom View

PHILCO

PHILCO TELEVISION 8L35 and 8L35U CHASSIS

Model No.	Chassis	Tuner	Picture
F4221	8L35	(T-68C) 76-11450-5	21CQP4
UF4221	8L35U	(T-69G) 76-11547-5	21CQP4
F4221L	8L35	(T-68C) 76-11450-5	21CQP4
UF4221L	8L35U	(T-69G) 76-11547-5	21CQP4
F4222	8L35	(T-68C) 76-11450-5	21CQP4
UF4222	8L35U	(T-69G) 76-11547-5	21CQP4
F4222L	8L35	(T-68C) 76-11450-5	21CQP4
UF4222L	8L35U	(T-68G) 76-11547-5	21CQP4
F4629	8L35	(T-68C) 76-11450-5	21CQP4
UF4629	8L35U	(T-69G) 76-11547-5	21CQP4
F4629L	8L35	(T-68C) 76-11450-5	21CQP4
UF4629L	8L35U	(T-69G) 76-11547-5	21CQP4
F4629W	8L35	(T-68C) 76-11450-5	21CQP4
UF4629W	8L35U	(T-69G) 76-11547-5	21CQP4

RECEIVER SET-UP CONTROL LOCATIONS

1. Vertical Linearity — Adjust with a thin screwdriver through the hollow brightness shaft.
2. Height — Adjust with a thin screwdriver through the hollow vertical hold shaft.
3. Horizontal Hold Centering — Adjust with a thin screwdriver through the hollow horizontal hold control shaft.
4. Width — Remove back. Width control is at lower left.
5. Fusible B+ resistor — Remove back. Resistor is a plug-in at lower left corner of chassis.
6. Tubes — All tubes (except CRT) are accessible after removing back. 1G3GT, high voltage rectifier, is in cage.

CHASSIS REMOVAL

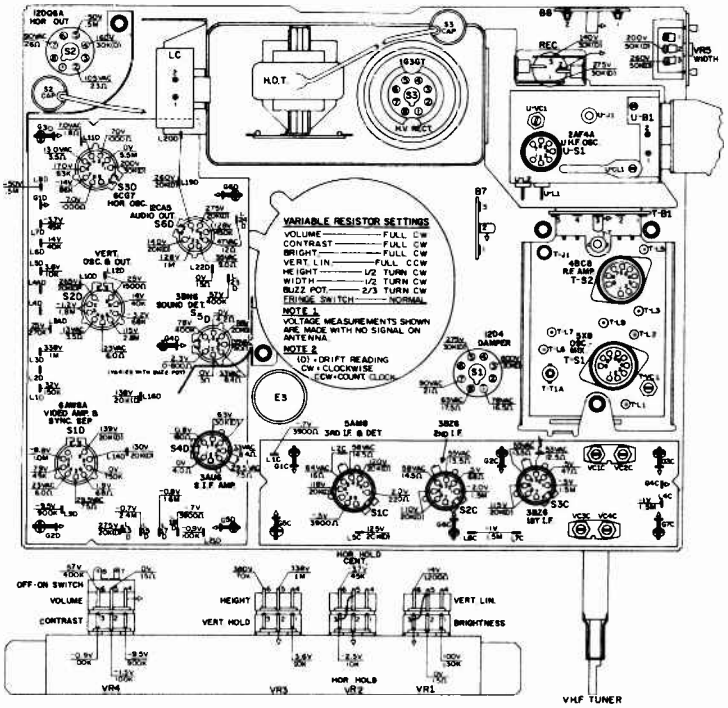
1. Remove knobs and cabinet back.
2. Disconnect speaker leads and remove pilot lamp socket from mounting clip in front of control panel.
3. Remove 2 screws mounting range switch and 2 screws mounting control panel to top cabinet block.
4. Remove top front trim strip by removing 3 screws.
5. Remove safety glass by tilting top forward and lifting out.
6. Remove screw from mask and lift out.
7. Remove 2 screws holding top chassis bracket to chassis.
8. Remove 2 screws mounting bottom chassis bracket to bottom cabinet block.
9. Remove 4 nuts and washers mounting CRT frame to cabinet.
10. Remove chassis and CRT assembly from front.

NOTE: Exercise care to prevent damage to bottom trim strip when removing chassis.

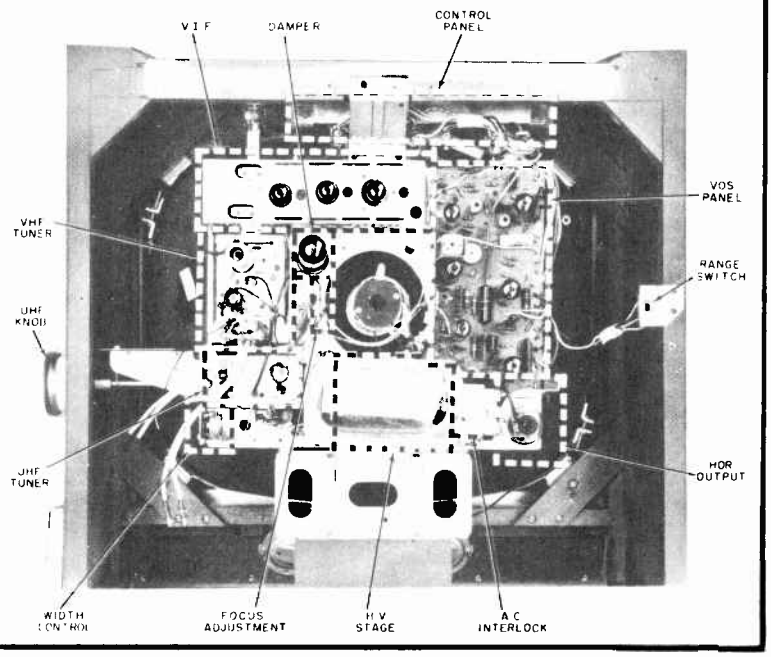
UHF CROSSOVER NETWORK

A UHF-VHF antenna crossover network is available for use with the 8L35U chassis sets. This network should be ordered through our Accessory Division by part no. 426-3034.

Reproduced through the courtesy of Philco Corp.
(Continued below and on the next 5 pages)



Voltage-Resistance Readings — Top View



PHILCO Chassis 8L35 and 8L35U

VIDEO I-F ALIGNMENT

AM ALIGNMENT

CHANNEL SELECTOR: Set tuner to channel 4 position.

SIGNAL INJECTION: To tuner feed-thru, L2, in mixer grid circuit.

BIAS: —4.5 volts to I-F A-G-C, L17D, on V.O.S. panel.

SCOPE: Connect to L18D on V.O.S. panel, video second detector output.

OUTPUT LEVEL: Not to exceed 2.0 volts peak-to-peak during pole and sweep alignment. Not less than .2 volts peak-to-peak as null, during trap alignment, is approached.

(1) Adjust tuner pole, T1A, for maximum at 47.4 MC. This is a temporary setting for trap alignment.

(2) Adjust trap VC3C for minimum at 41.25 MC. *

(3) Adjust traps VC2C and VC4C for minimum at 47.4 MC. *

(4) Repeat steps 2 and 3. Bias may be reduced as trap minimum is approached.

(5) Adjust tuner pole, T1A, for maximum at 45.0 MC.

(6) Adjust VC1C and T2C for maximum at 42.7 MC.

(7) Adjust T3C for maximum at 45.75 MC.

(8) Adjust T1S for maximum at 43.85 MC.

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

SWEEP ALIGNMENT

SIGNAL INJECTION: To antenna terminals through an antenna matching network (generator to 300 ohms.)

CHANNEL SELECTOR, BIAS, SCOPE and OUTPUT LEVEL: Same as above under AM alignment.

(1) Inject 65.75 MC, AM, 30% modulated signal, into antenna. Adjust fine tuning control for minimum output. *Do Not Disturb* fine tuning during balance of I-F adjustments.

(2) Inject channel 4 sweep signal (69 MC with 6 MC sweep width) into antenna. If necessary, adjust the following poles to bring the curve within limits (See curve, figure 2).

a. Tuner I-F pole, T1, to set carrier level.

b. T16, 3rd V-I-F pole, to adjust curve tilt.

c. T26, 2nd V-I-F pole, and VC16, 1st grid pole, to adjust 42.7 MC (sound side) slope.

d. T36, 1st V-I-F pole, to adjust carrier level.

4.5 MC TRAP ALIGNMENT

(1) Inject 4.5 MC AM signal into L18D or use station signal.

(2) Connect 4.5 MC detector (see circuit, figure 1) to L1D (pin 2 of CRT).

NOTE: Preliminary padding of 4.5 MC test detector — Connect detector to an accurate source of 4.5 MC signal and pad core of transformer for maximum DC output voltage.

NOTE: When using generator, calibrate by zero beating with sound I-F developed from station signal.

(3) Connect 20,000 ohms/volt meter, set to 2.5 volt range, to detector output.

(4) Turn contrast control fully clockwise (to maximum).

(5) Adjust 4.5 MC trap (T2D) for minimum indication.

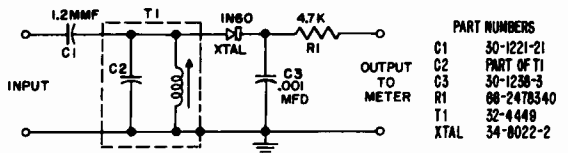


Figure 1. 4.5 mc. Detector Tube

SOUND I-F ALIGNMENT

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

1. With a weak station signal (antenna disconnected) tune receiver for best possible picture. Do not readjust fine control during balance of procedure.
2. Set buzz control, VR1D, to the center of its range.
3. With a strong signal (antenna connected) adjust the quadrature coil, T8D, for maximum sound. See Note 1 below.
4. With a weak signal (antenna disconnected) adjust the sound take-off coil, T6D, and the sound interstage transformer, T7D (both pri. and sec. cores), for maximum sound.
5. With a weak signal, back off on the contrast control. Adjust the buzz control, VR1D, for minimum buzz and noise. See Note 2 below.
6. Reset the contrast control. With a weak signal, touch-up T6D (sound take-off) and T7D (sound interstage) for maximum. See Note 3 below.
7. With a strong signal (antenna connected) adjust the quadrature coil, T8D, for maximum sound. See Note 1 below.

NOTE 1: The quadrature coil, T8D, will peak at two points. The correct peak is the first peak reached as the core is backed out from the full in position. If this coil is misadjusted weak and distorted output will result and the other coils will not tune properly.

NOTE 2: The buzz control, VR1D, sets the operating point of the 3BN6 midway between saturation and cut-off. This enables the tube to provide proper limiting action. If this control is misadjusted, excessive buzz or noise will result.

NOTE 3: Misadjustment of the sound take-off, T6D, and the sound interstage, T7D, will cause either weak sound or an excessively high noise level, or both.

TUNER OSCILLATOR ALIGNMENT

AM GENERATOR: Connect to receiver antenna-input terminals (no matching network is required). Use 30% modulated signal.

PRE-SET: Fine tuning control to middle of its range.

OSCILLOSCOPE: Connect to L18D, video detector output, on V.O.S. panel.

NOTE: This procedure uses the traps of the video I-F channel. Proper oscillator adjustment is therefore dependent upon an accurately aligned I-F strip.

STEP	AM. GEN. FREQ.	TUNER POSITION	ADJUST FOR MIN.
1	209.75 mc	Channel 13	T4
2	203.75 mc	Channel 12	TC6
3	197.75 mc	Channel 11	TC5
4	191.75 mc	Channel 10	TC4
5	185.75 mc	Channel 9	TC3
6	179.75 mc	Channel 8	TC2
7	173.75 mc	Channel 7	TC1
8	81.75 mc	Channel 6	T9
9	75.75 mc	Channel 5	T8
10	65.75 mc	Channel 4	T7
11	59.75 mc	Channel 3	T6
12	53.75 mc	Channel 2	T5

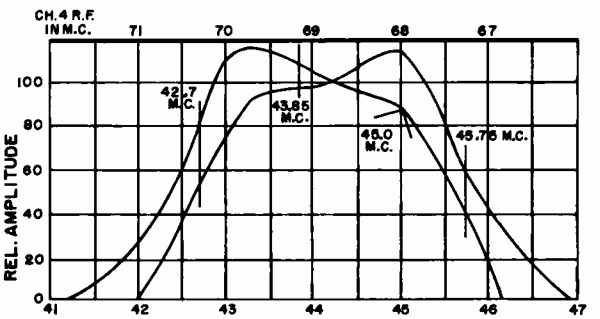
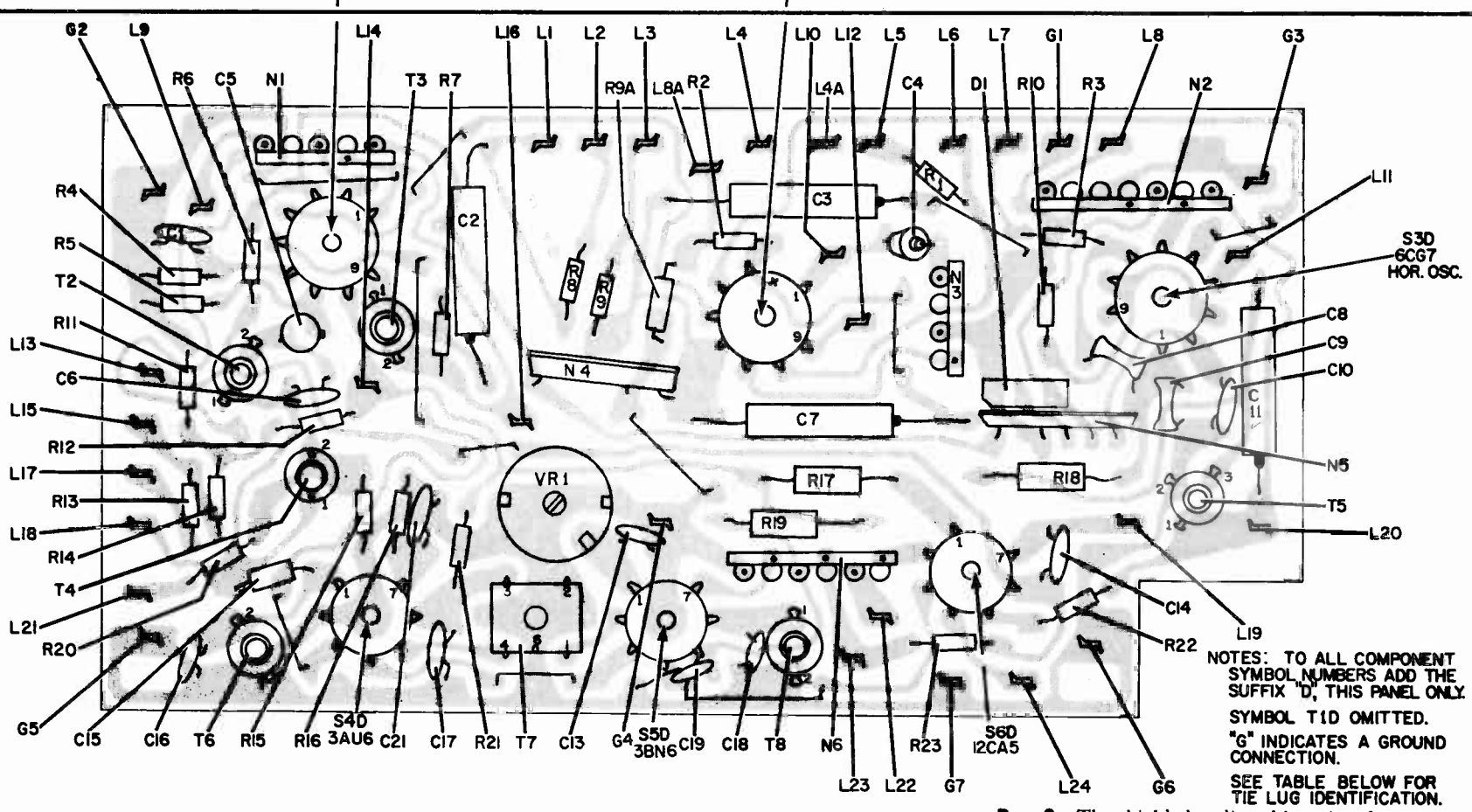


Figure 2. Overall R-F I-F Response Curve

HORIZONTAL OSCILLATOR ADJUSTMENT

Allow set to warm up. Tune in a picture.

1. Short out the horizontal ringing coil, T5D, by placing a jumper across C11D.
2. Set the horizontal hold control, VR2 shaft, to the center of its range.
3. Adjust the horizontal hold centering control, VR2 screwdriver adjustment, 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 C11D and adjust the ringing coil (T5D) core for stable picture sync.



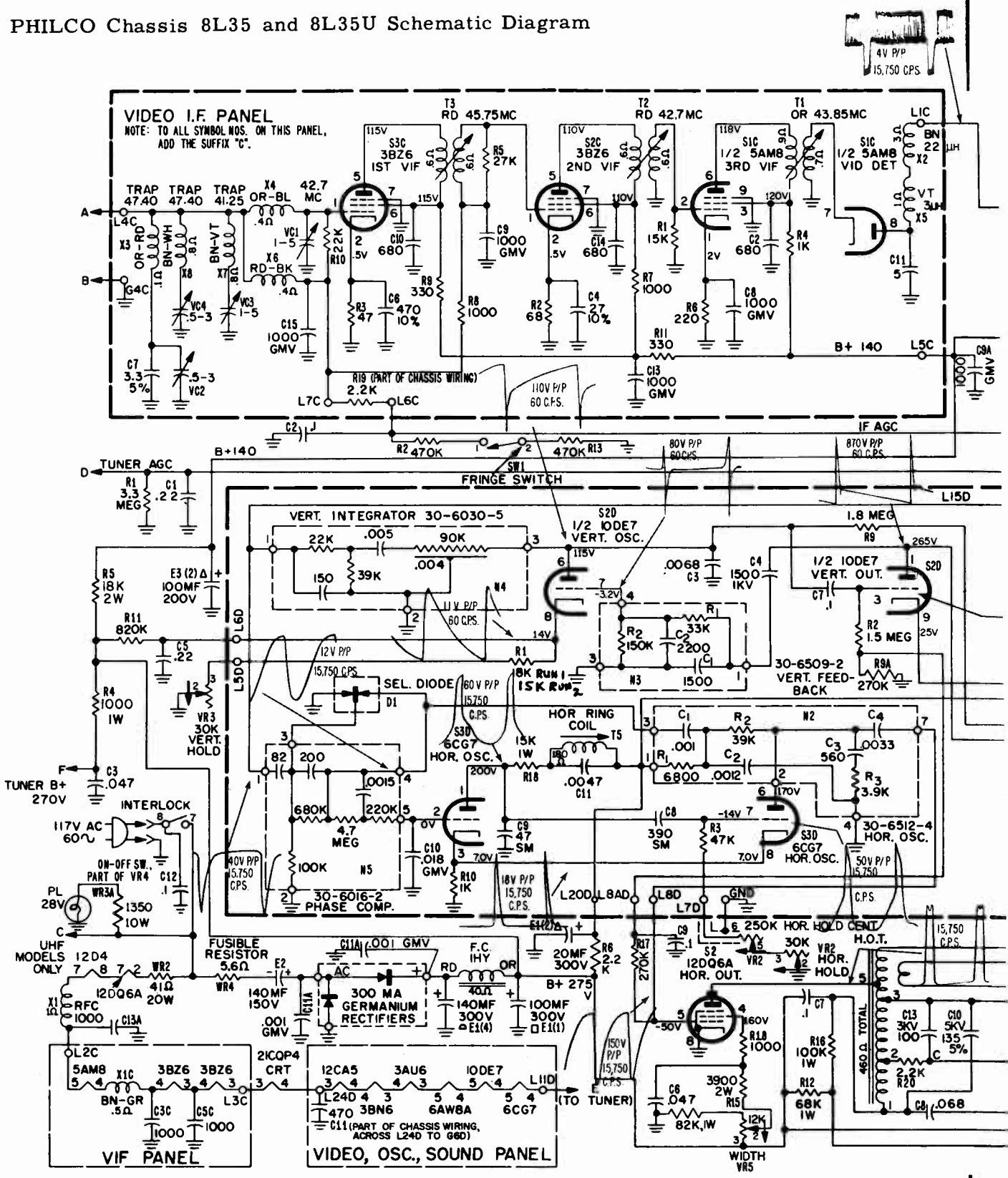
Base Layout of Video-Oscillator-Sound Printed Wiring Panel

Run 3. The shielded audio cable going from the volume control to L22D and L23D on the VOS panel was removed and turned end for end so that the shield is grounded at terminal board B4, lug 2 on the main chassis. The black and white lead connecting lug 2 of VR3 and lug 4 of the volume control (VR4) should be removed from lug 4 and wired to ground at terminal board B1, lug 2. A new wire is added from lug 4 of the volume control to electrolytic E3 lug 2. The wire going from L13D to terminal board B2 lug 1 is removed from terminal board B2 lug 1 and wired to electrolytic E1, lug 3. The red lead coming from the vertical output transformer V.O.T. and wired to electrolytic E1 lug 3 is removed from E1, lug 3 and wired to terminal board B3 lug 7. R8, the 330-ohm 1-watt resistor wired from terminal board B3 lug 7 to electrolytic E1 lug 3 was changed to 1000 ohms ½ watt.

TERMINAL LUG IDENTIFICATION — V.O.S. PANEL

L1D	Video output to CRT cathode, yellow lead.
L2D	Lead to arm of Brightness control, VR1-2.
L3D	Lead to arm of Height control, VR3-5.
L4D	Tie Lug — A.O.T. green lead & speaker lead.
L4AD	Tie Lug — A.O.T. black lead & speaker lead.
L5D	Lead to top of vert. hold control, VR3-1.
L6D	Lead to vertical osc. cathode by-pass (C5) and fixed bias (R11).
L7D	Shielded lead to top of hor. hold centering control, VR2-6.
L8D	Horizontal oscillator output to grid of 12DQ6A, pin 5 of S2.
L8AD	To junction of R17 and C9.
L9D	Lead to bottom of contrast control, VR4-1.
L10D	Vertical sweep output to blue lead of V.O.T.
L11D	Filament output to tuner.
L12D	Vertical output cathode to junction of R7, and cathode by-pass, E3(3).
L13D	275V B+
L14D	140V B+
L15D	Tuner A-G-C output.
L16D	To WR1, video amp. plate resistor.
L17D	I-F A-G-C.
L18D	Video output from I-F panel.
L19D	Audio output plate to blue lead of A.O.T.
L20D	De-coupled B+ to hor. osc.
L21D	Lead to top of contrast control, VR4-3.
L22D	Lead from arm of volume control, VR4-5.
L23D	Lead to top of volume control, VR4-6.
L24D	Filament in put and C11, filament by-pass.

PHILCO Chassis 8L35 and 8L35U Schematic Diagram

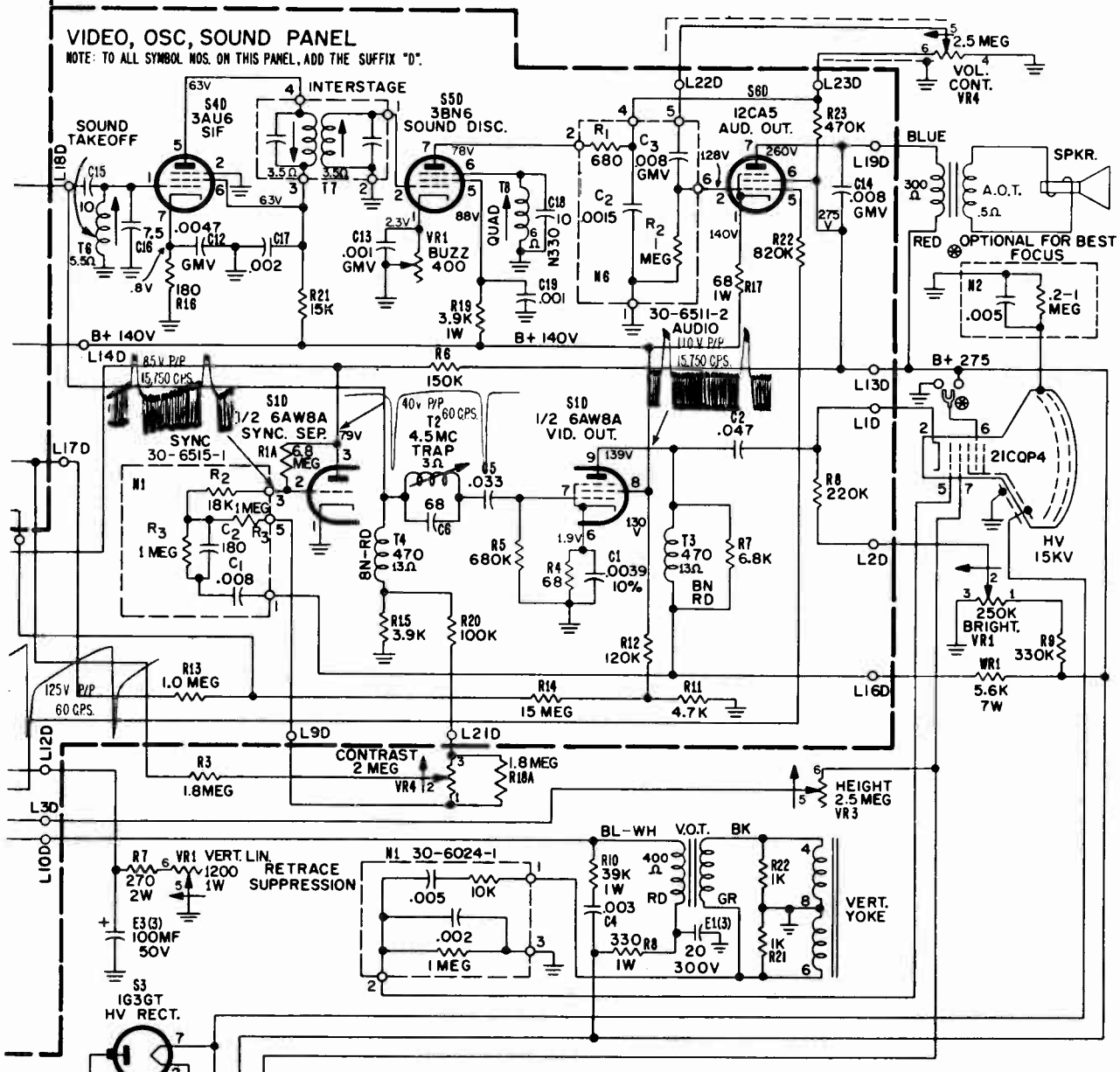


Schematic Diagram for Chassis 8L35 and 8L35U

* NOTE: The 1G3GT is electrically identical to the 1B3GT. Mechanically, however, the 1G3GT is specially designed with a short bulb and must be used for replacement.

Run 2. The V.O.S. panel was changed from a run 1 (white dot) to a run 2 (red dot).

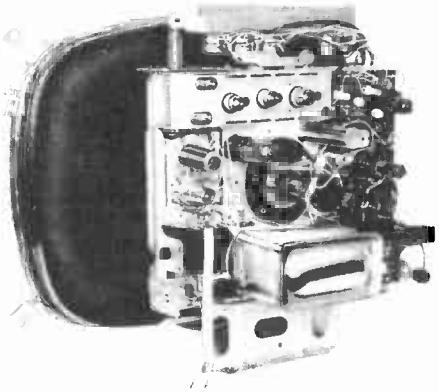
PHILCO Chassis 8L35 and 8L35U



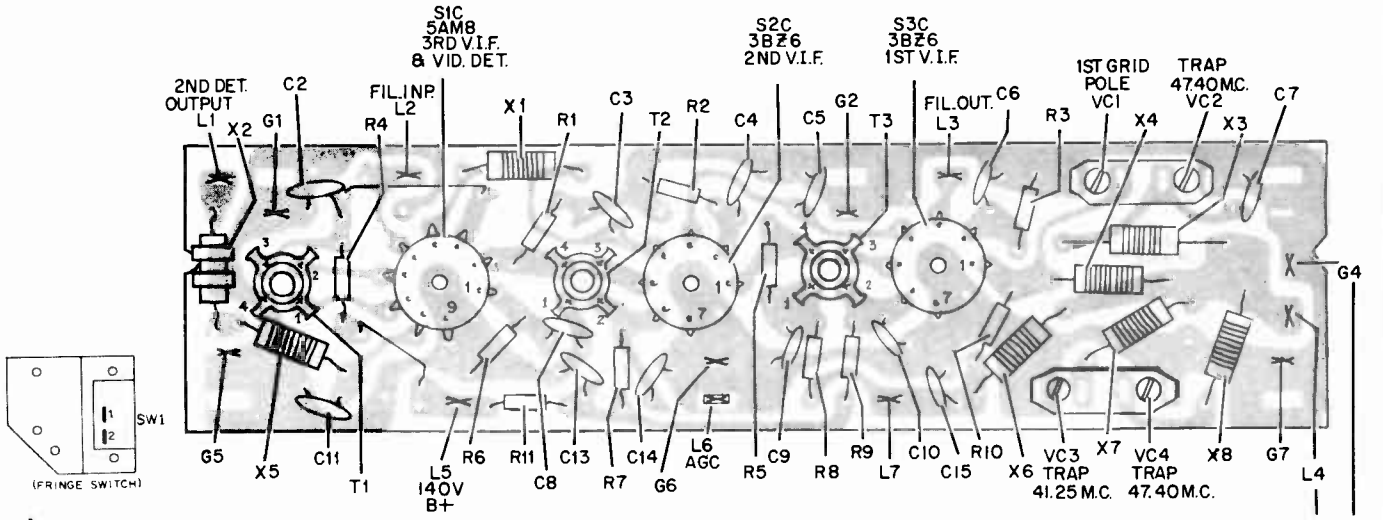
NOTES: All capacitor values greater than 1 are in MMF unless otherwise noted.
All capacitor values less than 1 are in MFD unless otherwise noted.
All resistors are ½ watt, 10%, carbon unless otherwise noted.
Arrow through control indicates clockwise rotation.
Voltages are DC from point shown to chassis unless otherwise noted.
Voltages were read using a 20,000 ohms/volt meter. Voltages were taken with no signal. The receiver was adjusted for a good quality picture; i.e., normal contrast, brightness, width, height, vertical lin. and sound, picture in sync, then removed signal.

* Indicates a voltage dependent upon signal.

● Focus voltage optional for best focus.



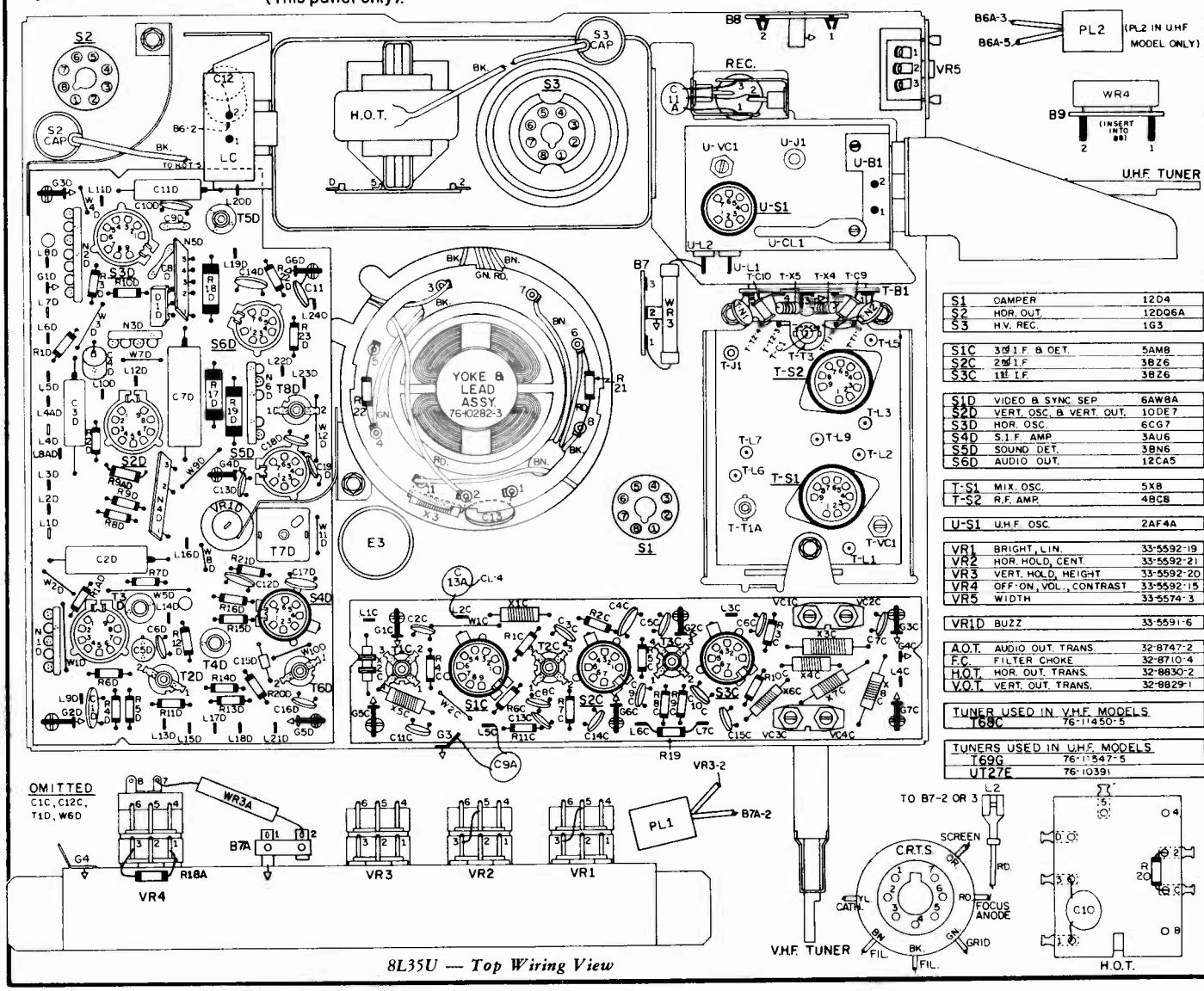
PHILCO Chassis 8L35 and 8L35U Service Information, Continued



A.L. RD.

NOTE = To all symbol Nos. add suffix "C" (this panel only).

Base Layout of Video I-F Printed Wiring Panel



S1	DAMPER	12D4
S2	HOR. OUT.	12DQ6A
S3	H.V. REC.	1G3
S1C	3rd I.F. & DET.	5AM8
S2C	2nd I.F.	3BZ6
S3C	1st I.F.	3BZ6
S1D	VIDEO & SYNC. SEP.	6AW8A
S2D	VERT. OSC. & VERT. OUT.	10DE7
S3D	HOR. OSC.	6CG7
S4D	S.I.F. AMP.	3AU6
S5D	SOUND DET.	3BN6
S6D	AUDIO OUT.	12CA5
T-S1	MIX. OSC.	5X8
T-S2	R.F. AMP.	4BC8
U-S1	U.H.F. OSC.	2AF4A
VR1	BRIGHT, LIN.	33-5592-19
VR2	HOR. HOLD, CENT.	33-5592-21
VR3	VERT. HOLD, HEIGHT	33-5592-20
VR4	OFF-ON, VOL., CONTRAST	33-5592-15
VR5	WIDTH	33-5574-3
VR1D	BUZZ	33-5591-6
A.O.T.	AUDIO OUT. TRANS.	32-8747-2
F.C.	FILTER CHOKE	32-8710-4
H.O.T.	HOR. OUT. TRANS.	32-8830-2
V.O.T.	VERT. OUT. TRANS.	32-8829-1

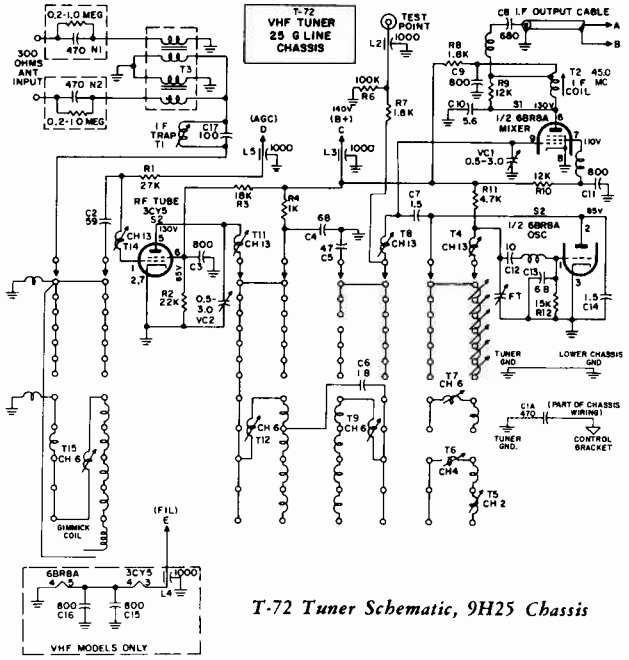
TUNER USED IN V.H.F. MODELS
T69C 76-11450-5

TUNERS USED IN U.H.F. MODELS
T69G 76-11547-5
UT27E 76-10391

8L35U — Top Wiring View

PHILCO

9H25 and 9H25U CHASSIS



T-72 Tuner Schematic, 9H25 Chassis

VIDEO I-F ALIGNMENT

AM ALIGNMENT

CHANNEL SELECTOR: Set tuner to channel 4 position.

SIGNAL INJECTION: To tuner feed-thru, L2, in mixer grid circuit.

BIAS: —8.0 volts to arm of contrast control, VR4-2.

SCOPE: Connect to L11R on Video-Sound panel, video second detector output.

OUTPUT LEVEL: Not to exceed 2.0 volts peak-to-peak during pole and sweep alignment. Not less than .2 volts peak-to-peak as null, during trap alignment, is approached.

(1) Adjust tuner pole, T2, for maximum at 47.25 MC. This is a temporary setting for trap alignment.

(2) Adjust trap VC3Z for minimum at 41.25 MC. *

(3) Adjust traps VC2Z and VC4Z for minimum at 47.25 MC.*

(4) Repeat steps 2 and 3. Bias may be reduced as trap minimum is approached.

(5) Adjust tuner pole, T2, for maximum at 45.0 MC.

(6) Adjust VC1Z and T2Z for maximum at 42.7 MC.

(7) Adjust T3Z for maximum at 45.75 MC.

(8) Adjust T1Z for maximum at 44.4 MC.

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

SWEEP ALIGNMENT

SIGNAL INJECTION: To antenna terminals through an antenna matching network (generator to 300 ohms.)

CHANNEL SELECTOR, BIAS, SCOPE and OUTPUT LEVEL: Same as above under AM alignment.

(1) Inject 65.75 MC, 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 (69 MC with 6 MC sweep width) into antenna. If necessary, adjust the following poles to bring the curve within limits. (See curve, figure 2).

a. Tuner I-F pole, T2, to set carrier level.
b. T1Z, 3rd V-I-F pole, to adjust curve tilt.
c. T2Z, 2nd V-I-F pole, and VC1Z, 1st grid pole, to adjust 42.5 MC (sound side) slope.
d. T3Z, 1st V-I-F pole, to adjust carrier level.

4.5 MC TRAP ALIGNMENT

(1) Inject 4.5 MC AM signal into L11R or use station signal.

(2) Connect 4.5 MC detector (see circuit, figure 1) to L4R (pin 7 of CRT).

NOTE: Preliminary padding of 4.5 MC test detector — Connect detector to an accurate source of 4.5 MC signal and pad core of transformer for maximum DC output voltage.

NOTE: When using generator, calibrate by zero beating with sound I-F developed from station signal.

(3) Connect 20,000 ohms/volt meter, set to 2.5 volt range, to detector output.

(4) Turn contrast control fully clockwise (to maximum).

(5) Adjust 4.5 MC trap. (T2R, top) for minimum indication.

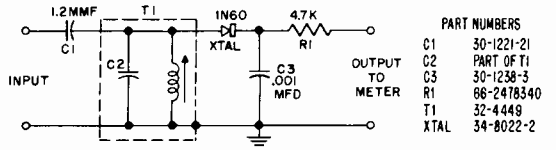


Figure 1. 4.5 mc. Detector Tube

SOUND I-F ALIGNMENT

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

1. With a weak station signal (antenna disconnected) tune receiver for the best possible picture. Do not readjust fine tuning control during balance of procedure.
2. Set buzz control, VR1R, to the center of its range.
3. With a strong signal (antenna connected) adjust the quadrature coil, T1R, for maximum sound. See Note 1 Below.
4. With a weak signal (antenna disconnected) adjust the sound take-off coil, T2R (bottom), and the sound interstage transformer, T3R (both pri. and sec. cores), for maximum sound.
5. With a weak signal, back off on the contrast control. Adjust the buzz control, VR1R, for minimum buzz and noise. See Note 2 Below.
6. Reset the contrast control. With a weak signal, touch-up T2R (bottom) (sound take-off) and T3R (sound interstage) for maximum. See Note 3 Below.
7. With a strong signal (antenna connected) adjust the quadrature coil, T1R, for maximum sound. See Note 1 Below.

NOTE 1: The quadrature coil, T1R, will peak at two points. The correct peak is the first peak reached as the core is backed out from the full in position. If this coil is misadjusted, weak and distorted output will result and the other coils will not tune properly.

NOTE 2: The buzz control, VR1R, sets the operating point of the 4CS6 midway between saturation and cut-off. This enables the tube to provide proper limiting action. If this control is misadjusted excessive buzz or noise will result.

NOTE 3: Misadjustment of the sound take-off, T2R (bottom), and the sound interstage, T3R, will cause either weak sound or an excessively high noise level, or both.

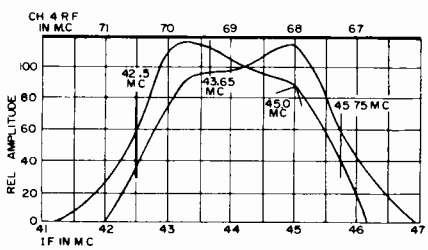
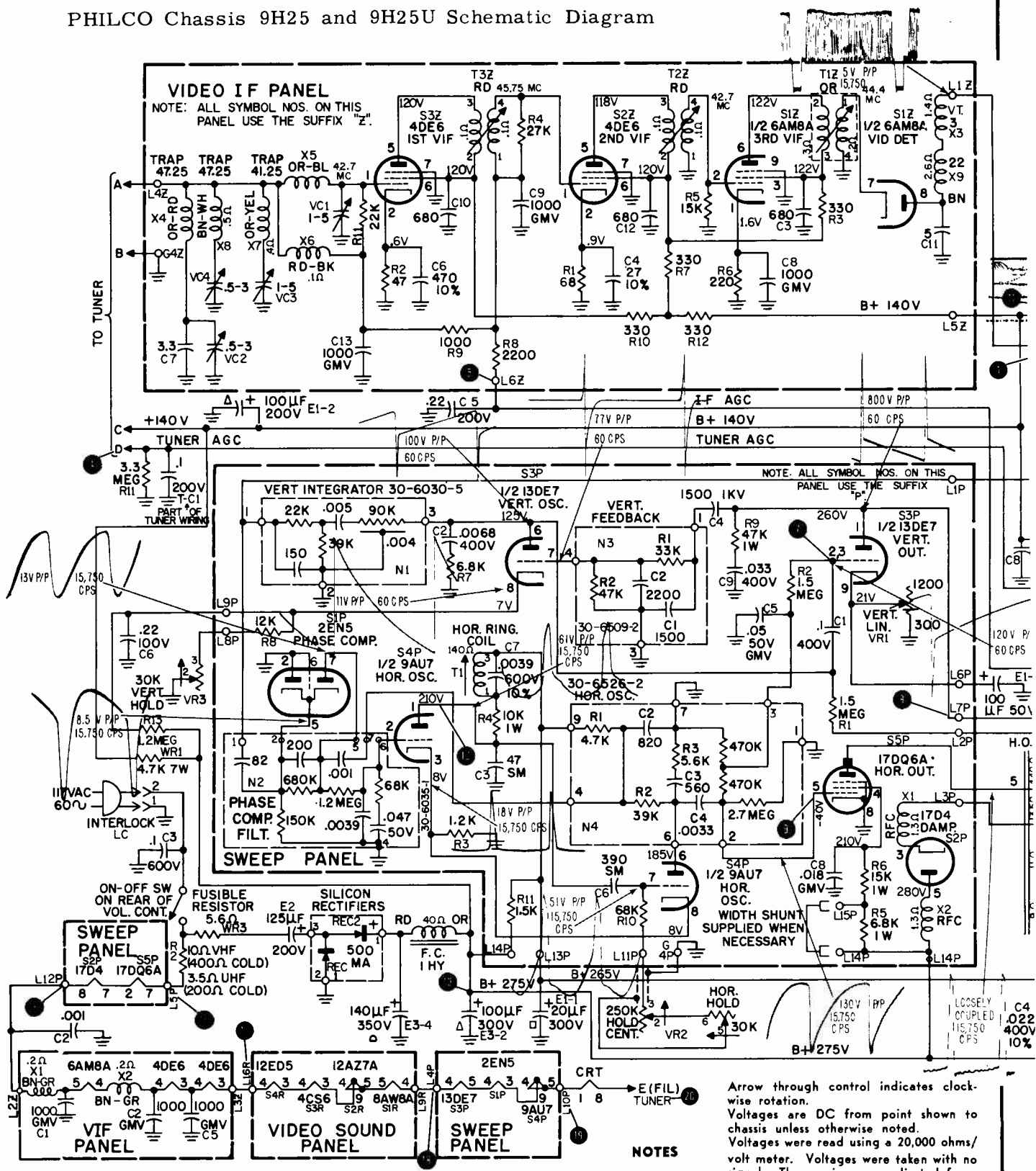


Figure 2. Overall R-F I-F Response Curve

PHILCO Chassis 9H25 and 9H25U Schematic Diagram



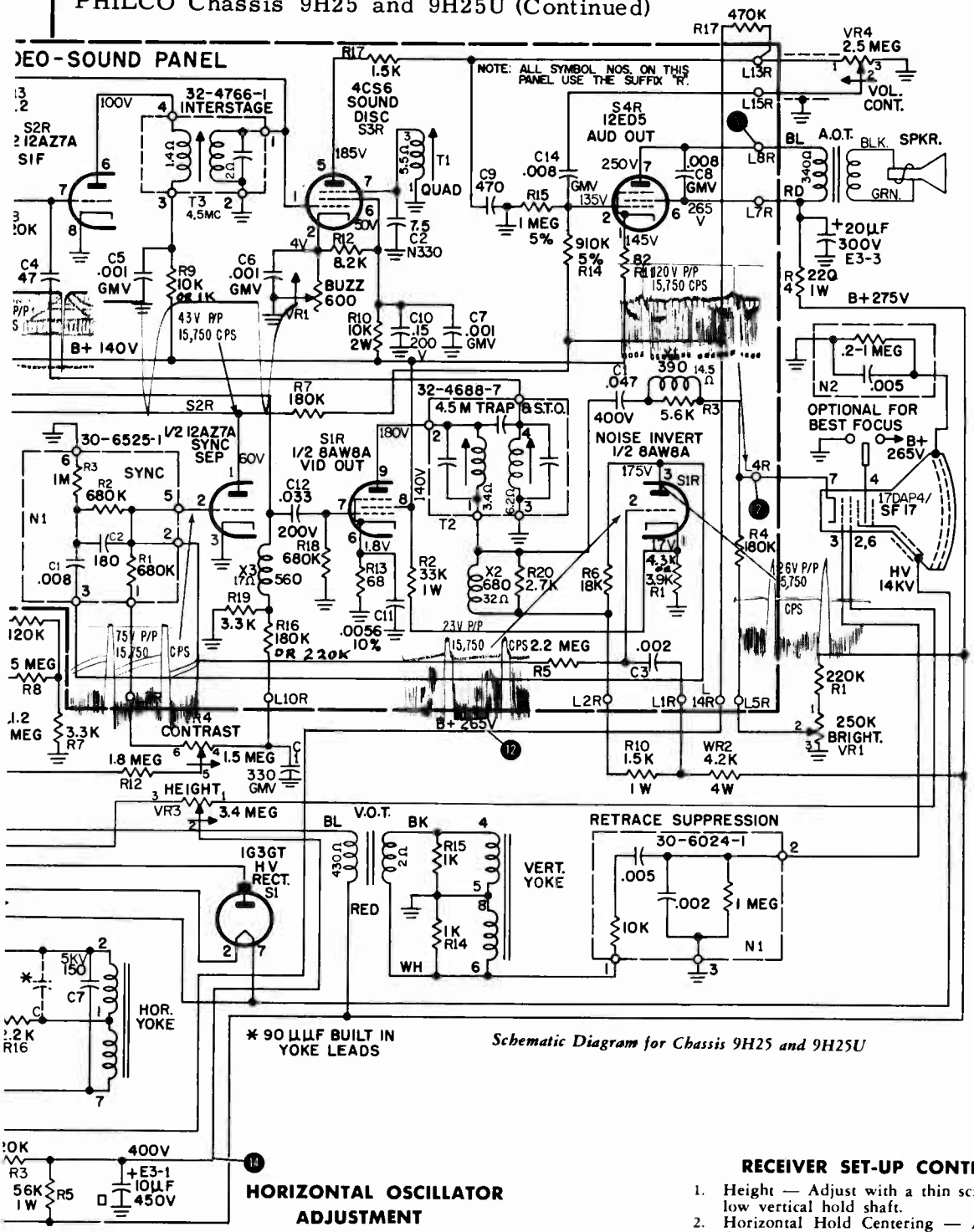
When replacing chassis after Servicing, care must be taken to ensure that is is correctly remounted. See details under "Chassis and CRT Removal". When chassis is remounted the resistance between chassis and metal cabinet parts should measure not less than 100,000 ohms.

NOTES

All capacitor values greater than 1 are in MMF unless otherwise noted.
All capacitor values less than 1 are in MFD unless otherwise noted.
All resistors are 1/2 watt, 10%, carbon unless otherwise noted.

Arrow through control indicates clockwise rotation.
Voltages are DC from point shown to chassis unless otherwise noted.
Voltages were read using a 20,000 ohms/volt meter. Voltages were taken with no signal. The receiver was adjusted for a good quality picture; i.e., normal contrast, brightness, width, height, vertical lin. and sound, picture in sync, then removed signal.
⊛ Focus voltage optional for best focuus.

PHILCO Chassis 9H25 and 9H25U (Continued)



Schematic Diagram for Chassis 9H25 and 9H25U

CRITICAL LEAD DRESS INFORMATION

To Prevent Corona:

(1) S1, 1G3GT, socket must be kept free of points or sharp edges due to wiring or soldering.

(2) The body of C7, the 150 uuf, 5KV, ceramic disk, must dress flat against the fiber panel of H.O.T. and must not touch the high voltage cage.

To Prevent Regeneration:

(1) All leads connected to I-F panel must be as short as possible and any slack pulled from under the I-F shielded area.

To Reduce Vertical and Horizontal Drift:

(1) Component packs N1P and N2P must be dressed perpendicular to the Sweep panel.

To Prevent Yoke Rotation:

(1) Position Yoke and Lead assembly on C.R.T. neck so that the pincushion magnet, between lugs 1 and 2 of yoke, is at 12 o'clock. All leads to yoke must be free of entanglement and yoke must be free to turn either way from this position (before cap clamp screw is tightened) without restriction from leads.

HORIZONTAL OSCILLATOR ADJUSTMENT

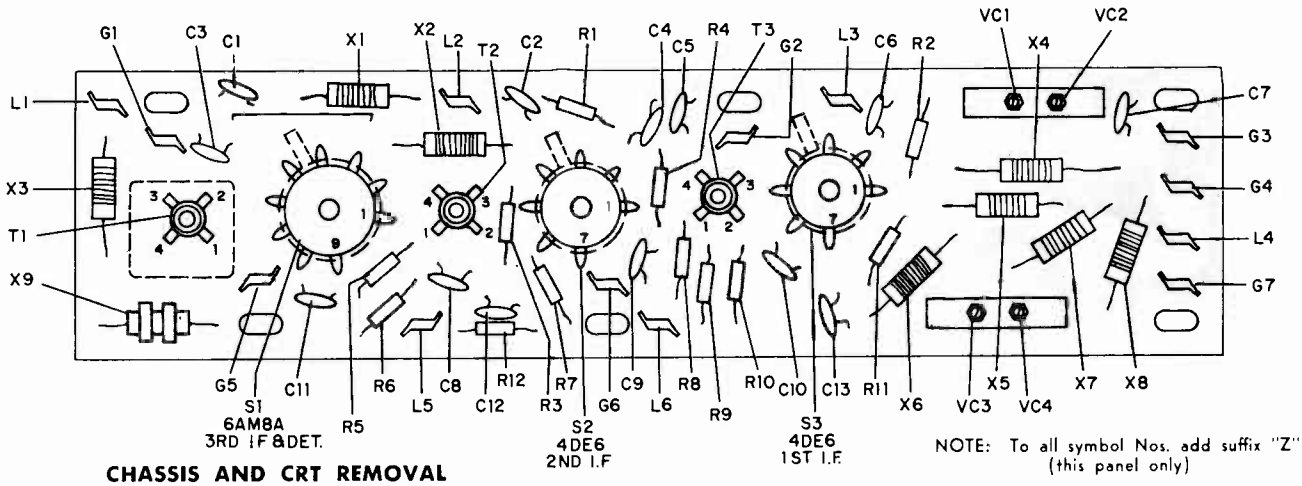
Allow set to warm up. Tune in a picture.

1. Short out the horizontal ringing coil, T1P, by placing a jumper across terminals 1 and 3.
2. Set the horizontal hold control, VR2 shaft, to the center of its range.
3. Adjust the horizontal hold centering control, VR2 screw driver adjustment, to set the oscillator to the correct horizontal line frequency (to stop the picture; it will not be stable). Bring picture into sync from high frequency side (black bars sloping up to the left).
4. Remove the shorting jumper from across T1P and adjust the ringing coil core for stable picture sync. Bring picture into sync from high frequency side.

RECEIVER SET-UP CONTROL LOCATIONS

1. Height — Adjust with a thin screwdriver through the hollow vertical hold shaft.
2. Horizontal Hold Centering — Adjust with a thin screwdriver through the hollow horizontal hold shaft.
3. Vertical Linearity — Remove cabinet back (7 screws; 4 at top and 3 at bottom). Control is located on deflection panel.
4. Width Link — Remove cabinet back. A jumper across deflection panel lugs L14P to L15P is used when necessary. These lugs are the two along the rear edge of the deflection panel to the left of the 17DQ6A horizontal output tube. Width is increased with jumper.
5. 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.

PHILCO Chassis 9H25 and 9H25U Service Material, Continued



Base Layout of Video I-F Printed Wiring Panel

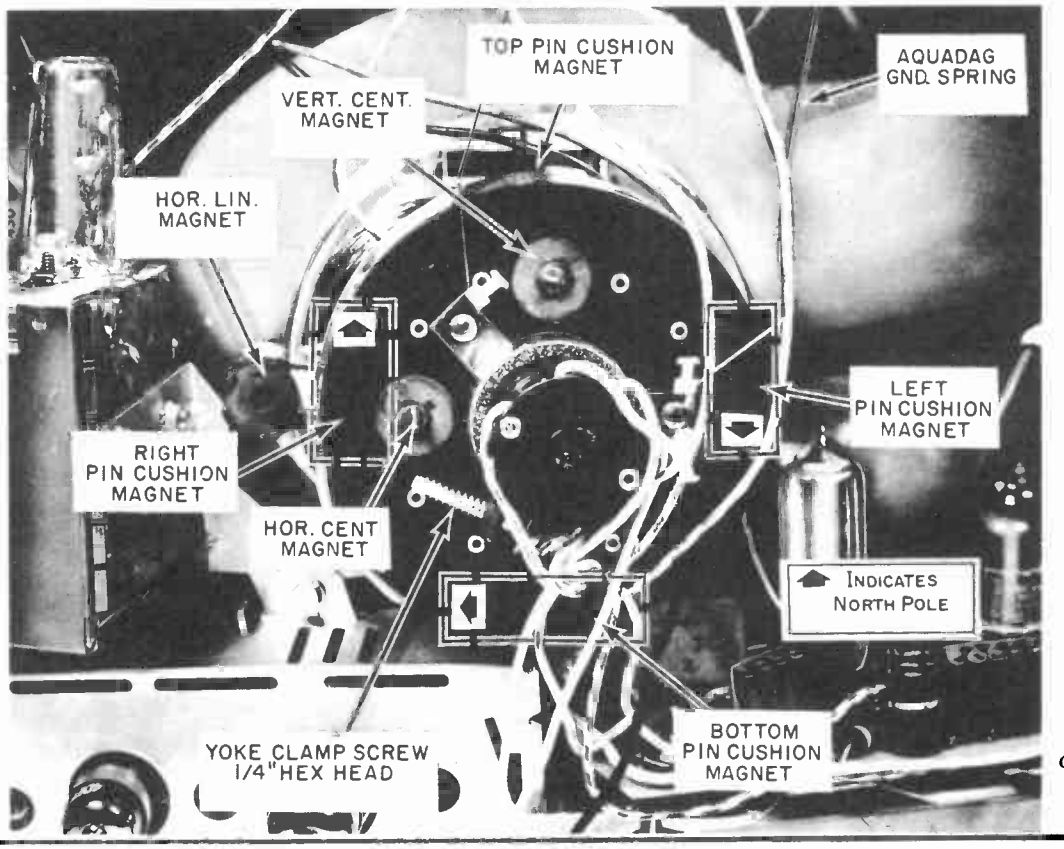
CHASSIS AND CRT REMOVAL

1. Remove back — 7 screws, four at top and three at bottom.
2. Remove front (safety window and bezel) — 5 screws, one on each side and three at bottom. Free front from bottom and then disengage from top.
3. Remove knobs.
4. Remove the five 5/16 in. drive screws from cabinet bottom.
5. Remove one 1/4 in. drive screw from right rear side and two 1/4 in. drive screws from left rear side.
6. Remove two 1/4 in. drive screws from rear top bracket. Tilt bracket and remove.
7. Remove five 1/4 in. drive screws from front top.
8. Separate wrap-around cabinet from chassis and CRT assy. Caution: speaker leads are still connected.
9. Disconnect anode lead and CRT socket.
10. Remove four 1/4 in. drive screws from front that mounts CRT bracket to chassis frame.
11. Remove CRT assembly from front. Caution: yoke leads are still connected.

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

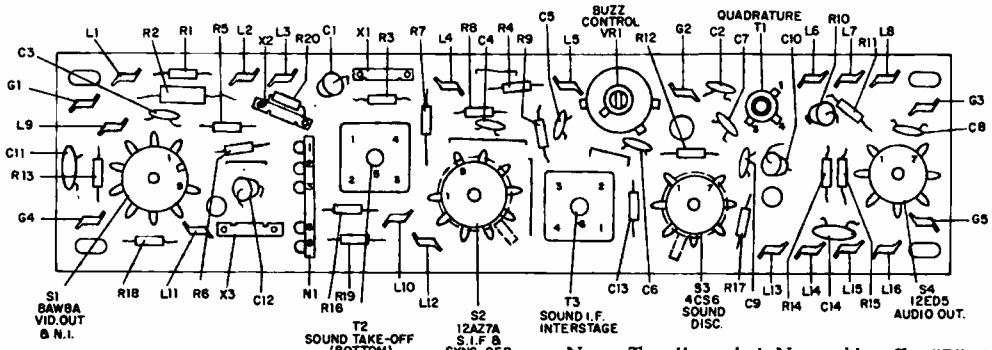
TERMINAL LUG IDENTIFICATION — I-F PANEL

L1Z	Video output from video 2nd detector.
L2Z	Filament input from L5P of Deflection panel.
L3Z	Filament output to L16R of Video-Sound panel.
L4Z	I-F input link from tuner.
L5Z	140V B+.
L6Z	A.G.C.
G4Z	Shield braid of I-F link.



CRT Adjustments

PHILCO Chassis 9H25 and 9H25U Service Material, Continued

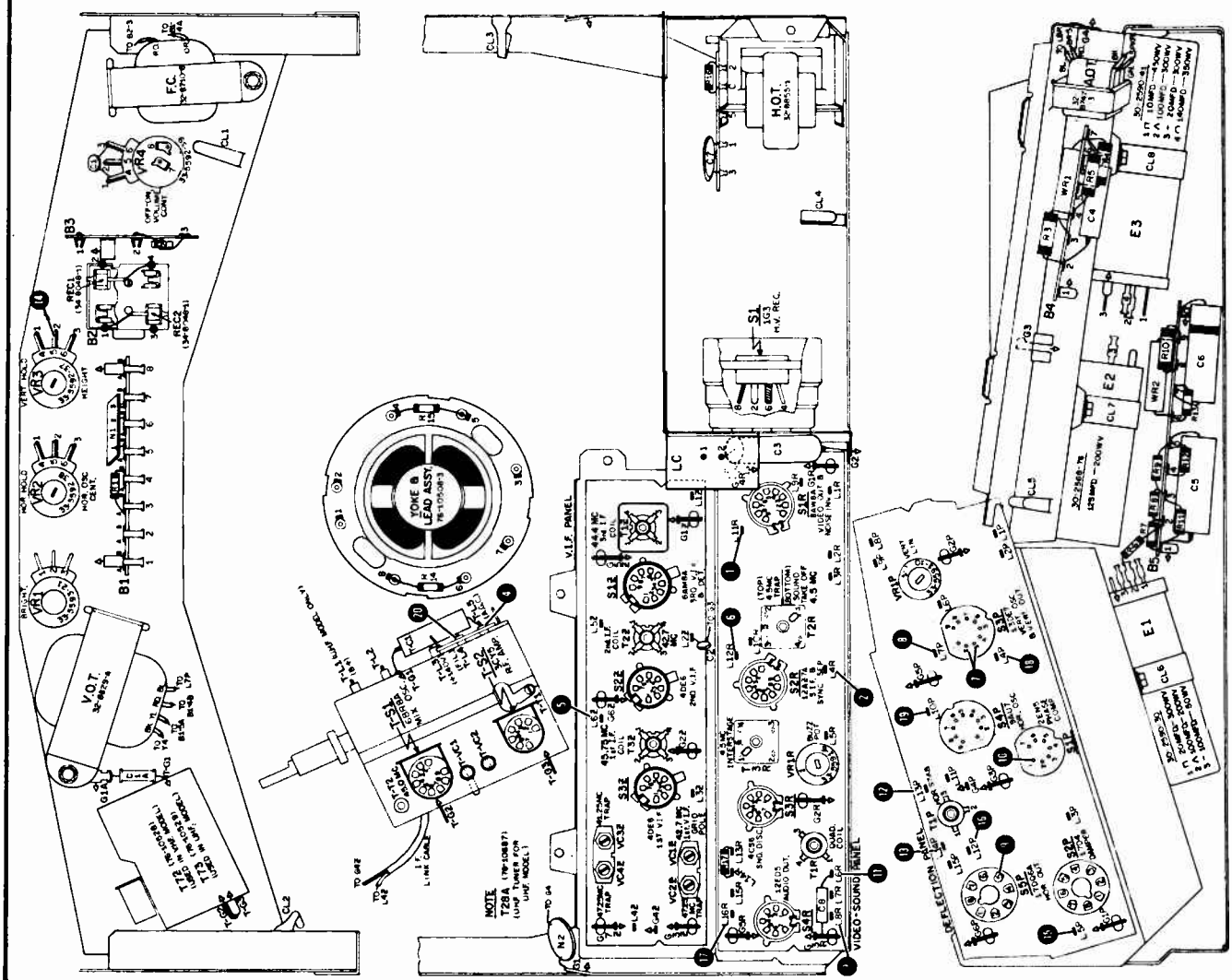


Base Layout of Video-Sound Printed Wiring Panel

Note: To all symbol Nos. add suffix "R" (this panel only).

TERMINAL LUG IDENTIFICATION — VIDEO-SOUND PANEL

- L1R — Lead from noise inverter grid coupling (C3R) to junction of R10 and WR2 (B5-9).
- L2R — Lead to video plate supply, R10, at B5-8.
- L3R — Lead to lug #1 of VR4, the contrast control.
- L4R — Video output to CRT cathode, pin 7.
- L5R — Lead to arm of brightness control, VR1.
- L6R — 140V B+ lead.
- L7R — Red lead of A.O.T. and B+ to audio output screen.
- L8R — Blue lead of A.O.T. to audio output plate.
- L9R — Filament lead to L4P of Sweep panel.
- L10R — Lead to contrast control, VR4-3.
- L11R — Video input from 2nd detector, L1Z of V.I.F. panel.
- L12R — Sync output to L1P of Sweep panel.
- L13R — Shielded lead to top of volume control, VR4-6.
- L14R — 265V B+.
- L15R — Shielded lead from arm of volume control, VR4-5.
- L16R — Filament lead from L3Z of V.I.F. panel.



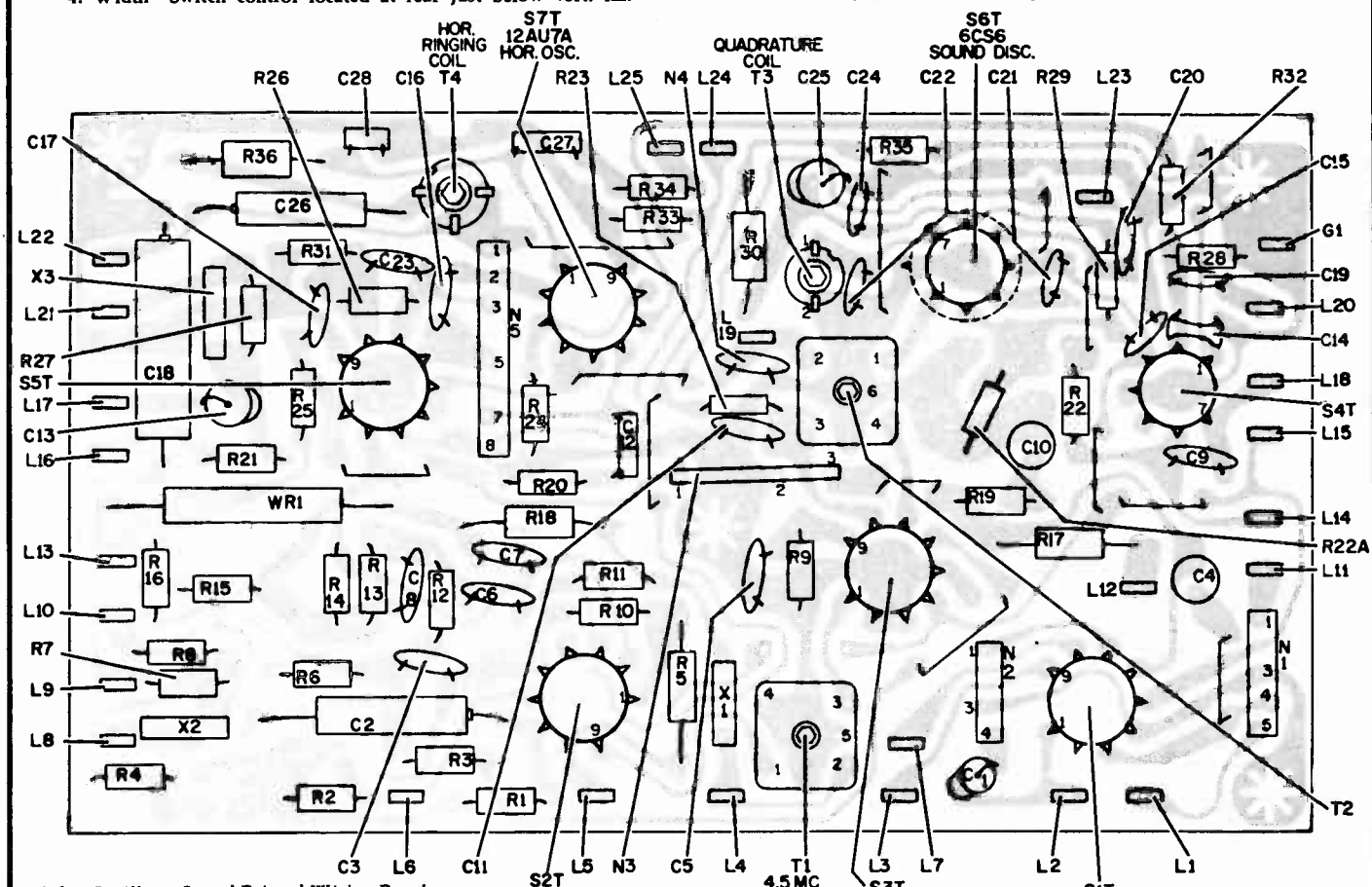
Chassis View Showing Voltage and Resistance Readings

PHILCO

9L41 and 9L41U CHASSIS

CONTROL LOCATIONS

1. Vertical Linearity — Control shaft located on rear chassis flange. Accessible through hole in back.
2. Height—Adjust with a thin screwdriver through the hollow vertical linearity control shaft.
3. Horizontal Hold Centering—Remove horizontal hold knob, lowest of the three knobs on cabinet side. Adjust with a thin screwdriver through hollow horizontal hold control shaft.
4. Width—Switch control located at rear just below vert. lin. control. Accessible through hole in back. Slide to left (looking at rear) to increase width.
5. Fringe—Normal Range Switch—Located top center of back. Slide to left (looking at rear) for "Normal."
6. Fuse—Located on rear chassis flange just under width control. Back must be removed. Push in and twist CCW to remove. Use .7 amp., slow-blow, part number 27-6318-1.
7. Centering Magnets—Remove back. Magnets are just to the rear of the yoke shield. Rotate by the tabs.

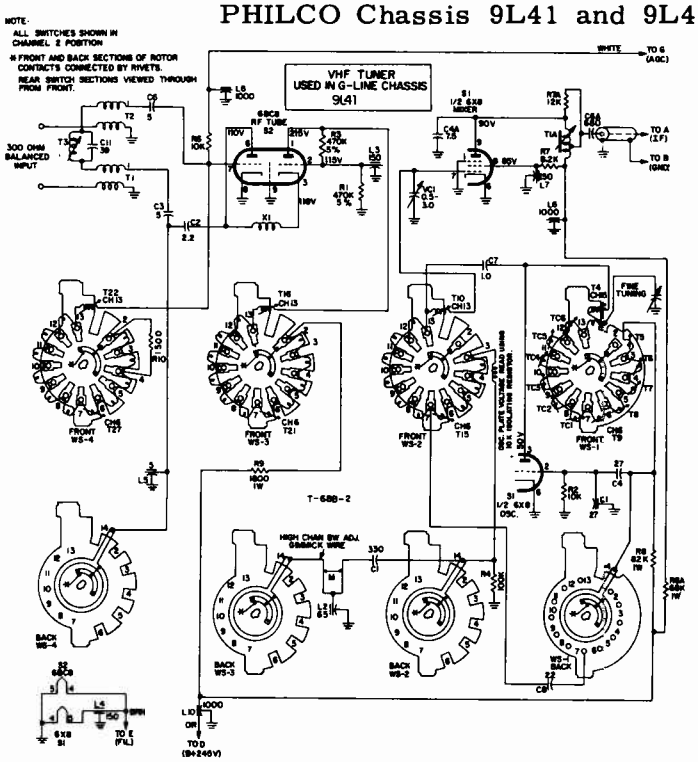


Video-Oscillator-Sound Printed Wiring Panel

TERMINAL LUG IDENTIFICATION

- G1T Ground terminal for shield braid of volume control cable.
- L1T Red lead of V.O.T. and white/black lead to yoke socket.
- L2T Blue lead of V.O.T. to vertical output plate.
- L3T Yellow lead to VR2(3), vert. lin. control, from vertical output cathode.
- L4T Orange lead to VR1(3), top of contrast control.
- L5T 140V B+; red lead to IF panel and red/white lead to E1-3.
- L6T Brown lead from video cathode to C4A.
- L7T Orange lead from vertical osc. cathode to VR4(1), vert. hold control.
- L8T Video input; one end of coil X1.
- L9T IF AGC; yellow lead to L5S on video panel & yellow lead to R9.
- L10T Tuner AGC; yellow lead to junction of R6 and white tuner lead.
- L11T Retrace suppression; green lead of CRT cable.
- L12T Orange lead to arm of height control, VR2(5).
- L13T 270V B+; red/white lead to L14T.
- L14T 270V B+; bare strap to B3-4.
- L15T Filament input; brown lead.
- L16T Yellow lead to arm of brightness control, VR3(2).
- L17T Green lead to arm of contrast control, VR1(2).
- L18T Blue lead of A.O.T. to audio output plate.
- L19T Sound discriminator test point.
- L20T Green lead of audio cable; from arm of volume control, VR1(6).
- L21T Video output; yellow lead of CRT cable.
- L22T De-coupled B+ to hor. oscillator; red/white lead to E1(2).
- L23T Sound disc. audio output; R8A to B3-10.
- L24T Horizontal oscillator output; green lead to pin 5 of 6DQ6A.
- L25T Shielded lead to hor. hold aux. control, VR5(4).

PHILCO Chassis 9L41 and 9L41U Service Material, Continued



HORIZONTAL OSCILLATOR ADJUSTMENT

Allow set to warm up. Tune in a picture.

1. Short out the horizontal ringing coil, T4T, by placing a jumper across C26T.
2. Set the horizontal hold control, VR5 shaft, to the center of its range.
3. Adjust the horizontal hold centering control, VR5 screwdriver adjustment, 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 C26T and adjust the ringing coil (T4T) core for stable picture sync.

VIDEO I-F ALIGNMENT

AM ALIGNMENT

CHANNEL SELECTOR—Set tuner to channel 4 position.

SIGNAL INJECTION—To mixer grid through T-L2.

BIAS— —5.0 volts to L9T. Connect 2:1 voltage divider from L9T to ground. Feed from divider —2.5 volts to L10T.

SCOPE—Connect to video detector output, L8T on V.O.S. panel.

OUTPUT LEVEL—Not greater than 2 volts peak to peak during pole and sweep alignment; not less than 0.2 volts peak to peak during trap alignment.

WARM UP—Allow equipment and chassis 15 minutes warm-up.

1. 45.75 mc Adjust T1A (tuner) for maximum.
2. 41.25 mc Adjust trap VC3S for minimum. Bias may be reduced as minimum is approached.
3. 47.40 mc Adjust traps VC2S and VC4S for minimum. Bias may be reduced as minimum is approached. Repeat for accuracy.
4. 42.7 mc Adjust VC1S and T2S for maximum.
5. 45.0 mc Adjust T3S for maximum.
6. 44.4 mc Adjust T1S for maximum.

SWEEP ALIGNMENT

CHANNEL SELECTOR—Set tuner to channel 4 position.

SIGNAL INJECTION—To the antenna terminals through an antenna matching network (generator to 300 ohm antenna).

Bias, Scope and Output Level same as above for AM alignment.

1. 65.75 mc, AM, 30% modulated to antenna. Tune fine tuning control for minimum output. Do not disturb fine tuning during balance of video I-F sweep alignment. Remove signal.
2. Inject channel 4 sweep signal (69 mc, with 6 mc sweep width) into antenna. If necessary, adjust the following cores to bring the curve within limits (see Overall R-F - I-F Response Curve Fig. 2). *Do not change* settings of VC2S, VC3S or VC4S.
3. Adjust 67.25 mc to fall at the 50% point with cores T1A (tuner) and T3S.
4. Level curve with core T1S.
5. Position 70.50 mc slope with T2S and VC1S.

4.5 MC TRAP ALIGNMENT

(1) Inject 4.5 MC AM signal into L8T or use station signal.

(2) Connect 4.5 MC detector (see circuit, figure 1) to L21T (pin 11 of CRT).

NOTE: Preliminary padding of 4.5 MC test detector—Connect detector to an accurate source of 4.5 MC signal and pad core of transformer for maximum DC output voltage.

NOTE: When using generator, calibrate by zero beating with sound I-F developed from station signal.

(3) Connect 20,000 ohms/volt meter, set to 2.5 volt range, to detector output.

(4) Turn contrast control fully clockwise (to maximum).

(5) Adjust 4.5 MC trap (top core of T1T) for minimum indication.

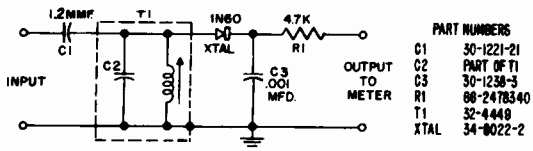


Figure 1. 4.5 mc. Detector Tube

SOUND I-F ALIGNMENT

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

(1) With a weak station signal (antenna disconnected) tune receiver for best possible picture. Do not readjust fine tuning control during balance of procedure.

(2) With a strong signal (antenna connected) adjust the quadrature coil, T3T, for maximum sound.

(3) Connect a VTVM to the audio test point, L19T. Be sure voltmeter probe contains an isolation resistor. (If it is required to add a probe isolating resistor, use a value of 10,000 ohms or more.) Using a weak station signal (antenna disconnected), adjust the sound take-off coil (bottom core of T1T) and the sound interstage transformer, T2T (both pri. and sec. cores), for a maximum. The station signal employed should not be too weak for this adjustment.

(4) If any signs of intercarrier buzz or noise interference occur, a VERY SLIGHT adjustment of T2T and/or the bottom core of T1T may be made to minimize the noise. Neither core should be adjusted more than ¼ turn; if more adjustment appears necessary, re-check the sound alignment.

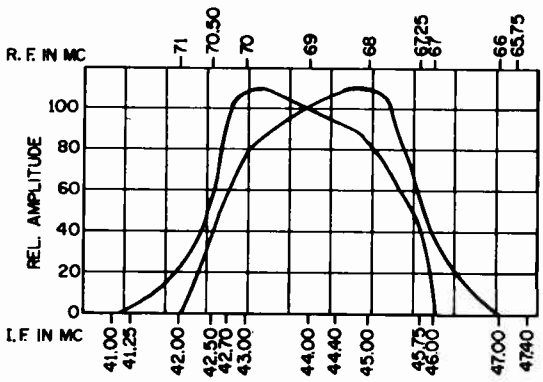
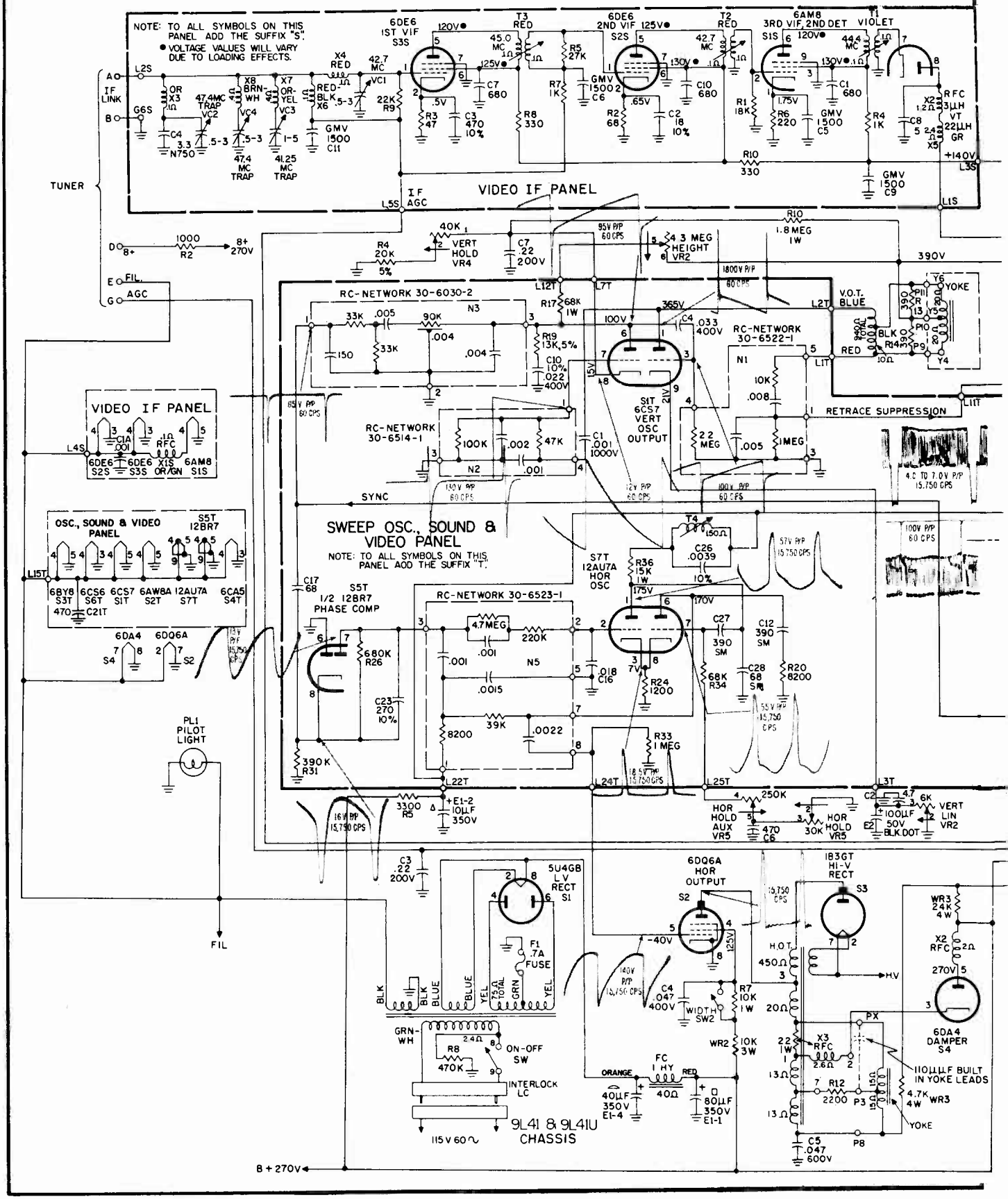
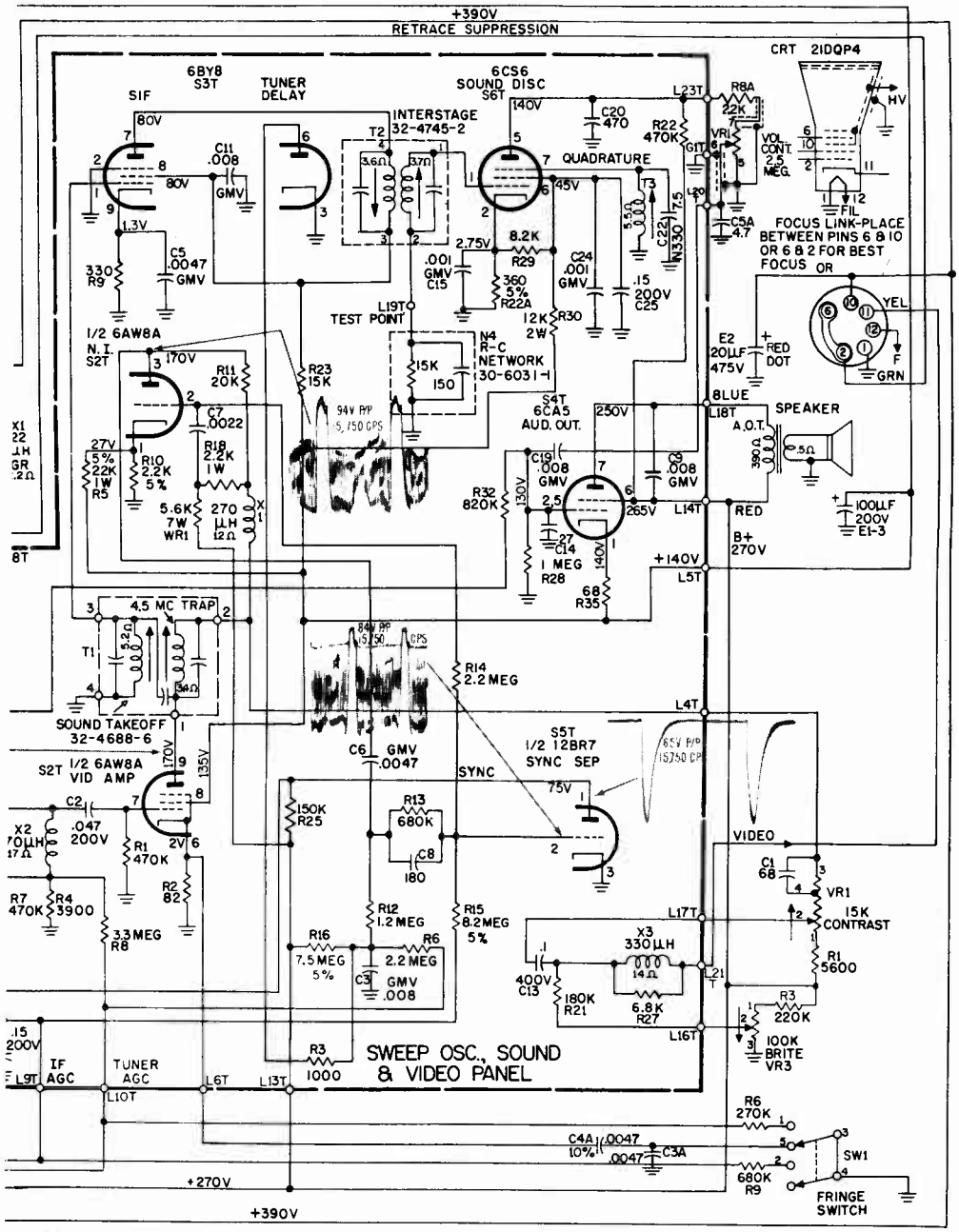


Figure 2. Overall R-F I-F Response Curve, Channel 4

PHILCO Chassis 9L41 and 9L41U Schematic Diagram (Continued)



PHILCO Chassis 9L41 and 9L41U Schematic Diagram (Continued)



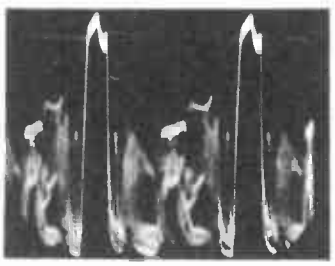
Schematic Diagram for Chassis 9L41 and 9L41U

NOTES: All capacitor values greater than 1 are in MMF unless otherwise noted.
All capacitor values less than 1 are in MFD unless otherwise noted.
All resistors are ½ watt, 10%, carbon unless otherwise noted.
Arrow through control indicates clockwise rotation.
Voltages are DC from point shown to chassis unless otherwise noted.
Voltages were read using a 20,000 ohms/volt meter. Voltages were taken with no signal. The receiver was adjusted for a good quality picture; i.e., normal contrast, brightness, width, height, vertical lin. and sound, picture in sync, then removed signal.
* Focus voltage optional for best focus.
Coil resistances read with coil in circuit.

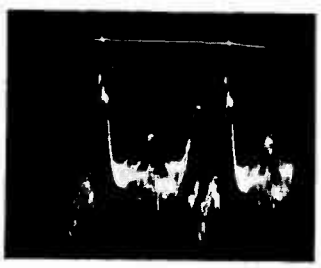
WAVEFORM PATTERNS

Composite video, 2nd detector output, L8T (on V.O.S. panel), 4.0 volts in "Normal," 7.0 volts in "Fringe," 60 c.p.s.

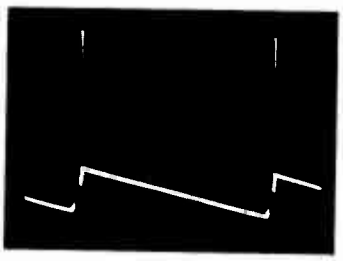
Composite video, 2nd detector output, L8T (on V.O.S. panel), 4.0 volts in "Normal," 7.0 volts in "Fringe," 15,750 c.p.s.



Composite video, noise inverter plate (pin 3 of 6AW8A, S2T), 94 volts, 15,750 c.p.s.

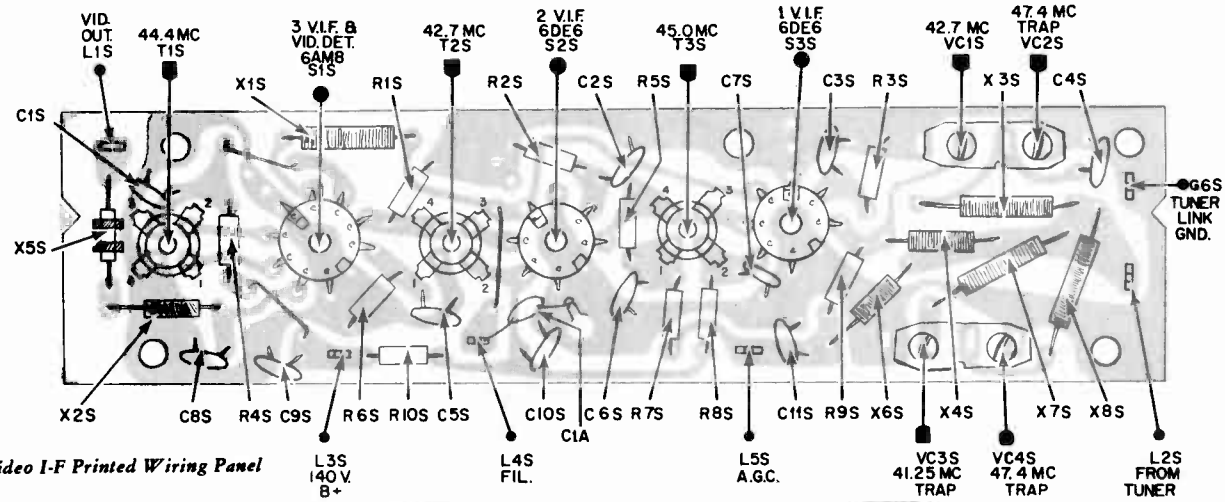


Composite video, sync separator grid (pin 2 of 12BR7, S5T), 84 volts, 60 c.p.s.

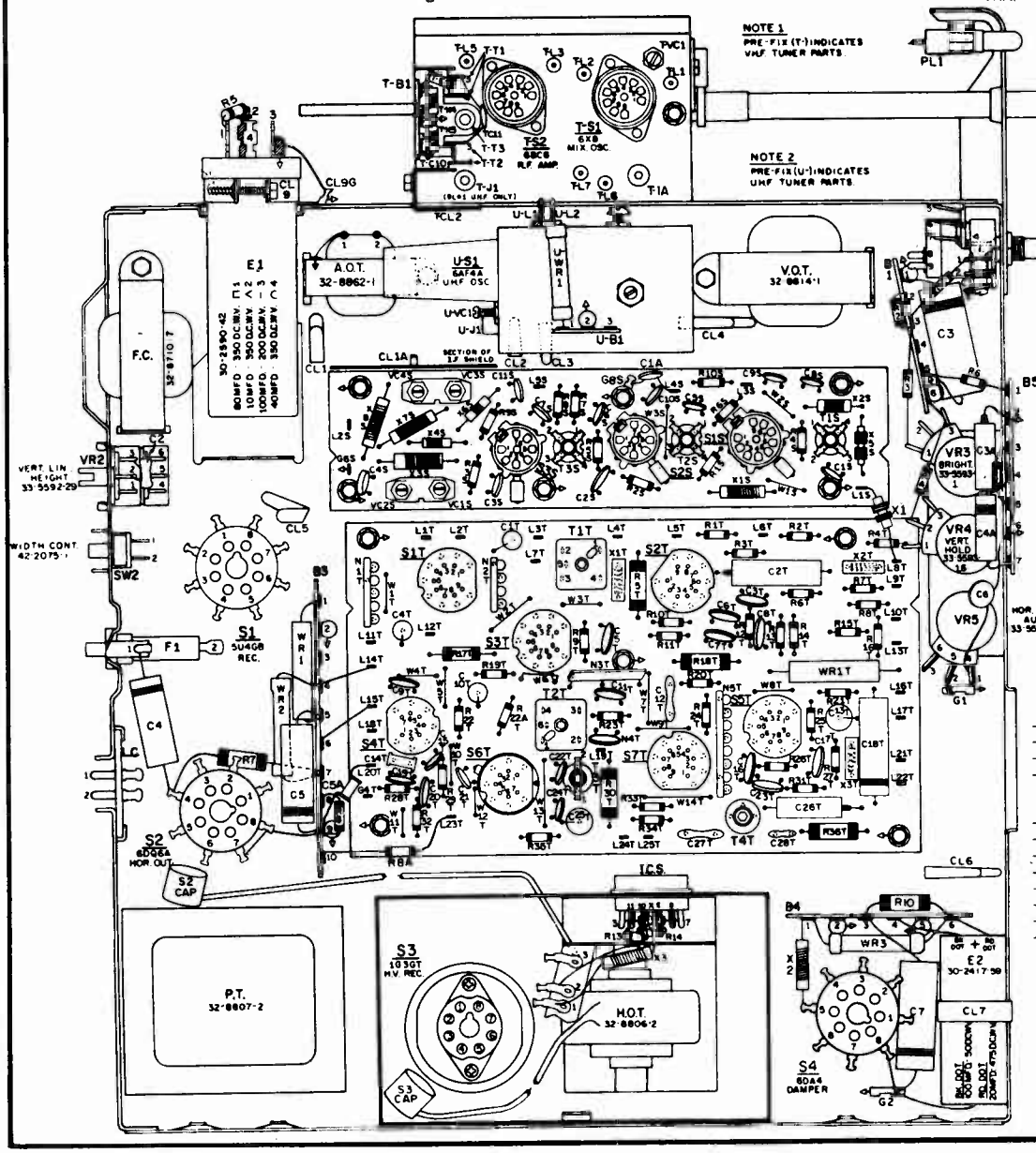


Vertical output plate, pin 1 of 6CS7 (SIT); or panel lug L2T, 1800 volts, 60 c.p.s.

PHILCO Chassis 9L41 and 9L41U Service Material, Continued



Video I-F Printed Wiring Panel



V.I.F.		
S1S	6AM8	3RD. V.I.F. & DET.
S2S	6DE6	2ND. V.I.F.
S3S	6DE6	1ST. V.I.F.

V.O.S.		
S1T	6CS7	VERT. OSC. & VERT. OUT.
S2T	6AW8A	VID. OUT. & NOISE INV.
S3T	6BY8	S.I.F. & TUNER DELAY
S4T	6CA5	AUDIO OUT.
S5T	12BR7	SYNC. SEP. & PHASE COMP.
S6T	6CS6	SOUND DISC.
S7T	12AU7A	HOR. OSC.

9L41U—Top View Showing Component Placement

PHILCO

AM ALIGNMENT

CHANNEL SELECTOR: Set tuner to channel 4 position.

SIGNAL INJECTION: To tuner feed-thru, L2, in mixer grid circuit.

BIAS: –4.5 volts to I-F A-G-C, L22U, on V.O.S. panel.

SCOPE: Connect to L24U on V.O.S. panel, video second detector output.

OUTPUT LEVEL: Not to exceed 2.0 volts peak-to-peak during pole and sweep alignment. Not less than .2 volts peak-to-peak as null, during trap alignment, is approached.

(1) Adjust tuner pole, T1A, for maximum at 47.4 MC. This is a temporary setting for trap alignment.
(2) Adjust trap VC3C for minimum at 41.25 MC.*
(3) Adjust traps VC2C and VC4C for minimum at 47.4 MC.*
(4) Repeat steps 2 and 3. Bias may be reduced as trap minimum is approached.
(5) Adjust tuner pole, T1A, for maximum at 45.0 MC.
(6) Adjust VC1C and T2C for maximum at 42.7 MC.
(7) Adjust T3C for maximum at 45.75 MC.
(8) Adjust T1C for maximum at 43.85 MC.

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

SWEEP ALIGNMENT

SIGNAL INJECTION: To antenna terminals through an antenna matching network (generator to 300 ohms).

CHANNEL SELECTOR, BIAS, SCOPE and OUTPUT LEVEL: Same as above under AM alignment.

(1) Inject 65.75 MC, AM, 30% modulated signal, into antenna. Adjust fine tuning control for minimum output. *Do Not Disturb* fine tuning during balance of I-F adjustments.
(2) Inject channel 4 sweep signal (69 MC with 6 MC sweep width) into antenna. If necessary, adjust the following poles to bring the curve within limits (See curve, figure 2).
   a. Tuner I-F pole, T1A, to set carrier level.
   b. T1C, 3rd V-I-F pole, to adjust curve tilt.
   c. T2C, 2nd V-I-F pole, and VC1C, 1st grid pole, to adjust 42.7 MC (sound side) slope.
   d. T3C, 1st V-I-F pole, to adjust carrier level.

4.5 MC TRAP ALIGNMENT

(1) Inject 4.5 MC AM signal into L24U or use station signal.
(2) Connect 4.5 MC detector (see circuit, figure 1) to L3U
(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 (T1U) for minimum indication.

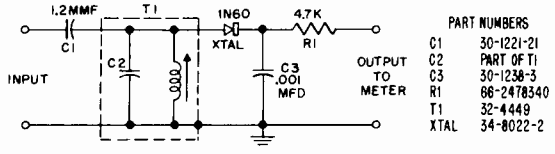


Figure 1. 4.5 mc. Detector Tube

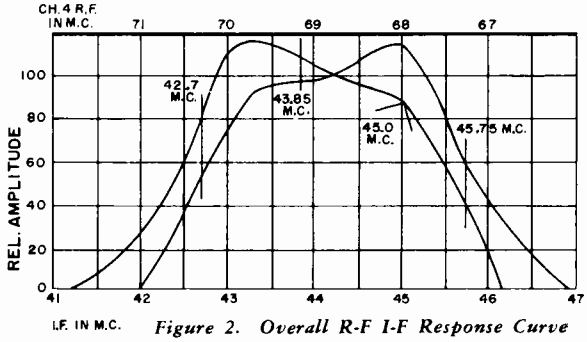
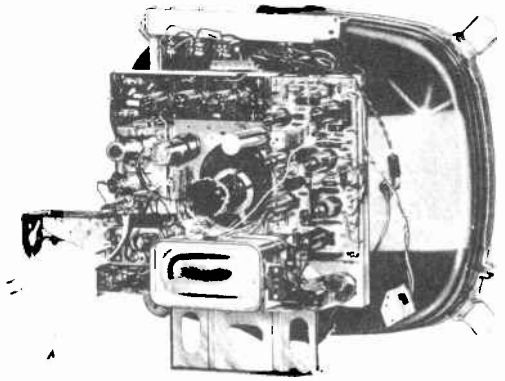
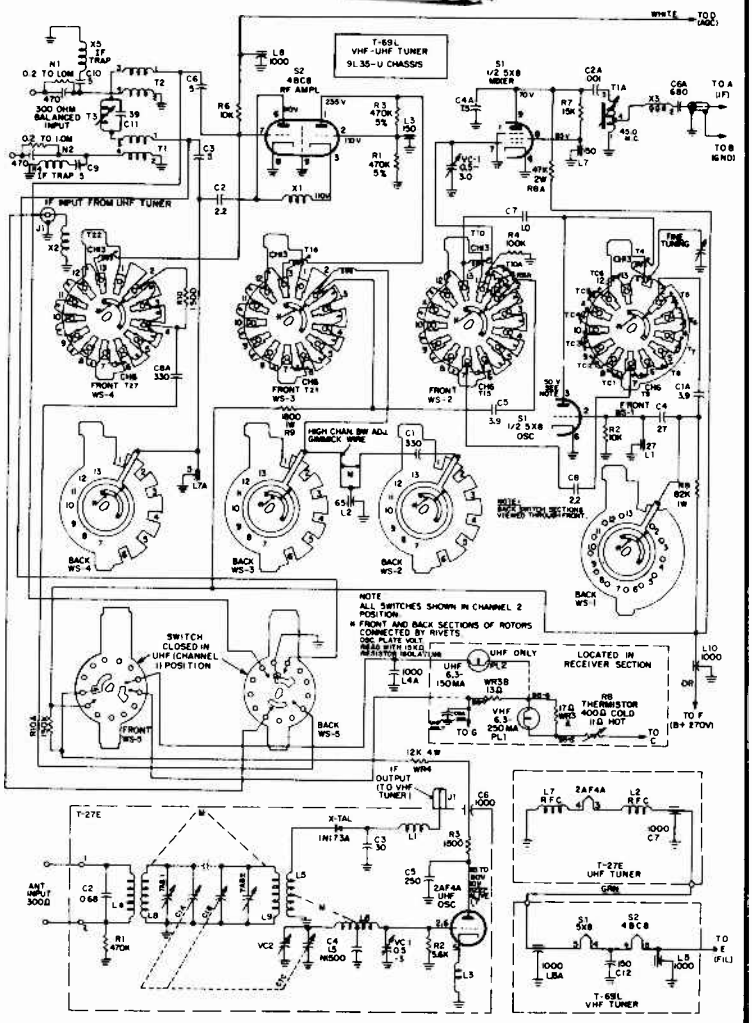


Figure 2. Overall R-F I-F Response Curve

9L35 and 9L35U CHASSIS

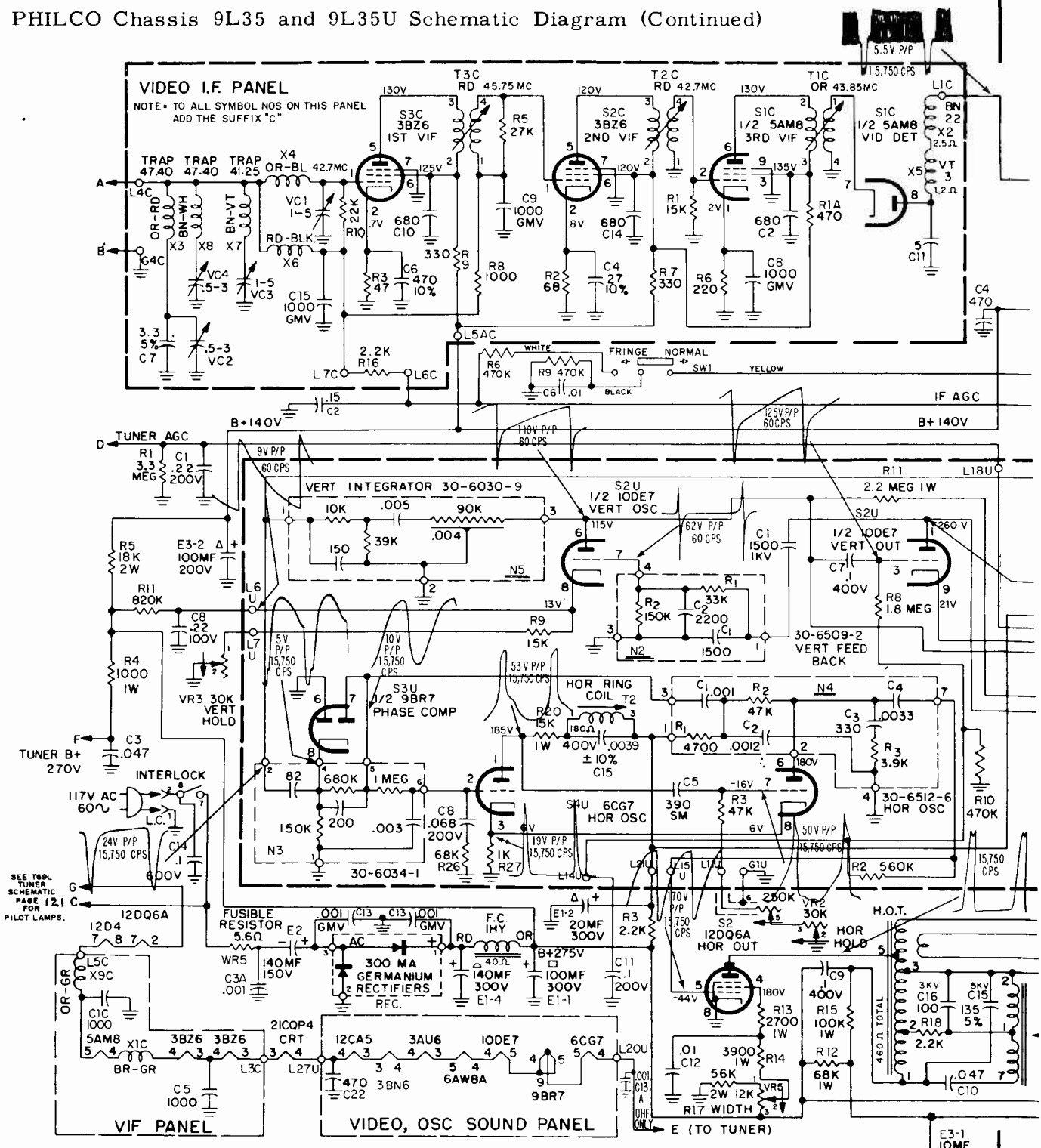
Material on pages 121 through 124. There is some similarity of these sets to Chassis 8L35, -U, on pages 105 through 110.





Tuner T-69L schematic used in 9L35U Chassis.

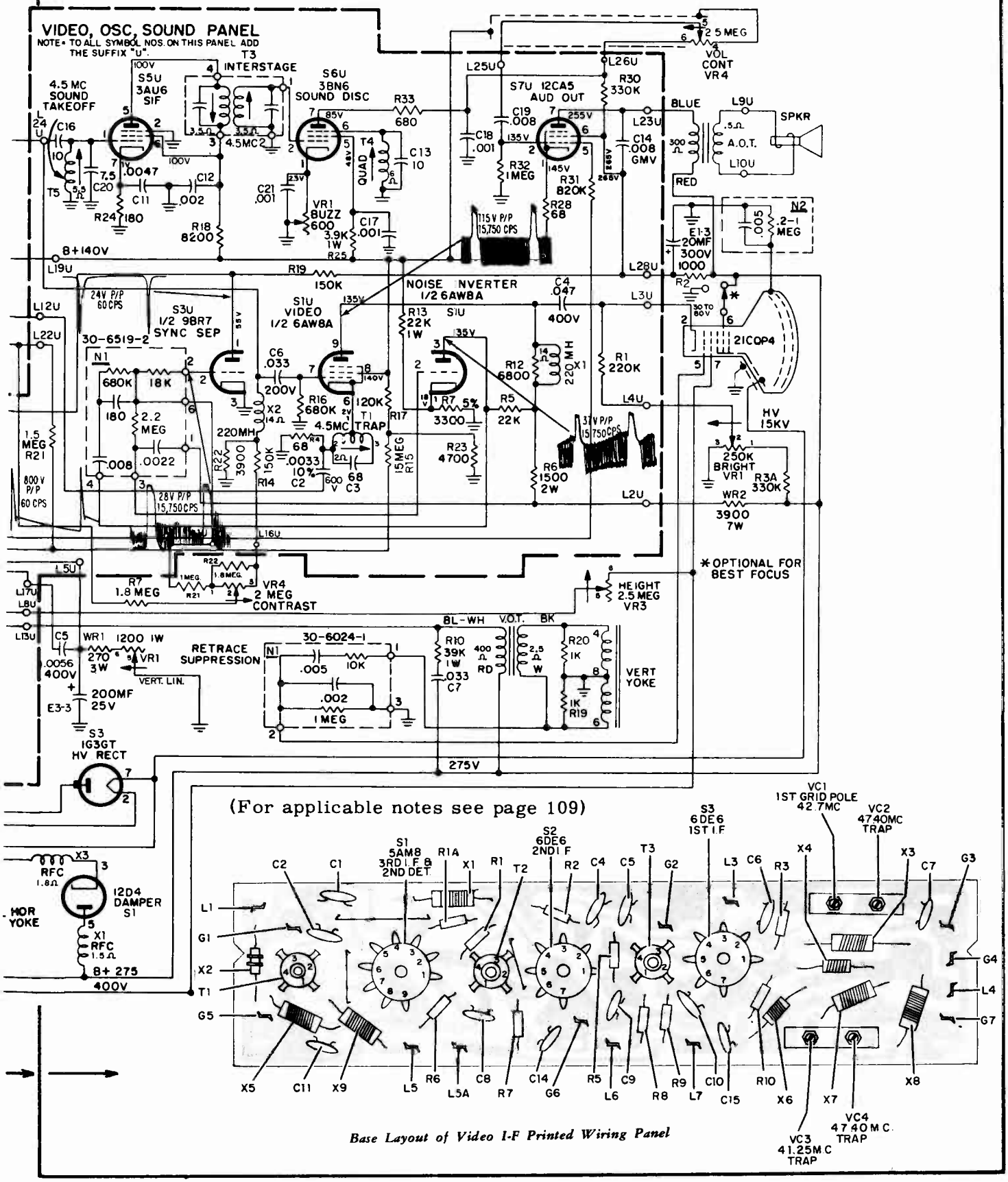
PHILCO Chassis 9L35 and 9L35U Schematic Diagram (Continued)



* NOTE: The 1G3GT is electrically identical to the 1B3GT. Mechanically, however, the 1G3GT is specially designed with a short bulb and must be used for replacement. The 1B3GT, being taller, will place the plate cap too close to the high voltage cage and ARCING will result.

PHILCO

Schematic Diagram for Chassis 9L35 and 9L35U



Base Layout of Video I-F Printed Wiring Panel

PHILCO Chassis 9L35 and 9L35U Service Material, Continued

CHASSIS REMOVAL

1. Remove knobs and cabinet back.
2. Disconnect speaker leads and remove pilot lamp socket from mounting clip in front of control panel.
3. Remove 2 screws mounting range switch and 2 screws mounting control panel to top cabinet block.
4. Remove top front trim strip by removing 3 screws.
5. Remove safety glass by tilting top forward and lifting out.
6. Remove screw from mask and lift out.
7. Remove 2 screws holding top chassis bracket to chassis.
8. Remove 2 screws mounting bottom chassis bracket to bottom cabinet block.
9. Remove 4 nuts and washers mounting CRT frame to cabinet.
10. Remove chassis and CRT assembly from front.

NOTE: Exercise care to prevent damage to bottom trim strip when removing chassis.

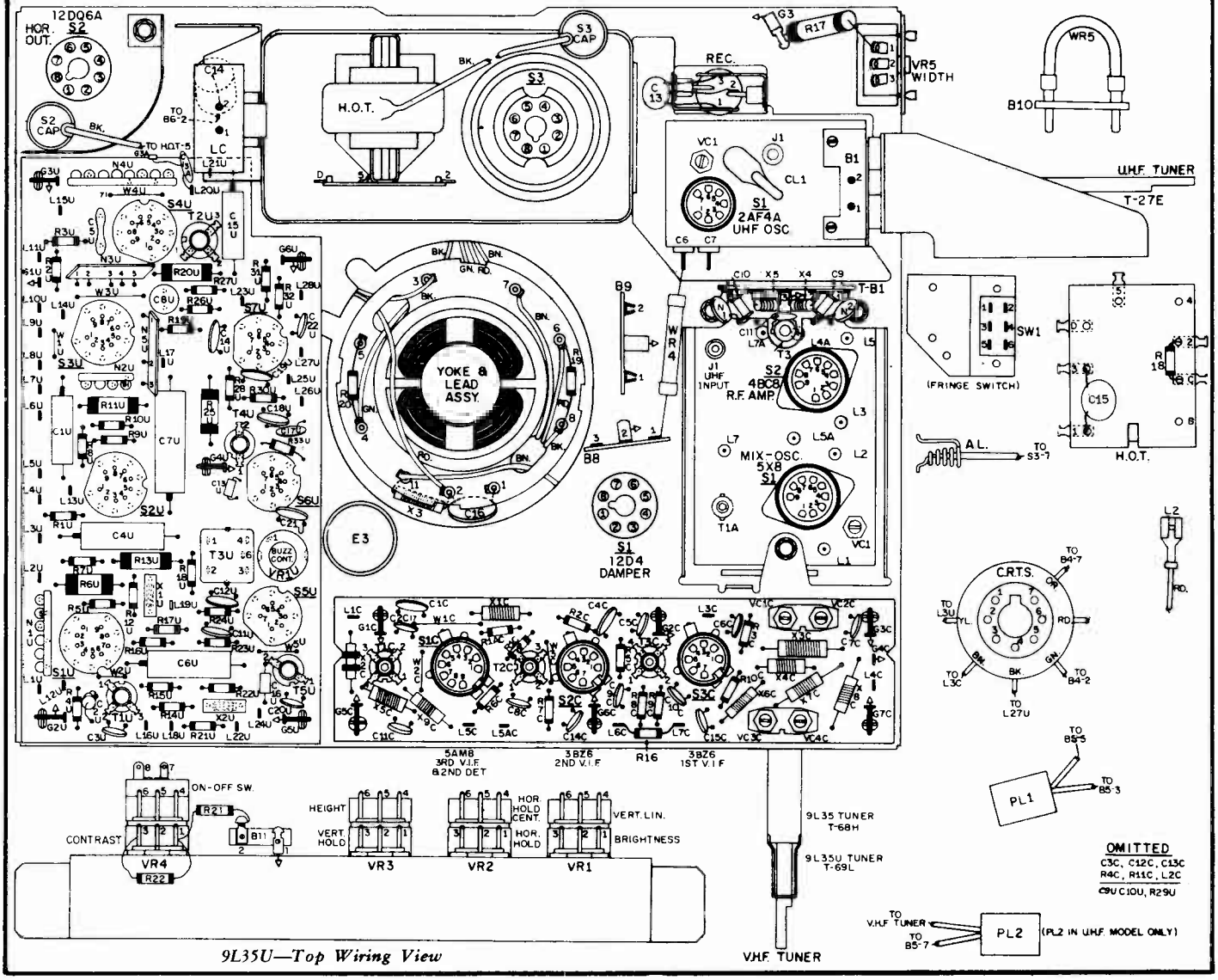
RECEIVER CONTROL LOCATIONS

1. Vertical Linearity—Adjust with a thin screwdriver through the hollow brightness shaft.
2. Height—Adjust with a thin screwdriver through the hollow vertical hold shaft.
3. Horizontal Hold Centering—Adjust with a thin screwdriver through the hollow horizontal hold control shaft.
4. Width—Remove back. Width control is at lower left.
5. Fusible B+ resistor—Remove back. Resistor is a plug-in at left center of chassis, between yoke and tuner.
6. Tubes—All tubes (except CRT) are accessible after removing back. 1G3GT, high voltage rectifier, is in cage.

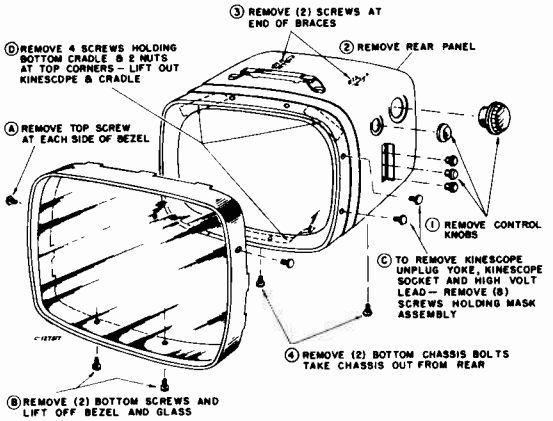
HORIZONTAL OSCILLATOR ADJUSTMENT

Allow set to warm up. Tune in a picture.

1. Short out the horizontal ringing coil, T2U, by placing a jumper across C15U.
2. Set the horizontal hold control, VR2 shaft, to the center of its range.
3. Adjust the horizontal hold centering control, VR2 screwdriver adjustment, 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 C15U and adjust the ringing coil (T2U) core for stable picture sync.



9L35U—Top Wiring View



RCA VICTOR

TELEVISION RECEIVERS – MODELS

21-PT-9095 & U, 21-T-9112 & U
21-T-9115 & U, 21-T-9117 & U

CHASSIS NOS.

KCS117A & KCS117B

CHASSIS AND SAFETY WINDOW REMOVAL

KINESCOPE AND SAFETY WINDOW CLEANING

The front safety window may be removed to allow for cleaning of the kinescope faceplate and the safety window. Use a soft cloth and water only.

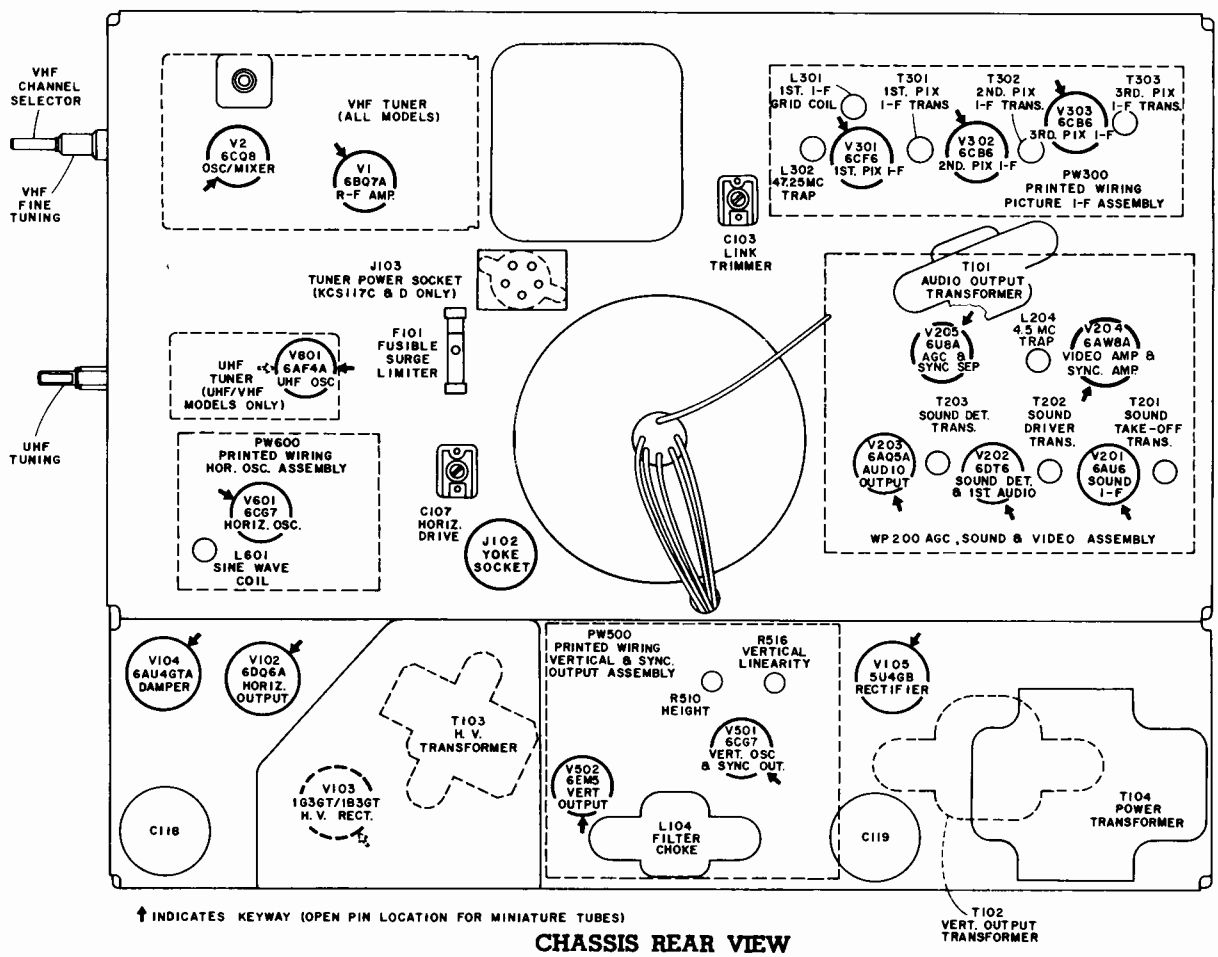
Remove the two screws at the bottom edge of the front bezel and the screw on each side of the bezel near the top. Pull the bezel and safety window outward to remove. Refer to A & B of illustration above.

CHASSIS REMOVAL

To remove the chassis from the cabinet, remove the cabinet back and the control knobs. Unplug the antenna cable, the kinescope socket and the speaker cable. Unplug the yoke cable. Remove the two chassis screws at the bottom of the cabinet and the two screws on the braces at the top rear edge of the cabinet. Refer to steps 1, 2, 3 and 4 of illustration above. Disconnect the H.V. anode lead and remove the chassis from the cabinet rear.

KINESCOPE REMOVAL

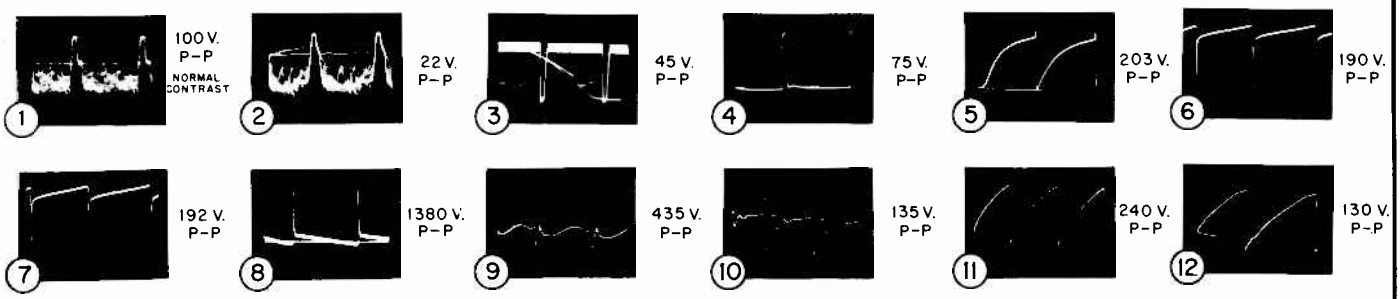
Remove the front bezel as shown in A and B of above illustration. Remove rear panel; unplug kinescope socket, yoke and H.V. anode lead. Remove (8) screws holding mask assembly and remove mask. Take out (4) screws holding kinescope cradle and two nuts at top corner braces. Remove kinescope and cradle from front of cabinet. Refer to steps C and D of above illustration.



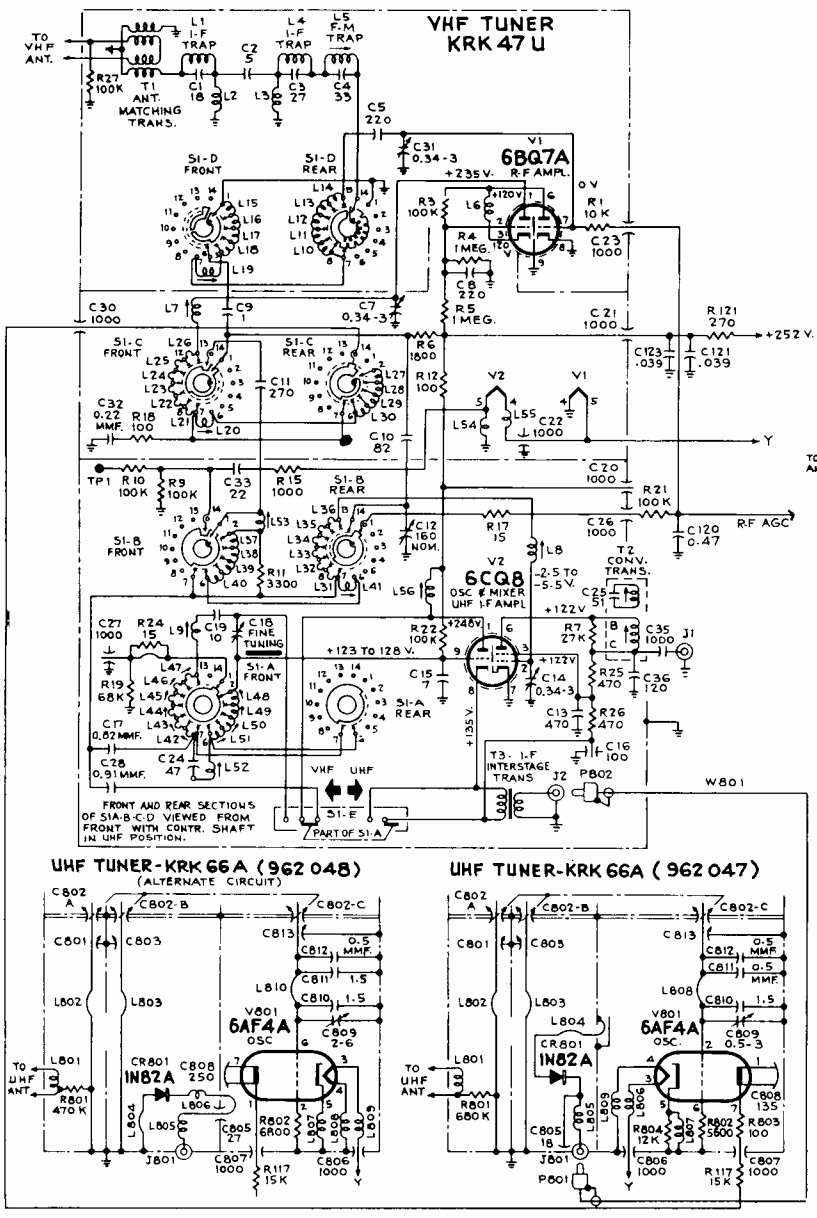
↑ INDICATES KEYWAY (OPEN PIN LOCATION FOR MINIATURE TUBES)

CHASSIS REAR VIEW

RCA Victor Chassis KCS-117A and KCS-117B, Continued



Waveforms for Chassis KCS-117A, KCS-117B, refer to schematic on page 127.



Tuners used in Chassis KCS-117B. (See page 127 for balance of schematic of main chassis.)

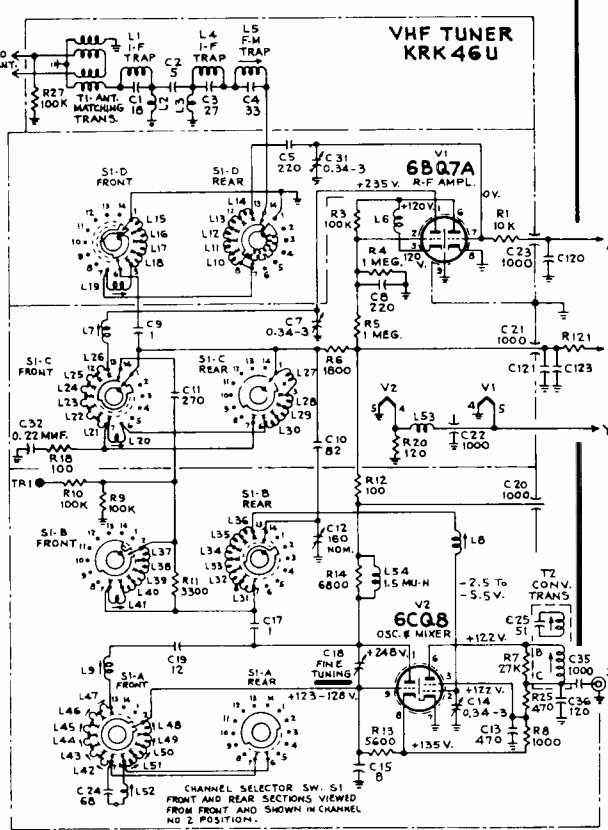
All resistance value in ohms. K = 1000.

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

Direction of arrows at controls indicates clockwise rotation.

All voltages measured with "Volt-Ohmyst" and with no signal input. Voltages should hold within ±20% with 117 v. a-c supply.

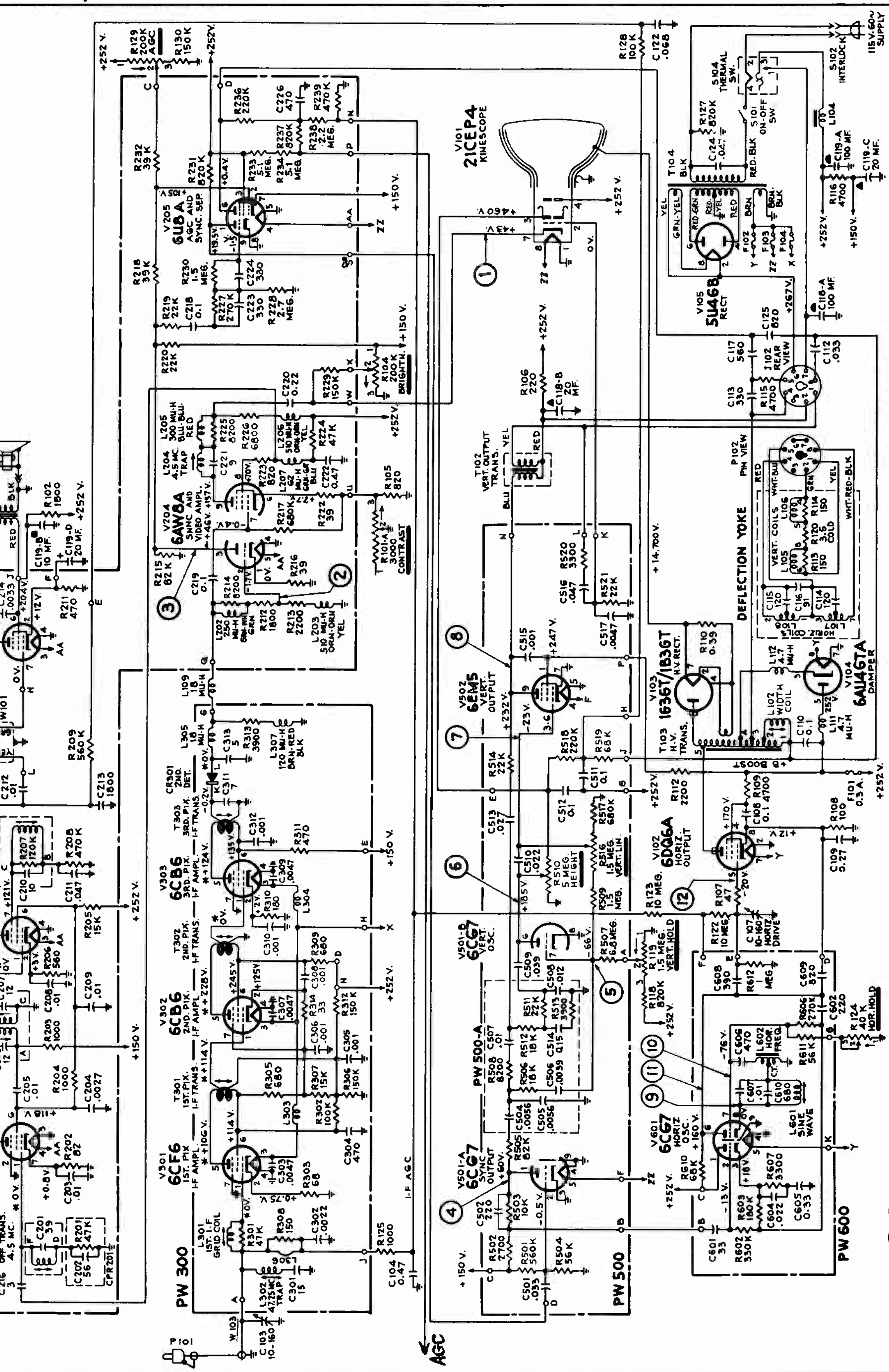
*Measured with 1 megohm, ½ watt resistor in series with probe.



KRK46U VHF TUNER SCHEMATIC
(Used on KCS117A Chassis)

RCA Victor Chassis KCS-117A and KCS-117B Schematic Diagram

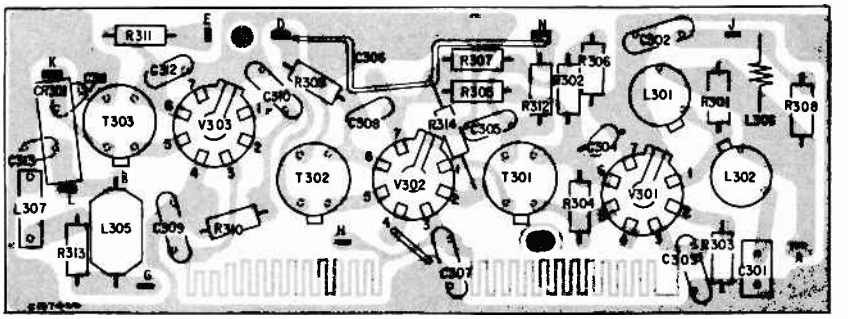
(See page 126 for schematic diagrams of tuners used.)



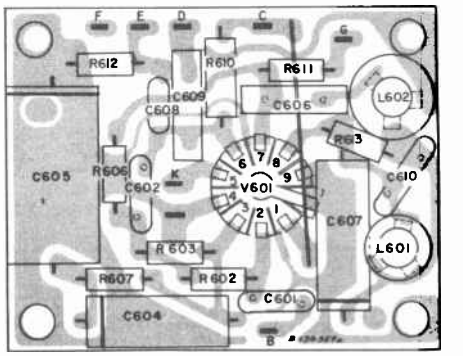
Balloons ① ② etc., shown on schematic above, indicate points of observation of the waveforms shown

RCA Victor Chassis KCS-117A and KCS-117B, Service Information, Continued

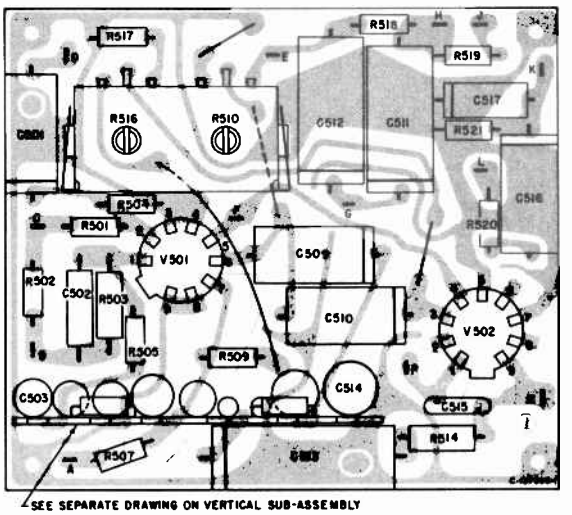
PRINTED WIRING ASSEMBLIES



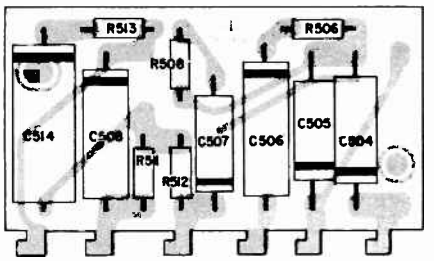
PW300—PICTURE I-F UNIT LAYOUT



PW600—HORIZONTAL OSCILLATOR UNIT LAYOUT



PW500—VERTICAL OSC. & SYNC OUTPUT UNIT LAYOUT



PW500A—SUBASSEMBLY FOR PW500

The assemblies represented above are viewed from the component side of the boards and are oriented as they will usually be viewed on the chassis.

The printed wiring, on the reverse side of the boards, is presented in "phantom" views superimposed on the component layouts. This will enable circuit tracing without removing the assemblies from the chassis to see the printed wiring on the reverse side.

FOCUS ..... Electrostatic

INTERMEDIATE FREQUENCIES

Picture I-F Carrier Frequency ..... 45.75 mc.
Sound I-F Carrier Frequency ..... 41.25 mc.

REPLACEMENT PARTS
(Partial Listing)

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CAPACITORS
C103	100849	Variable, mica, 10-160 mmf., I.F. link
C105	105674	Ceramic, 100 mmf., ±10%, 500 v.
C107	100849	Variable, mica, 10-160 mmf., horizontal drive
C113	102177	Ceramic, 330 mmf., ±10%, 2000 v.
C114, C115	103536	Ceramic, 120 mmf., ±10%, 2500 v.
C116	103535	Ceramic, 91 mmf., ±10%, 2500 v.
C117	106307	Ceramic, 560 mmf., ±10%, 2000 v.
C121	105479	Ceramic, .039 mf., +80%, —20%, 500 v.
C122	73815	Paper, .068 mf., ±20%, 1000 v.
C123	105479	Ceramic, .039 mf., +80%, —20%, 500 v.
C203	73960	Ceramic, .01 mf., +100%, —0%, 500 v.
C204	104131	Ceramic, .0027 mf., ±10%, 500 v.
C205	73960	Ceramic, .01 mf., +100%, — 0%, 500 v.
C208, C209	73960	Ceramic, .01 mf., +100%, —0%, 500 v.
C213	105524	Ceramic, .0018 mf., ±10%, 500 v.
C215	79980	Ceramic, 680 mmf., ±20%, 500 v.
C216	102415	Ceramic, 3 mmf., ±1 mmf., 1000 v.
C221	77108	Ceramic, 9 mmf., ±1 mmf., 500 v.
C223, C224	105301	Ceramic, 330 mmf., ±10%, 500 v.
C226	106546	Ceramic, 170 mmf., ±20%, 500 v.
C301	103614	Ceramic, 15 mmf., ±5%, 500 v.
C302	77953	Ceramic, 2200 mmf., +100%, —0%, 500 v.
C303	73473	Ceramic, .0047 mf., +100%, —0%, 500 v.
C304	78622	Ceramic, 470 mmf., ±20%, 500 v.
C305, C306	77252	Ceramic, .001 mf., +100%, —0%, 500 v.
C307	73473	Ceramic, .0047 mf., +100%, —0%, 500 v.
C308	102234A	Ceramic, .001 mf., ±20%, 500 v.
C309	73473	Ceramic, .0047 mf., +100%, —0%, 500 v.
C310	77252	Ceramic, .001 mf., +100%, —0%, 500 v.
C311	104177	Ceramic, 7 mmf., ±0.5 mmf., 500 v.
C312	102234A	Ceramic, .001 mf., ±20%, 500 v.
C313	104178	Ceramic, 5 mmf., ±0.5 mmf., 500 v.
C502	39636	Mica, 220 mmf., ±10%, 500 v.
C515	104222	Ceramic, 0.001 mf., ±10%, 2000 v.
C601	105348	Ceramic, 33 mmf., ±10%, 500 v.
C602	105245	Ceramic, 220 mmf., ±10%, 500 v.
C606	105672	Mica, 470 mmf., ±5%, 1000 v.
C608	105675	Ceramic, 390 mmf., ±10%, 1000 v.
C609	106080	Mica, 820 mmf., ±10%, 500 v.
C610	105518	Ceramic, 680 mmf., ±20%, 500 v.
CPR201	104329	Circuit—Printed sub-assembly — Includes C202, R201
F101	104295	Fuse—Fusible surge limiter
F102, F103	——	Fuse—#28 AWG copper wire heater
F104	——	Fuse—#32 AWG copper wire heater fuse
L102	105522	Coil—Width
L602	105667	Coil—Horizontal frequency
		PRINTED CIRCUITS
PW300	106159	Circuit—Printed pix board less tubes
PW500	106161	Circuit—Printed vertical board less tubes
PW500A	106079	Circuit—Printed vertical board sub-assembly
PW600	106160	Circuit — Printed synchroguide strip less tubes

CENTERING ADJUSTMENT

The electrostatic focus kinescope is provided with special centering magnets. These magnets are in the form of two discs mounted on the back of the deflection yoke. When the magnets are rotated on the tube so that the levers are together, maximum centering effect is produced. To shift the picture, rotate one of the magnets with respect to the other. To shift the picture in the desired direction rotate both magnets simultaneously in the same direction on the neck of the kinescope. 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.

WIDTH ADJUSTMENT

The width adjustment is located on the chassis rear. The rear panel must be removed to perform this adjustment.

The width of the picture should be adjusted to fill the mask with a line voltage of 105V. With normal voltage of 117V, 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 R253 on chassis rear (remove rear panel) until the picture overscans approximately ⅝" at both top and bottom with normal line voltage of 117V. Adjust vertical linearity (R259 on chassis rear), until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. Recheck centering of the picture within the mask.

CHECK OF HORIZONTAL OSCILLATOR ADJUSTMENT

Turn the horizontal hold control to the extreme clockwise position. The picture should be out of sync, with approximately eight bars slanting downward to the left. Turn the control counter-clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 1½ to 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional counter-clockwise rotation of the control. The picture should remain in sync for approximately two-thirds of a full turn of additional counter-clockwise rotation of the control. Continue counter-clockwise rotation until the picture falls out of sync. Rotation beyond fallout position should produce between 2 and 5 bars before interrupted oscillation (motorboat occurs). Interrupted oscillation (motorboat) should be reached before full counter-clockwise rotation.

When the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned Skip "Adjustment of Horizontal Oscillator".

ADJUSTMENT OF HORIZONTAL OSCILLATOR

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

The width adjustment should be properly set, as explained in paragraph above, before adjusting the sine wave coil.

Set the sine wave coil L211 fully clockwise.

Adjustment of the horizontal frequency control in the counter-clockwise direction will show a multiple number of bars before "motorboat" occurs. Adjust the sine wave coil L211 until 3 bars are present before "motorboat" occurs, when the horizontal frequency control is rotated counter-clockwise from the fall out point.

FM TRAP ADJUSTMENT

In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the FM trap for minimum interference in the picture. The trap is L5 and is located on top of the tuners as shown in Figures 9 and 10.

CAUTION.—In some receivers, the FM trap L5 will tune down into channel 6 or even into channel 5. Needless to say, such an adjustment will cause greatly reduced sensitivity on these channels. If channels 5 or 6 are to be received, check L5 to make sure that adjustment does not affect sensitivity on these two channels.

RCA VICTOR

PORTABLE TELEVISION RECEIVERS MODELS

17-PD-9062 & U, 17-PD-9064 & U
17-PD-9070 & U, 17-PD-9072 & U
17-PD-9074 & U, 17-PD-9078 & U
17-PD-9079 & U, 17-PT-9041 & U
17-PT-9042 & U, 17-PT-9050 & U
17-PT-9054 & U, 17-PT-9059 & U

CHASSIS NOS.

KCS118A, B, C & D

The service material for these chassis is printed on pages 129 through 136. The printed wiring assembly illustration on page 133, and schematic on pages 134-135 are exact for KCS-118C, -118D. Chassis KCS-118A, -B, use somewhat different tuners and have a few other very minor differences.

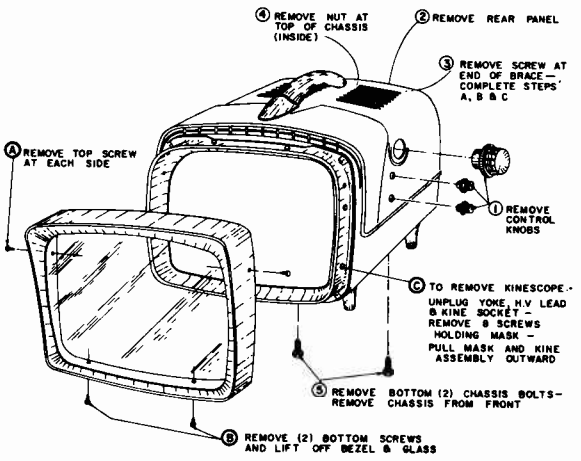


Figure 2—Chassis Removal and Safety Glass Cleaning

KINESCOPE REMOVAL AND REPLACEMENT

The kinescope is removable from the front of the cabinet, leaving the chassis in place.

RCA Victor Chassis KCS-118A, -B, -C, -D, Alignment Procedure

ALIGNMENT PROCEDURE

HORIZONTAL INTERFERENCE

Interference from the horizontal sweep circuits of the receiver may appear on the responses making it difficult to observe a clearly defined trace. It is recommended that the horizontal circuits be disabled during alignment.

The horizontal circuits in these receivers should be disabled in the following manner. Connect a 150 ohm 10 watt resistor in series with the plate lead of V102 horizontal output tube. Apply —12.5V. bias to the grid of V102, pin 5.

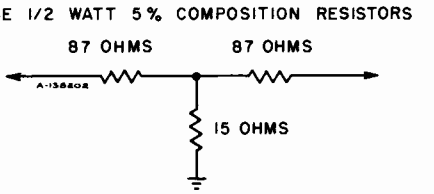


Figure 3—Sound Attenuation Pad

PICTURE I-F TRANSFORMER AND TRAP ADJUSTMENTS

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Apply —4 volts to I-F AGC bus at terminal "Q" of PW200. Positive lead to chassis.

SIGNAL GENERATOR ..... Connect in series with 1500 mmf. to mixer grid at S1B as shown below.

VACUUM TUBE VOLTMETER.... Connect to 2nd Detector output at terminal "TP". Use DC probe.

STEP		SIGNAL GENERATOR	ADJUST	REMARKS
1	Peak 3rd pix. I-F transformer	44.5 mc.	T205	Peak on specified frequencies for maximum indication on meter. Set generator output for 3 volts on meter when finally peaked.
2	Peak 2nd pix. I-F transformer	45.5 mc.	T204	
3	Peak 1st pix. I-F transformer	43.0 mc.	T203	
4	Adjust 47.25 mc. trap	47.25 mc.	L203	Adjust for minimum voltage on meter

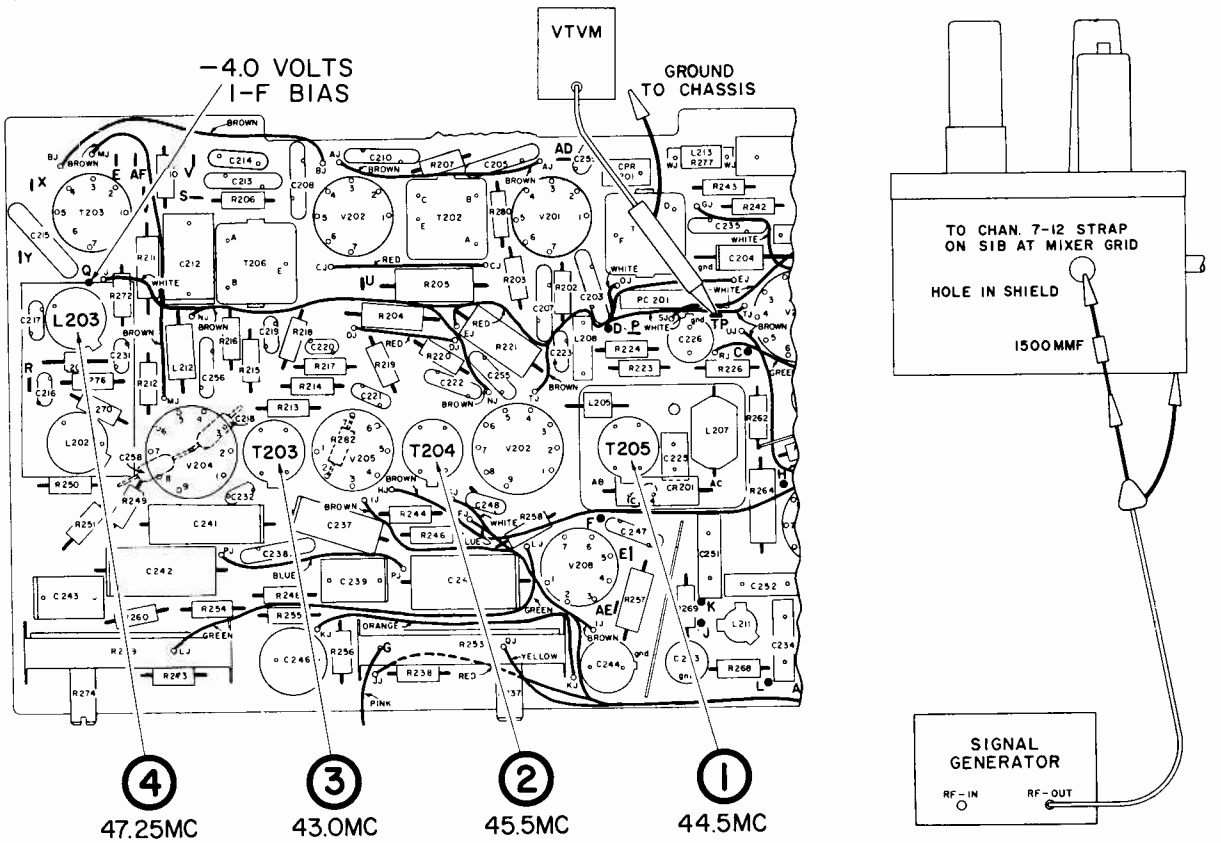


Figure 6—Picture I-F Transformer and Trap Adjustments

RCA Victor Chassis KCS-118A, -B, -C, -D, Alignment Procedure, Continued

SWEEP ALIGNMENT OF PICTURE I-F

BIAS SUPPLY ..... Apply —4 volts to I-F AGC bus at terminal "Q" of PW200. Positive lead to chassis
OSCILLOSCOPE ..... Plug test adapter under 1st picture I-F tube V204. Connect 180 ohm resistor between pins 2 and 3 on adapter. Connect oscilloscope to pin 2 on adapter using diode probe.
SWEEP GENERATOR ..... Connect in series with 1500 mmf. capacitor mixer grid at S1B as shown below.
SIGNAL GENERATOR ..... Couple loosely to sweep output cable to provide markers.
VACUUM TUBE VOLTMETER... Connect to 2nd Detector output at terminal "TP". Use DC probe.

STEP		SWEEP GENERATOR	SIGNAL GENERATOR	ADJUST	REMARKS
Set channel selector to Channel 4.					
1	Adjust mixer plate, link trimmer & I-F grid input coil	40-50 mc. (I-F)	42.5 mc. 45.75 mc.	L56, L57 or T4 & C103 & L202	Adjust for max. gain with response "A" & 0.5 v. p-p on scope.
Remove adapter from V204 and reinsert tube. Connect oscilloscope to terminal "TP" using direct probe.					
2	Adjust pix. I-F overall	40-50 mc. (I-F)	42.5 mc. 45.0 mc. 45.75 mc.	T205, T204, T203	Adjust for response "B" 5 v. p-p on scope.
Connect signal generator to mixer at S1B, in series with pad shown in Figure 3 (see below). Set generator to 45.75 mc. and adjust output for exactly 1½ volts on the "VoltOhmyst". Remove the pad. Do not change generator output during step 3 below.					
3	Set 41.25 mc. attenuation	40-50 mc. (I-F)	41.25 mc. (42.5 mc., 45.0 mc., 45.75 mc.)	T203 & T205	Adjust for 1.2 to 1.5 volts. Maintain response "B."
4	Connect sweep generator to antenna terminal through pad shown in Figure 5. Check all channels for proper response as in "B" below. Retouch T204 and T205 slightly to correct for any overall tilt which is essentially the same on all channels. Use —2.0 volts R-F AGC bias on chassis with tetrode KRK70A or KRK71A tuners or —3.0 volts R-F AGC bias on chassis with cascode KRK46R or KRK47R tuners. Apply R-F bias to tuner AGC terminal.				

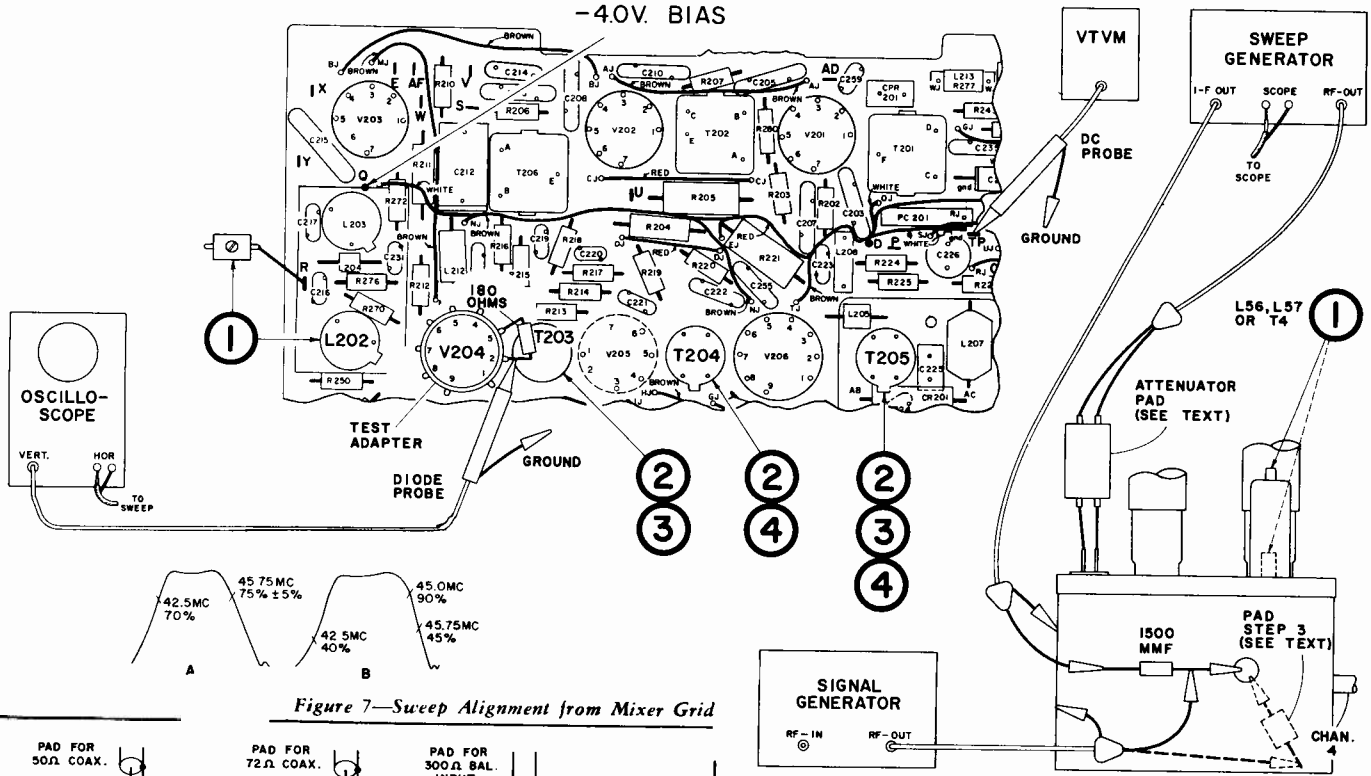


Figure 7—Sweep Alignment from Mixer Grid

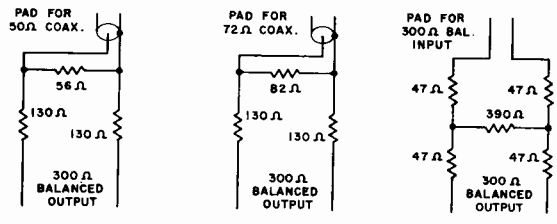


Figure 5—Sweep Attenuator Pads

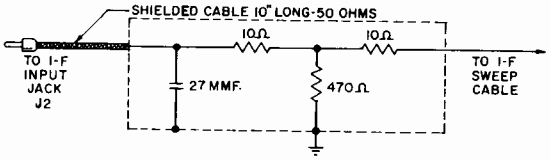


Figure 4—Tuner I-F Input Head

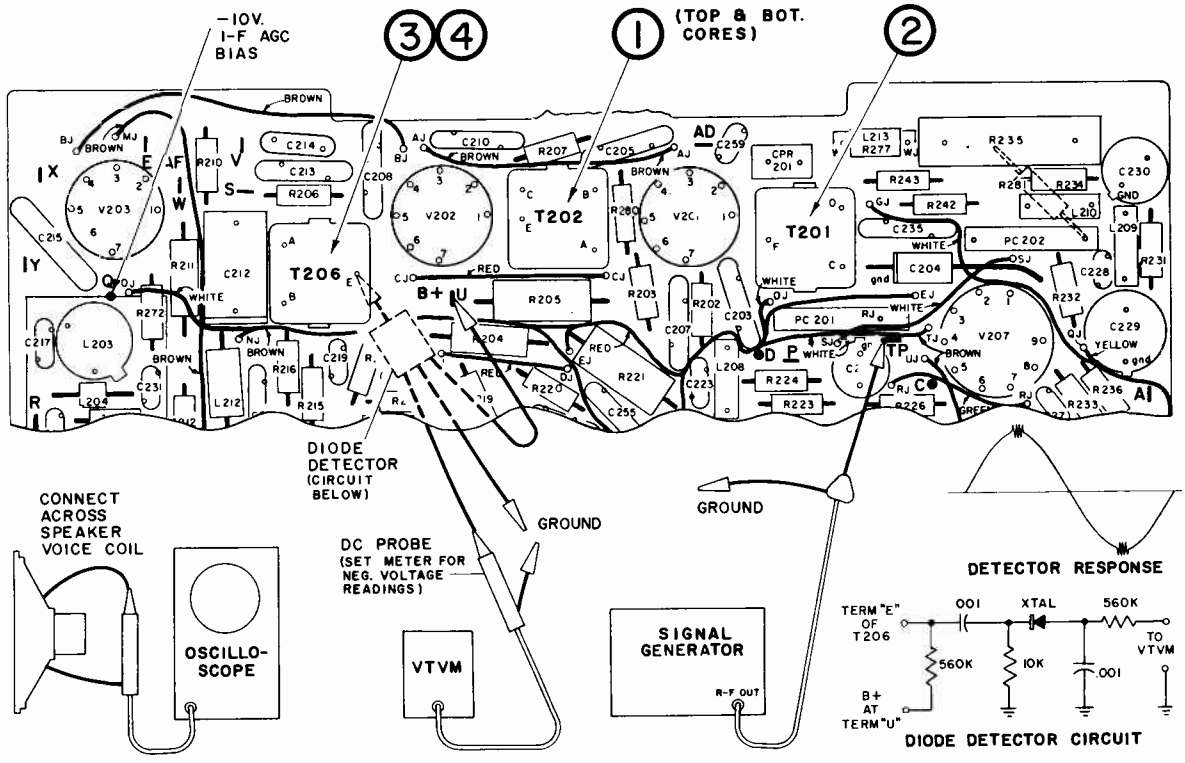
RCA Victor Chassis KCS-118A, -B, -C, -D, Alignment Procedure, Continued

SOUND I-F AND SOUND DETECTOR ALIGNMENT

TEST EQUIPMENT CONNECTIONS:

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

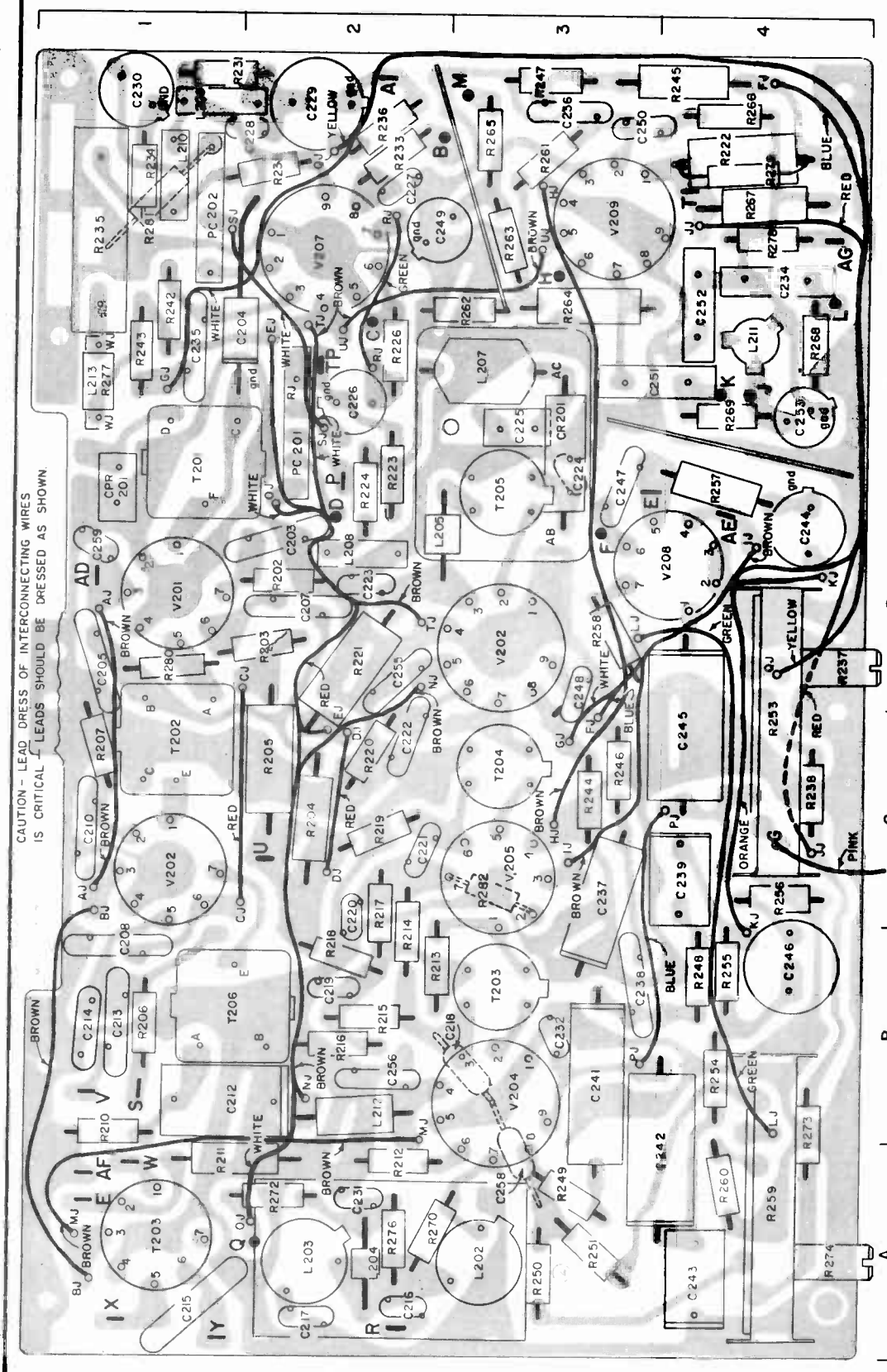
	STEP	SIGNAL GENERATOR	ADJUST	REMARKS
	Set contrast control maximum clockwise.			
1	Adjust Driver Transformer Primary and Secondary	4.5 mc.	T202 (top & bottom	Adjust T202 top & bottom for maximum negative DC on meter. Set generator for 1.0 to 1.5 volts on meter when finally peaked. Peak cores at open end of coils (maximum core separation).
2	Adjust Sound Take-Off Trans.	4.5 mc.	T201	Adjust T201 for maximum negative DC on meter. Set generator for 1.0 to 1.5 volts on meter when finally peaked.
3	Disconnect the diode test detector. Turn off signal generator and tune in strongest signal in area adjusting volume control for normal volume (approx. ¼ turn from c.c.w.). Turn core of T206 flush with top of coil form.			
4	Adjust Sound Detector Trans.	Observing oscilloscope and listening to audio output adjust T206 clockwise to a peak. Continue clockwise to a second louder peak and adjust T206 for maximum on this second peak.		
	Alternate Method Using Generators With F-M Modulation Provided			
1	Same as step 1 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation.			
2	Same as step 2 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation.			
3	Adjust Sound Detector Trans.	4.5 mc. 400 cycle F-M Mod. 7½ kc. Dev.	T206	Adjust T206 for max. 400 cycle output on scope using max. amplitude peak. Adjust volume control for .70 v. p-p on scope when peaked. See response below.
4	Retouch Driver and Sound Take-Off Trans. for breakout	4.5 mc. 400 cycle F-M Mod. 7½ kc. Dev.	T201 & T202	Decrease input signal to minimum usable signal and retouch T201 & T202 for symmetrical breakout. Response below.



Sound I-F and Sound Detector Alignment

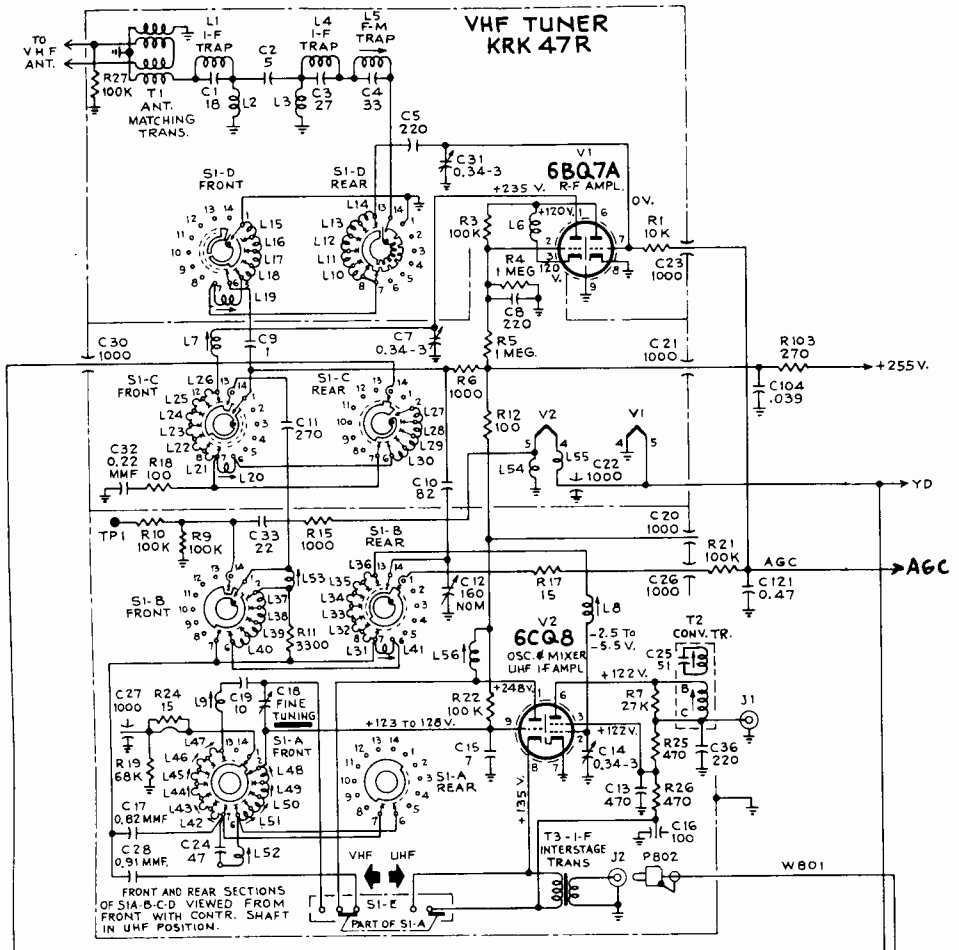
RCA Victor

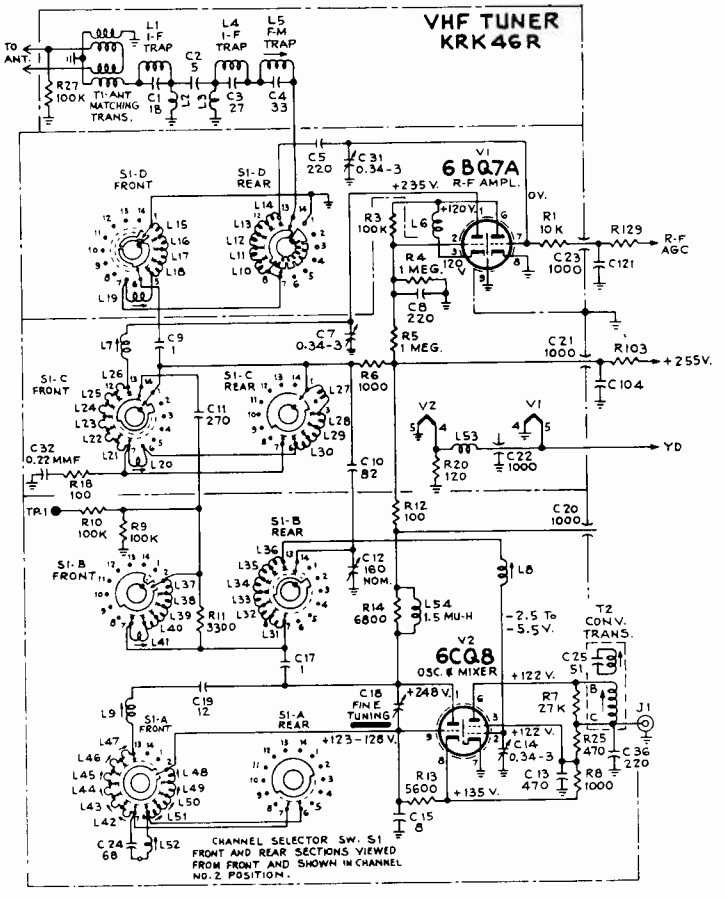
KCS118C & KCS118D PRINTED WIRING ASSEMBLY (Continued)



COMPONENT LOCATION GUIDE

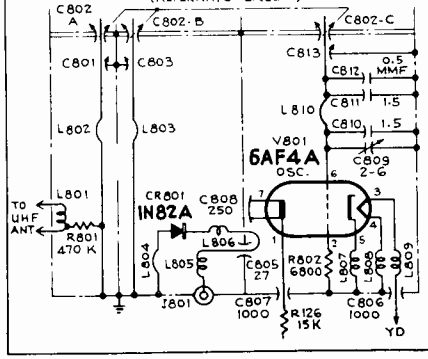
C203	D2	C221	C2	C238	B3	C254	E4	L208	D2	R207	C1	R224	D2	R245	F4	R262	E3	R280	D1
C204	E2	C222	C2	C239	C4	C255	D2	L209	F1	R210	B1	R225	E2	R246	C3	R263	F3	R281	F1
C205	D1	C223	D2	C241	B3	C256	B2	L210	F1	R211	A1	R226	E2	R247	F3	R264	E3	R282	C3
C207	D2	C224	E3	C242	A4	C258	A3	L211	E4	R212	A2	R230	E2	R248	B4	R265	F3		
C208	B1	C225	E3	C243	A4	C259	D1	L212	B2	R213	B2	R231	F1	R249	A3	R266	F4	T201	E1
C210	C1	C226	E2	C244	D4			L213	E1	R214	B2	R232	F2	R250	A3	R267	F4	T202	C1
C212	B1	C227	F2	C245	C4	CPR201	E1			R215	B2	R233	F2	R251	A3	R268	E4	T203	B3
C213	B1	C228	F2	C246	B4			PC201	E2	R216	B2	R234	F1	R254	B4	R269	E4	T204	C3
C214	B1	C229	F2	C247	E3	CR201	E3	PC202	F1	R217	C2	R235	F1	R255	B4	R270	A2	T205	D3
C215	A1	C230	F1	C248	D3					R218	B2	R236	F2	R256	C4	R272	A2	T206	B2
C216	A2	C231	A2	C249	F2	L202	A3	R202	D2	R219	C2	R237	D4	R257	E4	R273	B4		
C217	A2	C232	B3	C250	F3	L203	A2	R203	D2	R220	C2	R238	C4	R258	D3	R276	A2		
C218	B2	C235	E1	C251	E4	L204	A2	R204	C2	R221	D2	R242	E1	R259	A4	R277	E1		
C219	B2	C236	F3	C252	E4	L205	D2	R205	C2	R222	F4	R243	E1	R260	A4	R278	F4		
C220	C2	C237	C3	C253	E4	L207	E3	R206	B1	R223	E2	R244	C3	R261	F3	R279	F4		



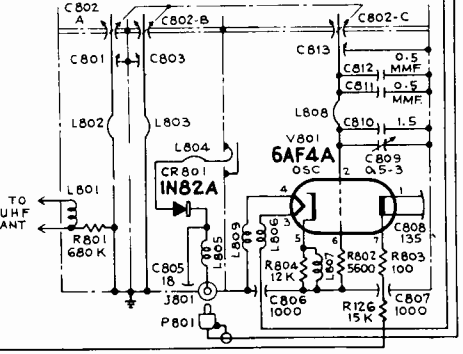


KRK46R VHF TUNER SCHEMATIC
FOR KCS118C CHASSIS

UHF TUNER-KRK 66A (962048)
(ALTERNATE CIRCUIT)



UHF TUNER-KRK 66A (962047)



Tuners used in Chassis KCS-118D.

All resistance value in ohms. K = 1000.

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

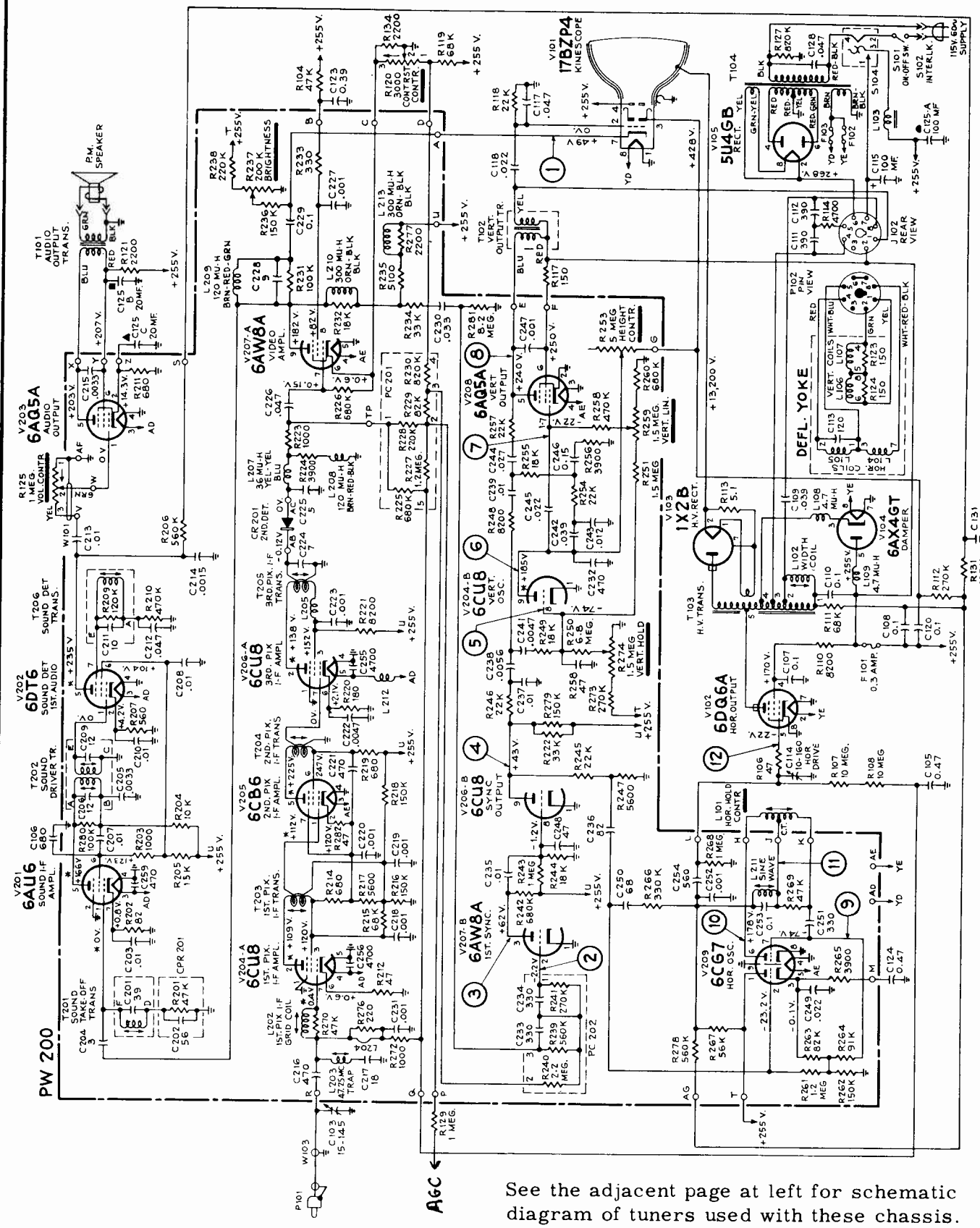
Direction of arrows at controls indicates clockwise rotation.

All voltages measured with "Volt-Ohmyst" and with no signal input. Voltages should hold within ±20% with 117 v. a-c supply.

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

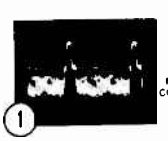
Balloons ① ② etc., shown on schematics, indicate points of observation of the waveforms shown on page 136.

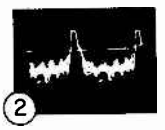
RCA Victor Main Schematic Diagram Chassis KCS-118C, KCS-118D

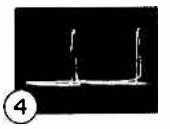


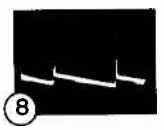
See the adjacent page at left for schematic diagram of tuners used with these chassis.

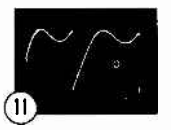
RCA Victor Chassis KCS-118A, -B, -C, -D, Service Material, Continued





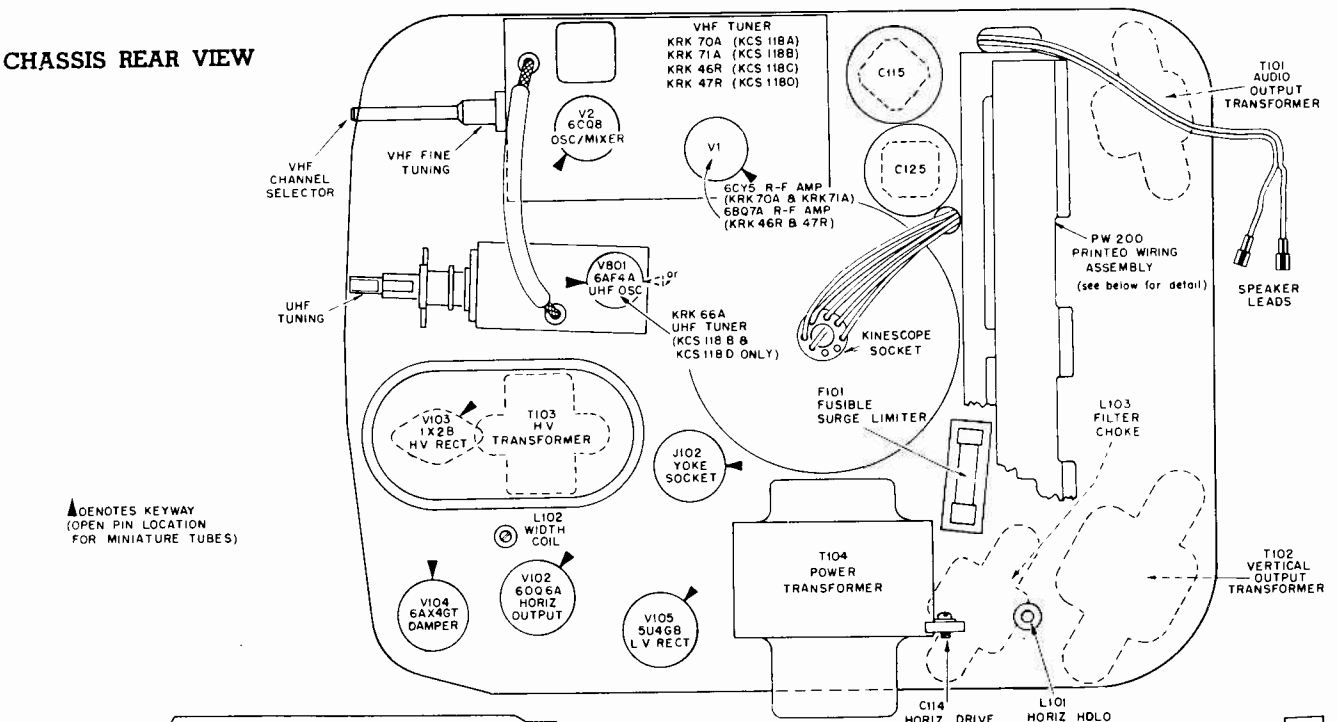


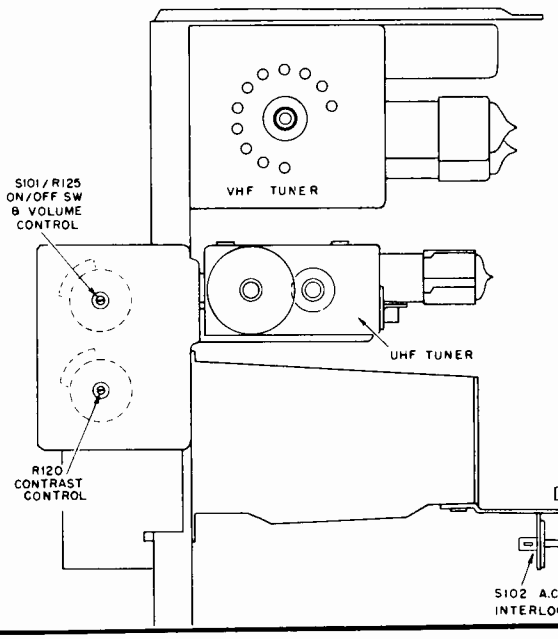




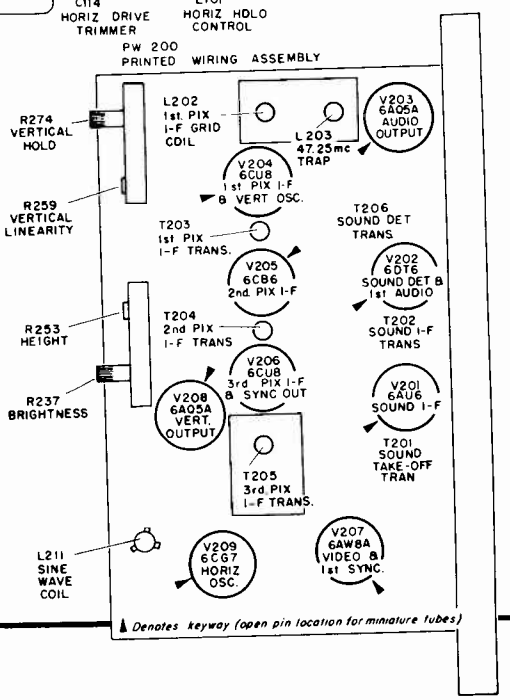
Waveform Observations, refer to main schematic printed on page 135.

CHASSIS REAR VIEW





Chassis Rear View



Chassis Removal

To remove the chassis from the cabinet for repair or installation of a new kinescope, remove the four control knobs from the side of cabinet, the cabinet back, and disconnect antenna leads. Remove metal screws from bottom front of cabinet and lift mask gently from cabinet. Take out screws holding chassis bottom and top chassis guide rail. Withdraw the chassis from the front of the cabinet.

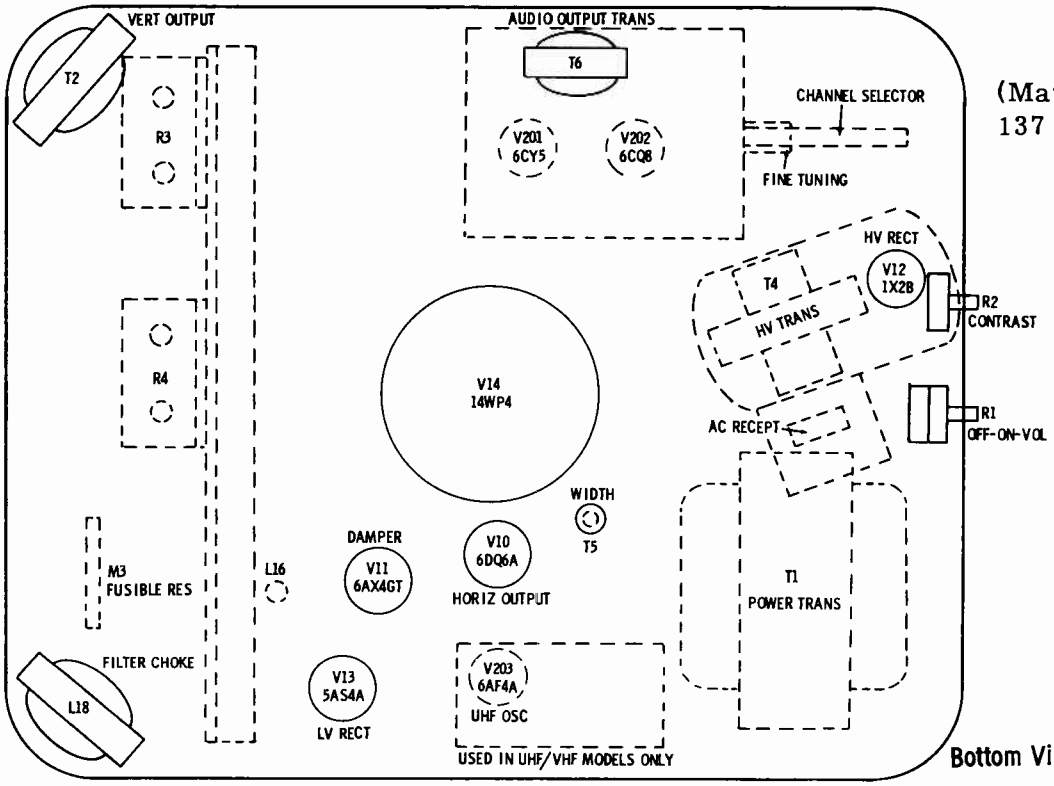
RCA VICTOR

TELEVISION RECEIVERS—MODELS

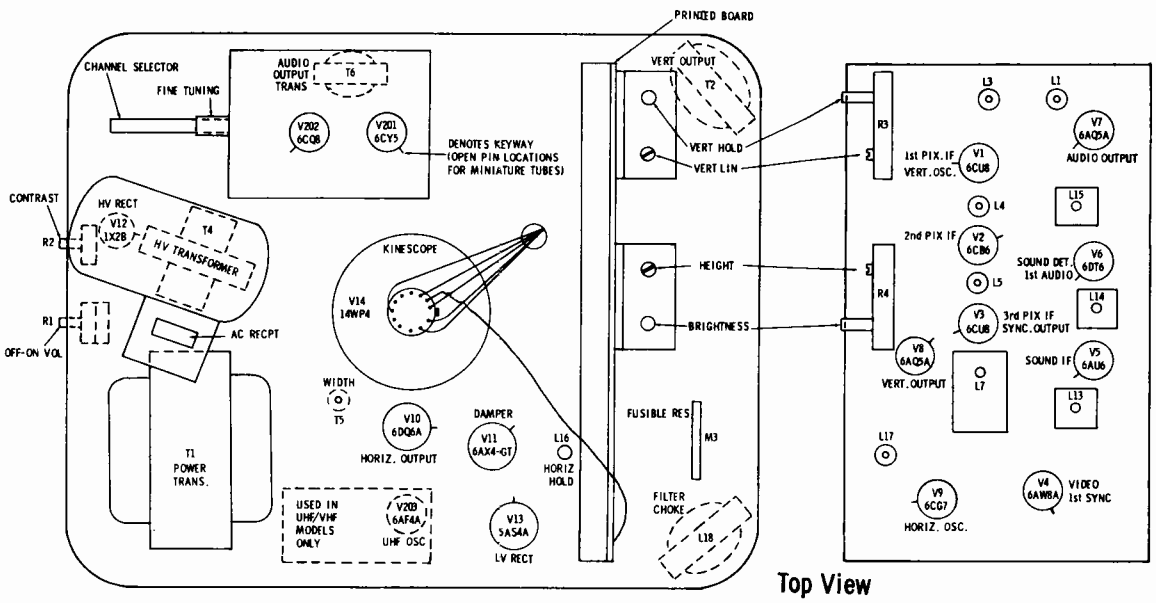
14PD9030-3-4&U 14PT9011-2&U

Chassis Nos. KCS120A,B

(Material on pages 137 through 140.)

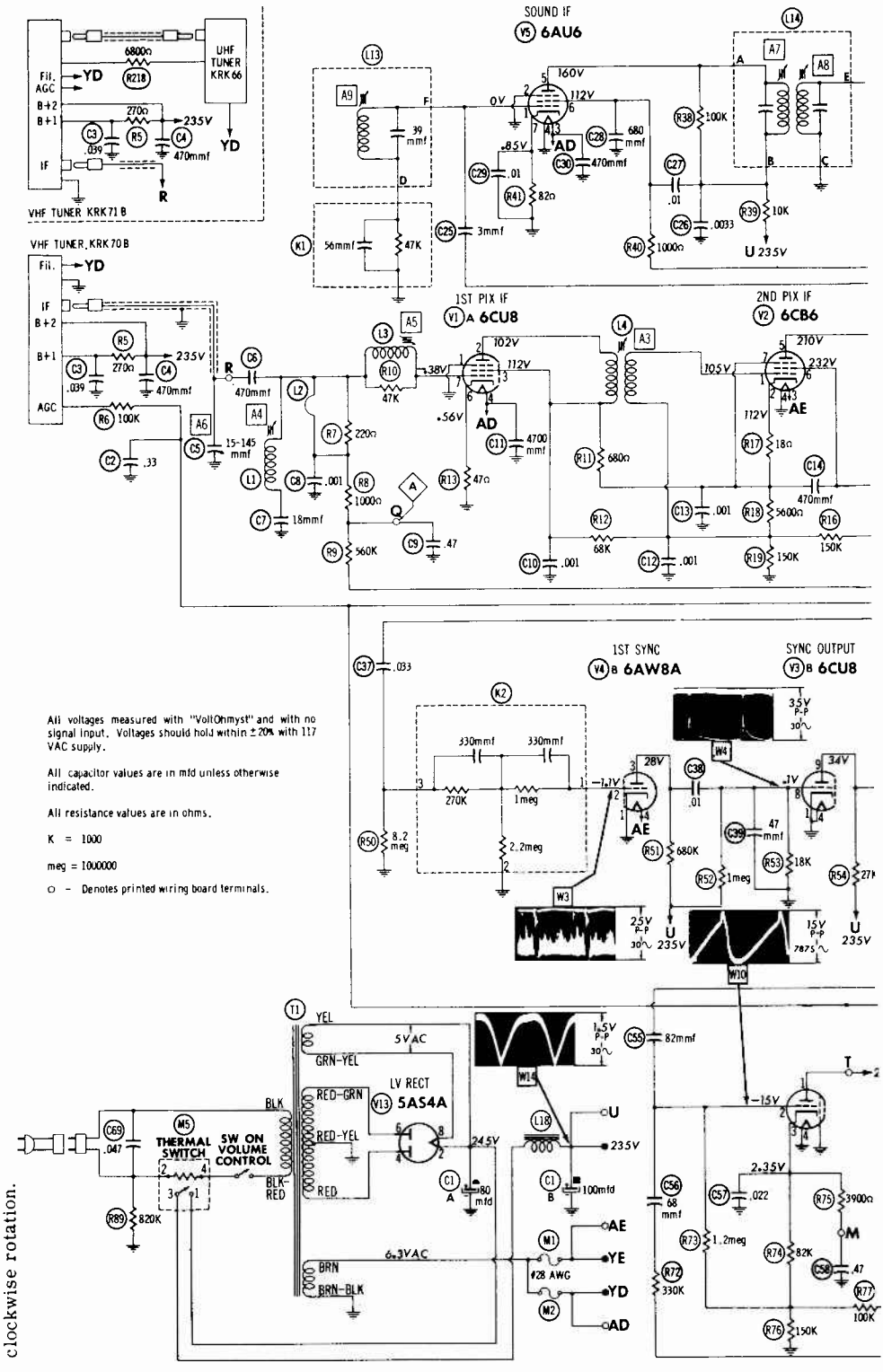


Bottom View



Top View

RCA Victor
Chassis KCS-120A, -B
Schematic Diagram



Adjustment Of Horizontal Oscillator

If in the above check the receiver failed to hold sync over approximately one-quarter of a full turn of counter-clockwise rotation of the control from the full-in point, it will be necessary to make the following adjustments.

Set the sine wave coil adjustment (B2) fully counter-clockwise.

Adjustment of the horizontal frequency control in the counter-clockwise direction will show a multiple numbers of bars before "motorboat" occurs. Adjust B2 until 3 or 4 bars are present before "motorboat" occurs, when the horizontal frequency control is rotated counter-clockwise from the fall out point.

Check Of Horizontal Oscillator Adjustment

Turn the horizontal hold control to the extreme clockwise position. The picture should be out of sync, with approximately eight bars slanting downward to the left. Turn the control counter-clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 1 1/2 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. The picture should remain in sync for approximately one-quarter of a full turn of additional counter-clockwise rotation of the control. Continue counter-clockwise rotation until the picture falls out of sync. Rotation beyond fallout position should produce between 2 and 5 bars before interrupted oscillation (motorboat) occurs. Interrupted oscillation (motorboat) should be reached before full counter-clockwise rotation.

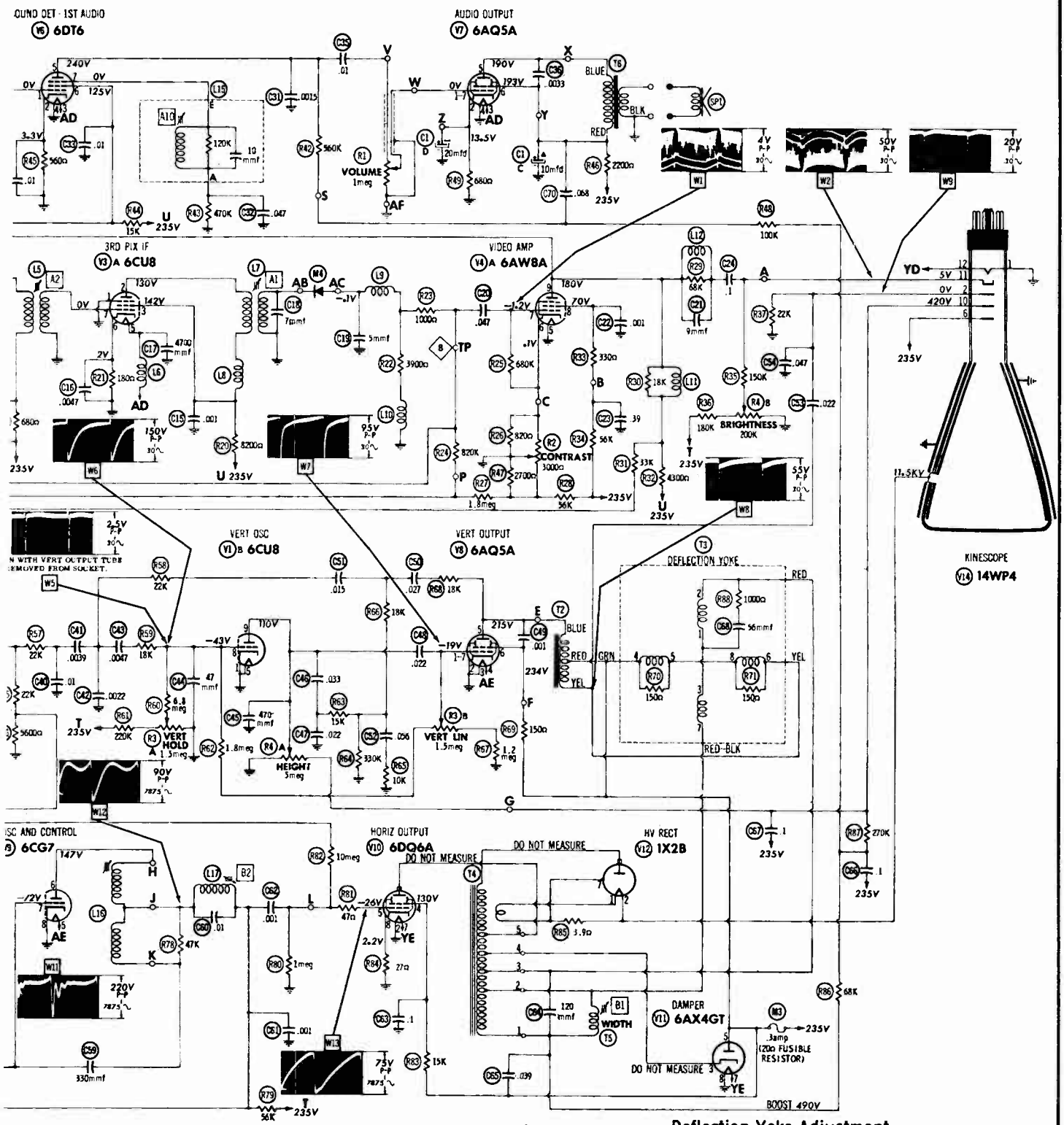
Kinescope And Safety Glass Cleaning

The front safety glass may be removed to allow cleaning of the kinescope faceplate and the safety glass if required. Remove two bottom metal screws holding kinescope mask and gently lift mask bottom first from cabinet.

The kinescope faceplate should be cleaned with a soft cloth and "Windex," or similar cleaning agent.

The safety glass is a plastic material and should be cleaned with a soft cloth and warm, soapy water.

RCA Victor Chassis KCS-120A, KCS-120B, Schematic Diagram

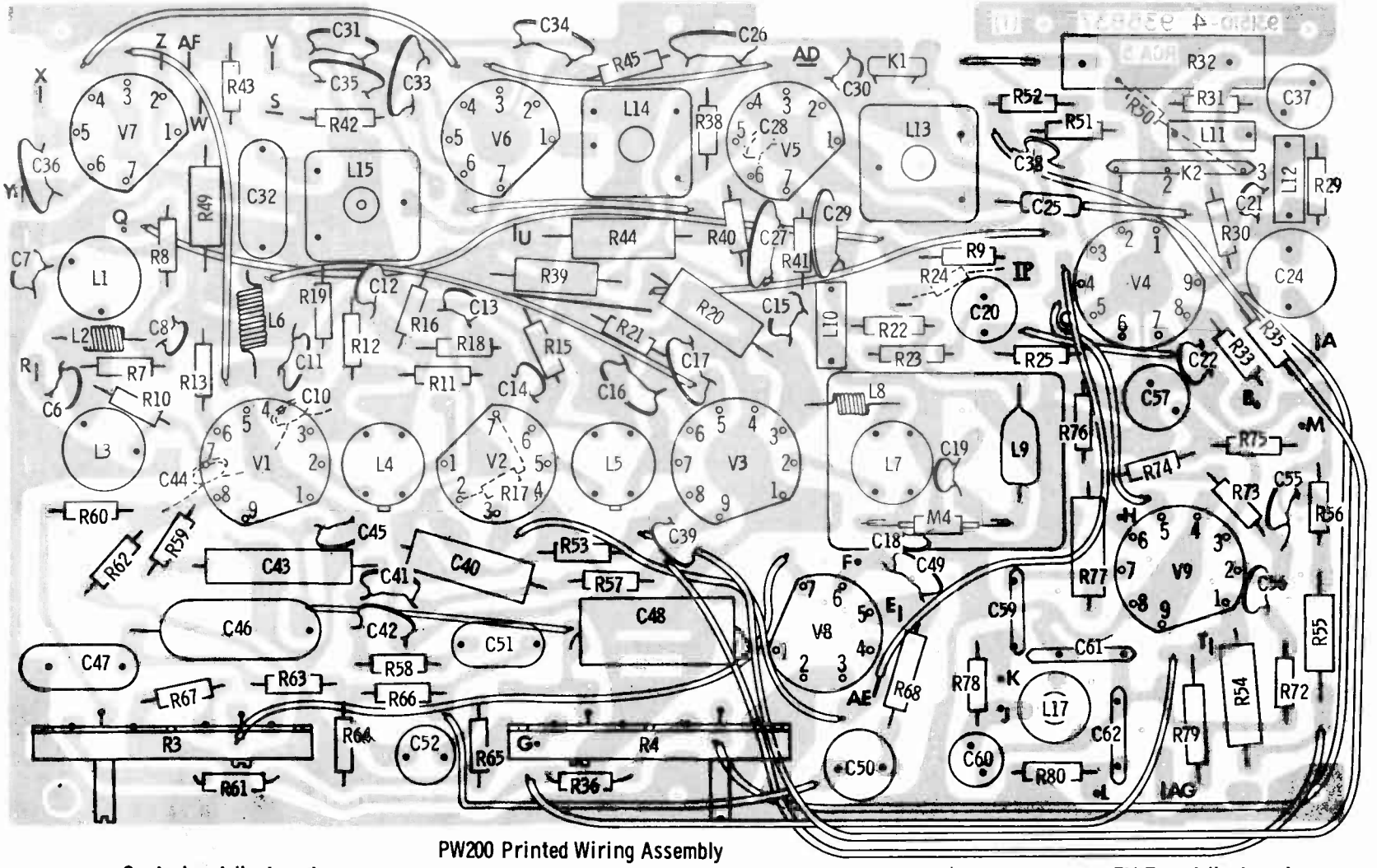


Focus

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

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. The yoke clamp must be loosened to allow the yoke to be rotated. Make sure the yoke assembly is pushed forward against the kinescope bell.



PW200 Printed Wiring Assembly

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.

Height And Vertical Linearity Adjustments

Adjust the height control (R4A) until the picture overscans approximately 5/8" at both top and bottom. Adjust vertical linearity (R3B), until the test pattern is symmetrical from top to bottom.

VHF RF Oscillator Adjustments

Tune in all available stations to insure that the receiver RF oscillator is adjusted to the proper frequency on all channels. If adjustments are required, these should be made by the method outlined in the alignment procedure.

Adjustments for channels 2 through 12 are available through the holes on the front of the tuner. Adjustment for channel 13 is on top of the tuner chassis.

FM Trap Adjustment

In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the FM trap for minimum interference in the picture. The trap is part of L201 and is located on the rear of the antenna matching unit.

CAUTION. In some receivers, the FM trap will tune down into channel 6 or even into channel 5. If channels 5 or 6 are to be received, check the trap to make sure that adjustment does not affect sensitivity on the these two channels.

RCA VICTOR

CHASSIS NOS.

KCS121A, B, C, D, E, F, H, J, K, L, M, N, P & R

TELEVISION RECEIVERS — MODELS

21-D-9182 & U, 21-D-9185 & U 21-D-9187 & U, 21-D-9195 & U 21-D-9197 & U, 21-D-9475 & U 21-D-9477 & U, 21-D-9495 & U 21-D-9496 & U, 21-D-9497 & U 21-D-9516 & U, 21-D-9530 & U 21-D-9534 & U, 21-RD-9675 & U 21-RD-9676 & U, 21-RD-9677 & U 21-RD-9690 & U, 21-RD-9699 & U 21-T-9375 & U, 21-T-9376 & U 21-T-9377 & U, 21-T-9378 & U

CHASSIS DESIGNATIONS

CHASSIS	TUNER ASSEMBLY	TUNER Sub-assemblies	MODELS
KCS121A	KRK79E	KRK72D	21-D-9195 21-D-9197
KCS121B	KRK79F	KRK73D KRK66A	21-D-9195U 21-D-9197U
KCS121C	KRK78T	KRK72B	21-T-9375-6 21-T-9377-8
KCS121D	KRK78U	KRK73B KRK66A	21-T-9375U-6U 21-T-9377U-8U
KCS121E	KRK78P	KRK72E	21-D-9475-7 21-D-9516
KCS121F	KRK78R	KRK73E KRK66A	21-D-9475U-7U 21-D-9516U
KCS121H	KRK78C	KRK72C	21-D-9495-6-7 21-D-9530-4
KCS121J	KRK78D	KRK73C KRK66A	21-D-9495U-6U-7U 21-D-9530U-4U
KCS121K	KRK78K	KRK72F	*21-RD-9675-6 *21-RD-9677
KCS121L	KRK78L	KRK73F KRK66A	*21-RD-9675U-6U *21-RD-9677U
KCS121M	KRK78M	KRK72F	*21-RD-9690 *21-RD-9699
KCS121N	KRK78N	KRK73F KRK66A	*21-RD-9690U *21-RD-9699U
KCS121P	KRK81A	KRK46T	21-D-9182 21-D-9185 21-D-9187
KCS121R	KRK81B	KRK47T KRK66A	21-D-9182U 21-D-9185U 21-D-9187U

*These models also incorporate a KRK83A Remote Control Receiver Chassis and a KRK84A Remote Control Transmitter Assembly.

(Material on pages 141 through 148)

CHECK OF HORIZONTAL OSCILLATOR ADJUSTMENT

Turn the horizontal hold control to the extreme clockwise position. The picture should be out of sync, with approximately eight bars slanting downward to the left. Turn the control counter-clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 1½ to 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional counter-clockwise rotation of the control. The picture should remain in sync for approximately one quarter of a full turn of additional counter-clockwise rotation of the control. Continue counter-clockwise rotation until the picture falls out of sync. Rotation beyond fall out position should produce between 2 and 5 bars before interrupted oscillator "motorboat" occurs. Interrupted oscillation "motorboat" should be reached before full counter-clockwise rotation.

When the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned. Skip "Adjustment of Horizontal Oscillator" and proceed with "Centering Adjustment."

ADJUSTMENT OF HORIZONTAL OSCILLATOR

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

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

Set the sine wave coil L601 fully counter-clockwise.

Adjustment of the horizontal hold control in the counter-clockwise direction will show a multiple number of bars before "motorboat" occurs. Adjust the sine wave coil L601 until 3 or 4 bars are present before "motorboat" occurs, when the horizontal hold control is rotated counter-clockwise from the fall out point.

CENTERING ADJUSTMENT

The electrostatic focus kinescope is provided with special centering magnets. These magnets are in the form of two discs mounted on the back of the deflection yoke. When the magnets are rotated so that the levers are together, maximum centering effect is produced. To shift the picture, rotate one of the magnets with respect to the other. To shift the picture in the desired direction rotate both magnets simultaneously in the same direction on the neck of the kinescope. 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.

WIDTH AND DRIVE ADJUSTMENTS

Set the horizontal control at the "pull-in" point. Adjustment of the horizontal drive control affects the high voltage applied to the kinescope. In order to obtain the highest possible voltage hence the brightest and best focused picture, set the width coil maximum counter-clockwise and adjust horizontal drive trimmer counter-clockwise until a bright vertical line appears in the middle of the picture, then clockwise until the bright line just disappears. If no line appears set the drive trimmer at maximum counter-clockwise position.

At normal brightness adjust the width coil L102 to obtain ¾" overscan at each side with normal line voltage.

Readjust the drive trimmer C109 as was done previously.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENTS

Adjust the height control (R107 on chassis rear) until the picture overscans approximately ⅝" at both top and bottom. Adjust vertical linearity (R112 on chassis rear) until the test pattern is symmetrical from top to bottom. Adjustment of either control will require a readjustment of the other. Adjust centering to align the picture with the mask.

RCA Victor

21-D-9182 & U to 21-RD-9699 & U Incl.
21-T-9375 & U to 21-T-9378 & U Incl.

AGC AND NOISE LIMITER CONTROLS

To check the adjustment of these controls, 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 adjustment. If the picture bends at all, readjustment should be made.

Turn the Noise Limiter control R140 fully clockwise.

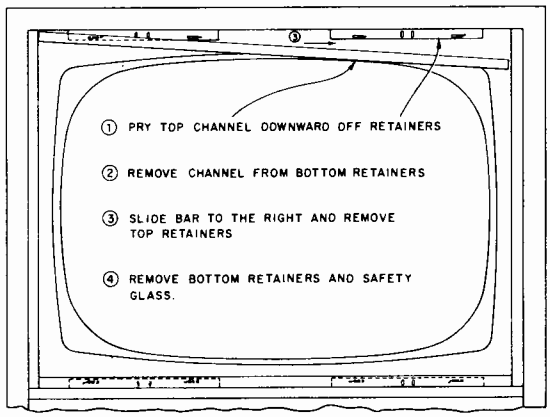
Adjust the AGC control slowly clockwise for a slight bend in the picture, then turn the control counter-clockwise approximately ¼ turn (90°) from this point.

Adjust the fine tuning control until the 4.5 mc. beat is just perceptible in the picture. Readjust the AGC control for start of picture bend, then counter-clockwise 45° from this point.

Set the horizontal hold control as far counter-clockwise as possible (toward motorboat condition) without sync becoming unstable.

Turn the Noise Limiter control counter-clockwise until a horizontal bend or shift in position is visible in the picture, then clockwise about 30° past the point where the bend just disappears. In noisy locations set 15° from point of bend.

Return the horizontal hold control to the center of its holding range.



Safety Glass Removal

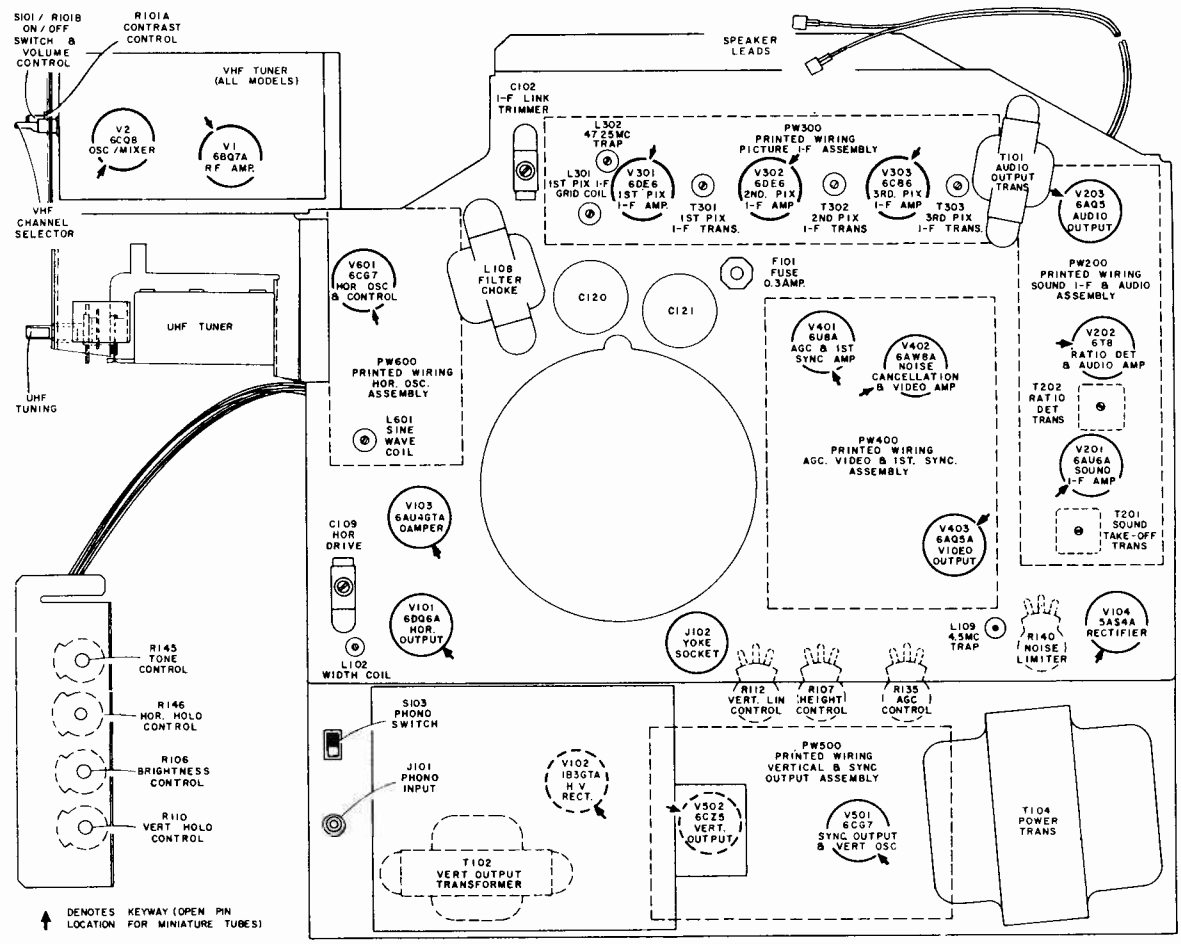
CHASSIS REMOVAL

To remove the chassis from the cabinet for repair, remove the cabinet back, unplug the speaker cable, the antenna cable, the pilot lamp, the kinescope socket, and the yoke. On all models except 21-D-9182, 5, 7 & U remove the "on-off" volume and contrast control knobs and remove the screws holding the "on-off"/volume/contrast control mounting bracket.

Remove the knobs from the controls in the control case or at the receiver front on Models 21-D-9195, 7 & U and remove the screws holding the control bracket. Unplug the I-F link cable and the tuner power plug.

Remove the two nuts at the top of the chassis and the two screws at the bottom. Move chassis out slightly to enable the H.V. lead to be disconnected from the kinescope. Clear all wires from lances and retaining springs. Remove chassis from cabinet.

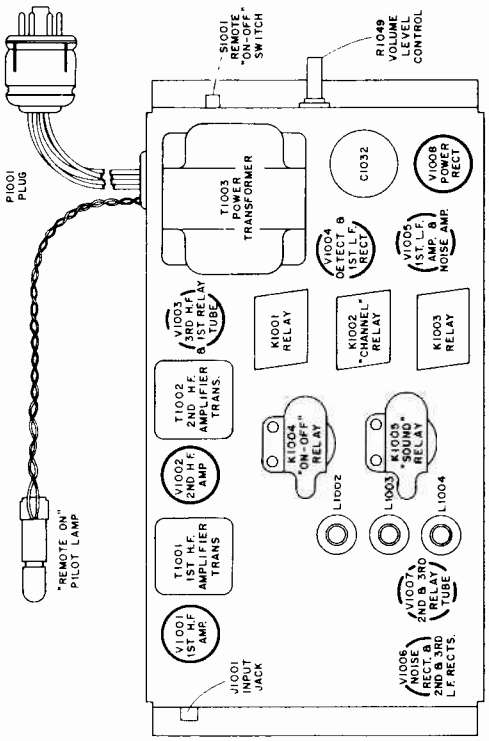
If it is necessary to remove the tuner assembly, remove the nuts holding the tuner mounting plate to the cabinet. The tuner and control brackets may be fastened to the chassis for transporting.



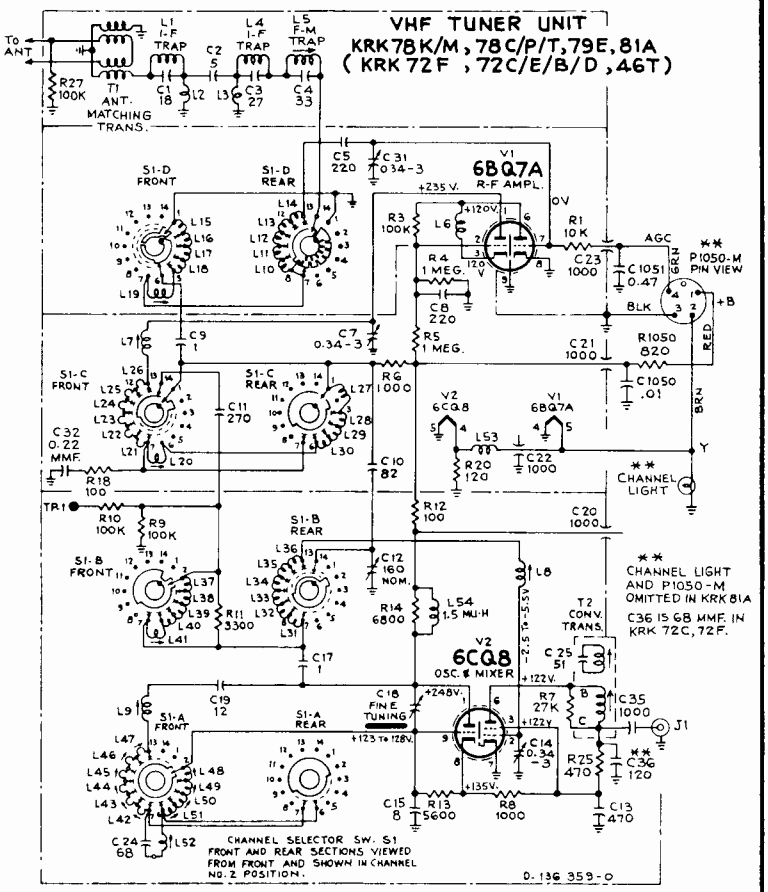
Chassis Rear View

RCA Victor

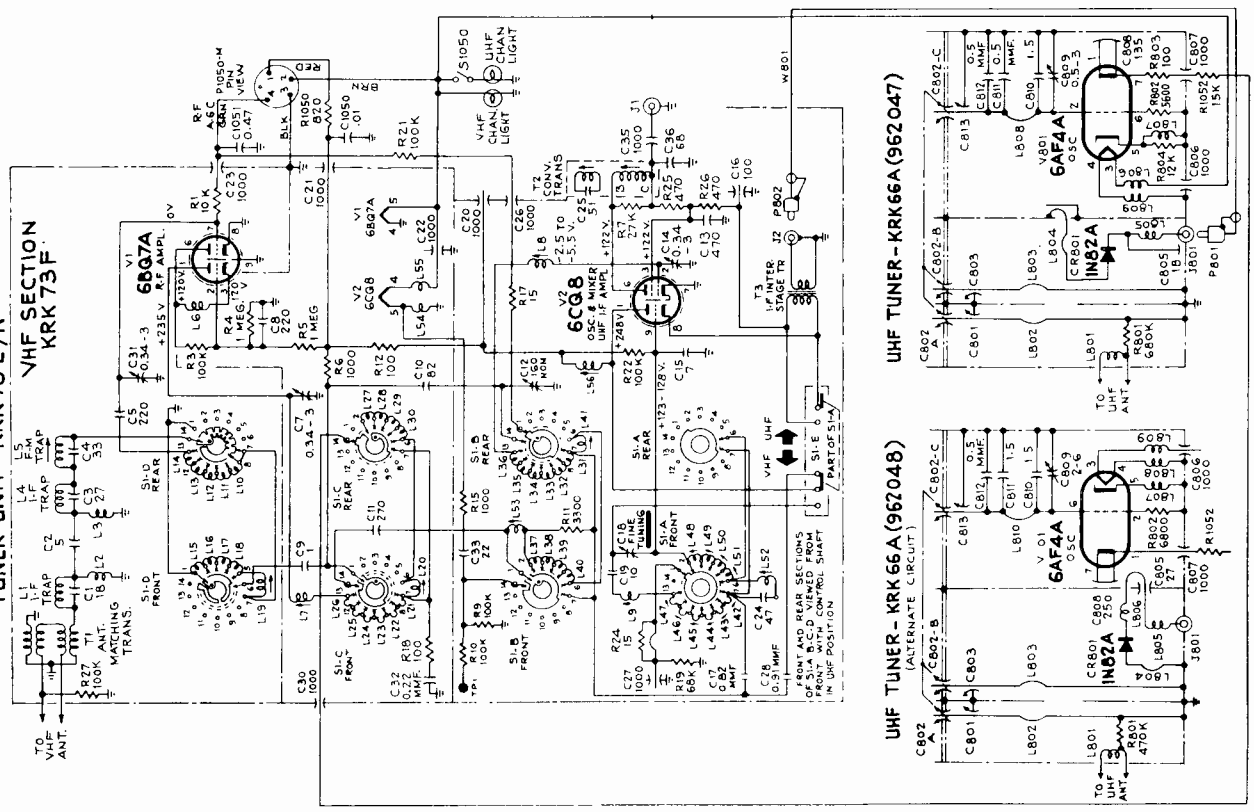
21-D-9182 & U to 21-RD-9699 & U Incl.
21-T-9375 & U to 21-T-9378 & U Incl.



Remote Control Receiver Chassis—KRK83A

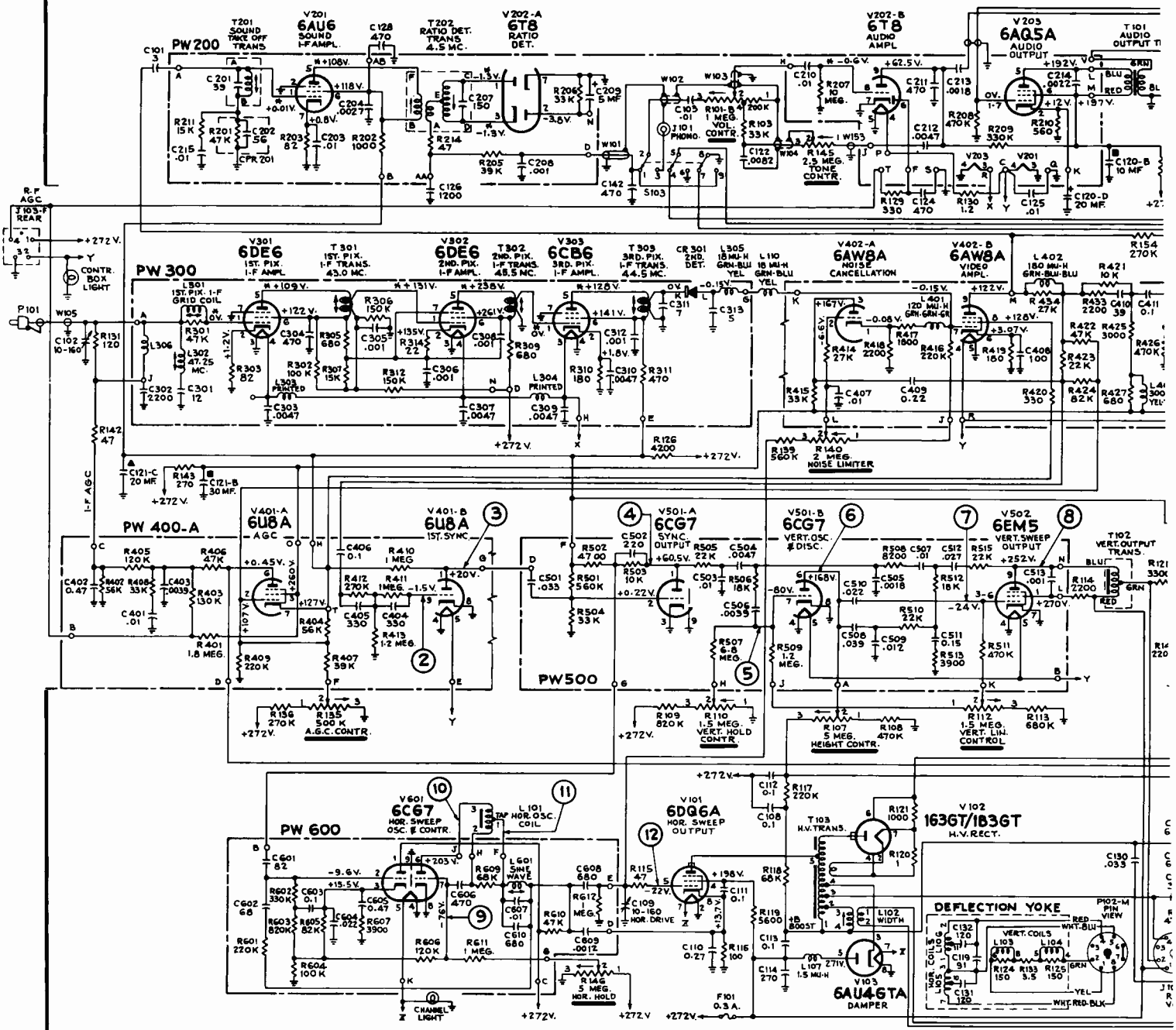


VHF TUNER SCHEMATIC DIAGRAM



Tuners used with Chassis KCS-121B, -D, -F, -J, -L, -N, -R. Main schematic on page 144.

RCA Victor Chassis KCS-121K, -L, -M, -N, Schematic Diagram



Regular type Chassis KCS-121A, -B, -C, -D, -E, -F, -H, -J, -P, -R, are practically identical except for the remote control feature. Tuner diagrams are printed on page 143.

REMOTE CONTROL TRANSMITTER CHASSIS AND PUSHBUTTON REMOVAL

Chassis Removal—Remove the end plate from the transmitter case. Turn and remove the two battery retainers and unplug the battery. Take out the two Phillips head screws holding the chassis and push the chassis forward to remove.

Pushbutton Removal—The "Channel" and "Sound" pushbuttons must be removed first by pulling outward. This will expose the side of the inner "Off-On" button. Loosen the Allen set screw at the side of the button and pull the button outward. Repeat the same procedure for the outer "Off-On" button.

All resistance value in ohms. K = 1000.

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

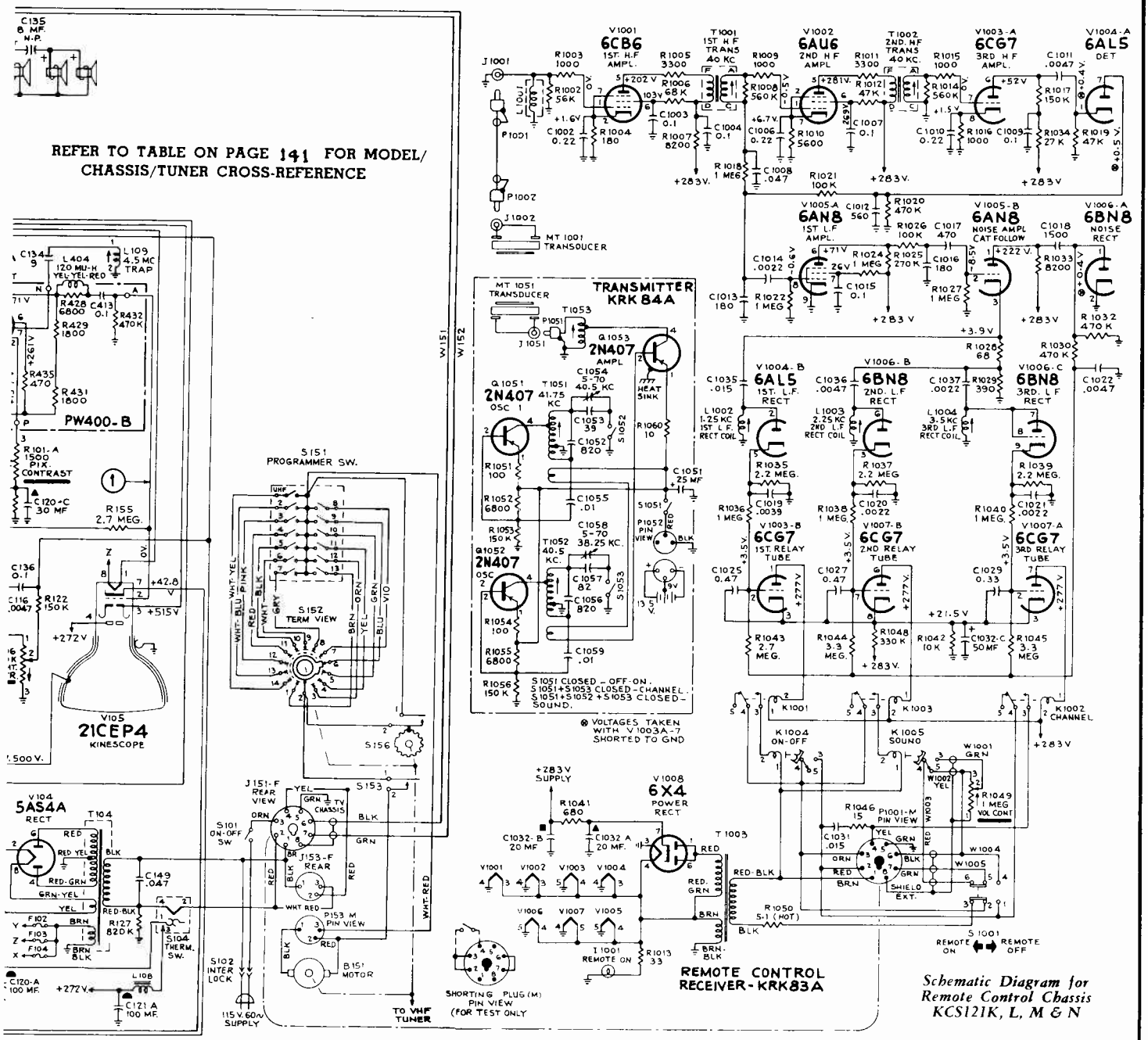
Direction of arrows at controls indicates clockwise rotation.

All voltages measured with "Volt-Ohmyst" and with no signal input. Voltages should hold within ±20% with 117 v. a-c supply.

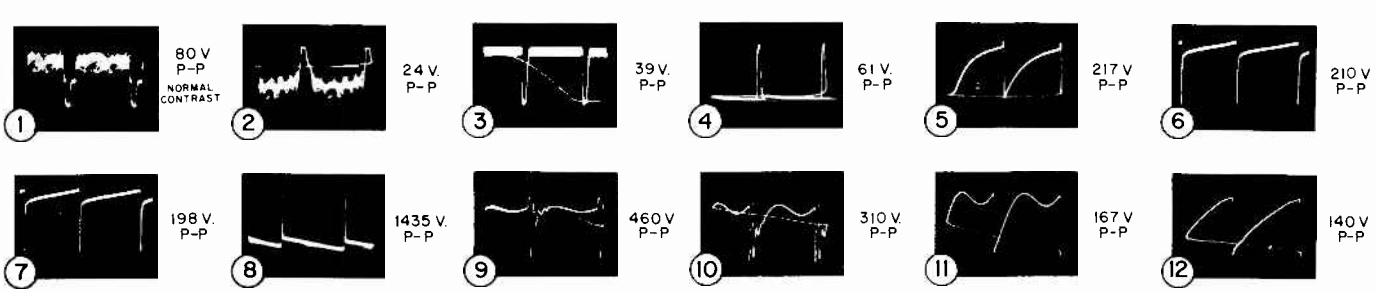
*Measured with 1 megohm, ½ watt resistor in series with meter probe.

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

RCA Victor Chassis KCS-121K, -L, -M, -N, Schematic Diagram



Schematic Diagram for Remote Control Chassis KCS121K, L, M & N



RCA Victor

21-D-9182 & U to 21-RD-9699 & U Incl.
21-T-9375 & U to 21-T-9378 & U Incl.

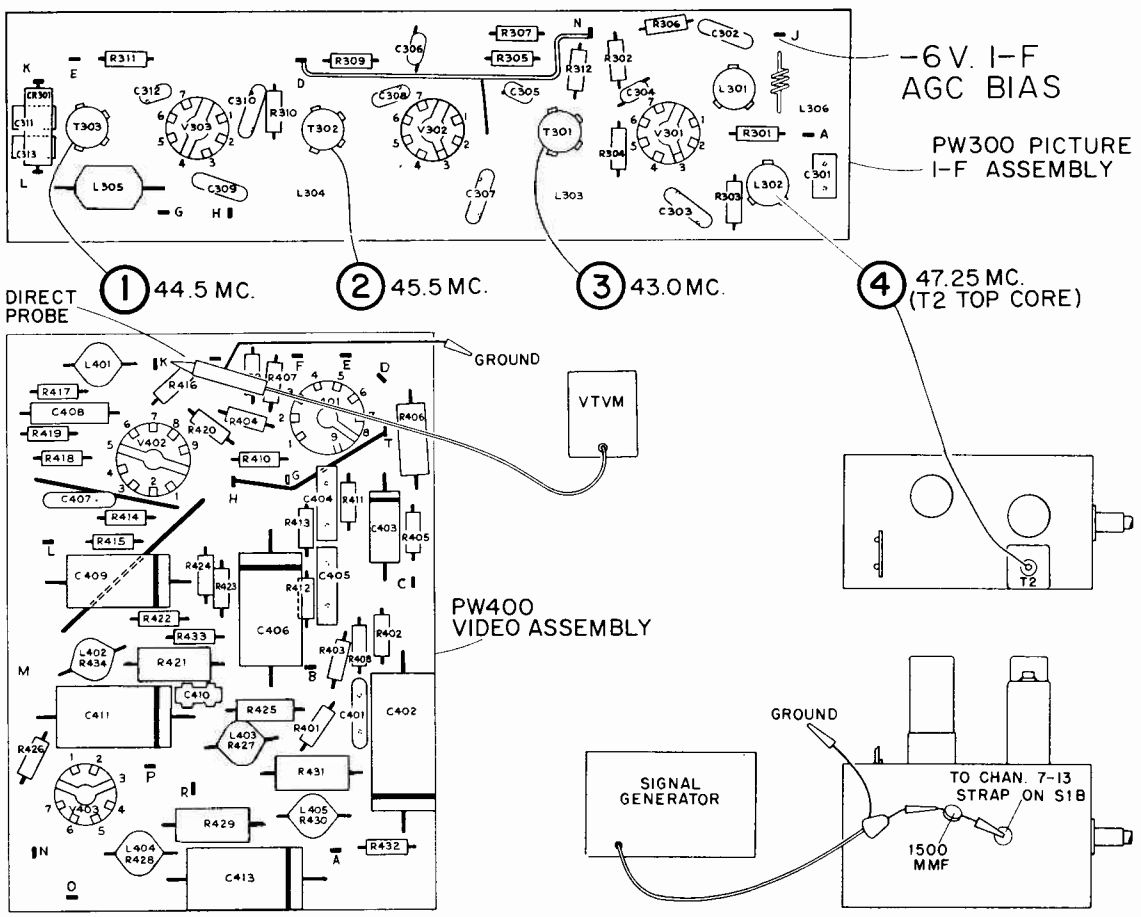
ALIGNMENT PROCEDURE

PICTURE I-F TRANSFORMER AND TRAP ADJUSTMENTS

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY . . . . . Apply —6 volts to I-F AGC bus at terminal "J" of PW300. Ground positive lead to chassis.
SIGNAL GENERATOR . . . . . Connect to mixer grid at strap on S1B, in series with 1500 mmf. capacitor (see below).
VACUUM TUBE VOLTMETER . . . . Connect to 2nd Detector output at terminal "A" of PW400 using direct probe. Ground lead connected to chassis.

STEP		SIGNAL GENERATOR	ADJUST	REMARKS
1	Peak 3rd pix. I-F transformer	44.5 mc.	T303	Peak T303, T302 & T301 on frequency for maximum output on meter. Adjust generator output for 3 volts on meter when finally peaked.
2	Peak 2nd pix. I-F transformer	45.5 mc.	T302	
3	Peak 1st pix. I-F transformer	43.0 mc.	T301	
4	Adjust 47.25 mc. traps	47.25 mc.	L302 & T2 (top core)	Minimum output indication on meter.



Picture I-F Transformer and Trap Adjustments

RCA Victor

21-D-9182 & U to 21-RD-9699 & U Incl.
21-T-9375 & U to 21-T-9378 & U Incl.

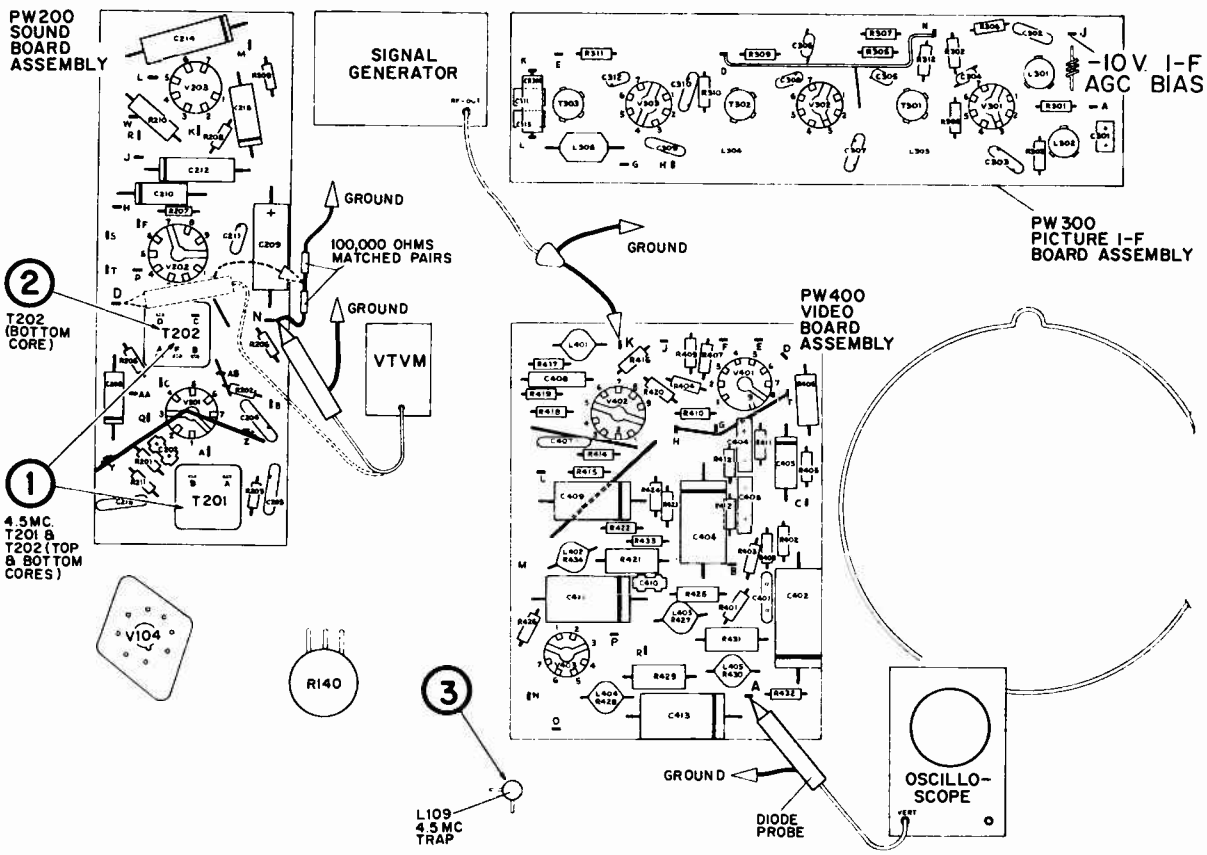
ALIGNMENT PROCEDURE

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

TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY ..... Apply —10 volts bias to I-F AGC, terminal "J" of PW300.
OSCILLOSCOPE ..... Connect to terminal "A" on PW400 at the kinescope grid, using the diode probe.
SIGNAL GENERATOR ..... Connect to Video Detector output at terminal "K" of PW400.
VACUUM TUBE VOLTMETER ... Connect to terminal "N" of PW200.
MISCELLANEOUS ..... Connect a matched pair of 100,000 ohm resistors in series from terminal "N" of PW200 to ground.

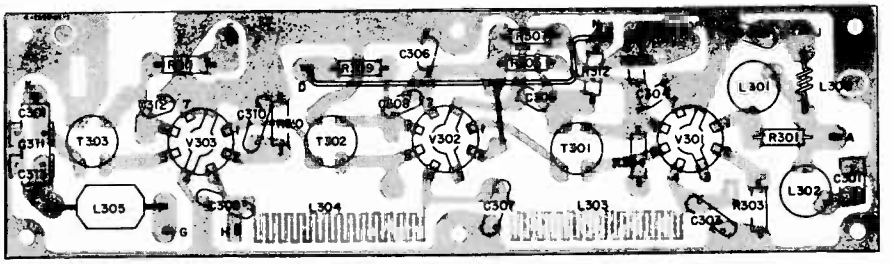
STEP		SIGNAL GENERATOR	ADJUST	REMARKS
1	Adjust Ratio Detector Trans. & Sound Take-off	4.5 mc.	T202 (Top & bottom cores) & T201	Adjust T202 (top & bottom core) & T201 for maximum reading on VTVM. Set generator for 10 to 12 volts on VTVM.
Move VTVM to terminal "D" of PW200, with ground lead to junction of 100,000 ohm resistors. (See illustration below.)				
2	Adjust Ratio Detector Trans. Secondary	4.5 mc.	T202 (Bottom core)	Adjust T202 (bottom core) for zero reading on VTVM.
Repeat steps 1 and 2 until proper results are obtained.				
*3	Adjust 4.5 mc. Trap	4.5 mc. (Modulate 30% with 400 cycles)	L109	Adjust L109 for minimum 400 cycle output indication on the oscilloscope. Set contrast control full clockwise.
*Step 3 may be performed "on the air" using a transmitted signal if desired. Observe picture on kinescope for 4.5 mc. beat, set fine tuning to exaggerate beat, then tune L109 for minimum beat pattern with contrast fully clockwise.				



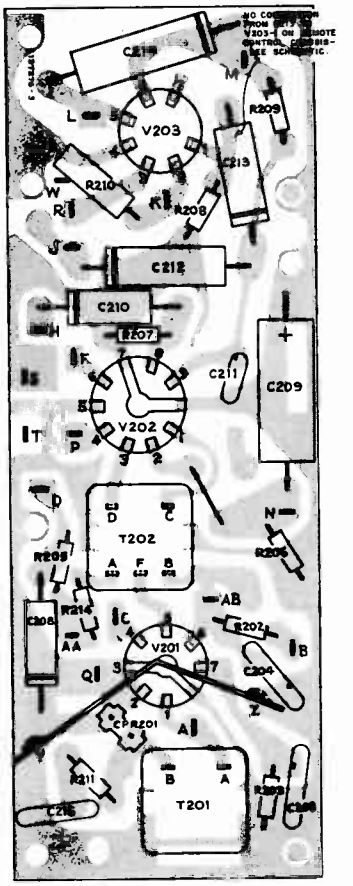
Sound I-F, Ratio Detector and 4.5 mc. Trap Alignment

RCA Victor Printing Wiring Assemblies

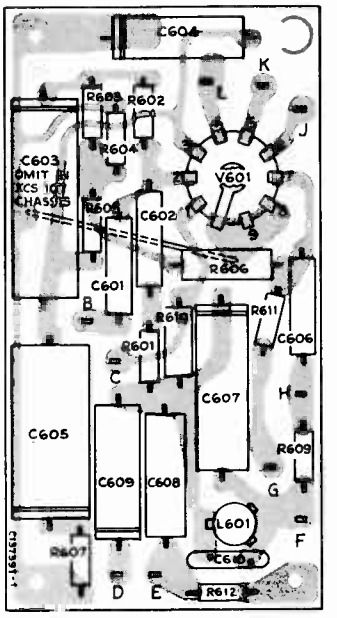
21-D-9182 & U to 21-RD-9699 & U Incl.
21-T-9375 & U to 21-T-9378 & U Incl.



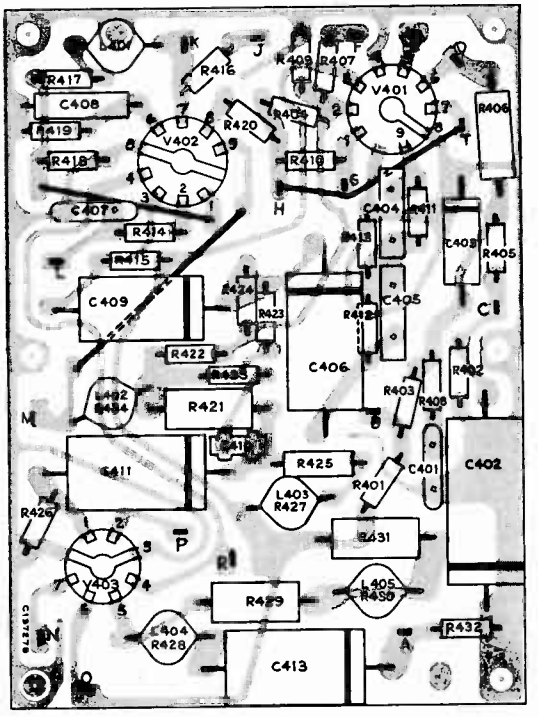
PW300 Picture I-F Assembly Layout



PW200 Sound I-F and Audio Assembly Layout



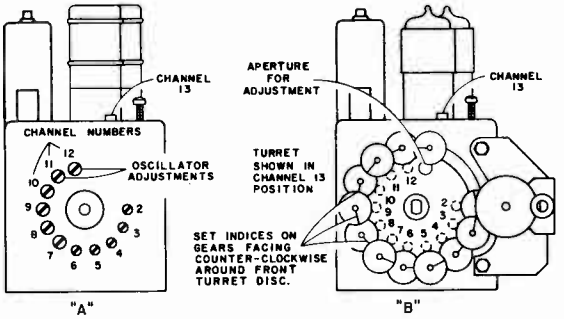
PW600 Horizontal Oscillator Assembly Layout



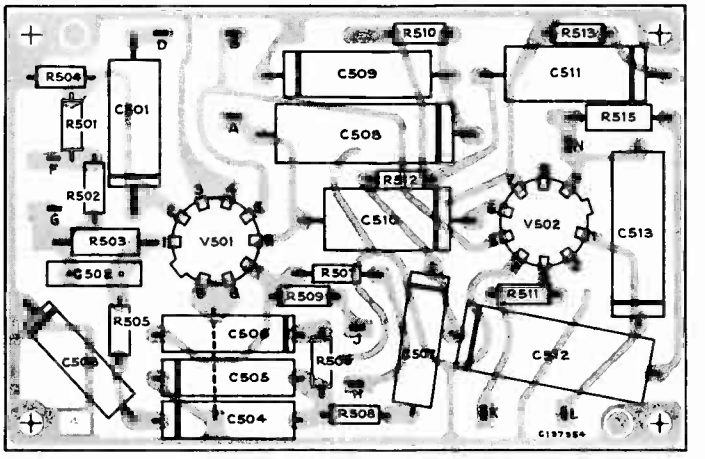
PW400 Video, 1st Sync and AGC Assembly Layout

The assemblies represented above are viewed from the component side of the boards and are oriented as they will usually be viewed on the chassis.

The printed wiring, on the reverse side of the boards, is presented in "phantom" views superimposed on the component layouts. This will enable circuit tracing without removing the assemblies from the chassis to see the printed wiring on the reverse side.



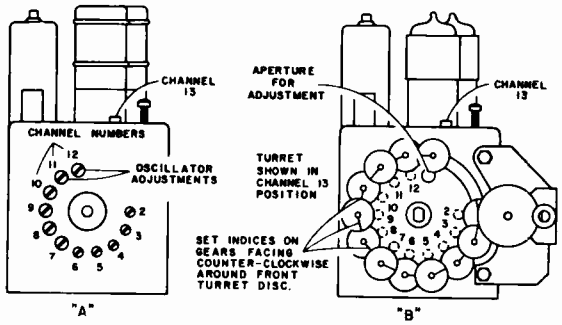
VHF Oscillator Adjustments



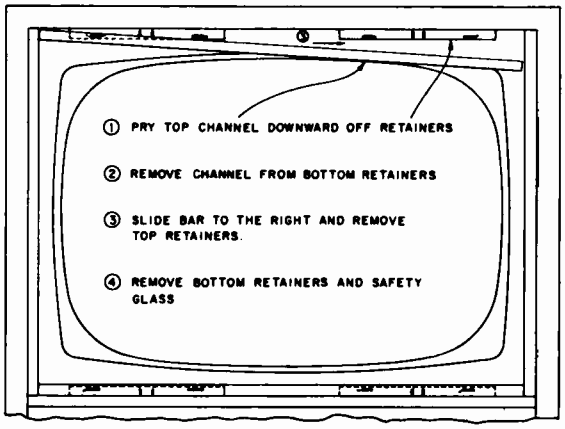
PW500 Vertical and Sync Output Assembly Layout

FM TRAP ADJUSTMENT

In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the FM trap for minimum interference in the picture. The trap is L5 on all tuners and is located on the rear of the antenna matching transformer assembly.



VHF Oscillator Adjustments



Safety Glass Removal

WIDTH AND DRIVE ADJUSTMENTS

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

At normal brightness adjust the width control L102 to obtain ¾" overscan at each side with normal line voltage.

Readjust the drive trimmer C109.

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 R135. If the picture requires an appreciable portion of a second to reappear, or bends excessively, R135 should be readjusted.

Turn R135 fully counter-clockwise. The raster may be bent slightly. This should be disregarded. Turn R135 clockwise until there is a very slight bend or change of bend in the picture. Then turn R135 counter-clockwise just sufficiently to remove this bend or change of bend.

If the signal is weak, the above method may not work as it may be impossible to get the picture to bend. In this case, turn R135 clockwise until the snow in the picture becomes more pronounced, then counter-clockwise until the best signal to noise ratio is obtained.

The AGC control adjustment should be made on as strong a signal as possible. If the control is set too far clockwise on a weak signal, then the receiver may overload when a strong signal is received.

FM TRAP ADJUSTMENT

In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the FM trap for minimum interference in the picture. The trap is L5 on all tuners and is located on the rear of the antenna matching transformer assembly.

RCA VICTOR

TELEVISION RECEIVERS — MODELS

21-RT-9632-5-7 & U
21-RT-9655-6-7 & U, 21-T-9132-5-7 & U
21-T-9152-5-6-7 & U, 21-T-9215-6-7 & U
21-T-9225-6-7-5M-6M-7M-U & MU
21-T-9235-6-7-8-5M-6M-7M-8M-U & MU
21-T-9255-6-7-8-5M-6M-7M-8M-U & MU
21-T-9315-6-7-8 & U, 21-T-9335-7-9 & U
21-T-9355-6-7 & U, 21-T-9396-7-9 & U
21-T-9415-7 & U, 21-T-9435-6-7 & U

CHASSIS NOS.

KCS122E, F, H, J, P, R, BA, BB, BC, BD, BE, BF, BH, BJ, BK, BL, BM, BN, BP, BR, BW, BAA, BAB, BAC, BAD, BAE, BAF & BAH

Service material on these sets printed on pages 149 through 152. Remote control models use a circuit similar to the one shown except for remote control feature which is also used in circuit on page 145.

CHASSIS REMOVAL

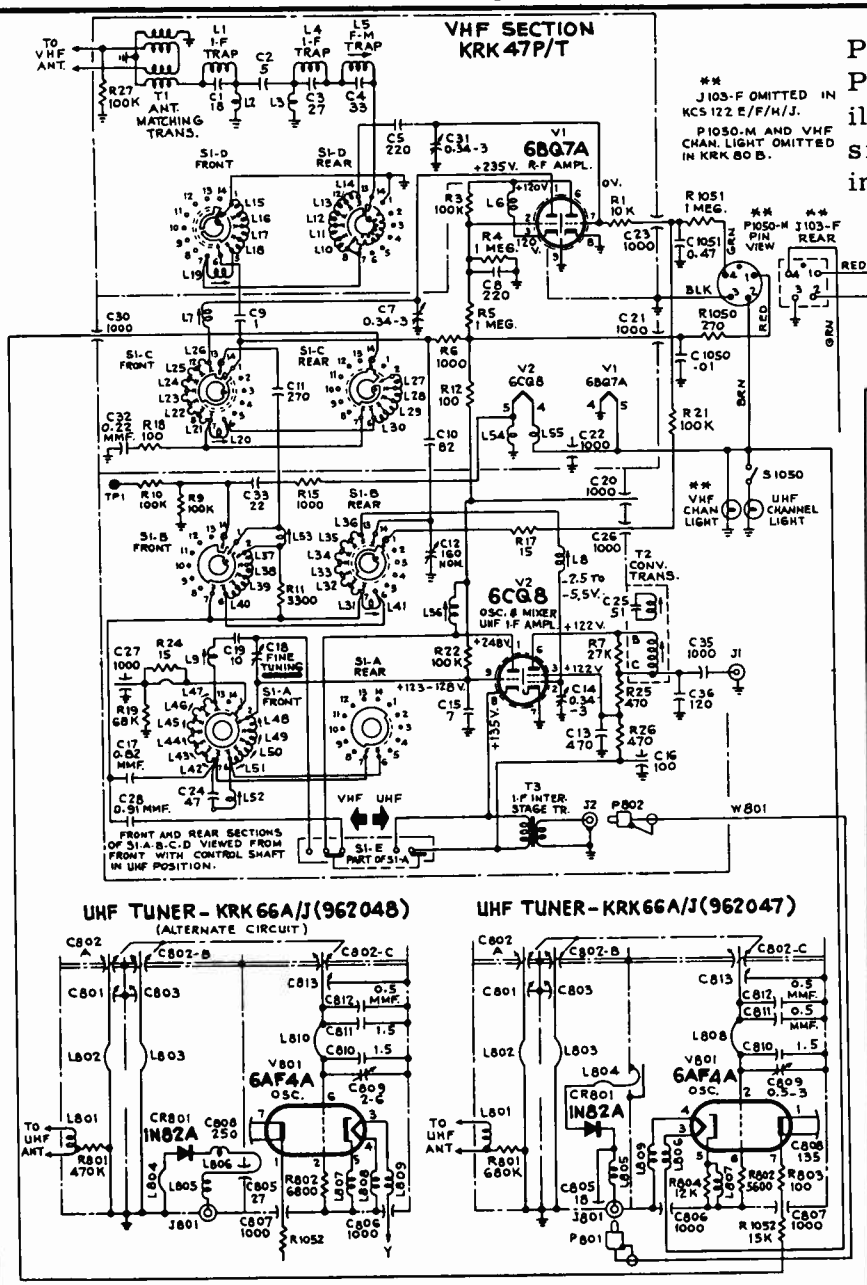
To remove the chassis from the cabinet for repair, remove the cabinet back, unplug the speaker cable, the antenna cable, the pilot lamp, the kinescope socket, and the yoke. Remove the "on-off" volume and contrast control knobs and remove the screws holding the "on-off"/volume/contrast control (except models with control mounted on chassis).

Remove the knobs from the controls in the control case and remove the screws holding the control bracket to the control case. Unplug the I-F link cable and the tuner power plug.

Remove the nuts at the top of the chassis and the screws at the bottom. Move chassis out slightly to enable the H.V. lead to be disconnected from the kinescope. Clear all wires from lances and retaining springs. Remove chassis from cabinet.

If it is necessary to remove the tuner assembly on models with tuner detached from chassis, remove the nuts holding the tuner mounting plate to the cabinet. The tuner and control brackets may be fastened to the chassis for transporting.

TUNER UNIT KRK79D, 80B



UHF TUNER - KRK66A/J(962048)
(ALTERNATE CIRCUIT)

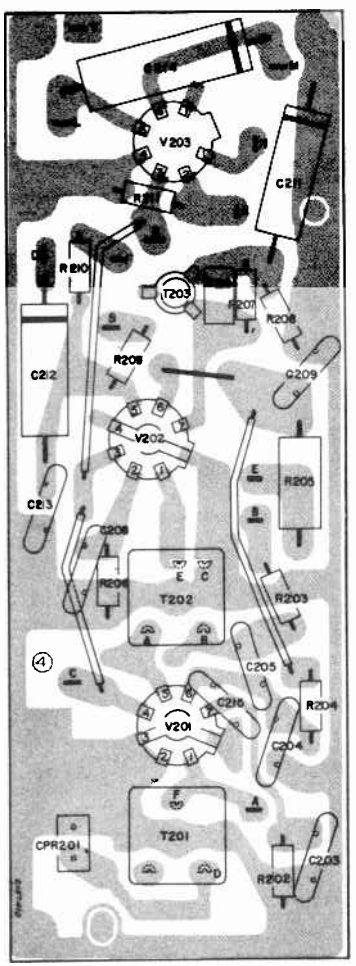
UHF TUNER - KRK66A/J(962047)

Circuits of tuners used with Chassis KCS-122E, F, H, -J, P, R. Circuits of tuners used with other KCS-122+ chassis are similar to VHF tuners shown on page 143.

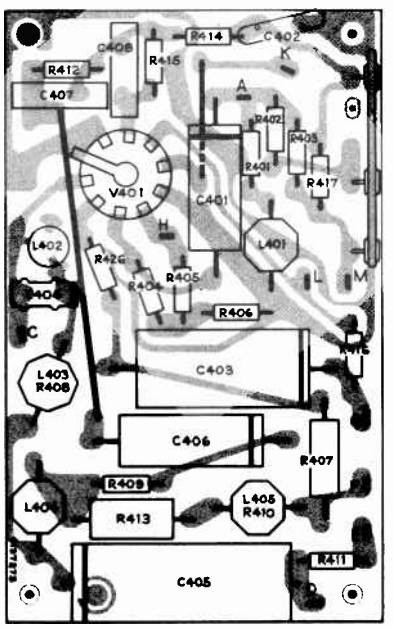
Printed wiring assemblies PW300 and PW500 are illustrated on page 148, since they are also used in other chassis.

The assemblies represented above are viewed from the component side of the boards and are oriented as they will usually be viewed on the chassis.

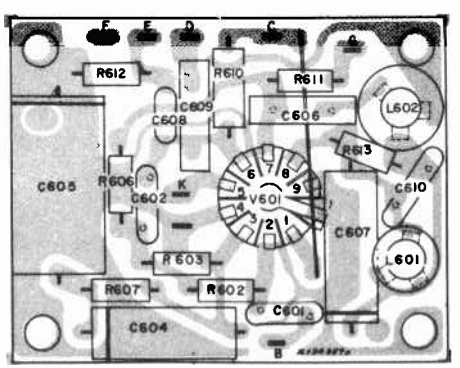
The printed wiring, on the reverse side of the boards, is presented in "phantom" views superimposed on the component layouts. This will enable circuit tracing without removing the assemblies from the chassis to see the printed wiring on the reverse side.



PW200 Sound I-F & Audio Assembly Layout



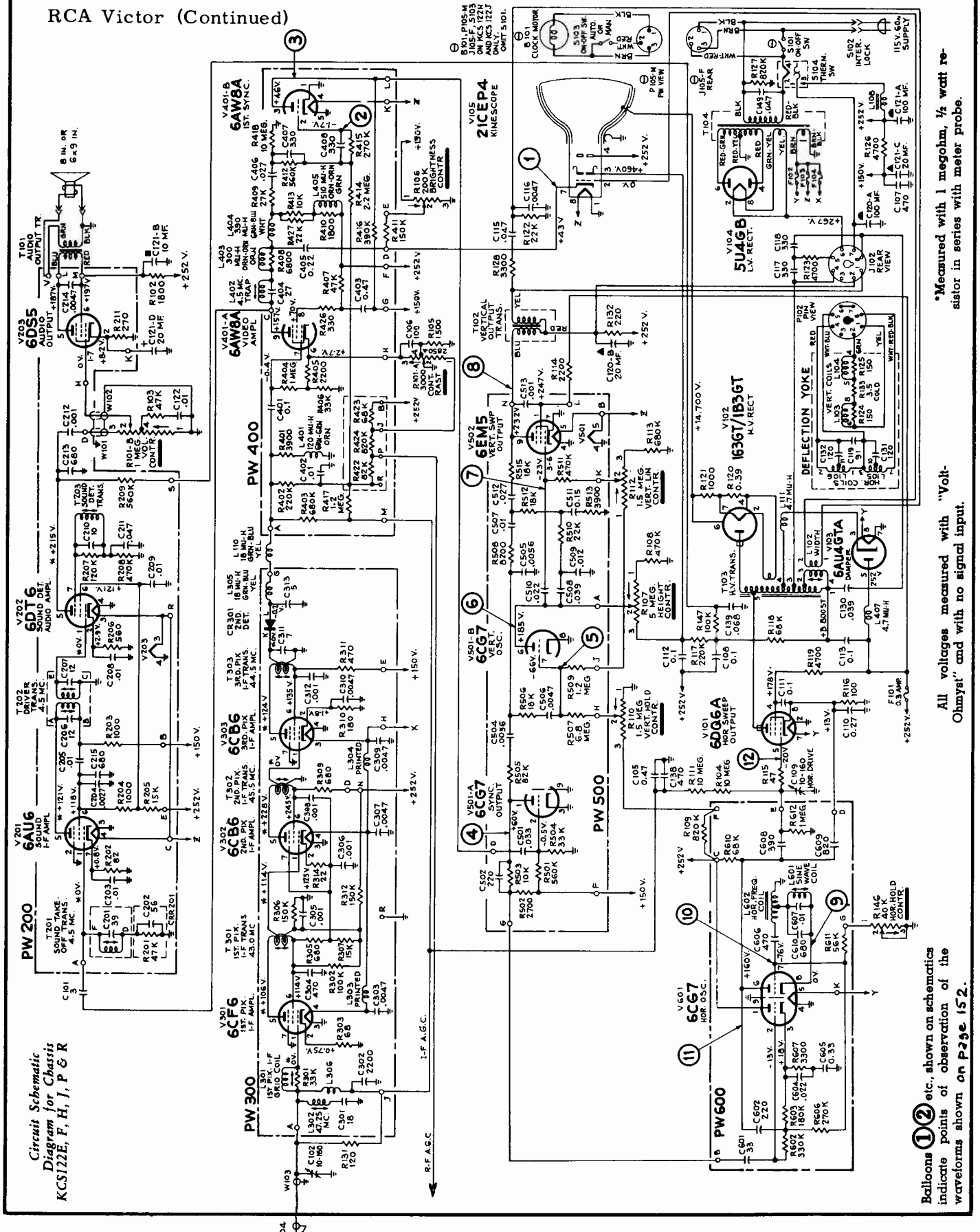
PW400 Video & Sync Assembly Layout KCS122E, F, H, J, P & R only



PW600 Horizontal Oscillator Assembly Layout

CIRCUIT SCHEMATIC DIAGRAM KCS122E, F, H, I, P & R CHASSIS

RCA Victor (Continued)



Circuit Schematic Diagram for Chassis KCS122E, F, H, I, P & R

Balloons ① ② etc., shown on schematics indicate points of observation of the waveforms shown on page 152.

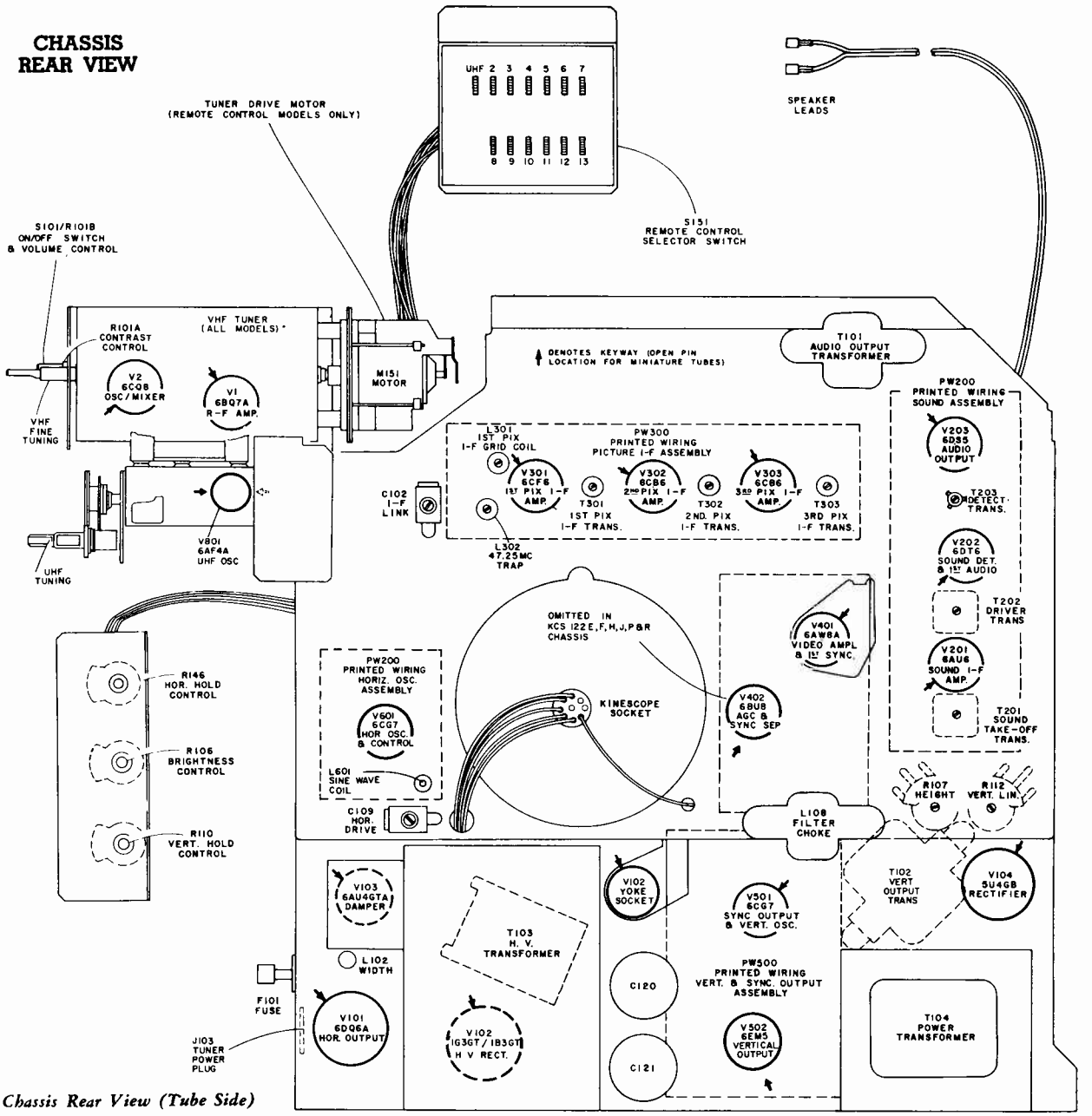
All voltages measured with "Volt-Ohmyst" and with no signal input.

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

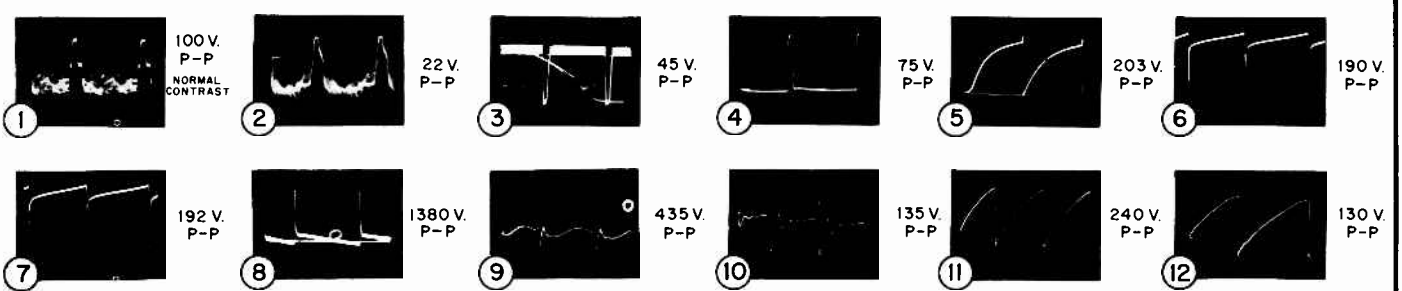
RCA Victor (Continued)

21-RT-9632 & U to 21-RT-9657 & U Incl.
21-T-9132 & U to 21-T-9437 & U Incl.

CHASSIS REAR VIEW



Chassis Rear View (Tube Side)

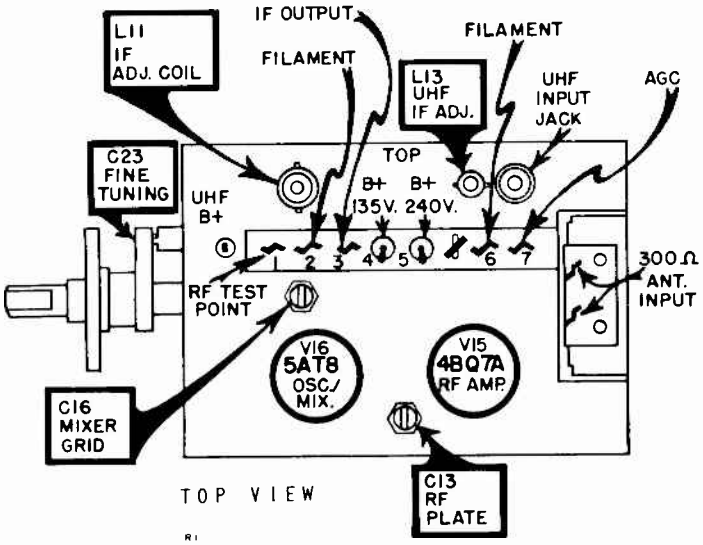


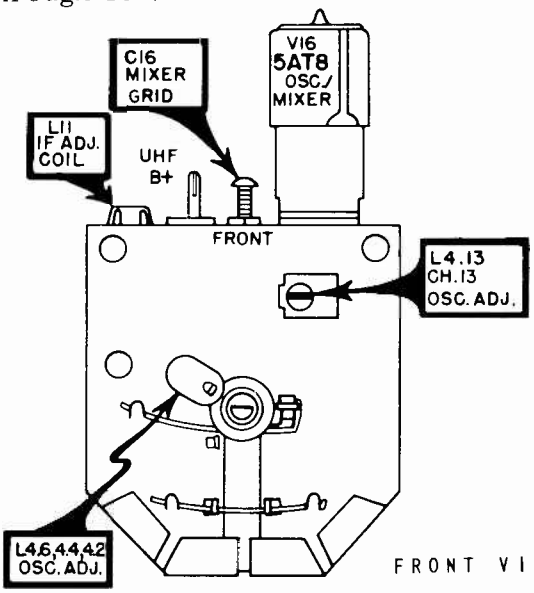
Waveform photographs, refer to correspondingly marked balloons on schematic, page 151.

SYLVANIA

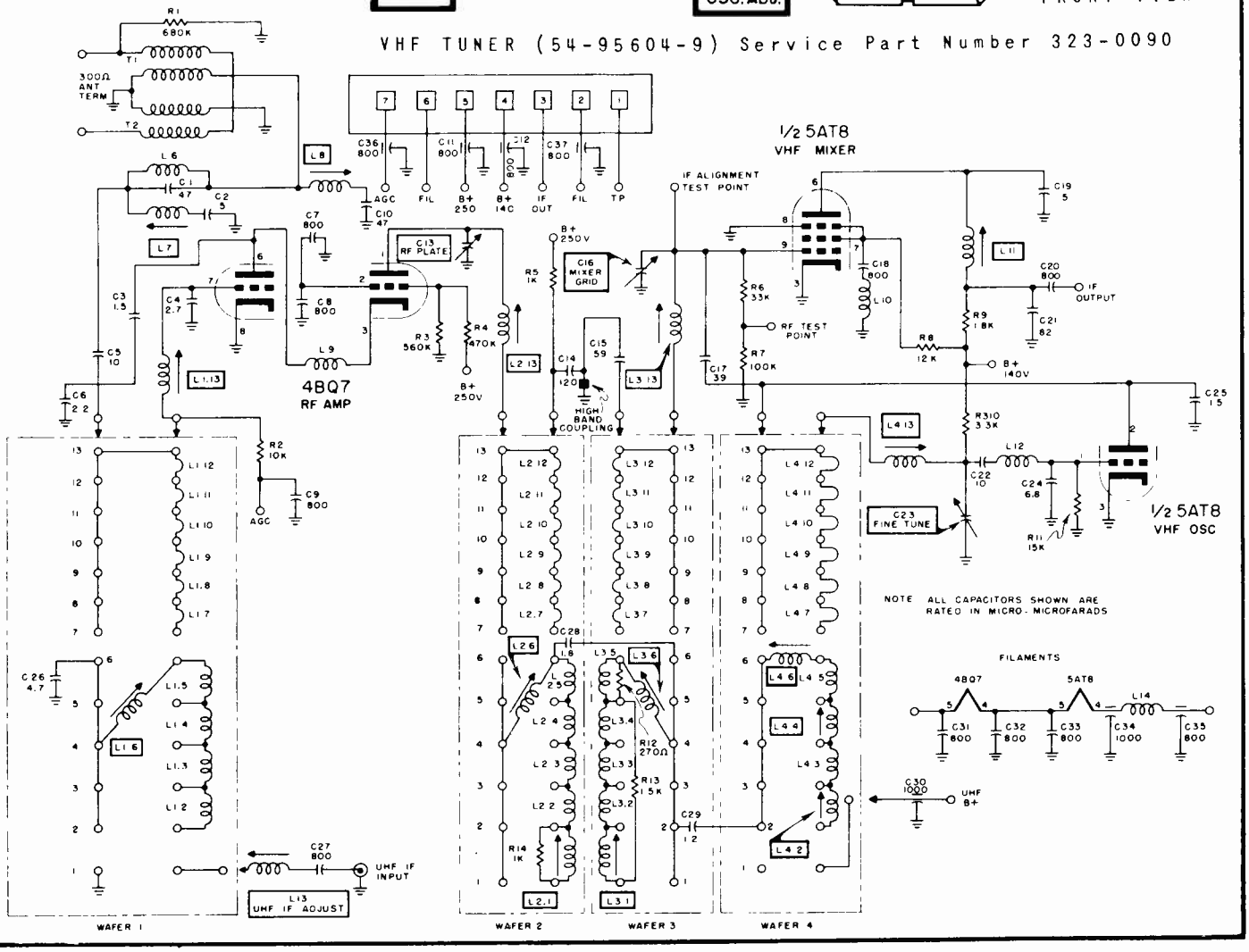
CHASSIS 1-537-5, -6, MODELS 17P110, 17P206
CHASSIS 1-539-3, -4, MODEL 21T121

(Service material on pages 153 through 158)





VHF TUNER (54-95604-9) Service Part Number 323-0090



—SCHEMATIC DIAGRAM—
SYLVANIA
1-537-5,-6 CHASSIS

▲1

V4 12BY7 Pin 2

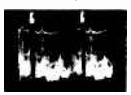
▲2

V14 17BWP4 Pin 2

▲3

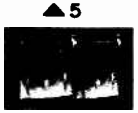
V5 58R8 Pin 2

▲4



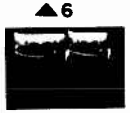
V5 58R8 Pin 1

▲5



V8 3CS6 Pin 7

▲6

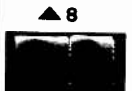


V8 3CS6 Pin 1

▲7

V8 3CS6 Pin 5

▲8



Cathode-Hor Discrim

▲9

Plate-Hor Discrim

READ THESE INSTRUCTIONS CAREFULLY AND OBSERVE THE CONDITIONS NOTED WHEN TAKING VOLTAGE READINGS OR OBSERVING WAVEFORMS.

VOLTAGE MEASUREMENT CONDITIONS UNLESS OTHERWISE SPECIFIED:

1. Voltage measured to chassis using Sylvania Polymeter (VTVM).
2. AC power source 117V. 60 cycle line.
3. Voltage readings in brackets taken with no signal input: channel selector set to 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 11V. on IF AGC bus (junction of R-203 & R-205).
5. Contrast control set to maximum. Brightness control set to minimum.
6. Voltage values shown are average readings. Variations may be observed due to normal production tolerances.

SPECIAL VOLTAGE MEASUREMENT CONDITIONS:

Ⓟ Picture tube anode voltage measured with VTVM high voltage probe at line voltage of 117V. under conditions of normal signal. No brightness and correct scan size.

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

WAVEFORM MEASUREMENT CONDITIONS:

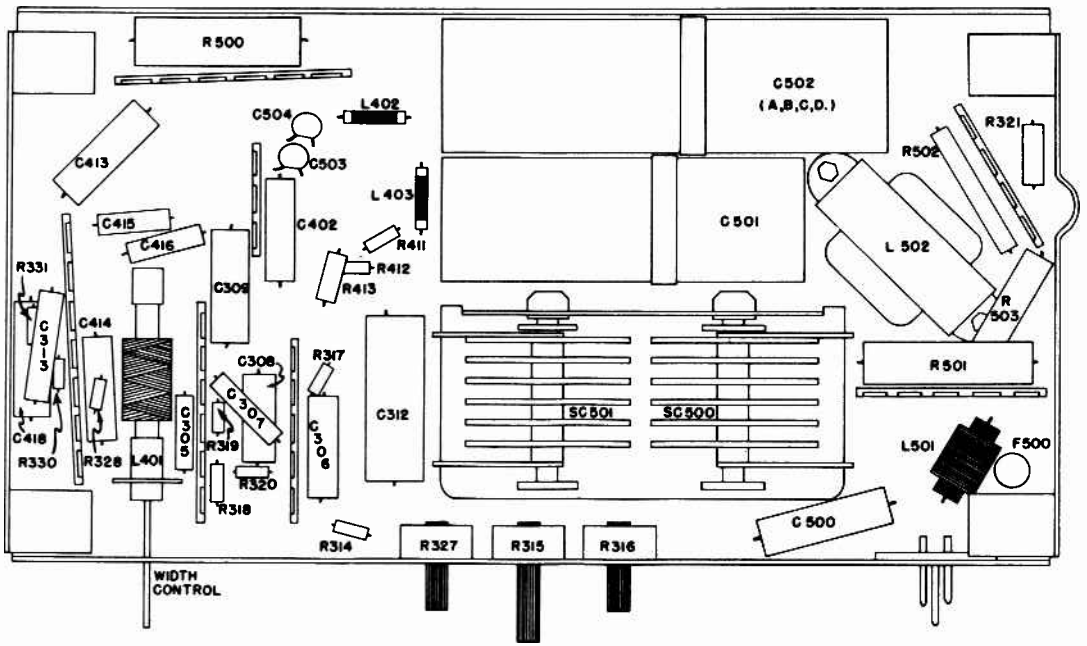
1. Channel selector set to strong channel.
2. Contrast control set for signal of 60V. PP at yellow lead of picture tube.
3. Waveforms measured with respect to chassis using Sylvania type 404 oscilloscope. (Other type oscilloscopes may alter waveform shapes or amplitudes).
4. The terms "30 " or "7875 " refer to scope sweep frequency used.

GENERAL SCHEMATIC NOTES

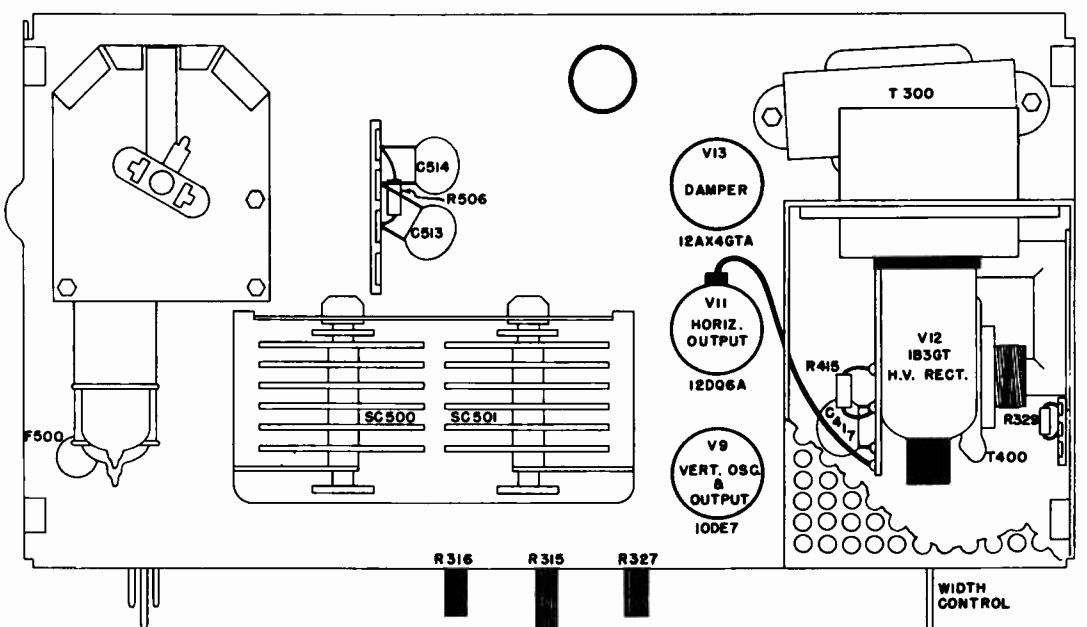
1. Voltage sources are indicated by encircled symbols: corresponding symbols without circles indicate voltage tie points.
2. Average resistances of coils and transformers are shown and are measured with component connected in circuit.
3. Encircled numbers on edge of printed circuit indicate tie points corresponding with those shown on parts layout of top board.
4. All capacitors are rated in microfarads unless otherwise specified.
5. Coil and transformer terminal views are shown as seen from bottom.
6. Arrows on controls indicate direction of clockwise rotation.
7. Schematic coordinates are for reference in locating components, for example, R106 located in coordinates A-7.

PARTS CODING

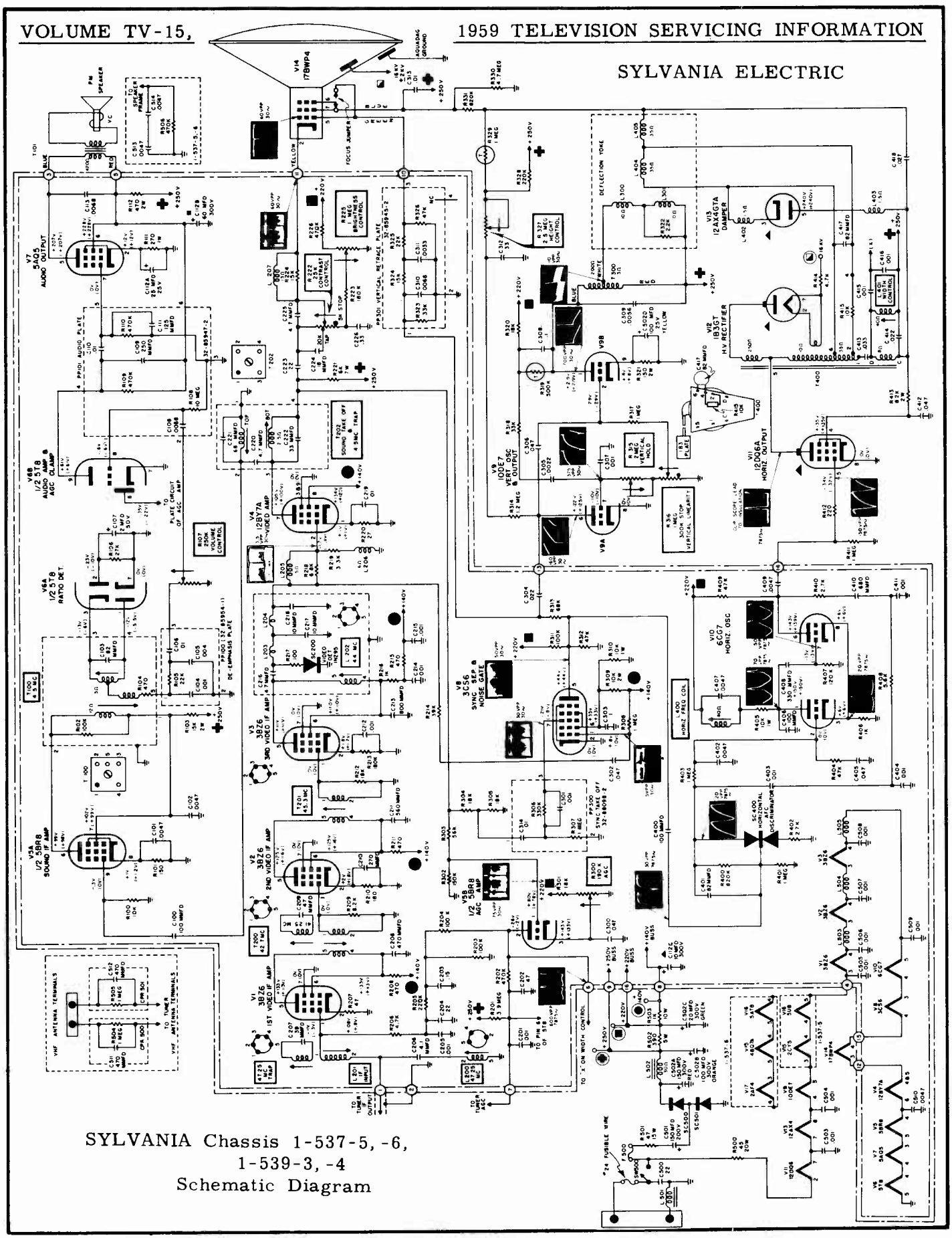
Tuner Section	1-99
Sound Section	100-199
Video Section	200-299
Vert. & Sync Section	300-399
Horiz. & HV Section	400-499
L.V. Supply, Fil	500-599



BOTTOM PARTS LAYOUT (LOWER) CHASSIS



TOP PARTS LAYOUT (LOWER) CHASSIS



SYLVANIA Chassis 1-537-5, -6,
1-539-3, -4
Schematic Diagram

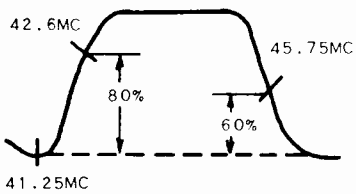
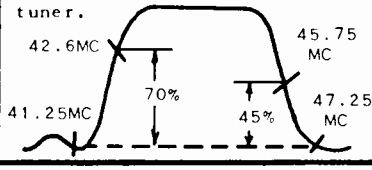
SYLVANIA Chassis 1-537-5, -6, 1-539-3, -4, Alignment Information, Continued

VIDEO IF, SOUND IF AND 4.5MC TRAP ALIGNMENT PROCEDURES

PRELIMINARY INSTRUCTIONS

1. Connect an isolation transformer between chassis and power line.
2. Use high scope gain and keep sweep generator output at lowest usable value; check, at intervals for possible sweep generator overloading by temporarily varying signal input level and noting any change (excluding amplitude) in response curve shape.
3. Keep marker generator coupling to a minimum to avoid distortion of response curve.
4. For optimum receiver alignment, power line voltage should be maintained at 117 volts.
5. Receiver and test equipment should warm up for approximately 15 minutes before alignment.

VIDEO IF ALIGNMENT

STEP	ALIGNMENT SETUP NOTES	TEST EQUIPMENT HOOKUP	ADJUST
1.	Set VHF tuner to a free channel. Connect -5 volts DC source (-) term to junction of R203 (100K) and R204 (100K) and (+) term. to chassis. Detune tuner converter plate coil by turning core fully counterclockwise.	SWEEP GENERATOR - through a .0047 Mfd DC blocking capacitor to pin 1 of L201. Set generator to 43.5 MC with 10 MC sweep. SIGNAL GENERATOR - loosely coupled as a marker to sweep generator lead. OSCILLOSCOPE - connected to junction of R219 and L205, through a 33K resistor.  FIGURE 1	a. Adjust sweep generator output to produce response curve of 3V. peak to peak. b. Adjust T200 (top core) for minimum 41.25 MC marker amplitude. c. Adjust L202 for maximum response at 44.0 MC. d. Adjust T201 for maximum response at 45.3 MC e. Adjust T200 (bottom core) for maximum response at 42.7 MC. f. Repeat steps C to E until 45.75 MC marker is at 60% and 42.6 MC marker is at 80%. Adjust L202 to remove tilt. Adjust T201 to position 45.75 marker. Adjust T200 (bottom core) to position 42.6 MC marker. (See Fig. 1).
2.	Same as step 1.	SWEEP GENERATOR - through a .0047 Mfd DC blocking capacitor to VHF IF cable at chassis tie point (No. 1). SIGNAL GENERATOR - Same as step 1. OSCILLOSCOPE - Same as step 1.	Adjust L200 and L201 (top core for minimum 47.25 MC marker amplitude. For optimum results, repeat steps 1 & 2.
3.	Leave -5 volt AGC voltage connected as in step 1. Set VHF tuner to a high band VHF channel which causes minimum distortion of response curve as fine tuning control is rotated.	SWEEP GENERATOR - to jig shield on mixer tube (V16). SIGNAL GENERATOR - same as step 1. OSCILLOSCOPE - same as step 1.	Adjust tuner converter plate and L201 to give response shown below. For optimum results, repeat steps 1 & 3 but do not detune tuner. 

SYLVANIA Chassis 1-537-5, -6, 1-539-3, -4, Alignment Information, Continued

4.5MC TRAP, SOUND IF AND RATIO DETECTOR ALIGNMENT

STEP	ALIGNMENT SETUP NOTES	TEST EQUIPMENT HOOKUP	ADJUST
1.	Set contrast control to maximum and brightness control to minimum. Connect -30 volts DC source (-) term. to junction of R203 (100K) & R204 (100K) 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 R106 (27K). DC probe through 100K resistor to terminal 1 of de-emphasis plate (PP100) Isolate VTVM from ground. SIGNAL GENERATOR - connected to junction of R219 and L205. Set signal generator to 4.5 MC preferably crystal calibrated or controlled.	For MAXIMUM neg reading: T100 (Top core) T100 (Bottom core) T202 (Bottom core) T202 (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: T202 (Bottom core) Using lowest signal generator output level, repeat steps 1 & 2 except T202 (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 4.5MC TRAP ALIGNMENT

Connect a good antenna to the receiver and properly tune in a strong station. Adjust (T202 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.

CHASSIS REMOVAL

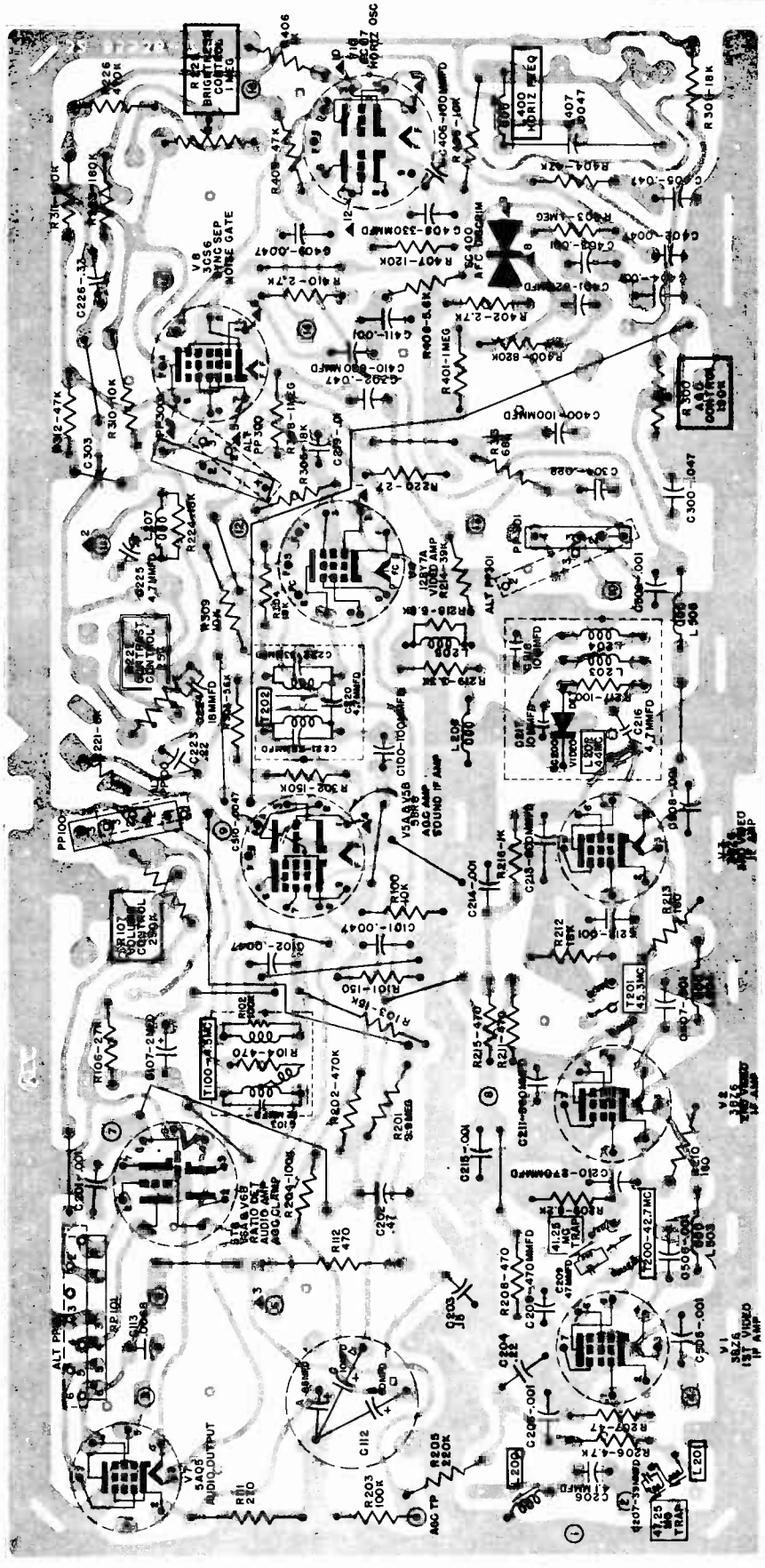
CAUTION: WHEN SERVICING CHASSIS OUT OF CABINET, DO NOT OPERATE RECEIVER WITH SPEAKER LEADS DISCONNECTED.

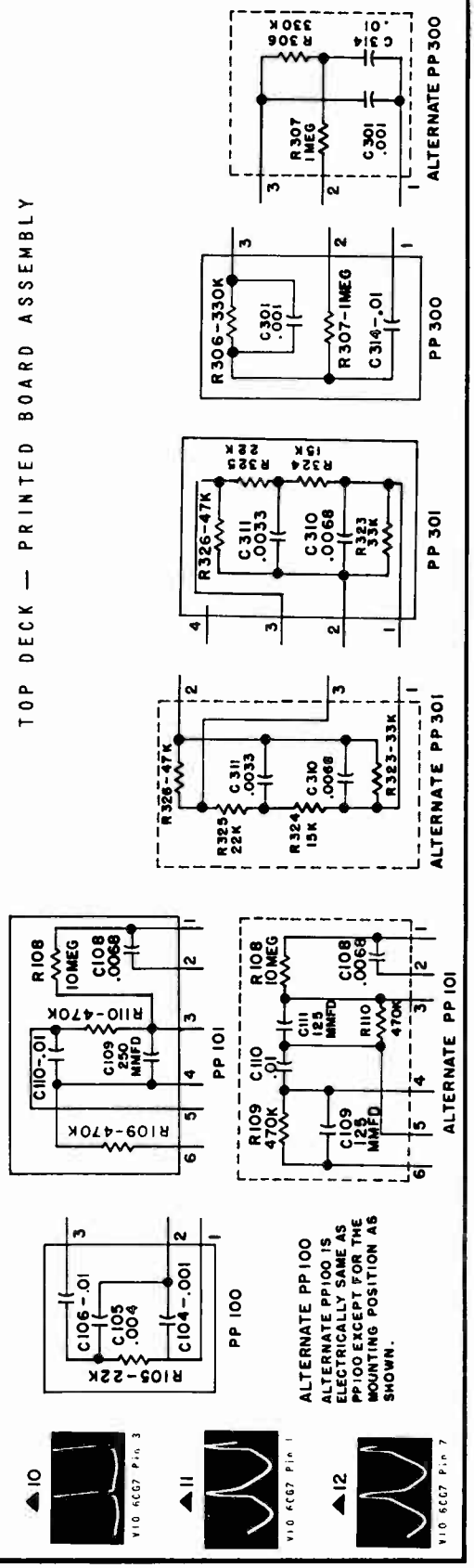
NOTE: For purposes of trouble-shooting, the chassis may be removed leaving the deflection yoke and speaker mounted in the cabinet. If this is desired, perform steps one (1) through five (5) only. For complete chassis removal, perform the entire procedure.

1. Disconnect AC power cord and antenna connections; remove rear interlock cover.
2. Disengage knobs.
3. Remove two (2) screws locking rear chassis feet to slots in cabinet bottom.
4. Disconnect picture tube high voltage lead.
5. Lift chassis up and to the rear until chassis feet are clear of slots in cabinet bottom. Lift chassis from cabinet.
6. Unsolder speaker and isolation leads from chassis.
7. Remove yoke retaining spring and yoke from cabinet.

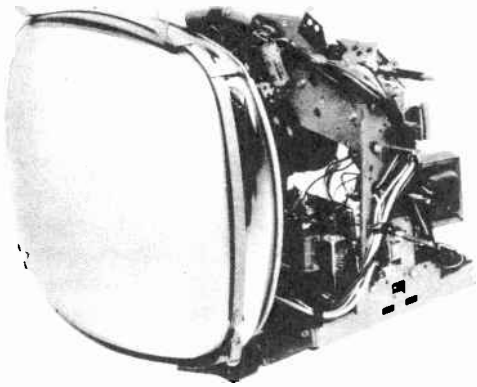
SYLVANIA Chassis 1-537-5, -6, and 1-539-3, -4, Continued.

TOP DECK — PRINTED BOARD ASSEMBLY





Westinghouse



Chassis V-2365

(Material on pages 159 through 166)

MODEL INFORMATION CHART

Models	*Chassis Used*	*VHF Tuner*
H17T249 H17T250	V-2365-1	470V057H01 or 470V059H01
H17TU249 H17TU250	V-2365-2	470V058H01 or 470V060H01
H17T247	V-2365-7	470V057H01 or 470V059H01
H17TU247	V-2365-8	470V058H01 or 470V060H01

CHASSIS REMOVAL

Note: The picture tube is NOT removed with the chassis.

1. Remove the external antenna leads.
2. Remove the back cover.
3. On models with a built-in antenna, remove the nylon bushing between the telescoping antenna arms and remove the antenna.
4. Pull the control knobs (picture, volume, channel selector, etc.) out from the cabinet.
5. Remove the antennal terminal board from the cabinet.
6. Remove the speaker leads. Remove the two speaker retaining nuts and remove the speaker from the cabinet.
7. Remove the base socket and HV anode lead from the CRT. Unclip the yoke leads from the side of the HV cage.
8. Remove the two self-tapping screws which secure the top of the mezzanine to the top metal cabinet support. The screws are located on either side of the filter choke.
9. Remove the four screws, on the bottom of the cabinet, which secure the chassis to the cabinet.
10. Carefully slide the chassis out of the cabinet until it clears the cabinet. The receiver can now be serviced. It is recommended that extensions be used between the CRT base socket and the CRT base and also between the HV anode lead and the CRT HV anode.

CRT REMOVAL

1. Remove the external antenna leads; remove the back cover.
2. Remove the CRT base socket; loosen the yoke clamp and remove the deflection yoke slowly, making sure it will clear corner of tuner; remove the HV anode lead from the CRT; discharge the CRT anode.
3. Remove the two bottom mounting screws (Figure 1) from the cabinet. Lift the bottom of the front mask out and up from the cabinet. The top of the front mask will unhook from the top of the cabinet.
4. Remove the two top mounting screws (Figure 1) securing the top of the CRT mounting bracket to the cabinet front.
5. Remove the two bottom mounting nuts securing the bottom of the CRT mounting bracket to the cabinet front.
6. Remove the CRT from the front of the cabinet.
7. Remove the CRT support strap from the CRT by removing the two nuts from the strap.

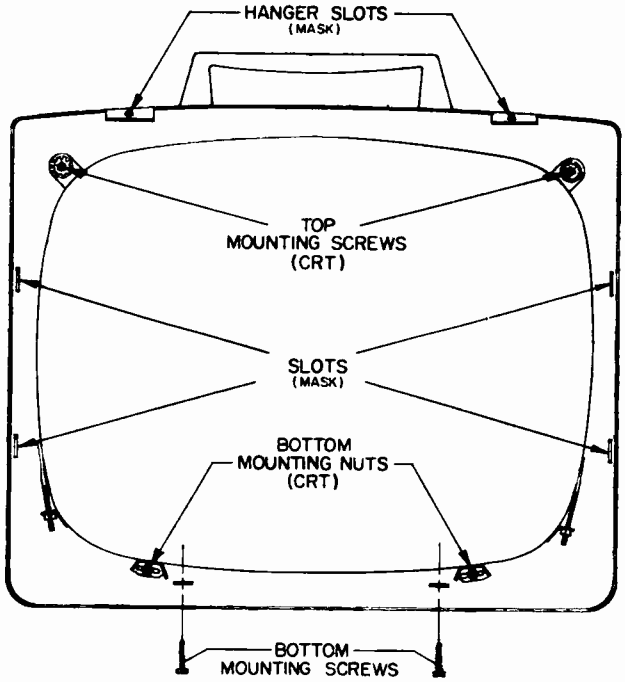


Figure 1. Mask and CRT mounting.

TEST POINTS

Figure 4, a diagram which shows a bottom view of the printed board and physical location of parts, also shows the location of test points. Test points, designated by an *encircled* letter are also shown in the complete receiver schematic diagram. The test points are important in aligning, adjusting, and servicing the receiver, as explained below:

SPEAKER LOAD RESISTOR

Whenever the receiver is operated with the speaker disconnected, turn Volume control to minimum or substitute a load resistor (3.2 ohms, 2 watts) for the speaker. Connect this resistor to the secondary of the audio output transformer. Failure to do so may result in damage to the audio output tube.

WESTINGHOUSE Chassis V-2365, Service Information, Continued

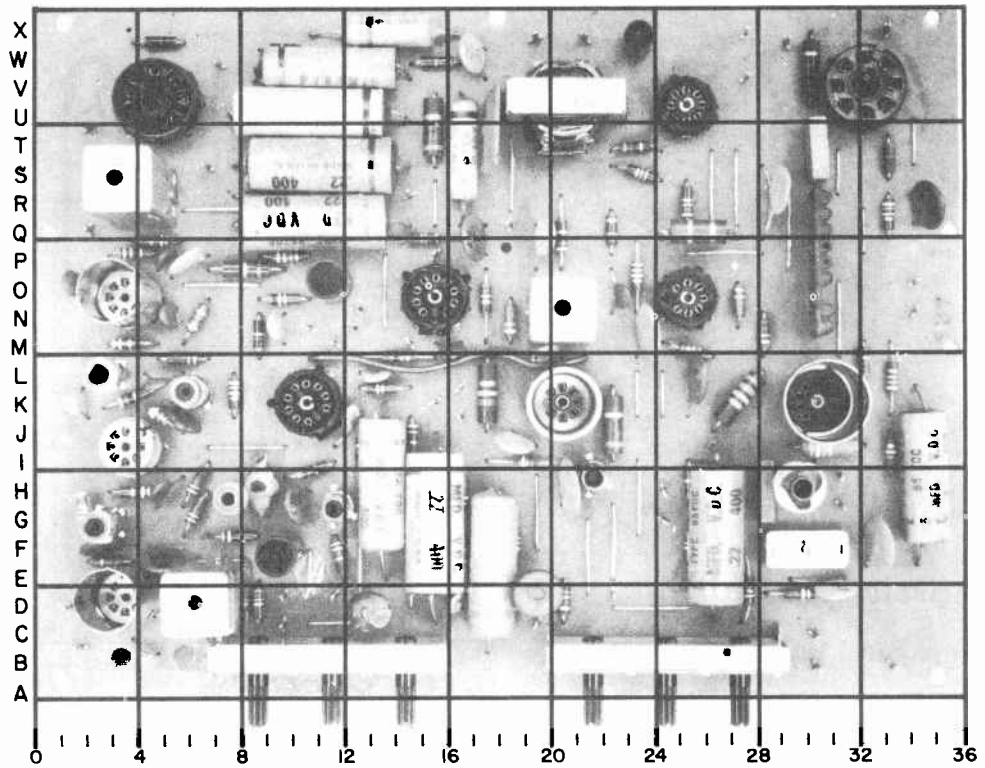


Figure 2. Top view of PC board. Guide to resistor, capacitor, coil, and transformer locations. Use with chart below.

Part	*Location*	*Part*	*Location*	*Part*	*Location*	*Part*	*Location*	*Part*	*Location*	*Part*	*Location*
C100	I19	C205	H5	R201	R12	R226	J13	R301	P23	C415	H28
C101	H21	C206	E3	R202	Q5	R227	P8	R302	M26	C416	E31
C102	J19	C208	E5	R203	P5	R228	J15	R303	Q26	C417	F30
C103*	L22	C209	P6	R204	M6	R229	O10	R304	O27	C418	R35
C104	M16	C210	F9	R205	M5	R230	H17	R305	R25	C419	G27
C105	Q17	C211	N10	R206	N7	R231	A11	R306	S23	C422	T30
C106	X23	C212	H10	R207	K4	R232	H25	R307	A12	L402	H30
C107	M20	C213	D16	R208	H6	R233*	H7	R308	Q15	R404	I34
L100	H22	C215	H13	R209	H4	T200	S3	R309	W15	R405	L34
L101	O21	C216	L13	R210	E3	T201	L3	R310	U15	R406	L32
R100	A22	C217	G16	R211	G6	T202	F3	R311	X5	R407	I32
R101	J23	C218	J12	R212	L8	T203	D6	R312	W10	R408	D30
R102	N19	C219	O11	R213	P10	C300	N24	R313	A9	R409	H30
R103	K18	C220	L26	R214	F8	C301	O23	R314	D9	R410	N28
R104	O18	C221	J5	R215	I11	C302	Q20	R315	Q21	R411	L28
R106	T23	C222	J6	R216	N9	C303	R29	R316	A25	R412	E28
R107	T21	L200	K6	R217	F12	C304	W17	Z300	U18	R413	A28
T100	V21	L201	H7	R218	D21	C305	W12	C402	O1	R414	T33
C200	S12	L202	H9	R220	D18	C306	T17	C403	K1	R415	R33
C201	Q12	L203	G12	R221	F19	C307	X14	C404	G2	R416	W30
C202	P5	L204	D13	R222	F17	C308	U12	C405	B4	R417	F26
C203	N5	L205	E20	R224	K14	C309	E18	C413	F33	Z401	Q31
C204	K5	R200	R9	R225	M14	R300	Q22	C414	H35		

* Underneath PC board

KEY TO BOTTOM VIEW OF PC BOARD

1. Shielded lead to tuner IF output
2. Brown wire to pin 7 of 12D4
3. Green wire to pin 2 of CRT
5. Brown wire to tuner (filament VHF/UHF receivers only)
6. Brown wire to tuner (filament VHF receivers only)
7. Blue wire to PICTURE control R219
8. Brown wire to pin 11 of CRT
9. Yellow wire to T300 secondary
10. Green wire to arm of PICTURE control R219
11. White wire to pin 6 of CRT (B+, 115V)
12. Gray wire to lug 3 of T400 (B+ +, 425V)
13. Red wire to pin 10 of CRT
14. Red/white wire to C410A (B+, 135V)
15. Yellow wire to lug 2 of T400
16. Green shielded lead to arm of VOLUME control R105
17. Orange wire to C412A (B+, 115V)
18. Black wire, filament return to ground
19. Black wire to pin 1 of CRT
20. Blue wire to T300 primary
21. White wire to tuner AGC
22. Orange/white wire to junction R402 and C411A (B+, 105V)
23. Blue shielded lead to top of VOLUME control R105

WESTINGHOUSE Chassis V-2365, Service Information, Continued

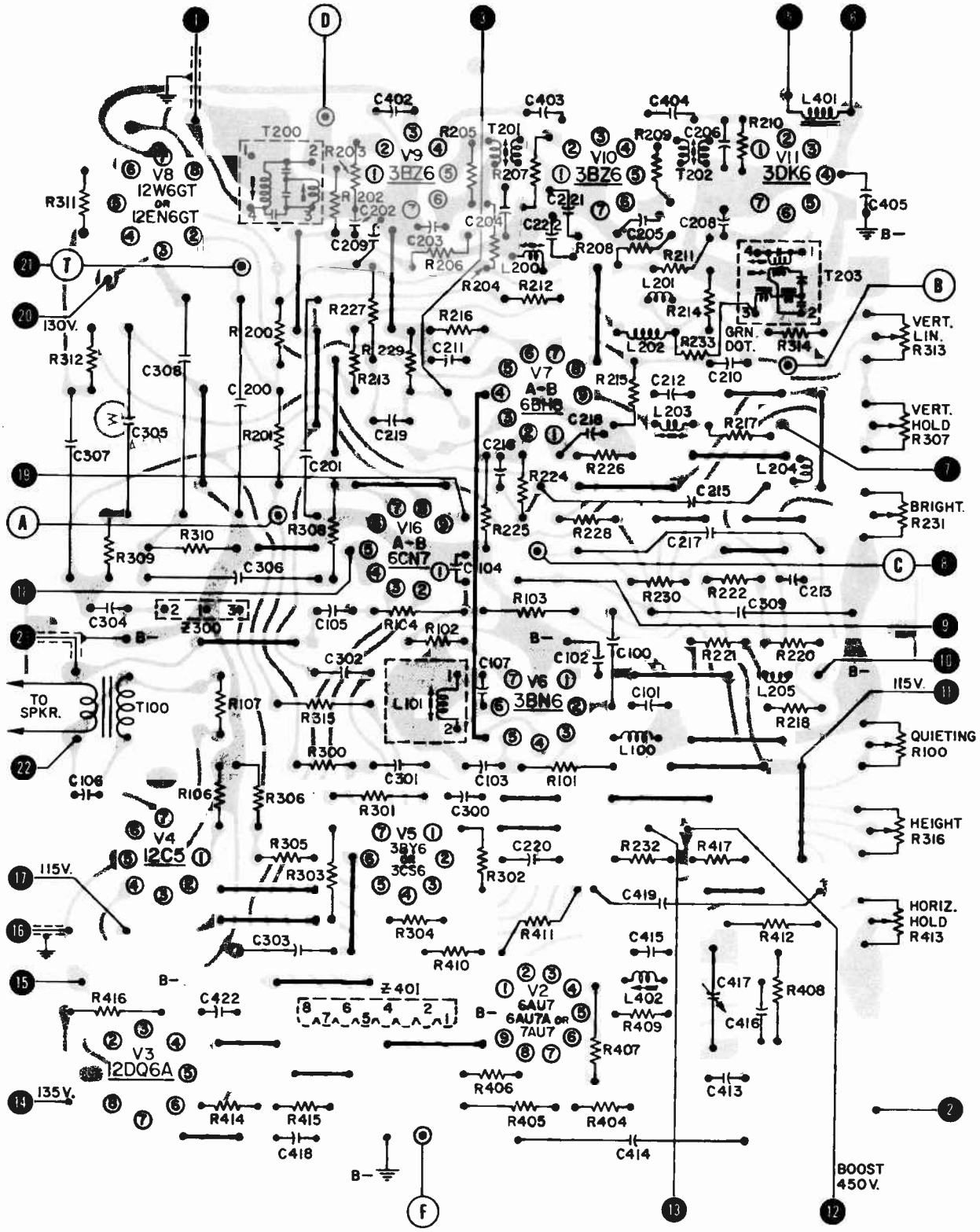


Figure 4. Bottom view of PC board showing top components as schematic symbols.

For key to circled numbers, 1 through 23, see bottom of page 160, at left.

WESTINGHOUSE Chassis V-2365, Alignment Information, Continued

IF ALIGNMENT

EQUIPMENT:

1. **Sweep generator** – Output frequencies of 40 MC through 60 MC. Output voltage level should be adjustable.
2. **CW or marker generator** – Output frequencies of 4.5 MC, 41.25 MC, 43.1 MC, 42.5 MC, 47.25 MC, and 215.75 MC. Generator should be accurate and stable; crystal calibration preferred. Output voltage level should be adjustable.
3. **Oscilloscope** – Hickock 640 or equivalent.
4. **VTVM** – RCA Voltohymst or equivalent.
5. **Bias supply** – A negative 3 volt bias.
6. **Alignment tool** – The alignment tool shown in Figure 7 should be used to adjust all slugs having a hexagonal bore.

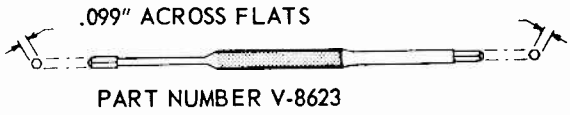
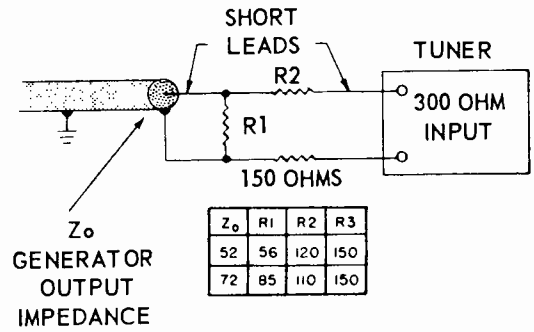


Figure 7. Alignment tool; .099" across flats.

TERMINATION OF EQUIPMENT:

1. **Generators** – Except where otherwise noted, all signal generating equipment should be terminated as shown in Figure 9.
2. **Oscilloscope and VTVM** – Use direct probe terminated with decoupling network shown in Figure 11.



Z_o	R1	R2	R3
52	56	120	150
72	85	110	150

Figure 8. Impedance matching network.

IF ALIGNMENT

Step	*Generator*	*Freq. (MC)*	*Generator Connection Point*	*Indicator and Connection Point*	*Adjustment*
1.					a) Connect a -3 volt bias to test point (A). b) Short out the receiver antenna terminals with a *short* jumper wire. c) L2 (tuner). Turn slug fully counterclockwise (all way out) to detune tuner output.
2.	Sweep	43.9	Connect sweep generator output to control grid (pin 1) of 3rd IF Amp.	Scope. Connect to test point (B). Calibrate for 2V PP.	T203. Bottom slug for maximum output at 43.9 MC; top slug to check that response will "rock" about 43.9 MC. If necessary, readjust bottom slug slightly until top slug will "rock" response about 43.9 MC. Finally, adjust top slug for flatest response.
3.					a) Remove generator connection from control grid (pin 1) of 3rd IF Amp. b) Remove scope connection from test point (B).
4.	CW	43.1	Connect CW generator output to test point (D).	VTVM. Connect to test point (B). Use range suitable for measuring -1.5V.	T202. Adjust for maximum negative voltage.
5.	CW	47.25	CW. Leave connected as in step 4.	VTVM. Leave connected as in step 4.	L200. Adjust for minimum negative voltage.
6.	CW	45.2	CW. Leave connected as in step 4.	VTVM. Leave connected as in step 4.	T201. Adjust for maximum negative voltage.
7.					a) Remove generator connection from test point (D) b) Remove VTVM connection from test point (B).

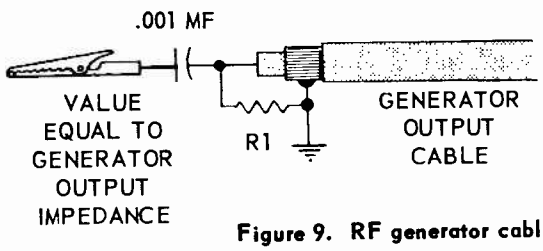


Figure 9. RF generator cable.

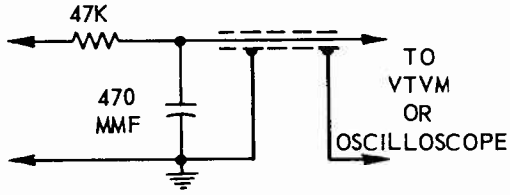


Figure 11. Decoupling network.

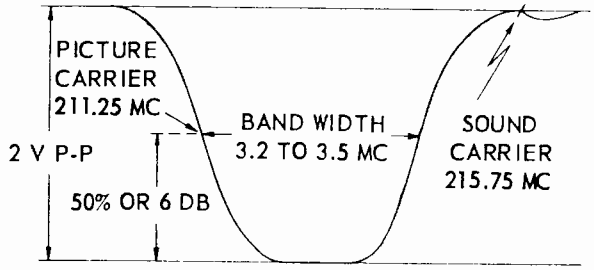


Figure 10. Overall response.

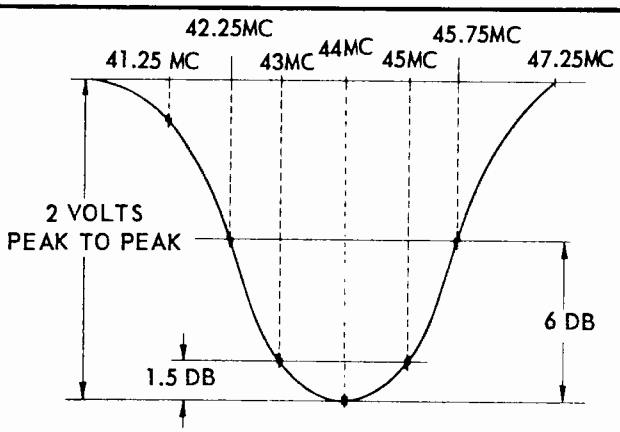


Figure 12. Video IF response curve.

IF ALIGNMENT (Continued)

Step	*Generator*	*Freq. (MC)*	*Generator Connection Point*	*Indicator and Connection Point*	*Adjustment*
8.	Sweep	44	Connect sweep generator output to test point Ⓓ	Scope. Connect to test point Ⓑ Calibrate for 2V PP.	Response curve should be as shown in Figure 12. Slight readjustment of T201 and T202 should be used, if necessary, to obtain the proper IF response curve.
9.					a) Remove generator connection from test point Ⓓ b) Remove scope connection from test point Ⓑ
10.	CW	41.25	Connect CW generator to test point on tuner.	VTVM. Connect to test point Ⓑ Use range suitable for measuring -1.5V.	T200. Top slug for minimum negative voltage. (Increase generator output or reduce IF bias if necessary to obtain indication.)
11.					a) Remove jumper wire shorting out antenna terminals. b) Set receiver channel selector to Ch. 13.
12.	Sweep	215.75	Connect sweep generator to antenna terminals through impedance matching network shown in Figure 8.	VTVM. Leave connected as in step 10.	Fine tuning. Adjust for lowest point in trap dip.
13.					a) Remove generator connection from antenna terminals. b) Remove VTVM connection from test point Ⓑ
14.	Sweep	Ch. 13 (210-216)	Connect sweep generator to antenna terminals through impedance matching network shown in Figure 8.	Scope. Connect to test point Ⓑ Calibrate for 2V PP.	a) L2 (tuner). Adjust for maximum output. b) T200. Bottom slug to check that response will "rock" about Ch. 13 center frequency (213 MC). If necessary, readjust L2 slightly until bottom slug of T200 will "rock" response about 213 MC. Finally, adjust bottom slug of T200 for overall response curve as shown in Figure 10.
15.					a) Remove generator connection from antenna terminals. b) Remove scope connection from test point Ⓑ .
16.	CW	4.5	Connect CW generator to test point Ⓑ	VTVM. Connect to point Ⓒ , low side to B-.	L203. Adjust for minimum positive voltage.

SOUND ALIGNMENT

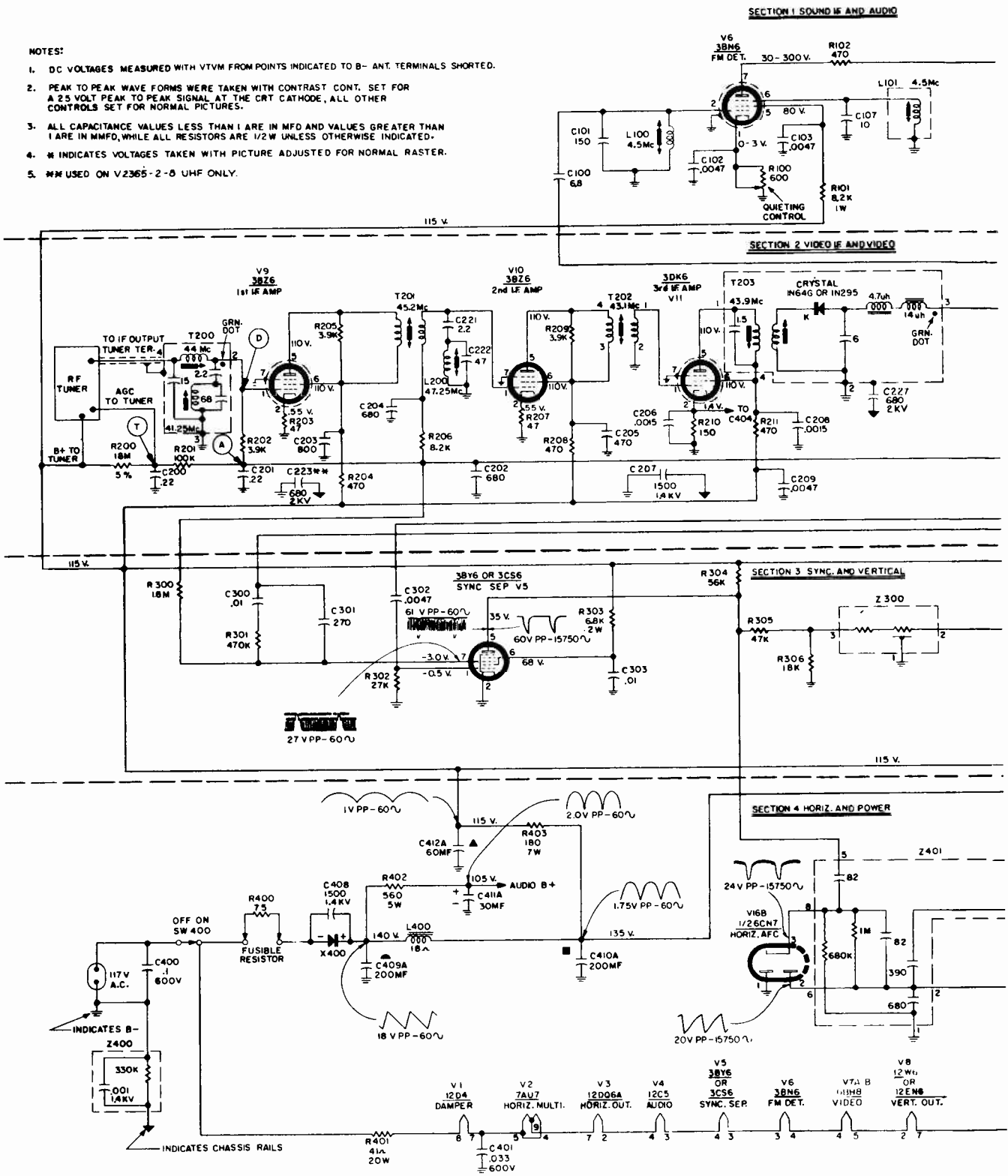
LOCALLY GENERATED SIGNAL ALIGNMENT EQUIPMENT:

1. **FM generator** – Output frequency of 4.5 MC with approximately ±7.5 KC deviation.
2. **AM generator** – Output frequency of 4.5 MC, modulated approximately 30%.
3. **VTVM or oscilloscope** – Use with high impedance probe. Connect across VOLUME control as AC voltage indicator.

PROCEDURE:

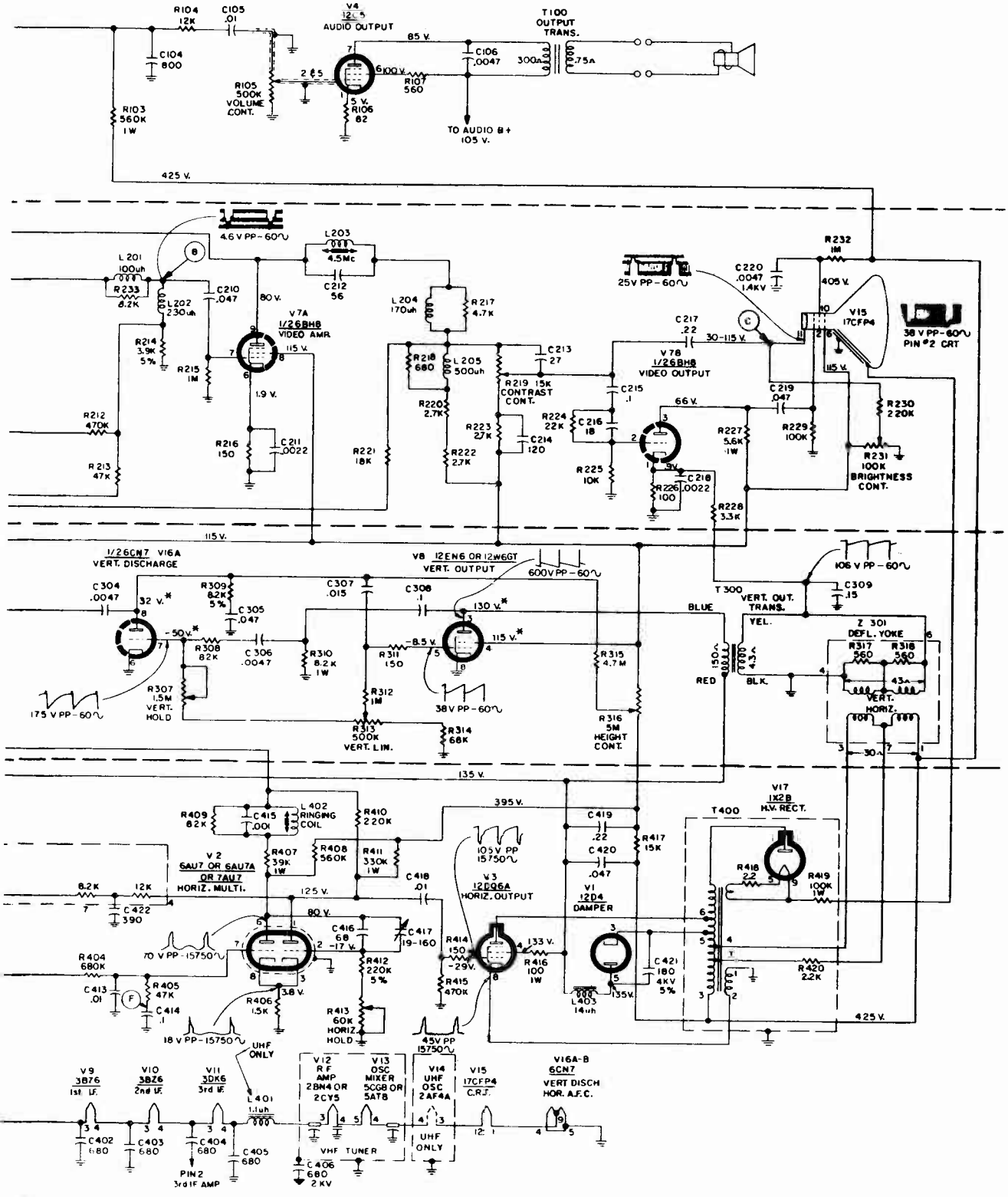
1. Connect VTVM or scope across VOLUME control.
2. Set QUIETING control R100 to mid-range.
3. Apply strong 4.5 MC FM signal to test point Ⓑ
4. Adjust quadrature coil L101 for maximum output.
5. Using lowest signal level that will produce an indication, adjust coil L100 for maximum output.
6. Apply medium strong 4.5 MC AM signal to test point Ⓑ
7. Adjust QUIETING control for minimum AM output.
8. Repeat steps 3 through 7.

WESTINGHOUSE Chassis V-2365, Schematic Diagram

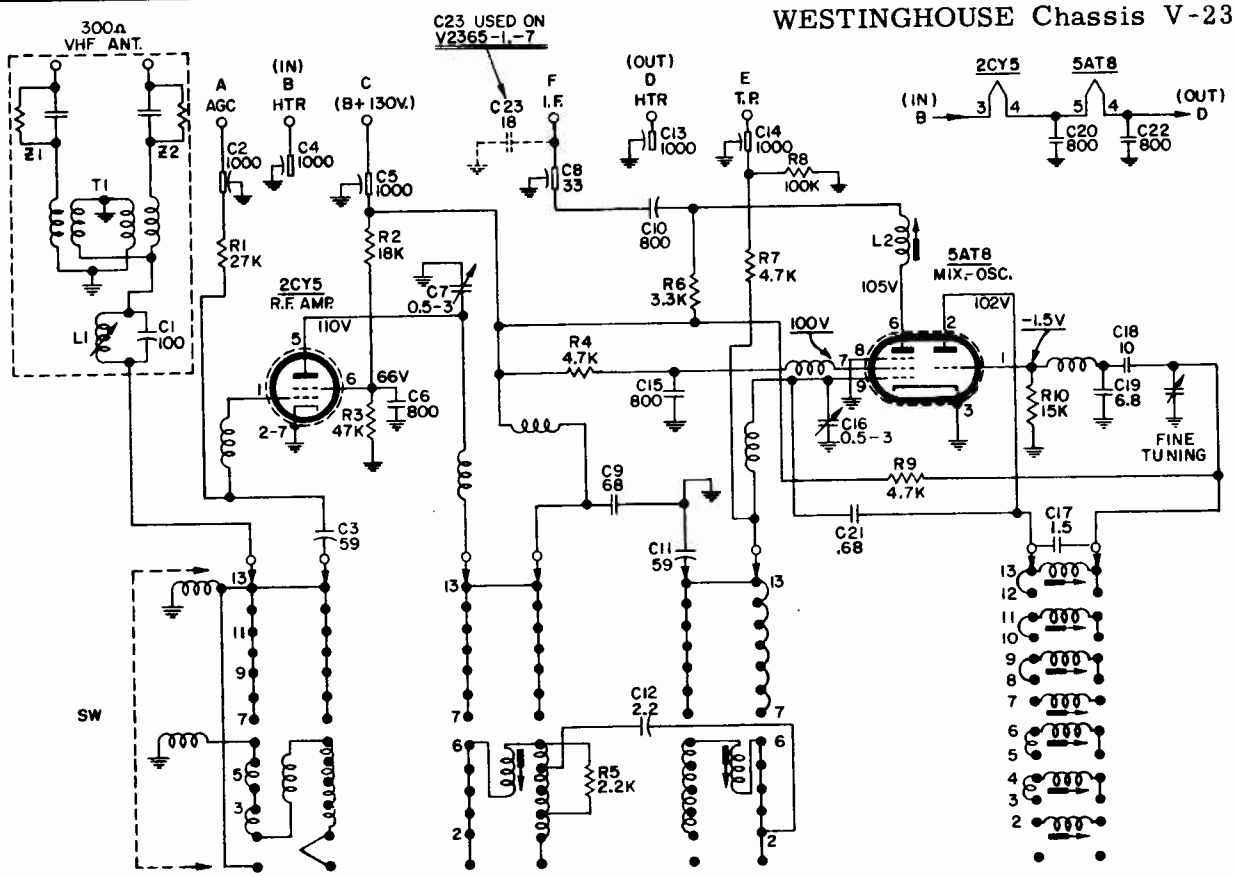


Schematic diagram; V-2365-1, V-2365-2, V-2365-7, and V-2365-8 chassis.

WESTINGHOUSE Chassis V-2365, Schematic Diagram



WESTINGHOUSE Chassis V-2365



NOTE:
1. ALL CAPACITANCE VALUES IN uuf, ALL RESISTORS 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
2. VOLTAGES WITH VTVM. (ANT. TERMINALS SHORTED)

Figure 15. Schematic diagram; VHF tuner 470V057H01

WESTINGHOUSE
Chassis V-2365,
Continued

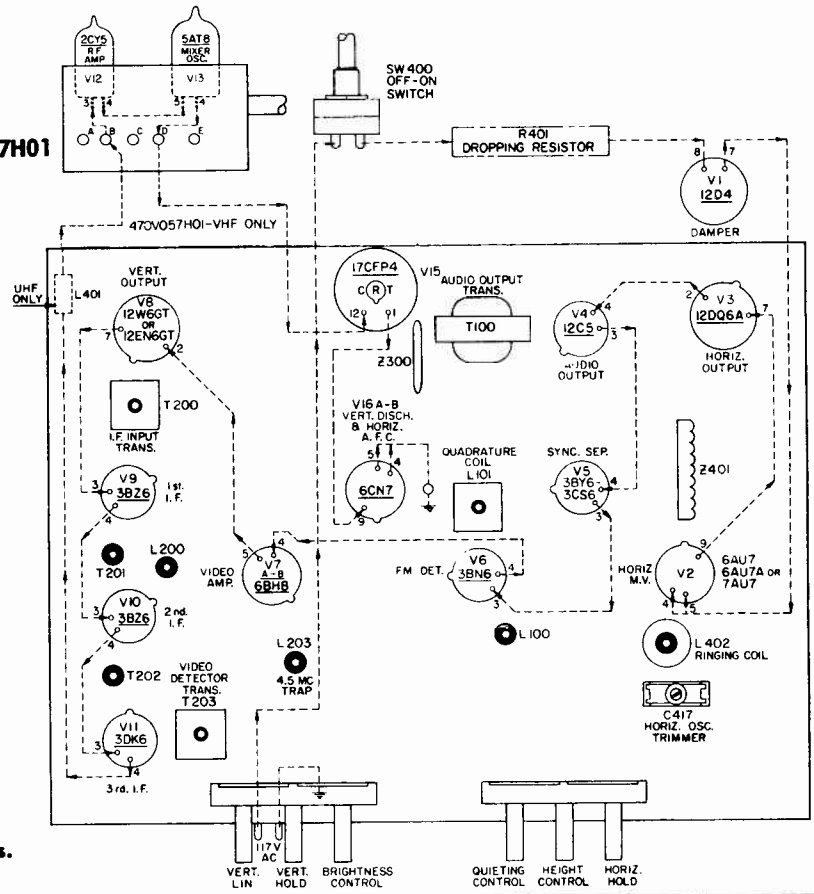


Figure 5.

Top view of chassis. Tube location, heater string, and adjustments.

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MODEL AND CHASSIS CHART

Model	*Chassis*	*Bands Covered*	*Tuner Used*	*Tuner Tubes*	*UHF Adaptability*
H21T201D – *mahogany* H21T202D – *limed oak* H21T203A – *fawn* H21T217 – *mahogany* H21K204D – *mahogany* H21K205D – *blond*	V-2366-1	VHF	VHF: 470V051H01, code 191	RF amp: 2CY5 Mix-osc: 5AT8	External converter required
H21TU203A – *fawn*	V-2366-2	VHF–UHF	VHF: 470V050H01, code 305 UHF: 472V034H01 code 191	RF amp: 2BN4 Mix-osc: 5CG8 UHF osc: 2AF4A Crystal: 1N82A	Equipped with UHF tuner

(Service material continued on pages 167 through 171.)

QUIETING CONTROL

The quieting control is located on the back of the chassis. This control, which determines the AM rejection characteristics of the sound system, is normally adjusted during sound alignment and will not ordinarily require further adjustment. In weak signal areas, however, a reduction in noise or hiss in the sound may be obtained by slightly readjusting the control.

HORIZONTAL RINGING COIL

The horizontal ringing coil L401 is adjusted as follows:

1. Short out the ringing coil (accessible from the top of the chassis) with a short jumper wire.
2. Set the horizontal hold control (labeled HORIZONTAL at the front escutcheon) to mid-position, and leave it in this position during the steps that follow.
3. Connect a VTVM to test point F (figure 5) or to pin 7 of the horizontal multivibrator socket to measure DC voltage between this point and B minus.
4. With the receiver tuned to a TV station, adjust C423 for zero voltage on the meter. If zero voltage can be approached but not quite reached at one extreme of the C423 adjustment, set the horizontal hold control slightly to one side of mid-position to obtain zero voltage.
5. Remove the jumper from the ringing coil.
6. Adjust the ringing coil (L401) for zero voltage on the meter.

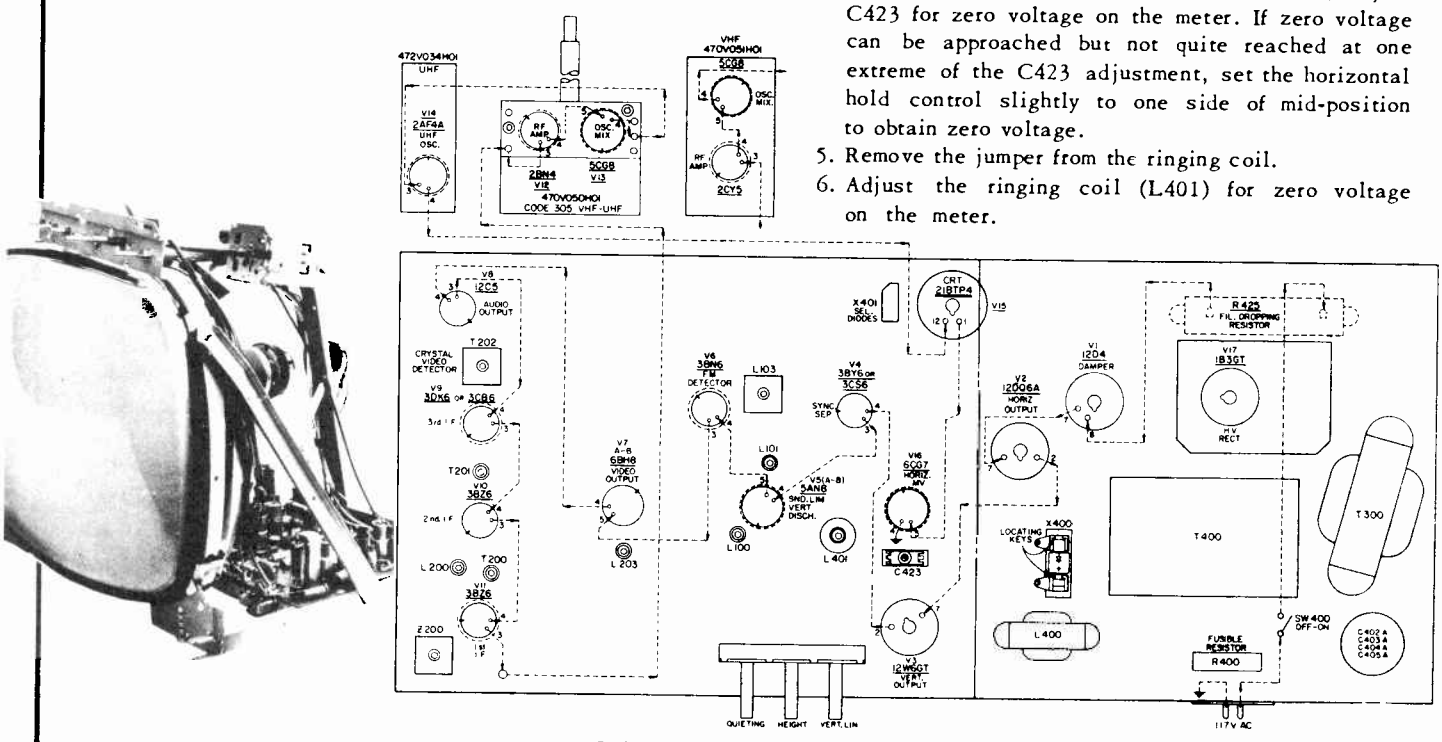


Figure 2. Tube location, heater string, and adjustments. Top view of chassis.

WESTINGHOUSE Chassis V-2366, Service Information, Continued

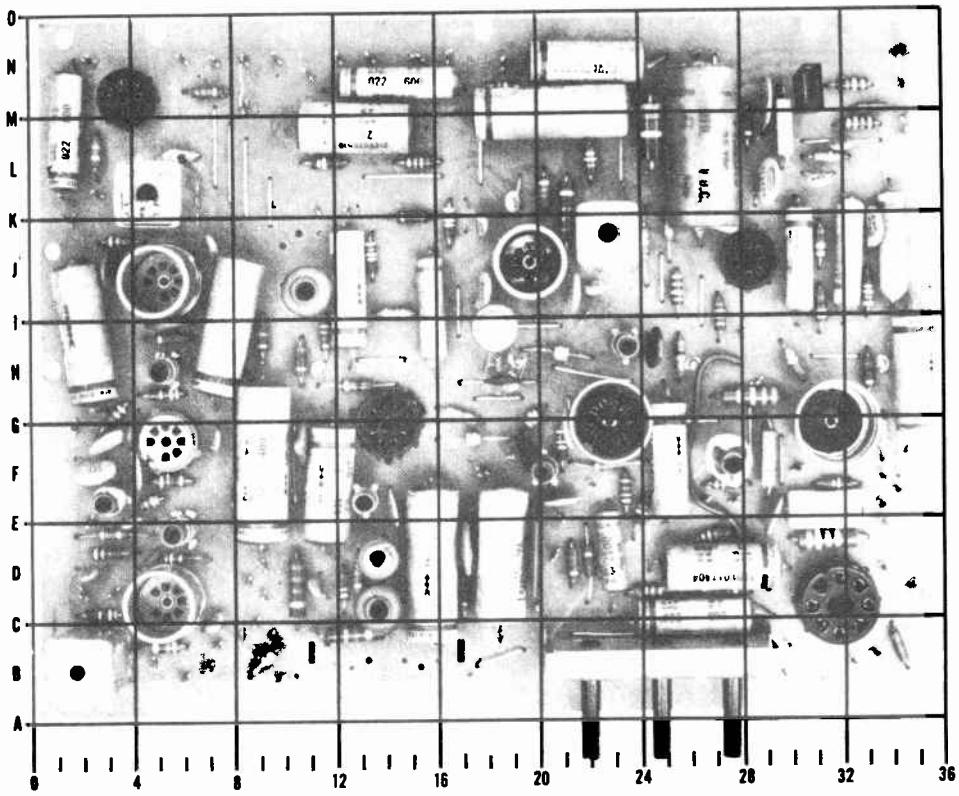


Figure 3. Top view of printed circuit board. Guide to location of resistors, capacitors, coils, and transformers when used with the chart below.

PART	LOCATION	PART	LOCATION	PART	LOCATION	PART	LOCATION	PART	LOCATION	PART	LOCATION
C100	G17	R109	L2	L205	C13	R226	G17	R308	F23	C420	E29
C101	F19	C200	I8	R200	L15	R227	E8	R310	E23	C422	J30
C102	G19	C201	I2	R201	L12	R228	B9	R311	H26	C423	E31
C103	H24	C202	D4	R202	D6	R230	C17	R312	C24	C424	N22
C104	G21	C203	E3	R203	B5	T200	E5	R313	C27	C425	M20
C105	H25	C204	E4	R204	D6	T201	H5	R314	A27	L401	F27
C106	J18	C205	F4	R205	D2	T202	K4	R315	B32	R403	M31
C107	I21	C206	D2	R206	E3	Z200	B1	R316	B27	R404	M28
C108	I22	C207	G4	R207	F5	C300	I16	R317	D21	R405	L32
C109	K19	C208	I5	R208	G5	C301	K17	R318	D22	R406	J31
C110	N15	C209	F2	R209	G3	C302	H18	R319	A24	R407	I31
C111	M12	C210	J3	R210	I5	C303	L27	R320	B23	R408	I33
C112	M1	C211	G3	R211	K3	C304	E21	Z300	D20	R409	F33
L100	F20	C212	J12	R212	J13	C305	F25	C407	K29	R410	E27
L101	H23	C213	G10	R213	I14	C306	D23	C408	M29	R411	D31
L102	I18	C214	E14	R214	I11	C307	D27	C409	L32	R412	H31
L103	K23	C215	F11	R215	H10	C308	C26	C410	L31	R413	E27
R100	G21	C216	D13	R216	F11	C309	D18	C411	K7	R414	H30
R101	K24	C217	D16	R217	C12	R300	K15	C412	M30	R415	G28
R102	A22	C218	F9	R218	D14	R301	K16	C413	J32	R416	E31
R103	K21	C219	D17	R219	D13	R302	I27	C414	J33	R418	M33
R104	K20	L200	E3	R220	D10	R303	M24	C415	J34	R419	M31
R105	N18	L201	L6	R222	D12	R304	M25	C416	G35	R421	M22
R106	L22	L202	J11	R224	H12	R305	K25	C417	G7	X401	M29
R108	M7	L203	E13	R225	H9	R306	I25	C418	F29		
		L204	D13			R307	E24	C419	C7		

WESTINGHOUSE Chassis V-2366, Service Information, Continued

KEY to figure 5,

1. Red lead to audio output transformer, T100
2. Lead to tuner B+, 120 volts
3. Shielded lead to tuner output
4. Lead to tuner heater
5. Lead to AGC
6. Lead to CRT pin 2
7. Lead to C403A, low B+, 120 volts
8. Lead to CRT pin 6
9. Lead to arm of BRIGHTNESS control, R229
10. Lead to CRT pin 11
11. Yellow lead to vertical output transformer T300 and vertical winding of deflection yoke Z301
12. Lead to CRT pin 10
13. Lead to arm of BRIGHTNESS control, R229
14. Shielded lead to VERTICAL hold control, R309
15. Heater to ground lead
16. Shielded lead to arm of VERTICAL hold control, R309
17. Blue lead to vertical output transformer, T300
18. Red/Yellow lead to vertical output transformer, T300
19. Heater lead to pin 2 of V2, 12DQ6 horizontal output
20. Shielded lead to HORIZONTAL hold control, R417
21. Lead to CRT pin 1
22. Lead to pin 5 of V2, 12DQ6 horizontal output
23. Lead to C403A, low B+, 120 volts
24. White/black lead to horizontal output transformer, T400, terminal 3, boost B+, 190 volts
25. Lead to C405A, B+, 140 volts
26. Lead to arm of CONTRAST control, R223
27. Lead to CONTRAST control, R223
28. Shielded lead to VOLUME control, R107
29. Shielded lead to arm of VOLUME control, R107
30. Blue lead to audio output transformer, T100

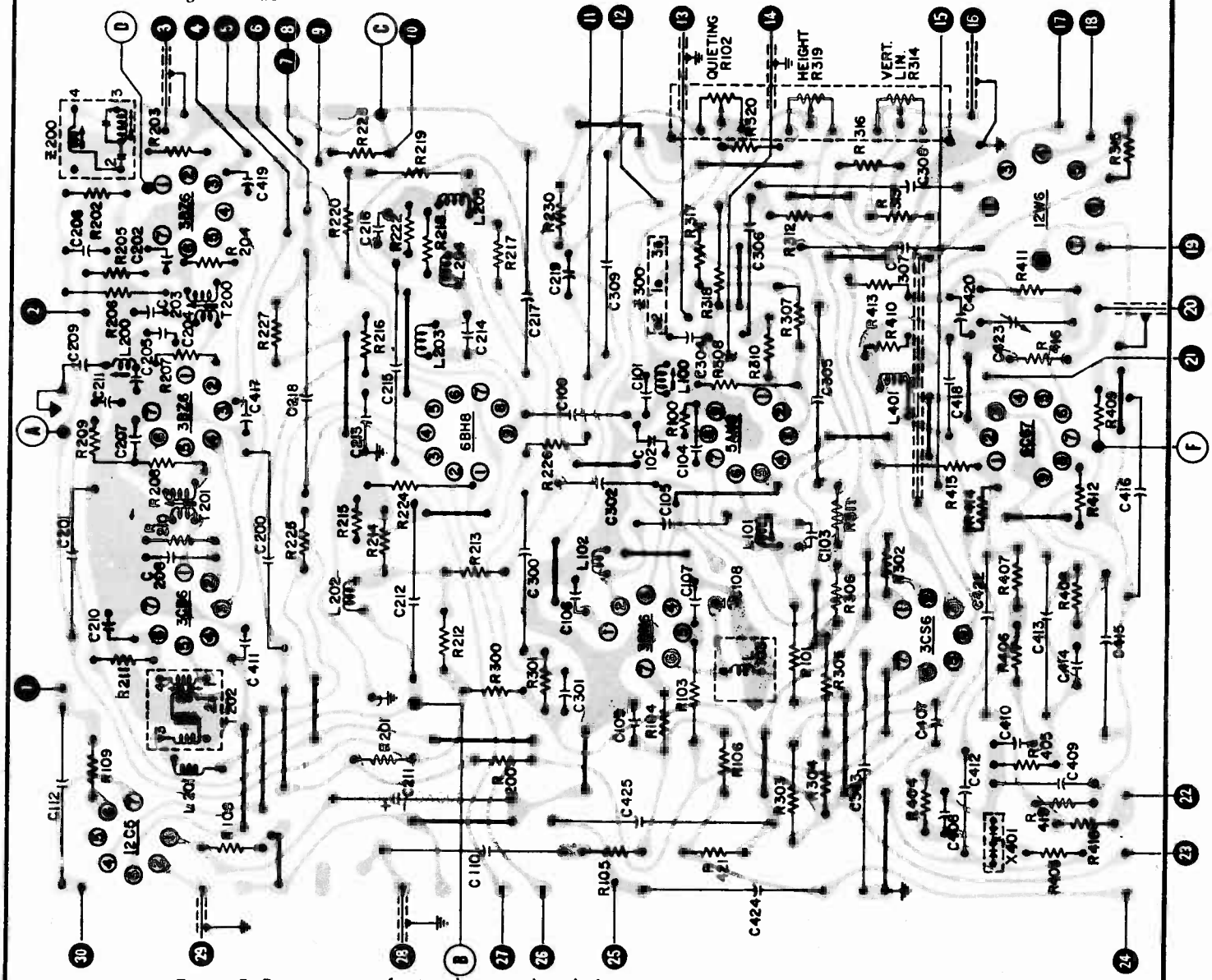
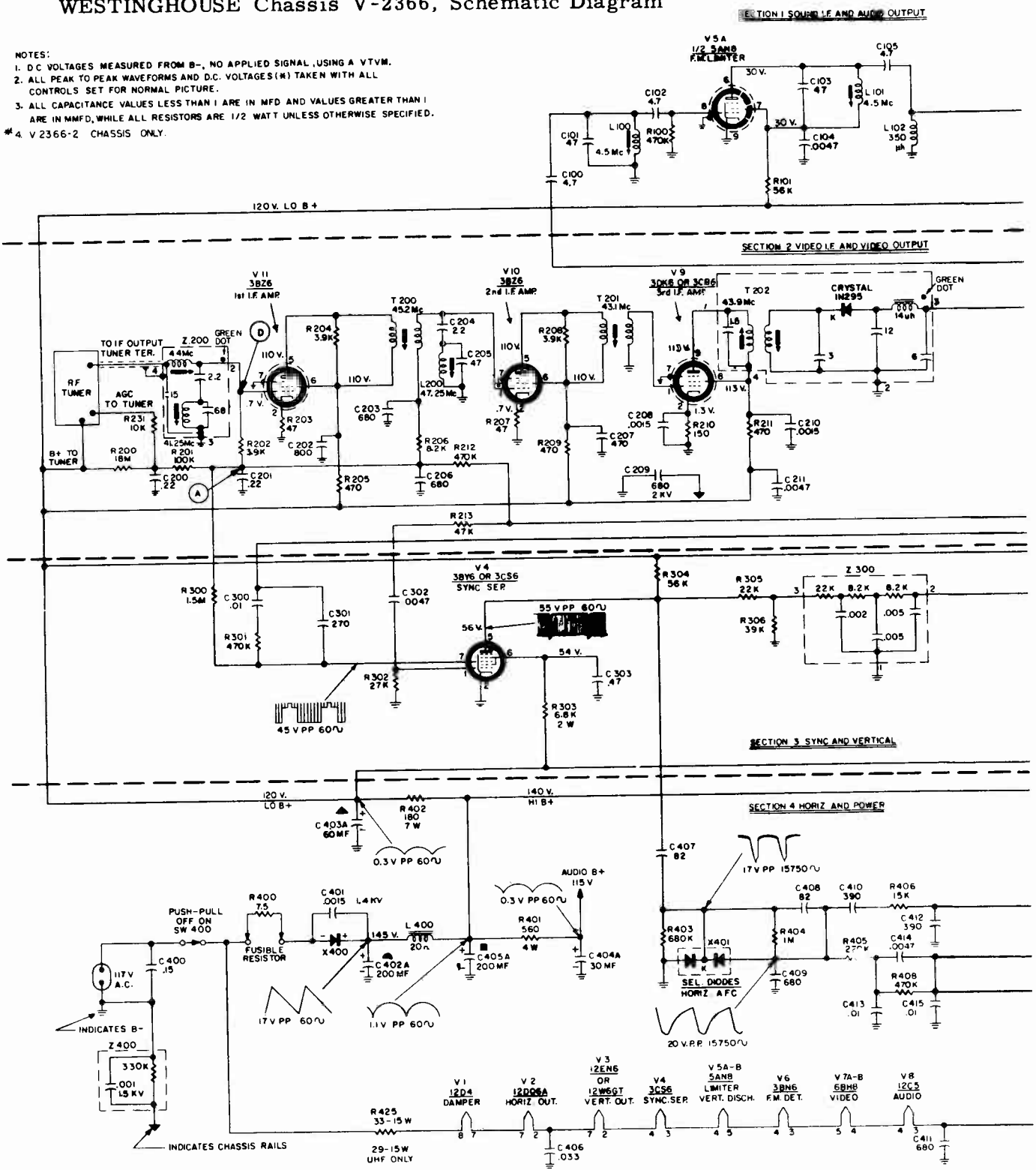


Figure 5. Bottom view of printed circuit board showing top components as schematic symbols.

WESTINGHOUSE Chassis V-2366, Schematic Diagram

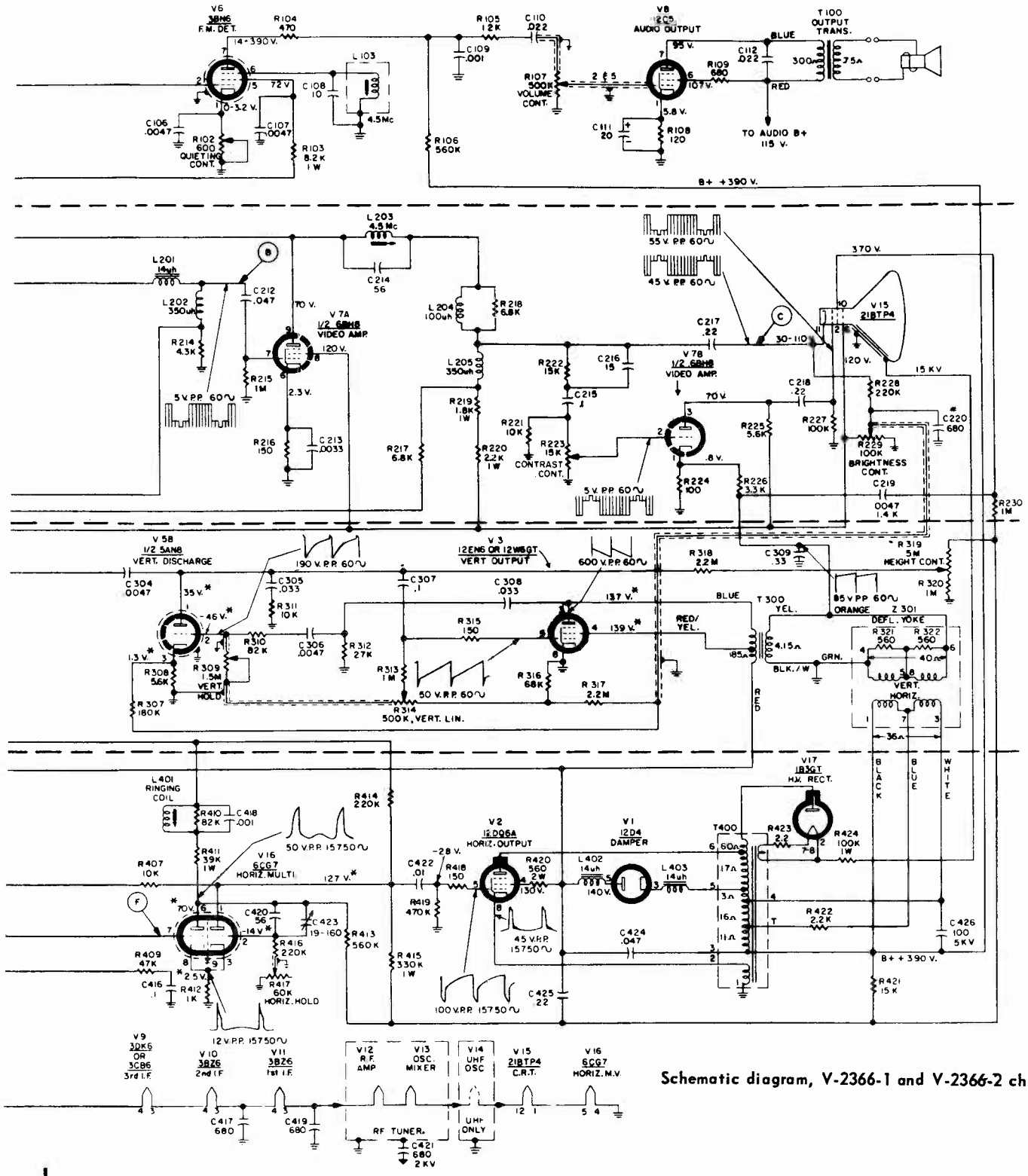


SOUND ALIGNMENT

ALIGNMENT USING AN AIR SIGNAL

1. Tune the receiver to a television station. Connect an attenuator between the antenna lead-in and receiver so that signal strength may be varied from weak to strong.
2. Set the quieting control to mid-range.
3. Apply a strong signal to the receiver. Adjust the quadrature coil, L103 for maximum program sound. If peaks occur at two widely separated positions, use the one that occurs with the slug farthest counterclockwise. If two peaks occur within a narrow range of adjustment, sufficient signal is not being applied to the receiver or the quieting control is not set at the correct position.

WESTINGHOUSE Chassis V-2366, Schematic Diagram



Schematic diagram, V-2366-1 and V-2366-2 chassis

4. Apply a very weak signal that allows noise to be heard. Adjust the 4.5 mc IF slugs (L100 and L101) for maximum program sound. If peaks occur at two different positions of the slug, use the peak that occurs when the slug is farthest counterclockwise.
5. Using a strong signal, readjust L103 for maximum sound.
6. Apply a strong signal and readjust the quieting control for minimum hum. This control determines the AM rejection characteristics of the sound system. Its correct setting is normally about mid-position.

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MODEL AND CHASSIS CHART

Model	*Chassis*	*Bands Covered*	*Tuner Used*	*Tuner Tubes*	*UHF Adaptability*	*Additional Information*
H21K210 – *mahogany* H21K211 – *limed oak* H21T206 – *mahogany* H21T207 – *blond*	V-2364-1	VHF	VHF: 470V049H01, code 305	RF amp: 2BN4 Mix-osc: 5CG8	External converter required	12DT5 used as vertical output tube
H21KU210 – *mahogany* H21KU211 – *limed oak* H21TU206 – *mahogany* H21TU207 – *blond*	V-2364-2	VHF–UHF	VHF: 470V050H01, code 305 UHF: 472V024H04	RF amp: 2BN4 Mix-osc: 5CG8 UHF osc: 2AF4A Crystal: 1N82A	Equipped with UHF tuner	12DT5 used as vertical output tube
H21K210A – *mahogany* H21K211A – *limed oak* H21T206A – *mahogany* H21T207A – *blond*	V-2364-3	VHF	VHF: 470V049H01, code 305	RF amp: 2BN4 Mix-osc: 5CG8	External converter required	5CZ5 used as vertical output tube
H21KU210A – *mahogany* H21KU211A – *limed oak* H21TU206A – *mahogany* H21TU207A – *blond*	V-2364-4	VHF–UHF	VHF: 470V050H01, code 305 UHF: 472V024H04	RF amp: 2BN4 Mix-osc: 5CG8 UHF osc: 2AF4A Crystal: 1N82A	Equipped with UHF tuner	5CZ5 used as vertical output tube

(Service material on pages 172 through 178)

CHASSIS REMOVAL

1. Remove the following knobs from front of escutcheon: CONTRAST, VHF channel selector, and PULL-ON VOLUME.
   If receiver is a UHF model, remove UHF knob and dial from side of cabinet.
2. Remove screws which hold back cover. Remove back cover.

See figure 1

3. FROM INSIDE THE CABINET, remove screws 1 and 2. These screws hold escutcheon from the rear, and are located in extreme upper left and right corners.
4. Remove the outside antenna lead-in wire and antenna bracket.
5. Unplug speaker leads.
6. Remove screws 3, 4, and 5, which hold escutcheon on front bracket.
7. Remove escutcheon.
8. Remove thumbwheels.
9. Remove screws 6, 7, 8, and 9, Note location of these screws in the diagram.
10. Remove chassis retaining bolts, accessible from bottom of cabinet.
11. Slide chassis out of cabinet.

CRT REMOVAL

Remove chassis from cabinet. Remove CRT socket, yoke and HV connector. Loosen bolt (at top of CRT) which secures CRT support strap. Carefully remove CRT.

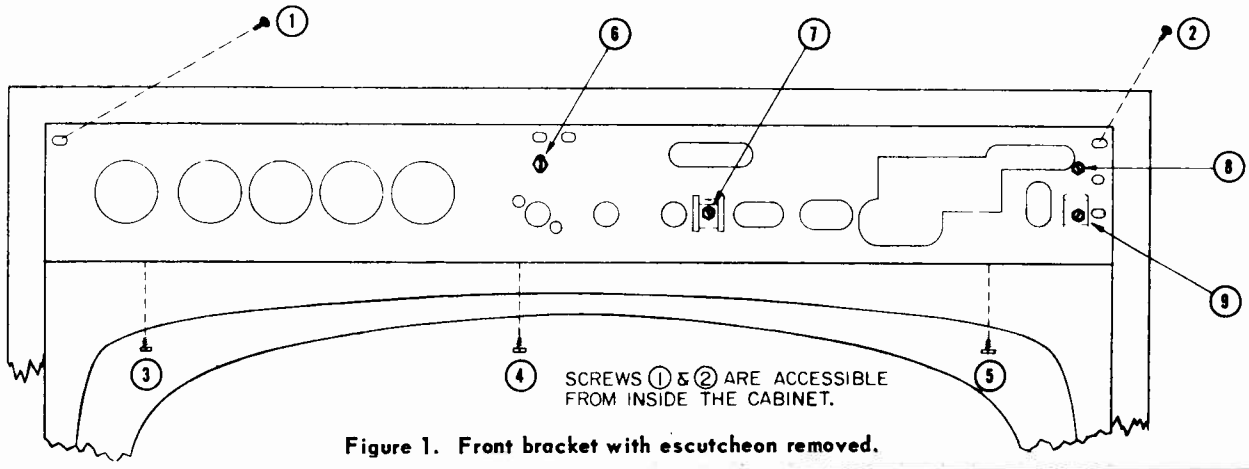


Figure 1. Front bracket with escutcheon removed.

WESTINGHOUSE Chassis V-2364, Service Data, Continued

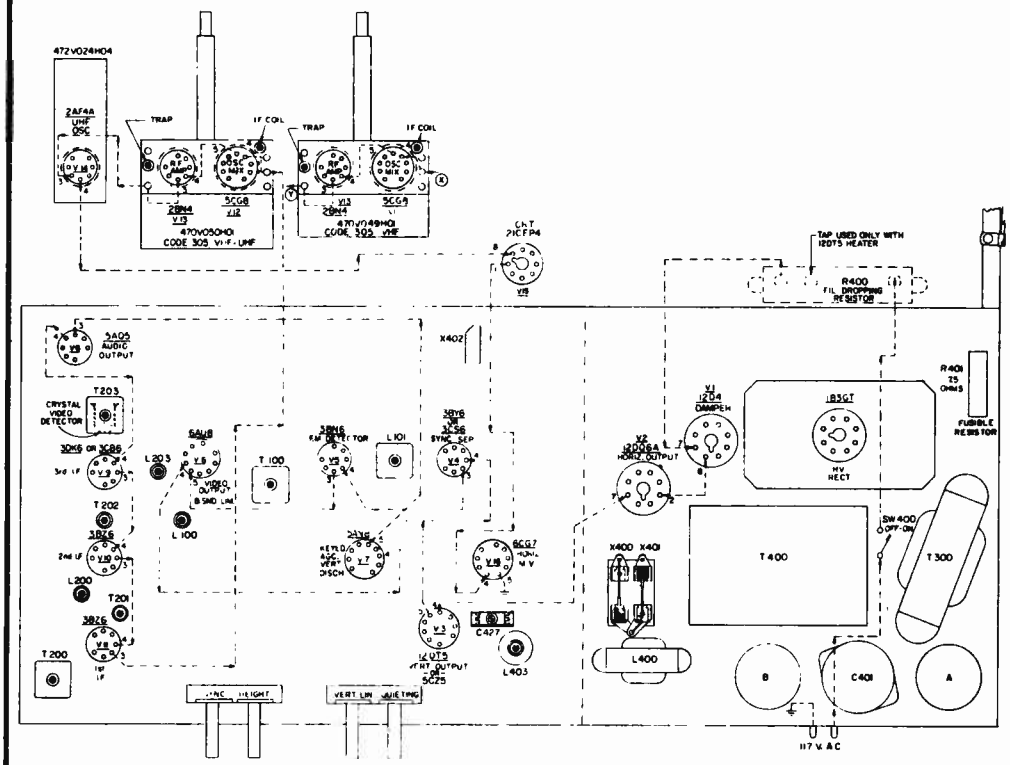


Figure 2. Tube location, heater string, and adjustments. Top view of chassis.

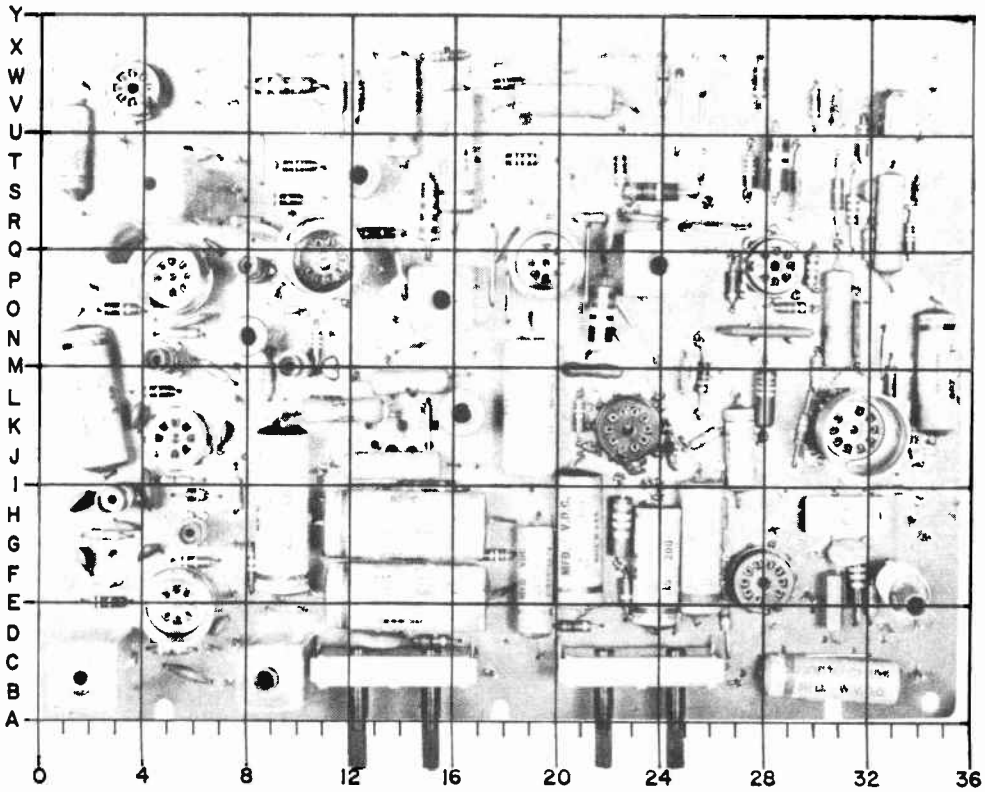


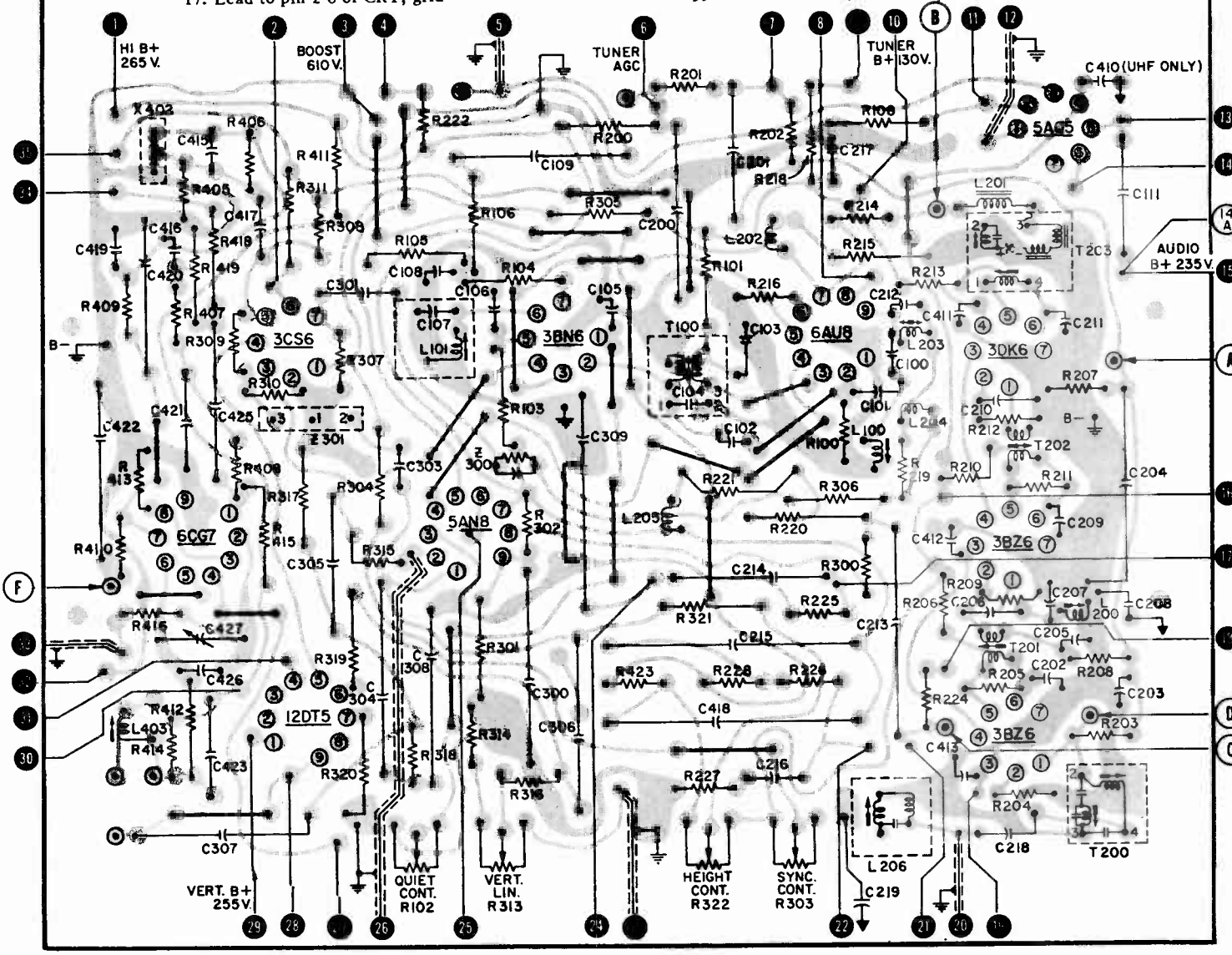
Figure 3. Top view of printed circuit board. Guide to location of resistors, capacitors, coils, and transformers when used with the chart.

PART	LOCATION	PART	LOCATION
C100	P9	R228	G14
C101	O9	T200	C2
C102	N14	T201	G6
C103	P14	T202	M5
C105	R18	T203	S4
C106	R22	C300	G21
C108	R23	C301	R26
C109	V20	C303	M25
C111	U1	C304	G25
L100	M10	C305	K27
L101	P24	C306	F19
R100	N10	C307	B30
R101	R15	C308	F24
R102	C24	C309	L19
R103	O22	R300	J 10
R104	R21	R301	H22
R105	S23	R302	L21
R106	T22	R303	C12
R108	W9	R304	M26
T100	P15	R305	T18
C200	U16	R306	L11
C201	V14	R307	P26
C202	G4	R308	T27
C203	G2	R309	P30
C204	M2	R310	O29
C205	H3	R311	T28
C206	I6	R313	C22
C207	I4	R314	F23
C208	H2	R315	K26
C209	K4	R316	D21
C210	O6	R317	L28
C211	Q3	R318	E25
C212	R9	R319	H26
C213	H9	R320	D26
C214	J 13	R321	I15
C215	H14	R322	C15
C216	D13	Z300	M21
C217	V10	Z301	N28
C218	C6	C410	X2
L200	I3	C411	Q7
L201	T6	C412	K7
L202	T12	C413	D7
L203	P8	C415	V30
L204	N8	C416	S32
L205	K16	C417	S29
R200	W18	C418	F14
R201	X16	C419	T34
R202	V12	C420	S33
R203	E3	C421	O32
R204	D5	C422	M35
R205	F6	C423	E31
R206	I7	C425	O31
R207	O3	C426	G31
R208	G3	C427	H31
R209	I5	L403	F33
R210	M7	R405	U31
R211	L5	R406	V29
R212	N5	R407	R32
R213	R8	R408	M30
R214	T10	R409	R33
R215	S10	R410	K34
R216	R13	R411	W27
R218	V11	R412	F31
R219	M9	R413	L33
R220	L12	R414	E32
R221	M14	R415	K30
R222	W24	R416	I33
R224	F8	R418	S30
R225	H12	R419	S31
R226	G12	R423	G18
R227	D15	X402	V33

WESTINGHOUSE Chassis V-2364, Service Information, Continued

Bottom view of printed circuit board showing top components as schematic symbols.

1. Lead to high B+, 265 volts
2. Lead to C302, .47 mfd
3. Boost B+, 610 volts
4. Lead to R223, BRIGHTNESS control
5. Shielded lead to R107, VOLUME control
6. AGC lead to tuner
7. AGC lead to lug no. 1, T400
8. Lead to R217, CONTRAST control
9. Lead to arm of CONTRAST control
10. B+ lead to tuner, 130 volts
11. Lead to C110B, 20 mfd
12. Shielded lead to R107, VOLUME control
13. Blue lead to T101, audio output transformer
14. Lead to screen supply, audio B+, 230 volts
14A. Red lead to T101, audio output transformer
15. Lead to audio B+, 235 volts
16. Lead to pin 4 of CRT, focus
17. Lead to pin 2-6 of CRT, grid
18. Lead to R223, BRIGHTNESS control
19. Heater lead to tuner
20. Shielded lead from tuner, IF input
21. Lead to pin 7 of CRT, cathode
22. Lead to pin 3 of CRT, screen
23. Shielded lead to R312, VERTICAL hold
24. Lead to T300 and orange lead to yoke, Z302
25. AGC lead to lug 2, T400
26. Shielded lead to R312, VERTICAL hold
27. Lead to pin 1 of CRT, heater
28. Blue lead to T300, vertical transformer
29. Red lead to T300, vertical transformer
30. Lead to C424A, 10 mfd
31. Lead to pin 7 of 12DQ6A horiz. output tube
32. Black lead to ground, B−
33. Shielded lead to R417, HORIZONTAL hold
34. Lead to pin 5 of 12DQ6A horiz. output tube
35. Lead to low B+, 130 volts



WESTINGHOUSE Chassis V-2364, Service Information, Continued

ALIGNMENT

VIDEO ALIGNMENT

VIDEO ALIGNMENT EQUIPMENT REQUIRED

1. **Oscilloscope.** Use direct probe.
2. **VTVM**
3. **Marker or CW signal generator.** Output frequencies required: 40 through 220 mc. Equipment should be accurate and stable; crystal calibration preferred. Output voltage level should be adjustable.
4. **Sweep generator.** Output frequencies required: 40 through 220 mc (video IF and channels 2 - 13). Output voltage level should be adjustable.
5. **Bias supply.** A 6 volt battery, with a tapped 10 K ohm resistor connected across its terminals, may be used. The resistor should be tapped at the 3 volt point for the receiver AGC connection, and at the 2.5 volt point for the tuner AGC connection. Or, two separate batteries may be used.

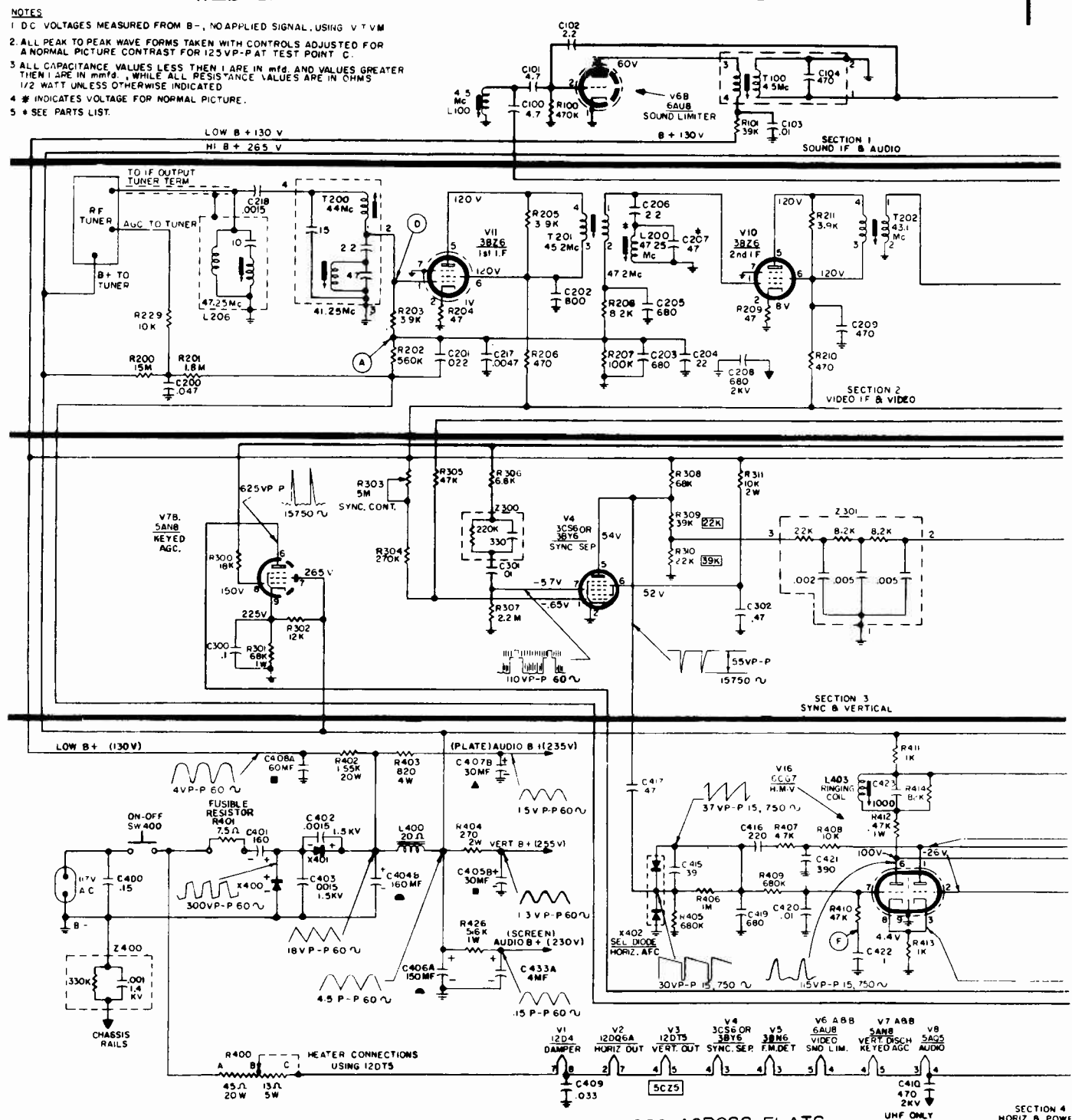
VIDEO ALIGNMENT CHART

Use alignment tool shown in figure 6, except where noted.

For scope-to-test point connection, or VTVM-to-test point connection, use decoupling network shown in figure 10.

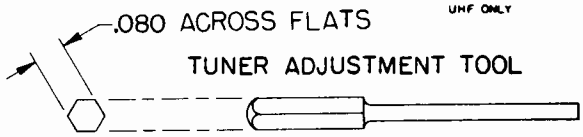
Step	Generator	Freq. (MC)	Generator Connection Point	Indicator and Connection Point	Adjustment
1.					Connect -3V bias to test point A. Detune the IF output coil located in the tuner. (Figure 14)
2.	IF sweep	43.9	Connect generator output to grid of V9 (pin 1).	Scope, calibrated 2V P-P. Connect to test point B thru decoupling network.	T203. Bottom slug for maximum output; top slug to rock response at 43.9 mc.
3.			Remove sweep generator output cable from grid of V9.		
4.	CW	43.1	Connect generator output to test point D, thru terminated cable.	VTVM. Connect to test point B thru decoupling network.	T202. Adjust for maximum output.
5.	CW	47.25	" "	" "	L200. Adjust for minimum output.
6.	CW	45.2	" "	" "	T201. Adjust for maximum output.
7.			Remove CW output cable from test point D.		
8.	IF sweep	44	Connect generator output to test point D thru terminated cable.	Scope, calibrated 2V P-P. Connect to test point B thru decoupling network.	If necessary, touch up T201 and T202 so that curve resembles that shown in figure 11.
9.			Remove IF sweep generator output cable from test point D.		
10.	CW	41.25	Connect CW generator output to tuner test point thru terminated cable.	VTVM. Connect to test point B thru decoupling network. Set VTVM sensitivity so that meter will show an indication at -1.5 volts.	Switch channel selector to channel 12 or 13. Adjust T200, top slug, for minimum voltage indication.
11.	CW	47.25	" "	" "	With channel selector set at either channel 12 or 13, adjust L206 for minimum indication.
12.			Disconnect CW generator output cable from tuner test point.		
13.	CW	59.75	Connect CW generator output to antenna terminals thru impedance matching network. (Figure 8)	" "	Apply -2.5 volts bias to tuner AGC point. Adjust fine tuning control for minimum dip on VTVM. The VTVM should show a voltage rise on either side of the dip.
14.			Disconnect CW generator output cable from antenna terminals.		
15.	RF sweep	CH 2 (54-60)	Connect RF sweep output to antenna terminals thru impedance matching network.	Scope, calibrated 2V P-P. Connect to test point B thru decoupling network.	Tune IF output coil (on tuner) for maximum output. Tune T200 (bottom slug) to rock response at center of pass band (57 mc). Curve is shown in figure 12. Use alignment tool shown in figure 7.

WESTINGHOUSE Chassis V-2364, Schematic Diagram



PART NUMBER V-8623-1
IMPORTANT: USE CORRECT TOOL FOR ALL ALIGNMENT ADJUSTMENTS

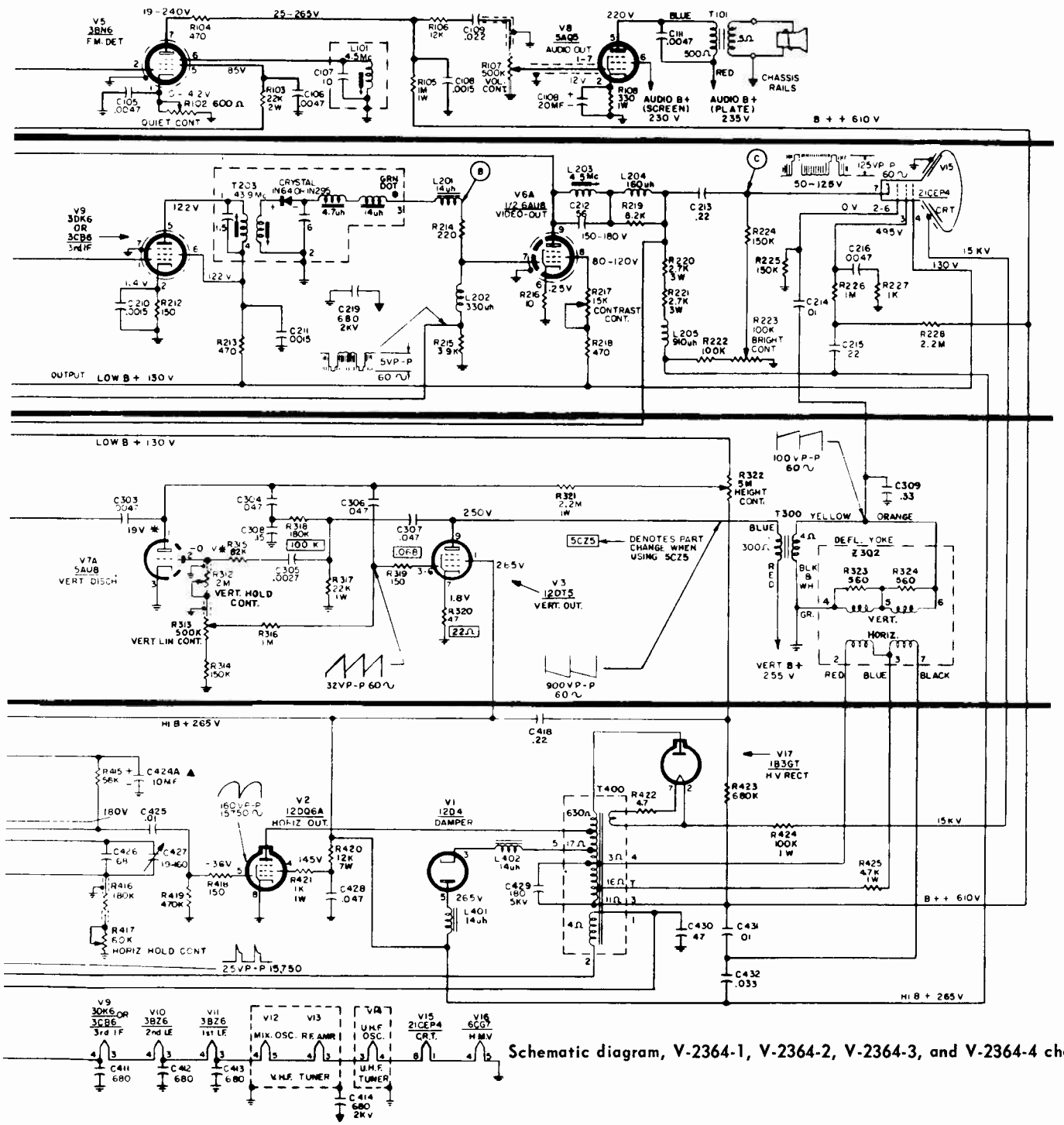
Figure 6. Alignment tool, .099" across flats.



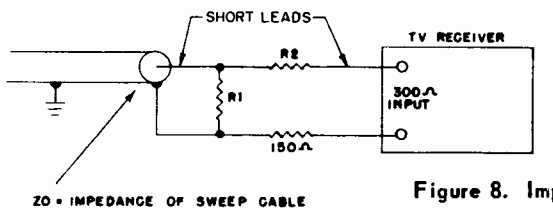
PART NO. V-8623-2

Figure 7. Alignment tool, .080" across flats.

WESTINGHOUSE Chassis V-2364, Schematic Diagram



Schematic diagram, V-2364-1, V-2364-2, V-2364-3, and V-2364-4 chassis.



ZO	R1	R2
52 Ω	56 Ω	120 Ω
72 Ω	85 Ω	110 Ω

Figure 8. Impedance matching network.

Alignment continued on page 178, over.

WESTINGHOUSE Chassis V-2364, Alignment Information, Continued

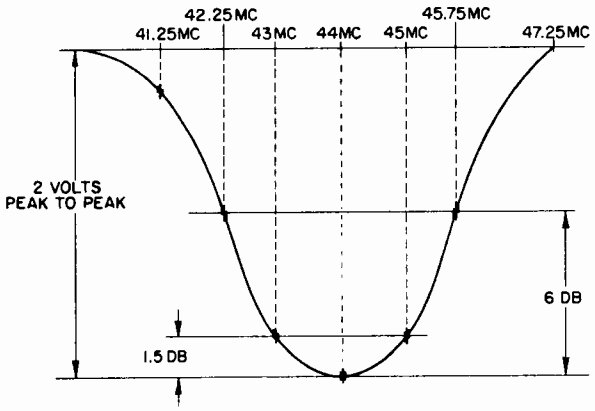


Figure 11. Video IF response curve.

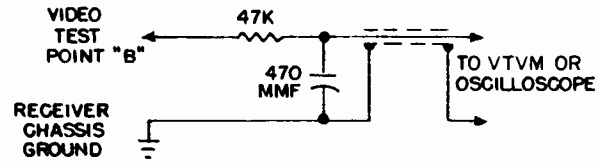


Figure 10. Decoupling network, oscilloscope or VTVM input.

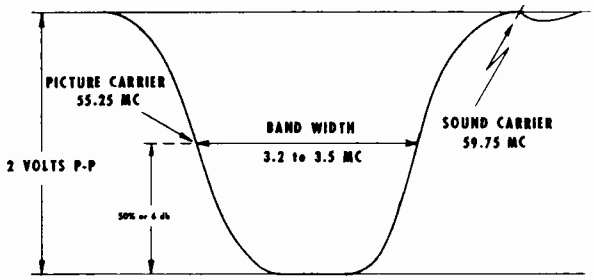


Figure 12. Overall response curve, channel 2.

SOUND ALIGNMENT

The sound section may be aligned using signal generators (FM or AM) or by using an air signal. Alignment procedure for both methods follows:

ALIGNMENT USING A SIGNAL GENERATOR

1. Connect a high impedance AC voltmeter or oscilloscope across the volume control for use as an indicator.
2. Set quieting control to mid-range.
3. Apply a 4.5 mc FM signal (deviation approximately 7.5 kc) to video test point B.
4. Using a strong signal, adjust the quadrature coil, L101, for maximum output.
5. Reduce the signal to the lowest level that will produce an indication. Adjust L100 and T100 for maximum output.
6. Using a strong signal, readjust the quadrature coil, L101, for maximum output.
7. Apply a 4.5 mc AM signal (modulated approximately 30 percent) to video test point B. Adjust the generator output for strong signal level.
8. Adjust the quieting control for minimum AM response or output.

ALIGNMENT USING AN AIR SIGNAL

1. Tune the receiver to a television station. Connect an attenuator between the antenna lead-in and receiver so that signal strength may be varied from weak to strong.
2. Set the quieting control, R102, to mid-range.
3. Apply a strong signal to the receiver. Adjust the quadrature coil, L101, for maximum program sound. If peaks occur at two widely separated positions, use the one that occurs with the slug farthest counterclockwise. If two peaks occur within a narrow range of adjustment, sufficient signal is not being applied to the receiver or the quieting control is not set at the correct position.
4. Apply a very weak signal that allows noise to be heard. Adjust the 4.5 mc IF slugs (L100 and T100) for maximum program sound. If peaks occur at two different positions of the slug, use the peak that occurs when the slug is farthest counterclockwise.
5. Using a strong signal, readjust L101 for maximum sound.
6. Apply a strong signal and readjust the quieting control for minimum hum. This control determines the AM rejection characteristics of the sound system. Its correct setting is normally about mid-position.

ELIMINATION OF THE SPOT REMOVER CIRCUIT

Exhaustive tests showed that the spot appearing on the CRT was not detrimental. Therefore, the spot remover circuit (R228 & C215) was eliminated in later production.

3BN6 TUBE SOCKET CHANGE

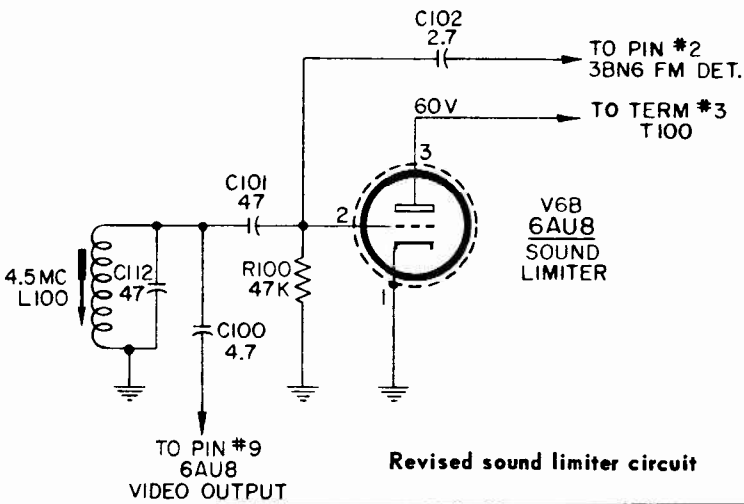
The tube socket for the 3BN6 FM Detector was replaced by a socket of different composition to further reduce any tendency toward 4.5 MC drift.

VERTICAL OUTPUT VOLTAGE CHANGE

Later production, using the 12DT5 Vert. Out tube, required a change in the screen grid (pin 1) voltage from Hi B+ (265V) to Vert. B+ (255V). This change provides a more stable vertical output operating range.

REVISION OF SOUND LIMITER CIRCUIT

The sound limiter circuit has undergone several changes. These changes result in improved tuning characteristics and a lower interference level without any decrease in sound sensitivity.



Revised sound limiter circuit

ZENITH RADIO CORPORATION

ZENITH TELEVISION

CHASSIS 15A26 - 15A26Q - 17A30 - 17A30Q - 17A31Q - 19A30 - 19A30Q

CHASSIS 15B20 - 15B20Q - 17B20 - 17B20Q - 17B21Q - 17B22 - 19B20 - 19B20Q

Service material on pages 179 through 190. Model and chassis information below.

MODEL	CHASSIS	PICTURE TUBE
A1410L	15A26	14AUP4
A1411P	15A26	14AUP4
A1412G	15A26	14AUP4
A1716L	15A26	17CRP4
A1717G	15A26	17CRP4
A1718G	15A26	17CRP4
A1719J	15A26	17CRP4
A2001L	15A26Q	17CRP4
A2221R & L	17A30	21CXP4
A2223E,R,Y	17A30	21CXP4
A2245,E,R	17A30	21CXP4
A2246E & R	17A30	21CXP4
A2252R	17A30	21CXP4
A2253E & R	17A30	21CXP4
A2282E & R	17A30/3Z01	21CXP4
A2329R	19A30	21CXP4
A2330E &R	19A30	21CXP4
A2360M & R	19A30	21CXP4
A2673E & R	17A30	24AJP4
A3000E & R	17A31Q	21CXP4
A3001E & R	17A30Q	21CXP4
A3004,E,R	17A31Q	21CXP4
A3006E,H,R	17A30Q	21CXP4
A3007R	17A30Q	21CXP4
A3008E & R	17A30Q	21CXP4
A3009E & H	17A30Q	21CXP4
A3010E & R	19A30Q	21CXP4
A3011,E,Y	19A30Q	21CXP4
A3012H & R	19A30Q	21CXP4
A3013H	19A30Q	21CXP4
A3014H & R	19A30Q	21CXP4
A4007E & R	19A30Q	24AJP4
A4012H & R	19A30Q	24AJP4

Suffix Q following chassis number identifies remote control set. Suffix U or UD is added to chassis and model number when UHF tuner is added to set.

MODEL	CHASSIS	PICTURE TUBE
B1410L & LZ	15B20	14AUP4
B1411P & PZ	15B20	14AUP4
B1412G & GZ	15B20	14AUP4
B1413G & GZ	15B20	14AUP4
B1715L	15B20	17CRP4
B1716C	15B20	17CRP4
B1717J	15B20	17CRP4
B1718B	15B20	17CRP4
B1719P	15B20	17CRP4
B1720C	15B20	17CRP4
B2001L	15B20Q	17CRP4
B2221R & Y	17B20	21CXP4
B2223E,R,Y	17B20	21CXP4
B2225,E,R	17B20	21CXP4
B2245,E,R	17B20	21CXP4
B2245Z,EZ,RZ	17A30	21CXP4
B2246E & R	17B20	21CXP4
B2247E & R	17B20	21CXP4
B2247EZ & RZ	17A30	21CXP4
B2249,H,R	17B20	21CXP4
B2250MZ & RZ	17A30	21CXP4
B2254E,H,R	17B20	21CXP4
B2282,E,R	17B22/5B26	21CXP4
B2329R	19B20	21CXP4
B2330E & R	19B20	21CXP4
B2335,E,R	19B20	21CXP4
B2358E & R	19B20	21CXP4
B2359 & E	19B20	21CXP4
B2360M & R	19B20	21CXP4
B2673,E,R	17B20	24AJP4
B3000E & R	17B21Q	21CXP4
B3001E & R	17B20Q	21CXP4
B3004,E,R	17B21Q	21CXP4
B3006,E,R	17B20Q	21CXP4
B3007E & R	17B20Q	21CXP4
B3008R	17B20Q	21CXP4
B3009,E,Y	17B20Q	21CXP4
B3010E,H,R	19B20Q	21CXP4
B3011,E,Y	19B20Q	21CXP4
B3012H & R	19B20Q	21CXP4
B3013H	19B20Q	21CXP4
B3014H & R	19B20Q	21CXP4
B4007E & R	19B20Q	24AJP4
B4012H & R	19B20Q	24AJP4

AGC ADJUSTMENT

To adjust the AGC, 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 inter-carrier buzz, picture distortion and improper sync. This setting will correspond to approximately 3 V. peak to peak output from the video detector.

FRINGE LOCK ADJUSTMENT

The fringe lock adjustment is made to obtain best possible synchronization under weak and noisy signal conditions. To adjust, first check the AGC adjustment and proceed as follows.

1. Turn the fringe lock control fully clockwise and then back it off approximately 1/4 turn. Adjust the vertical and horizontal hold controls and check operation of the receiver to see that it syncs normally when the turret is switched from channel to channel.

2. If the picture jitters or shows evidence of delay, tearing, split phase, etc., back down the fringe lock control further, a few degrees at a time, each time re-adjusting the hold controls and switching from channel to channel until normal sync action is obtained. It will be found that under normal signal conditions, the correct adjustment will be near the counterclockwise position of the control.

3. In fringe and noisy areas, the best adjustment will be found at or near the maximum clockwise position of the control; however, do not automatically turn the fringe lock fully clockwise in fringe areas. Follow the procedure outlined. In areas where both local and fringe signals are received, a compromise setting should be made for best overall performance.

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 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 re-adjustment unless accidentally bent out of position. If this occurs, proceed as follows:

1. With the vertical and horizontal size controls, reduce the size of the picture to a point where the four corners and sides of the picture are visible. (In some receivers it may not be possible to reduce the picture size sufficiently to see all the sides and in this case 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.

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.

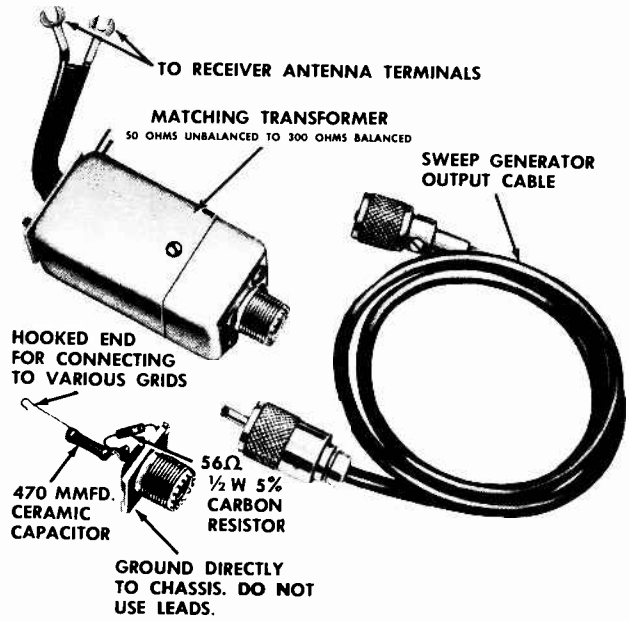


Fig. 5 IF-RF Alignment Fixtures

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 with 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 tube and trimmer layout for reference test points.

1. Slowly turn the channel selector until the tuner rotor is made to rest between two channels. This will prevent an erroneous response.

2. Connect an oscilloscope through a 10,000 ohm isolation resistor to terminal "C" (detector). Connect the ground lead to chassis.

3. Feed the sweep generator through the special terminating network shown in Fig. 5 to point "G" (Pin 1 of the 3rd IF). Adjust generator to obtain a response similar to Fig. 6 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. 6. The 39.75 Mc

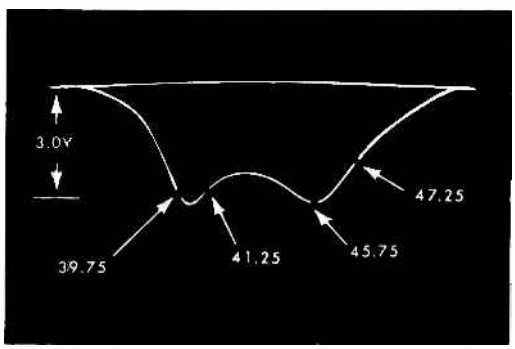


Fig. 6. 4th IF Response

marker can fall within ± 0.5 Mc of the specified frequency. If the correct response cannot be obtained, check the position of the cores to see that they are not butted but are entering their respective windings from the opposite ends of the coils.

5. Connect the sweep generator to terminal "A" (Mixer grid, see fig. 1,2 or 3, depending on tuner). Connect terminal "F" to chassis and connect a jumper between terminal "E" and the junction of the 56 (68 in 15A26) and 1500 ohm resistors in the cathode of the 1st IF. Adjust sweep to obtain a response similar to Fig. 9. Switch oscilloscope to 10 X gain to "blow up" the traps.

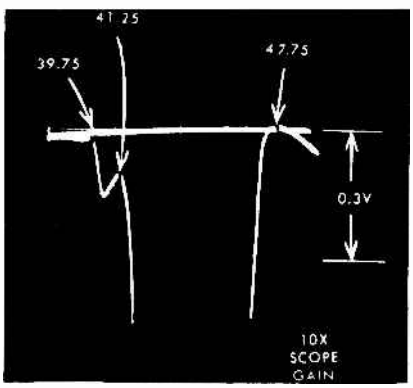


Fig. 7. Expanded View of Traps

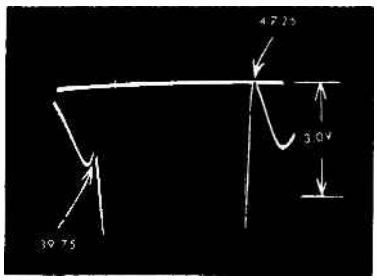


Fig. 8. Further Expansion of Fig. 7 for detail view of the 39.75 and 47.25 Mc Traps.

6. Refer to Fig. 7 and 8 and adjust the 39.75 Mc 41.25 Mc, and the two 47.25 Mc traps for minimum marker amplitude. (15A26 chassis has one 47.25 Mc trap.) It can be seen that high oscilloscope gain must be used to "run" the response off the screen in order to view a "blow up" of the traps.

7. Disconnect the jumper between "E" and the 56 and 1500 ohm cathode resistors. Connect this jumper between "E" and chassis. Adjust sweep generator for 3 volts peak to peak output. Alternately adjust the 2nd, 3rd, 1st IF and the converter plate coil until an overall response similar to Fig. 9 (Fig. 10 for 15A26) 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. After alignment remove all jumpers and check operation.

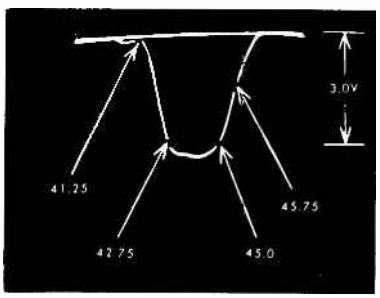


Fig. 9. Overall IF Response 17A & 19A Chassis

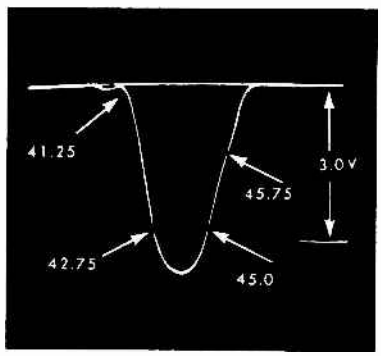


Fig. 10. Overall IF Response 15A26 Chassis

ZENITH Chassis 15A26 and 15A26Q Service Material

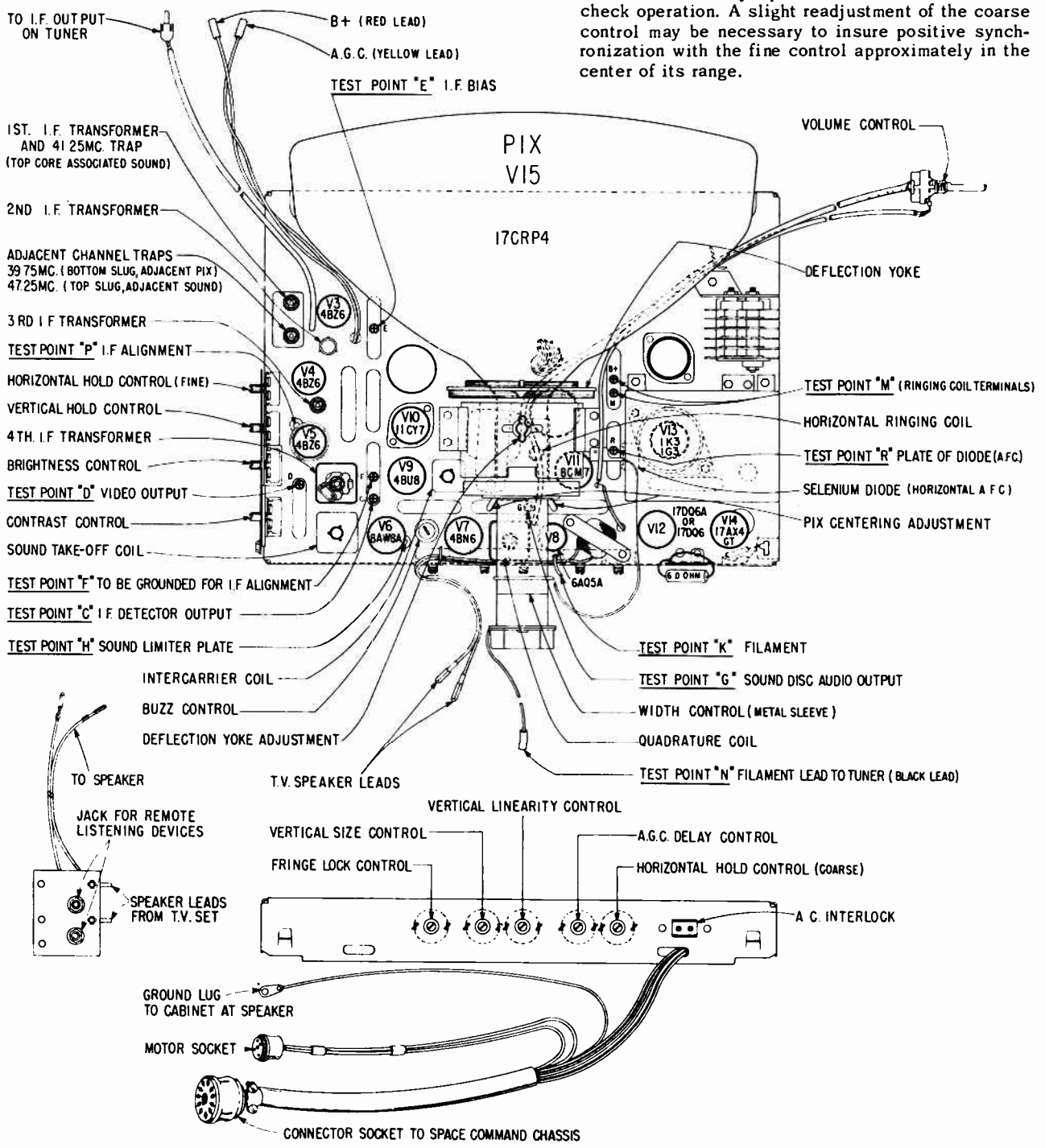
AFC ADJUSTMENT

1. Connect a jumper from the grid end of diode X2 (see fig) to chassis. Connect a short jumper across the terminals of the oscillator coil. Set the horizontal fine control to the center of its range.

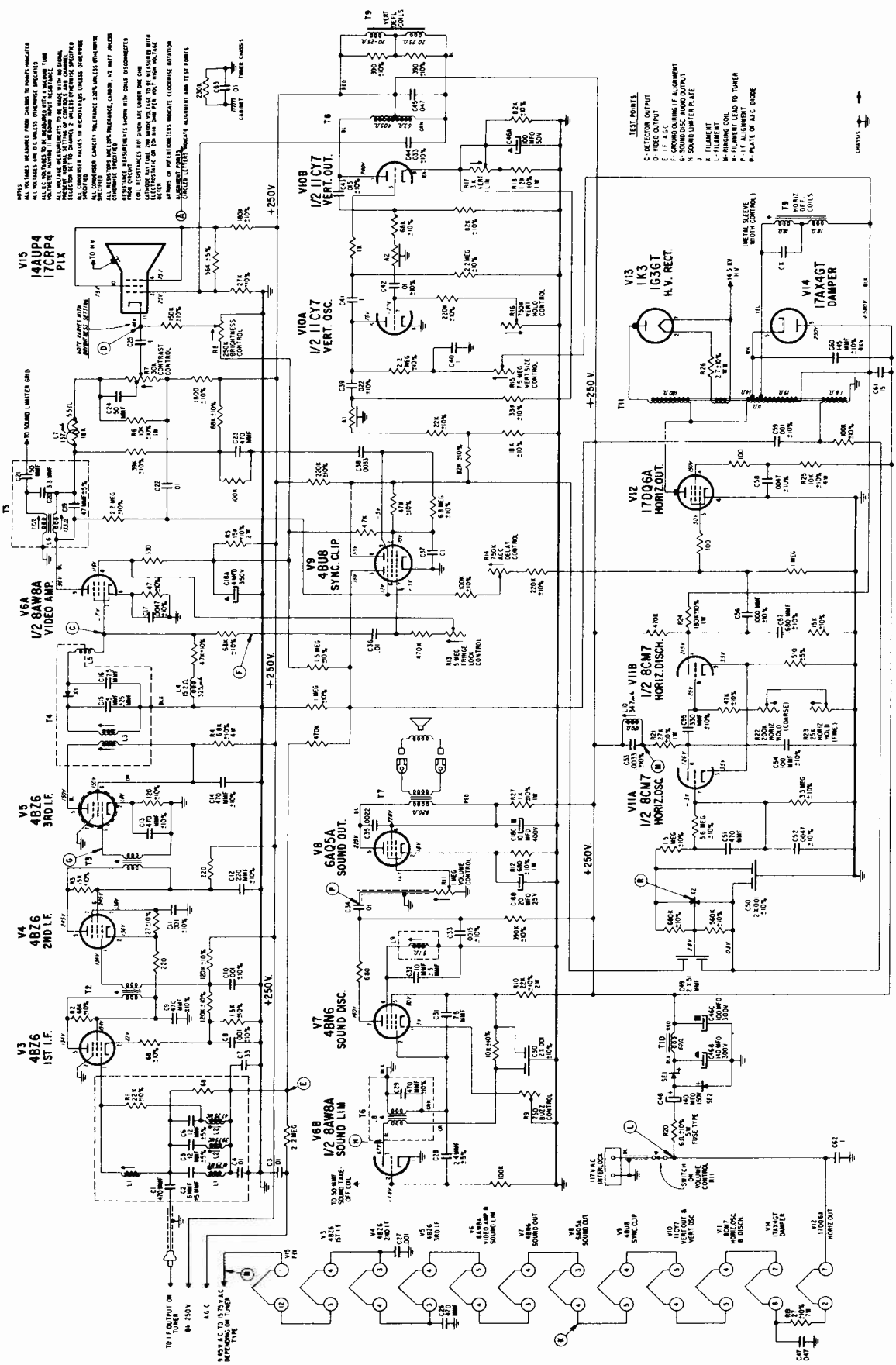
2. Tune in a TV station and adjust the horizontal coarse control until the picture is as nearly synchronized as possible.

3. Remove the jumper from the oscillator coil and adjust the core until the picture is again as nearly synchronized as possible.

4. Remove the jumper from the AFC diode and check operation. A slight readjustment of the coarse control may be necessary to insure positive synchronization with the fine control approximately in the center of its range.

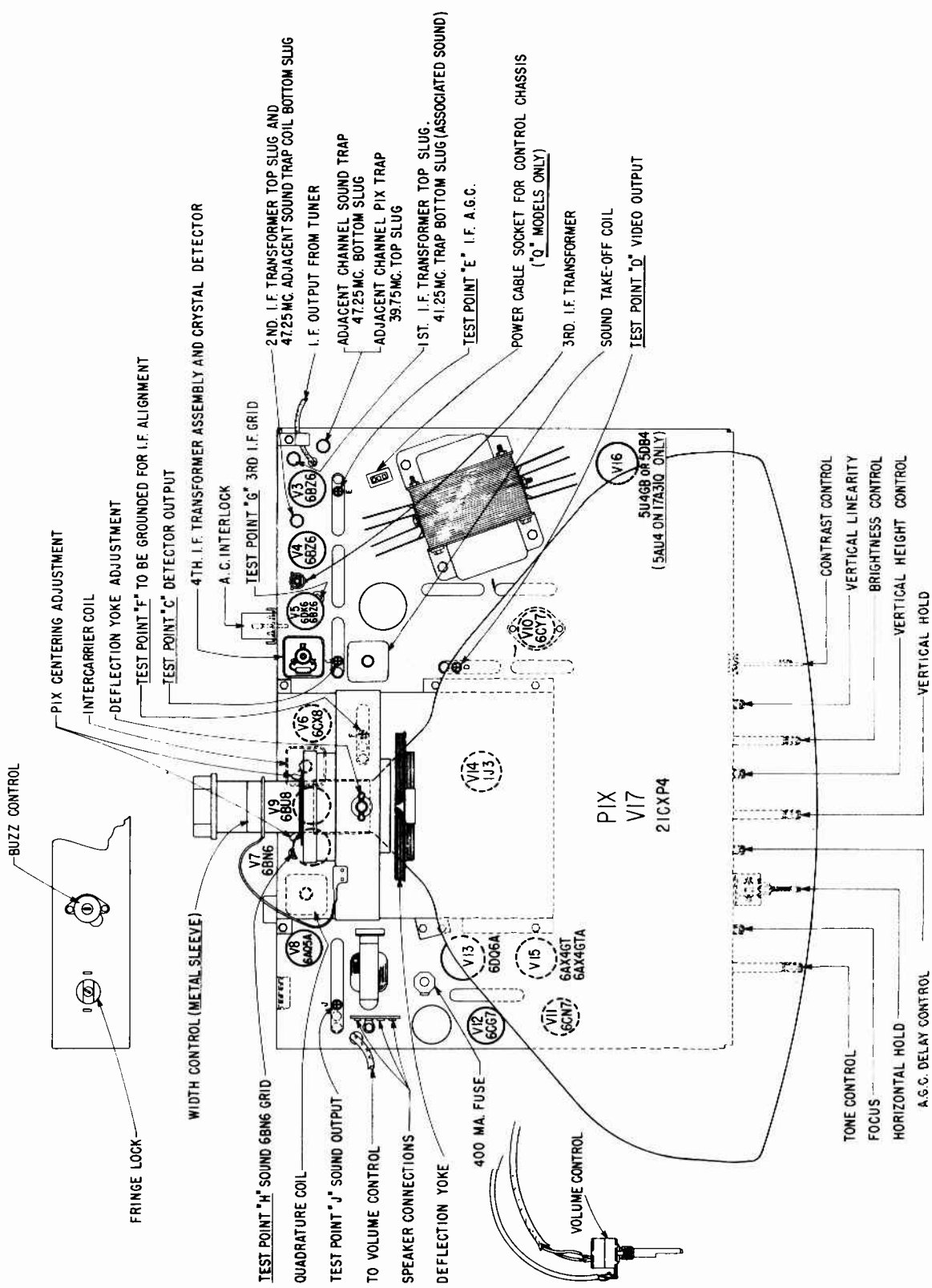


Tube and Trimmer Layout 15A26 & 15A26Q Chassis.



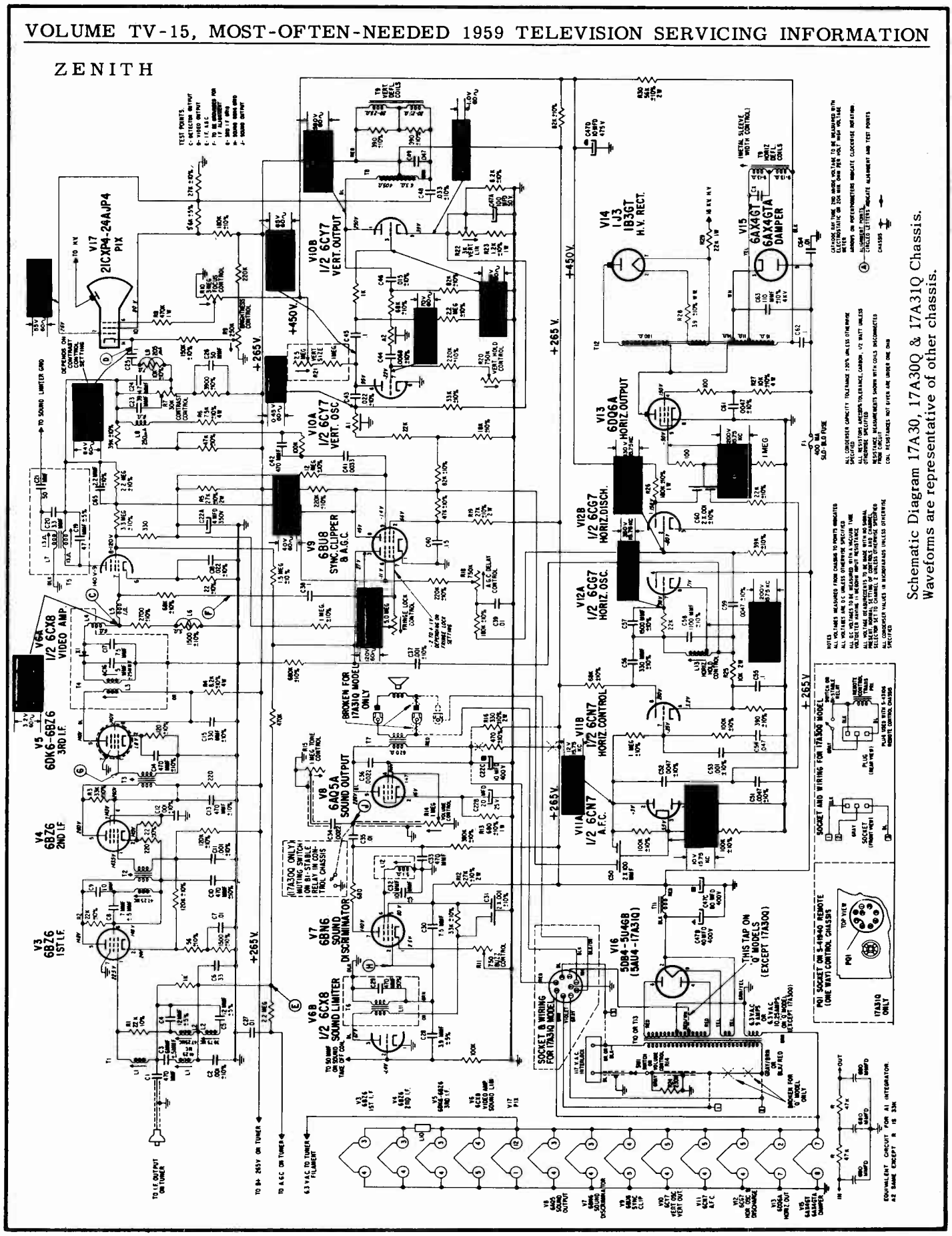
ZENITH Schematic Diagram of Chassis 15A26. Chassis 15A26Q is essentially the same except for Space Command circuit.

ZENITH Chassis 17A30 Tube and Trimmer Layout

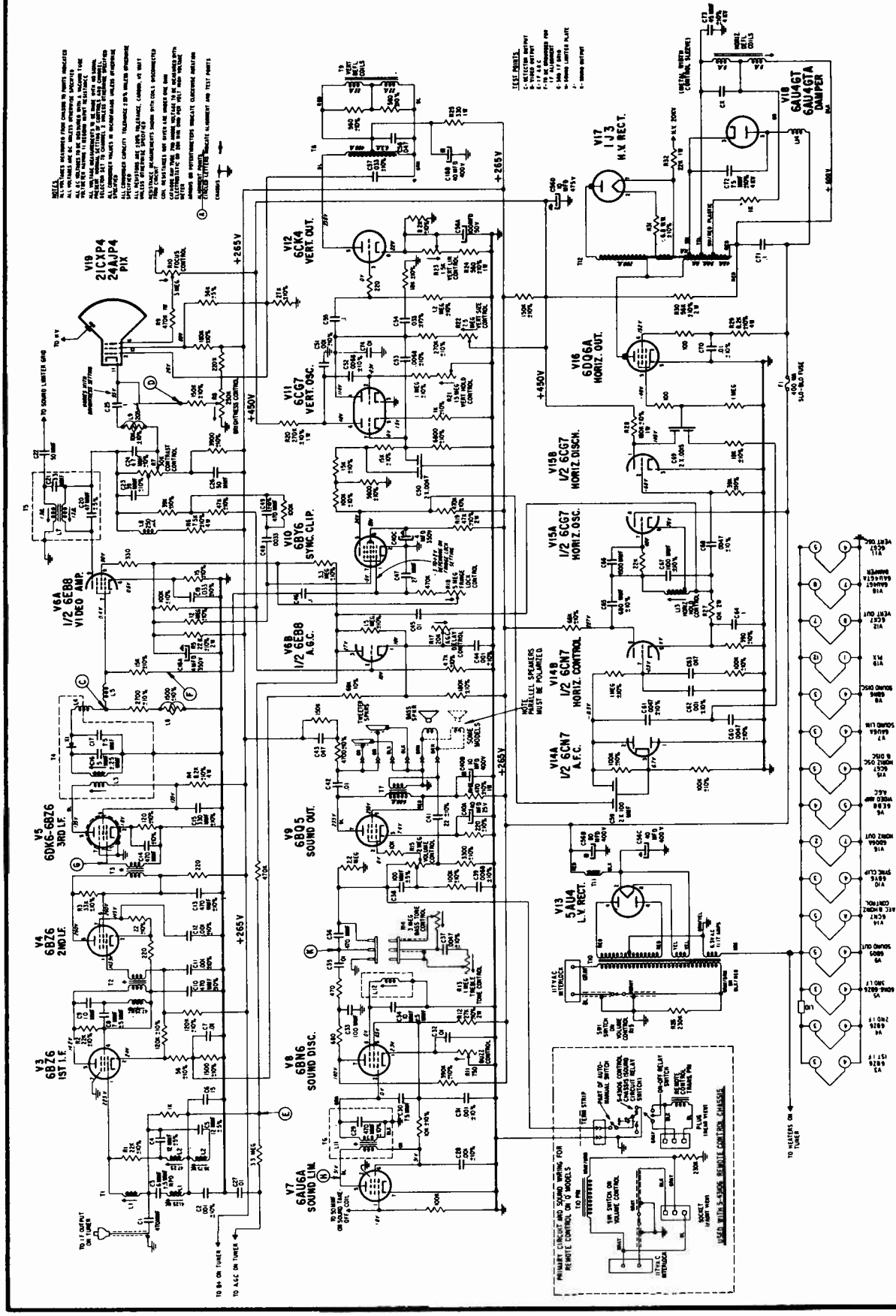


ZENITH Tube and Trimmer Layout 17A30 Chassis.

ZENITH

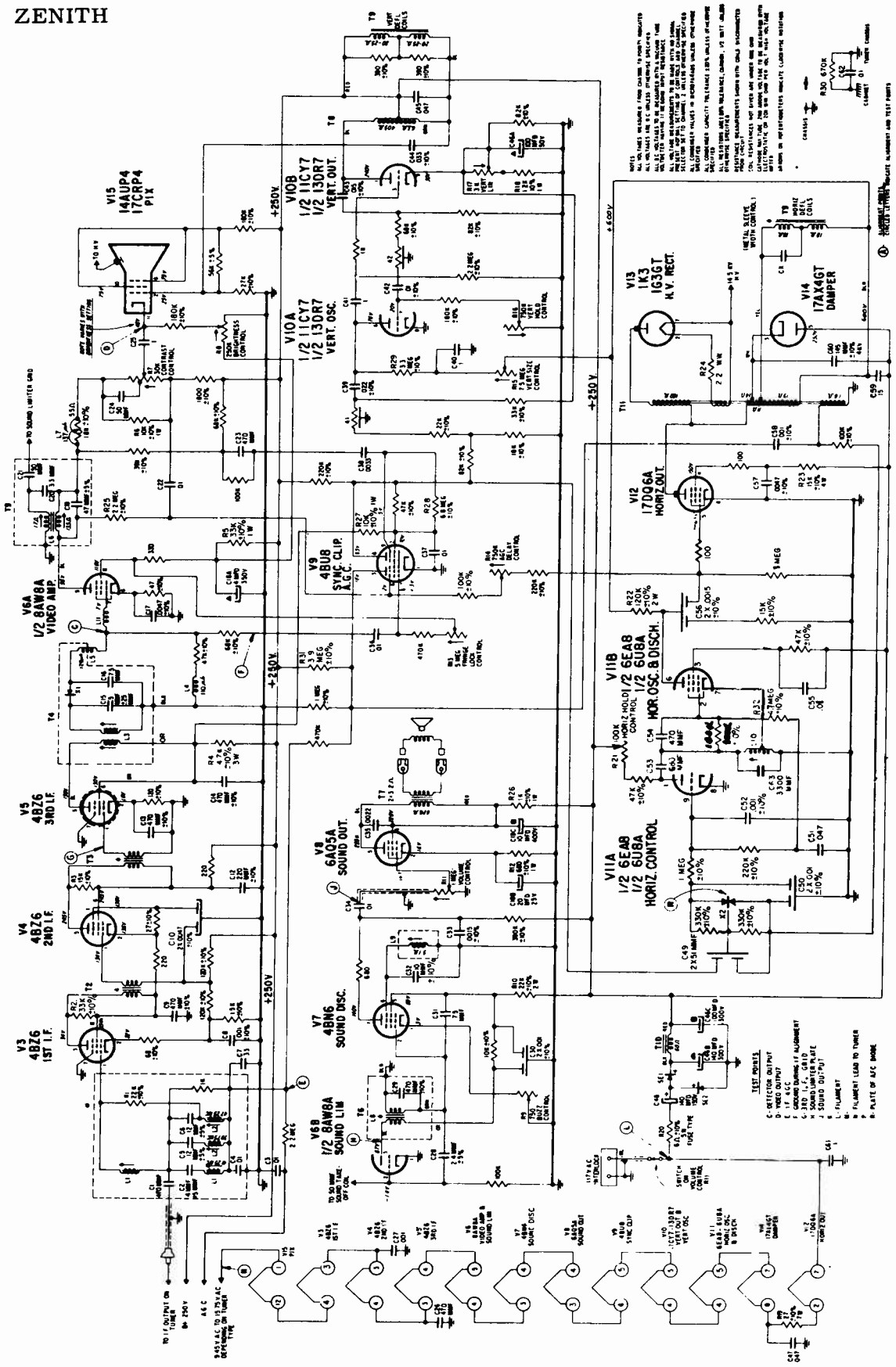


Schematic Diagram 17A30, 17A30Q & 17A31Q Chassis.
Waveforms are representative of other chassis.



ZENITH Schematic Diagram 19A30 & 19A30Q Chassis.

ZENITH

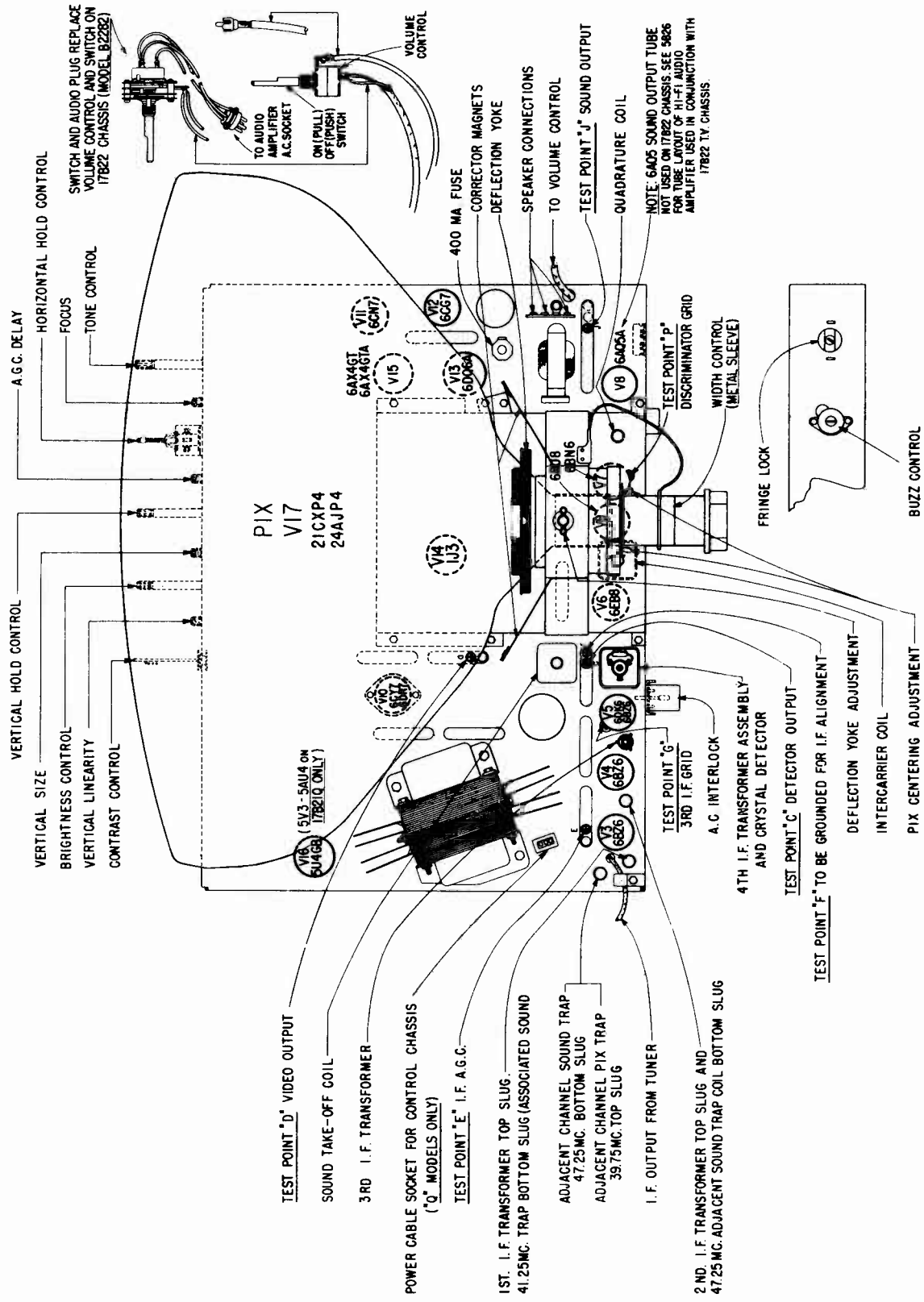


AFC ADJUSTMENT 15B20 CHASSIS

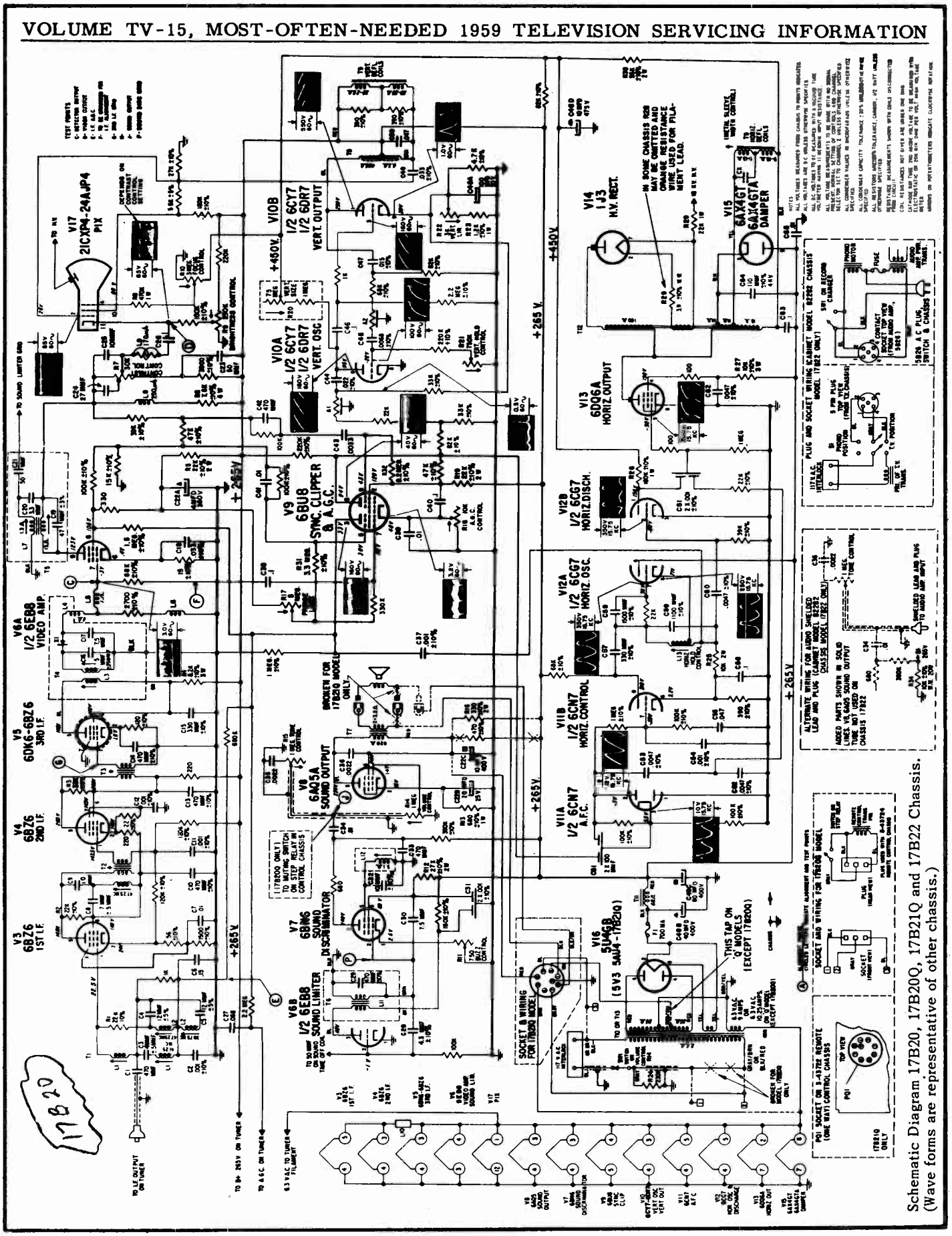
1. Set the horizontal hold control to the center of its range.
2. Tune in a TV station and adjust the core in the horizontal oscillator coil to obtain a stable picture.
3. Proper adjustment is indicated when it is possible to switch channels without disturbing synchronization.

Schematic Diagram 15B20 Chassis

ZENITH Chassis 17B20 Tube and Trimmer Layout

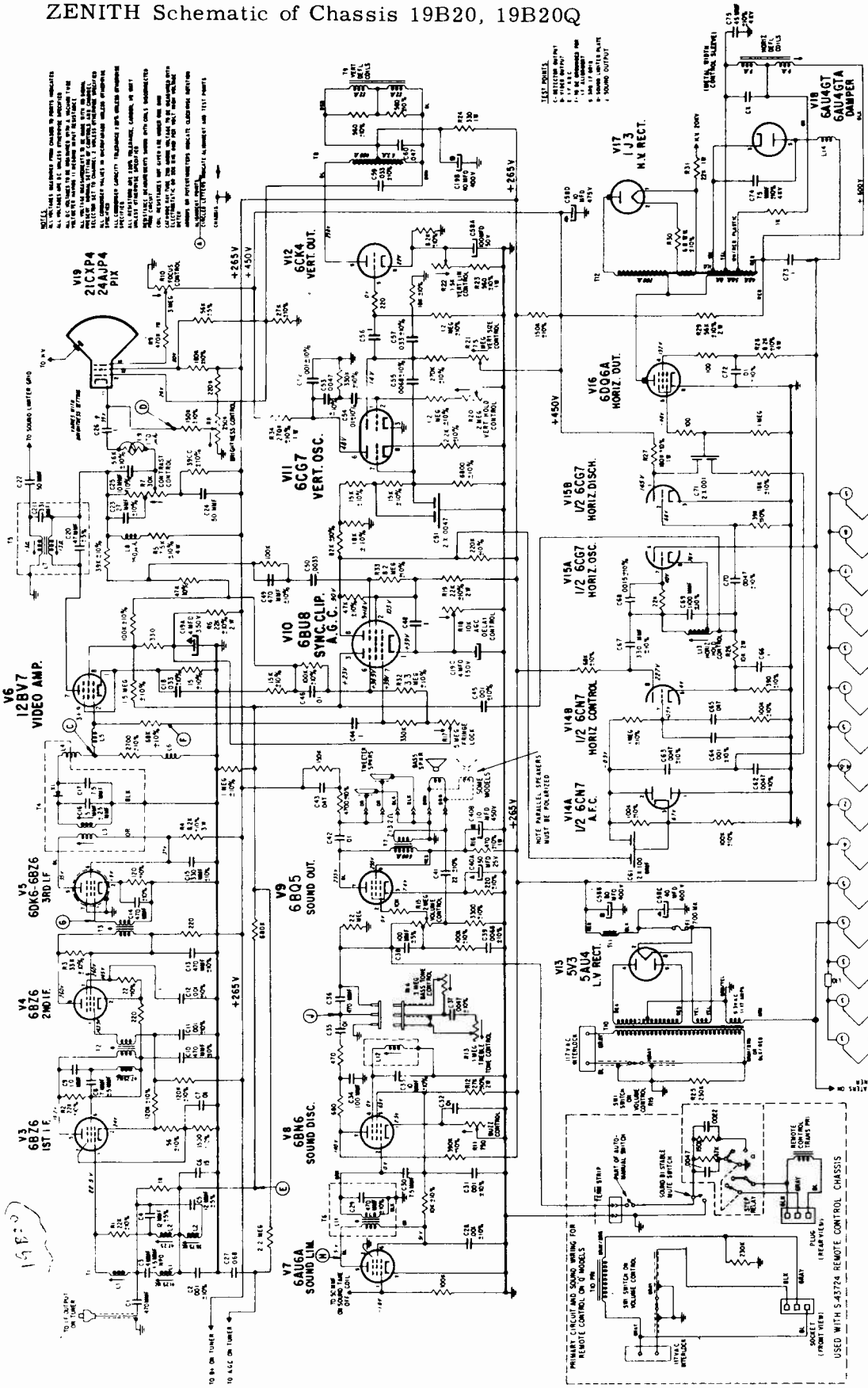


Tube and Trimmer Layout 17B20 Chassis



Schematic Diagram 17B20, 17B20Q, 17B21Q and 17B22 Chassis. (Wave forms are representative of other chassis.)

ZENITH Schematic of Chassis 19B20, 19B20Q



ZENITH Schematic Diagram of Chassis 19B20 and 19B20Q

Index

Under each manufacturer's name are listed that make chassis and models in numerical order, at left. The corresponding page number at right of each listing refers to the first page of each section dealing with such material.

Another

Supreme Publications

Service Manual